Using the Smart Industry Readiness Index (SIRI) for Digital Transformation

MANUFACTURING SUMMIT 2019
Preparing Philippine Manufacturing of the Future of Production

Manila, 2 December 2019
Dr Andreas Hauser
EMBRACING CHANGE

“We are at the threshold of a radical systemic change that requires human beings to adapt continuously. As a result, we may witness an increasing degree of polarization in the world, marked by those who embrace change versus those who resist it.”

- Klaus Schwab, Founder and Executive Chairman, World Economic Forum
Why Transform Anyway?

- Leading countries are leaders in manufacturing today that are also well positioned for the future of production.
- Legacy countries: strong Structure of Production, low level of readiness for the future of production.
- Historically, many Legacy countries benefit from globalization. More developed economies outsourced lower pieces of the value chain to places with lower labour costs.
- Legacy countries risk losing traditional manufacturing share to Nascent countries that can offer even cheaper labour.

Source: Which countries are best prepared for the future of production?, World Economic Forum, 2018
INDUSTRY 4.0 ACROSS THE GLOBE

United States

Advanced Manufacturing
Industrial IT and IoT drives horizontal integration with disruptive impact.

Germany

Plattform Industrie 4.0
Engineering driven Integration originating in automated production systems. Germany coined the term Industrie 4.0.

China

Made in China 2025
Technology development and strong adoption of robotics and IoT to climb up the manufacturing value chain.

Japan

Society 5.0
Cutting-edge innovation focusing on robotics and Artificial Intelligence with broad impact on Society.

Singapore

Smart Nation Initiative
Broad ecosystem with concerted digital initiatives across all sectors leads to high adoption rate of I40 solutions.

India

Made in India
Ambitious initiative to transform India into a global design and manufacturing hub.

Other local initiatives
- Thailand 4.0
- Making Indonesia 4.0
- Industry4WD Malaysia
- Vietnam 4.0
- Philippines Industry 4.0
Industry 4.0 Jungle – Technologies, Concepts, Initiatives….
3 key observations on the industry adoption of Industrie 4.0

Industrie 4.0 will transform manufacturing

Growing Adoption
Across various reports, a high percentage (60% to 80%) of companies plan to deploy Industrie 4.0 solutions by 2020.

Yet many still:
1. Lack familiarity with Industrie 4.0 concepts
2. Are unclear how to get started
3. Lack a systematic approach to identify opportunities and high-impact initiatives
Industrie 4.0 Transformation Steps

01 STEP
- Develop individual understanding of I40
- Create Baseline
- Identify Gaps

02 STEP
- I40 Roadmap, Business Case
- I40 Solutions
- Qualify Vendors and Technologies

03 STEP
- Smooth integration of new technologies
- Safe, secure and reliable operations
- Meet quality and performance targets

INITIATION
- I40 Readiness Assessment
- Gap Analysis & Prioritisation Matrix
- Training

SOLUTIONING
- Define targeted future state and state problem
- Determine business impact
- Specify solutions and vendors

IMPLEMENTATION & OPERATION
- Security, Safety, Reliability, Biz Continuity
- QAQC, Project Risk Management
- Training
Objective of the Index

01 To help companies start, scale and sustain their transformation initiatives

What is Industry 4.0 and the tangible benefits that it can yield for my company?

What is the Industry 4.0 maturity level of my organisation and manufacturing facility?

How can my company improve in a targeted and step-wise fashion?

02 Key considerations in the development of the Index:

- Comprehensive to cover the key elements of Industry 4.0
- Balance between technical rigour & practical usability
- Relevant to all companies, regardless of industry, size, profile, and Industry 4.0 maturity

Source: The Smart Industry Readiness Index, Economic Development Board, 2017
The Development of SIRI
Development Process of the Index

1. **Screen**
   - Research and Evaluation
     - Literature review and landscape scan of existing Industry 4.0 concepts and frameworks

2. **Draft**
   - Index Framework Design & Development
     - Design & development of a practical yet technically rigorous framework

3. **Validate**
   - Key Expert Validation
     - Validate index with industry and academic experts and key associations

4. **Pilot**
   - Index Pilot with Industry
     - Pilot the index with Singapore-based SMEs & MNCs

5. **Launch**
   - Index Publication
     - Release of index through a whitepaper for industry to learn and apply

Source: The Smart Industry Readiness Index, Economic Development Board, 2017
Validated with global and local thought leaders from industry and academia

The Index was piloted across MNCs & SMEs

<table>
<thead>
<tr>
<th>Multi-National Corporations (MNCs)</th>
<th>Small and Medium Enterprises (SMEs)</th>
</tr>
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<tbody>
<tr>
<td>Alcon A Novartis Division</td>
<td>Eagle Services Asia</td>
</tr>
<tr>
<td>BD</td>
<td>JEP Aerospace</td>
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<tr>
<td>Rockwell Automation</td>
<td>People Bee Hoon Factory Pte Ltd</td>
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<td>Oronite</td>
<td>Univac</td>
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</table>

Source: The Smart Industry Readiness Index, Economic Development
Smart Industry Readiness Index
The Index: 3 Building Blocks

Using technology to digitize a poorly-designed process will only result in a poorly-designed digital process. Conversely, applying technology to a well-developed process will compound the amount of improvement.

Under Industry 4.0, the concept of process improvements has expanded beyond efficiency enhancement of individual processes, to include integration of multiple processes.

A cornerstone of every major industrial revolution and remains a critical pillar for Industry 4.0.

Advanced automation & digital technologies are necessary to drive the convergence of cyber-physical systems.

Need to adapt organizational structures and processes to allow the workforce to keep pace.

2 critical elements:
(i) The people who make up the organization, and
(ii) The institutional systems that govern how the

Source: The Smart Industry Readiness Index, Economic Development Board, 2017
Comprehensive Approach to Address Complex Industrie 4.0

**Operations**
The planning and execution of processes which lead to the production of goods & services

**Supply Chain**
The planning & management of raw materials & inventory of a company’s goods & services, from the point of origin to the point of consumption

**Product Lifecycle**
The sequence of stages that a product goes through, from its initial conceptualization to its eventual removal from the market

**Automation**
The application of technology to monitor, control, & execute the production & delivery of products & services

**Connectivity**
The state of interconnectedness between equipment, machines, & computer-based systems to enable communication & data exchange across assets

**Intelligence**
The processing & analysis of data collected, to diagnose problems & identify opportunities for improvement

**Talent Readiness**
The ability of the workforce to drive and deliver Industry 4.0 initiatives

**Structure & Management**
Strong leadership, supported by a clear strategy & governance framework, will enable firms to be more flexible, collaborative, & empowered to design & implement Industry 4.0 strategies effectively

Source: The Smart Industry Readiness Index, Economic Development Board, 2017
The Index: 16 Dimensions

Smart Industry Readiness Index

Process
- Operations
- Supply Chain
- Product Lifecycle

Technology
- Automation
- Connectivity
- Intelligence

Organization
- Talent Readiness
- Structure & Management

Vertical Integration
Horizontal Integration
Integrated Product Lifecycle

1. Vertical Integration
2. Horizontal Integration
3. Integrated Product Lifecycle
4. Shopfloor
5. Enterprise
6. Facility
7. Talent Readiness
8. Workforce Learning & Development
9. Leadership Competency
10. Structure & Management
11. Inter- and Intra-Company Collaboration
12. Strategy & Governance

Source: The Smart Industry Readiness Index, Economic Development Board, 2017
Learn key concepts and build a common language for alignment

01 The Index will provide a **base foundation** to build knowledge:

- An understanding of the key principles, concepts, and technologies under Industry 4.0
- An overview of the tangible benefits and business value that Industry 4.0 can yield
- A guide to illustrate how companies can achieve their ideal end-states in a practical, step-wise fashion

Source: The Smart Industry Readiness Index, Economic Development Board, 2017

02 The Index will establish a **common language** amongst different stakeholders
Sample Results (Current State)

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Bands</th>
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</thead>
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<tr>
<td>2. Horizontal Integration</td>
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<td>3. Integrated Product Lifecycle</td>
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<td>4. Shopfloor Automation</td>
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<td>5. Enterprise Automation</td>
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<td>6. Facility Automation</td>
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<td>7. Shopfloor Connectivity</td>
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<td>8. Enterprise Connectivity</td>
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<td>10. Shopfloor Intelligence</td>
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<td>11. Enterprise Intelligence</td>
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<td>12. Facility Intelligence</td>
<td>None</td>
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Identify Gaps – The Prioritisation Matrix

Source: The Prioritisation Matrix, Economic Development Board, 2019
EDB launched the Index and Assessment Matrix with TUV SUD back in November 2017. Since then, it has been piloted with over 220 companies.

The Prioritization Matrix, the second tool under SIRI was developed with McKinsey, SAP, Siemens and TUV SUD to help companies architect their implementation roadmap. It has been launched in Hannover 2019.

Overview of Data Set

200 COMPANIES

Annual Entity Turnover*

- 51% < $100M
- 29% $100M - $500M
- 20% > $500M

33% SMALL AND MEDIUM ENTERPRISES

12 MANUFACTURING INDUSTRIES

14 COUNTRIES

2018 - 2019 ASSESSMENT PERIOD

- **Coniferous Forest**: Generally further along in their Industry 4.0 journeys. Similar in their pace of transformation.  
  → Governments: ensure sectors’ physical and social infrastructure enables constrain development.

- **Tundra**: Face greater challenges in industrial transformation. Nature of products and manufacturing processes limit the ease of deploying I40 solutions.  
  → Governments to **partner companies** to explore initiatives e.g. redesigning manufacturing process, enhancing workforce or training programs.

- **Rainforest**: Most firms are ahead, but a small group has not kept pace.  
  → Governments: identify the sources contributing to the high variance and then **support individually**.

- **Savanna**: Most companies are in their early stage of transformation.  
  → Government to **encourage companies** to pursue transformation using examples from Coniferous Forest.

SIRI - Global Adoption
Global Adoption – SIRI has become De-Facto Standard

- 230+ Companies consulted
- >30 Experts (Industry 4.0 Assessors and Consultants)
- 4 Industries (Manufacturers, Logistics, Utilities, Service Providers)

Countries: United States, Germany, China, Japan, Vietnam, Singapore, Thailand, Indonesia, Malaysia, India
Thank You

Industrie4.0@tuv-sud.sg