

НІТАСНІ

Beyond the Pilot:
Industry's Physical AI
Progression

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Research Introduction

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Beyond the Pilot: Industry's Physical AI Progression

Introduction

AI is moving beyond knowledge work into the physical systems that underpin society, including energy, industrial, and mobility infrastructure. For these mission-critical environments, AI must meet a higher standard: delivering outcomes that are reliable, deterministic, explainable, and auditable. This is where we will witness AI's true impact.

Understanding how prepared industrial organizations are for this next phase is crucial. Not just to enterprises seeking to learn their competitive positioning as well as where they should invest. But to Hitachi, too, as the company pioneers new, disruptive innovations that can continue to propel industrial client success.

To that end, Hitachi surveyed more than 200 decision-makers across energy, manufacturing, transportation, logistics, and other mission-critical sectors – domains within which the century-old company is well-anchored. The research examines where their organizations are applying AI today, the value they seek, and what it will take to scale physical AI.

The findings reveal strong momentum, but a notable gap between adoption and scale. Ninety-seven percent of respondents use physical AI in industrial use cases to some degree, yet only 8% say their deployments have reached continuous optimization and innovation. Operational efficiency and productivity are the leading adoption drivers, followed by cost reduction. Yet, repeatable scale remains just out of reach.

The message is clear: industrial organizations are adopting physical AI but scaling it across complex operational environments remains the next key challenge. This report explores where organizations stand today and the priorities that can help them turn AI adoption into sustained operational performance with resilience to deliver long-term value.

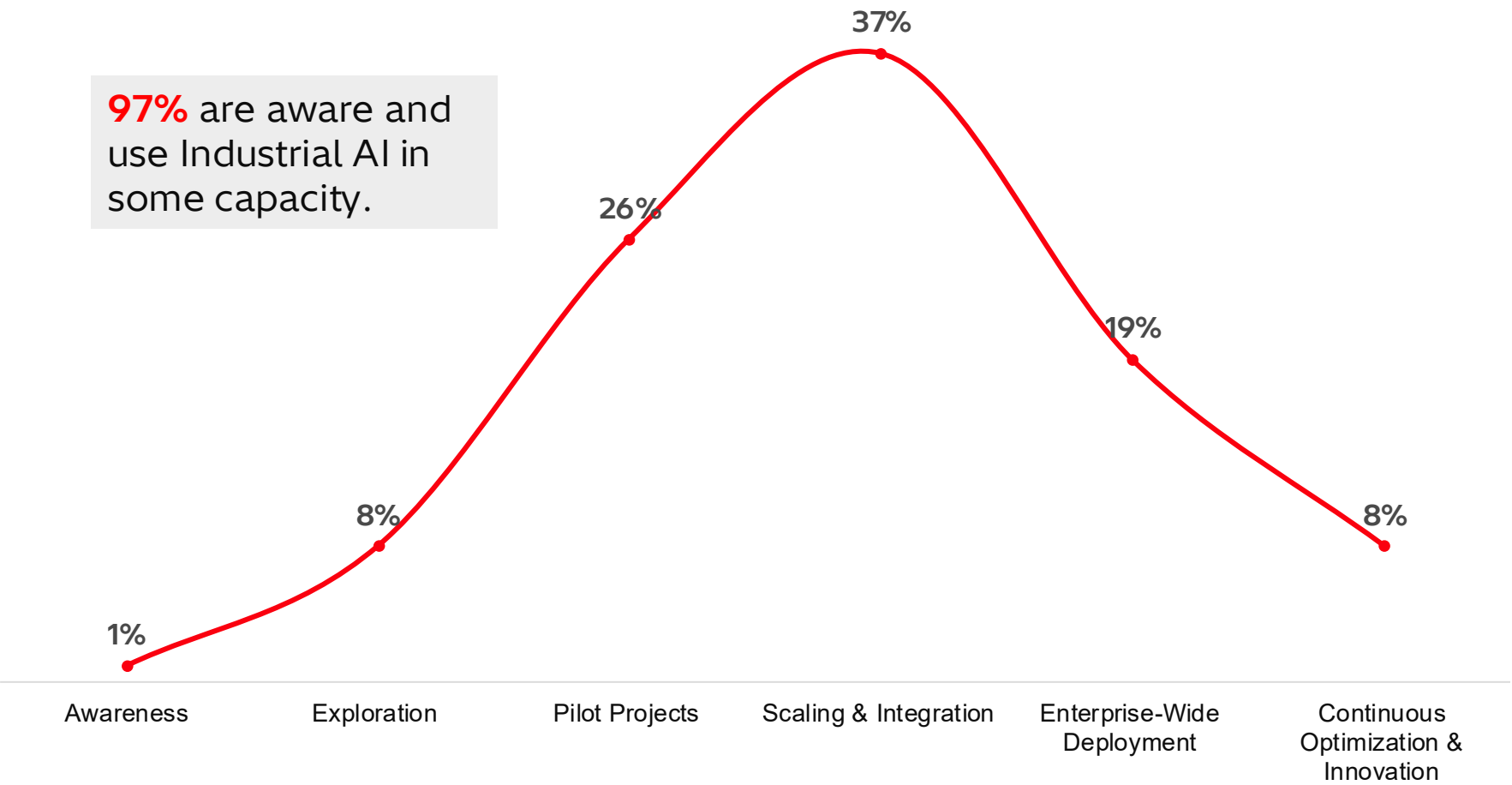
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Industrial AI Adoption Landscape

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Industrial AI Adoption Stage

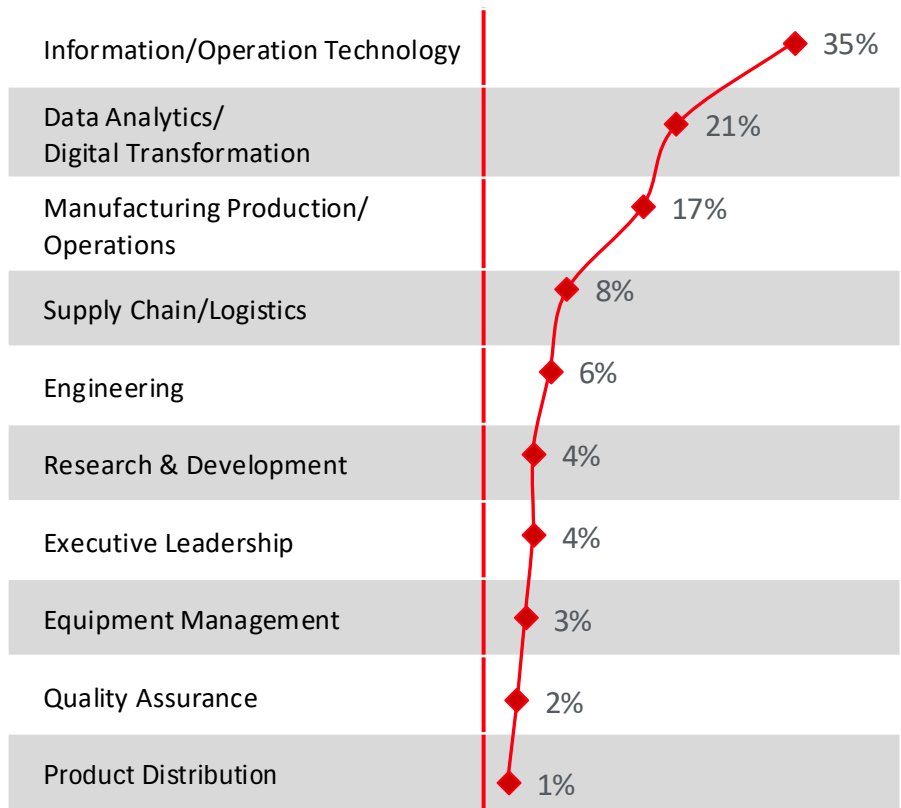
More than one-third of organizations are scaling and integrating Industrial AI while one-fifth have deployed and only a few have reached optimization and innovation.



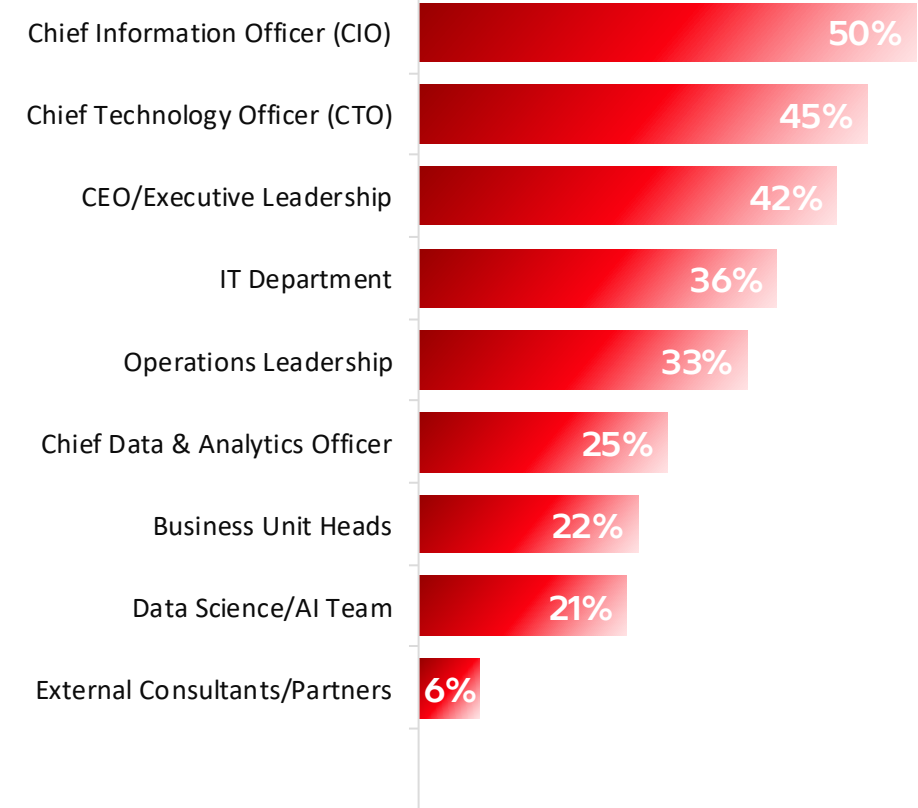
NOTE: Industrial Artificial Intelligence (AI) refers to the application of artificial intelligence technologies in physical, industrial and manufacturing settings to improve efficiency, productivity, safety, and decision-making.

IT and Operations teams are steering AI transformation with CIOs, CTOs, and CEOs emerging as the most influential decision-makers.

Department Leading Industrial AI Adoption

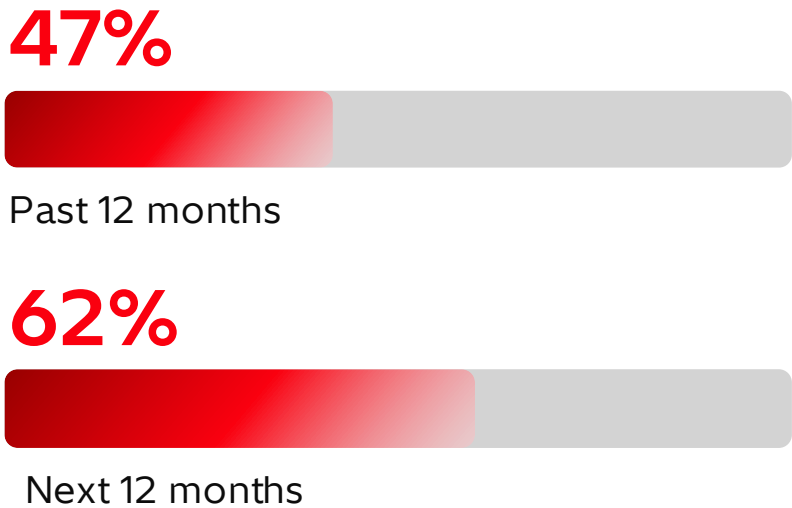


Primary Stakeholders Driving Transformation

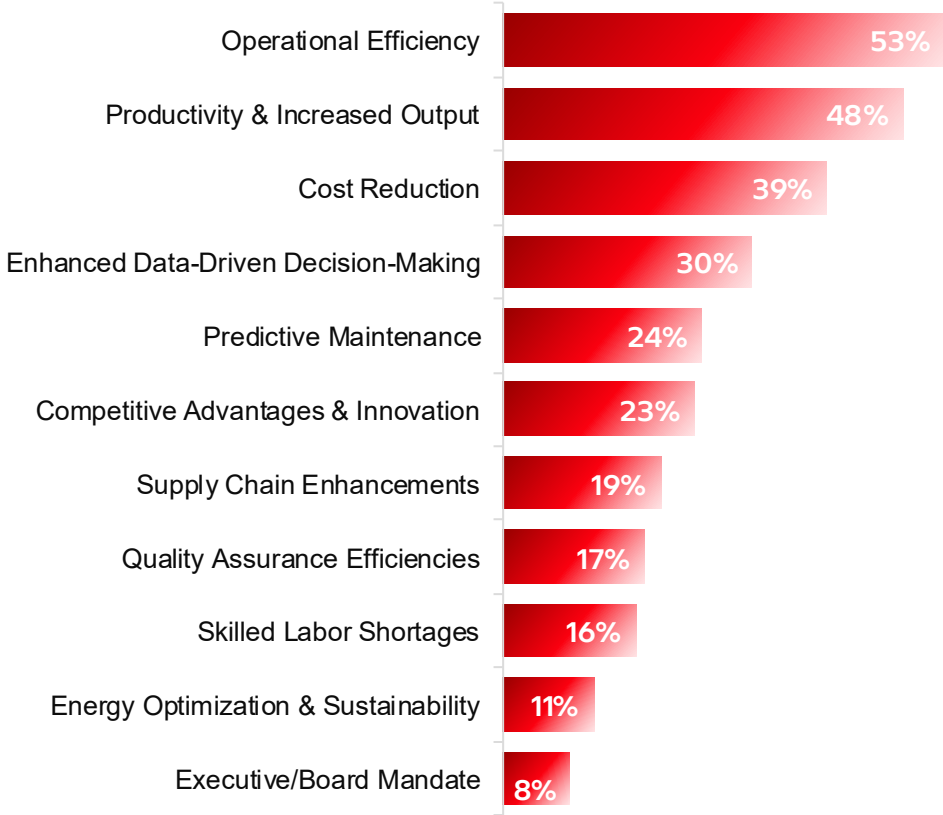


Investment momentum is accelerating fueled by a focus on operational efficiency, productivity gains, and cost reduction.

Approximate Investment in Industrial AI
(% high level of investment)



Industrial AI Investment Drivers



Drivers of Industrial AI Investment by Industry

Industries vary on why they invest in AI. Logistics places greater emphasis on efficiency; Utilities on cost and energy optimization; and Construction/Mining/Engineering/Architecture on data-driven decision support and board mandate.

	Total	Manufacturing	Transportation/ Logistics*	Utilities & Energy*	Construction/Mining/ Engineering/ Architecture*
Operational Efficiency	53%	57%	74%	35%	33%↓
Productivity & Increased Output	48%	49%	52%	35%	48%
Cost Reduction	39%	38%	39%	55%	36%
Enhanced Data-Driven Decision-Making	30%	28%	22%	30%	45%↑
Predictive maintenance	24%	24%	9%	25%	33%
Competitive Advantages & Innovation	23%	22%	26%	20%	27%
Supply Chain Enhancements	19%	19%	22%	15%	21%
Quality Assurance Efficiencies	17%	19%	13%	-	18%
Skilled Labor Shortages	16%	18%	22%	15%	6%
Energy Optimization & Sustainability	11%	10%	9%	30%	3%
Executive/Board Mandate	8%	7%	4%	10%	18%↑

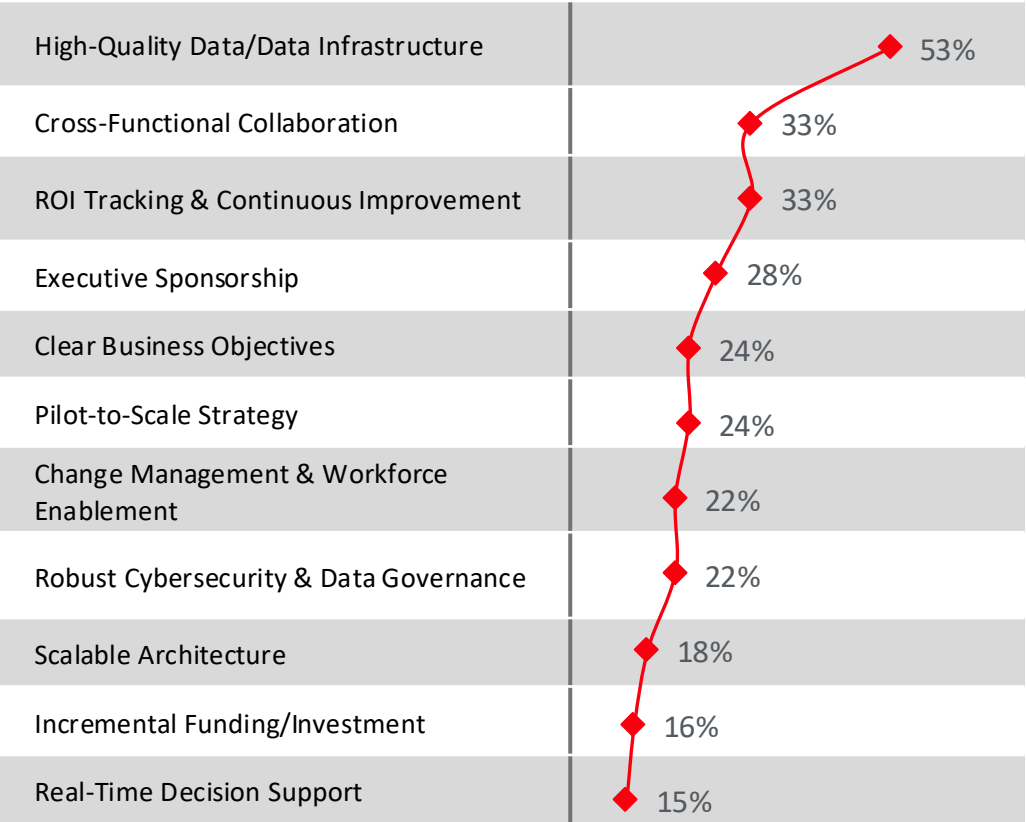
NOTES: Up and Down arrows (↑↓) indicate significant difference from total at a 95% confidence interval.
Asterisk (*) indicates low base, results included to provide a directional read and should be considered qualitative in nature. Interpret results with caution.

Skills shortages and integration challenges remain the biggest hurdles. Meanwhile, strong data infrastructure, collaboration, and ROI tracking can lead to greater adoption.

Barriers to Industrial AI Adoption

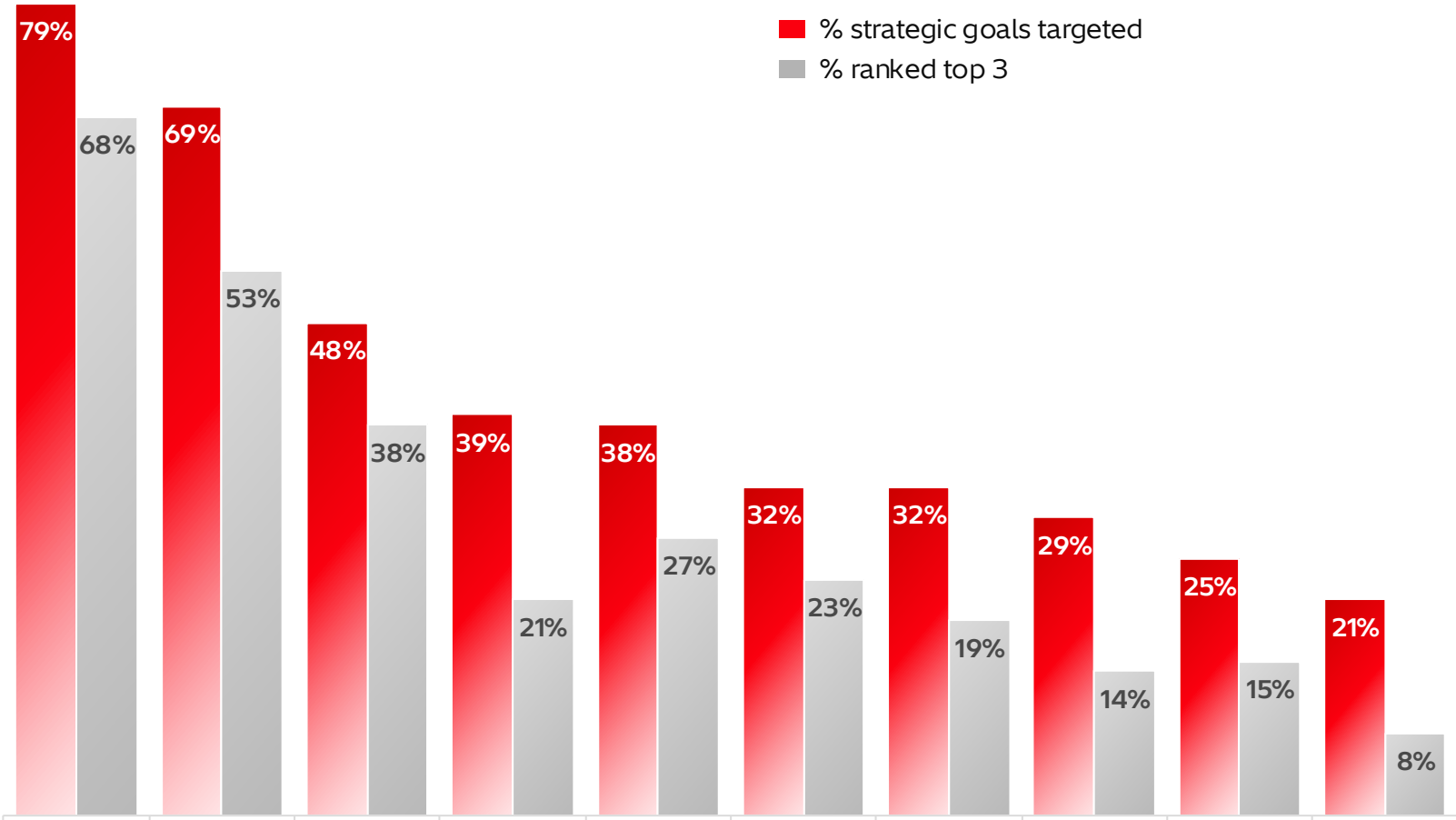


Factors Needed for Greater Adoption



Strategic Goals Targeted Through Industrial AI Initiatives

AI initiatives are primarily aimed at boosting efficiency and reducing costs. Sustainability and ESG (environmental, social, and governance) compliance are lower priorities.



Industrial AI Importance to Organization Goals, Risk of Delay, and Competitive Pressure

Industrial AI is critical to achieving strategic goals. Delaying adoption potentially carries heightened competitive risk.

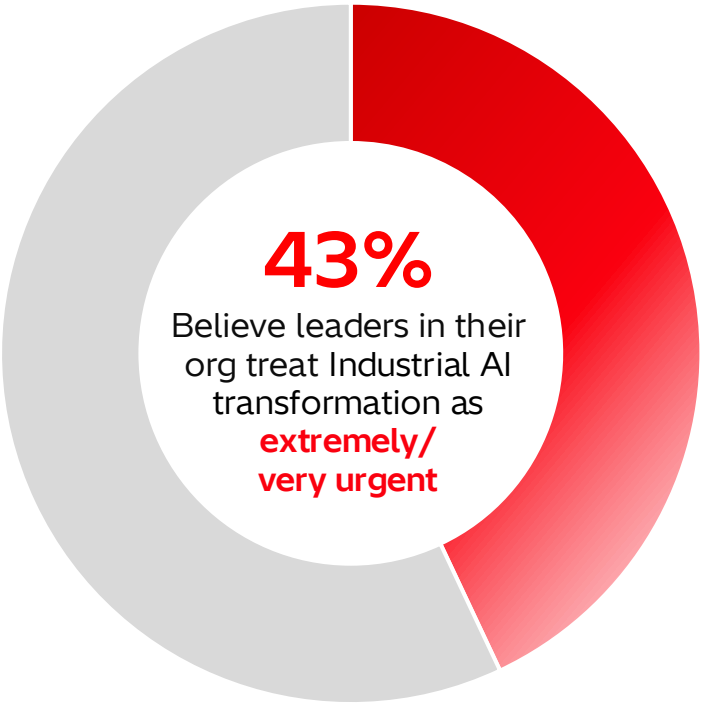
70% of organizations consider Industrial AI **very** or **extremely important** to their strategic goals.

87% of organizations associate **critical, high, or moderate risk** with delaying Industrial AI transformation.

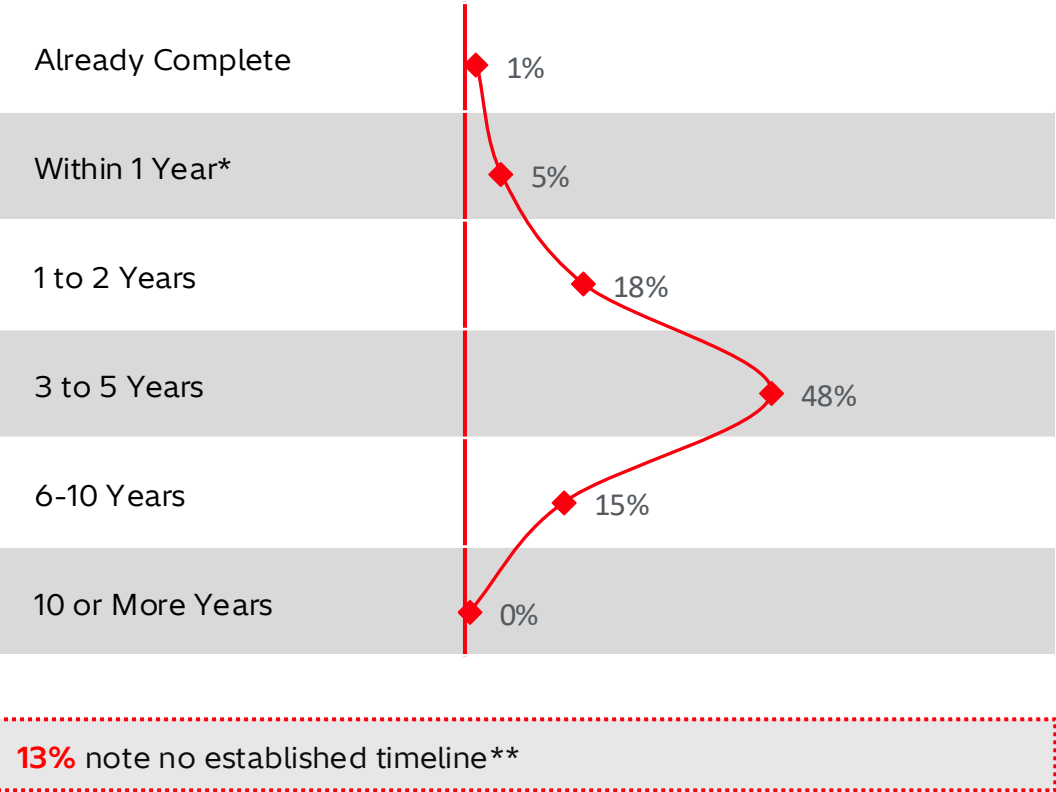
37% of organizations feel **extreme** or **high pressure** from peers to accelerate Industrial AI adoption.

While AI transformation is considered urgent, half of organizations do not expect full-scale AI integration for another 3 to 5 years with some having no timeline at all.

Urgency of Full-Scale Industrial AI Integration



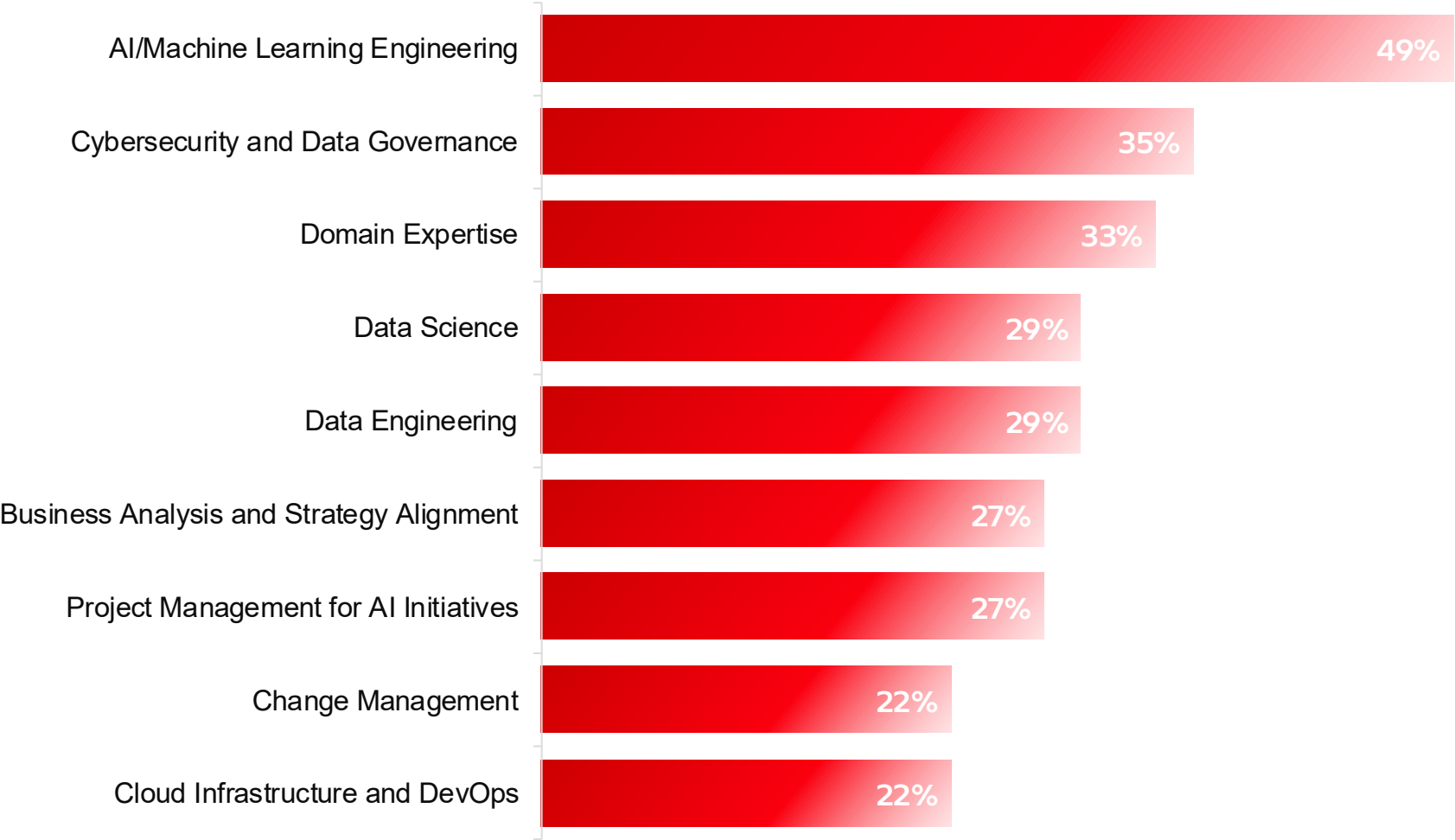
Full-Scale Industrial AI Integration Timeline



NOTES: Up and Down arrows (↑↓) indicate significant difference from total at a 95% confidence interval.
* Decision-makers who note they're at Enterprise-Wide Deployment were more likely to mention within 1 year (15%↑ vs. 5% total).
** Decision makers who mention they're deploying pilot projects were more likely to mention not having an established timeline (23%↑ vs. 13% total).

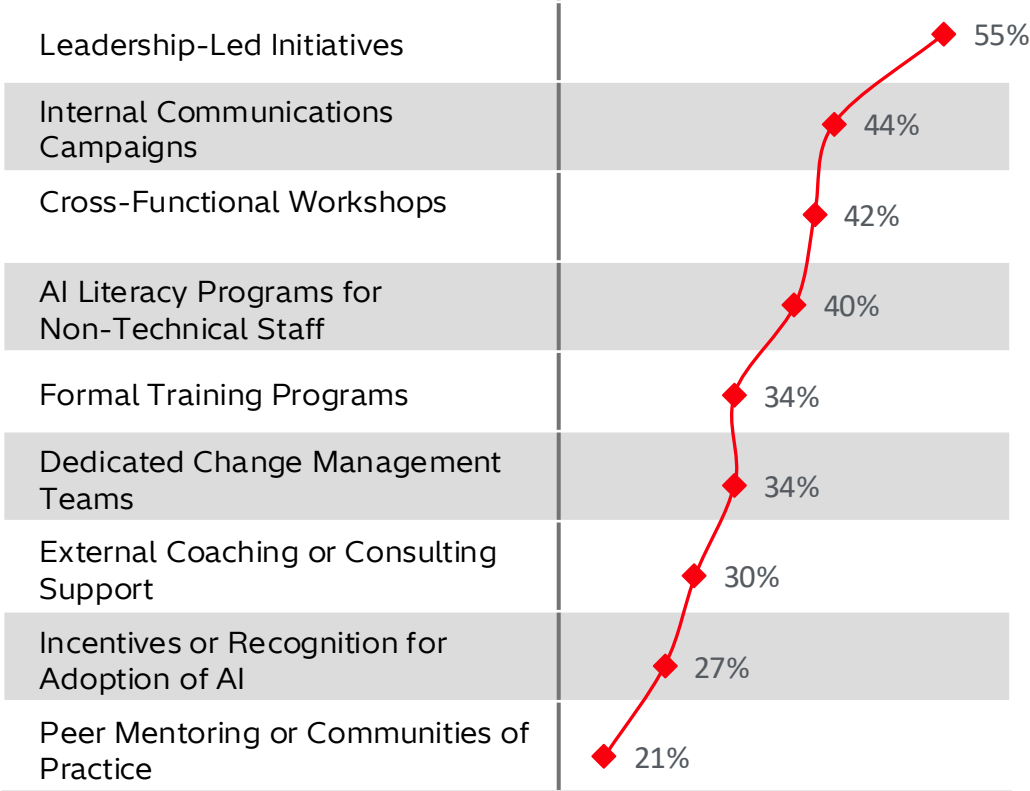
Biggest Talent Gaps in Industrial AI Initiatives

AI engineering, cybersecurity and data governance, and domain expertise are the most critical skill gaps threatening successful adoption.



AI change management strategies are top-down. Organizations lean on leadership-led initiatives while fewer peer-led strategies currently exist.

Change Management Strategies

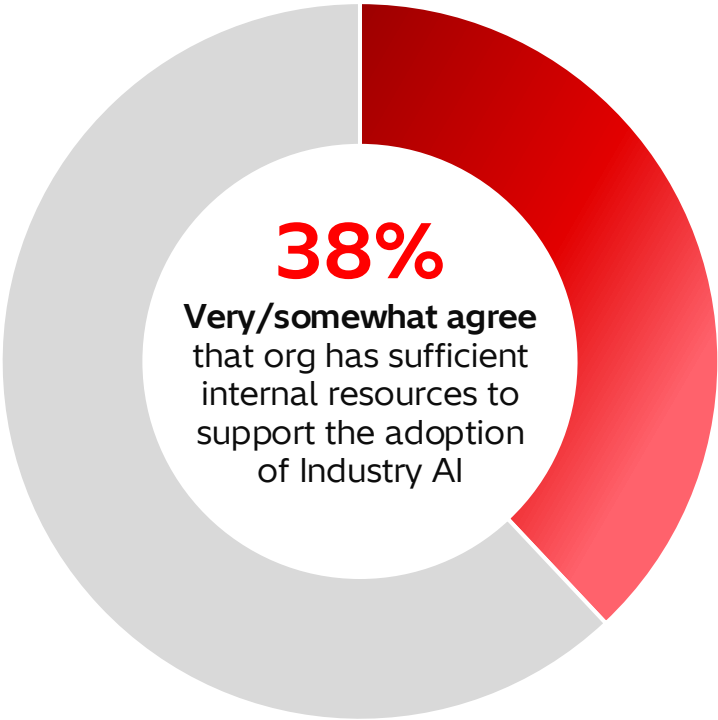


Organizational Ethical Use Measures

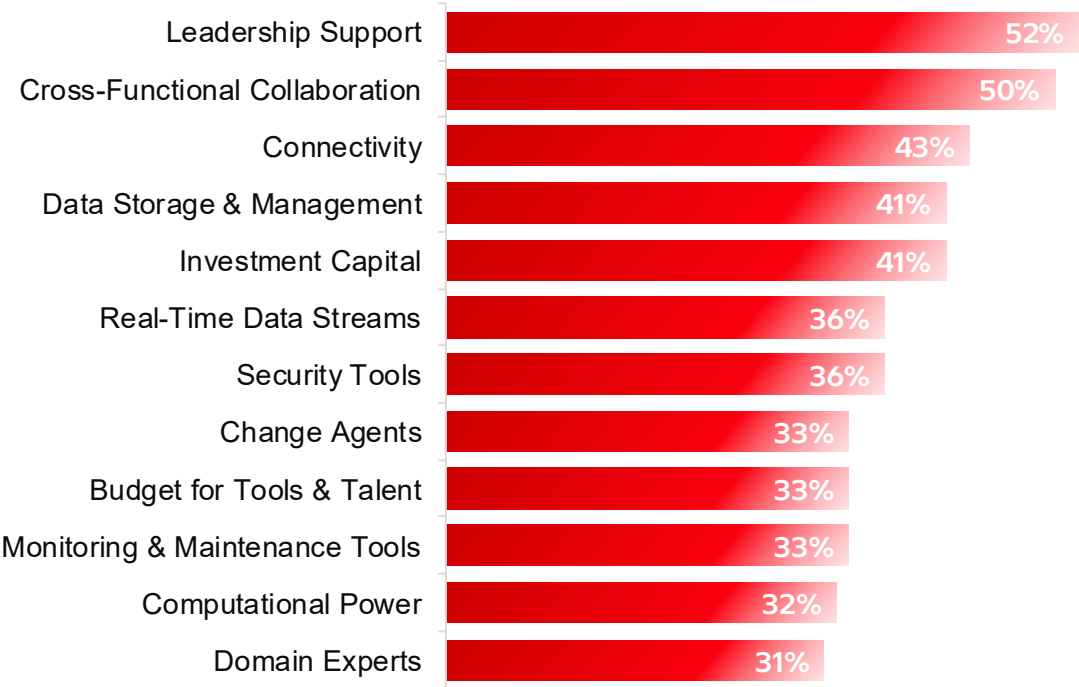


Less than two-fifths of organizations feel adequately resourced for AI adoption. Leadership support leads while capital, budgeting and expertise lag.

Industrial AI Adoption Resources



Resources Available to Support Industrial AI Adoption and Scaling



Industrial AI Attitudes (% Strongly/Somewhat Agree)

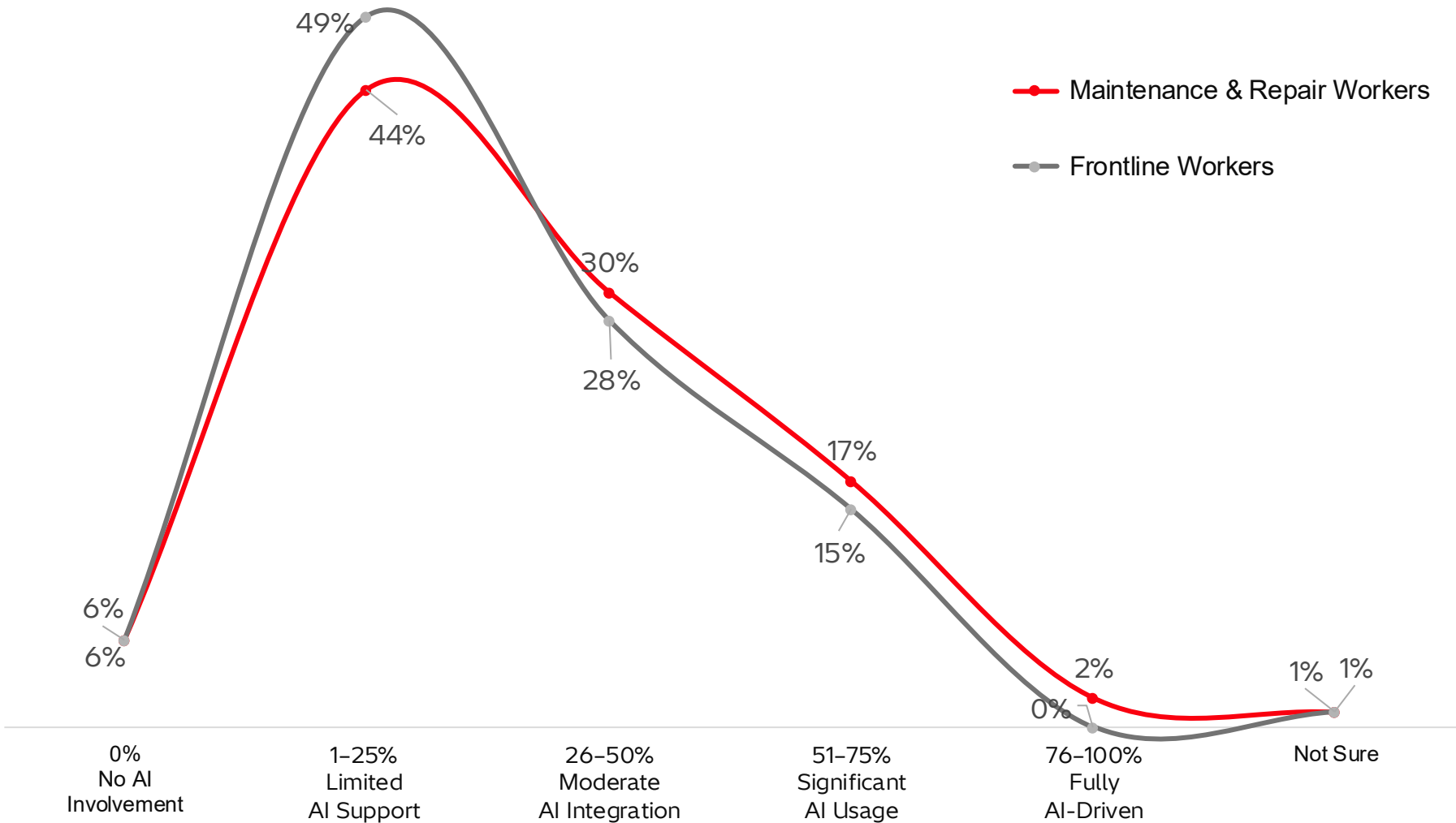
Leadership support is strong. However, agreement on tools to execute AI solutions such as access to high-quality data, necessary skill, and integrated systems remain inconsistent.



Key Findings

Maintenance and Frontline Workers Supported by AI

Industrial AI support for the workforce is currently shallow. About half of organizations provide only limited AI support to frontline and maintenance teams, while fully AI-driven operations are virtually non-existent.



NOTE: A frontline worker is an employee whose job requires direct interaction or involves hands-on duties critical to daily operations (e.g. manufacturing assembly line workers).

Industrial AI Deployments and Outcomes

Key Findings

Manufacturing Vertical Scorecard: Solution Deployment and Level of Priority If Not Deploying

Manufacturing prioritizes computer vision inspection, automated quality inspection, and predictive maintenance for AI deployments. Collaborative robots, smart CNC (computer numerical control) machines, and smart PPE (personal protective equipment) are currently lower priorities.

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	Currently at production deployment	Currently at proof-of-concept stage	Not currently deployed but planned	Not currently deployed and not planned	% High Priority (among not currently deployed)
Computer Vision for Inspection	43%	29%	20%	8%	40%
Automated Quality Inspection	38%	32%	23%	8%	37%
Predictive maintenance	34%	41%	19%	7%	32%
Supply Chain Optimization	31%	39%	24%	6%	40%
Digital Twins	29%	31%	26%	14%	13%
Process Optimization	28%	45%	22%	6%	52%
Computer Vision for Safety	28%	24%	33%	16%	19%
Natural Language Processing & Analytics	28%	36%	21%	16%	14%
AI-Powered Robotics	24%	28%	30%	18%	22%
Autonomous Mobile Robots	24%	27%	29%	21%	11%
AI-Driven SOC Automation	23%	28%	29%	21%	14%
Predictive Defense & Incident Response	21%	38%	25%	16%	20%
Collaborative Robots	19%	27%	29%	24%	17%
Behavioral Analysis	19%	26%	34%	21%	10%
Smart CNC Machines	15%	25%	34%	26%	18%
Smart Personal Protective Equipment	11%	18%	29%	41%	11%

NOTE: Red shaded box indicates top three per column.

Transportation and Logistics Vertical Scorecard: Solution Deployment and Level of Priority If Not Deploying

Transportation and Logistics prioritizes route optimization for AI deployments. Supply chain risk management and AI traffic management systems are in the PoC (proof of concept) stage.

	Currently at production deployment	Currently at proof-of-concept stage	Not currently deployed but planned	Not currently deployed and not planned	% High Priority (among not currently deployed)
Route Optimization	61%	26%	13%	-	67%
Demand Forecasting	48%	26%	13%	13%	33%
Natural Language Processing & Analytics	48%	26%	9%	17%	-
Demand Forecasting & Load Planning	43%	35%	13%	9%	60%
Warehouse Automation	35%	26%	13%	26%	33%
Cargo Tracking & Condition Monitoring	30%	39%	17%	13%	14%
Computer Vision for Safety	30%	35%	13%	22%	-
AI-Driven SOC Automation	30%	17%	35%	17%	8%
Autonomous Delivery Vehicles	26%	35%	13%	26%	11%
Supply Chain Risk Management	22%	52%	13%	13%	33%
Behavioral Analysis	22%	26%	22%	30%	8%
AI Traffic Management Systems	17%	48%	13%	22%	13%
Predictive Defense & Incident Response	17%	26%	26%	30%	8%
Fleet Predictive Maintenance	13%	43%	22%	22%	10%
AI-Enhanced Drones	13%	30%	17%	39%	8%
Smart Personal Protective Equipment	13%	26%	17%	43%	-

NOTE: Red shaded box indicates top three per column.

Key Findings

Utilities and Energy Vertical Scorecard: Solution Deployment and Level of Priority If Not Deploying

Utilities and Energy prioritizes SOC (security operations center) automation for AI deployments. Drone-based line inspection, grid optimization, and smart grid automation are lower priorities.

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	Currently at production deployment	Currently at proof-of-concept stage	Not currently deployed but planned	Not currently deployed and not planned	% High Priority (among not currently deployed)
AI-Driven SOC Automation	30%	35%	15%	20%	14%
Asset Health Monitoring	25%	45%	25%	5%	33%
Predictive Maintenance of Infrastructure	25%	60%	5%	10%	33%
Drone-Based Line Inspection	25%	30%	10%	35%	11%
Computer Vision for Safety	25%	30%	40%	5%	22%
Natural Language Processing & Analytics	25%	45%	15%	15%	33%
Predictive Defense & Incident Response	25%	35%	30%	10%	50%
Grid Optimization	20%	20%	25%	35%	17%
Smart Meter Analytics	20%	35%	35%	10%	-
Outage Detection & Response	20%	25%	30%	25%	27%
Energy Consumption Forecasting	15%	45%	20%	20%	25%
Smart Grid Automation	15%	15%	30%	40%	-
Smart Metering	15%	35%	35%	15%	20%
Smart Personal Protective Equipment	15%	45%	15%	25%	13%
Behavioral Analysis	15%	45%	25%	15%	-
AI-Driven Energy Storage Management	10%	30%	30%	30%	8%

NOTE: Red shaded box indicates top three per column.

Construction/Mining/
Engineering/Architecture
Vertical Scorecard:
Solution Deployment
and Level of Priority
If Not Deploying

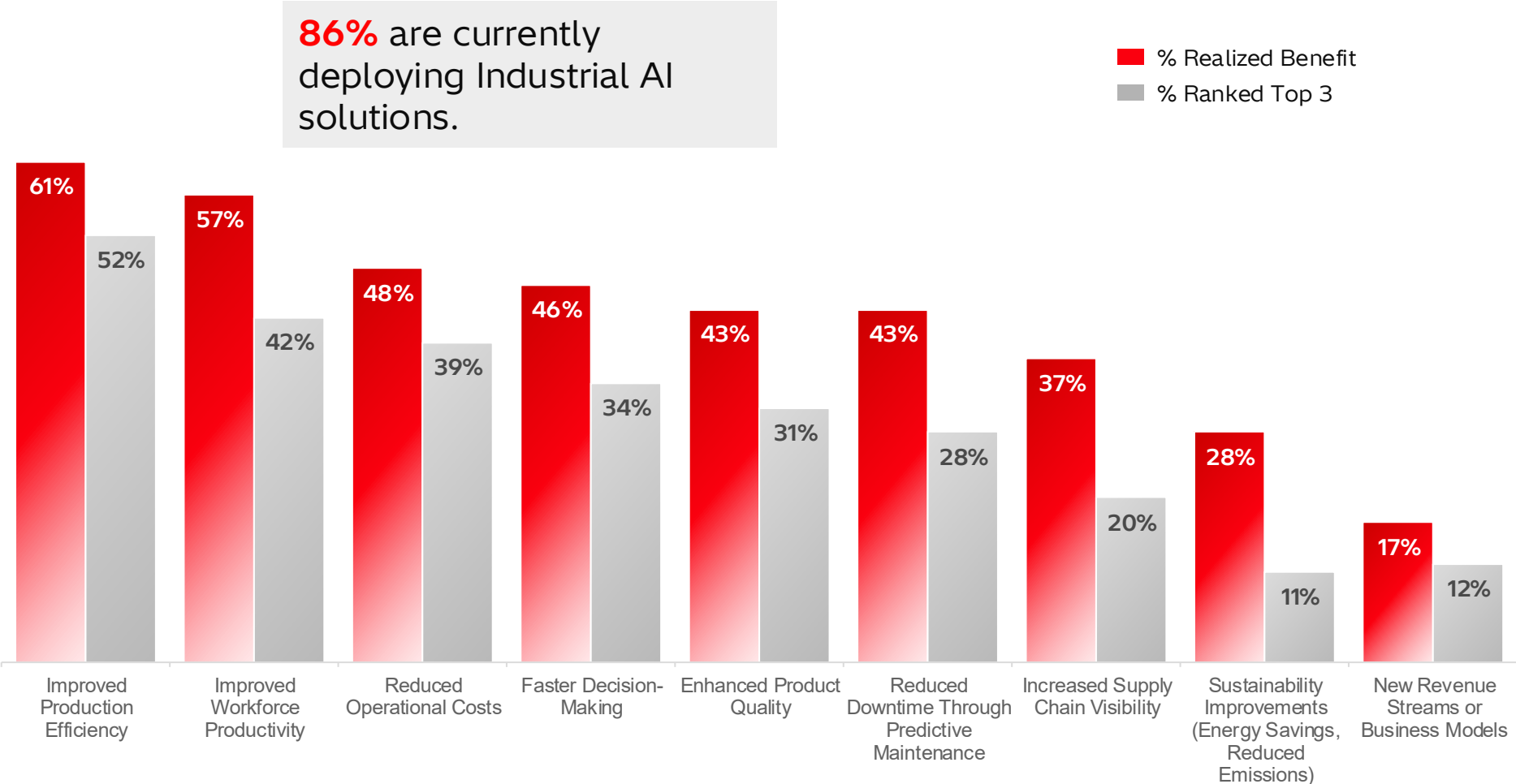
Construction/Mining/Engineering/Architecture prioritize natural language processing and analytics along with SOC (security operations center) automation for AI deployments. Smart PPE (personal protective equipment) is a lower priority.

	Currently at production deployment	Currently at proof-of-concept stage	Not currently deployed but planned	Not currently deployed and not planned	% High Priority (among not currently deployed)
Natural Language Processing & Analytics	42%	36%	15%	6%	29%
AI-Driven SOC Automation	42%	30%	21%	6%	33%
Predictive maintenance	39%	36%	21%	3%	38%
Project Risk Forecasting	39%	42%	15%	3%	-
Predictive Defense & Incident Response	39%	33%	15%	12%	56%
Computer Vision for Safety	33%	21%	39%	6%	27%
Behavioral Analysis	33%	21%	36%	9%	27%
Generative Design	30%	45%	15%	9%	25%
Supply Chain Optimization	24%	45%	24%	6%	40%
Sustainability & Energy Efficiency Modeling	24%	36%	30%	9%	38%
Smart Personal Protective Equipment	18%	42%	24%	15%	15%

NOTE: Red shaded box indicates top three per column.

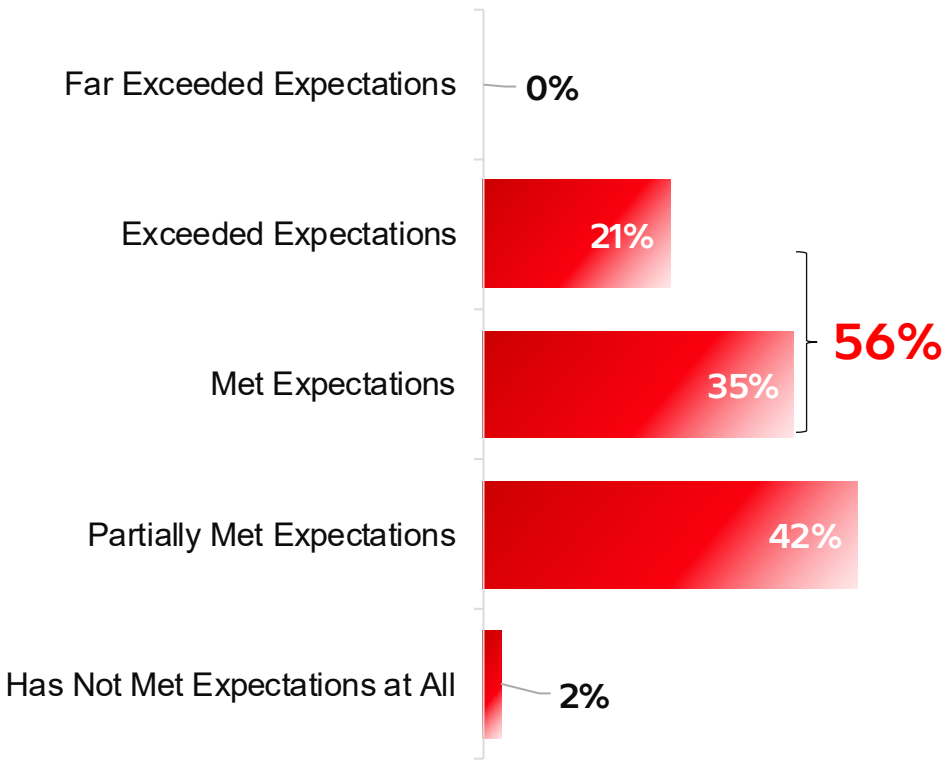
Benefits Realized from Current Industrial AI Deployments

Efficiency, productivity, and operational cost savings are the top realized and most important benefits, highlighting AI’s contribution to enhancing profitability.



While more than half of organizations report that current Industrial AI solutions met or exceeded expectations, two-fifths say they were only partially satisfied suggesting a gap between promise and performance.

Current Industrial AI Solution Expectations



86% are currently deploying Industrial AI solutions.

Quotes About Expectations Ratings

Exceed Expectations

“We saw a roughly 25% cut in equipment downtime because the real time anomaly detection flagged issues before they became problems.”

“Revenue stream is through the roof. Safety for our workers has increased dramatically. Learning new architectural technology.”

Met Expectations

“Delivered tangible benefits aligning with our business objectives with promising ROI, although there's room for further optimization and scalability.”

“AI has created necessary production and workflow improvements on our manufacturing line; however, we know there are new enhancements that AI will provide.”

Partially Met Expectations

“The solutions lack full integration, consistent usage, and quality data, so the impact is limited, and expectations are only partly met.”

“We are seeing some modest signs of efficiency and tracking towards KPIs but it has been somewhat slow to materialize in visible ways.”

Has Not Met Expectations

“We are behind in terms of AI awareness, partnerships and alliances to move agenda forward.”

Challenges Contributing to Failure or Underperformance

Poor data quality, legacy constraints, insufficient data, inadequate integration, and lack of human knowledge are the leading contributors to failure or underperformance – underscoring the need for modernization to drive AI forward.



86% are currently deploying Industrial AI solutions.

Methodology

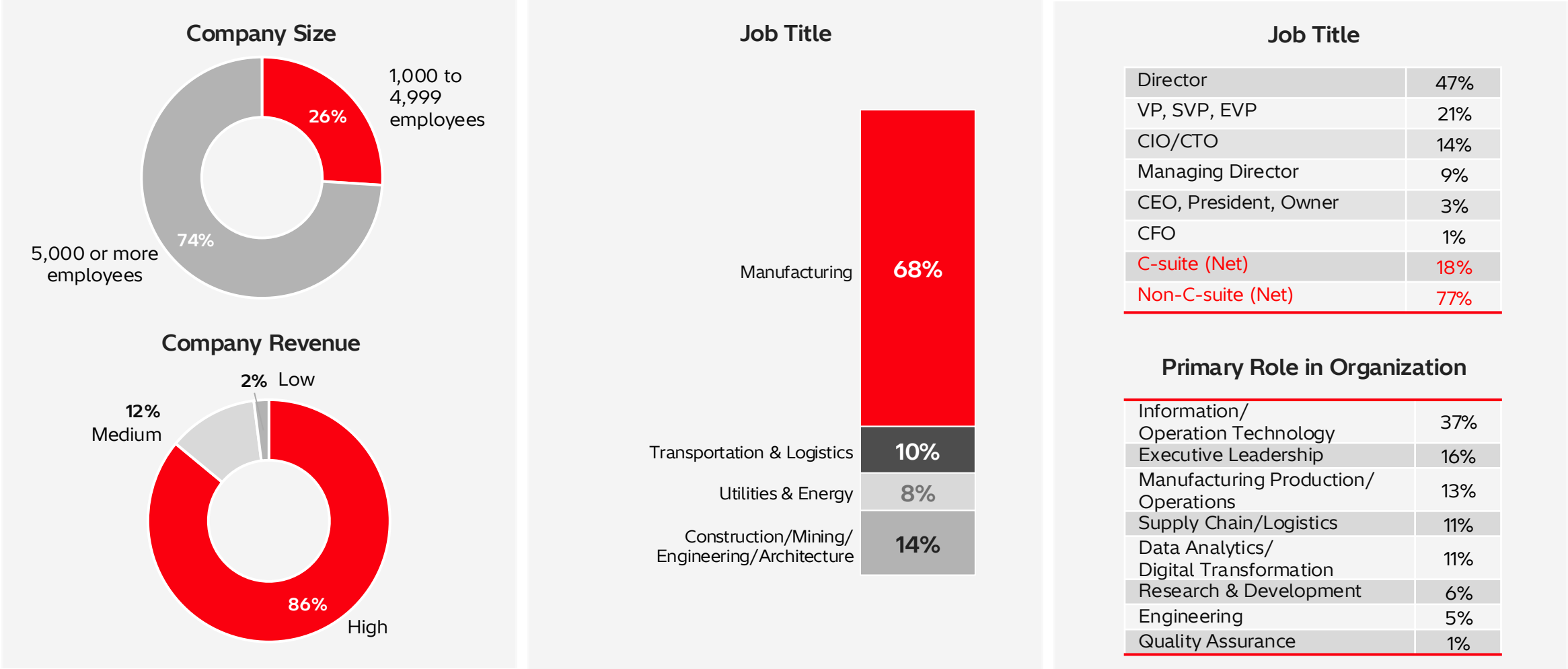
Beyond the Pilot: Industry's Physical AI Progression

Methodology

The report is based on a survey evaluating the adoption and progression of Industrial AI among large enterprises across manufacturing, transportation and logistics, energy, and other mission-critical industries. The research draws on 236 completed responses across six global markets (US/Canada, Germany, UK, Japan, and India). The majority of respondents (74%) came from large organizations with 5,000+ employees, with 86% of the organizations reporting revenues of \$100M+. All respondents held senior roles (C-suite, VPs, and directors) and were directly involved in or responsible for Industrial AI decisions – ensuring the findings reflect perspectives from experienced, decision-level stakeholders at the forefront of the Industrial AI movement

Firmographic Profile

Business decision-makers primarily come from large firms in the manufacturing space holding non-C-suite roles; mostly in information or operation technology roles.



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