



SEAGATE

RETHINK DATA

Put More of Your Business Data to Work—
From Edge to Cloud

A SEAGATE TECHNOLOGY REPORT



WITH RESEARCH AND ANALYSIS BY IDC

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About the Report

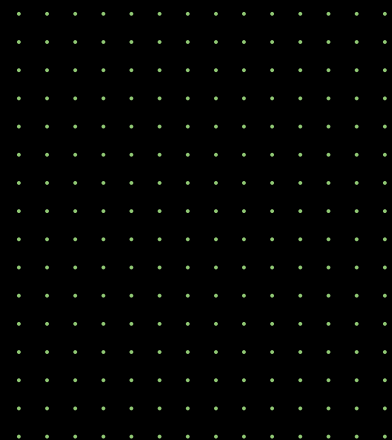
This Seagate Technology report draws on a global survey sponsored by Seagate and conducted by the independent research firm IDC, which took place in December 2019 and January 2020. Seagate authored the following report to share its forecasts and opinions, based on the survey findings, along with analysis from IDC. Any content, data, analysis, or views not attributed to IDC or IDC analysts are those of Seagate. The quantitative web survey queried 1500

respondents globally (375 in North America, 475 in Europe, 500 in APJ, and 150 in China) from mid-sized businesses to larger enterprises in Canada, United States, United Kingdom, France, Germany, Russia, Australia, Japan, India, South Korea, Taiwan, and China. The survey participants' professional titles include CIO, CTO, IT VP, director, executive, COO/LOB, storage architect, and solution architect.

Seagate Technology has been a global leader offering data storage and management solutions for over 40 years. Seagate crafts the datasphere, maximizing human potential by innovating world-class, precision-engineered data storage and management solutions with a focus on sustainable partnerships.



SEAGATE



Summary of Findings

Today's unprecedented growth and sprawl of data result in a complex movement of data within an increasingly varied ecosystem that includes multicloud and the edge. The complexity of data's location compounds business owners' data management challenges. Most data available

to businesses goes untapped. The survey zeroed in on a solution to today's data management dilemmas: DataOps—a discipline of connecting data creators with data consumers. Business leaders who implement DataOps can count on better business outcomes.

Survey Highlights

- Over the next two years, enterprise data is projected to increase at a 42.2% annual growth rate.
- Only 32% of data available to enterprises is put to work. The remaining 68% goes unleveraged.
- On average, organizations now periodically transfer about 36% of data from edge to core. Within only two years, this number will grow to 57%. The volume of data immediately transferred from edge to core will double, from 8% to 16%. This means enterprises will have to manage a lot more data in motion.
- Managing data in the multicloud ecosystem is a top data management challenge expected over the next two years—with managing data in hybrid cloud a close second.
- The top five barriers to putting data to work are: 1) making collected data usable, 2) managing the storage of collected data, 3) ensuring that needed data is collected, 4) ensuring the security of collected data, and 5) making the different silos of collected data available.
- The solution to a great deal of data management challenges is DataOps—the discipline connecting data creators with data consumers. Only an average of 10% of organizations report having implemented DataOps fully across the enterprise. A majority of respondents say that DataOps is “very” or “extremely” important.
- Along with other data management solutions, DataOps leads to measurably better business outcomes: boosted customer loyalty, revenue, profit, and a host of other benefits.
- Improving data security is the most important factor driving the changes to how organizations manage central storage needs.
- Two thirds of survey respondents report insufficient data security, making data security an essential element of any discussion of efficient data management.



SECTION ONE

Global Findings



CHAPTER ONE

The Growth and the Sprawl of Data

Data is who we are, who we have been, and who we are becoming.

SEAGATE POV

The planet's population is at 7.8 billion and it keeps growing. More and more people work from home. Technologies like the Internet of Things (IoT), the growth of edge computing, edge data centers, and artificial intelligence (AI) proliferate. Demand for consumer endpoint devices is growing. All these factors result in the

proliferation of enterprise data.

In order to smartly manage the ever-accelerating amount of information, business owners need to understand how and where data is gaining in volume. Two concepts help illustrate this trend: growth and sprawl.

Data growth refers to the percentage by which the

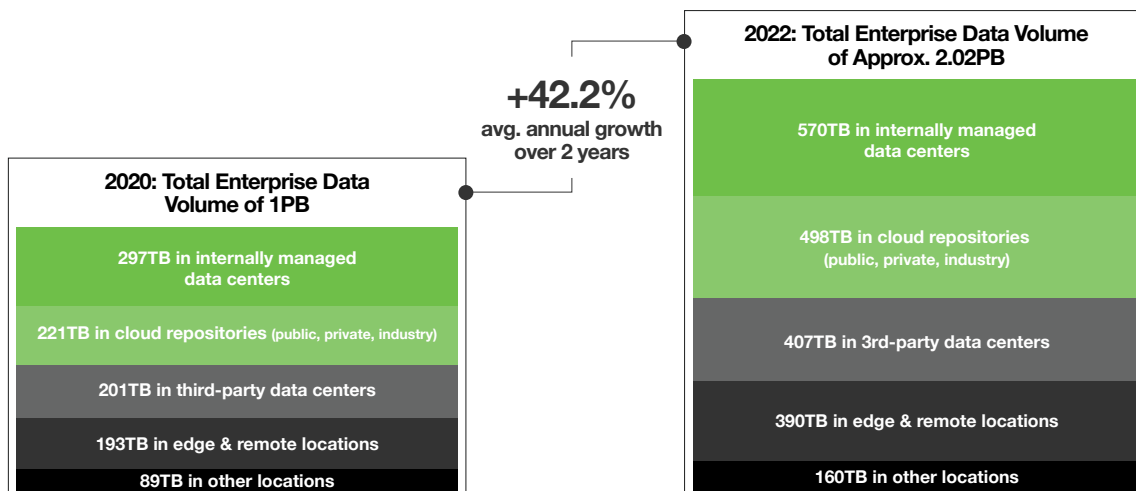
datasphere increases over time.

The datasphere is humanity's ever-expanding dimension of living data that reflects and amplifies life in infinite ways.

Data sprawl describes the spread of this growing data through various configurations—from endpoints through edge to cloud.

FIGURE 1

Expected Annual Data Growth Rate



Source: The Seagate Rethink Data Survey¹, IDC, 2020

¹ The Seagate Rethink Data Survey by IDC is IDC's name for the survey whose findings are discussed in this report.



Survey Findings

Data growth has been and will continue to be unprecedented in volume. The survey conducted shows that in just two years, from the beginning of 2020 through the beginning of 2022, enterprises will see a **42.2% annual increase** in the volume of generated data. In order to project the volume of enterprise data, IDC uses enterprise storage capacity as a proxy (Figure 1).

The survey data indicates that three factors are the most important catalysts for the growth of stored data:

1. Increasing use of analytics.
2. The proliferation of IoT devices.
3. Cloud migration initiatives.

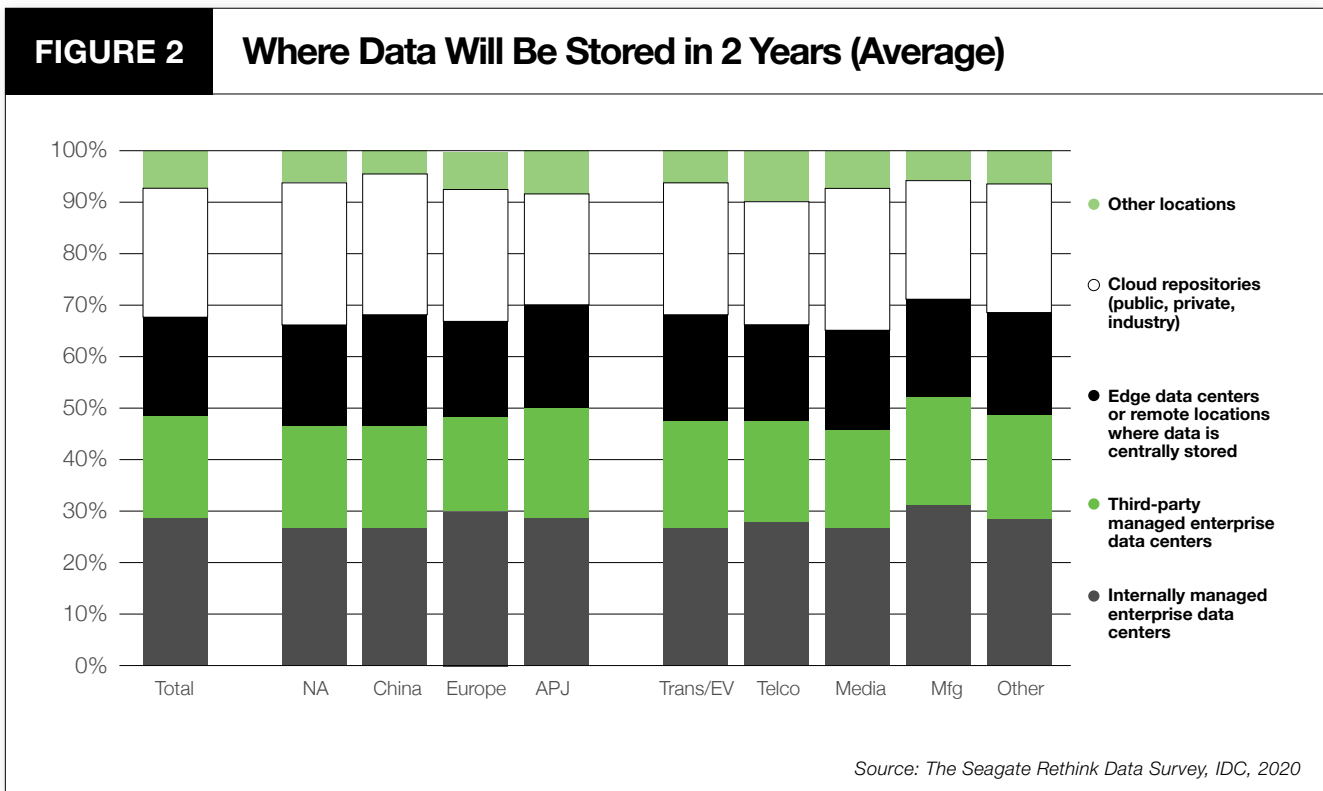
Data sprawl reflects how business data is scattered.

Enterprise data doesn't reside in one location, which adds complexity to data management.

Survey respondents indicate that approximately 30% of stored data is found in internal data centers, 20% in third-party data centers, 19% in edge data

center or remote locations, 22% in cloud repositories, and 9% in other locations. This distribution won't change significantly over the next two years, indicating that enterprise storage environments will remain dispersed and complex for the foreseeable future.

Enterprises will have an ever-increasing need to manage this scattered data wherever it exists.





Innovation is not driven by trends, but by the need to create more value under constraints—and there are constraints everywhere. Access to the full value of data is one of them.

Take a look at our data-driven world. Data is growing, and the rate of growth is accelerating. The sum of data generated by 2025 is set to accelerate exponentially to 175 zettabytes. More data is created per hour now than in an entire year just two decades ago. **Data is human potential.** The sharpest minds attempt to harness the power of data.

The constraints on capturing the full potential of data are both systemic and operational. At zettabyte scale, there needs to be **a simple, secure, and economic way to capture, store, and activate data.** People who use the data do not want to worry about this. How can we solve this data management puzzle at scale and enable other innovations that change the way we live, work, commute, and take care of our planet?

If we address the opportunities while navigating these constraints and enable the most value, then does it matter whether the innovation used the latest trend or not? Trends may capture our minds, but if the initial excitement does not **translate into value** for companies and for humanity, innovation doesn't take hold.

When we solve problems at scale, we need to **bring multiple worlds together,** and invite their synergy.

DAVE MOSLEY
CEO OF SEAGATE TECHNOLOGY



Delving Deeper

Additional research done by IDC as part of the *Global DataSphere*¹ sheds light on why enterprises will see so much **data growth**.

- The amount of new data created each year is growing at a compound annual growth rate of about 26% between 2015 and 2025.
- The number will be up to 175.8ZB of new data created in 2025 (compared to 18.2ZB in 2015).
- Enterprise data stored in 2025 will amount to 9ZB—while in 2015 was 0.8ZB.
- The *Rethink Data* survey backs up this trend: respondents consistently indicate that for their organization, enterprise data capture and storage

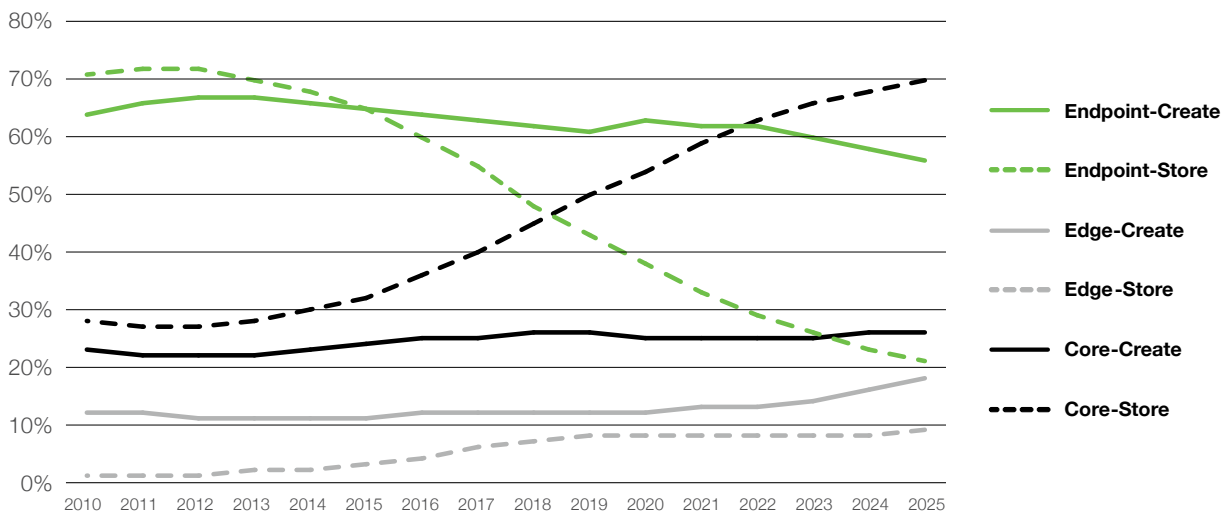
are expanding. It indicates that the increasing use of analytics, increasing use of IoT devices, and cloud migration initiatives are the top three most important factors impacting the growth of stored data.

- Leveraging the *Global StorageSphere*² and *Global DataSphere* studies, we can better understand data sprawl.
- The *Global DataSphere* indicates that 65% of data created in 2015 was at endpoints, and 35% in the core and edge.
- By 2025, the 44% of data created in the core and edge will be driven by analytics, artificial intelligence, and deep learning, and by an increasing number of

IoT devices feeding data to the enterprise edge.

- Data is shifting to both the core and the edge: By 2025 nearly 80% of the world’s data will be stored in the core and edge, up from 35% in 2015.
- By 2025, IDC predicts 12.6ZB of installed capacity—HDD, flash, tape, optical—will be managed by enterprises. Cloud service providers will manage 51% of this capacity.

FIGURE 3 Where Data Is Created and Stored



Source: *Data Age 2025*, sponsored by Seagate, with data from *Global DataSphere* and *StorageSphere*, IDC, May 2020

¹ *Data Age 2025*, sponsored by Seagate, with data from *Global DataSphere*, IDC, May 2020

² *The Global StorageSphere*, IDC, 2020



What Is the Edge?

The edge can be found anywhere and everywhere, in a wide range of locales, including:

- Floors of manufacturing plants
- Roofs of buildings
- Cell phone towers in the field
- Barns on farms
- Autonomous vehicles
- Platforms at oil and gas fields

The edge is **a location, not a thing**. It is the outer boundary of the network—sometimes found hundreds or thousands of miles from the nearest enterprise or cloud data center, and as close to the data source as possible. The edge is where real-time decision-making takes place.



Giving Data an Edge

More and more data needs analysis and action at the edge.

A unique mix of technology and economics will make it practical to assemble, store, and process more data at the edge.

The shift of data's center of gravity to the edge is driven by four technologies:

1. AI has become cost-effective and practical.
2. Billions of IoT devices are being deployed.
3. Wireless operators are upgrading their networks to the fifth generation of cellular mobile communications (5G).

4. Innovations in edge data centers are solving for the complexities of distributed facilities and unit cost economics.

In addition to these technologies, key factors drive demand for edge computing: latency; high data volume accompanied by insufficient bandwidth; cost; and data sovereignty and compliance.

As massive amounts of data are created outside the traditional data center, the cloud will extend to the edge. It won't be cloud versus edge; it will be cloud with edge.



In Focus: Data at the Edge

The amount of data stored at the edge is increasing at a faster rate than data stored in the core.

This survey found that, on average, organizations periodically transfer about 36% of data from the edge to core. **Within only two years this percentage will grow to 57%.**

The volume of data immediately transferred from edge to core will grow from 8% to 16% as well. To accommodate this increase, data management plans must enable a much more significant movement of data—from endpoints, through edge, to public, private, or industry clouds.

What does this mean for enterprises?

It means a greater extent of data sprawl, which enterprises are increasingly tasked to manage. Data sprawl leads to siloed data, which cannot be accessed by all who need it. Without automated methods, managing data sprawl requires significant human labor and redundant tool purchases.

An increasing amount of storage will be expected to be compute-conversant—if not, eventually, offering compute functions.

The edge is expected to store critical data and insight that fuels latency-sensitive requests from endpoint transactions and services. At the same time, the

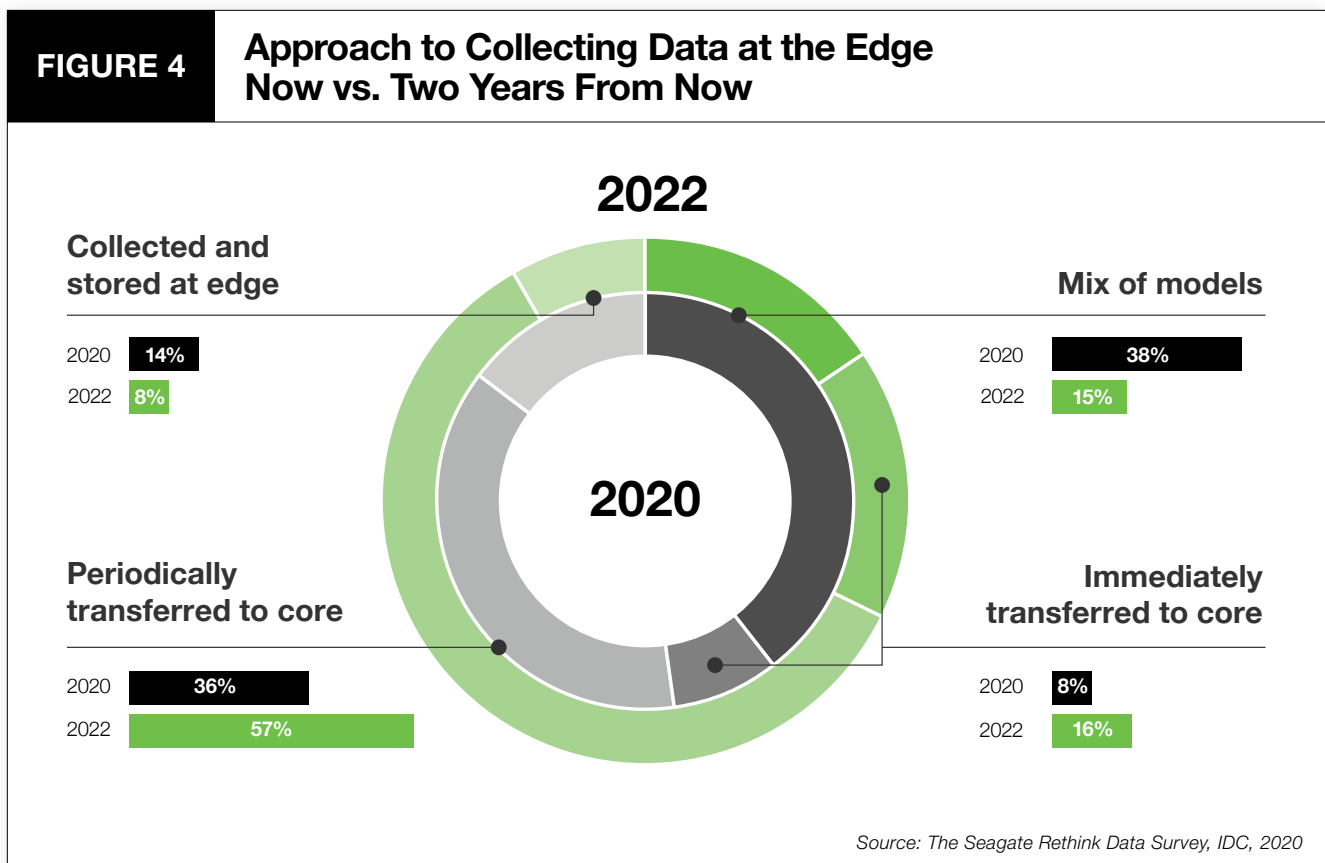
edge will make possible distributed computing to perform analysis of streaming data.

Streamed data is likely to be cached in storage media until the servers complete analytics.

As such, **the line between storage and caching of data at the edge may become blurred,** especially given the expectation that data will be stored for only a short period of time until it is analyzed or processed before moving relevant data to the core.

FIGURE 4

Approach to Collecting Data at the Edge Now vs. Two Years From Now



CHAPTER TWO

A Treasure Trove of Value

The datasphere contains an ever-expanding kaleidoscope of human endeavors: urgent life-critical information, histories of knowledge, operational instructions, manufacturing processes, chronicles of emotion, etc. Data is a treasure trove of value.

SEAGATE POV

Winning enterprises know that how they treat their data can directly translate into business growth.

To businesses entrusted with data—for example, cloud

providers, smart devices manufacturers, hospital networks, streaming networks, grocery store chains, just to name a few—data means investment into collecting, analyzing, and storing data in

various repositories.

The more they can leverage their investment by putting that data to use, the more value they will derive from it.



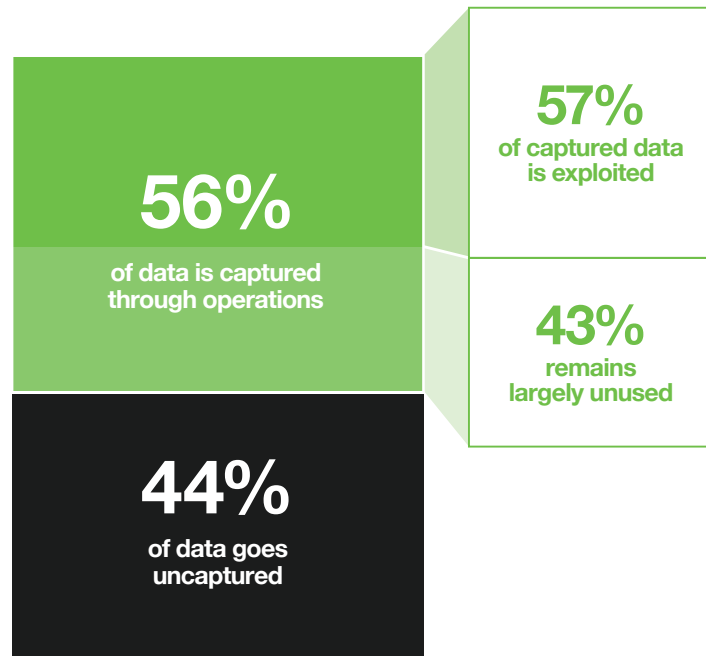
Missing Out on Data

The *Rethink Data* survey has found that organizations report that **much of their business data is not put to use**, or activated. While the data offers value, that value too often goes uncaptured.

- Survey respondents estimated their organizations collect only 56% of the data potentially available through its operations. This means organizations are missing out on almost half of data.
- Out of that 56%, only 57% of data was used by the organization.
- 43% of the captured data went largely unleveraged.
- This means that **only 32% of the data available to enterprises was put to work. As much as 68% of data goes unleveraged.**

FIGURE 5

How Much Data Actually Gets Put to Work?



Source: The Seagate Rethink Data Survey, IDC, 2020



The Value of Data

Overall, for many organizations, data is an understated, intangible asset that is not represented on the balance sheet—even though data is increasingly being leveraged to drive new sources of revenue and improve customer experiences and operational efficiencies. Simply stated, data can increase enterprise value even without being formally represented in financial statements.

However, to realize the value of data, it must be put to work. The survey established that only 32% of the data available to enterprises was leveraged.

Putting data to work and unlocking its value first requires a method for measuring the value of the data itself. In a survey conducted for Seagate in 2018¹, IDC found that the workforce in only 25% of organizations worldwide had systems and processes for actively quantifying the value of enterprise data, at least in certain situations.

Opportunities abound for organizations to better leverage data for competitive advantage. In the same survey, only 11% of all organizations reported that they considered themselves to be industry leaders in the ability to leverage the value of corporate data compared to other organizations in their industry. The percentage was even lower for the healthcare and transportation industry verticals, where fewer than 10% of organizations identified themselves as industry leaders.

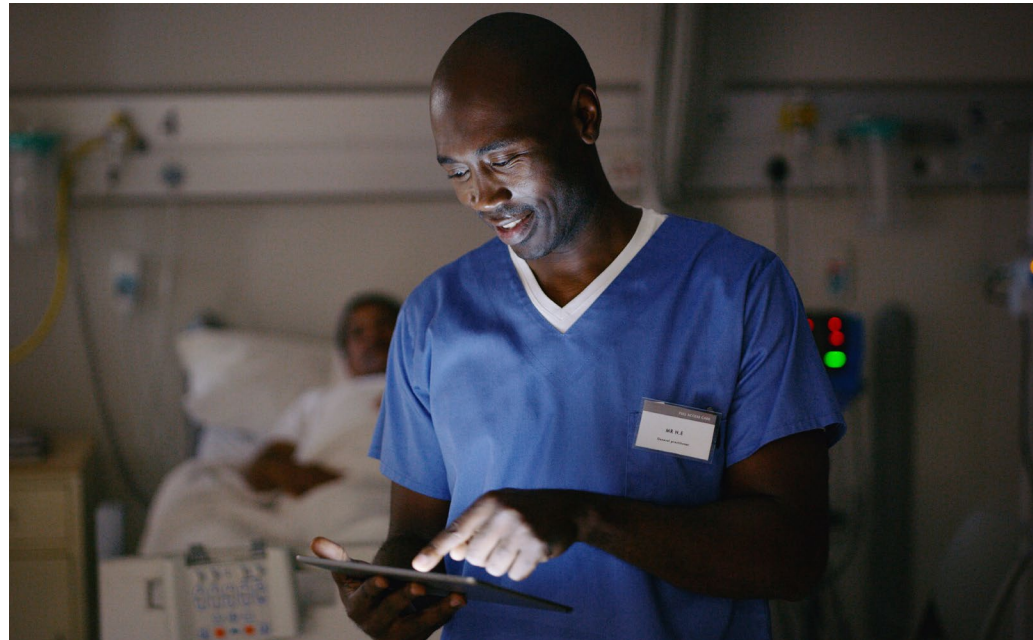
One thing is certain: Companies want to have vibrant data lakes where fresh data is taken in and old, stale data is moved to low-cost storage domains. **No company wants their data lake to turn into a data swamp where unleveraged yet potentially useful data sits dormant on storage media.**

The value of data for any given enterprise involves numerous variables, including the industry within which it is created, the purpose it serves, and if and how it is eventually monetized.

Take, for example, the types of data created and managed by a hospital: patient data, scheduling, insurance and billing data, MRIs, cancer treatments, operations and financial data, and advertising. Regulations require that hospitals keep data for many years after

the death of a patient (this is likely dormant data that potentially can be leveraged). The value of each dataset will vary, especially data that is highly secure due to privacy and compliance requirements. In the future, video sessions for remote care, the surgeon's actions during an operation, or even robotic operation procedures will be recorded and saved for a variety of reasons—even if only to serve for instructional or legal purposes. Can one really place a value on this data?

IDC has yet to fully quantify the value of the global datasphere. Nevertheless, making some general assumptions about the value of a byte created in a hospital with a staff of 1000 to 2500 and revenues of over \$1B, IDC believes it is likely the value of data created at that hospital could be approaching several hundred million dollars.



¹ Worldwide DATCON and VoB surveys, IDC, September 2018





Every business is a data business. But enterprise data is of little value if it is not used. To efficiently and smartly make sense of data, we need to see data lakes as reservoirs where many vibrant rivers meet; the task is to comingle the incoming data currents. There is a need to share data with other lakes, in order to cross-reference and run analytics on disparate streams of data.

Take autonomous cars. To begin with, there's value in analyzing data from one vehicle, and within one company. Cross-analyzing that one vehicle's data with vehicles from all autonomous car companies adds another layer of insight. For a richer picture, zoom out from there to integrating knowledge derived from that one vehicle's data with data that proceeds from the billions of sensors that make up a smart city. The fuller picture may be useful to the regional government and city planners who implement better public safety standards and traffic flows.

The more pieces you put together, the bigger a puzzle you can solve. You can tackle a much higher-order problem if you share data, cross-referencing various streams of information for analysis.

That's why enabling the movement of data matters. **Data needs to move in order to allow for interconnectedness of data—and the insights that result.**

RAVI NAIK
SENIOR VICE PRESIDENT AND CIO
OF SEAGATE TECHNOLOGY



“Whether structured, semistructured, or unstructured; generated by humans or by machines; or stored in the data center or the cloud, data is the new basis of competitive advantage.”

PHIL GOODWIN
RESEARCH DIRECTOR, IDC

ANALYSIS BY IDC

Putting Data to Work

Organizations must be able to capture the right data, identify it, store it where it is needed, and provide it to decision makers in a usable way.

Activating data—putting it to work—starts with data capture. Given the exponential growth of data due to growing IoT applications, enterprises do not currently capture all available data. To do so would result in an overworked IT infrastructure and tremendous costs. Without a solid data management solution, companies need to leverage

data ingest software capabilities to identify and classify data at the beginning of data lifecycle. With proper identification and classification, automated policies can keep data through its useful period, and then delete or archive it when it is no longer needed. This data pruning lowers costs and avoids clogging data management efforts. However, as data management solution technology advances, companies can consider capturing more data, which can be utilized for improving their artificial intelligence or machine learning.

At the Edge

Edge devices pose a particular challenge for data capture. Often, only the edge application knows what data needs to be captured and acted upon, and what data is transient and thus can be ignored. A lot of decision-making has to happen close to where data is created. But the newer centralized data management ingest applications can leverage artificial intelligence (AI) and machine learning (ML) to make the determination. These programs can often identify sensitive data (like personally identifiable information, private health information, credit card numbers, etc.) and automatically mask them from the view of unauthorized personnel. This reduces the chance of a data breach or inadvertent data disclosure.

Data capture then feeds into data analysis. Most often, it's done in data lakes where data is assessed by specialized data analysis software based on industry or other criteria. Data curators and scientists use these tools to mine information from the data to provide to decision makers. Data ingest into a data lake eliminates the silos that separate data and allow connections to be made from seemingly unrelated data elements.

This is what leads to competitive advantage.

Storage is integral to an organization's data strategy as it is an active contributor to the process of sorting and analyzing information. The need for accurate, real-time reporting of stored data to improve workflows, security, and resource management initiatives continues to drive demand for advanced data management and analytics solutions.



Storage Innovation and the Value of Data

How and where data is stored can greatly affect the value that organizations can derive from it. Here are areas in which storage innovations bear directly on the value of data.

1. **Mass capacity** is the enabler of economies of scale. Analytics improve as the data sets that they access grow. Good data management includes ensuring that any new AI or ML breakthroughs have access to all of the data (as much as physically possible). That is why data storage companies like Seagate focus on the development of areal density growth (so devices can store more on a given unit).

The focus on areal density innovation is based on data from the world's largest clouds. Companies distribute data roughly along the 90/10 rule: 90% of their data is stored on

hard drives and 10% on flash memory devices (SSDs).

2. Another focus of storage innovation has been delivering **higher bandwidth** in order to catalyze more robust movement of data among storage, networking, and compute functions. This is important for analytics. The backbone of today's analytics is the GPUs (graphics processing units). They require high bandwidth ingest of information. To improve bandwidth, for example, organizations use composable disaggregated architectures in large-scale AI applications.

3. **Security** is another area of innovation. There is continued investment in device integrity through open enclaves for making firmware and compute carry and house appropriate protocols to digitally verify devices. System solutions

benefit from securities at the component and device level. Networking's security benefits from the system's security. Finally, compute is made more secure as a result of more security networking.

4. In the longer term, **data movement architectures** will need to ensure that hardware acceleration or hardware offload through the storage systems is done at appropriate points. Specifically, compression, encryption, and deduplication of data sets today get done in compute. As a result, big architectures are having to scale because these tasks are done at the higher level. This need not be the case if innovation moves the hardware acceleration and offload to the storage or network layer.



CHAPTER THREE

The Multicloud

The public cloud has catalyzed the growth of countless companies. When enterprises reach scale, however, they find public cloud alone too inflexible.

SEAGATE POV

Enterprises often struggle with access to some of their data that resides in the public cloud. They also have a hard time with moving data out of the cloud—not to mention the fees that come with the retrieval. This can stand in the way of deriving optimum value from data in the public cloud context—

because to be valuable, data has to move. As a result, enterprises increasingly mix up their storage options, choosing to manage data in the multicloud ecosystem.

Multicloud means the use of more than one public cloud, which is orchestrated through data management. It may also include

a private cloud component. In practice, multicloud can mean that an enterprise houses some data in public clouds and some in on-prem **private cloud**.

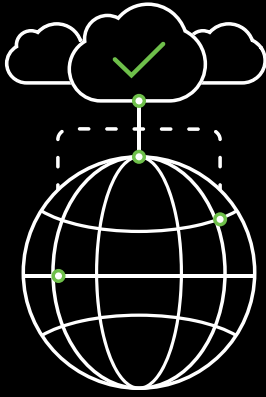
Repatriating some data to private cloud ensures a mesh of benefits from private cloud and from the multicloud ecosystem.



Private cloud offers the following advantages:

1. **Predictable economics at scale**, which are under an enterprise's control.
2. **IP ownership, protection, and control** of where that data physically resides. This is useful, for example, in cases of data that needs a clear audit trail or must comply with regulatory requirements.
3. Frequent **access to large data sets**. This is advantageous because storage becomes very expensive when businesses need to read and analyze the data frequently.
4. **Compliance with regard to sensitive data sets**. For example, life-critical data that requires a certain provider's and patient's locality, as well as compliance with laws and regulations such as HIPAA and GDPR.





The public cloud benefits that extend to the multicloud ecosystem include:

1. **Fast growth and scale.** In the multicloud, teams can build and deploy an application or service in a common environment—plus benefit from the resulting revenue stream—without an investment in CapEx to do so globally.
2. **Access to a broad catalog of services** that include applications, compute, and monitoring resources. The multicloud features the ability to turn on a high-performance compute that would be unaffordable in most private clouds. GPUs can run between \$500 thousand and \$5 million. Access to the public cloud means businesses can rent them, solve a puzzle, and be done with them without leaving them to sit idle. Access to public cloud compute means maximum compute horsepower that enables an efficiency growth and elimination of stranded resources.

Hybrid cloud seamlessly fuses the resources of private and public clouds to deliver an integrated infrastructure as a service. Hybridization ensures communication between clouds and interoperability, or the ability to work across resource boundaries. What does it look like? For example, a company buys an OEM

enterprise service and puts it in a colocation environment in a shared building and connects to a cloud service provider's protocol on the back end.

Hybrid cloud tends to be under one software management portal, which does the heavy lifting of connect; the application knows how to talk to the lead software layer.

In multicloud, the application, which tends to be built as cloud-native, knows how to use and run the resources. Hybrid clouds often have to figure out how to take legacy systems and connect them to the benefits of public cloud.

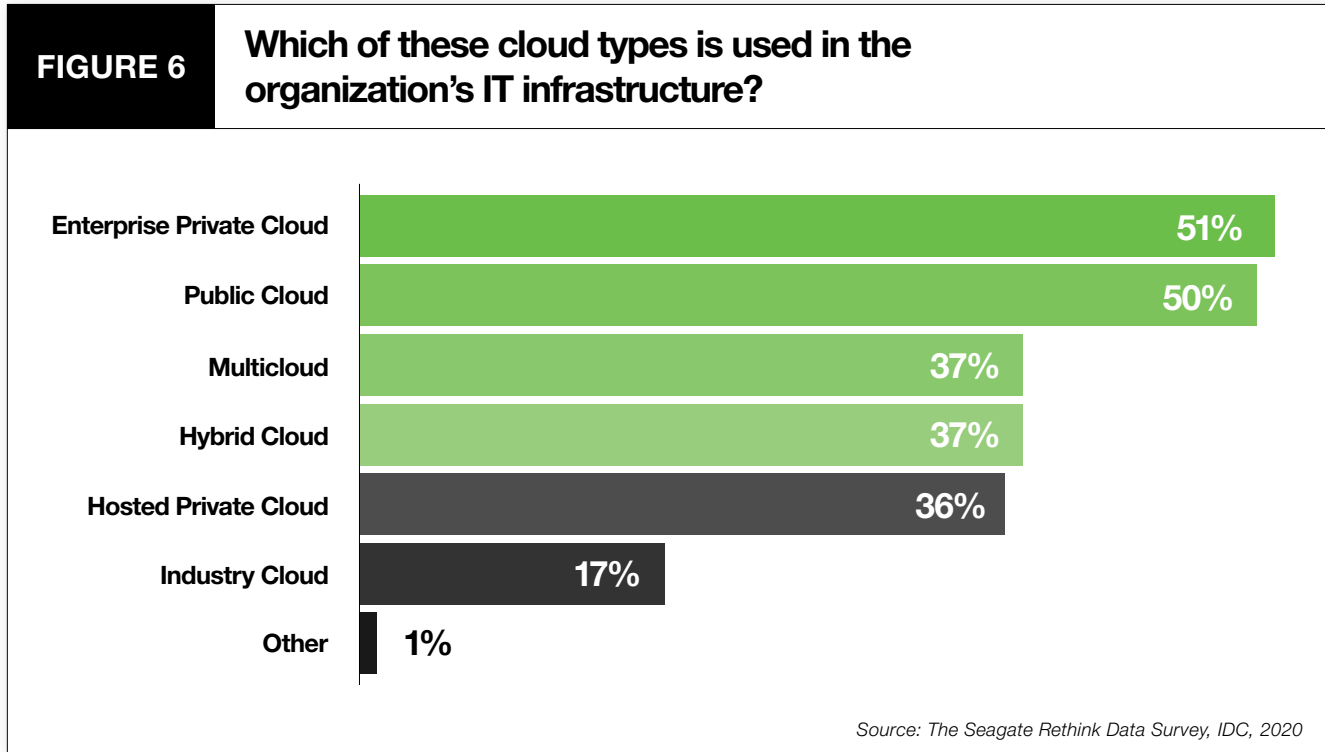


Multicloud as Organizational Strategy

IDC analysts describe the multicloud as “an organizational strategy or the architectural approach to the design of a complex digital service that involves consumption of cloud services from more than one cloud service provider.” These may be

directly competing cloud services, such as public object storage from more than one public cloud service provider, or IaaS and SaaS from one or more cloud service providers. According to IDC, in both of these contexts, multicloud encompasses

a much larger universe than does hybrid cloud and is only gated by the cost and complexity associated with enabling consistent management and governance of many different cloud options.



DATA BY IDC

Managing Data in More Than One Cloud

Survey respondents indicate a wide range of cloud deployments, including adoption of multiple cloud service providers:

- The study reveals an equal adoption of both multicloud and hybrid cloud deployments (37% each).
- Hybrid cloud use is typically application-driven. The use of more

than one cloud develops organically over time, with different lines of business purchasing different cloud providers for specific tasks.

- Businesses using multicloud report that they do not necessarily have a cohesive integration plan for the long term.
- Multicloud and hybrid cloud environments solve a number

of different problems. They can make access to data and analysis easier, cut costs, offer administrators better control, and boost data security.

But multicloud and hybrid cloud ecosystems also pose some challenges when it comes to data management.



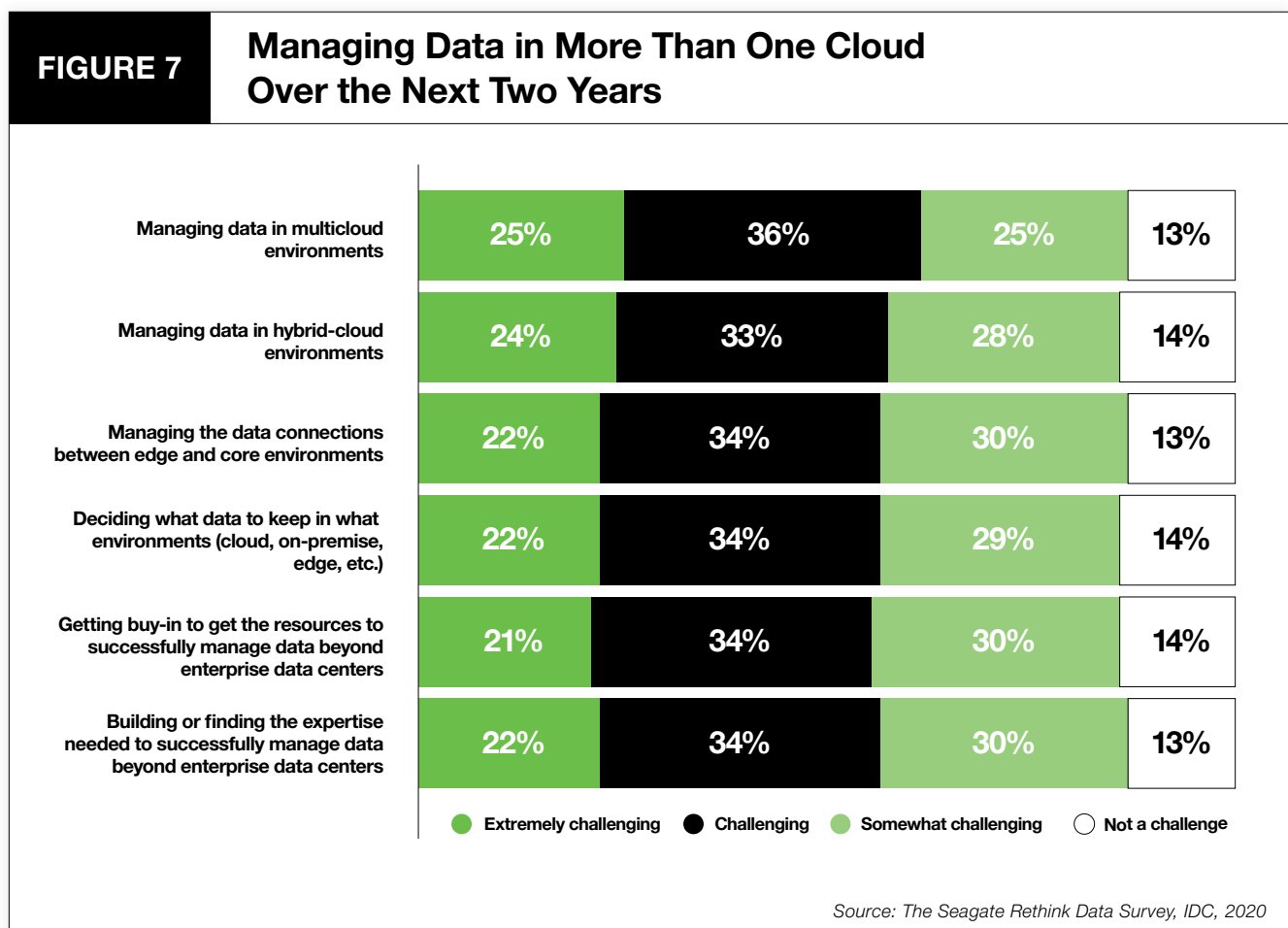
“Multicloud deployments are much more difficult to orchestrate and manage consistently, as the infrastructure tools native to each cloud platform are typically designed to operate within the confines of the specific platform. Furthermore, adjacent services offered by public cloud providers for data management or analytics are usually designed to operate alongside the native public cloud infrastructure, and may not integrate or be able to provide full functionality on other public cloud platforms.”

ANDREW SMITH
RESEARCH MANAGER, IDC

DATA BY IDC

Takeaways

- Managing data in multicloud environments is the number one data management challenge expected in the next two years by survey respondents.
- Managing data in hybrid clouds is listed as the second most important data management headache.



Delving Deeper

According to IDC's *IaaSView* research¹, the most common use case for multicloud is to have an application on one public cloud IaaS that regularly interacts with applications on another public cloud IaaS. This arrangement may work at the application level.

But at the data management level, significant challenges remain:

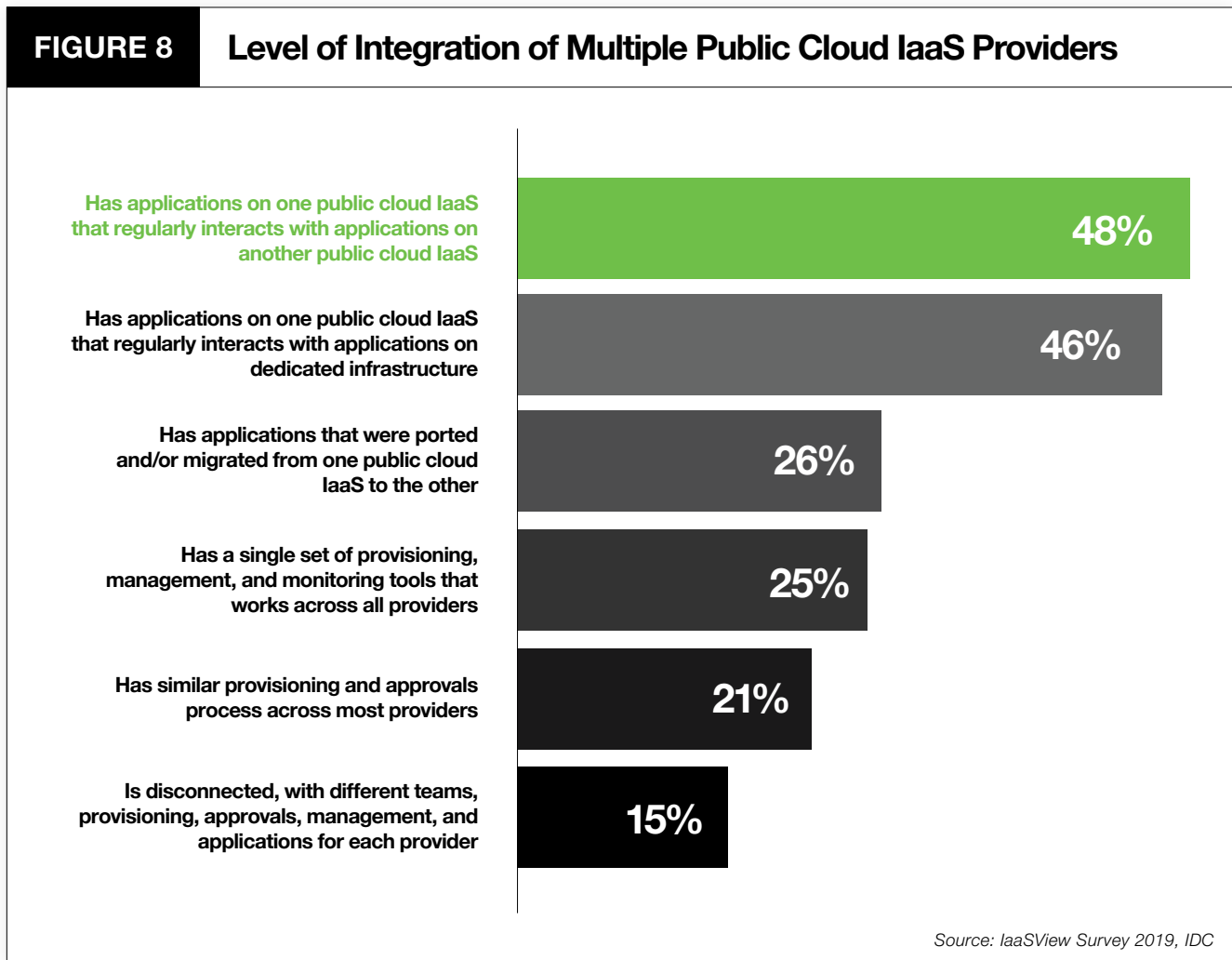
- separate workflows
- disparate management tools
- lack of unified security management
- the difficulty of sharing and

moving large amounts of data across multiple cloud providers

These challenges add complexity and time to even the simplest data-related tasks, like dashboard creation and reporting in multicloud environments.

FIGURE 8

Level of Integration of Multiple Public Cloud IaaS Providers



¹ *IaaSView Survey*, IDC, 2019



CHAPTER FOUR

Data Management Challenges and the Multicloud Ecosystem

SEAGATE POV

So far, this report has established that:

- Business data contains a great deal of value.
- Much of this value goes untapped, costing business

owners potential revenue.

- An impediment to deriving optimum value from data lies in businesses not collecting much of their data.

But there are other reasons why

data management is a challenge: issues inherent to the multicloud ecosystem. This chapter sheds light on these challenges.

DATA BY IDC

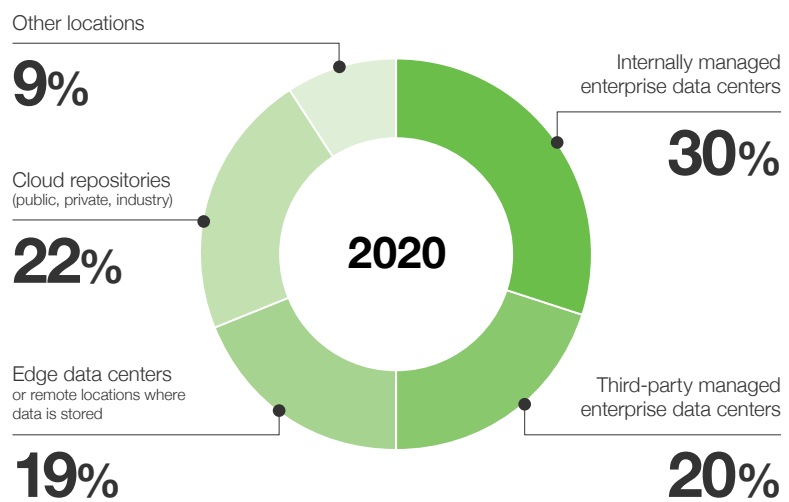
Managing Data

The survey has found that when it comes to managing one of their most valuable resources—data—enterprises report being unable to successfully control the growing complexities on their own. They report that they need help with data management.

A key reason for this is a wide and relatively even distribution of data across edge and cloud repositories. There is some variation: the transportation and electric vehicles industry shows most data at the edge, while the manufacturing sector stores more data in internally managed data centers.

FIGURE 9

Where Data Is Stored Currently



Source: The Seagate Rethink Data Survey, IDC, 2020



FIGURE 10

Where Data Is Stored Now vs. Two Years From Now

Other locations

2020 **9%**
2022 **8%**

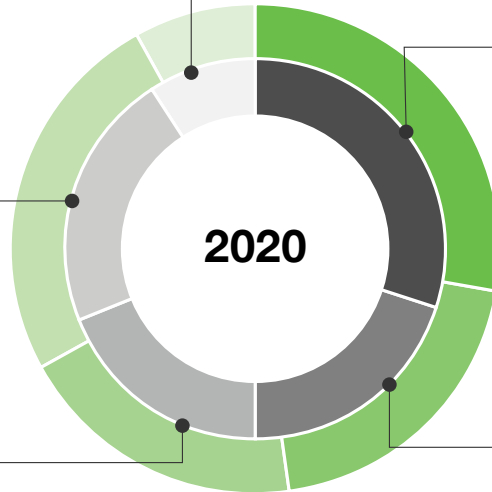
Cloud repositories
(public, private, industry)

2020 **22%**
2022 **25%**

2020 **19%**
2022 **19%**

Edge data centers
or remote locations where data is stored

2022



Internally managed enterprise data centers

2020 **30%**
2022 **28%**

2020 **20%**
2022 **20%**

Third-party managed enterprise data centers

Source: The Seagate Rethink Data Survey, IDC, 2020

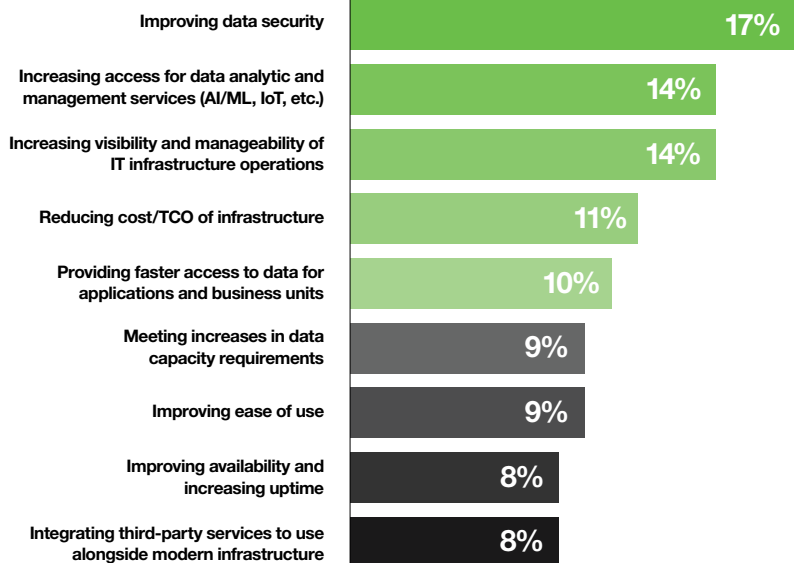
Driving Changes in Data Management

When asked what was the most important factor driving the changes being made to the organization's approach to how it manages central storage needs:

- 17% of respondents pointed to improving data security
- 14% quoted increasing access for data analytic and management services (AI/ML, IoT, etc.)
- 14% noted increasing visibility and manageability of IT infrastructure operations
- 11% listed reducing cost/TCO of infrastructure
- 10% mentioned providing faster access to data for applications and business units

FIGURE 11

Driving Factors in How Data Is Stored



Source: The Seagate Rethink Data Survey, IDC, 2020



Business Owners, Stop (Merely) Hoarding Data

Before business owners implement the steps to better manage data, they need to understand their own data.

Unfortunately, most organizations have a tendency to collect and dump data into large repositories.

But when they merely collect tons of data, they will struggle to make sense of it. If they don't understand their company's data, then they don't know what data they need to collect and what intelligence they can get out of it.

Business leaders' first task is to define why they want to collect data and what insights they are trying to gain. Only once they are clear on

that agenda should they go after that particular goal—as opposed to the kitchen sink approach.

Collecting data is easy.

Intelligence is hard.

To smartly collect and sort through data, enterprises need to deal with challenges of overlapping tools, data complexity, data integration, ensuring that data is “clean,” ensuring proper data correlation, etc.

Collecting data has to be about what enables the business objective (what business owners want to learn). Unless they figure this out, amassing data won't provide them with the value they expect.

Take, for example, manufacturing.

Many industries adopted large volumes of IoT devices and platforms, endpoint devices with sensors, as well as ML and AI to manage their manufacturing ecosystems. Data collection happens at unprecedented volumes. Business owners can collect a great deal of data. But without understanding what they want out of their data, it can be difficult to accomplish basic goals—for example, to improve throughput of manufacturings—if the factories are flooded with tens of thousands of uncoordinated IoT devices deployed on different platforms.



Data Storage, Through a Single Pane of Glass

Another way to achieve successful data management is through smart data storage solutions.

Challenges arise as a result of a confluence of factors:

- Nonstandard architectures
- The proliferation and coexistence of different storage technologies
- Difficulties managing the storage technology footprint
- Lack of visibility, or the so-called single pane of glass, of stored data's management (object and file storage show up differently)
- Deciding which data goes where

- Prohibitive costs play a role in decision-making about storage solutions
- Inability to look at a multicloud storage pool as a whole between on-prem and cloud

A key solution to these data storage management challenges has to do with how business owners **see the stored data**. The idea is to see it—all of it—as if through a single pane of glass. It goes beyond data democratization and into storage unification. CIOs should be able to look across the multiple cloud ecosystems in a seamless manner.



This challenge, meaningfully shown by the shift of data to the multicloud ecosystem, can be solved by storing data in clouds that allow enterprises control over their data (on premises, private clouds, or the rare public

clouds that do not come with data lock-in).

Another solution on the horizon is storage virtualization, which a number of companies are working to innovate. In this scenario, the single pane of glass would

be a data storage management software layer.

Bottom line for business owners: ownership of your data starts with an unobstructed, easy view into it—as if through a single pane of glass.

DATA BY IDC

Data Management Challenges

Organizations face five key challenges that they believe limit their ability to exploit the full potential of collected data:

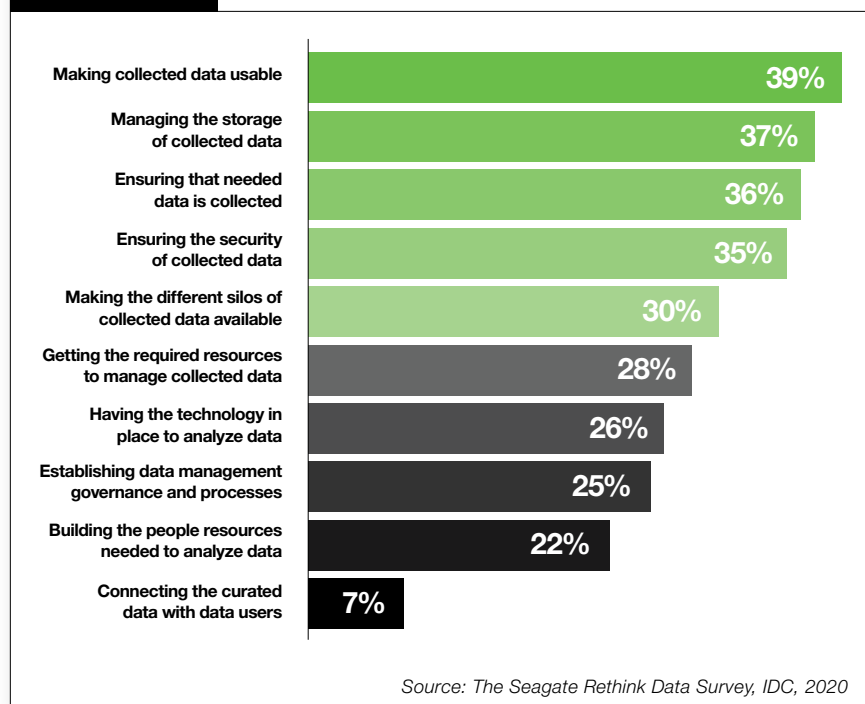
1. Making collected data usable
2. Managing the storage of collected data
3. Ensuring that needed data is collected
4. Ensuring the security of collected data
5. Making the different silos of collected data available

These considerations are put in the language of IT. But they should matter to business owners because they directly affect the value of data that businesses can uncover, which affects revenue (as we'll see in chapter 6.) Modern data management solutions should focus on resolving these challenges to provide the most

effective experience possible for both business owners and customers, and begin to help businesses chip away at the percentage of data that they are unable to exploit.

In the following chapter we learn about the one reported missing link of data management that can help make this happen.

FIGURE 12 Barriers to Putting Data to Work



Manufacturing: An Outlier

In our survey data, the manufacturing industry has distinguished itself as a data management laggard of sorts.

Perhaps counterintuitively, the sector shows the lowest level of task automation in data management, and lowest rate for full integration (single platform) of data management functions.

- Manufacturing lags in both multicloud and hybrid cloud adoptions.
- Along with the telco and CDN/media industries, it indicates below-average satisfaction with its data management approach.
- Along with telco, respondents in manufacturing indicate low satisfaction with data management tools.
- Manufacturing's greatest data management challenge is storage management.

Additionally, manufacturing indicated one of the lowest rates of data growth of any industry (37% vs 42.2% on average). However, the sector has the highest enterprise data center footprint (on premises) of any surveyed industry. This may provide insight into why manufacturing has a lower rate of data growth: they are slowed down by on-premises infrastructure that is likely more difficult to expand in terms of capacity (especially when compared to scalable cloud infrastructure).

An argument can also be made that while manufacturing generates

a significant amount of sensor and device-related data, much of it is produced at the edge and discarded, rather than transferred to a core environment for long-term storage.

Manufacturing also indicated the lowest levels of automation of data management functions—and the lowest rate for full integration of data management functions on a single platform (just 9%, compared to 19%+ in all other industries). Both of these data points may be driven by the sheer number of connected assets entering modern manufacturers.

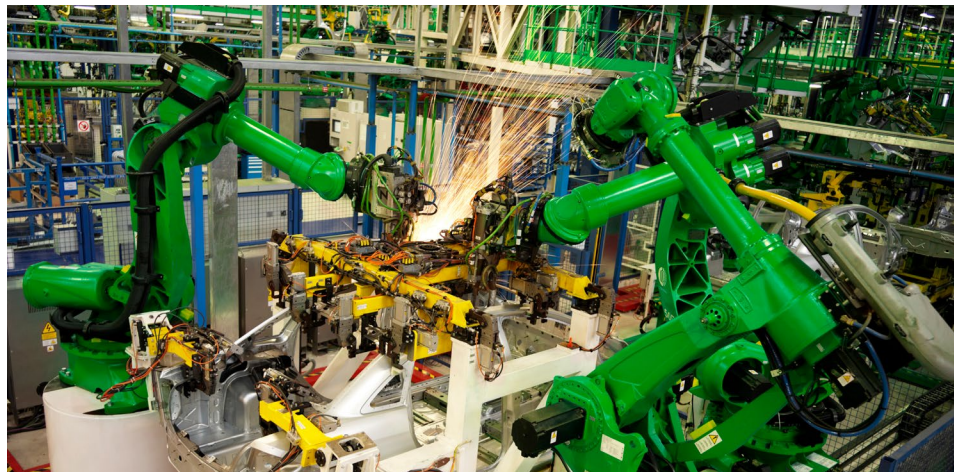
As IDC's Manufacturing Insights 2018 IT and OT Integration Survey showed, nearly 80% of instrumented production assets are digitally connected in some form. The question is why does this **disconnect between digital assets and data management**

exist within the manufacturing industry? IDC research has identified two important challenges to consider alongside this survey analysis:

1. Manufacturing faces a major skills gap. If skilled people represent

the ultimate opportunity for the factory of the future in developed economies, the lack of adequate skills is one of the toughest barriers that companies need to address. They are dealing with aging workforces and challenges in finding new skilled employees willing to work on the plant floor when it comes to hard and soft IT skills.

2. Most manufacturing plants are lucky if they can connect to half of their assets on the floor. This isn't just about applications, data centers, and networks; it's also about core enterprise architecture and infrastructure decisions such as IT/OT integration and security. In many cases, legacy infrastructure simply won't be able to keep up with the amount of connected assets entering the plant. As a result, many plants may implement ad hoc processes to connect and manage assets without being able to rely on underlying infrastructure for comprehensive management.



CHAPTER FIVE

DataOps: The Missing Link of Data Management

Given what we've learned in the preceding sections, a conundrum emerges.

SEAGATE POV

In the age when the volume of data is proliferating at unprecedented speed, how do enterprises manage all this data in a way that taps its value and satisfies both shareholders and customers?

The survey identified a key solution to this data management quandary: DataOps. Throughout the global

business landscape, DataOps looms as the missing link of data management—and the solution to business owners' data headaches.

DataOps, defined by IDC as the **discipline connecting data creators with data consumers**, should be part of every successful data management strategy.

DataOps is part of data management. In addition to DataOps, data management includes data orchestration from endpoints to core, data architecture, and data security. The goal of data management is to facilitate a holistic view of data and enable users to access and derive optimal value from it—both data in motion and at rest.

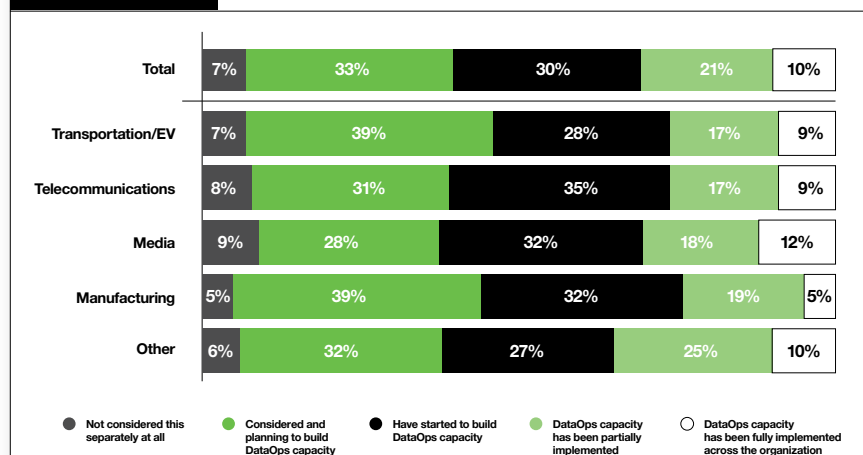
DATA BY IDC

DataOps

Across regions and industries, only an average of 10% of organizations report having implemented DataOps fully across the organization. The opportunity is there for the taking.

DataOps is neither a technology nor a process, but rather an emerging discipline of connecting data consumers with data creators to enable collaboration and accelerate innovation.

FIGURE 13 The State of DataOps



Source: The Seagate Rethink Data Survey, IDC, 2020



Data consumers are people within business units who are responsible for driving the organizational decision-making—whether toward product development, product distribution and marketing, cost control, operations, etc. Common data consumers are general managers, VPs, CXOs, and the people who support them. Data consumers really don't need data; instead, they need actionable information.

Data creators can be both machines—such as endpoint and IoT devices—and people who generate the reports and information that is fed to decision-makers. The challenge for data creators is often to determine what data must be collected for prompt activation and what should be collected for retention. For

example, the health of a device (e.g., whether it's running) may not necessarily require immediate processing and can be moved to long-term archiving. However, data about the device's operations (e.g., temperature, capacity, speed, etc.) may need immediate analysis or coordination. This sort of data can lead to better predictive analytics, event correlations, and so on.

DataOps can exploit technology, in particular AI and ML, to assist in correlating data from core, cloud, and edge data sources. DataOps also utilizes ELT-like data ingest functionality (Extract. Load. Transform.) to pull data from multiple sources and load into a common structure, frequently as a data lake. AI can be a key for transforming data into the information needed by decision makers.

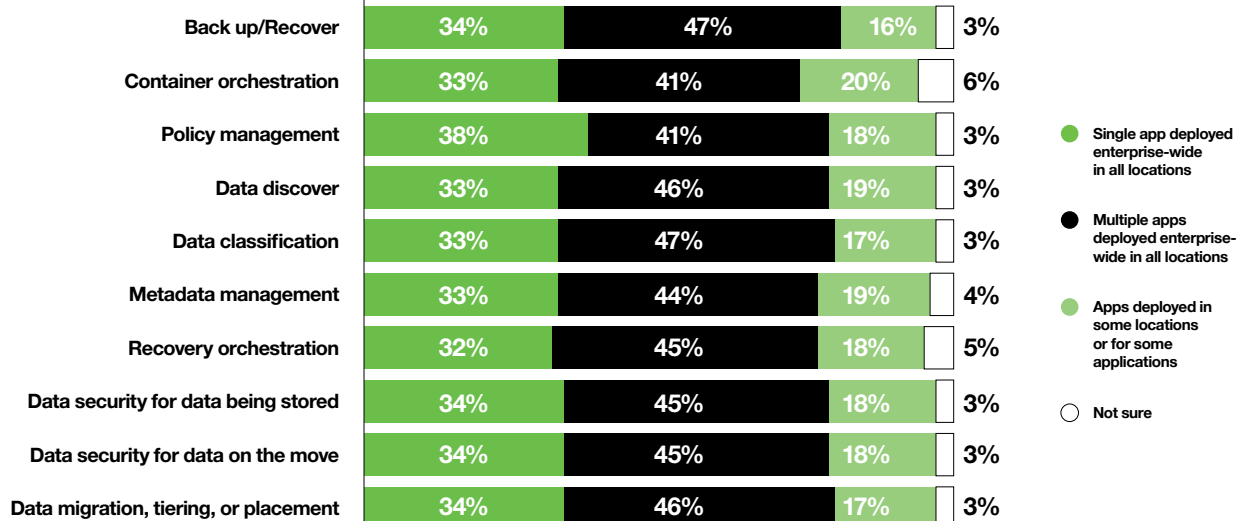
Being able to correlate data from disparate sources is a capability not easily available through other means. Because it is difficult, those organizations able to master it can expect to have an edge over the competition.

The survey revealed that most organizations have multiple tools to perform a similar function, which makes enterprise data management a challenge.

In fact, only about one third of organizations reported having a single solution for a single function. This may be caused by a variety of reasons: different buyers within the organization, incompatibility of solutions across platforms, or simply historical evolution of the systems.

FIGURE 14

Approach Used to Deploy Tools or Applications for Data Management Functions



Source: The Seagate Rethink Data Survey, IDC, 2020



While it may be necessary to have point products at a system level, it is essential to have a unified data management capability. DataOps is the practice of bringing disparate data systems into an understandable entity. The core functionality needed for DataOps is metadata management, data classification and policy management. As data is ingested, the metadata management function allows data to be associated and managed based on its characteristics. This metadata,

along with data classification capabilities, can identify specific types of data, such as personally identifiable information (PII) and data governed by the Health Insurance and Portability and Accountability Act (HIPAA). Once data is classified, AI algorithms can be developed to automatically recognize data and make associations.

DataOps is particularly well suited to the iterative learning approach required by AI-driven applications. This approach is the reverse of the traditional data analytics

approach. Traditional analytics takes a problem and searches for an answer; DataOps makes data associations and searches for insights. For example, data may reveal that consumers make seemingly unrelated product purchases together, leading to better merchandizing or product placement; or it may spot trends within certain demographic groups leading to focused micromarketing.

SEAGATE POV

DataOps: The Human Element

It is not always technology *only* that stands in the way of effective DataOps. Business owners need to be aware of culture and people challenges.

When organizations operate in silos, too often different competing groups work toward their own objectives. They want to gain and keep control of data. The mindset is, if they lose control of the data, they lose power, because data is power.

As a result, data is stored, managed, and analyzed in silos.

If various groups within an organization access the same raw company data and each group does analysis, their reports do not often match because they don't avail themselves of a global repository of data.

The solution to this people problem needs to start with the business owner's strategy. That strategy needs to institute global standards, global data architecture, global data management, and the same access to the same analytical tools by global teams.

Rolling back reporting functions to IT can provide global tools, capabilities, and solutions that every group can leverage. The various groups within the enterprise should get out of siloed management of their own data, and allow the IT-instituted tools to do that globally.

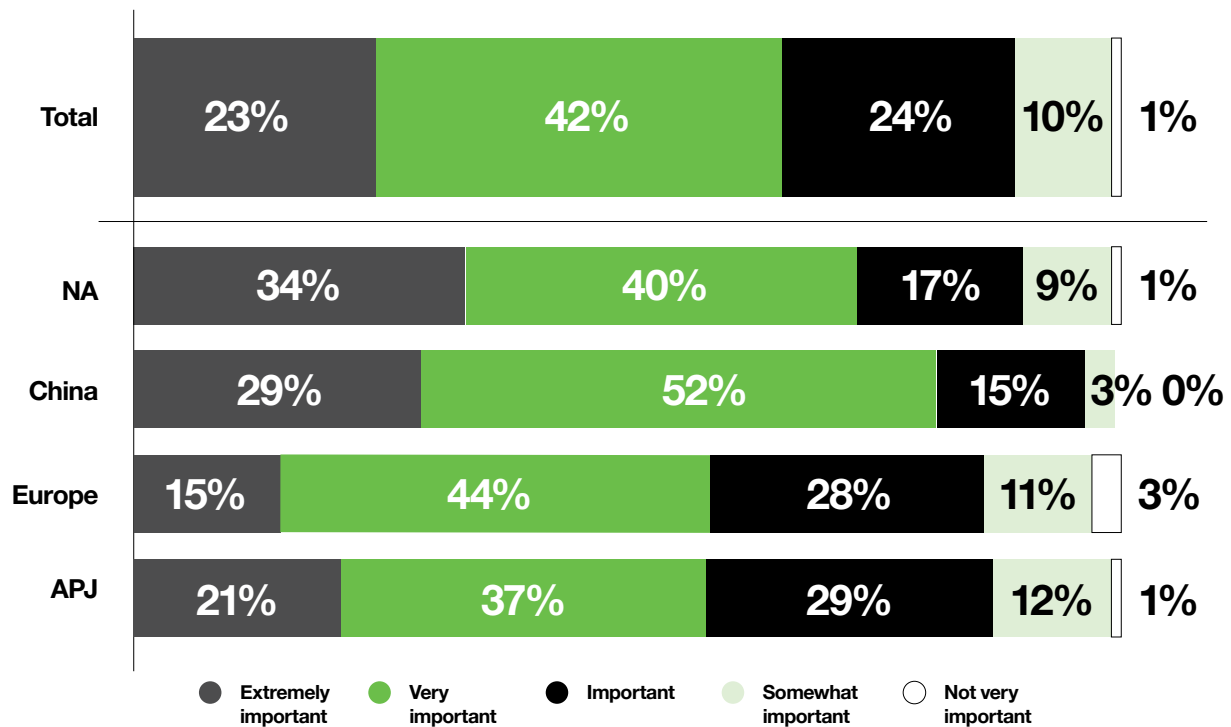
In doing so, the teams will be freed to make decisions based on insights from reliable, global, accessible pools of data.



Business leaders all over the globe agree with the need for DataOps.

- Majority of respondents say that DataOps is “very” or “extremely” important
- DataOps is seen as most important in North America and China (see Section II for the regional analysis)
- While DataOps is considered important across all industries, transportation shows a slightly higher need for it than other industries
- While this survey was done prior to the COVID-19 pandemic, DataOps is going to be even more needed as more people continue to rely on working from home, which has already accelerated migration to cloud services.

FIGURE 15 Importance of DataOps



Source: The Seagate Rethink Data Survey, IDC, 2020



CHAPTER SIX

Better Business Outcomes

At last, we come to the truly good news that the survey delivers to business owners.

SEAGATE POV

The findings make clear that in large part the solution to data management puzzles can be found in implementing DataOps—the discipline that connects data consumers with data creators, and the processes that go with it. How do we know DataOps is

useful? The survey results point to a significant result.

Along with other data management solutions—analytics-enabled data orchestration and well-functioning data architecture—DataOps leads to measurably better

business outcomes. Among them: improved customer loyalty and satisfaction, better profits, higher revenues, and greater employee retention and productivity.

DataOps therefore has a demonstrated bearing on an enterprise's competitive edge.



A Competitive Edge

Efficient DataOps is the foundation for rapidly building and training AI models and for deploying analytics at scale. These advanced analytical results can lead to competitive advantage.

The survey found that better data analysis leads to measurably better business outcomes.

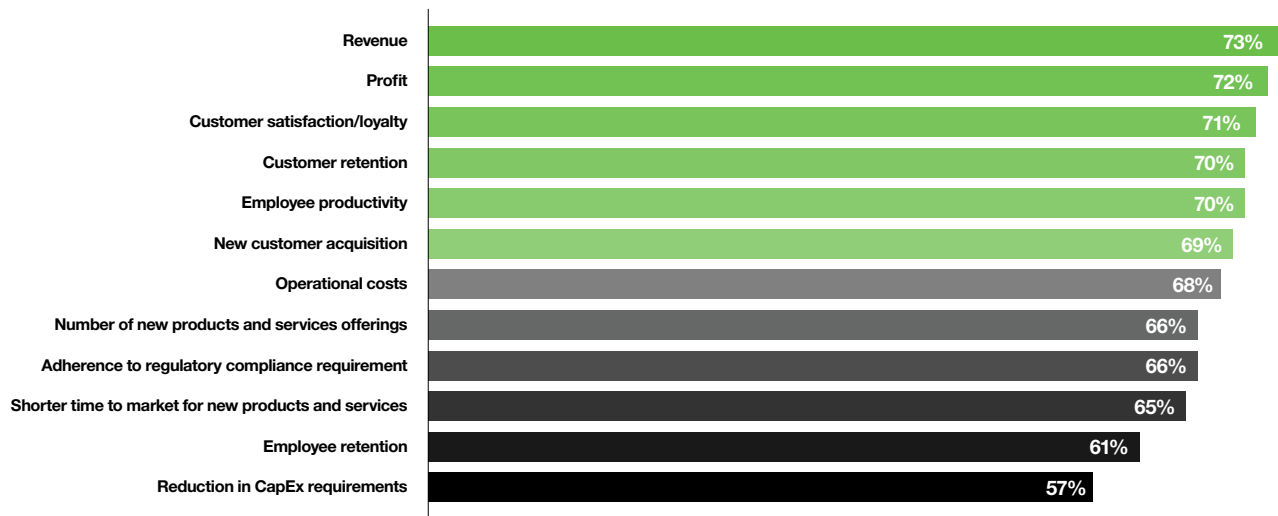
The following chart points out the areas of improvement from organizations that cited having improved data analytics. Note that speed of improvement makes a difference, since most organizations can say they improved over time.

The companies that improve fastest can expect better business results

compared to peers. Though the results in Figure 16 do not reflect the effect of DataOps alone, DataOps is the latest and leading-edge method for improving data management.

FIGURE 16

Indicators Used to Measure the Success of Investments in Data Management and Analytics in Improving Performance of the Organization



Source: The Seagate Rethink Data Survey, IDC, 2020

For most organizations, the trifecta of better business outcomes is the following:

1. Better revenue.
2. Better profit.
3. Better customer satisfaction/loyalty.

But better results due to data management and analytics were

seen across the enterprise and also included:

- Better employee productivity.
- Better employee retention.
- Lower costs.
- Improved regulatory compliance.
- Better new customer acquisition.

Among the more proactive results is better new customer acquisition, which obviously is the key to growing revenue.



DataOps: Getting to Customer Satisfaction and Profit Through Data

This survey established that a smooth-functioning DataOps is key to data management that enables organizations to get more value out of data and boosts business outcomes such as profit and customer satisfaction.

How can businesses get there?

As noted in the preceding section, the human element of the equation cannot be overstated. It's the people who keep data in silos.

Consequently, the way to institute effective DataOps is not just about having the right tools. To be sure, the right tools are key. **Virtualization tools** are immensely useful, if not necessary, in that they allow for the retrieval and manipulation of data. Whether it's a software virtualization plane (such as Kubernetes, "a portable, extensible, open-source platform for managing containerized workloads and services, that facilitates both declarative configuration and automation") or virtual machines that are an abstraction mechanism for app deployment, virtualization layers can streamline data management.

But before DataOps avails itself of virtualization, it has to start with decisions about data. Putting tools to work is the easy part. It's trickier for enterprise leaders to make decisions about data via data governance and processes around it.

Business owners need to start with their goals—which commonly include boosting customer satisfaction and profit. To get

there, they need to **interrogate the data** at their disposal.

They need to coordinate data from various sources and solve governance issues such as:

- Who has access to what data?
- How to classify data?
- Which data to keep and where?
- What to do with data after it's analyzed?
- How to make data available?
- How to interconnect data?

In order to make these determinations, business owners, data administrators, or CIOs need to consult subject matter experts (SMEs). **Along with SMEs, they need to identify, evaluate, cleanse (detect and correct inaccurate records), and validate data.** SMEs need to be at the table because only they possess deep knowledge of certain types of data.

It's with the involvement of the SMEs, under the direction of business owners, and facilitated by data administrators that determinations need to be made regarding a key question: **What intelligence do you want out of what data?** What do you want it to tell you? How do you want to use it?

There can be about 10,000 entry point parameters collected for a single product that a company manufactures. If the company is to retain all these points of information for just one product, without a clear data architecture defining where it will all be stored and how

it will flow between environments, the data risks drowning in a data swamp. The decision-makers need to confer with product design engineers and quality engineers, and ask: Which of the 10,000 parameters are the most critical? Then, through interrogating and tracking the curated data, they are on a more efficient path to building components and solutions.

The upfront work of data governance—involving coordination, discussion, analysis, agreements around language, and data classification (more on this in the following chapter)—can give way to the mostly-automated downstream processes facilitated by virtualization tools.

This twofold process of DataOps can then reap the results of customer satisfaction because optimizing the governance and flow of data leads to better quality of offerings, which directly affects how customers feel about their purchases. As IDC analysts pointed out in the previous chapter, speed of delivery matters too. Getting to results faster means greater customer satisfaction—because getting to data faster means customers and business owners can make decisions faster.

This is how a process that starts with business owners setting out to increase customer satisfaction and profit attains these very goals through optimizing data via DataOps.

It's about being intentional on making the most of data.



CHAPTER SEVEN

Data Security and Data Management

In addition to DataOps, a unique part of data management that deserves a special examination is data security.

DATA BY IDC

Two thirds of survey respondents report insufficient data security,

making data security an essential element of any discussion of efficient data management.

Data security is consistently rated among the highest concerns and priorities of IT leaders and business leaders alike. Data breaches lead to direct financial losses, significant regulatory fines, reputational loss and embarrassment, lost customers, and more. Malware attacks can result in the theft of corporate secrets, lost employee productivity, unrecoverable data, and, in the case of ransomware, financial loss and embarrassment.

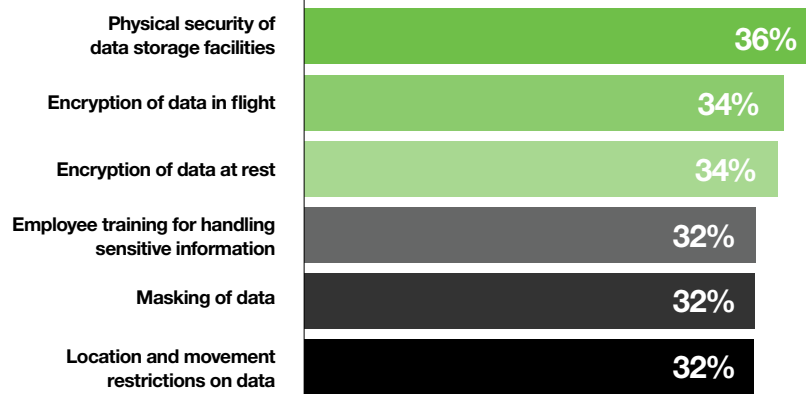
However, many organizations surveyed have not implemented common data security practices enterprise-wide (Figure 17).

The results in Figure 17 do not represent an all-or-nothing approach to enterprise security. That is, a respondent might answer “yes” to encryption of data at rest,

but “no” to all others, for example. Thus, it is highly probable that the vast majority of organizations have at least some significant vulnerabilities in their environments.

FIGURE 17

Percentage of Organizations Fully Implementing Key Security Practices



Source: The Seagate Rethink Data Survey, IDC, 2020



Data Security: A People Issue

The biggest myth about enterprise data security is that the technology is the hard part; it's not.

The challenge is getting alignment on classification of data by risk and on how data should be stored and protected. That, as in the case of DataOps, is the human element.

Technology boils down to business owners' purchasing decisions. You want to protect data at rest? Buy self-encrypting drives; problem solved.

Educating data users—those within the company who create, touch, analyze, and move the data—is a different matter. Business leaders should remember that the more data creators and consumers within their company are educated, the better for the business. Business owners' own education about data security is key to success, because it ensures their buy-in.

The education about data security should be democratic. Protecting

data (and the education that comes with it) ought to be built into other stacks. It cannot merely be the domain of CISOs, CIOs, IT admins, security, and the legal teams. Data owners, too, should be at the table.

Bottom line: If you're a business leader, don't wait for a data breach or data loss to grasp the reality that data security is foundational to the value your business can get out of data.



Key Steps of Data Protection

1. **Data Classification.** A daunting task that requires a lot of cross-organization communication, classifying data is imperative. Data creators, owners, and users within the organization must align on data classification standards, and map data types to those classifications. Without this step of defining and aligning, any data protection program will fail. Keep it simple.

For example, at Seagate Technology, team members aligned to broader standards. As a result, the team arrived at four data classifications: restricted, confidential, internal, and public.

2. **Data Flows.** Business owners must understand where the company's data is flowing—either by design/intent or against design/intent. Determining what is right or valid is an important step of defining controls. Understanding data flows will help identify the biggest areas of risk.
3. **Access Control.** Role-Based Access Control (RBAC) may be the most basic form of access control, but it is rarely comprehensive. The idea that only those who need access should have access is easy to grasp, but the discipline to implement and maintain is harder. The higher the sensitivity of the data (per data classification), the stricter the implementation. Beyond RBAC, other controls that can be considered include:
 - Information Rights Management (IRM) controls at the file-level encryption, using granular access controls (restricting functions like print, edit, copy/paste per given asset)
 - Other access mechanisms like browser-only access (no download) and watermarking to avoid screenshots/capture



Basics of Data Security

A well-implemented data security program can seem intimidating. And it's a good idea to not let the perfect be the enemy of the good. What if you're an overwhelmed business owner who can't quite do it all right now, but wants to first take at least the most necessary steps, and take care of the less-urgent protections later?

Here are the *must-haves* of data security that protect against the greatest risks:

- 1. Encrypt data in flight.** At a minimum, only use secure protocols and services—HTTPS over HTTP, SFTP over FTP, IPsec, or SSL VPN for all remote access. This is not hard: Only leverage tools that use secure communication, configure them correctly, make it the standard, and enforce compliance.
- 2. Encrypt data at rest.** Laptops and mobile devices are the biggest risk to data. Your storage array or server is generally in access-controlled data centers; there's little risk of it being stolen from a car or falling out of a pocket in a cab. Address the biggest risks first. Leverage enterprise-managed full-disk encryption for laptops. Enforce file-system encryption for mobile devices in mobile device management policies.
- 3. Educate users.** As this report notes throughout, users will either be your strongest or weakest control. Business owners need to ensure all employees are educated on best practices and risk. Stop. Think. Protect.





SECTION TWO

Regional Findings



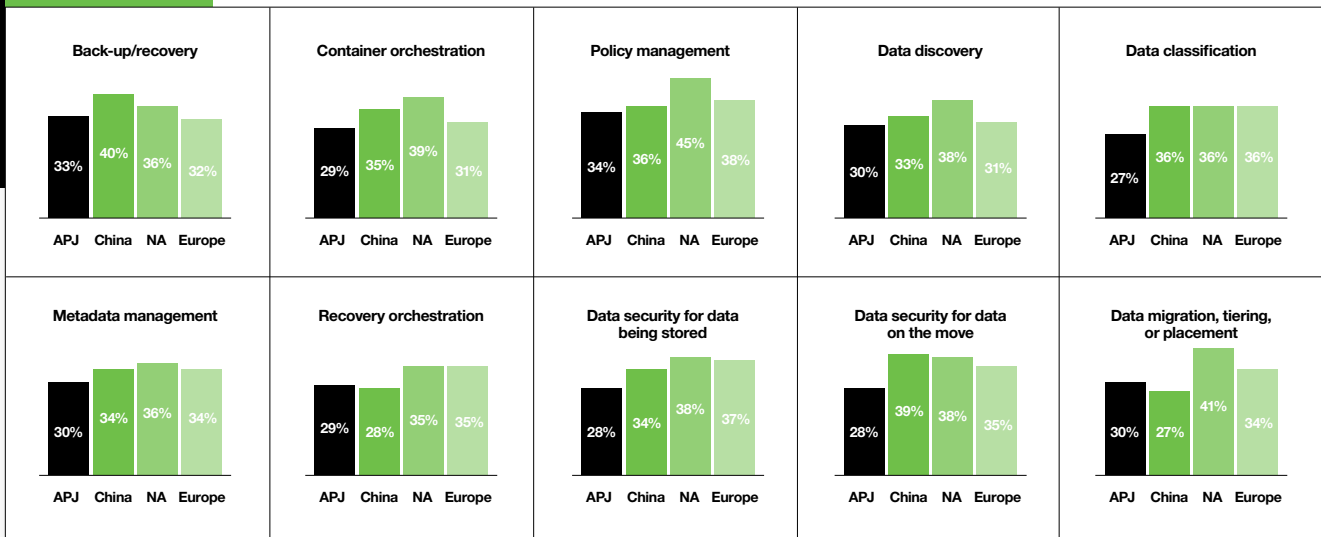
CHAPTER ONE

Asia Pacific and Japan (APJ)

APJ respondents included those based in Australia, Japan, India, South Korea, and Taiwan. For the purposes of this survey, China is treated as its own region and not included in this category.

FIGURE 1

Proportion of Respondents Reporting Their Organizations Have a Single Enterprise-Wide App for Policy Management



Source: The Seagate Rethink Data Survey, IDC, 2020

DATA BY IDC

To take a region like APJ and characterize it as an entity is increasingly difficult. Technological advancement is not evenly distributed across this diverse region. With that said, the survey includes five of the region's most

technologically developed countries. Even given this sample, it is fair to conclude that the region's integration of data management functions is still developing.

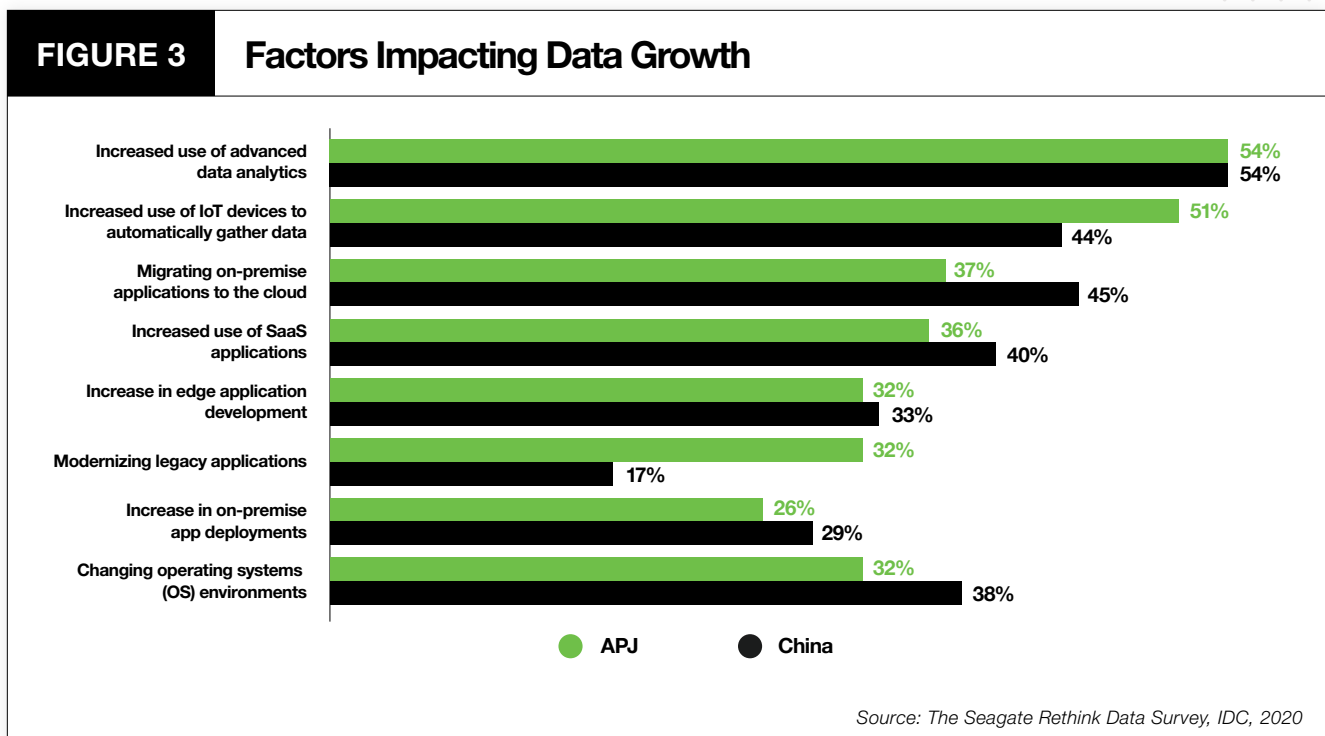
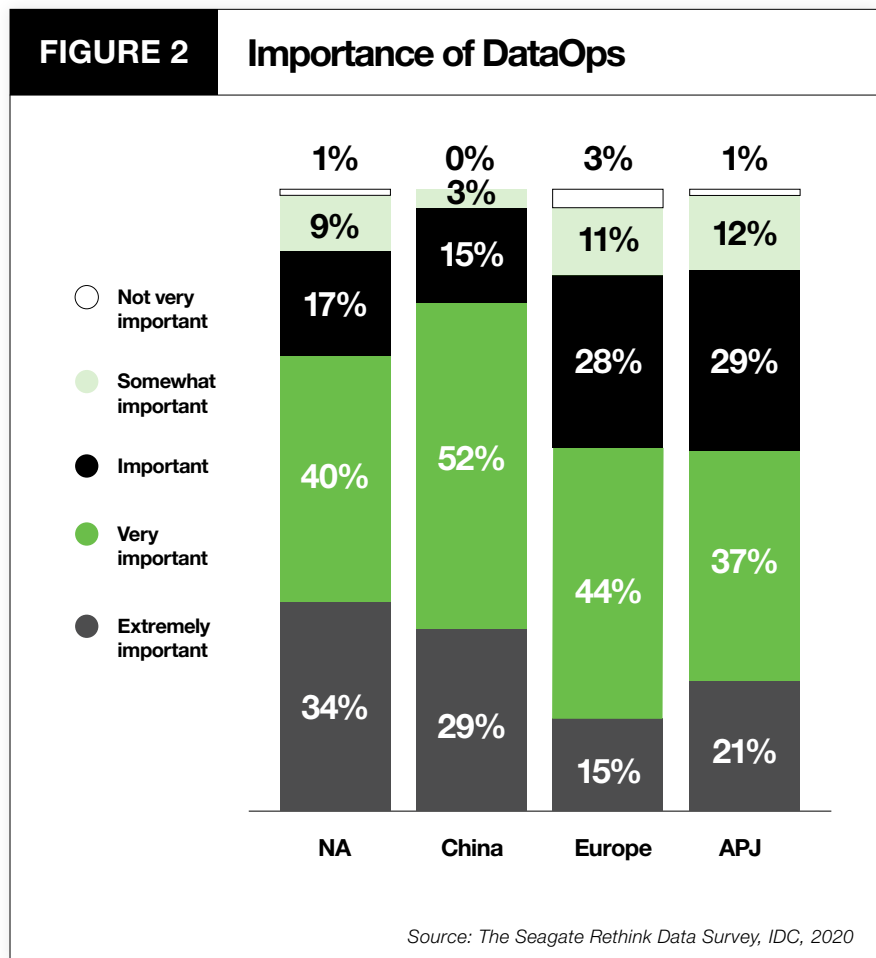
The following survey findings distinguish the region from the others:

- APJ trails North America (NA) and Europe with 34% of organizations reporting having a single enterprise-wide application for policy management (Figure 1).
- 87% of respondents say that DataOps is either “extremely



important,” “very important,” or “important” (Figure 2).

- APJ sees the increase of data growth in the next two years as a result of more widespread use of advanced data analytics and the IoT devices to automatically gather data. Unlike their counterparts in other regions, companies in APJ do not expect as much of this growth to happen as a result of the move to the cloud (Figure 3).
- APJ organizations are least daunted by the challenges to managing data that they see in the coming couple of years (Figure 4).
- APJ’s enterprise data does not appear to be very dynamic. It does not move as much as data does in other regions. Still, within the next two years, 7% of APJ’s enterprise data is expected to move to the cloud (Figure 5).



What It Means

There are no region-wide laws or regulations in APJ that impede the movement of data across borders—unlike, for example, Europe’s General Data Protection Regulation (GDPR). Data sovereignty is less of an issue, or at least it is treated differently. A unified policy mechanism is the most efficient, automated way to manage data consistently at scale.

The fact that it is reported by only a quarter of the respondents means that most of the region’s enterprises struggle with unifying data management functions. One potential factor impeding the movement of data in APJ may be the variety of languages and laws that make the region very heterogenous, with significant translation and compliance factors.

When looking at the proportion of respondents indicating “extremely challenging” or “challenging” to the following data management issues (Figure 4), APJ is consistently lower than the overall survey average. Why is it that APJ respondents appear less pressured by the challenges related to

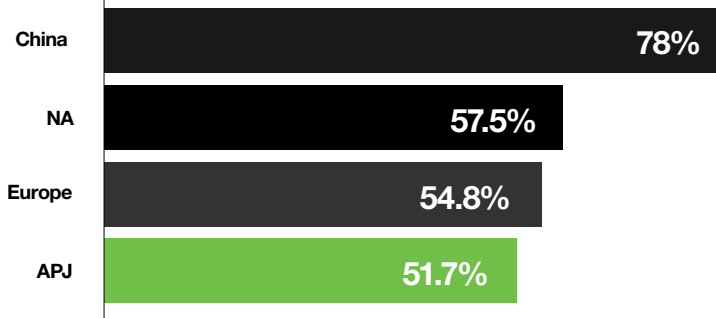
data management? Our hypothesis is that data management maturity may play a role here.

Compared to other regions, APJ indicated the lowest average levels of satisfaction with their organizations’ general approach to data management. APJ also indicated the lowest average levels of satisfaction with data management tools. These low levels of satisfaction with data management operations and tools may be indicative of earlier-stage maturity of tools and processes in the region. If APJ respondents are not satisfied with their operations and tools, it seems likely that there would be a lower proportion of organizations

in the region pursuing advanced data management tasks (e.g., managing data in multi- and hybrid-cloud environments). APJ organizations may simply still be working to improve the operational and technological aspects of their data management strategy, before moving on to more advanced tasks.

With that said, APJ (tied with China) leads the way when it comes to data analytics and IoT being the top factor propelling the growth of data (Figure 3). This could be because of the growing use of devices by various manufacturers, such as the OEM suppliers in the region.

FIGURE 4 Proportion of Regions Expecting Extreme Challenges or Challenges in Managing Data in the Next Two Years



Source: The Seagate Rethink Data Survey, IDC, 2020

SEAGATE POV

Room for Growth—and Education

Although enterprise data management is not as integrated in APJ as in other regions, business leaders should make sure it is agile to better cope with future needs

such as a global pandemic where the digital behavior completely shifts. There is a need for an enterprise data management to 1) encourage business owners to classify data

properly and figure out what goals it should accomplish; 2) put analytics at the heart of decision-making; and 3) prepare the workforce for a data-driven future.



As IDC points out, a unified policy mechanism is the most efficient and automated way to manage data consistently at scale. Why are both a unified policy and DataOps not as prioritized in APJ as in other regions?

First, except for privacy protections, many APJ governments historically have not interfered with private companies' management of their data.

Second, the companies in the majority of the region's countries still need to raise their awareness around optimizing the value of data through company-wide data policies. Business leaders need to become familiar with the benefits of unified data policies and DataOps—and they need to institute them.

Third, a company's IT infrastructure needs to be customized to support the use of AI and, in particular, the edge devices that enable real-time data gathering, analysis, and use. It's important to have a

robust infrastructure that includes hardware and software platforms that gather and manage huge amounts of data from automation. Business owners should work closely with their IT departments to secure the most appropriate platforms and ensure they're located where they need to be. For many, that means having edge devices close to factory equipment, rather than offsite.

Fourth, employees must be retrained and reskilled to be effective. It's about enabling data agility: organizations have to build a talent base that's adept at using big data to make decisions, whether sourcing new talent with the right skills or retraining and reskilling employees. The result would be prepared employees who thrive in a data-driven future.

Fifth, organizations should consider longer-term investments to get ready for the future. As the COVID-19 pandemic has shown

us, readiness for the long term matters a great deal.

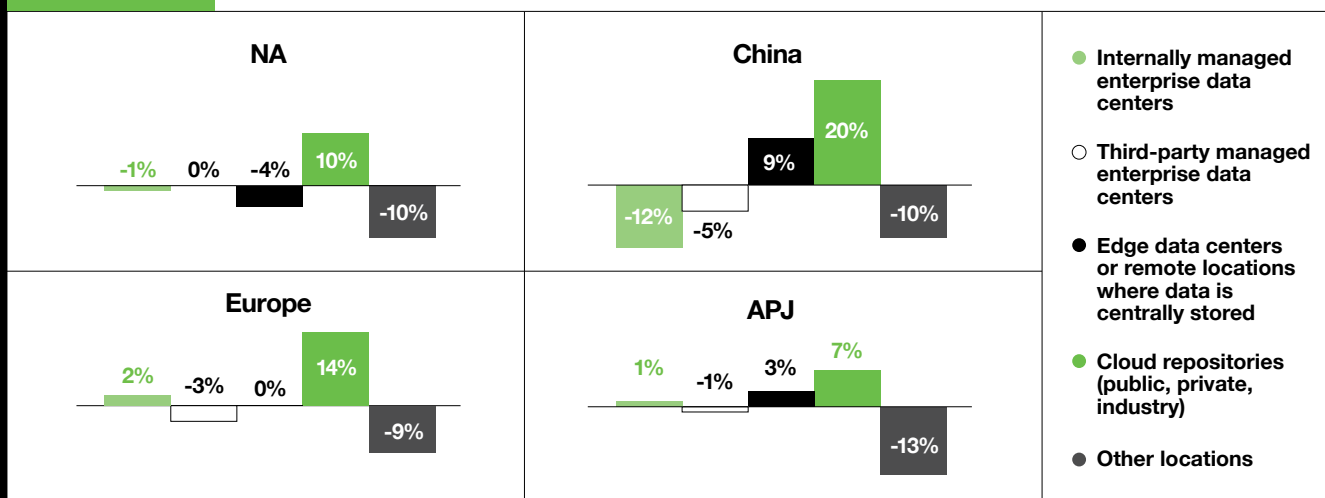
In sum, APJ businesses are still growing in their understanding of how data management can boost the value of data. The region appears to be slightly more conservative, for example, when it comes to putting data in the cloud or changing data locations. The region's greatest catalyst for change is improving data security.

There's a reluctance—whether associated with means or with lack of data education—to get out of a comfort zone when it comes to data processes: **APJ has the opportunity to invest in DataOps** in order to maximize the value of its growing data.

In the aftermath of the onset of a global pandemic that resulted in many more employees working from home, it is even more critical for enterprises to take data management more seriously.

FIGURE 5

Expected Changes in How Data Is Stored—Over the Next Two Years



Source: The Seagate Rethink Data Survey, IDC, 2020

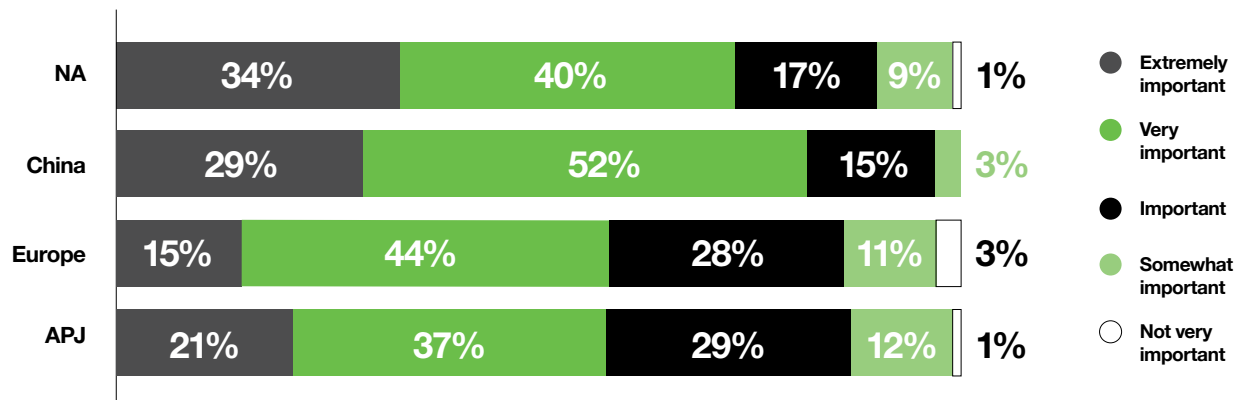


CHAPTER TWO

China

For the purposes of this survey, China is a stand-alone region. This makes sense because of its expansiveness, homogeneity, and geopolitical uniqueness.

FIGURE 6 Importance of DataOps



Source: The Seagate Rethink Data Survey, IDC, 2020

DATA BY IDC

The survey shows that China is the most progressive region when it comes to taking on data management challenges.

- Of all regions, DataOps is most likely to be seen as “very” or “extremely” important in China. When asked how important they felt the concept of DataOps was, 52% of respondents said

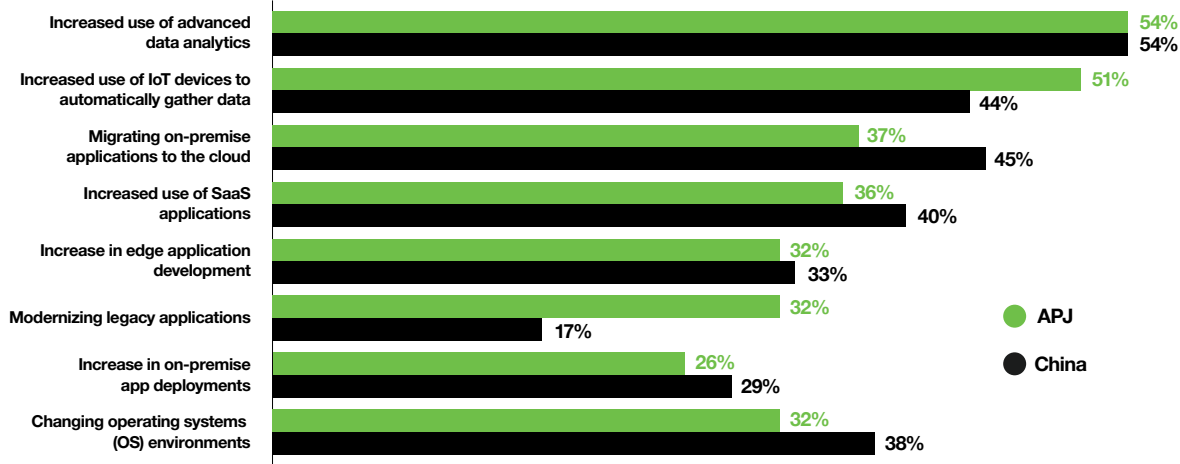
“very important” and 29% said “extremely important”—a total of 81% (Figure 6).

- When it comes to factors influencing data growth, China is most aggressive about data analytics (54% of respondents, tied with APJ) and least focused on modernizing legacy apps (Figure 7).

- In the coming two years, respondents project that 20% more enterprise data will move to cloud repositories (by far the biggest percentage among the regions) and 9% more will migrate to edge data centers (Figure 8).
- Enterprise data management is more centralized in China than in other regions. A high percentage



FIGURE 7 Factors Impacting Data Growth

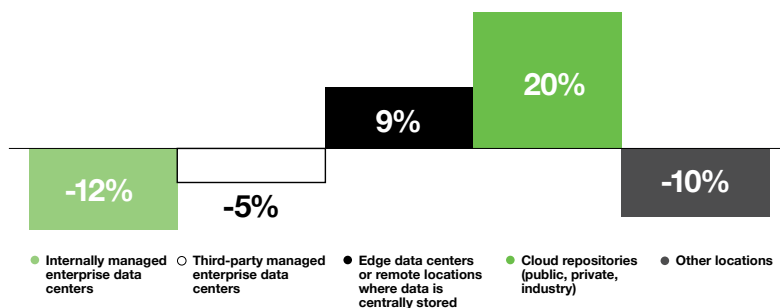


Source: The Seagate Rethink Data Survey, IDC, 2020

(67%) of enterprises in China use just one dedicated centralized group as a data management function (Figure 9).

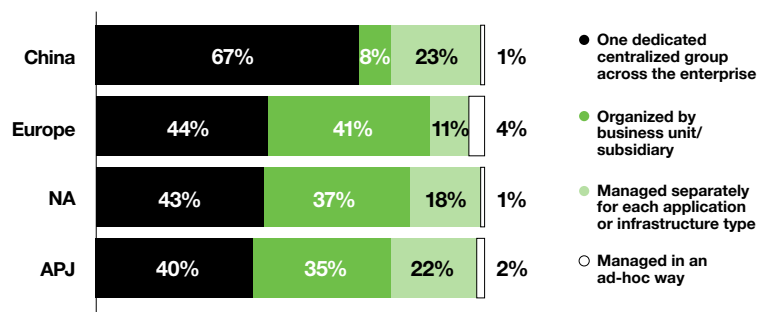
- China is behind other regions when it comes to integration of data management—but it is most interested in integration (Figure 10).
- China reports the highest degree of challenges in exploiting data’s full potential—including making collected data usable, managing the storage of collected data, ensuring data’s security, and making different silos of collected data available (Figure 11).

FIGURE 8 Expected Changes in How Data Is Stored Over the Next Two Years



Source: The Seagate Rethink Data Survey, IDC, 2020

FIGURE 9 How Data Management Functions Are Organized



Source: The Seagate Rethink Data Survey, IDC, 2020



What It Means

Chinese organizations' data management capabilities are growing fast. Its enterprises understand the power of DataOps.

Centralized data management may improve the ability to exploit data by reducing silos. While centralization of policy management is important, integrating data management functions is the next level of data use.

China doesn't perform as well in integrating data, but respondents

see data integration as a key goal in the next two years.

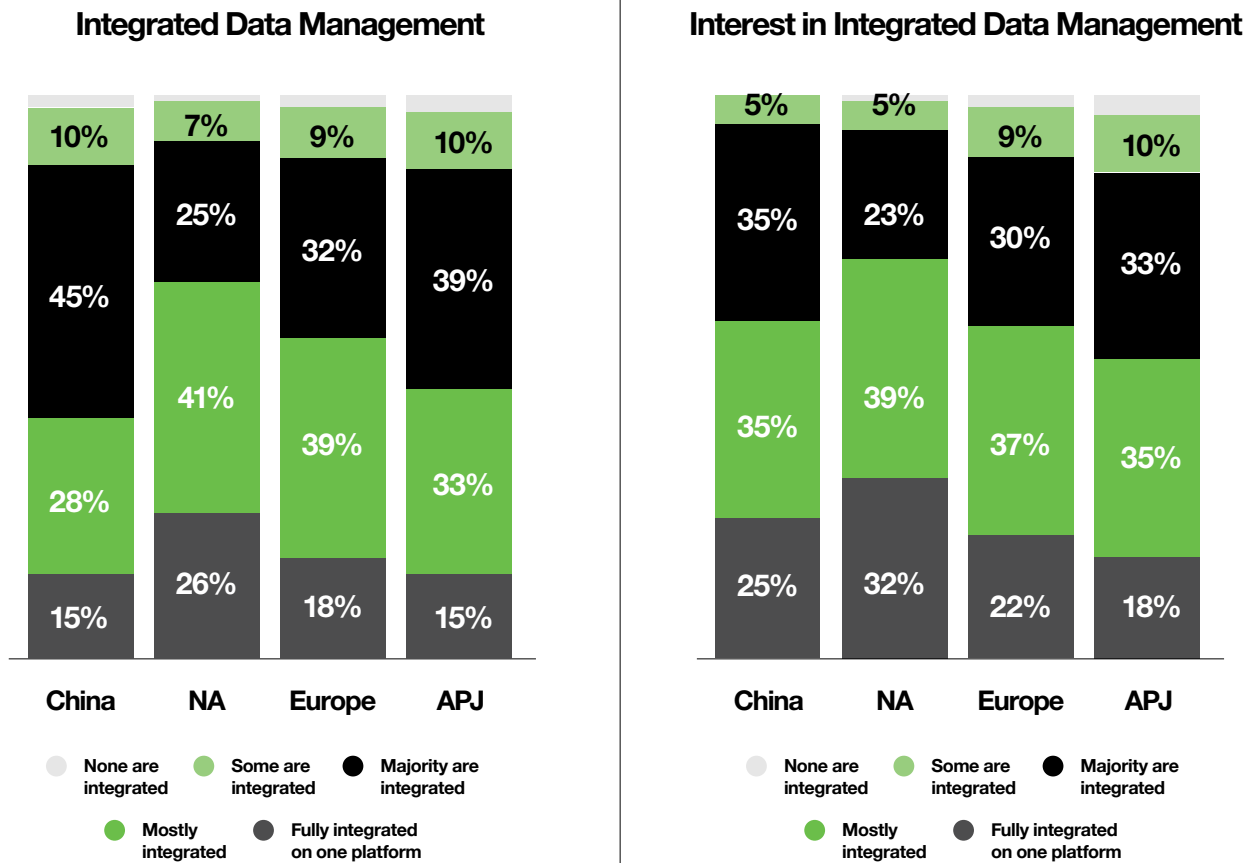
Several large cloud providers are based in China, so the local market is ready for cloud adoption. This may be why the region reports the highest levels of migration to the cloud (public, industry, and private). A lot of this data is generated by the proliferation of IoT devices, sensors, and AI algorithms.

Growing adoption of public cloud

aaS resources offered by regional providers is also driving the move to the cloud.

China is most driven to increase data access and analytics and least driven to reduce costs. Because of the state of China's IT maturity, we believe the region has fewer legacy apps to burden its competitive efforts.

FIGURE 10 Integration of Data Management—Current vs. in Two Years



Source: The Seagate Rethink Data Survey, IDC, 2020



Data on the Move

In China, data is on the move—from on premises to cloud and the edge.

China is in an invest-to-grow phase of economy, which is true for a lot of Chinese companies.

When enterprises are in this mode, they have less focus on profit and loss (P&L). They instead focus on profit for the long term. This means they choose to invest in growth so they can eventually see profit at scale.

Chinese enterprises do not have to concern themselves with updating legacy applications—apps developed and architected in the client server era, typically on-prem apps that are single-tenant. (Examples include hardware in power plants, manufacturing machines controlled by computers running MS-DOS, or outdated

financial systems.) This means that their budget is freed up to invest in data movement (to the cloud and edge) and to exploit the value of data with streamlined DataOps.

Chinese respondents report the highest degree of difficulty when it comes to taking advantage of data: this may simply be a reflection of Chinese businesses’ ambitions and their intense focus on growth, plus the reality that they find themselves in the trenches of DataOps adoption.

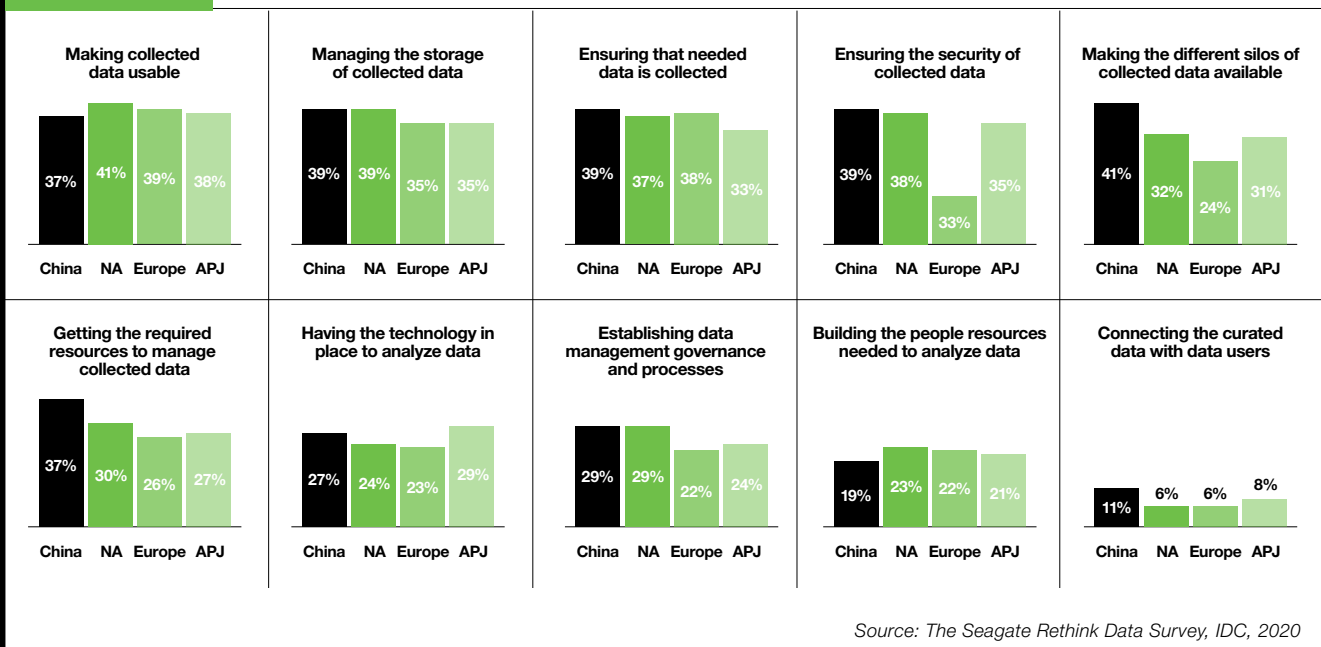
It may be that China lags most “behind” when it comes to integrating data management functions precisely because of its centralization—and because there are no legacy apps to worry about integrating. China is a growing economy strongly driven by government and legislation,

as opposed to many Western economies.

AI is a huge initiative in China, partly because of the massive volumes of data generated by the enormous population of around 1.4 billion. AI is touted as one of the leading initiatives that China uses to compete on a global scale. The country’s government supports the development of AI, 5G, hyperscale data centers, and other means of accelerating data on the move.

As a result of these factors, China’s infrastructure is a lot more pliable. China has implemented its New Infrastructure project to boost the digital economy. Combined with technology, this initiative could also translate into new business opportunities for enterprise data management.

FIGURE 11 Main Challenges in Exploiting Data’s Potential



Source: The Seagate Rethink Data Survey, IDC, 2020

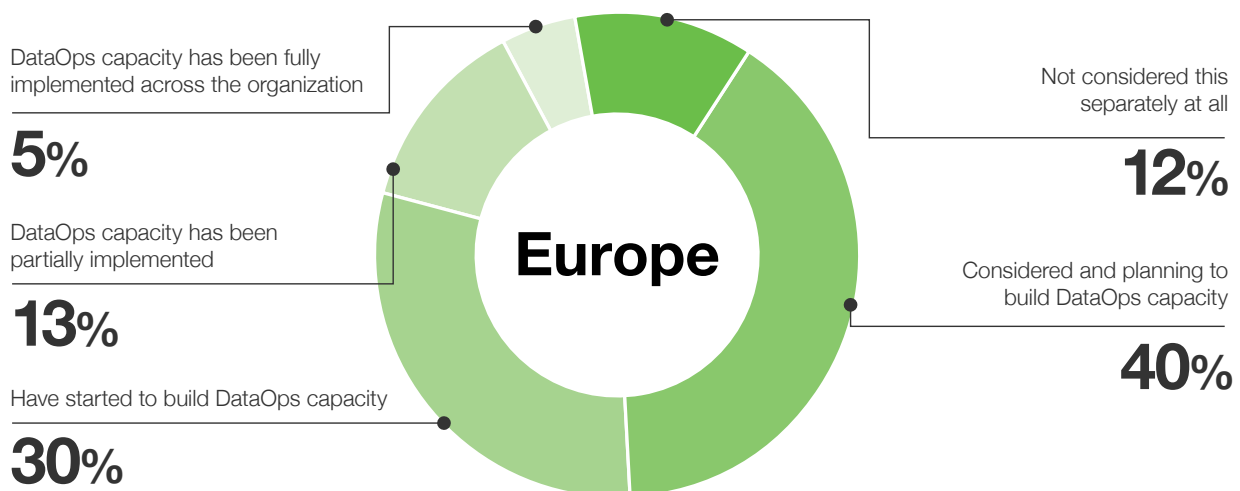


CHAPTER THREE

Europe

The survey queried enterprises from four European countries: the United Kingdom, France, Germany, and Russia.

FIGURE 12 State of DataOps in the Organization



Source: The Seagate Rethink Data Survey, IDC, 2020

DATA BY IDC

An important note while examining the European data is that the region tends to respond conservatively versus other regions in nearly all global surveys across a variety of subjects. The region's surveyed countries include three Western European powers and Russia.

- Europe has the least-implemented DataOps discipline of all regions. Only 18% of the region's respondents report that its DataOps capacity has been fully or partially implemented (Figure 12).
- But European companies understand the need for DataOps.

As many as 86% of respondents say that DataOps is "extremely important," "very important," or "important" (Figure 13).

- The region's data growth rate is also the lowest compared to other regions (Figure 14).

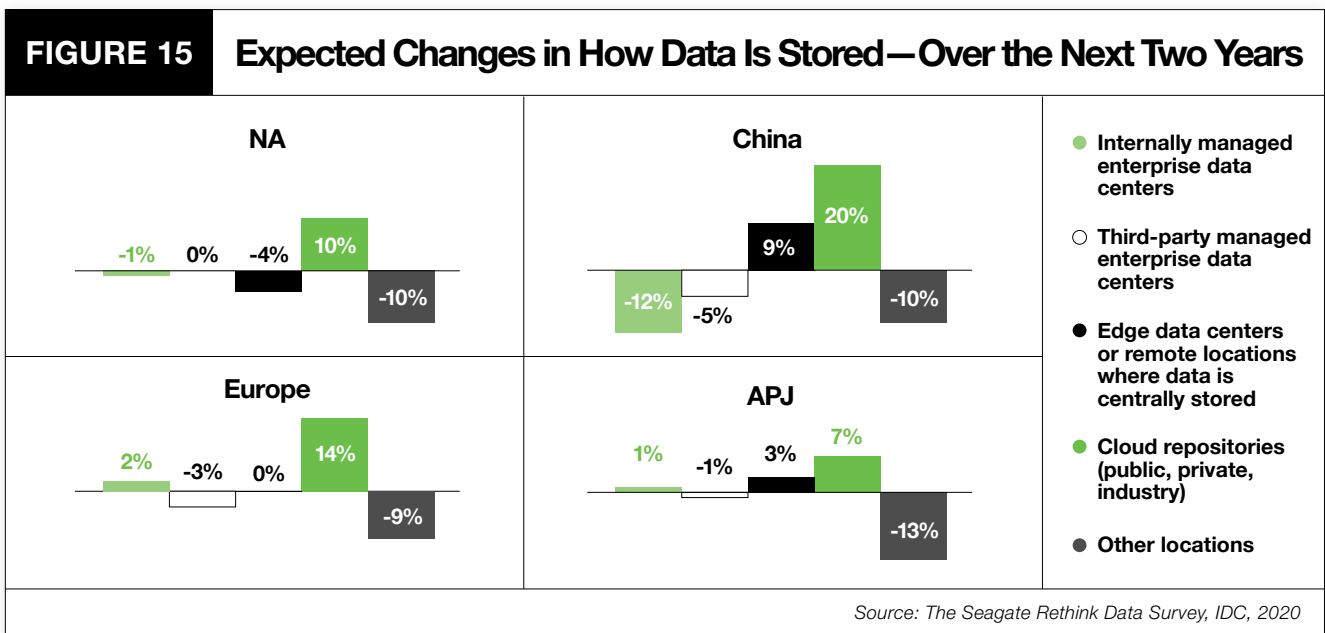
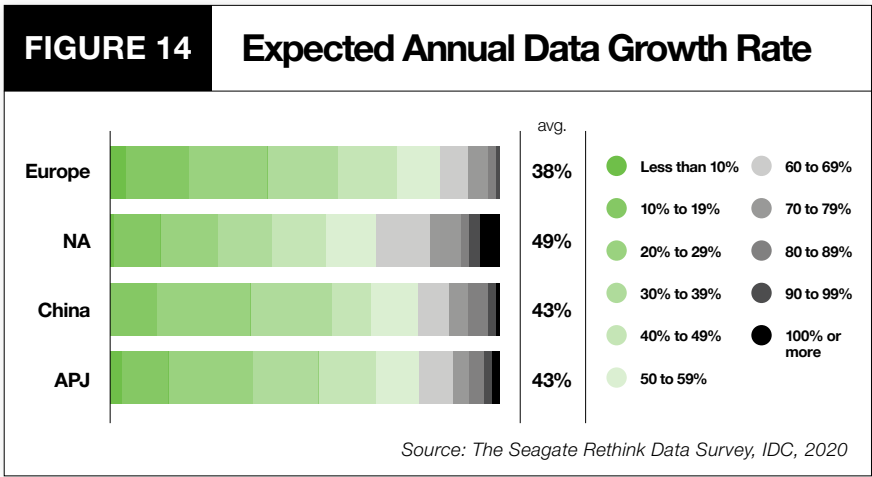
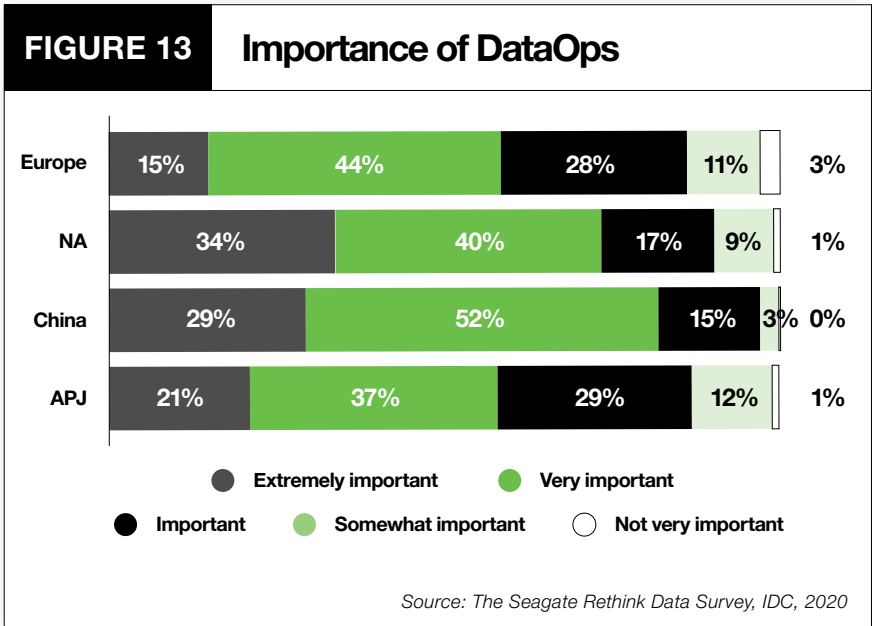


- European organizations are moving data to the cloud. Over the next two years, 14% of enterprise data is going to shift to the cloud (Figure 15). Factors impacting data growth include migrating on-prem apps to the cloud and increase in on-prem app deployments (Figure 16).
- When it comes to factors deciding how data is stored, Europe is driven to increase security and reduce costs when determining its data storage (Figure 17).

ANALYSIS BY IDC

What It Means

The less time organizations spend focused on legacy apps (e.g., updating them), the more resources they can put toward new innovations. The reverse also holds. Europe is focused on updating existing applications and on on-prem applications. On-prem apps, because of their inherent architecture and dependence



on their in-place local compute and storage resources, generally have less agility than cloud apps. COVID-19 has brought this issue to the fore, as organizations are looking to use the cloud to quickly adapt. Europe may not be as agile in infrastructure as other regions. This can hinder the movement of data, and its value.

Pan-European organizations may use common apps, but because of GDPR and other regulations they cannot share that data across borders. Thus, regulations—more

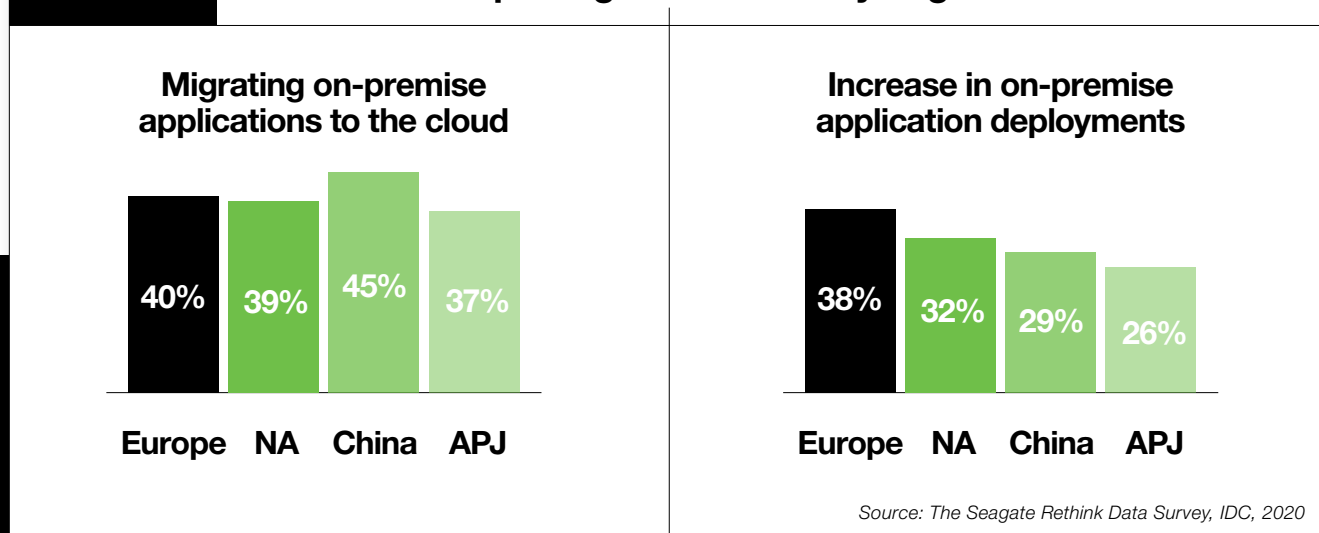
than data management technology—may inhibit their ability to fully leverage data compared to, say, APJ-based organizations. Organizations bound by regulation will need to expend more effort and be more creative to exploit the value of the data available to them. DataOps can provide an avenue for this.

Because European companies need to maintain legacy applications while complying with local regulations, they become quite TCO-conscious. Issues and regulations related to GDPR, data privacy, and the right to be forgotten

complicate data management—and are all rather costly. Privacy protection is often achieved through secure data silos, which can stifle data management innovation.

There are different motivations for moving to the cloud. One is to increase organizational agility, the other is to reduce the cost of hosting applications or storing data. One hypothesis is that Europe’s organizations are more driven by the latter.

FIGURE 16 Two Factors Impacting Data Growth by Region



SEAGATE POV

A Mix of Legacy Apps and DataOps Readiness

In addition to the more mature region’s preponderance of legacy apps, data sovereignty and data privacy play a great role in Europe because of the region’s stricter regulatory system and geopolitical diversity. There’s a burden to do

well by one’s investments—in this case, investments made in the existing, older structures and apps. It’s a kind of path dependency, as is the logic of wanting to recoup already-incurred costs rather than venturing out

into new, costlier arrangements. The value placed on data privacy outweighs the additional costs and it may slow the migration of data to the cloud, which nevertheless remains strong at 14% projected in the next two years.



Europe's enterprise data is growing at 38%. This may be slightly slower than other regions, but faster than the predicted general data growth for all sectors, which IDC had previously put at 32%. Considering the maturity and regulatory conservatism regarding putting data to work in Western Europe and the relative newness of IT development in some parts of Russia, the 38% is quite impressive.

According to Seagate-sponsored IDC report *The EMEA Datasphere*¹, nearly a third of the global datasphere growth results from growth of video surveillance, signals from IoT devices, metadata, and entertainment.

Whether it's surveillance growth in the United Kingdom and France, manufacturing in Germany, or growth in Russia's mining industry,

data is playing a much more critical role these days. In order to make better use of this data, the region's organizations would do well to avail themselves of the power of DataOps.

The survey found that, in addition to improving data security, TCO is the main driver in decisions regarding where the data should be stored (Figure 17). This could explain the migration to the cloud.

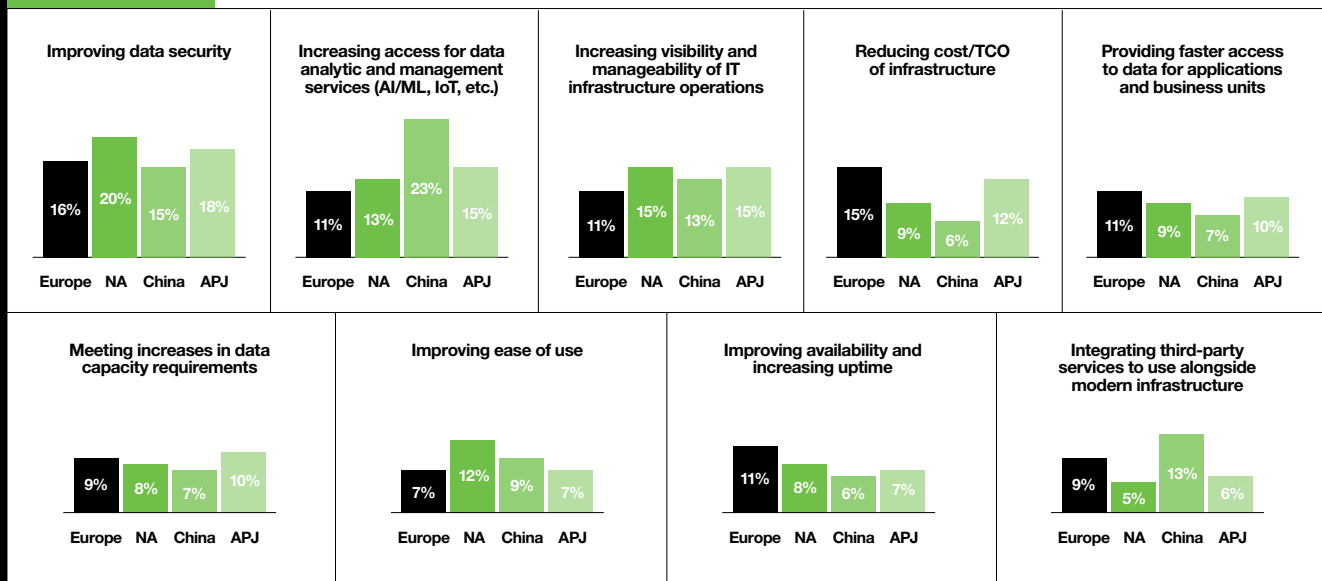
As European enterprises were too focused on maintaining and updating the legacy apps, they could not invest significantly in innovation, because those apps lack agility compared to cloud ones. To quickly adapt to changing business conditions, Europe's data infrastructure needs to be more agile. Migration to the cloud could also be the solution to quickly

and cost-effectively adapt to new business environments and challenges like the COVID-19 era.

Cloud migration can in many cases boost business innovation, making it more agile. But the challenge that the European companies now face is data management. As they store data in hybrid cloud and in multicloud, efficient data management will be a must in order to derive optimal value from data.

This need could explain the finding that 40% of Europe's enterprises are planning to build DataOps capacity and 30% already are in the process of building it. **Europe is conscious of the urgency to implement DataOps** in order to get the most out of data.

FIGURE 17 Factors Driving the Changes in How Data Is Stored



Source: The Seagate Rethink Data Survey, IDC, 2020

¹ The EMEA Datasphere, IDC, 2019



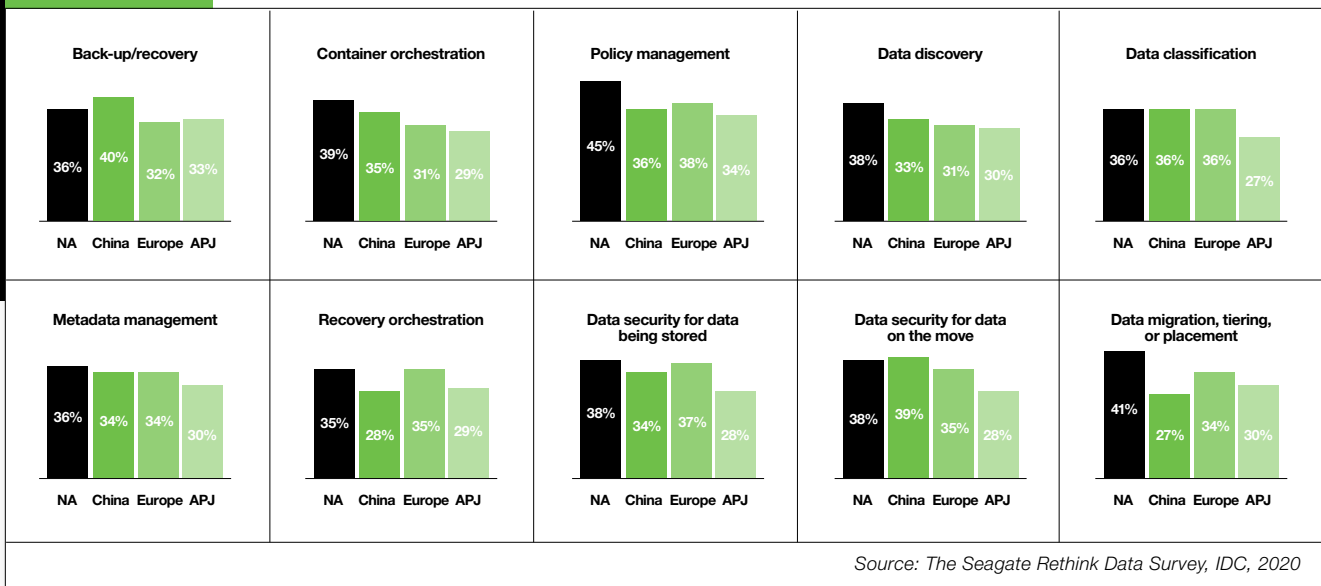
CHAPTER FOUR

North America (NA)

The survey queried enterprises in the United States and Canada.

FIGURE 18

Proportion of Respondents Reporting Their Organizations Have a Single Enterprise-Wide App for Policy Management



DATA BY IDC

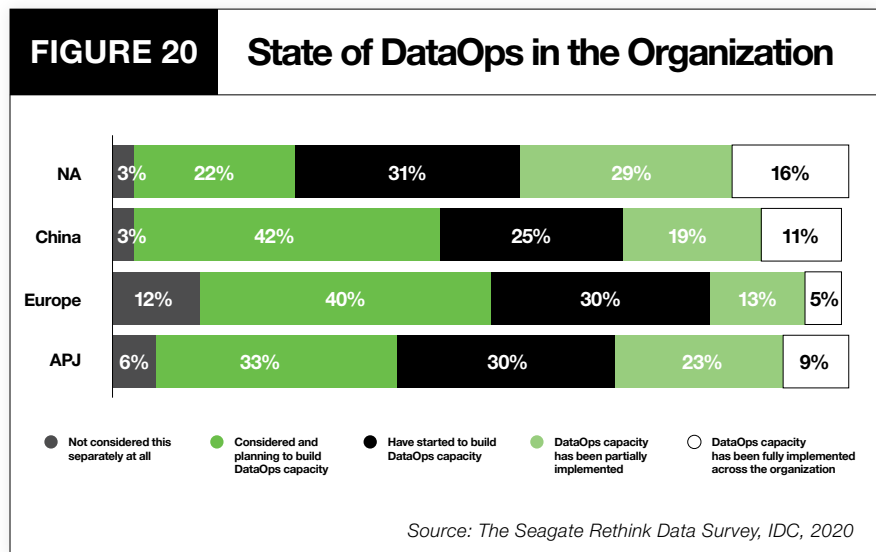
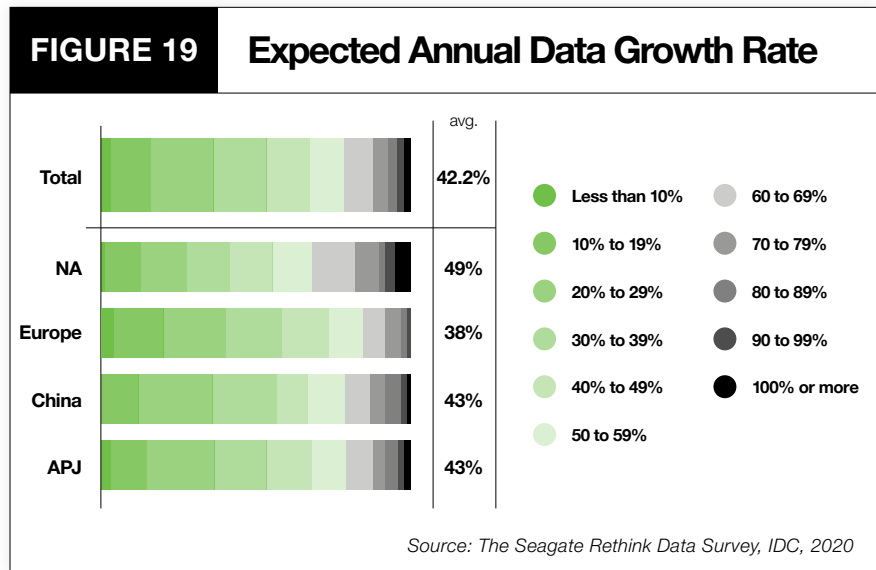
NA is leading other regions when it comes to the integration of data management functions.

- 45% of NA organizations report having a single, enterprise-wide data policy application, compared to 38% in Europe and 34% in APJ (Figure 18).
- NA is the region with the most projected data growth. The region’s enterprise datasphere is set to grow at nearly 50% (faster than the global average of 42.2%) (Figure 19).
- NA has the most advanced DataOps implementation. The region has the greatest number of respondents who say



that DataOps—the discipline connecting data creators with data consumers—has been either fully or partially implemented: a total of 45% of respondents (Figure 20).

- When it comes to determining how their data is stored, NA enterprises are most driven by improving data security (20%) (Figure 21).
- NA organizations are farthest along in getting the most value out of their data (Figure 22).
- NA’s greatest challenges in taking full advantage of data are making collected data usable, managing the storage of collected data, ensuring the security of collected data, and ensuring that needed data is collected (Figure 23).



ANALYSIS BY IDC

What It Means

A unified policy mechanism is the most efficient, automated way to manage data consistently at scale. Arguably, it is the only way to manage data consistently, as manual efforts are not realistic for medium- or large-scale organizations. Policy management is foundational to data management and to leveraging that data.

Based on this survey, it appears that NA organizations are moving most aggressively to implement unified data policies throughout organizations and are most adept at using DataOps to derive maximum value from data.

In general, an enterprise-wide data management policy application (i.e.,

a way to manage policies across the enterprise) indicates a higher level of data management maturity. Therefore, the organizations that implement it are better equipped to fully leverage the value of the data available to them. Certainly, having an enterprise-wide policy application is not assurance of competitive advantage, but it



is a key indicator that would be used in a benchmark to compare organizations.

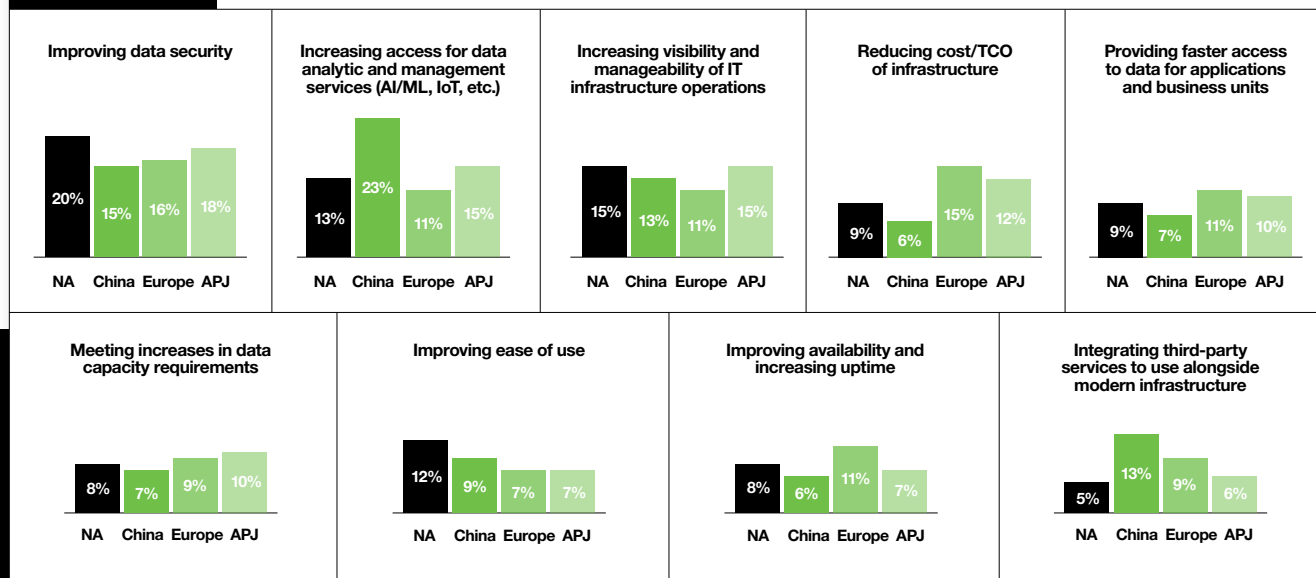
Organizations focused on reducing costs may not be making all the

necessary investments needed to keep up with organizations that are focused on improving data access and extracting value from data.

NA organizations appear to be

focused on data security, perhaps for regulatory reasons and/or in order to maintain IP protection.

FIGURE 21 Factors Driving the Changes in How Data Is Stored



Source: The Seagate Rethink Data Survey, IDC, 2020

SEAGATE POV

A Data Growth Leader

In the next two years, enterprise data is projected to grow at the average annual data growth rate of 42.2%. That’s a lot more than 32% the projected annual average (for all kinds of data, not just enterprise) previously projected by IDC¹. **What sets the NA region apart is that it is driving up the 42.2% global rate with an**

astonishing 49% of expected annual data growth in NA over the next two years.

We can safely conclude that the NA enterprises are drivers of data growth. The data growth in this region is coming from an increased use of IoT devices to automatically gather data, increased use of advanced data analytics, and

increased use of SaaS applications.

When it comes to how NA businesses determine where to store data, data security goals outbid all others. Ascertaining security risks is a key part of smoothly functioning DataOps, as concerns related to hackers, industry espionage, intellectual property, and geopolitical defense

¹ Data Age 2025, sponsored by Seagate with data from Global DataSphere, IDC, May 2020

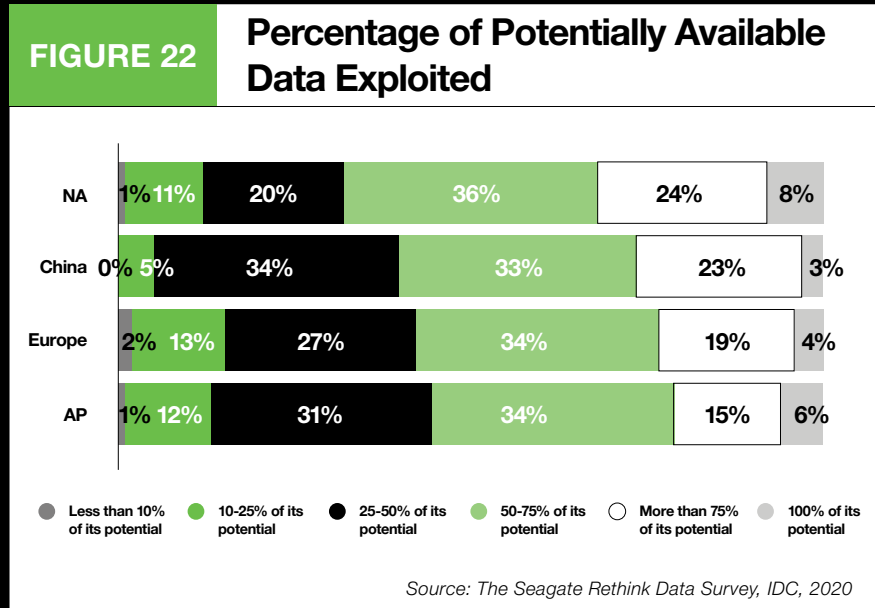


are on the minds of owners of NA organizations. The drive to protect business data also has to do with something a lot more mundane, but just as important: business continuity. In the US, there is a great deal of education and publicity around these data security issues as NA's data is protected at a company level; there is no national firewall.

With many companies implementing DataOps or at least intending to, NA respondents indicated that they are the furthest along when it comes to exploitation of data (Figure 22).

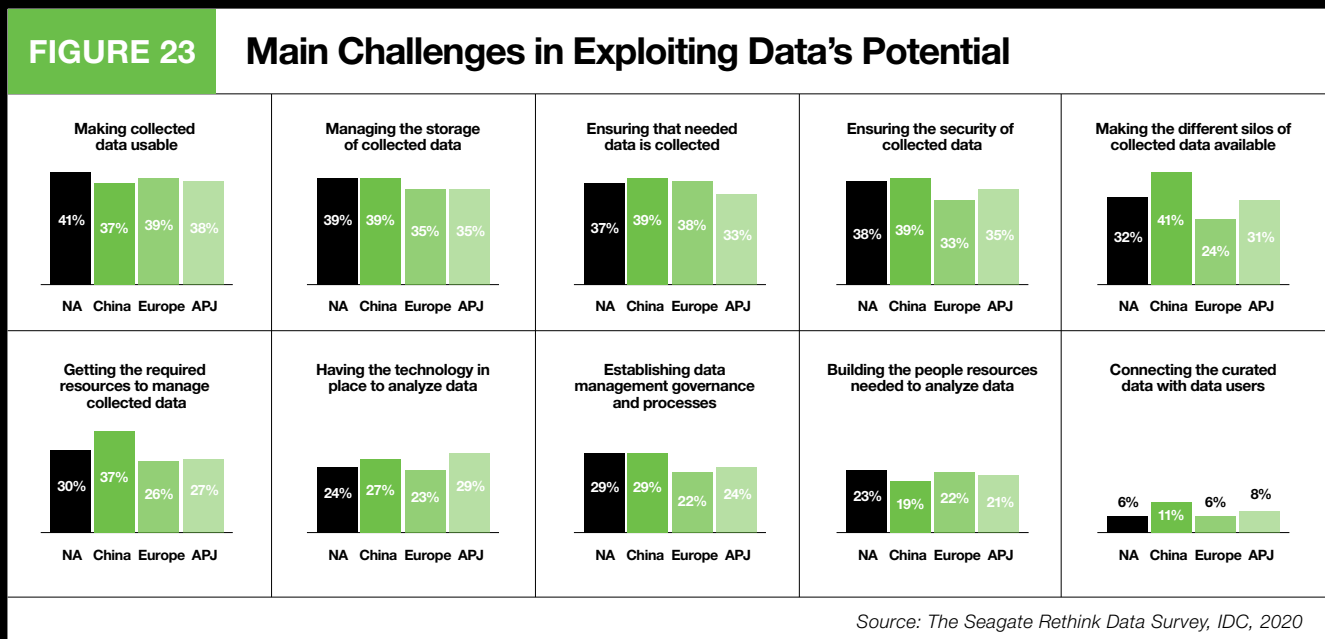
At the same time, they recognized that the greatest challenges in taking full advantage of data included making collected data usable, managing the storage of collected data, ensuring the security of collected data, and ensuring that needed data is collected (Figure 23).

Knowing the appropriate storage



environment for various data sets, classifying data correctly based on communication between data creators and business owners, setting goals for various types of data, making sure that the needed data is collected, securing data, as well as converting collected data to usable data—these are all concerns that comprise DataOps.

Respondents from NA in particular stood out from other regions by noting their need to improve the ease of data's use (Figure 21). This is useful self-awareness. While the NA region is fairly advanced in adopting DataOps and relatively well educated on the need to implement it, more education and practice of the discipline are needed to better take advantage of available data.





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