

Breaking Boundaries: Edge-Native Infrastructure Powers AI Advancements

How a Software-Defined Edge Empowers AI Innovation and Evolution



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In This InfoBrief

From streamlining operations to uncovering valuable insights from sensitive data to connecting with customers and partners in new ways, digital infrastructure at the edge is the bedrock supporting innovation.

AI-infused applications have heightened awareness of the cost and data privacy challenges of transporting data. Often, it's more cost effective to process and store data where it's created — at the edge. Many new AI-assisted use cases require high performance and low latency to act in near real time — something that can only be accomplished with edge infrastructure.

About the Research

The physical location of IT resources cannot be a barrier that impedes progress. In November 2023, IDC and Intel underwent an extensive research initiative to understand IT and business leaders' challenges when extending IT service to the edge.

This research gathered input from 800 IT and operations decisionmakers and performed in-depth interviews with operational technology (OT) leaders in North America, Europe, and Asia/Pacific. The findings from this research are in this IDC InfoBrief.

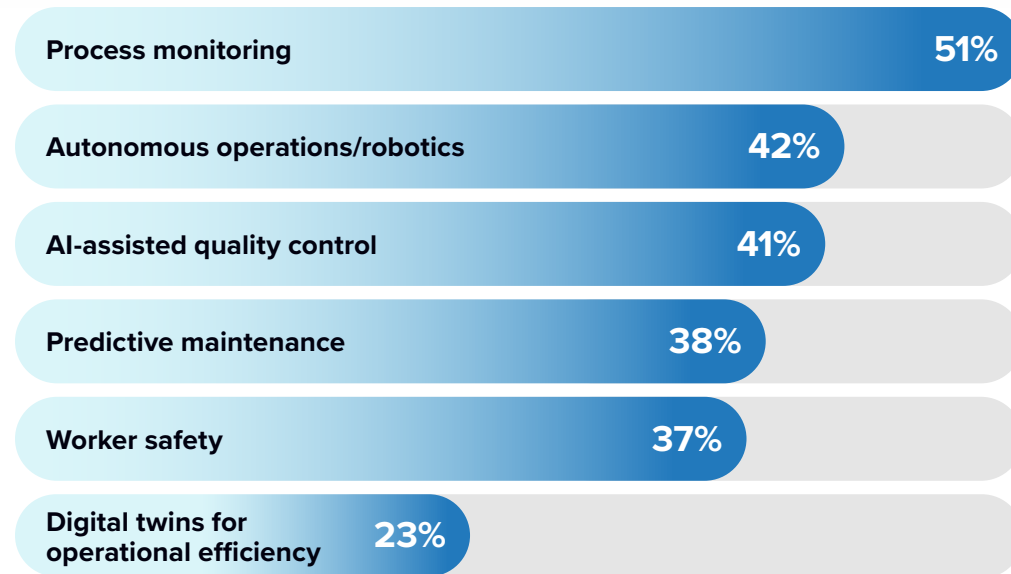
Notes for all data in this document: Managed by IDC's Global Primary Research Group. Some data in this document are multiple dichotomous tables; totals may not sum to 100%. Data weighted by IT spending by country or region.

Why Industries Are Expanding to the Edge

Reacting in Real Time: Projects that infuse operating technologies with IT are being rapidly adopted.

Manufacturing

Monitoring processes, assessing AI-assisted quality control, and powering autonomous operations and robotics are top edge projects. Digital infrastructure at the edge ensures resilient operations, even when disconnected.



Retail

Edge is driving in-store analytics and more personalized shopping experiences. Optimizing the supply chain, delivering better customer experiences, and connecting with partners and customers in new ways are essential.

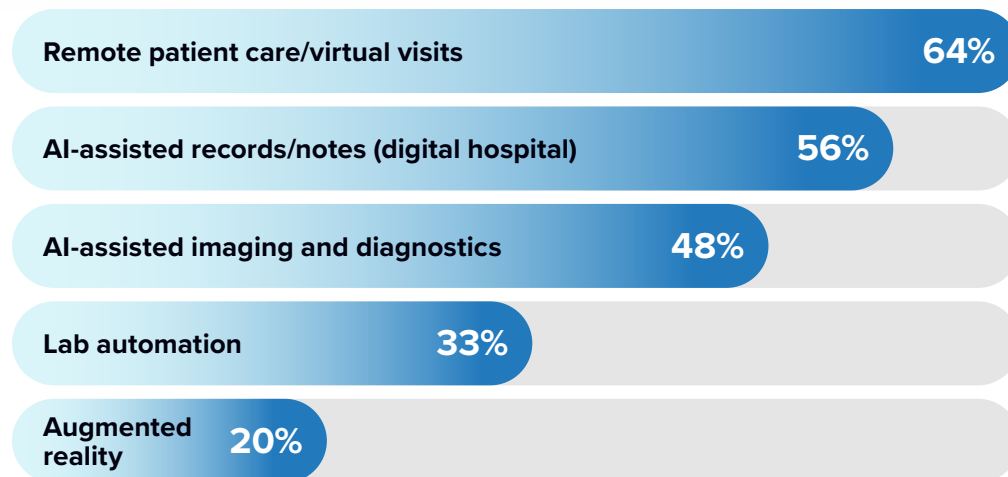


n = 800; Source: IDC's *Edge Native Thought Leadership Survey*, November 2023

Why Industries Are Expanding to the Edge (continued)

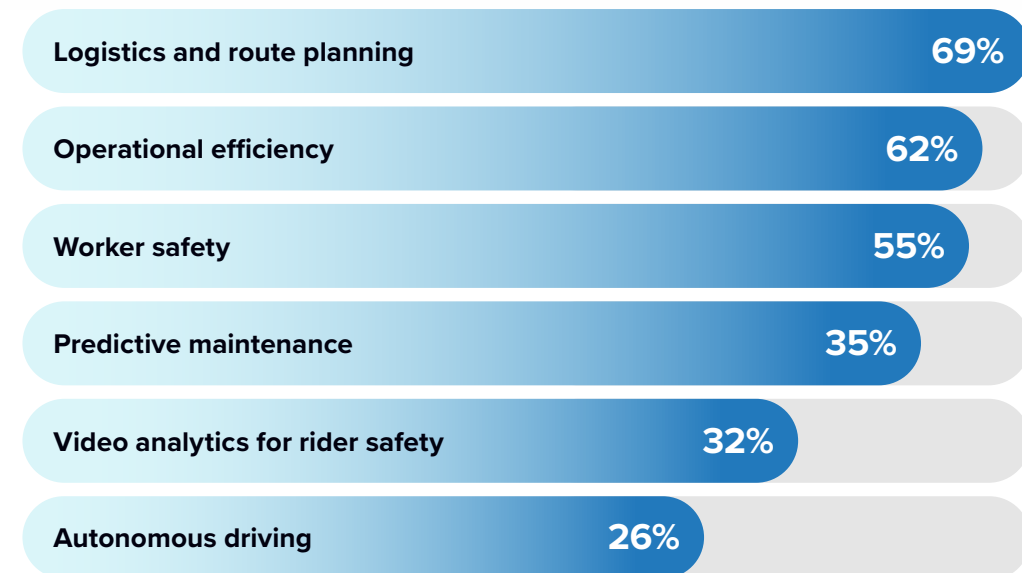
Healthcare

Virtual visits surged in the past two years, supporting remote quality patient care. AI-assisted notetaking, imaging, and diagnostics are streamlining processes, enabling hospital staff to focus on patient care.



Transportation

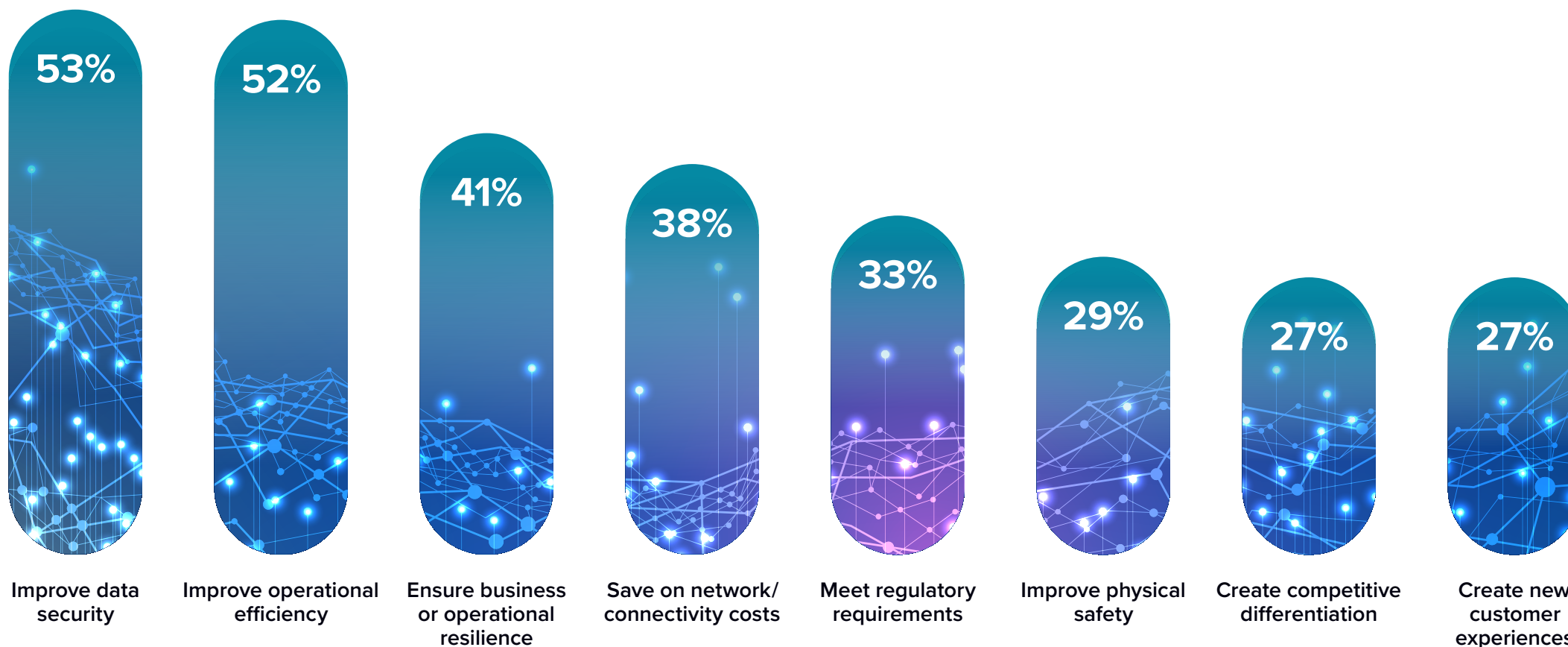
Logistics and route planning are the most frequently cited edge use cases, supporting operational efficiency and sustainability initiatives. Improved safety of workers is also a top priority supported by edge analytics.



n = 800; Source: IDC's *Edge Native Thought Leadership Survey*, November 2023

Edge Delivers Better Data Security, Operational Efficiency, and Business Resilience

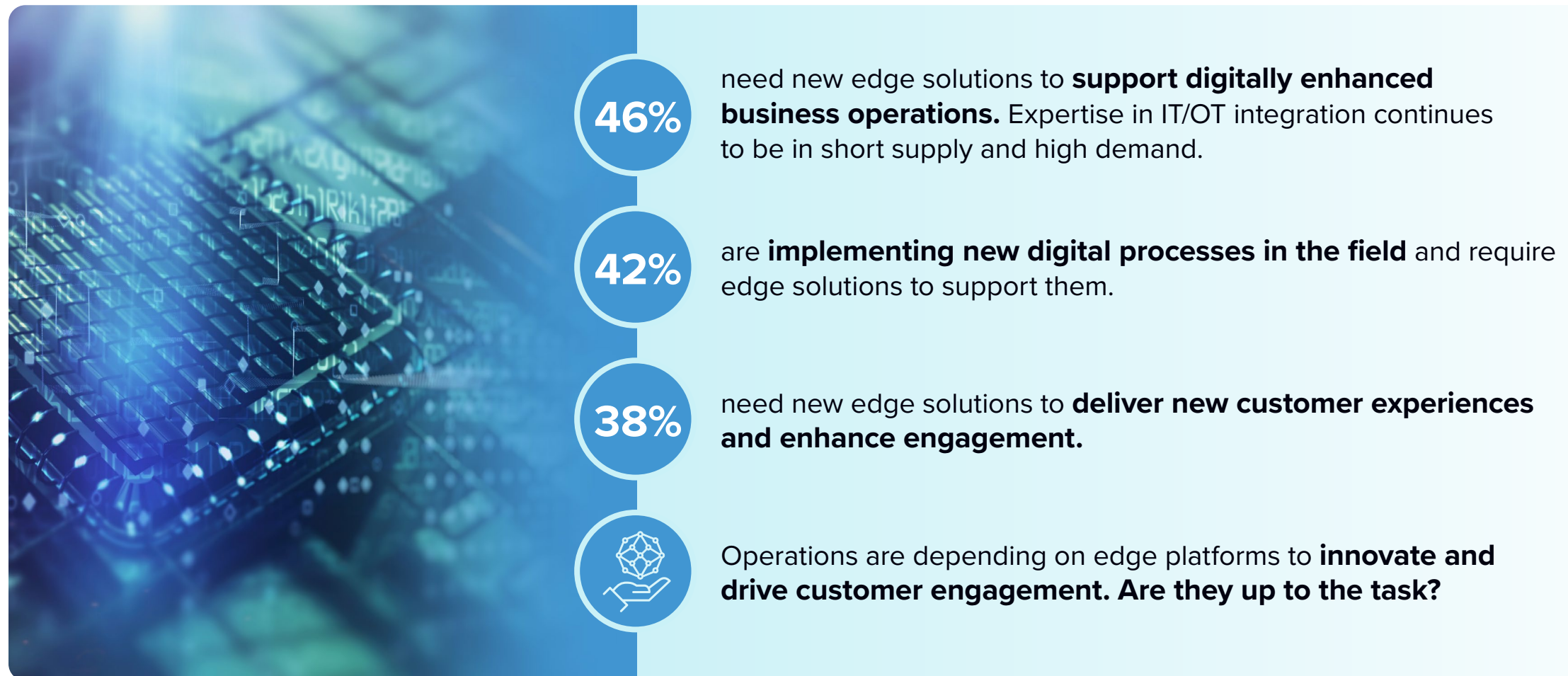
What does your organization gain from edge investments?



n = 800; Source: IDC's *Edge Native Thought Leadership Survey*, November 2023

Influx of New Applications at the Edge

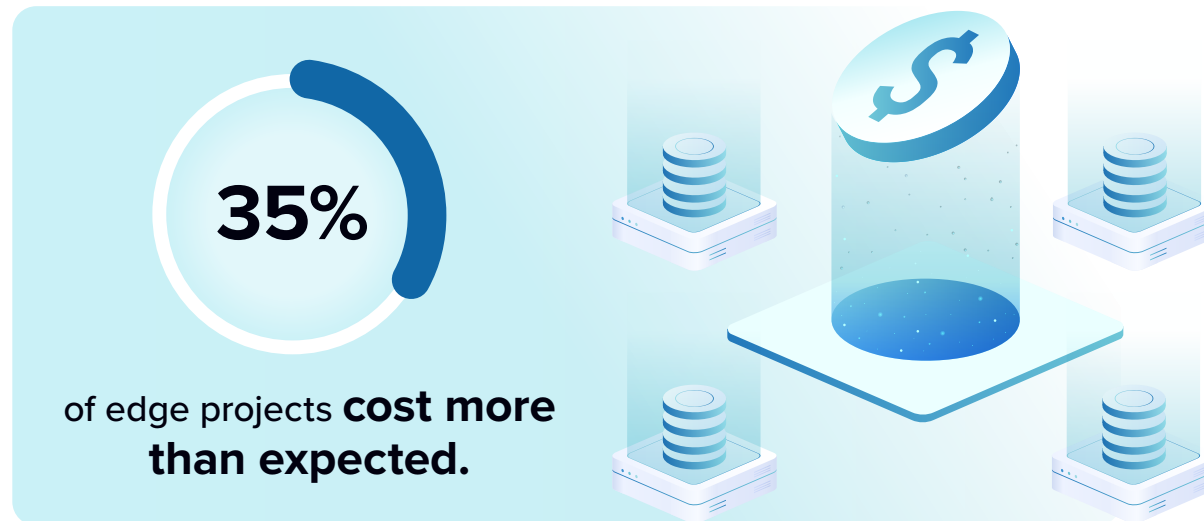
Most organizations will be deploying 10–20+ new applications at the edge by 2026.



n = 800; Source: IDC's *Edge Native Thought Leadership Survey*, November 2023

Unmodified Datacenter Apps at the Edge Cause Delays and Service Interruptions

“Distributed by design” introduces new challenges. Edge projects often take more time and cost more than planned.



Most organizations had difficulty integrating existing systems with new systems. Often, they needed to hire outside expertise and were challenged to integrate IT with operating technologies.

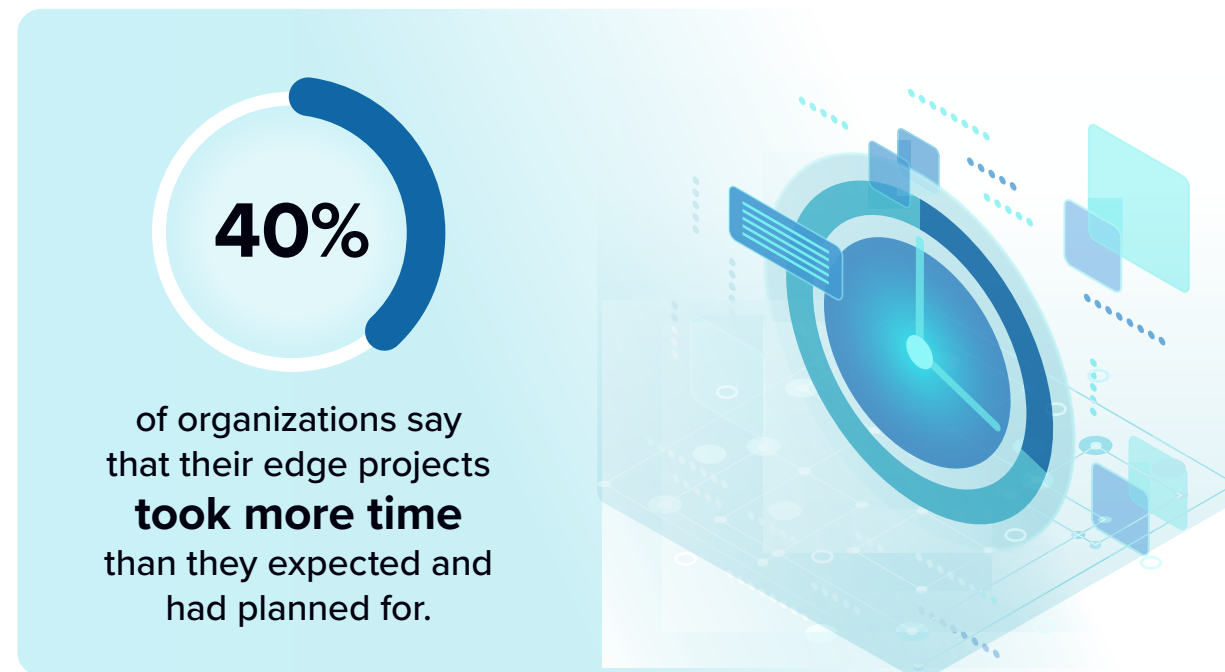
What are the challenges?

- ✘ Demanding new edge applications require more compute power and storage capacity at the edge. AI applications need more horsepower and the ability to tackle bigger data sets.
- ✘ The process of integrating OT with IT is complex and time consuming.
- ✘ Modernizing legacy applications is difficult. Data security and compliance needs require modification of most applications running at the edge.

Why Edge Projects Aren't Completed on Time

Edge projects are not easy. Despite thorough planning, many projects are derailed.

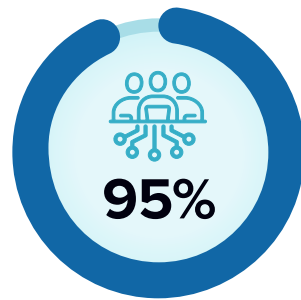
Edge project delays happen for a myriad of reasons, but the leading cause is related to staff time and skill sets. **The demands on their time and the need to learn new processes are slowing the time to value for edge projects.**



- ✘ “The regulatory differences between regions make edge projects very difficult.”
- ✘ “Manual processes slowed down the project.”
- ✘ “Data management was tough.”
- ✘ “Applications were difficult to scale.”
- ✘ “Getting equipment controllers to work with software is a time-consuming task.”
- ✘ “OT systems are old, and interfacing with new systems is difficult.”

Why Edge Projects Aren't Completed on Time (continued)

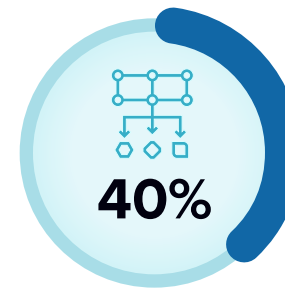
Why did the edge projects take more time than planned?



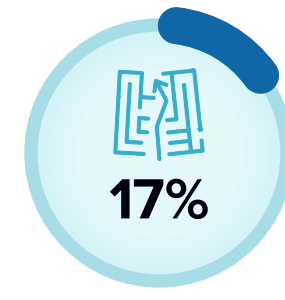
Not enough staff
or the right skills



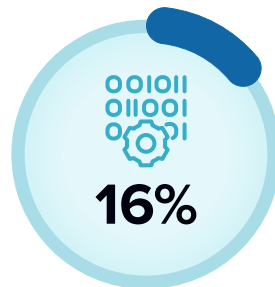
Lack of financial
resources



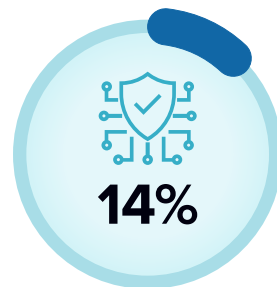
Planning and strategy
challenges



Project
complexity



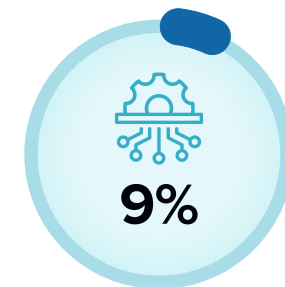
Integration
issues



Extra work to ensure
security



Needed to upgrade
infrastructure



Application refactoring,
licensing, scale issues

n = 800; Source: IDC's *Edge Native Thought Leadership Survey*, November 2023

Optimizing for the Edge Takes Time

Edge applications need to take into consideration a new set of requirements for security and data management.

To ensure security and manage data, a significant amount of **application refactoring and optimization** needs to be done for edge use cases.

Progress is happening, but it's slow.

About **60%** report that it takes **6–14 months** to optimize applications for the edge.

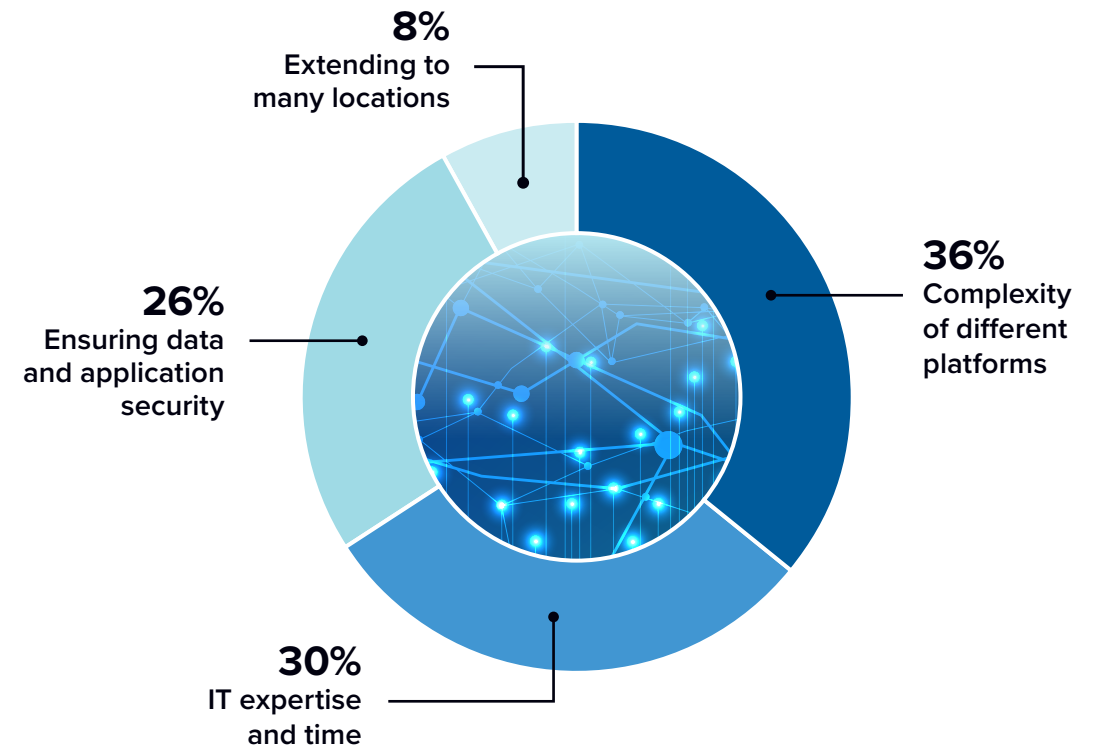


Organizations report that 43% of apps had been refactored in November 2023, and this will rise to 57% by November 2024 (an increase of 14 points).

Often, internal IT teams are doing the application refactoring themselves.

n = 800; Source: IDC's *Edge Native Thought Leadership Survey*, November 2023

What is the most challenging aspect of optimizing applications for the edge?



Meeting the Unique and Diverse Needs of Edge

Edge-native platforms are emerging to streamline the edge journey.

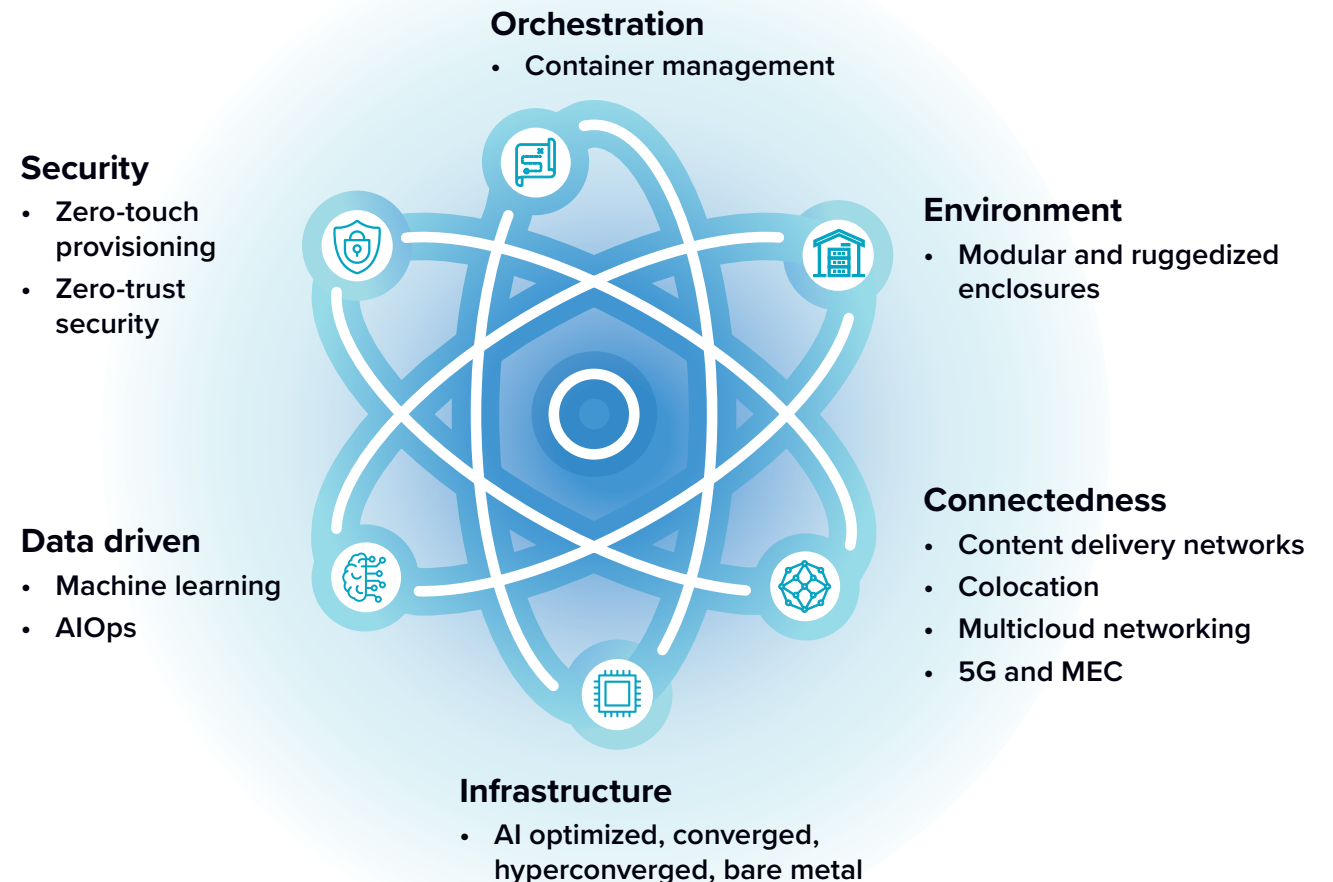
Edge-native platforms address the unique needs of digital infrastructure, applications, and data residing in edge locations. Core design principles include:

- ▶ Ease of deployment
- ▶ Autonomous and remote management
- ▶ Physical and data security







Edge native is designed and built for distributed infrastructure, often placed in unsecured and unattended locations. Edge introduces some unique environmental and location demands, requiring a different approach. **The ability to integrate with operating technologies and existing applications is key to success.**

Edge-native applications and infrastructure are built for the additional security needs at the edge to support highly resilient IT services.

Edge-Native Platforms



What's the Difference Between Cloud Native and Edge Native?

	Cloud Native	Edge Native
 Infrastructure	Standardized and abstracted, placed in controlled environments	Highly varied, existing in harsh environments
 Data	Centralized for processing and storage	Real-time processing, caching, and encryption for security
 Connectivity	High speeds and broad capabilities	Varying speeds and capabilities
 Infrastructure deployment	Centralized	Zero touch
 Security	Trusted fabric in secured places	Zero trust for unsecured places
 Resilience	Infrastructure failover to multiple nodes and regions	AIOps and hardware built for resilience

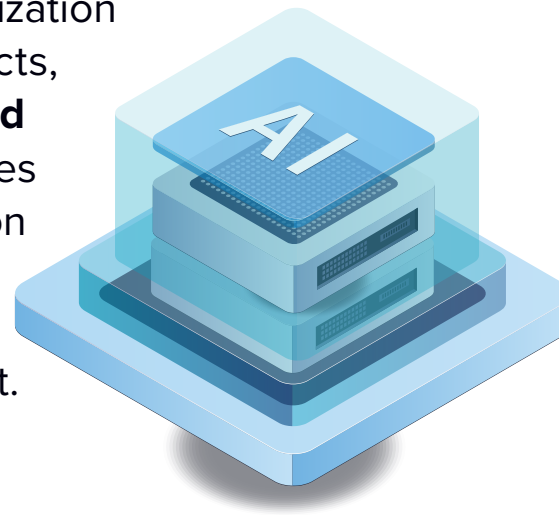
Importance of Software-Defined Edge

Software-defined resources at the edge: Security, efficiency, and cost will always be key factors when choosing edge solutions and partners.

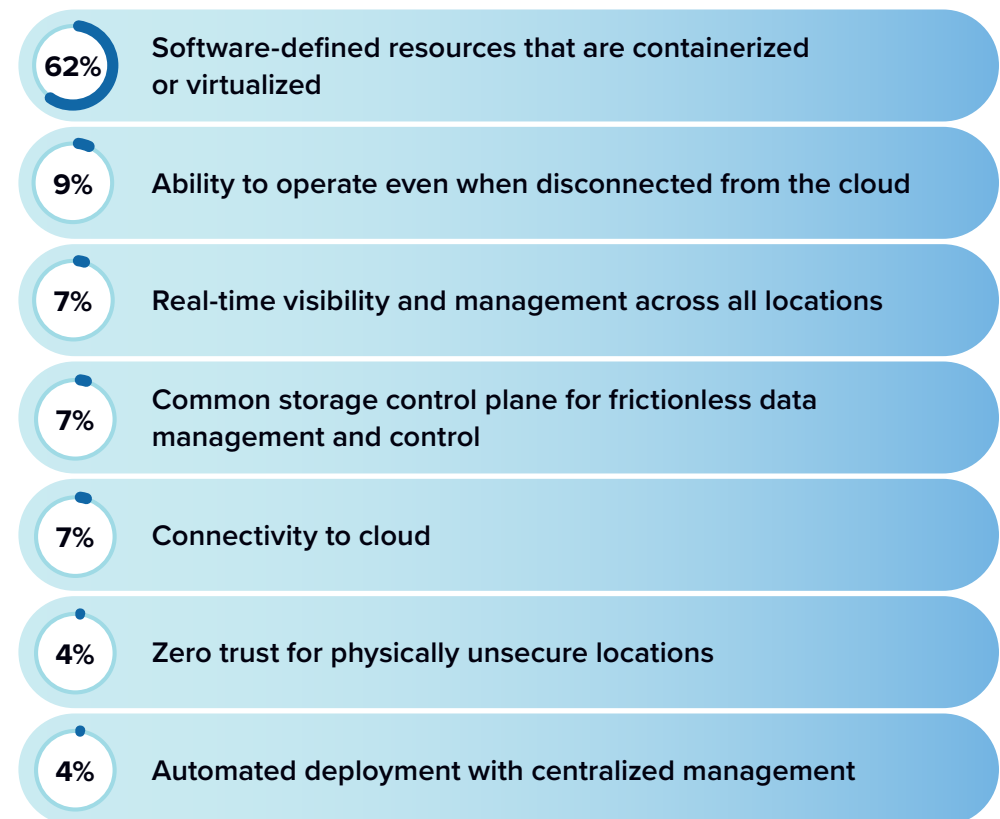
But when it comes down to the details, what is most important? IDC's driver analysis* determined that **software-defined resources that are containerized or virtualized** are far and above the most important.

This critical study finding aligns with IDC's findings based on end-user challenges related to edge projects. **Staff time and expertise are in short supply and high demand.**

To support IT and enable the organization to achieve success with edge projects, **modernized, edge-native apps and platforms are crucial.** Major qualities of these platforms include automation to reduce the burden on staff time while ensuring that processes are followed and security needs are met.



Relative Importance Analysis



* Driver analysis is a regression analysis performed to identify key attributes.

How Data Challenges Necessitate AI at the Edge

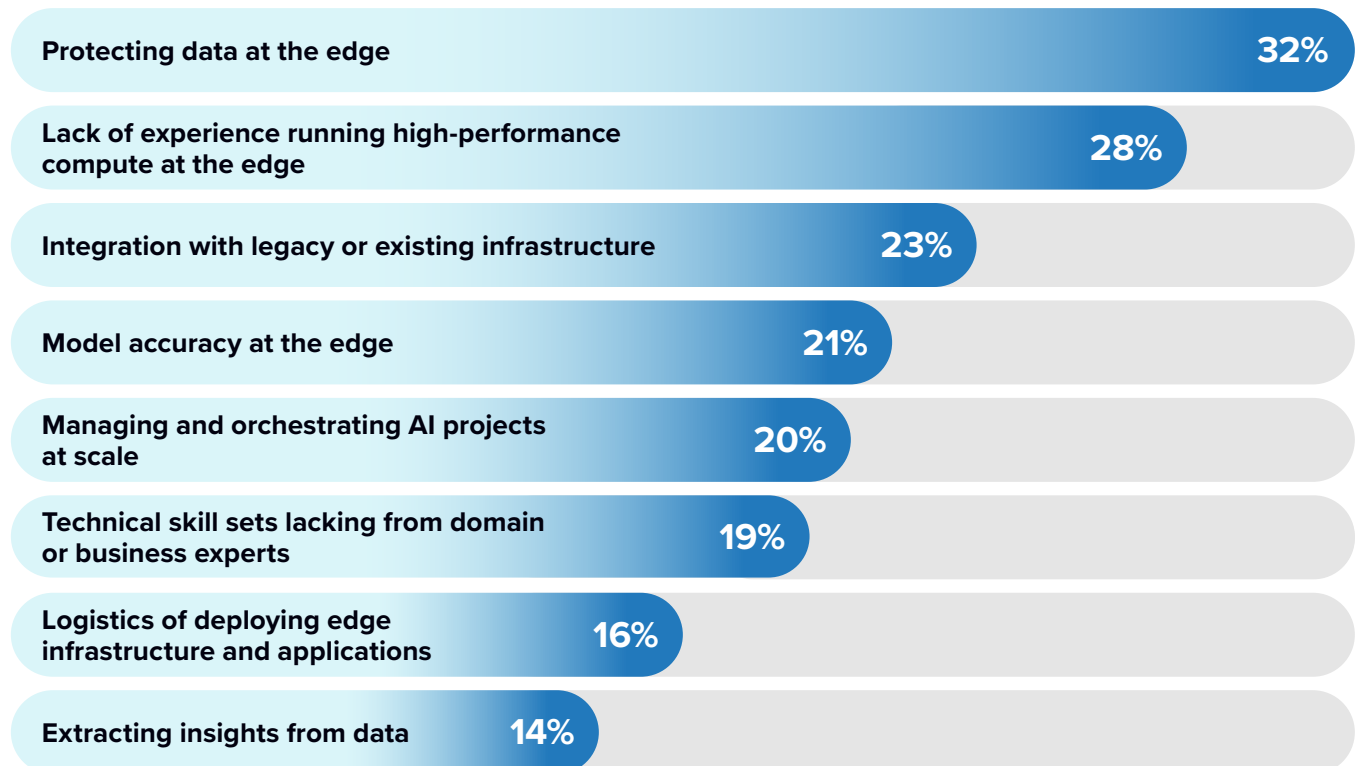
Bringing AI to the data, not data to AI, is the future for organizations running apps at the edge.

Today, more than one in three organizations are running AI at the edge, and soon, **half will be running AI apps at the edge.**

AI requires regular “feeding” of vast amounts of data. This data is generated at the edge and often will be analyzed and acted upon at the edge as well. While this reduces latency, managing data at the edge can be problematic.

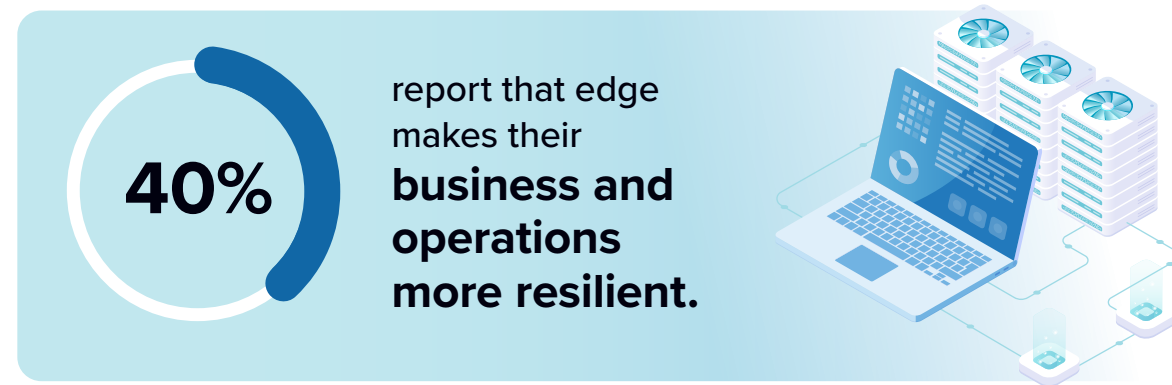
Setting and adhering to data control processes and ensuring compliance is a challenge for many. AI, with its need for vast amounts of data, amps up the pressure on organizations to protect, store, and leverage data that exists outside of a datacenter.

What do you believe are (or will be) the most challenging aspects of AI at the edge projects?



Edge Done Right Can Fuel Innovation and Deliver Results

More than half of organizations report that edge improves their operational efficiency.



These benefits are in addition to the savings they realize on networking costs.

However, not all edge deployments are the same. **Key questions to ask when evaluating an edge platform are:**

- ▶ Will we be able to **easily deploy infrastructure and applications** to every edge location?
- ▶ Does the edge platform operate with a **high degree of autonomy and support remote, hands-off management?**
- ▶ How well does the edge platform **protect the physical infrastructure and the data contained within it?**

✓ “We’ve achieved a **30% reduction in downtime** by using a predictive maintenance solution.”

✓ “We **lowered our cloud costs by 20%.**”

✓ “We have **realized huge financial benefits** implementing our edge transformation project.”

Key Takeaways



Software-defined infrastructure is critical to overcoming key challenges experienced with edge use cases.

When edge projects fail to meet deadlines, it is most often because of the strain they place on IT staff. Modern, software-defined edge platforms benefit from autonomous operations and ease of deployment. Platforms purpose built for highly distributed infrastructure can be deployed and operated with little human intervention. By investing in edge-native platforms, the burden on IT skill sets and time is greatly reduced.



Edge ultimately delivers strong value, but OT complexity often increases costs.

Many edge projects cost more than planned, often due to the expense of specialized skills in connecting operating technologies with IT platforms. Despite missing budget targets, organizations reported positive results and payback from edge investments. From reducing downtime to improving operational efficiency, edge platforms delivered a return on investment.



Modifying apps for the edge is important.

Half of edge users say that apps that are not modified/optimized for edge are causing delays and interruptions to service. With the mission-critical nature of many edge use cases, it's very important to address these risks early in the project design phase.

Key Takeaways (continued)



Apply an ecosystem approach to edge.

Connecting operating technologies with edge IT is difficult and time consuming. Seek technology partners that have experience with the unique challenges in your industry and edge use cases. Edge projects require coordination among ecosystem partners to securely build interfaces between OT and IT.



Location matters for AI.

New AI applications and the accompanying vast data sets are increasing the complexity of data management and protection challenges. Using edge-native platforms for inferencing, where data is created, can overcome these challenges. By running inferencing at the edge, organizations can reduce the cost and risk of moving data. Data location should be discussed early in project strategy sessions.



IT organizations drive business innovation with edge.

Customer conversations reveal that they often don't start projects thinking of AI inferencing or edge AI solutions. They start with a problem they want to solve. IT organizations can serve a strategic role within the organization by helping line of business and operations management understand the logistical and regulatory challenges of moving data and gaining meaningful insights from data. IT's ability to extend secure IT service to the edge can improve project success, reduce costs, and ensure data security.

About the IDC Analysts



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Dave McCarthy is Research Vice President within IDC's worldwide infrastructure research organization and global research lead for the cloud and edge services practice. Dave leads a team of analysts covering research on shared (public) cloud, dedicated (private) cloud, and edge deployments, services, adoption trends, vendor strategies, and market dynamics. Benefiting both technology suppliers and IT decisionmakers, Dave's insights delve into ways in which hybrid and distributed cloud platforms provide the foundation for next-generation workloads, enabling organizations to innovate faster, automate operations, and achieve digital resilience.

[More about Dave McCarthy](#)



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Jennifer Cooke is Research Director within IDC's worldwide infrastructure research organization and part of the cloud and edge services practice. Jennifer leads IDC's research on edge computing trends and strategies. Jennifer's research provides insights into the ecosystem of physical infrastructure, software, and services that support secure and resilient operations at the edge.

[More about Jennifer Cooke](#)

Message from the Sponsor



Every industry is racing toward AI, and the transformation of physical to digital infrastructure is driving 1.4X more AI inference demand at the client and edge than in the datacenter. Intel is leveraging experience from nearly 100,000 edge deployments to help customers quickly and efficiently take advantage of the edge AI opportunity.

Integrating operating technologies with IT platforms is complex and time consuming. Enabling IT organizations to support their business units with on-time and on-budget projects requires a modern, edge-native platform. With a deep understanding of the challenges that industries and partners face, Intel has developed the Intel® Tiber™ Edge Platform — an open, software-defined platform prioritizing security, resilience, and modularity to abstract complexity from compute and connectivity at the edge, optimized for AI.

IDC Custom Solutions

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