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CREATING GROWTH, ENHANCING LIVES

A*STAR's Future of Manufacturing Initiative (FoM)

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Agency for Science, Technology and Research (A*STAR)

25 September 2018

SG Passion Made Possible

ABOUT A*STAR

Our mission and vision

MISSION

We advance science and develop innovative technology to further economic growth and improve lives

VISION

A global leader in science, technology and open innovation

A*STAR

MISSION

We advance science and develop innovative technology to further economic growth and improve lives

Biomedical Research Council (BMRC) 13 Research Entities	**Science & Engineering Research Council (SERC)** 9 Research Entities	**ETPL** Commercialisation	**A*STAR Graduate Academy** Scholarships

>5,200 STAFF

>4,100
Researchers, Engineers and Technical Support Staff

>38%
of whom come from 64 countries

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Passion Made Possible

Singapore's lead government agency for economic oriented R&D

Achievements in FY17

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SG Passion Made Possible

Content

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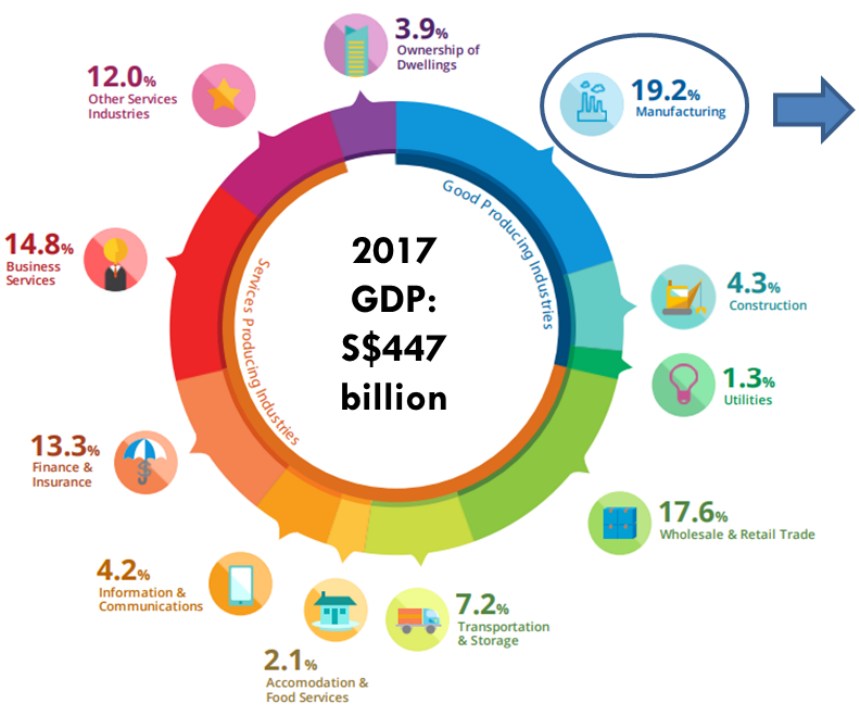
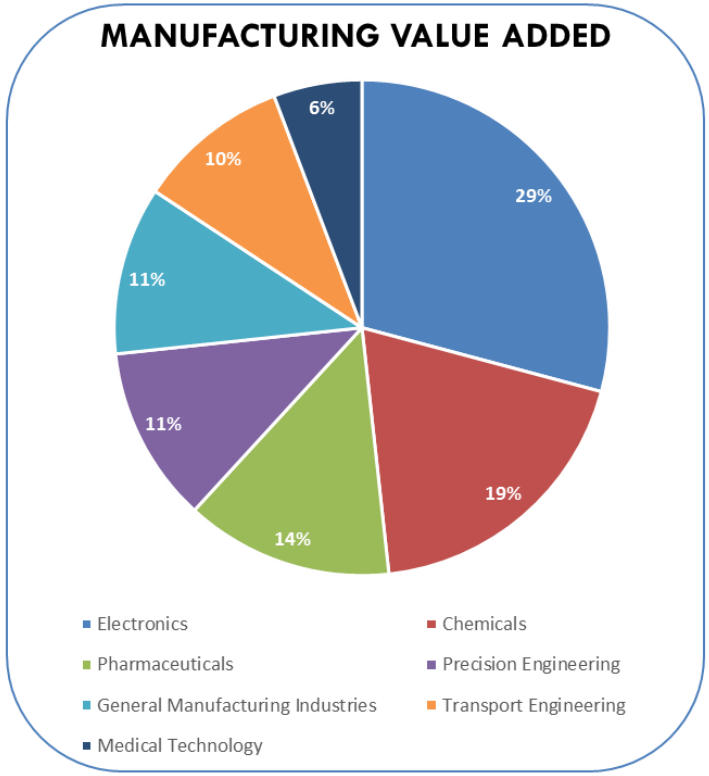
Preamble on A*STAR's Future of Manufacturing (FoM) Strategy

Manufacturing is a key pillar of Singapore's economy





Source: Department of Statistics (DOS), Economic Development Board (EDB)

Employment contribution

>480,000; 13.4% of total employment

Diverse manufacturing jobs

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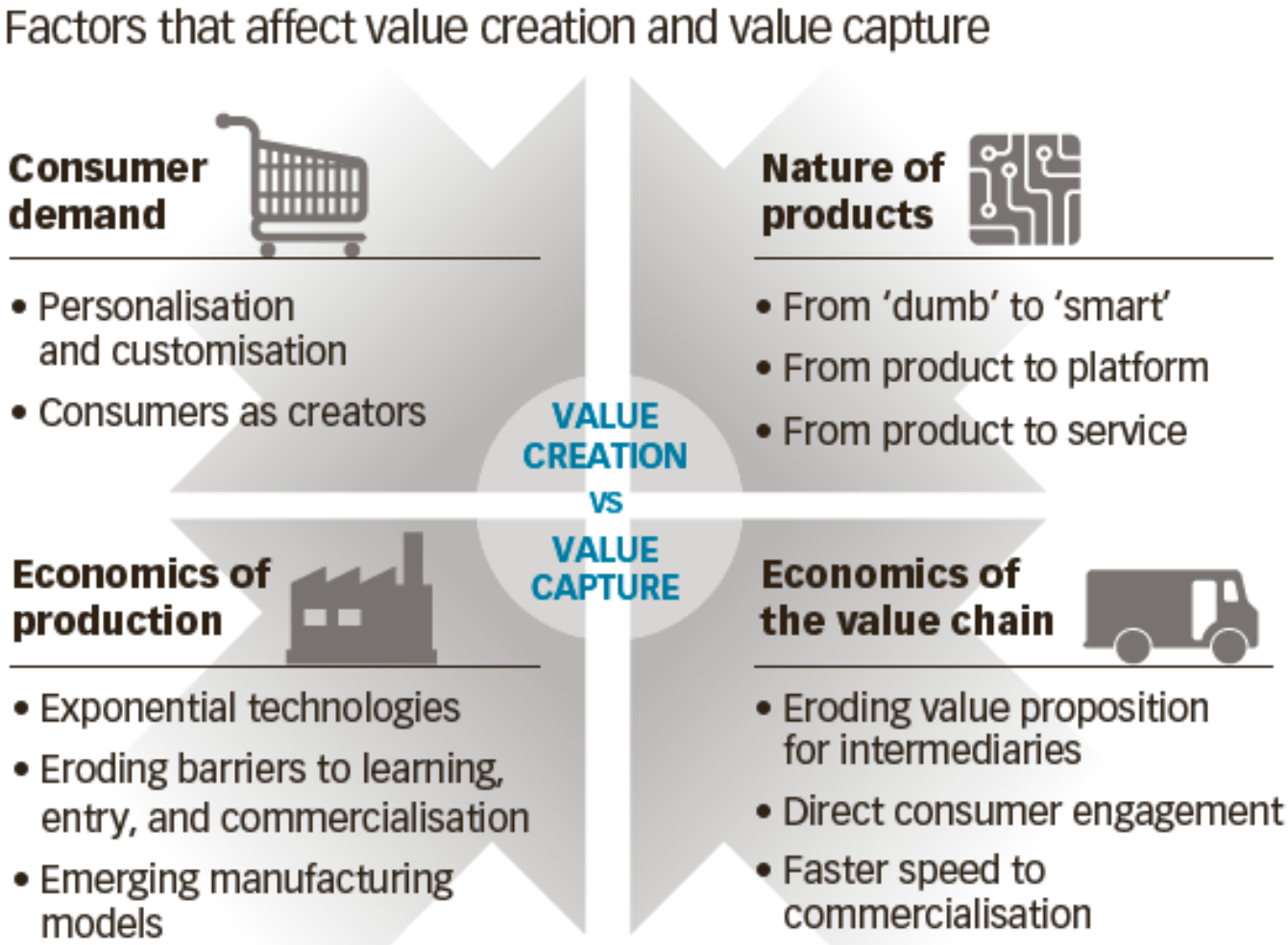
Recognised that manufacturing is no longer simply about making physical products



Source: The Business Times Graphics, Oct 2015, 4 shifts in manufacturing, The Future of Manufacturing, 2015, Deloitte University Press

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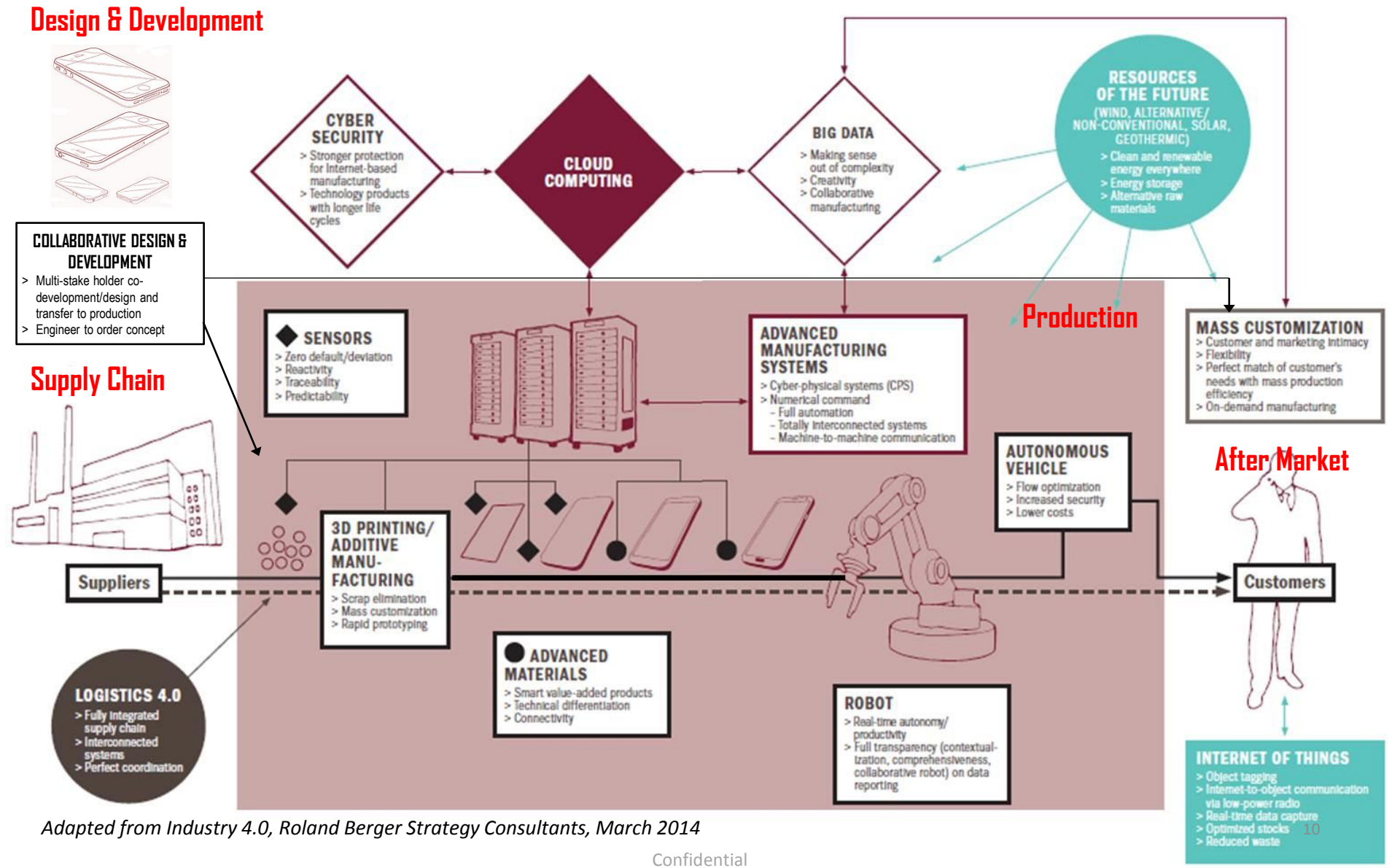
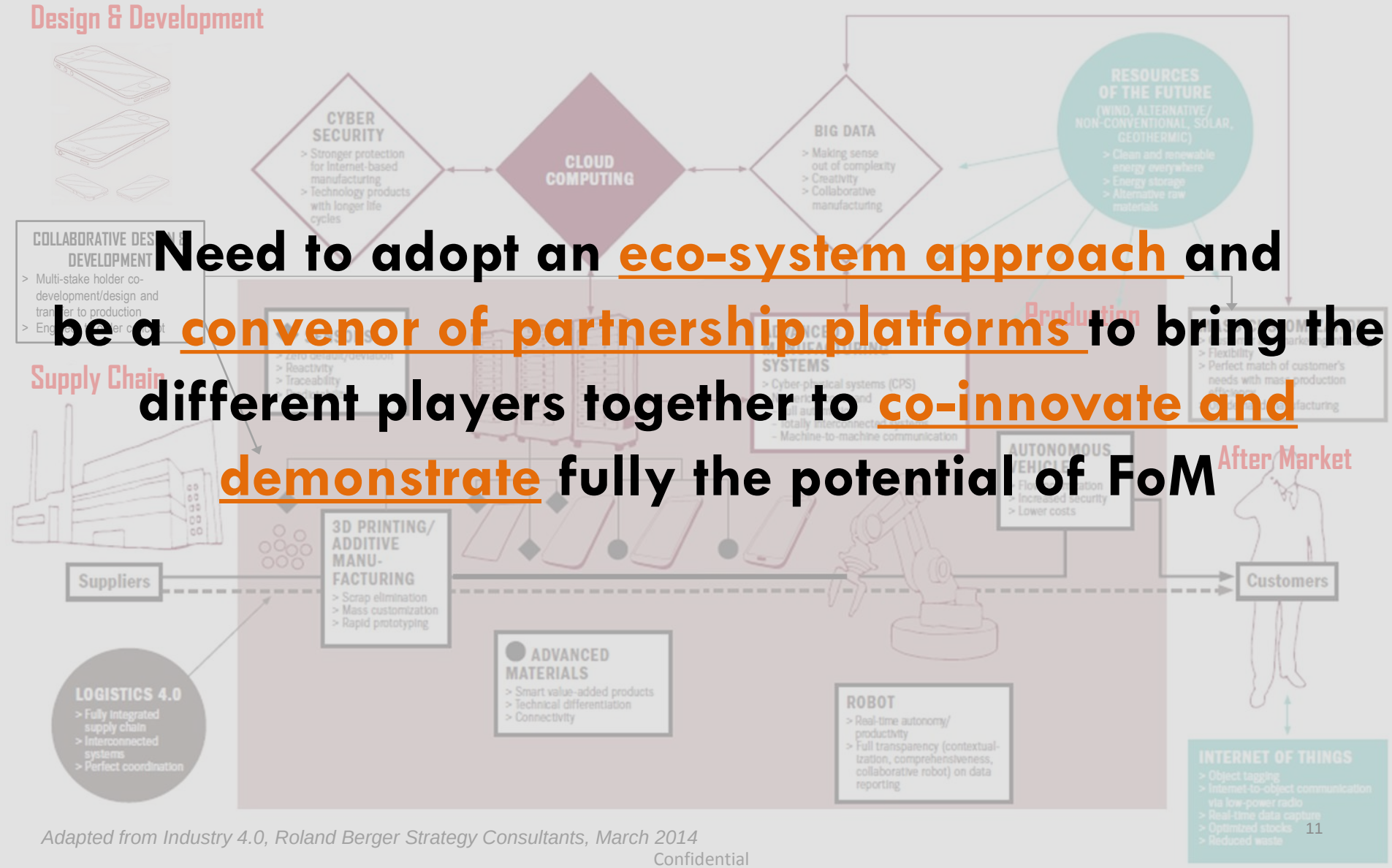
Digitalisation in a fully connected manufacturing value chain with multiple different players in the eco-system



Adapted from Industry 4.0, Roland Berger Strategy Consultants, March 2014

Digitalisation in a fully connected manufacturing value chain with multiple different players in the eco-system

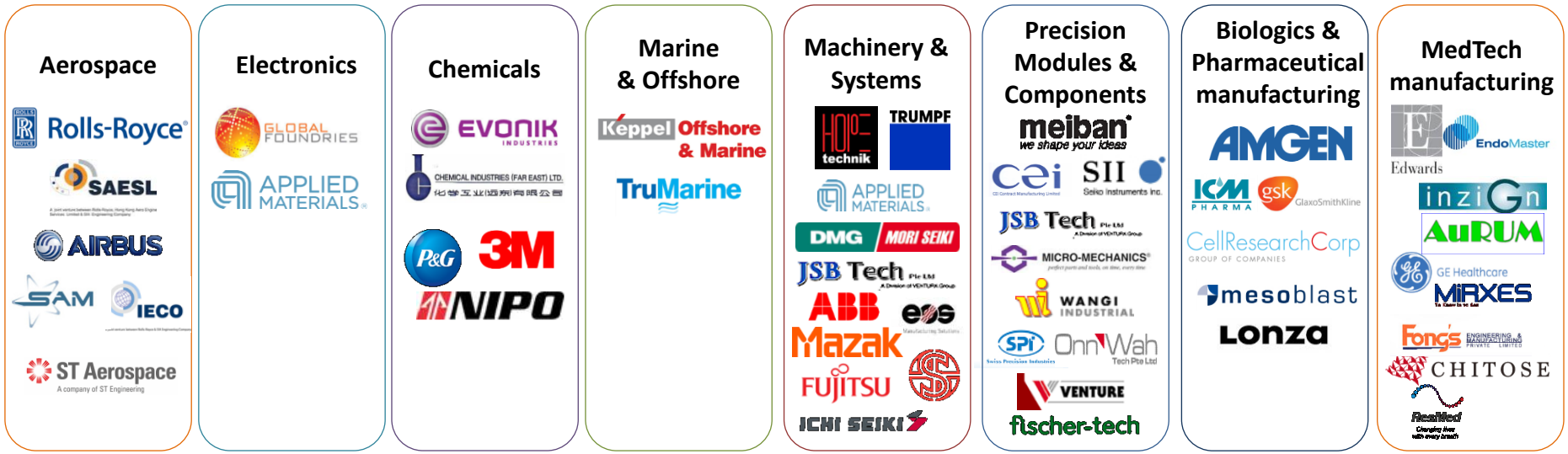


Need to adopt an eco-system approach and be a convenor of partnership platforms to bring the different players together to co-innovate and demonstrate fully the potential of FoM

Adapted from Industry 4.0, Roland Berger Strategy Consultants, March 2014

Broad engagement of stakeholders in the FoM strategy development in 2016

- **104** Participants (FoM Steering Committee and Sub-committees[1])
- **58** companies from the **8** AME industry clusters were consulted
  - **3** Industry Roundtable discussions and one-to-one engagements (incl. Singapore and overseas trips[2])



TACs: SPETA Singapore Precision Engineering and Technology Association; Singapore Manufacturing Federation; Agency for Science, Technology and Research, Singapore

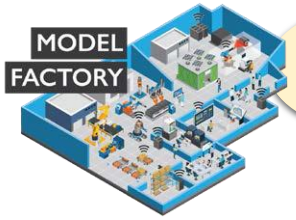
[1] Comprising Industry reps, Trade Association & Chambers (TACs), Ministry of Trade and Industry (MTI) agencies and Institutes of Higher Learning (IHLs)

[2] Overseas engagements with the following companies: Rolls-Royce, Lloyd's Register, SAP, FESTO, Bosch, Fujitsu, Mitsubishi Chemical Corporation, Lonza

A*STAR's Future of Manufacturing (FoM) Technology Strategy

To sustain Singapore's competitiveness in manufacturing and technology innovation, as a location of choice for developing, test-bedding and deploying advanced technologies in the manufacturing sector

1 **Creation of public-private partnership platforms to catalyse adoption of FoM technologies in the near term**



Tech Labs (Model Factory)

Bring together ecosystem of research performers, end users, technology providers and system integrators to jointly innovate, test and demonstrate FoM technologies

Public–Private Platforms

Tech Access

Supports firms' innovation efforts by providing access to an installed base of advanced mfg equipment/ facilities & expertise

Tech Depot

TechDepot.

Provides SMEs with access to a suite of plug-and play, easy-to-use technologies to help them improve productivity

2 **R&D programmes in FoM to address near and medium/long term industry needs**

Additive Manufacturing

Advanced Materials

Artificial Intelligence in Manufacturing

Industrial Internet of Things

Robotics & Automation

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1 Announcements of public-private partnership platforms for FoM

a) Tech Labs – Model Factories

*"I'm pleased to announce that **A*STAR will establish two 'Model Factories'** to allow companies, particularly our SMEs, to firstly **experience the technologies first-hand in a learning environment**, without affecting their existing business operations; and secondly to **collaborate with stakeholders to test-bed and jointly develop innovative solutions** for their processes."*

Minister of State
Dr Koh Poh Koon
Committee of Supply 2017

b) Tech Access

*"We will also support companies in the use of advanced machine tools for prototyping and testing, which may require costly specialised equipment. **A*STAR will provide access to such equipment, user training and advice under a new Tech Access Initiative**"*

Finance Minister,
Mr Heng Swee Keat
Budget 2017

c) Tech Depot

*"To improve our companies' access to technology and digital solutions, we will add a one-stop **Tech Depot** to the SME Portal... This is a showcase of **easily adoptable technology solutions**... include A*STAR's ready-to-go (RTG) technologies as well as IMDA's pre-qualified Infocomm & Media (ICM) solutions."*

Senior Minister of State,
Ms Sim Ann
Committee of Supply 2017

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Future of Manufacturing Initiatives – Partnerships

Collaboration with Rolls-Royce in aerospace sector

A*STAR and Rolls-Royce to establish technology centres to develop FoM capabilities

McKinsey & Company Digital Capability Centre at ARTC

Help companies learn about Industry 4.0 technologies, and groom talent for FoM technologies through workshops & training

Testbedding Model Factory technologies at CKE Manufacturing

Target for 500 SMEs to benefit from Model Factory initiatives over the next 5 years

Working with Feinmetall to build their advanced manufacturing capabilities

Support for SMEs that wish to build up in-house R&D and innovation capabilities

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TECH LABS (MODEL FACTORIES)

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Tech Labs

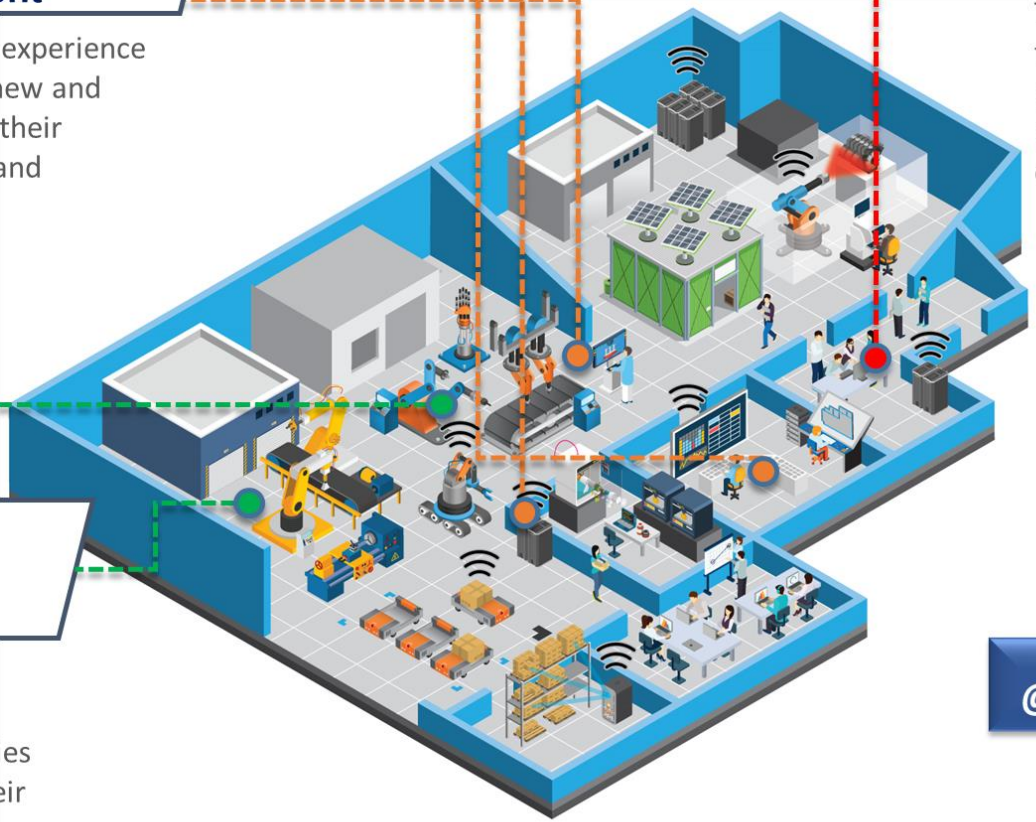
Features of Model Factories in A*STAR

1 **Experiential Learning Environment**

Companies will be able to experience and learn the benefits of new and advanced technologies to their manufacturing processes and operations.

3 **Co-Innovation Platform**

Test bedding facilities will allow the ecosystem of research performers, technology providers and end-users to co-create and test new innovations.



2 **Improving Production Processes**

The dynamic production environment in the Model Factories will allow companies to optimise and improve their production processes.

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MODEL FACTORIES @ SIMTech and @ARTC

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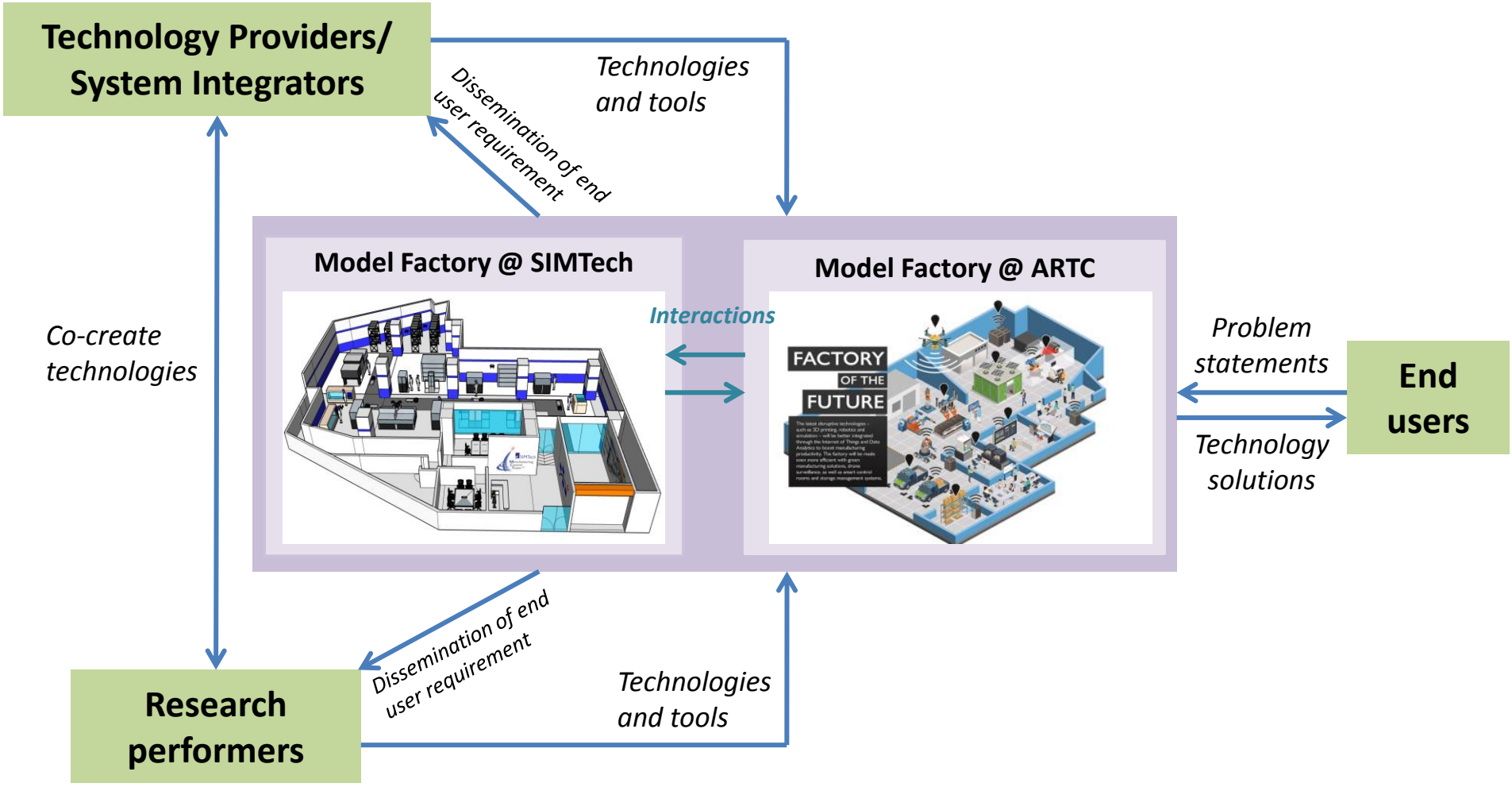
Operating model of Model Factories



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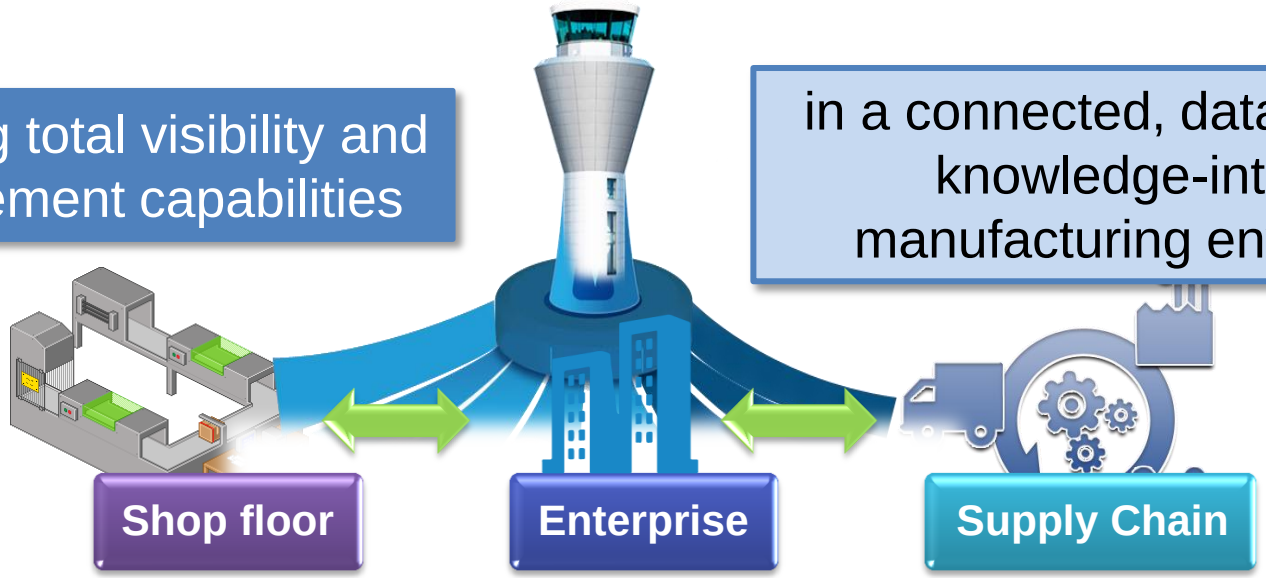
Model Factory@SIMTech

Providing total visibility and management capabilities

in a connected, data-driven and knowledge-intensive manufacturing environment



Complete & Timely visibility

Supported by

3rd ICT Platform & **Manufacturing System** technologies

On-the-go Smart Decision Tools

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Model Factory@SIMTech - Sandbox

Equipment Testing
Systems Integration
Nerve Centre
Demonstrators
Test-runs

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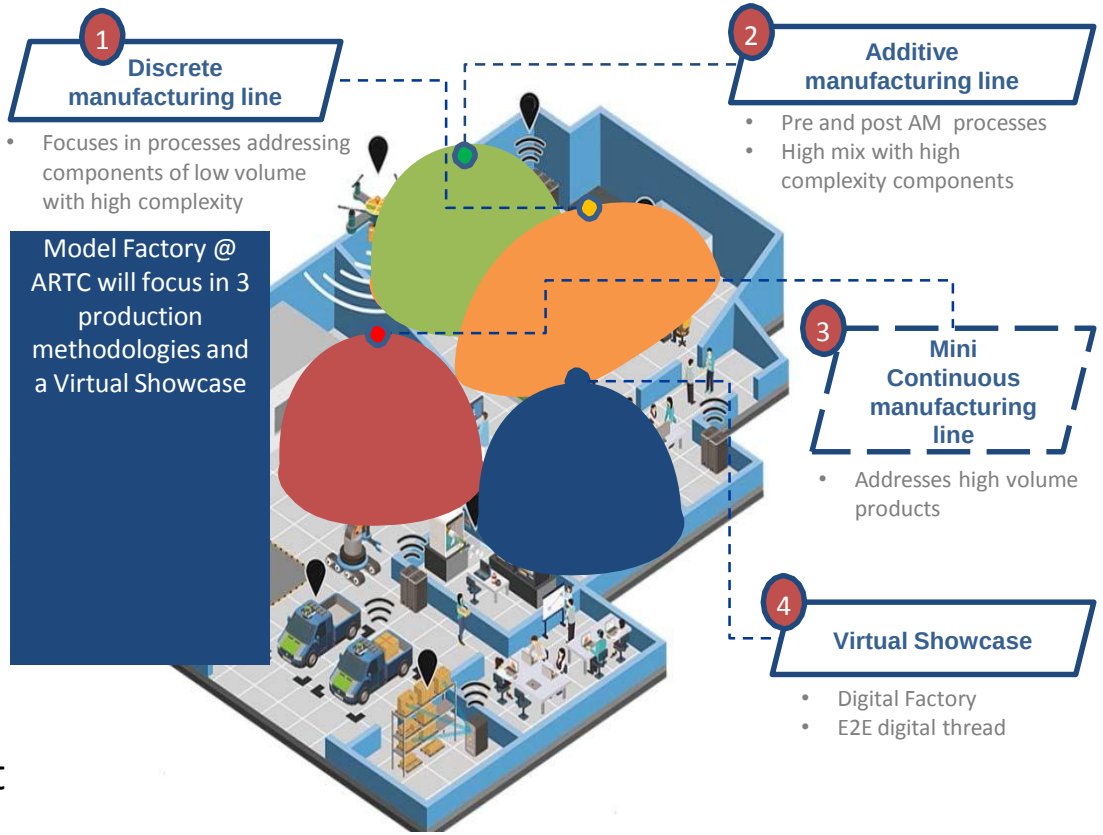
Model Factory @ ARTC

A **Public-Private Partnership platform** to accelerate the adoption of digital and smart manufacturing technologies.

- **Develop learning and knowledge management** in digital and smart manufacturing for **aerospace and heavy machinery industry**

- Develop and **validate various IT/OT architectures, technologies and process models** required for a smart factory concept



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Model Factory @ ARTC

- 3 type of production methodologies and a virtual showcase testbeds have been built to test, validate and demonstrate the technologies and solutions developed from research.

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TECH ACCESS

Tech Access
Objectives

- Mitigate SMEs' risks and enable move to advanced manufacturing
- Provide SMEs access to A*STAR's installed base of research equipment through resource planning and time shifting
- Tech Access can be provided in various combinations –
  a) access to use of the equipment;
  b) user training; and
  c) consultancy to optimise equipment effectiveness.
- From the experience gained and benefits validated with the adoption of such technologies, the SMEs could then opt to scale and acquire their own equipment to capture new business opportunities.

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TECH DEPOT

Tech Depot
Objectives

- **Online platform to showcase easily adoptable technology solutions under SME Portal**
  - A*STAR's ready-to-go technologies
  - IMDA's and SPRING's prequalified digital solutions by private solution providers

- **Applicable to various business functions such as**
  - Inventory Management
  - Customer Management
  - HR Management
  - Workflow Tracking
  - Machine Effectiveness
  - Quality Assurance

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Thank you