Beyond Reactive

How digital intelligence is enabling infrastructure resilience for a climate-disrupted world

2026

Research conducted by Verdantix, an independent research and advisory firm

Bentley®

Foreword

The thought leadership report, Beyond Reactive: How Digital Intelligence Is Enabling Infrastructure Resilience For A Climate-Disrupted World, provides important insights into how infrastructure owners and operators are evolving their approach to resilience, as well as the barriers and challenges they continue to face in moving from policy to practice.

Amit Prothi,
Director General, CDRI

As climate-driven disruptions become more frequent, interconnected and increasingly impactful to infrastructure services and operations, the report makes a strong case for investing in risk assessments, resilience cost-benefit analysis, and technologies to better inform infrastructure resilience planning and investments. It articulates the need to embed resilience throughout the infrastructure life cycle. It also emphasizes the role of a system-wide approach connected to data systems, predictive capabilities and coordinated decision-making in improving operational performance, enhancing risk visibility and enabling faster recovery.

The evidence presented in this report makes an important contribution to the global discourse on infrastructure resilience and strongly complements the findings of CDRI's Second Global Infrastructure Resilience Report (GIR 2025), which highlights how investments in technology, data systems and risk-informed planning can significantly reduce the cascading impacts of disaster-related infrastructure disruptions.

Executive summary

Infrastructure is at a watershed moment. In the face of increasing service disruptions, system complexity and evolving climate risks, infrastructure resilience is shifting from a long-term ambition to an immediate operational and strategic priority. As capital investments in assets continue to grow, the imperative to make these infrastructure systems truly resilient has never been clearer—a priority that will ultimately determine the quality of life for generations to come. This report explores how infrastructure owners and operators are evolving their approach to resilience, drawing on insights from 50 senior executives across key sectors. It assesses strategy maturity, climate risk management, and the financial, technical and organizational barriers limiting progress. While most firms recognize resilience as critical to business continuity, many still face challenges in translating this into consistent, system-wide execution.

Organizations have largely moved beyond awareness, but scaling resilience remains constrained by fragmented digital systems, siloed data and competing investment priorities. At the same time, digital technologies are beginning to improve operational performance and risk management. Crucially, the report highlights how leading firms should leverage integrated digital capabilities to not just mitigate environmental risk, but also to protect long-term asset value and support informed investment decisions. Ultimately, this research showcases where progress is being made and the actions needed to enable more integrated, scalable and proactive resilience strategies.

Key findings

Resilience has become an operational priority, but execution remains uneven:

84% of firms report that they have a developing or mature resilience strategy in place.

76% of firms view climate-driven disruptions as a significant risk.

However, resilience maturity and risk management remain inconsistent across hazard types and organizations.

Financial and technical constraints continue to limit progress:

Competing priorities remain the biggest barrier to resilience investment.

Technical limitations—particularly fragmented data—continue to constrain organizations' ability to scale resilience capabilities.

Most organizations remain in early stages of predictive resilience:

The majority of resilience approaches remain reactive or only partially predictive.

AI adoption is growing but largely focused on early operational use cases such as inspection, defect recognition and asset health forecasting.

Integrated digital capabilities are delivering measurable operational value:

Organizations report strong operational benefits from digital technologies, including improved planning accuracy and decision-making.

Digital twins are emerging as a major investment priority as firms seek more integrated and system-wide visibility across infrastructure networks.

Resilience strategies

Organizations have largely crossed the awareness threshold on resilience and are now implementing and refining resilience strategies

Resilience is no longer a conceptual priority for most organizations; it is now being translated into active strategy and execution (see Figure 1).

Figure 1 – Defining infrastructure resilience

What does infrastructure resilience mean to your organization?

Operational continuity and reliability

Keeping core services running, minimizing downtime and recovering quickly from failures.

"Maintaining operational continuity and safety across all infrastructure and minimizing downtime."

Head of Technology Transformation, Energy

Safety of people, communities, and the environment

Protecting people, communities and the environment under all conditions.

"Resilience is about protecting our people, the environment and our assets."

Group CFO, Mining

Asset longevity and lifecycle management

Long asset lifespans, aging infrastructure, proactive maintenance and visibility of asset health.

"Ensuring infrastructure shall last for 25–35 years minimum. Designed in consideration of extreme weather conditions."

Head of Engineering Services & Inventory, Energy

Risk management and proactive planning

Balancing resilience with cost, managing financial and operational risks, and long-term planning.

"It comes down to finding a balance between risk and investment—protected against severe downtime without overspending."

Operations Director, Transport

Adaptability to change and extreme events

Responding to uncertainty, climate impacts, emergencies and unforeseen disruptions.

"Ensuring our renewable energy assets can operate reliably under changing weather conditions."

Engineering Manager, Energy

Digital, IT, and cyber resilience

IT/OT systems, cybersecurity, SCADA, redundancy and digital continuity.

"Aligning IT resilience with business continuity, so production and safety are never compromised."

Senior Director of IT, Mining

Source: Verdantix survey analysis, *How Digital Intelligence Is Enabling Infrastructure Resilience For A Climate-Disrupted World* (2026)

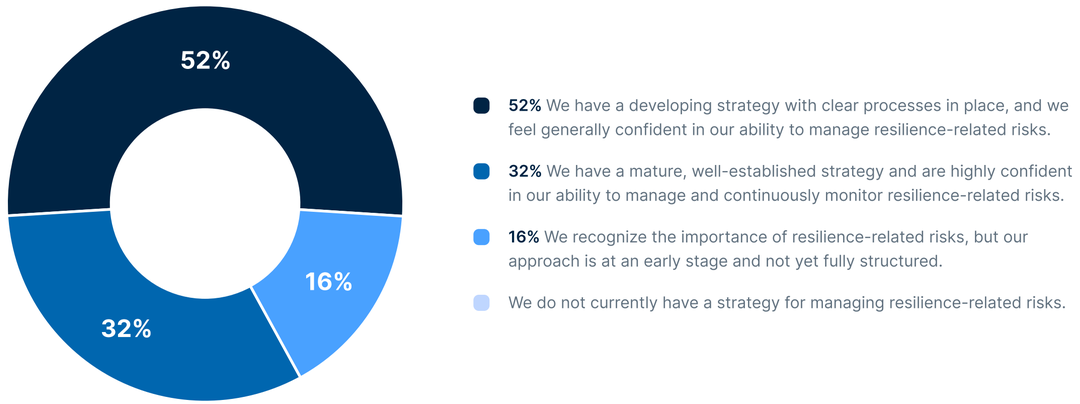
Most firms view their resilience strategies as developing or mature

Infrastructure organizations are increasingly recognizing that resilience is no longer only a long-term ambition, but is also an immediate business continuity requirement. Reflecting this, 52% of firms have a developing strategy, with clear processes in place—leaving them generally confident in their ability to manage resilience-related risks (see Figure 2).

A further 32% of industrial organizations describe themselves as having a mature, well-established resilience strategy. This indicates a broad progression beyond early awareness into more established approaches (see Figure 3).

Figure 2 – Distribution of organizations by maturity of resilience strategy

Which of the following best describes your organization's strategy for managing resilience-related risks to your infrastructure?



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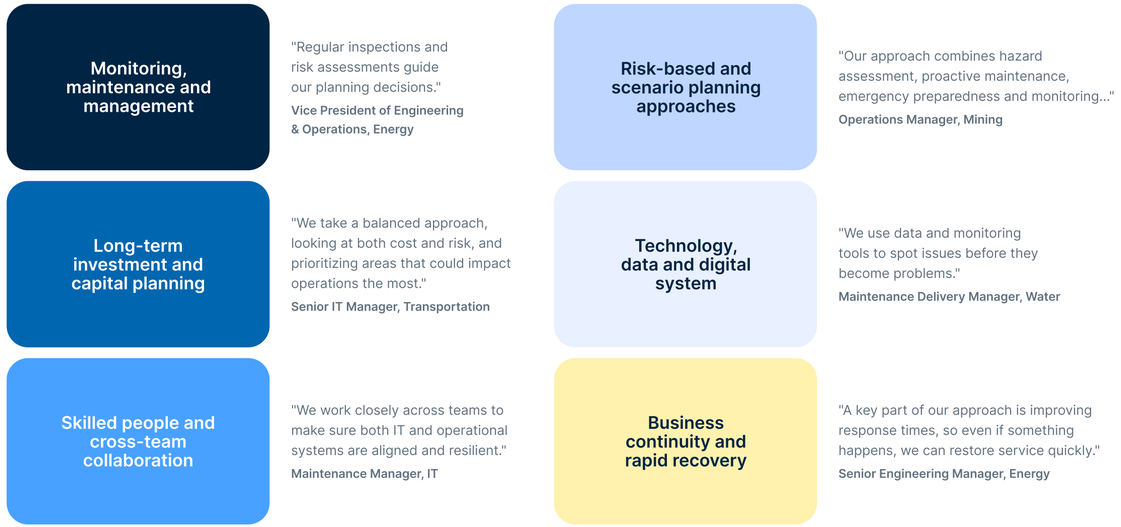
Source: Verdantix survey analysis, *How Digital Intelligence Is Enabling Infrastructure Resilience For A Climate-Disrupted World* (2026)

Figure 3 – Core approaches used by organizations to manage infrastructure resilience

How does your organization currently approach infrastructure resilience planning and management?



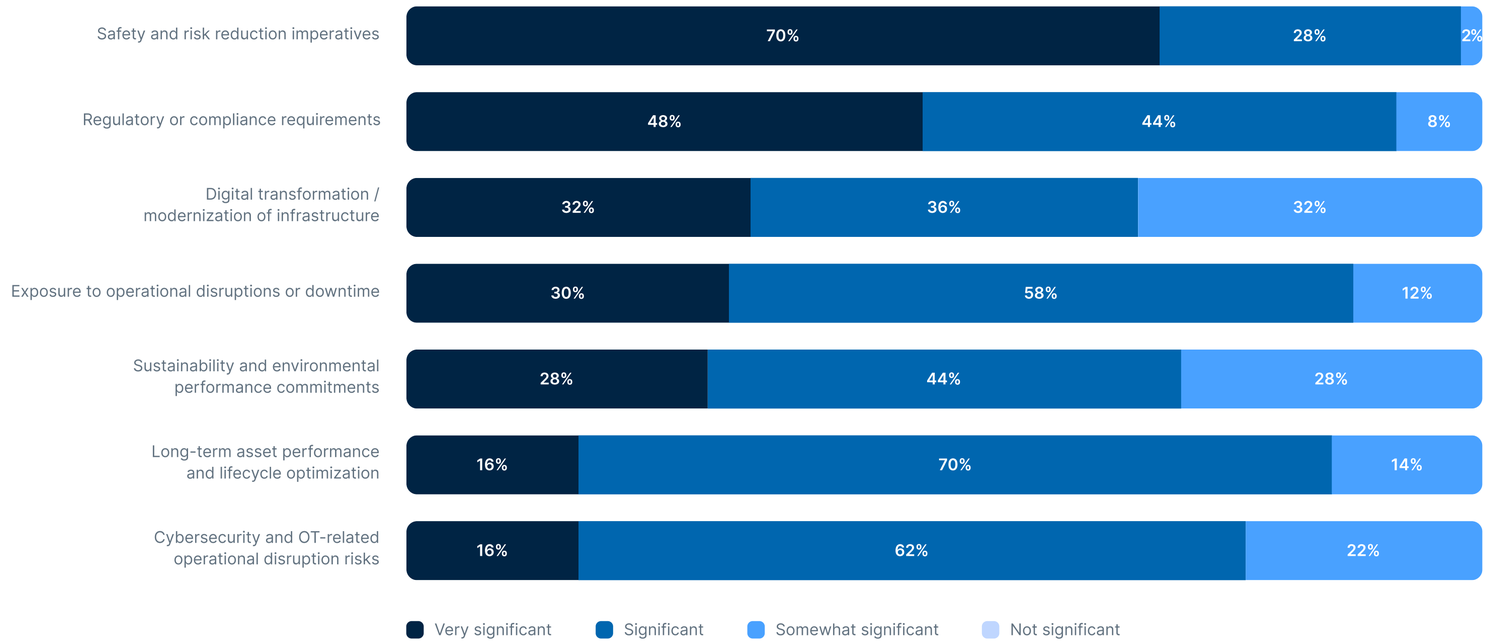
Source: Verdantix survey analysis, *How Digital Intelligence Is Enabling Infrastructure Resilience For A Climate-Disrupted World* (2026)

Drivers of resilience investment are immediate, risk-led and compliance-driven

Almost all firms—98%—identify safety and risk reduction as major drivers of investment in infrastructure resilience (see Figure 4). This suggests that resilience spending is still primarily focused on protecting assets, people and operations, rather than enabling long-term transformation or innovation. Regulations and compliance requirements are also major investment drivers for 92% of organizations, highlighting the growing influence of external regulatory pressure. Operational disruptions and downtime are another key factor, influencing investment decisions for 88% of firms. Taken together, these findings show that resilience investment is largely driven by immediate operational and regulatory pressures. However, they also suggest that many organizations may still be underinvesting in longer-term resilience capabilities, particularly those needed to address systemic and climate-related risks.

Figure 4 – Key drivers shaping investment in infrastructure resilience

How significant are the following factors in shaping your organization's decisions to invest in infrastructure resilience?



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Source: Verdantix survey analysis, *How Digital Intelligence Is Enabling Infrastructure Resilience For A Climate-Disrupted World* (2026)

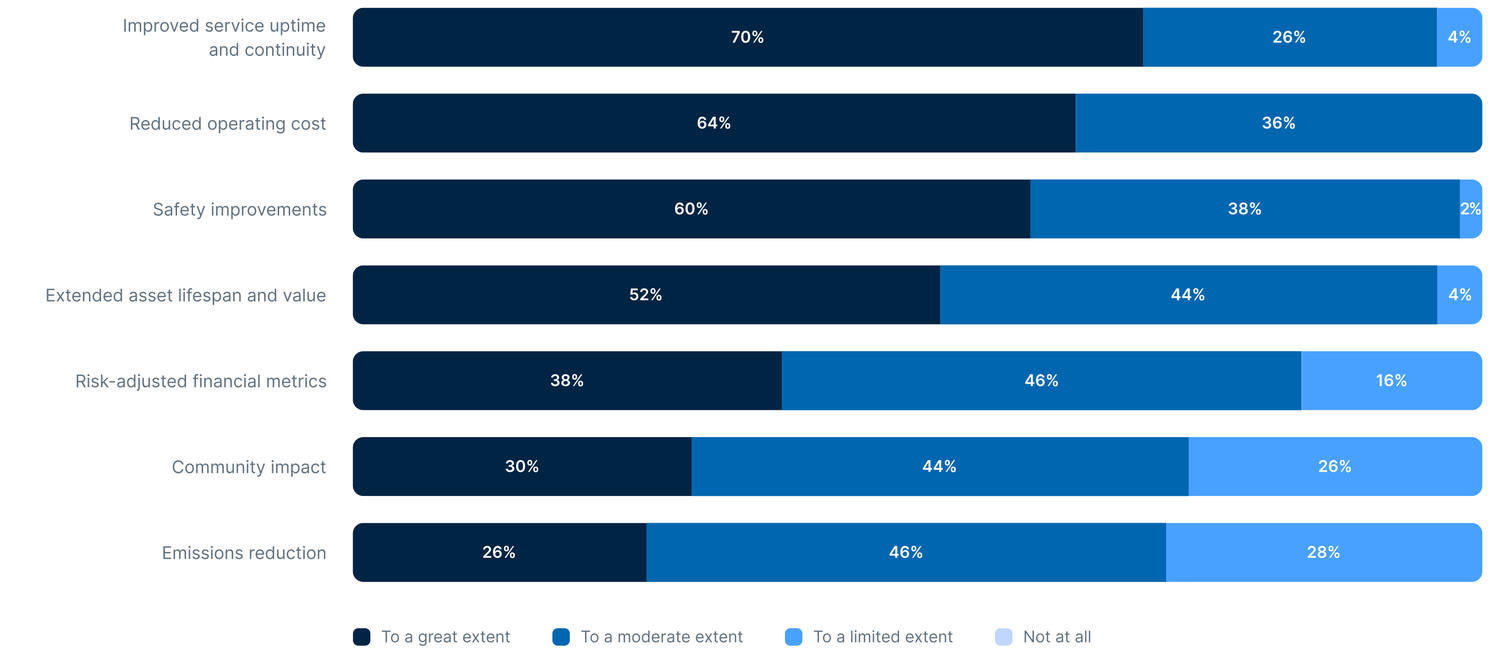
Note: Any percentages lower than 3% are shown as plain numbers.

Resilience benefits are primarily measured through operations, cost and safety-related KPIs

When assessing the benefits of infrastructure resilience, organizations are primarily focusing on short-term, measurable operational outcomes, with environmental and societal impacts receiving less emphasis due to the challenges in quantifying them and their longer-term nature. Reflecting this, 70% of organizations use improved service uptime and continuity metrics to a great extent in measuring resilience benefits (see Figure 5). Reduced operating costs and safety improvements complete the top three metrics used to measure benefits. This focus reflects organizations' shift into a delivery and optimization phase, prioritizing measurable operational outcomes and near-term value. On the other hand, ESG-related metrics such as emissions reduction and community impact lag behind, with only 26% and 30% of firms respectively using these metrics to a great extent.

Figure 5 – How organizations measure the benefits of infrastructure resilience

To what extent does your organization use the following metrics to measure the benefits of infrastructure resilience?



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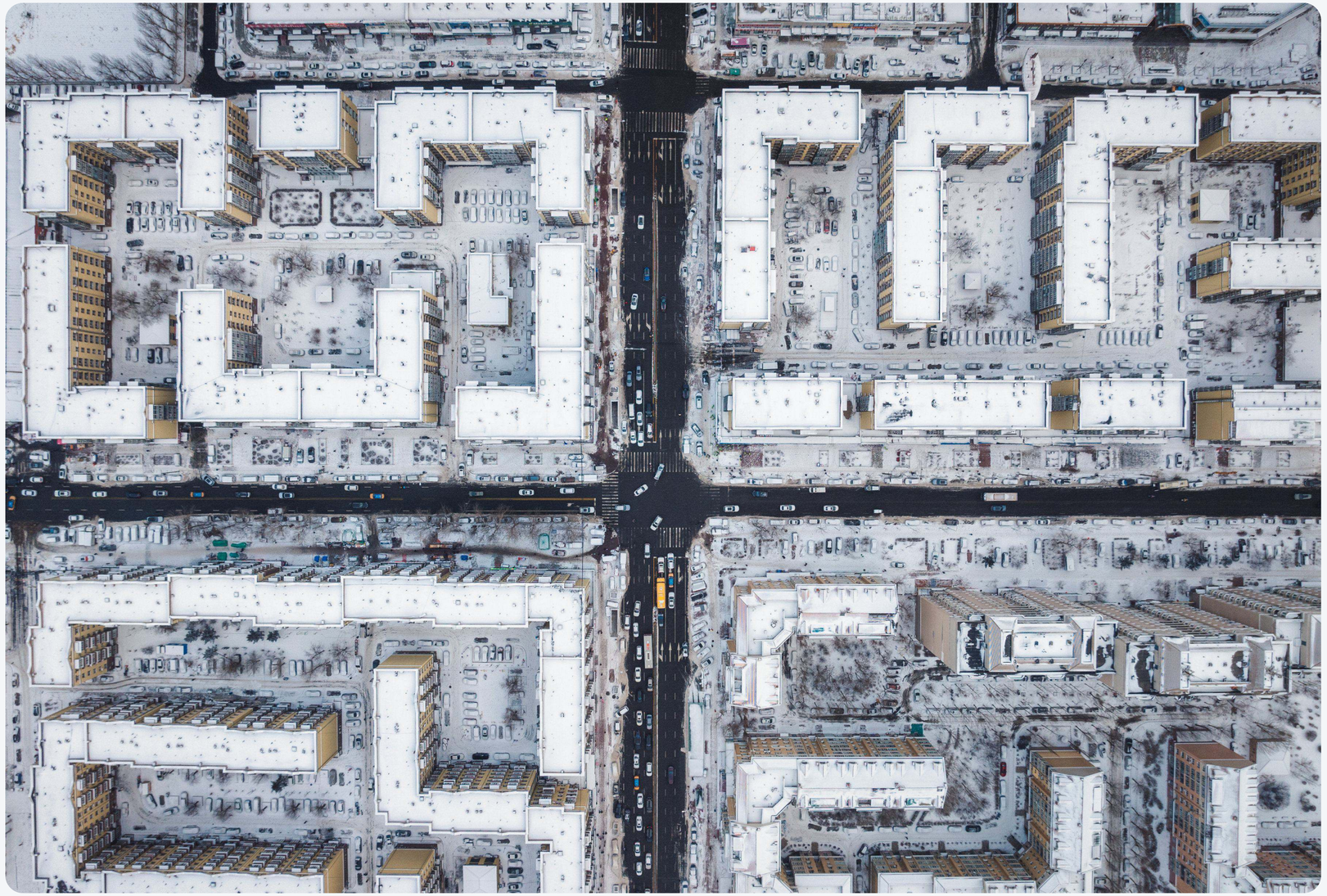
Climate risk

Climate risk is clearly understood as a resilience issue, but execution varies widely by hazard type

As organizations move into the delivery phase, climate risk is increasingly shaping how resilience strategies are prioritized and applied in practice.

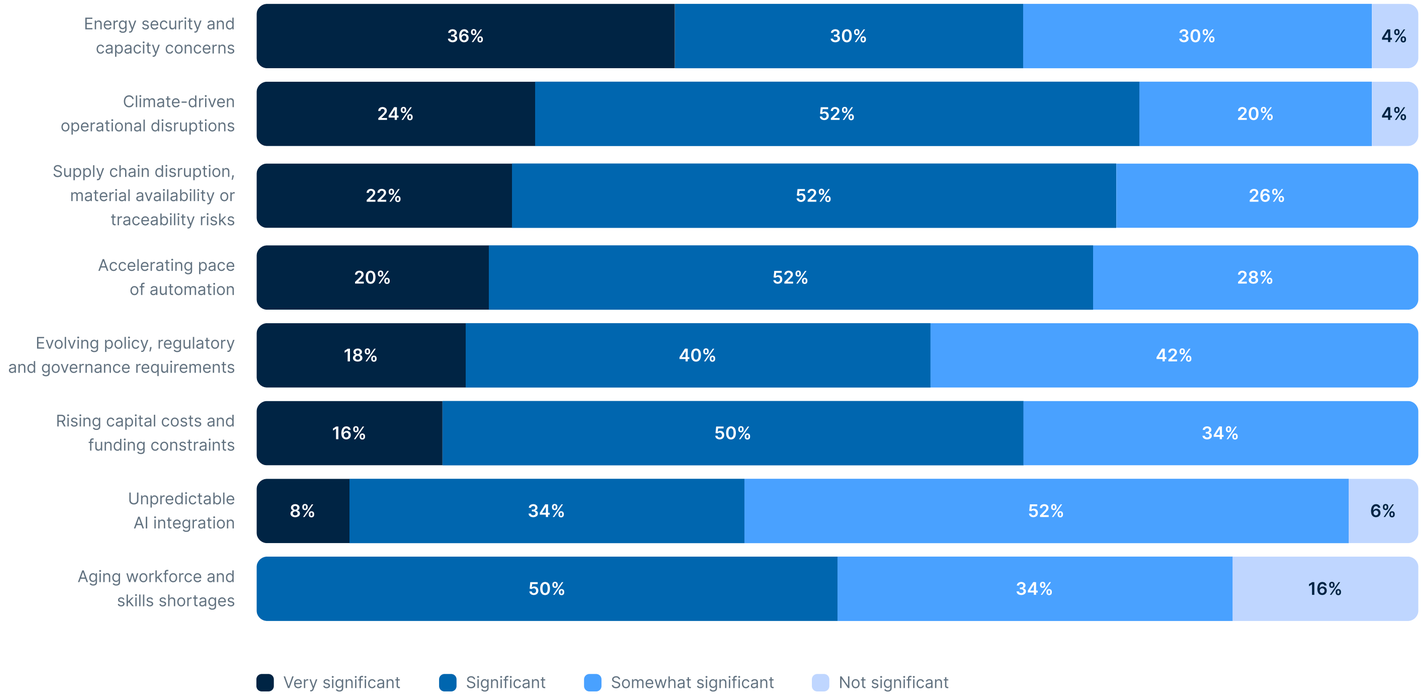


Climate-driven disruptions are recognized as significant resilience risks

Three-quarters of firms—76%—place climate-driven disruptions as either a significant or very significant risk to their infrastructure resilience (see Figure 6). This reflects the growing reality that climate-related risks are no longer isolated concerns, but are becoming more frequent, severe and operationally disruptive. This is unsurprising given the scale of the threat: according to data from the CDRI, global disaster losses now exceed $732 billion annually, with indirect economic costs averaging 7.4 times the value of direct infrastructure damage. Together, these findings indicate that climate risk is now firmly recognized as a critical priority within the resilience agenda, with growing awareness at both organizational and policy levels.

Figure 6 – Perceived impact of key risks on infrastructure resilience

How significant is the impact of each of the following risks on your organization's infrastructure resilience?



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Source: Verdantix survey analysis, *How Digital Intelligence Is Enabling Infrastructure Resilience For A Climate-Disrupted World* (2026)

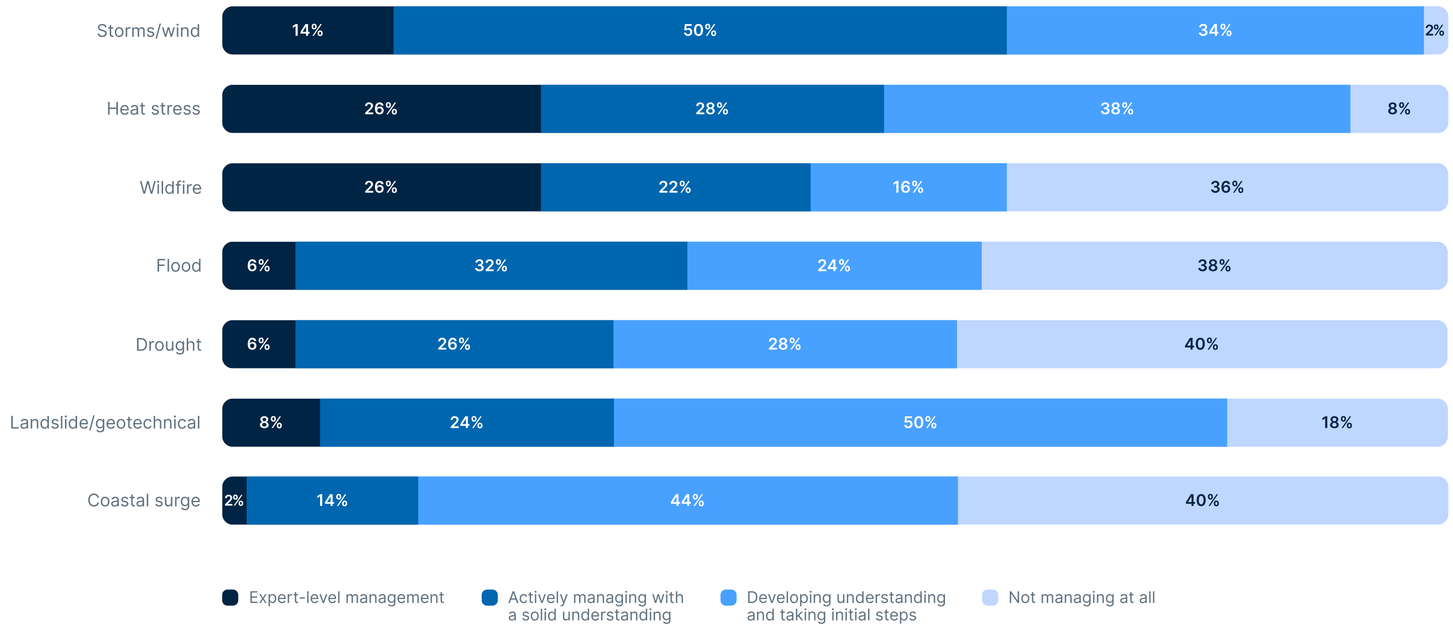
Management of climate risks varies by hazard type

Despite strong recognition, the extent to which climate risks are actively managed varies significantly by hazard type, revealing a clear disconnect between overall ambition and practical execution. Storms and wind have the highest level of management, with 64% of firms managing these risks with at least a solid understanding (see Figure 7). This likely reflects both the frequency and immediacy of such events, as well as the relatively mature risk mitigation approaches developed in response to their historically visible and recurring impacts. Following this, both heat stress and wildfires are being actively managed by 54% and 48% of organizations respectively, seemingly gaining increasing attention as their impacts intensify.

In contrast, 40% of firms report not managing drought and coastal surge risks at all. This may be because such hazards are more geographically specific or slower onset in nature, leading some organizations to deprioritize them. This variation creates a fragmented approach to climate resilience across hazard types, which may leave critical vulnerabilities unaddressed—particularly as climate patterns shift and risks that were previously less material become more acute.

Figure 7 – How organizations are managing different types of climate-related risks

To what extent are you currently managing the following climate-related risks as part of infrastructure resilience planning?



N = 50

Source: Verdantix survey analysis, *How Digital Intelligence Is Enabling Infrastructure Resilience for a Climate-Disrupted World* (2026)

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Financial

Firms know resilience matters, but financial justification remains a persistent barrier to scaling up

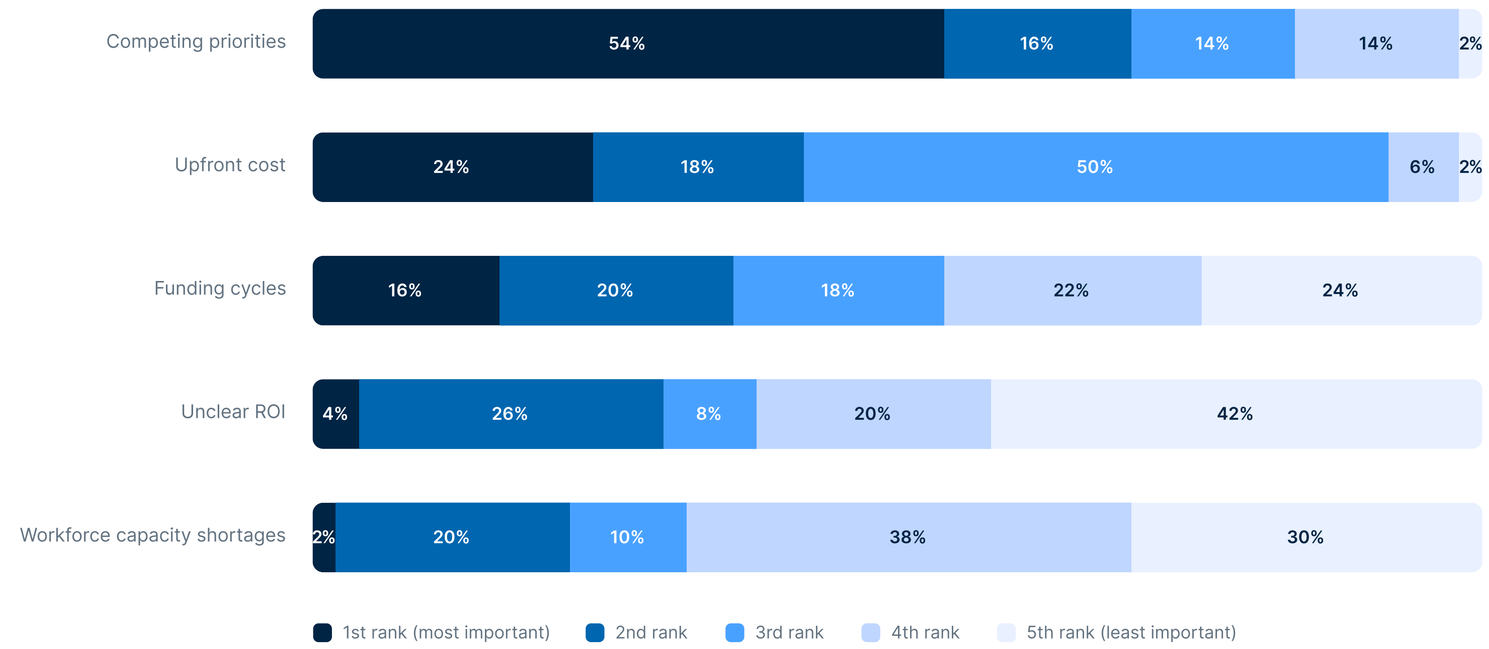
As organizations begin to address more complex and climate-driven risks, the challenge shifts from understanding resilience to justifying and funding it at scale.

Competing priorities are a key financial hurdle to achieving stronger infrastructure resilience

Financial constraints are among the greatest barriers to achieving stronger infrastructure resilience, with over half of firms ranking it as a top three challenge. Within this, competing priorities for limited budgets emerges as the most significant hurdle, with 54% of organizations identifying it as their primary constraint (see Figure 8). In an environment shaped by supply chain disruption, energy price volatility, geopolitical uncertainty and sustained cost pressures, many firms are being forced to allocate increasing resources simply to maintain stable operations. As a result, while the importance of infrastructure resilience is widely recognized, it often competes with more immediate operational demands for funding—delaying or limiting the scale at which resilience investments can be deployed.

Figure 8 – Financial barriers limiting investment in infrastructure resilience

What are the biggest financial barriers preventing your organization from achieving stronger infrastructure resilience?



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Firms struggle to quantify the operational and financial impacts of disruption

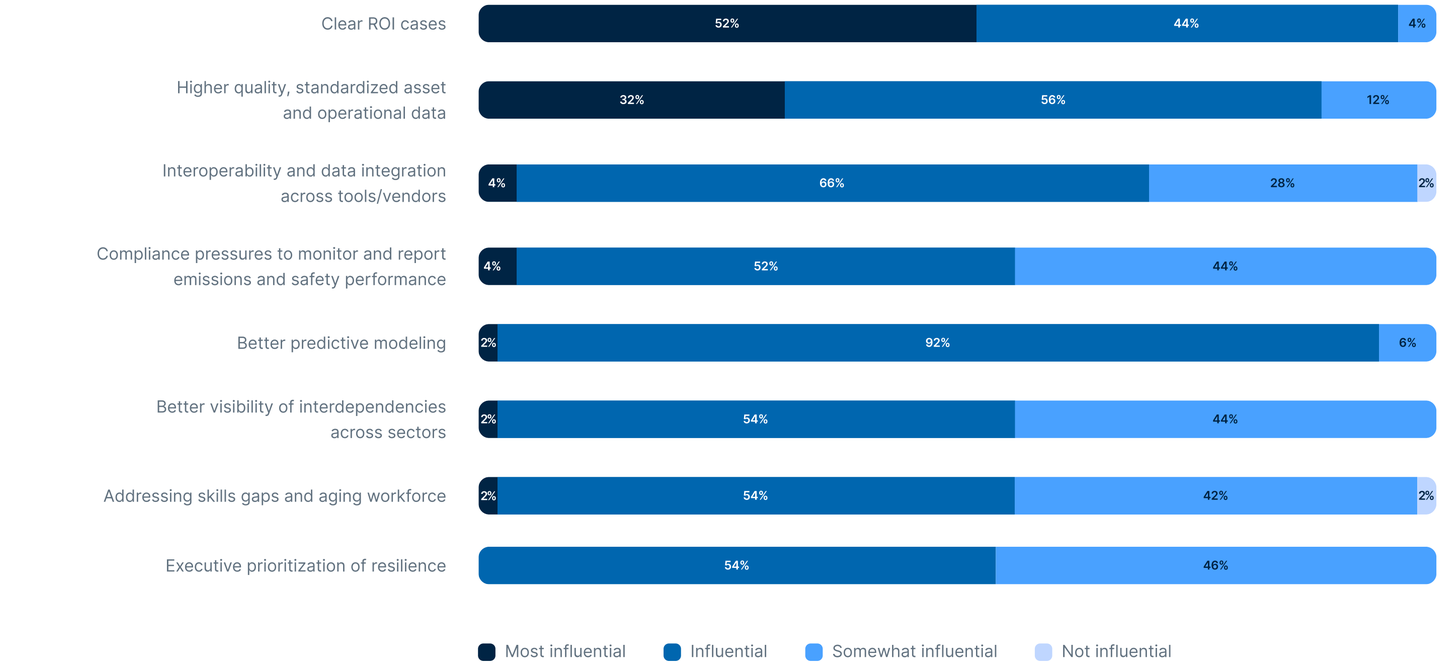
Quantifying resilience impacts—including the cost of disruptions and associated operational downtime—remains a critical challenge, particularly when implementing digital technologies to manage infrastructure resilience. Without robust data on the financial and operational consequences of disruptions, organizations face difficulties in articulating the full value of resilience investments. This lack of quantification weakens the business case, making it harder to prioritize resilience initiatives against other competing investments. In turn, this creates a self-reinforcing cycle: limited measurement constrains investment, and limited investment restricts the ability to generate the data needed to demonstrate impact at scale.

Clearer ROI cases are needed to drive digital resilience investments

To best motivate investment in digital technologies that support infrastructure resilience, clear return on investment (ROI) cases are critical: this is rated as the most influential factor by 52% of firms, with a further 44% identifying it as influential (see Figure 9). In the context of constrained budgets and competing priorities, organizations require stronger, more tangible business cases that not only justify the upfront investment, but also clearly articulate the cost of inaction. Accelerating digital resilience investment, therefore, depends on organizations clearly linking it to measurable financial and operational outcomes, with strong ROI cases essential to unlocking funding and scaling implementation.

Figure 9 – Factors driving investment in digital technologies for infrastructure resilience

Please rate how influential the following factors would be in motivating your organization to invest in digital technologies that support infrastructure resilience.



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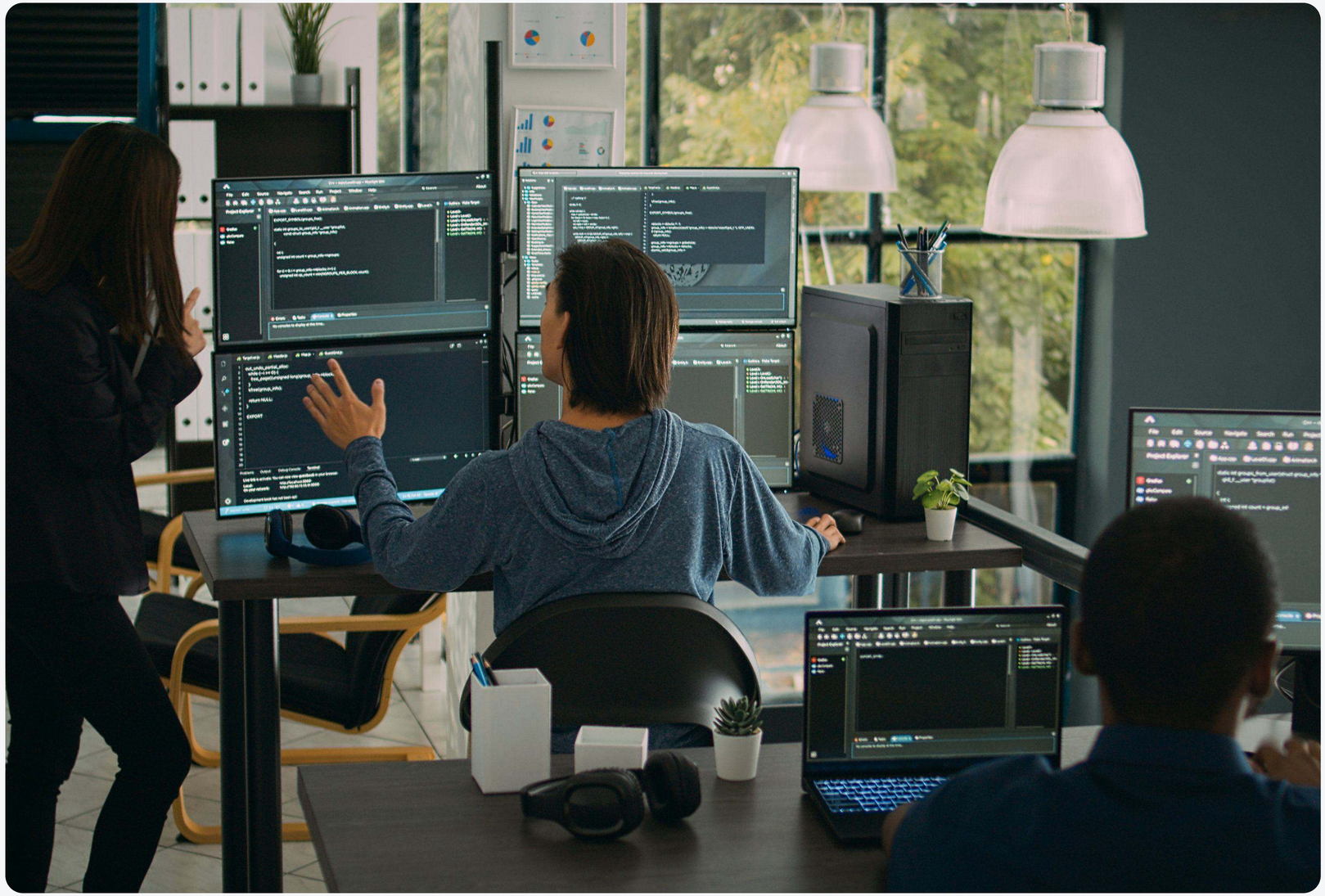
Digital technologies

Fragmented digital systems limit infrastructure performance

Delivering resilience at scale is not only a financial challenge, but also a reflection of how well organizations connect and utilize their digital systems and data.

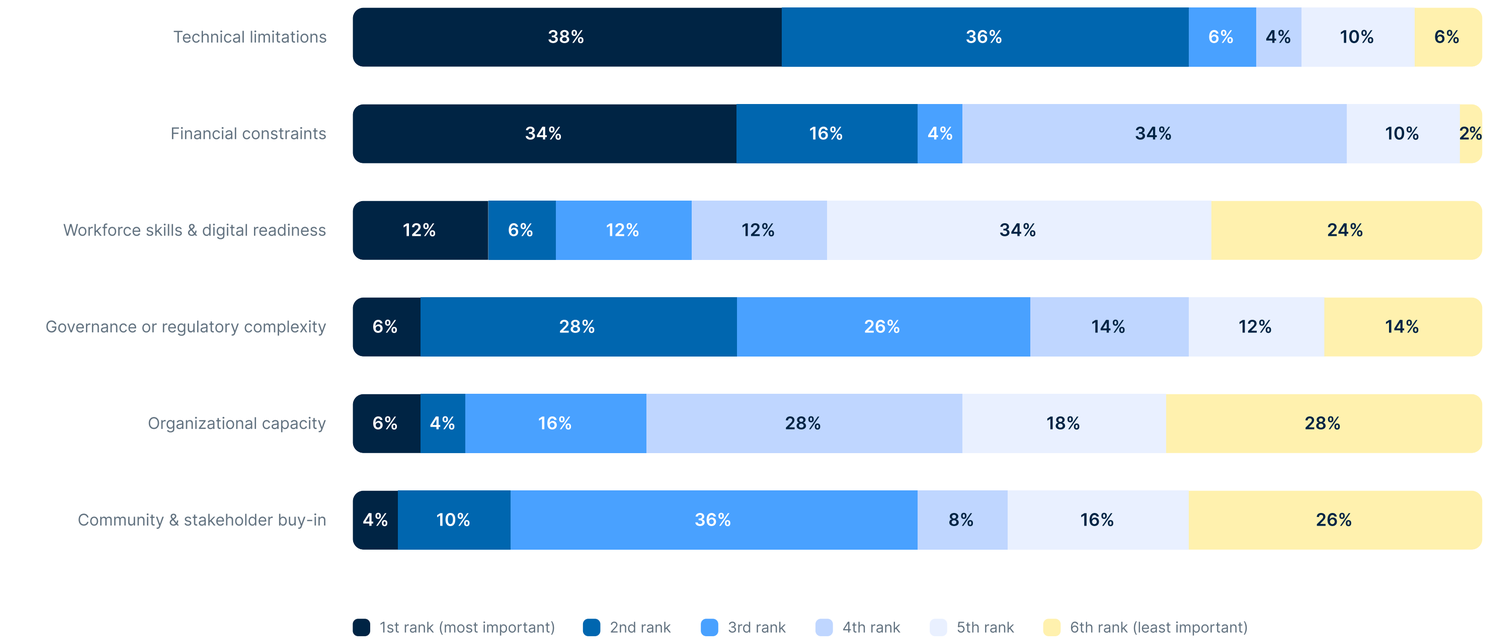


Technical limitations are one of the most significant barriers to resilience

Across firms, technical challenges emerge as the most critical constraint on achieving stronger infrastructure resilience, with over a third of respondents (38%) ranking technical limitations as their most important barrier (see Figure 10). These limitations refer to constraints within an organization's digital and data environment that reduce its ability to effectively manage resilience, spanning outdated legacy digital systems, poor data integration, fragmented data environments, and a lack of interoperability between tools and platforms. These issues often stem from incremental technology adoption, where digital systems are built to address isolated needs rather than a unified architecture, leaving fragmented environments unable to keep pace with increasingly interconnected infrastructure.

Figure 10 – Key barriers to achieving infrastructure resilience

Which of the following areas poses the greatest barrier to your organization achieving stronger infrastructure resilience?



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Source: Verdantix survey analysis, *How Digital Intelligence Is Enabling Infrastructure Resilience For A Climate-Disrupted World* (2026)

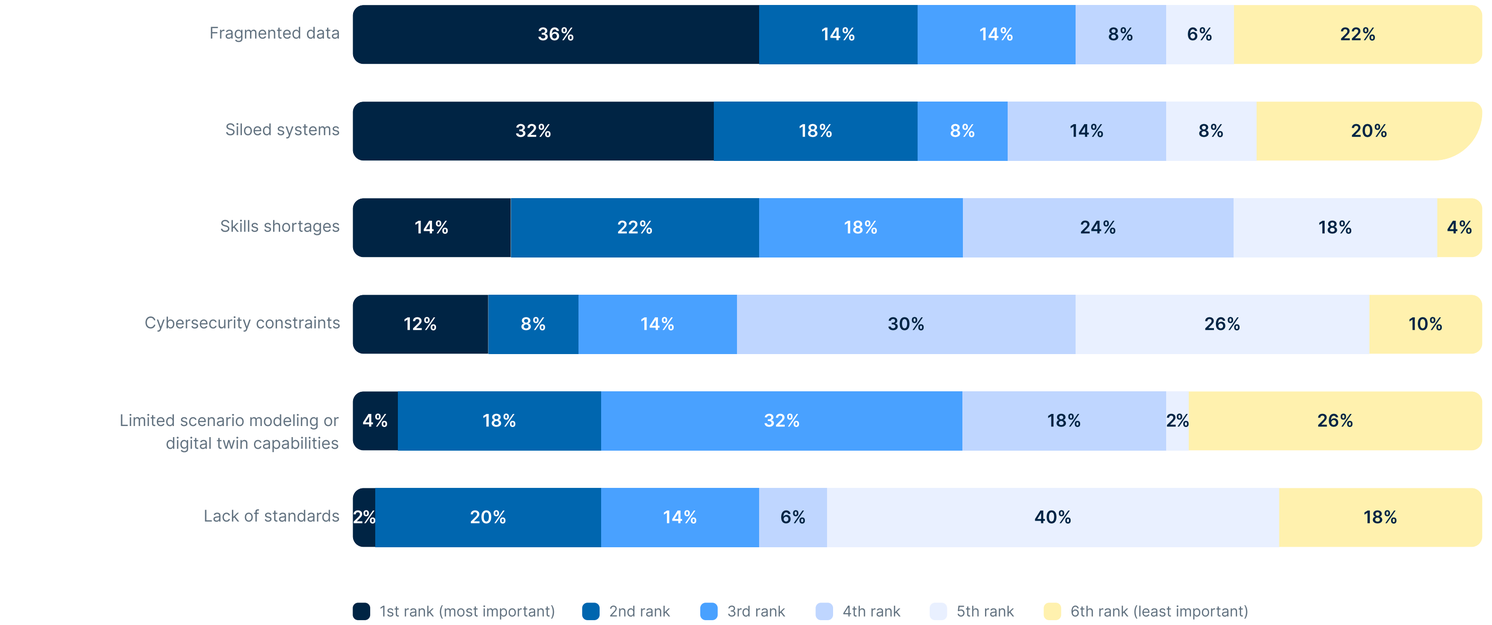
Note: Any percentages lower than 3% are shown as plain numbers.

Fragmented data and siloed systems restrict visibility and coordination

At a more granular level, 36% of firms identify fragmented data as the most significant technical barrier, with a further 32% selecting siloed systems (see Figure 11). These challenges prevent the creation of a holistic, unified view of assets, operations and risk, making it difficult to coordinate responses across the infrastructure life cycle. In practice, data are often dispersed across digital systems used by operations teams, asset management and engineering functions, and external sources such as climate, hazard and regulatory datasets, with limited integration between them. This fragmentation restricts organizations' ability to connect key datasets such as climate inputs, hazard exposure and asset condition, limiting understanding of how risks interact across assets and networks and undermining the potential to anticipate and respond effectively.

Figure 11 – How organizations rank technical barriers to strengthening resilience

What are the biggest technical barriers preventing your organization from achieving stronger infrastructure resilience?



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Cross-department misalignment further reinforces fragmentation

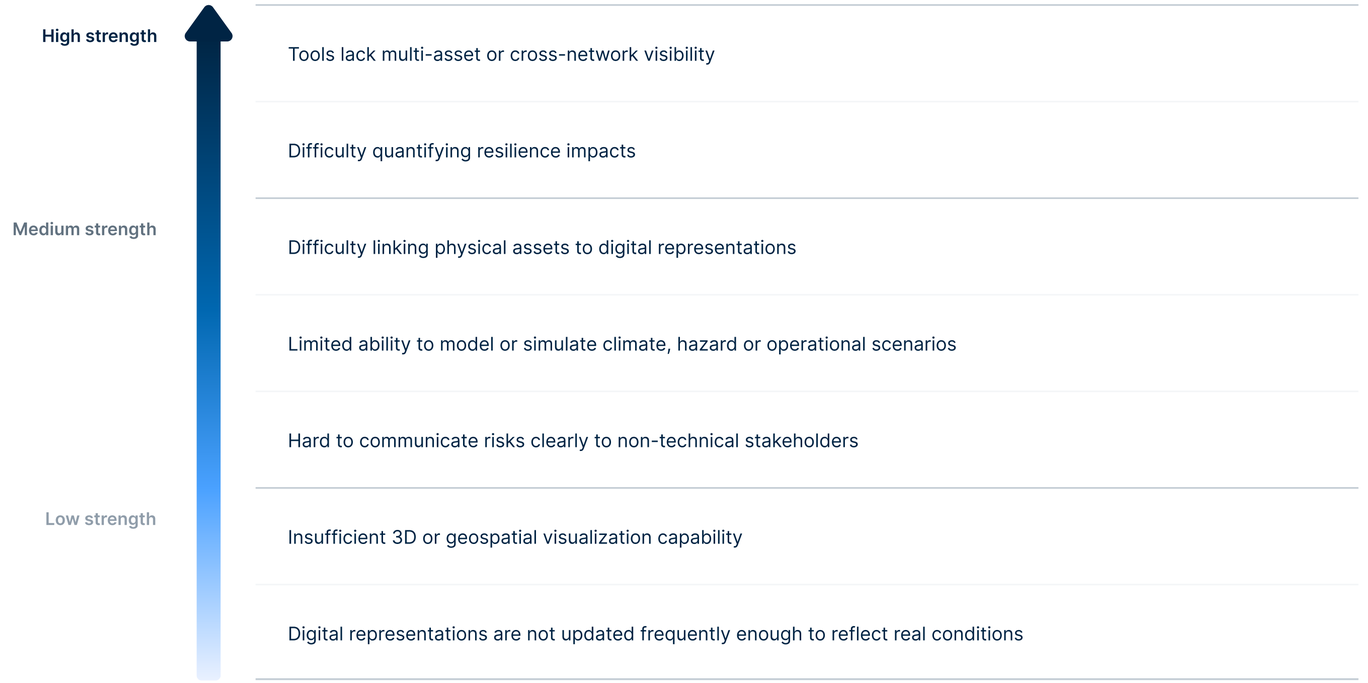
These technical challenges are compounded by organizational silos, with cross-department alignment issues ranked as the most significant governance barrier by 38% of firms. In many organizations, resilience responsibilities are distributed across functions such as engineering, operations, IT and risk or sustainability teams, each operating with different priorities and data environments. The lack of coordination across functions further inhibits the integration of digital systems and data—as a result, fragmentation is not only a technology issue, but also a structural challenge embedded within organizational processes and decision-making.

Limited cross-network visibility constrains system-level resilience

Consistent with earlier findings, firms report facing challenges with multi-asset or cross-network visibility when using current digital tools: 80% of organizations list this as a top 3 challenge (see Figure 12). Even where digital tools are deployed, they may be utilized only for specific functions or teams, preventing a holistic understanding of infrastructure systems and making it difficult to assess interdependencies, cascading failures and system-wide risk exposure. Without this broader perspective, firms remain constrained in their ability to anticipate disruptions and manage resilience at a network level, limiting the overall value derived from digital technologies.

Figure 12 – Key challenges in applying digital tools to resilience management

What are the 3 biggest challenges you face when using digital technologies for managing infrastructure resilience?



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Source: Verdantix survey analysis, *How Digital Intelligence Is Enabling Infrastructure Resilience For A Climate-Disrupted World* (2026)

Note: Rankings have been weighted.

Digital technologies are shifting infrastructure resilience from reactive to predictive

To overcome these limitations, organizations are increasingly leveraging digital technologies to move towards more predictive and insight-driven resilience.

Most organizations still have limited digital maturity in resilience capabilities

As firms advance their resilience capabilities, digital technologies are enabling a fundamental shift from reactive, event-driven responses towards predictive and insight-driven decision-making. However, based on the maturity model (see Figure 13), the majority of organizations are still positioned within fragmented or partially integrated stages, where resilience activities are either reactive or partially predictive. At this level, responses to disruptions are often triggered after events occur, with limited coordination across digital systems and teams. Fully integrated, predictive capabilities where risks are anticipated and addressed ahead of failure remain nascent.

Figure 13 – A stepwise maturity model for building infrastructure resilience

A stepwise maturity model for building infrastructure resilience

1. Fragmented and reactive

(Basic awareness, limited coordination)

- Resilience is perceived as a cost or compliance obligation
- Operations rely on manual responses to disruptions
- Systems and data sources remain siloed across functions
- Limited or fragmented monitoring of IT, OT, assets and networks
- Responsibility for resilience sits with specialist teams, not integrated into the system
- High variability in response quality and recovery time

→

2. Digitized snd predictive

(Improved awareness, insight-driven)

- Resilience is a measurable operational capability
- Core digital tools such as asset performance management (APM), sensors, asset and operational data widely deployed
- Use of integrated IT/OT monitoring and asset health analytics
- Predictive insights inform decisions before failure occurs
- Advanced capabilities such as digital twins and AI tools in evaluation or early deployment
- Silos persist across functions, and broader datasets are not yet fully integrated into decision-making

→

3. Autonomous and fully integrated

(Continuous closed-loop workflows)

- Resilience focus extended to full network- and enterprise-level outcomes using holistic approach
- Integrated operational, climate, hazard and external risk data with no functional or data silos
- Full network and system visibility
- Digital tools support continuous, closed-loop decision-making
- Digital twins act as the core engine for resilience planning, simulation and scenario analysis across full life cycle
- AI-driven operational and maintenance orchestration
- Technical insight translated into business-relevant resilience metrics driving executive-level prioritization and funding

Source: Verdantix survey analysis, *How Digital Intelligence Is Enabling Infrastructure Resilience For A Climate-Disrupted World* (2026)

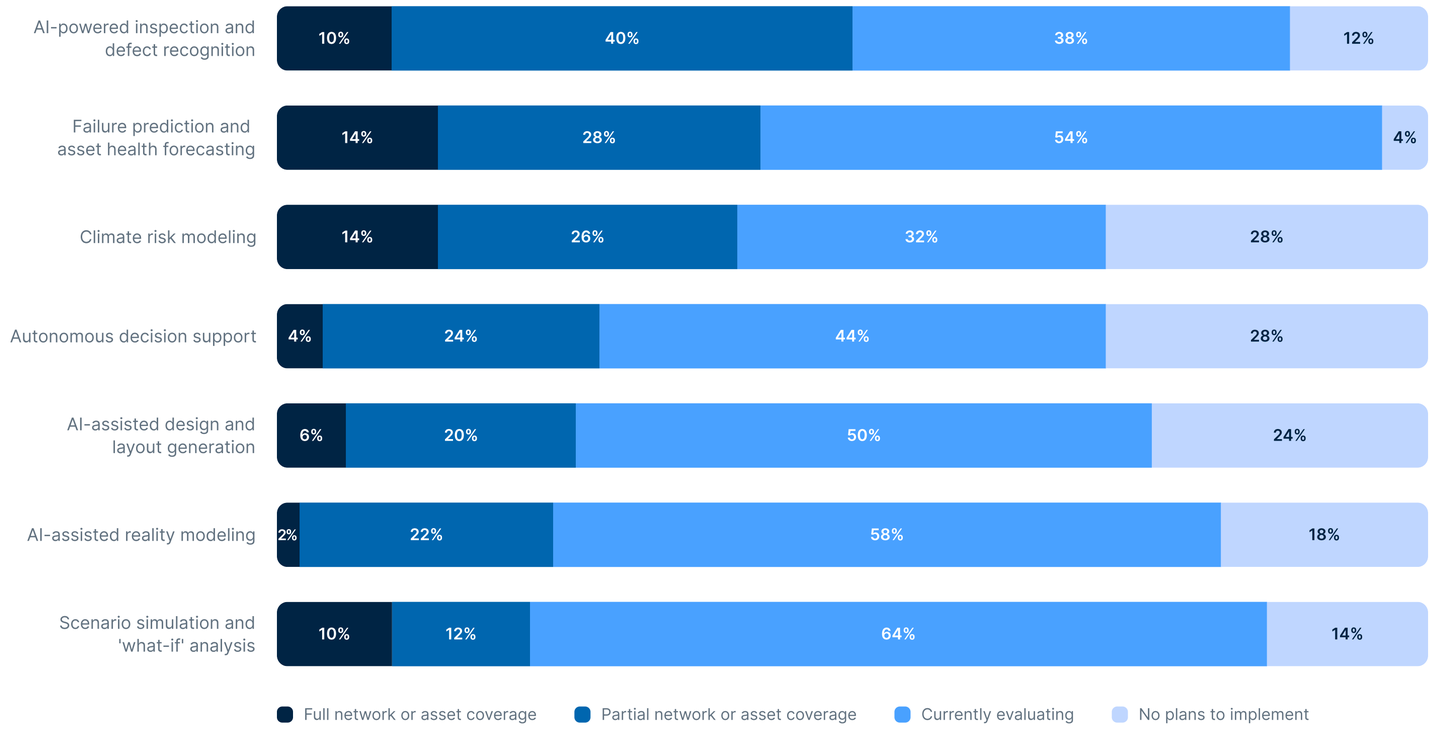
AI-enabled capabilities are driving the shift towards predictive resilience

Leading organizations are beginning to move beyond reactive approaches by embedding predictive monitoring, advanced analytics and AI-enabled capabilities into their operations, enabling more closed-loop workflows. AI is already accelerating this transition, particularly in high-value, practical use cases. The highest levels of adoption are for applications such as inspection and defect recognition—with 50% of organizations deploying at least partially—and failure prediction and asset health forecasting—deployed by 42% (see Figure 14).

However, more advanced capabilities—such as scenario simulation and autonomous decision support—remain largely in evaluation, reflecting the need for stronger data foundations and digital system integration before broader, system-wide deployment.

Figure 14 – Adoption of AI-enabled capabilities for infrastructure resilience

Which AI-enabled capabilities have you adopted or do you plan to adopt for infrastructure resilience?



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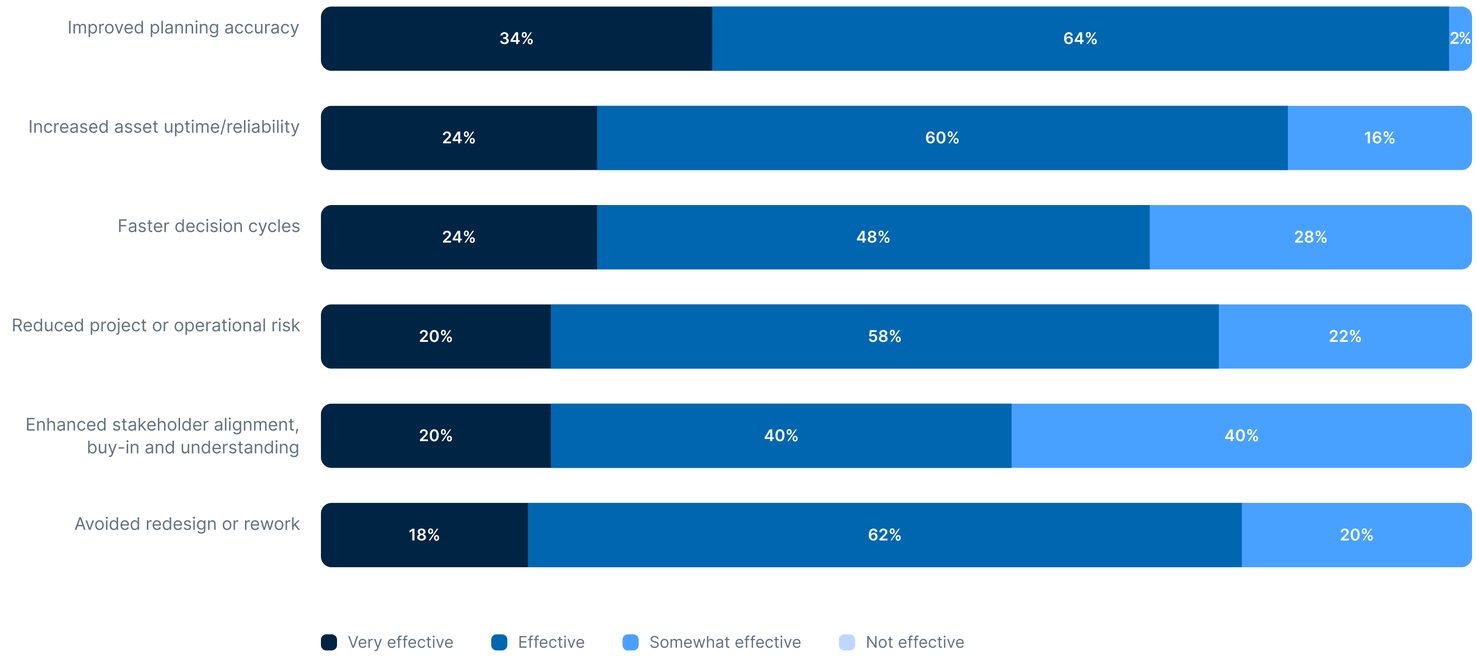
Digital technologies are already delivering measurable operational improvements

Even at current levels of maturity, digital tools are generating significant benefits. Organizations report strong outcomes in planning accuracy—with 98% rating technology effective or very effective—as well as improvements in asset uptime, risk reduction and avoiding redesign or rework (see Figure 15). These gains reflect the increasing use of real-time data, improved asset visibility and more structured decision-making enabled by digital tools. The next phase of value lies in scaling predictive, system-wide capabilities. This includes integrating AI, digital twins and real-time data into continuously updated models that enable proactive risk management and informed decision-making throughout the full life cycle of an asset or network.

Figure 15 – How digital technologies are delivering infrastructure resilience benefits

How effective have digital technologies been in helping your organization achieve the following benefits for infrastructure resilience?



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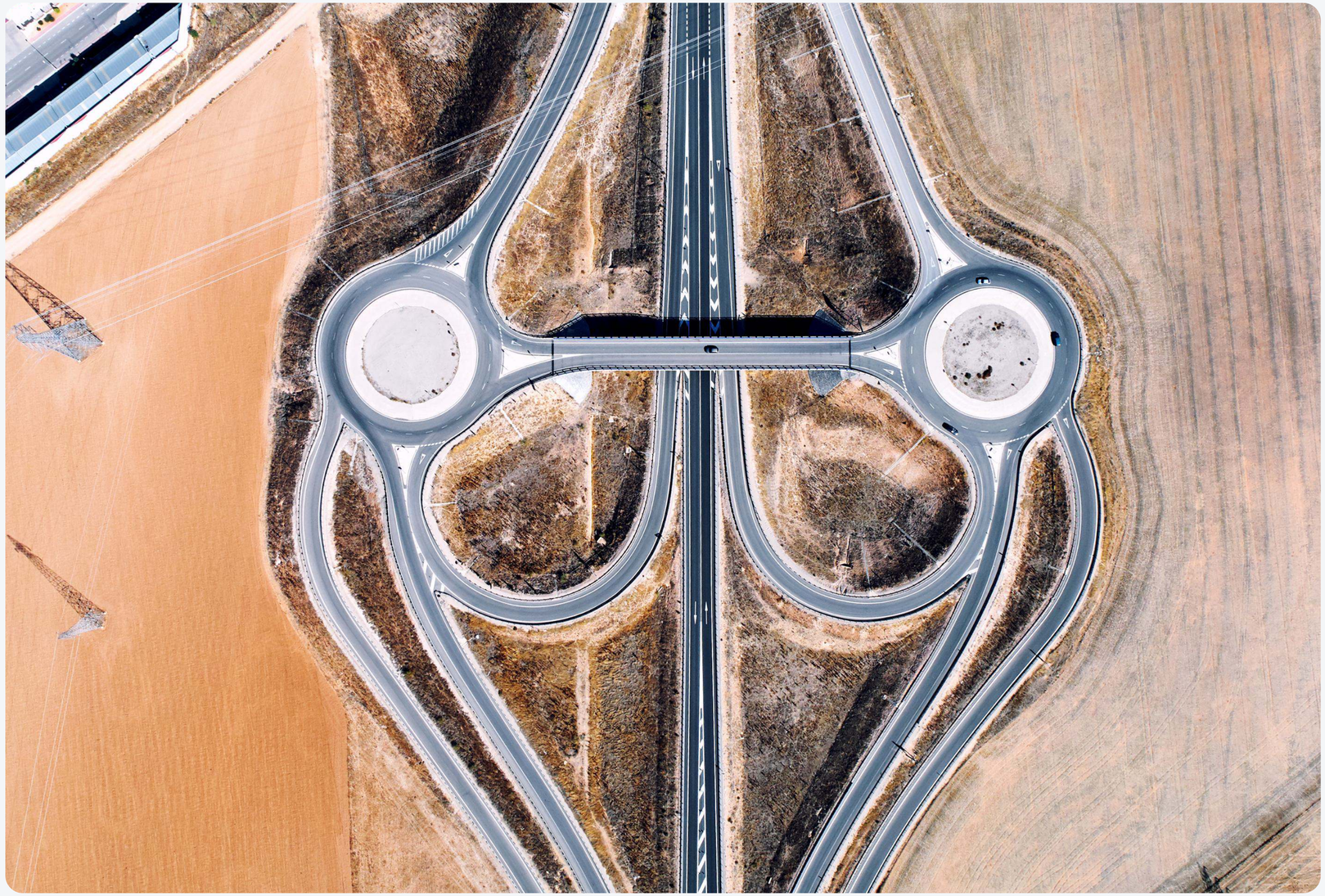
Best practices

Best practices for integrated system-wide resilience

Based on the challenges and maturity gaps identified, leading organizations should be adopting the following practices to move from fragmented approaches to a more cohesive, holistic resilience strategy:

1. Treat resilience as a lifecycle and business continuity priority.
2. Break down silos by integrating operational, climate and asset data.
3. Shift from asset-level management to system-level resilience.
4. Establish digital twins as the foundation for resilience.



1. Treat resilience as a lifecycle and business continuity priority

Firms with mature strategies are shifting from operational resilience towards enterprise-level business continuity, aligning technical, financial, operational and climate risk insights with executive priorities. This ensures resilience supports broader outcomes such as service reliability, long-term asset value, cost optimization and environmental performance, recognizing that continuity and lifecycle performance are interconnected, not separate objectives. This approach is reflected in practice, with U.S.-based utility firm DC Water embedding resilience into a long-term strategy using real-time network monitoring to prevent billions of gallons in water loss, enhance service reliability for millions of users, and enable a carbon footprint reduction of 50,000 metric tons, demonstrating how lifecycle planning can deliver both operational and sustainability outcomes at scale.

2. Break down silos by integrating operational, climate and asset data

Fragmented data persists as one of the most significant barriers to resilience, driving the need to integrate operational, climate, hazard and external risk data across the full asset life cycle from design to operations and maintenance. By eliminating functional and data silos, organizations can apply these datasets to enable advanced resilience insights such as scenario analysis and stress testing, predictive maintenance strategies, climate-risk-informed planning, and more effective capital and maintenance decision-making. A power utility firm in China has combined terrain data, flood models, BIM and sensor monitoring to enhance flood risk assessment for critical substations. This unified resilience platform has led PowerChina Henan to achieve clear disaster prediction, more informed planning and improved resilience to extreme weather events.

3. Shift from asset-level management to system-level resilience

Organizations should set the ambition to operate as fully integrated infrastructure systems, where resilience is embedded through a holistic, network-wide approach. Moving from asset-level views to full network and cross-system visibility enables a clearer understanding of interdependencies and cascading impacts (see Figure 16 and Figure 17).

This wider system-level perspective is essential to anticipate large-scale disruptions—including climate events—prioritize interventions, and strengthen resilience across entire infrastructure networks. Following a city-scale subsidence event in Maceió, Brazil, where underground instability spread across multiple neighborhoods impacting infrastructure, housing and public safety, the Geological Survey of Brazil (SGB) implemented an integrated 3D modeling tool to identify root cause, monitor ground movement, and support proactive risk management and accountability.

Figure 16

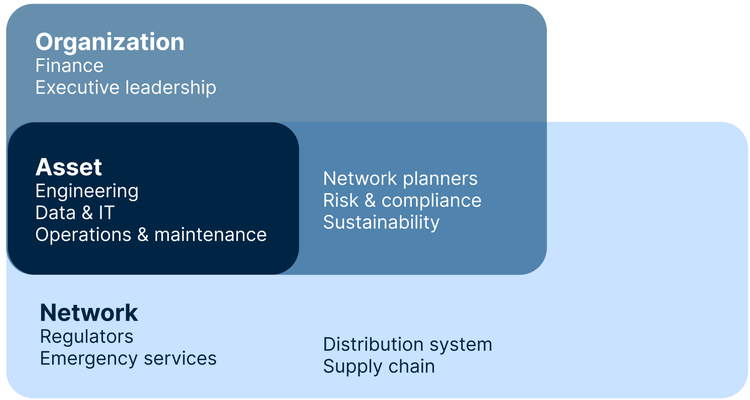
Definition for key functional terms

Level	Definition	Typical teams	Functionality
Asset	Individual physical components of infrastructure (e.g. pump, substation, bridge, pipeline segment, rail track section).	Engineering, maintenance, operations teams, asset managers.	Asset condition monitoring, maintenance planning, performance optimization, inspection and lifecycle management at a component level.
Network	A connected group of assets that deliver a specific service across a defined geographic area (e.g. power grid, rail network, water distribution system), with visibility into how those assets interact and perform collectively. This may also extend to dependencies on external systems and services where relevant.	Network planners, cross-functional teams (operations, engineering, IT, risk), as well as engagement with external stakeholders, regulators, emergency planners.	Service delivery, flow and capacity management, failure propagation, redundancy planning, and coordination across multiple assets. Assessing interdependencies, cascading risks, climate and hazard impacts, scenario modeling, and coordinated response across sectors.
Organization	The overall entity responsible for planning, operating and maintaining infrastructure (e.g. utility, transport authority, mining operator).	Executive leadership, finance, risk & compliance, operations, engineering, IT, sustainability teams.	Enterprise-level strategy, governance, investment decisions, business continuity, regulatory compliance and long-term resilience planning.

Source: Verdantix survey analysis, *How Digital Intelligence Is Enabling Infrastructure Resilience For A Climate-Disrupted World* (2026)

Figure 17

Key teams involved in managing infrastructure resilience



Source: Verdantix survey analysis, *How Digital Intelligence Is Enabling Infrastructure Resilience For A Climate-Disrupted World* (2026)

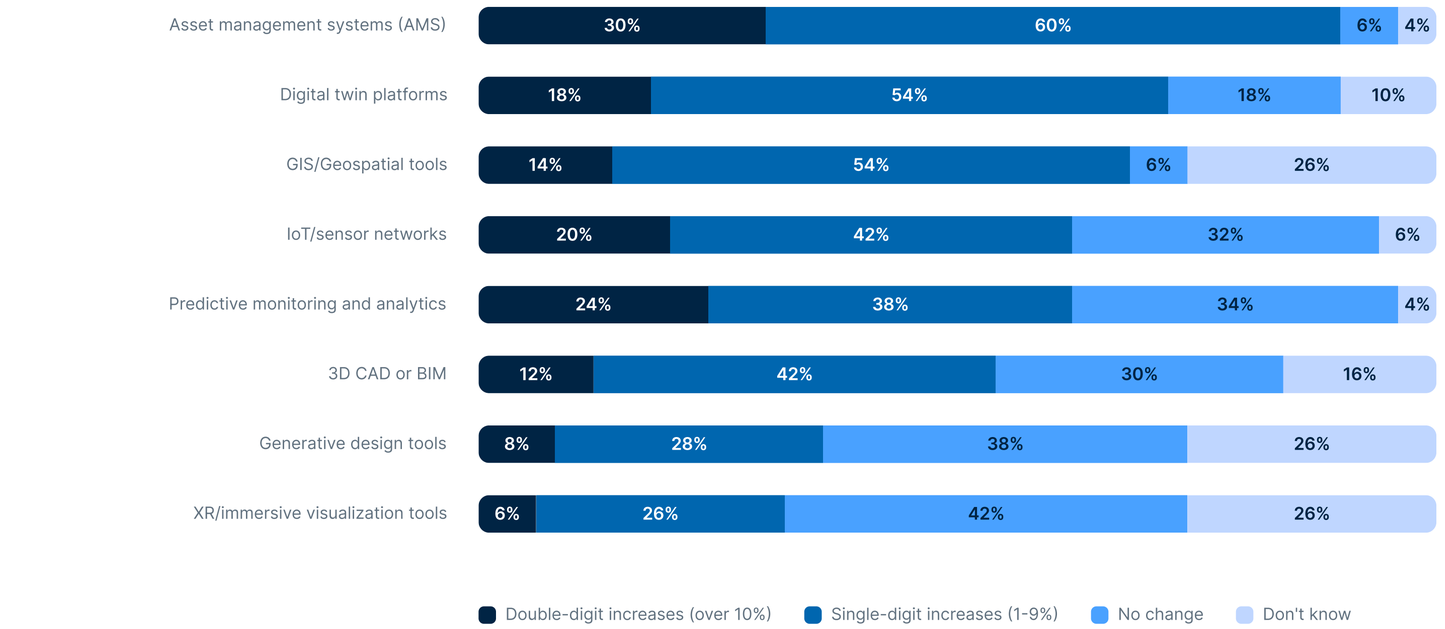
4. Establish digital twins as the foundation for resilience

Firms should look to establish digital twins as a core capability for enabling integrated, predictive resilience. Investment trends already reflect this shift, with 72% of organizations expecting increased spend on digital twin platforms over the next 24 months (see Figure 18).

As adoption grows, digital twins are beginning to deliver tangible value, including reduced redesign and rework. By providing a single view of truth, they integrate lifecycle data and link physical and digital environments, enabling real-time insight, scenario analysis and optimization, as well as more proactive resilience management. This is illustrated by a critical flood protection system in New Orleans, where an operational digital twin of the 17th Street Canal pump station integrates legacy and real-time infrastructure data to improve emergency readiness, reduce coordination time and inform lifecycle decision-making.

Figure 18 – Expected investment trends across key resilience technologies

How is investment/spend on the following technologies expected to change over the next 24 months?



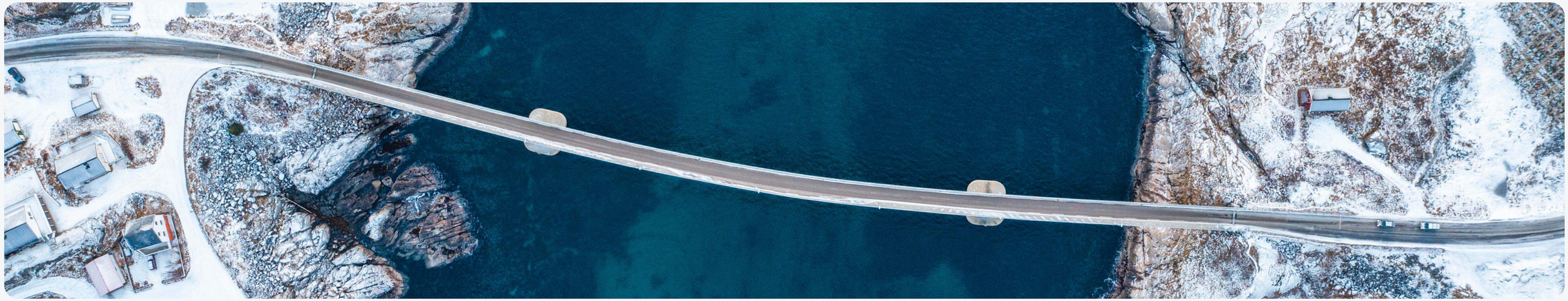
N = 50

Source: Verdantix survey analysis, *How Digital Intelligence Is Enabling Infrastructure Resilience For A Climate-Disrupted World* (2026)

Conclusion

Infrastructure resilience is no longer a future ambition but an immediate operational and strategic priority, shaped by the increasing frequency and severity of climate-driven disruption, alongside pressures such as energy security, supply chain volatility and the pace of automation. While organizations have largely moved beyond awareness and into operationalizing resilience strategies, their ability to scale resilience remains constrained by fragmented digital systems, siloed data, and limited visibility across asset life cycles and networks. Digital technologies are already delivering tangible value, improving planning accuracy, asset performance and risk reduction. However, most organizations continue to operate in reactive or partially predictive modes, with advanced capabilities such as AI and digital twins still in early stages of adoption.

As climate risks become more complex and interconnected, these limitations will become increasingly pronounced. The next phase of resilience will be unlocked by organizations moving towards an integrated common data environment across operational, environmental and external risk domains to enable predictive, insight-driven decision-making. By adopting connected digital foundations, embracing system-level visibility and embedding advanced technologies such as digital twins, organizations will be better placed to navigate disruption and build resilience in a climate-disrupted world.



Research methodology

To better understand firms' approaches to using digital tools for infrastructure resilience—including the perspective of key stakeholders—we commissioned Verdantix, an independent research and advisory firm, to conduct 50 interviews with senior executives at large firms across the energy (30%), mining (22%), transportation (24%) and water (24%) sectors. Interviewees held roles across C-Suite (10%), Engineering (30%), IT & Technology (26%) and Operations & Maintenance (34%) job functions. Respondents were based in North America (34%), Europe (32%), and APAC (34%), and worked at firms with an annual revenue of above £250 million. Verdantix probed executives on their state of resilience readiness, barriers (to digital resilience, business cases for investment, and the adoption landscape of key digital technologies, such as AI and digital twins.

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