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SMART INDUSTRY READINESS INDEX

The Global Smart Industry Readiness Index (SIRI) Initiative:

Manufacturing Transformation Insight Report 2025

WHITE PAPER
JUNE 2025

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Foreword

Thomas Rilke

Division Manager
Deutsche Messe AG

Dr. Dominic Gorecky

Head of Swiss Smart Factory & Swiss Health Tech Center, Partner, Executive Board Member President of the Board "Swiss Cobotics Competence Center" (S3C)

As the manufacturing sector stands at the forefront of a historic transformation, the journey toward resilience, sustainability and digital integration has become increasingly essential. Global manufacturers face multifaceted challenges, from post-pandemic recovery and climate imperatives to technological disruptions and geopolitical tensions. In a world increasingly fraught with political fragmentation, conflicts, increasing trade disputes, and protectionism, geopolitical risks, in particular, have the potential to significantly upset the process of industrial digitalisation. To navigate this evolving landscape, the manufacturing sector must adopt comprehensive frameworks that not only guide digital transformation but also foster resilience and inclusive growth.

In 2022, the World Economic Forum partnered with the International Centre for Industrial Transformation (INCIT) to release a seminal Whitepaper on the Smart Industry Readiness Index (SIRI). The report underscored the growing importance of digital maturity assessments and set a foundation for guiding manufacturers in their digital journeys. Since then, the landscape has continued to evolve, and SIRI's reach has expanded to over 60 countries, with thousands of assessments conducted across diverse industries. These efforts have positioned SIRI as an indispensable resource for global benchmarking, best practices and actionable insights, all aimed at advancing digital transformation in a structured, data-driven manner.

Building on the findings of the 2022 white paper, this report delves deeper into the latest data and trends from SIRI, highlighting key challenges and opportunities that have emerged in the past two years. It presents a robust roadmap for manufacturers, governments, and industry stakeholders to close the gap between strategic intent and operational execution, a gap that continues to widen as transformation efforts intensify.

This report reaffirms SIRI's role as not just a tool, but a global movement shaping a digitally integrated and resilient future. With the support of Deutsche Messe AG, Swiss Smart Factory, a brand of Switzerland Innovation Park Biel/Bienne AG, INCIT, and international partners, SIRI has become a beacon of progress in Industry X.0. As you explore this white paper's findings and recommendations, we encourage industry leaders, policymakers and manufacturers to leverage SIRI's insights. Together, let us build a manufacturing ecosystem that is agile, innovative, and well-prepared for the challenges of tomorrow, delivering sustainable economic, social and environmental impact across geographies. Looking ahead, SIRI is poised to shape the future of manufacturing. We invite manufacturers everywhere to embrace SIRI's framework, to strengthen their digital maturity, and to lead the charge in building a robust, sustainable, and innovative industrial landscape. Together, through SIRI, we can forge a path toward a resilient global economy that values growth, sustainability, and collective progress.

Executive summary

As manufacturers intensify their digitalisation efforts to navigate today's global challenges, this report delivers critical data-driven insights to ensure they embark on the right path for transformation.

The global manufacturing sector is navigating unprecedented challenges intensified by the aftermath of the pandemic, climate change, geopolitical tensions, and rapid technological advancements. Safeguarding and fortifying value chains have become critical priorities for industry leaders aiming to remain competitive in this volatile environment. This report highlights pivotal trends transforming manufacturing, drawing insights from data collected from thousands of companies across more than 60 countries. The findings uncover a gap between strategic intent and operational execution, driven primarily by the scale and complexity of required changes and constrained resources. To close this gap, manufacturers must embrace a comprehensive, transformative approach by adopting frameworks like the **Smart Industry Readiness Index (SIRI)**. SIRI offers an all-encompassing assessment of operational efficiency, technology integration, and organisational readiness, serving as a critical roadmap for companies advancing toward Industry X.0. Through SIRI, manufacturers gain actionable insights and a clear path to accelerate their digital transformation journey, ensuring resilience and future competitiveness. Leading manufacturers have advanced by implementing foundational and innovative strategies that reinforce value chains, creating a best-practices playbook for organisations throughout the industrial ecosystem. The magnitude of transformation required calls for enhanced collaboration between the private and public sectors. Organisations like the International Centre for Industrial Transformation (INCIT) play a pivotal role in facilitating knowledge exchange and fostering partnerships that drive industrial growth and competitiveness.

Embracing a proactive, holistic approach to digital transformation empowers manufacturers to navigate future disruptions, drive sustainable growth, and deliver lasting economic, societal and environmental impact by aligning strategy with operational strength and fostering value chain collaboration. This can be achieved, inter alia, through the drivers below:

Globally Integrated, Locally Adaptive Value Chains:
Transforming traditional supply chains into dynamic, globally connected ecosystems with local agility to meet shifting demands and disruptions head-on.

Digital-First Manufacturing Excellence:
Shifting from sporadic digital adoption to a comprehensive, digitally integrated production environment, driving real-time insights, efficiency, and operational synergy.

Pioneering Sustainable Growth:
Moving from a regulatory focus to a proactive, innovation-led approach to sustainability, setting new environmental standards.

Customer-Centric Value Creation:
Transitioning from cost-centric strategies to deep customer engagement, delivering unparalleled quality and personalisation.

Introduction

The Smart Industry Readiness Index (SIRI) is the world's first independent digital maturity assessment toolkit for manufacturers. This can help manufacturers to accelerate their digital transformation journeys.

The integration of digital technologies in manufacturing, accelerated by recent global disruptions, has been transformative. Companies adopting tools like big data, IoT, AI, and Generative AI are better

Industry 4.0 is revolutionising global manufacturing, fuelled by groundbreaking digital technologies like AI, IoT, robotics, and machine learning. These advancements are reshaping traditional processes, unlocking new levels of connectivity, automation, and data-driven insights. However, harnessing the full potential of Industry 4.0 is a challenging journey that demands a clear framework to assess digital readiness and track progress.

Born amid the global disruption caused by COVID-19, the Smart Industry Readiness Index (SIRI) rapidly gained traction as manufacturers sought data-driven solutions to adapt to the "new normal". In September 2020, the World Economic Forum (the Forum) and Singapore's Economic Development Board launched the Global SIRI Initiative to accelerate SIRI's adoption as an international standard for Industry X.0 benchmarking and transformation.

To further the expansion of SIRI's impact, the International Centre for Industrial Transformation (INCIT) was founded in 2021 as an independent, non-profit organisation. Supported by the Forum and other international bodies, INCIT now leads the SIRI programme, collaborating with public and private sectors to drive industrial transformation worldwide.

What is the International Centre for Industrial Transformation?

INCIT – International Centre for Industrial Transformation – is an internationally recognised global organisation dedicated to driving industrial transformation across geographies. Established to oversee the global rollout and management of the Smart Industry Readiness Index (SIRI), INCIT provides frameworks, tools, and programs to help manufacturers assess and improve their digital readiness in the context of Industry X.0. INCIT works closely with global partners, including both public and private sectors, and offers various training, certification programmes, and assessment tools. Its goal is to facilitate digital transformation by enabling companies to evaluate their current digital maturity and plan effective strategies for modernisation.

It is an independent, non-government, non-profit organisation focused on accelerating the transformation of the global manufacturing industry. Our team comprises industry experts and professionals with significant experience in the transformation of organisations, processes and technologies. Starting with SIRI, INCIT:

- *Developed and introduced internationally referenced frameworks, concepts and programmes for the international manufacturing community to raise awareness of trends and developments.*
- *Designs, conducts and publishes qualitative and quantitative international benchmarks to help inform companies' and governments' strategies.*
- *Facilitate sharing of learning points, best practices and insights, to help the industrial community tackle challenges and drive progress on the digital transformation journey*

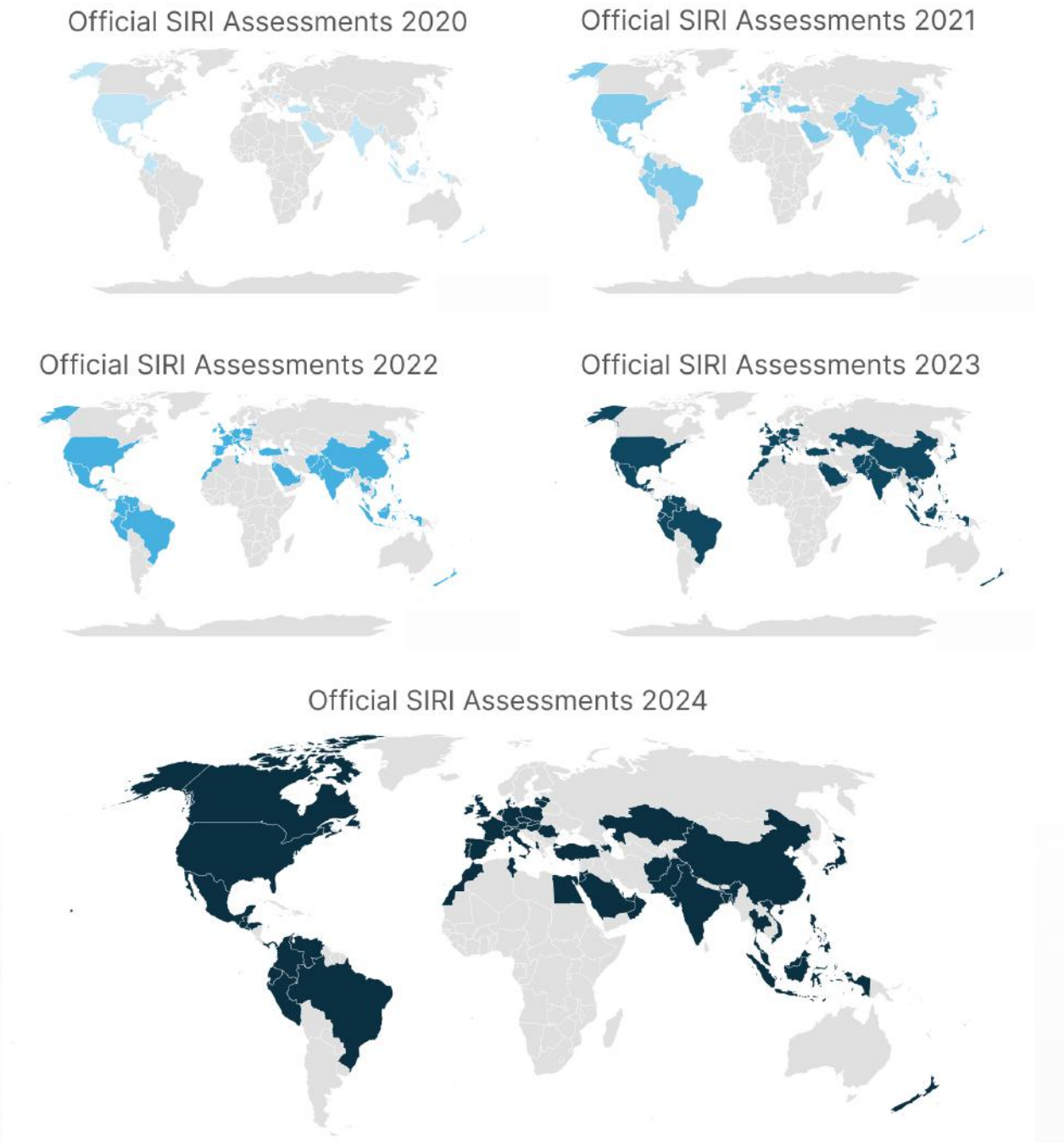
Transforming Global Manufacturing | INCIT

Smart Industry Readiness Index (SIRI)

The Smart Industry Readiness Index (SIRI) is a comprehensive framework for manufacturers to assess and advance their Industry X.0 transformation. It enhances awareness of technology's impact on manufacturing, promotes organisational alignment, and enables benchmarking of digital maturity across sites and against industry peers. SIRI helps prioritise transformation efforts, creating structured roadmaps and facilitating efficient resource allocation. With a straightforward and secure assessment process, SIRI provides a holistic view across critical areas like Process, Technology, and Organisation. SIRI offers impartial insights as an independent certified toolkit, designed to assess the digital readiness of manufacturers across various stages of transformation, independent of specific technologies or vendors.

The Smart Industry Readiness Index growth over the Years

FIGURE 1 **Global Adoption of SIRI Prioritization index, 2020 to 2024.**



Source: International Centre for Industrial Transformation

SIRI is now present in more than 60 countries!

Overall, the maps in Figure 1 show a remarkable expansion of SIRI, underscoring its impact as a critical tool for guiding and benchmarking digital transformation at a global scale. The increasing adoption also points to a future where digital readiness becomes foundational for economic growth and industrial development worldwide.

The widespread adoption of SIRI has yielded an extensive repository of data that goes beyond individual assessments to create a comprehensive view of the current state of digital maturity within the manufacturing sector. With thousands of assessments conducted globally, SIRI has built a data-driven foundation for benchmarking digital readiness, allowing manufacturers to position their progress relative to a vast array of peers. This benchmarking capability is pivotal: it enables manufacturers not only to assess their current status but also to identify strategic opportunities for advancement based on proven industry trends. By providing visibility into how different segments of the manufacturing industry are adopting and advancing digital technologies, SIRI offers a powerful tool for planning and prioritisation, empowering manufacturers to direct resources toward high-impact areas and measure progress over time.

In addition, the data collected from SIRI assessments has become a valuable asset for policymakers, industry bodies, and research institutions. By aggregating insights from thousands of assessments, SIRI enables governments and industry organisations to make informed decisions about where to allocate resources, how to support sectoral development, and how to promote digital transformation at a national or regional level. The benchmarking data supports evidence-based decision-making, helping to shape policies and strategies that align with the needs of the manufacturing sector in an era of digital innovation.

SIRI's continued evolution underscores its role as more than an assessment tool; it represents a paradigm shift in how manufacturing readiness for digital transformation is conceptualised and measured. As manufacturers across diverse geographies and industries participate in the SIRI assessment, they contribute to a dynamic, globally recognised benchmark that reflects the state of Industry 4.0 adoption on an unprecedented scale. The insights generated through this process offer a unique lens into digital maturity, creating a shared foundation for manufacturers, industry leaders, and policymakers as they advance toward a digitally integrated and resilient future.

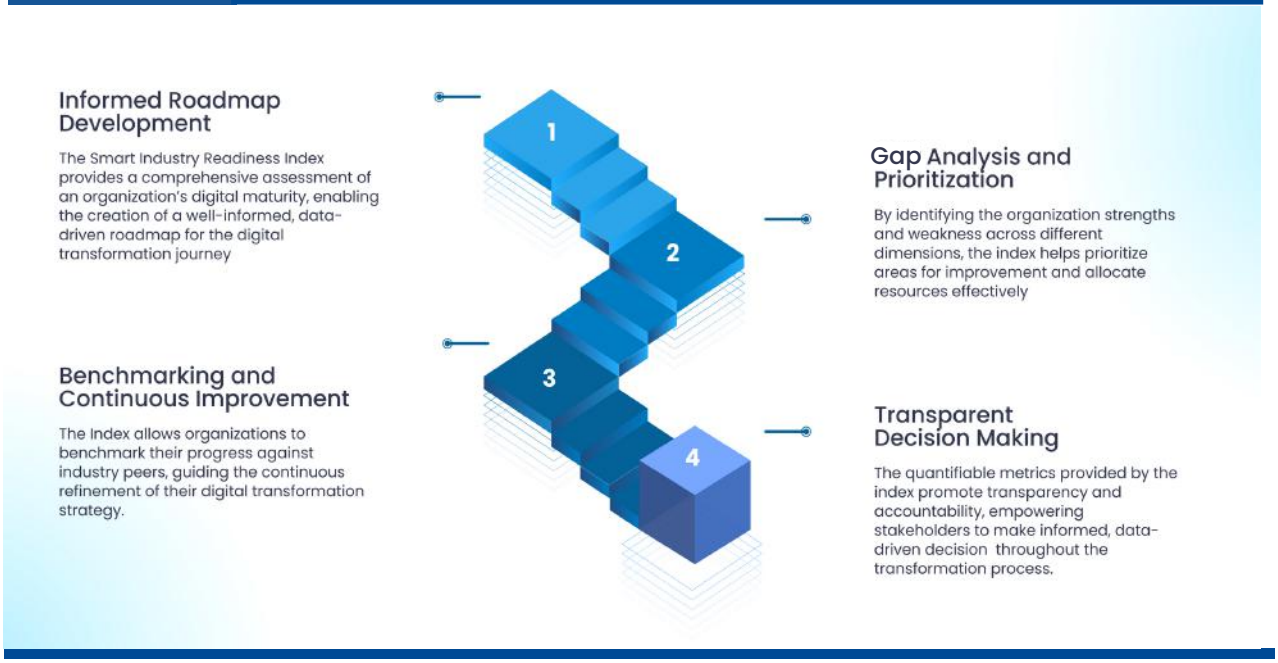
This report draws on the latest data and trends from SIRI's extensive database, offering a comprehensive perspective on the opportunities and challenges facing the manufacturing sector in the era of Industry 4.0. It provides essential insights for those seeking to understand the trajectory of digital transformation and positions SIRI as an indispensable resource for charting the path forward in an increasingly complex technological landscape

Sector-Wide Transformation and Key Takeaways

- The report offers a detailed examination of industrial transformation across various manufacturing sectors, showcasing the tangible benefits of adopting frameworks like the Smart Industry Readiness Index (SIRI).
- It includes case studies demonstrating how companies, from manufacturers to technology providers, are harnessing digital tools to boost operational efficiency, growth, and resilience.
- These insights provide a valuable roadmap for industries, governments, and trade associations focused on fostering sustainable, long-term solutions in the digital age.

Why SIRI is essential?

FIGURE 2 **The Smart Industry Readiness Index (SIRI) framework**



Source: International Centre for Industrial Transformation

SIRI is an essential tool to track transformation progress, provide measurable insights, and support the continuous improvement of digital capabilities in alignment with evolving industry standards. Smart Industry Readiness Index can be leveraged for Strategic Decision Making. Here's a summary of why SIRI is essential

Comprehensive Assessment

SIRI evaluates infrastructure, processes, and workforce readiness, offering a holistic view of digital maturity and identifying improvement areas.

Traceability and Transparency

SIRI's KPIs provide traceable insights, ensuring accountability and supporting data-driven decisions.

Structured Approach

SIRI aligns capabilities with Industry 4.0 standards, establishing a clear improvement roadmap that aligns with business goals.

Strategic Decision Making

SIRI supports benchmarking, helping organisations refine strategies, make informed decisions, and prioritise key areas.

Gap Analysis and Target Setting

SIRI's assessments identify improvement areas and set measurable milestones for transformation goals.

Agile Implementation and Upskilling

SIRI promotes agility in transformation and upskills the workforce, ensuring adaptability and sustained growth.

Understanding SIRI

Key Components of SIRI

The SIRI framework is structured to provide a clear and in-depth assessment across three critical layers as illustrated in the Figure 3 below.

Three Core Building Blocks

Process, Technology, and Organisation foundational components assess operational efficiency, technology integration, and organisational readiness essential for digital transformation in Industry 4.0 environments.

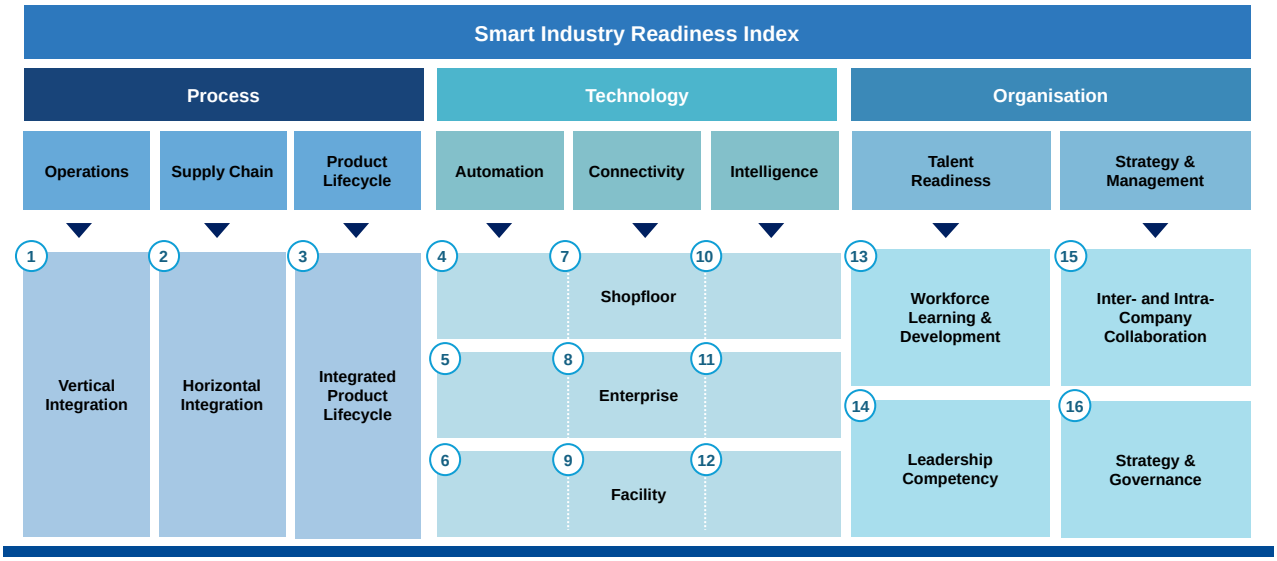
Eight Key Pillars

These pillars represent focal areas within the three core building blocks that companies must address to transition effectively to smart manufacturing.

Sixteen Dimensions of Assessment

Each dimension provides a granular perspective on a company's maturity level, facilitating benchmarking and strategic roadmap development for enhanced operational and technological capabilities.

FIGURE 3 **The Smart Industry Readiness Index framework**



Source: International Centre for Industrial Transformation

The Official SIRI Assessment (OSA)

One of the key programmes under SIRI is the Official SIRI Assessment (OSA). The OSA is a two-day independent review of a factory or plant, designed to balance technical rigor and practical applicability. It includes:

1. An assessment component, where the company's factory/plant is evaluated based on its maturity across the 16 dimensions of the SIRI framework. Post-evaluation, for each of the 16 dimensions, the factory/plant is classified into one of six maturity bands, with **Band 0** representing the lowest level of maturity and **Band 5** representing the highest.
2. A prioritisation component, also known as the **Prioritisation Matrix** exercise, draws on information provided by the company, such as their cost profile and priority key performance indicators (KPI).

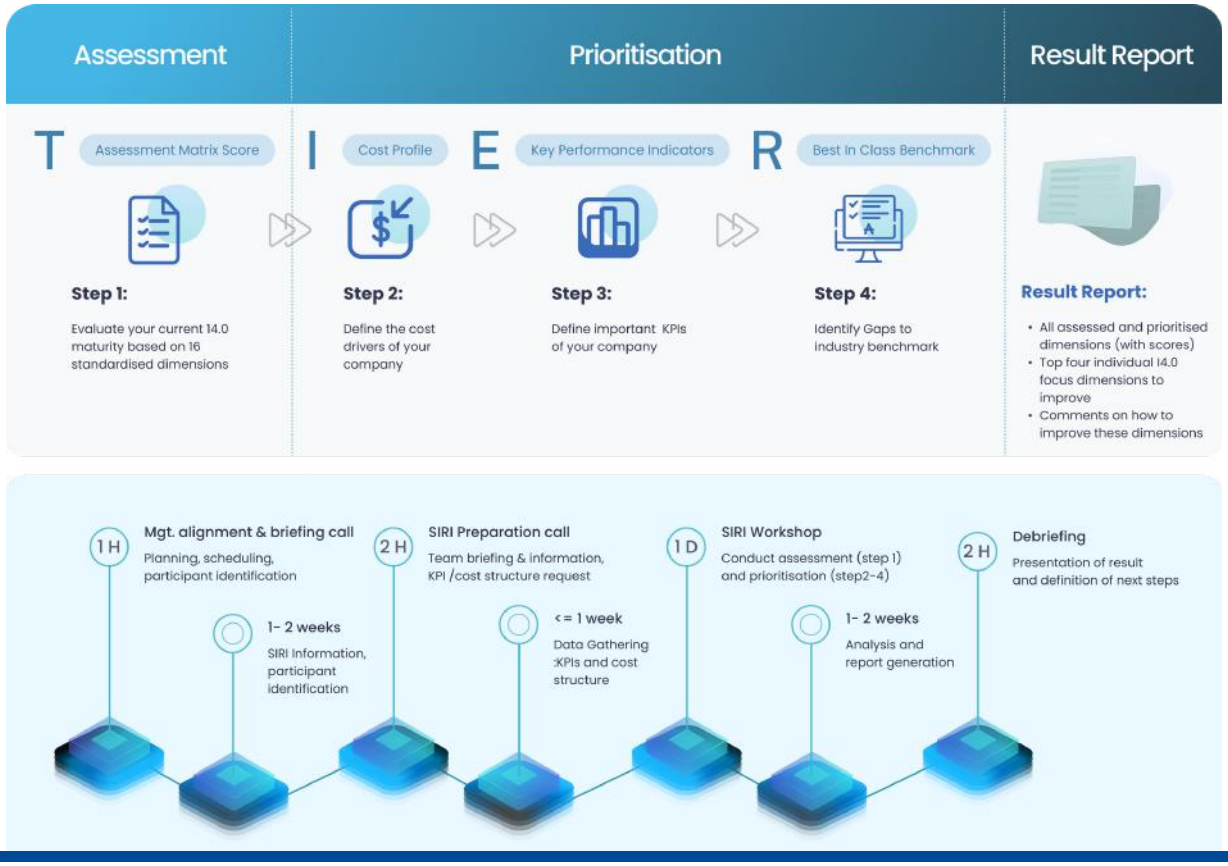
   After the OSA, companies receive a formal report with the following insights to help them start, scale and sustain their transformation journeys.

A. Characterisation of the current state of their manufacturing plants/factories.

B. Benchmarks against industry peers or other companies within a given geography.

C. Identification of high-impact areas that they can prioritise for improvement.

FIGURE 4 **A Typical SIRI Assessment – Timeline 2 Days onsite**



Source: International Centre for Industrial Transformation

There are 5 Principles of Assessment underpinning the approach in which the SIRI Assessment is conducted:

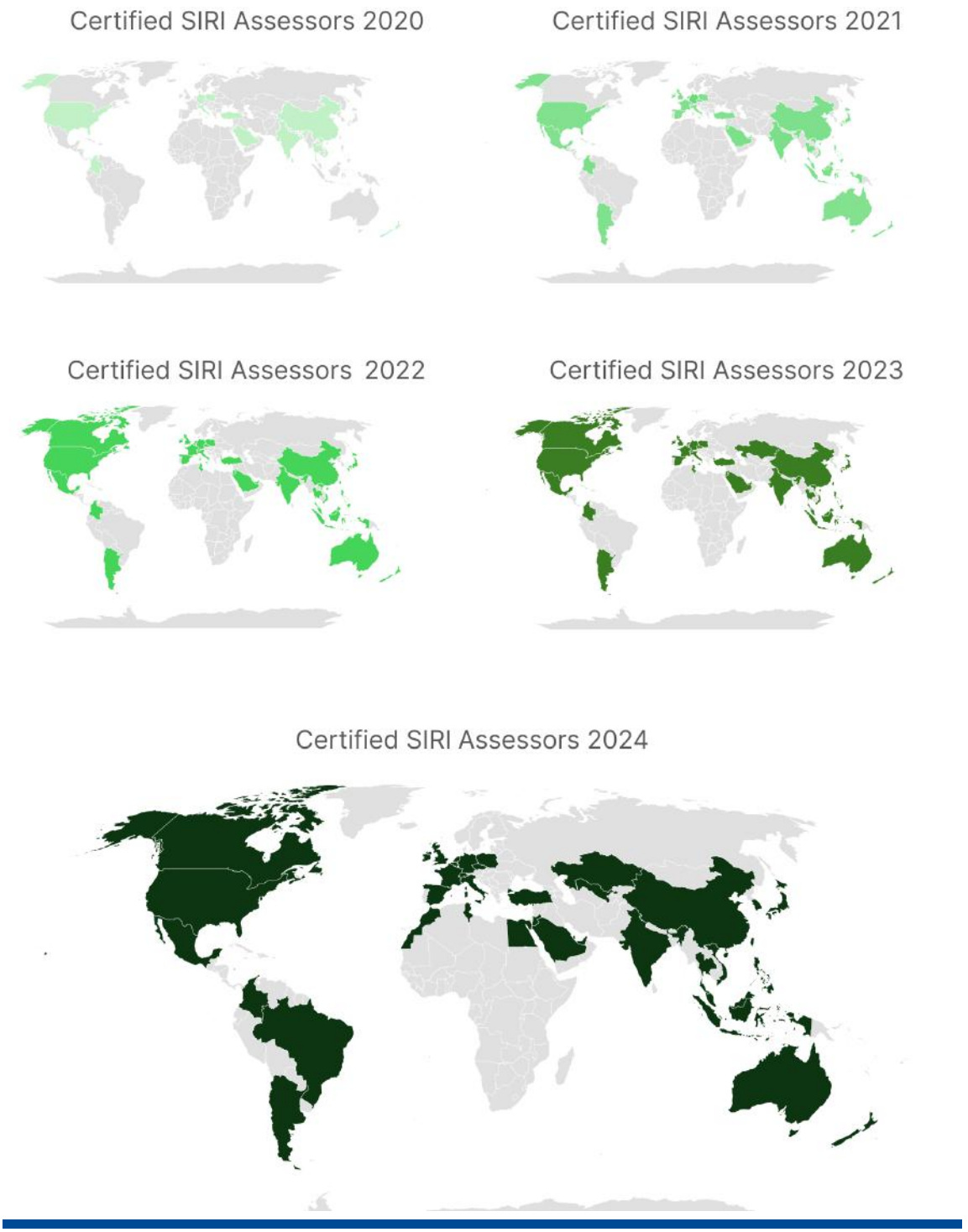
1. *The SIRI Assessment provides a snapshot of a facility's current state but not its future potential.*
2. *The SIRI Assessment uses Industry 4.0 concepts as reference points. Future manufacturing and industrial concepts, as well as technologies, should also be considered if relevant.*
3. *All dimensions should be considered, though the importance and relevance of each will vary, depending on the nature of the industry as well as the company's current and future needs.*
4. *Companies should not feel compelled to achieve Band 5 across all dimensions. Instead, they should strive towards higher bandings based on specific business needs and aspirations.*
5. *The SIRI Assessment is more than a one-off exercise – it should be used on an ongoing basis.*

Certified SIRI Assessors (CSA)

Certified SIRI Assessors' growth from 2020 to 2024 is 831%!

The (Official SIRI Assessments) OSAs are conducted by qualified individuals known as Certified SIRI Assessors (CSA). A **Certified SIRI Assessor** (CSA) is an industry practitioner trained and certified to conduct assessments using the **Smart Industry Readiness Index** (SIRI) framework. Today, the Official SIRI Assessment (OSA) counts on an impressive network of CSAs across the globe (Figure 5), and experts from the global manufacturing community continue to join this growing pool.

FIGURE 5 **Growth of SIRI Assessors across the Globe**



Source: International Centre for Industrial Transformation

Jeff Winter

Vice President, Business Strategy, Critical Manufacturing

Industry 4.0 & Digital Transformation Enthusiast | Business Strategist | Tech Geek | Avid Storyteller | Public Speaker

As the VP of Business Strategy at Critical Manufacturing, my role is to help guide strategic growth and position the company at the forefront of manufacturing innovation. But beyond that, I'm deeply involved in helping manufacturers and solution providers navigate the world of Industry 4.0.

How do you use your SIRI certification to guide companies in implementing sustainable transformation?

The certification has given me a comprehensive understanding of the SIRI framework and its 16 critical dimensions of Industry 4.0. Even though I'm not conducting the assessments myself, I use this knowledge to educate and guide companies on how to effectively leverage SIRI.I focus on helping them take the insights from the assessment and turn them into meaningful initiatives-ones that are not just theoretical but are actionable, sustainable, and aligned with their long-term strategic goals. My goal is to ensure that transformation efforts have a real, lasting impact.

How do you ensure that the SIRI process aligns with the broader industrial transformation journey of a company, including elements like planning. budgeting, and implementation?

My role is to figure out how the SIRI process fits into the larger industrial transformation journey for companies. I focus on aligning it with critical components such as planning, budgeting, road mapping. implementation, and training, SIRI helps by providing a foundational understanding of where a company stands today and a clear direction for where they need to go. I work closely with organisations to integrate SIRI into these broader initiatives, ensuring that the assessment results lead to actionable, long-term strategies.

Can you explain how you use SIRI to help organisations set realistic goals and create actionable roadmaps

SIRI is a powerful tool because it's not just about benchmarking; it's the gold standard for helping companies figure out how to structure their entire transformation journey. As a strategist, I see it as a way to help organisations define their current state, set realistic goals, and build out a roadmap to achieve them. It's not just about technology; it's about integrating SIRI into a broader, more holistic approach to industrial change, whether it's implementing new technologies, adjusting business processes, or developing talent-ensuring that each stage of the transformation is grounded in practical, measurable outcomes.

Source: International Centre for Industrial Transformation

Ayman Aljohani

CEO IIoT Solutions Full-time

Industry 4.0 & Digital Transformation Enthusiast | System Integrator | IIoT Architect | Founder of IIoT Solutions | Open source advocate | Digital transformation expert

Ayman Aljohani is a seasoned digital transformation expert and System Architect with extensive experience in industry 4.0, automation, and control systems. As the founder and CEO of IIoT Solutions, Ayman has led impactful projects across the GCC region, helping manufacturers transition to digital operations through innovative integration and data acquisition solutions. He specializes in using the Smart Industry Readiness Index (SIRI) framework to evaluate and enhance operational efficiency. With a unique blend of technical and financial analysis expertise, Ayman provides actionable insights that drive sustainable transformation, tailored to each company's cost profile and strategic objectives.

How do you use your SIRI certification to guide companies in implementing sustainable transformation?	With my SIRI certification, I guide companies by conducting in-depth assessments that not only gauge digital maturity across technology, process, and organisational structure but also dive into integration and data acquisition capabilities. I identify key areas where integrated systems and real-time data flow can significantly enhance operational insights and efficiency. Furthermore, I incorporate financial analysis into the SIRI framework to ensure that each recommendation is economically viable and aligned with the company's budgetary constraints and investment goals. This combined approach helps create a customised, financially sustainable roadmap for digital transformation, laying the foundation for long-term success.
How do you ensure that the SIRI process aligns with the broader industrial transformation journey of a company, including elements like planning. budgeting, and implementation?	lensure alignment by leveraging my expertise in system integration, data acquisition, and financial planning to connect the SIRI process with a company's overall transformation strategy. By working closely with company leaders, I map out a comprehensive roadmap that integrates data acquisition points throughout their operations, enabling real-time insights and enhanced decision-making capabilities. Through detailed financial analysis, I ensure that each phase of the transformation joumey is backed by an appropriate budget and aligns with the company's financial goals. My approach involves building an interoperable network that supports gradual improvements, making sure the transformation journey is both strategic and financially manageable
Can you explain how you use SIRI to help organisations set realistic goals and create actionable roadmaps	Utilising the SIRI framework, I help organisations establish realistic data-driven goals that account for both their current digital maturity and their integration capabilities. By analysing the data acquisition potential across various points in their production processes, I provide insights into achievable milestones that reflect each company's unique operational strengths and limitations. Additionally, my experience in financial analysis allows me to develop actionable roadmaps that consider cost-effectiveness and ROI, ensuring that each step is not only technically feasible but also financially prudent. This strategic planning process ensures that organisations can implement sustainable transformation initiatives that deliver real value.

STATE OF INDUSTRIAL TRANSFORMATION

1 Data-Driven Insights for Tailored Transformation

The global manufacturing community are actively seeking data-driven insights to better understand how different industry sectors across geographies are incorporating advanced manufacturing concepts and technology into their digital transformation strategies. Understanding the maturity profile of each sector can help companies, trade associations, business chambers, governments, and even developmental banks identify company- and sector-specific opportunities that lead to more customised intervention

1.1 The archetypes of transformation map of Industries

This describes the four main transformation profiles that a manufacturing sector can fall within, based on the SIRI Maturity and SIRI Variance of the given sector.

Understanding SIRI Maturity profiles for 12 industries helps identify digital transformation progress, disparities, and opportunities for customised interventions

SIRI Maturity

It is a ranking measure of how companies within an **industry sector have collectively performed** in the OSA across all 16 dimensions, as compared to other sectors. A **higher ranking indicates that the industry is likely to be further ahead** and more mature in its industrial transformation journey.

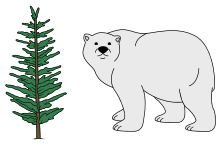
SIRI Variance

It measures the **degree of dispersion among SIRI Maturity levels** of companies within a given industry sector. The lower the SIRI Variance, the more uniform the pace of industrial transformation in the sector. The **higher the SIRI Variance**, the greater the **disparity in transformation levels within the sector.**

Industry Performance Cards (IPC)

These are industry-specific benchmarks that offer an “apples-to-apples” comparison for companies to assess their performance against industry peers. The IPCs for each of the 12 industry groups can be found in the Appendix of this report. In conclusion, the **SIRI maturity profiles provide valuable insights into the digital transformation progress** of 12 manufacturing industry clusters. By analysing SIRI Maturity, which ranks industries based on overall performance across 16 dimensions, and SIRI Variance, which measures disparities within sectors, organisations can identify opportunities for sector-specific improvements. The source of insight, like the Industry Performance Cards (IPC), enables companies to benchmark themselves against peers, helping governments, businesses, and trade associations make **informed, customised interventions**.

Table 1: The four archetypes of transformation

RAINFOREST 	The rainforest is a habitat with year-round rainfall, ample sunlight and comfortable temperatures, all of which facilitate the growth of lush vegetation. Yet, despite such favourable conditions, some plants still falter. The "Rainforest" archetype describes industries that rank high in both SIRI Maturity and SIRI Variance. While most firms in a "Rainforest" archetype industry are ahead of the pack in terms of their digital transformation journeys, a small group has not kept pace.
CONIFEROUS FOREST 	A coniferous forest is associated with rows of uniform-looking pine trees growing tall and strong. The "Coniferous Forest" archetype describes industries that rank high in SIRI Maturity and low in SIRI Variance. Companies from these industries are generally ahead in their digital transformation journeys as compared to their peers in different industries, and largely similar in their pace of transformation.
SAVANNA 	The savanna is a semi-arid habitat scattered with shrubs and isolated trees. The "Savanna" archetype describes industries that rank low in SIRI Maturity but exhibit high SIRI Variance. While most companies within these industries are in the early stages of digital transformation, a small number have forged ahead, like the occasional large trees that rise above grasslands. An industry in this archetype usually has a large base of SMEs.
TUNDRA 	The tundra habitat is associated with a harsh climate, strong winds, low temperatures, and limited rainfall. The "Tundra" archetype characterises industries that rank low in both SIRI Maturity and Variance. Just as wildlife in the tundra battles formidable conditions to survive, industries in this archetype may face greater challenges in industrial transformation. Often, this can be due to company size or the nature of their products or manufacturing processes, all of which may limit the ease and feasibility of deploying certain advanced manufacturing concepts and technologies

Source: International Centre for Industrial Transformation

Realignment of Industry Clusters: Strategic Changes

In response to evolving global dynamics, INCIT has strategically realigned industry clusters to better reflect current market conditions and support innovation, competitiveness, and growth. Key changes from 2022 Whitepaper include:

Integration of Semiconductors and Electronics

- Reflecting their interdependence, semiconductors now fall under the electronics cluster, facilitating collaborative R&D and boosting advancements in AI, IoT, and advanced manufacturing.

Separation of Energy and Chemicals

- Energy now focuses on renewables, grid modernisation, and decarbonisation, while chemicals emphasise advanced materials and sustainable manufacturing. This separation allows each sector to adopt targeted strategies in line with specific market demands.

Unified Transportation Cluster

- Automotive, aerospace, and logistics are consolidated under Transportation, highlighting their shared technologies and supply chains. This shift emphasises a holistic view of mobility, including smart cities, electrification, and sustainable, interconnected transport solutions.

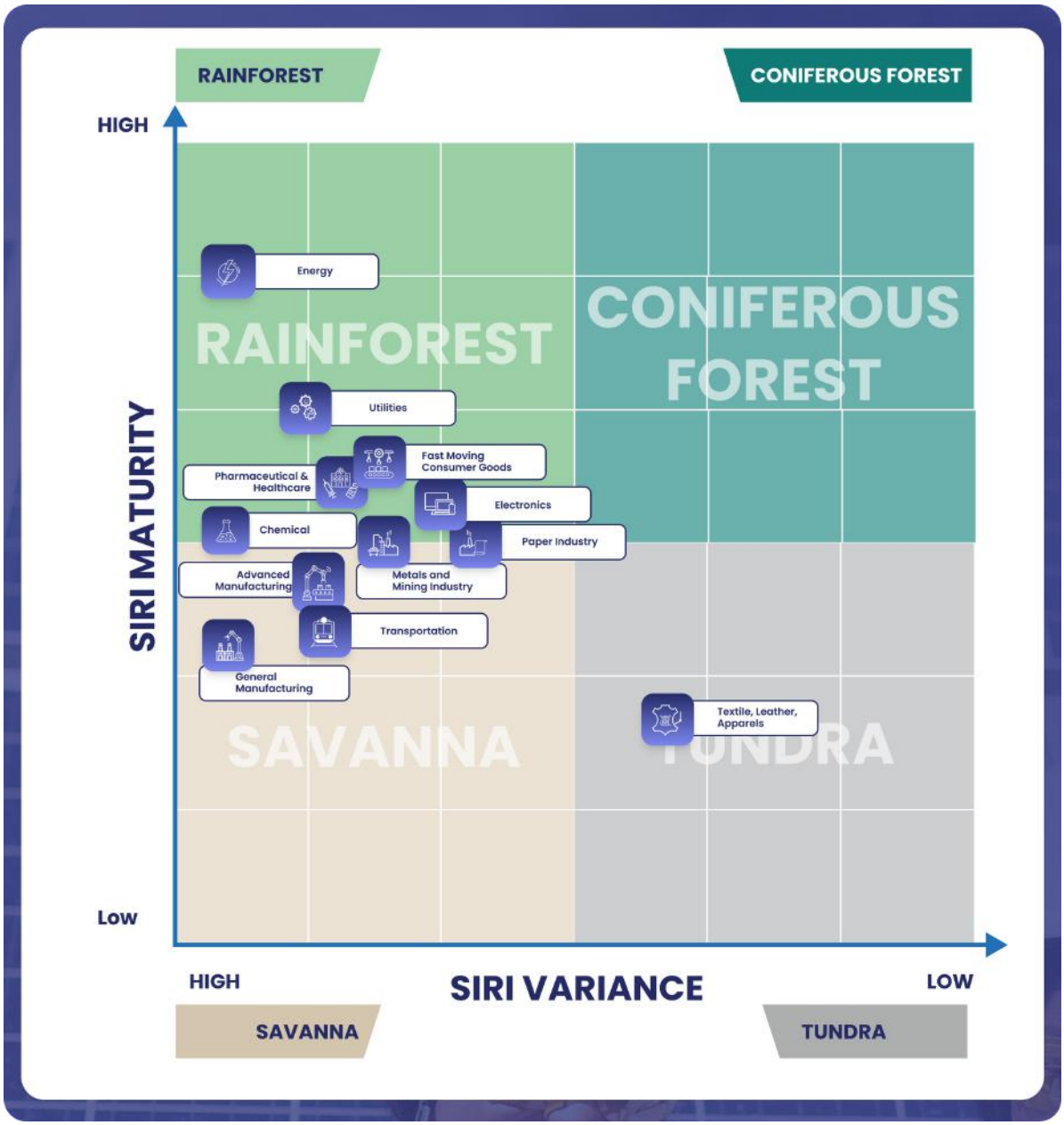
Creation and Rebranding of Specific Sectors

- New clusters like Metals and Mining, Paper Industry, and Utilities underscore the rising importance of sustainable resource extraction and material-based industries. Sectors like Fast Moving Consumer Goods(FMCG) and Pharmaceuticals have been refined to capture fast production cycles and post-pandemic healthcare trends. Additionally, Textile, Clothing, Leather & Footwear has been rebranded to Textile, Leather, and Apparels, aligning with modern industry terminology.

These adjustments allow for more precise analysis and help position industries to thrive amidst changing global conditions.

The lack of a Coniferous Forest archetype highlights no uniform maturity across industry sectors.

FIGURE 6 **The four archetypes of transformation – 2023-2024**



Source: International Centre for Industrial Transformation

Industries show varied digital transformation levels, with Rainforest sectors leading but needing support for smaller players, Savanna industries showing early progress with a few leaders, and Tundra facing foundational challenges. Tailored strategies are essential for balanced growth.

Rainforest Archetype

Chemical, Electronics, Energy, Fast Moving Consumer Goods, Metals and Mining Industry, Paper Industry, Pharmaceutical & Healthcare, Utilities

Energy and Utilities, with higher Overall SIRI Ratings, highlight sectors where larger players may dominate in terms of digital maturity, while smaller or less-resourced companies struggle to keep pace. This diversity within these industries points to a mix of digital frontrunners and lagging firms.
The lagging firms might need additional support or resources to bridge the maturity gap, ensuring a more consistent digital transformation across the sector.

Coniferous Forest Archetype

Industries: (None in the updated data)
No industry in the current dataset aligns with the Coniferous Forest archetype, which would indicate high maturity with low variance. This absence may imply that none of the Analysed industries have uniformly mature digital transformation practices. Instead, most exhibit variability, perhaps due to differences in company size, resources, or focus within each sector.

Savanna Archetype

Industries: Advanced Manufacturing, General Manufacturing, Transportation
The Savanna archetype characterizes industries with lower overall SIRI Ratings but high SIRI Variance, suggesting a few digitally mature firms within an otherwise early-stage industry.

General **Manufacturing** and **Transportation** contain a broad base of companies at the early stages of digital transformation, with select players leading the charge in adopting advanced technologies.
This disparity in digital maturity suggests a fragmented industry landscape, where SMEs may need significant support in digital skills, infrastructure, and funding to match the maturity levels of larger firms.

Tundra Archetype

Industries: Textile, Leather, Apparels
The Tundra archetype indicates industries with low SIRI Variance and low overall SIRI Ratings, signaling limited digital transformation progress across the board.

Textile, Leather, and Apparels typically comprise many small and medium-sized enterprises that may face constraints in adopting digital technologies due to limited resources, capital, or lack of industry-specific technological solutions.
This industry may require substantial intervention in the form of training, financial aid, and accessible technology solutions to overcome the challenges in digital transformation.
The updated data reinforces the diversity in digital maturity and variance across different industries:

- **Rainforest** industries show significant variation in digital maturity, with a combination of advanced companies and those needing further digital adoption. Tailored support for the lagging companies could help close the maturity gap within these industries.
- **Savanna** industries contain a mix of digital pioneers and lagging companies, indicating potential for growth if resources are allocated to uplift the digitally immature companies.
- **Tundra** industries face foundational challenges in digital transformation. These sectors would benefit from basic digital skill development, financial support, and access to scalable technologies suited to their needs.

This analysis can help prioritise interventions for each archetype, focusing on levelling the maturity within Rainforest industries, supporting digital growth in Savanna industries, and initiating foundational improvements in Tundra industries.

SIRI Maturity and SIRI Variance progression from 2022 to 2024 across Industries

From 2022 to 2024, industries have shown varied trajectories in their digital transformation journeys, as captured by changes in SIRI Variance and SIRI Maturity.

*Transition in Figure 7 does not show the New Industry Clusters which are formed after 2022

FIGURE 7 **The transition of SIRI Maturity and SIRI Variance across Industries (2022 vs 2024)**

Source: International Centre for Industrial Transformation

The data suggests that while several industries have made strides in digital transformation, the increasing variance highlights the growing divide between leaders and laggards.

Our Data does not show any industry currently falling into the Struggling Innovators Classification, indicating no sector is experiencing both declining maturity and increasing variance simultaneously.

Steady Champions

Transportation, General Manufacturing and Pharmaceuticals & Healthcare belong to this Club. Industries in this Club exhibit consistent and advanced adoption of Industry 4.0 practices with minimal variability across organisations. They are considered benchmarks for other industries.

Action Points

- Leverage best practices to sustain leadership.
- Share strategies to support lagging sectors.

Transformation-Resistant

The **Electronics** sector shows declines in both variance and maturity, indicating a contraction in digital transformation efforts across the industry. This could reflect sector-wide challenges or a leveling effect where firms are converging at a lower maturity level, potentially due to disruptions or a strategic shift. This displays uniform and minimal progress, indicating resistance to further transformation. Their progress has stagnated or regressed.

Action Points

- Identify and address root causes of stagnation (e.g., lack of investment, strategic misalignment).
- Introducing external support for workforce training and technology upgrades

Ambitious Trailblazers

Advanced **Manufacturing, Chemical, Energy, Fast-Moving Consumer Goods (FMCG), Textile Leather and Apparels** reflect overall sectoral progress, with leading companies pushing boundaries.

However, the widening gap indicates a risk of polarisation within these industries, where leaders may outpace smaller players who struggle to keep up.

Action Points

- Standardise processes to reduce variability.
- Align organisational strategies to support consistent growth

Low Variance is Critical as Reducing disparity across organisations within a sector improves collective progress. **Positive Maturity Needs Sustained Efforts** with Focus on industries like Steady Champions and Ambitious Trailblazers to maintain leadership and consistency. **Address Negative Maturity** in Industries like Transformation-Resistant and Struggling Innovators as they require urgent interventions to reverse declining trends. Industries with declining maturity levels, especially those with positive variance, may need targeted support to ensure that struggling firms don't fall further behind.

1.2 Digital Maturity - A Three-Year Journey Across Industries

In the rapidly evolving world of technology, industries strive to adapt, innovate, and lead in digital maturity. Over the course of three years from 2022 to 2024 there is a fascinating shift in ranking across various sectors, revealing how some industries surged ahead while others struggled to keep pace. This is the story of how industries battled for the top positions in digital maturity.

The top five most digitally mature Industry Clusters in 2022, 2023 and 2024

Ranking	2022	2023	2024
1	Electronics	Utilities	Energy
2	Pharmaceutical & Healthcare	Energy	Fast Moving Consumer Goods
3	Fast Moving Consumer Goods	Pharmaceuticals & Healthcare	Pharmaceuticals & Healthcare
4	Transportation	Fast Moving Consumer Goods	Electronics
5	Advanced Manufacturing	Paper Industry	Metals & Mining Industry

Source: International Centre for Industrial Transformation

Examining relative rankings alone provides an incomplete perspective without considering the absolute growth or decline within individual industries. Notably, there have been no significant leaps in maturity scores across industries.

2022: The Dawn of Electronics

In 2022, the **Electronics industry** appeared to be at the forefront of digital transformation, likely fueled by increasing global reliance on electronic devices. Many leading companies seemed focused on advanced manufacturing, AI-driven processes, and consumer electronics innovations.

Pharmaceuticals & Healthcare seemed to maintain a solid position, possibly influenced by developments in telemedicine and AI diagnostics, and digital patient care. **The Fast-Moving Consumer Goods** (FMCG) sector also appeared to progress, utilising data analytics to gain insights into consumer behaviour and optimise supply chains. **Transportation** appeared to be advancing rapidly, exploring connected technologies, AI, and automation to enhance logistics and customer experiences

2023: Utilities Take the Lead

By 2023, the industry the Archetype Data from our assessment shows the landscape shift, with **Utilities** rise to the forefront, possibly driven by a move toward smart grids, IoT, and data-centric energy management to meet sustainability demands and modernize infrastructure. The **Energy sector** also makes significant strides, potentially due to investments in renewable energy management, predictive maintenance, and AI-driven operations.

Pharmaceuticals & Healthcare seemed to retain a stable position, continuing to integrate digital health technologies. **Pharmaceuticals & Healthcare** maintains a solid position due to their stringent regulatory needs, high R&D investment, and focus on patient-centric care. Advanced technologies like AI, IoT, and data analytics help ensure compliance, drive personalised medicine, and enable efficient supply chains.

2023: UTILITIES TAKE THE LEAD (CONTINUED...)

The **FMCG** sector appeared to adapt well to the digital era, utilising personalised marketing and optimising real-time supply chains.
Interestingly, the **Paper** Industry joins the top ranks, likely influenced by digitalisation in production and supply chain processes, indicating that even traditional sectors were embracing the shift toward digital solutions

2024: THE ASCENDANCE OF ENERGY

By 2024, the **Energy** sector took the lead in digital maturity, likely due to substantial investments in smart energy systems, data analytics, and innovations in sustainable energy. This shift suggests that even traditionally conservative industries may be adapting to digital demands.
The **FMCG** sector followed closely in second place, using digital tools for dynamic pricing, automated logistics, and data-driven consumer engagement.

Pharmaceuticals & Healthcare maintained a steady presence, likely reflecting ongoing advancements in digital health.
Meanwhile, **Electronics**, previously a leader, seemed to experience a slower pace of change relative to other industries, potentially due to increased competition.
Metals & Mining entered the top ranks for the first time, possibly driven by AI, robotics, and data-centric decision-making within mining operations. This indicates that the drive for digital transformation is reaching a broad range of industries.

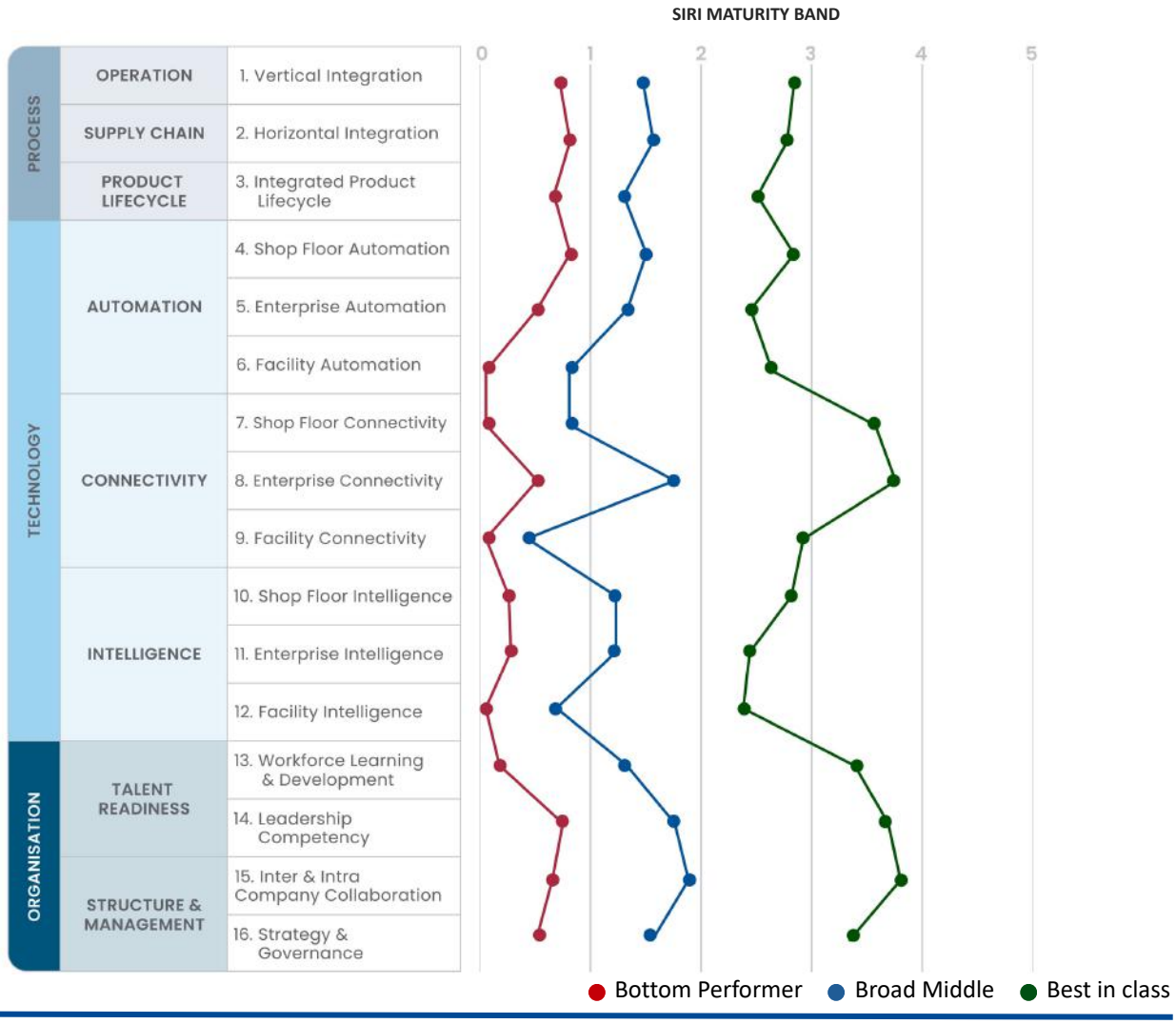
1.3 Analysing SIRI Maturity profiles at the company level with respect to the Benchmarks

The 3B Maturity Benchmark aims to show what the general maturity profile of a production site looks like, depending on whether it is highly advanced, average, or rudimentary by today's standards.

These quantitative reference points are obtained by ranking according to SIRI Maturity – all companies that have taken the OSA and classifying them into three groups

1. ***Best-in-Class**, representing the **top 10%** of companies*
2. ***Broad Middle**, representing the **middle 80%** of companies.*
3. ***Bottom Performers**, representing the **bottom 10%** of companies*

FIGURE 8 **3B Maturity Mapping 2024**



Source: International Centre for Industrial Transformation

Best-in-Class companies are consistently more mature across all 16 SIRI dimensions

This chart displays a Global 3B Benchmark for SIRI (Smart Industry Readiness Index) maturity, with data up to September 2024. The chart is segmented into three categories: Top 10%, Middle 80%, and Bottom 10%. It tracks various levels of readiness or Smart Industry maturity across different areas.

*Both **Enterprise** and **Shop Floor Automation** are seen as critical differentiators, with top-performing companies showing strong capabilities in these areas. The **Bottom 10%** struggles significantly with intelligence and connectivity, while the **Best-in-Class 10%** has higher, but not exceptional, scores.*

***Collaboration & Governance: Best-in-Class's** high scores in **Inter- and Intra-Company Collaboration** and **Strategy & Governance** demonstrate their commitment to building strategic partnerships and structured governance.*

Process

Over the last several years, manufacturers have increasingly recognised the importance of digital integration. By 2022, the **Broad Middle** had clearly defined processes but had only started to approach digitisation, with basic implementations across vertical and horizontal integration, product lifecycles, and automation. In contrast, the **Best in Class** had already begun integrating their digital processes, approaching advanced stages of integration. The **Bottom Performers** lagged, remaining in the early "approaching defined" stages with undefined processes in many areas.

By 2023, the **Broad Middle** progressed toward digital adoption, approaching advanced levels in automation and integration processes. The Best-in-Class moved closer to fully integrating their processes, nearing automation in both vertical and horizontal dimensions. However, the **Bottom Performers** showed little change, with undefined or basic processes.

In 2024, the trend continued, with the **Broad Middle** solidifying their defined processes but still far from full integration, and the **Best in Class** making strides toward automation. The Bottom performers are still struggling to move past the basic stages of process digitisation and integration.

Best-in-Class companies are nearing full process **integration and automation**, leveraging data and analytics to optimise operations and aligning organisational goals for agility and resilience. The **Broad Middle** is progressing in digitisation but remains in a transition phase, with processes not yet fully automated or integrated, and a gap in aligning digitised systems with analytics. The **Bottom performers** lag significantly, with fragmented processes and minimal digitisation, risking inefficiency and obsolescence without a clear strategy for integration.

The Broad Middle is advancing in Process digitalisation but must prioritise full integration, while the Best-in-Class have moved ahead with automation and intelligent systems. The Bottom Performers remain far behind, needing urgent focus on digital integration strategies to close the gap.

Technology

In 2022, **Best-in-Class** companies began laying the groundwork for real-time, secure, and interoperable connectivity systems. The **Best-in-Class** had already implemented advanced levels of automation and connected environments where assets and systems exchanged information seamlessly. For the **Broad Middle**, connectivity was only basic, meaning processes were partially automated, with significant human intervention. Companies were only beginning to connect shop floors and enterprise systems, with few having achieved full interoperability. The **Bottom Performers** remained at the early stages, with most connectivity undefined or non-existent.

By 2023, connectivity became a stronger focus for the **Broad Middle**, and progress was seen in both enterprise and shop floor connectivity, moving from basic to interoperable levels. The best in class continued refining their real-time data systems and diagnostics, allowing them to unlock greater efficiency. The **Bottom performers** had yet to establish any meaningful connectivity.

Best-in-Class companies lead in technology with real-time, secure, and scalable connectivity across all domains, leveraging IIoT for seamless communication and predictive automation to optimise processes. The **Broad Middle** is advancing but struggles with real-time, secure networks and fully integrated systems, limiting their use of predictive intelligence for decision-making. The **Bottom 10%** remains largely disconnected, with minimal technological adoption and fragmented systems, hindering their ability to utilize automation and data-driven insights, which significantly impacts productivity and competitiveness.

The Best-in-Class companies excel in real-time, secure connectivity, unlocking the full potential of automation and predictive intelligence. The Broad Middle is adopting these technologies but lags in full connectivity, while the Bottom Performers remains disconnected, limiting productivity. To progress, companies must enhance IIoT architecture, connectivity, and automation

Organisation

In 2022, many companies across the Broad Middle had structured but rudimentary workforce learning programs, with limited efforts at developing leadership and governance strategies. The **Best-in-Class** companies showed more progress in integrating workforce learning and leadership competency, laying the groundwork for more independent, collaborative, and scalable organisational structures. The **Bottom 10%** remained informal, with limited understanding and cooperation across teams, leaving much room for improvement.

By 2023, **Best-in-Class** companies were ahead in workforce learning and development, advancing from structured to continuous learning systems. Leadership competency improved, with leadership teams becoming more independent and engaged in collaboration across and within companies. The **Broad Middle** began formalising strategies, making incremental improvements in governance and inter-company collaboration. The **Bottom 10%**, however, workforce learning, and underdeveloped leadership, lacking the strategic focus needed continued to fall behind, maintaining informal learning environments and weak governance structures.

In 2024, the **Broad Middle** advanced further, solidifying workforce development with structured programs and some cooperative collaboration efforts. However, few companies had reached the scaling stage. The **Top 10%** continued their push toward adaptive strategies, with fully integrated workforce learning systems, independent leadership, and scalable governance models. The **Bottom 10%** showed very little movement in this pillar, with learning and leadership still in their informal stages.

Best-in-Class companies excel with agile structures, continuous learning, and empowered leadership, supported by advanced governance frameworks that enable scaling and flexibility. The **Broad Middle** has made progress in workforce development and leadership, but they still rely on static models and face challenges in scaling and agility. The **Bottom 10%** continues to struggle with informal structures, minimal for digital transformation, leaving them increasingly behind in the digital era.

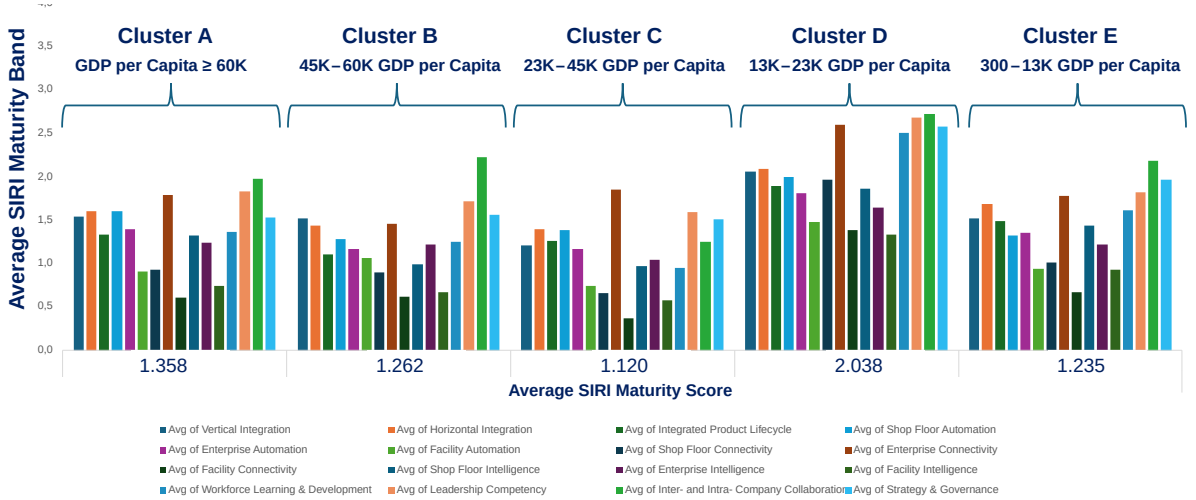
Best-in-Class companies foster innovation with continuous learning and agile structures, while the Broad Middle improves but remains limited by static training. The Bottom performers struggle with informal practices, hindering transformation. Companies must focus on workforce retraining, leadership development, and adaptive governance to thrive in digital transformation.

The data shows a widening gap between **Best-in-Class** and the **Bottom Performer** across all pillars. The **Broad Middle** is progressing slowly, particularly in digitisation and connectivity, but needs to accelerate organisational strategies and workforce retraining to stay competitive. **Best-in-Class** companies lead with near-full automation, real-time connectivity, and adaptive systems, supported by agile structures. Meanwhile, the **Bottom 10%** lags in all areas, with minimal progress in digitisation and transformation, putting their long-term viability at risk.

1.4 SIRI Performance distribution comparison across 5 Different Clusters by GDP per Capita

Empowering manufacturing with Industry 4.0 is gateway to higher GDP per capita and global economic leadership.

FIGURE 9 **SIRI 16 Dimension maturity comparison across 5 Different Clusters by GDP per Capita***



Source: International Centre for Industrial Transformation

Analysis of SIRI 16 Dimensions for Different Clusters

The graph represents the average SIRI (Smart Industry Readiness Index) ratings across 16 dimensions, grouped by GDP per capita clusters (A, B, C, D, E) *. The numbers on the x-axis shoes the average SIRI 16 Dimension score across different Clusters.

Overall Trends:

Leadership and Collaboration:
Strong across all clusters, indicating a focus on strategic planning and partnerships.

Connectivity:
Significant gaps in **Facility Connectivity** and **Facility Intelligence** across most clusters except Cluster D.

Cluster D Excellence:
Outperforms others in nearly all dimensions, showcasing advanced industrial readiness. This reflects the high growth in some of the major developing countries in the Manufacturing Sector and that pulls up the overall Cluster performance

Cluster C and E Challenges:
These clusters need substantial improvements in connectivity and intelligence dimensions.

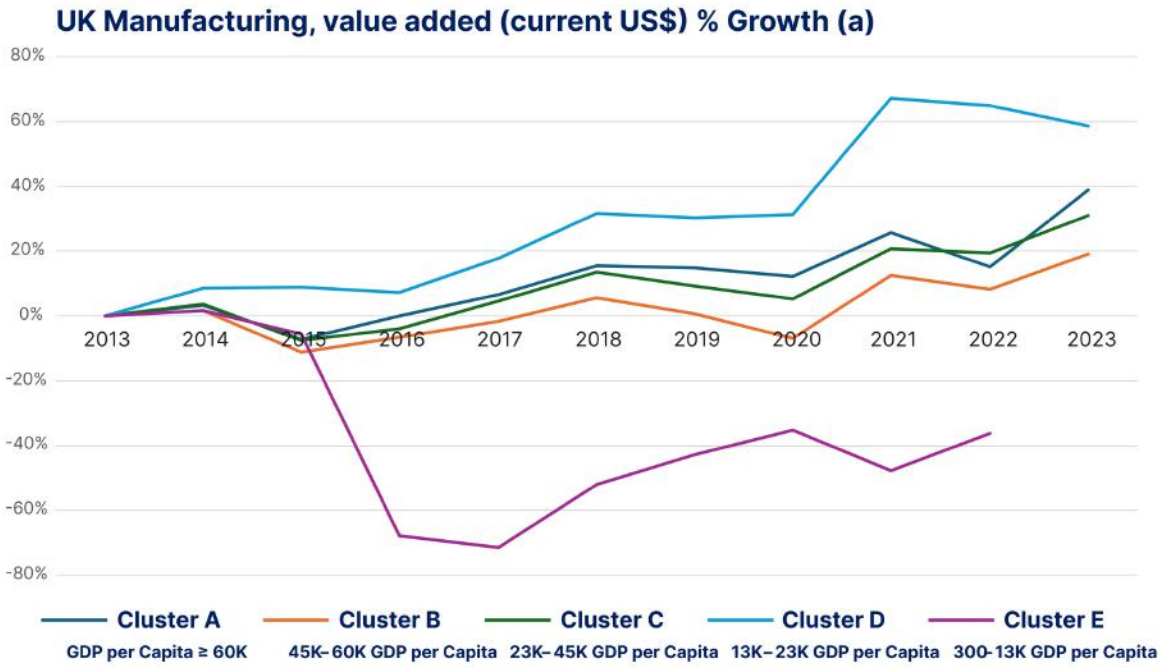
High GDP per capita reflects potential for advanced tech-nological readiness and skilled labor.
Lower GDP per capita in certain regions highlights disparities in readiness, requiring tailored approaches for workforce training and adoption

Monitoring year-on-year changes of Manufacturing Value Added can show the growth trajectory of a country's manufacturing sector.

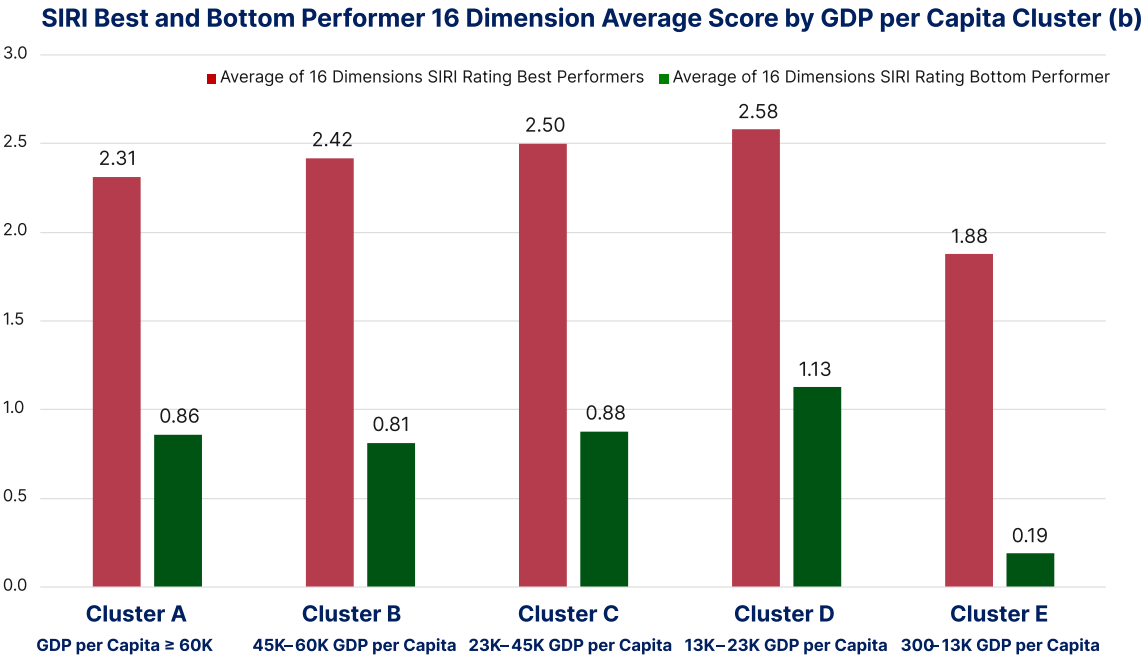
Source: International Centre for Industrial Transformation

High GDP per capita reflects potential for advanced tech-nological readiness and skilled labor.
Lower GDP per capita in certain regions highlights disparities in readiness, requiring tailored approaches for workforce training and adoption

FIGURE 10 **Manufacturing Value Added (Current US$) Growth % for 16 Dimension SIRI rating Best Performer (a) Best and Bottom Performer by GDP per Capita Clusters (b)**



Source: International Centre for Industrial Transformation



Source: International Centre for Industrial Transformation

Monitoring year-on-year changes of Manufacturing Value Added can show the growth trajectory of a country's manufacturing sector.

It is imperative to enhance digital capabilities to maintain global competitiveness, with a specific focus. The vast disparity between the Best Performer and the Bottom Performer in Cluster E Figure 10(b) directly relates to a negative growth in Figure 10(a). Manufacturing Value Added (Current US$) metric represents the net output of the manufacturing sector after adding up all outputs and subtracting intermediate inputs. It is a critical indicator of a country's industrial performance and economic strength.

GDP is critical for understanding economic scale, while GDP per capita is crucial for assessing workforce and organisational readiness. Both metrics together provide a comprehensive picture for Industry 4.0 transformation planning.

For **Industry 4.0** transformation, both **GDP** and **GDP** per capita provide important insights, but their relevance depends on the context of the transformation.

- **Overall Economic Capacity:** A high GDP indicates a country's ability to allocate significant resources (capital, technology, infrastructure) toward Industry 4.0 investments.
- **National-Level Readiness:** Countries with higher GDPs are more likely to have large-scale industrial ecosystems that benefit from Industry 4.0.
- **Attraction of Investments:** Higher GDP economies attract global technology providers, partnerships, and infrastructure projects critical for digital transformation.
- **Workforce and Productivity:** GDP per capita provides insights into the average productivity and earning power of individuals, indicating whether the workforce is ready to adapt to Industry 4.0.
- **Technology Penetration:** Higher GDP per capita often correlates with greater digital literacy, advanced education, and workforce skills, which are critical for implementing Industry 4.0 technologies.
- **Targeted Adoption:** It helps identify regions or clusters with better technological readiness, even within countries with lower overall GDP.

Limitations:

- GDP does not reflect income distribution, workforce readiness, or the penetration of advanced technologies at a per-person level.
- High GDP alone does not guarantee that industries across the country are technologically advanced.
- GDP per capita does not capture the size or diversity of an industrial ecosystem, which can limit large-scale transformation initiatives.
- Small countries with high GDP per capita may still lack the economic scale to implement widespread Industry 4.0 transformations.

Which of the Metrics is more relevant?

For Large-Scale National Transformation: GDP

- A higher GDP reflects the financial capacity to invest in infrastructure, innovation hubs, and large-scale industrial transformations.
- Relevant for designing national strategies, funding R&D, and building large-scale infrastructure (e.g., IoT networks, smart factories).

For Workforce Readiness and Adoption: GDP Per Capita

- More relevant when assessing the ability of individuals and organisations to adopt Industry 4.0 technologies.
- Indicates levels of education, digital skills, and purchasing power, which influence the success of technology adoption at the micro level.

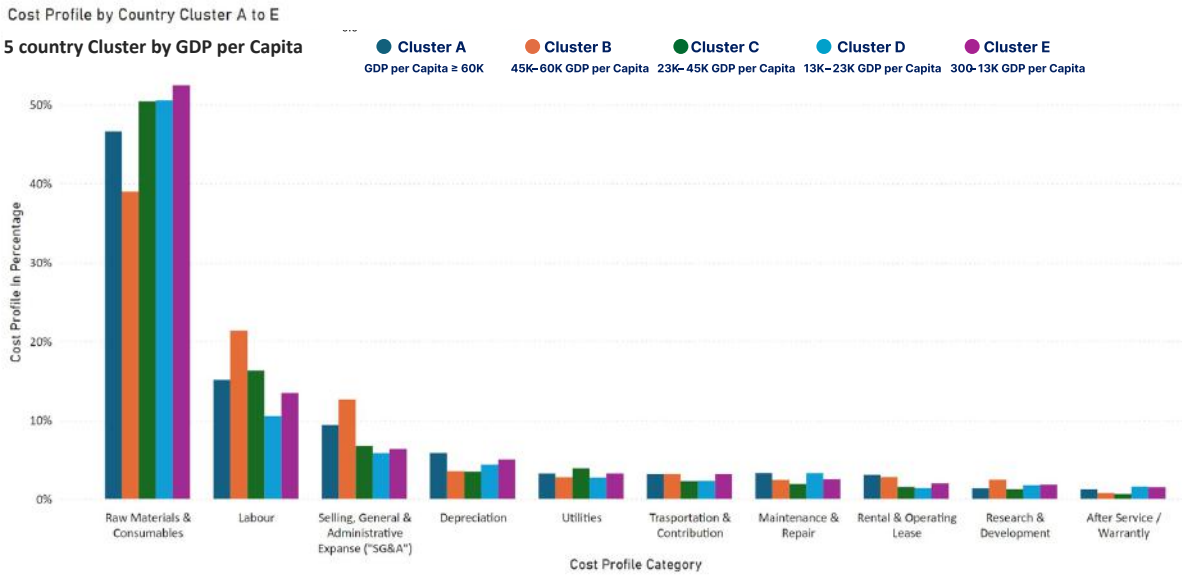
**Cluster A (GDP per Capita ≥ 60K) , Cluster B (45K – 60K GDP per Capita), Cluster C (23K – 45K GDP per Capita), Cluster D (13K – 23K GDP per Capita), Cluster E (300 – 13K GDP per Capita)*

1.5 Understanding the Relationship Between Economic Wealth and Industrial Readiness

Despite the intuitive expectation that wealthier nations would naturally excel in industrial readiness, our analysis reveals a surprising disconnect between GDP per capita and the Smart Industry Readiness Index (SIRI) rating. The scatterplot of GDP per capita versus Overall SIRI Ratings paints a compelling picture: economic prosperity alone does not guarantee a nation's readiness for smart manufacturing and advanced industrial capabilities. Rather, government priorities and policies including subsidies can play a significant role in facilitating or hindering industrial readiness for digitalisation.

The Cost Profile across different Cluster does not bring any stark difference.

FIGURE 11 **Cost Profile Distribution across different Clusters by GDP per Capita**



Source: International Centre for Industrial Transformation

Key Observations from the Analysis of Cost Profile by Clusters by GDP per Capita

Dominance of Raw Materials & Consumables

1. This category is the largest cost contributor across all clusters.
2. Clusters D and E exhibit the highest percentages, highlighting a strong reliance on raw materials in middle- to low-GDP per Capita countries.
3. Clusters A and B has a slightly lower share due to higher automation and operational efficiencies.

Labour Costs

1. Labour costs are higher in Clusters A and B (wealthier countries), reflecting higher wages and benefits.
2. Clusters D and E (lower GDP countries) have reduced labour costs, potentially due to lower wages or workforce optimisation.

Selling, General, and Administrative Expenses (SG&A):

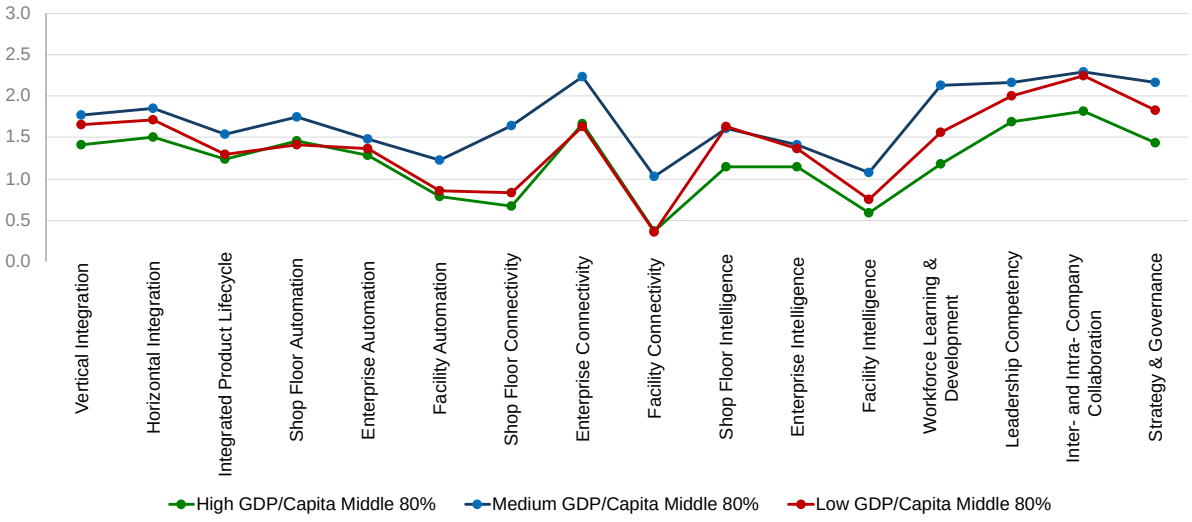
- SG&A costs are significant in Clusters A and B, reflecting complex organisational structures and administrative processes in wealthier economies.
- These costs are minimised in Clusters D and E, indicating a leaner approach in lower GDP countries.

The Cost Profile across different Cluster does not bring any stark difference.

Insights and Recommendations

1. Optimise Raw Materials & Consumables further by enhancing procurement strategies.
2. Allocate more resources to R&D to drive innovation and long-term competitiveness.
3. Address inefficiencies in SG&A to reduce overhead costs.
4. Balance labour costs by leveraging automation where feasible.
5. Prioritise reducing dependency on raw materials through local sourcing or alternative materials.
6. Invest in modernising infrastructure to minimize Maintenance & Repair costs.
7. Focus on reducing Utilities and Transportation costs through energy-efficient practices and streamlined logistics.
8. Encourage workforce development to improve productivity and reduce labour-related costs.
9. Lean heavily into cost optimisation for Raw Materials & Consumables through local sourcing.
10. Explore collaborations for shared infrastructure to reduce Utilities and Maintenance costs.

FIGURE 12 **Average SIRI Dimension Scores for 80% Broad Middle across GDP per Capita***



Source: International Centre for Industrial Transformation

The Data tells an **unexpected story** of the **connection of wealth** to the **Industry 4.0 maturity**. Our assessment data revealed a weak correlation between GDP per capita and SIRI scores. Countries with a GDP per capita ranging from $60,000 and above to GDP per Capita below $13,000 exhibit similar SIRI ratings, with some lower-income nations achieving comparable or even higher readiness levels than their wealthier counterparts. The scores across the 16 Dimension for 80% **Broad middle** for the different GDP per Capita range (Figure 12) also tells a similar story.

Minimal Correlation

A Key Insight: The calculated correlation coefficient of just 0.02 between GDP per capita and Overall SIRI Ratings highlights the weak relationship between these variables. A coefficient so close to zero indicates that GDP per capita explains almost none of the variability in industrial readiness scores. These findings challenge traditional assumptions that economic wealth directly correlates with technological advancement and industrial sophistication.

Beyond GDP

The Need for Broader Measures: The absence of a strong correlation suggests that factors other than wealth play a crucial role in shaping a country's industrial readiness. Elements such as policy frameworks, innovation ecosystems, workforce skills, digital infrastructure, and industry-specific strategies may significantly influence a nation's SIRI rating. This highlights the need for a holistic approach to industrial development that extends beyond mere financial metrics.

Divergent government priorities and varying levels of digital infrastructure investment can create significant market distortions, posing a major political risk for the development of smart industries. Differences in national policies lead to unequal access to funding, particularly in key areas such as 5G deployment, AI research, and industrial automation.

Furthermore, governments vary in their approach to digital education, with some investing heavily in STEM programs and workforce upskilling, while others lag behind. This divergence affects the availability of skilled talent and creates inconsistent levels of digital readiness across regions. As a result, companies operating across multiple jurisdictions must navigate uneven regulation and policies landscapes and workforce capabilities, impacting their ability to scale and compete globally.
Moreover, the government priorities and policies create divergent landscapes to attract global talent. Using simple and attractive visa policies as well as the provision of funding for an attractive research landscape have the potential to attract skilled workers more strongly to some regions and countries than to others.

Ultimately, depending on political views on the process of industrial transformation, some governments contribute significantly more funds to the direct support of their national companies, while others rely more heavily on private-sector initiatives. In other words, some companies and sectors might have direct access to government subsidies in digital transformation as well as research and development or companies might even be directly affiliated with state structures. This advantages some enterprises at the expense of others and may also help explain divergences in successfully building smart industries.

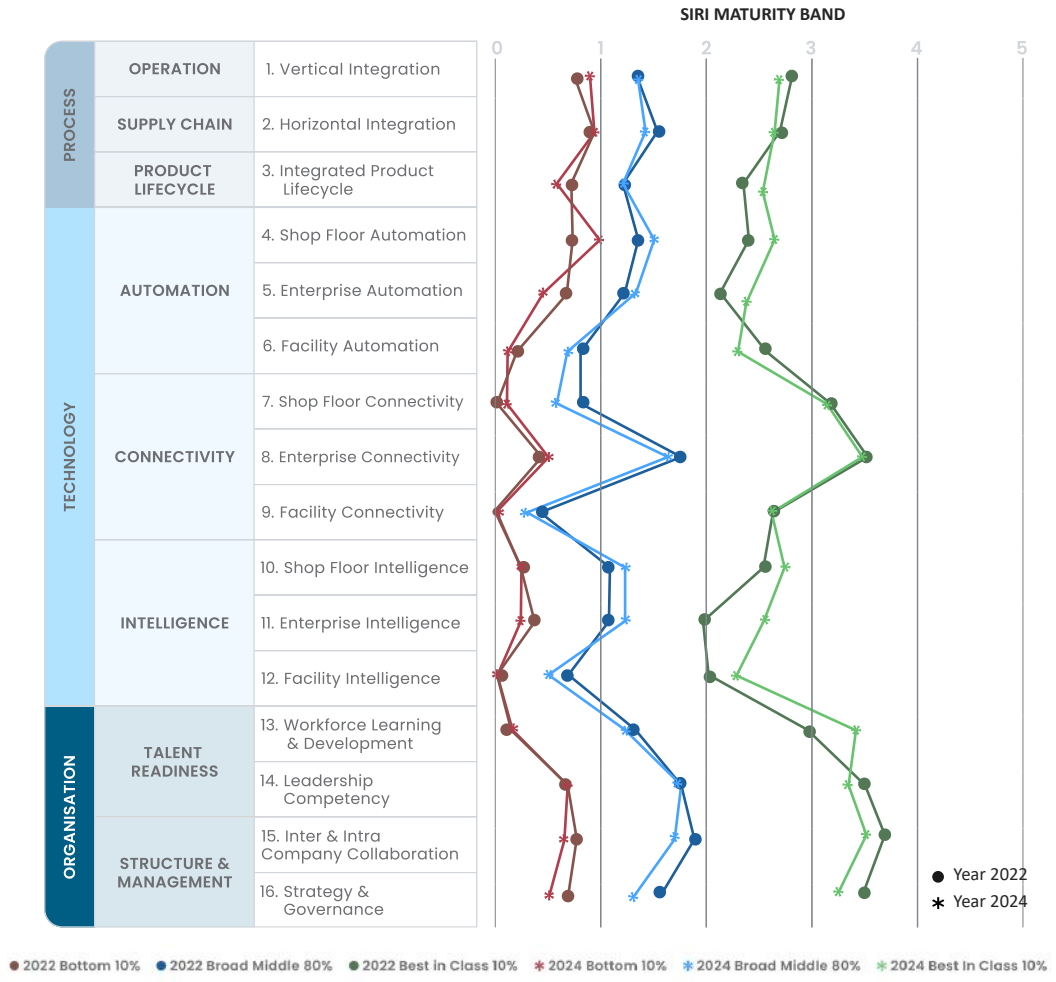
For policymakers and industry leaders, these findings underscore the importance of targeted interventions that go beyond economic growth. Investment in education, skills development, and technology adoption, combined with forward-thinking policies, can elevate a nation's industrial readiness regardless of its GDP per capita. The disparity in the data points serves as a call to action, to rethink the metrics of progress and to foster inclusive, resilient, and adaptive industrial strategies that cater to the unique strengths and challenges of each economy.

Our analysis highlights a critical insight for the global industrial landscape – economic wealth does not automatically translate into smart industry readiness. This disconnection invites us to look deeper into the unique drivers of industrial success, urging nations to craft strategic roadmaps that harness their distinct potential. As the global economy moves towards a more interconnected and technologically advanced future, embracing these nuanced understandings will be pivotal in shaping the next generation of smart industries.

**High GDP Per Capita from 40,800 to 150,000 USD, Medium GDP Per Capita from 11,200 to 40,700 USD, Low GDP Per Capita from 7,000 to 11,200 USD - Data from world bank 2023*

1.6 Comparative Progression (2022 to 2024) of SIRI ratings across 16 Dimensions Analysis

FIGURE 13 **3B Maturity Mapping Progression**



Source: International Centre for Industrial Transformation

Best in Class 10% – Leading but Stabilising; **Middle 80%** – Incremental Improvements with lag in Advanced Capabilities like interconnected systems and real-time analytics are still challenging for them to implement; **Bottom 10%** – Limited Progress and Persistent Challenges.

The 2022-2024 progression reveals a striking contrast between different tiers, while the **Best in Class 10%** is moving rapidly toward an AI-driven, interconnected environment, the **Bottom 10%** and Broad **Middle 80%** show only incremental gains.

A balanced approach, combining investments in technology and human capital, is essential to prevent these lagging tiers from falling even further behind in the digital transformation journey.

Growing Digital Divide

The gap between the **Bottom 10%** and **Best in Class 10%** continues to widen, particularly in areas such as connectivity, intelligence, and workforce development. This divide suggests that lower-performing companies are struggling to keep pace and may require targeted support to bridge the gap.

Incremental Change Over Rapid Transformation

The slow pace of change across all tiers suggests that industrial transformation, especially digital transformation, is a gradual process. This aligns with the understanding that factors like resource constraints, infrastructure limitations, and organisational readiness impact the rate of adoption.

The SIRI assessment data reveals a **stagnation shock** in all 3 Performance tiers – **Best in Class, Broad Middle and Bottom Performer.**

Stark contrast in Workforce Learning & Development

The widening gap with the Best in Class **highlights a critical digital skills divide** that goes beyond technology itself underscoring that digital transformation is as much about investing in people as it is in systems.

Way forward suggestions:

Bottom 10% – Building Foundational Capabilities

Focus on Basic Connectivity and Automation
Begin by implementing essential connectivity tools and basic automation processes. Low-cost IoT solutions can provide initial connectivity, enabling data collection and small-scale automation on the shop floor.

Prioritise Workforce Upskilling
Offer training programmes focused on digital literacy and operational technology basics. Workforce development at this stage will create a foundation for further technological adoption.

Leverage External Support and Partnerships
Seek government incentives, grants, or partnerships with technology providers to access affordable digital solutions. This external support can ease financial constraints and kickstart digital initiatives.

This suggests that, despite industry trends emphasising the importance of upskilling, a vast portion of companies seem to be overlooking this foundational aspect of digital transformation.

Broad Middle 80% – Accelerating Adoption and Building Intelligence

Expand Automation and Connectivity Initiatives

Invest in expanding automation capabilities from shop floor to enterprise levels, ensuring data flows across departments. Increasing facility connectivity will enable real-time monitoring and better data integration.

Introducing Intelligence and Analytics
Begin integrating analytics tools and predictive maintenance systems to leverage collected data. Developing enterprise intelligence can unlock insights to improve efficiency and reduce downtime.

Strengthening Workforce and Leadership Development

Offer advanced training in data analytics, AI, and process optimisation for employees. Strengthen leadership competency in digital strategy to ensure alignment across functions and drive a culture of continuous improvement.

Best in Class 10% – Advancing Toward Full AI-Driven Transformation

Optimise and Integrate Advanced Intelligence Systems

Build on existing connectivity by integrating AI-driven predictive analytics and machine learning models. This can enhance decision-making, enabling proactive and automated responses to operational changes.

Focus on Cross-Functional Collaboration and Governance

Strengthen inter-departmental and inter-company collaboration to streamline processes across the supply chain. Establish governance frameworks that continuously evaluate and adapt digital strategies.

Invest in Future-Ready Workforce Capabilities

Encourage upskilling in cutting-edge technologies like AI, robotics, and cybersecurity. Promote agile leadership and adaptive governance to empower teams to leverage digital tools effectively and stay ahead of industry changes.

General Recommendations for All Tiers

Adopt a Balanced Approach
Combine technology investments with human capital development to maximise the impact of digital initiatives. Upskilling employees and empowering leaders are as crucial as implementing new technologies.

Encourage a Culture of Innovation
Foster an organisational mindset that embraces change and experimentation. This can accelerate digital adoption across all levels, allowing organisations to quickly adapt to new technologies.

Leverage Data for Continuous Improvement
Establish metrics and benchmarks to measure digital progress regularly. Use data insights to refine strategies, focusing on high-impact areas that drive efficiency and growth.

1.7 Analysis of SIRI Maturity scores by Building blocks across the Continent

While digital transformation has been a significant focus for the past 15 years, its impact on global productivity and economic growth has been less pronounced than anticipated. Several factors have contributed to this slower-than-expected progress.

FIGURE 14 **SIRI Maturity scores by Building blocks across the continents**

Source: International Centre for Industrial Transformation

15 Years of Digital Transformation: A Critical Assessment

Limited Cross-Border Impact

- **Standardisation Challenges –** lack of global standards and interoperability hinders the seamless integration of digital technologies across borders.
- **Regulatory Disparities –** different regulatory environments in various countries create barriers to the adoption and scaling of digital solutions.
- **Digital Divide –** Unequal access to digital infrastructure and skills exacerbates disparities between countries, limiting the potential benefits of digital transformation.

Slow Progress in Adoption and Implementation

- **Organisational Resistance -** many organisations struggle to adapt to the rapid pace of technological change, facing challenges in terms of culture, skills, and processes.
- **Legacy Systems -** existing legacy systems often hinder the integration of new digital technologies, leading to inefficiencies and delays.
- **Lack of Clear Strategy -** many organisations lack a clear and well-defined digital transformation strategy, resulting in fragmented and uncoordinated efforts.

Declining Productivity Relative to Inflation

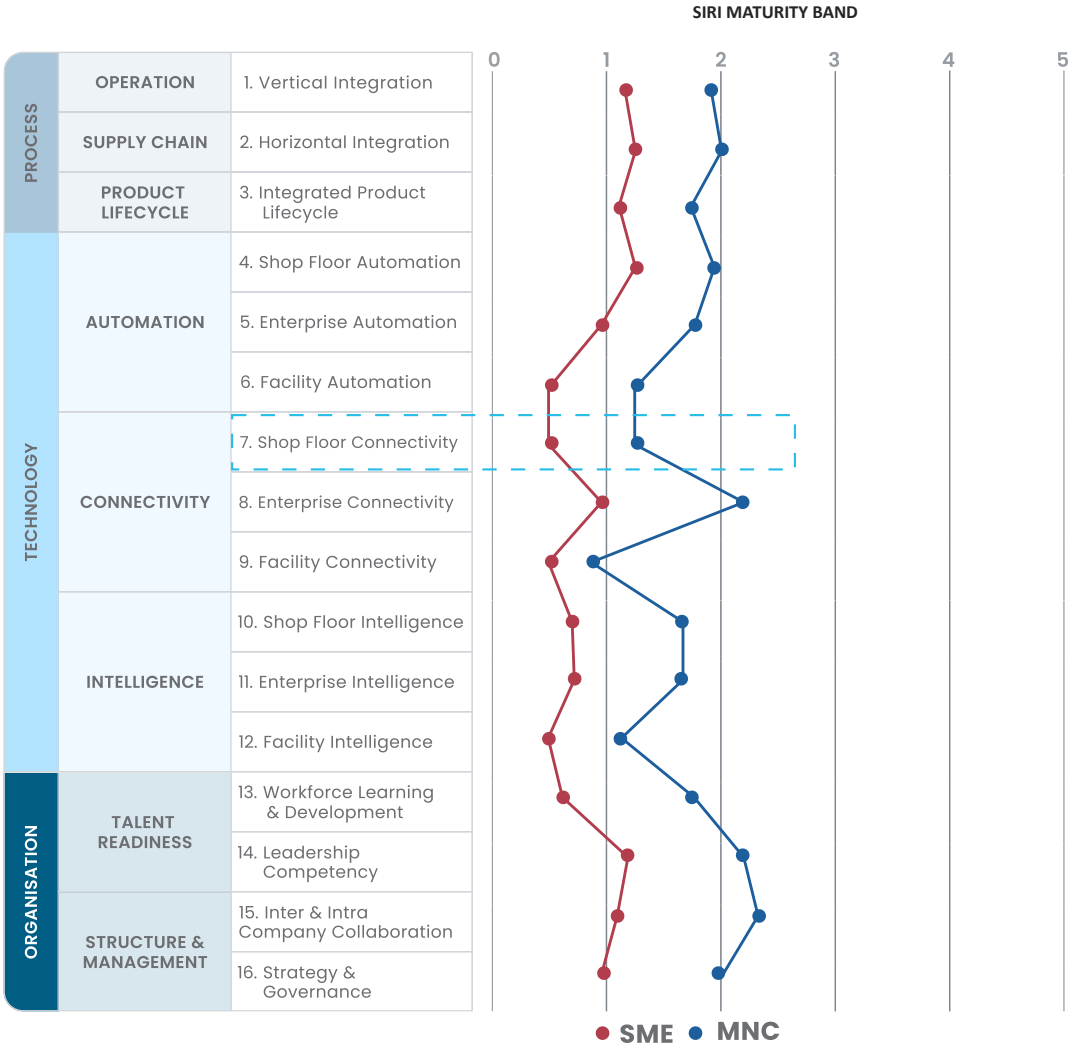
- **Automation's Impact -** while automation has the potential to boost productivity, its benefits have been offset by job displacement and skill mismatches.
- **Data Privacy and Security Concerns -** increasing concerns about data privacy and security have slowed down the adoption of data-driven technologies and hindered innovation.
- **Focus on Efficiency, Not Innovation** - many organisations prioritize cost reduction and operational efficiency over innovation and growth, limiting the transformative potential of digital technologies.
- **Talent Gap** - the shortage of skilled workers in digital technologies hampers the implementation of digital initiatives.

The insight reveals that the full potential of digital transformation is hindered by **systemic barriers** across global, organisational, and workforce levels. To drive meaningful progress, efforts must focus on addressing **interoperability through global standards**, **aligning regulatory frameworks**, and closing the digital divide with **equitable access to infrastructure and skills**. At the organisational level, overcoming **cultural resistance**, **modernising legacy systems**, and establishing clear, **innovation-focused strategies** are crucial. Moreover, addressing workforce challenges, such as **bridging the talent gap** and mitigating the impacts of automation while balancing efficiency with innovation, is essential to unlocking sustainable growth and productivity gains.

1.8 Comparing different segments of the manufacturing community

__MNC__ and __SME__ maturity profiles follow similar patterns across the 16 dimensions, with some key differences. This analysis compares MNCs (Multinational Corporations) and SMEs (Small and Medium Enterprises) across the pillars of Process, Technology, and Organisation. The comparison highlights where each company type stands in their digital transformation journey and the gaps they need to address to move forward.

FIGURE 15 **The SIRI Maturity profiles of MNCs and SMEs**



Source: International Centre for Industrial Transformation

To provide a different perspective in our analysis, we compared the maturity of MNCs and SMEs. As shown in Figure 15, the maturity profiles of MNCs and SMEs follow similar patterns across the 16 dimensions. **MNCs are ahead of SMEs by either one half or one full maturity band in most dimensions,** both the lines are running **almost parallel to each other.**

SMEs can close the digital maturity gap with MNCs by prioritising connectivity, continuous learning, leadership development, and foundational integration and automation.

In today's rapidly evolving manufacturing landscape, digital transformation is no longer a luxury; it's a necessity. While Multinational Corporations (MNCs) have generally embraced this shift, Small and Medium Enterprises (SMEs) often face challenges in catching up. A recent assessment of these two groups across SIRI dimensions reveals not only where MNCs excel but also where SMEs have potential to close the gap.

The data collected revealed a lack of focus on job shop connectivity among companies, regardless of their size. This suggests that companies may be missing out on valuable opportunities to optimise their operations through AI.

The Digital Divide: Connectivity and Intelligence

One of the most noticeable gaps lies in connectivity, especially in facility and enterprise systems. MNCs have made significant progress, achieving "interoperable and secure" connectivity across functions, which allows data to flow seamlessly and supports real-time decision-making. This high level of connectivity gives MNCs the agility to respond swiftly to market demands. On the other hand, many SMEs are still in the early stages of connectivity, particularly in facility connectivity, where integration is often minimal or absent. Limited connectivity means information is siloed, which restricts cross-functional insights, slows down response times, and reduces operational efficiency. For SMEs, investing in basic connectivity infrastructure could be transformative, allowing them to move from isolated systems to a connected enterprise and setting the stage for future advancements in data-driven intelligence.

MNCs also demonstrate greater sophistication in intelligence, particularly in shop floor, enterprise, and facility intelligence. Their systems operate at the “visible” level, enabling them to gather data and visualise it for diagnostic insights. In contrast, SMEs typically remain at the “computerised” level, where data is collected but underutilised. By adopting visualisation and diagnostic tools, SMEs could more effectively use their data, leading to better, data-informed decisions and enabling them to anticipate issues before they escalate.

Organisational Capabilities: Workforce and Leadership

The differences between MNCs and SMEs go beyond technology and extend into organisational capabilities. MNCs generally have better-established workforce learning and development programs. With a focus on continuous learning, they ensure that employees remain up to date with emerging technologies, fostering a workforce that is adaptable, innovative, and resilient.

SMEs, however, tend to have structured but non-continuous learning models. Employees receive essential training, but without ongoing skill development, their knowledge can quickly become outdated. By implementing more frequent and flexible training programs, SMEs could cultivate a workforce that is better equipped to support digital transformation and can quickly adapt to industry changes.

Leadership competency also varies significantly. MNCs tend to have more independent and adaptive leaders who are well-prepared to handle complex strategic challenges. These leaders understand digital transformation, enabling them to spearhead change across their organisations. SME leaders, on the other hand, often have limited understanding of digital strategies. Developing stronger leadership capabilities through targeted training and mentorship could empower SME leaders to guide their organisations more effectively in a digital-first environment.

The Collaboration and Governance Advantage

Another area where MNCs stand out is in collaboration—both internally and with external partners. MNCs have well-developed systems that allow seamless coordination and collaboration, fostering innovation, approach to a coordinated and collaborative structure could unlock new opportunities for SMEs. By establishing regular cross-functional meetings, using integrated project management tools, and creating clear communication protocols, SMEs could lay the foundation for more effective collaboration, both within their teams and with external partners. strengthening supply chains, and improving responsiveness to market changes.

SMEs are generally at an earlier stage, with basic communication and cooperation frameworks. Transitioning from a communication-centred

In terms of strategy and governance, MNCs are already moving through the "development to implementation" stages, with formal governance structures that support scalability and strategic initiatives. SMEs, however, are still in the process of formalising and developing governance models. Advancing toward a more structured governance framework would help SMEs build a strong foundation for growth and scalability.

Areas of Opportunity: Narrowing the Gaps in Integration and Automation

Despite the significant differences in connectivity, intelligence, and organisational maturity, the assessment shows that SMEs are closer to MNCs in certain foundational areas. Vertical and horizontal integration and shop floor automation are dimensions where SMEs have established a solid base. MNCs have moved further, achieving higher stages, but the gap here is narrower.

For SMEs, enhancing vertical and horizontal integration could involve implementing standardised processes and ensuring data flows smoothly across functions. This would improve alignment and pave the way for digital integration. Additionally, investing in more advanced shop floor automation could yield immediate benefits, optimising production, reducing errors, and setting the stage for further digital enhancements.

Conclusion: A Roadmap to Digital Maturity for SMEs

The digital maturity assessment clearly illustrates where MNCs have a competitive edge and where SMEs have opportunities to close the gap. For SMEs, the key to progress lies in focusing on foundational areas such as connectivity, intelligence, and organisational capabilities. Establishing a secure, connected environment, embracing continuous learning, and developing collaborative leadership could help SMEs make meaningful strides toward digital maturity.

SMEs are also well-positioned to improve in areas where the gaps are narrower, like integration and automation. Focusing on these areas can help SMEs build on their existing strengths while investing in high-impact dimensions. By doing so, SMEs can not only enhance their competitiveness but also build a resilient foundation for the future, as manufacturing becomes increasingly digitalised.

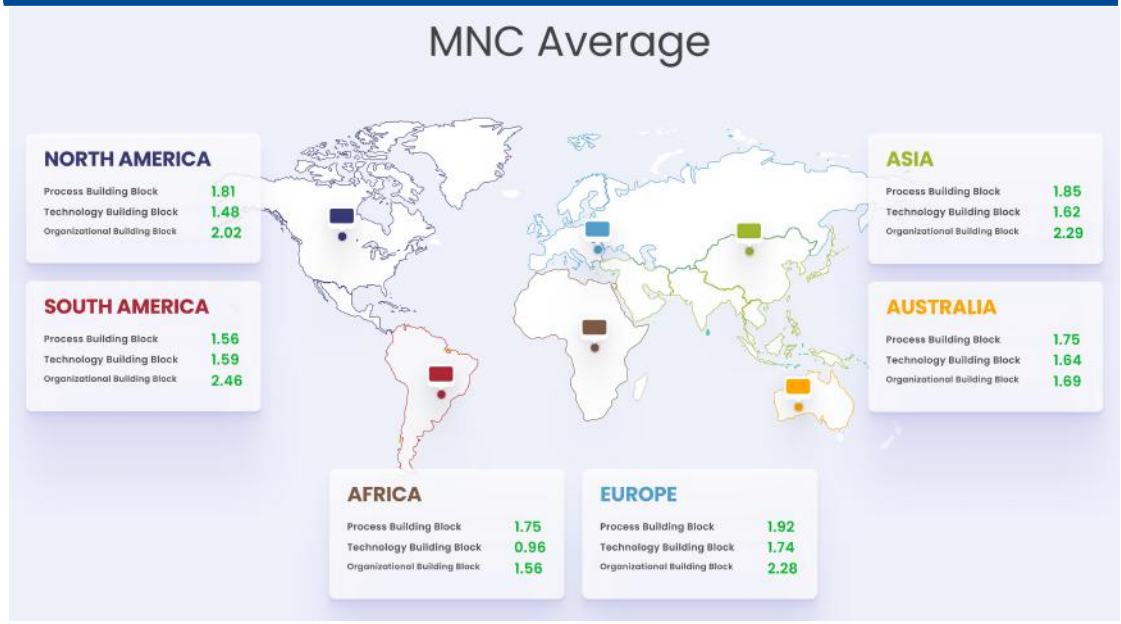
By strategically investing in connectivity, workforce development, leadership, and governance, SMEs can gradually move from basic digital practices to a more integrated, adaptive, and intelligent model. This journey will not only enable them to catch up with MNCs but will also unlock growth opportunities, positioning them as agile players ready to thrive in the Industry 4.0 era.

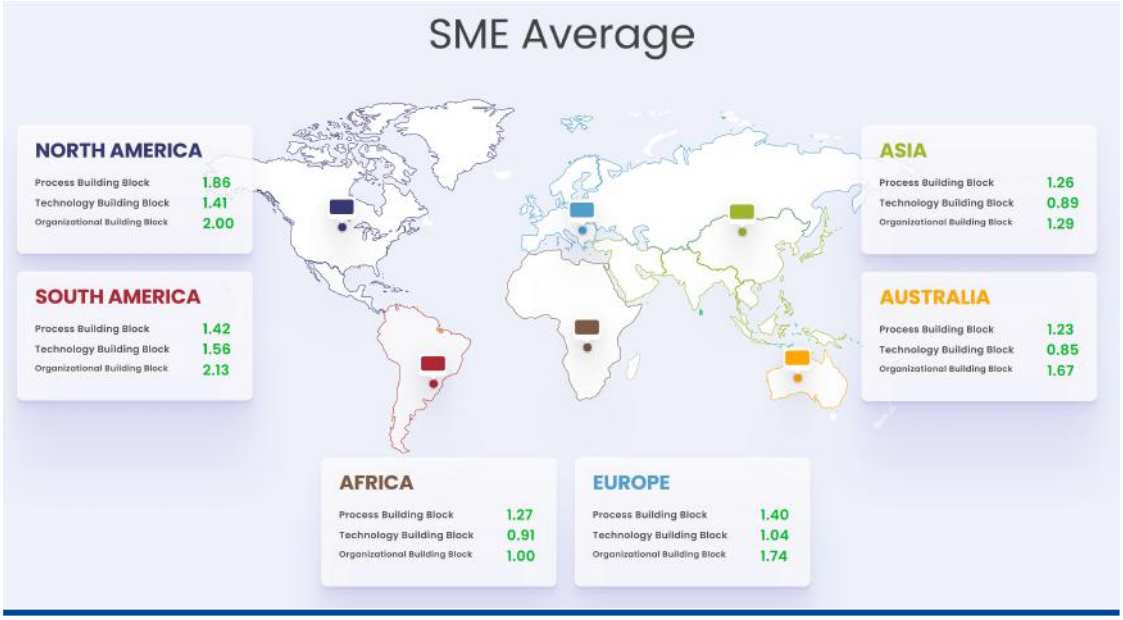
The SMEs require a Targeted support otherwise their existence will come in question.

1.9 Comparing different segments of the manufacturing community across the Continents

MNCs generally lead in digital maturity, yet rising SME maturity in regions like South America and Asia suggests smaller enterprises are increasingly pivotal in the digital economy.

FIGURE 16 **The overall SIRI *(Smart Industry Readiness Index) ratings for MNCs and SMEs across the continents)***





Source: International Centre for Industrial Transformation

Key Observations across the continents

1. **Asia's** strong SIRI ratings across diverse industries indicate that both MNCs and SMEs are embracing digital transformation, particularly in sectors critical to the region's economy like electronics, utility and energy.
2. **North America** shows balanced maturity between MNCs and SMEs, indicating that both large and smaller companies are effectively leveraging technology. This reflects North America's focus on innovation across diverse sectors, including advanced manufacturing and pharmaceuticals.
3. **South America** exhibits a unique trend where SMEs almost match MNCs in digital maturity, driven by strong performance in electronics and FMCG sectors. This suggests SMEs in the region are catching up rapidly in digital transformation.

4. **Europe** showcases a significant gap between MNCs and SMEs, with MNCs demonstrating higher maturity. This highlights Europe's advanced manufacturing and pharmaceutical sectors' reliance on large multinational enterprises for technological leadership.

5. **Africa** shows the lowest overall maturity, especially for SMEs, reflecting challenges in digital adoption across the continent. SIRI Rating Data shows Africa's digital transformation is primarily driven by MNCs, particularly in textiles and healthcare. SMEs face considerable barriers to digital adoption, especially in capital-intensive sectors. 5. Africa shows the lowest overall maturity, especially for SMEs, reflecting challenges in digital adoption across the continent. SIRI Rating Data shows Africa's digital transformation is primarily driven by MNCs, particularly in textiles and healthcare. SMEs face considerable barriers to digital adoption, especially in capital-intensive sectors.

6. **Australia** presents moderate maturity for both MNCs and SMEs, suggesting balanced growth in digital readiness. However, there is still room for improvement, particularly among SMEs in sectors such as metals and mining.

Overall, the data indicates that MNCs generally lead in digital maturity due to greater resources and access to advanced technologies. However, the growing maturity of SMEs in regions like South America and parts of Asia highlights the potential for smaller enterprises to play a significant role in the digital economy.

Key Observations across the continents by Industry

The SIRI (Smart Industry Readiness Index) ratings reveal notable differences in digital maturity between MNCs and SMEs across various industries.

Based on the SIRI ratings for the Industries across MNCs and SMEs across different continents, make these insights visible. In **Advanced Manufacturing**, **MNCs** show significantly **higher maturity**, especially in **Asia and Europe**, while **SMEs lag**, particularly in **Africa**.

Chemical Industry also shows a **high variance**, with **MNCs** in **Asia leading** due to strong industry growth, whereas **SMEs in Europe** seem to **struggle** to keep pace.

Electronics sees the **highest disparity**, with **MNCs** in **North America excelling**, while **SMEs** show **better** performance in regions like **South America**. In **Energy, MNCs** in **Asia dominate**, whereas **SMEs**, especially in North **America, lag**.

The **FMCG** sector exhibits **moderate variance**, though **MNCs** maintain an **edge**. In **General Manufacturing MNCs lead globally, with SMEs** remaining **competitive** in regions like **Australia.**

The **Metals and Mining** Industry shows a **smaller variance**. **Pharmaceutical & Healthcare** shows a **significant maturity gap**, that can be due to factors like **MNCs heavily investing in R&D** and compliance technologies, while **SMEs struggle** with **high entry barriers**.

The **Textile, Leather, and Apparels** industry sees a **closer** maturity level between **MNCs** and **SMEs**, particularly in **South America**.

In **Transportation**, **MNCs lead**, whereas **SMEs** show **strong maturity**, particularly in **North America.**

Utilities exhibit the **highest variance**, with **MNCs** in **Asia dominating**, while **SMEs** face **significant challenges** in adopting large-scale technologies.

MNCs generally lead in maturity across industries, though SMEs in specific regions show competitive growth, especially in sectors like textiles and electronics.

1.10 Comparing the Top KPI Selection across different profiles of the manufacturing community

The Prioritisation Matrix is a tailored tool used in OSA for management planning that helps companies align with strategic priorities by focusing on three essential elements: cost, top KPI categories, and proximity to the industry's best-in-class. These elements are guided by the prioritisation principles within the TIER Framework. KPIs are the "E" of the TIER Framework – Essential Business Objective.

FIGURE 17 **Key KPIs selected by manufacturers of different profiles**

Source: International Centre for Industrial Transformation

Key Performance Indicators (KPIs) are metrics that gauge a company's success in meeting its primary business goals and strategic aims. The KPI Factor of a SIRI Dimension represents how significantly that dimension can influence a company's essential business objectives.

To calculate the KPI Factor for a SIRI Dimension, companies must identify their **5 most relevant KPIs** that best align with their future goals and desired outcomes.

In assessing the top KPIs,distinct trends emerge across MNCs,SMEs,and performance tiers(Best-in-Class, Broad Middle, Bottom Performers). These key metrics reveal priorities and gaps in operational focus and highlight the most effective strategies for driving efficiency and quality.

FIGURE 18 **Key KPIs selected by manufacturers of different profiles**

Top KPIs	MNCs	SMEs
1	Asset & Equipment Efficiency	Asset & Equipment Efficiency
2	Planning & Scheduling Effectiveness	Product Quality
3	Product Quality	Planning & Scheduling Effectiveness
4	Workforce Efficiency	Workforce Efficiency
5	Material Efficiency	Process Quality

KPI Category Productivity Quality Speed Flexibility

Source: International Centre for Industrial Transformation

MNCs and SMEs: Prioritising Core Efficiency Metrics

MNCs and SMEs prioritise Asset & Equipment Efficiency as their top KPI, underscoring a universal focus on optimising machinery and equipment usage to reduce downtime and boost productivity.

For MNCs, Planning & Scheduling Effectiveness and Product Quality follow as critical KPIs, highlighting the need for precise scheduling to meet demand and maintain high standards in product quality. Additionally, Workforce Efficiency and Material Efficiency suggest a balanced focus on employee productivity and resource management.

SMEs also emphasize Product Quality as a top KPI, followed by Planning & Scheduling Effectiveness and Workforce Efficiency, showing alignment with MNCs in maintaining quality and operational effectiveness. However, Process Quality ranks as a key KPI for SMEs, indicating their focus on refining process control and consistency.

FIGURE 19 **Key KPIs selected by manufacturers of different performance bands**

Top KPIs	Best-in-Class (Top 10%)	Broad Middle (Middle 80%)	Bottom Performers (Bottom 10%)
1	Asset & Equipment Efficiency	Asset & Equipment Efficiency	Product Quality
2	Product Quality	Planning & Scheduling Effectiveness	Workforce Efficiency
3	Planning & Scheduling Effectiveness	Product Quality	Asset & Equipment Efficiency
4	Material Efficiency	Workforce Efficiency	Time to Delivery
5	Safety	Process Quality	Planning & Scheduling Effectiveness

KPI Category Productivity Quality Speed Flexibility

Source: International Centre for Industrial Transformation

Best-in-Class Companies: Prioritising Efficiency and Safety

Top 10% (Best-in-Class) organisations universally rate **Asset & Equipment Efficiency** as their top KPI, followed by **Product Quality** and **Planning & Scheduling Effectiveness**. This highlights that companies excelling in performance heavily invest in maintaining top-tier equipment efficiency and quality standards.

Material Efficiency and **Safety** are also crucial for Best-in-Class companies, reflecting a strong commitment to optimising resource use and ensuring safe work environments.

Broad Middle and Bottom Performers: Quality and Workforce Focus

Middle 80% (Broad Middle) firms align with Best-in-Class by prioritising **Asset & Equipment Efficiency** and **Product Quality.** However, **Planning & Scheduling Effectiveness** and **Workforce Efficiency** are prominent, indicating an emphasis on maintaining reliable production schedules and enhancing workforce productivity.

For **Bottom Performers (Bottom 10%), Product Quality** ranks lower, with Time **to Delivery** and **Planning & Scheduling Effectiveness highlighting**

challenges in delivering timely, quality products. **Workforce Efficiency** and **Asset & Equipment Efficiency are weaker for** these companies, suggesting areas for improvement in managing assets and optimising employee productivity.

Story and Insights:

The KPI trends across MNCs, SMEs, and performance groups paint a clear picture of operational focus:

- **Universal Focus on Asset & Equipment Efficiency**: Across all organisations, optimising equipment and asset performance is key to reducing costs and maintaining production stability.
- **Product Quality as a Core Priority**: For MNCs, SMEs, and especially Best-in-Class companies, maintaining high product quality is crucial. The emphasis on quality control signals the importance of meeting customer expectations and minimising defects.
- **Best-in-Class Safety and Efficiency**: Leading companies not only excel in asset and quality metrics but also prioritize safety and material efficiency, contributing to a balanced and resilient operation.
- **Challenges in the Bottom Tier**: Bottom performers struggle with Workforce Efficiency and Scheduling Effectiveness, pointing to potential inefficiencies in resource allocation and workforce management.

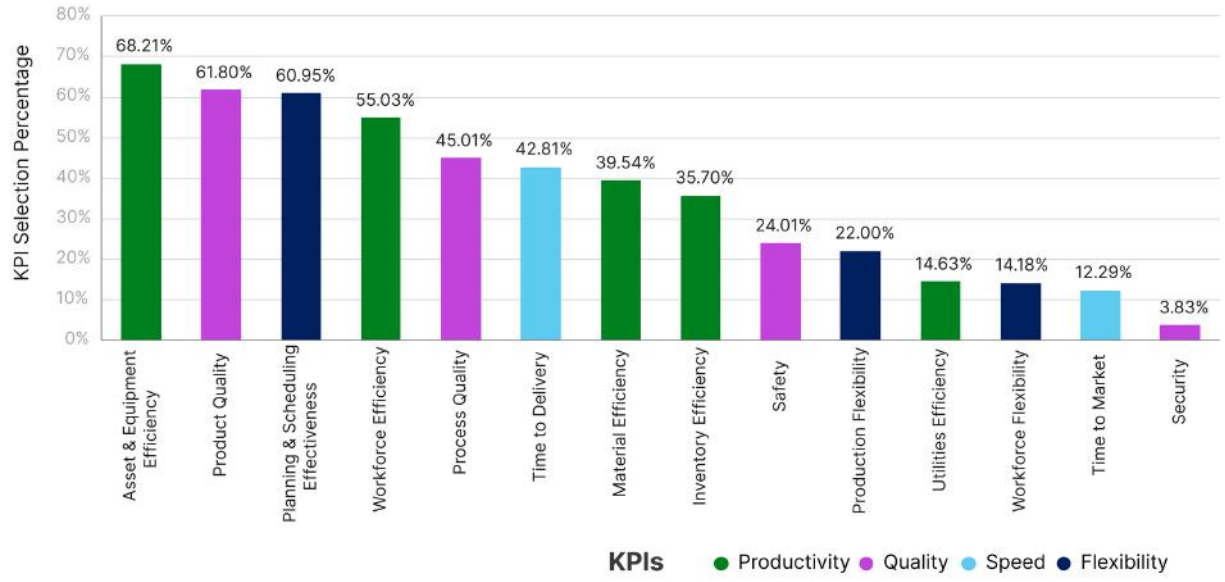
This analysis shows that while **MNCs** and **Best-in-Class** companies lead in balancing efficiency and quality, **SMEs** and **Broad Middle** firms are steadily aligning with these priorities. **Bottom Performers** highlight areas for improvement in asset use and employee productivity. To excel, companies should focus on adopting best practices in asset management, quality control, and workforce training, as these factors are critical to climbing into higher performance tiers.

Manufacturers today are strategically aligning their KPIs to boost efficiency, quality, and adaptability while embedding sustainability and safety, ensuring resilience and readiness for future industry demands.

FIGURE 20 **Key KPIs**

Manufacturers globally prioritize Productivity and quality as their top operational goals, with KPIs like Asset & Equipment Efficiency and Product Quality leading the way.

FIGURE 21 **Key KPIs selection percentages by manufacturers**



Source: International Centre for Industrial Transformation

The graph (Figure 21) illustrates the diverse yet interconnected priorities of modern manufacturers

Top Selected KPIs:

Asset & Equipment Efficiency (68.21%) is the highest-priority KPI, reflecting a strong focus on optimising equipment utilisation and resource management.

Product Quality (61.80%) and Planning & Scheduling Effectiveness (60.95%) rank next, emphasising the importance of delivering high-quality products and effective operational planning.

Moderately Selected KPIs:

Workforce Efficiency (55.03%) and Process Quality (45.01%) show significant attention to workforce productivity and process optimisation.

Time to Delivery (42.81%) and Material Efficiency (39.54%) suggest a growing emphasis on reducing lead times and minimising material waste.

Least Selected KPIs:

Security (3.83%) and Time to Market (12.29%) are the least prioritised, possibly due to their lower relevance in certain industries or the challenges associated with these areas.

Workforce Flexibility (14.18%) and Utilities Efficiency (14.63%) indicate less immediate focus compared to core productivity and quality-related metrics.

In conclusion, the diverse selection KPIs demonstrates that manufacturers are not only focused on improving immediate operational efficiencies but are also preparing for future challenges through sustainability, safety, and flexibility. This strategic alignment of KPIs ensures that manufacturers can continue to thrive in a rapidly evolving industrial landscape.

1.11 Comparing the Planning horizon selected by manufacturers of different profiles

FIGURE 22 **Planning horizon selection by manufacturers of different profiles**

Planning Horizon	Strategic	Tactical	Operational
MNCs	61.61%	31.93%	6.46%
SMEs	42.10%	43.49%	14.41%
Best-in-Class (Top 10%)	78.57%	17.65%	3.78%
Broad Middle (Middle 80%)	46.22%	41.81%	11.97%
Bottom Performers (Bottom 10%)	34.82%	48.18%	17.00%

Source: International Centre for Industrial Transformation

The landscape of digital transformation is evolving rapidly, with companies across industries recognising the need to adapt quickly. The pace of action or hesitation can dramatically impact their ability to sustain quality, customer trust, and market relevance. As digital disruption touches nearly every sector, the imperative is clear – transform or be outpaced by more innovative competitors.

However, a key insight from our observations is that companies differ significantly in how they approach planning for this transformation. Depending on their size and maturity, organisations display varied planning horizons, especially in manufacturing. Large multinational corporations (MNCs) and Best-in-Class companies, which tend to lead the way in digitalisation, focus predominantly on long-term strategic plans with their planning aimed at strategic goals. This is a reflection of their access to greater resources, established processes, and confidence in forecasting further into the future.

In contrast, smaller firms, such as SMEs and Bottom Performers, are more constrained, with a stronger focus on tactical and operational planning horizons. These organisations are more likely to prioritize immediate needs and short-term goals, driven by limited resources and a need to react quickly to immediate market pressures.

This difference in planning approaches highlights a potential risk: the maturity gap between digital leaders and late adopters could widen, especially during times of economic turbulence. Smaller companies and those in the early stages of their digital journey could struggle to look beyond pressing short-term challenges, limiting their ability to innovate and compete in the long run.

Governments, policymakers, and industry leaders must be mindful of this growing divide. Strategic interventions, such as targeted support and incentives for SMEs, can encourage these organisations to stretch their horizons and invest in long-term digital strategies. Without such assistance, there is a real risk that smaller or less mature businesses could be left behind as digitalisation becomes the new baseline for success in manufacturing and beyond.

Ensuring a more inclusive digital transformation will not only help balance the competitive landscape but also drive a more widespread economic resilience across all tiers of industry.

1.12 Comparative Progression (2022 to 2024) of SIRI ratings across different continents

Steady growth in all areas makes Asia a strong contender for digital transformation leadership.

FIGURE 23 **Progression of SIRI Building Blocks across Continents**

Source: International Centre for Industrial Transformation

Progression of SIRI Building Blocks across Continents (Figure 23) shows the progression across SIRI Dimension Scores, making the baseline as *SIRI Building Block Average score of 2022 and comparing that to scores from 2023 and 2024 assessments.*

Balanced Growth: Asia exhibits balanced growth across all three areas, showing steady progress in process optimisation, technology adoption, and organisational alignment, positioning it as a strong contender in digital transformation.

Africa shows modest **improvements** in **Technology and Organisation**building blocks, but a **decline** in **Process** indicates challenges in optimising operational processes. Investments in process efficiency could help Africa build a more balanced digital maturity.

Australia and Europe experienced declines across all building blocks, particularly in **Technology and Process**. Reinvestment in technology and process improvements could help Australia and Europe regain its digital momentum.

North America shows improvement in **Process** but a decline in **Organisation** could hinder long-term digital transformation efforts. The slight decline in **Technology** indicates a potential plateau in tech adoption, suggesting a need for renewed focus on organisational and technological innovation.

South America shows **strong growth in Process,** indicating significant progress in optimising operations. The modest growth in Technology and minimal decline in organisation suggest an overall positive digital transformation trajectory, positioning South America as a region with strong potential for continued growth.

1.13 The Correlation Between Different SIRI Dimensions

The greens in Figure 24 highlight the positive correlation between the SIRI 3 Building Blocks - Process, Technology, and Organisation demonstrates that a balanced approach across these interconnected pillars drives sustainable digital transformation, operational excellence, and resilience, with each component enhancing the impact of the others to build a future-ready Organisation.

FIGURE 24 **Correlations of SIRI Dimensions Ratings**

		Process			Technology									Organisation			
		Vertical Integration	Horizontal Integration	Integrated Product Lifecycle	Shop Floor Automation	Enterprise Automation	Facility Automation	Shop Floor Connectivity	Enterprise Connectivity	Facility Connectivity	Shop Floor Intelligence	Enterprise Intelligence	Facility Intelligence	Workforce Learning & Development	Leadership Competency	Inter- and Intra- Company Collaboration	Strategy & Governance
Process	Vertical Integration	1.00	0.61	0.50	0.52	0.54	0.49	0.63	0.52	0.51	0.56	0.53	0.48	0.49	0.53	0.52	0.49
Process	Horizontal Integration	0.61	1.00	0.56	0.40	0.59	0.45	0.49	0.56	0.45	0.46	0.57	0.44	0.50	0.49	0.50	0.46
Process	Integrated Product Lifecycle	0.50	0.56	1.00	0.33	0.48	0.39	0.44	0.45	0.43	0.41	0.47	0.40	0.48	0.48	0.46	0.42
Technology	Shop Floor Automation	0.52	0.40	0.33	1.00	0.46	0.51	0.61	0.41	0.48	0.63	0.42	0.49	0.40	0.40	0.32	0.40
Technology	Enterprise Automation	0.54	0.59	0.48	0.46	1.00	0.45	0.47	0.58	0.43	0.46	0.65	0.42	0.47	0.45	0.43	0.43
Technology	Facility Automation	0.49	0.45	0.39	0.51	0.45	1.00	0.59	0.45	0.74	0.52	0.44	0.76	0.51	0.48	0.46	0.49
Technology	Shop Floor Connectivity	0.63	0.49	0.44	0.61	0.47	0.59	1.00	0.51	0.67	0.64	0.47	0.58	0.51	0.52	0.45	0.51
Technology	Enterprise Connectivity	0.52	0.56	0.45	0.41	0.58	0.45	0.51	1.00	0.45	0.45	0.62	0.46	0.50	0.49	0.44	0.47
Technology	Facility Connectivity	0.51	0.45	0.43	0.48	0.43	0.74	0.67	0.45	1.00	0.50	0.41	0.73	0.50	0.46	0.45	0.46
Technology	Shop Floor Intelligence	0.56	0.46	0.41	0.63	0.46	0.52	0.64	0.45	0.50	1.00	0.53	0.60	0.47	0.46	0.44	0.44
Technology	Enterprise Intelligence	0.53	0.57	0.47	0.42	0.65	0.44	0.47	0.62	0.41	0.53	1.00	0.47	0.52	0.48	0.47	0.47
Technology	Facility Intelligence	0.48	0.44	0.40	0.49	0.42	0.76	0.58	0.46	0.73	0.60	0.47	1.00	0.50	0.47	0.44	0.47
Organisation	Workforce Learning & Development	0.49	0.50	0.48	0.40	0.47	0.51	0.51	0.50	0.50	0.47	0.52	0.50	1.00	0.60	0.58	0.57
Organisation	Leadership Competency	0.53	0.49	0.48	0.40	0.45	0.48	0.52	0.49	0.46	0.46	0.48	0.47	0.60	1.00	0.59	0.66
Organisation	Inter- and Intra- Company Collaboration	0.52	0.50	0.46	0.32	0.43	0.46	0.45	0.44	0.45	0.44	0.47	0.44	0.58	0.59	1.00	0.53
Organisation	Strategy & Governance	0.49	0.46	0.42	0.40	0.43	0.49	0.51	0.47	0.46	0.44	0.47	0.47	0.57	0.66	0.53	1.00

Source: International Centre for Industrial Transformation

The highest correlation scores, including duplicate highest scores (italicised at the bottom of the graph), are marked in red and reveal the following insights.

1. Automation and Intelligence Synergy
   - Automation and intelligence are deeply interconnected. Automation generates data, while intelligence processes it for actionable insights.
   - Investment in automation directly impacts the ability to implement intelligent systems.
   - Automation systems are vital for generating the data required to develop intelligence capabilities
2. Connectivity as a Foundation
   - Connectivity underpins both automation and intelligence. Robust connectivity ensures data flows seamlessly across systems, enabling both automation and intelligence to function effectively.
   - Connectivity consistently emerges as a critical enabler across automation, intelligence, and integration initiatives.

The timeless mantra applies: "You cannot excel in one without strengthening the others. Balance is non-negotiable." To succeed, an organisationmust prioritize this interconnected development, ensuring that each dimension under the Building Blocks - Process, Technology, and Organisation is equally empowered and aligned for sustainable growth.

3. Leadership and Strategy Alignment

- Leadership competency is pivotal for aligning strategy and governance efforts. Effective leaders ensure organisational goals are met through clear strategies and proper governance structures.

4. Workforce Development

- Training programs must evolve to support new technologies like automation and intelligence systems

Connectivity and Intelligence Go Hand-in-Hand: Higher connectivity within both enterprise and facility levels appears to support intelligence capabilities. This suggests that organisations aiming to enhance intelligence should prioritize improving connectivity.

Integration and Connectivity Are Closely Linked: Horizontal integration efforts align well with enterprise connectivity, indicating that companies aiming for interconnected systems and processes also seek seamless information flow across the organisation.

Leadership, Governance, and Workforce Development Are Interrelated: Companies that emphasize workforce learning and strong leadership are more likely to implement effective governance structures, supporting a comprehensive approach to digital transformation.

Shop Floor and Facility Connectivity Drive Intelligence: Connected shop floors and facilities support intelligence capabilities, underscoring the importance of end-to-end connectivity in physical spaces for advanced analytics and real-time insight.

Key Themes and Recommendations:

1.Leadership and Governance:

- Leadership competency consistently drives governance and strategic success.
- Invest in leadership development programs tailored for governance and integration.

2. Integration and Connectivity:

- Connectivity at both the facility and shop floor levels is critical for enabling intelligence and automation.
- Ensure that horizontal and vertical integrations are implemented concurrently to maximise value.

3. Workforce Development:

- Workforce training must align with automation and product lifecycle initiatives.
- Promote cross-functional skills to support collaboration and innovation.

4. Collaboration:

- Inter- and intra-company collaboration depends heavily on connectivity and skilled leadership.
- Invest in collaborative tools and training to strengthen partnerships.

These insights provide a strategic roadmap for achieving higher SIRI dimension maturity through targeted improvements in leadership, governance, connectivity, and workforce development.

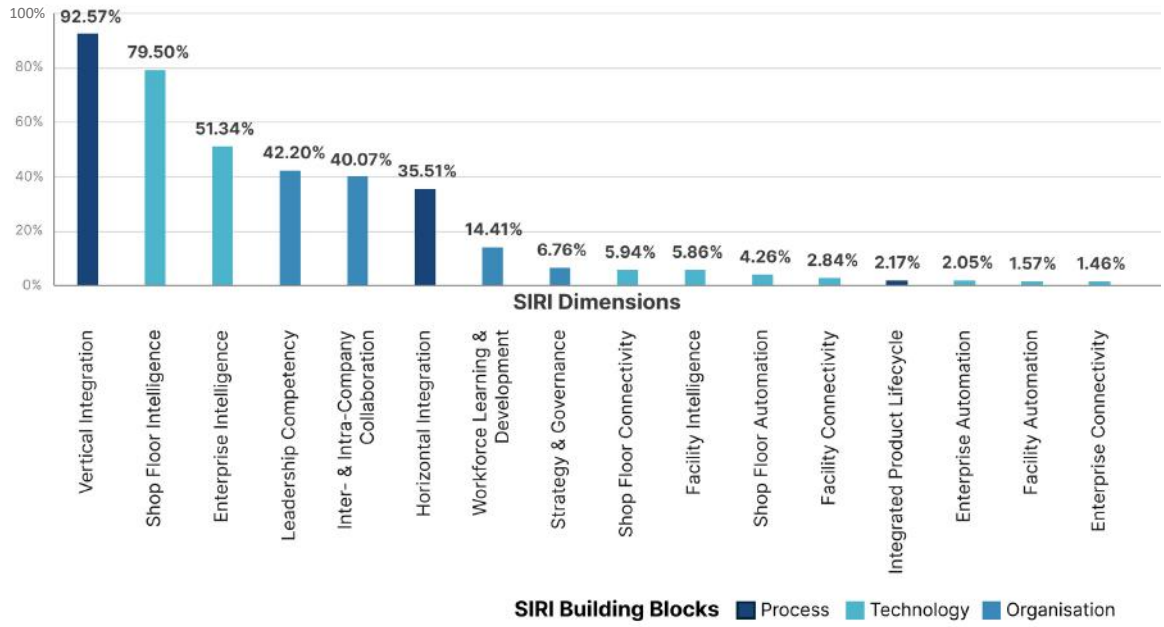
1.14 The Highest Impact Factors of Different SIRI Dimensions

*Taking into consideration the Manufacturers Assessment Matrix Score across SIRI 16 Dimensions, Cost Profile, top KPIs, and proximity to its Industry Best-in-Class Benchmark, the Prioritisation Matrix identifies the **4 SIRI Dimensions** as the high-impact areas for the Manufacturers. The Impact value calculation helps manufacturers prioritize high-impact dimensions tailored to their business objectives, planning horizons, and resource constraints.*

Figure 25 showcases the percentages of the 16 SIRI dimensions identified as having the highest Impact Values in global SIRI assessments.

The highest impact Value Percentages shows that manufacturers are addressing short-term needs while laying the groundwork for sustainable growth.

FIGURE 25 **SIRI Dimensions with highest Impact Values Percentage**



Source: International Centre for Industrial Transformation

The higher Priority for Shopfloor Intelligence and Enterprise Intelligence and lower Priority for Shopfloor and Enterprise Connectivity also suggests that most of the company are mature in Connectivity Dimensions

The chart reflects the percentage frequency with which 4 of the SIRI dimensions attained the highest impact factor for the Assessments globally.

Why the Highest Dimensions Stand Out (Vertical Integration, Shop Floor Intelligence)

Immediate Cost Impact: Both dimensions heavily influence operational cost savings, aligning with short-term planning horizon weightages.

High Improvement Potential: Low proximity factor indicates substantial room for growth, making them high-priority areas.

Critical KPI Relevance: Directly impact key operational KPIs like productivity, speed, and quality, which are critical for short-term ROI.

Why the Lowest Dimensions Lag (Shop Floor Connectivity, Enterprise Connectivity)

High Proximity Factor: Organisations are already close to achieving benchmarks, reducing the improvement potential.

Foundational Role: These dimensions act as enablers rather than direct drivers of operational or strategic improvements.

Limited Cost and KPI Impact: They indirectly support KPIs but have minimal direct cost impact.

Detail Analysis by the SIRI Dimensions

Dominant Dimensions: Key Drivers of Industry 4.0 Transformation

Vertical Integration (92.57%)

- Vertical integration dominates as the most critical SIRI dimension globally.
- Seamless data flow from the shop floor to top management is foundational for decision-making, process optimisation, and real-time responsiveness.
- Industries recognise this as the backbone for digital transformation efforts.

Shop Floor Intelligence (79.50%)

- A high-frequency priority, indicating its critical role in operational excellence.
- Real-time data analytics ensure better monitoring, reduced downtime, and improved machine performance.
- Highly relevant for industries focused on reducing operational costs and enhancing productivity.

Enablers of Strategic and Operational Excellence

Enterprise Intelligence (51.34%)

- Represents the growing importance of centralised intelligence in supporting decision-making across the organisation.
- Consolidated data insights are critical for cross-functional planning and strategic alignment.

Inter- & Intra-Company Collaboration (40.07%)

- Reflects the need for collaborative ecosystems across value chains.
- Efficient communication and data sharing among internal teams and external partners lead to better supply chain management and customer satisfaction.

Leadership Competency (42.20%)

- It indicates the importance of visionary leadership in steering Industry 4.0 initiatives.
- Leaders play a pivotal role in prioritising initiatives, securing resources, and driving organisational change.

Horizontal Integration (35.51%)

- Highlights the role of connected workflows in ensuring end-to-end process efficiency.
- Critical for improving production and logistics alignment across the value chain.

Foundational and Long-Term Prioritie

Workforce Learning & Development (14.41%)

- A less frequent priority globally but essential for long-term adaptability.
- Workforce upskilling ensures that human capital can effectively utilize Industry 4.0 technologies.

Facility Intelligence (5.94%)

- Viewed as a secondary focus but necessary for smart infrastructure.
- Upgrading facilities to incorporate smart systems enhances energy efficiency and resource utilisation.

Strategy & Governance (6.76%)

- Remains foundational but not immediately impactful.
- Strong governance structures ensure scalability and sustainability in the long run.

Key Implications

Balanced Approach:

- Immediate focus on high-impact dimensions (Vertical Integration, Shop Floor Intelligence).
- Concurrent investment in mid-tier enablers (Enterprise Intelligence, Leadership, Collaboration) to sustain transformation.
- Long-term attention to foundational priorities for scalability and resilience.

Cost Efficiency and KPI Alignment:

- Rankings reflect the degree to which dimensions contribute to reducing costs and improving KPIs like productivity, quality, and flexibility.

Phased Implementation:

- Implement top-ranked dimensions in the short term for immediate benefits, followed by mid- and lower-tier dimensions for sustainable growth.

Strategic Benefits:

- High-impact dimensions like Vertical Integration and Shop Floor Intelligence provide immediate ROI.
- Mid- and long-term investments in leadership, collaboration, and governance create a solid foundation for ongoing innovation and growth.

1.15 The role of geopolitical risks

Geopolitical risks impact digital transformation through trade restrictions, cybersecurity threats, data regulations, and supply chain vulnerabilities. Scenario-based risk planning and regional diversification are essential to mitigating disruptions in semiconductors, critical minerals, and digital infrastructure.

The Potential to Upset Industrial Digital Transformation:

Political risks can be understood as the risk of any type of political action negatively impacting business activities. As such, political risks are very broad, and a variety of actors must be considered when assessing the potential impact of politics on the development of smart industries.

National security concerns

A considerable risk in the cross-border roll-out of digital transformation measures is the increasing tendency of governments around the world to judge technological developments through a national security lens. Governments have in the past restricted, for example the export of semiconductors and chip technology as well as access to some artificial intelligence models and other types of smart technology within their borders. This usually concerns technology originating in specific countries that are either incorporated in critical infrastructure or that is capable of large-scale data collection.

Additionally, governments might restrict the use, import, and export of technologies that are perceived to have potential dual-use functions (civilian/commercial and security-related applications). Dual use is frequently defined very broadly and even if these technologies are designed for peaceful, everyday use but can also be repurposed for defense, surveillance, or strategic military operations, governments might choose to restrict them.

These national security concerns imply that industry leaders cannot only see digital transformation as merely productivity-enhancing because governments are increasingly as concerned about national security as they are about economic productivity.

Regionalisation of trade

Seamless horizontal integration across globally connected yet locally agile supply chains is essential for achieving Industry 4.0-aligned digital transformation. However, rising geopolitical tensions and the securitisation of economic activities, especially in manufacturing and digital technologies, threaten to fragment trade and production ecosystems. This shift risks forcing businesses to adopt region-specific software, hardware, and data governance frameworks, creating barriers to interoperability. Stricter import/export controls further exacerbate the challenge, limiting the seamless flow of information, products, and industrial standards across borders.

For multinational corporations (MNCs), this could lead to the formation of regionalised production clusters, rather than globalised clusters of production, and hurt the scalability of automated and interconnected solutions. While MNCs may still navigate these complexities, small and medium-sized enterprises (SMEs) face a far greater challenge in maintaining cross-border operations, impeding their ability to compete in an increasingly fragmented global market.

Regulatory variation and divergent standards

The growing risk of trade regionalisation, driven by national security concerns, threatens to create significant regulatory divergence and fragmented industry standards. In highly digitalised industries, where regulations and standards for emerging technologies are still evolving, this uncertainty is particularly pronounced. Critical sectors such as advanced semiconductor manufacturing, battery technology, and artificial intelligence could face region-specific or even country-specific requirements due to intensifying geopolitical competition. While globally harmonised standards would drive efficiency and scalability, businesses must proactively navigate the possibility of a fragmented regulatory landscape, ensuring adaptability in an era of shifting trade and compliance frameworks.

Data protection regulations and customer confidentiality

The evolving landscape of data protection, data residency requirements, and cross-border data transfer regulations is reshaping global manufacturing operations. Regulatory frameworks now vary significantly across regions, with Europe enforcing some of the strictest data protection laws under GDPR, particularly affecting manufacturers handling consumer and industrial data. For industries dealing with sensitive information, such as automotive, pharmaceuticals, and high-tech manufacturing, ensuring compliance is critical, as any perceived misuse or data breach can lead to regulatory penalties, operational disruptions, and reputational damage.

Beyond consumer privacy, governments increasingly classify industrial data, including production metrics, supply chain intelligence, and machine-to-machine communication, as matters of national security. This has led to stringent requirements on data storage locations, forcing manufacturers to localize servers and adapt to region-specific data transfer restrictions. These limitations pose significant challenges for smart factories, predictive maintenance systems, and real-time analytics, which rely on seamless global data exchange for optimisation and efficiency.

To maintain operational agility and Industry 4.0 integration, manufacturers must proactively navigate this fragmented regulatory environment, implementing secure, compliant, and scalable data management strategies that align with both local laws and global industrial connectivity needs.

Cybersecurity and hybrid conflicts

Cybersecurity has long been recognised as a critical political risk, but in an era of increasing digitalisation and connectivity, its significance has grown exponentially as industrial systems become more vulnerable. Traditionally associated with industrial espionage and cybercrime, cybersecurity risks now extend to hybrid threats of sophisticated, state-linked attacks that blur the lines between economic competition, digital sabotage, and geopolitical conflict.

In Europe and beyond, recent incidents, such as attacks on undersea data cables, highlight the growing vulnerabilities of critical digital infrastructure. While large-scale disruptions to cross-border communication and smart factory networks have yet to materialise, the risk is escalating. However, the risk of communication outages exists and is potentially growing in an age of hybrid scenarios that operate below the threshold of armed conflict.
As manufacturing operations become more interconnected, relying on real-time data exchange, remote monitoring, and cloud-based automation, any disruption to digital infrastructure could severely impact supply chains, production efficiency, and overall industrial resilience.

To mitigate these evolving threats, manufacturers must adopt a proactive cybersecurity approach, integrating robust threat detection, resilient data architectures, and multi-layered security protocols to safeguard operations in an increasingly volatile digital landscape.

Geopolitical and Supply Chain Risks in Access to Critical Minerals for Digitalised Manufacturing

The availability of critical minerals essential for digitalised manufacturing is increasingly shaped by geopolitical factors and supply chain vulnerabilities. While many countries possess minor deposits, the largest known reserves are concentrated in a few regions, giving those nations significant strategic leverage. This has been particularly evident in trade disputes involving rare earth elements, where governments have used supply restrictions as geopolitical tools to assert economic and political influence. Moreover, the extraction of key minerals, such as cobalt, is often tied to politically unstable regions, where conflicts drive up costs, disrupt supply chains, and introduce ethical concerns regarding labor practices. Beyond raw material availability, refining and processing capacities are disproportionately controlled by a handful of countries, further centralising supply chain power.

In times of trade conflicts or diplomatic tensions, export controls on refined minerals can severely disrupt global industries reliant on these essential materials for semiconductors, batteries, and advanced automation technologies.

For policymakers and industry leaders, these risks underscore the urgent need to diversify supply chains, secure alternative sources, and invest in domestic refining capabilities. Long-term strategies, including resource partnerships, recycling initiatives, and geopolitical risk assessments, are essential to mitigating vulnerabilities and ensuring the resilience of digitalised manufacturing ecosystems amid an increasingly volatile global landscape.

Geopolitical Conflicts and Semiconductor Supply Chain Vulnerabilities

Semiconductors are a critical bottleneck in digitalised manufacturing, with production concentrated in Northeast Asia and controlled by a few companies. This geographic dependency creates significant vulnerabilities, as any regional conflict could severely disrupt supply chains, impacting global industries reliant on AI, automation, and high-performance computing.

Beyond production, logistics and transport networks are also fragile. Recent shipping disruptions, such as those in the Red Sea, highlight the risks of conflict-induced supply chain disruptions, which could lead to semiconductor shortages, rising costs, and delays.

These risks directly affect industrial digitalisation, as both new deployments and hardware maintenance could suffer from supply constraints.

Mitigating Political Risks Through Strategic Planning

Given the uncertainty of global conflicts, scenario-based risk planning is essential. By utilizing impact-probability matrices, policymakers and business leaders can assess geopolitical risks and develop mitigation strategies.

Key risk reduction measures include:

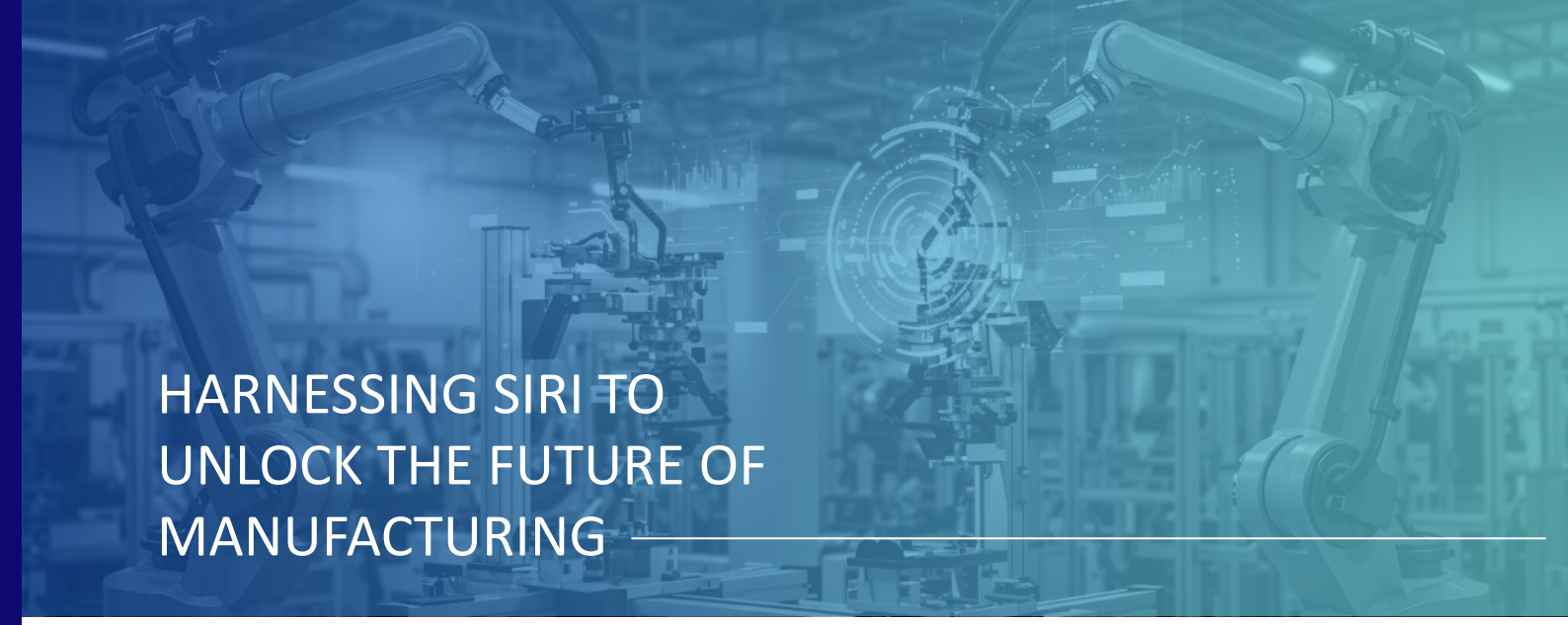
- **Diversifying production** to reduce reliance on a single region.
- **Strengthening regional supply chains** to mitigate global transport risks.
- **Building inventory buffers** of critical semiconductor components.
- **Investing in alternative trade routes** for resilient logistics.

By proactively addressing these vulnerabilities, industries can **strengthen supply chain resilience** and safeguard the future of digitalised manufacturing.

To navigate the geopolitical risks impacting industrial digital transformation, businesses must **integrate resilience planning into their corporate strategy.** A **multi-pronged approach** which combines **supply chain flexibility, regulatory compliance, cybersecurity resilience, and resource diversification,** which is essential for ensuring sustained industrial digitalisation in an era of geopolitical uncertainty.

By adopting **scenario-based risk planning**, leveraging **impact-probability analyses**, and investing in **regional diversification**, manufacturing leaders can pro**actively mitigate threats and maintain global competitiveness in a fragmented world.**

In conclusion, political risks are manifold and can affect the digitalisation of industries in a variety of ways. While it is impossible to precisely predict the future, policy makers and leaders should think about political risks in a scenario-based manner. Risk scenarios can be evaluated in the form of an impact-probability matrix. This can help to evaluate risk scenarios and prepare reaction and mitigation strategies.



HARNESSING SIRI TO UNLOCK THE FUTURE OF MANUFACTURING

2 Applications: Harnessing SIRI to unlock the future of manufacturing

The international manufacturing community can harness SIRI insights in three essential ways to drive digital transformation at both the company and sector levels

Applying SIRI insights

Data and information reach their full potential only when applied strategically. SIRI insights empower manufacturing stakeholders by offering guidance in three critical areas, enabling more effective decision-making and driving impactful digital transformation. Through SIRI, stakeholders gain actionable insights that help them refine strategies, optimise processes, and stay competitive in a rapidly evolving industrial landscape. These insights facilitate targeted improvements, allowing manufacturers, technology providers, and policymakers to harness the power of predictive analytics, AI, and real-time data to accelerate growth and enhance resilience across the manufacturing ecosystem.

SIRI insights provide valuable guidance to manufacturing stakeholders in three key areas:

1. Enhancing Transformation Strategies for Manufacturers: SIRI insights support manufacturers in refining their digital transformation strategies by optimising operations at individual sites or scaling initiatives across multiple locations and organisation-wide projects.
2. Enabling Technology and Advisory Firms: Technology and advisory firms can accelerate digital transformation in the manufacturing sector by empowering them to deliver deeper insights and support data-driven decision-making.
3. Supporting Sectoral Planning and Development: Governments and industry associations can leverage SIRI insights, using machine learning and real-time analytics to anticipate trends, forecast industry demands, and shape policies that foster industrial growth and competitiveness.

Section 2.2 will present the few applications, illustrating real-world case studies where SIRI has been successfully utilised to achieve transformative results across their sites and industries.

2.1 Supporting to develop and strengthen the industry transformation strategies

The most straightforward use of SIRI insights is to help manufacturers shape and enhance their digital transformation strategies or initiatives, for smaller companies. These insights can be applied at a single site, across multiple locations, or at an organisation-wide level for maximum impact.

When companies leverage SIRI insights to design transformation strategies or roadmaps for individual sites, they should consider the following key questions to make informed decisions on priority areas and desired improvements:

Where are we today?

The SIRI Assessment focuses on developing a clear understanding of a company's current Industry 4.0 maturity level through a detailed and impartial evaluation across SIRI 16 Dimensions. This assessment enables manufacturers to identify existing strengths, address weaknesses, and uncover the most pressing opportunities for improvement. By challenging outdated assumptions and correcting misperceptions, the SIRI Assessment lays the groundwork for a well-structured and impactful Industry 4.0 transformation plan.

Where do we want to be?

Define the "what" and "why" of the desired future state.

In the context of the SIRI Assessment, determining the desired future state involves defining what the company aims to achieve and why those objectives matter, based on key insights:

1. Focus on Financial Impact ("Impact to Bottom Line")

What: Identify and prioritize Industry 4.0 initiatives that yield the highest financial returns, such as reducing energy costs, improving operational efficiency, or enhancing productivity.

Why: Maximising profitability is the core driver of transformation. Focusing on financially viable initiatives ensures sustainable growth and optimal resource allocation.

Key Insight: For example, companies with high utility costs can prioritize energy and water-saving technologies over less impactful areas like IT integration.

2. Alignment with Essential Business Objectives

What: Define specific, measurable outcomes aligned with the company's broader goals, such as achieving net-zero emissions, reducing time-to-market, or improving product quality.

Why: Clear business objectives provide direction and ensure efforts are concentrated on initiatives that address the company's unique challenges and aspirations.

Key Insight: Prioritising initiatives aligned with essential objectives helps narrow the focus to areas that deliver the most meaningful impact.

3. Consideration of Community Benchmarks

What: Learn from the broader manufacturing community by benchmarking against industry leaders, identifying successful practices, and avoiding common pitfalls.

Why: Looking outward provides a broader perspective, helping companies identify high-potential areas and avoid costly mistakes.

Key Insight: Comparative analysis ensures that the company is not isolated in its transformation journey and leverages collective industry insights.

Integrating the "What" and "Why" into Transformation Strategies

Resource Optimisation: Prioritise initiatives that offer the greatest financial returns and align with key business goals.

Outcome-Driven Focus: Define and track success metrics like reduced emissions, cost savings, or improved delivery times.

Informed Decision-Making: Use industry benchmarks to validate strategies and ensure alignment with best practices.

This framework helps companies design a future state that is both ambitious and achievable, ensuring their Industry 4.0 transformation delivers meaningful value.

How urgent/important is this to us?

Identify factors influencing timelines, including start and completion dates, and evaluate the required effort.

Which areas should we focus on?

Use guidance from the OSA Prioritisation Matrix to identify key focus areas.

Larger companies with regional or international operations can also use SIRI insights for multi-site assessments. By aggregating and comparing OSA results from different sites, leaders gain a comprehensive view of the organisation's manufacturing operations. This allows them to pinpoint site-specific weaknesses, foster areas of excellence, and address broader organisational challenges and opportunities.

The **Prioritisation** Matrix is a management planning tool designed to help companies translate the principles of prioritisation into actionable, company-specific recommendations. By quantitatively evaluating cost, key performance indicators (KPIs), and proximity to industry best-in-class benchmarks, the matrix identifies high-priority SIRI Dimensions where improvements will yield the greatest benefits. These factors are weighted based on their relevance to the company's goals, aligning with the principles of the TIER Framework to ensure targeted and effective decision-making.

The following case studies focus on different companies and the ways they have used the SIRI programme to develop and execute transformation strategies.

When using SIRI insights for single-site transformation, companies should evaluate their current maturity, define future goals, assess urgency, allocate resources, and prioritize focus areas. Larger firms can use SIRI for multi-site reviews. By consolidating and Analysing OSA results and insights from individual sites, decision-makers can gain a comprehensive overview of the company's entire manufacturing operations. This enables them to identify site-specific weaknesses, highlight areas of excellence, and tackle organisation-wide challenges and opportunities effectively.

Government, Government Organisations and businesses can also benefit from country wide analytics offered by INCIT. That presents a comprehensive framework for assessing and benchmarking industrial transformation using the Smart Industry Readiness Index (SIRI). The analytics is named XIRI, which provides actionable insights on national performance, global benchmarks, and sectoral disparities across 12 industries and 16 dimensions. Features like the 3B Maturity Benchmark and Industry Performance Chart allow stakeholders to identify strengths, weaknesses, and transformation opportunities. By tracking official and country-specific SIRI assessments, the XIRI-Analytics dashboard highlights industry leaders and areas requiring intervention. This tool enables governments and businesses to prioritize investments, align policies, and foster sustainable industrial growth, ensuring global competitiveness in the evolving manufacturing landscape

Single-site review – Viessmann

CASE STUDY 1

Viessmann Climate Solutions Manisa Plant

Viessmann is a global leader in sustainable climate solutions and energy systems, with over 100 years of expertise in the heating and cooling industry. Founded in 1917, the company is family-owned and operates across more than 74 countries, offering innovative and energy-efficient solutions for residential, commercial, and industrial applications. Viessmann is committed to sustainability, integrating renewable energy sources like solar, biomass, and geothermal into its product portfolio. They also focus on smart home technologies and digital services that enhance energy management and comfort while reducing environmental impact. Viessmann's mission is to create living spaces for generations to come, emphasising environmental responsibility and technological innovation.

The VCS Manisa plant was founded in 2013, located in Turkey, is a key production facility within Viessmann's global operations. Opened as part of the company's strategic expansion, the Manisa plant focuses on manufacturing high efficiency heating systems, including boilers and related components.

Quotation From Viessmann Leadership

OSA has become an integral part of our digital transformation culture, serving as a guide for us moving forward. It has not only helped us generate use cases during brainstorming sessions but also enhanced our digital maturity. After implementing our digitalisation projects, led by our digital transformation team, we are eagerly looking forward to undergoing another SIRI assessment to see the progress we've made in addressing our shortcomings

Gorkem Sakinmaz

Head of Operations & OpEx
Viessmann Climate Solutions Manisa Plant

Creating Digitalisation Culture with SIRI

Since 2018, Viessmann has been making great efforts to foster a culture of digital transformation. Both the company's top management and local leadership have consistently supported in this endeavor. In line with the company's strategy, numerous investments have been made in Industry 4.0 and digitalisation. The goal is to create a culture by adapting to the existing digital tools and making the right moves for the future, introducing new digitalisation solutions and projects to enhance efficiency and establish a digital transformation culture.
SIRI has been instrumental in shaping this culture. By taking a holistic approach, we all processes in the factory were examined from a digitalisation perspective. This allowed every department to be a part of the process, helping them identify the shortcomings, understand where they should focus, and recognize where they excel. Additionally, it guided them in aligning with global digitalisation trends, ensuring they remain competitive on a global scale.

Understanding Where Viessmann is on a global scale with SIRI.

SIRI provided Viesmann with insight into where they stand among global companies by assessing them across 16 evaluation criteria (SIRI Dimensions). This presented a valuable opportunity to identify their weaknesses and determine the key areas to focus on in their digitisation efforts. In today's rapidly changing world, it is crucial to allocate the resources and efforts to the right areas, and SIRI has served as a guiding tool in this regard.

The transformation process can be highly industry-specific, often significantly influenced by factors such as the nature and volume of products, the complexity of manufacturing processes, and competitive dynamics. Macroeconomic trends also play a role, affecting business conditions and the operational environments of various industries in different ways.

Industry Performance Cards (IPC) provide industry-specific benchmarks. These cards offer more precise comparisons, allowing companies to evaluate their performance against industry peers. Each IPC includes the average Assessment Matrix Score across all 16 SIRI Dimensions, tailored to companies within that specific industry.

When compared to the General Manufacturing IPC, Viessmann Manisa Isı Teknolojileri San. ve Tic. Ltd. Şti. has achieved impressive results, with 15 dimensions performing either On Par or Above the industry average, and only one dimension performing Below the industry average.

Following the SIRI assessment, they identified key areas for improvement and implemented an automation project specifically aimed at increasing production capacity. By automating the process previously carried out by operator labor, and simultaneously integrating equipment data into our SCADA system for real-time monitoring on the vertical integration side, they have achieved greater efficiency in both production and office operations.

FIGURE 26 **Viessman SIRI Dimensions Industry Benchmark Comparison**

Industry Group Comparison

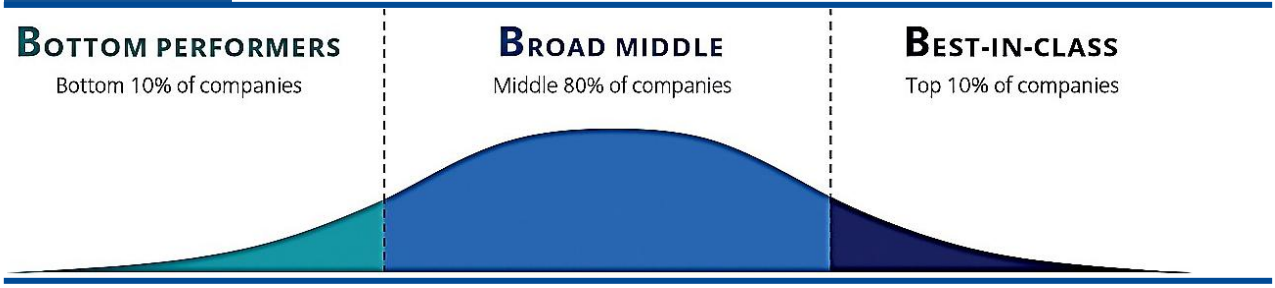
DIMENSION				BAND		COMPARISON
				COMPANY	INDUSTRY IPC	
PROCESS	OPERATIONS	1	Vertical Integration	3	1.37	
	SUPPLY CHAIN	2	Horizontal Integration	3	1.38	
	PRODUCT LIFECYCLE	3	Integrated Product Lifecycle	3	1.15	
TECHNOLOGY	AUTOMATION	4	Shop Floor Automation	1	1.25	
		5	Enterprise Automation	2	1.16	
		6	Facility Automation	3	0.65	
	CONNECTIVITY	7	Shop Floor Connectivity	3	0.48	
		8	Enterprise Connectivity	3	1.32	
		9	Facility Connectivity	3	0.35	
	INTELLIGENCE	10	Shop Floor Intelligence	2	0.95	
		11	Enterprise Intelligence	2	0.96	
		12	Facility Intelligence	2	0.49	
ORGANISATION	TALENT READINESS	13	Workforce Learning & Development	4	1.19	
		14	Leadership Competency	4	1.78	
	STRUCTURE & MANAGEMENT	15	Inter- and Intra-Company Collaboration	4	2.05	
		16	Strategy & Governance	5	1.36	

– On Par or Above – Below

According to the findings from the SIRI assessment, the organisation was lagging in the area of field automation when compared to industry standards. However, following the year of the evaluation, they implemented two major projects related to field automation, and three more projects are currently in the configuration phase and progressing as planned.

Being recognised as "best in class" in the area of connectivity was especially significant, as it validated the investments they have made in this field, which were also highlighted positively in the OSA report. The digitalisation of the field, enabling real-time tracking of all machines and equipment to create strategic KPIs and contribute to problem-solving, positioned them among the best-in-class companies in the OSA report.

FIGURE 27 **Viessman 3B Sector Wide Comparison**



Insights

Manufacturing Sector Wide Comparison

The 3B Maturity Benchmark provides a manufacturing sector-wide reference point of what it means for a factory or plant to be Best-in-Class (BIC), in the Broad Middle, or lagging behind with the Bottom Performers. Based on the SIRI Assessment Results and the prevailing 3B Maturity Benchmark (2020 Edition), **Viessmann Manisa Isı Teknolojileri San. ve Tic. Ltd. Şti** has 0 number of dimensions falling within the Bottom Performers range, **7** falling within the Broad Middle range, and **9** falling within the BIC range

Roadmap for Improvement (Post Assessment)

Short-term Priorities
(0–6 months)

Quick wins, low-cost initiatives: Building roadmaps for industry 4.0 and digitalization within all departments at Manisa Plant.

Medium-term Goals
(6–18 months)

Upgrading technology, enhancing processes: Creating use cases for real time data tracing related to production and logistics process.

Long-term Strategy
(18+ months)

Full integration, leading digital initiatives: Implementing use cases for data driven operations to solve problems of production.

Outcomes/Results (Post-Assessment)

Tangible Impacts

Key Performance Improvements After Digital Transformation

Our manufacturing modernization initiative has delivered measurable improvements across multiple operational areas.

Area of Transformation	Before	After	Impact
Increased Production Efficiency	90% production efficiency due to manual processes	95% efficiency after process automation and digital integration	5% increase in output with the same resources
Reduction in Defect Rates	High defect rate due to inconsistent quality control processes	Automated quality monitoring systems led to a substantial decrease in defect rates	Waste and rework requirements were greatly reduced
Energy Savings	High energy consumption due to outdated equipment and lack of monitoring	Smart energy management systems significantly improved energy efficiency	Marked reductions in energy-related costs
Cost Savings	High operational costs from energy inefficiencies and material waste	Energy management systems and optimized production planning reduced operational expenses	Significant cost advantages across operations
Improved Cycle Time	12 hours per production cycle; 15 hours to collect and report quality data	8 hours per cycle; 1 second to access dashboards and reports after digitalization	33% faster production, enabling higher throughput

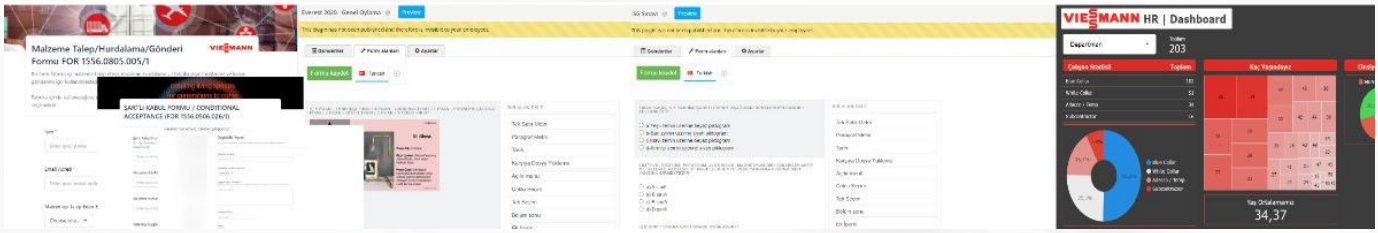
Intangible Impacts

Area of Transformation	Before	After	Impact
Enhanced Workforce Skills and Engagement	Resistance to new technologies and lack of digital skills among employees	Digital training programmes increased employee confidence and readiness to adopt new technologies	A more engaged and future-ready workforce, with reduced resistance to change
Improved Organizational Agility	Slow decision-making due to disconnected data and manual processes; reporting took too much time	Real-time data visibility and one-click access to dashboards and reports	Quicker response to market changes and customer demands
Strengthened Innovation Culture	Limited innovation due to lack of structured collaboration and siloed departments	Cross-functional teams collaborated more effectively using digital collaboration tools	Fostering a culture of innovation and continuous improvement

Intangible Impacts (continued...)

Increased Customer Satisfaction	Inconsistent product quality and delivery delays	Improved product consistency and faster delivery through optimized processes	Better customer relationships, higher retention, and increased loyalty
Enhanced Market Position	Lagging behind competitors in digital transformation	Completion of key digital initiatives elevated the company's Industry 4.0 leadership	Improved market perception, new business opportunities and partnerships
Cultural Shift Towards Continuous Improvement	Reactive approach to operational problems	Predictive maintenance and real-time monitoring fostered a proactive mindset	Employees actively suggest improvements, leading to ongoing enhancements

30000 + paper saved



PT. Akebono Brake Astra Indonesia's Digitalisation Journey

CASE STUDY 2

PT. Akebono Brake Astra Indonesia (AAIJ) is a leading Southeast Asian automotive manufacturer specialising in advanced brake systems and components. Established in 1981 as a joint venture between PT. Astra Otoparts Tbk and Akebono Brake Industry Co., Ltd., AAIJ leverages global expertise to deliver innovative and reliable solutions for automobiles and motorcycles.

To effectively manufacture and supply high-quality products to its clients, AAIJ has been a pioneer in adopting advanced digitalisation frameworks. By integrating IoT, predictive analytics, and robotics, the company aims to remain competitive in a fast-evolving industry. These efforts have significantly improved productivity, reduced inefficiencies, and minimised waste, aligning the company with the Fourth Industrial Revolution.

Headquartered in Jakarta, AAIJ is a trusted name in the automotive industry, delivering cutting-edge, sustainable braking solutions for a dynamic market.

Quotation From PT. Akebono Leadership

Through the SIRI framework, AAIJ has established itself as a frontrunner in digital transformation. Its targeted improvements in Horizontal Integration, Enterprise Automation, and Leadership Competency have resulted in measurable operational excellence. With a clear focus on sustainability and continuous innovation, the company is paving the way for long-term success in the evolving transportation industry. With measurable impacts in efficiency, costs, and sustainability, and intangible gains in workforce engagement and market leadership, the company is now poised to lead in Industry 4.0. These initiatives underscore the value of leveraging structured frameworks like SIRI for comprehensive and effective transformation.

Leveraging SIRI to Strengthen Digitalisation Initiatives

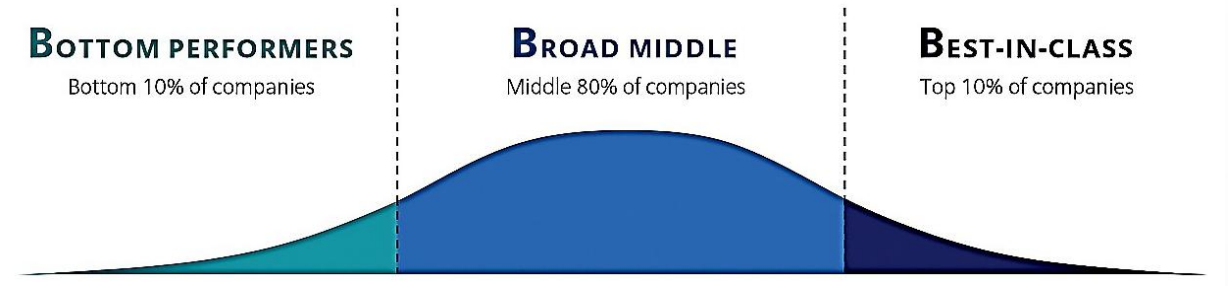
Company AAIJ utilised the Smart Industry Readiness Index (SIRI) to assess its digital maturity and identify areas of improvement across 16 dimensions. The Official SIRI Assessment (OSA) focused on achieving advanced integration and automation in dimensions like Horizontal Integration, Enterprise Automation, Shop Floor Automation, and Leadership Competency.

Through the SIRI framework, AAIJ identified actionable priorities to:

1. Validate the effectiveness of its digital transformation efforts.
2. Address blind spots and enhance digital capabilities.

Key Results and Validation

FIGURE 28 Performance Against Industry Benchmarks



The 3B Maturity Benchmark provides a manufacturing sector-wide reference point of what it means for a factory or plant to be Best-in-Class (BIC), in the Broad Middle, or lagging behind with the Bottom Performers. Based on the SIRI Assessment Results and the prevailing 3B Maturity Benchmark (2020

Edition), AAIJ has 0 number of dimensions falling within the Bottom Performers range, 2 falling within the Broad Middle range, and 14 is within the BIC (Best in Class) range. AAIJ consistently matched or exceeded the Best-in-Class maturity levels in several dimensions,

particularly in Leadership Competency and Enterprise Connectivity. These achievements validate its ongoing efforts to develop smart manufacturing facilities.

Identified Opportunities and Interventions

Building Block	Process	Technology	Organisation
Highest Impact Value	Horizontal Integration	Shop Floor Automation; Enterprise Automation	Leadership Competency

Next Steps:

Horizontal Integration

- Automate supply chain decision-making using RPA for demand/supply planning and logistics.
- Enhance capabilities for new business models like contract manufacturing and packaging.
- Integrate sustainability KPIs into procurement, production, and logistics.

Shop Floor Automation

- Invest in fully automated production lines to achieve the next generational leap in productivity.
- Automate warehouse material handling with ASRS.

Enterprise Automation

- Transition to next maturity level by enabling enterprise workflows to be easily reconfigured.
- Integrate unified software platforms with a master configuration tool for seamless data integrit

Leadership Competency

- Continue leveraging Industry 4.0 technologies while addressing emerging challenges like cybersecurity.
- Drive digital transformation initiatives through proactive leadership and strategic decision-making.

Workforce Development

Future Outlook

- Although Workforce Learning & Development was not a top priority in the SIRI matrix, AAIJ has introduced a digital skill development roadmap (2024–2026). Employees are transitioning to knowledge workers, focusing on improving automation robustness and developing advanced physical and software systems.
- By continuously fine-tuning its transformation roadmap, AAIJ is well-positioned to expand its capabilities, remain competitive, and align with global Industry 4.0 standards. The company's efforts are set to future-proof its operations, ensuring scalability and sustainability across its production facilities worldwide.

Roadmap for Improvement Post-Assessment

Short-term Priorities
(0–6 months)

Focus on quick wins and low-cost initiatives:

- Enhance connectivity using IoT-enabled devices.
- Automate repetitive tasks in supply chain processes with RPA.
- Initiate digital training programs to upskill employees.

Medium-term Goals
(6–18 months)

Upgrade technology and optimise processes:

- Implement automated quality control systems.
- Deploy predictive maintenance tools to reduce downtime.
- Centralize facility automation with an advanced Building Management System (BMS).

Long-term Strategy
*(*18+ months)

Achieve full integration and drive innovation:

- Scale end-to-end horizontal and vertical integration.
- Adopt enterprise-wide workflow automation tools.
- Develop a digital transformation office to lead continuous improvement initiatives.

Outcomes/Results (Post-Assessment)

Tangible Impacts

	Category	Before	After	Impact
	Inventory Reduction	**8.1 days** of production inventory (manual info flow)	**5 days** (automated ordering & integrated scheduling)	**$584,000** inventory savings
IMPROVEMENT IN PRODUCTIVITY	**Production Productivity**	**70% OEE** (manual painting process)	**79.1% OEE** (automation & digitalisation)	**$177,400** annual savings
IMPROVEMENT IN PRODUCTIVITY	**Operational Costs**	High aluminium usage costs	**11% cost** reduction via automated material recycling	**$226,000** annual savings
REDUCTION IN DEFECT RATES	**Quality Control**	**0.72%** defect rate (manual inspection)	**0.63%** defect rate (automated monitoring)	**12.5%** defect reduction, 8 manpower saved
REDUCTION IN DEFECT RATES	**Production Cycle Time**	**140 pcs/hour**	**161 pcs/hour** (automation & IIoT)	**15% increase** in production cycle
ENERGY SAVING	**Energy Consumption**	High due to lack of control	**Smart energy** management, reduced operational waste & chemical and electric consumption	**$119,700** annual savings

Intangible Impacts

Area of Transformation	Before	After	Impact
Enhanced Workforce Skills and Engagement 	Resistance to digital technologies	Introduction of comprehensive training programs	Increased confidence and digital readiness among employees
Improved organisational Agility 	Slow decision-making due to disconnected data	Real-time analytics enabled faster, data-driven decisions	Quick adaptation to market changes and customer demands
Strengthened Innovation Culture 	Limited collaboration across departments	Cross-functional collaboration tools fostered innovation	Continuous improvement in product and process
Increased Customer Satisfaction 	Inconsistent quality and delayed deliveries	Optimised processes ensured better quality and faster delivery	Improved customer relationships and loyalty
Enhanced Market Position 	Lagging in digital transformation compared to competitors	Achieved Industry 4.0 leadership	Attracted new business opportunities and partnerships
Cultural Shift Towards Continuous Improvement 	Reactive approach to operational problems	Predictive tools and monitoring fostered a proactive mindset	Employees actively suggest and implement process enhancements
SUSTAINABILITY GAINS: **Energy and Waste Efficiency** 	Higher energy consumption and material wastage	Reduction in energy consumption with smart management systems and lower defect rates minimised material wastage.	Progress towards sustainability goals and reduced environmental footprint

Qatar effort in SIRI and Digital Transformation with QDB

CASE STUDY 3

Qatar Development Bank (QDB), established in 1997, is a government-owned institution dedicated to accelerating economic diversification by supporting Qatar's private sector. Aligned with Qatar National Vision 2030, QDB's strategy emphasizes innovation support, local enterprise development, and export ecosystem enablement. To advance Industry 4.0, QDB launched the Digital Transformation Initiative, assisting SMEs in assessing their digital readiness using the Smart Industry Readiness Index (SIRI). The initiative offers financial support through Digital Grants for startups and low-interest Digital Loans for SMEs. Additionally, the Digital Transformation Program educates SMEs on Industry 4.0 practices and provides opportunities to test digital solutions at Factory One.

Quotation From CEO of Qatar Development Bank

In today's fast-paced and ever-evolving economy, the ability to innovate and embrace digital transformation is no longer optional; it is essential. Through initiatives like the Smart Industry Readiness Index for strategic clusters and our focus on advanced manufacturing, we are equipping businesses with the tools and knowledge to compete on a global scale. Qatar's strategic location, ambitious vision, and world-class infrastructure provide a unique opportunity for SMEs to lead in this digital era. By fostering knowledge sharing through platforms like Factory One and implementing robust financial support mechanisms, we are continuously enabling SMEs to adopt cutting-edge technologies and drive sustainable growth.

We are proud to offer a structured, holistic framework that guides SMEs through every step of their digital transformation journey, ensuring tangible, long-term benefits and maximising their return on investment. Through strategic partnerships, financial incentives, and ecosystem development, QDB is leading Qatar's charge toward becoming a regional leader in Industry 4.0.

Our vision is to build a future where digital transformation empowers SMEs to innovate, grow, and contribute to a resilient, knowledge-based economy that reflects Qatar's vision and ambition.

Abdulrahman bin Hesham Al-Sowaidi
CEO of Qatar Development Bank

As a driving force behind Qatar's industrial transformation, **Qatar Development Bank (QDB)** has **strategically** aligned its Industry 4.0 initiatives with **Qatar National Vision 2030 s economic diversification goals**. Through its partnership with **TÜV SÜD and INCIT**, **QDB** has **pioneered the implementation of the Smart Industry Readiness Index (SIRI)** across Qatar's key industrial sectors, including petrochemicals, manufacturing, and logistics. This strategic initiative demonstrates Qatar's commitment to becoming **a regional leader in advanced manufacturing**, leveraging its strong technological infrastructure and ambitious national development framework to accelerate digital transformation across the country's manufacturing landscape.

Building a Strong Industry 4.0 Ecosystem

Government Ministries

Providing policy support and national-scale industrial strategy alignment

Consultancy Firms

Supporting companies in assessing digital transformation readiness with leading Qatari consulting firms and global partners like TÜV SÜD and INCIT delivering transformation expertise.

Technology Vendors

Offering solutions for automation, AI, IoT, and digital manufacturing.

Recognising the need for a collaborative approach, QDB has worked extensively to build a strong ecosystem comprising private and public sector stakeholders. This collective effort ensures that Industry 4.0 transformation is not an isolated initiative but a national priority. This unified approach aligns with Qatar National Vision 2030 and positions Qatar as a regional leader in industrial digital transformation.

Factory One: Qatar's Premier SIRI Training Hub

Qatar's Knowledge Center

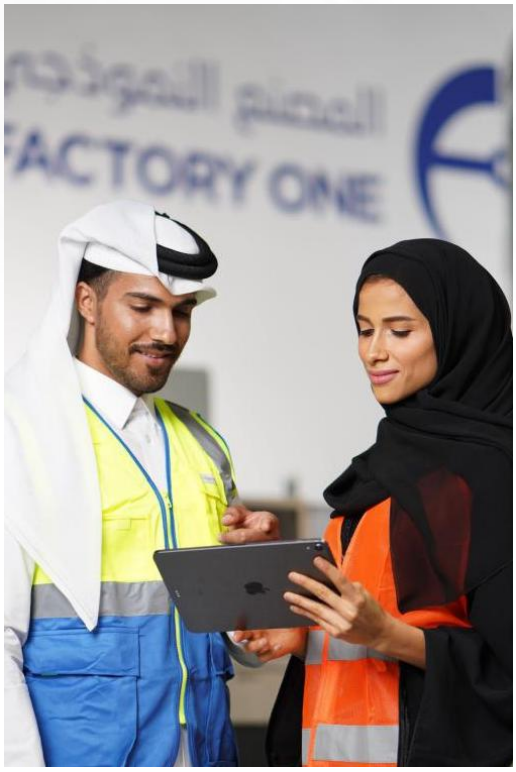
The first comprehensive digital transformation hub in the GCC region, serving Qatar's industrial sector.

National Training Ground

The first comprehensive digital transformation hub in the GCC region, serving Qatar's industrial sector.

Regional Certification Authority

The first Smart Industry Readiness Index (SIRI) certification centre in the Middle East.



Located in **Qatar's thriving industrial zone, Factory One** represents a milestone in Qatar's industrial development strategy. Established through **QDB's partnership with TÜV SÜD and INCIT**, this state-of-the-art facility positions Qatar as the regional leader in Industry 4.0 implementation. It serves as a catalyst for transforming Qatar's manufacturing sector, supporting the country's economic diversification goals while building local technological capabilities.

Certification of SIRI Assessors to Strengthen Capability

1. Conduct SIRI Assessments
2. Provide Data-Driven Insights
3. Guide Transformation Journey

To accelerate the assessment and transformation of manufacturing entities, QDB has focused on increasing the number of certified assessors. So far, 20 Certified SIRI Assessors (CSA) have been trained and certified. The certification initiative ensures a growing pool of industry professionals capable of evaluating and executing digital transformation programs at scale.

Collaboration with World Economic Forum (WEF) and C4IR

Industrial Digital Adoption

Accelerating Industry 4.0 implementation across Qatar's key sectors including oil & gas, manufacturing, and logistics through WEF's proven frameworks.

Strategic Global Partnerships

Working closely with the World Economic Forum and C4IR to develop Industry 4.0 policies tailored to Qatar's unique economic landscape.

Vision 2030 Alignment Ensuring

digital transformation initiatives align with Qatar National Vision 2030 while accelerating the modernisation of critical industrial sectors.

QDB's strategic alliances are designed to advance Qatar's position in the global digital economy. Through collaboration with the World Economic Forum (WEF) and the Center for the Fourth Industrial Revolution (C4IR), QDB is developing Industry 4.0 policies specifically tailored to Qatar's unique economic landscape and industrial strengths.

Financial Incentives to Accelerate Industry 4.0 Adoption

Digital Grant
Up to $100,000 per SME to fund their digital transformation journey.

Digital Loan
Flexible financing to support investment in automation, AI, and IoT solutions.

QDB has implemented strong financial support mechanisms to encourage SMEs and manufacturing firms to adopt Industry 4.0 technologies. These incentives significantly reduce the financial burden on SMEs, enabling them to upgrade their infrastructure and technology capabilities.

Supporting SMEs Through Consulting and Government Programs

Consulting and Training Programs
Providing step-by-step guidance for digital implementation.

Government Support Services
Ensuring SMEs have access to policy- driven benefits.

Impact Measurement Mechanisms
Assessing transformation success based on key performance indicators.

QDB is committed to maximising the ROI for SMEs by offering a structured support framework. This holistic approach ensures that SMEs are not just provided with funding but are also guided through the digital transformation process to achieve tangible, long-term be nefi ts .

The Result Impact

20+

Certified Assessors
Actively supporting industry-wide digital transformation.

100K

Digital Grant
Upto $100,000 per SME for digital transformation

QDB's **structured and impact-driven** approach has already yielded significant results, including: **A rapidly growing ecosystem** of Industry 4.0 stakeholders in Qatar, **a skilled workforce** through SIRI training and certification programs, **increased SME participation** in digitalisation programs with financial incentives, and a structured national policy framework co-developed with international organisations like WEF.

Through QDB's **leadership, strategic partnerships, and financial incen**tives, Qatar is on the path to becoming **a regional leader in Industry 4.0**. By building a strong ecosystem, certifying experts, collaborating on policy development, and ensuring SME success, QDB is making digital transformation **accessible, structured, and impactful**.

The case of QDB's **SIRI initiative serves as a model for how nations can systematically drive Industry 4.0 adoption** at scale while ensuring sustainable industrial growth.

THE WAY FORWARD

The way forward

Vision is to redefine global manufacturing by creating a connected, sustainable, and equitable industrial ecosystem.

To the global manufacturing community, the **Global SIRI Initiative and the Manufacturing Transformation Insights Report 2024** represent a groundbreaking step in redefining how we approach and accelerate industrial transformation in an era of unprecedented change and opportunity.

In partnership with global stakeholders, we are building the world's most comprehensive manufacturing data sets and benchmarks—pioneering an effort to democratize knowledge and enable every manufacturer, regardless of size or geography, to unlock the full potential of digital transformation. This initiative is not merely about understanding the present; it is about reshaping the future. By transitioning from fragmented, anecdotal approaches to a standardised, data-driven methodology, we aim to empower the manufacturing community to act decisively and strategically.

We believe transformation is not just a technical process but a strategic imperative that aligns operational excellence with long-term societal impact. Through SIRI, we deliver tools, insights, and pathways for manufacturers to future-proof their operations, elevate workforce capabilities, and achieve environmental sustainability while remaining competitive in a rapidly evolving global landscape.

The findings, case studies, and actionable insights in this report are a call to action for leaders to embrace change with purpose and precision. By adopting the SIRI framework, manufacturing stakeholders can chart a clear path to success, accelerate their transformation journeys, and collectively define the future of manufacturing—one that is innovative, sustainable, and inclusive for generations to come.

The SIRI Framework has laid a strong foundation for the development of a new benchmark: the **Artificial Intelligence Maturity Readiness Index (AIMRI)**. For manufacturers who have already surpassed maturity level 3, the natural question is: *What's next in their transformation journey?*

A future-ready, **standardised framework, the Artificial Intelligence Maturity Readiness Index (AIMRI)** is on the horizon to assess AI readiness and is designed to guide manufacturers through the next phase of industrial evolution. Stay tuned – more details *will be revealed soon.*

Acknowledgements

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Authors

Thomas Rilke
Division Manager
Deutsche Messe AG

Ranjana Raveesh
Digital Transformation Leader

Co-Authors

Dr. Dominic Gorecky
Head of Swiss Smart Factory & Swiss Health Tech *Center, Partner, Executive Board Member*
President of the Board
"Swiss Cobotics Competence Center" (S3C)

Analytics Support and Co Author

Kevin Foo
Operations and Digitalisation Manager
International Centre for Industrial Transformation

Partner organisation

Raimund Klein
Founder and CEO
International Centre for Industrial Transformation

Contributing organisations

ABON Biopharm (Hangzhou) Co., Ltd PT. Akebono Brake Astra Indonesia (AAIJ)
Viessmann Manisa Isi Teknolojileri Sanayi ve Ticaret Limited
Qatar Development Bank

Contributors

Nick Leeder
Owner Nick Leeder & Co

Jeff Winter
Vice President, Business Strategy
Critical Manufacturing

Dr Carolin Kautz
Founder and Owner
SinoVise

Author's Honest Reflection

The journey of the global manufacturing sector through the lens of the SIRI framework is both inspiring and sobering. The document unravels some compelling narratives, like transformation in Industry 4.0 is not dictated by economic wealth or geographic advantage alone, but by the willingness to innovate, adapt, and collaborate. Yet, behind progress lies a deeper truth, a tale of uneven adoption and unrealised potential.

One of the most striking reflections is the lack of stark, groundbreaking leaps in maturity scores across industries. Despite the rhetoric of revolution, many industries remain incremental in their progress, cautiously tiptoeing into the future rather than embracing it boldly. This raises a critical question: **Are we as ambitious as we claim to be in driving industrial transformation?** The data suggests **otherwise**, steady progress for some but stagnation or regression for others, particularly in industries resistant to change. Transformation-resistant industries signal a deeper challenge that is entrenched in mindsets, systemic inertia, and a lack of urgency to adapt.

Yet, this is not a story of despair. It's a story of opportunity. The emergence of "Steady Champions", industries with increasing maturity with uniformity, and "Ambitious Trailblazers" provides a beacon of hope, showing what is possible when industries align vision with execution. My honest submission from my analysis is that the path forward requires not just technology or policy but **leadership and a willingness to experiment, fail, and try again.**

The Smart Industry Readiness Index (SIRI) offers a guiding light in this complex landscape; by providing a structured framework to measure maturity and identify gaps, SIRI empowers organisations to prioritize high-impact areas for transformation. This targeted approach ensures that investments align with measurable outcomes, enhancing operational efficiency, driving innovation, and ultimately boosting ROI. For CEOs, SIRI serves as a critical tool to justify bold moves into new technology areas, providing data-driven insights that validate transformation decisions and reduce the risks of experimentation.

The Real Challenge Ahead

The reflections from this document go beyond statistics; they challenge us to rethink what success in Industry 4.0 truly means. Is it about ranking and maturity, or is it about creating systems that are inclusive, resilient, and sustainable? The truth is that relative rankings are only a small part of the picture. Absolute growth, equitable adoption, and the elimination of disparity are what would truly define the success of this industry-wide transformation.

We are at the cusp of something extraordinary, but our **collective inertia risks** turning extraordinary **potential into mediocrity**. The way forward lies in embracing honesty by acknowledging gaps, celebrating progress, and committing to the hard work of transformation. The future of manufacturing depends **not** on **how quickly we transform but** on **how intentionally and inclusively** we do it. And this perhaps is the most honest realisation of all.

The authors extend their sincere gratitude to the industry leaders, academic experts, and policymakers whose valuable input and insights greatly contributed to the development of this paper. We offer special appreciation to Jesmond Hong, Aykut Yeni, Charmaine Chong, and Deny Septian for their exceptional contributions.

Appendix

Industry Performance Cards*

	Industry Cluster	Pharmaceutical & Healthcare		Textile, Leather, Apparels		Transportation		Utilities	
		Average Maturity		Average Maturity		Average Maturity		Average Maturity	
Process	Vertical Integration	1.63	Approaching Digital	0.85	Approaching Defined	1.57	Approaching Digital	1.73	Approaching Digital
Process	Horizontal Integration	1.69	Approaching Digital	1.09	Defined	1.80	Approaching Digital	1.93	Approaching Digital
Process	Integrated Product Lifecycle	1.58	Approaching Digital	1.17	Defined	1.36	Defined	1.47	Defined
Technology	Shop Floor Automation	1.48	Basic	1.08	Basic	1.27	Basic	2.60	Approaching Full
Technology	Enterprise Automation	1.28	Basic	0.90	Approaching Basic	1.36	Basic	1.87	Approaching Advanced
Technology	Facility Automation	1.61	Approaching Advanced	0.42	Undefined	0.82	Approaching Basic	1.73	Approaching Advanced
Technology	Shop Floor Connectivity	1.08	Connected	0.19	None	0.84	Approaching Connected	2.20	Interoperable
Technology	Enterprise Connectivity	1.75	Approaching Interoperable	1.41	Connected	1.85	Approaching Interoperable	2.27	Interoperable
Technology	Facility Connectivity	1.38	Connected	0.12	None	0.53	Approaching Connected	1.40	Connected
Technology	Shop Floor Intelligence	1.27	Computerized	0.57	Approaching Computerized	1.11	Computerized	2.00	Visible
Technology	Enterprise Intelligence	1.13	Computerized	0.77	Approaching Computerized	1.22	Computerized	1.33	Computerized
Technology	Facility Intelligence	1.36	Computerized	0.29	None	0.58	Approaching Computerized	1.27	Computerized
Organisation	Workforce Learning & Development	1.89	Approaching Continuous	0.48	Informal	1.30	Structured	2.07	Continuous
Organisation	Leadership Competency	1.81	Approaching Informed	1.13	Limited understanding	1.76	Approaching Informed	2.20	Informed
Organisation	Inter- and Intra- Company Collaboration	2.38	Cooperating	0.88	Approaching Communicating	1.72	Approaching Cooperating	2.20	Cooperating
Organisation	Strategy & Governance	1.55	Approaching Development	1.05	Formalization	1.61	Approaching Development	2.20	Development

	Industry Cluster	Fast Moving Consumer Goods		General Manufacturing		Metals and Mining Industry		Paper Industry	
		Average Maturity		Average Maturity		Average Maturity		Average Maturity	
Process	Vertical Integration	1.59	Approaching Digital	1.35	Defined	1.44	Defined	1.61	Approaching Digital
Process	Horizontal Integration	1.67	Approaching Digital	1.37	Defined	1.52	Approaching Digital	1.58	Approaching Digital
Process	Integrated Product Lifecycle	1.26	Defined	1.12	Defined	1.25	Defined	1.42	Defined
Technology	Shop Floor Automation	1.82	Approaching Advanced	1.35	Basic	1.57	Approaching Advanced	1.84	Approaching Advanced
Technology	Enterprise Automation	1.48	Basic	1.16	Basic	1.37	Basic	1.35	Basic
Technology	Facility Automation	1.17	Basic	0.61	Approaching Basic	0.81	Approaching Basic	0.71	Approaching Basic
Technology	Shop Floor Connectivity	1.09	Connected	0.60	Approaching Connected	0.90	Approaching Connected	1.03	Connected
Technology	Enterprise Connectivity	2.03	Interoperable	1.47	Connected	1.87	Approaching Interoperable	2.10	Interoperable
Technology	Facility Connectivity	0.79	Approaching Connected	0.32	None	0.50	None	0.52	Approaching Connected
Technology	Shop Floor Intelligence	1.51	Approaching Visible	0.96	Approaching Computerized	1.34	Computerized	1.81	Approaching Visible
Technology	Enterprise Intelligence	1.43	Computerized	0.97	Approaching Computerized	1.27	Computerized	1.32	Computerized
Technology	Facility Intelligence	1.06	Computerized	0.46	None	0.76	Approaching Computerized	0.77	Approaching Computerized
Organisation	Workforce Learning & Development	1.74	Approaching Continuous	0.97	Approaching Structured	1.57	Approaching Continuous	1.26	Structured
Organisation	Leadership Competency	2.01	Informed	1.60	Approaching Informed	1.81	Approaching Informed	2.19	Informed
Organisation	Inter- and Intra- Company Collaboration	2.14	Cooperating	1.72	Approaching Cooperating	1.66	Approaching Cooperating	1.58	Approaching Cooperating
Organisation	Strategy & Governance	1.94	Approaching Development	1.26	Formalization	1.63	Approaching Development	1.77	Approaching Development

	Industry Cluster	Advanced Manufacturing		Chemical		Electronics		Energy	
		Average Maturity		Average Maturity		Average Maturity		Average Maturity	
Process	Vertical Integration	1.52	Approaching Digital	1.47	Defined	1.91	Approaching Digital	1.92	Approaching Digital
Process	Horizontal Integration	1.59	Approaching Digital	1.51	Approaching Digital	1.86	Approaching Digital	1.97	Approaching Digital
Process	Integrated Product Lifecycle	1.33	Defined	1.27	Defined	1.73	Approaching Digital	1.82	Approaching Digital
Technology	Shop Floor Automation	1.51	Approaching Advanced	1.82	Approaching Advanced	1.48	Basic	1.89	Approaching Advanced
Technology	Enterprise Automation	1.36	Basic	1.29	Basic	1.54	Approaching Advanced	1.67	Approaching Advanced
Technology	Facility Automation	1.03	Basic	0.87	Approaching Basic	1.04	Basic	1.30	Basic
Technology	Shop Floor Connectivity	0.99	Approaching Connected	1.01	Connected	1.25	Connected	1.84	Approaching Interoperable
Technology	Enterprise Connectivity	1.78	Approaching Interoperable	1.74	Approaching Interoperable	2.29	Interoperable	2.46	Interoperable
Technology	Facility Connectivity	0.64	Approaching Connected	0.64	Approaching Connected	0.82	Approaching Connected	1.16	Connected
Technology	Shop Floor Intelligence	1.24	Computerized	1.41	Computerized	1.45	Computerized	1.84	Approaching Visible
Technology	Enterprise Intelligence	1.20	Computerized	1.24	Computerized	1.51	Approaching Visible	1.61	Approaching Visible
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Organisation	Strategy & Governance	1.63	Approaching Development	1.35	Formalization	1.88	Approaching Development	2.11	Development

* The most up to date is integrated in the assessment reports generated by the software platform for SIRI.

Source: International Centre for Industrial Transformation

Endnotes

1. For more information on the Official SIRI Assessment and the evaluation scope, please refer to: Singapore Economic Development Board, The Smart Industry Readiness Index, 2017, www.edb.gov.sg/en/about-edb/media-releases- publications/advanced-manufacturing-release.html.
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3. The previous rankings can be found in: Singapore Economic Development Board, Manufacturing Transformation Insights Report 2019, 2019, www.edb.gov.sg/en/about-edb/media-releases-publications/advancedmanufacturing-release.html. For more information, visit www.incit.org.
4. Committee on the Budget United States Senate, Concurrent Resolution on the Budget FY 2014: Committee Print to Accompany S. Con. Res. 8 together with additional and minority views, 2013, https://books.google.ch/ books?id=xuhCHGjK9IIC (accessed 14/12/21).
5. The World Bank Data portal (https://data.worldbank.org/) is a comprehensive resource for global development data. It provides open access to a vast array of datasets, covering various domains such as economics, health, education, environment, and governance. The data is collected from credible international and national sources, and it is often used by researchers, policymakers, and businesses to Analyse trends, assess impacts, and make informed decisions.
6. The indicator "Manufacturing, Value Added (% of GDP)" (Code: NV.IND.MANF.ZS) measures the proportion of GDP derived from manufacturing activities. Manufacturing refers to industries involved in the physical or chemical transformation of materials, substances, or components into new products.
7. The indicator "Manufacturing, Value Added (Current US$)" (Code: NV.IND.MANF.CD) measures the total gross value added by manufacturing industries in a country's economy, expressed in current U.S. dollars.
8. An SME is defined as any organisation with fewer than 250 employees (Source: IFC, the World Bank Group)
9. Qatar Development Bank Strives to Empower Private Sector| News | Qatar Development Bank – https://www.qdb.qa/about/news/news/qatar-development-bank-strives-to-empower-private-sector?utm_source=chatgpt.com

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