Deloitte. Digital

THE INDUSTRY 4.0 PARADOX

Overcoming disconnects on the path to digital transformation

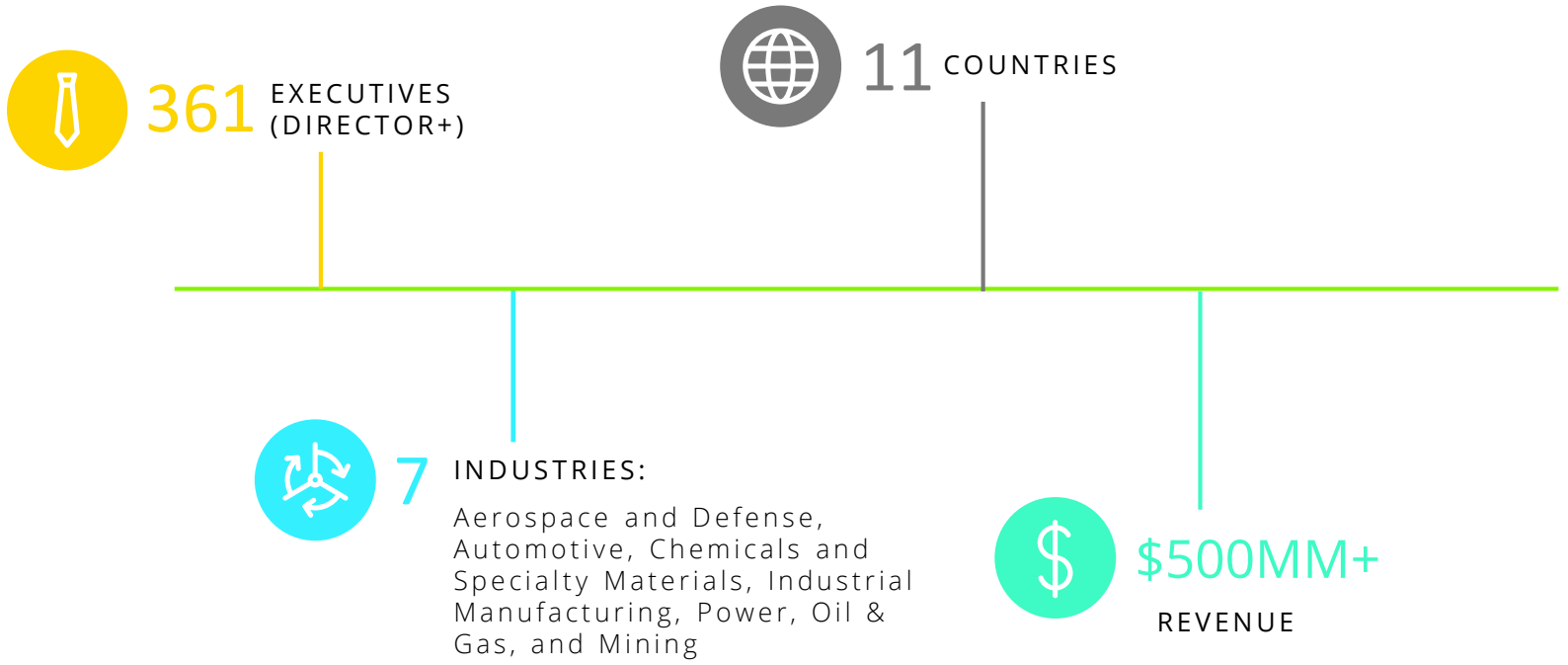
October 10, 2018

Industry 4.0 Paradox

A global survey of how companies are investing in Industry 4.0-driven capabilities to enable digital transformation

The era known as Industry 4.0 has opened up new opportunities to drive innovation and growth in business operations, processes, and production. But how are organizations planning to invest in digital transformation? Where and how do they plan to use digital technologies?

SURVEY BY THE NUMBERS:



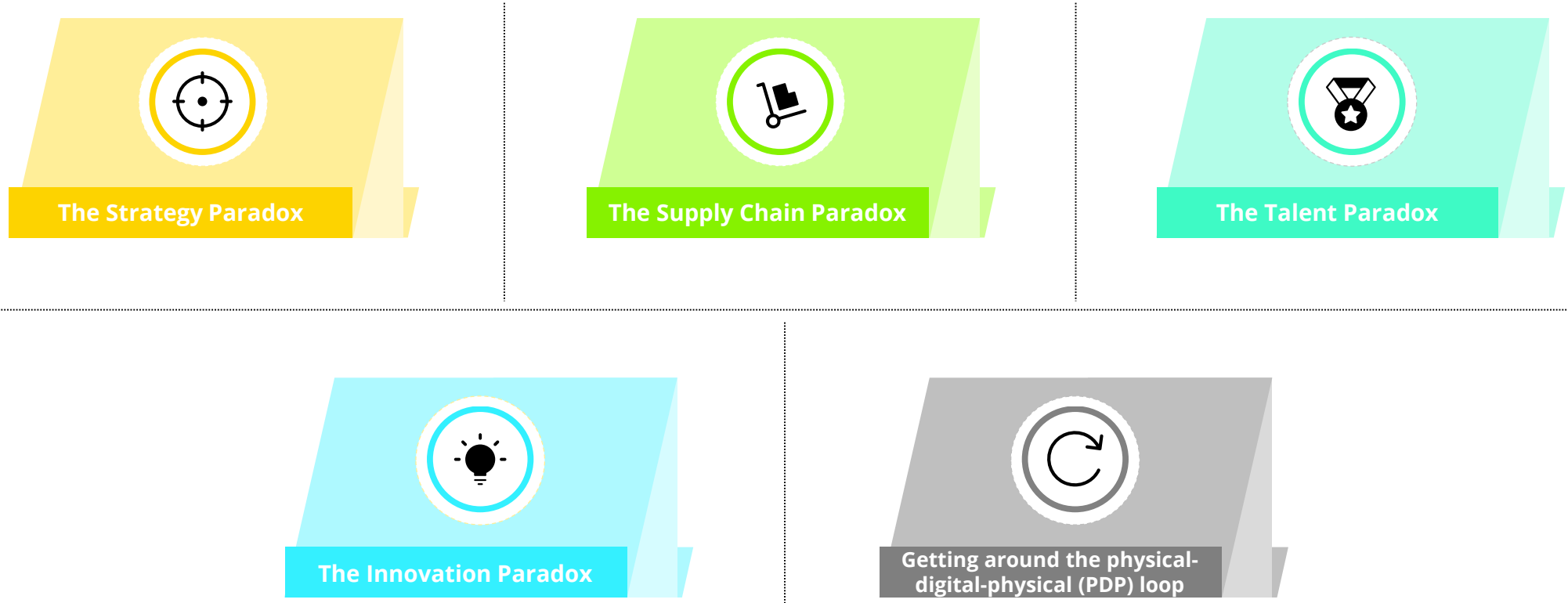
UNDERSTAND

How and where they are investing -- or planning to invest -- in digital transformation

Key challenges they face in making such investments

How they are forming their technical and organizational strategy around digital transformation.

As digital transformation is taking shape in nearly every organization, our study reveals five key states of play:



The Strategy paradox – Digital transformation prioritized, but not necessarily perceived as profitable

Key Findings

- **94 percent** of all respondents indicate that digital transformation is a top strategic objective for their organization.
- **But only 68 percent of all respondents and just 50 percent of CEOs** indicated that these transformations are critical to maintaining profitability.
- Digital transformations may be viewed as **"defensive" investments** to protect, rather than grow their business.
  - On average, companies plan to invest a **median of 30 percent of their operational/IT budget** on digital transformation initiatives -- but **only 11 percent of their R&D budgets** on the same.

Recommendations

- **Incrementally move beyond operational upgrades:** Digital transformation can lead to revenue growth in the form of improved products or services.
- **Invest in the long run:** Transformative benefits often take time to accrue and require mindset shift. Don't neglect longer-term opportunities in pursuit of shorter-term objectives.
- **Consider increasing time and financial investments in digital transformation R&D efforts**, focusing on supply chain -- especially as it offers opportunities to pilot a number of digital technologies.

Source: Deloitte Industry 4.0 Investment Survey, 2018

The Supply Chain paradox – High priority, low stakeholder engagement

Key Findings

- Respondents' **most planned future investment** area identified is supply chain **(62 percent).**
- But **only 22 percent** of Chief Supply Chain Officers (CSCOs) were either a key decision maker or highly-involved in the decision-making process.
- Also **only 34 percent** of overall respondents **see supply chain as a driver of innovation.**

Recommendations

- **Status of the CSCO** should be elevated and provided a seat at the decision-making table.
- Organizations should train its supply chain function **to align with the broader strategic objectives** of the organization.
- Leverage DSN for **new innovative and transformative uses of technology**, which can drive end-to-end supply chain transparency and intelligent decision making.

Source: Deloitte Industry 4.0 Investment Survey, 2018

The Talent paradox – Technically advanced, intuitively limited

Key Findings

- **Only 15 percent** of respondents indicated they need to dramatically alter the composition and skill sets to support digital transformations.
- **Yet the #1** organizational and cultural related challenge cited is finding, training, and retaining the right talent **(35 percent).**
- Respondents cite their biggest talent need is for **user interface design, but it is not budgeted for.**

Recommendations

- Consider building technologies collaboratively by **involving employees in the digital integration process.**
- Make **upfront investments in talent development** which can help ensure that **employees have the right skills and tools**.
- Build a more **intuitive user interface design** which can improve employee engagement with these digital technologies.

Source: Deloitte Industry 4.0 Investment Survey, 2018

The Innovation paradox – A balance between optimization and uncharted waters

Key Findings

- The top 2 factors driving digital transformation, as cited by respondents to our survey, are **Productivity improvement and Operational goals** - mostly doing the same things better - help generate positive ROIs.
- However, the survey data suggests that **equally positive ROIs** can be realized when organizations are driven by an **increased desire for innovation**.

Recommendations

- Continue to invest in **productivity and operations**; however, sticking mostly with tried-and-true can leave opportunities untapped.
- Consider focusing not only on building a strong foundation of technologies, but also truly **innovative new approaches**.
- Get moving – **because others are likely planning to** or already are moving along the digital transformation maturity curve.

Source: Deloitte Industry 4.0 Investment Survey, 2018

Getting around the physical-digital-physical loop – A look at current Industry 4.0 capabilities

Key Findings

- **Harnessing each stage of the PDP loop is important** to the full realization of Industry 4.0 and a challenge that many organizations face.
- **More than 90 percent** of respondents report **gathering some data** from the physical world. But fewer are able to analyze the data and **only about half report being able to act on it in real time.**

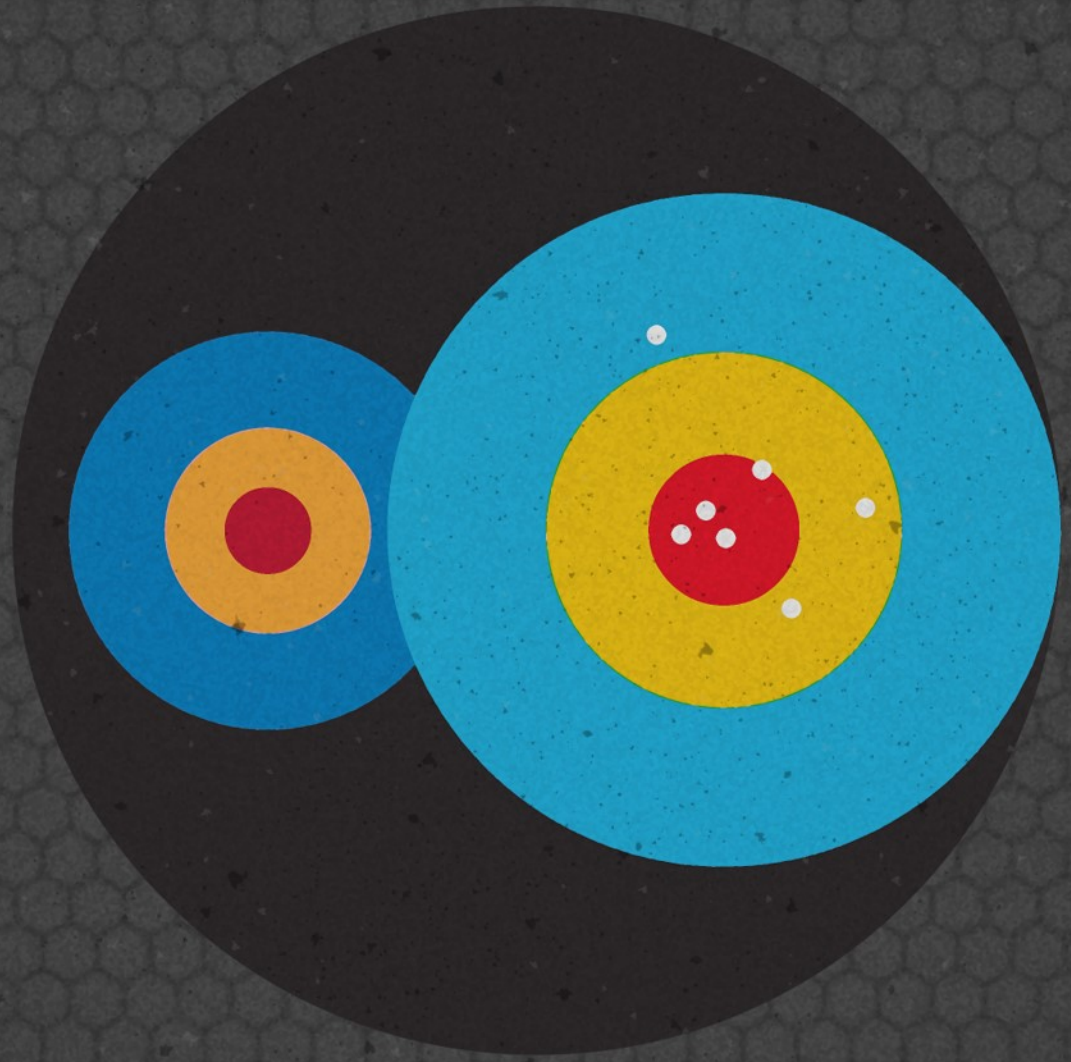
Recommendations

- Generating and analyzing data is valuable, but **focus should be on completing the PDP loop** as a roadmap for technology investments.
- Recognize that **investment begets Industry 4.0 success**, and increases the risk that those who haven't gotten started could be left behind.
- Organizations should **start building their technology capabilities by using the tools they already have.**
- Subsequently organizations could identify and make more **targeted investments in what they actually need.**

Source: Deloitte Industry 4.0 Investment Survey, 2018

The strategy paradox

Leaping beyond a defensive position



The strategy paradox

While 94 percent of respondents agree that digital transformation is a strategic priority, only 68 percent of total respondents -- and only 50 percent of CEOs -- view it as a critical to profitability.

Percent of respondents that agree with each statement

Q8. Which statement about digital transformation is more true?

N=361

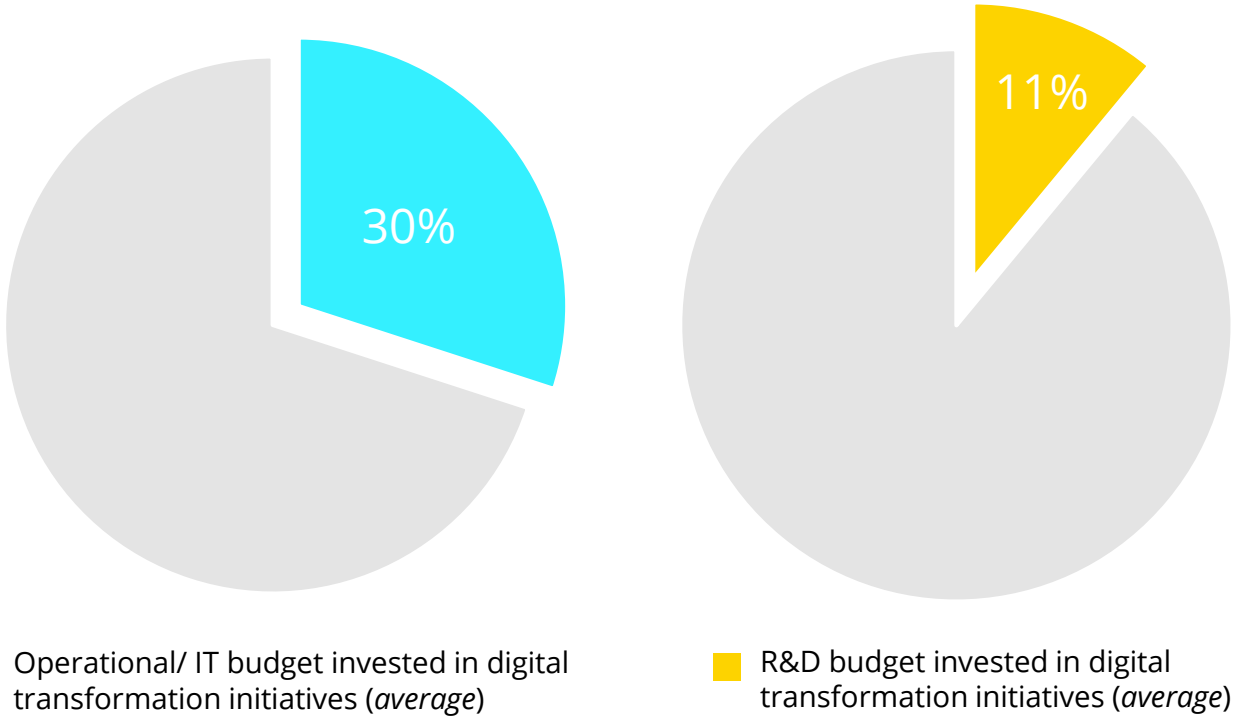
Source: Deloitte Industry 4.0 Investment Survey, 2018

Further understanding the strategy paradox

Most respondents stated its importance, but aren't necessarily fully exploring the realm of strategic possibilities made possible by digital transformation. Executives reported investing a significantly higher percentage of their operational and IT budgets in digital transformation, while spending a relatively lower proportion of R&D budget.

On average, companies plan to invest a median of 30 percent of their operational/IT budget on digital transformation initiatives -- and only 11 percent of their R&D budgets on the same.

This focus on digital transformation for operational investments, coupled with a relatively smaller emphasis on profitability suggests that leaders may associate operational improvements with *strategic* growth, but do not necessarily associate them with *revenue* growth resulting from R&D-driven new products or business models.



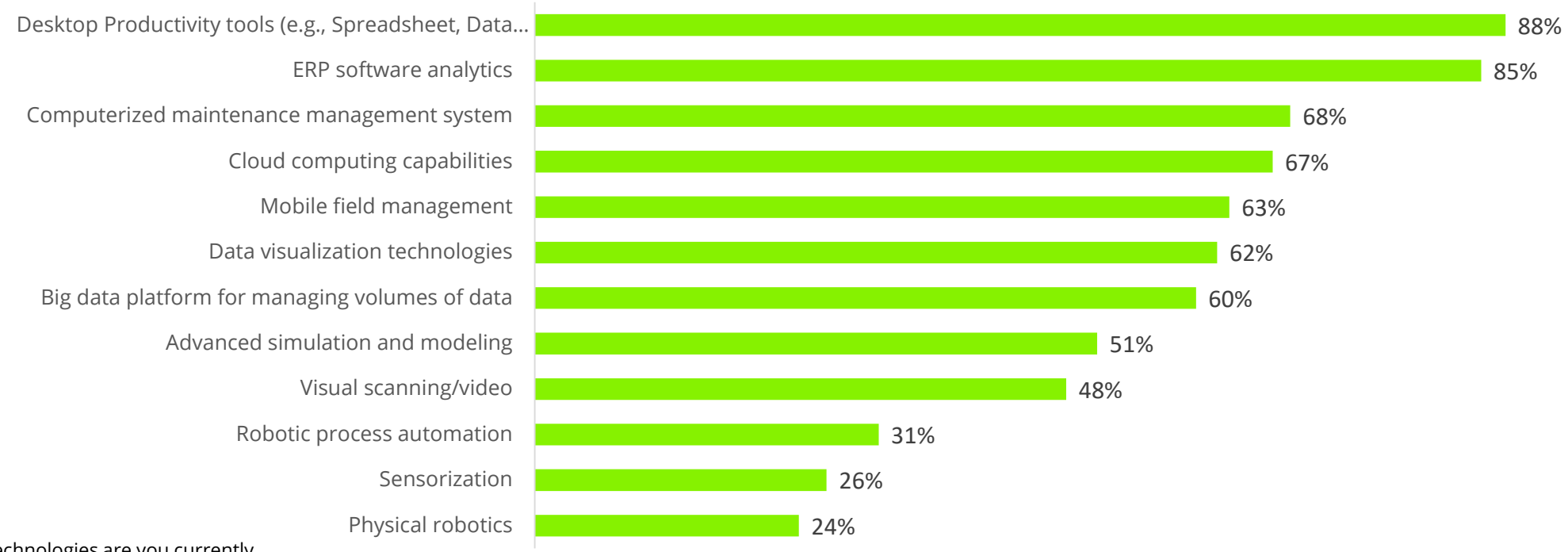
Q10. Approximately (best estimate), what percentage of your overall operational/IT budget are you intending to spend on digital transformation in 2018? What percentage of your R&D budget?
N=361

Source: Deloitte Industry 4.0 Investment Survey, 2018

A focus on familiar approaches can make it difficult to prepare for and fend off competitive challenges

Most organizations report using familiar operational tools such as desktop productivity tools and ERP software analytics to leverage their data. Newer tools, like physical robotics and sensor technologies are leveraged considerably less. But disruptive competitors with fresh digital approaches can lead to challenges.

Tools used to access, analyze, and leverage the data from assets, current and planned use



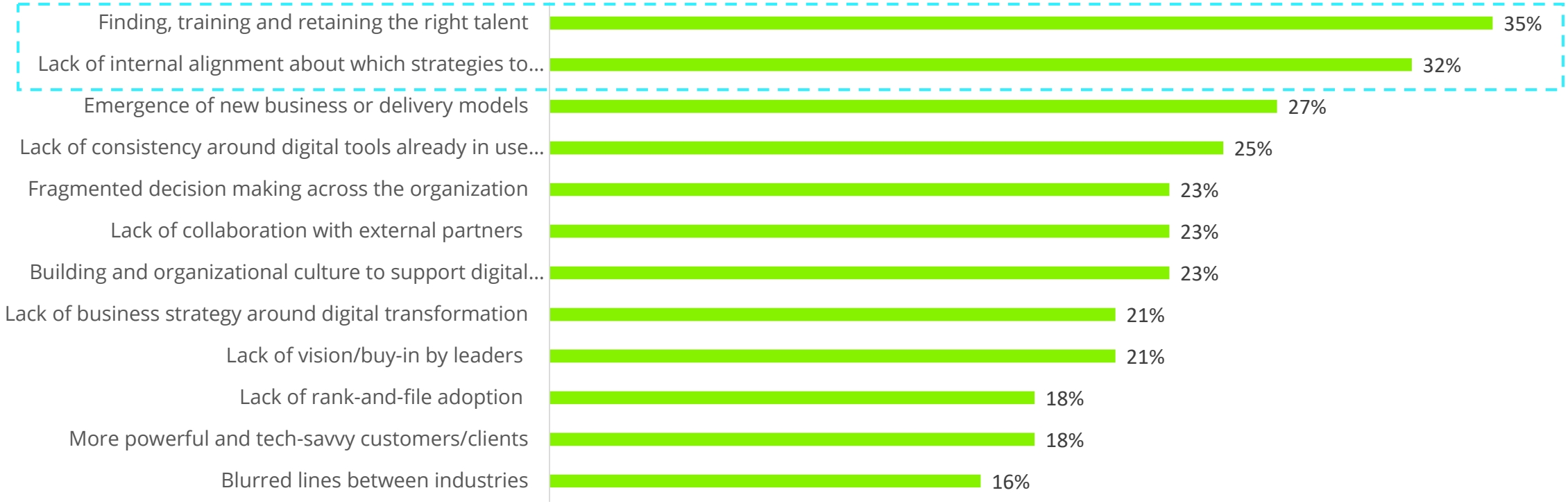
Q19. What tools and technologies are you currently using to access, analyze, and leverage the data from your assets? Which do you plan to implement in the next 1 to 3 years?
N=361

Source: Deloitte Industry 4.0 Investment Survey, 2018

Searching for a common consensus

Talent, adapting to changes in the marketplace, and reaching internal alignment on the best path forward were cited as the most significant hurdles. It can be difficult to pursue new, unfamiliar business models without the right people in place -- or a clear consensus on which strategies are the right ones to follow

Operational, culture-related and environmental challenges organizations face as they seek to pursue digital transformation initiatives



Q21. Which of the following are the most common operational, culture-related and environmental challenges your organization faces as it seeks to pursue digital transformation initiatives?
N=361

Source: Deloitte Industry 4.0 Investment Survey, 2018

Thinking strategically about digital transformations: Move beyond operational upgrades, invest long-term, and focus on R&D

RECOMMENDATIONS

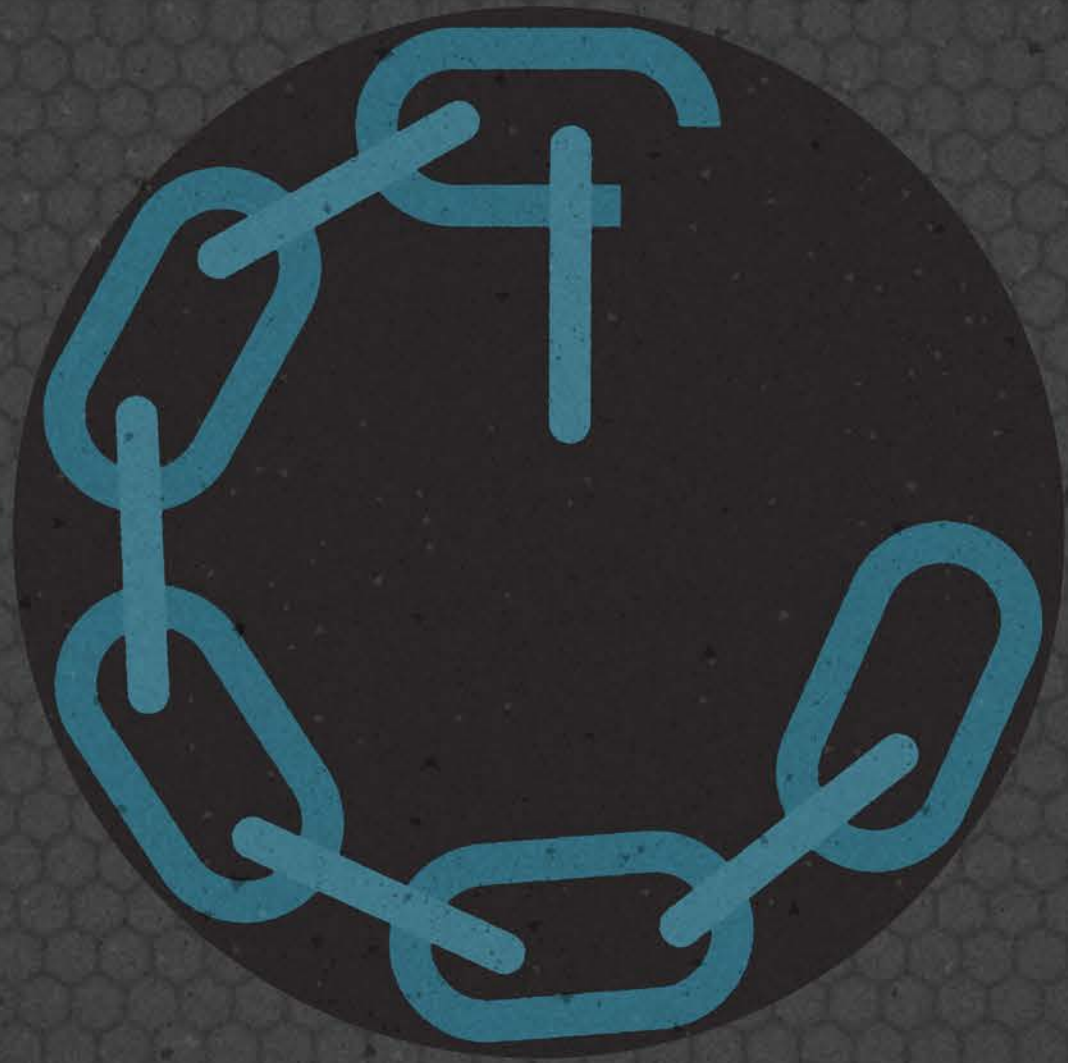
Incrementally move beyond operational upgrades
Digital transformation can lead to revenue growth in the form of improved products or services.

Invest in the long run
Transformative benefits often take time to accrue and require mindset shift. Don't neglect longer-term opportunities in pursuit of shorter-term objectives.

Consider increasing time and financial investments in digital transformation R&D efforts
Focusing on supply chain -- especially as it offers opportunities to pilot a number of digital technologies.

The supply chain paradox

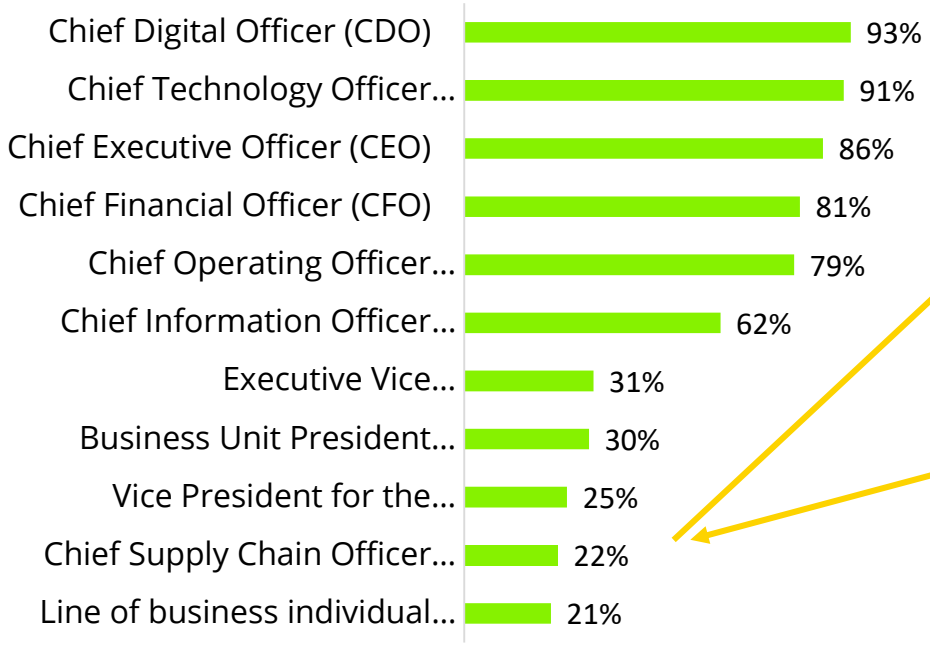
High priority, low stakeholder engagement



The supply chain paradox

Respondents suggest that CSCOs have relatively little influence on investment decision making, and supply chain is not seen as driving significant digital innovation. But it was cited by respondents as the **top priority for future digital investment**

Role in Major Decision Making around Investment and Technology



In my organization, I am seeing the most digital innovation driven from:	Overall Respondents %	C-Suite Respondents %
Information Technology (IT)	60	62
Operations / Production	57	57
Finance	35	33
Supply chain	34	38
Engineering	33	31
Marketing and Sales	30	30
Aftermarket / Customer Support	23	22
Talent / Human Resources	22	22

Which functions are you prioritizing for future investment?	Overall Respondents %	C-Suite Respondents %
Supply chain	62	66
Planning	61	58
Product design	50	52
Marketing	50	51
Sales	43	41
Talent and Human resources	39	36
Customer/Fielded asset support	38	43
Inbound/outbound logistics	36	36
Smart facilities	35	38
Shop Floor Production	30	30

Q9. When it comes to investing in or acquiring new technologies or capabilities to aid in a digital transformation, who makes the decisions within your organization? (Highly involved, key decision maker)
Q13. In my organization, I am seeing the most digital innovation driven from:
Q14x2. Which functions are you prioritizing for future investment?
N=361

Source: Deloitte Industry 4.0 Investment Survey, 2018

Further understanding the supply chain paradox

CSCOs are aware of their lack of a seat at the table. They ranked themselves far lower than *other* C-Suite executives ranked themselves in terms of personal involvement in digital transformation investment decisions

Degree of personal involvement in digital transformation investment decision	Key Decision Maker / Highly Involved in Decision	Somewhat Involved in Decision	Play a role / Not at all involved
C-Suite respondents (excluding CSCO)	90%	8%	2%
Non C-Suite respondents	37%	63%	0%
CSCO	0%	93%	7%

Source: Deloitte Industry 4.0 Investment Survey, 2018

- Slightly more than 90 percent of C-Suite respondents (excluding CSCO respondents) said that they personally were either highly-involved or key decision makers
- 37 percent of non-C-suite respondents said the same
- None of the CSCO respondents reported as such

S6. How involved are you personally in investment or purchasing decisions related to digital transformation within your organization?

Why does this seeming paradox exist?

CSCO is a new role

1

Being relatively new, the CSCO may not yet be viewed as an established role. Some executives, including the CSCO himself, may not yet understand what the purview of the role should be.

Supply chain may have an image problem

2

C-Suite executives may not yet consider supply chain as an area riper for innovation. Such an image problem may also make it more difficult for the CSCO to be heard on strategy planning matters.

Like CSCO, like non-C-Suite

3

CSCO may not be perceived as critical to the decision to invest in digital technologies, mainly due to them being viewed as outside of the C-Suite, who are reported being the least involved in making technology investment decisions.

Overcoming the supply chain paradox: Elevate CSCO status, align supply chain with organizational strategic objectives, and leverage DSN

RECOMMENDATIONS

Validate the increasing strategic importance of the supply chain -- and, by extension, those who run it
Supply chain figures prominently in the implementation of digital technologies. The status of the CSCO should be elevated and provided a seat at the decision-making table.

Train future CSCOs to think strategically
To obtain a strategic CSCO, organizations should train its supply chain function to align with the goals of the broader strategic objectives of the organization.

Leverage the opportunities for digitally-driven innovation inherent in a digital supply network
The DSN opens new opportunities to guide end-to-end supply chain transparency, intelligent optimization, and flexible, intelligent decision.

The talent paradox

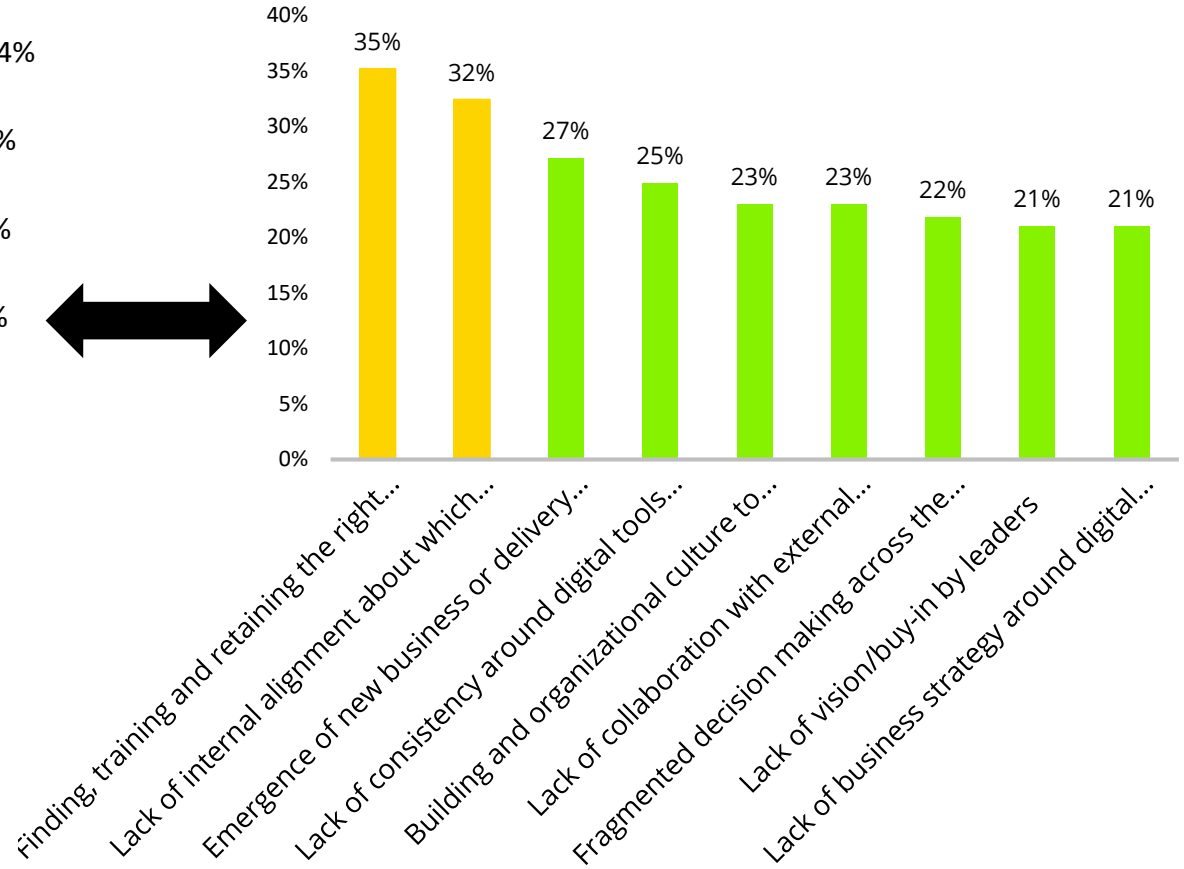
Technically advanced, intuitively limited

The talent paradox

85 percent of respondents are more likely to agree that their organization has "exactly the workforce and skillset it needs to support digital transformation." Yet "finding, training, and retaining the right talent" is cited as the number one operational challenge.

Percent of respondents that agree with each statement

Operational and cultural challenges cited



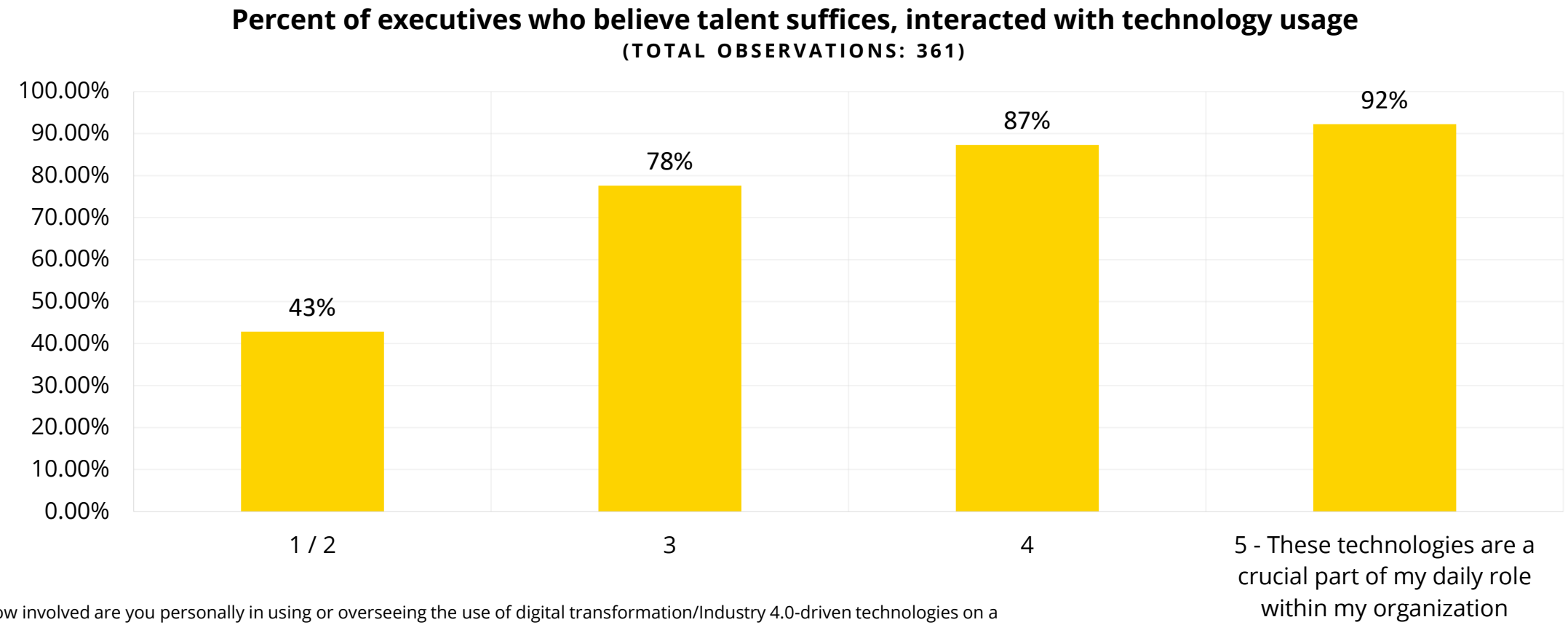
Q8. Which statement about digital transformation is more true?

Q21. Which of the following are the most common operational, culture-related and environmental challenges your organization faces as it seeks to pursue digital transformation initiatives?
N=361

Source: Deloitte Industry 4.0 Investment Survey, 2018

Further understanding the talent paradox

C-Suite respondents suggest they use digital technologies the most. Yet those same individuals seem to be the most satisfied with the talent; while those that have little-to-no interaction with digital technology see the greatest gap in talent and development.

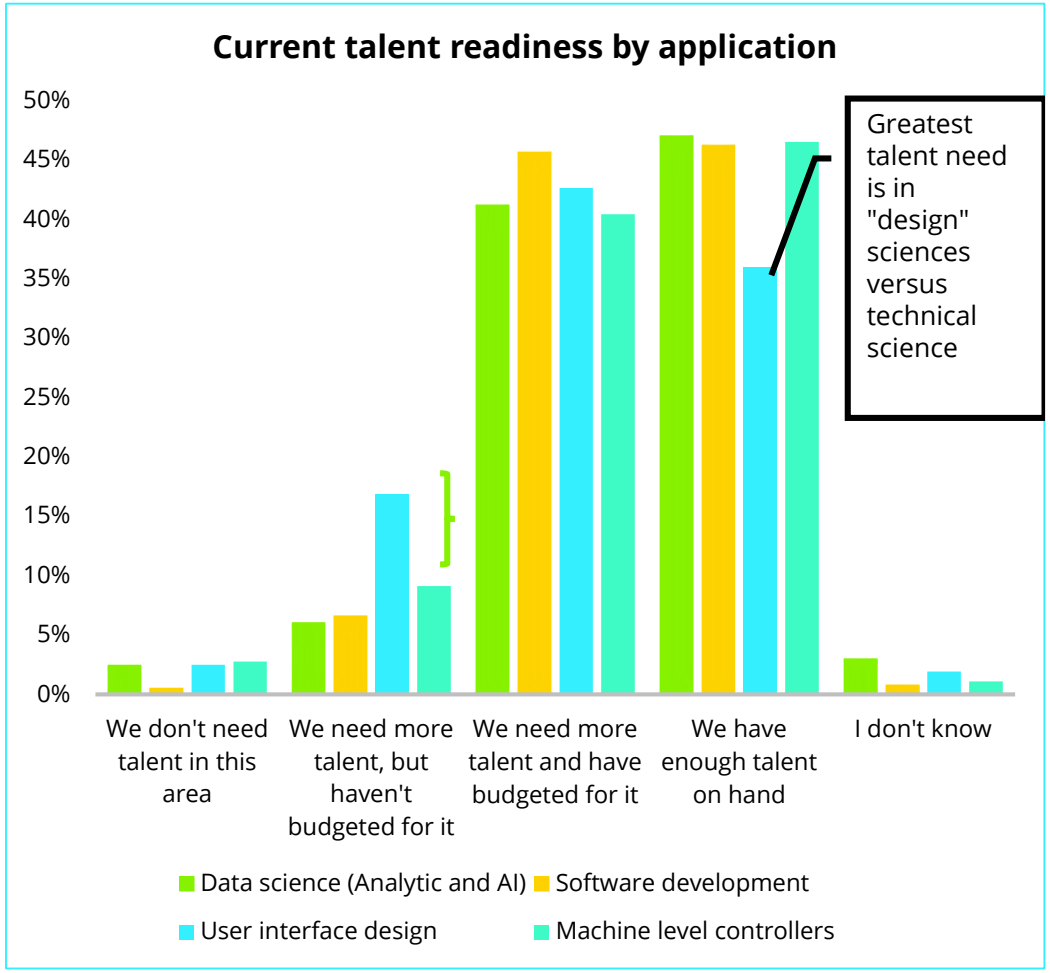


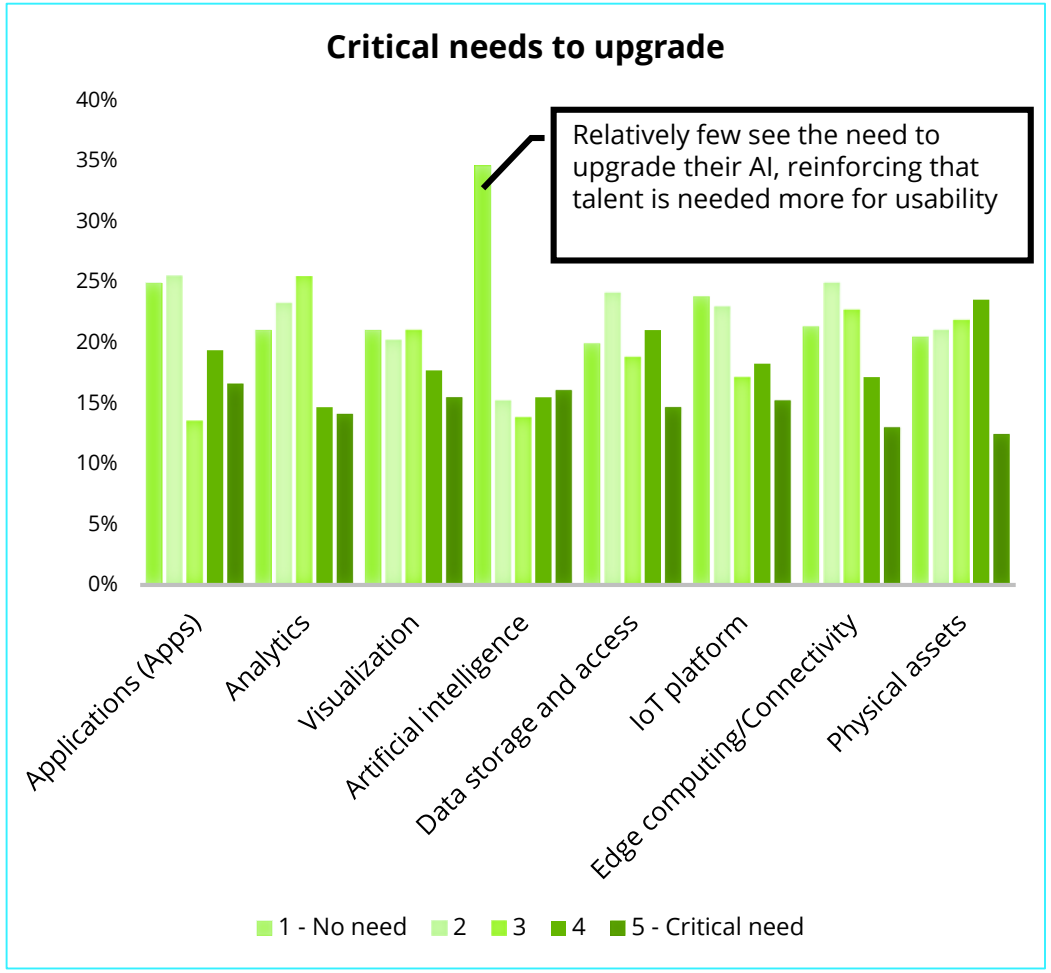
S7. How involved are you personally in using or overseeing the use of digital transformation/Industry 4.0-driven technologies on a day-to-day basis?
Q8. Which of the following statements about digital transformation is more true? "My organization has exactly the workforce and skillset it needs to support digital transformation"

Source: Deloitte Industry 4.0 Investment Survey, 2018

Where to direct talent

17 percent of respondents stated that user interface design talent is needed but not budgeted for; it is also ranked lowest in terms of having enough talent already on-hand. This suggests that ease of technology usability can be seen as an area of focus





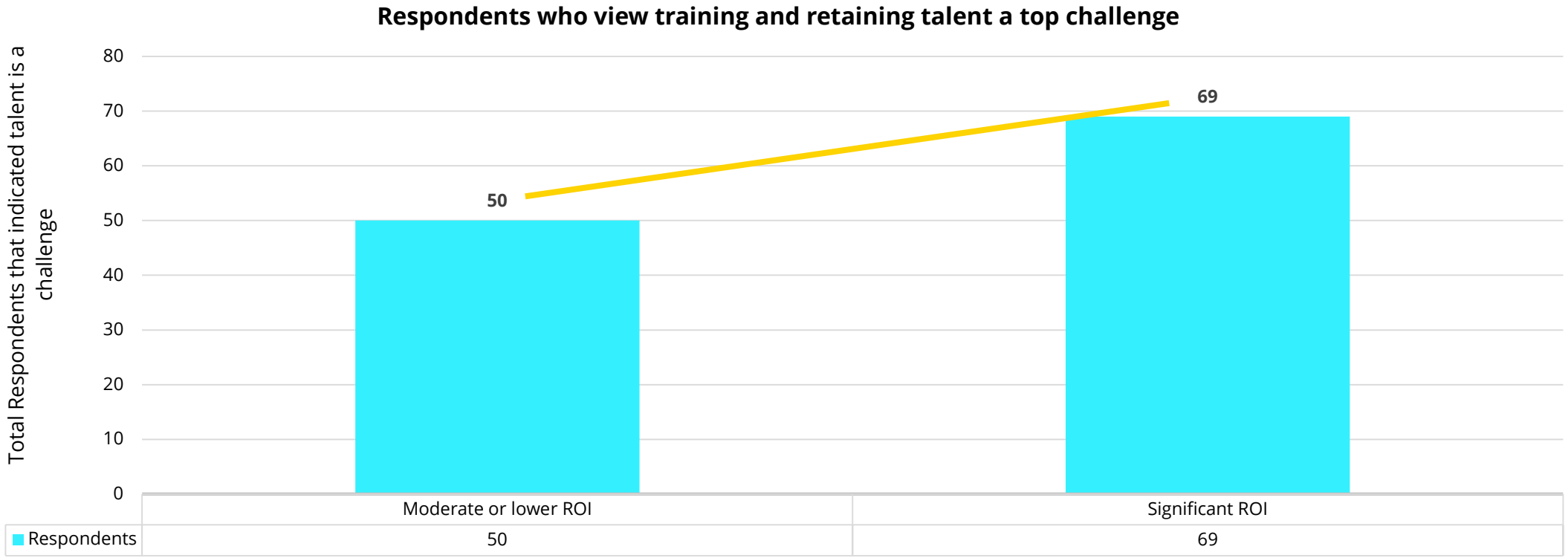
Q15. When it comes to the ability to ideate, design, and implement digital initiatives, what is the state of your talent pool in the following areas of expertise?

Q17. Considering your existing applications and infrastructure, what is the biggest need you currently see for new technology within your organization? For each of the following categories below, please rate the need for upgrade or replacement.

Source: Deloitte Industry 4.0 Investment Survey, 2018

The better the ROI, the greater the need for talent

Talent is identified as the number one operational challenge. This is magnified for high ROI organizations, suggesting that the deeper an organization moves into digital transformation, the more they see a need for the right talent to drive their digital initiatives.



This may signal that these organizations are ready to transcend operational usage, but need to find the talent first

Q12. Generally speaking, what level of ROI have you realized from digital transformation initiatives?
Q21. Which of the following are the most common operational, culture-related and environmental challenges your organization faces as it seeks to pursue digital transformation initiatives?

Source: Deloitte Industry 4.0 Investment Survey, 2018

Overcoming the talent paradox: Involve employees in digital integration process, improve user interface design, and continue investing in talent development

RECOMMENDATIONS

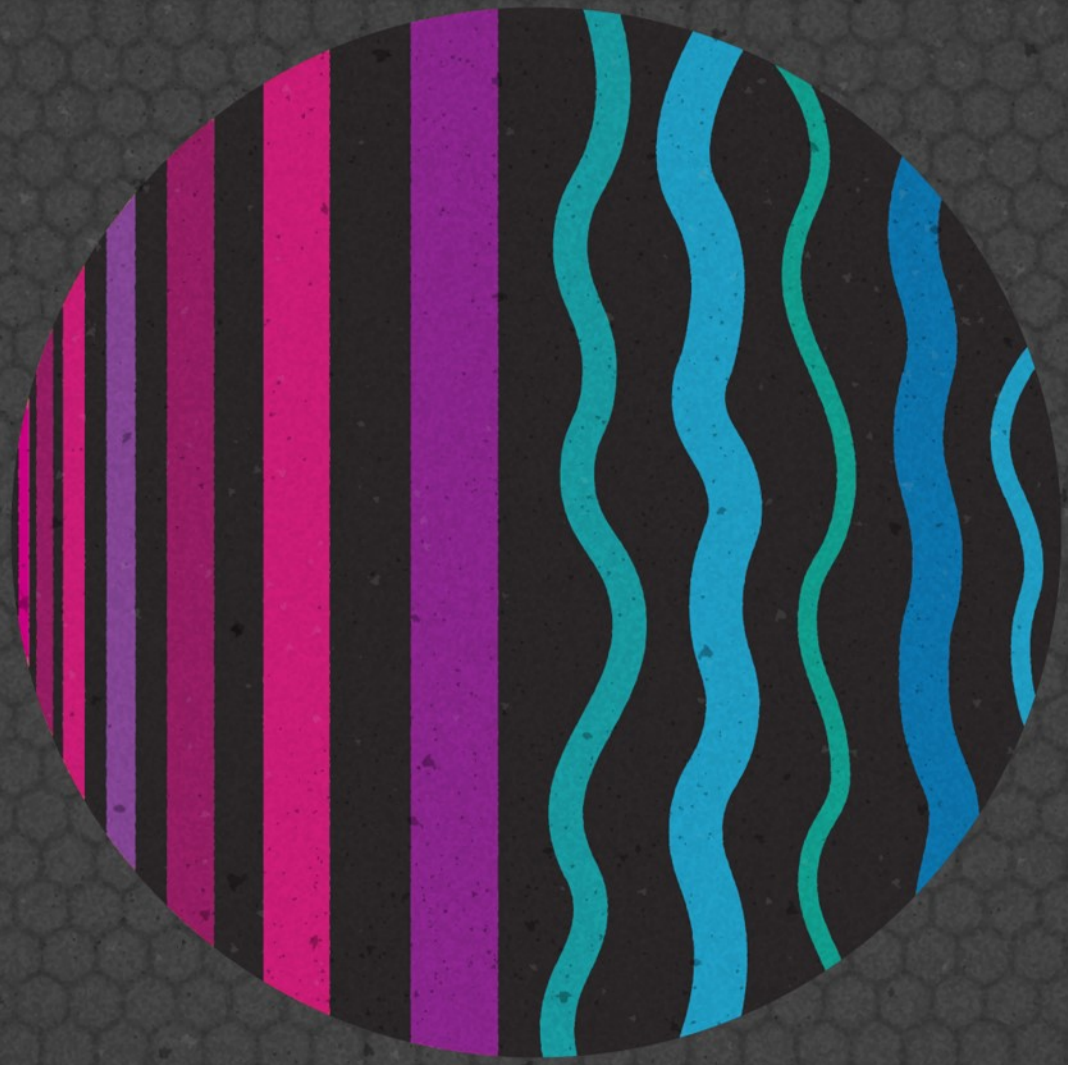
Build these capabilities with, not for your employees: These technologies often work best when they are built collaboratively with their business users rather than for them. Employees that are not fully immersed in the digital integration process may react with a level of skepticism to its benefits.

Hire for design: Better user interface design can act as the channel to greater employee engagement with these digital technologies. Further, the more intuitive the design, generally the less need for turning over talent in favor of more technically savvy individuals.

Sustaining success typically requires continual investment in talent development: Leaders may recognize the need to continually ensure that their people have the right tools in place to use and interact with these enhanced features. These upfront investments can extend the reach of these technologies throughout the organization—in a more sustainable manner!

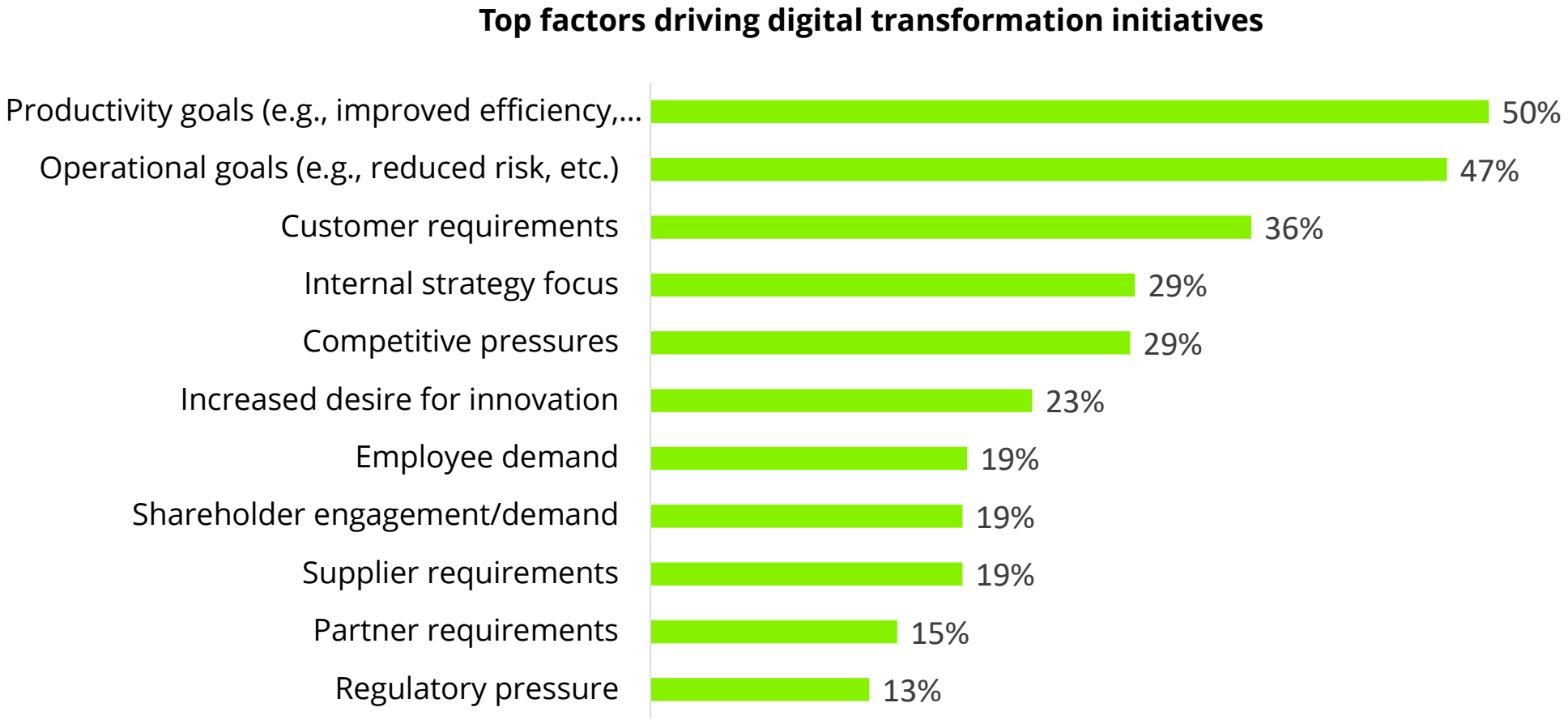
The innovation paradox

balance between optimization and uncharted waters



The innovation paradox

When it comes to digital transformation, many respondents report that their companies are driven largely by improving their current processes, rather than innovation



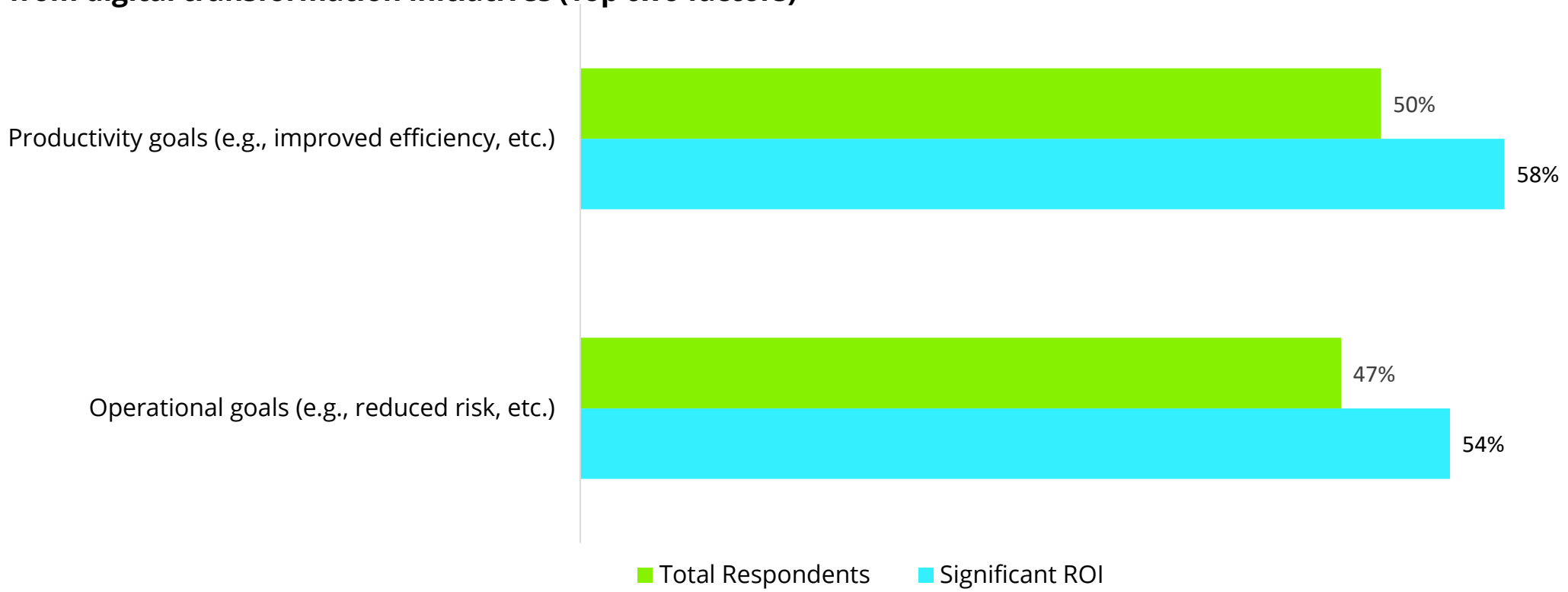
Q16. What are the top factors driving digital transformation initiatives within your organization?
N=361

Source: Deloitte Industry 4.0 Investment Survey, 2018

Further understanding the innovation paradox

Even those who have realized significant ROI from digital transformation often report being driven by productivity and operational goals. This suggests that perhaps focusing on those initial areas for digital transformation can yield significant returns that encourage further future investment.

Factors driving digital transformation initiatives, total respondents and those who have realized significant ROI from digital transformation initiatives (Top two factors)



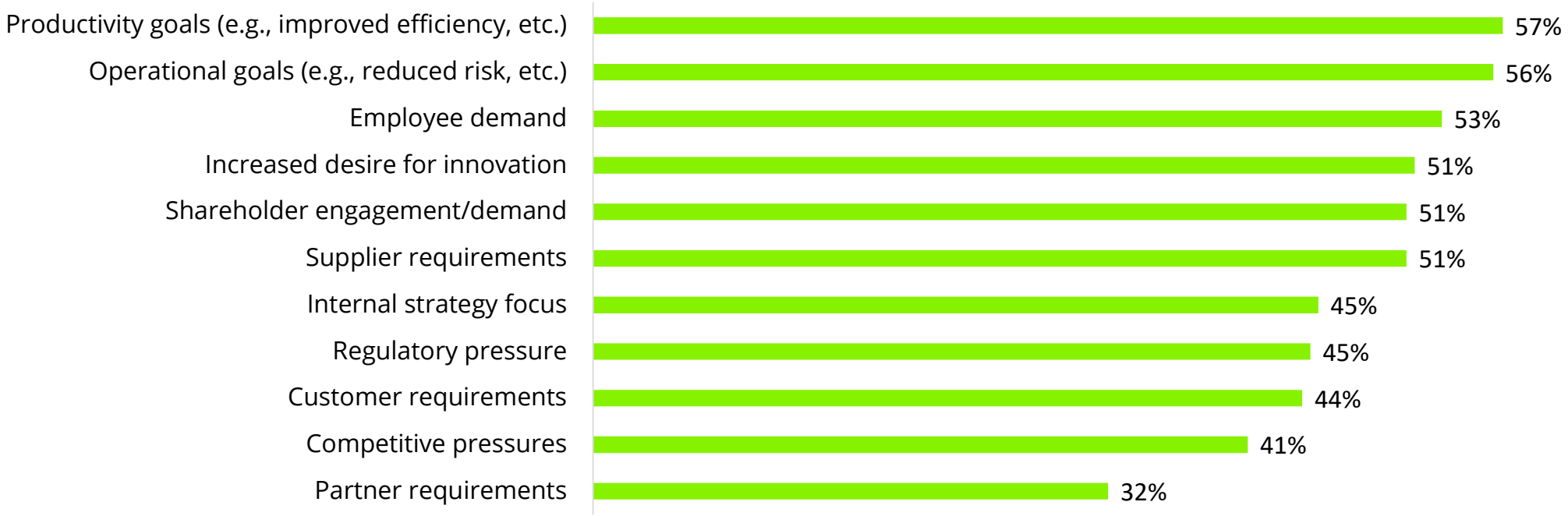
Q12. Generally speaking, what level of ROI have you realized from digital transformation initiatives?
Q16. What are the top factors driving digital transformation initiatives within your organization?

Source: Deloitte Industry 4.0 Investment Survey, 2018

However, while operations-driven digital transformation can yield success, sticking with continued evolution of the tried-and-true can leave opportunities untapped

Those driven by innovation are nearly as likely to recognize significant ROI from digital transformations as those who are driven by operations and production goals.

Drivers for digital transformation initiatives, segmented by those who report realizing significant ROI from digital transformation initiatives



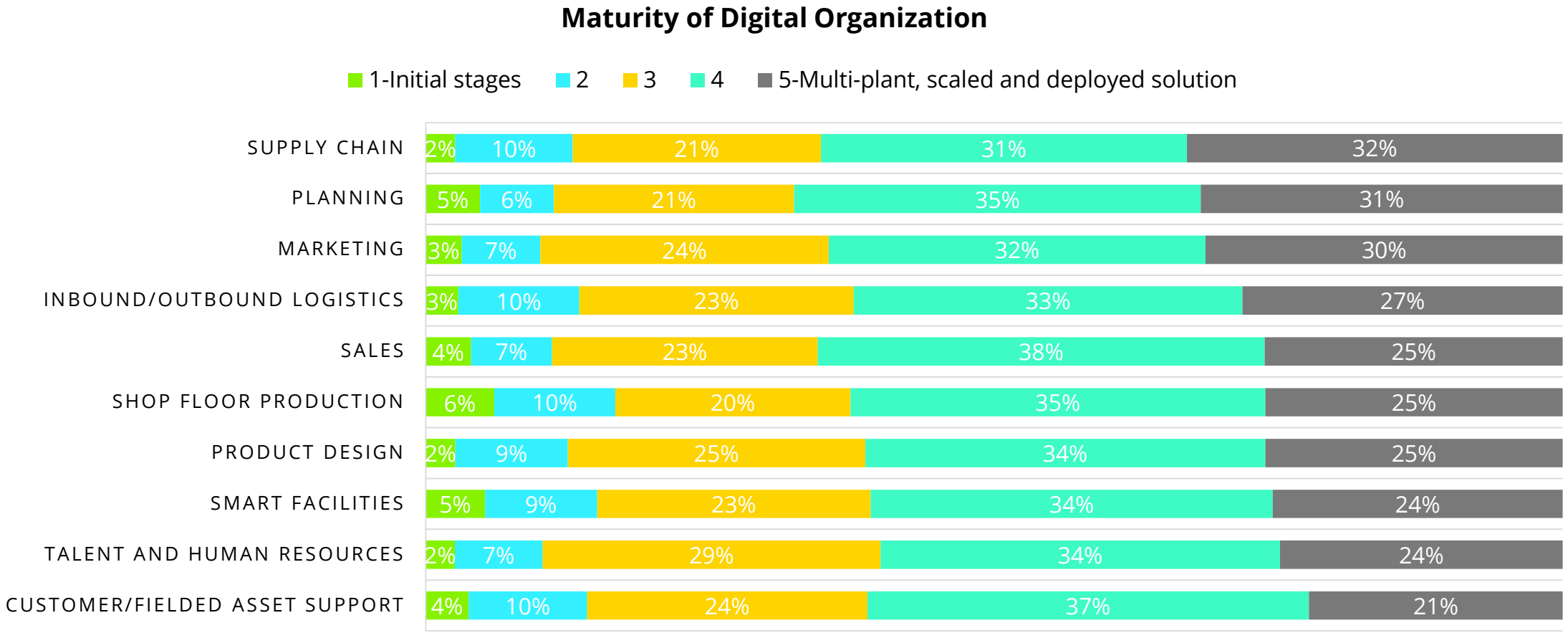
Q12. Generally speaking, what level of ROI have you realized from digital transformation initiatives?

Q16. What are the top factors driving digital transformation initiatives within your organization?

Source: Deloitte Industry 4.0 Investment Survey, 2018

Digital organization maturity

Respondents report the highest levels of maturity around operations-driven functions. Functions that drive innovation are relatively less mature: shop floor production, product design, smart facilities, and asset support.



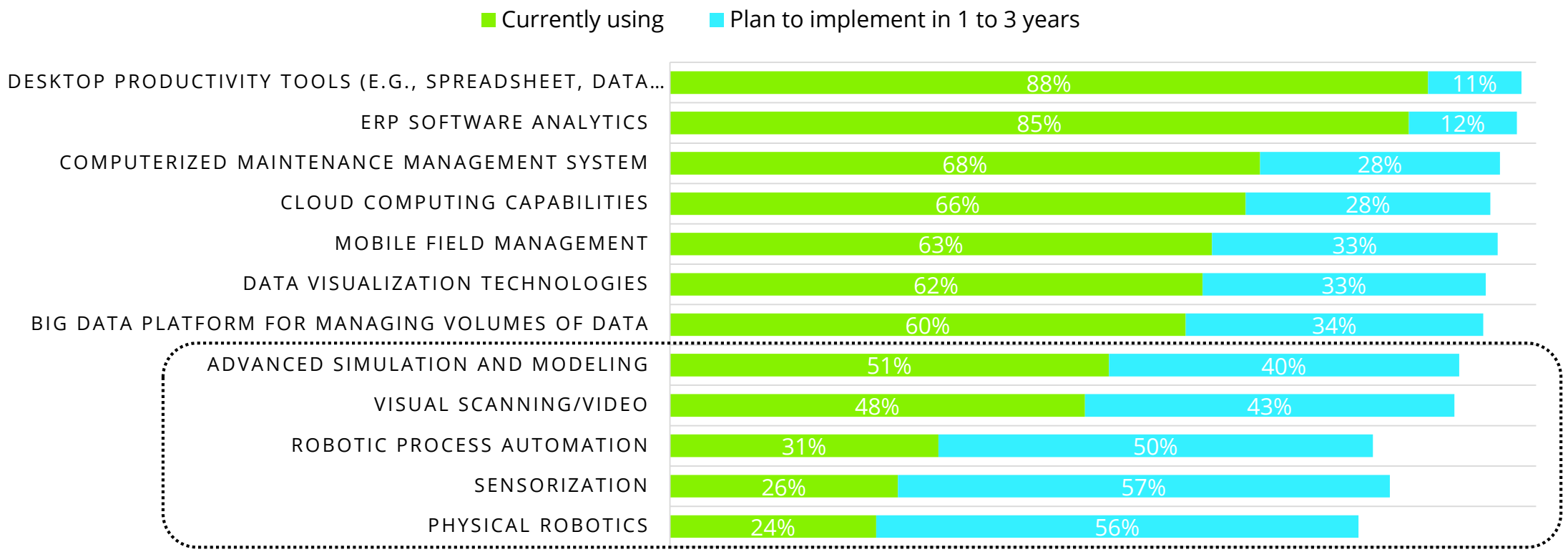
Q14x1. Where do you currently have digital transformation efforts underway within the organization, and how mature are those efforts?
N=361

Source: Deloitte Industry 4.0 Investment Survey, 2018

Investment in more advanced, connected capabilities may increase in the future

Executives' reported plans to invest in advanced technologies such as visual scanning and physical robotics suggests a move toward innovation is on the horizon - as part of a continued evolution, rather than a revolution

Use of tools and technologies to access, analyze and leverage data from assets



Q19. What tools and technologies are you currently using to access, analyze, and leverage the data from your assets? Which do you plan to implement in the next 1 to 3 years?

Source: Deloitte Industry 4.0 Investment Survey, 2018

There isn’t any one single path to digitally-transformative innovation; organizations can adopt the technologies that best suit the complex needs of their industry

Use of these technologies is perhaps reflective of each industry’s various complexities, whether the distributed nature of manufacturing or the remote monitoring needs of mining and oil and gas

Tools and technologies currently used to access, analyze, and leverage the data from assets	Mining	Manufacturing	Power and Utilities	Oil and Gas
Desktop Productivity tools (e.g., Spreadsheet, Data Management System)	94%	81%	89%	95%
ERP software analytics	86%	83%	86%	89%
Cloud computing capabilities	68%	64%	72%	65%
Data visualization technologies	62%	60%	67%	59%
Mobile field management	58%	61%	72%	60%
Computerized maintenance management system	80%	61%	75%	67%
Big data platform for managing volumes of data	56%	54%	68%	65%
Sensorization	16%	32%	30%	19%
Physical robotics	18%	25%	20%	31%
Robotic process automation	28%	32%	24%	40%
Advanced simulation and modeling	50%	47%	62%	48%
Visual scanning/video	52%	47%	48%	48%

Q19. What tools and technologies are you currently using to access, analyze, and leverage the data from your assets? Which do you plan to implement in the next 1 to 3 years?

Source: Deloitte Industry 4.0 Investment Survey, 2018

Overcoming the innovation paradox: Explore new areas for driving innovation, focus on innovative new approaches, and build a roadmap to greater ROI

RECOMMENDATIONS

Get comfortable with the unknown
Consider focusing not only on building out strong foundation of technologies, but also include truly innovative new approaches.

Recognize the tendency to invest in productivity and operations
A firm foundation in operations-driven transformation is important, but sticking with continued evolution of the tried-and-true can leave other opportunities untapped.

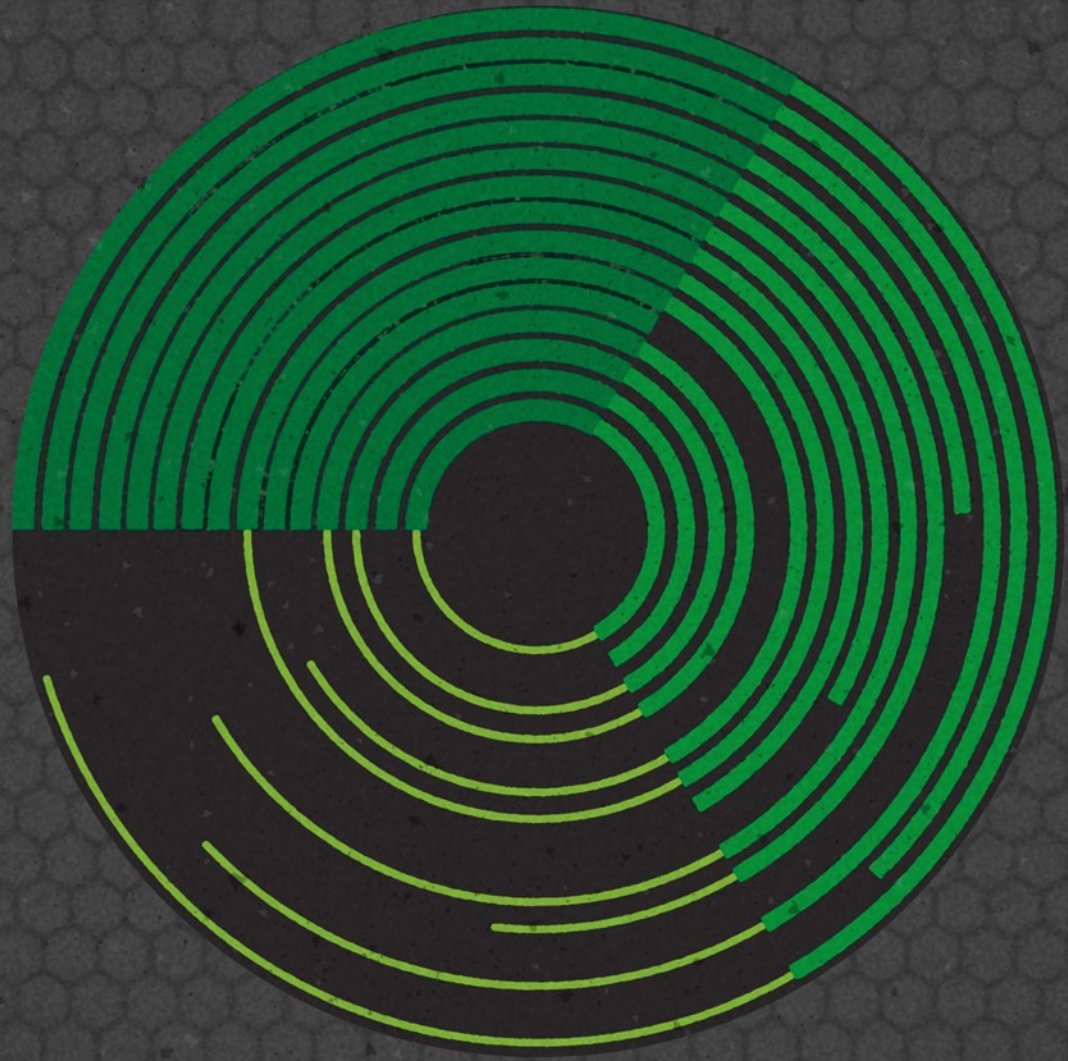
Consider pathways that will lead foundational investments to opportunities for innovation
A strong foundation of digital transformation for fundamental operational purposes can help leaders identify key white space opportunities.

Get moving – because others are planning to
Many organizations are planning to invest in capabilities that will help them move further along on the digital transformation maturity curve. Those who fail to invest risk being left behind

Build a roadmap to greater ROI
Consider the technology investments already made, to drive your organization toward a high-ROI future.

Getting around the physical-digital-physical loop

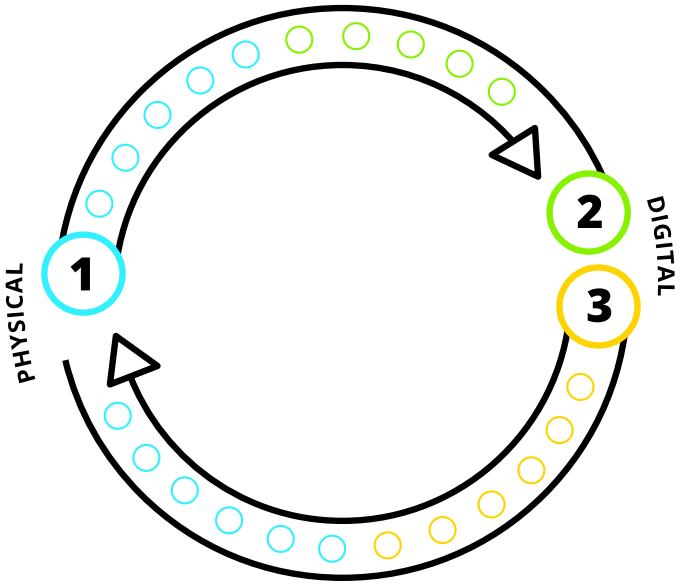
A look at current Industry 4.0 capabilities



The physical-digital-physical loop

Industry 4.0 integrates digital information from many different sources to drive the physical act of doing business, in an ongoing cycle known as the physical-digital-physical loop

Figure 1. The physical-digital-physical loop and the technologies used



1. Establish a digital record

Capture information from the physical world to create a digital record of the physical operation and supply network

2. Analyze and visualize

Machines talk to each other to share information, allowing for advanced analytics and visualizations of real-time data from multiple sources

3. Generate movement

Apply algorithms and automation to translate decisions and actions from the digital world into movements in the physical world

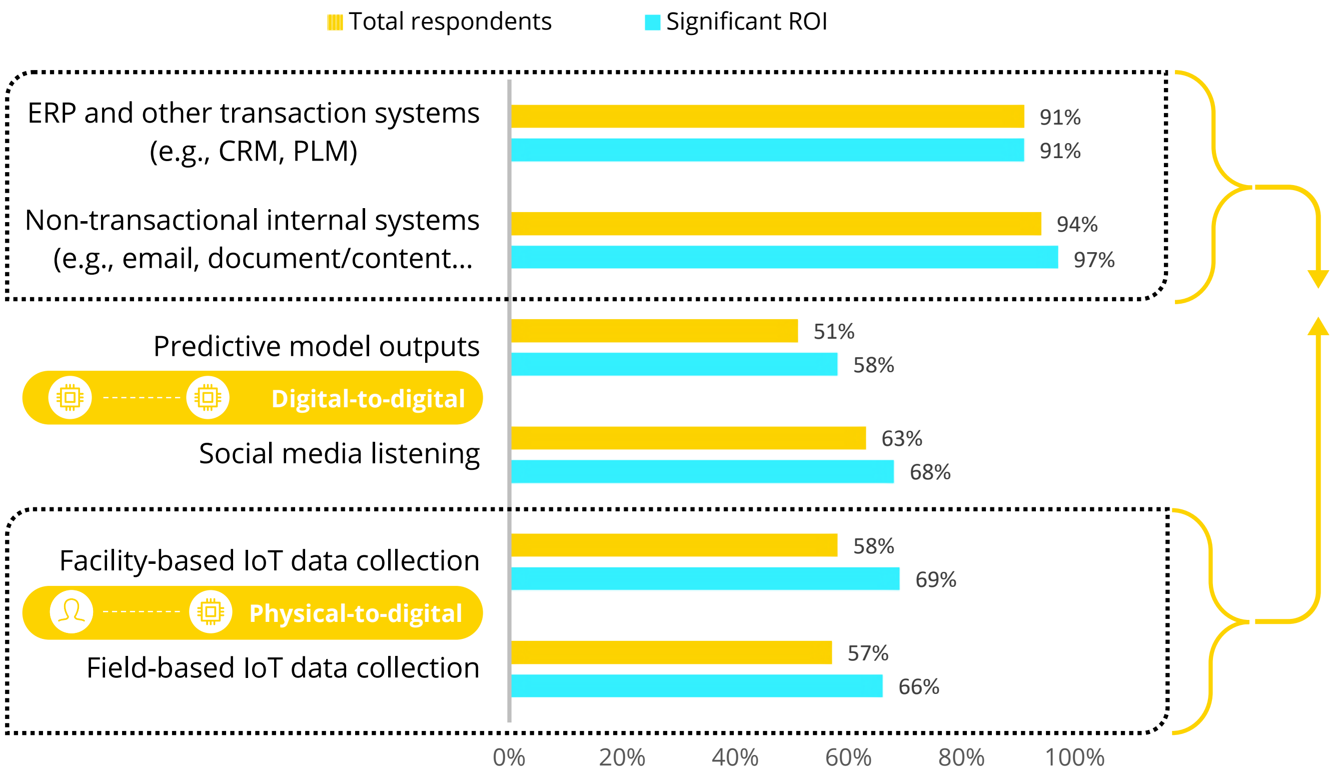
Source: Center for Integrated Research

Cotteleer, Sniderman, “Forces of Change: Industry 4.0,” Deloitte Insights, December 18, 2017

Further understanding the physical-digital-physical loop

While most respondents have the first, and many have the second stage of the PDP loop in place, far fewer are yet able to harness the last, seemingly more important stage – the ability to act on the data they have analyzed

Technology Currently in Use



How effectively are you able to use each category?	Total respondents	Significant ROI
ERP and other transaction systems	84%	87%
Non-transactional internal systems	92%	99%
Predictive model outputs	75%	82%
Social media listening	82%	85%
Facility-based IoT data collection	82%	**89%**
Field-based IoT data collection	78%	**85%**

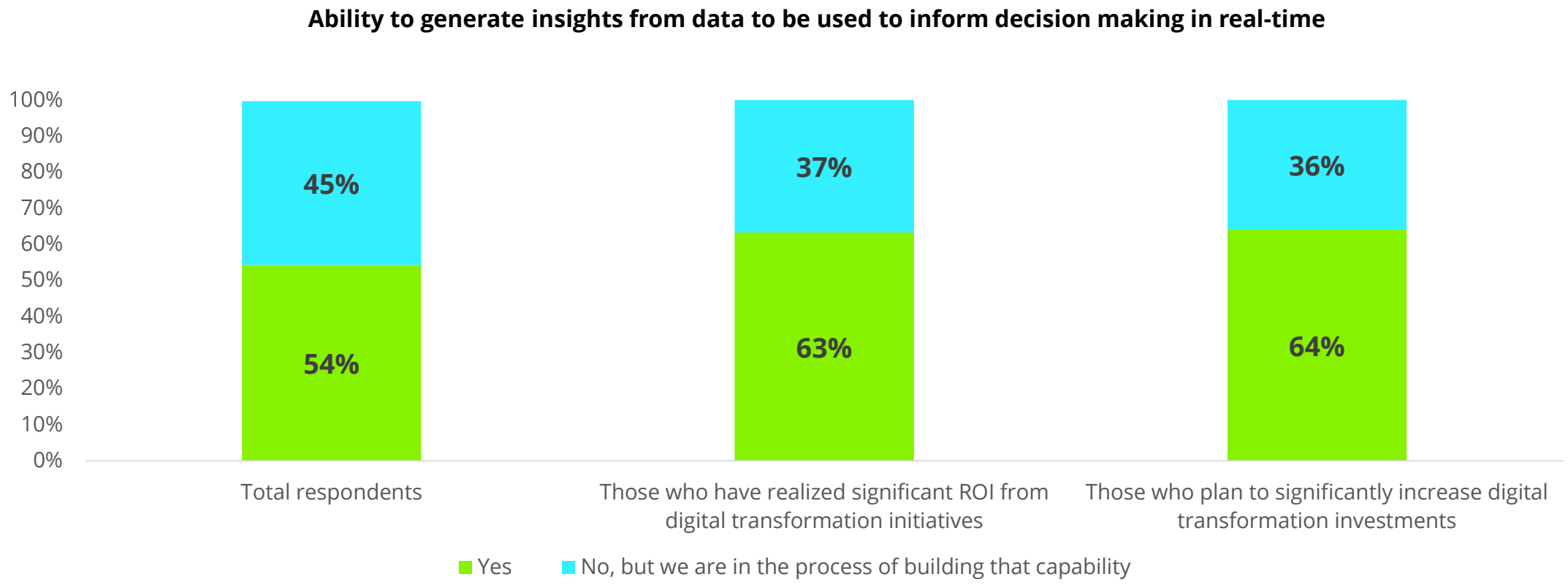
Does your organization use digital technology for real-time decision making?	Total respondents	Significant ROI
Yes	54%	63%
No, but we are in the process of building that capability	45%	37%

Q18a. When it comes to data, which of the following sources does your organization have? (Select all that apply)
Q18b. How effectively are you able to use each data category to make decisions?
Q20. Does your organization have digital technology in place that enables insights from data to be used to inform decision making in real-time?

Source: Deloitte Industry 4.0 Investment Survey, 2018

Ability to complete the PDP loop typically increases with investments in digital transformation

Respondents who report significant ROI from digital transformation initiatives, as well as those who note that they plan to significantly increase their investments in digital transformation, were much likelier to note that they are already capable of using data to make decisions



Q20. Does your organization have digital technology in place that enables insights from data to be used to inform decision making in real-time?
N=361

Source: Deloitte Industry 4.0 Investment Survey, 2018

Getting around the physical-digital-physical loop: Consider getting started by investing in Industry 4.0, and spend time building current capabilities to better enable adopting new ones

RECOMMENDATIONS

Focus on completing the PDP loop as a roadmap for technology investments Particularly the last step of being able to act upon the data generated by connected systems. The ability to generate and analyze data can be highly valuable, but organizations should explore and invest in technologies, talent, and capabilities that can enable them to drive their businesses forward.

Recognize that investment begets Industry 4.0 success, and increases the risk that those who haven't gotten started could be left behind
The gap between those who have gotten started and those who are waiting to do so will likely only widen in the future, as those who see success continue to build upon it.

Realize you may already have more tools than you think
Organizations should start building their technology capabilities by using the tools they already have. Subsequently organizations could identify and make more targeted investments in what they actually need.

Conclusion

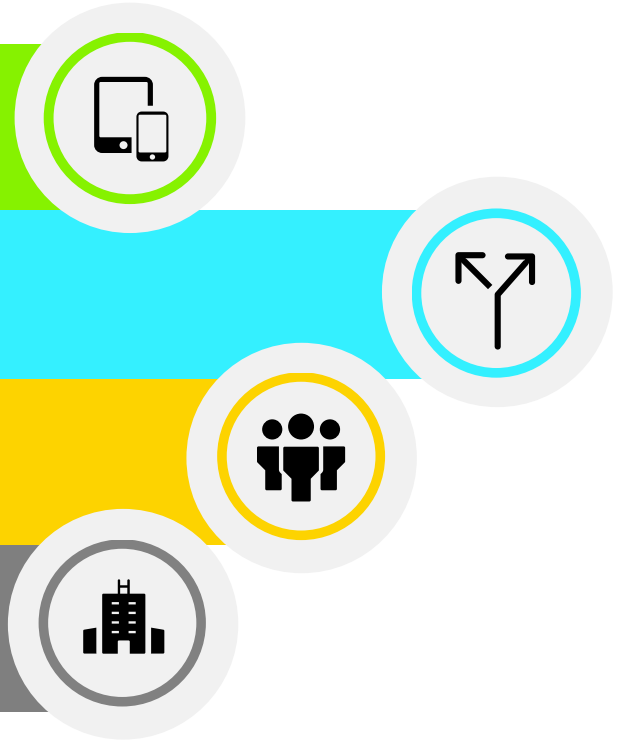
Overcoming the paradoxes

01 **Digital transformation not just limited to technology implementation**, but can also be critical to organizational strategy, touching upon every aspect of the company

02 **There are multiple paths to digital transformation**. Organizations should consider their requirements and strategic goals, and determine the unique path to achieve it through digital transformation.

03 **Organizations should assess their talent readiness** and take action to prepare them for digital transformation. Also help legacy talent understand how their roles may reshape in a digital world.

04 **People within all levels of the organization should be heard** in order to drive digital transformation and ensure its viability on a daily basis.

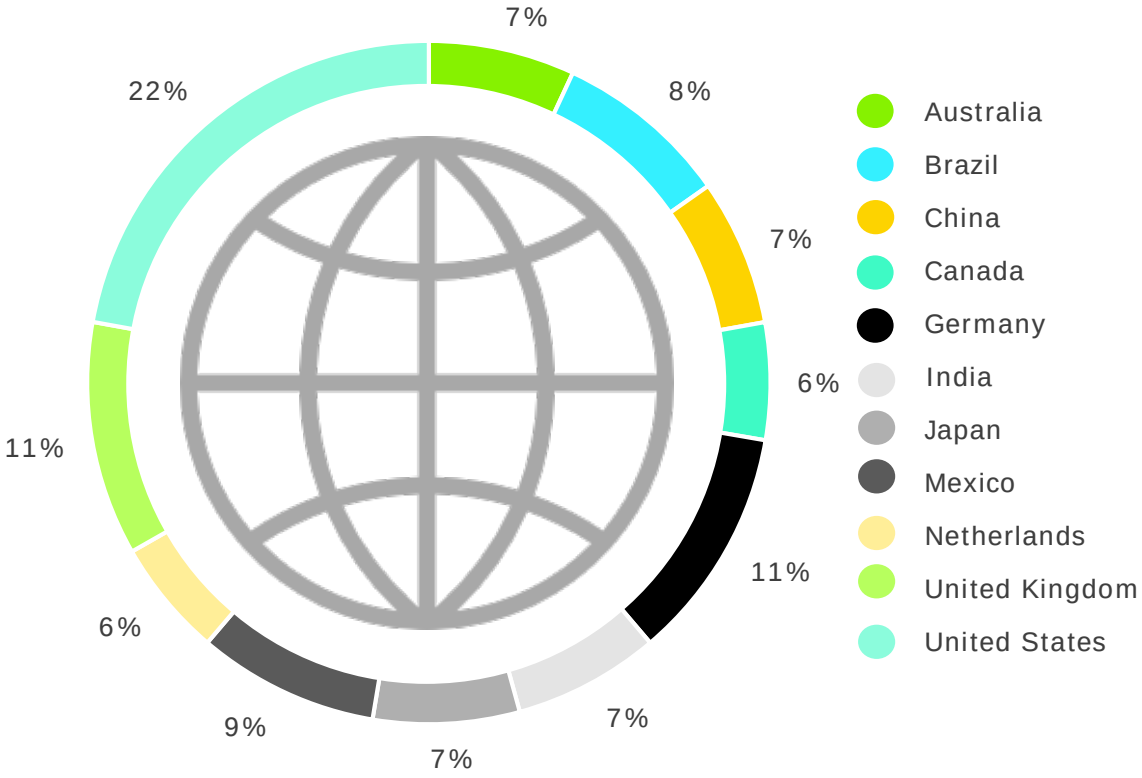


Survey methodology

Who we surveyed – All Industries

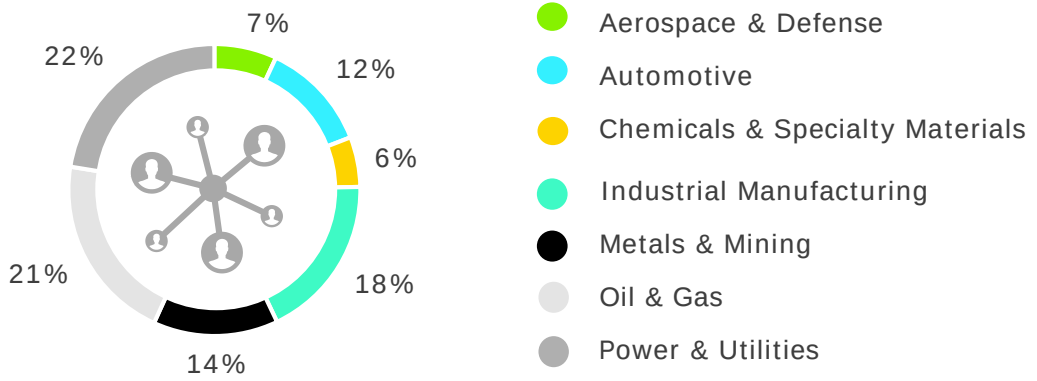
We explored how business leaders in manufacturing, mining, oil & gas, and power & utilities are planning for, using, and investing in digital transformation initiatives and technologies in the age of Industry 4.0.

Location*

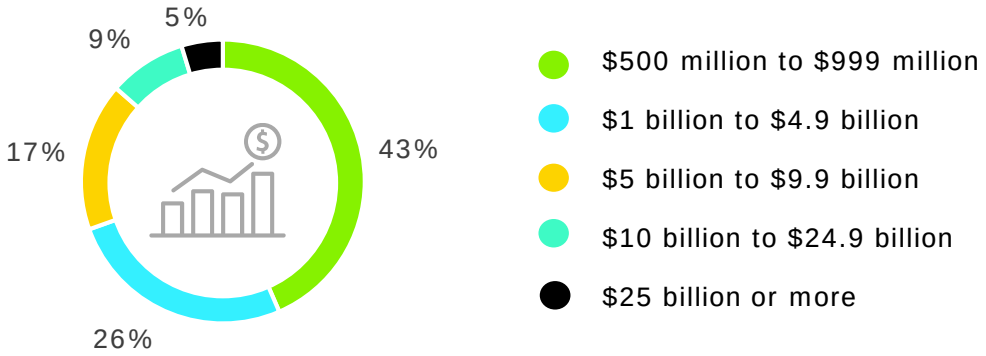


*Numbers may add to more than 100 due to rounding

Industry



Organization's annual revenue

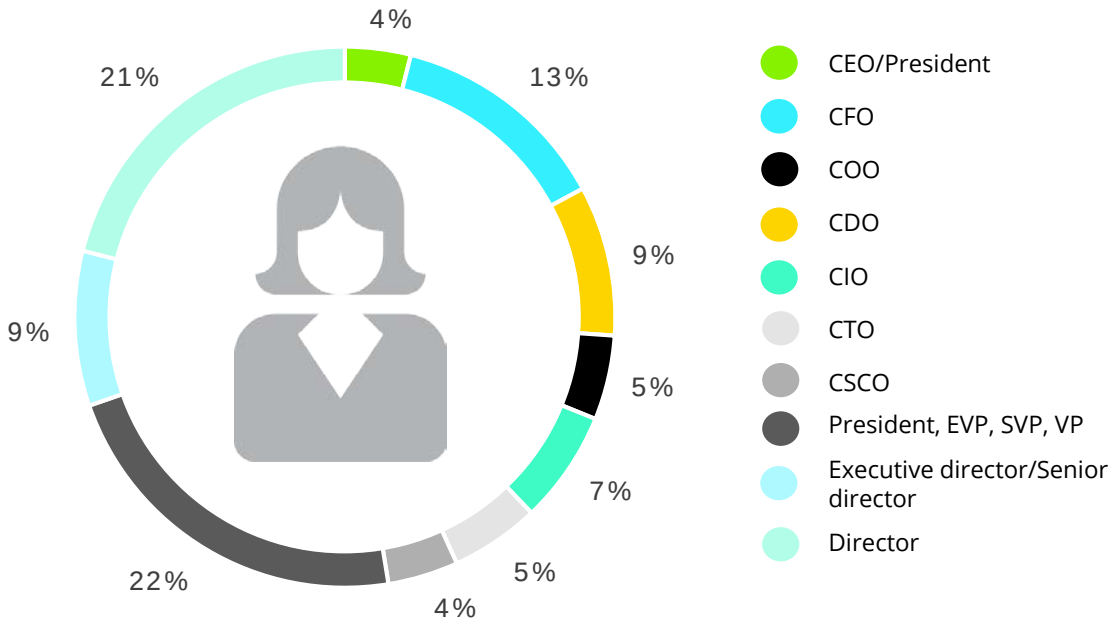


Source: Deloitte Industry 4.0 Investment Survey, 2018

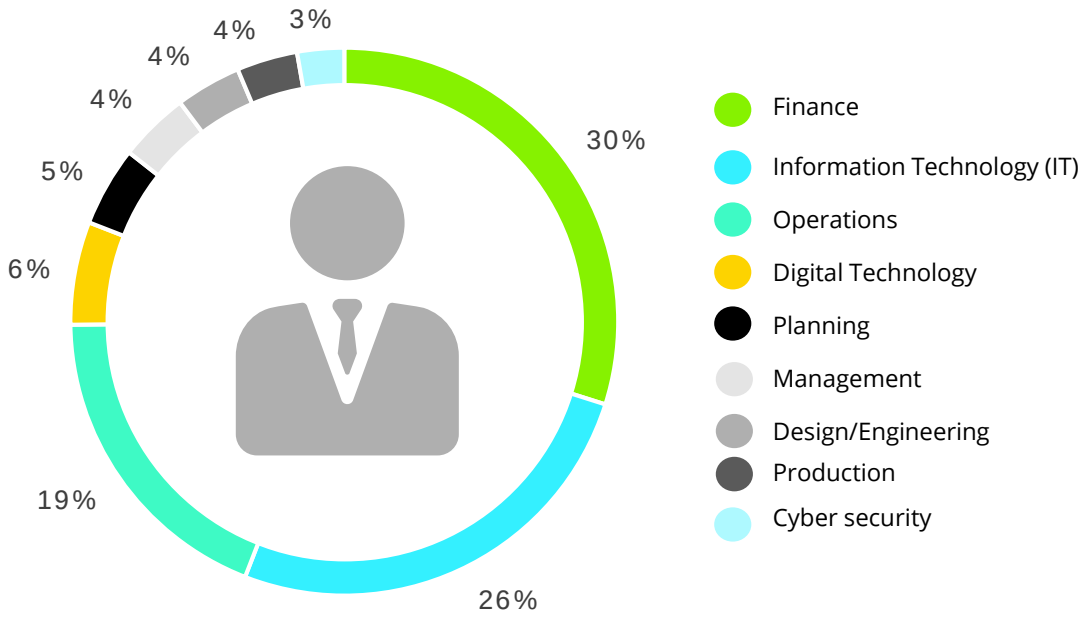
Who we surveyed – All Industries (cont'd)

We explored how business leaders in manufacturing, mining, oil & gas, and power & utilities are planning for, using, and investing in digital transformation initiatives and technologies in the age of Industry 4.0.

Job title



Job Function*



Numbers may add to more than 100 due to rounding

Source: Deloitte Industry 4.0 Investment Survey, 2018

Deloitte.
Digital

Thank you.