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Focus on Business Outcomes and Tech Innovations to Enhance Industrial IoT Edge Solutions

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> Edge solutions provide opportunities to overcome IT and OT challenges in industrial IoT use cases. Product managers can improve on these edge solutions by validating the specific industry use cases and business outcomes that strengthen the use of edge deployment architecture for operational needs.

Overview

Key Findings

- Edge hardware and software technologies often remain horizontal in functional design and through the implementation process, while edge configurations become customized in terms of industry and client needs.

- Edge solutions offer IoT providers opportunities to address latency, autonomy and security issues that have created friction in industrial client adoption and implementations, and furthermore, improve the ability of clients to achieve measurable business outcomes.

Recommendations

Product managers planning and validating edge products should:

- Strengthen IoT edge solutions by leveraging industry skills, experience and client feedback to validate and prioritize use-case capabilities to deliver against business outcomes.

- Improve latency, autonomy and security capabilities at the edge by using innovative technologies such as neuromorphic computing, specialized AI chips and privacy-enhanced computing (PEC).

Strategic Planning Assumption

By 2025, a peak of 65% of industrially aligned IoT edge solutions will be reached, followed by more horizontally designed solutions, up from 10% in 2022.

Analysis

Trade-offs between operational data requirements such as latency, autonomy and security, and rapid and cost-effective scalability of cloud-based computing solutions have been a challenge for technology and service providers (TSPs) assisting enterprises in digitally transforming their operational technology (OT) environments.

On-premises versus cloud deployment topologies offered bifurcated decisions, constraining the overall advantages of IT-OT convergence. For TSPs of industrial IoT platforms as an example, a competitive necessity for industrial clients was the ability to offer both deployment options to clients (see Magic Quadrant for Industrial IoT Platforms) at additional development and maintenance costs to the provider.

The emerging deployment topology of edge computing provides IoT providers a new opportunity to overcome this challenge by offering IoT edge enterprise buyers solutions that help meet business outcomes and support IT organizations in a managed and consistent fashion. Edge computing enables applications, workload and services to be deployed across core data centers and remote locations, each optimized for a specific set of operations and no longer constrained to an either-or on-premises or cloud option.

Factors Influencing Edge Computing Deployment Decisions
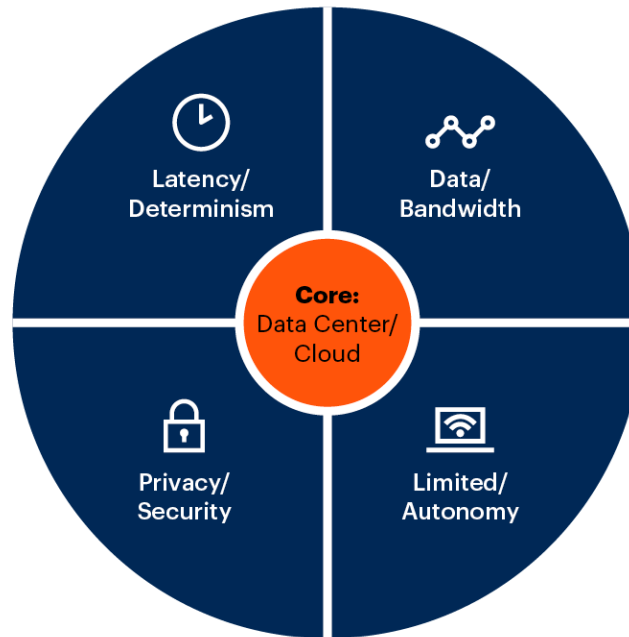
Source: Gartner
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As part of a business solution, edge computing offers a path that combines IT scalability at the core (i.e., at the edge), which in terms of infrastructure may manifest itself in a device, gateway, local or even regional data center, and the ability to address the four OT factors identified in Figure 1. Naturally, as the edge is situated closer to the operational environment, the constraints on the capabilities of the edge infrastructure become highly influential on edge computing capabilities. To achieve and maintain the IT-OT advantages of edge computing, product managers should focus on technology innovations and buyers' business outcomes to strengthen industrial IoT edge solutions.

Use Industry Skills, Experience and Client Feedback to Define and Prioritize Capabilities
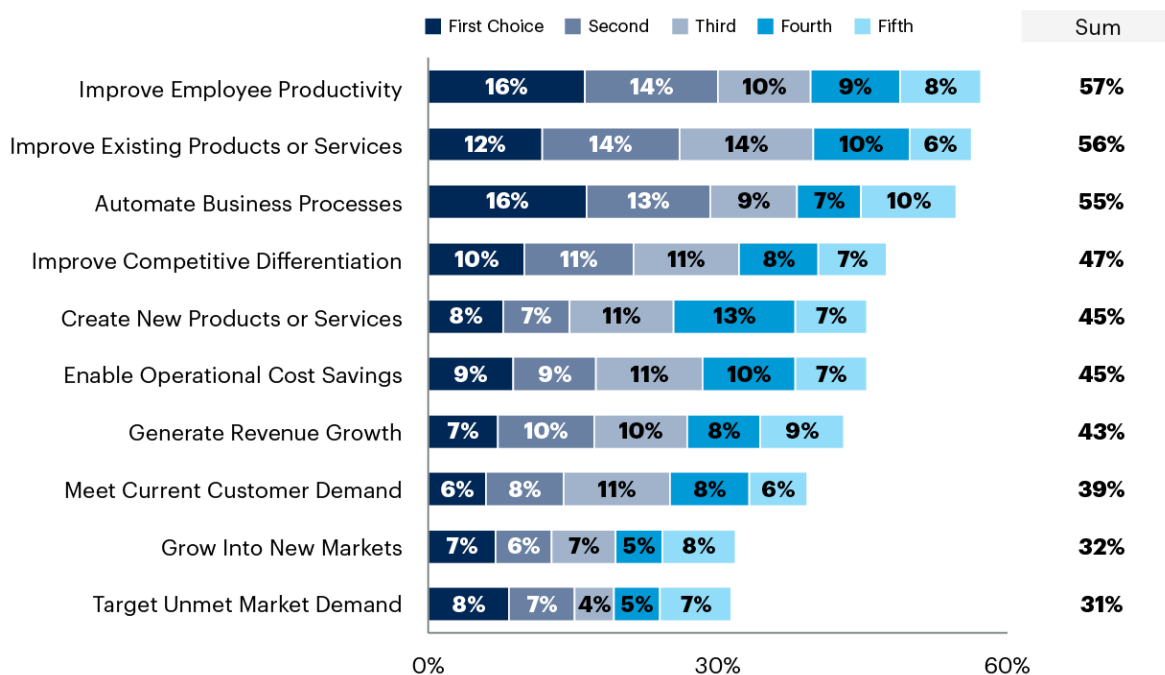
Too often, product managers remain totally and solely focused on the features, functions and technical capabilities of their products, and IoT edge solutions are no exception. Providers of edge hardware and software who view edge as another technology market miss an exceptional opportunity: edge computing brings the scalability and strengths of IT together with the requirements of operational technologies that until very recently had been managed in protected, closed-loop environments.

IoT edge solutions, particularly from a buyer's point of view, become stronger when the technology supports and enables the achievement of business outcomes and objectives. From the 2021 Gartner End-User Emerging Technology Survey, it is clear that objectives matter. Figure 2 shows the most important objectives that companies hope to achieve by investing in selected emerging technology solutions.

Figure 2: Most Important Objectives Companies Hope to Achieve by Investing in Emerging Technology Solutions

Most Important Objectives Companies Hope to Achieve by Investing in Emerging Technology Solutions
Sum of Top Five Ranks

	First Choice	Second	Third	Fourth	Fifth	Sum
Improve Employee Productivity	16%	14%	10%	9%	8%	57%
Improve Existing Products or Services	12%	14%	14%	10%	6%	56%
Automate Business Processes	16%	13%	9%	7%	10%	55%
Improve Competitive Differentiation	10%	11%	11%	8%	7%	47%
Create New Products or Services	8%	7%	11%	13%	7%	45%
Enable Operational Cost Savings	9%	9%	11%	10%	7%	45%
Generate Revenue Growth	7%	10%	10%	8%	9%	43%
Meet Current Customer Demand	6%	8%	11%	8%	6%	39%
Grow Into New Markets	7%	6%	7%	5%	8%	32%
Target Unmet Market Demand	8%	7%	4%	5%	7%	31%

n = 499; All respondents, excluding "don't know" and "unsure"

Q: What are the most important objectives your company hopes to achieve by investing in selected emerging technology solution?
Source: 2021 Gartner End-User Emerging Technology Survey
Note: Figures in the chart may slightly vary from actual due to rounding off.
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The objectives or outcomes can vary from industry to industry, and how IoT edge solutions help deliver on these objectives in the specific industry sectors, areas and processes becomes an absolute imperative for product managers to identify. Here are some examples:

- IoT edge solutions — such as computer vision on production lines — can help with overall employee productivity through the immediate and real-time analysis of product quality from images on the production line. Such solutions can provide real-time advice to operators of machines, increasing overall productivity.

- In several continuous processing industries, such oil and gas and pharma, any form of latency in the discovery and correction of poor machine or process performance can result in poor-quality products at additional cost. With IoT edge solutions constantly monitoring, analyzing and processing the data, immediate (sometimes automated) actions can be taken, resulting in critically optimized business processes.

A significant barrier to the general adoption of IoT has been security concerns around the streaming of data to the cloud, an outcome sought by many clients. These concerns range from data confidentiality, to misuse of data including efforts to gain remote access and control of operations, to issues that may arise if data is no longer able to reach the cloud destination for processing. Also, extremely important for many global enterprises is the compliance with national and regional data privacy policies. In establishing edge compute instances, usually in close and immediate proximity to assets and equipment, technology and service providers are able to help enterprises meet such latency, security and autonomy issues.

Recommendations for Product Managers

- Plan and develop IoT edge solutions by using industry associate skills and experiences from within the organization, and combine these insights with client feedback and validation.

- Assess IoT edge use-case capabilities by communicating the value of the edge solution to customers through customer interviews and validating them through continuous measurement of KPIs.

- Identify new revenue options by building out annuity stream analysis that uses the value propositions your edge computing solutions deliver to clients with the appropriate fee structures over the short and long term.
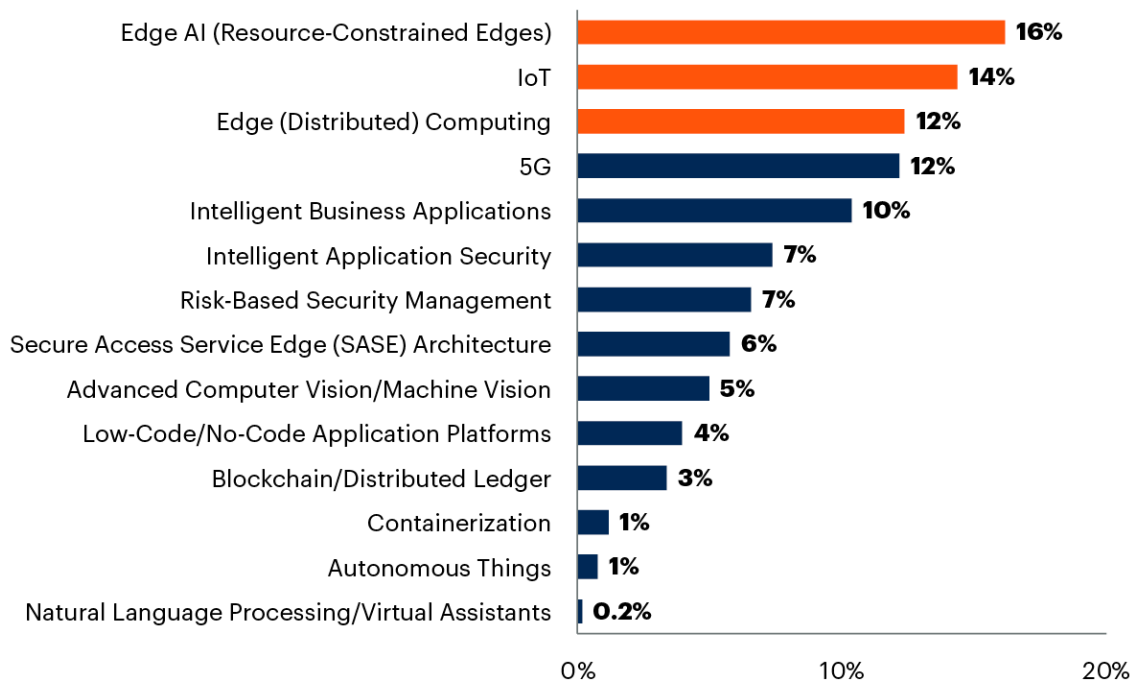
Use Innovative Technologies Such as Neuromorphic Computing, Specialized AI Chips and PEC

Operational requirements of latency, autonomy and security capabilities, as well as the challenges around data and bandwidth costs and capabilities, have made edge computing an extremely compelling option for enterprises to consider. As per the 2021 Gartner End-User Emerging Technology Survey, 16% and 12% of end-user respondents, respectively, had made major investments in edge AI and edge computing, specifically in the last 12 months (see Figure 3). Notably, IoT as a more general technology also landed between the two (14%) in the survey, suggesting an extremely close relationship between IoT solutions and edge.

Figure 3: Emerging Technology That Companies Have Invested in the Most Over the Last 12 Months

Emerging Technology That Companies Have Invested in the Most Over the Last 12 Months
Percentage of Respondents

Technology	Percentage
Edge AI (Resource-Constrained Edges)	16%
IoT	14%
Edge (Distributed) Computing	12%
5G	12%
Intelligent Business Applications	10%
Intelligent Application Security	7%
Risk-Based Security Management	7%
Secure Access Service Edge (SASE) Architecture	6%
Advanced Computer Vision/Machine Vision	5%
Low-Code/No-Code Application Platforms	4%
Blockchain/Distributed Ledger	3%
Containerization	1%
Autonomous Things	1%
Natural Language Processing/Virtual Assistants	0.2%

n = 500; All respondents

Q: From the list below, what is the emerging technology that your company has invested in the most over the last 12 months?
Source: 2021 Gartner End-User Emerging Technology Survey
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Technology and service providers exploring how best to address the operational requirements of industrial organizations where increased compute and short-term storage may be required, should begin to explore the latest technology innovations around neuromorphic computing, specialized AI chips and PEC. See Emerging Technologies: Tech Innovators in Neuromorphic Computing, Emerging Technologies: Rising Opportunity for Edge Machine Vision and Top Strategic Technology Trends for 2022: Privacy-Enhancing Computation for detailed insight on each of these innovations.

Recommendations for Product Managers

- Build against a single edge architecture pattern by choosing between an edge-in or cloud-out approach.

- Enhance the capabilities at the edge by working with third-party vendors on hardware and software innovations for the edge.

Evidence

2021 Gartner End-User Emerging Technology Survey. This survey was conducted to understand end users' buying behavior when investing in emerging technologies. The research was conducted online from September through October 2021 among 500 respondents from midsize or larger organizations ($250 million or more in annual revenue) from North America (the U.S. and Canada), Western Europe (the U.K., France and Germany) and Asia/Pacific (Australia, China and Japan). Industries surveyed included education providers, financial services, government, insurance, healthcare providers, manufacturing (including natural resources and energy), media, retail, business services, telecommunications, transportation and utilities. Qualified respondents held manager-level or higher roles and were involved in their organization's emerging technology purchase decisions in the past 12 months.

Disclaimer: Results of this survey do not represent global findings or the market as a whole, but reflect the sentiments of the respondents and companies surveyed.

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