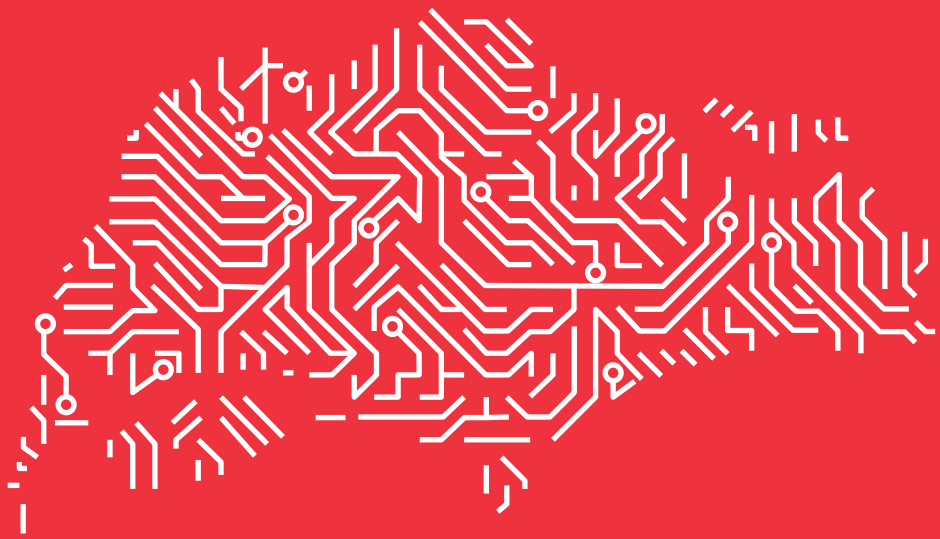


SINGAPORE

YOUR GLOBAL PARTNER IN MANUFACTURING

CONTENTS

"Singapore's ambition is to be the global hub for manufacturing and one of the best places globally for high-tech innovation. What makes Singapore unique is the strong partnership between industry, the ecosystem of partners, and the government. This allows companies to translate Industry 4.0 concepts and technologies into new value, for Singapore and the markets around us."

Mr Lim Kok Kiang
Assistant Managing Director,
Singapore Economic Development Board
13 November 2017

SINGAPORE:
A WORLD-CLASS
MANUFACTURING ECOSYSTEM

Manufacturing has been the engine of Singapore's economic growth since our independence in 1965. Today, manufacturing remains a key pillar of our economy, accounting for around 20% of our nation's Gross Domestic Product (GDP).

Over the past few decades, Singapore has built a diverse base of industries, occupying leadership positions in sectors such as aerospace, semiconductor, chemicals and biomedical sciences. The country is also recognised as a vibrant hub for high-value manufacturing – one with deep engineering and innovation capabilities.

Singapore's world-class manufacturing ecosystem makes it one of the best places globally for manufacturers to design and execute their global manufacturing strategies.

Identified by the World Economic Forum as one of the best-positioned countries for Industry 4.0.[1]

Ranked 2nd globally in the 2018 World Economic Forum's *Readiness for the Future of Production Report*.[1]

The world's 4th largest exporter of high-tech products.[2]

[1] World Economic Forum, *Readiness for the Future of Production Report 2018*

[2] The World Bank Open Data, High-Technology Exports

LEADERSHIP IN HIGH-VALUE MANUFACTURING

60%

BIOMEDICAL SCIENCES

60% of the world's micro-arrays and one-third of the world's thermal cyclers and mass spectrometers are manufactured in Singapore. In the pharmaceutical sector, four out of the top 10 drugs by global revenue are manufactured in Singapore.

AEROSPACE

Singapore accounts for about 10% of the global maintenance, repair and overhaul output, and boasts one of Asia's largest and most diverse ecosystems with more than 130 aerospace players.

10%

100

ENERGY AND CHEMICALS

Singapore's integrated energy and chemicals complex, Jurong Island, is the world's fifth-largest producer of refined oil, and ranks among the top 10 globally in terms of chemicals exports by volume. More than 100 global chemicals firms have located major operations in Singapore.

HOME TO A VIBRANT BASE OF TECHNOLOGY AND SOLUTIONS PROVIDERS

Attracted by the dense network of manufacturers, presence of a robust research community, and the availability of talent, leading technology and solution providers have established global or regional centres in Singapore. In partnership with lead customers, these centres develop new products, solutions and business models, which will be exported from Singapore to the rest of the world.

ABB	Global Digital Solutions Centre	accenture High performance. Delivered.	Global Internet of Things Centre of Excellence
EMERSON	Global Pervasive Sensing & Additive Manufacturing Centres of Excellence	OMRON	Omron Automation Centre
Rockwell Automation	Global Integrated Controls & Information CoE	Schneider Electric	Software Industry Solutions
SIEMENS	Integrated Digitalisation Hub	TÜV SÜD	Global IoT Digital Services Centre of Excellence

Singapore is the ideal location for this Hub because of its distinctively advanced industrial and urban infrastructure development, combined with the government's Smart Nation thrust to enable a digital economy.

Joe Kaeser

President & CEO of Siemens AG

11 July 2017

STRONG COMMITMENT TO RESEARCH & DEVELOPMENT

Investments in Research and Development are critical to ensure that Singapore is at the forefront of innovation. To foster industry-focused research within Advanced Manufacturing and Engineering, the Singapore Government has committed US$2.4 billion to these efforts.

Singapore has set up national programmes in many of the emerging technology domains to help our partners translate research into reality. These include the National Robotics Programme to drive robotics adoption and the National Additive Manufacturing Innovation Cluster to translate 3D printing research into commercial applications.

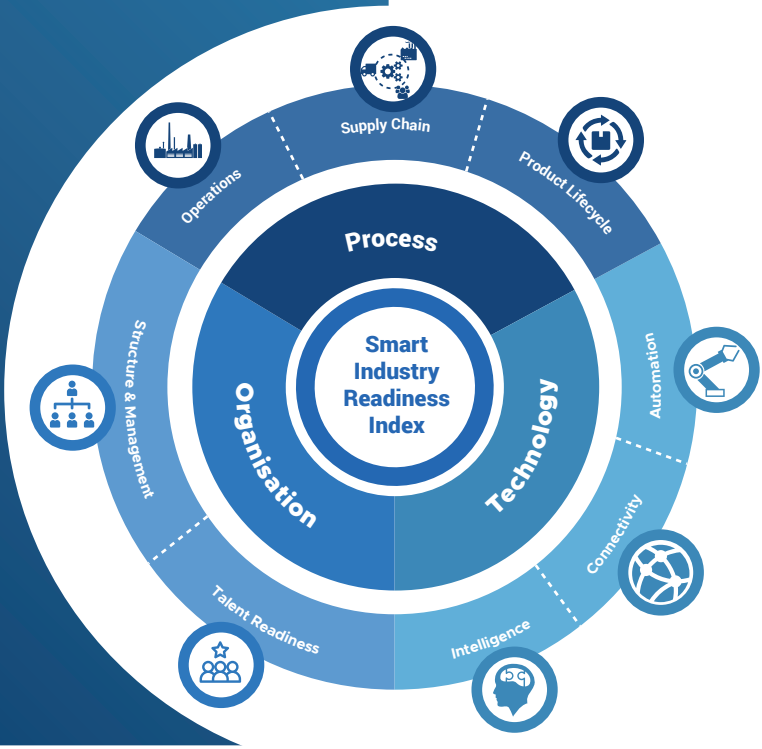
Model Factories have been built within Singapore's research institutes and universities, to simulate a real-life production environment for the test-bedding of new manufacturing technologies. The first Model Factory, established in 2017, features demonstrations in predictive maintenance, real-time monitoring, and remote control centre management.

> *"R&D is an investment in our own future. If we want to be a knowledge-based economy, which thrives on innovation and enterprise, we must build this knowledge base on which we can build the future of Singapore – then R&D is where we have to invest."*
>
> Teo Chee Hean
> Deputy Prime Minister
> Coordinating Minister for National Security
> Chairman, National Research Foundation
> Singapore
> 8 January 2016

THE SINGAPORE SMART INDUSTRY READINESS INDEX©

The world's first Industry 4.0 tool developed by a government for nation-wide transformation of industrial sectors

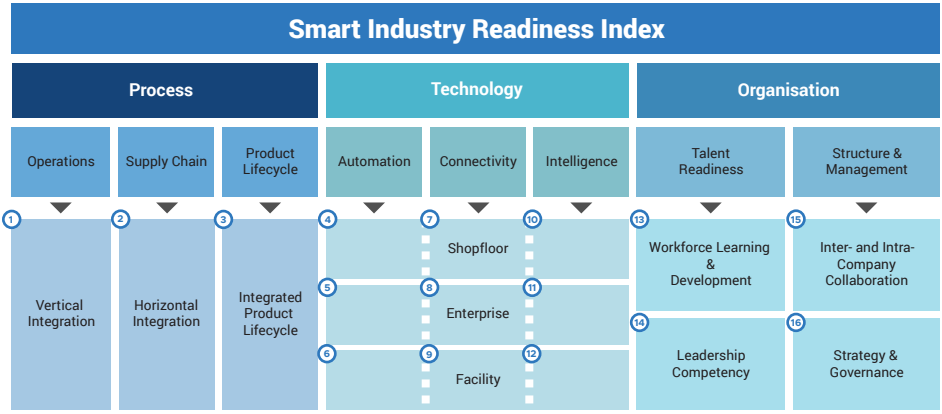
Industry 4.0 is gathering momentum globally. Based on a 2017 study conducted in partnership with Accenture, 70% of manufacturers in Singapore will deploy Industry 4.0 solutions by 2020. To help manufacturers start, scale and sustain their Industry 4.0 transformation initiatives, Singapore developed The Singapore Smart Industry Readiness Index©. With the Index, companies can evaluate the readiness of their facilities and design their transformation roadmaps in a more targeted and systematic manner.



Created in partnership with TÜV SÜD, and validated by an advisory panel of academic and industry experts, the Index is a comprehensive and easy-to-use tool for all companies regardless of their industry or size. The Index draws its key concepts from the Reference Architectural Model for Industry 4.0 (RAMI 4.0) developed by *Plattform Industrie 4.0*, one of the largest Industry 4.0 networks globally.

THE 16 DIMENSIONS OF ASSESSMENT

The Index comprises three layers. The topmost layer is made up of the 3 building blocks of Industry 4.0: Process, Technology & Organisation. Underpinning these building blocks are 8 pillars of focus. The pillars then map onto 16 dimensions of assessments; which companies can use to evaluate their own facilities.



TRANSLATING CONCEPTS INTO BUSINESS VALUE

The true test of the value of any index is its ability to translate concepts into real business value. Encapsulated in a "LEAD" Framework, the Index outlines four steps for companies to consider in their transformation journeys:

Learn

Learn key concepts and build common language for alignment

Evaluate

Evaluate the state of existing facilities and the company's readiness level

Architect

Architect a comprehensive transformation strategy and implementation roadmap

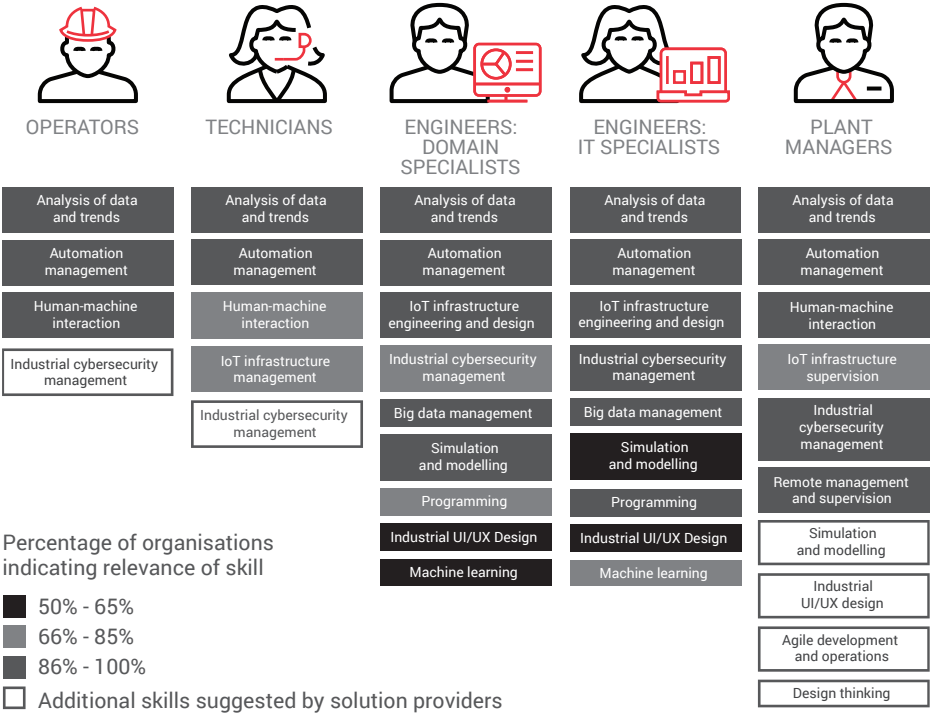
Deliver

Deliver impact and sustain transformation initiatives

A FUTURE-READY WORKFORCE

A strong manufacturing workforce will enable and accelerate the transformation and growth of our manufacturing base. With the advent of Industry 4.0, the skillsets of the manufacturing workforce will evolve. To ensure that our workforce is future-ready, the Singapore Government has taken a three-pronged approach to prepare our workforce to take on new roles and acquire new skills.

1 **Identified the new skills needed across job archetypes, in partnership with the industry**



Source: Accenture Consulting, *Manning the Mission for Advanced Manufacturing*

2 **Launched the SkillsFuture Series for Advanced Manufacturing, a nation-wide training programme to help the workforce acquire new skills**

These programmes were developed and validated after close to 300 hours of consultation with companies, to ensure that Singapore's workforce is equipped with industry-relevant skillsets.

3 **Strong tripartite partnership among unions, companies, and the Singapore Government, to continually upskill and reskill workforce**

ASIA-PACIFIC EDITION OF HANNOVER MESSE COMES TO SINGAPORE

Industrial Transformation ASIA-PACIFIC - A HANNOVER MESSE event
16 – 18 October 2018
Singapore EXPO Convention and Exhibition Centre

Capitalising on Growth Opportunities in Asia-Pacific

In response to industry trends, changing markets and new customer needs in Asia-Pacific, Deutsche Messe AG and SingEx Exhibitions Pte Ltd have established a long-term partnership to host the Industrial Transformation ASIA-PACIFIC – a HANNOVER MESSE event from 16 to 18 October 2018 in Singapore.

This inaugural Asia-Pacific edition of Hannover Messe will be a flagship manufacturing event for the region. It will be shaped by the insights of global industry experts and the needs of manufacturers as they embark on digital transformation. Designed to help companies in Asia-Pacific start, scale and sustain their Industry 4.0 initiatives, this platform brings together companies and stakeholders across the value chain to learn, exchange best practices, collaborate, network and do business with each other. Leading technologies and solutions will also be showcased at the event.

Industrial Transformation ASIA-PACIFIC will be a key pillar of Singapore's efforts to drive the growth and transformation of the manufacturing industry in Singapore and the region.

ACCELERATE YOUR EXPANSION WITH US

Manufacturing is on the brink of a new age – arising from the convergence of the physical and digital worlds. Singapore has embarked on a nation-wide effort to transform our manufacturing base and deepen our ecosystem of partners. This allows us to be the best place globally for companies to design and execute their manufacturing strategies, so as to tap the immense opportunities that Industry 4.0 can offer. The time is now for us to come together to shape the future of manufacturing for Singapore and for the world. Join us!

SINGAPORE ECONOMIC DEVELOPMENT BOARD

WWW.EDB.GOV.SG