Driving the cluster towards Thai industries 4.0

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Vice Chairman of The Federation of Thai Industries

Which external factors affect industries?

Economic Crisis

Asian Financial Crisis

EU Crisis

Subprime Crisis

The factors that affect industries

International Agreements

An industry should follow international law and regulations affecting trade and investment

.

The factors that affect industries

Government Policy

THAILAND BOARD OF INVESTMENT

The factors that affect industries

An environmental awareness

GREENPEACE

There is an increase in a green awareness especially in climate change nowadays.

The factors that affect industries

An investment in infrastructure

Economic Corridor

Power Plant

High-speed Rail

Double Track Railway

The factors that affect industries

Disaster Management

	จีดีพี 2554	
	ประมาณการก่อนน้ำท่วม	ประมาณการหลังน้ำท่วม
สภาพัฒน์ ฯ	3.5 - 4%	1.5%
ธปท.	2.6%	1.8%
สศค.	2.6%	1.7 - 2%
ธนาคารโลก	3.6%	2.4%
ความเสียหายภัยพิบัติน้ำปี 2554 รวม 1.9 แสนล้าน		

ที่มา : ไทยพับลิก้า รวบรวมข้อมูล ณ 30 พ.ย. 2554

The factors that affect industries

Education and Human Resource

An efficient human resource is a key factor to support technology and innovation of industry.

The factors that affect industries

A Shortage of Unskilled Labor

Most Thai industry hire unskilled labor from neighboring countries that lead benefits and drawbacks to Thailand.

The factors that affect industries

Technology Development

Industries should be adaptable for technology development.

The factors that affect industries

12 CLUSTER INDUSTRIES move toward AEC

Agro-Based Industry

- Food Processing Cluster
  "Kitchen of the World"
- Agriculture Industry Cluster
  "Better Farming Solutions for Better Agro – Industry"
- Natural Rubber and Rubberwood Cluster
  "Rubber Hub of ASEAN"

High-Value Industry

- Fashion and Lifestyle Cluster
  "Innovation for Life Hub"
- Printing and Packaging Cluster
  "Regional Printing Hub"

New Wave Industry

- Environment Friendly Energy Cluster
  "ASEAN Renewable Hub"
- Health & Beauty Products Cluster
  "Hub of Health & Beauty"
- Engineering Machinery and Metal Work Cluster
  "ASEAN Leader in Engineering Works"

Hi-Tech Industry

- Automotive Cluster
  "Moving Forward for The Future"
- Electrical Electronics & Air-Conditioning Cluster
  Construction Materials Cluster
  "Better Living of Asia"
- Petrochemical Cluster
  "Toward Competitive and Sustain Petrochemical Hub"
- Construction Materials Cluster
  "Better Living of Asia"

Subject to "Value Chain Collaboration"

Product Differentiation	**New Innovation**	**Cost Competition**
Marketing	**Data Based Center**	**Labor Productivity**

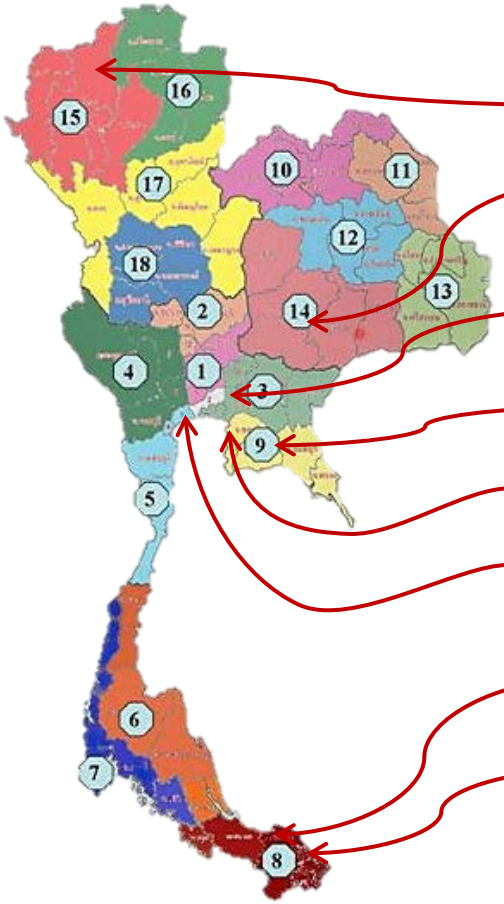
AEC

Subject to "Industry 4.0"

Cluster

ที่	Cluster	กลุ่มฯ	Supporting Cluster
1	**Food Processing Cluster**	Food, Sugar, Palm oil, Printing and paper packaging, Agricultural Machinery, Chemical, Pulp and paper, Plastics, Steel, Herbal, Environmental management, Bio-technology, Renewable energy	Gas, Bio-technology, Information technology
2	**Natural Rubber and Rubberwood Cluster**	Rubber product, Furniture, Panel product, Wood Processing, Gift and decorative	
3	**Fashion & Lifestyle Cluster**	Textile, Garments, Cosmetics, Footwear, Gift and decorative ,Leather product, Furniture, Gem and Jewelry	
4	**Printing and Packaging Cluster**	Printing and paper packaging, Pulp and paper, Plastics, Glass, Food, Cosmetics	
5	**Environment Friendly Energy Cluster**	Renewable energy, Power producer, Environmental management, Sugar, Agricultural Machinery,Palm oil, Rubber product, Furniture, Panel product, Pulp and paper	
6	**Health & Beauty Products Cluster**	Medicine, Herbal, Cosmetics, Bio-technology	
7	**Engineering Machinery and Metal Work Cluster**	Machinery and Metal Work, Agricultural Machinery, Shipbuilding, Repairing and Steel Construction	
8	**Automotive Cluster**	Automotive, Auto parts	
9	**Electrical Electronics & Air-Conditioning Cluster**	Electrical, Electronics, telecommunications , Air-Conditioning and Refrigeration	
10	**Petrochemical Cluster**	Petrochemical, Chemicals, Plastics, Petroleum refining	
11	**Construction Materials Cluster**	Cement, Steel, Roofing and Accessories, Granite and Marble, Glass, Ceramic, Wood Processing, Panel product, Electrical, Electronics, telecommunications, Aluminium	
12	**Agriculture Industry Cluster**	Agricultural Machinery, Machinery and Metal Work, Sugar, Palm oil, Rubber product, Renewable energy, Food	

Cluster and Area Linkage

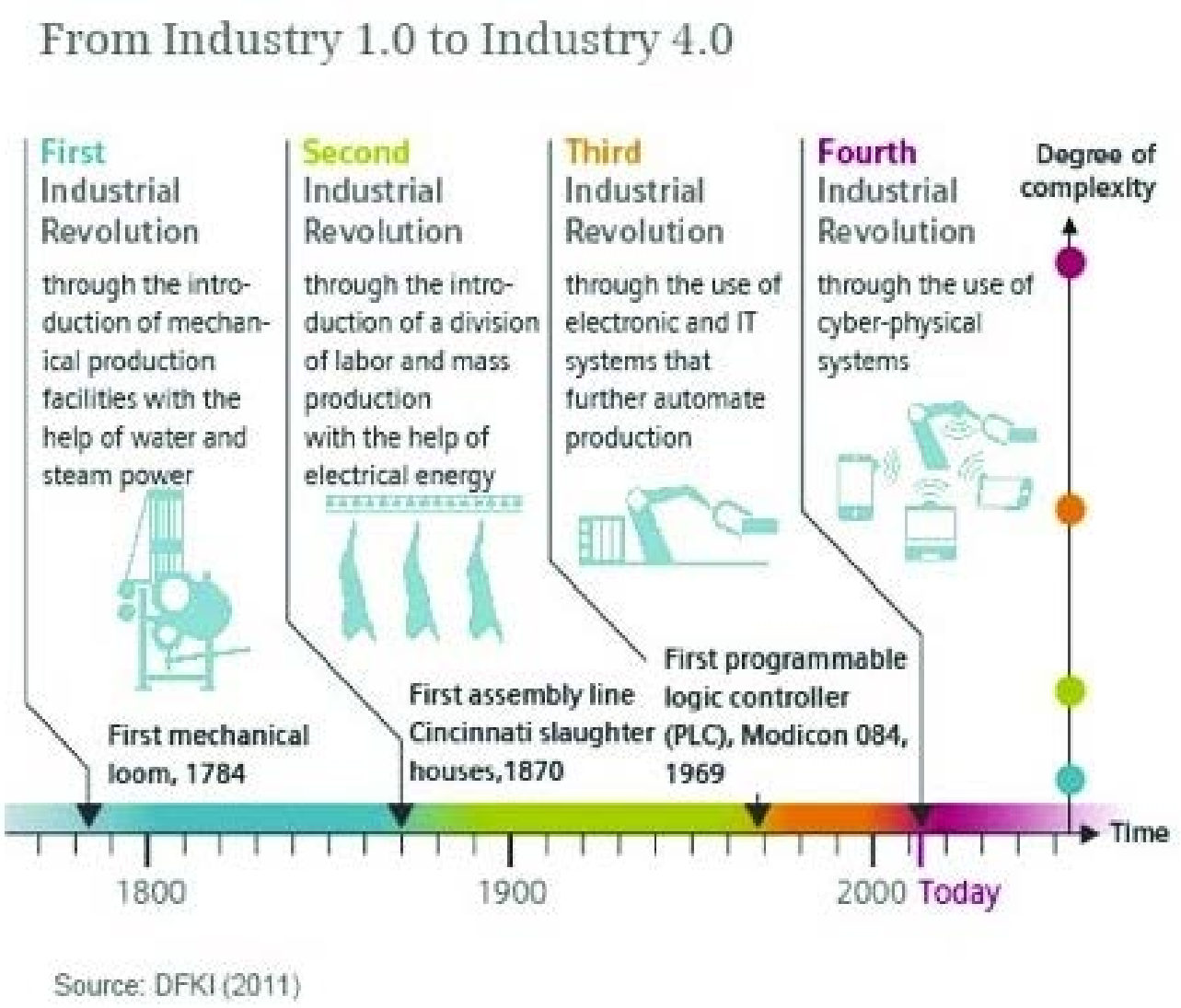


- Map 18, The group of provinces -

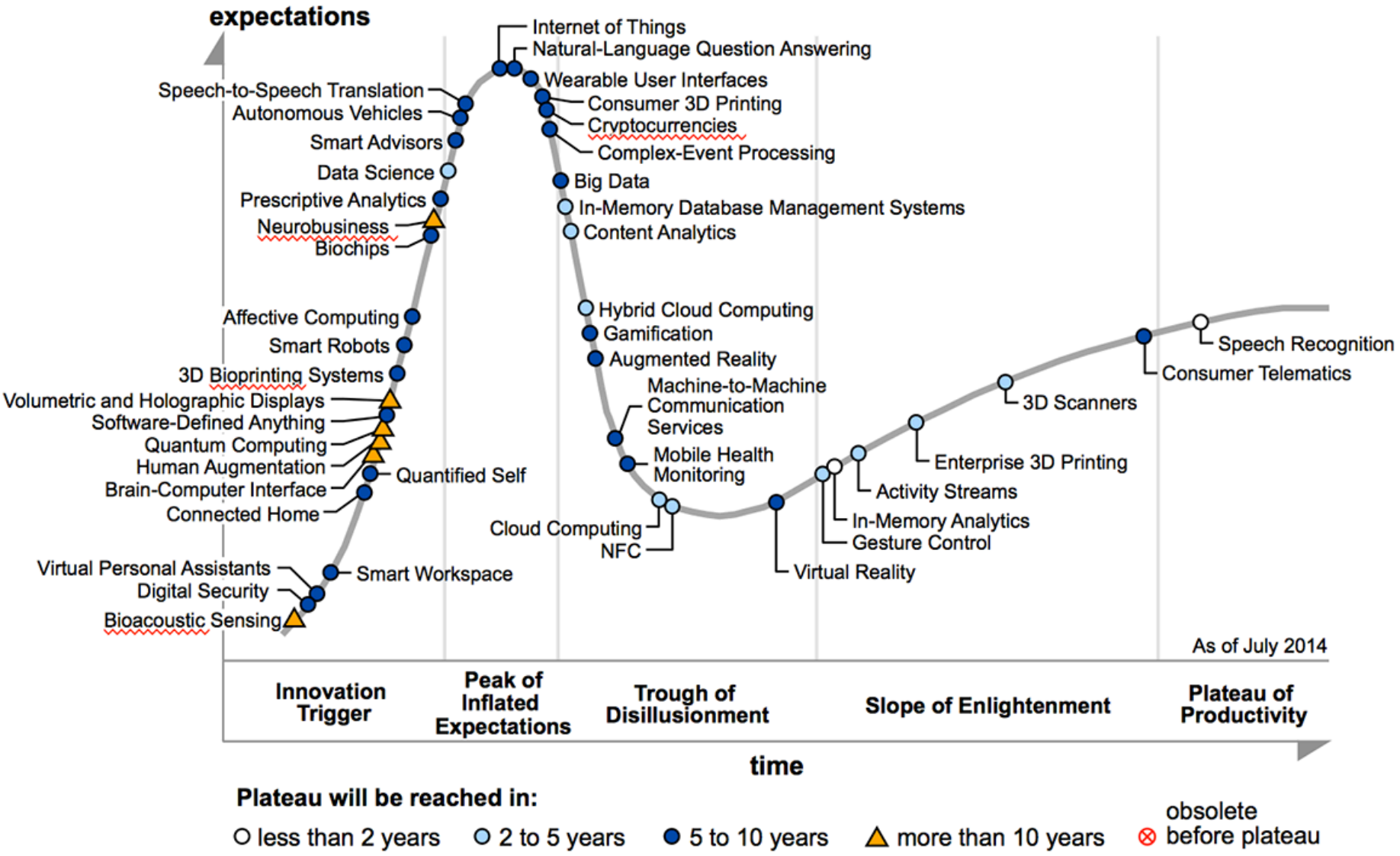
Strategy / Policy

1. Thailand Food Valley
2. Agro Industry Commodity
3. Automotive Human Resource Development Academy (AHRDA)
4. Bio-industry & Petrochemical Hub
5. ASEAN Leader in Engineering Works
6. AEC Printing and Packaging Hub
7. ASEAN Rubber HUB
8. Halal food industry
9. Special Economic Zone (SEZ)

Industry 4.0


From Industry 1.0 to Industry 4.0
First Industrial Revolution
through the introduction of mechanical production facilities with the help of water and steam power
Second Industrial Revolution
through the introduction of a division of labor and mass production with the help of electrical energy
Third Industrial Revolution
through the use of electronic and IT systems that further automate production
Fourth Industrial Revolution
through the use of cyber-physical systems
Degree of complexity
First mechanical loom, 1784
First assembly line Cincinnati slaughter houses,1870
First programmable logic controller (PLC), Modicon 084, 1969
Time
1800
1900
2000
Today
Source: DFKI (2011)

The 2014 Gartner Hype Cycle Chart



Similarity

- Factories of the Future : EU
- Industry 4.0 : Germany
- Smart Manufacturing : USA
- Etc.

EU Program for Industries

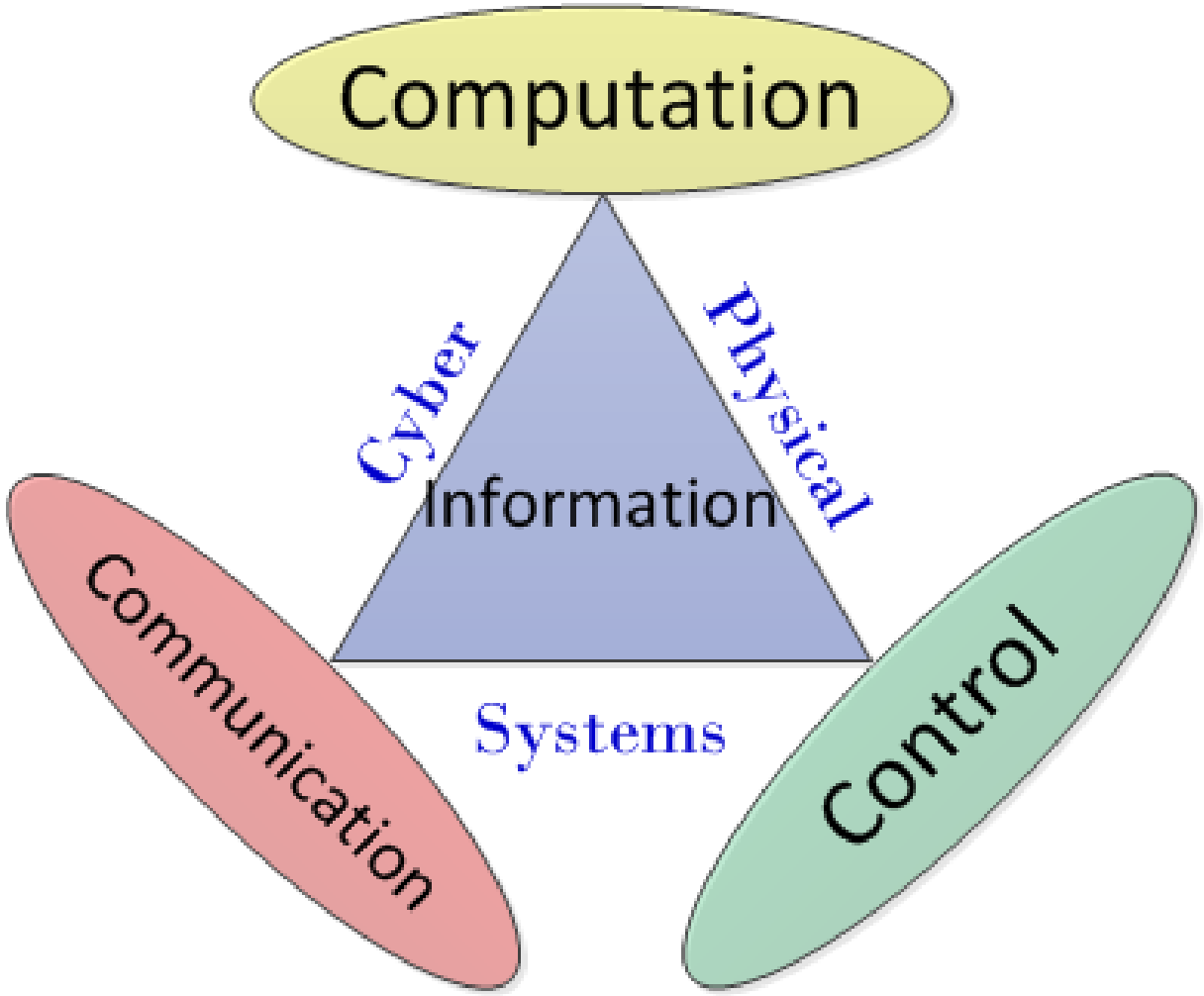
In 2008, the Public-Private Partnership (PPP) for Factories of the Future (FoF) was launched under the European Economic Recovery Plan.

The FoF multi-annual roadmap for the years 2014-2020 sets a vision and outlines routes towards high added value manufacturing technologies for the factories of the future, which will be clean, highly performing, environmental friendly and socially sustainable.

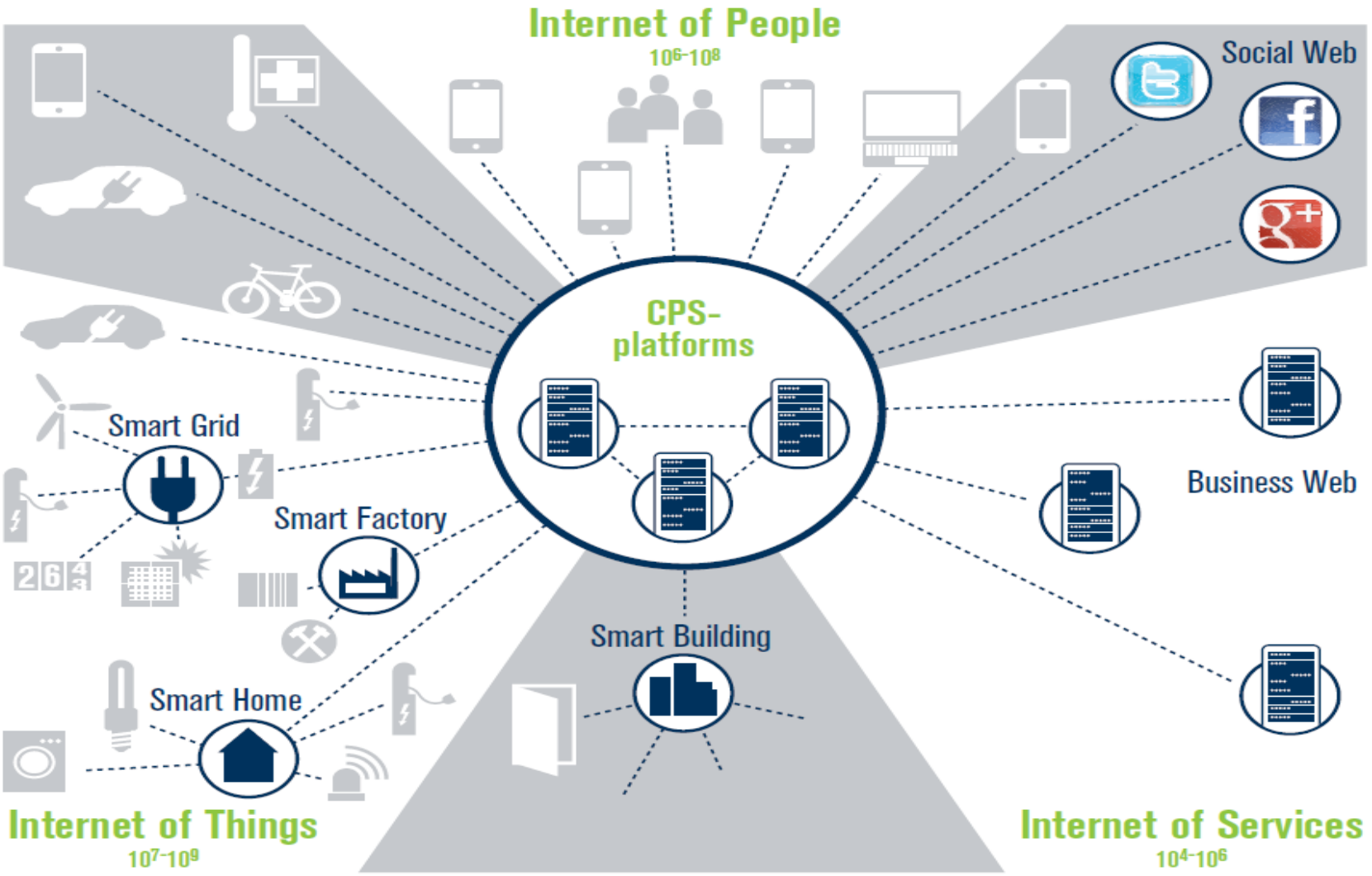
Key Important Factors of Industry 4.0

- Cyber Physical System (CPS)
- Internet of Things
- Smart Factory
- Integration
- Mass Customization

Cyber Physical System (CPS)

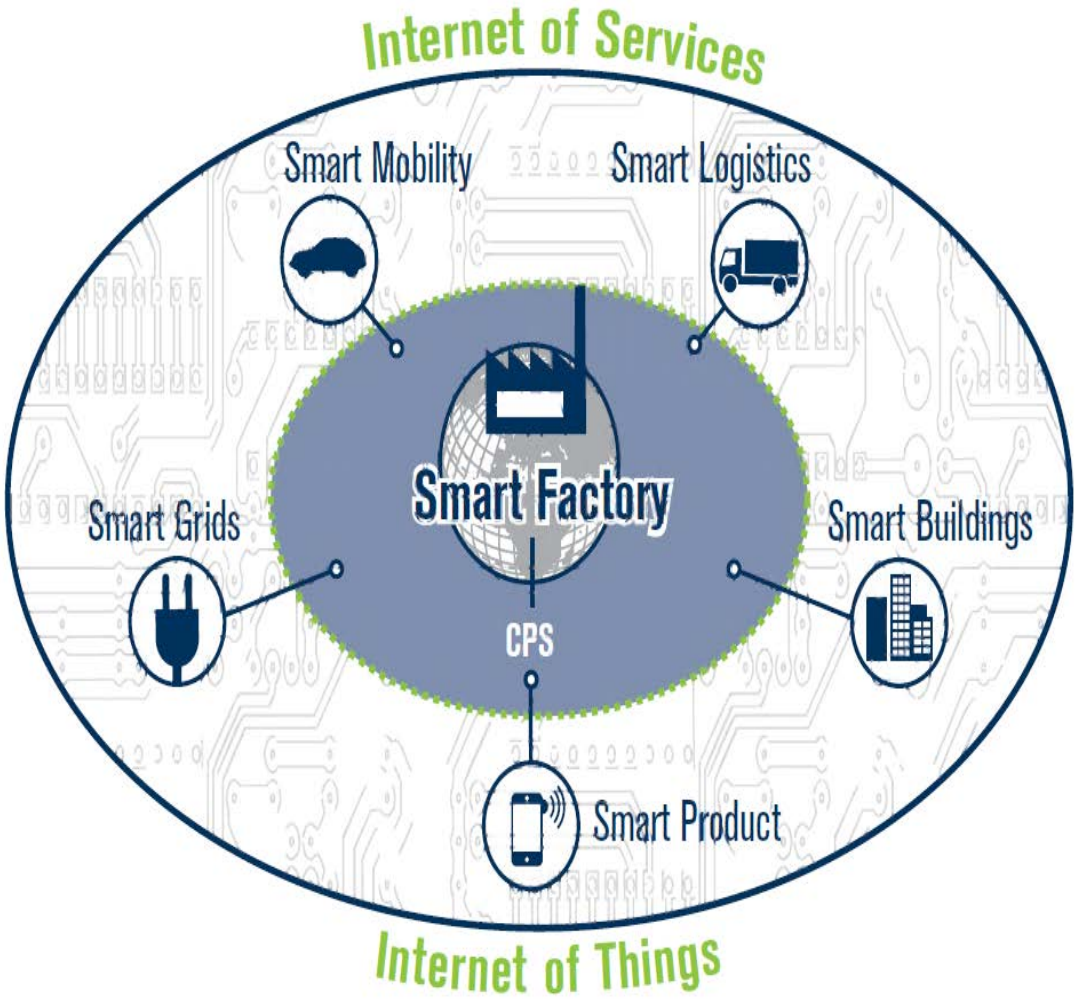


Internet of Things and Services



Source: Bosch Software Innovations 2012

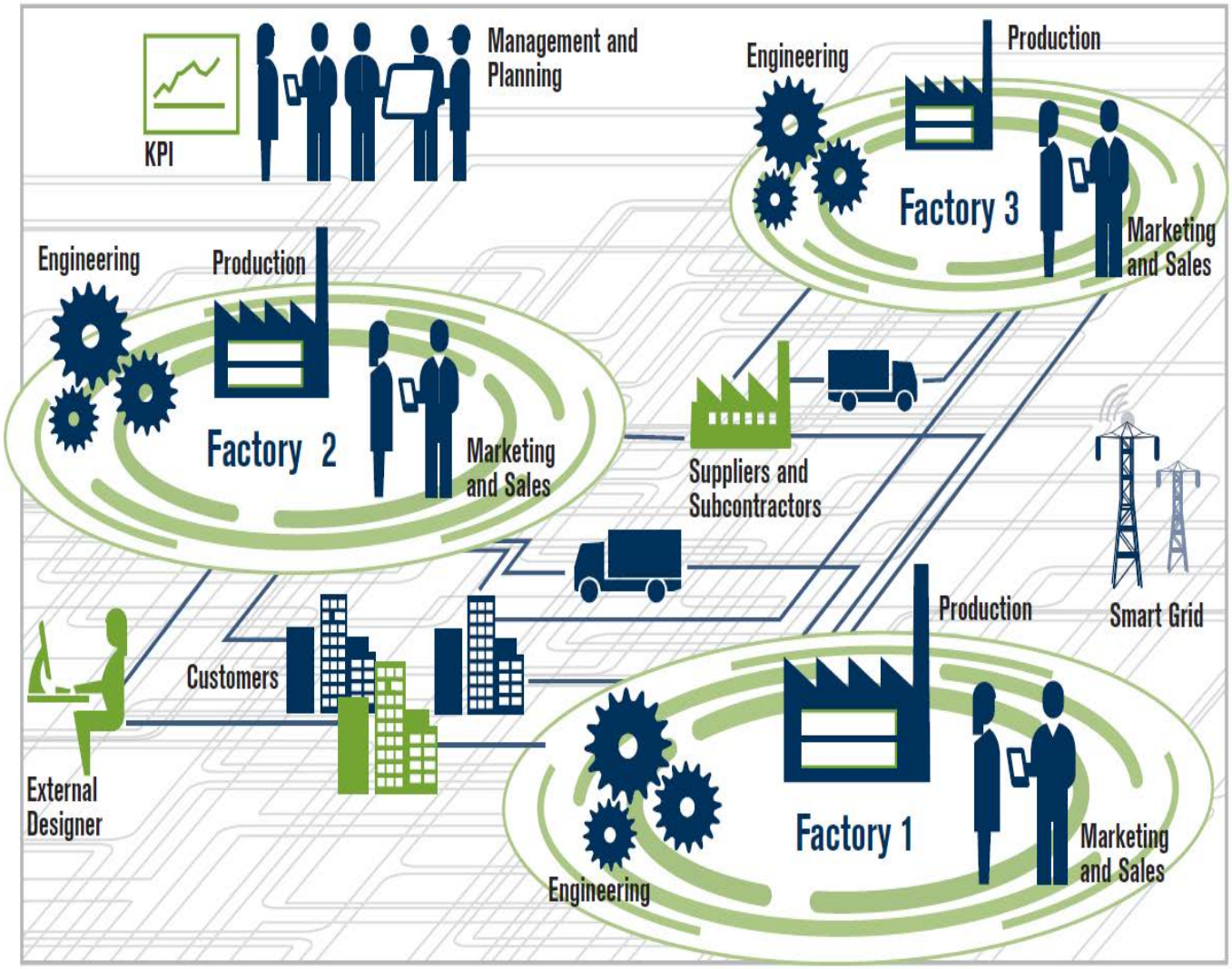
Smart Factory



Integration

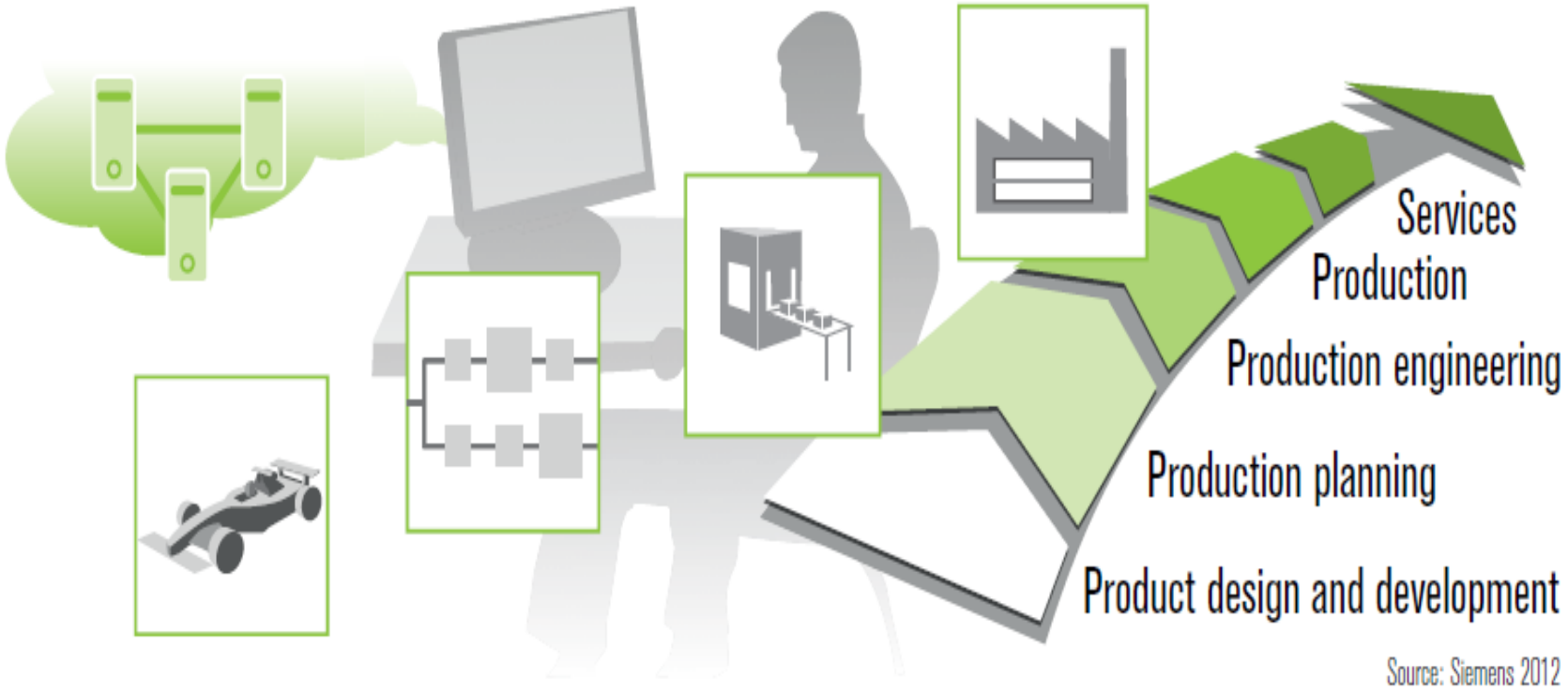
- Horizontal integration through value networks
- End-to-end digital integration of engineering across the entire value chain
- Vertical Integration and networked manufacturing systems

Horizontal integration through value network



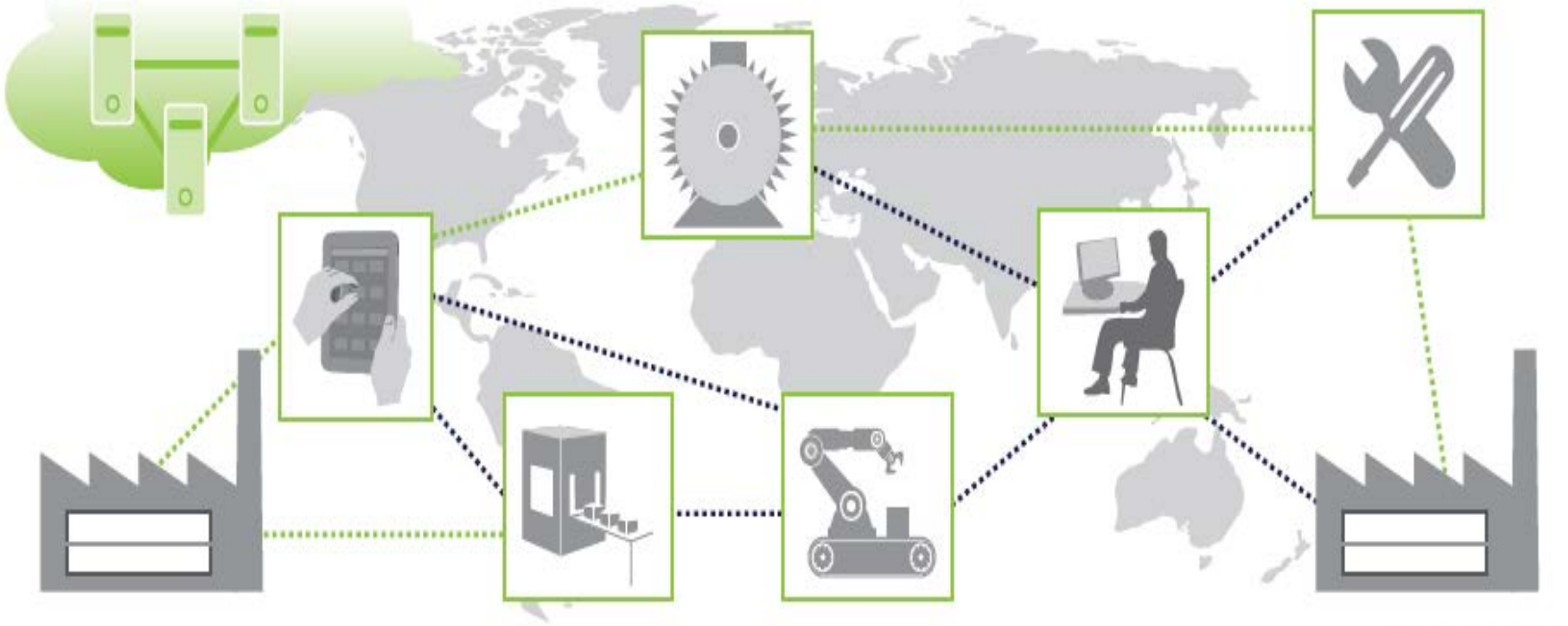
Source: Hewlett-Packard 2013

End-to-end digital integration of engineering across the entire value chain



Vertical Integration and networked manufacturing systems

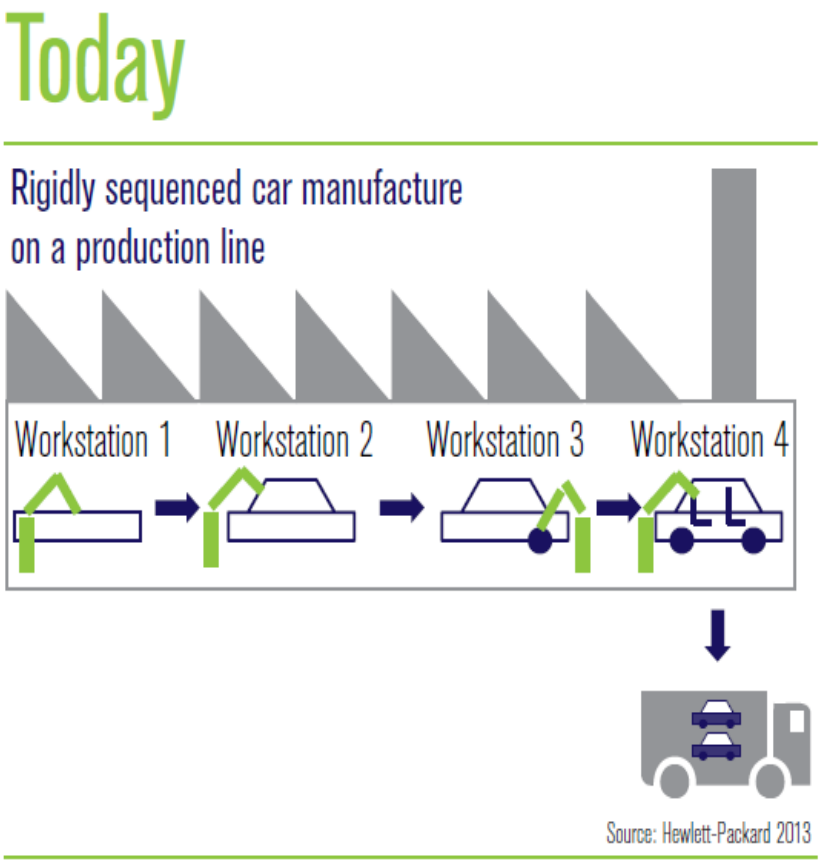
- Customer integrated system
- Supply chain integrated system

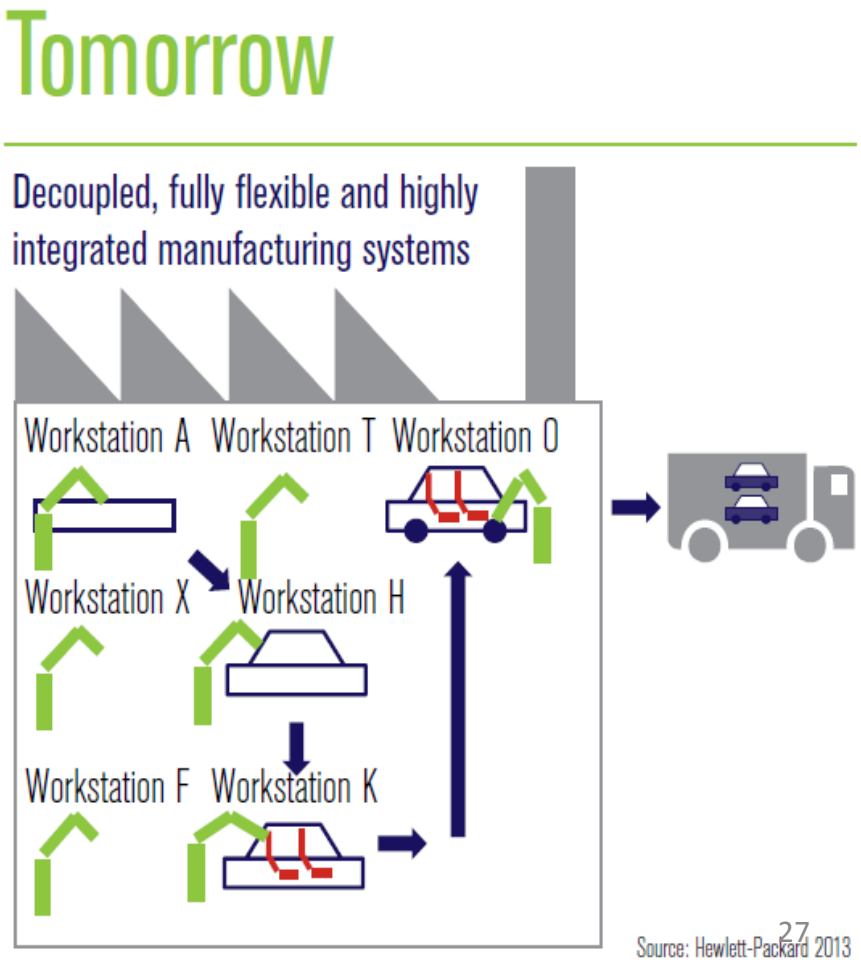


Source: Siemens 2012

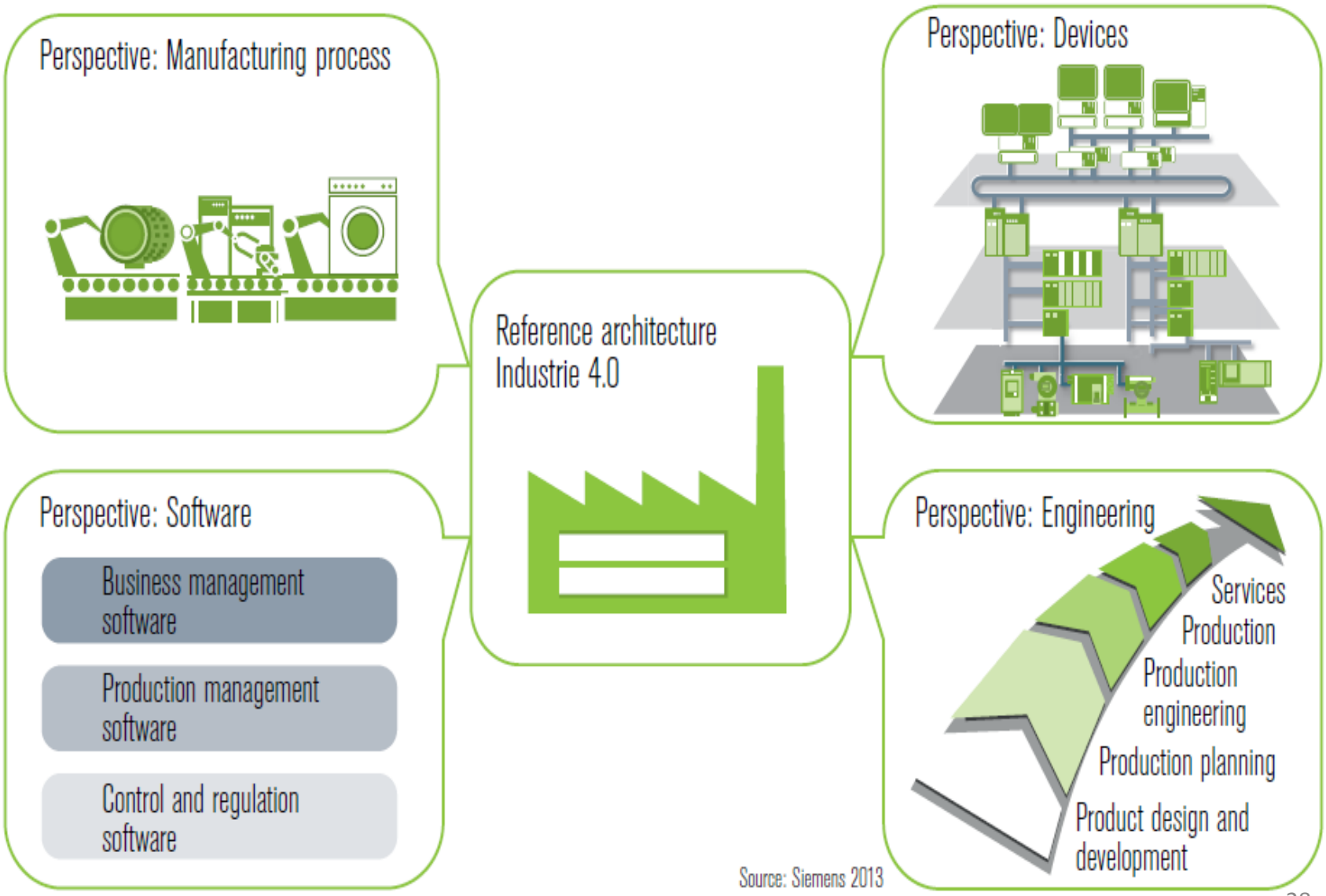
Mass customization

Complexity VS Variability





Industry 4.0 4 Perspectives



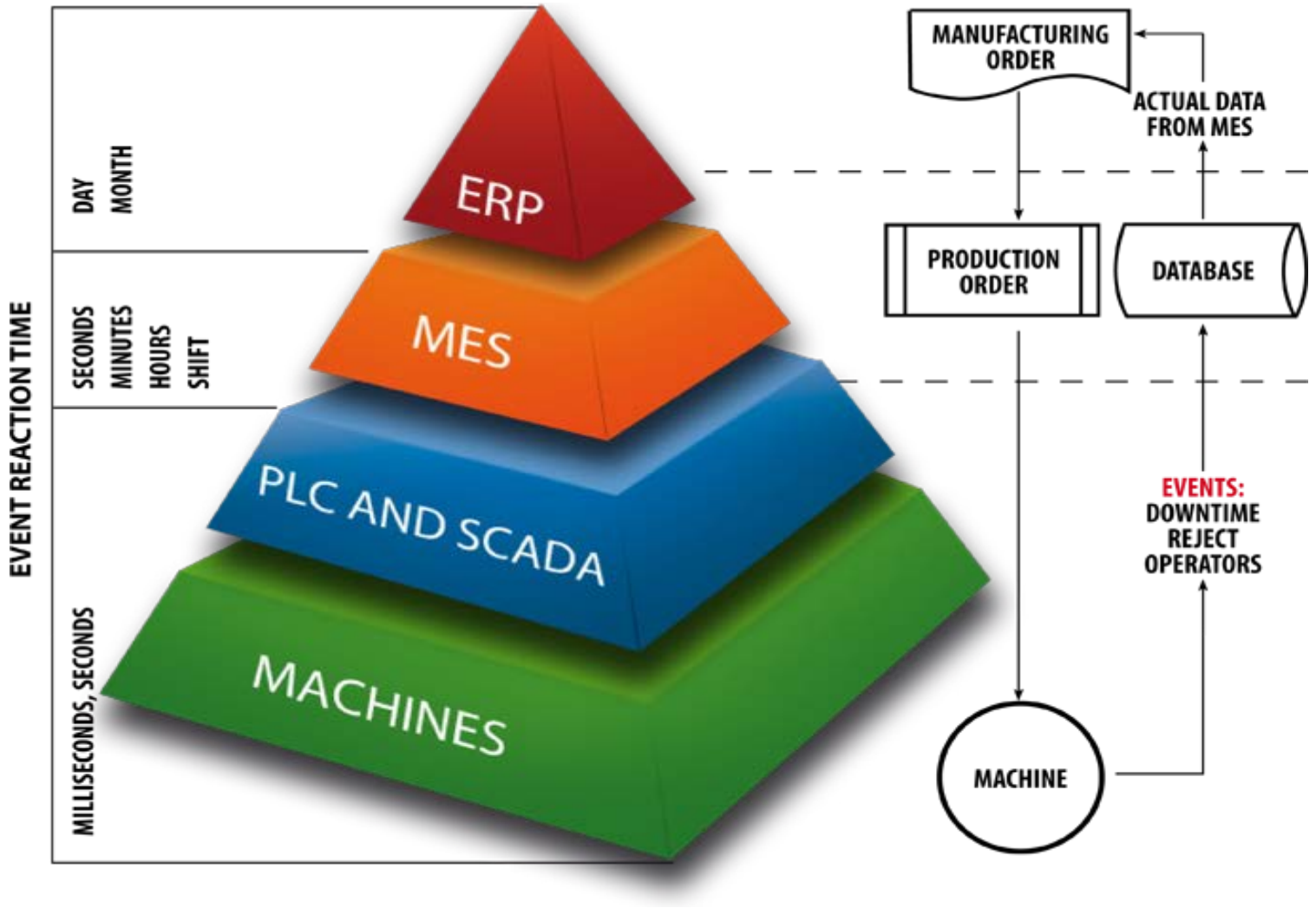
Thailand's Industries 4.0

The objective is to help Thai Industries in every sectors, especially **SMEs**, to adapt to global competitive pressures by increasing the **technological** base through the development and integration of enabling technologies, etc.

4 Priorities

1. Sustainable manufacturing / Green Production
   - Energy
   - Environment
   - People
2. Usage of ICT in manufacturing
   - Digital Engineering
   - Digital Workflow
   - M-ERP
   - etc.
3. High Performance manufacturing
   - Modular Production
   - Automation
   - 3D Printing
   - Robotics
   - Simulations
   - etc.
   - Zero-defect
4. Usage of New Materials
   - Bio-plastic
   - Graphene
   - recycle materials
   - etc.

ICT for Industry



Fishbone Analysis
5M + 2E

- **Man** : Happiness of people in manufacturing with higher technological skill
- **Method** : Digital engineering and digital work-flow, Simulation
- **Machine** : Modular, Automation, Robotics, 3D printing, zero-defect, etc.
- **Materials** : New materials eg., powder metal, graphene, permanent magnet, recycle materials
- **Management** : ICT , M-ERP
- **Energy and Environment** :

Expected Outcome and Impact

- Increasing competitiveness
- Reduce cost
- Reduce waste, reduce impact to environment
- Smart, Virtual and Digital factories
- Increase quality and productivity
- Reduce time to market and cycle time
- Flexibility and mass customization
- Research and Innovation
- New products
- Less environmental impact and less energy
- Societal
- Etc.

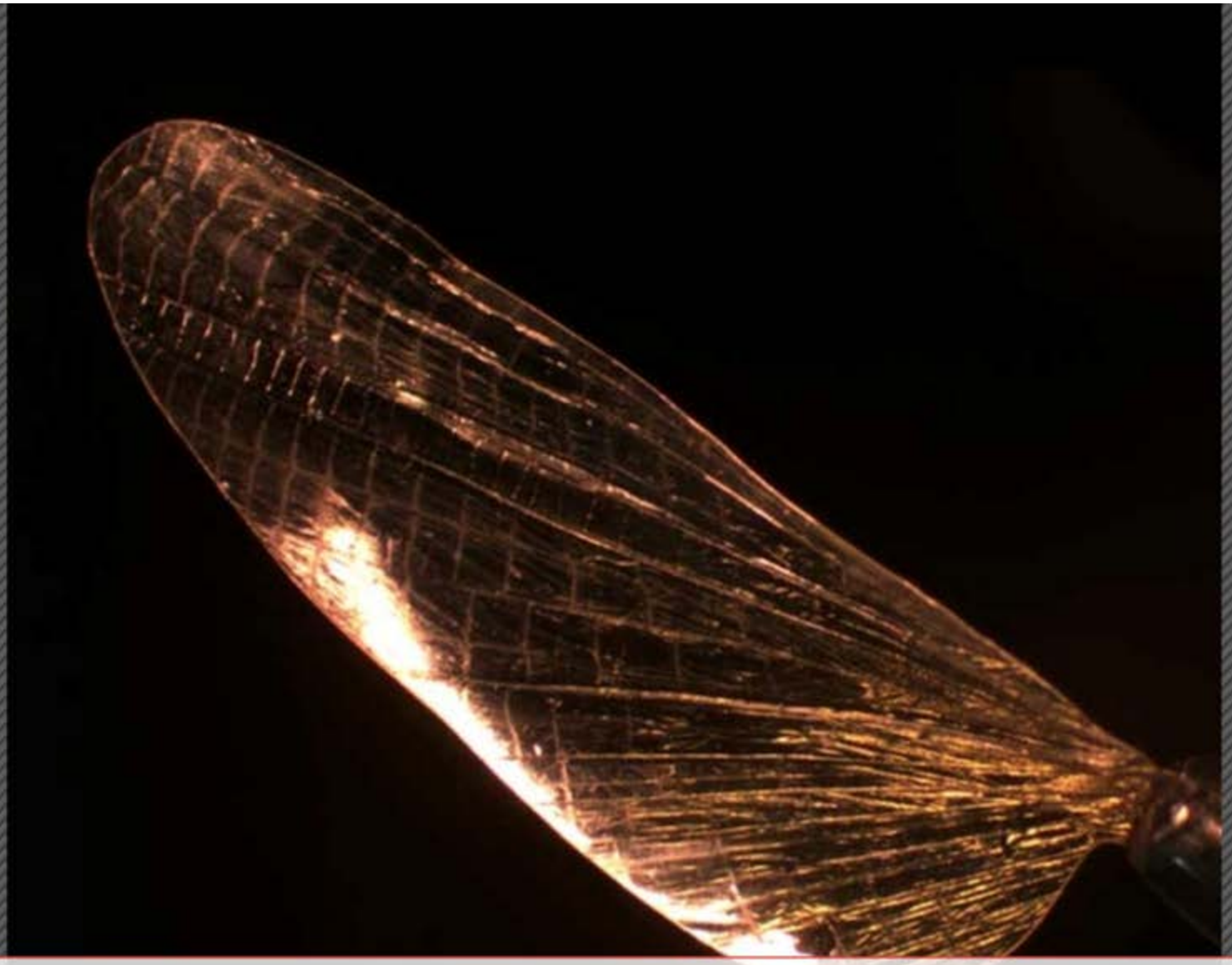
Net shape manufacturing
(additive manufacturing)

Graphene Aerogel

2 3

If the phrase graphene aerogel sounds to you like someone combined the two buzziest of materials buzzwords then... you wouldn't be far wrong. In fact, this graphene aerogel snatched the title of the world's lightest material just a few of months ago—with a density lower than that of helium and just twice that of hydrogen at 0.16 mg/cm^3. This stuff practically floats.

MEGA MAGNETS: Rare earth materials are vital to the manufacture of wind turbines, electric and hybrid cars, and consumer electronics due to their powerful magnetic properties. Yet they are also expensive and come almost entirely from one source—China.....[More]

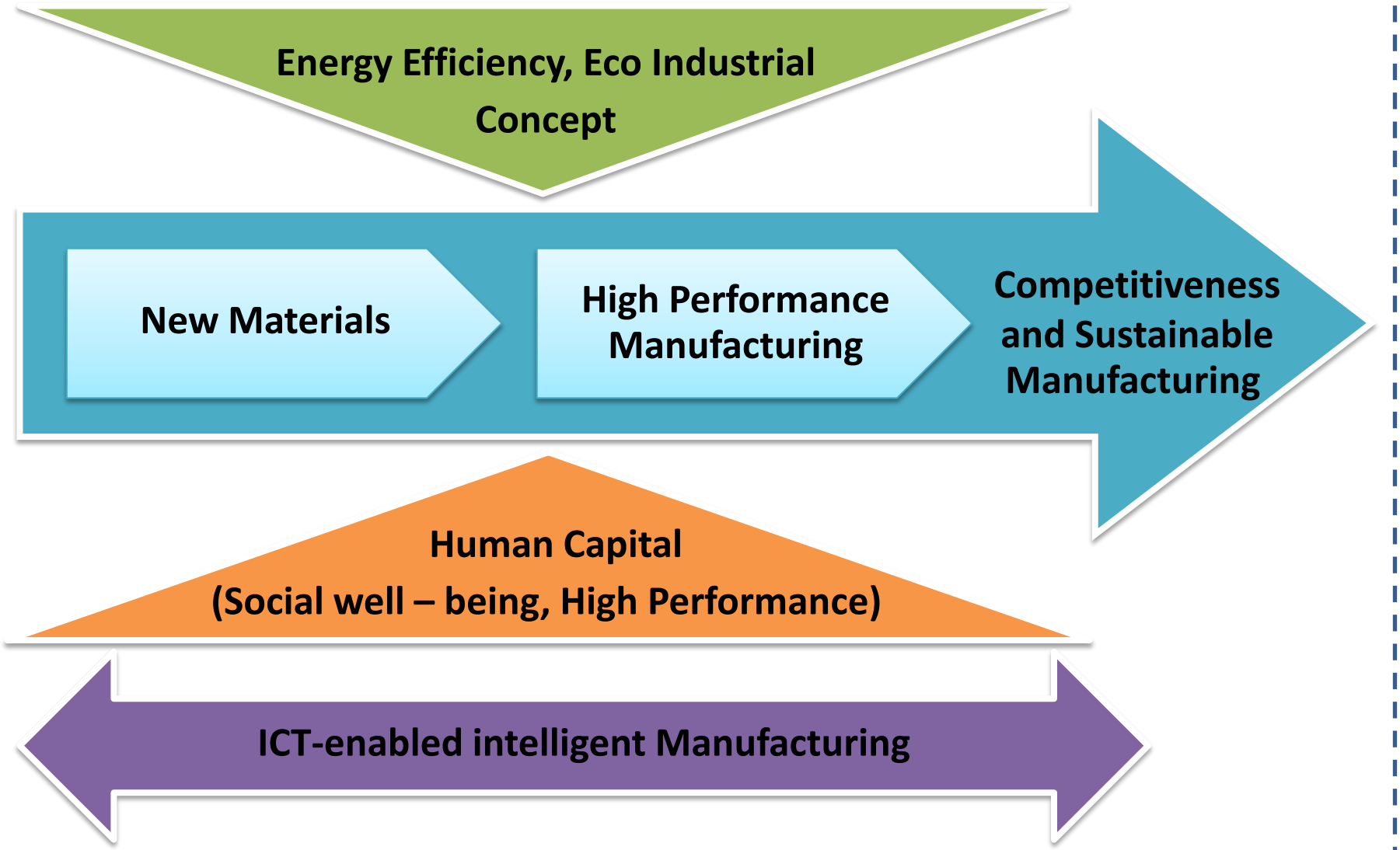


BIO-INSPIRED PLASTIC: Light enough to permit flight and thin enough to accommodate flexibility and strong enough to protect its host, natural insect cuticle—found in the rigid exoskeletons of houseflies and grasshoppers—provides its host protection without adding weight or bulk.....[More]

Recycle materials

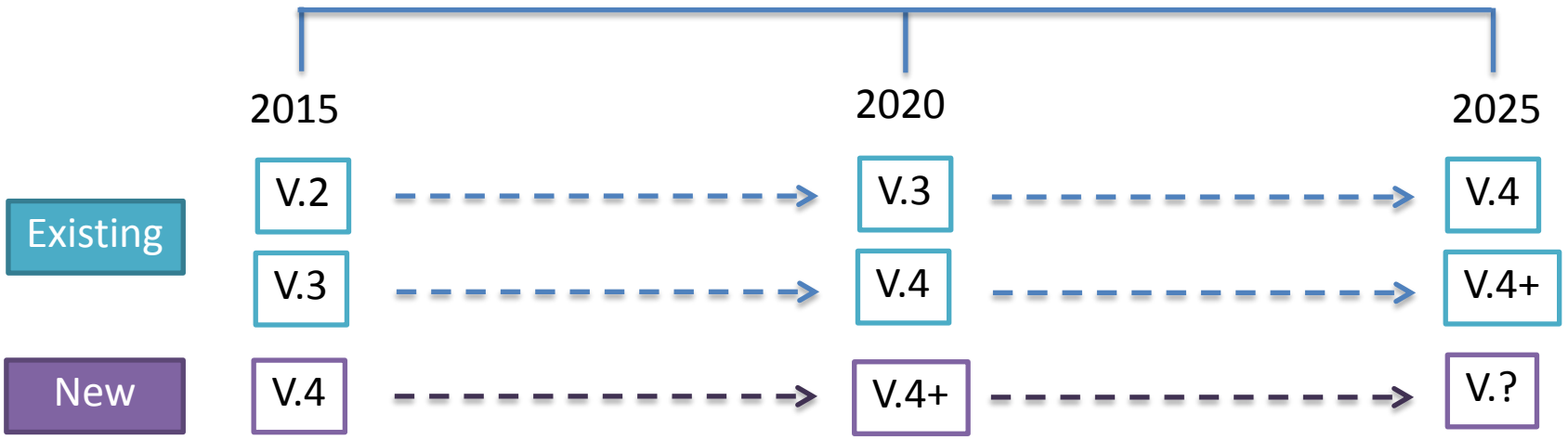
Metal Materials for 3D Printer

Thailand's Industries 4.0



Timeline and Roadmap

Timeline :



Road Map :

How to start?

- Human capital
- IT infrastructure capital
- Knowledge and skill of new technologies
- PPP
- Funding both research, design, development and engineering
- Etc.

Enabling Technologies

- ICT and Digital Engineering technology
- Precision Engineering technology
- Nanotechnology
- Biotechnology
- Microelectronics
- Advanced materials technology
- Sensor technology
- Laser technology
- Robotics Technology
- Sustainable environmental and energy technology
- Advanced manufacturing technology and automation
- Research and Innovation
- Etc.

Public-Private Partnership - PPP

Stakeholders

FTI + SMEs (Value Chain / Cluster)

Ministry of Industry; TPI.; OIE.

Ministry of Energy

Ministry of Science and Technology ; NSTDA & NSTIC

Ministry of Education; Universities, Etc.

Ministry of Finance

Ministry of Commerce

BOI.

Etc.

Possible Obstacles

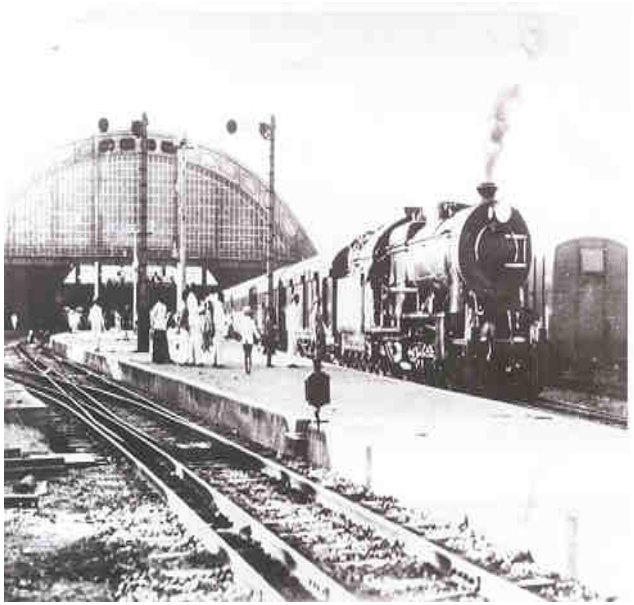
- Understanding and acceptance of FoF of SMEs
- Lack of knowledge and skill of people in each industry
- Investment cost of new infrastructures and new technologies
- Lack of R&I in related areas
- Government new regulations , eg. 3D printer dual uses, etc.
- Safety issues of new materials
- Etc.

Priorities & F.T.I. & Government

	Priorities	F.T.I.	Government
1	Sustainable manufacturing / Green Production - Energy - Environment - People	- สถาบันพลังงานฯ - สถาบันสิ่งแวดล้อม - สถาบันเสริมสร้างขีดความสามารถมนุษย์	- ก.พลังงาน - ก.อุตสาหกรรม - ก.แรงงาน / ก.ศึกษาธิการ
2	Usage of ICT in manufacturing - Digital Engineering - Digital Workflow - M-ERP	- สถาบัน **ICTI** - กลุ่มฯ **ITIC**	-ก.**ICT** **- DE Committee** - สวทช.
3	High Performance manufacturing - Modular Production - Automation - 3D Printing - Robotics - Simulations - Zero-defect	- สายงานอุตสาหกรรม - สถาบันวิจัยและพัฒนาเพื่ออุตสาหกรรม	- ก.อุตสาหกรรม - ก.วิทยาศาสตร์ฯ
4	Usage of New Materials - Bio-plastic - Graphene - recycle materials	- สายงานอุตสาหกรรม - สถาบันวิจัยและพัฒนาเพื่ออุตสาหกรรม	- ก.วิทยาศาสตร์ฯ - ก.อุตสาหกรรม


Industry 4.0
in Thailand

From Industrial 1.0 to 2.0



Steam Engine

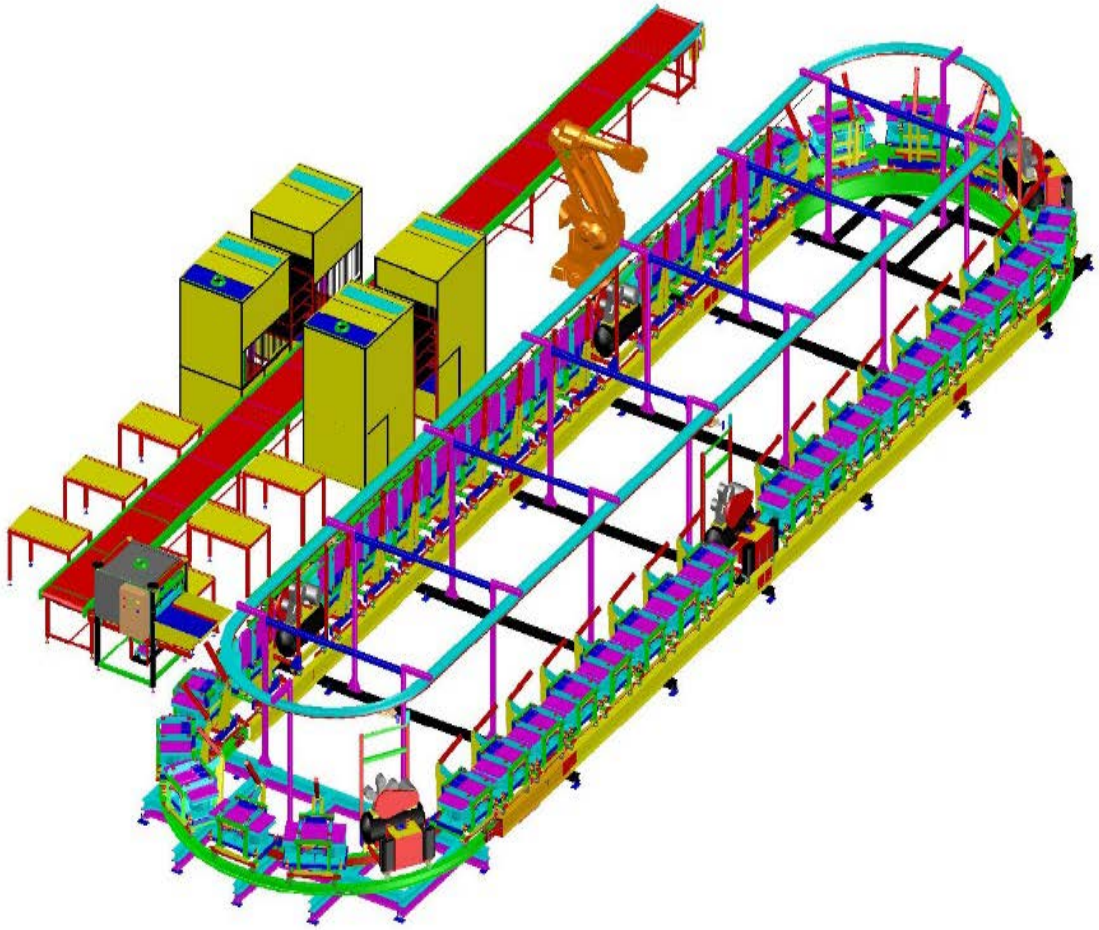
Labor Intensive Production line

Industry 2.0 in Motor bike seat production line

Seat Mold

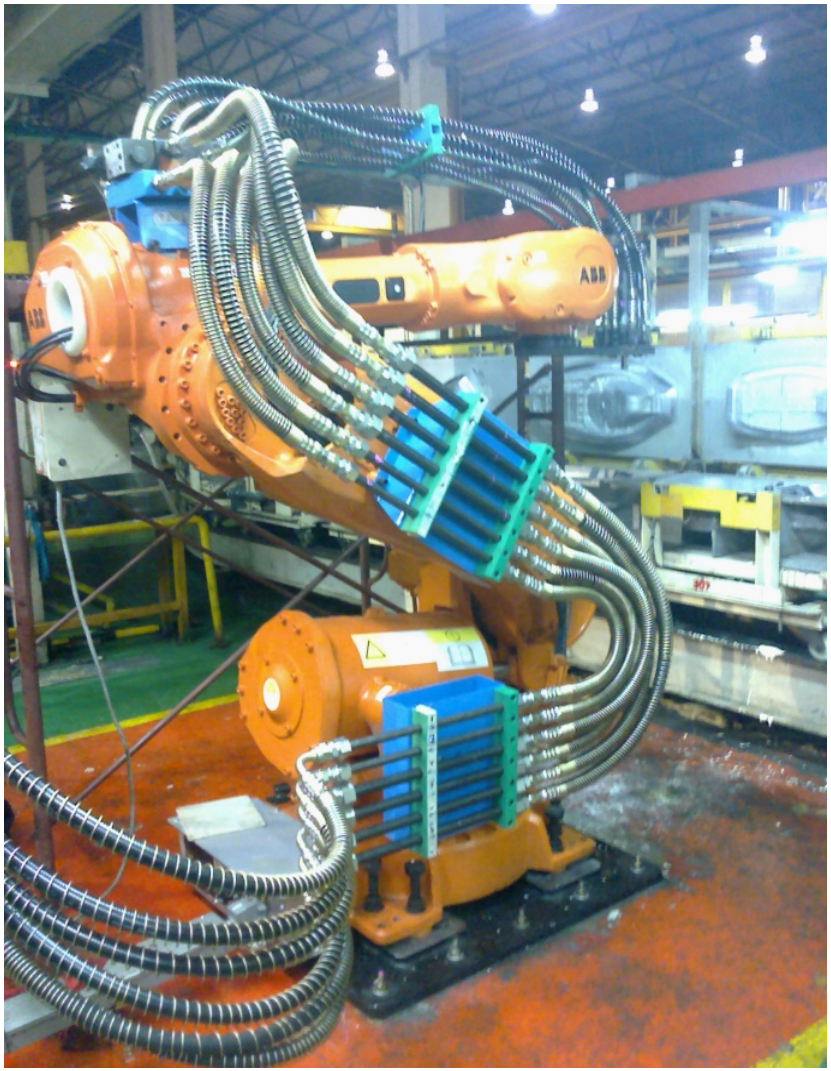
Industry 3.0 in Motor bike seat production line

Industry 3.0 in Motor bike seat production line



Industry 3.0 in Motor bike seat production line

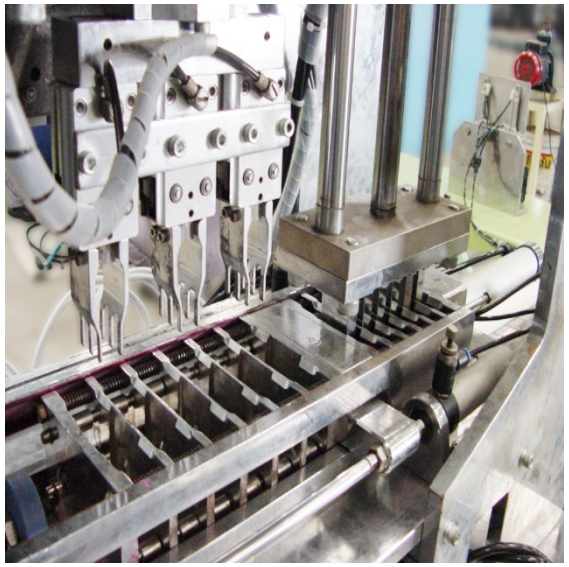
Foam Injecting Robot



VDO

Mold Identification

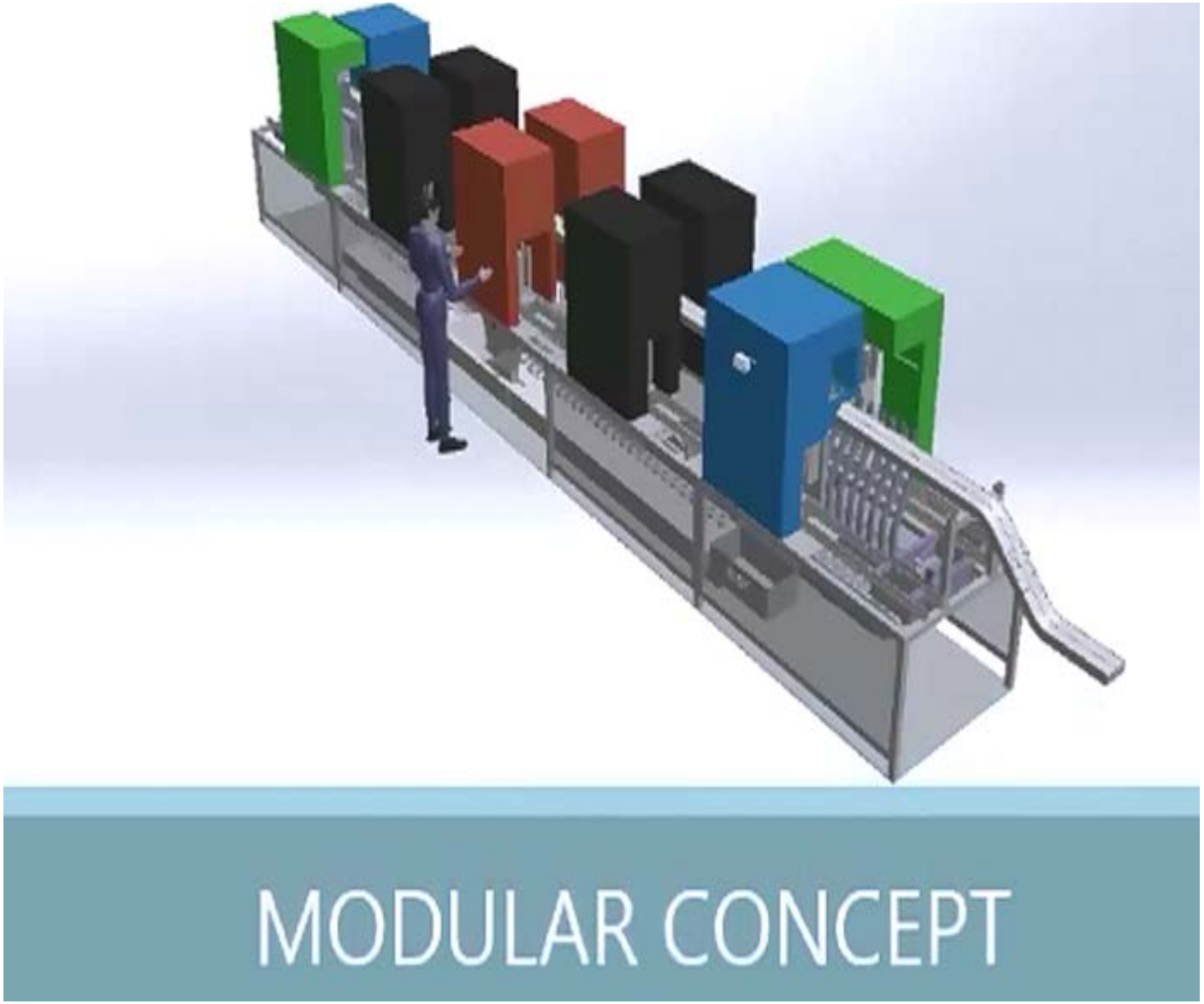
Battery Assembly Line



Truck’s Chassis production line

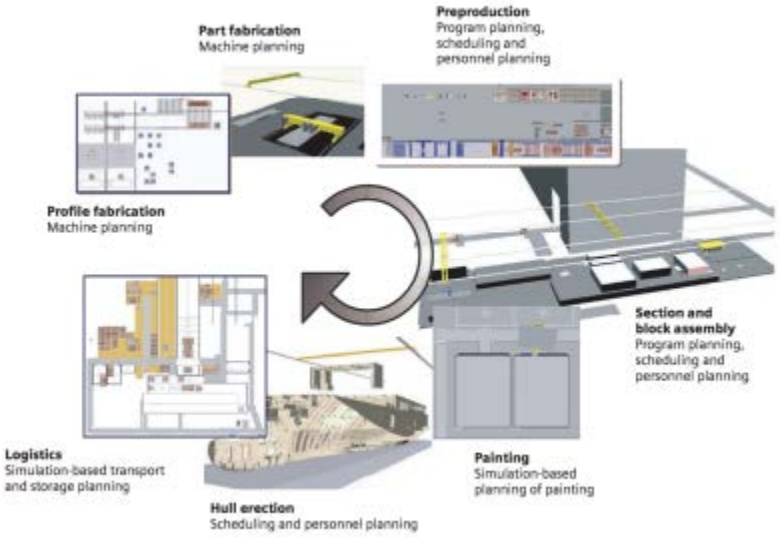
VDO

Modular Design Concept



VDO

Thank You


Part fabrication
Machine planning
Preproduction
Program planning, scheduling and personnel planning
Profile fabrication
Machine planning
Section and block assembly
Program planning, scheduling and personnel planning
Logistics
Simulation-based transport and storage planning
Painting
Simulation-based planning of painting
Hull erection
Scheduling and personnel planning


Q&A