

A photograph of three industrial workers in orange safety vests and white hard hats ascending a white metal staircase. The staircase is set against a plain, light-colored wall. The workers are positioned at different levels of the stairs, moving from the bottom right towards the top left.

Supply Chain and Engineering Insights

**Six research-based perspectives on the
next era of engineering, manufacturing,
capital projects and supply chain reinvention**

September 2026

**Tracey Countryman**

Supply Chain and Engineering
– Global Lead

I have spent much of my career studying what makes organizations work in the daily realities of factories, supply chains, engineering teams and capital projects. The lesson I keep coming back to is this: Performance depends less on what technology can do than on whether people can use it to make better decisions, faster, in the flow of real work. That challenge has become even more apparent as AI moves from experimentation into the core value chain.

When I talk with executives today, I hear a sharper question than I did a year ago. Leaders no longer ask only whether AI can deliver a return. They ask how to redesign work so AI becomes part of how the business runs. That question demands more than a technology roadmap. It requires clear choices about roles, judgment, accountability and the operating models that connect them.

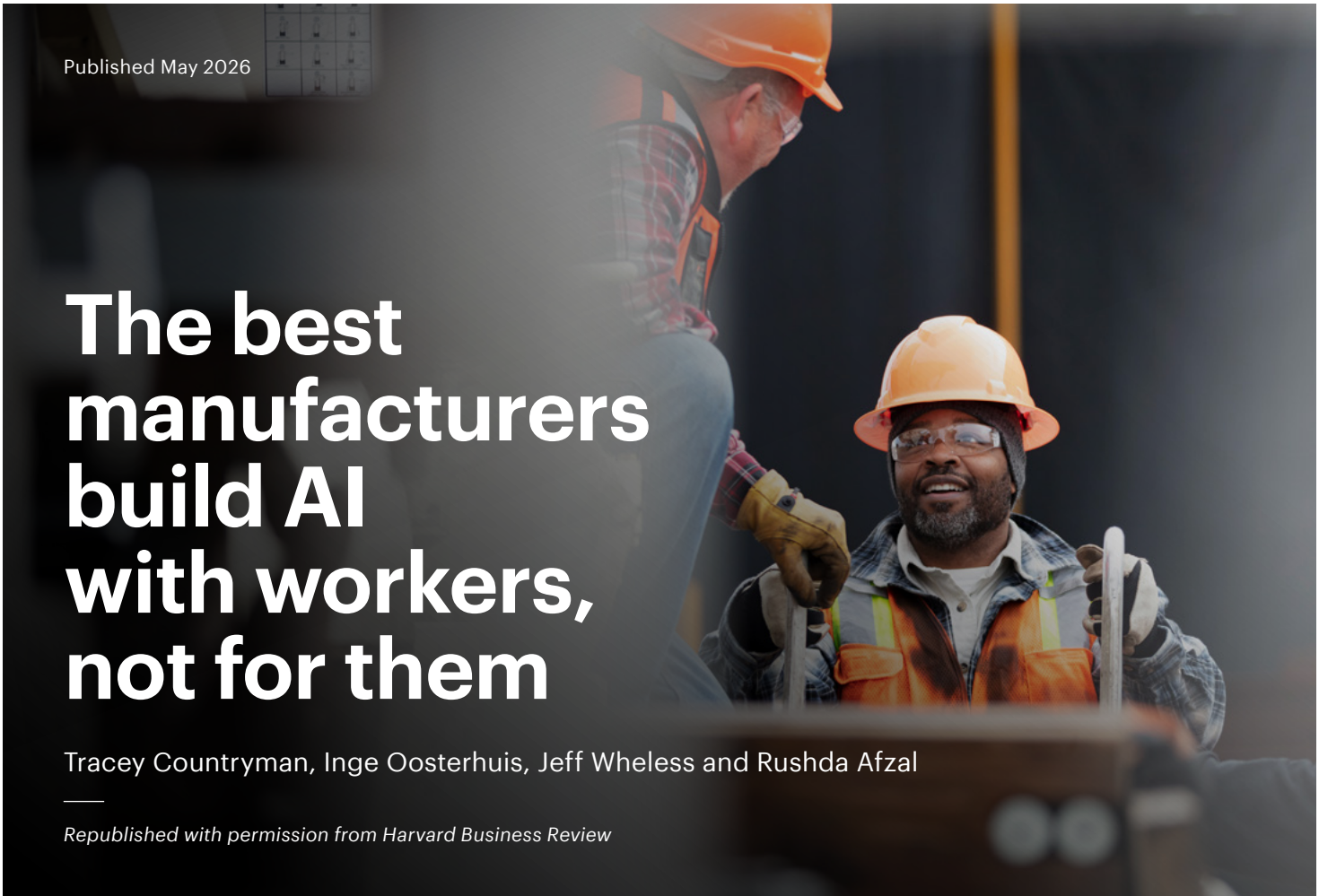
This collection of articles from across our supply chain and engineering practice exists because that question deserves a serious answer. The insights draw on original Accenture research, including surveys, interviews and direct observations from subject matter experts across industries and geographies. Together, they follow a deliberate path across the core value chain. They start with the state of supply chain and engineering, then move through

the pressure points where reinvention is most urgent: factories' workers adapting to AI-enabled roles, engineering teams weighed down by administrative drag, manufacturing investment choices, industrial orchestration, capital projects where dashboards can miss site reality and the workforce model needed to sustain growth.

Across those settings, the same leadership imperative emerges. Companies need to design technology, operations and work together. That means involving workers in shaping AI, building data foundations that make AI useful, giving field intelligence a faster route to decision-makers and treating workforce redesign as a core operating discipline. When leaders make those choices together, organizations start to scale on intelligence, absorb volatility with more discipline and strengthen the connection between strategy and the people who make it real.

I hope you come away with both clarity and confidence: clarity about where constraints really sit, and confidence that practical progress is within reach. The opportunity in front of industrial organizations is significant. So is the cost of moving too slowly.

1	The best manufacturers build AI with workers, not for them	Page 03
	Tracey Countryman, Inge Oosterhuis, Jeff Wheless and Rushda Afzal <i>Republished with permission from Harvard Business Review</i>	
2	The AI breakthrough in engineering	Page 08
	Roland Mayr, Jean Cabanes, Götz Erhardt, Tobias Geißinger, Jeff Brehm and Andreas Egetenmeyer	
3	How manufacturers can find the AI wins others overlook	Page 13
	Tracey Countryman, Prasad Satyavolu, Roland Mayr, Luis Luque and Edward Blomquist	
4	Industrial reinvention	Page 17
	Christophe Mouille, Götz Erhardt and Kerstin Stapelmann	
5	Your capital projects dashboard may be hiding the real work	Page 22
	Adam J. Shaw, Jonas Kampik and Alberto Sanz	
6	The new playbook for supply chain skills and roles	Page 26
	Inge Oosterhuis, Jaime Lagunas, Kristine Renker, Stephen Wroblewski and Stephen Meyer	
7	Suggested reading	Page 31



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The best manufacturers build AI with workers, not for them

Tracey Countryman, Inge Oosterhuis, Jeff Wheless and Rushda Afzal

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Executives are optimistic about AI's potential to transform manufacturing. Workers, on the other hand, are more skeptical. In a seven-week internal unpublished study of video diaries from 85 frontline workers across six industries in Australia, the UK and the United States, we asked workers to describe how emerging technologies, including AI, are being introduced into their jobs, what training they receive, and how they see their future. Across industries, distrust ran deep, of both the tools and the organizations deploying them. More than three-quarters of participants said they were dissatisfied with their training. Many were uncertain about how their roles would change or whether they would have a place in the future factory.

But some manufacturers are getting this right. They are closing the gap between executive optimism and workers' lived experience. Their approach—and our internal research—point to three key principles that shape how the smartest manufacturers approach this kind of working environment. They reduce uncertainty about how roles will shift with input from the shop floor. They train people in the context of real work. And they measure performance based on how humans and AI operate together, not on training hours logged.



72%

of factory leaders say helping workers adapt to emerging manufacturing technologies needs to be a priority for the next five to seven years.

They reduce uncertainty

Today's factory workers lack a clear line of sight into how their work will change and where (and whether) they fit in the future of their organization. They hear talk of "dark factories" and fully autonomous operations. They know that as AI tools and agentic teams advance, new jobs will emerge even as others are no longer needed. But they're worried that the more they work with AI, the more likely their own positions will be targeted for elimination. They want to know how best to prepare to do well in the future, whatever it may hold.

Trust and confidence hang in the balance, along with the ability to continue to perform at a high level. When expectations are unclear, workers hesitate to rely on new systems, question their own accountability, and struggle to know when to intervene or escalate. It's not easy for leaders to give workers what they want and need.

Executives can't offer employees a clear line of sight into the future of factory work because they don't have one themselves. They are still learning what AI will realistically change on the floor. A significant majority (61%) of the COOs we surveyed said that AI is fundamentally going to change the organization's core business model. In an internal 2025 global survey, 72% of 552

factory leaders said that helping workers adapt to emerging manufacturing technologies needs to be a priority for the next five to seven years.

That makes it hard to confidently define how work will change, what decisions will remain human, where escalation should happen, and what new roles will look like in practice right now. When leaders are uncertain, the uncertainty travels downstream, and workers are left to interpret signals and rumors instead of clear expectations.

Executives are also worried about the cost of training. In that same study, almost half (49%) said that reskilling workers requires excessive effort, even given the dearth of people with the skills currently needed. What's more, nearly half (46%) agreed that employees' fear of job loss is a serious concern. They worry that fear will keep employees from fully embracing the technologies, hindering workforce transformation over the next five to seven years. The study also found that meeting integration requirements, handling compatibility problems with legacy systems and managing uncertainty around governance and data quality also complicate matters, making it more difficult to integrate AI, and delaying outcomes. Rockwell Automation Chairman and CEO Blake Moret has said he thinks complexity "is the primary deterrent to more rapid incorporation of technology in automation."

All these concerns at the leadership level translate into fear and frustration across the workforce. One line worker put it this way: "As more tasks become automated, it's not always clear what decisions we're still responsible for and when we're supposed to step in."

To bring factory workers along, manufacturing organizations need to engage them in creating what's ahead.

Another noted: “Being able to put my trust in something that I don’t know is something that I really struggle with. Sometimes these systems are not the most reliable.” An operations manager summed it up, saying that when AI tools don’t meet expectations on the floor, “We feel like we’re the problem.”

To bring factory workers along, manufacturing organizations need to engage them in creating what’s ahead. Taking that approach will not only help efforts to integrate AI, but also, critically, tap the best source of information about the potential of AI to foster innovation and growth on the shop floor. In the AI era, viable possibilities open as soon as someone says, “If only we could do ‘X,’ we could . . .”

Here’s what we recommend: Start by breaking manufacturing roles into the tasks workers complete and the judgment calls they make as they perform a job. This process, known as dynamic skill and task mapping, makes tacit knowledge about what a job really entails explicit. Done thoroughly, with worker input plus AI-generated insights, mapping reveals the workarounds, shortcuts, and “common sense” insights. As a result, it gives managers a view of how skills and training needs will need to evolve as they delegate to AI and spend more time on oversight, orchestration and handling exceptions. Plus, when employees see their own expertise and judgment shape the intelligence of the system, trust rises. People

can see clearly how new ways of working overcome old challenges and raise the quality of output—and why their input matters.

Take planners who, today, work reactively across silos to try to plug gaps in workflows. (For example, if a customer requires a design change, the planner has to recalibrate the workstreams, so the whole fulfillment process stays coordinated.) Mapping can help planners work with their leaders to anticipate and plan for a time when agentic teams are a part of the mix. It can illuminate things the planner has been doing that add value all along but have previously escaped notice. It can also surface activities (existing or emerging) that require human judgment or creativity and need to be recognized and rewarded.

A global consumer goods company that we observed offers an example. The organization captured the tacit adjustments operators made in its powder agglomeration process and embedded that know-how into a real-time analytics stack that predicts quality and recommends optimal setpoints. In this way, teams can apply expert-level judgment more consistently, and roles shift naturally from manual tuning toward monitoring, validation, and exception management.

Leaders can also send a clear message that the AI journey isn’t something they’re simply imposing on others, by showing workers that they, too, are figuring out where AI can take them. Connection, curiosity and courage are at a premium during turbulent times. The more leaders can connect with workers directly, demonstrating empathy, sharing their own learning experiences, the better able they will be to address the emotional strain of change.

Measure what workers do, not what you think they do.

They train people in the context of real work

More specifically, they train for the flow of work in the flow of work. Most training programs still focus on broad concepts and take workers out of their environments to study. What they need, instead, are details, in context.

Learning in the flow of work. If operators now use AI tools to diagnose production issues and generate daily reports, adjacent training that only covers these tasks in broad strokes isn't helpful. Same with schedulers learning to manage alongside reoptimizing systems and quality engineers validating algorithmic recommendations instead of searching manually for defects.

Moreover, learning in the flow of work, supported by real-time analytics, allows supervisors to see where work stalls, errors rise or confidence drops. They can then intervene as needed, to great effect.

Here, an example from a food-processing plant we observed illuminates the point. Waste at this plant had been running nearly twice the industry average. Using operational-twin data and simple machine-learning insights, supervisors saw how small changes in line speed and seasoning equipment affected over-feeding and product loss.

Operators helped them develop a “next-best-action” dashboard and began using it to anticipate when to adjust before waste occurred. Within weeks, yield improved and acceptance rose. Workers trusted the

system because they had a hand in shaping the logic behind its guidance and because training took place in real time, on the line, where it was immediately relevant.

Finally, learning in the flow of work doesn't only benefit workers; it also benefits the AI they're working with, as people respond to the tools with questions, or build on what they've learned and begin to ask the tool to support more advanced work, in a continuous cycle of what we call “co-learning.”

They measure real-world performance

Measure what workers do, not what you think they do. Traditional training metrics, such as courses completed or hours logged, say little about whether people are ready to work effectively alongside AI. They capture exposure, not capability. The real test is whether workers are using new tools confidently and consistently, and whether outcomes on the factory floor are changing as a result.

That is why a growing number of manufacturers are shifting away from participation-based measures and toward performance indicators that reflect how work gets done. Instead of asking who has been trained, they are tracking signals such as the speed and accuracy of human-AI handoffs, the time it takes to resolve exceptions, and the frequency and quality of successful interventions when systems flag issues. These measures reveal how well people and machines are learning together in real operating conditions.

The most telling signals of progress do not come from learning dashboards, but from how work unfolds once AI is embedded in daily operations. Ford Motor Company offers a useful example of what this shift looks like in practice.



The company embedded lightweight, AI-assisted inspection tools directly into production routines, using cameras and mobile devices to support operators as they identified defects in real time. Rather than treating adoption as a one-time training milestone, supervisors focused on operational signals that showed whether people and systems were learning together. They paid attention to how quickly issues were detected and addressed, how often operators validated or corrected the system's recommendations, and how consistently teams acted on what the tools surfaced.

Those measures made it possible to see where confidence was building, where judgment was strong and where friction still slowed the flow of work. Crucially, they also created a feedback loop for leaders. Dashboards and analytics helped identify early adopters, pinpoint where workflows broke down and guide targeted coaching before performance slipped. Over time, effective practices could be shared across sites, while persistent friction points signaled where workflows or system design needed to change. Adoption is not a one-time milestone; it is a continuous measure of how humans and AI co-evolve.

As AI use proliferates, particularly with the rise of agentic AI systems, the economics of work are shifting. A wide range of AI-powered tools are emerging, and converging, to support people who work in manufacturing environments. This progress has been made possible due to advances in connectivity, cost, and edge computing. As this happens, it's becoming clear that the factory of the future will depend on reliability engineers who maintain fleets of autonomous agents and mobile robots, model-based technicians who supervise digital

twins and anomaly detection systems, and supervisors of agent swarms who monitor quality across planning, maintenance, and logistics. These are software-defined factory roles: technical, human-centered, human-led, and vital.

Showing workers that the future of manufacturing will be AI-enabled, not AI-run, is important. Leaders who include people in redesigning roles, train them in the flow of work and make it clear who is accountable for outcomes (and how to escalate problems) when work includes AI will not merely help their workforces keep pace with the learning curve. They will help them to define it.

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About the authors

Tracey Countryman

Accenture's Global Lead of Supply Chain and Engineering

Inge Oosterhuis

Accenture's Global Lead for Workforce in Supply Chain and Engineering

Jeff Wheless

Global Lead for Research for Supply Chain and Engineering, Accenture Research

Rushda Afzal

Manager with Accenture Research



The AI breakthrough in engineering

Five targeted moves that free engineers from administrative drag and turn AI investments into better products, faster

Roland Mayr, Jean Cabanes, Götz Erhardt, Tobias Geißinger, Jeff Brehm and Andreas Egetenmeyer

Every AI investment decision in engineering should start with one uncomfortable fact. Roughly half of every engineer's working day disappears into documentation, status chasing and searching for information rather than building. Our new research, based on 136 interviews with engineering leaders and front-line engineers across Asia-Pacific, Europe and North America, puts the global price of that lost time at \$39 billion a year. For a single automotive company with 15,000 engineers, the annual loss reaches \$420 million.

Technology skills and ambition still matter, but they will not recover that lost value on their own. The bigger constraint sits in the operating environment around engineering work.

Our research points to a practical disconnect between where leaders are investing and what engineers need most to make AI useful. Engineering leaders rank technology investment, talent acquisition and AI-usage training as their top priorities. Engineers rank something more immediate: reducing administrative tasks, improving AI reliability and making cross-functional collaboration easier. Leaders are investing in faster tools while engineers are still waiting for a road those tools can run on.

Closing that gap can change the economics of engineering. The potential gains are substantial: development cycles that run up to 80% faster, engineering costs that fall by up to 50% and product quality that improves by roughly 30%.

But those gains depend on a crucial first step: building the infrastructure that makes AI useful in the flow of engineering work. With that foundation in place, leaders can make five moves that translate AI investment into faster decisions, earlier validation, continuous compliance, sharper engineering judgment and stronger collaboration across the product network.

The biggest AI blocker is yesterday's toolchain

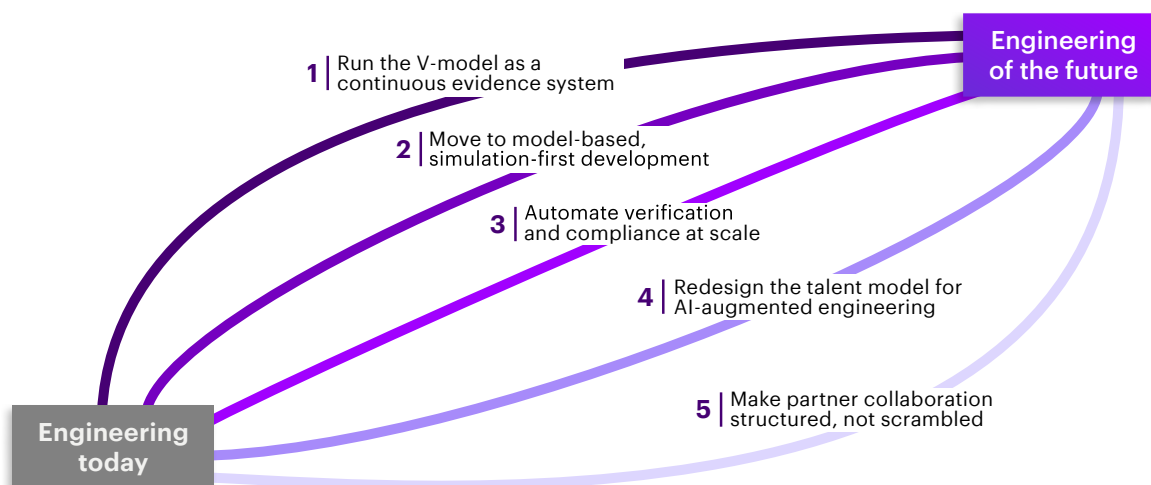
Many leaders who have invested in AI tools are surprised when adoption stalls. The reason is visible in the data. More than three quarters of senior engineering leaders maintain over 200 discrete engineering applications, while only 4% have implemented a true end-to-end digital thread. When data lives in disconnected systems, AI has nothing coherent to work with. One aerospace executive in the study noted that companies are spending 80% of their IT budgets keeping legacy systems alive, while engineers hunt records across incompatible tools and chase approvals through email chains. Adding AI to that environment accelerates dysfunction rather than transformation.

That is why the first AI investment should look beyond another point solution. Leaders need the right connective tissue across the engineering environment, starting with a cloud-based digital core that links requirements, designs, tests, approvals, quality records and field data across existing systems under a governed structure.

CNH Industrial built this kind of backbone for its engineering, sourcing and manufacturing teams. By connecting data across functions before teams locked in specifications, the company brought cost intelligence into the design process while engineers could still act on it. Iterations that previously took 40 hours dropped to minutes, and earlier evaluation surfaced nearly \$9 million in cost-saving opportunities.

The point is not to replace every tool engineers use. It is to make those tools behave as one coherent product story, so engineers spend less time reconciling information and more time solving the problems they were hired to solve. That foundation makes five additional moves beneficial (Figure 1).

Figure 1: The roadmap to reinvent engineering process



Source: Accenture

By 2030, “perfect but late” engineering will carry a heavy penalty.

1. Build evidence into the V-model

The first move is to fix how evidence moves through the V-model. Too often, the process works like a relay race, with sequential execution, fragmented handovers and weak evidence flow across functions. A better approach makes the process explicit. Define what “good” looks like at each stage, set required inputs and outputs, assign decision owners and connect requirements to architecture, designs, tests and approvals through a minimum viable digital thread.

BMW shows what such traceability can unlock. The company needed faster access to signals from 3,500 development vehicles, so it built a system that monitors more than 10,000 signals twice per second and added an AI layer that lets engineers query vehicle data in natural language. Data delivery and analysis became roughly 10 times faster, freeing engineers to act on findings instead of searching for them.

2. Simulate before the build

The same logic applies earlier in development, where late validation can turn avoidable design issues into expensive rework. By 2030, “perfect but late” engineering will carry a heavy penalty. One leader in the study described rebuilding a circuit three or four times, with each iteration consuming two to two and a half months. That kind of late learning compounds delay and diverts scarce engineering capacity from higher-value work.

Simulation-first development changes that sequence. When models connect directly to requirements and architecture, and teams reuse validated work across programs, issues surface before anyone commits to a physical build.

Siemens Energy demonstrated the upside by using an integrated digital thread across global turbine development teams. The company completed 26 design iterations, four times more than traditional methods allowed, and delivered the world’s first 100% hydrogen gas turbine in record time.

3. Put compliance in the pipeline

As industrial products become more software-defined, launch day increasingly marks version 1.0 rather than the finish line. That shift turns compliance into a continuous engineering challenge across software, hardware and the systems that connect them. Yet many companies still treat it as a downstream activity. Engineers absorb the cost. Half of surveyed leaders identified validating frequent software releases in regulated environments as a top challenge. Behind that statistic are teams assembling evidence packages under deadline rather than building products. Treating verification as a continuous output of the pipeline converts a recurring crisis into a daily discipline.

Daiichi Elektronik, a Tier 1 automotive supplier, used PTC’s Codebeamer to link requirements, tests, defects and releases end to end. The company built a compliant framework in under a year, cutting implementation effort from 12 months to two, while helping teams find problems earlier instead of scrambling to close gaps at the gate.

59%

of executives report
difficulty acquiring or
developing AI talent.

4. Redesign roles around judgment

Freeing engineers from administrative drag is only part of the work. Leaders also need to rethink where scarce engineering judgment gets used. Fifty-nine percent of executives report difficulty acquiring or developing AI talent, and the instinct is often to hire through the problem. The research points to a more immediate lever: protect existing engineering capacity by removing work that should never have required an engineer in the first place, including low-value documentation, status chasing and manual reconciliation across siloed systems. That frees engineers to spend more of their judgment on higher-value decisions. Hybrid roles that carry context across mechanical, electrical, software and compliance domains can then reduce the handoffs and coordination drag behind one of engineers' clearest asks: better cross-functional collaboration.

ABB's RobotStudio environment shows the scale of what freed capacity can make possible. By integrating simulation with physical-world validation for more than 60,000 engineers, the company achieved 99% simulation-to-real correlation, cut deployment costs by up to 40% and reduced setup and commissioning time by up to 80%.

5. Bring partners into the product story

The final move pushes the same discipline beyond engineering's walls. Product development now depends on a wider network of functions, partners and customers that need to work from the same information. Engineering moves only as fast as procurement, manufacturing, suppliers and customers can respond, which means cross-boundary collaboration is where competitive speed is often won or lost.

Volkswagen's engineering hub in Hefei, China, demonstrates what deliberate integration can achieve. By combining software, hardware and full-vehicle validation under one roof, coordinating joint-venture R&D teams and bringing suppliers into the concept phase earlier, the company anticipates cutting vehicle development cycles by 30%. Integration problems surface early only when all parties work from the same governed baseline. Without that baseline, the cost shows up later in surprises and emergency redesigns, eroding the margins engineering was supposed to protect.

When AI becomes engineering's working advantage

A practical starting point is narrow and concrete. Leaders should choose one product line where delays are most damaging and build a single source of data access first. That means connecting the data, establishing clean decision gates with named owners and using AI to surface broken trace links before they become program crises. Once that discipline proves itself, it can extend into manufacturing, procurement, service and the partner network.

\$39 billion

sitting in wasted
engineering time
is recoverable.

The \$39 billion sitting in wasted engineering time is recoverable, but only if leaders treat AI as more than another layer of software. The companies that recover that value will rebuild the conditions for engineering work itself, giving engineers coherent data, clearer decisions and fewer administrative obstacles between an idea and a better product.

About the authors

Roland Mayr

Senior Managing Director – Industry and Enterprise, Industrials Global Lead

Jean Cabanes

Senior Managing Director – Industry and Enterprise, Industrials EMEA Lead

Götz Erhardt

Senior Managing Director – Supply Chain and Engineering, EMEA Lead

Tobias Geißinger

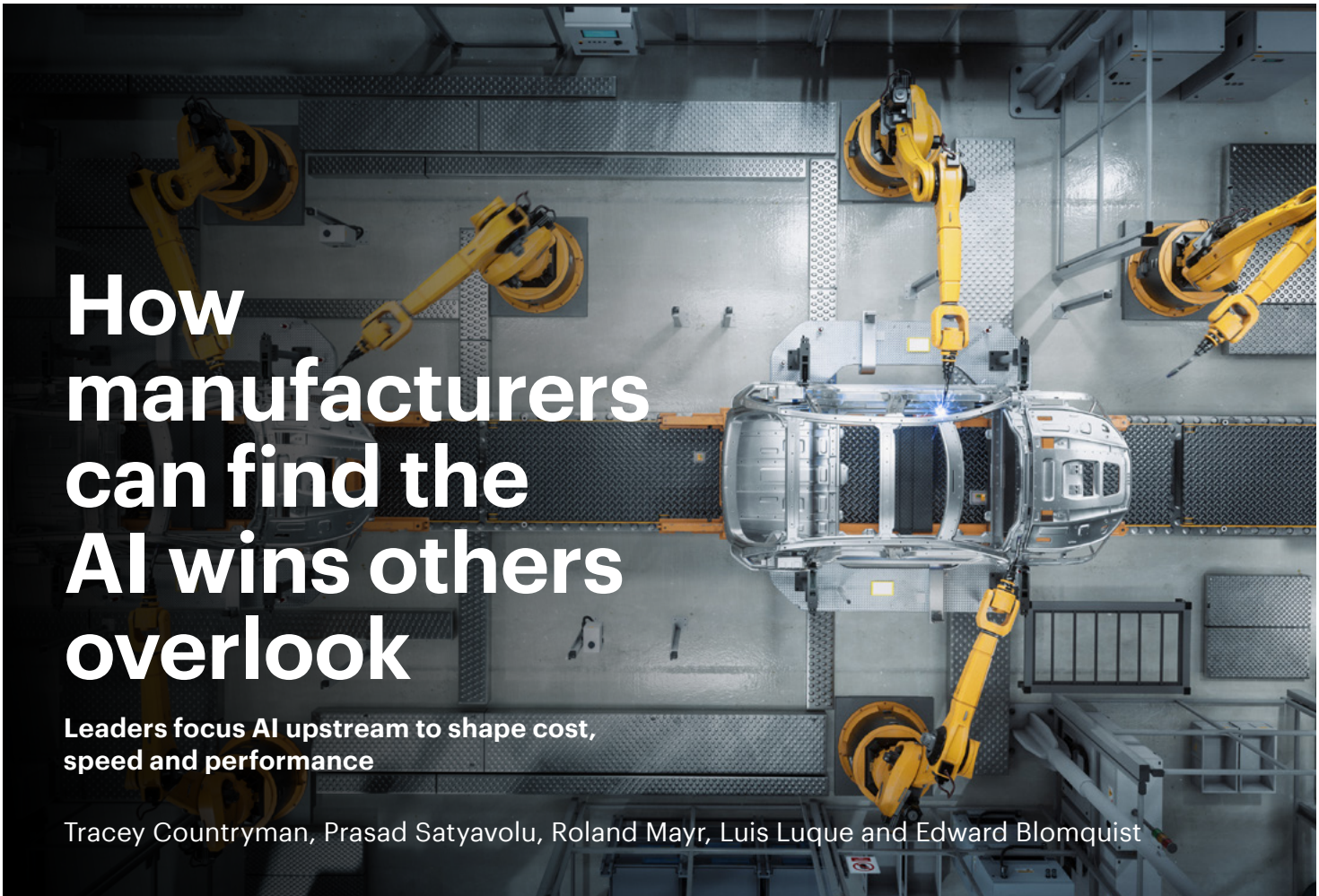
Managing Director – Supply Chain and Engineering, Industrials, EMEA

Jeff Brehm

Managing Director – Supply Chain and Engineering, Industrials, Americas

Andreas Egetenmeyer

Manager – Accenture Research, Industrials, EMEA



How manufacturers can find the AI wins others overlook

Leaders focus AI upstream to shape cost, speed and performance

Tracey Countryman, Prasad Satyavolu, Roland Mayr, Luis Luque and Edward Blomquist

Manufacturing leaders have put much of their AI spending where the business case looks clearest: operations and maintenance. These are the areas where data is richest, assets are connected and models can tie directly to downtime, scrap and throughput. When executives want proof that AI can deliver a return, the shop floor can often produce a positive number within the quarter.

But that logic can steer investment toward the smallest prizes. When we spoke with 36 manufacturing leaders across Europe, North America and Asia-Pacific about how they're scaling AI, one pattern held across interviewees: The AI that's easiest to fund is often not the AI that delivers the most value.

When that gap between expected impact and realized value persists, early enthusiasm can give way to disappointment and skepticism.

To capture the larger prize, leaders need to shift how they evaluate, place and scale AI investments. Quick operational wins still matter because they build confidence, but leaders need to pair them with upstream investments that shape cost, speed and performance before production begins. They also need to target the decisions that are most expensive to reverse and build the operating model, data foundations and governance that let AI scale across plants and networks.

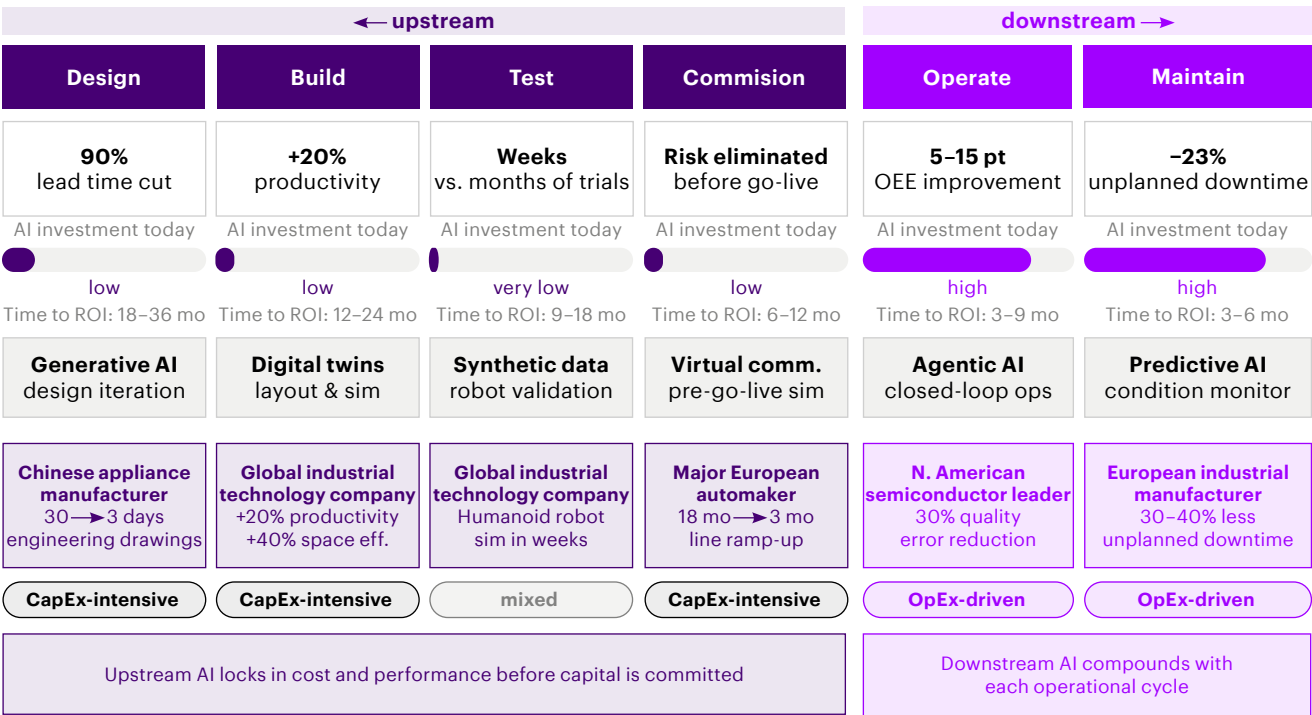
The biggest AI gains start before production does

The leaders we interviewed could point to real results from using AI earlier in the manufacturing lifecycle. One European automaker used virtual commissioning to cut a new line’s ramp-up from 18 months to three. Another manufacturer applied AI in design and reduced engineering lead time from 30 days to three. Digital twins let teams test entire factories before construction begins. These gains go beyond operational tweaks. They shape the environment for everything that happens downstream.

So why does upstream stay the road less taken? The answer, often, is speed. Economics help explain why. Procurement AI can improve spend costs by 3% to 8% and pay back in three to six months. Supply chain planning, by contrast, can reduce time to recover from disruption by 60%, but often takes 12 to 24 months to show its return. The quickest return and the highest stakes return often sit in different places (Figure 1). That gap is partly structural. Upstream investments compete for capital budget, while downstream AI runs against operating spend, creating two approval processes with different time horizons and different sponsors. When every AI dollar faces pressure to pay back quickly, slower but more valuable bets become harder to make.

Figure 1: AI value and investment across the manufacturing plant lifecycle

Upstream phases offer the highest strategic leverage but receive the smallest share of current AI investment. Downstream phases deliver faster payback and are where most AI programs begin.



■ Upstream phases — CapEx decisions; highest strategic leverage; longest time to ROI
 ■ Downstream phases — OpEx rhythm; fastest ROI; current concentration of AI investment

Source: Accenture Research (Primary Interview Series, 2025-2026; Factory Manager Survey, n=552, 2025)



Manufacturers need to build “the foundation alongside the fireworks.”

The demand for quick wins, combined with the pressure not to miss a generational technology shift, can screen out the AI investments with the greatest long-term potential.

Longer horizons are not a reason to wait. The AI race in manufacturing is already underway, and the leaders pulling ahead are aiming at better targets. Deferring upstream work is becoming more expensive because every month of delay gives competitors more time to compound their advantage.

Aim AI at the decisions that are hardest to reverse

The lesson is to start now, alongside the quick wins, not after them. Leaders should ask more than what will pay back fastest. They should ask which decisions are most expensive to get wrong, or to avoid making altogether.

For new capacity, that means testing major commitments before they are locked in, from layout and line configuration to automation logic in a digital twin before breaking ground. For existing plants, which is where most manufacturers operate, it means using AI to improve decisions inside the assets they already own: when to modernize, where to debottleneck and how to sequence upgrades. These choices are difficult because production cannot simply stop for experimentation, equipment is interdependent and a wrong call

can be expensive or even dangerous to unwind. That is why simulation matters. One executive described an AI-informed network redesign that surfaced \$50 million on a single product line by rationalizing where capacity already sat, reducing the network from 52 plants to 27.

Fast operational and maintenance wins still matter. They build proof and confidence that unlock the next round of spending. But they are not enough to create the structural change manufacturers need as AI reshapes how factories and networks operate. As one leader put it, manufacturers need to build “the foundation alongside the fireworks.” The mistake is treating the easy win as the whole opportunity.

Build the operating model that lets AI scale

Scaling beyond quick wins also requires a broader change in how manufacturers design their operating models. The goal is to make AI systemic rather than episodic. A use case that works on one line, for example, may fail at the next plant if it depends on custom integrations no one can reuse. An agent without proper oversight may propose changes to a live line without anyone owning the decision. These kinds of failures keep adoption tentative. They also determine whether investment programs scale or stall.

The leaders we interviewed were building a different set of foundations. Five choices separated the manufacturers scaling AI across a network from those whose pilots remained stuck in place. First, they integrate decisions across planning, production, quality and logistics, so intelligence flows end to end instead of pooling in one function.

Second, they build on shared platforms and common data standards, so a use case proven once can redeploy to the next site without a rebuild. Third, they redesign decision rights and operating rhythms, so AI becomes part of how work gets done rather than a layer bolted on beside it.

Fourth, they connect physical and agentic AI into a closed loop, so the factory does more than report what happened. It learns from those signals and takes increasingly informed actions. Finally, and perhaps most importantly, they keep AI human-led by design, with clear accountability as machines take on more work.

Each of these five choices clears a different bottleneck in AI implementation. Miss one and the system stalls. Get them right and advantage compounds: upstream bets pay off alongside downstream improvements, the business begins to transform and every new deployment moves faster than the last. With each plant, the gap widens between manufacturers that can scale AI across their networks and those that cannot. That compounding advantage is the value prize that will define tomorrow's manufacturing leaders.

About the authors

Tracey Countryman

Supply Chain and Engineering – Global Lead

Prasad Satyavolu

Senior Managing Director – Supply Chain and Engineering, Manufacturing and Operations Global Lead

Roland Mayr

Senior Managing Director – Industry and Enterprise, Industrials Global Lead

Luis Luque

Managing Director – Security, Operational Technology Security Global Lead

Edward Blomquist

Thought Leadership Research Senior Principal

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Industrial reinvention

Turning digital investments into industrial outcomes

Christophe Mouille, Götz Erhardt and Kerstin Stapelmann

Orchestration in action

Leading manufacturers that implement orchestrated systems report 25-35% faster execution cycles and measurable reductions in unplanned downtime. For a typical \$5B manufacturer, orchestration could eliminate \$50-150M in annual operational friction costs while improving on-time-in-full (OTIF).*

Industrial manufacturers operate on a complex foundation of specialized platforms: Siemens, PTC and Dassault Systèmes govern engineering and PLM. SAP, Blue Yonder

and Kinaxis manage supply chain planning and the commercial backbone. Rockwell, Aveva and Honeywell run manufacturing and operations. Bentley and Ansys power digital twinning and simulation. Hyperscalers like Microsoft, AWS and Google provide the cloud infrastructure underneath all of it.



Manufacturers implementing orchestrated systems report 25-35% faster execution cycles and measurable reductions in unplanned downtime.

Every one of these partners is now aggressively embedding agentic AI into their platforms. The question is no longer whether agents will proliferate across this ecosystem, it's whether manufacturers can orchestrate them into coordinated outcomes before the complexity becomes unmanageable.

Industrial manufacturers need to design how decisions move across planning, engineering, operations and ecosystem partners. When asset data, supply disruptions or engineering changes surface, teams should know who acts, in what sequence and within what authority. Decisions should travel quickly from insight to execution without stalling between functions.

Three actions make this coordination real:

1. Build orchestration inside the core value chain.

Link asset signals directly to automated cross functional workflows, so engineering, production and maintenance teams act in sync. Close the coordination gaps that slow response and create avoidable downtime.

2. Extend orchestration across ecosystem boundaries.

Create shared operational context with suppliers, maintenance providers and logistics partners through secure, partner-agnostic coordination models that improve reliability across the network.

3. Govern agentic execution.

Set clear human checkpoints at defined risk thresholds so autonomous decisions remain traceable, compliant and aligned with operating authority.

The results are tangible. A leading aerospace manufacturer faced a sprawling engineering toolchain with its engineers relying on thousands of applications. Siloed processes, traceability gaps and manual effort slowed every product development cycle. By integrating MBSE, ALM and PLM platforms into a single orchestrated architecture spanning engineering and supply chain, the company identified a 20% reduction in engineering costs, projected a 15:1 ROI over three years and cut project delays by 30%.

A major European energy company applied orchestration at full enterprise scale across SAP S/4HANA, sourcing, operations and maintenance systems. Working with Accenture, the company identified 80 AI and innovation opportunities across its value chain and eliminated over 5,000 days of effort in the first implementation phase. The program contained governance from day one: human oversight at every material decision threshold, full auditability and compliance embedded directly into the AI and innovation roadmap.

The coordination constraint

Each platform improves its own domain. When no one owns the outcome, teams protect their own targets. Maintenance defers work to protect uptime metrics, procurement delays purchases to manage cash flow and production resists shutdowns even as asset risk rises. Costs climb while reliability declines.

Current digital architectures assume linear workflows. But manufacturing rarely operates in straight lines. A single equipment failure can cascade across production scheduling, material planning, quality inspection sequencing and customer delivery commitments.

57%

of executives cite integration with existing systems as their top risk in scaling AI.

Traditional integration connects systems through data exchange, yet it provides no mechanism to coordinate the adaptive responses these disruptions require. Every coordination gap adds two to five days to response cycles, turning manageable disruptions into premium freight, overtime labor and customer concessions.

Now, that coordination gap is about to widen, because the next wave of software won't just share data. It will act. SAP has committed to over 1,000 Joule agents by its Sapphire conference in May 2026. Siemens is embedding intelligence across Opcenter and the full engineering stack. PTC is doing the same in Windchill. Blue Yonder and Kinaxis are deploying planning agents. Rockwell and Aveva are pushing agents into operations and asset management.

Multiply this across every partner in a manufacturer's extended network—suppliers, logistics providers, service firms—and the number of autonomous agents interacting across a single manufacturer's ecosystem quickly reaches the thousands. Each agent is optimizing locally. Without orchestration, this doesn't reduce complexity, it multiplies it.

According to recent Accenture research, 57% of executives cite integration with existing systems as their top risk in scaling AI, while 94% acknowledge that agentic AI requires

fundamental rethinking of platform strategies.¹ The gap between digital investment and operational outcome continues to widen.

Manufacturers must engineer systems of action that connect intelligence directly to execution. Three moves make this possible.

Build orchestration inside the enterprise core value chain

Early signals already exist. Execution slows in approval chains and functional handoffs. Asset degradation detected weeks in advance still results in reactive firefighting because maintenance, procurement, engineering and production act sequentially rather than in concert. To close that gap:

- **Design decision propagation pathways** that map how asset signals trigger automated workflows across maintenance, procurement, engineering, production and quality functions. Establish clear escalation thresholds where automation hands off to human judgment.
- **Implement orchestration logic** that connects APM, ERP, MES and PLM systems through workflow engines (not just data integration) that execute known scenarios automatically while routing material exceptions to appropriate decision-makers.
- **Deploy agentic capabilities** that propose optimized execution paths that balance maintenance timing, parts availability, production impact and cost with human oversight for decisions that exceed predefined risk or cost thresholds.

1. The New Rules of Platform Strategy in the Age of Agentic AI, Accenture, 2025

40-50%

potential reduction in
expediting costs from
cross-ecosystem orchestration.

This approach can reduce planning-to-execution cycle time by 25-35%, decrease unplanned downtime by 15-25% and eliminate 30-40% of manual coordination overhead, improving both operating efficiency and reliability.*

Extend orchestration across ecosystem boundaries

Internal coordination does not guarantee reliable outcomes when performance depends on suppliers, service providers and logistics partners operating across distributed networks. Manual emails and portal updates cannot scale under volatility. To create network-level reliability:

- **Establish shared operational context** with tier-one suppliers and critical service providers through secure data exchange that provides mutual visibility into demand signals, capacity constraints and performance metrics.
- **Define explicit decision ownership and escalation paths** in cross company workflows, specifying which partner has authority for which decisions and under what conditions humans intervene.

- **Implement partner-agnostic coordination standards** using industry frameworks such as Agent-to-Agent communication protocols that allow workflow orchestration independent of each partner's internal systems.

These steps can improve network-wide OTIF performance, reduce ecosystem inventory carrying costs by 20-30% and decrease expediting costs by 40-50%, strengthening both reliability and working capital efficiency.*

Govern agentic execution

As intelligence scales, risk scales with it. Manufacturing operates in regulated and safety-critical environments where decisions must remain traceable and accountable. To balance speed with control:

- **Implement human oversight** at defined thresholds where decisions involve material safety risk, regulatory compliance or financial exposure exceeding approved limits. Ensure agents escalate rather than proceeding independently when thresholds are crossed.
- **Establish explicit authority boundaries** between systems and people through workflow design that encodes compliance requirements, approval authorities and audit trails directly into orchestration logic.
- **Deploy explainability capabilities** that document decision rationale, data sources and logic applied for every automated action, enabling audit, continuous improvement and trust-building.

30-40%

possible reduction in audit and exception-handling through built-in documentation.

This approach supports orchestration at scale while maintaining compliance and accountability. It reduces audit and exception-handling costs by 30-40% through built-in documentation and accelerates regulatory response through transparent decision trails.*

The European energy company referenced earlier embedded this discipline from the outset, routing all 42 delivery execution innovations through defined human checkpoints, with compliance and Responsible AI evaluation built directly into the AI roadmap alongside delivery execution targets.

Orchestration to outcomes

Manufacturers have spent decades connecting systems. The next challenge is connecting decisions to execution. Companies that engineer coordination across functions, partners and agents—with clear governance at every threshold—convert digital investment into measurable operational outcomes and build an operating model ready for the next era of industrial competition.

About the authors

Christophe Mouille

Senior Managing Director – Supply Chain and Engineering, Ecosystem Global Lead

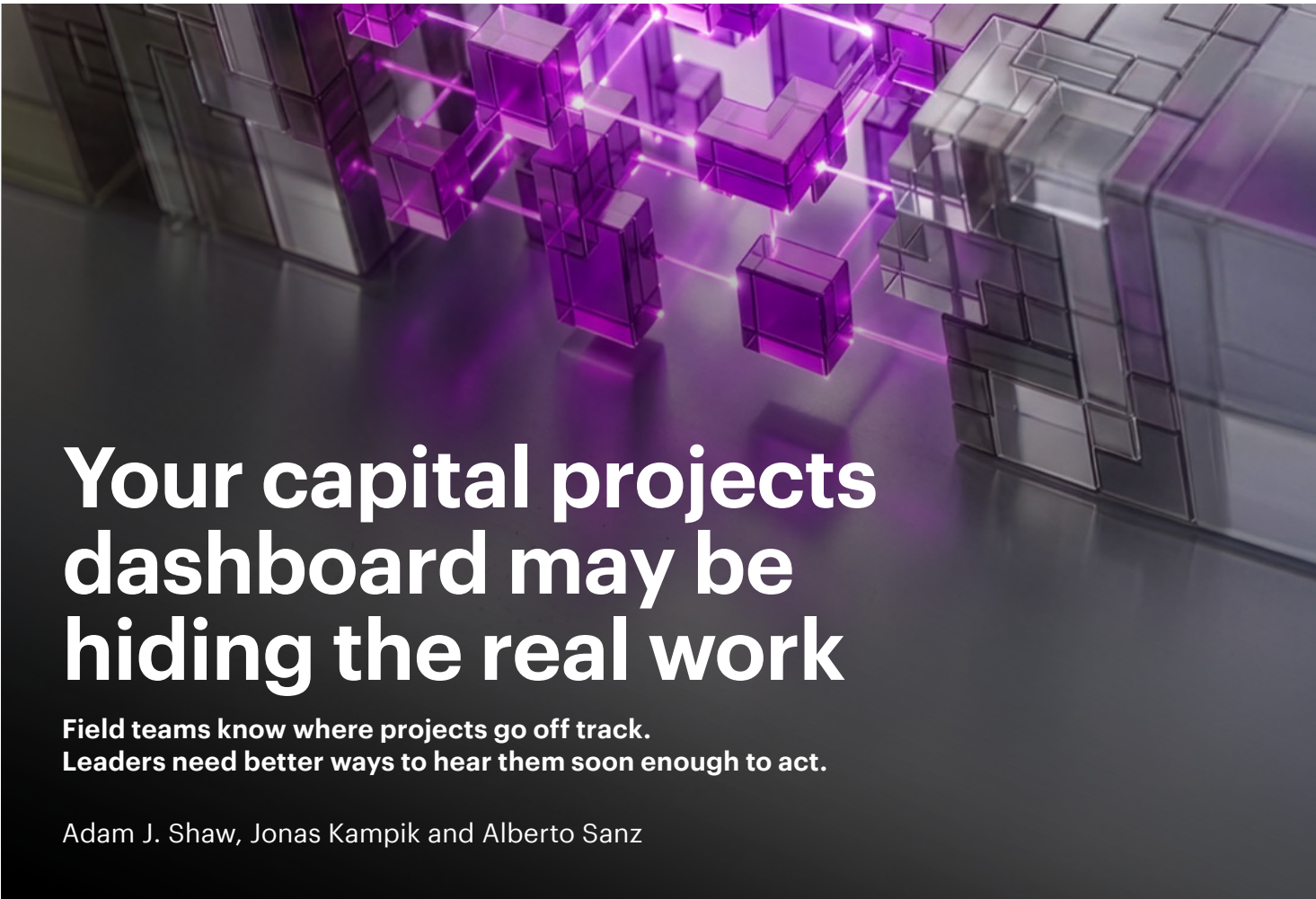
Götz Erhardt

Senior Managing Director – Supply Chain and Engineering, EMEA Lead

Kerstin Stapelmann

Associate Director – Supply Chain and Engineering, Alliance Insights and Management

*Based on Accenture analysis and client projects

An abstract graphic featuring a 3D arrangement of translucent purple cubes. Some cubes are solid, while others are hollow, creating a complex geometric pattern. Bright purple lines connect various points across the cubes, suggesting a network or data flow. The background is a dark, reflective surface that mirrors the cubes and lines.

Your capital projects dashboard may be hiding the real work

**Field teams know where projects go off track.
Leaders need better ways to hear them soon enough to act.**

Adam J. Shaw, Jonas Kampik and Alberto Sanz

Every capital project has two versions: the one leaders see in dashboards and the one crews must deliver today. The distance between them can decide whether work stays on track or slides into delay, rework and escalation.

Accenture's research shows how wide that distance has become. Across two proprietary surveys, one with 350 frontline infrastructure and capital projects workers in seven countries and one with 700 senior leaders in 23 countries, senior leaders reported strong influence over cost, planning and schedule performance. Yet only 13% of field workers said project goals consistently guide daily work on site, and only 15% said leadership's technology choices fully support how work happens in the field.

That mismatch creates urgent risk because field problems recur quickly. Unclear or incomplete drawings rank as the top delivery barrier, cited by 57% of workers. Procurement delays disrupt work several times a week for 48% of the workers who selected that barrier. Scope changes create the same weekly pressure for 43%. These failures do not wait for the next steering committee. They compound at the pace of daily work.

The fix starts before leaders buy another system or launch another adoption campaign. Companies that run capital projects need a new operating habit that makes site reality harder to filter out. That means treating field signals as early intelligence, turning tradeoffs into explicit decision rules and designing technology around the moments when work changes.

Done well, those moves can improve response times, reduce delay and rework, raise productivity and make AI useful where crews make decisions. The people best positioned to make that happen are the project directors, construction managers and delivery leads who sit between senior leadership and site teams; close enough to the field to catch what is changing and senior enough to influence decision-making.

Stop blaming adoption when the tools break first

When digital tools disappoint, leaders often reach for more training, more communication and more change management. The data points elsewhere. Workers put system failures at the top of their list: unreliable tools and poor system

integration at 57% each, followed by tools that fail to reflect real workflows at 55%. Preference for manual processes ranked last, at 22% (Figure 1).

That finding changes the diagnosis. Workers do not need leaders to persuade them that technology matters. They need tools that hold up in site conditions, connect to surrounding systems and reduce the manual reconciliation that slows execution. Their priorities confirm the point. Only 36% ranked more reliable and integrated digital tools among the practices that would most help delivery, below better planning, clearer drawings, reliable materials and stronger coordination. The field is asking leaders to fix the work system before they add another tool to it.

Figure 1: Why field workers struggle to use digital and AI tools effectively

Barrier	Share ranking it among their top three barriers
Tools are not reliable or are difficult to use in the field	57%
Tools are not integrated with other systems	57%
Tools do not fit actual site workflows	55%
Lack of training or hands-on support	35%
Prefer existing manual or paper-based processes	22%

Source: Accenture Voices from the Field survey, April 2026. Respondents ranked up to five reasons from a list of 16.
Base: all respondents, n=350.



“By the time data updates, the site situation has already changed.”

Clean reports can hide messy reality

Once leaders see the problem as a work system failure, the next risk becomes clearer: The system can make the wrong signals look reliable. Many capital projects still reward clean reporting more than early warning. Site teams often see risk first in late materials, design gaps, safety constraints, labor shortages and sequencing conflicts. When milestone compliance dominates the management rhythm, teams learn to show progress and filter bad news until the cost or schedule impact becomes impossible to ignore.

That is how strategy loses force before it reaches the site. Leaders may state goals clearly, and workers may understand them. In the survey, 67% of field workers said project goals were mostly clear. But clarity alone doesn't help when priorities shift faster than reporting cycles. One field supervisor put it, “By the time data updates, the site situation has already changed.”

Site teams then solve the problem in front of them, while leaders track a version of the project that has already drifted from site reality.

Give weak signals a direct route to power

If reports lag reality, the first leadership move is to make weak signals easier to act on. A late drawing, an unreliable tool, a repeated workaround or a material constraint should trigger inquiry before it becomes a project exception. Project directors, construction managers, delivery

leads and project control leads can play the translation role, surfacing what is changing on site and connecting it to decisions about funding, sequencing and priorities.

One energy operator shows the value of that shift. The company connected operational data from sensors, analytics and control room inputs in one digital environment, then used AI to link real-time field insight with enterprise planning and operations systems.

As adoption of these AI capabilities grows, the operator expects to resolve more than 70% of issues without specialist support and to improve throughput by 4% to 6%. Faster detection-to-action cycles should let teams respond 30% to 40% quicker, supporting higher productivity and fewer unexpected stoppages.

Turn tradeoffs into rules before pressure rises

Faster signals help only if leaders know how to decide once those signals arrive. The second move is to align the portfolio, project team and site around one hierarchy of value. Senior leaders track cost, governance and portfolio risk. Field teams track labor, materials, task completion, safety and sequencing. Each view matters, but execution suffers when no one translates tradeoffs across them.

Leaders should make those tradeoffs explicit before pressure rises. If schedule takes priority this week, teams need to know what changes for procurement, crew allocation and quality review. If safety takes priority, teams need to know which work slows. A steel producer that applied this kind of governed view to a capacity expansion cut schedule overruns on critical packages from more than eight months to under two months, raised site productivity 15% to 20% and reduced vendor claims by 18%.



83%

of users ranked AI
planning and scheduling
tools as highest positive impact.

Make AI earn trust at the point of work

Clearer tradeoff rules also sharpen technology choices. The third move is to design technology around the work, rather than around the review meeting. The opportunity is real. AI planning and scheduling delivered the highest positive impact of all 17 tools in the field survey, at 83% among users. AI safety monitoring reached 73%, while AI field instructions and quality control each reached 71%.

But trust breaks when the inputs fail. AI planning and scheduling reached only 69% of workers. Data quality explains much of the gap: 70% of field workers cited data quality, availability or access as a primary challenge to adopting digital tools or AI. Workers also ranked safety monitoring and real-time data access above advanced AI decision support on their technology wish list. Leaders need a reliable operating foundation before they scale more ambitious tools.

A global data center operator took that practical path. It used AI simulations to flag resource misalignments and critical path risks before they reached the field. Doing so reduced planning activity volume from 3,000 to 1,000 items and created one milestone reference for leaders and field teams. Forecasting accuracy improved 10% to 15%, rework fell 5% to 10%, schedule processing became three times faster and field use of the milestone framework rose 30%.

The real visibility test

Our analysis makes clear that visibility has little value if it shows leaders a cleaned-up version of work. Field workers are asking for practical value in clear drawings before crews arrive, materials before work starts, tools that connect data once and guidance that holds when conditions shift. They are also showing leaders where performance gains hide. The next improvement in capital project delivery may come less from a new dashboard than from a better path for field reality to shape leadership decisions.

Project leaders who create that path can improve more than delivery metrics. They can rebuild trust between the people who set priorities and the people who make them real. That trust helps future tools land faster, helps teams surface problems earlier and helps capital investment produce the return leaders expected from the start.

About the authors

Adam J. Shaw

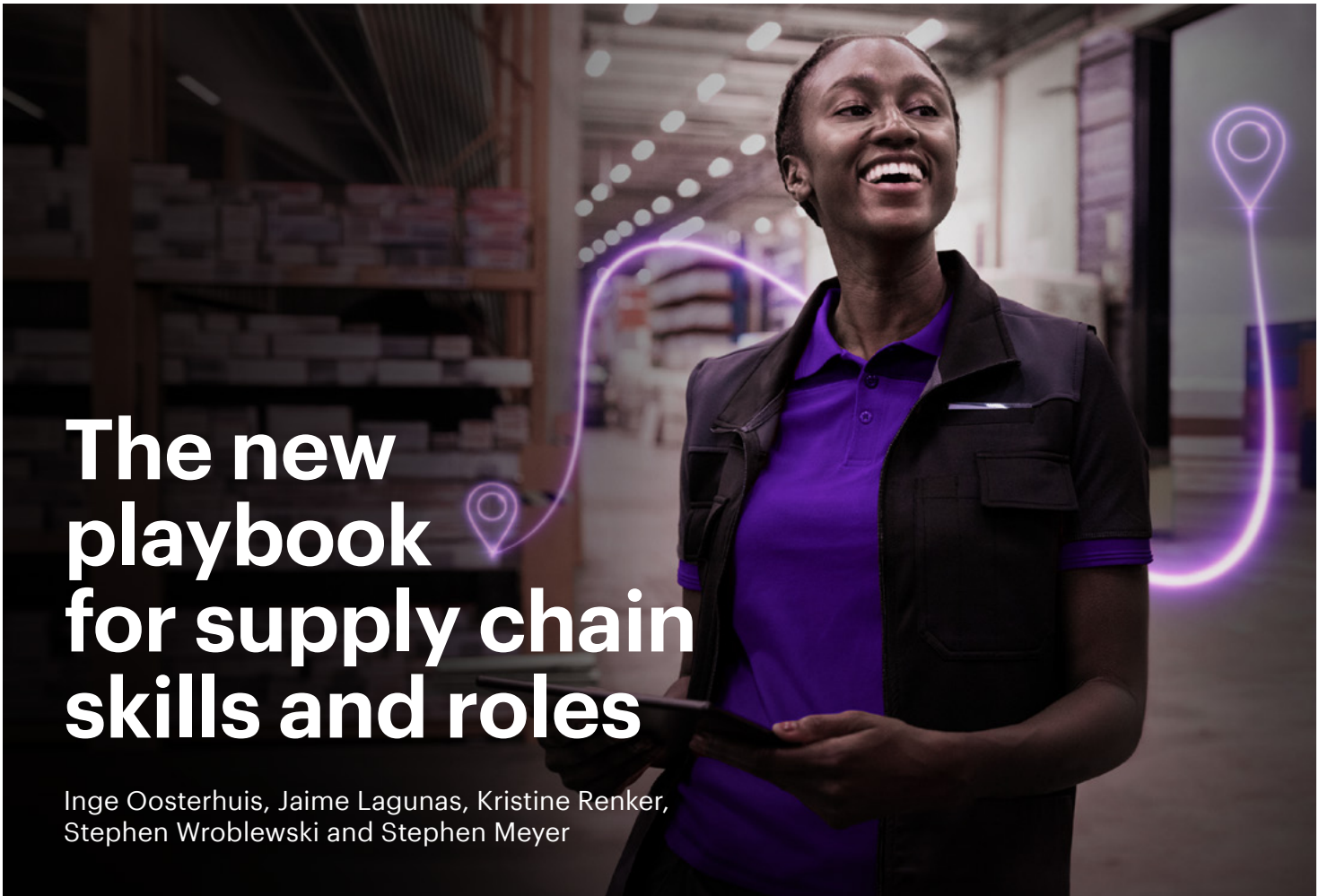
Managing Director – Supply Chain and Engineering, Infrastructure and Capital Projects US Lead

Jonas Kampik

Managing Director – Supply Chain and Engineering, Infrastructure and Capital Projects EMEA Lead

Alberto Sanz

Manager – Accenture Research, Infrastructure and Capital Projects, EMEA



The new playbook for supply chain skills and roles

Inge Oosterhuis, Jaime Lagunas, Kristine Renker,
Stephen Wroblewski and Stephen Meyer

Supply chain leaders have spent decades solving growth with the same tool: headcount. More volume meant more planners. More suppliers meant more buyers. More compliance pressure meant more managers. That instinct built the modern supply chain function. Today, it is running out of road.

By 2035, demand across US supply chain occupations will rise by 1.34 million roles. Over the same period, the available labor force will grow by roughly 221,000 workers. The implied gap reaches nearly 1.1 million roles, a number no hiring strategy can close. Several forces are driving demand simultaneously: nearshoring, supplier diversification, geopolitical volatility,

delivery compression and rising compliance complexity. The labor market is not keeping pace with any of them. The instinct is still to hire, but the math no longer supports it.

Chief Supply Chain Officers (CSCOs) who recognize this are asking a fundamentally different question: How do we redesign work so that growth no longer requires a proportional increase in headcount? Answering it requires four moves: anchoring decisions in task-level visibility, sequencing investments by their impact on the labor equation, pairing technology deployment with explicit role redesign and governing the whole as a connected portfolio.

Workforce redesign is a risk control decision, not an HR initiative attached to a technology program.

When leaders execute these moves together and align technology deployment with workforce redesign, Accenture's proprietary scenario-planning model shows that projected workforce demand growth compresses from 18.7% to roughly negative 3% between 2026 and 2035, turning a shortfall of 1.1 million roles into a potential surplus of more than 360,000. That outcome requires deliberate action. It does not happen through technology deployment alone.

Workforce redesign is risk control, not optimization

The most important reframe for supply chain leaders is that workforce redesign is a risk control decision, not an HR initiative bolted onto a technology program. When technology moves faster than role redesign, the capacity gains never materialize. Exception volumes rise beyond what teams can absorb. Decision rights blur as intelligent systems surface more insights than leaders can validate or act on. Governance bottlenecks replace execution bottlenecks, slowing throughput even as automation expands. Organizations end up carrying more technology, similar labor demand and higher operational fragility.

That risk played out clearly when Accenture's workforce model tested a real strategic challenge at a large US-based pharmaceutical company. Leadership had set a target to reduce its demand planning team by a third, from 135 planners to 90, by centralizing work into a single hub. Even after modeling full deployment of

agentic AI and robotics across the complete scope of planner tasks, the net efficiency gain reached only around six percentage points, far short of the 33% reduction target.

The model also revealed why. Automation absorbed some tasks and generated others. In a compliance-heavy environment, planners would still need to configure AI workflows, audit system decisions and intervene in edge cases. The analysis did not weaken the case for technology. It clarified its limits and sharpened the real opportunity: deliberately redesigning how humans and machines share the work rather than treating automation as a headcount lever.

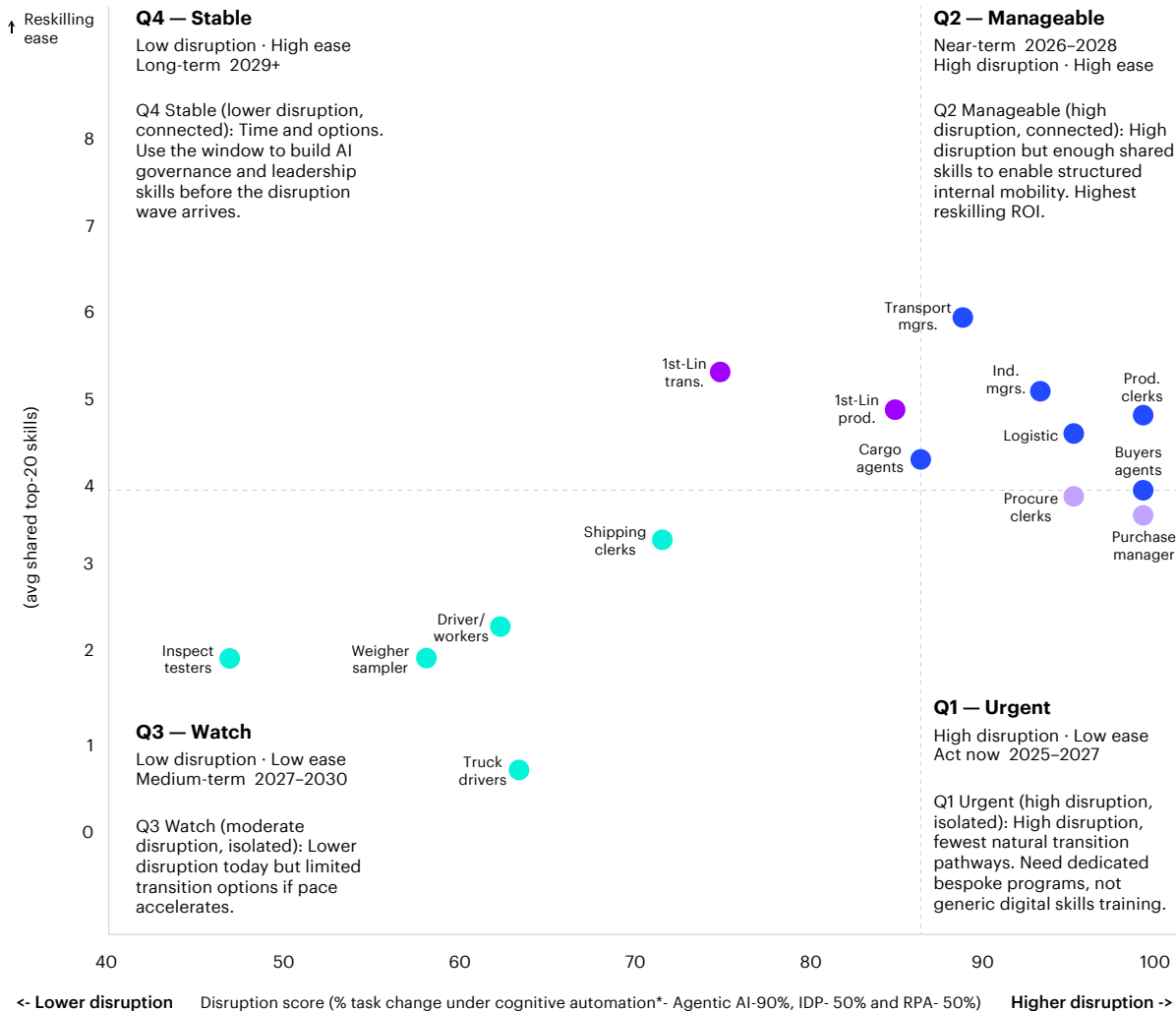
Three groups, three different conversations

Technology does not affect every supply chain role the same way (Figure 1). The model points to three distinct role groups, each requiring a different conversation about where technology can relieve capacity, raise expectations or preserve human judgement. Understanding the difference is where workforce strategy has to start.

The roles most relevant to closing the labor gap are automation-led. Production planning clerks, procurement clerks and shipping and inventory clerks carry disproportionate shares of routine, rules-based work including enterprise resource planning updates, scheduling, document handling and compliance checks. Under high-adoption scenarios, 40 to 55% of current task time in these roles is either automated or significantly augmented. These roles scale linearly with volume today and absorb a disproportionate share of the labor gap. Redesigning them for automation breaks that link and delivers the fastest path to capacity relief.

Figure 1: Workforce roles by disruption and reskilling ease

X axis = disruption score (technology impact on task content) · Y axis = reskilling ease (avg shared top-20 skills) · Active technologies: Agentic AI · IDP · RPA



*Simultaneous deployment of agentic AI (75%), IDP (75%) and RPA (75%) across supply chain operations.

Source: Accenture proprietary workforce model

Managerial and supervisory roles, including transportation managers and purchasing managers, respond differently. Intelligent systems accelerate their analytics, coordination and validation work, but decision scope widens as a result. Up to 70% of task time in these roles is supported by intelligent systems, and yet workforce demand does not fall. Cognitive load increases and the bar for judgment, governance and system oversight rises. Technology investment in these roles increases expectations rather than reducing them.

A third group, including inspectors, testers and field operations roles, remains structurally durable. More than half of task share in these roles resists even aggressive technology adoption because the work depends on physical presence, sensory assessment and human judgment. These roles are also touched: Upstream automation reshapes surrounding workflows, decision timing and performance expectations around them. They anchor performance and deserve investment in enablement rather than replacement.

56%

of purchasing
manager skills
will be new by 2035.

Four actions for CSCOs

To avoid accumulating risk across these three groups, organizations need to build workforce strategy around four disciplines: task-level visibility, investment sequencing, role and skill design and connected governance.

The first action is anchoring investment decisions in task-level visibility. That means moving beyond the organizational chart to understand where time concentrates, which tasks scale with volume and which resist automation. When Accenture's model broke the demand planner role into individual tasks, it revealed that agentic AI and IoT each targeted distinct pockets of work with minimal overlap, agentic AI augmenting 37% of tasks and automating 53%, Internet of Things covering the remaining 10% through shop-floor monitoring. That granularity is what a role-level analysis would have missed entirely, and it is what makes deployment decisions precise rather than directional.

The second action is sequencing investments by their impact on the labor equation. Automation-led roles offer the fastest capacity relief and should come first. The shipping and inventory clerk role illustrates what becomes possible. When agentic AI, autonomous vehicles and IoT combined to automate over 65% of

that role's task time, the role restructured entirely around exception handling and AI output validation rather than disappearing. Augmentation-led roles should follow, but only once leaders confirm that governance capacity exists to absorb expanded decision scope. Technology that widens decision authority without capable decision-makers in place creates risk rather than relief.

The third action is pairing technology deployment with explicit role and skill redesign. Every technology deployment changes what a role requires, and the purchasing manager role makes that concrete. As automation absorbed documentation and coordination work, the role shifted toward designing AI workflows, monitoring system decisions and managing exceptions, with 56% of its projected 2035 skill profile entirely new. Leaders who treat that transition as an incidental byproduct of technology rollout will find their workforce unable to operate the systems they have invested in. Skill replacement, not just skill addition, belongs on the deployment plan from day one.

Finally, they should govern technology, workforce and operating model decisions as a single connected portfolio rather than as isolated initiatives. The CSCO defines how work changes and how it scales. The Chief Human Resources Officer (CHRO) translates that into skills, career pathways and reskilling programs that sustain the model over time. When those two functions operate at different speeds, the gap between technology and talent erodes the return on both.

The 1.1 million-role gap is real and it is widening. Hiring will not close it. The leaders who move first on workforce redesign will build supply chains that absorb complexity and scale on intelligence. Those who wait will spend the decade managing scarcity while the window to act narrows. The organizations that will lead are those that bring their people with them as technology scales.

About the authors

Inge Oosterhuis

Senior Managing Director – Talent, Nordics Lead

Jaime Lagunas

Managing Director – Supply Chain and Engineering, AI and Data Global Lead

Kristine Renker

Managing Director – Supply Chain and Engineering, Talent Global Lead

Stephen Wroblewski

Managing Director – Talent

Stephen Meyer

Principal Director – Accenture Research, Supply Chain and Engineering

Suggested reading



Reinventing for human + AI engineering | Published May 2026

Engineering faces rising product complexity, tighter regulation and cost pressure. AI can help, but only when companies build a cloud-based digital core and single source of data access. Research reveals that leaders must reinvent engineering processes, tools, roles and governance to improve speed, economics and lifecycle performance.



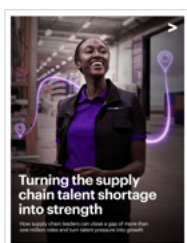
Systemic AI at the root of manufacturing performance | Published April 2026

Manufacturers will not capture AI's full value through disconnected pilots. The report highlights the importance of systemic AI: a repeatable operating capability built on shared data, governance, ownership and common performance metrics across the plant lifecycle. The prize is compounding performance improvement from design through operations, maintenance and continuous learning.



Capital projects execution gap | Published August 2026

Capital projects fail when leadership strategy and site reality diverge. While 73–77% of senior leaders believe they positively influence project outcomes, only 13% of frontline workers say goals guide their daily work. Closing this gap requires surfacing real field intelligence, aligning on a shared definition of value and designing technology for execution instead of oversight.



Turning the supply chain talent shortage into strength | Published May 2026

Supply chains are growing faster than the workforce built to run them. By 2035, US demand for core supply chain roles could outpace labor-force growth by nearly 1.1 million roles. The report shows how leaders are redesigning work now, using technology to scale intelligence rather than headcount.

About Accenture

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