OCTAVE

400 executives & senior leaders

1 key topic – digitalization

Data and competitive advantage in the EPC sector

Expert insights on driving industry transformation through enhanced data capabilities

70%

of industrial organizations have increased the number of digital tools and data sources over the past 12 months

Data: The key to EPC growth

Driving transformation through enhanced data capabilities

The engineering, procurement and construction (EPC) sector is stepping into a new era. One filled with unmatched growth opportunities.

Research by McKinsey projects that the construction industry could grow by around 70% by 2040.[1] But the barriers to achieving that growth are also significant, with the analysis noting "engineers and constructors in many parts of the world are struggling to deliver even today's project pipeline."

With labor shortages, cost pressures, higher risk and more regulation, EPC leaders are turning to digital transformation. It's helping them work smarter, move faster and stay connected.

A study by Deloitte[2] found that the use of just one additional technology "increased the likelihood of a project delivering ahead of schedule by 0.59 percentage points and a 0.81 percentage point increase in the share of total projects delivered under budget."

We spoke to

400

global C-suite executives and senior leaders from large and complex industrial businesses – all with revenues of over $1 billion and more than 1,000 employees.

Data imperative

Real digital transformation requires fast, visualized data from across the business. The key to getting it right? Contextualized information needs to land in front of the right people at the right time.

But diverse landscapes of systems and processes can lock data into silos. This impedes decision-making and leads to disruptive challenges.

Industry leaders are seeking answers through innovations that provide visibility through connected data. Yet many are still struggling to successfully integrate data tools that remove challenges and provide a competitive edge.

For this report, we surveyed global C-suite executives and senior leaders from large industrial businesses. This is a look into their biggest challenges and experiences of adopting data technologies to overcome them.

We hope you find the research and accompanying best-practice insights valuable to your organization's goals.

[1] Delivering on construction productivity is no longer optional, August 2024, McKinsey

[2] State of digital adoption in the construction industry 2025, Deloitte

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The industrial disconnect

The challenges affecting performance

69%

acknowledge a strong impact from project milestones being missed

This study surveyed leaders at large industrial businesses from across APAC, Europe, Latin America, the Middle East and North America.

Executives confirmed that several common challenges are holding their organizations back. 93% are impacted by projects running over budget, with 64% reporting a strong or severe impact from this challenge.

70% say they are being impacted by project milestones being missed. While 65% acknowledge a strong or severe impact from unplanned production downtime.

For 93% of leaders, the inability to scale assets and meet business demand has a reported impact, with strong or severe implications for 68%. Safety concerns (65%) and cybersecurity concerns (63%) also have a significant impact for the executives surveyed. These operational issues are particularly pertinent in the EPC sector. An industry that has long encountered more pronounced productivity challenges than other industrial sectors. McKinsey's research[3], for example, found that construction productivity improved by only 10% (0.4% annually) between 2000–2022, versus 90% (3% annually) in manufacturing.

The challenges identified by the survey participants will likely come as no surprise to fellow executives. Yet, the contributing factors behind them reveal the day-to-day reality facing organizations. Especially as they strive to achieve their strategic objectives.

93%

are impacted by projects running over budget

70%

are being impacted by project milestones being missed

68%

have severe implications from the inability to scale assets and meet business demand

93%

93% of industrial executives acknowledge an impact from projects running over budget

70%

say they are being strongly or severely impacted by project milestones being missed

[3] Delivering on construction productivity is no longer optional, August 2024, McKinsey

The factors behind the disconnect

From skills gaps to manual processes

67%

say skills and knowledge gaps are having a severe or strong impact

A major force behind these challenges is talent. 67% of leaders say skills and knowledge gaps are having a severe or strong impact. 72% say retirements and departures are hitting operations at the same level. Capability is shrinking just as expectations rise.

This will no doubt resonate with leaders in the EPC sector. As McKinsey[4] observes: "In addition to shortages in the workforce, retirement, shorter job cycles and competition for talent have caused a decline in the construction workforce's skill and experience levels."

Across large industrial businesses, data quality and availability are also major contributing factors to the ongoing challenges. Severe or strong contributing impacts were reported for:

74%
Delayed or out-of-date information

73%
Poor data integration/ connectivity

73%
Incomplete or inaccurate information

For EPC businesses, these are mission-critical challenges. They can lead to a disconnect between field teams, misalignment between planning and execution, and more.

[4] Delivering on construction productivity is no longer optional, August 2024, McKinsey

The head of engineering at a major global engineering business told our researchers that overcoming the data quality challenge is a strategic priority: “In the past, people focused on delivering documents – now they have to ensure the data behind them is correct. This shift requires a new mindset because poor data quality can affect automation and AI applications.

“Working with messy data was fine in the past because you could still get your documents out. But now, data is the key driver and it has to be reliable, structured and correctly formatted from the start.”

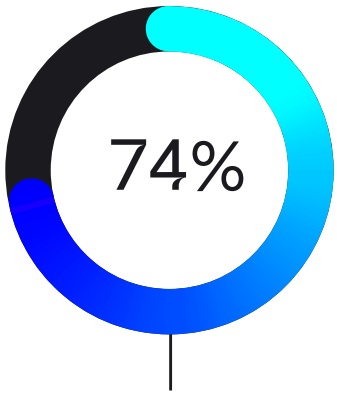
Outdated methodologies and systems are playing into this data problem across industrial sectors. 74% of executives say manual processes are having a strong or severe impact with consideration to the challenges. Whereas, 73% confirm the same level of impact from aging infrastructure and legacy systems.

Other key factors contributing impact to disruptive challenges include:

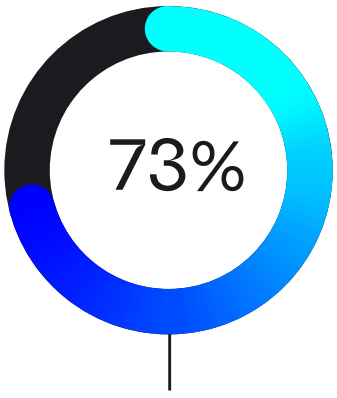
62%
Increased maintenance costs

62%
Asset unreliability

62%
A lack of stakeholder alignment



of executives in the industry say manual processes are having a strong or severe impact with regard to their business challenges



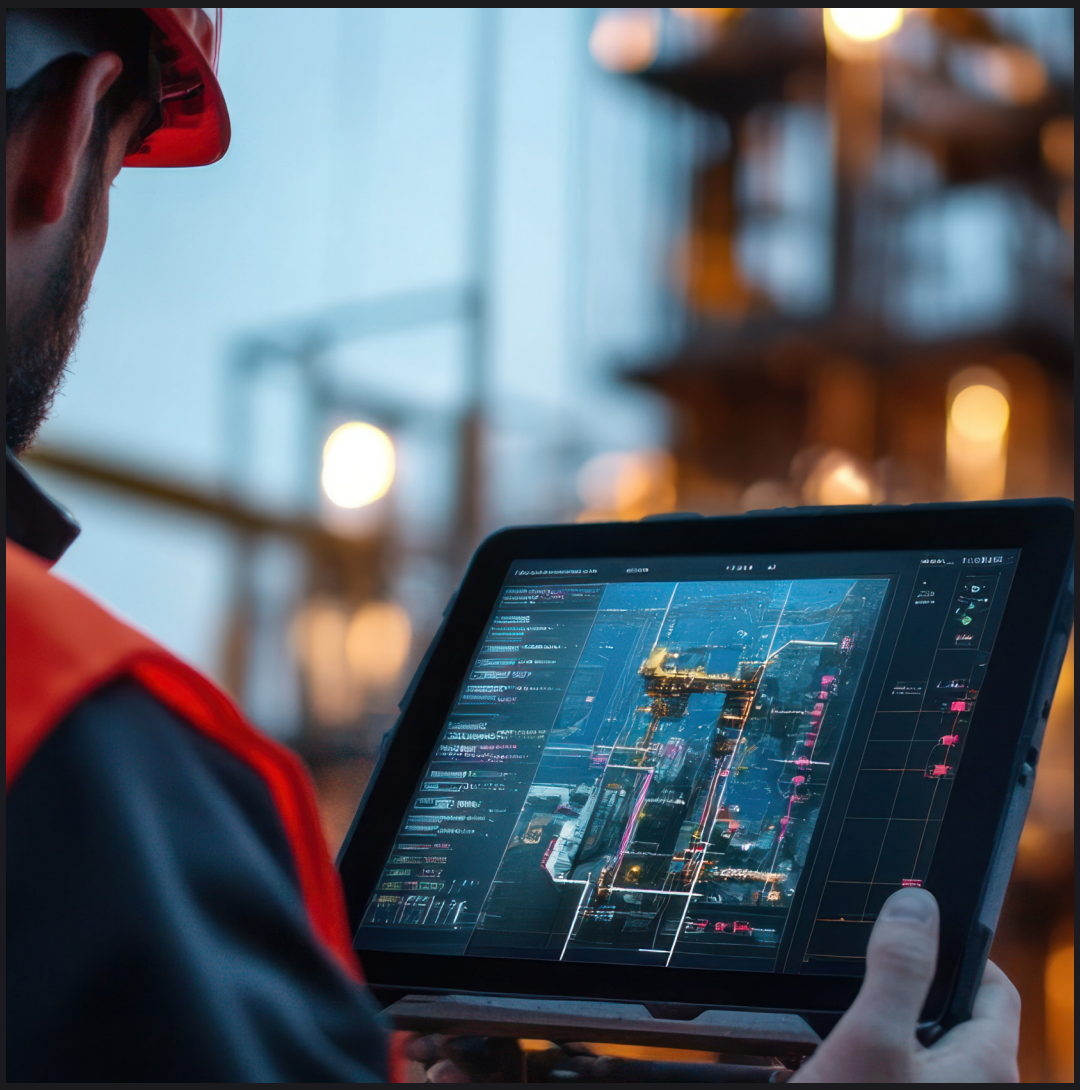
say poor data integration/ connectivity is having a strong or severe impact with regard to their challenges

Data visualization: the most adopted solutions

Sophisticated digital tools are increasing, counteracting challenges

70%

have increased the number of digital tools in the past year



"My business has increased the number of digital tools and data sources over the past 12 months."

70%

of leaders agree with this statement

Organizations are responding to challenges by increasing technology investment. For example, 70% of leaders surveyed agree with the statement: 'My business has increased the number of digital tools and data sources over the past 12 months'.

Deloitte's study[5] shows why this strategy is particularly significant in the EPC sphere – finding that, for sector businesses with $100 million in revenue, adopting an additional technology is associated with:

- $1.14 million higher revenue growth
- 1.5% more projects delivered under budget
- 1.1% more projects delivered on time in our study of industrial organizations with revenues of over $1 billion, leaders confirmed that tools designed to enhance visibility into assets and processes are being adopted and used to a high degree.

Visualization dashboards are the most regularly utilized technology. They are used frequently or continuously by 76% of organizations. The data also shows that digital twins are becoming widely used. This is a trend that is predicted to grow according to Hexagon's Digital Twin Industry Report[6], with 80% of leaders saying AI has made them more interested in digital twin technology.

Meanwhile, knowledge graphs and info maps are frequently or continuously used by 71% of respondents. Digital thread adoption is strong at 69%, but data approaches vary. And with 66% still using paper-based information, results will differ across the industry.

Other point solutions used to this degree include 3D digital models (68%), geospatial information (66%), 2D digital design (62%), point clouds (60%) and panoramics (57%).

Reliance on manual work and isolated tools highlights major untapped potential to boost data connectivity and visibility.

71%
using knowledge graphs and info maps

69%
Digital thread adoption

66%
using paper-based information

[5] State of digital adoption in the construction industry 2025, Deloitte

[6] Hexagon's Digital Twin Industry Report. 2025. Hexagon

Too many tools? The overload trap.

Digital thread technology needs consistent data access, connectivity and continuity

66%

of businesses with more tools than a year ago see cybersecurity concerns as a challenge

66%

of businesses with more tools than a year ago see cybersecurity concerns as a challenge

53%

53% of those who haven't added more digital tools

Even as data-visualization tools expand across industries and investments deepen, many challenges remain unresolved. So, why hasn't the impact been greater?

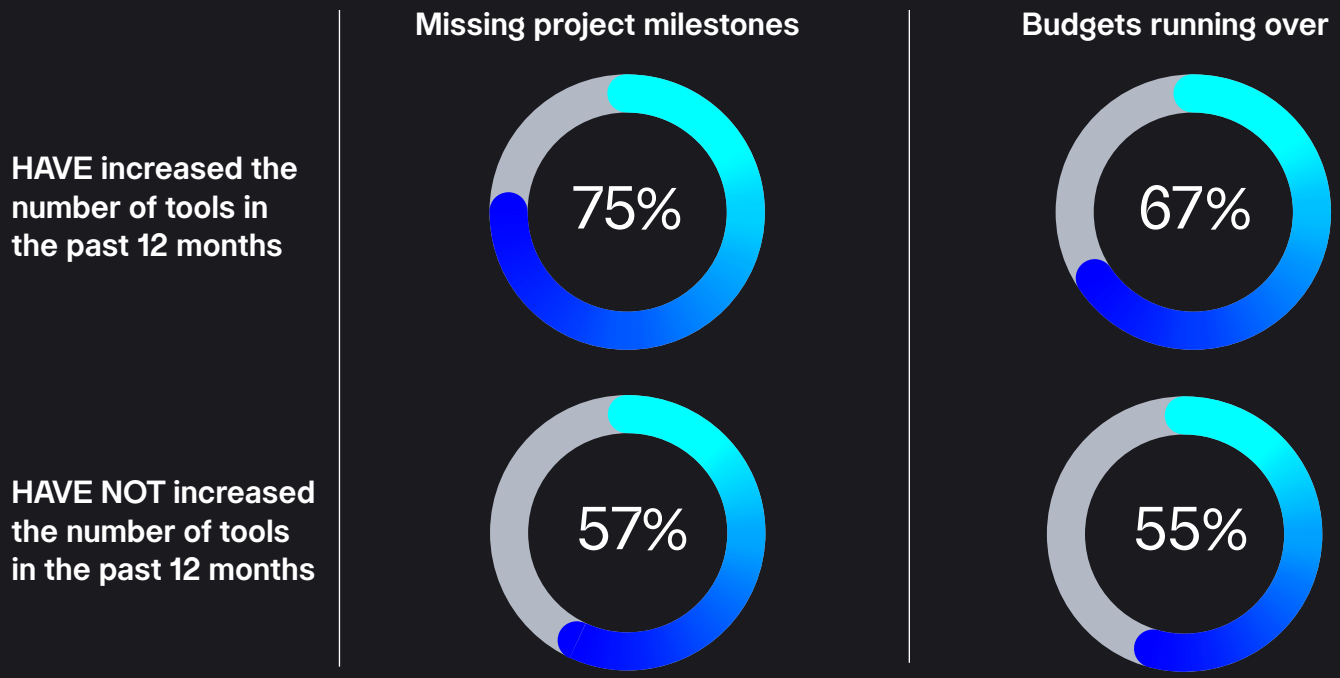
For example, 56% of the leaders surveyed agree with the statement 'transformation efforts in our organization haven't yet returned the expected value.'

Providing more context on this lack of ROI, 62% agree with the statement 'the lack of available data on asset performance is impacting the financial performance of the business' and 57% agree that 'the tools and platforms used to visualize data lack connectivity to each other.'

"The lack of available data on asset performance is impacting the financial performance of the business."

62%

of leaders agree with this statement



The visibility illusion

Strikingly, instead of solving problems, more tools seem to be slowing teams down. Creating more work and impacting responses to key business challenges. say retirements and departures are hitting operations at the same level. Capability is shrinking just as expectations rise.

63% of those with more tools than a year ago agree that their team spends too much time manually creating reports and consolidating data points. In fact, they spend an average of 18.72 hours a week. This equates to 117 working days a year.

It's clear the data is still fragmented, and a single source of truth remains out of reach.

Of those who have increased the number of digital tools in the past year, 75% report project milestones being missed as having a detrimental impact on their organization. This is compared with 57% of those who have not increased the number of digital tools in the past year. Similarly, 67% of those who have increased their tools cite projects running over budget as a challenge, compared with 55% of those who haven't added more tools.

Deloitte's data[7] shows how this impact is being felt in the EPC sector. For example, in Asia Pacific, the average construction business uses 11 data environments, leading to inefficiencies. It estimates that streamlining legacy data environments could save managers 1.5 days per week.

A director of digital delivery at a global EPC firm told our researchers the company is moving away from disconnected point solutions and toward a unified digital backbone:

"If engineering, supply chain and construction all talk about analytics and dashboards and KPIs, that's not something we'd want the [IT] function to deliver. [Instead, we] pull that up into the enterprise level and then build a data foundation, driven by enterprise IT, that we can then provide back as a service for the functions to use."

[7] State of digital adoption in the construction industry 2025, Deloitte

Safety and cybersecurity implications

Cybersecurity is also impacted for those with increased digital tools. This will have implications for their ability to confidently comply with sector regulations.

Octave's research found that 70% of those who have added more tools in the past 12 months cite safety concerns as a challenge, compared with 49% of those who haven't. And 66% with more tools than a year ago see cybersecurity concerns as a challenge, compared with 53% of those who haven't added more digital tools.

Our study shows that adding more tools impacts stakeholder alignment in some organizations. 64% of those who have grown digital toolsets in the past year acknowledge this challenge, compared with 56% of those who have not.

Organizations need clear best practices. Without them, tools can't deliver their full value or address the problems they were meant to solve.

117

working days a year per organization, on average, is spent manually creating reports and consolidating data points

Solution in focus: the digital thread

End-to-end visibility for organizations that follow best practices

69%

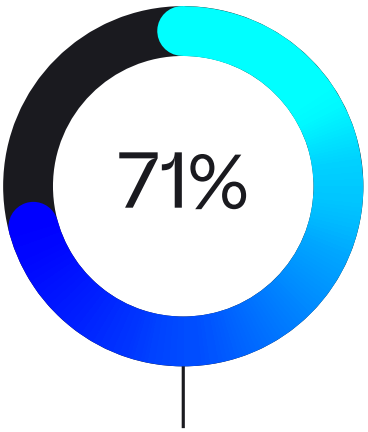
of executives confirm use of digital thread technology

At its core, the research reveals the same issues again and again. Fragmented data, weak integration, the challenge of gaining insights and unmet ROI expectations. This brings digital thread technology into focus. Designed to connect data end-to-end, it could address these challenges. Yet, many organizations struggle to put it into practice.

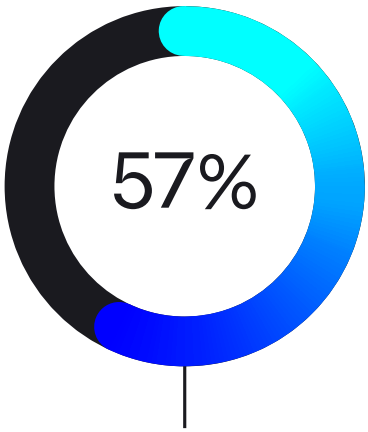
Some 69% of executives confirm continuous or frequent use of digital thread technology at their organizations and 71% of those respondents say that their stakeholders have direct access to the data and systems they need, compared with 57% for those who use it less frequently.

But what about those who say stakeholders still don't have direct access to the data and systems needed? For those organizations, why is the digital thread still not delivering on its promise? Where is the 'single pane of glass' where all operational and asset data?

The next chapter outlines the digital thread maturity curve—and why mastering it is key to realizing real business benefits.



of those who use digital threads frequently or continuously say that their stakeholders have direct access to the data and systems they need, compared with...



who use it less frequently.

IDC's three stages of digital thread maturity

In the 2025 IDC analyst brief, 'Unlocking industrial transformation with a unified digital thread from engineering to operations[8],' IDC, in conjunction with Octave, observes that there are three stages of digital thread maturity, based on the solutions selected and methodology followed:

Low maturity:

"Labor-intensive, ad hoc integrations of data and manual data transfers of external data are conducted. Often, this external data fails to be utilized, especially in the case of engineering and construction data. The electronic product code process creates value-rich documentation and data that provides a baseline ontology of an entire operational setting. However, at the handoff, this data set is often recreated nearly entirely from scratch by the owner operator."

Moderate maturity:

"Some isolated data integration capabilities are executed with the help of IT staff by utilizing horizontal tools and practices. This works for some data and use cases, but often neglects the operations subject matter expertise necessary to contextualize data fully. Many organizations report years-long efforts to pipe operational data from many sources to an IT data lake only to find that combining the data in meaningful ways is severely limited because it lacks context and is not available in a timely manner."

Robust maturity:

"Organizations develop a digital thread through a platform-based architecture that maintains data context within original applications while ensuring data access and continuity through engineering to operations and beyond. These organizations understand that data context is best preserved closest to the source and is ever changing."

[8] Unlocking Industrial Transformation with a Unified Digital Thread from Engineering to Operations, 2025 IDC Analyst Brief, sponsored by Octave, document no. US52853924, January 2025

Digital thread adoption

"Increasing, maturity can fix existing problems and enable many new things."

Paul Connell
Product manager,
Octave

Paul Connell, product manager at Octave, has previously worked in global projects and development at ExxonMobil. Here, he discusses the data visibility challenges and opportunities for today's EPC organizations:

Paul Connell
Product manager, Octave

1 What's the state of play with digital thread adoption in the EPC sector today?

I discussed this very topic with several EPC organizations and owner operators in the US recently. Without a doubt, everyone wants this capability, but they're also feeling that it's a monumental effort to implement when there are already long-established processes in place to execute projects. When you have projects that are ready to be executed and you have constrained resources, it can become difficult to find the moment to move digital thread maturity along.

2 With regard to IDC's definition of the three maturity stages for digital thread capability [see previous chapter], where are most EPC companies today?

The majority are in that middle "moderate maturity" group. At some organizations, there are also variations in capability within projects. For example, design and engineering might be pushing forward toward mature digital thread capabilities. Further down the project lifecycle, however, teams may be utilizing some fully cloud, totally SaaS capabilities, but with significant gaps in the processes and workflows where they end up supplementing with other point solutions to fill in. There are also still a few organizations at the "low maturity" end, where there's a lot of manual data handling, Excel spreadsheets and so on.

3 What benefits do organizations see in making the effort to increase maturity?

It can fix existing problems and enable many new things. One of the key issues that it would help mitigate is the validation of data coming out of engineering before it gets downstream. If you have the ability to connect all data through a centralized pipeline, if you have a kind of birthmark on each piece of data that allows it to be tracked through its lifecycle, then that becomes incredibly powerful. When you've gone through the pains that can be experienced in projects when you have bad data, that becomes a real motivation to do something about it.

4 What are the most common internal barriers to transformation?

Project teams who want to develop digital thread capabilities will often face resistance from a much higher level in the organization, such as "we can't invest the people and the time right now," "we don't have the budget," "corporate has standardized on technology X," and so on. In other organizations, they might commit a large group of their IT professionals to actually develop a custom software solution for data connectivity, which can work initially, but then often hits scalability and reliability issues – then they backslide from moderate maturity back to the low maturity stage.

5 Does industry-wide collaboration have a part to play in advancing maturity?

Absolutely. Talking to those EPCs and owners in the US recently, they were all concerned about that data validation issue. For example, how do you ensure that the data you're producing during engineering is controlled and validated, so when it leaves one of the authoring tools and is disseminated through other systems and programs, it remains true and correct and there is only one source of truth? There's an imperative here for the industry to come together and have an open and honest discussion on what good looks like – for instance, "if we can all align on what this type of pump is called, across the world, then we'll always have the taxonomy right.

6 Is this somewhere that AI can also help with?

Sure. If you train an AI agent on a specific type of taxonomy or a specific project data naming convention or structure, you could then deploy it to carry out clash detection – for example, identifying and correcting naming anomalies such as extra spaces, too many numbers and so on. It has the potential to significantly speed up the harmonization of data in support of a digital thread.

Turn the page for expert advice on advancing along the digital thread maturity curve, from wherever your organization stands today...

Advanced digital thread maturity

Expert insights for leaders in the EPC sector

"As a priority, legacy systems need to be addressed."

Lawrence Benson
VP, portfolio strategy, Octave

So, how can power industry organizations amplify digital thread maturity and the data visibility needed for key business challenges?

Lawrence Benson, VP of portfolio strategy at Octave, has worked with organizations across industrial sectors to unleash maturity in this area. He offers these five pieces of advice for EPC leaders:

Lawrence Benson
VP, portfolio strategy, Octave

1 Address legacy systems and manage change

"Best practices are vital for enhancing data visibility, because, for example, some organizations are less advanced in their digital thread maturity than others. Part of what's holding organizations back from increasing their digital thread maturity is that this really is a large endeavor – so where do you start? As a priority, legacy systems need to be addressed because older software systems and processes don't provide the infrastructure for mature digital thread capabilities."

"And this needs to go hand in hand with change management. The IT team can be doing a fantastic job at maintaining existing infrastructure but may not know the best route to creating the modern and robust digital backbone required for a digital thread. There will potentially be a lack of expertise in the business and those gaps need to be quickly identified."

2 Have scalability in mind from the outset

"What you need to avoid is investing in tools that will get you a little bit further but then realizing a couple of years down later that they are now not able to achieve what the business needs. Think long-term and focus on the ideal end state you'd like to achieve, then select solutions capable of scaling with you as your digital thread maturity grows.

With that wider vision in place, identify the shorter-term easy wins along the journey and build momentum and excitement in the organization. When people see progress, it garners more enthusiasm for the next phase."

3 Leverage solutions that meet you where you are

"Wherever you are on your digital thread maturity journey, moving to the next phase requires partners and solutions that can meet you where you are and extend on that progress – rather than discounting the investments that have already been made. They should be able to assess how your available data can be connected to other systems, in a way that isn't just point-to-point – bringing things together in an intelligent way."

4 Take a platform approach

"A key way to build on what you have today and bring it all together is through the adoption of a platform-based architecture. This means that, instead of passing data from point solution to point solution, you have a connected 'single pane of glass' for data across all sources – so you can instantly access contextualized data from anywhere, analyze and share it. You want all your data to remain close to its sources, where it is authored, changed, kept accurate and up-to-date, and so on. But then you have your overarching platform that democratizes that data – making it instantly accessible to stakeholders from anywhere in the business."

5 When you reach robust maturity, exploit AI

"The most successful organizations have data they know they can rely on. It's from a trusted source, in a trusted location, it's comprehensive and up to date, and their digital thread makes it always available, from anywhere. Their next stage of maturity is exploiting AI. When the foundation is right, it's not a daunting task to layer on AI tools that enable the exponential acceleration of data analysis – identifying anomalies and root causes and enabling fast decisions that improve all around operational efficiency."

"The most successful organizations have data they know they can rely on, from a trusted source, in a trusted location."

Taking the next step

Ready to unlock smarter, faster and more connected operations? Talk to Octave's EPC experts and take the next step in your digital maturity journey.

Connect with the Octave team today.

Contact us

About us

Octave provides mission-critical software that empowers organizations to make informed decisions across every stage of the asset lifecycle — Design, Build, Operate and Protect — where performance, safety and reliability are non-negotiable and failure is not an option.

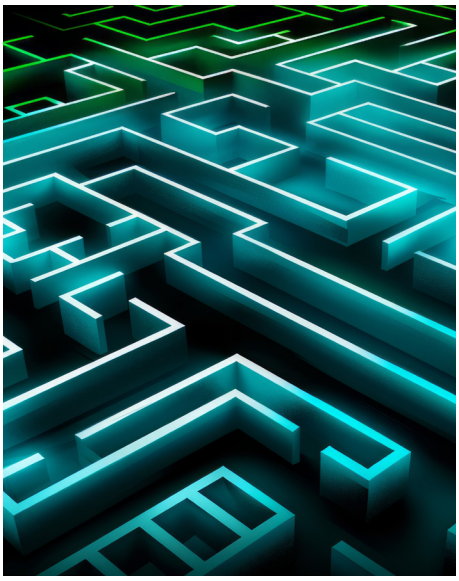
Turning complex operational data into actionable intelligence, Octave connects expertise, real-world conditions and enterprise-scale insight to improve performance, resilience and incident response where it matters most.

Octave has approximately 7,200 employees in 45 countries.

The spin-off of Octave remains subject to an ongoing separation process and final approval of the board and shareholders, as well as other conditions, consents and regulatory approvals. There can be no assurances a separation, spin-off or listing will occur.

Survey methodology

How we put our global survey together



This report uses data from the Octave study into the impact of digital tools and data in industrial business environments. Four hundred decision-makers were surveyed, including C-level executives, about key business challenges and digital tools in their organizations.

We surveyed respondents from APAC (Australia, Hong Kong, Japan, Singapore and South Korea), Europe (France, Germany, Italy, Spain and the U.K.), Latin America (Brazil, Chile and Mexico), the Middle East (Israel, Qatar, Saudi Arabia and the UAE) and North America (Canada and the U.S.).

We focused on three key sectors: manufacturing (food and beverage, and pharma), oil and gas / chemicals and power. All organizations surveyed have annual revenues of more than US$1 billion.

Fieldwork was conducted over the phone and online between December 2024 and January 2025. To qualify, respondents had to meet certain criteria – to either be a top-level decision maker or report to a top-level decision-maker.

Questions focused on both the digital tools they are using and the business value they are seeing.

Find out how Octave can support your organization's digital thread journey.

Contact us

About Octave

Octave is a leader in enterprise software, turning data into decisive action and intelligence into your edge. Our software solves for and simplifies complexity, from the design and build to operations and protection of people, property and assets – for any scope, at any scale. For decades, we've partnered with customers to sharpen performance, elevate efficiency and amplify results. From factory floors to entire cities, our solutions are tuned to scale up what's possible from day one onward.