OCTAVE

400 executives & senior leaders

1 key topic – digitalization

Data visibility and compliance

in heavy industrial organizations

Insights from top leaders navigating high stakes, highly regulated operations

70%

of organizations ramped up their digital tool stack in the last 12 months. Complexity followed. Visibility didn't.

We spoke to

400

global C-suite executives and senior leaders. Manufacturing. Pharma. Food and beverage. Power. Oil and gas. Chemicals.

Data connectivity: The key to compliance

Across the world, industrial giants are investing heavily in digital transformation. Driving efficiency, sharpening yields, advancing sustainability and keeping pace with rising compliance demands.

In highly regulated sectors like chemicals, durable manufacturing and metals and mining, that transformation depends on one thing. Fast, clear visibility into data across operations, projects and assets.

Getting the right, contextualized data to the right people, exactly when they need it, is the difference between compliant, efficient operations. And a reporting process bogged down by manual effort.

But complexity gets in the way. Disparate systems and siloed processes lock critical data out of reach. Decisions slow. Risks escalate. Cybersecurity gaps widen. Safety exposure grows. And compliance reporting becomes more labor intensive than ever.

Unprecedented visibility

Forward-thinking leaders know it. They're pushing for innovation that connects fragmented data and turns complexity into clarity. But while the goal is clear, the path isn't. Many still struggle to integrate the very tools designed to eliminate their blind spots and unlock real operational advantage.

To understand what's standing in the way, Octave surveyed 400 C-suite and senior leaders across global industrial enterprises. The results are telling: visibility gaps remain one of the biggest threats to compliant, efficient operations. And one of the biggest opportunities for leaders ready to act.

The insights in this report are built for that next step. You'll find clear takeaways and proven practices to strengthen compliance today. And to scale your organization's capabilities for whatever comes next.

Contents

4 Compliance is getting more complex. Fast.

7 Today's top industry challenges

10 Data visualization: the most adopted solutions

13 The investment/value gap

16 Solution in focus: The digital thread

18 5 ways to advance digital thread maturity

Compliance is getting more complex. Fast.

Across industries, leaders agree on one thing: compliance is getting harder. Fast. In PwC's Global Compliance Survey 2025[1], 86% of industrial sector executives said that their requirements have become more complex in the last three years.

The scope keeps widening. Products and services. Governance. Reporting. Tax. Sustainability. IT and data. Ethics. Workforce. Safety. Trade. Sanctions. And that's before factoring in the challenge of navigating multiple regulatory regimes across global operations.

PwC captures the reality well: "This is creating a multidimensional risk environment for leaders that operates like an 'ecosystem' – dynamic and changing and connected across the organization, value chain and industry."

AI is amplifying that complexity. Boston Consulting Group (BCG)[2] notes in its global ESG compliance and risk report: "…as the European Union's AI Act comes into force, finding efficient and effective ways to implement its requirements is a top priority. Complying with AI regulations entails dealing with significant complexity, not only around technical adjustments but also regarding governance changes across organizations."

Octave's global study reinforces this trend. Compliance is getting more complex just as industrial tech stacks are splintering. Siloed point solutions keep multiplying, making it harder to surface the insights needed to meet rising regulatory demands. And even harder to do it with any real efficiency.

77%

of leaders say compliance complexity has already had a negative impact on their organization

86%

of industrial sector executives say their compliance requirements have increased over the last three years

[1] Global Compliance Survey 2025, PwC
[2] New Ways to Combat Rising Complexity and Costs, November 2024, BCG

Sector challenges

In the chemicals sector, the pressure is mounting. McKinsey[3] reports that shifting regulations, especially across Europe and the United States, are adding a new layer of operational and strategic complexity. "New regulations have affected compliance costs and companies' operational strategies. Carbon taxes and land use regulations have put pressure on industries, further impacting domestic demand."

Sustainability regulations are accelerating the shift. BCG's[4] analysis shows materials and process industries feeling the squeeze as EU sustainability mechanisms, especially the Emissions Trading System (ETS), take hold. The signal is unmistakable. It reports: "ETS prices are expected to rise to €125 per ton by 2030 and further to €153 per ton by 2034. This reflects a substantial increase from today's levels and underscores the dual challenge facing EU producers: covering a greater proportion of their emissions (up to 100% by 2034) while paying significantly higher prices for allowances."

And the impact extends far beyond chemicals. Across industries, 77% of leaders told PwC[5] their organization has already been hit by compliance complexity in five or more growth-critical areas. The top pressure points: resource capacity, transformation and change efforts, IT and data systems and overall profitability. The takeaway is clear: regulatory expectations are escalating. The cost of keeping up is rising in parallel. For large industrial organizations, the compliance landscape isn't just expanding. It's tightening.

Siloed point solutions keep multiplying, making it harder to surface the insights needed to meet rising regulatory demands. And even harder to do it with any real efficiency.

Fragmented response

Rising complexity has pushed many industrial organizations into disjointed, inefficient compliance workflows. As BCG[6] notes: "In the absence of a unified approach, assurance efforts lack consistent alignment and coordination, and teams may not share a common understanding of their organization's risk taxonomy."

And the data backs it up. Octave's survey of leaders across industrial sectors makes it clear: a lack of visibility across projects and assets is at the core of today's biggest operational challenges. The implications are clear. Visibility gaps weaken compliant operations. Making reporting slower, harder and far more resource-intensive.

[3] The state of the chemicals industry, December 2024, McKinsey
[4] Decoding ETS and CBAM..., February 2025, BCG
[5] Global Compliance Survey 2025, PwC
[6] New Ways to Combat Rising Complexity and Costs, November 2024, BCG

Today's top industry challenges

74%

say data delays are hurting performance. Badly.

Octave surveyed leaders from major industrial organizations across APAC, Europe, Latin America, the Middle East and North America. Each generating over $1 billion in revenue and employing more than 1,000 people.

Across the board, the message is consistent: core challenges are dragging performance.

70%

say missed project milestones are hitting their organizations hard.

64%

say projects running over budget are hurting performance.

65%

point to unplanned production downtime as a major disruptor.

Capacity challenges are widespread. 93% of leaders say their ability to scale assets and meet business demand is being impacted. For 68%, that impact is strong or severe.

Risk pressures are rising in parallel.

Safety concerns are hitting 65% of executives at a strong or severe level and cybersecurity threats follow closely at 63%.

Across regions and industries, operational strain is intensifying. And visibility gaps are amplifying every challenge.

The factors behind the challenges

These challenges won't surprise leaders running large industrial operations. But the forces driving them are far more revealing. They lay bare the day-to-day reality executives navigate as they push toward strategic goals while staying compliant in an environment that grows more complex by the quarter.

Across regions and sectors, one pressure rises above the rest. The talent gap.

76%

of leaders say skills and knowledge shortages are having a strong or severe impact.

72%

report the same from employees retiring or leaving. An exodus that drains institutional expertise and slows progress.

But the compliance implications run deeper. Data quality and availability are now central contributors to disruption:

74%

report strong or severe impact from delayed or outdated information.

73%

cite poor data integration and connectivity.

73%

point to incomplete or inaccurate information.

These issues don't appear in a vacuum. They're symptoms of aging systems. Outdated ways of working.

74%

of executives say manual processes deliver a strong or severe hit.

73%

point to aging infrastructure and legacy systems as equally damaging.

Other structural factors compound the strain. Increased maintenance costs (62%), asset unreliability (62%) and a lack of stakeholder alignment (62%) to name a few. Together, they create a landscape where compliance becomes harder to achieve, slower to maintain and more resource-intensive with every passing year.

Against this backdrop, the challenge is clear. Industrial organizations are fighting to meet fast-evolving compliance obligations. With systems, processes and data foundations that weren't built for the complexity they now face.

Now, let's look at the technologies industrial giants are implementing to address these issues.

Data visualization: The most adopted solutions

69%

use digital thread technology to a high degree

Organizations across industrial sectors are responding to rising operational pressure. Increasing compliance complexity by accelerating technology investment. The trend is clear. 70% of leaders agree their business has increased the number of digital tools and data sources in the past 12 months.

Tools that sharpen visibility into assets and processes are leading adoption. Visualization dashboards are the most frequently used technology. 76% of organizations relying on them regularly or continuously.

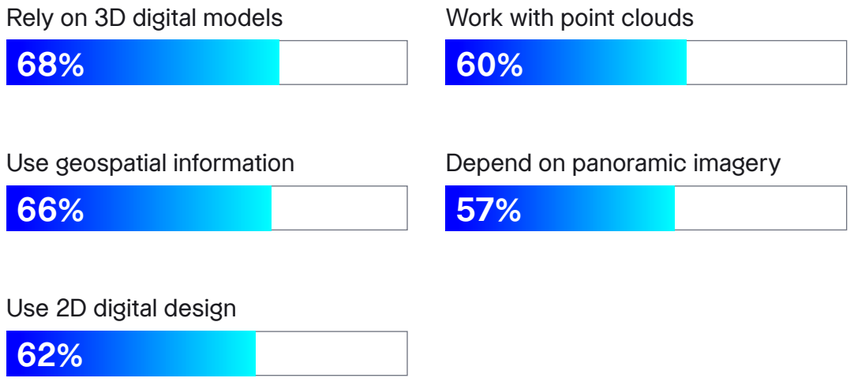
Close behind are digital twins, now a core part of industrial operations across regions. Globally, 73% of organizations report using digital twin technology to a high degree.

The takeaway: leaders are investing in visibility first because clarity drives compliance, performance and every strategic decision that follows.

Reliance on manual processes

Digital thread technology is now being used to a high degree by 69% of businesses. Yet the data shows that approaches to connectivity vary widely and the outcomes will vary with them. 66% of industrial organizations still depend on paper-based information on a continuous or frequent basis.

Other point solutions remain heavily used as well.



This continued reliance on manual processes and disconnected tools makes one thing clear. There is significant headroom for organizations to strengthen data connectivity and visibility in pursuit of efficient, sustainable and compliant operations.

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

70% **of leaders agree with this statement**

The investment/ value gap

63%

of leaders say that their team spends too much time manually creating reports and consolidating data points.

Data visualization tools are everywhere and adoption keeps climbing. The potential to boost compliance is real. Yet the reality does not match the promise. If the tools are so advanced, why are they not reducing the complexity leaders face every day?

The gap shows up fast. 56% of the leaders surveyed agree with the statement ‘transformation efforts in our organization haven’t yet returned the expected value’. The core issue is clarity. 62% of leaders agree that ‘the lack of available data on asset performance is impacting the financial performance of the business’. 57% agree that ‘the tools and platforms used to visualize data lack connectivity to each other’. When systems do not speak the same language, insight gets lost and decisions slow.

The impact on compliance reporting is unmistakable. More tools often mean more manual work. 63% of leaders who added tools in the past year say their teams spend too much time creating reports and consolidating data. On average, that workload adds up to 18.72 hours a week. 117 working days a year.

The operational fallout is just as telling. Among organizations that added more tools this year, 75% say missed project milestones are causing harm. Only 57% of organizations without added tools report the same. Budget overruns follow a similar pattern. 67% of those expanding their toolsets cite over-budget projects as a major challenge, compared with 55% of those that did not expand.

The pattern is clear. More tools are not solving the problem. Without connected data, complexity grows, workloads rise and compliance only gets harder.

Safety and cybersecurity compliance issues

The compliance implications run even deeper. Safety and cybersecurity risks rise sharply among organizations that have added more digital tools. 70% of leaders who increased their toolsets in the past year cite safety concerns as a challenge. Only 49% of organizations that did not add tools report the same.

Cybersecurity follows the same pattern. 66% of those with more tools than a year ago say cybersecurity concerns are a challenge, compared with 53% of those that have not expanded their digital stack.

The message is clear. More tools without better connectivity increase exposure. Safety risks rise. Cybersecurity risks rise. And the ability to stay compliant becomes even harder.

Our study shows a clear pattern. Adding more tools also affects stakeholder alignment in many organizations. 64% of leaders who expanded their digital toolsets in the past year acknowledge this challenge. That compares with 56% among organizations that did not increase their tools.

The message is straightforward. Organizations need best-practice strategies to ensure their tools deliver real value. Technology must solve the challenges it was brought in to address. That includes the growing complexity of compliance.

63%

say their teams spend too much time on manual reporting.

66%

report cybersecurity concerns after expanding their digital toolset. More tools, more exposure.

Solution in focus: The digital thread

IDC's three stages of digital thread maturity

The 2025 IDC Analyst Brief, Unlocking Industrial Transformation with a Unified Digital Thread from Engineering to Operation[7], IDC, sponsored by 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."

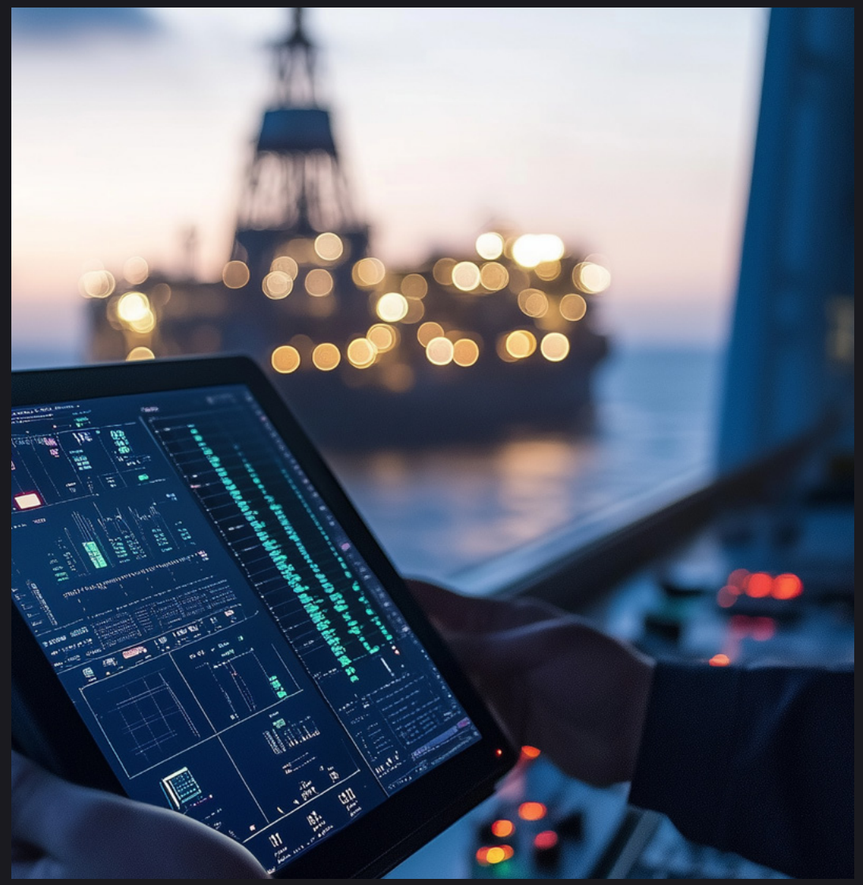
On the next page, you will find expert guidance built to accelerate progress along the maturity curve. Clear steps. Fast wins. Practical insight to strengthen compliant operations and streamline reporting without slowing your pace.

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

5 ways to advance digital thread maturity

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

Lawrence Benson
VP, portfolio strategy, Octave



So how do heavily regulated industrial organizations break through the noise, reach advanced digital thread maturity and finally gain the end-to-end visibility that powers performance and keeps compliance on track?

This is where experience matters. Lawrence Benson, vice president of portfolio strategy within Octave, has spent years working shoulder-to-shoulder with industrial leaders as they push their digital maturity forward. He has seen what accelerates progress. He has seen what stalls it.

And based on that real-world insight, he offers five clear pieces of guidance to help organizations move faster, simplify complexity and unlock the visibility they have been missing.

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

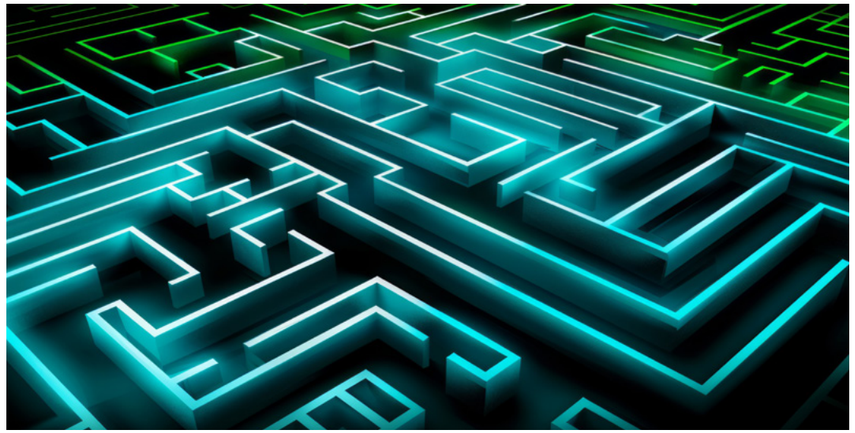
"Wherever you are on your digital thread maturity journey, moving to the next phase requires partners and solutions that can meet you where you are and extend on that progress – rather than discounting the investments that have already been made. They should be able to assess how your available data 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."



Survey methodology

How we put our global survey together

This report draws on data from Octave's global study into the impact of digital tools and data across industrial environments. We surveyed 400 decision-makers, including C-level executives, to understand their biggest operational challenges and how digital tools are shaping performance across their organizations.

Our respondents represented major industrial markets worldwide:

- **APAC:** Australia, Hong Kong, Japan, Singapore, South Korea
- **Europe:** France, Germany, Italy, Spain, the UK
- **Latin America:** Brazil, Chile, Mexico
- **Middle East:** Israel, Qatar, Saudi Arabia, UAE
- **North America:** Canada, the US

We focused on three core sectors: manufacturing, oil & gas / chemicals and power. Every organization surveyed operates at enterprise scale, with more than $1 billion in annual revenue.

Fieldwork was conducted by phone and online between December 2024 and January 2025. Respondents were required to be either top level decision-makers or report directly to them. Ensuring every data point reflects leadership priorities and on the ground realities.

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

Taking the next step

For industrial leaders facing tightening regulations and rising operational risk, the priority is clear: better visibility.

The next step isn't more tools. It's connected data. Giving teams a trusted, real time view across assets, projects and compliance requirements.

Octave helps industrial organizations unify their digital foundation, reduce reporting friction and stay compliant without slowing operations.

Connect with Octave to turn operational complexity into clarity.

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.

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.