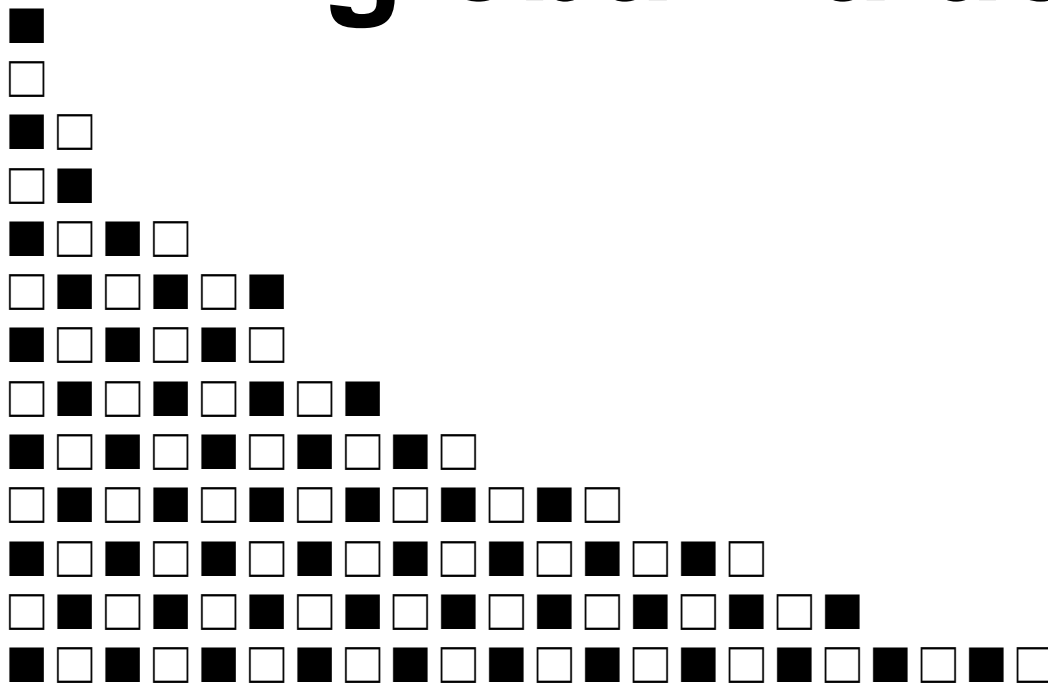


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# Digital technology and global value chains



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# “Industry 4.0” ← The High-Tech Strategy 2020

	Chronology	Key technologies / energy sources and main features of manufacture	Main industries under the new technology
Industry 1.0	Late 18 <sup>th</sup> century - early 19 <sup>th</sup> century	[Steam/water power] Mechanisation of manufacturing processes driven by steam engines	- Textile industry
Industry 2.0	End of 19 <sup>th</sup> century - beginning of 20 <sup>th</sup> century	[Electricity] Assembly line architecture for mass-production	- Automotive industry - Electric equipment industry
Industry 3.0	End of 20 <sup>th</sup> century	[Electronics] Automation of manufacturing processes / industrial robots	- Electric equipment industry - ICT industry
<b>Industry 4.0</b>	Beginning of 21 <sup>st</sup> century	[Quantum??] Harmonisation of digital technology and physical platforms	???

# **Industry 4.0 technologies: by relative emphasis in recent studies**

- Internet of Things
- Bigdata analytics
- 3D printer  
(additive manufacturing technology)
- Autonomous robotics (machine-to-machine)
- Smart sensors
- Augmented/virtual reality
- Cloud computing
- Artificial intelligence

# PwC Report

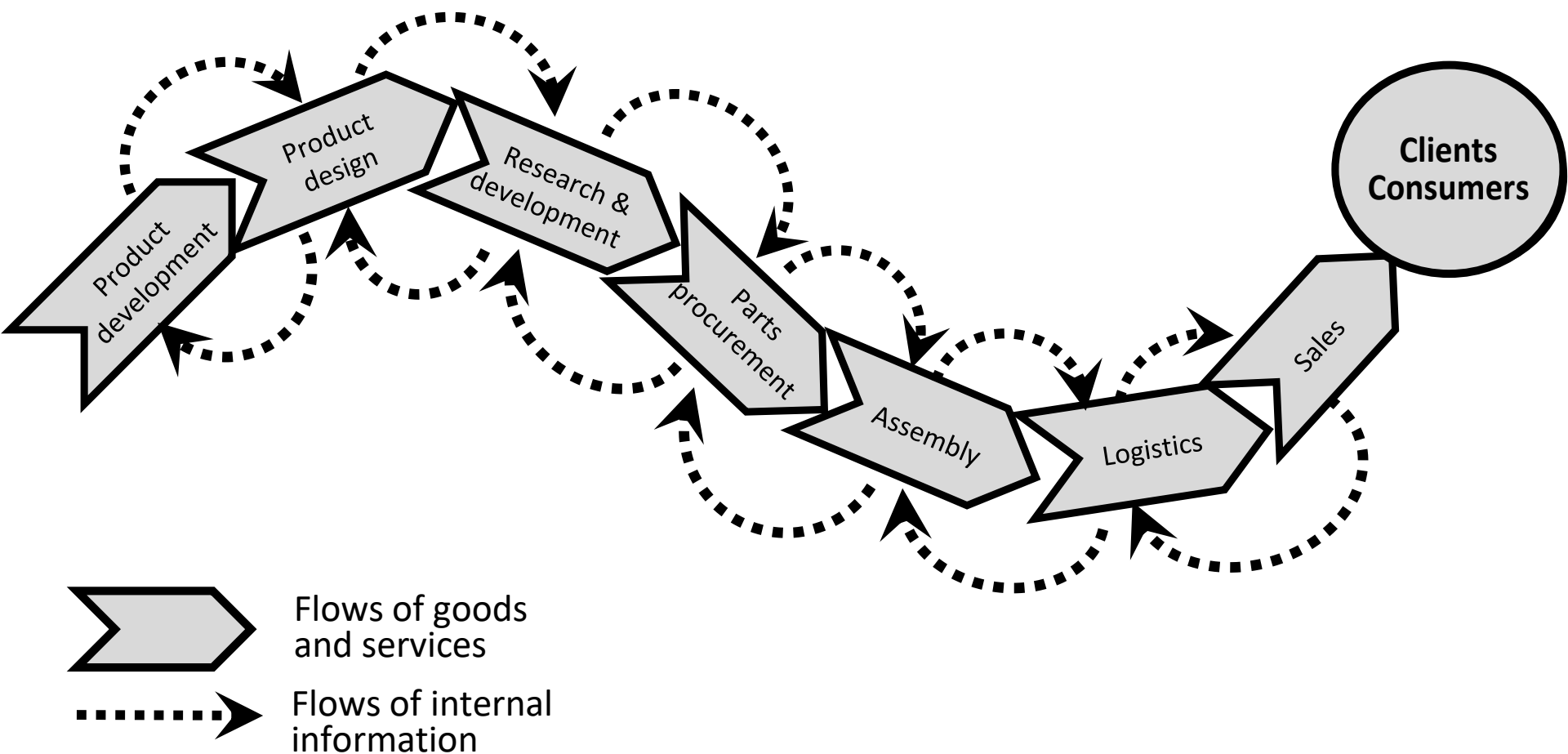
Schrauf, S., and P. Berttram, 2016,  
“Industry 4.0; How Digitization Makes the Supply Chain  
More Efficient, Agile, and Customer-Focused.”  
PriceWaterhouseCoopers LLP.

Supply chain management under  
Industry 4.0

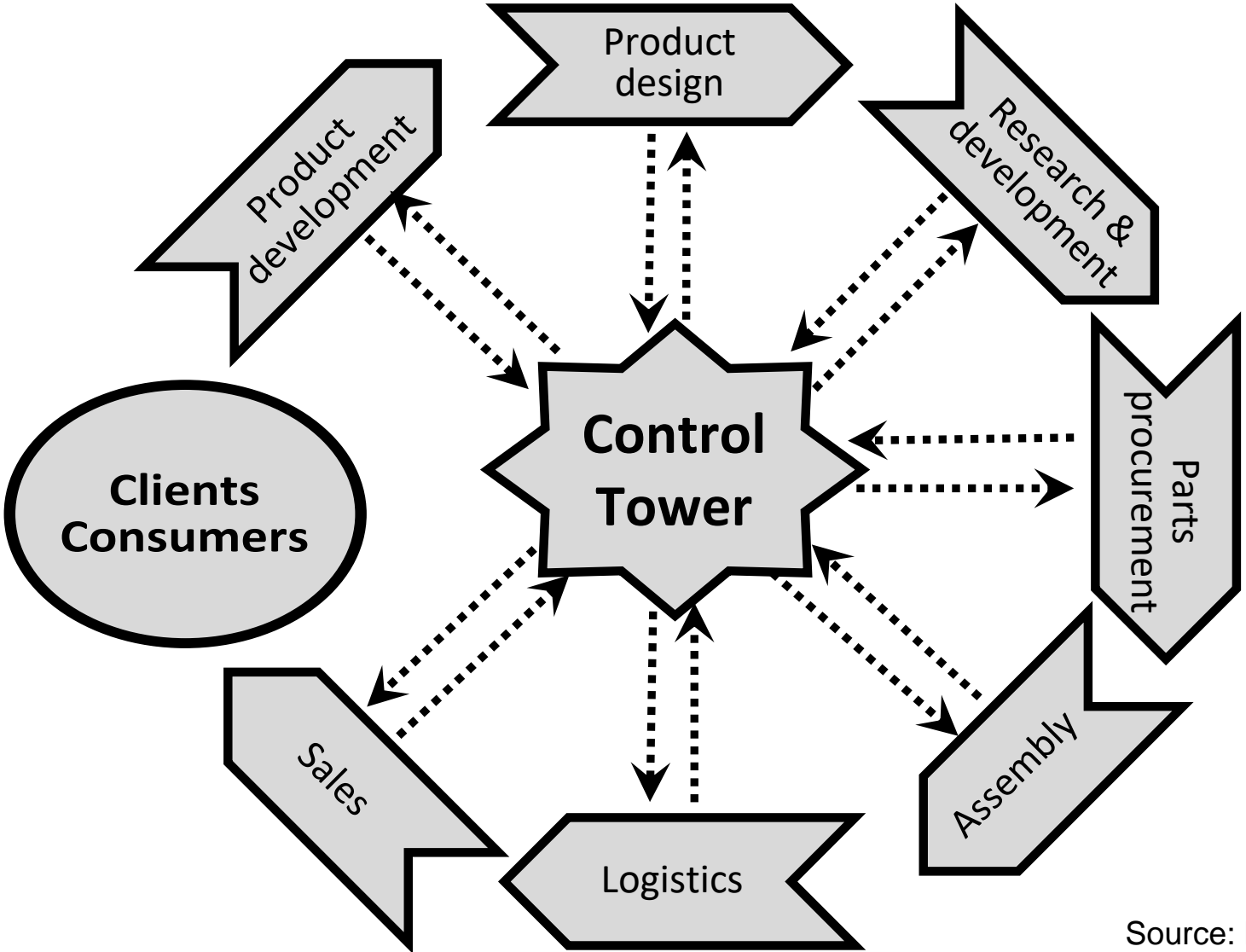
**“Linear” → “Omni-directional”**

# Pre-Industry 4.0

## Linear information management (Snake)



# Post-Industry 4.0 Omni-directional management (Spider)



Source: Inomata, 2019

# Evolution of supply chain management

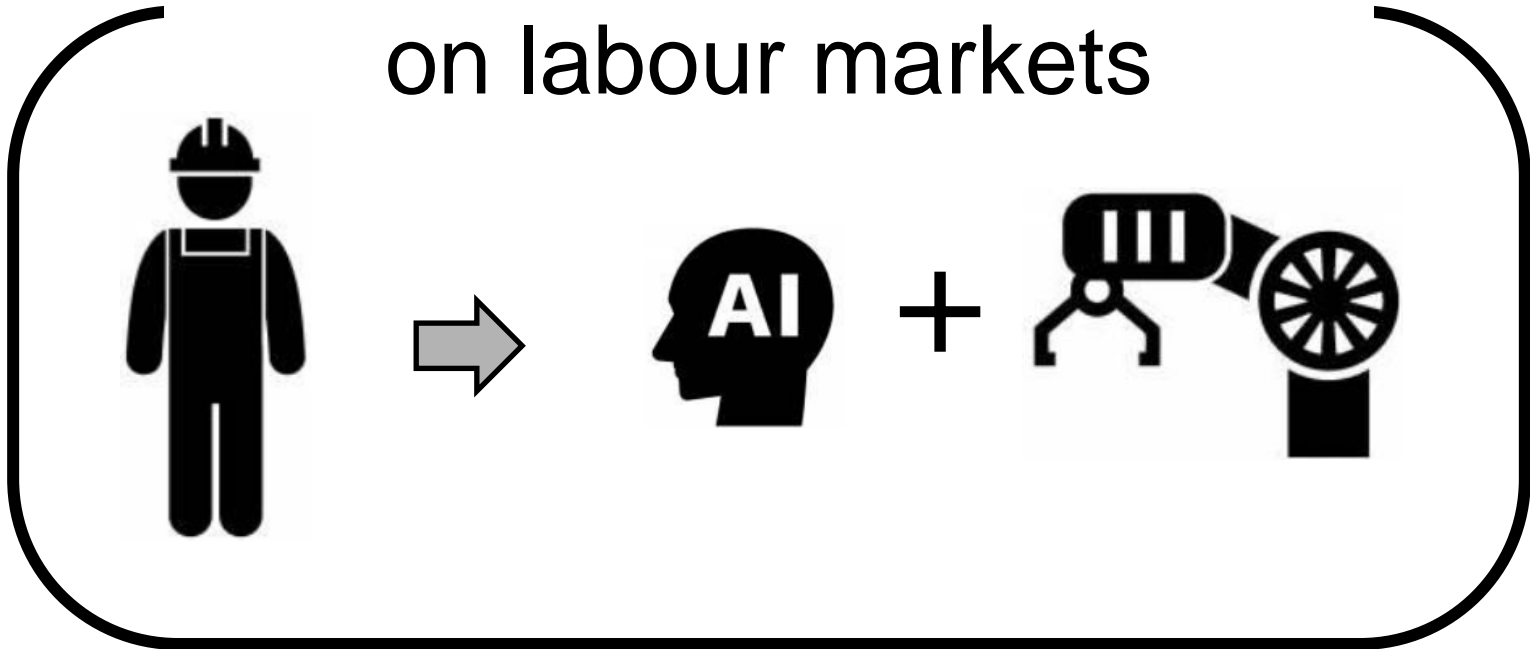
From:

Uni-directional tracking of information along a linear sequence of transactions

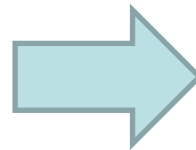
To:

A technological ecosystem with *synchronistic* and *omni-directional* control and on-time processing of every information available.

# Impact of new technologies on labour markets



Automation of  
production  
processes ↑



Economic value  
of human labour ↓



# Post-Industry 4.0

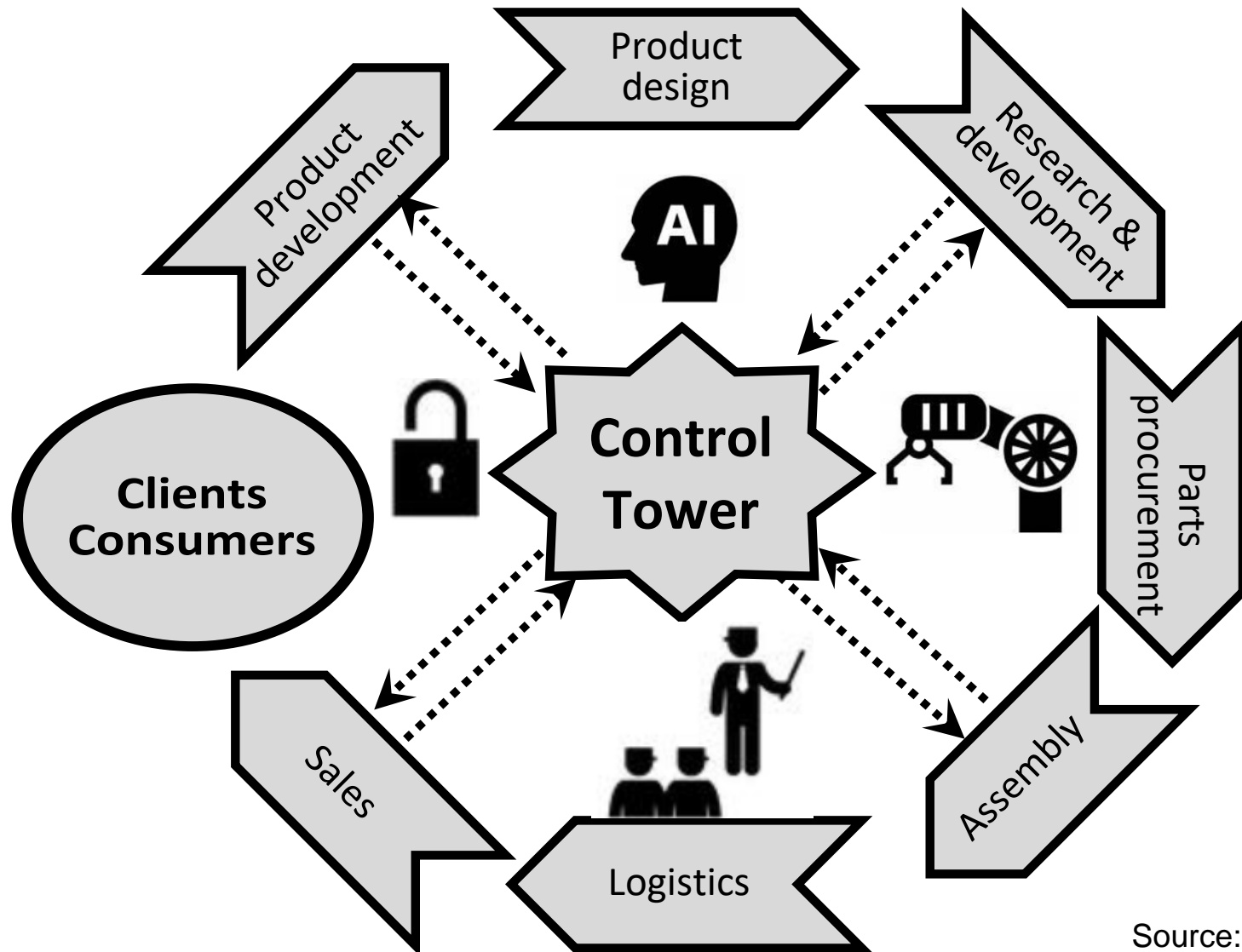
## Omni-directional management (Spider)

Productivity ↑  
by optimisation of

- equipment utilisation,
- first pass yield,
- inventory management,
- risk control and
- demand forecast etc.


*throughout the entire  
supply chains.*

# “Digital divide” between the interior and the exterior of the ecosystem ?



## E-commerce

Promotes business matching between clients and suppliers of various locations.


→ Business opportunities for individuals and small-medium size enterprises in the GVC peripheries. 

## 3D printers

Designers everywhere can remotely offer interactive prototyping of a new product at the world's frontier of product design and development. 


# Blockchain

Enhances traceability and transparency of complex supply chains. Shipping and border operations will be streamlined, reducing various forms of transaction costs, from physical paperwork to credibility assessment.

Combined with modern transport systems, supply chains of perishable commodities such as fresh fruits and vegetables become much more manageable, encouraging GVC participation of agricultural economies. 



# Virtual presence technology

- online meetings
  - remote medical services, etc.
  - **broadens the range of “*offshorable*” tasks.**
  
  - The production of a complicated product which requires a detailed, “on-the-spot” description of product specification,
  - Manufacturing services which are proprietary to a particular craftsmanship of individual meisters
- ... may become offshorable !!* 

## **My hypothesis:**

- A rise of new digital technologies under Industry 4.0 will sharpen *the dichotomy* between winners and losers of developing countries, and many ASEAN countries are standing on the edge.

**So, ASEAN,  
*Quo Vadis?***

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