# Industry Insights:
# Data and Analytics Management

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# Objectives and Methodology

**OVERVIEW**

- Methodology, data collection, and analysis by Endeavor Business Intelligence on behalf of Cloudera. Data collected February 9 through April 13, 2023.

- Methodology conforms to accepted marketing research methods, practices and procedures.

**METHODOLOGY**

- Between February 9, and April 12, 2023, Endeavor Business Intelligence emailed invitations to participate in an online survey to members of our *Smart Industry*, *Plant Services,* and *IndustryWeek* databases.

- By April 13, 2023, Endeavor Business Intelligence had received 113 qualified, completed responses to the survey. Only respondents with 500 or more employees who have already implemented or have plans to implement a digital transformation strategy are included in the report.

**RESPONSIVE MOTIVATION**

- To encourage prompt response and increase the response rate overall, a live link to the survey was included in the email invitation to route respondents directly to the online survey.

- The invitations and survey were branded with the appropriate Endeavor Business Media logo to take advantage of user affinity for these valuable brands.

- Each respondent was afforded the opportunity to enter a drawing for one of four $100 Amazon.com gift cards. On March 28, an enhanced incentive of a $10 Amazon.com card for all qualified respondents was added to the survey efforts.

# Executive Summary:

## The State of Data and Digital Transformation/Industry 4.0 in the Manufacturing Industry

***Study: Data and analytics management***
***The wealth of data created is causing manufacturers to prioritize ways to use it for greater business value.***

Manufacturing organizations already have or plan to put in place a digital transformation or Industry 4.0 strategy, and now they're backing it with investment: 43% have said they are budgeting $1 million or more in the next year for these initiatives.

The survey — conducted by *Smart Industry* in partnership with Cloudera — sought to understand how manufacturers plan to gain insights from their data and the challenges they face or expect to encounter along the way.

For example, their investments are being driven by the need to achieve business outcomes, including:

- Reducing operational costs
- Improving the customer experience
- Improving product quality
- Gaining a competitive edge

To meet these objectives, they're collecting all kinds of data, such as operational, customer, and product data. And so, it makes sense that their top technology investment priority is real-time analytics.

However, less than 50% of the respondents are collecting sensor/IoT data or application and security logs today, and only about one-third are utilizing streaming or real-time data. This could indicate that legacy technology is preventing manufacturers from fully unleashing the value of data.

# Executive Summary:

## The State of Data and Digital Transformation/Industry 4.0 in the Manufacturing Industry

Manufacturing organizations are currently using data and analytics to solve problems around product quality, process automation, asset maintenance, and demand forecasting/inventory management.

That said, it's also apparent they need an underpinning platform to better manage and glean insights from their data. For example, respondents cite multiple challenges associated with using more data, such as:

Legacy infrastructure and systems that cannot support the volume of data
Silos of data across different organizations and business units
The complexity of their data environment

Many manufacturers (48%) are trying to overcome these hurdles by leaning on hybrid or multiple clouds for improved data management. They are driven by the need to streamline business operations applications, reduce costs, and improve security and governance. It's a strategy that is garnering success. For example, 64% of the hybrid/multi-cloud adopters agree that the approach has helped them achieve their business goals.

Looking ahead, most manufacturers (68%) said they expect to increase the amount of data managed in the cloud over the next 12 months, whether that's hybrid, private, or multiple providers of cloud. Among all respondents, 56% see value in moving all data to hybrid cloud.

However, 41% agreed that some data must remain on-premises or in a private cloud — a good reason to rely on a management platform that helps unify data across all these environments to better analyze it and gain insights.

*Delve into the full survey results for more information.*

Respondent Profile

# Company Profile

- **Respondent companies manufacture a variety of products. <u>Sixteen percent</u> manufacture <u>transportation and industrial equipment</u>, while <u>12%</u> manufacture <u>advanced electronics and semiconductors.</u>**

### What is your company's primary product at your location/division?
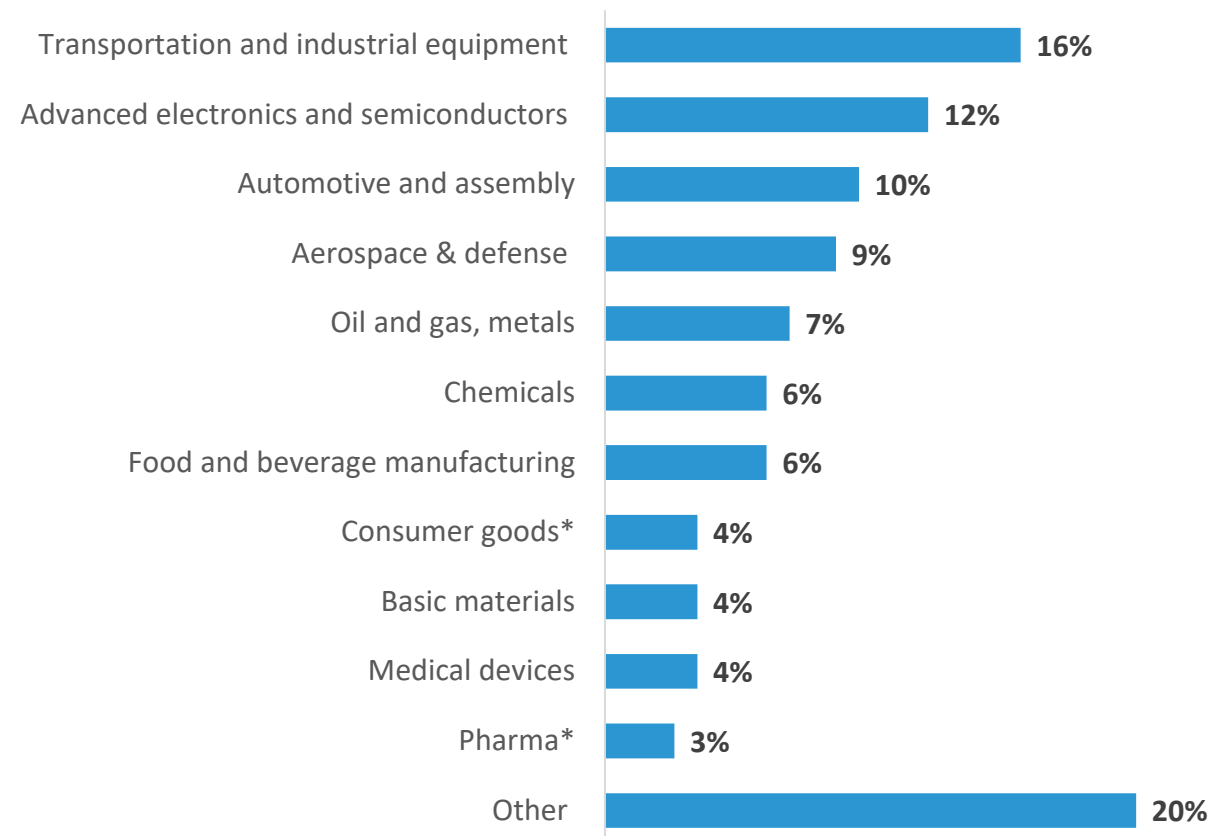
| Category | Percent |
|---|---|
| Transportation and industrial equipment | 16% |
| Advanced electronics and semiconductors | 12% |
| Automotive and assembly | 10% |
| Aerospace & defense | 9% |
| Oil and gas, metals | 7% |
| Chemicals | 6% |
| Food and beverage manufacturing | 6% |
| Consumer goods* | 4% |
| Basic materials | 4% |
| Medical devices | 4% |
| Pharma* | 3% |
| Other | 20% |

*Base: All respondents (n=113).*
*\*Analyst note: Choices marked with an asterisk were coded into these categories from the write-in responses to "other".*

# Respondent Profile

- **Respondents have a variety of job positions within their organization. <u>Thirty-eight percent</u> work in <u>engineering</u>, while <u>13%</u> are in <u>R&D</u> and <u>12%</u> are in <u>IT</u>.**

### Which of these best describes your position in the organization?

| Position | % |
|---|---|
| Operations Director/SVP; Senior Manager of the Unit | 20% |
| Data Analyst/Scientist/Architect | 20% |
| Engineer/Engineering Management* | 18% |
| Manager Level* | 13% |
| IT Director/Vice President | 10% |
| Chief Data Officer/Chief Data & Analytics Officer | 2% |
| Owner, Co-Owner, Partner, CEO | 2% |
| CTO/CIO | 1% |
| Other | 14% |

### In which one of these functional areas are you primarily employed within your organization?

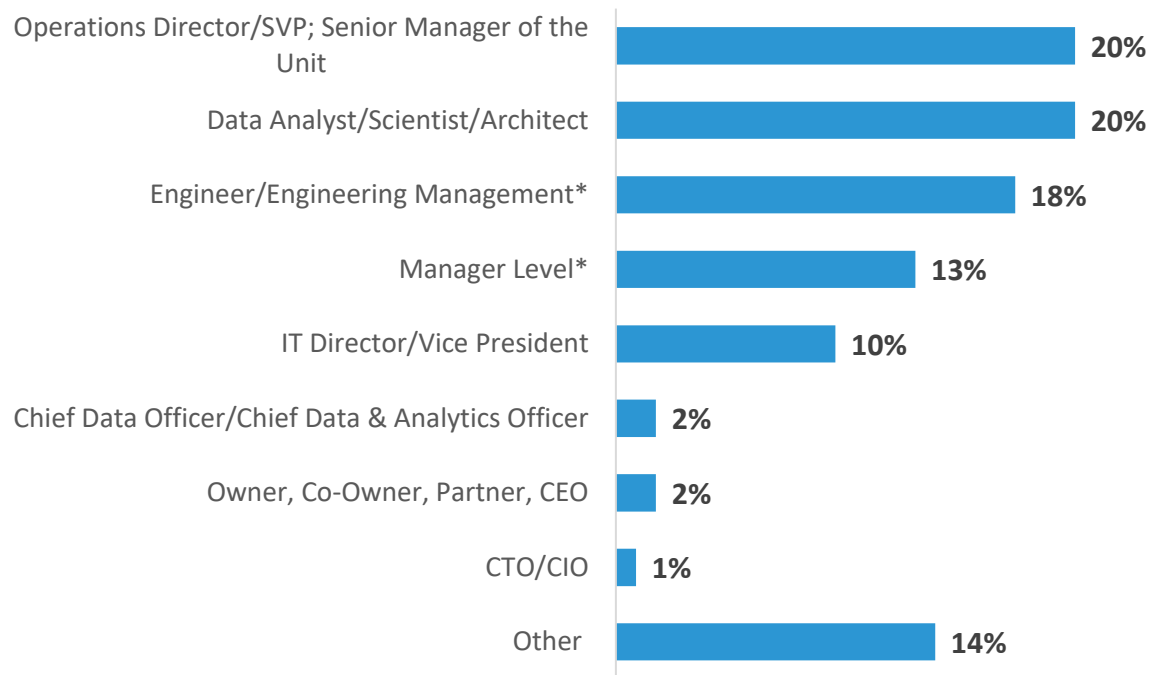| Functional area | % |
|---|---|
| Engineering | 38% |
| Design/research and development | 13% |
| Information technology | 12% |
| Production/manufacturing | 6% |
| Quality control | 5% |
| Business direction and strategy | 4% |
| Operations | 4% |
| Marketing communications | 4% |
| Facilities/property | 4% |
| Client services/relationship management | 2% |
| Business development/sales/channel | 2% |
| Purchasing/procurement | 2% |
| Logistics/supply chain/transport/fleet | 2% |
| Health and safety | 2% |
| Risk/fraud/compliance/governance | 1% |
| Other | 1% |

*Base: All respondents (n=113).*
*Analyst note: Choices marked with an asterisk were coded into these categories from the write-in responses to "other".*

*Base: All respondents (n=112).*

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# Company Size

- **Only respondents at companies with 500 or more employees were qualified to answer the survey. <u>Nearly two-thirds (64%) have 5,000 or more employees</u> and <u>76% have revenues of $1 billion or more.</u>**

### How many employees does your organization have globally?

| | |
|---|---|
| 5,000 or more employees | **64%** |
| 3,000-4,999 employees | **13%** |
| 1,000-2,999 employees | **12%** |
| 500-999 employees | **11%** |
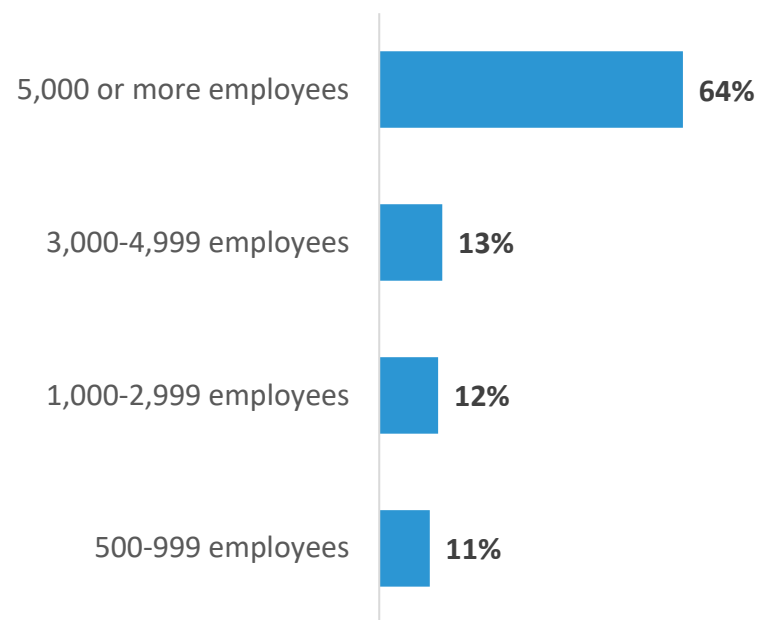
*Base: All respondents (n=113).*

### Into which of the following ranges does your company's annual revenue fall?

| | |
|---|---|
| $20 billion or more | **26%** |
| $10 billion to $19.9 billion | **12%** |
| $5 billion to $9.9 billion | **19%** |
| $1 billion to $4.9 billion | **19%** |
| $500 million to $999 million | **13%** |
| Less than $500 million | **12%** |
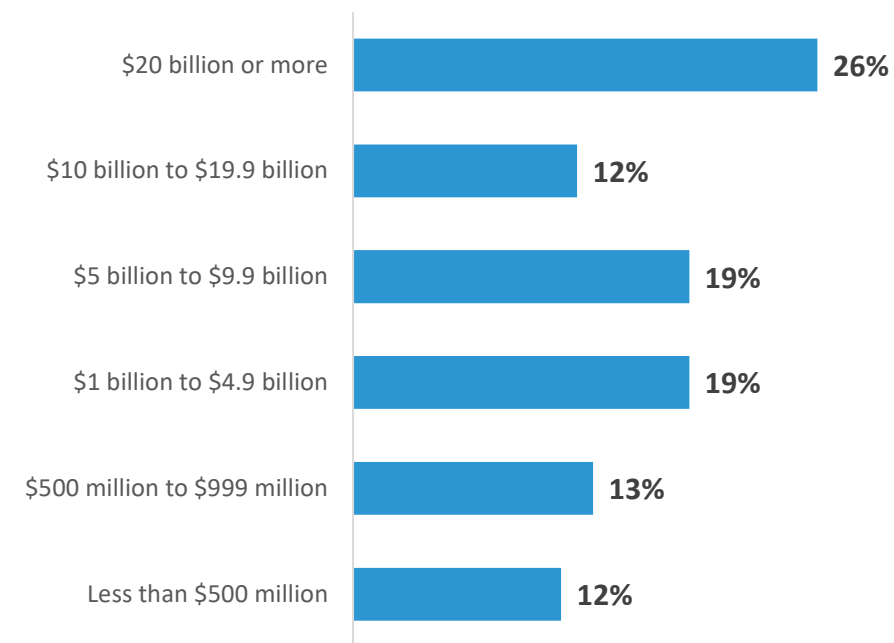
*Base: All respondents (n=113).*

# Company Location

- **Respondents are primarily located in <u>North America (91%)</u>.**

### Where are you located?

| Location | Percentage |
|---|---|
| North America | 91% |
| Europe | 4% |
| Central/South America | 2% |
| Middle East | 1% |
| Africa | 1% |
| Asia | 1% |

*Base: All respondents (n=113).*

Key Findings

# Digital Transformation Strategy

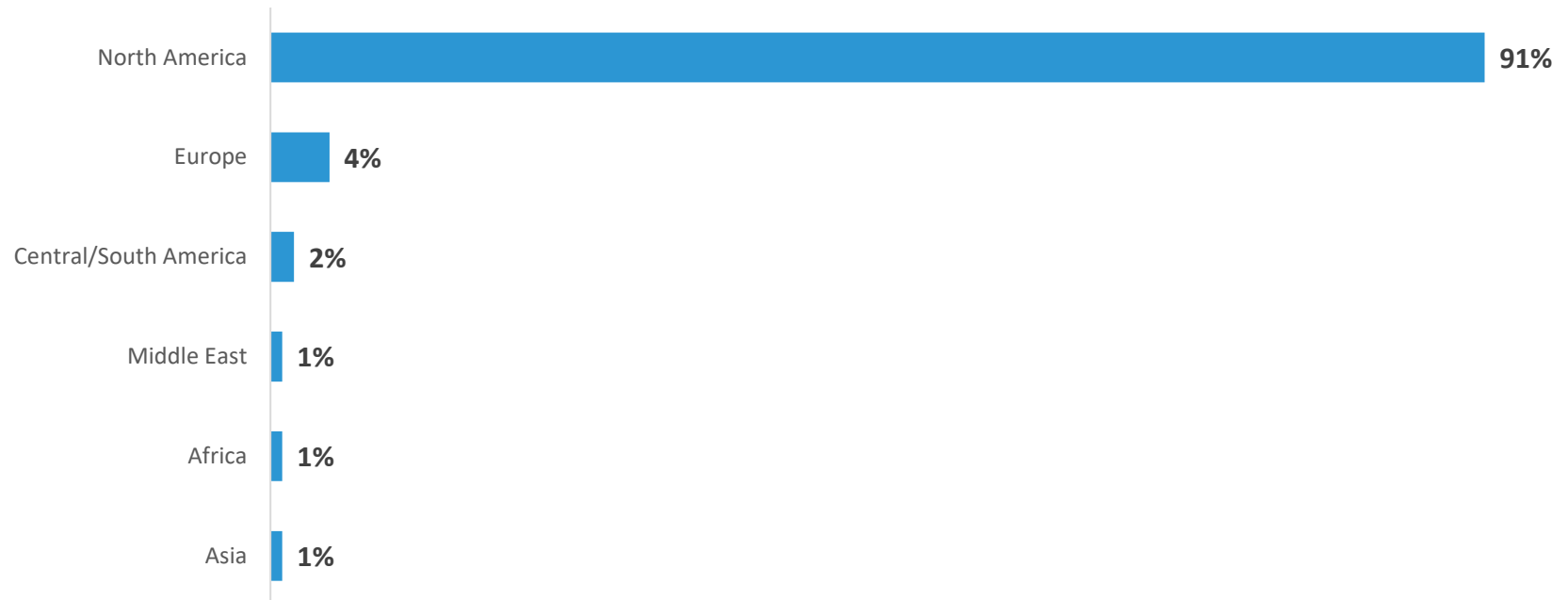- **Only respondents who currently have or plan to have a digital transformation/industry 4.0 strategy qualified to answer the survey. <u>Sixty-one percent</u> have had a strategy in place for <u>more than a year</u>. Large companies are leading the way with digital transformation, as <u>74% of companies with revenues of $10 billion or more</u> have had a digital transformation strategy in place for more than a year.**

## Does your organization currently have a digital transformation/Industry 4.0 strategy?

Yes, this has been in place for more than a year
**61%**

No, we do not have a digital transformation strategy in place but plan to beyond the next 12 months
**14%**

No, we do not have a digital transformation strategy in place but plan to within the next 12 months
**13%**

Yes, this has been in place for less than a year
**12%**
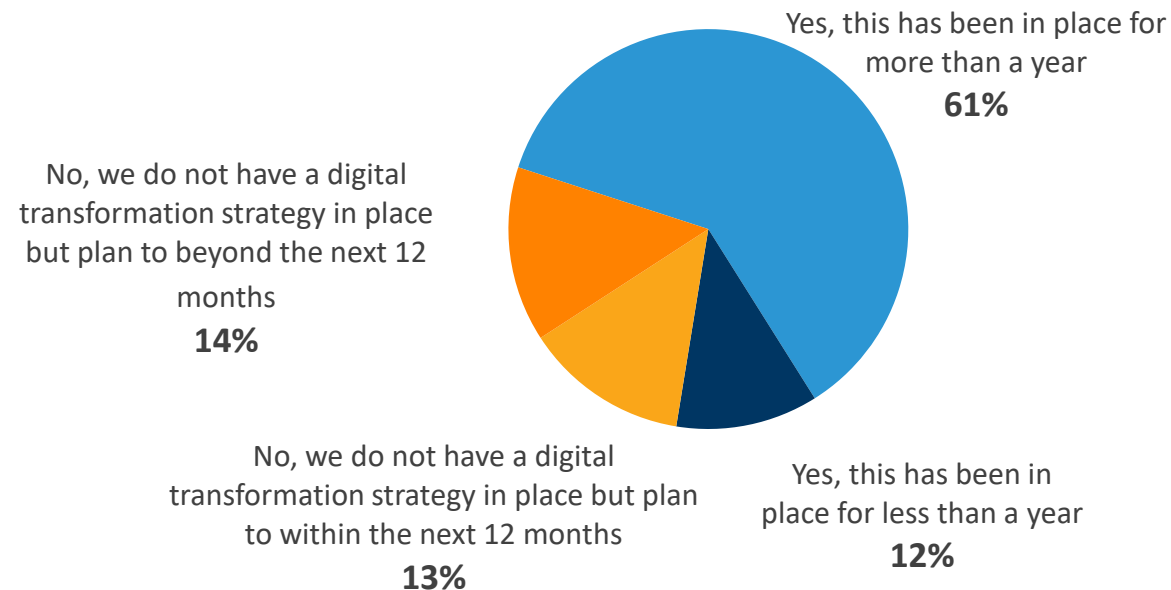
*Base: All respondents (n=113).*

# Digital Transformation Budget

- **Forty-three percent** of respondents have budgeted **$1 million or more** for digital transformation initiatives in the next 12 months. Companies who have had a digital transformation strategy in place for more than a year plan to continue their investments, as 50% of these respondents have $1 million or more budgeted to digital transformation initiatives.

### Approximately how much budget does your organization plan to spend on digital transformation initiatives in the next 12 months?

| Category | Percentage |
|---|---|
| More than $5 million | 25% |
| $1 million to $5 million | 18% |
| $500,000 to less than $1 million | 21% |
| Less than $500,000 | 12% |
| I don't know | 24% |
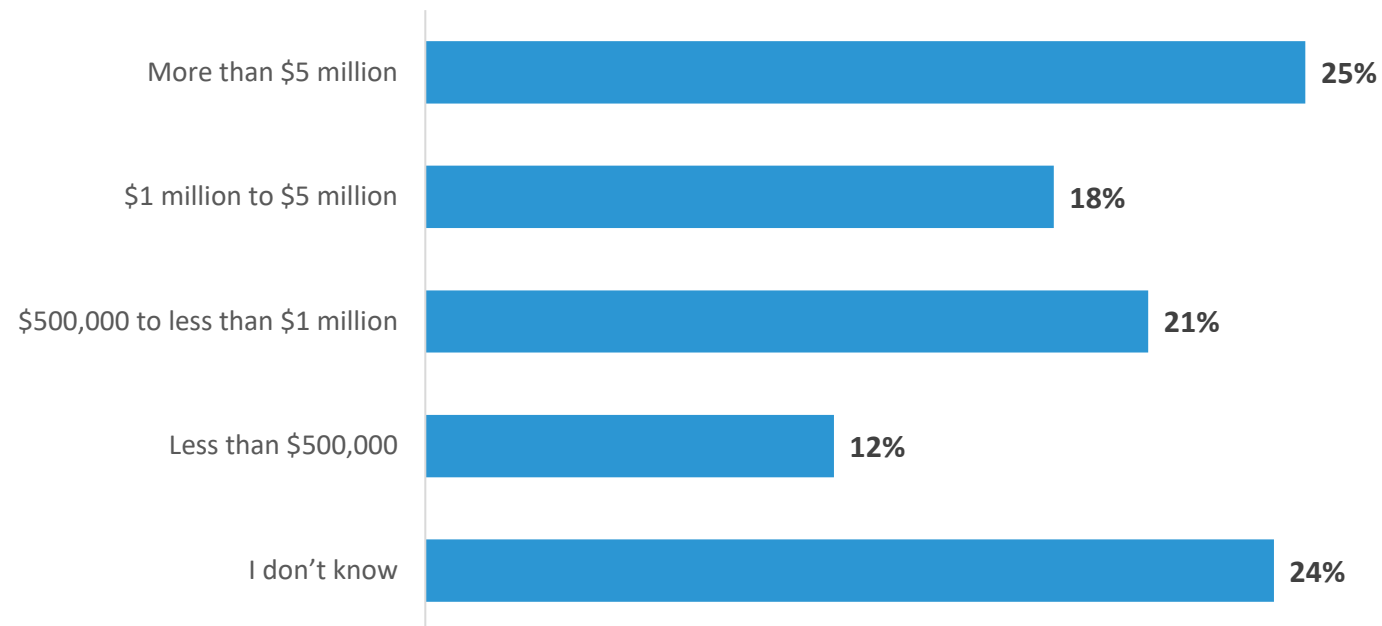
*Base: All respondents (n=111).*

# Technology Investment Drivers

- **A <u>reduction in operating costs (73%)</u>, <u>improved customer satisfaction (65%)</u>, and <u>improved product quality (63%)</u> are the top drivers for investments in data and analytics technology.**

### What are the top business drivers for your company's investments in adopting data and analytics technologies? (Please select all that apply.)

| Driver | Percentage |
|---|---|
| Reduce operations costs | 73% |
| Improve customer experience/satisfaction | 65% |
| Improve product quality | 63% |
| Innovation / Gain a competitive edge | 62% |
| Increase revenue | 54% |
| Reduce risk / Remain in compliance (regulatory, security, etc.) | 41% |
| Improve employee experience/satisfaction | 34% |
| I don't know | 1% |
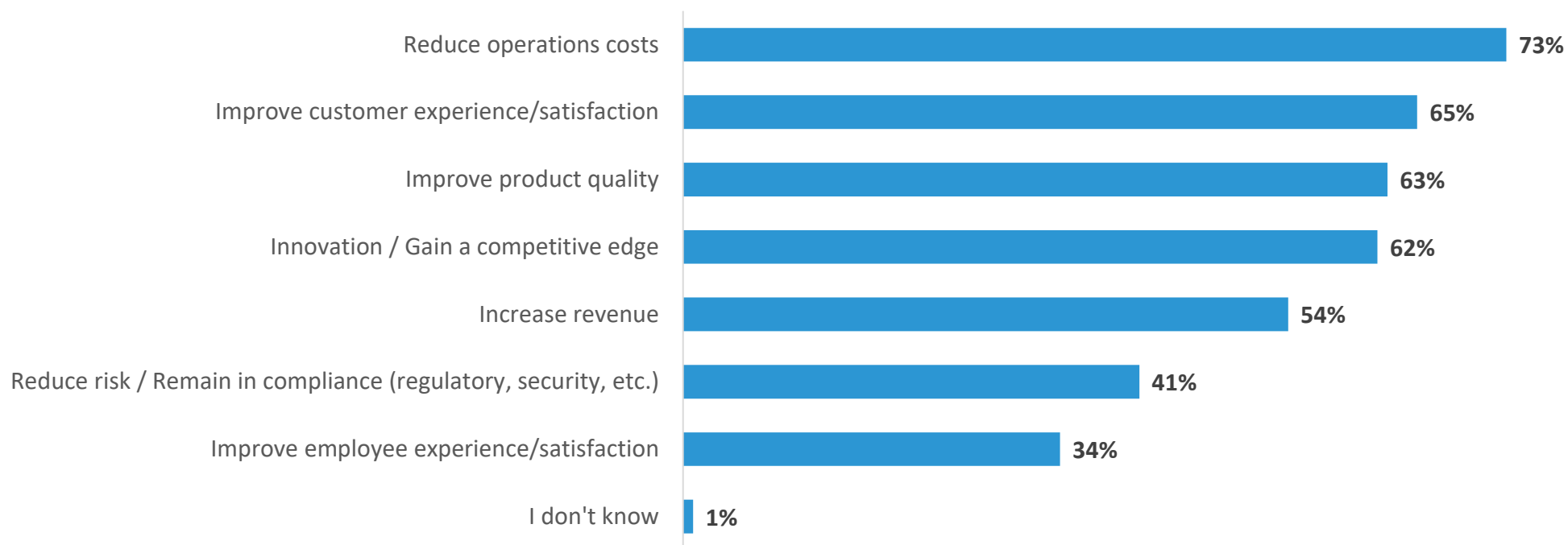
*Base: All respondents (n=113); multiple answers allowed.*

# Technology Investment Priorities – Ranked by Top Five

- **Real-time analytics and reporting, cybersecurity, and factory automation are the top priorities for technology investments in the next 12 months.**

Please rank your top five priorities for technology investments in the next 12 months.



Legend: ■ First choice ■ Second choice ■ Third choice ■ Fourth choice ■ Fifth choice

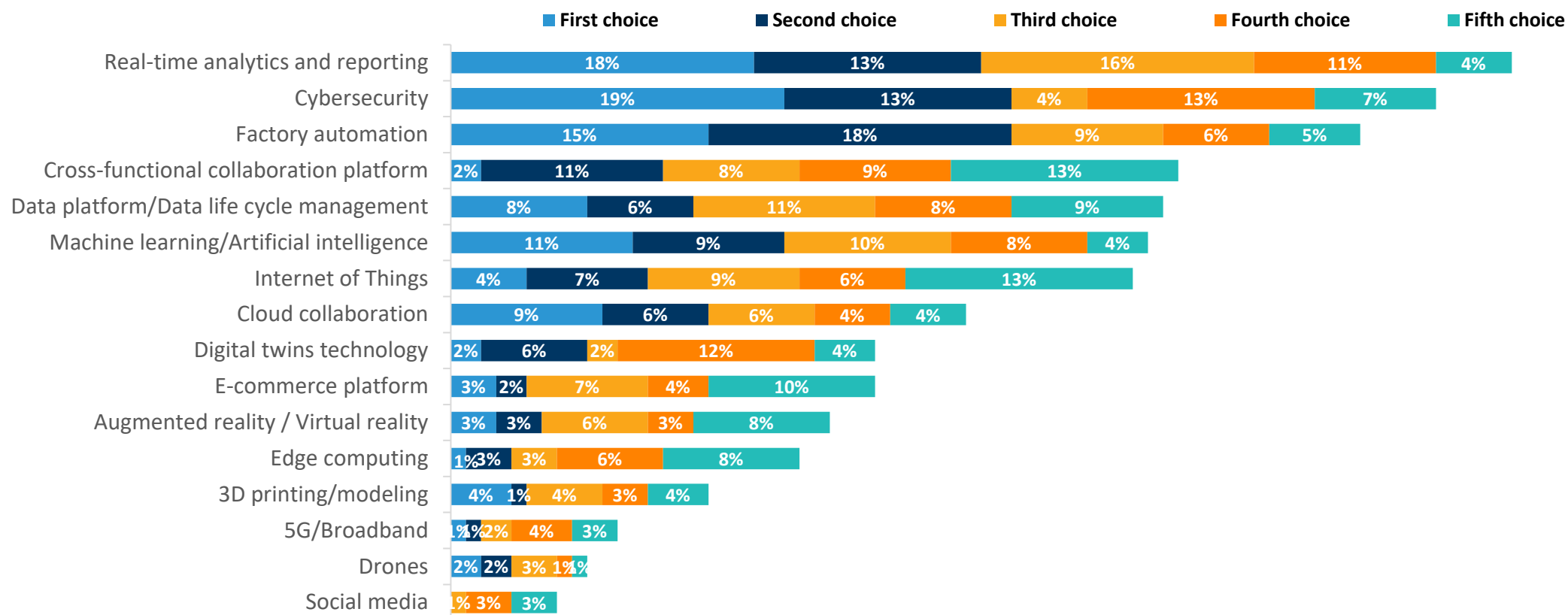| | First choice | Second choice | Third choice | Fourth choice | Fifth choice |
|---|---|---|---|---|---|
| Real-time analytics and reporting | 18% | 13% | 16% | 11% | 4% |
| Cybersecurity | 19% | 13% | 4% | 13% | 7% |
| Factory automation | 15% | 18% | 9% | 6% | 5% |
| Cross-functional collaboration platform | 2% | 11% | 8% | 9% | 13% |
| Data platform/Data life cycle management | 8% | 6% | 11% | 8% | 9% |
| Machine learning/Artificial intelligence | 11% | 9% | 10% | 8% | 4% |
| Internet of Things | 4% | 7% | 9% | 6% | 13% |
| Cloud collaboration | 9% | 6% | 6% | 4% | 4% |
| Digital twins technology | 2% | 6% | 2% | 12% | 4% |
| E-commerce platform | 3% | 2% | 7% | 4% | 10% |
| Augmented reality / Virtual reality | 3% | 3% | 6% | 3% | 8% |
| Edge computing | 1% | 3% | 3% | 6% | 8% |
| 3D printing/modeling | 4% | 1% | 4% | 3% | 4% |
| 5G/Broadband | 1% | 1% | 2% | 4% | 3% |
| Drones | 2% | 2% | 3% | 1% | 1% |
| Social media | 1% | 3% | 3% | | |

*Base: All respondents (n=113).*

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# Technology Investment Priorities – Ranked by Top Three

- **The chart below presents the top priorities for technology investments, the same question as the previous slide, ranked by the top three. <u>Real-time analytics and reporting</u>, <u>factory automation</u>, and <u>cybersecurity</u> are the top three priorities.**

Please rank your top priorities for technology investments in the next 12 months.



*Base: All respondents (n=113).*

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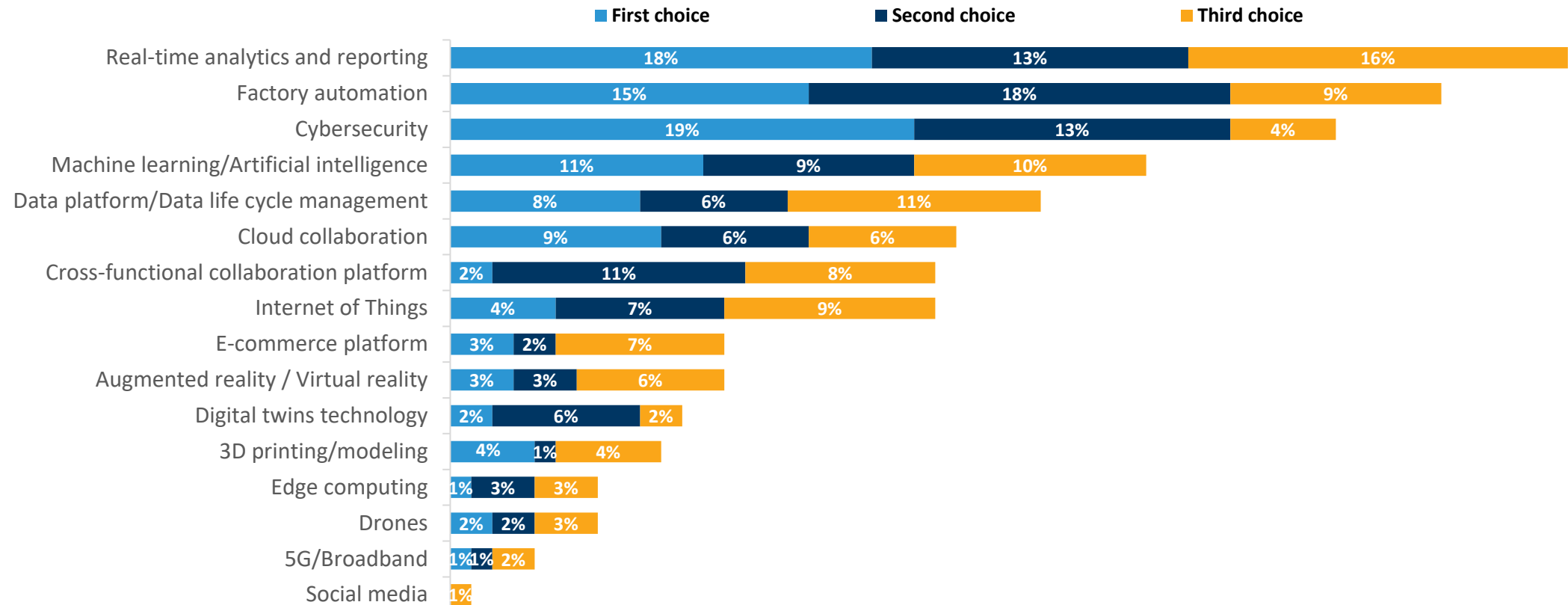
# Current Sources of Data

- **Respondents are likely to collect and analyze <u>operational data (81%)</u>, <u>customer data (76%)</u>, and <u>product data (70%).</u>**

### What data sources do you collect and analyze today? (Please select all that apply.)

| Data Source | Percentage |
|---|---|
| Operational data (OT) | 81% |
| Customer data | 76% |
| Product data | 70% |
| Sensor or Internet-of-Things data | 47% |
| Application and security Logs | 45% |
| Streaming data/real-time data sources | 38% |
| Historians | 30% |
| Behavioral data | 21% |
| Other | 1% |
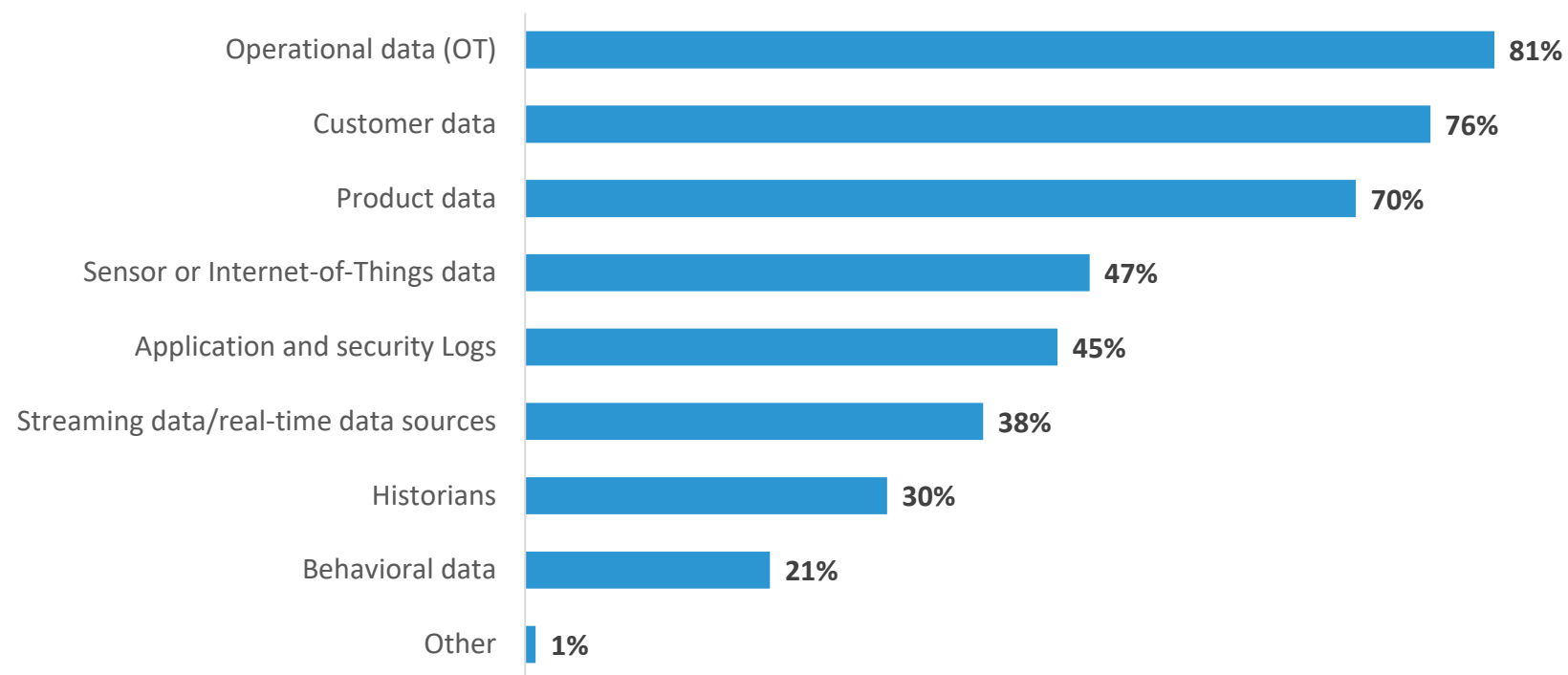
*Base: All respondents (n=112); multiple answers allowed.*

# Use of Data Analytics

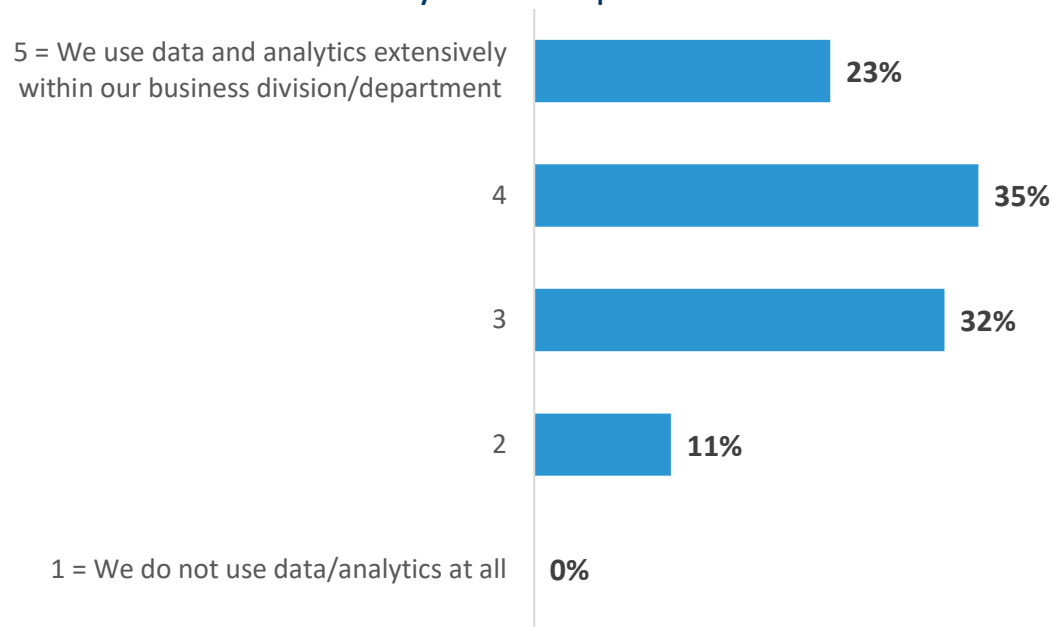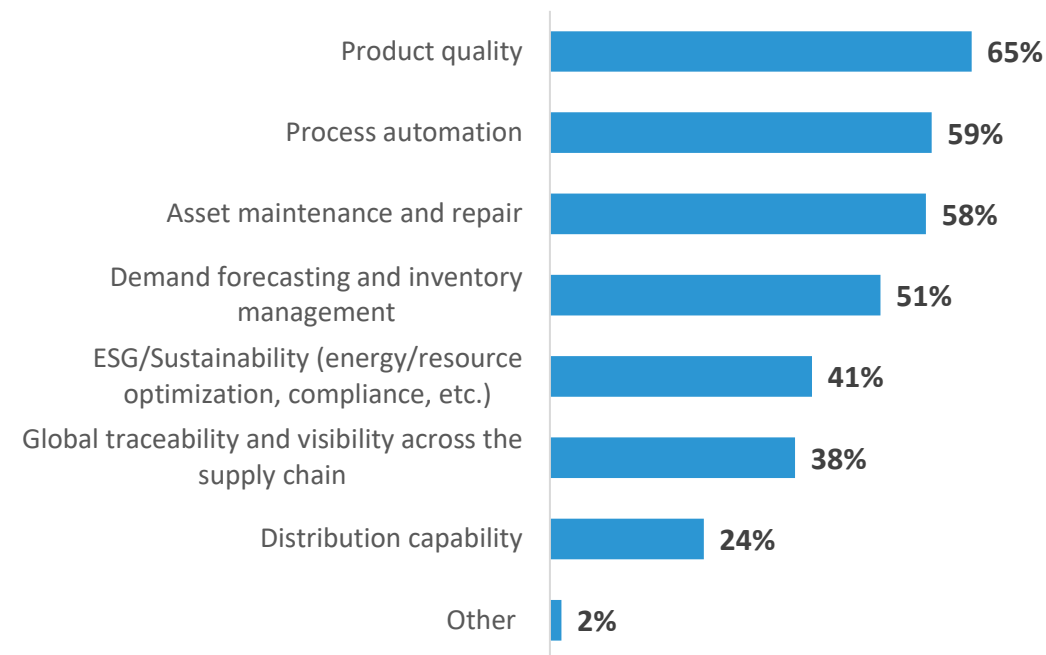- **Respondents are likely to use data and analytics within their business division. They are most likely to use data to solve challenges with <u>product quality (65%)</u>, <u>process automation (59%)</u>, and/or <u>asset maintenance and repair (58%)</u>.**

### To what extent does your business division/department currently use data and analytics in its processes?

| | |
|---|---|
| 5 = We use data and analytics extensively within our business division/department | 23% |
| 4 | 35% |
| 3 | 32% |
| 2 | 11% |
| 1 = We do not use data/analytics at all | 0% |

*Base: All respondents (n=113).*

### Which business/operational challenges is your company currently using data to solve? (Please select all that apply.)

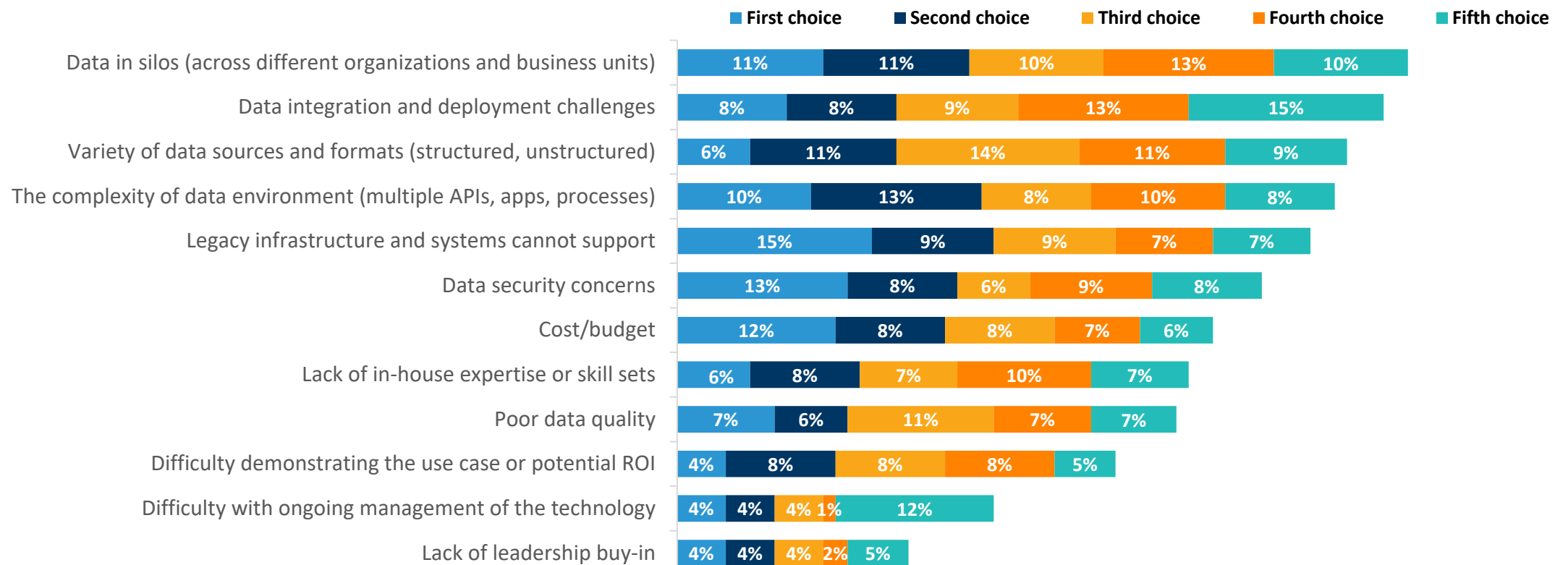| | |
|---|---|
| Product quality | 65% |
| Process automation | 59% |
| Asset maintenance and repair | 58% |
| Demand forecasting and inventory management | 51% |
| ESG/Sustainability (energy/resource optimization, compliance, etc.) | 41% |
| Global traceability and visibility across the supply chain | 38% |
| Distribution capability | 24% |
| Other | 2% |

*Base: All respondents (n=113); multiple answers allowed.*

# Internal Data Challenges – Ranked by Top Five

- **Respondents are likely to experience multiple internal challenges with using more data, including <u>siloed data</u>, <u>data integration and deployment challenges</u>, <u>multiple data sources and formats</u>, <u>data complexity</u>, and <u>legacy infrastructure that cannot support the analysis</u>.**

Please rank the top five internal challenges associated with using more data for your organization.
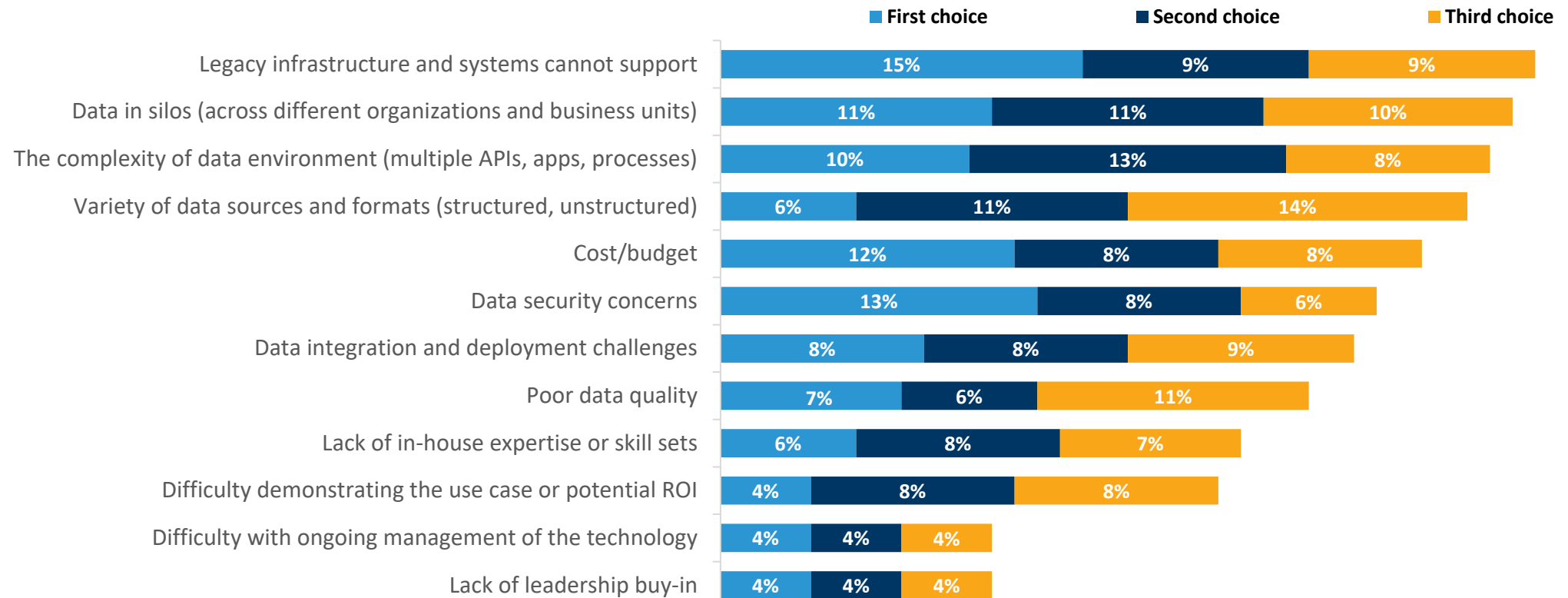
| | First choice | Second choice | Third choice | Fourth choice | Fifth choice |
|---|---|---|---|---|---|
| Data in silos (across different organizations and business units) | 11% | 11% | 10% | 13% | 10% |
| Data integration and deployment challenges | 8% | 8% | 9% | 13% | 15% |
| Variety of data sources and formats (structured, unstructured) | 6% | 11% | 14% | 11% | 9% |
| The complexity of data environment (multiple APIs, apps, processes) | 10% | 13% | 8% | 10% | 8% |
| Legacy infrastructure and systems cannot support | 15% | 9% | 9% | 7% | 7% |
| Data security concerns | 13% | 8% | 6% | 9% | 8% |
| Cost/budget | 12% | 8% | 8% | 7% | 6% |
| Lack of in-house expertise or skill sets | 6% | 8% | 7% | 10% | 7% |
| Poor data quality | 7% | 6% | 11% | 7% | 7% |
| Difficulty demonstrating the use case or potential ROI | 4% | 8% | 8% | 8% | 5% |
| Difficulty with ongoing management of the technology | 4% | 4% | 4% | 1% | 12% |
| Lack of leadership buy-in | 4% | 4% | 4% | 2% | 5% |

*Base: All respondents (n=107).*

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# Internal Data Challenges – Ranked by Top Three

- **The chart below presents the top internal challenges, the same question as the previous slide, ranked by the top three. <u>Legacy infrastructure</u>, <u>siloed data</u>, and <u>data complexity</u> are the top challenges when ranking the top three selections.**

### Please rank the top five internal challenges associated with using more data for your organization.
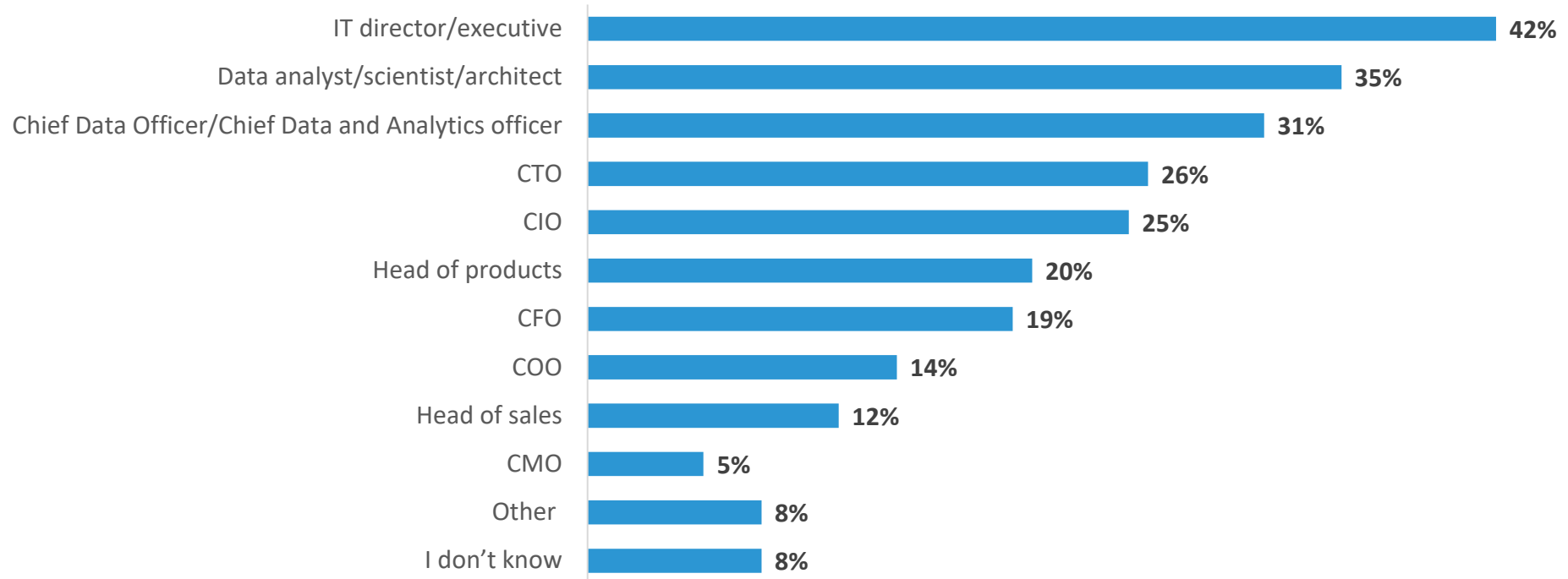


Legend: ■ First choice  ■ Second choice  ■ Third choice

| Challenge | First choice | Second choice | Third choice |
|---|---|---|---|
| Legacy infrastructure and systems cannot support | 15% | 9% | 9% |
| Data in silos (across different organizations and business units) | 11% | 11% | 10% |
| The complexity of data environment (multiple APIs, apps, processes) | 10% | 13% | 8% |
| Variety of data sources and formats (structured, unstructured) | 6% | 11% | 14% |
| Cost/budget | 12% | 8% | 8% |
| Data security concerns | 13% | 8% | 6% |
| Data integration and deployment challenges | 8% | 8% | 9% |
| Poor data quality | 7% | 6% | 11% |
| Lack of in-house expertise or skill sets | 6% | 8% | 7% |
| Difficulty demonstrating the use case or potential ROI | 4% | 8% | 8% |
| Difficulty with ongoing management of the technology | 4% | 4% | 4% |
| Lack of leadership buy-in | 4% | 4% | 4% |

*Base: All respondents (n=107).*

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# Data Responsibility

- **The responsibility for the use of data and analytics is likely to fall to <u>IT directors/executives (42%)</u>, <u>data analysts/scientists/architects (35%)</u>, or the <u>Chief Data Officer (31%)</u>.**

### Who is currently championing the use of data and analytics within your organization? (Please select all that apply.)
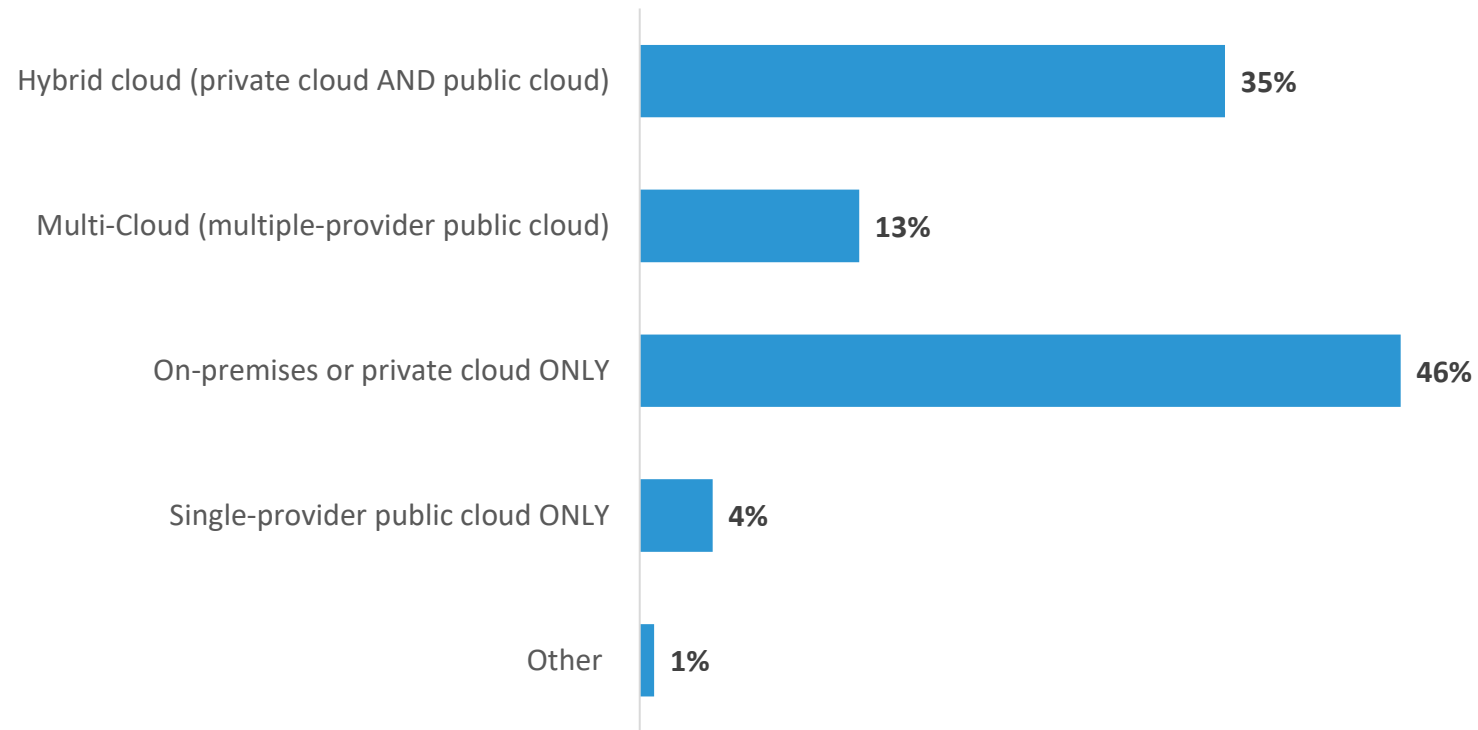
| Role | Percentage |
|---|---|
| IT director/executive | 42% |
| Data analyst/scientist/architect | 35% |
| Chief Data Officer/Chief Data and Analytics officer | 31% |
| CTO | 26% |
| CIO | 25% |
| Head of products | 20% |
| CFO | 19% |
| COO | 14% |
| Head of sales | 12% |
| CMO | 5% |
| Other | 8% |
| I don't know | 8% |

*Base: All respondents (n=113); multiple answers allowed.*

# Data Management Solutions

- **Nearly half of respondents use a <u>hybrid cloud (35%)</u> or <u>multi-cloud (13%)</u> solution to manage data.**

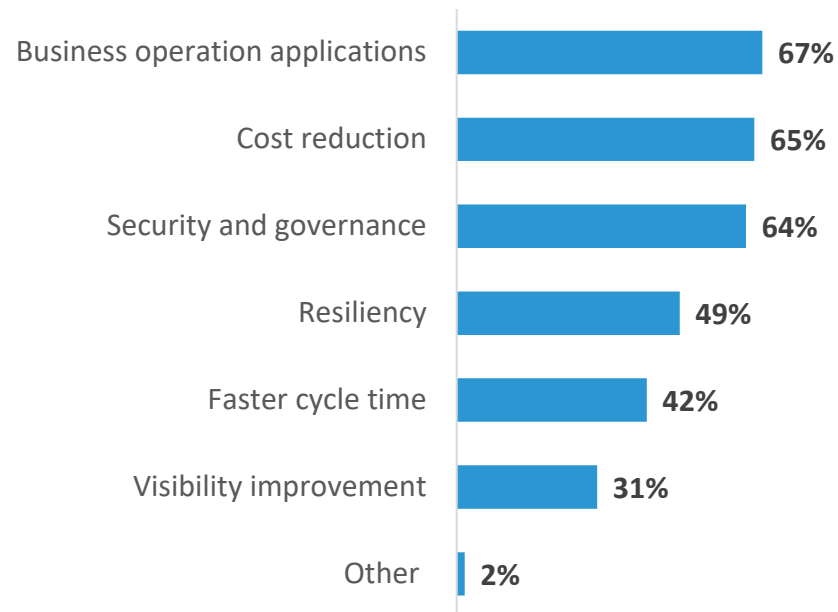### Where does your organization manage data?



| Category | Percentage |
|---|---|
| Hybrid cloud (private cloud AND public cloud) | 35% |
| Multi-Cloud (multiple-provider public cloud) | 13% |
| On-premises or private cloud ONLY | 46% |
| Single-provider public cloud ONLY | 4% |
| Other | 1% |

*Base: All respondents (n=113).*

# Hybrid and Multi-Cloud Strategies

- **Respondents are most likely to use a hybrid or multi-cloud solution due to <u>business operation applications (67%)</u>, <u>cost reduction (65%)</u>, or <u>security and governance (64%)</u>. Nearly two-thirds of respondents (<u>64%</u>) who use a hybrid or multi-cloud solution indicate that it has <u>helped advance or achieve business goals</u>.**

Which factors drive your organization's hybrid or multi-cloud data strategy? (Please select all that apply)

| | |
|---|---|
| Business operation applications | 67% |
| Cost reduction | 65% |
| Security and governance | 64% |
| Resiliency | 49% |
| Faster cycle time | 42% |
| Visibility improvement | 31% |
| Other | 2% |

*Base: Respondents using a hybrid or multi-cloud strategy (n=55); multiple answers allowed.*

Has a hybrid or multi-cloud strategy helped advance or achieve your organization's business goals?
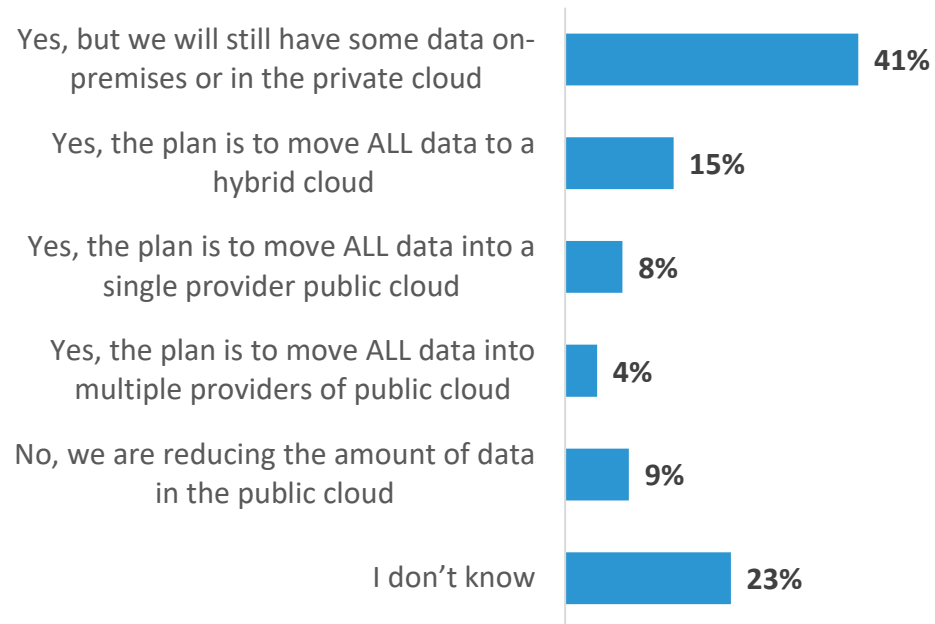
Yes **64%**
I don't know **31%**
No **5%**
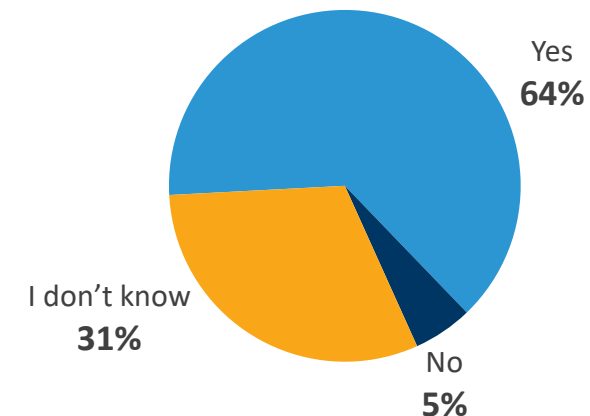
*Base: Respondents using a hybrid or multi-cloud strategy (n=55).*

# Expectations for Cloud Usage
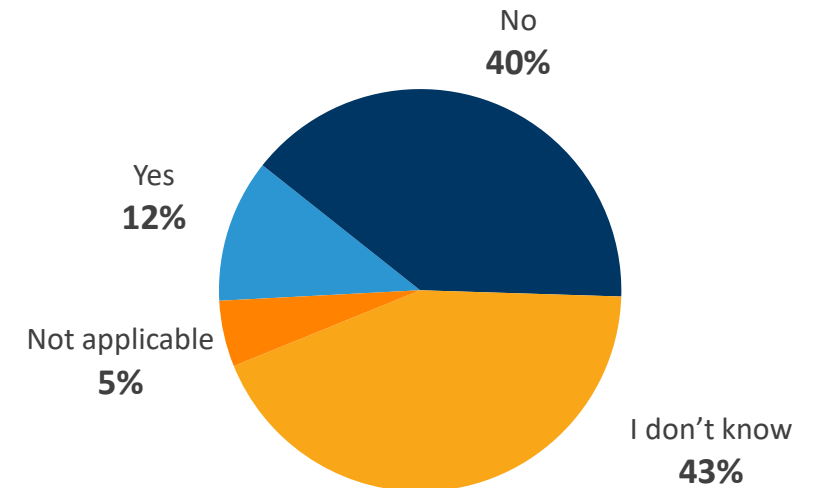
- **Sixty-eight percent** of respondents <u>plan to increase</u> the amount of data managed in the cloud over the next 12 months. <u>Forty-one percent</u> plan to <u>keep some data on-premises or in a private cloud</u>, while <u>27%</u> <u>plan to move all data to a public or hybrid cloud</u>. Conversely, <u>12%</u> of respondents <u>plan to move data from the public cloud to a private cloud or on-premises location</u> over the next 12 months.

**Does your organization plan to increase the amount of data it manages in the cloud over the next 12 months?**

| Response | % |
|---|---|
| Yes, but we will still have some data on-premises or in the private cloud | 41% |
| Yes, the plan is to move ALL data to a hybrid cloud | 15% |
| Yes, the plan is to move ALL data into a single provider public cloud | 8% |
| Yes, the plan is to move ALL data into multiple providers of public cloud | 4% |
| No, we are reducing the amount of data in the public cloud | 9% |
| I don't know | 23% |

*Base: All respondents (n=113).*

**Is your organization planning to move data back from the public cloud to on-premises or private cloud over the next 12 months?**

- No **40%**
- Yes **12%**
- Not applicable **5%**
- I don't know **43%**

*Base: All respondents (n=113).*

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Write-in Comments

# Write-in Comments

In which one of these functional areas are you primarily employed within your organization? Other responses:

- Quality - Operational effectiveness

Which of these best describes your position in the organization? Other responses:

- Area Lead
- Assistant
- Contributor
- Design & Manufacturing Technologist
- Director and Enterprise Architect
- Electrician

- Head, ADM & Mfg Simulation
- Individual contributor
- ISO  Systems
- Maint & Reliability Specialist
- Manufacturing Process
- Marketing

- quality
- Quality - Operational effectiveness
- Sr. Project Analyst, Quality Systems
- Technical

Within which sector is your manufacturing company? Other responses:

- All of the above
- Education
- Electronic assembly
- Energy Power Production Utility
- Fabricated / Forged components multiple sectors and industries
- Finance
- Glass containers

- Health
- Higher education
- Live science
- Manufacturing
- Mining and Construction Equipment
- Packaging
- Power Systems (Generators)
- Printing

- Research
- Ridged plastic packaging
- Rubber and Plastics
- Technology
- Telecom
- US Air Force Regional Medical Center
- Utilities
- Wastewater

# Write-in Comments

What data sources do you collect and analyze today? Other responses

- USAF Regional Med Ctr Equipment, Patient Data, energy consumption, Physical and Cyber Security.

Which business/operational challenges are your company currently using data to solve? Other responses

- 24/7, 365 days/year Utilities/Facilities Maintenance
- Customer engagement and throughput

Who is currently championing the use of data and analytics within your organization? Other responses

- CEO
- Dedicated Data Analytics Team
- Division President, Superintendents

- Division reliability leaders
- Engineering Manager
- Engineers

- Everyone!
- EVP, Digital Transformation
- Parent Organizations DoD and USAF

Where does your organization manage data? Other responses:

- AWS

ENDEAVOR BUSINESS INTELLIGENCE