

Manufacturing strategic vision 2026-2036

A combination of C-level input
and foresight analysis on the
revolution in industrial operations



Contents

Introduction: The lived reality of disruption 3

Executive summary 4

Research methodology 5

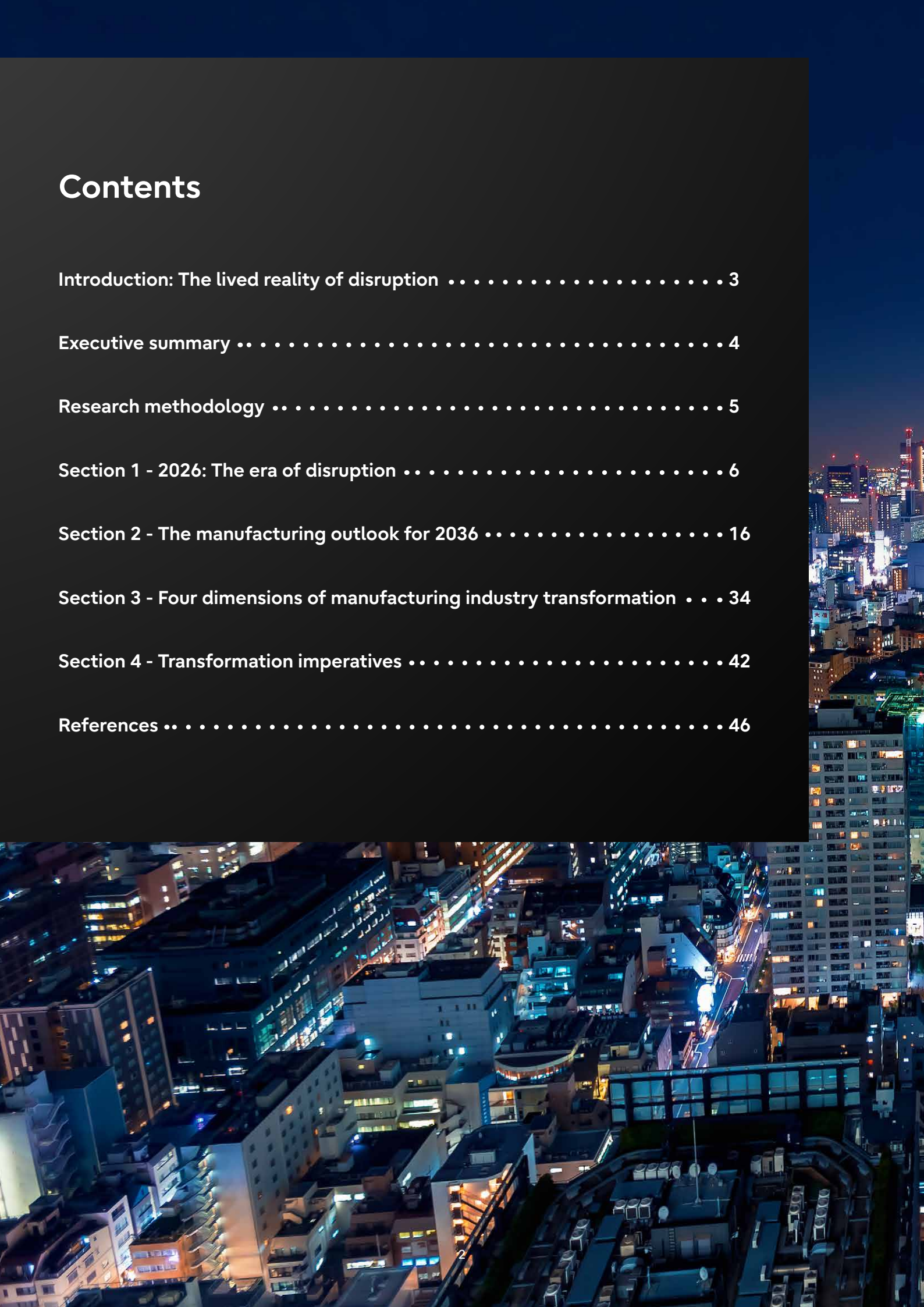
Section 1 - 2026: The era of disruption 6

Section 2 - The manufacturing outlook for 2036 16

Section 3 - Four dimensions of manufacturing industry transformation . . . 34

Section 4 - Transformation imperatives 42

References 46



An aerial night photograph of a city, likely Tokyo, showing a complex network of highways and train tracks. The city lights are visible in the background, and the foreground shows the infrastructure of the city.

Introduction: The lived reality of disruption

The manufacturing sector is currently navigating a real revolution defined by a steady disruption and a fundamental collision between two opposing macro forces: the exponential potential of technological acceleration and the restrictive reality of severe geopolitical fragmentation. Leaders are no longer managing a slow evolution; they are managing a polycrisis where immediate risks, such as erratic tariffs and a critical human capital emergency, are non-negotiable constraints.

In this paper we will look beyond analyst theories to address the lived, daily realities of the c suite. Combining in depth interviews with c suite decision makers in large manufacturing companies and the use of rigorous foresight analysis, we are connecting the immediate operational pressures of 2026 to the transformative strategic landscape of 2036.

The paper describes the industry transformations required to build resilience to survive the great supply chain scramble while funding the transition towards an autonomous production organism.

Executive summary

Future proofing production requires a complete transformation that balances immediate survival in the polycrisis with the long-term transition towards a hybrid, autonomous manufacturing ecosystem.

A revolution, not an evolution, the manufacturing sector is not merely undergoing a period of accelerated change; it is navigating a fundamental revolution defined by the collision of two opposing macro-forces: the potential of technological acceleration and the restrictive reality of severe geopolitical fragmentation. Leaders are no longer managing linear growth but are confronting a polycrisis where risks are compounded rather than isolated. Our research highlights a critical vicious cycle at the heart of this crisis: immediate pressures, such as a severe talent shortage and the loss of legacy expertise, are creating the very barriers that prevent the adoption of the AI and data technologies needed to solve them.

The forces of fragmentation

The era of frictionless global trade has ended, replaced by a landscape of erratic tariffs and shifting alliances. Manufacturers are being forced to move from efficiency-first global models to regional fortresses to secure market access. Simultaneously, the industry faces a human capital emergency characterized by a dual threat: a structural shortage of new workers and a brain drain of retiring experts who are taking decades of institutional knowledge with them. This is compounded by the AI stalemate, where the desire for generative AI is blocked by a lack of clean, robust data foundations. Leaders are responding by engineering hybrid strategies: balancing the need for national security with global efficiency and using efficiency gains to subsidize the transition to green sustainability.

The manufacturing outlook for 2036

Rather than predicting a single outcome, we map four potential future environments driven by geopolitical stability and technological pace: global efficiency, local production, the fully automated factory, and the augmented workforce. The mandate for leaders is not to choose a scenario, but to design a flexible, hybrid enterprise capable of navigating any of these varied futures.

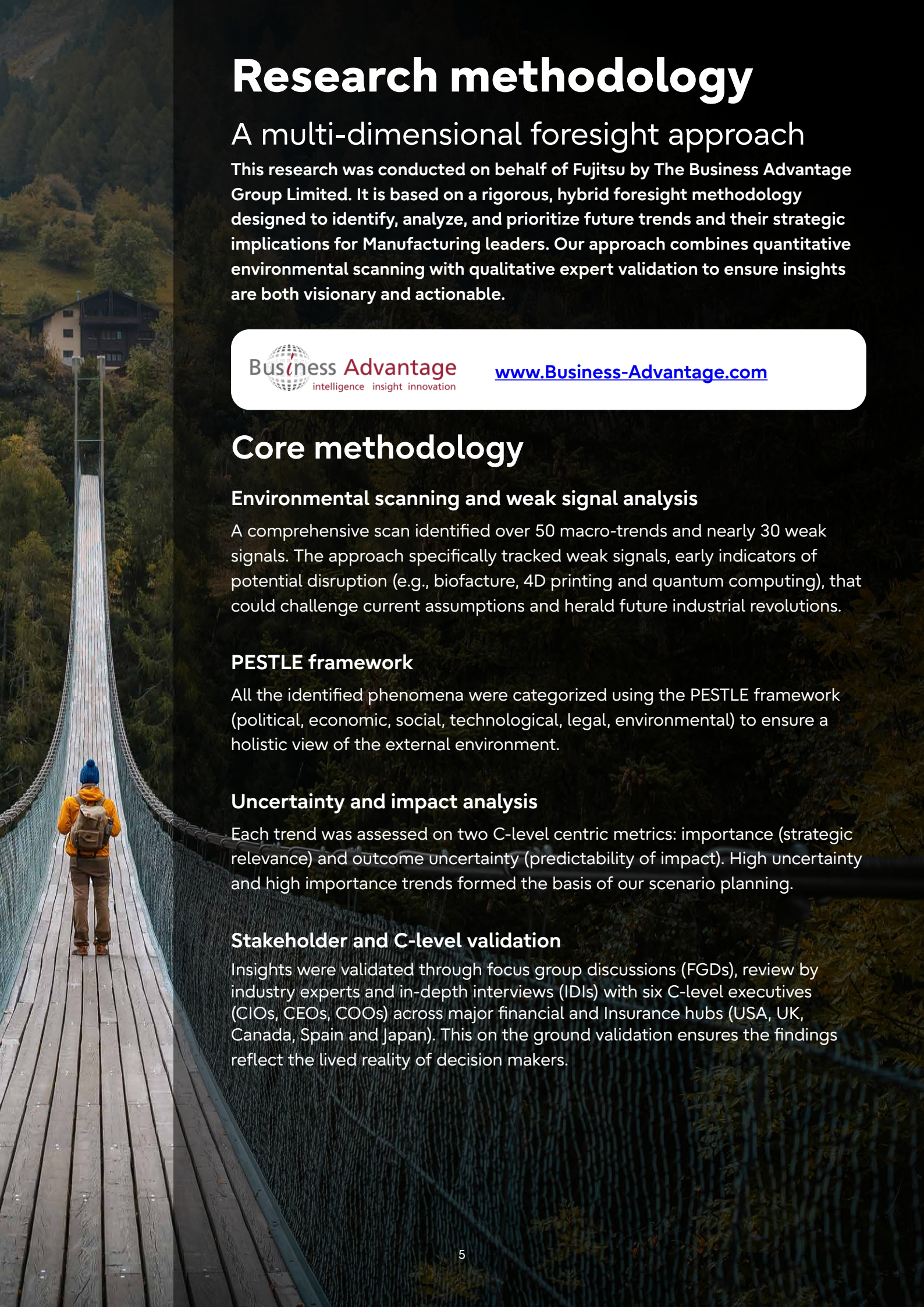
Four dimensions of transformation

To bridge the gap between the disrupted present and the hybrid future, organizations must execute across four interconnected battlegrounds:

- **Sovereignty:** Moving from global dependency to regional fortresses enabled by trusted data exchange.
- **Workforce:** Capturing legacy wisdom and augmenting human intuition with machine precision.
- **Architecture:** Executing a calculated IT/OT convergence to enable real-time insights while maintaining cyber safety.
- **Value:** Leveraging immediate operational profitability to fund long-term green sustainability.

Transformation imperatives

The time for theoretical planning is over. To survive, manufacturers need to act immediately to fix the broken pipes of legacy data, decentralize command structures, and compress the concept to market cycle from years to months.

A vertical photograph on the left side of the page shows a person from behind, walking across a long suspension bridge. The person is wearing a blue beanie, a yellow jacket, and a backpack. The bridge has wooden planks and metal cables. In the background, there is a small house on a hillside and a dense forest.

Research methodology

A multi-dimensional foresight approach

This research was conducted on behalf of Fujitsu by The Business Advantage Group Limited. It is based on a rigorous, hybrid foresight methodology designed to identify, analyze, and prioritize future trends and their strategic implications for Manufacturing leaders. Our approach combines quantitative environmental scanning with qualitative expert validation to ensure insights are both visionary and actionable.



www.Business-Advantage.com

Core methodology

Environmental scanning and weak signal analysis

A comprehensive scan identified over 50 macro-trends and nearly 30 weak signals. The approach specifically tracked weak signals, early indicators of potential disruption (e.g., biofacture, 4D printing and quantum computing), that could challenge current assumptions and herald future industrial revolutions.

PESTLE framework

All the identified phenomena were categorized using the PESTLE framework (political, economic, social, technological, legal, environmental) to ensure a holistic view of the external environment.

Uncertainty and impact analysis

Each trend was assessed on two C-level centric metrics: importance (strategic relevance) and outcome uncertainty (predictability of impact). High uncertainty and high importance trends formed the basis of our scenario planning.

Stakeholder and C-level validation

Insights were validated through focus group discussions (FGDs), review by industry experts and in-depth interviews (IDIs) with six C-level executives (CIOs, CEOs, COOs) across major financial and Insurance hubs (USA, UK, Canada, Spain and Japan). This on the ground validation ensures the findings reflect the lived reality of decision makers.

2026: The era of disruption

The manufacturing sector is confronting a structural polycrisis creating a profound disruption because converging geopolitical, demographic, and technological shocks are permanently dismantling the stability of traditional operating models and establishing constant volatility as the new baseline for survival.



The new reality: Navigating the polycrisis

The manufacturing industry is no longer navigating routine change but is confronting a structural polycrisis that redefines market norms.

The manufacturing sector historically operated on a foundation of predictable supply chains, open borders, and steady labor availability. That era has ended. Leaders today are not facing a single challenge but a convergence of geopolitical fragmentation, demographic collapse, and accelerating technological change.

This is what we call the polycrisis; which means the combination of issues consisting of (1) geopolitics, (2) market shifts, (3) human capital, (4) paradox, and (5) infrastructure (IT/OT). It is not a temporary disruption to be weathered, but a permanent structural shift. The strategies that delivered efficiency in the past are now the very vulnerabilities threatening survival in the future.

How deep is the structural change facing the industry?

"The world that you may have known in our company is gone and it will never be like the past. I think these bold words sometimes need to be said."

Chief Information Officer | Manufacturing | Germany

Business as usual is over. Success now requires managing multiple, overlapping crises simultaneously rather than solving them sequentially.

External forces: Geopolitics

The shifting friction of global trade is forcing a strategic pivot from global efficiency to regional fortresses.

While global trade has never been truly frictionless, the nature and location of these friction points are radically changing due to geopolitics, government protectionism, and shifting human workforce migrations. Because the rate of change is increasing exponentially, businesses must develop faster, high-confidence business agility. Leaders must actively adapt to new constraints and entirely new business models to ensure guaranteed access.

Manufacturers are responding by building regional fortresses, localized supply chains designed to be immune to global shocks. This transition accepts higher operational costs as the price for security, fundamentally altering the profit models of the last thirty years.

How are geopolitical tensions impacting your supply chain strategy?

"Trading will become easier with certain areas and more difficult with others, leading to a kind of de-globalization."

Chief Information Officer | Manufacturing | Germany

The strategy is no longer globalize to optimize but localize to survive.



Market shifts: Consumer behavior

Fundamental shifts in lifestyle and health, such as the Ozempic effect, are creating unpredictable changes in consumer demand.

Disruption is not only driven by supply chain shocks; it is increasingly driven by a radical transformation in demand. We are seeing weak signals from the healthcare sector, specifically the rapid adoption of GLP-1 weight-loss medications, evolve into a manufacturing mega-trend.

The term Ozempic effect describes the massive market disruption caused by the rapid global adoption of GLP-1 weight loss medications. Because these drugs significantly suppress human appetite and alter nutritional cravings, millions of consumers are suddenly buying fewer total calories and shifting their preferences toward different food types. For the food and beverage manufacturing sector, this creates a structural volume shock.

As consumer habits shift away from volume and toward specific nutritional needs, this Ozempic effect is forcing food and beverage manufacturers to overhaul product portfolios. This signals a broader truth: the most disruptive forces often originate completely outside the industry.

What trends are reshaping your product portfolio?

"The impact of weight loss medications is driving changes in consumption patterns... growth based on pure pricing is dissipating."

Chief Information Officer | Manufacturing | UK

Manufacturers must pivot from volume-based growth to value-based growth, requiring agile production lines capable of rapid adaptation.

Internal challenges: Human capital

The industry faces a human capital emergency where the departure of veteran talent threatens to erase institutional knowledge.

The most critical threat to manufacturing resilience is not technological, but human. As a generation of experts retires, they take with them decades of tribal knowledge and intuitive understanding of operations that is rarely documented in manuals.

This brain drain creates a vicious cycle. Without this deep operational expertise, new talent struggles to maintain efficiency, and the adoption of advanced tools like AI is stalled because there is no one left to train the models. However, the solution is not simply replacing the aging workforce. Instead, there is a profound opportunity to leverage AI and automation to re-imagine business workflows, enabling the human capital we already have to focus on higher-value tasks.

What is the biggest internal threat to your operations?

"We have a lot of talent that has been with us for 30-40 years and is now nearing retirement... a significant amount of legacy knowledge is leaving."

Chief Information Officer | Manufacturing | USA

We are not just losing people; we are losing wisdom. Technology must be deployed immediately to capture this knowledge before it leaves the building.



Competitive landscape: The paradox

The market is defined by a paradox of simultaneous consolidation among giants and fragmentation from agile new entrants.

The competitive landscape has split into two opposing realities. On one side, established giants are pursuing aggressive Mergers and Acquisitions (M&A) to secure IP and scale, creating a consolidated top tier. On the other, technology has democratized manufacturing, collapsing barriers to entry.

Tech-native competitors, unburdened by legacy infrastructure, are utilizing AI to compress the concept-to-market cycle from years to months. Incumbents now face a war on two fronts: a resource war against peers and an innovation war against startups.

How is the competitive landscape changing?

"We are at the moment in a real revolution... tech companies are now creating cars within two years... Barriers to entry are lower now."

Chief Information Officer | Manufacturing | Germany

Speed is the new currency. The ability to compress development timelines is the only defense against new entrants.

Technological barriers: Infrastructure

The ability to respond to these pressures is paralyzed by disconnected data pipes between IT and OT systems.

While the vision of AI-driven manufacturing is clear, the reality is often stalled by infrastructure. The air gap between IT (business systems) and OT (factory floor) is no longer a safety feature; it is a critical liability.

Our research shows that most organizations systems are disconnected. Without a unified flow of data from the sensor to the boardroom, AI models starve and predictive insights remain theoretical.

What prevents you from scaling technology solutions?

"Most companies don't have the pipes for this data to flow... or the data gets dumped into a lake with no one knowing what to do with it."

Chief Digital Officer | Manufacturing | USA

IT/OT convergence is the prerequisite for survival. You cannot build a future-ready company on disconnected data pipes.

Leaders' strategic responses

Leaders are responding to the polycrisis by abandoning efficiency-first models in favor of resilience and convergence.

Our interviews reveal that leaders are no longer waiting for stability to return. Instead, they are actively rewriting their operating models to address the polycrisis head-on. As illustrated in the model, the consensus response has crystallized into four distinct shifts:

- **Resilience over efficiency:** Moving from single-source global supply chains to regional fortresses that ensure continuity. While the short-term reaction to supply chain shocks is rapid localization, leaders must maintain a strategic balance between global reach and local resilience in the long run. This is backed by our interview findings, where one CIO noted that trading will become easier with certain areas and more difficult with others, proving that global trade is reconfiguring rather than ending.
- **Digitization of wisdom:** In the short run, leaders must rely on AI to transfer wisdom from experienced employees to the next generation. In the long run, however, as AI and robotics take over more tasks, leaders must proactively design good collaborative models between AI, robotics, and people.
- **IT/OT convergence:** Breaking down the air gap between business and factory data to enable real-time decision making. While this convergence is necessary, it introduces significant risks of security incidents. Leaders must carefully design a good balance between maintaining robust cybersecurity and enabling seamless digital connectivity.
- **The green vs. growth dilemma:** Rapid shifts in consumer behavior and lower barriers to entry are forcing manufacturers to prioritize aggressive growth and revenue protection. This creates a critical tension managing the conflict between this immediate need for profitability and the long-term imperative of sustainability.

How is the current volatility impacting your strategic planning and innovation timelines?

"We are on the right path to achieving this, but in terms of the timeline, we are sometimes behind schedule. Recent geopolitical uncertainties have put pressure on us to adjust our supply chain."

Chief Executive Officer | Manufacturing | China

The response is not just about new technology; it is about a fundamental change in mindset from optimization to adaptation.





Summary

2026 is defined by fragmentation and scarcity; the future must be defined by integration and intelligence.

We have established that the manufacturing industry is currently pinned between external shocks (geopolitics, changing consumer health and market paradoxes) and internal emergencies (talent loss, disconnected data).

The polycrisis is defined by the collision of the human capital emergency and the loss of veteran talent, geopolitical fragmentation forcing the regionalization of supply chains, unpredictable shifts in consumer behavior, and the urgent need to connect fragmented IT/OT infrastructure. The old maps no longer work, and navigating this landscape requires a holistic hybrid transformation that addresses all these colliding forces simultaneously.

The strategic outlook

In 2026, leaders need to accelerate business to survive. They must:

- Localize supply chains for regional resilience
- Keep legacy wisdom by transferring knowledge to AI
- Connect fragmented IT/OT infrastructure
- Balance green and growth by aligning immediate profitability with long-term sustainability.

However, is it good enough to accelerate and respond to the immediate challenge? Let's look at the view of 2036.

Section

2

The manufacturing outlook for 2036

Technology reset and redefined manufacturing industry.



The strategic imperative of the long-term view

The volatility of the present requires a structural long-term vision to guide immediate strategic decisions.

In an era defined by the polycrisis, looking one or two years ahead is no longer sufficient. Short-term planning inevitably leads to reactive survival rather than proactive leadership. To build resilience, we must look a full decade out, to 2036, to identify the structural shifts that will redefine the manufacturing landscape.

This section does not offer a prediction of a single future. Instead, it provides a framework for decision-making under uncertainty. Rather than being consumed by the immediate challenges of today, we must analyse how the structural forces of geopolitics, technology, and demographics will evolve and intersect over the next ten years. By projecting these long-term trajectories, we can build strategies that are robust enough to withstand whatever version of 2036.

Are you most interested in a future vision when it is explicitly linked to solving today's operational challenges or do you appreciate this long-term future focus?

"You need to have a long-term view to work back from on what your business strategies need to be. pushing that forward thinking is probably where there is more of a gap, so i think that is valuable"

Chief Marketing Officer | Manufacturing | USA

We must define the destination of 2036 to ensure our steps in 2026 are leading us in the right direction.

From market signals to strategic scenarios

We applied a rigorous analytical filter to separate temporary noise from permanent structural change.

To ensure this outlook is grounded in reality rather than speculation, we executed a rigorous multi-stage foresight process. We began by casting a wide net, identifying a long list of over 50 broad trends and nearly 30 emerging weak signals from across the global manufacturing ecosystem.

These inputs were then validated through expert focus groups and in-depth interviews with c-suite leaders across Germany, USA, the UK, Canada, and China. Finally, we applied a political, economic, social, technological, legal and environmental (PESTLE) impact analysis to rate these forces by importance and uncertainty. This filtration process allowed us to derive the two critical axes: geopolitical stability and technological pace, that form the matrix of our four future scenarios.

Foresight is not about guessing; it is about systematically filtering noise to find the structural forces that matter.

Driving forces redefining the long-term landscape

From a broad field of potential shifts and driving forces, we identified critical trends that will determine the industry's future..

We analyzed over fifty distinct trends, recognizing that their individual impacts will mature across different time timescales, from immediate operational disruptions in 2026, to structural landscape shifts in 2036, and highly speculative realities looking beyond 2036. However, these forces do not operate in isolation; they continuously interact and collide, collaboratively shaping the complex manufacturing environment of the future.

These were chosen because they are not isolated challenges; they are systemic accelerators. For example, the strategic realignment of supply chains is not just a logistics issue; it is being forced by energy uncertainty and state-backed cyber espionage. Understanding these primary structural trends is the prerequisite for understanding the scenarios that follow. They are the known variables in the future equation.

These trends are the battlefield; the scenarios describe how the battle might play out.

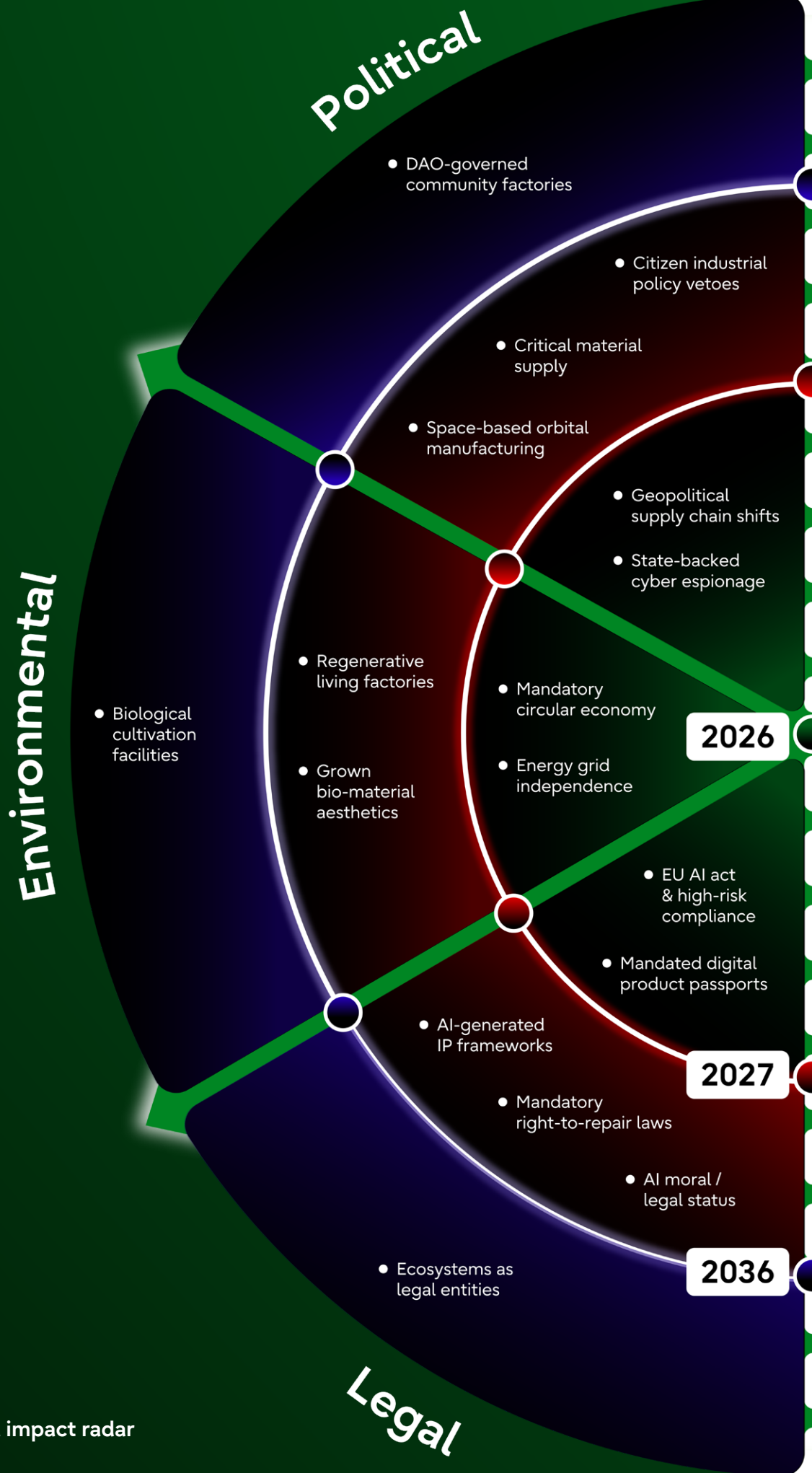
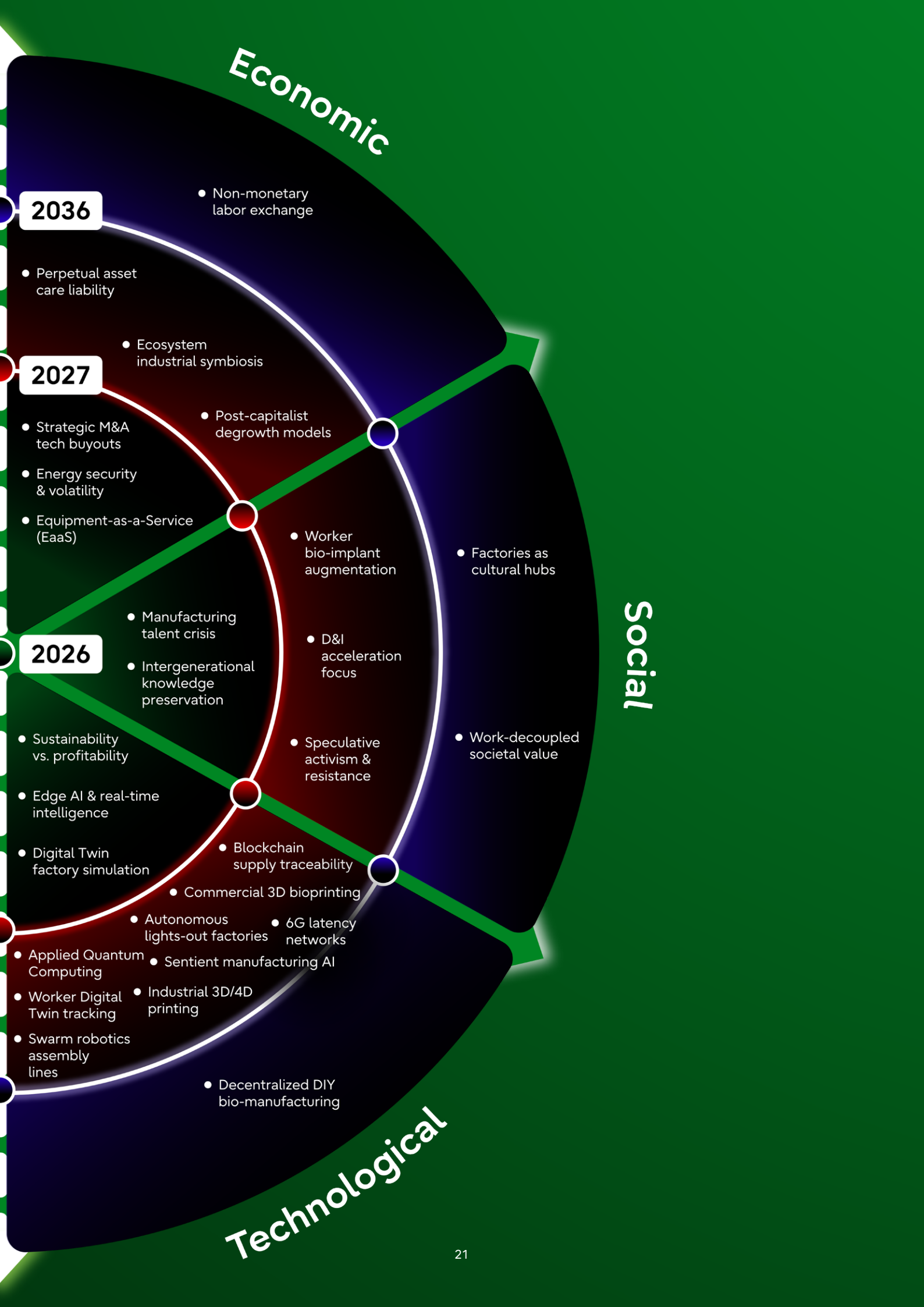


Figure 1: The macro-trend impact radar



From trends to scenarios: The logic of the future

Scenarios are not guesses; they are the structured outcome of high impact, high uncertainty forces colliding.

To derive the four potential futures of 2036, we applied a rigorous trend impact analysis and an uncertainty filter to the core structural forces identified in our research.

- **Rating:** We rated every trend on two dimensions: importance (how much it matters for the industry) and uncertainty (how hard it is to predict its outcome).
- **Filtering:** Trends that are high importance / low uncertainty are treated as guaranteed realities present in all scenarios.
- **Axes formation:** The trends that are high importance / high uncertainty, specifically global operating environment and engine of innovation, became the two axes of our matrix. These are the variables that will define the differences between the four visions of future worlds.

In the following slides, each scenario is accompanied by a trend radar. This visualization maps the 11 structural forces to show the unique pressure profile of that scenario. The shape of the radar changes to reflect which forces are dominant in that specific future.

To map the future, we filtered the main structural trends through a matrix defined by two critical axes: the global operating environment (ranging from global collaboration to geopolitical fragmentation) and the pace of transformation (ranging from accelerated adoption to cautious progress). Crucially, the resulting four scenarios are not strategic options for an enterprise to select from a menu. They represent unpredictable external environments dictated by macro-forces beyond any single company's control. Therefore, the goal is not to choose a favorite scenario, but to formulate robust, adaptive strategies to prepare for all four possible futures.

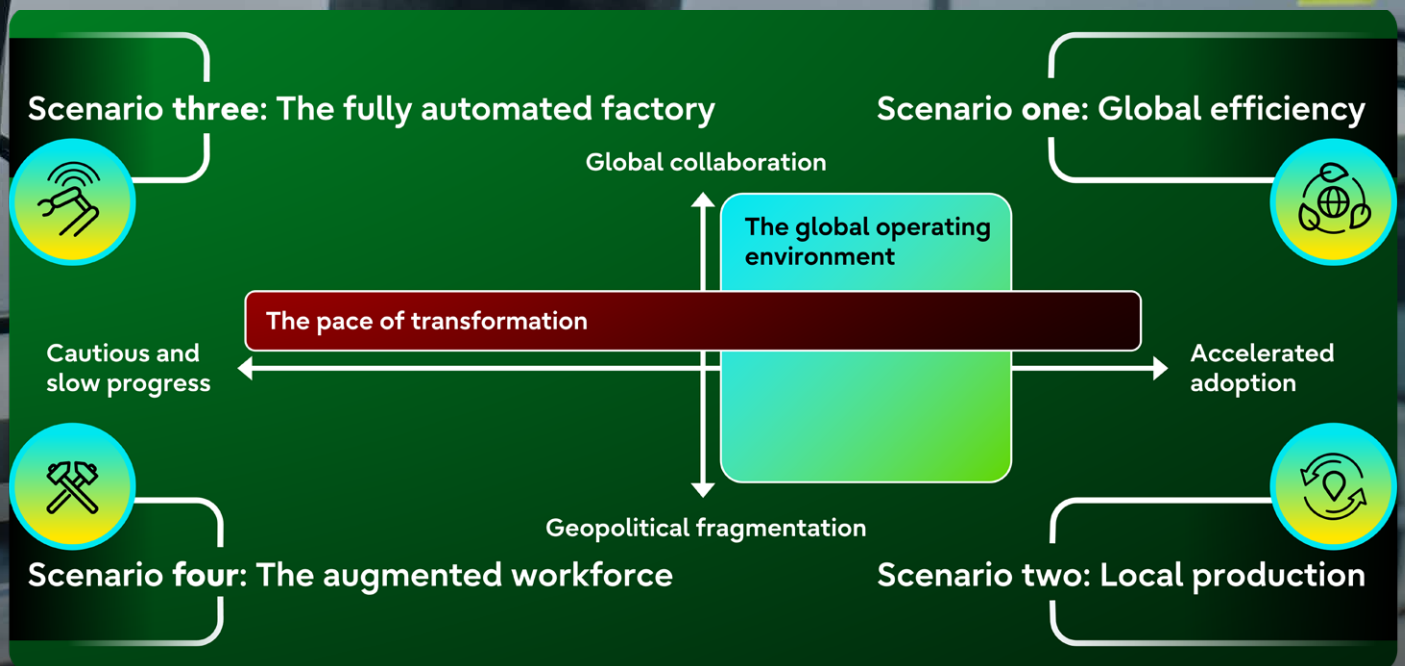


Figure 2: Manufacturing strategic scenario matrix

Defining the critical uncertainties

Two dominant forces: Geopolitical stability and technological pace, intersect to define the four futures.

The trends identified previously do not operate in a vacuum; they interact and collide. To make sense of this complexity, we mapped these trends against the two most unpredictable and high-impact variables facing the industry.

- The vertical axis: the global operating environment. This axis measures the level of global openness. At the top is global collaboration, defined by open trade and shared data standards. At the bottom is geopolitical fragmentation, defined by protectionism, tariffs, and regional power blocks.
- The horizontal axis: the pace of transformation. This axis measures how the industry responds to an accelerating technological baseline. As our interviews confirmed, the pace of change is no longer just fast; it is faster than ever before. On the left is cautious progress, where this inevitable acceleration is hindered by legacy culture, cost, and prioritization challenges. On the right is accelerated adoption, where companies actively embrace this compounding speed, using AI and digital twins to radically compress development cycles from years to months.

How would you characterize the current pace of change?

"The current pace of change is rapid. This is being amplified by the adoption of AI, which is creating even more pressure for speed and acceleration."

Chief Marketing Officer | Manufacturing | USA

We cannot predict which axis will dominate, so we must prepare strategies that can navigate the entire matrix of a fracturing world and compounding technological speed.

Understanding the scenario matrix

It is vital to distinguish between external realities and internal choices. These four quadrants represent potential external futures that business leaders need to be prepared to navigate. They are unpredictable environments shaped by global politics and technological compounding. Your strategic options are the internal actions you take today to ensure your organization remains resilient regardless of which external future ultimately materializes.

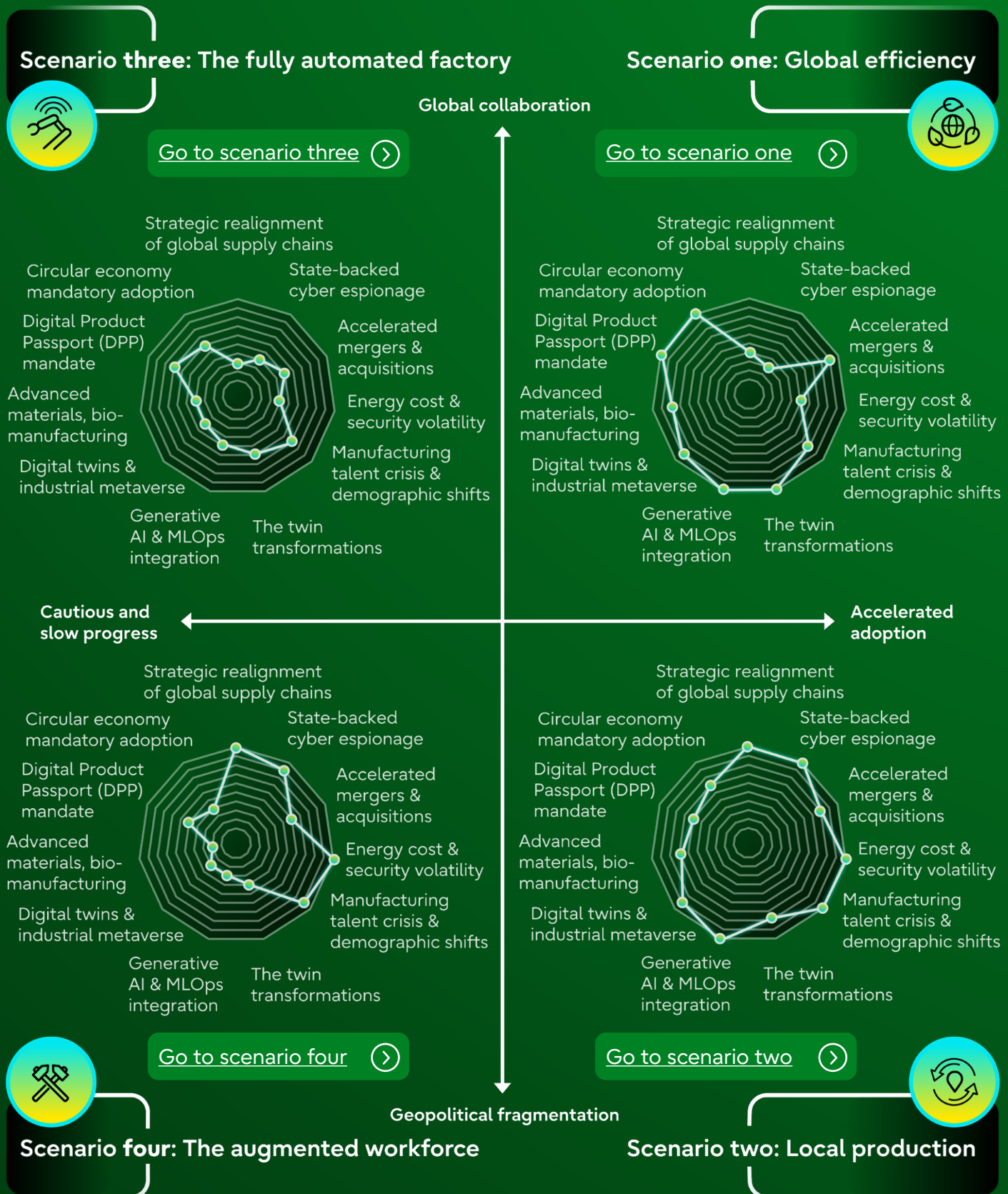


Figure 3: Comparative trend impact analysis

Scenario one: Global efficiency



In a connected world, a synchronized leap forward aligns digital efficiency with circular sustainability.

This is a race to the top. Global stability and open trade standards have allowed manufacturers to fully leverage digital tools to achieve unprecedented levels of efficiency. Companies will compete not on hoarding resources, but on the intelligence of their circular business models.

Open data standards, like the digital product passport, have become the norm, removing friction from international supply chains. Being a leader in sustainability and a leader in technology are now one and the same.

When you look out towards 2036, what do you see as the most significant shift your organization must navigate?

"The key one is we need to navigate the ability to grow in a challenging relatively flat environment. The organization must find new, creative ways to drive incremental growth".

Chief Information Officer | Manufacturing | UK

Strategic playbook:

Leaders will need to aim for these objectives to thrive in this scenario; though executing them will require overcoming significant transformation challenges that are addressed in Section 3:

- **Focus on:** Mastering global data and open standards integration.
- **Focus on:** Building collaborative, cross-border ecosystems rather than rigid chains.
- **Focus on:** Leading in data-driven business model innovation.
- **Move away from:** Hoarding intellectual property restrictively
- **Move away from:** Relying on opaque, disconnected legacy networks.

Success in this scenario requires radical openness and the ability to compete on the quality of your circular ecosystem.

What the radar diagram shows:

This radar chart visualizes the unique pressure profile of this specific scenario. It maps our top structural trends to show exactly which forces are most dominant in shaping this world. For example, the spikes on the left side of this chart indicate that circular economy mandates, alongside heavy technological adoption (Generative AI and Digital Twins), are the defining drivers of the global efficiency scenario.

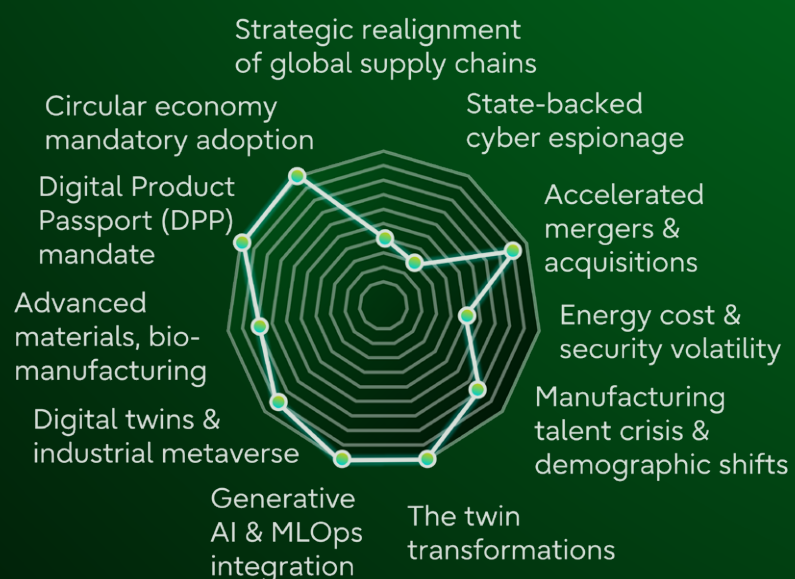


Figure 4: Scenario one

Scenario two: Local production



In a divided world, innovation becomes the ultimate defence and the primary survival mechanism.

Welcome to a world of high walls and deep moats. Geopolitical fragmentation has forced supply chains to retreat into regional, self-sufficient blocs. In this high-stakes environment, technology is weaponized for survival.

Companies pour investment into generative AI, automation, and digital twins to secure operations from state-backed cyber threats and insulate themselves from volatile energy markets. Sustainability is pursued, but it is framed as resource independence rather than global stewardship.

What would be the biggest risks for your organization in responding to these trends?

"You can just close a whole company, you know, just because of a cyber attack. you just need this one little thing, and then you can shut down whole plants".

Chief Information Officer |
Manufacturing | Germany

Strategic playbook:

Leaders will need to aim for these objectives to thrive in this scenario; though executing them will require overcoming significant transformation challenges that are addressed in Section 3:

- **Focus on:** Aggressively reshoring and friend-shoring production.
- **Focus on:** Weaponizing technology to guarantee local supply chain resilience.
- **Focus on:** Investing heavily in robust cybersecurity defences
- **Move away from:** Maintaining single-source, high-risk global suppliers.
- **Move away from:** Underestimating the impact of state-backed industrial policies.

When the world fractures, the winner is the one who can build the most resilient, self-sufficient regional stronghold.

What the radar diagram shows:

The radar shape skews heavily toward the top-left and bottom-left. State-backed cyber espionage and energy security spike to maximum intensity, reflecting the defensive posture of this world. Meanwhile, circular economy scores are driven strictly by resource scarcity rather than environmental altruism.

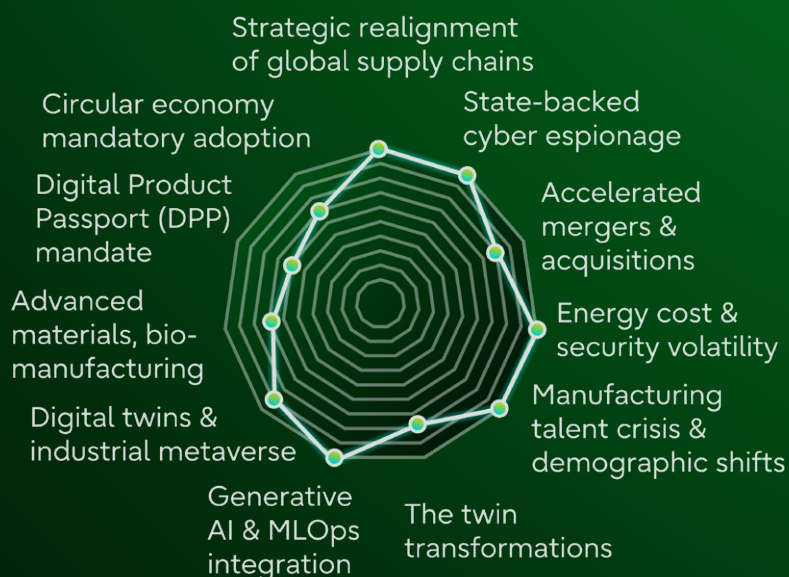


Figure 5: Scenario two

Scenario three: The fully automated factory



Stability breeds complacency, leading companies to prioritize short-term profit over long-term relevance.

In this world, the lack of external shocks has bred a dangerous sense of safety. Manufacturers are profitable today but are slowly eroding their competitive advantage for tomorrow. Companies prioritize short-term returns over the heavy investment required for true transformation.

Innovation happens in isolated pockets, and sustainability is viewed strictly through the lens of minimum compliance. The talent crisis simmers beneath the surface, but the urgency to solve it with radical new technologies is absent.

What do you see as the biggest internal barrier to your organization's ability to adapt at the necessary pace?

"The biggest internal barrier is the prioritization challenge... the tension of allocating resources for the longer term versus the need to deliver on short-term, tactical solutions for our shareholders."

Chief Information Officer | Manufacturing | UK

The greatest threat in a stable world is your own success; you must disrupt yourself before a competitor does.

Strategic playbook:

Leaders will need to aim for these objectives to thrive in this scenario; though executing them will require overcoming significant transformation challenges that are addressed in Section 3:

- **Focus on:** Creating internal urgency for radical innovation despite market calm.
- **Focus on:** Acquiring disruptive technology and talent via aggressive M&A.
- **Focus on:** Piloting transformative new business models now.
- **Move away from:** Mistaking current stability for permanent safety.
- **Move away from:** Letting short-term profits dictate and kill long-term strategy.

What the radar diagram shows:

This profile shows a dangerous imbalance. While digital twins and generative AI show moderate activity, the manufacturing talent crisis axis is critically neglected. The collapsed shape on the talent side visualizes the complacency of this scenario. Companies are automating slowly but failing to solve the human capital emergency.

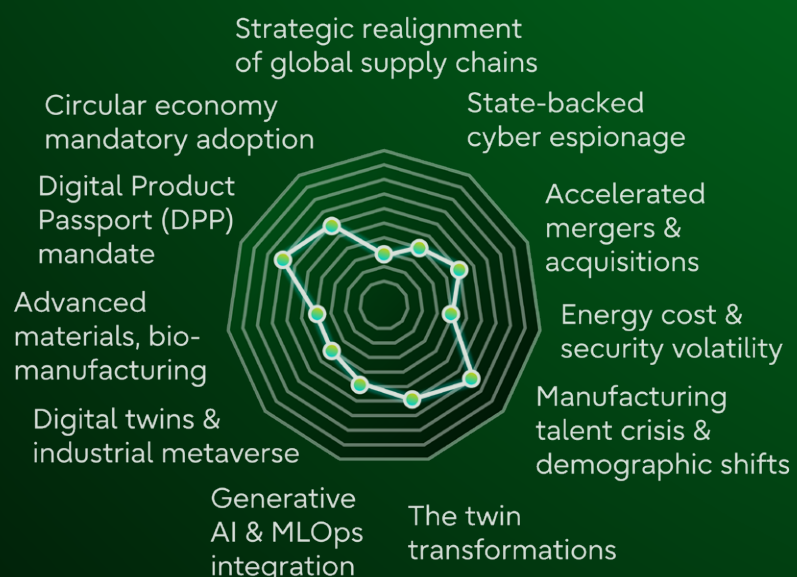


Figure 6: Scenario three

Scenario four: The augmented workforce



Constant disruption paralyzes progress, forcing a focus on daily survival over strategic growth.

This is a world of constant crisis. Geopolitical friction and volatile energy prices create a state of permanent uncertainty, forcing manufacturers into a defensive crouch. All strategic capacity is consumed by managing daily supply chain disruptions.

There is no room for long-term thinking. Technology is used only to patch immediate problems, not to build a future. The talent crisis becomes a chronic wound as companies struggle to attract new generations to an industry that appears to be going nowhere.

How would you characterize the current pace of change in your industry?

"The last 12 months have been a bit of a challenge... largely driven by the current political climate... punitive tariffs... extremely erratic or volatile."

Chief Operating Officer |
Manufacturing | Canada

Strategic playbook:

Leaders will need to aim for these objectives to thrive in this scenario; though executing them will require overcoming significant transformation challenges that are addressed in Section 3:

- **Focus on:** Prioritizing operational continuity and resilience above all else.
- **Focus on:** Securing essential energy and physical material supplies locally.
- **Focus on:** Directing technology spending strictly toward mitigating immediate risks.
- **Move away from:** Launching expensive, highly speculative long-term transformation projects.
- **Move away from:** Chasing opportunities that overextend already fragile supply chains.

In this scenario, the goal is not to win, but simply to endure until the storm passes.

What the radar diagram shows:

The radar here reveals a crisis profile. The energy costs and strategic realignment of global supply chains are stretched to their limits, indicating maximum external pressure. However, the Generative AI and Digital Product passports are contracted, showing that innovation is stifled by the struggle for daily survival.



Figure 7: Scenario four

Emerging signals and early indicators of change

While not yet dominant forces, these emerging signals represent the peripheral shifts that could radically redefine the industry by 2036.

Beyond the scenarios: While the four scenarios provide a robust framework for the primary structural forces shaping 2036, true foresight requires continuous environmental scanning. Beyond these core scenarios, leaders must track weak signals, emerging and peripheral phenomena that are not yet dominant but carry the potential for sudden, asymmetric disruption. Considering these early indicators in addition to the macro-scenarios allows leaders to anticipate radical shifts before they become mainstream realities.

History shows that the most profound industry shifts often start as faint signals in unrelated sectors. Just as artificial intelligence was a weak signal a decade ago, the concepts listed here offer a glimpse into the unwritten future of 2036. Tracking these early indicators allows leaders to prepare for sudden shifts before they become mainstream realities, effectively converting potential surprises into strategic advantages.

Where do you and other executives in your organization turn to for credible insights about the future?

"We turn to several places for insights... but we look for deep insights and expertise across multiple industries, because trends in other industries can be indicators for our own."

Chief Information Officer | Manufacturing | UK

The weak signal of today is the crisis or opportunity of tomorrow; leaders must monitor the periphery as closely as the core.

Emerging signals that could redefine the industry:

- **Critical material security:**
Finding alternative sources and recycling methods to bypass geopolitical bottlenecks for rare earths.
- **Space-based manufacturing:**
Using zero-gravity to build flawless materials (like perfect fiber optics) that are impossible to make on earth.
- **Equipment-as-a-service:**
Shifting from selling physical machines to leasing them based on guaranteed outcomes or uptime.
- **Industrial symbiosis:**
Creating a closed-loop network where one factory's waste directly becomes another's raw material.
- **Diversity & inclusion acceleration:**
Using diverse teams as a core operational strategy to prevent AI bias and drive innovation.
- **AI-native lights-out factories:**
Fully autonomous facilities designed without human needs (no lights, no climate control).
- **Quantum computing:**
Solving impossibly complex supply chain routing and material science problems in seconds.
- **Bio-manufacturing:**
Growing materials (like self-healing concrete or lab-grown textiles) rather than extracting or synthesizing them.
- **Additive manufacturing (3D/4D printing):**
Moving to mass customization, including 4D materials that change shape in response to their environment.
- **Blockchain & transparency:**
Using unhackable digital ledgers to track a product's carbon footprint and ethical sourcing.
- **6G networks:**
Sub-millisecond connectivity that makes instantaneous swarm robotics and real-time digital twins possible.
- **3D bioprinting:**
Printing organic tissues and compounds locally, disrupting traditional medical and pharma supply chains.
- **Consciousness-integrated manufacturing:**
Using brain-computer interfaces (BCI) so humans can control complex machinery via neural pathways.
- **AI intellectual property:**
The emerging legal battleground over who owns the patents for designs created entirely by AI.
- **Right to repair mandates:**
Legislation forcing companies to abandon planned obsolescence by designing modular, easily repairable products.

Preparing for multiple futures: Designing the hybrid enterprise

Each leader must design and share a unique hybrid future, leveraging the power of current and emerging technologies to avoid being left behind.

It is important to recognize that these four scenarios are not precise forecasts. The world of 2036 will likely not fit perfectly into just one of these boxes; it may start as one and evolve into another; or different regions may experience different scenarios simultaneously.

Therefore, the strategic mandate for every leader is to actively design and share their own future vision. There is no universal template. The exact formula will vary for every organization; leaders must determine their optimal level of global integration versus local self-sufficiency, and their specific balance between fully automated systems and human-augmented processes. Crucially, to achieve this hybrid model, they must aggressively leverage the power of current and emerging technologies, or they will quickly be left behind by more agile competitors.

How would your organization structure and culture need to change to respond to these scenarios?

"We need knowledge sharing that is liquid between entities, but a high level of competence on product development at the local level."

Chief Executive Officer | Manufacturing | China

Strategic outlook:

- **The goal:** Designing a flexible, hybrid operating model that secures relevance in 2036.
- **The reality:** In addition, leaders face significant internal and external challenges to realize this future vision today.

Let us explore these specific transformation challenges in section 3.



Four dimensions of manufacturing industry transformation

1. Sovereignty response



The regional fortress:
Strategic synthesis of global reach & local resilience.

2. Workforce response



Augmented operator:
Harmonizing human intuition with machine precision.

3. Architecture response



Calculated convergence:
Integrating secure IT with efficient OT systems.

4. Value response



Efficiency-funded green:
Leveraging profitability to drive sustainable impact.

Figure 8: Leaders' strategic responses

The transformation battlegrounds: From disruption to design

Navigating the polycrisis requires a reconfiguration of the enterprise across four specific dimensions.

Our environmental scanning and executive interviews revealed a critical transformation trap currently paralyzing the industry.

While the vision of the future is clear, the path to get there is blocked by four structural disablers:

- **The disconnection trap:**
Innovation is stalled not by a lack of AI tools, but by the broken pipes of disconnected IT and OT infrastructure.
- **The wisdom gap:**
The industry is losing institutional knowledge faster than it can digitize it, creating a brain drain that renders new tools less effective.
- **The incentive mismatch:**
Financial systems built for short-term efficiency are actively killing the long-term investments required for green energy and resilience.
- **The sovereignty wall:**
Rising geopolitical tensions and conflicting data regulations are forcing companies to regionalize, breaking the global efficiency models of the past.

The strategic framework

To break this cycle, leaders are abandoning isolated technology projects in favor of a synchronized transformation across four interconnected battlegrounds:

- **The sovereignty response:**
Moving from global dependency to regional fortresses enabled by trusted data exchange.
- **The workforce response:**
Shifting from replacing workers to augmenting them with collaborative wisdom systems.
- **The architecture response:**
Bridging the air gap with calculated convergence to balance security and speed.
- **The value response:**
Pivoting from efficiency-first models to efficiency-funded green strategies.

What prevents you from scaling technology solutions?

"The primary internal barrier to adapting to new technologies like AI is not the tool itself, but the challenge of organization-wide adoption and training. You can't just flip a switch; success depends on the team's ability to use it properly."

Chief Marketing Officer | Manufacturing | USA

Transformation is no longer about buying better software; it is about re-engineering the fundamental operating system of the manufacturing enterprise to support a hybrid future.

Dimension one: The sovereignty response: Creating a regional fortress

Building resilience requires global reach and local capability, enabled by trusted data exchanges.

How are geopolitical tensions impacting your supply chain strategy?

"Long-term success hinges on mastering global data [and] navigating complex regional AI regulations, like those from German works councils."

Chief Digital Officer | Manufacturing | USA



The goal is not to centralize all data, but to connect distributed fortresses through trusted, compliant corridors.

Figure 9: The sovereignty response

Transformation response:

The de-globalization highlighted by this chief digital officer confirms the shift away from borderless efficiency. The response is to build regional fortresses, supply chains that are physically localized for security but digitally connected for intelligence.

Managing the disablers:

- **Disabler (geopolitical friction):** As noted in the research, the nature of friction points is changing due to protectionism and workforce migration, making global data movement legally risky.
- **Response:** Leaders are deploying sovereign cloud architectures that keep sensitive data physically within its jurisdiction of origin, ensuring compliance with local laws while maintaining operations.

Leveraging the enablers:

- **Enabler (digital product passports):** Using standardized, decentralized ledgers to track product sustainability and origin data across borders without exposing trade secrets.
- **Enabler (federated learning):** Allowing AI models to travel to the local data source to learn, rather than moving the data to a central model, ensuring compliance without sacrificing intelligence.

Dimension two: The workforce response: The augmented collaborator

Harmonizing human intuition with machine precision requires the capture of legacy wisdom before it leaves the building.

What is the biggest internal threat to your operations?

"It's about... linking back to the here and now so people understand how technology is an enabler... to get that cultural shift that we're actually a technology company. We just happen to manufacture products."

Chief Information Officer | Manufacturing | UK



Technology must be used to transfer wisdom from the retiring generation to the next, acting as a bridge rather than just a replacement.

Figure 10: The workforce response

Transformation response:

This leader identifies a critical brain drain. The response is not just replacing workers, but digitization of wisdom, using technology to capture the gut feeling of these retiring experts before they leave.

Managing the disablers:

- **Disabler (the wisdom gap):** When experts leave, they take undocumented tribal knowledge with them, leaving new talent to struggle with efficiency.
- **Response:** Implementing knowledge capture agents (gen AI) that interview experts to create an interactive wisdom archive for the next generation.

Leveraging the enablers:

- **Enabler (augmented reality):** Overlaying digital insights directly onto the physical machine, allowing new workers to access the ghost of a veteran's expertise in real-time.
- **Enabler (cobotics or cobots):** Using cobots to handle the physical strain of tasks, allowing the remaining human workforce to focus on high-value problem solving.

Dimension three: The architecture response: Calculated convergence

Integrating secure IT with efficient OT systems requires fixing the broken pipes of legacy infrastructure.

What prevents you from scaling technology solutions?

AI will be like the Internet. It'll just be everywhere... but AI is pretty useless if the data isn't there or correct or robust.

Chief Digital Officer | Manufacturing | USA

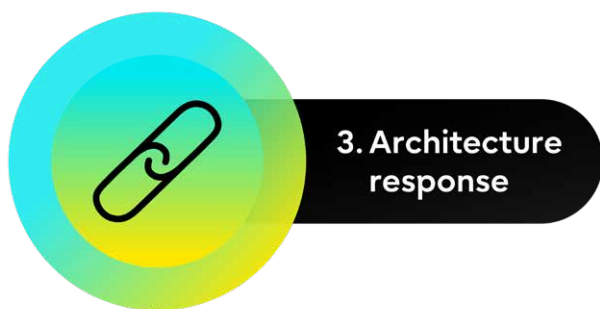


Figure 11: The architecture response

You cannot build a future-ready company on a fragmented foundation; connectivity is the prerequisite for survival.

Transformation response:

As this CDO states, AI is useless without data flow. The response is calculated convergence fixing the disconnected pipes between IT (business) and OT (factory) to enable real-time insights.

Managing the disablers:

- **Disabler (disconnected data):** Most systems are not broken, but simply disconnected, leaving AI models to starve without a unified flow of data from sensor to boardroom.
- **Response:** Deploying unified namespaces that act as a translator, allowing distinct factory systems to talk to business systems without complex custom code.

Leveraging the enablers:

- **Enabler (Edge computing):** Processing data locally on the factory floor to ensure real-time latency and reduce the security risk of sending sensitive raw data to the cloud.
- **Enabler (IT/OT gateways):** Secure middleware that bridges the air gap, allowing insights to flow up to the business while blocking cyber threats from flowing down to the machines.

Dimension four: The value response: Efficiency-funded green

Leveraging profitability to drive sustainable impact requires solving the conflict between short-term cost and long-term value.

What is the biggest internal barrier to your organization's ability to adapt?

"The industry is facing a primary conflict between consumer demands for sustainability and their unwillingness to absorb the associated extra costs, which stifles the implementation of green solutions."

CEO | Manufacturing | China



Figure 12: The value response

Sustainability is not a separate cost center; it is the ultimate efficiency metric. If you are wasting carbon, you are wasting money.

Transformation response:

This CEO highlights the green vs. growth dilemma. The response is efficiency-funded green - using digital tools to drive immediate efficiency (profit) that funds the longer-term transition to sustainability.

Managing the disablers:

- **Disabler (the ROI timescale gap):** The conflict between immediate shareholder returns and the heavy investment required for long-term transformation.
- **Response:** Shifting the focus from buying green tech to optimizing waste, proving that sustainability is actually a profitability driver through reduced energy and material costs.

Leveraging the enablers:

- **Enabler (predictive quality):** Using AI to reduce scrap rates, which simultaneously saves money (short-term) and reduces carbon footprint (long-term).
- **Enabler (energy intelligence):** IoT sensors that identify energy spikes, allowing for immediate tuning that cuts utility bills and emissions in the same quarter.

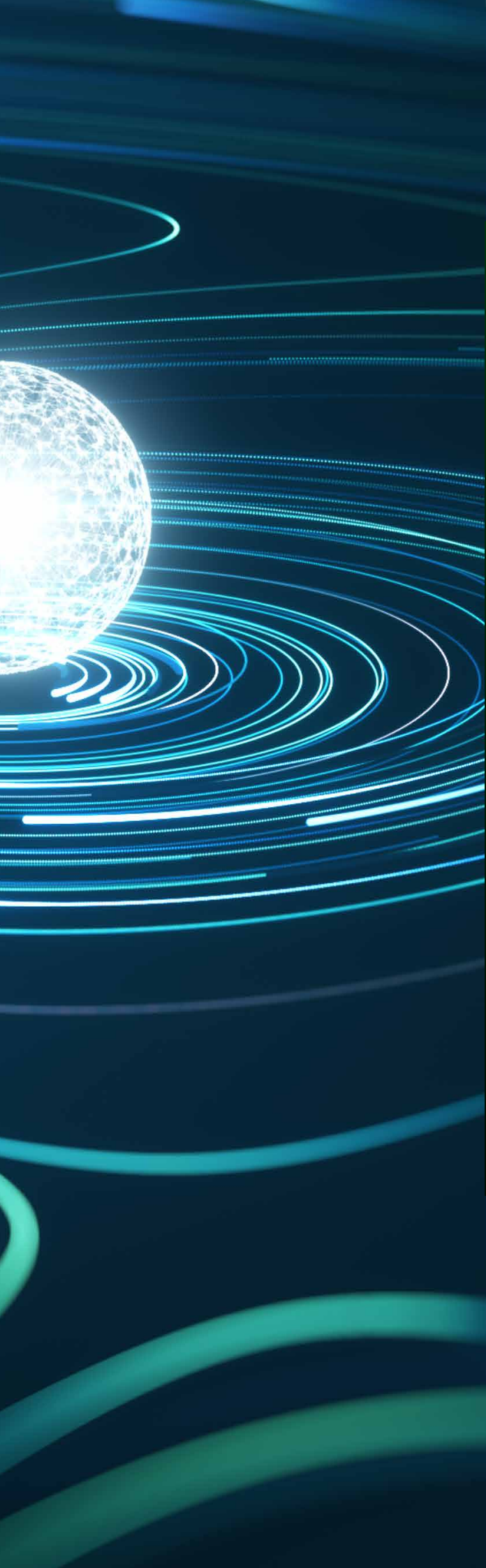
Summary and transition: The partner for the hybrid journey

No single organization can navigate these four dimensions alone; success requires an ecosystem of partners who understand both the technology and the industry.

We have mapped the landscape of 2036 and identified the specific sovereignty, workforce, architecture, and value transformations required to get there. As the CEO from China noted, success in this new world requires knowledge sharing that is liquid between entities, implying that isolation is no longer a viable strategy.

The challenge is immense: manufacturers must simultaneously fix the broken pipes of the past while building the AI-augmented future. This requires a partner who can bridge the gap between the shop floor (OT) and the top floor (IT).

This is where Fujitsu steps in. In the final section, we outline how the Uvance portfolio is purpose-built to act as the enabler for these specific transformations, turning these theoretical challenges into practical, sustainable solutions.



The common denominator action plan

Because we cannot predict exactly which scenario will dominate 2036, leaders need to execute strategies that act as common denominators, actions that solve immediate short-term crises today while building resilience for any of the varied future environments.

Immediate strategic actions to take:

- **Focus on:** Fixing the fundamental data architecture and connecting IT/OT pipes to enable agility in any environment
- **Focus on:** Decentralizing decision-making to empower regional leaders to react instantly to local volatility and tariffs
- **Focus on:** digitizing legacy operational wisdom using AI now, before veteran operators retire.

Strategic traps to avoid:

- **Move away from:** Making rigid, inflexible capital investments that rely on a single, predictable future materializing.
- **Move away from:** Viewing sustainability merely as a compliance cost rather than a direct driver of operational efficiency.
- **Move away from:** Relying on opaque, single-source global supply chains that cannot withstand geopolitical shocks.

Section

4

Transformation imperatives

Concrete actions to drive
future readiness



Strategic recommendations: From survival to supremacy

To remain successful manufacturers must address technical debt and decentralize decision-making.

We have analyzed the forces of 2026 and envisioned the scenarios of 2036. The question now shifts from what is happening? to what must we do?

Survival in the polycrisis is not guaranteed by size or history; it will be dependent on agility and coherence. The following section outlines the strategic actions leaders must take now to fix the fractured foundations of their enterprise and the specific role that Fujitsu plays in accelerating this journey.

The strategic roadmap

Based on our research, we recommend four immediate actions to bridge the gap between current struggles and future readiness:

- **Audit and fix data foundations (the architecture fix):**
As mentioned by one of the C-suite participants in USA AI is useless without data flow. Leaders must immediately treat disconnected data as a critical risk, auditing their OT/IT landscape to identify and bridge the air gaps that are starving predictive models.
- **Decentralize command (the sovereignty fix):**
Remove rigid global hierarchies. Empower regional leaders with the autonomy to navigate local volatility and tariff changes instantly, moving from a command-and-control model to a sense and respond network.
- **Compress timelines (the value fix):**
Aggressively deploy AI to shorten the concept-to-market cycle. Moving from years to months is the only way to capture fleeting market trends and fund the transition to green energy.
- **Partner radically (the ecosystem fix):**
Acknowledge that you cannot solve the polycrisis alone. Build ecosystems to fill capability gaps, whether in quantum computing, advanced robotics, or circular supply chains.



How are you addressing specific talent shortages in strategic areas?

"If you have a talent shortage of an employee who performs a physical task, the solution is robotics or AI-powered robotics. If the shortage is in a strategic department, you look to what AI can do to help create strategies."

Chief Digital Officer | USA

What future technologies are you betting on to change the game?

"The game-changing investments will be in humanoid robots for factory automation and quantum computing, which will create completely different ways of working and modeling."

Chief Information Officer | Manufacturing | Germany

How Fujitsu can help:

The partner for the hybrid world

Fujitsu empowers manufacturers to thrive in the polycrisis by transforming data into actionable knowledge and sustainability into profitability.

Leveraging 90 years of technology experience in its own factories, Fujitsu does not just advise on manufacturing; we live it. Through our Uvance portfolio, we help clients navigate the four dimensions of transformation by combining deep industry heritage with cutting-edge digital innovation.

Partnering for the transformation:

- **Transformation design (consulting):** Co-creating the roadmap to navigate complex change, helping you design the specific hybrid future that balances your global scale with local resilience.
- **Agile manufacturing (solutions):** Implementing flexible, data-driven production systems that allow lot size personalization and rapid reconfiguration in response to supply chain shocks.
- **Cross-industry intelligence (ecosystems):** Leveraging our diverse sector expertise to solve unique challenges, such as applying healthcare data privacy models to manufacturing IP security.
- **Advanced technology (innovation):** Deploying the next generation of tools: from quantum-inspired digital annealers for logistics optimization, to humanoid robotics integration, to secure operational dominance.





References



Fujitsu Technology and Service Vision (FT&SV)



The evolving story of Fujitsu insights into the future, updated annually and covering the Fujitsu approach to the main issues raised in the CxO survey.

global.fujitsu/en-global/about/vision



IDC on data and AI in Modern manufacturing

The IDC InfoBrief 'Data & AI: The Essentials for Building Robust Manufacturing Operations' reveals how leading manufacturers are using data and AI to boost efficiency, resilience, and productivity.

Discover the top priorities shaping the next two years, how AI improves KPIs across plant operations, supply chain, and R&D, and where companies are investing to scale impact. Learn how a persona-driven data and AI strategy helps organizations modernize faster and achieve measurable performance gains.

Select your region, register and download the InfoBrief:

[Europe](#)



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Profile of respondents:

The insights in this report are synthesized from in-depth interviews with six C-level executives across the global manufacturing sector.

Respondent demographics:

The panel consists of final decision-makers:

- 2x Chief Information Officers | Germany | UK
- 1x Chief Executive Officer | China
- 1x SVP / Chief Operating Officer | Canada
- 1x Chief Digital Officer | USA
- 1x Chief Marketing Officer | USA.

Company size:

Revenue predominantly \$1 Billion to <\$5 Billion (4 organizations), representing large-scale global enterprises with workforces up to 19,999 employees.

Industry segments:

Automotive, industrial connectivity, food and beverage, toys / entertainment, packaging and beauty.

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This research was conducted on behalf of Fujitsu by The Business Advantage Group Limited.



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