

# The 4<sup>th</sup> Industrial Revolution: Reshaping the Future of Production

DHL Global Engineering &  
Manufacturing Summit  
October 7, 2015  
Amsterdam

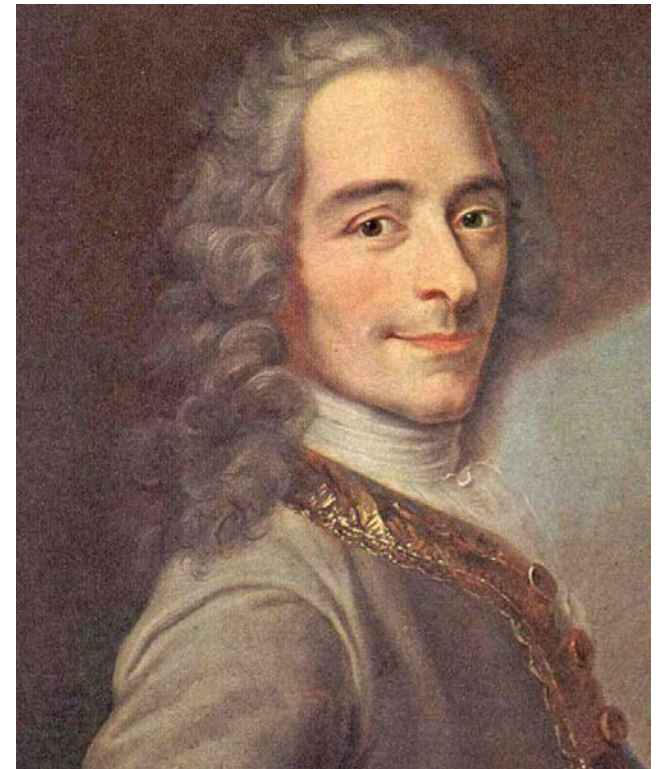
John Moavenzadeh  
Head of Mobility Industries, Member  
of the Management Committee  
World Economic Forum



# “The **Future** of Production”: A Caveat

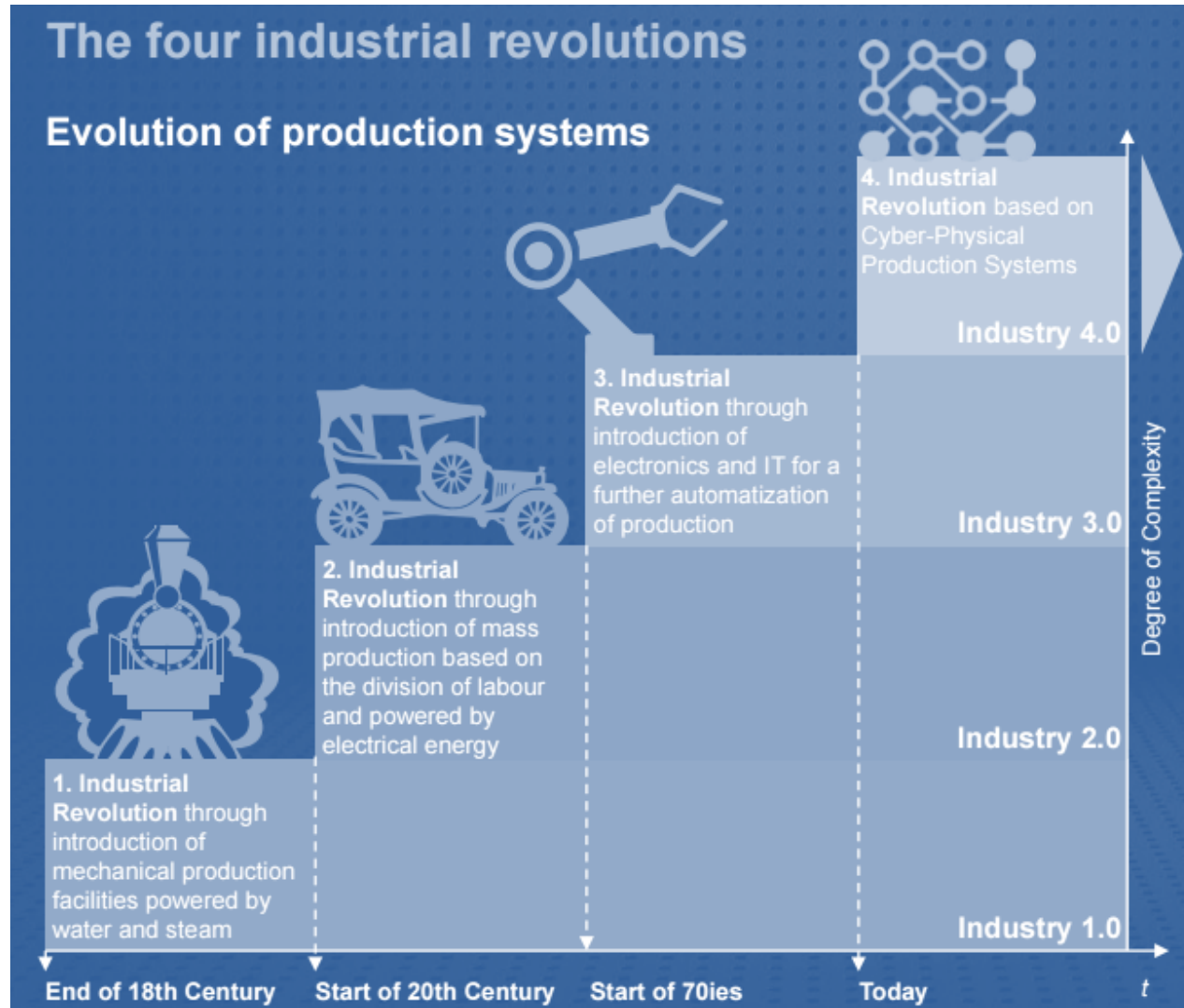


Nils Bohr: “Prediction is very difficult, especially if it’s about the future.”



Voltaire: “He who thinks himself wise, O Heavens! is a great fool.”

# Four Industrial Revolutions Have Transformed the Global Production System



Systems are being transformed  
– not specific products or services

**Cyber physical systems** combine communications, IT, data and physical elements integrating a number of core technologies:

- Sensor networks (receptors)
- Internet communication infrastructure (IP)
- Intelligent real-time processing and event management (CPUs)
- Actors for mechanical activities
- Embedded Software for logic
- Big Data and Data Provisioning
- Automated operations and management of system activities
- Advanced Robotics
- 3D/4D Printing

# Industry Transformation: The Digitization of Industries Creates Opportunities and Challenges

The digitization of products, big data and cloud computing make it easier to understand and meet individual customer needs more accurately.

We are at an inflection point: The rules from the industrial era of mass production are giving way to a digital era of individualization and optimization. Could we see the end of economies of scale?

Technology-driven transformation is giving rise to new questions and challenges that neither the public nor the private sector can tackle in isolation. For example,

- Will technology-driven automation ultimately eliminate jobs and slow economic growth, or will the labor force evolve and ultimately catch up with technological change?
- What should be done to bridge the growing skill gap in the global workforce?
- What is the meaning of privacy and security in a world of greater transparency?
- How will we collaborate to build the regulatory frameworks and standards rapidly enough to fuel the growth and adoption of new technologies?

# Business Models are Changing

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## Survey of Industry Strategy Officers, September 2015

**88%** of automotive strategy officers agree that by 2030 at least one major automaker will earn more revenue from selling data and mobility services than from selling cars and auto parts.

**70%** of professional services strategy officers agree that by 2025, digital solutions will generate more revenue for professional services firms than services delivered by people

# Technology is Transforming Business

## Survey of Industry Strategy Officers, September 2015

**50%** of media, entertainment & information strategy officers agree that by 2025 90% of the news read by the general public will be generated by computers

**100%** of insurance and asset management strategy officers agree that by 2020 real time data streams from sensors will be core to insurer's competitive positioning

**92%** of banking and capital markets strategy officers agree that by 2030 distributed ledger technology will underpin much of our financial architecture

**50%** of institutional investor and sovereign fund strategy officers agree that by 2025, the majority of financial transactions as well as management of important documents will take place on block chain architecture.

# Technology Can Address Resource Constraints

## Survey of Industry Strategy Officers, September 2015

**75%** of chemistry and advanced materials strategy officers agree that by 2025 the primary feedstock for chemical production will shift from oil & gas to biobased and recycled materials

**100%** of mining & metals strategy officers agree that by 2050 25% of annual mineral production will come from new frontiers and unconventional operations (deep sea bed, seawater, deep solution mining and asteroids)

**46%** of oil & gas strategy officers agree that by 2025 there will be a global price for carbon emissions at a level that will significantly affect investment decisions in the oil & gas sector

# All of these Changes will Impact Global Value Chains

## Survey of Industry Strategy Officers, September 2015

**78%** of supply chain & transport strategy officers agree that by 2025 the manufacturing output of developed countries will increase due to strategic onshoring/nearshoring decisions taken in response to changes in China's labour, land and energy costs

**63%** of consumer industries strategy officers agree that by 2030 at-home manufacturing will be mainstream in both developed and developing markets as consumers 3D/4D print a wide variety of products at home



# Factors of Production

**Land**

**Labor**

**Capital**



**Energy**

**Materials**

**Trust**

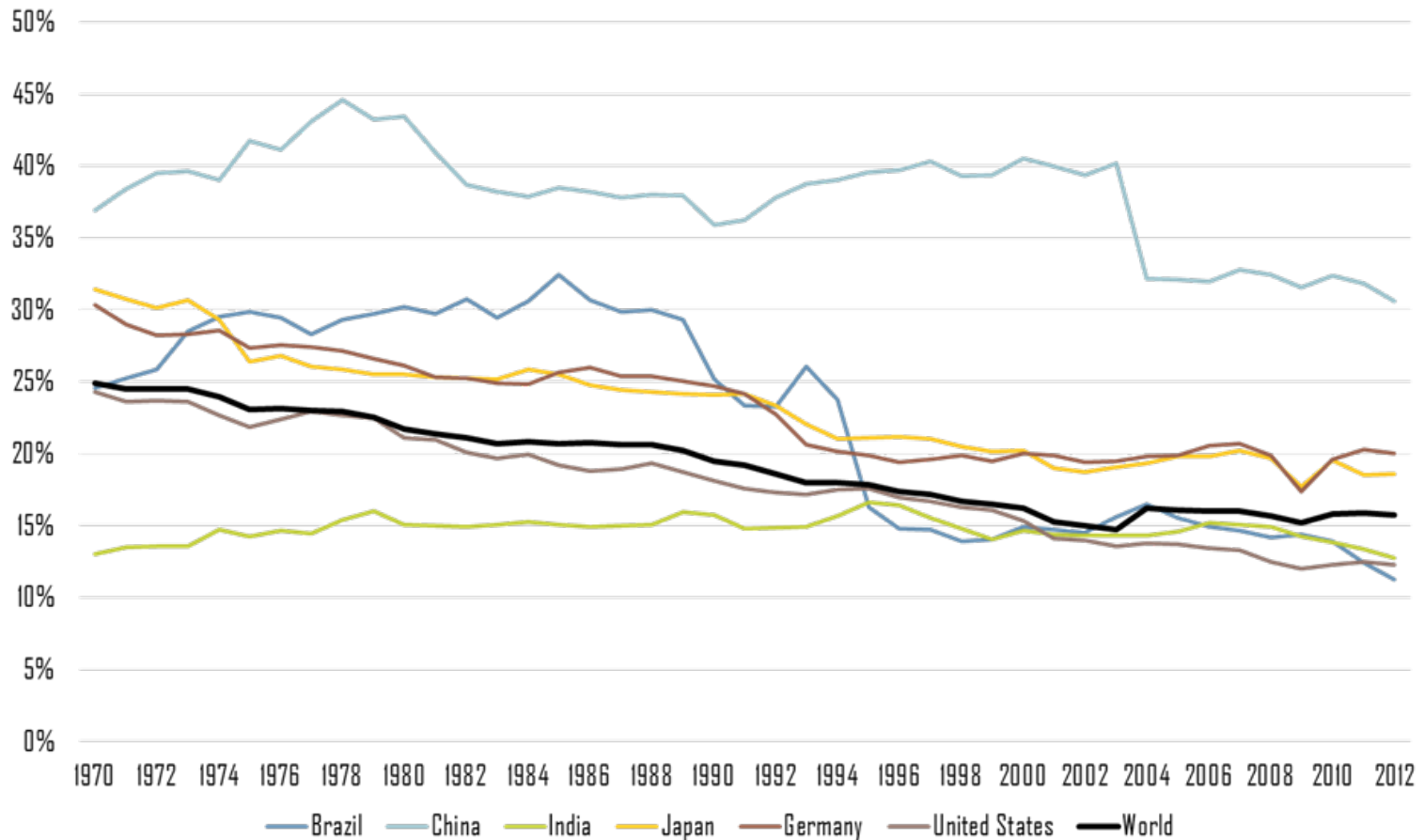
**Know-How**



Klaus Schwab: “Talentism” is the new capitalism.

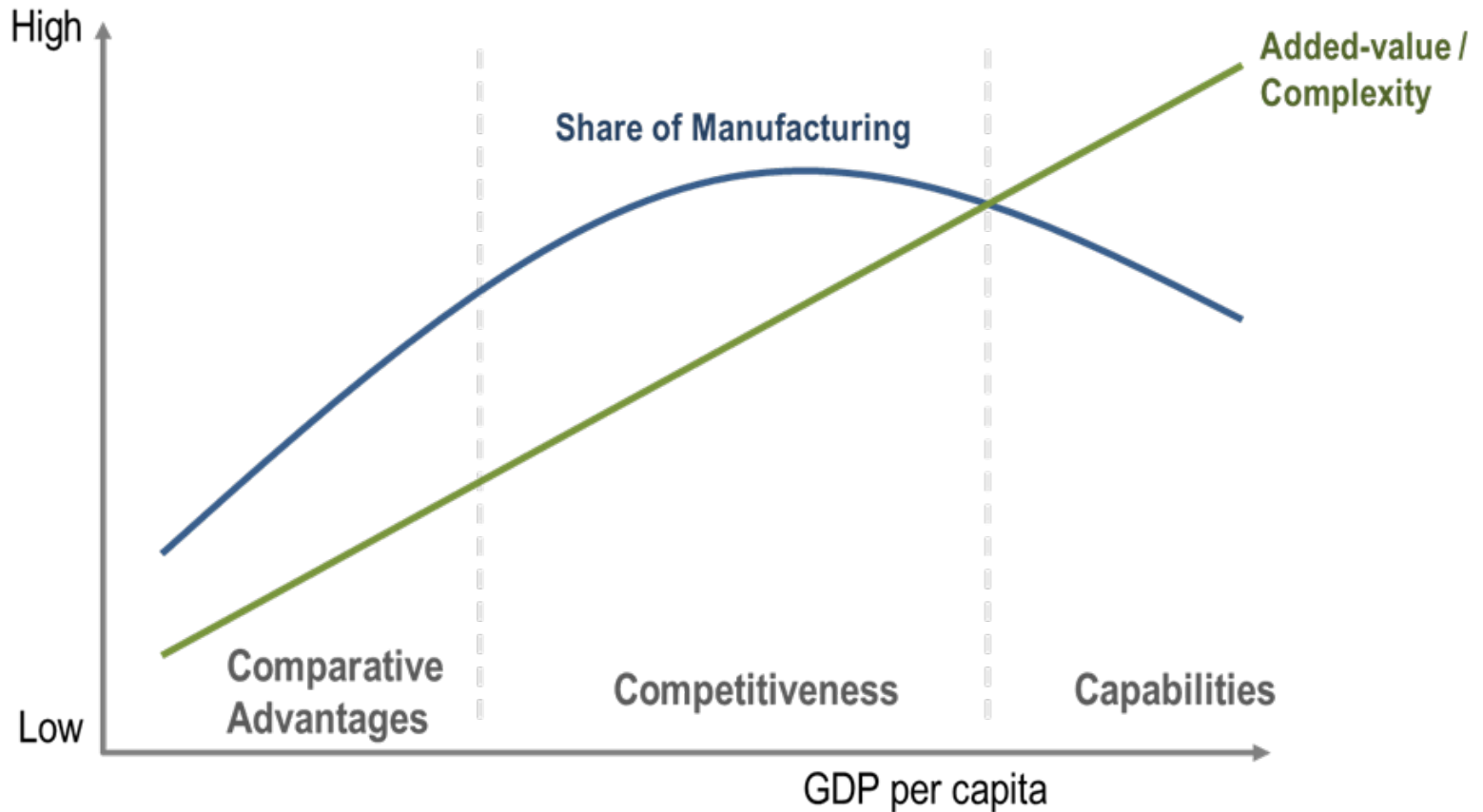
# Does Manufacturing Matter?

Manufacturing as a Percentage of GDP, 1970-2011, Selected Countries

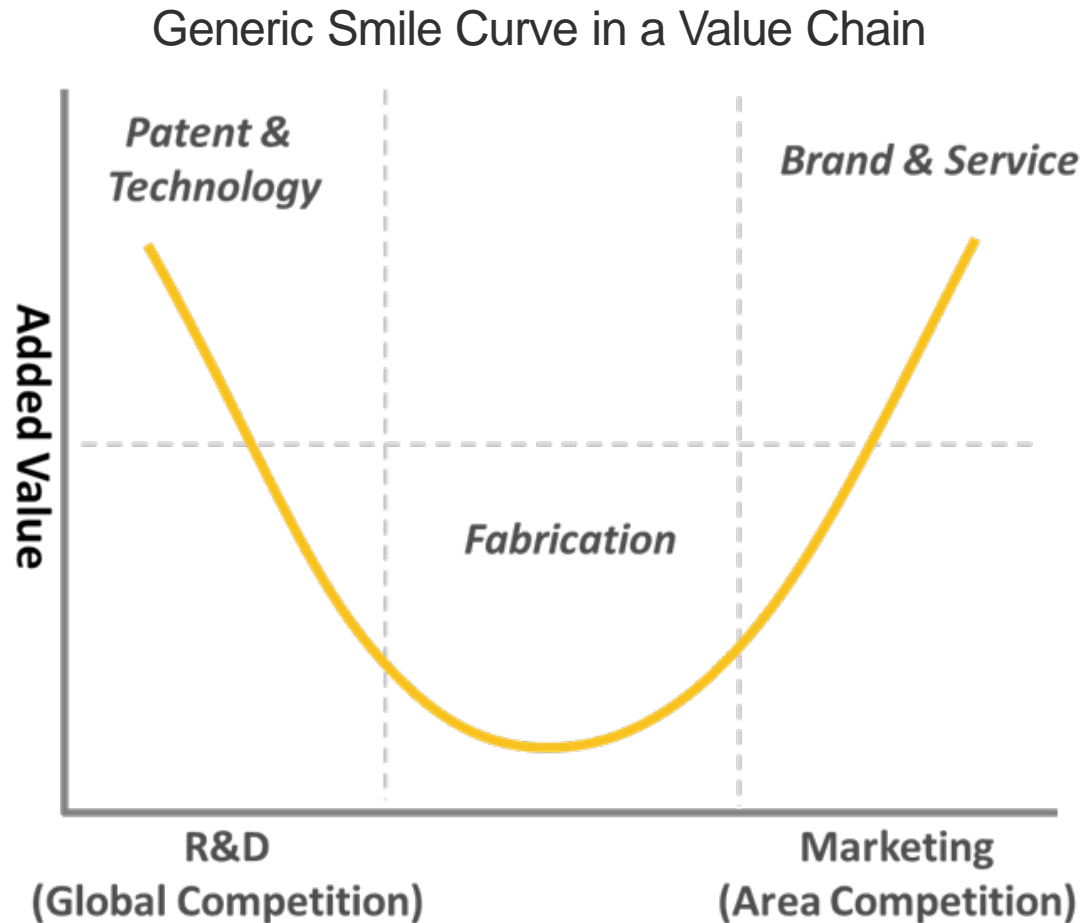


# What is Moving up the Value Chain?

Manufacturing as a Percentage of GDP, 1970-2011, Selected Countries

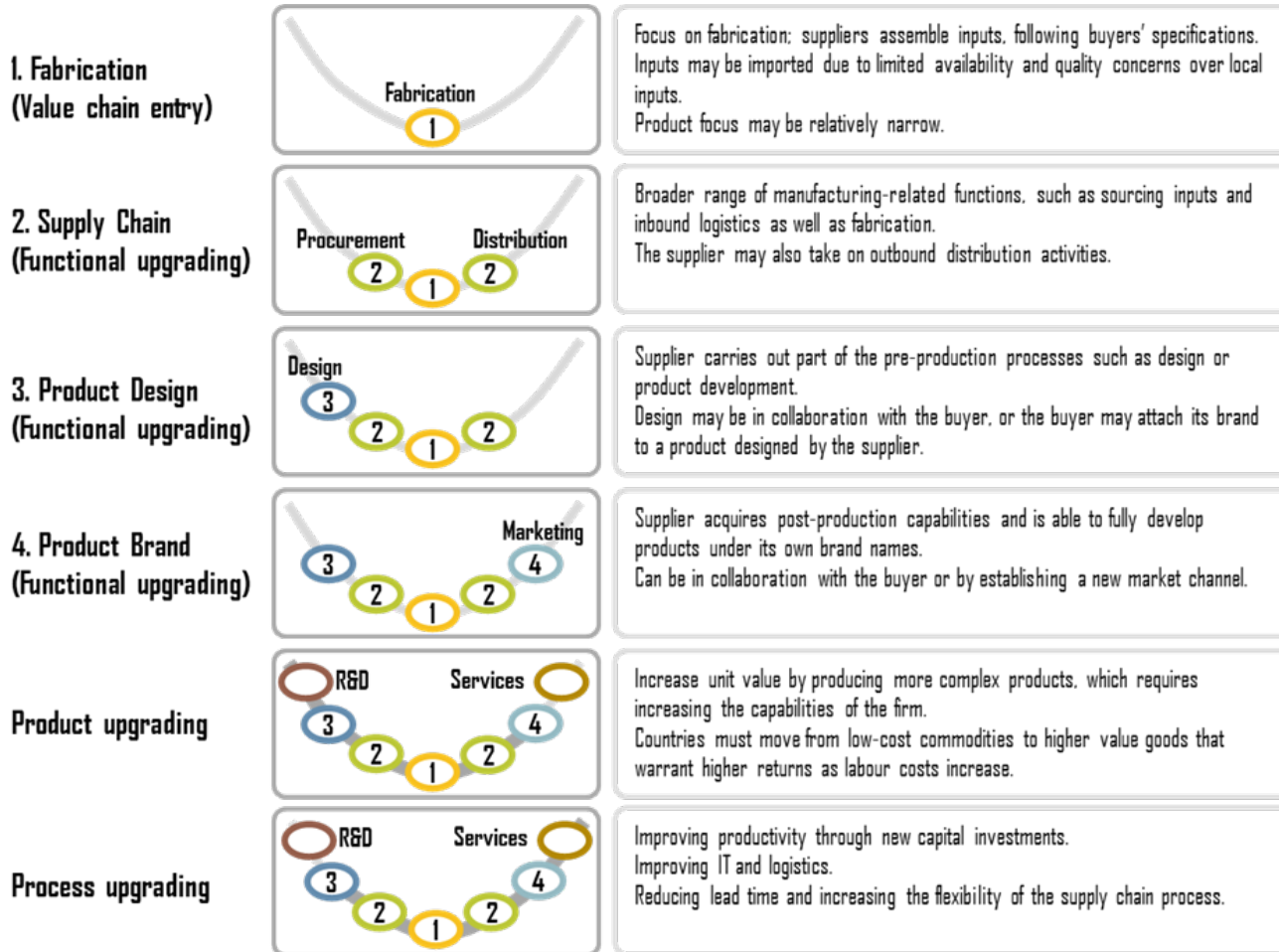


# The “Smile Curve”: One Way to Think About Value Flow



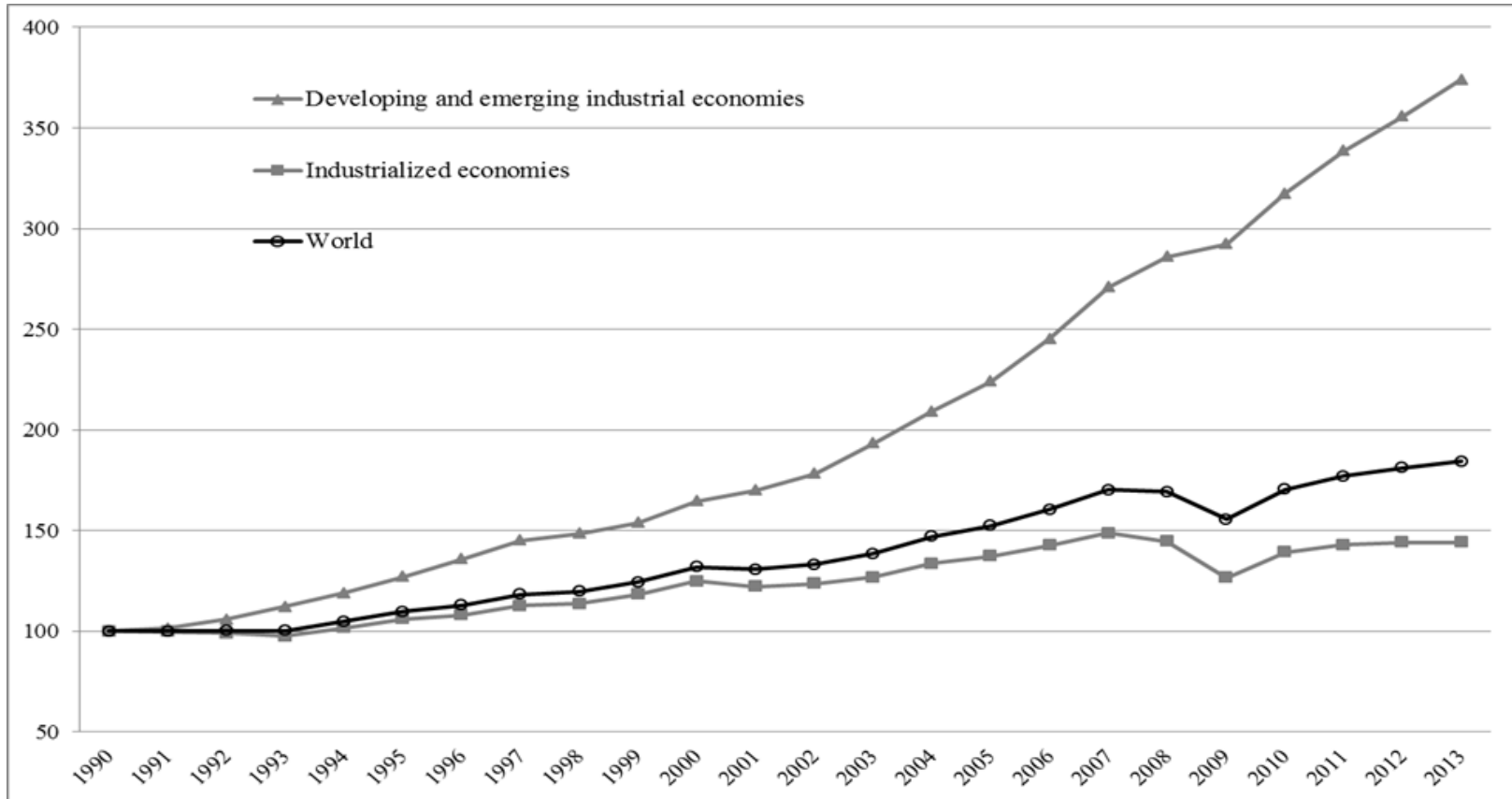
# Manufacturing

## Upgrading the Value Chain



# Manufacturing Value Added (MVA)

Growth Trend in World MVA: 1990-2013 at Constant 2005 US\$ (1990=100)



Source: UNIDO Statistical Database and UNIDO estimates, 1990-2013, [www.unido.org](http://www.unido.org)

# Manufacturing

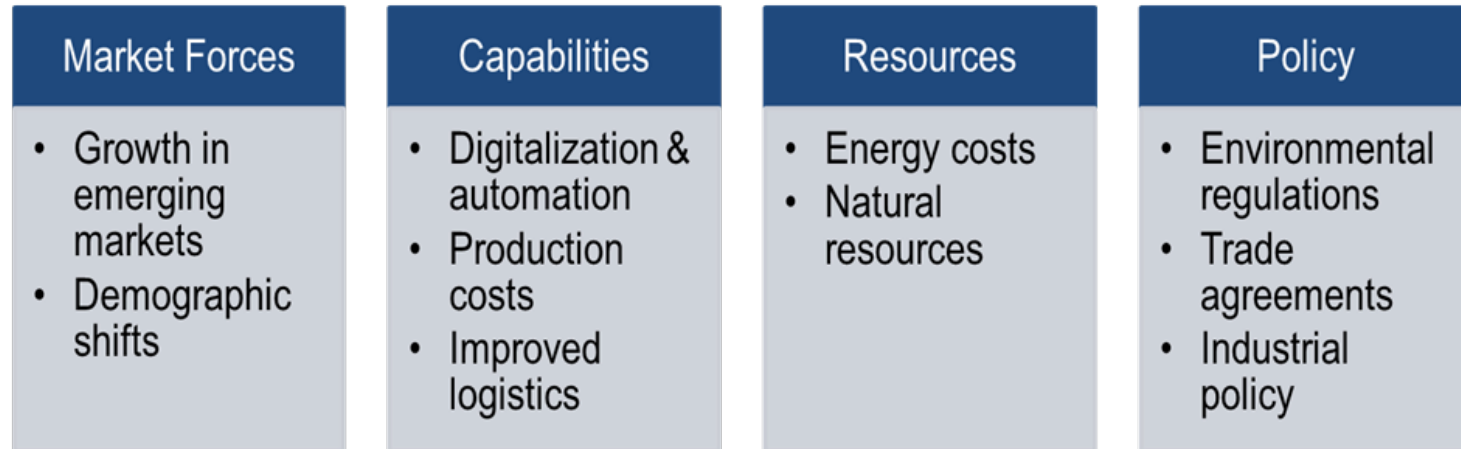
## World Manufactured Exports by Income Group, 2007-2012 (US\$ billion and %)

	1997	2007	2008	2009	2010	2011	2012	Average growth rate 2004-2008 (%)	Average growth rate 2008-2012 (%)
<b>World</b>	4,499	10,890	12,156	9,561	11,612	13,668	13,887	13.31	3.38
<b>Industrialized economies</b>	3,858	8,185	8,971	6,949	8,265	9,609	9,456	11.21	1.32
<b>Industrializing economies</b>	641	2,705	3,185	2,612	3,347	4,059	4,431	20.49	8.60

Source: UNIDO Statistical Database on the basis of COMTRADE, 1997-2012, [www.unido.org](http://www.unido.org)

# Manufacturing

## Drivers of Change in Manufacturing

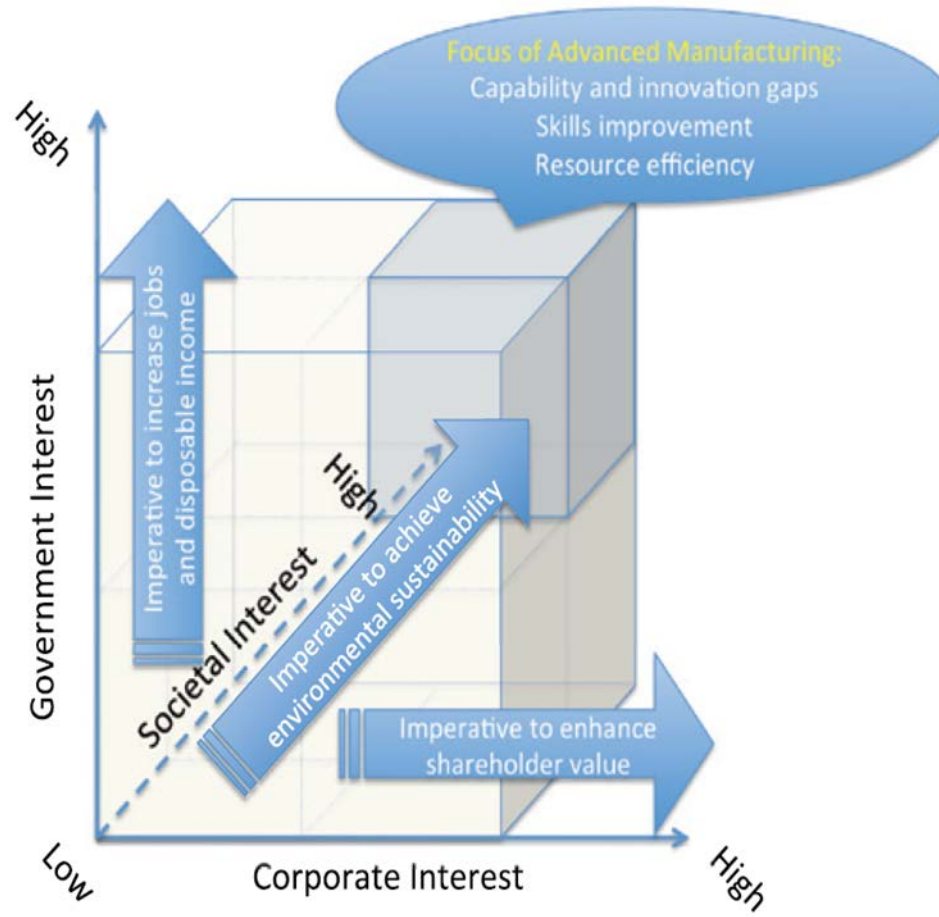


Source: Global Agenda Council on the Future of Manufacturing



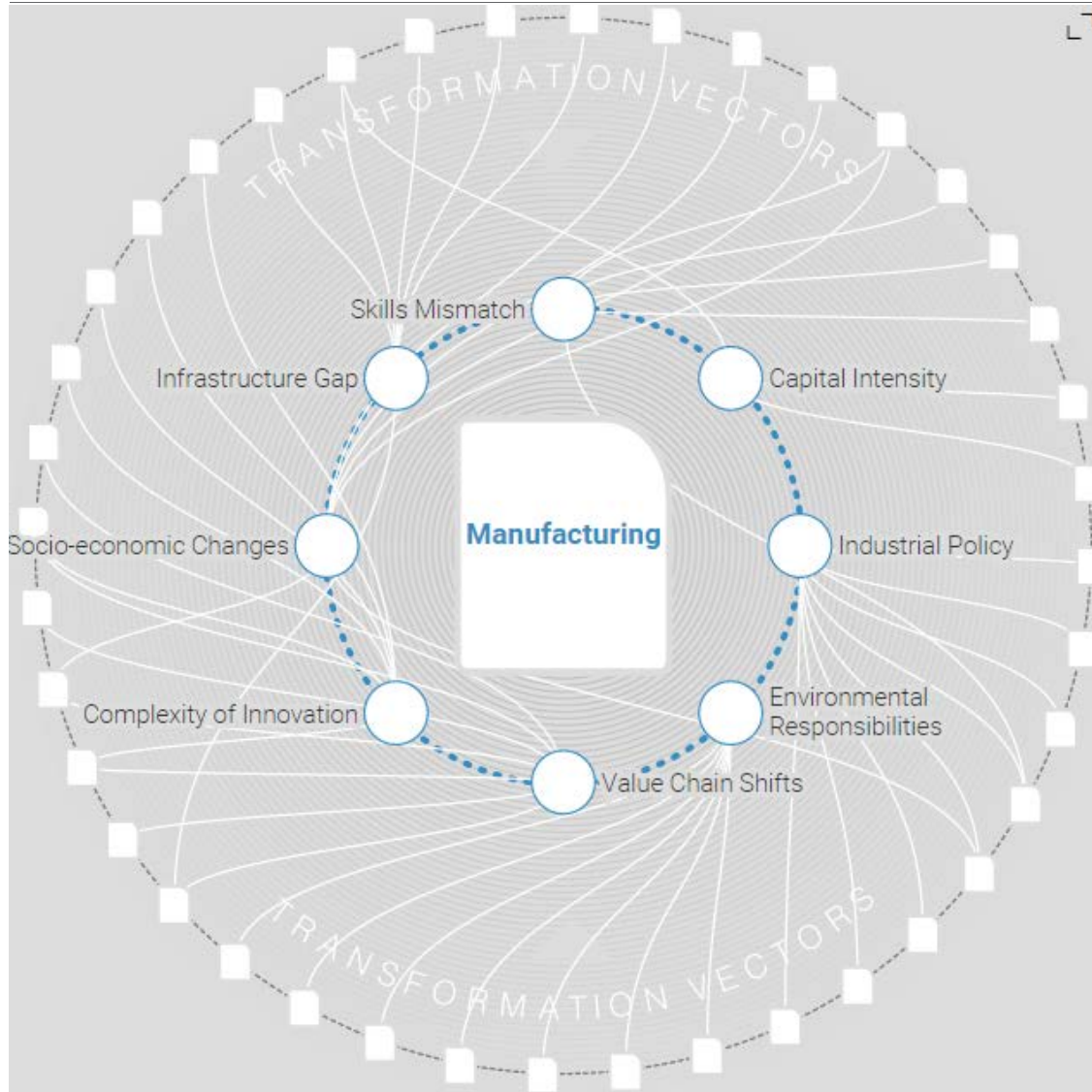
# Manufacturing

## Factors of Convergence and Divergence between Manufacturing Stakeholders



# Manufacturing

## Issues Transforming the Industry



### Skills Mismatch

Changes in technology and commerce challenge the development of skills and capabilities

### Complexity of Innovation

Adapting to the increasing complexity of innovation

### Industrial Policy

Using industrial policy to affect producers or consumers in line with socio-economic and political goals

### Infrastructure Gap

The provision of infrastructure supporting manufacturing sectors

### Value Chain Shifts

Value creation is shifting with technological, regulatory and market disruptions

### Socio-economic Changes

Fostering manufacturing relies on consumption patterns, market conditions and societal inclusiveness

### Capital Intensity

Increase in capital intensiveness as manufacturing moves towards further automation

### Environmental Responsibilities

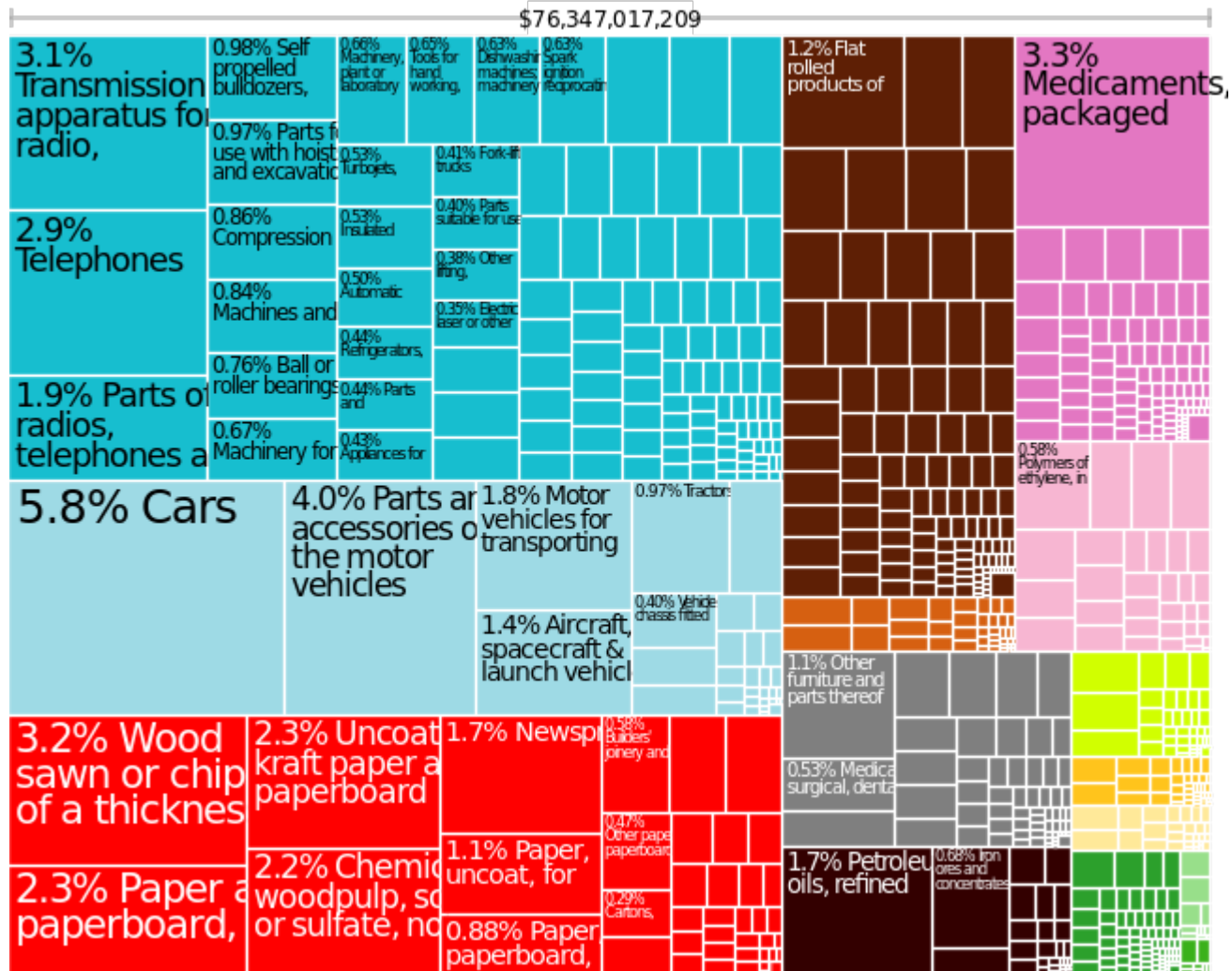
Environmental awareness drives sustainable innovation and production

# Five specific policy areas where common messages emerged from executives around the world

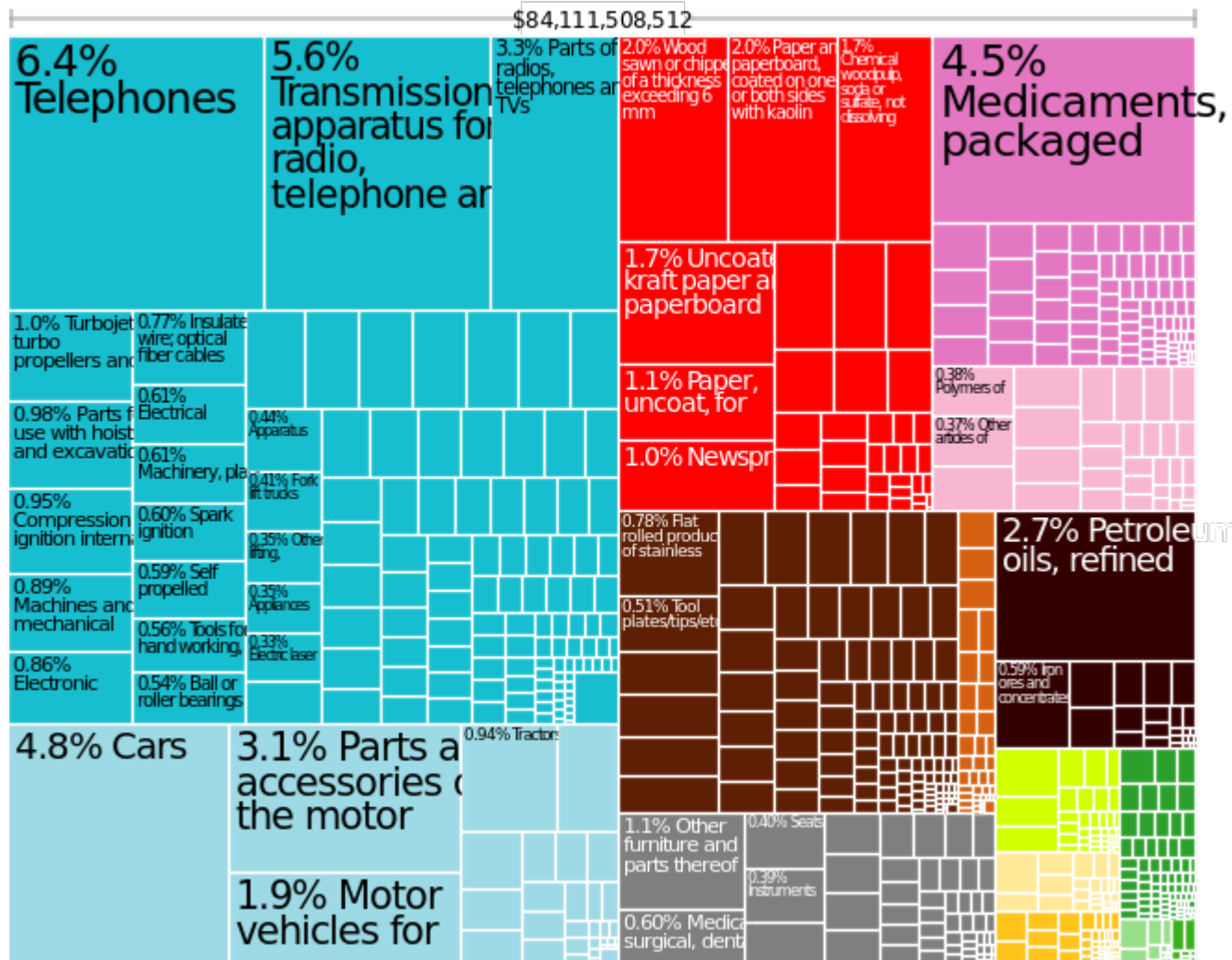
## World Economic Forum Manufacturing for Growth Initiative

1. Competitive tax policy applied within simplified tax systems
2. Policy that promotes and protects free and fair trade
3. Energy policy promoting efficiency, security, strong infrastructure and low cost
4. Education and workforce policies which develop superior talent
5. Science, technology and innovation policies which promote advanced manufacturing

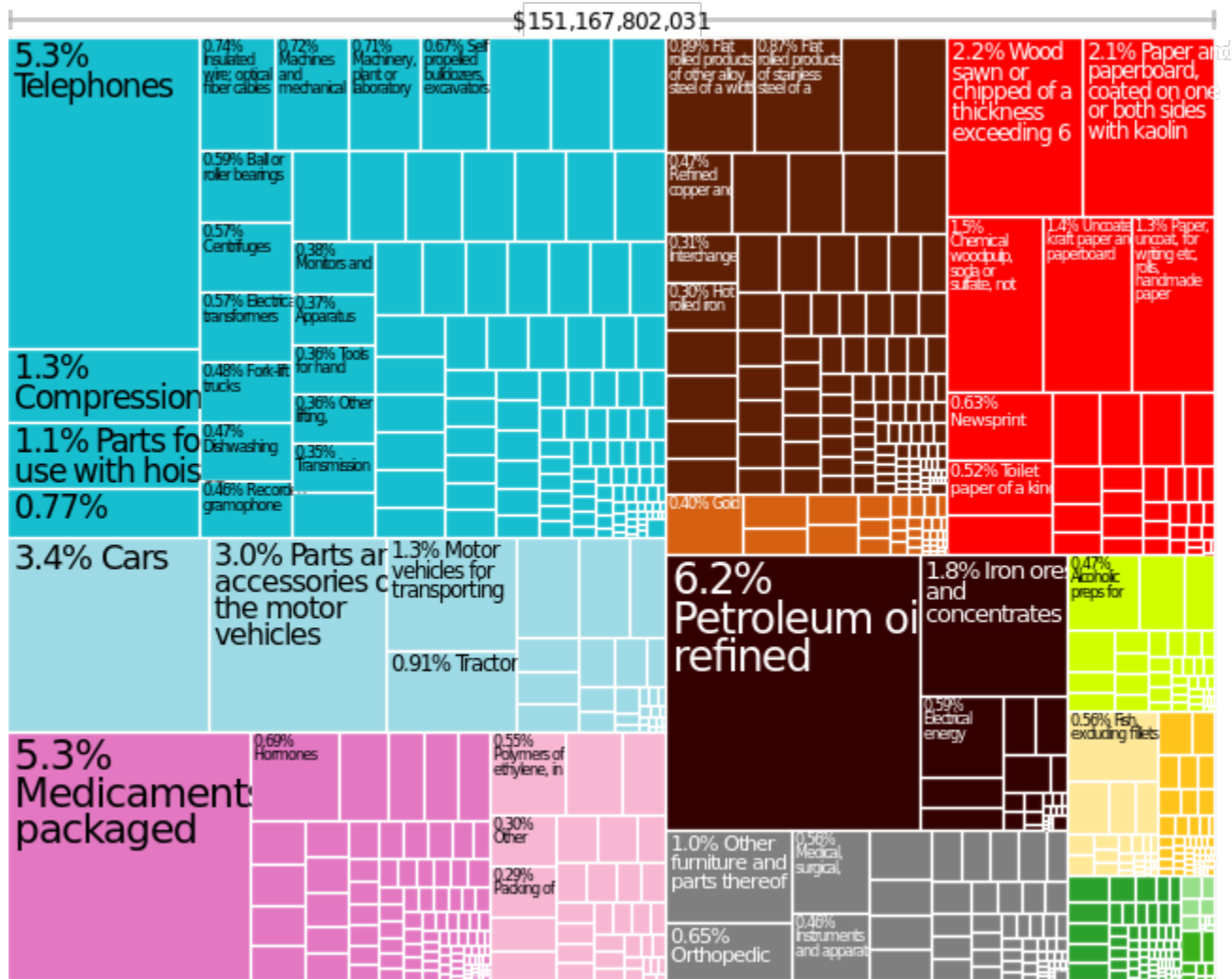
# Sweden's Exports, 1995



# Sweden's Exports, 2000

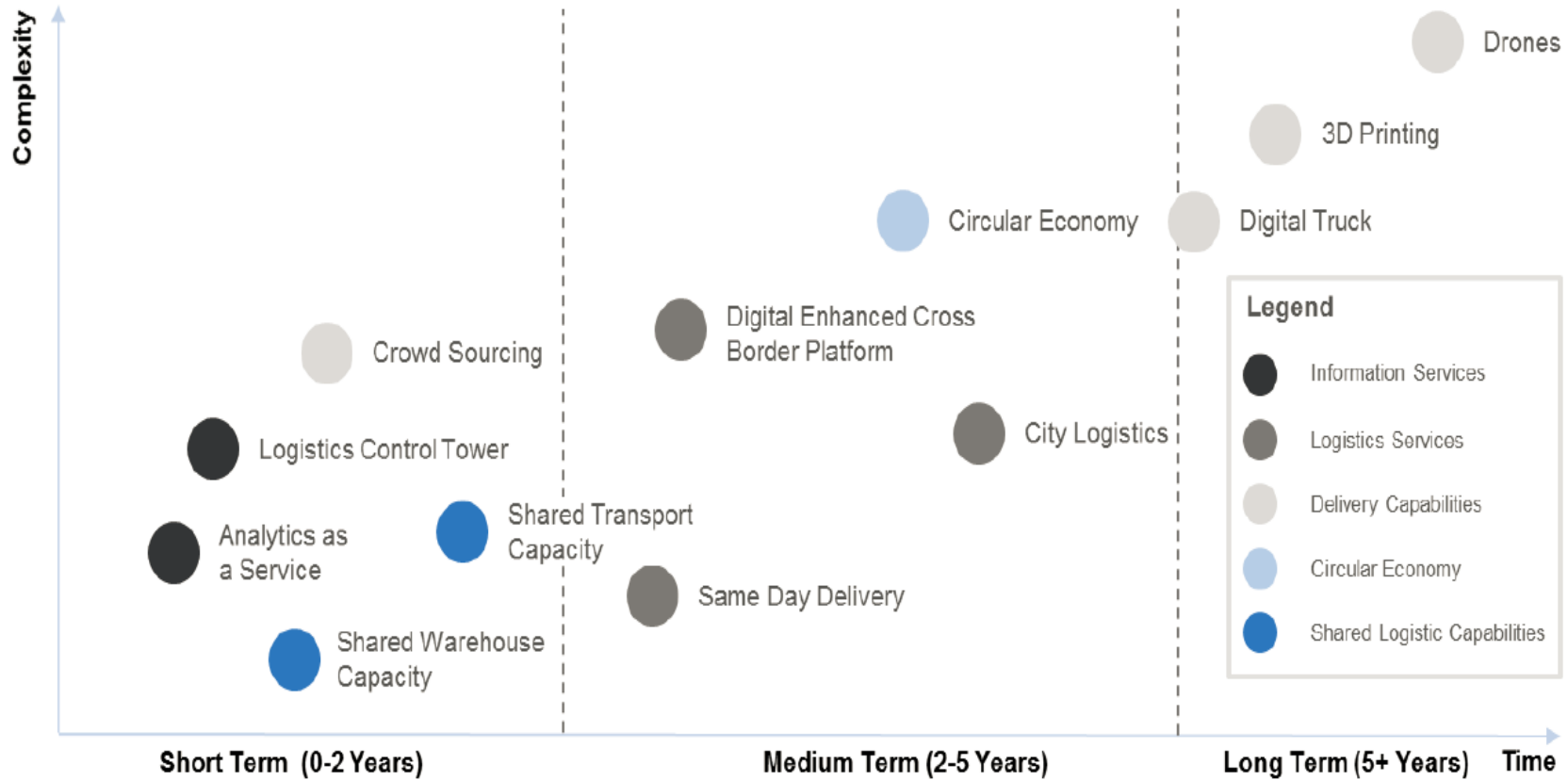


# Sweden's Exports, 2010

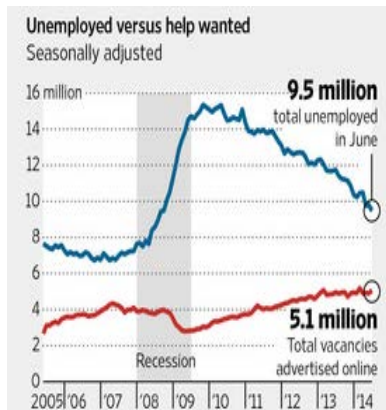
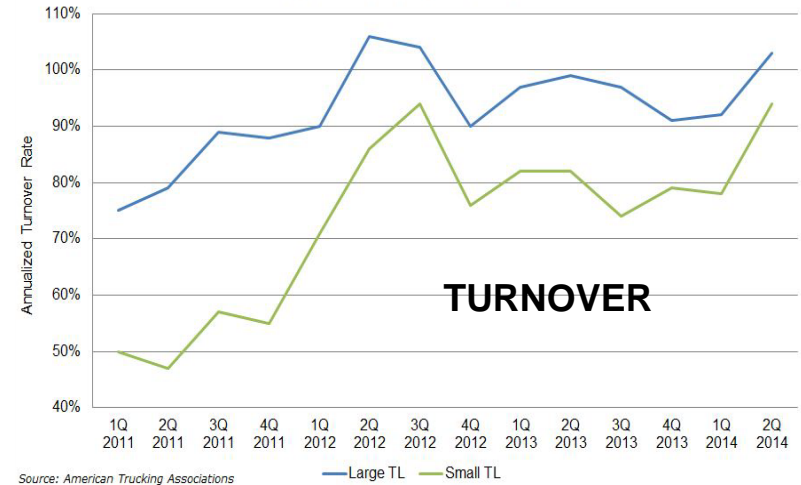
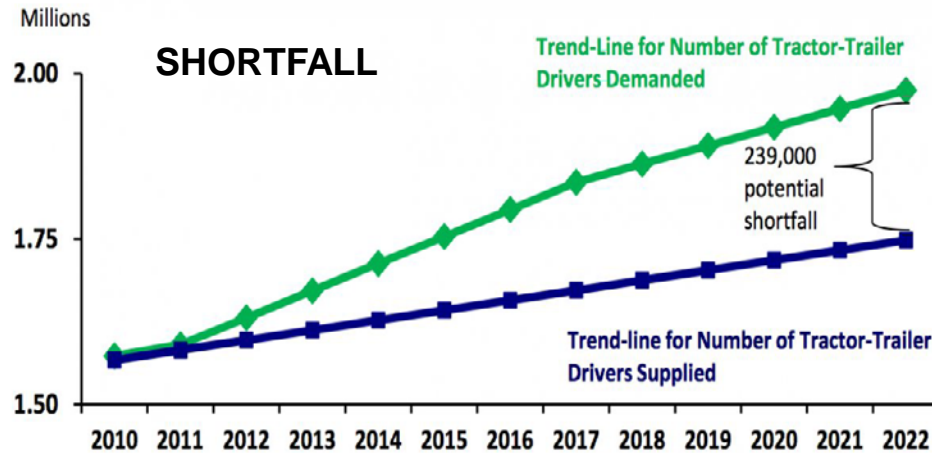


<http://atlas.media.mit.edu/country/swe/>

# Looking Toward the Future: The Digitization of Supply Chains



# Projected shortfall of truck drivers in USA; turnover and unemployment



**Labor Shortage in Shipping Industry reflects a Skills and Goals Gap**



# Trust and Visibility in Supply Chains is Critical

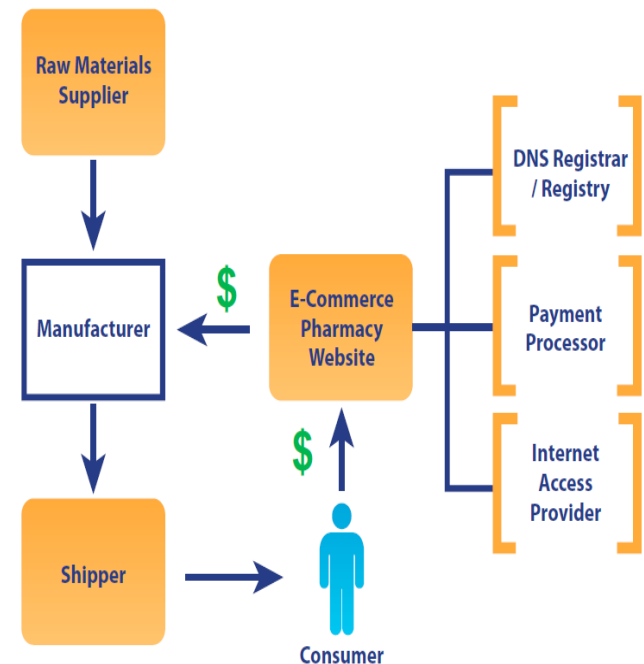
## Examples of SFFC\* Medicines

SFFC Medicine	Country/Year	Report
1. Avastin (for cancer treatment)	United States of America, 2012	Affected 19 medical practices in the USA. The drug lacked an active ingredient.
2. Viagra and Cialis (for erectile dysfunction)	United Kingdom, 2012	Smuggled into the UK. Contained undeclared active ingredients with possible serious health risks to the consumer.
3. Truvada and Viread (for HIV/AIDS)	United Kingdom, 2011	Seized before reaching patients. Diverted authentic product in falsified packaging.
4. Zidolam-N (for HIV/AIDS)	Kenya, 2011	Nearly 3,000 patients affected by falsified batch of antiretroviral therapy.
5. Alli (weight-loss medicines)	United States of America, 2010	Smuggled into the USA. Contained undeclared active ingredients with possible serious health risks to the consumer.
6. Anti-diabetic traditional medicine (used to lower blood sugar)	China, 2009	Contained six times the normal dose of glibenclamide. Two people died, nine people were hospitalized.
7. Metakelfin (antimalarial)	United Republic of Tanzania, 2009	Discovered in 40 pharmacies. The drug lacked a sufficient active ingredient.

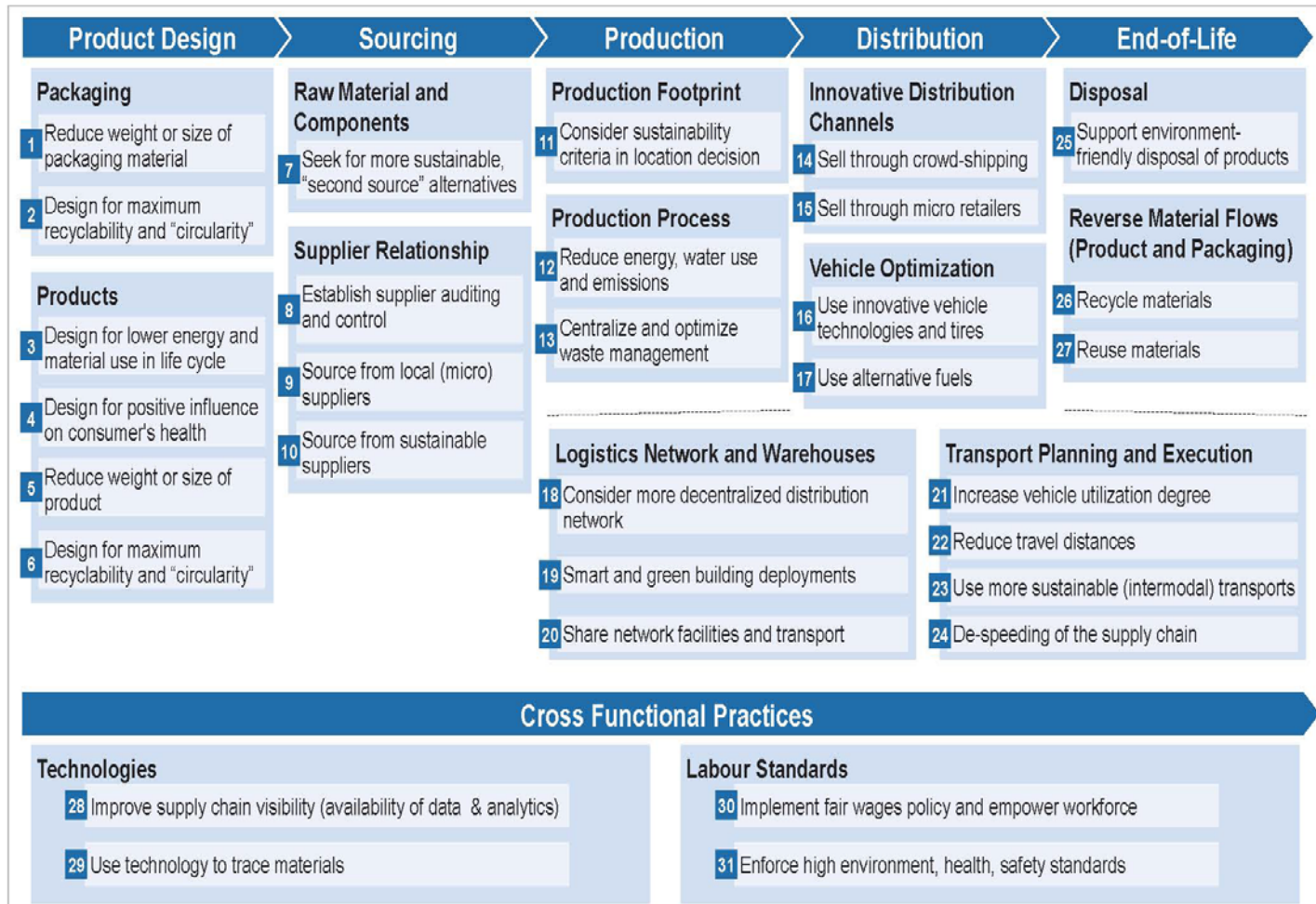
\* SFFC = spurious, falsely-labeled, falsified, counterfeit

## Stakeholders Map

Intermediaries involved in purchase, manufacture, and delivery of a counterfeit



# Landscape of Supply Chain Practices: Creating triple advantage



# Why Explore Responsible Value Chains

## Recent Incidents in Supply Chains

### Fashion Industry



#### Factory crash in Bangladesh

- Garment workers killed despite inspections/ supplier audits
- Incident caused brand damage and compensation payments to workers

#### Unethical working conditions

- No control over manufacturers and their outsourcing policies: non-approved and unethical sub-contractors

### Consumer Electronics



#### Child Labor

- Assemblers were audited, no child labor was found, but hundreds of children under 16 worked at sub-suppliers
- No transparency about hiring procedures at suppliers
- Incident caused brand damage

#### Suicides

- Mistreated workers attempted a mass suicide

### Transportation Industry



#### Environmental law violations

- Improper handling, storage and disposal of hazardous materials due to inefficient training leading to fines of 30 million USD

#### Carbon Footprint

- Challenges in matching different local customer needs for transportation with environmental aspirations

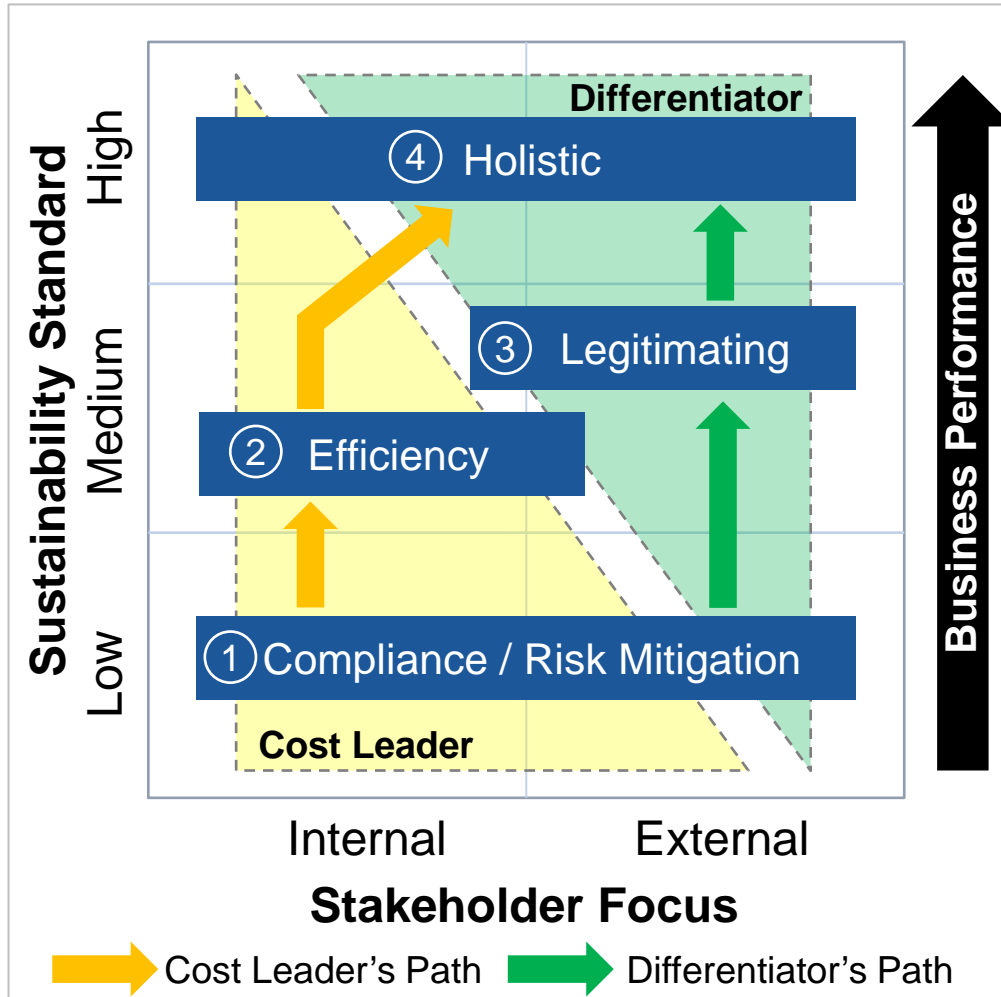
### Cross Industry



- Product recalls due to toxic lead paint on toys by a contract manufacturer
- Company was linked to rainforest deforestation causing 60 companies to suspend their relationship
- Letter from former employee condemning toxic unethical culture of firm drove market value down by \$2 billion

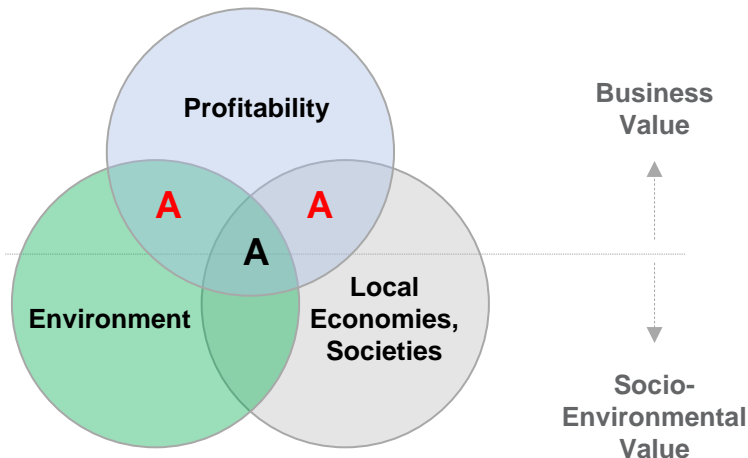
# Two Different Paths toward Responsible Supply Chains

## Development Path of Sustainability Strategies



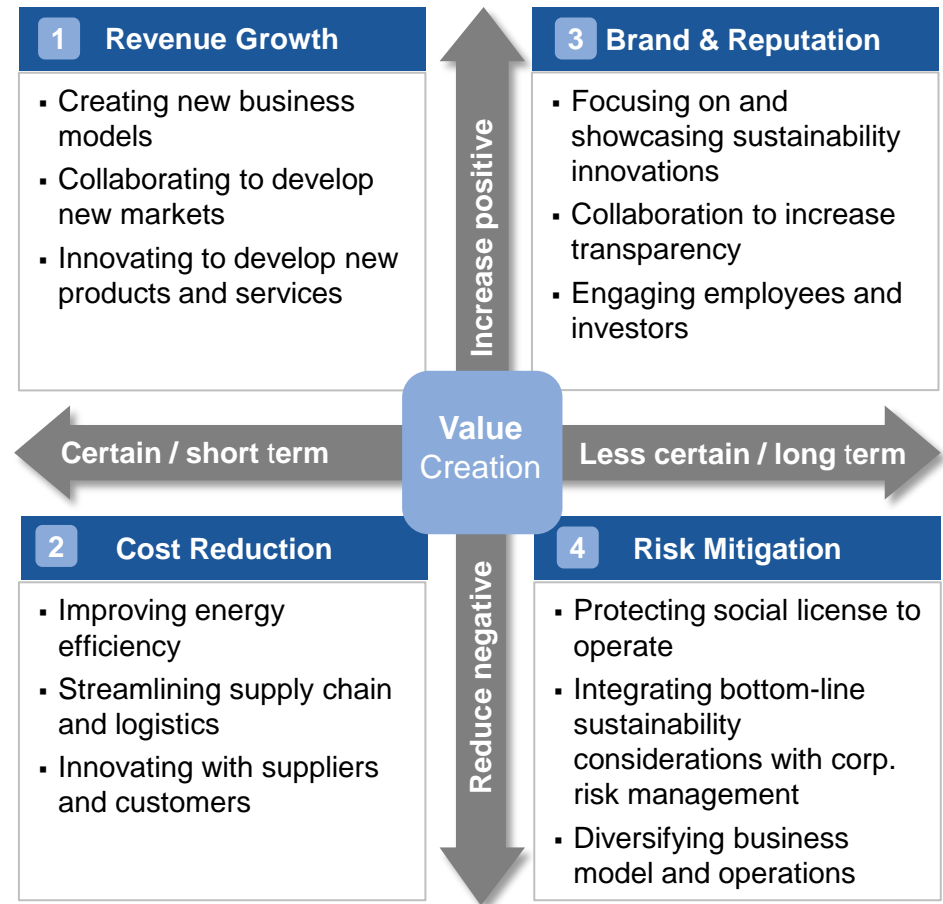
# Leading Companies Capture the “Triple Advantage” of Sustainability

## The “Triple Advantage”



- Maximized intersection of interests between business value and socio-environmental value
- Focus on initiatives that improve all three dimensions, business value and environment, business value and local economies/societies

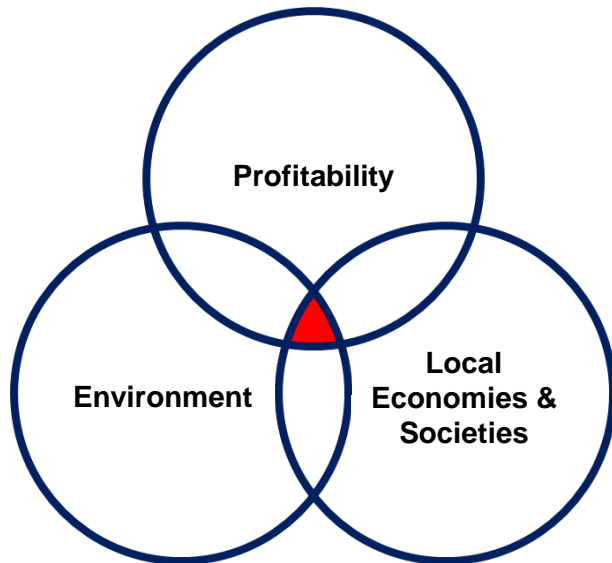
## Holistic Value Consideration



# Our goal: Accelerate deployment of supply chain practices benefitting communities, economies and companies

## What we Want to Achieve

### “Sustained Responsibility via Supply Chains”



- Maximized intersection of interests
- A framework to guide trade-offs
- Empowered companies and broad take-up of enabling supply chain practices and innovation

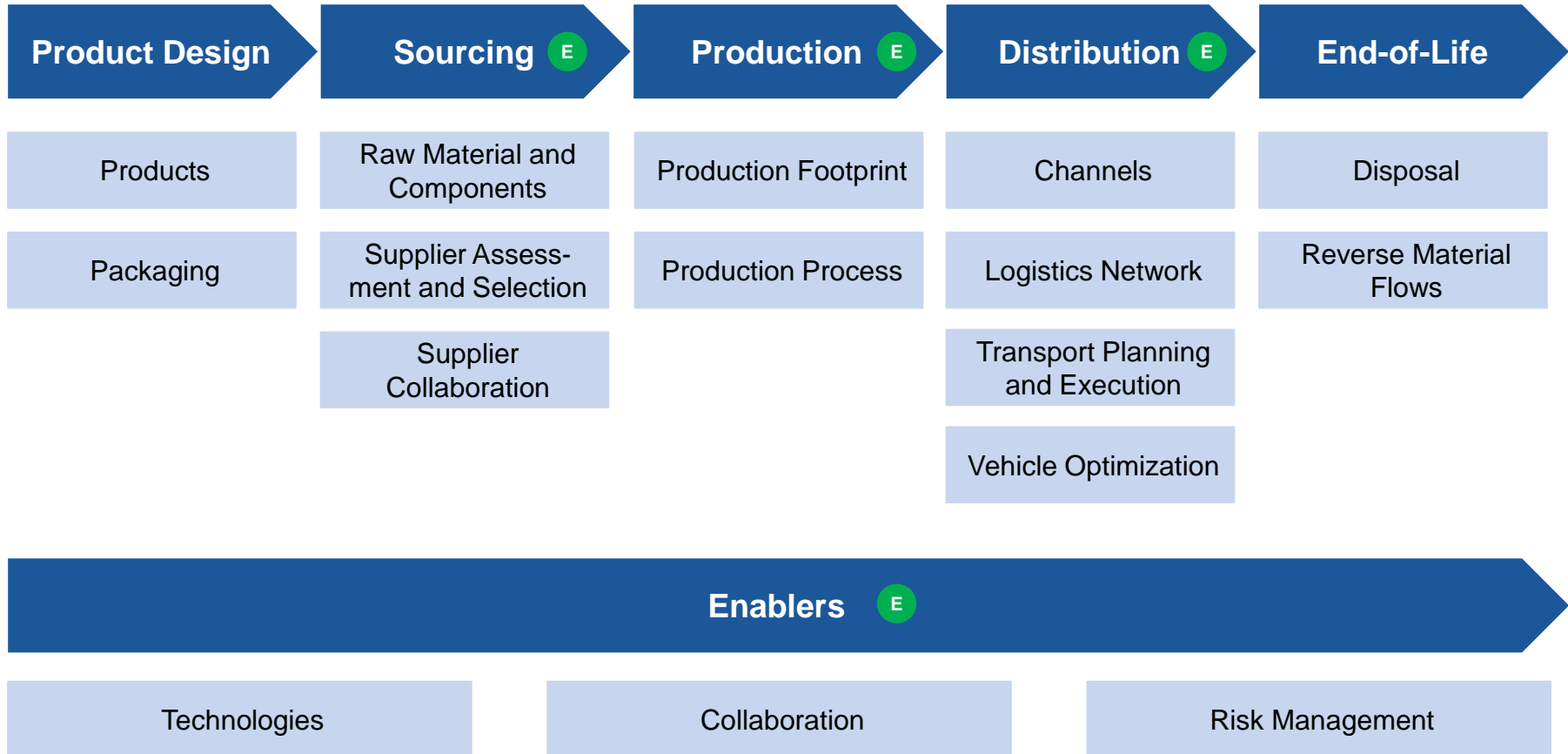
## Our Actions



- Help build consensus on **supply chain practices** contributing to these objectives
- Aim **for practitioner-relevance** by differentiating approaches by strategy, region, maturity, industry
- Attempt to **quantify impact** and **implementation challenges** to provide a **prioritization** guide
- Highlight "**enabling**" practices and governance requirements, e.g. data transparency
- Identify **dilemmas and trade-offs** in SC decisions, provide **decision criteria** to help resolve them
- **Socialize findings** via broad outreach

# For this, we identify supply chain measures and enablers of particular value and innovation potential

## Supply Chain Practices (Illustrative)



<sup>E</sup> Examples on following slide



# Good supply chain practices can improve carbon footprint as well as social and economic outcomes

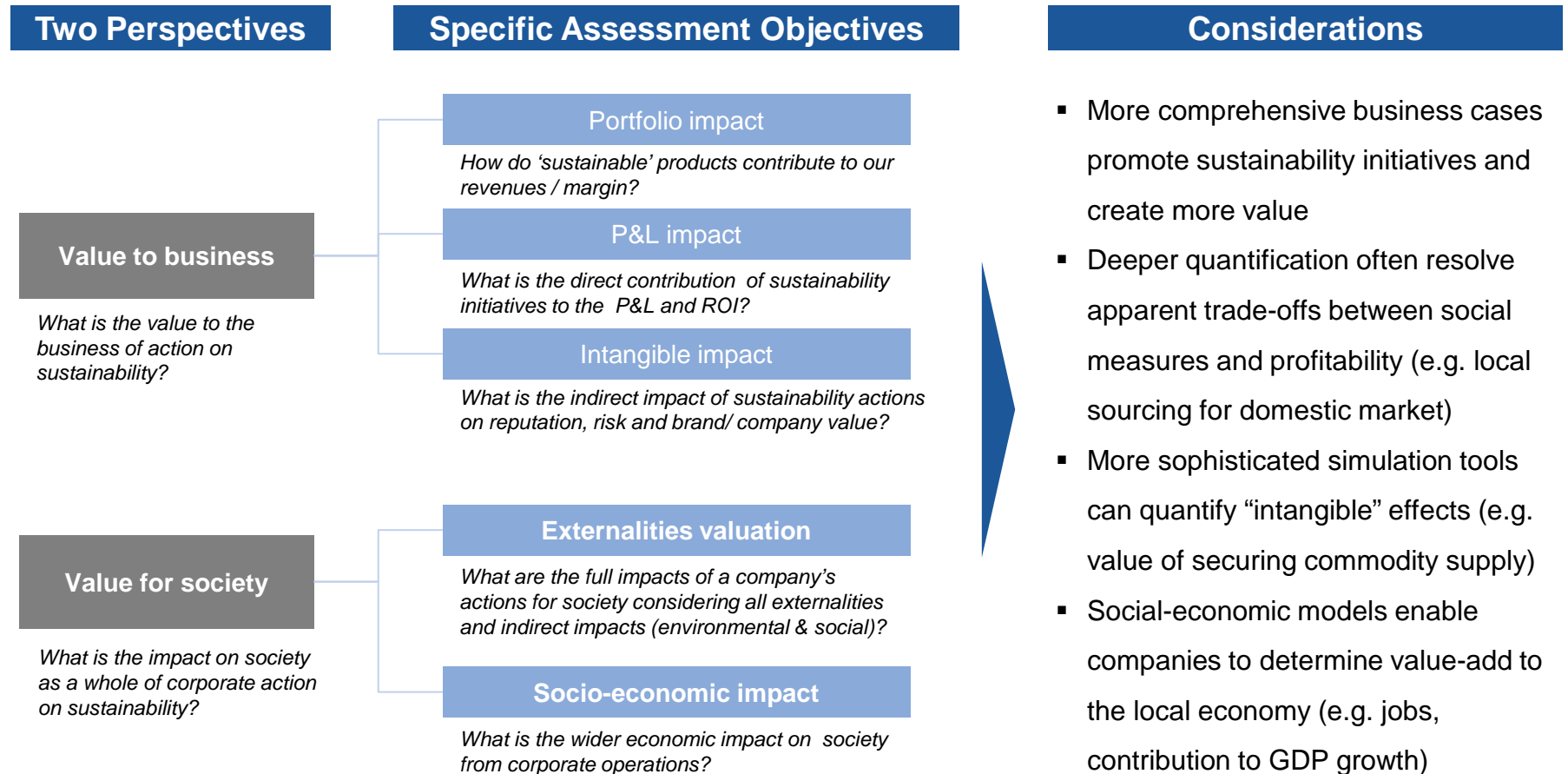
## Examples of Supply Chain Practices

Global Energy & Petrochemicals Company	Global Nutrition Company	International Consumer Goods Retailer	Global Automotive Player	Global Consumer Goods and Online Retailer	Global Fashion Retailer
Minimum Standards	Holistic Sourcing Approach	Transparency	Energy Efficient Production	Collaboration	“Green” Distribution
<ul style="list-style-type: none"> <li>▪ Expects all suppliers to comply with the Supplier Principles</li> <li>▪ Suppliers should also apply the same principles when dealing with sub-contractors</li> <li>▪ Principles cover issues such as health and safety, and labour and human rights</li> </ul>	<ul style="list-style-type: none"> <li>▪ Holistic sustainability plan aims to halve its environmental footprint whilst growing the business</li> <li>▪ Embedding sustainability across the business is a strategic goal</li> <li>▪ By 2015, 75% of paper and 50% of all agricultural raw materials to be sustainable sourced</li> </ul>	<ul style="list-style-type: none"> <li>▪ Detailed set of sustainability questions for all suppliers</li> <li>▪ Focus on additional goals beyond the usual cost and quality metrics</li> <li>▪ Invests in suppliers willing to commit to sustainable sourcing</li> <li>▪ Suppliers realising that sustainability can provide a competitive advantage</li> </ul>	<ul style="list-style-type: none"> <li>▪ Water reduction - Closing cooling circuits and water treatment systems</li> <li>▪ Energy reduction – Use central routing technology to turn energy using components on only when needed</li> <li>▪ Waste reduction – through smart product design; by constant monitoring of waste flows in each plant</li> </ul>	<ul style="list-style-type: none"> <li>▪ “The Knowledge Hub” is a collaboration platform between Tesco and its suppliers</li> <li>▪ Aims to reduce carbon emissions and improve resource efficiency across the supply chain</li> <li>▪ Share challenges, opportunities and best practice</li> </ul>	<ul style="list-style-type: none"> <li>▪ Introduced more fuel efficient lorries</li> <li>▪ Reduced energy use in stores, offices and warehouses</li> <li>▪ Reduced store refrigerant gas carbon emissions</li> <li>▪ Used two billion fewer single-use carrier bags in its food halls;</li> <li>▪ And tackled water-use in its stores and supply chain</li> </ul>



# Comprehensive business cases quantifying value for business and society is a key catalyst for more responsible outcomes

## Holistic Sustainability Valuation



# Across industries, companies have created tremendous value through supply chain sustainability initiatives

## Magnitude of Benefits - Examples

### International Consumer Goods Retailer

- A 5% packaging reduction is set to drive \$3bn in savings by 2013
- Package material reduction was reached by decreasing density of plastics through inducing a gas into plastic production

**Environmental  
Benefits**

**Economic Development  
of Local Economy**

### Postal Service Provider

- The company lowered absenteeism by 25% and saves £227m
- Invested heavily in health and wellbeing programs

**Human Rights  
and Ethical  
Standards**

### Global Beverage Company

- The company pays premium price of £20m after organic / Fairtrade brand becomes fastest growing brand.
- Successfully sources organic resources locally from small-holders and trains and develop them

# Questionnaire revealed priorities including practical realization, quantification and recognizing trade-offs

**Traceability is a key issue**, but high complexity makes it **difficult to put into practice**.

**Explicitly embed sustainability principles** in the purchasing and sourcing process.

Create a **culture of having trade-offs** and balancing them in the right way

Will mainstream consumers ever **pay more** for sustainable products?

**Measuring, understanding, managing trade-offs** within the company and along the supply chain

What is the **optimal level of transparency** in a supply chain? How much do I need?

Bring into the "carrier-freight forwarder relationship" equation the **involvement of manufacturers, shippers & consignees** to develop more meaningful commercial synergies

Development of faster, accurate, **LCA-lite** will help. Full LCA is too onerous but traceability is key.

1. How do we **scale** good sustainability performance across 1000s of value chains?
2. How do leading companies keep pushing **new approaches**?

Enquire about last mile logistics: **passenger-freight** transport interfaces, **crowd-shipping**, etc.

We should be trying to seek out ways in which sustainability leads to **enhanced commercial success**

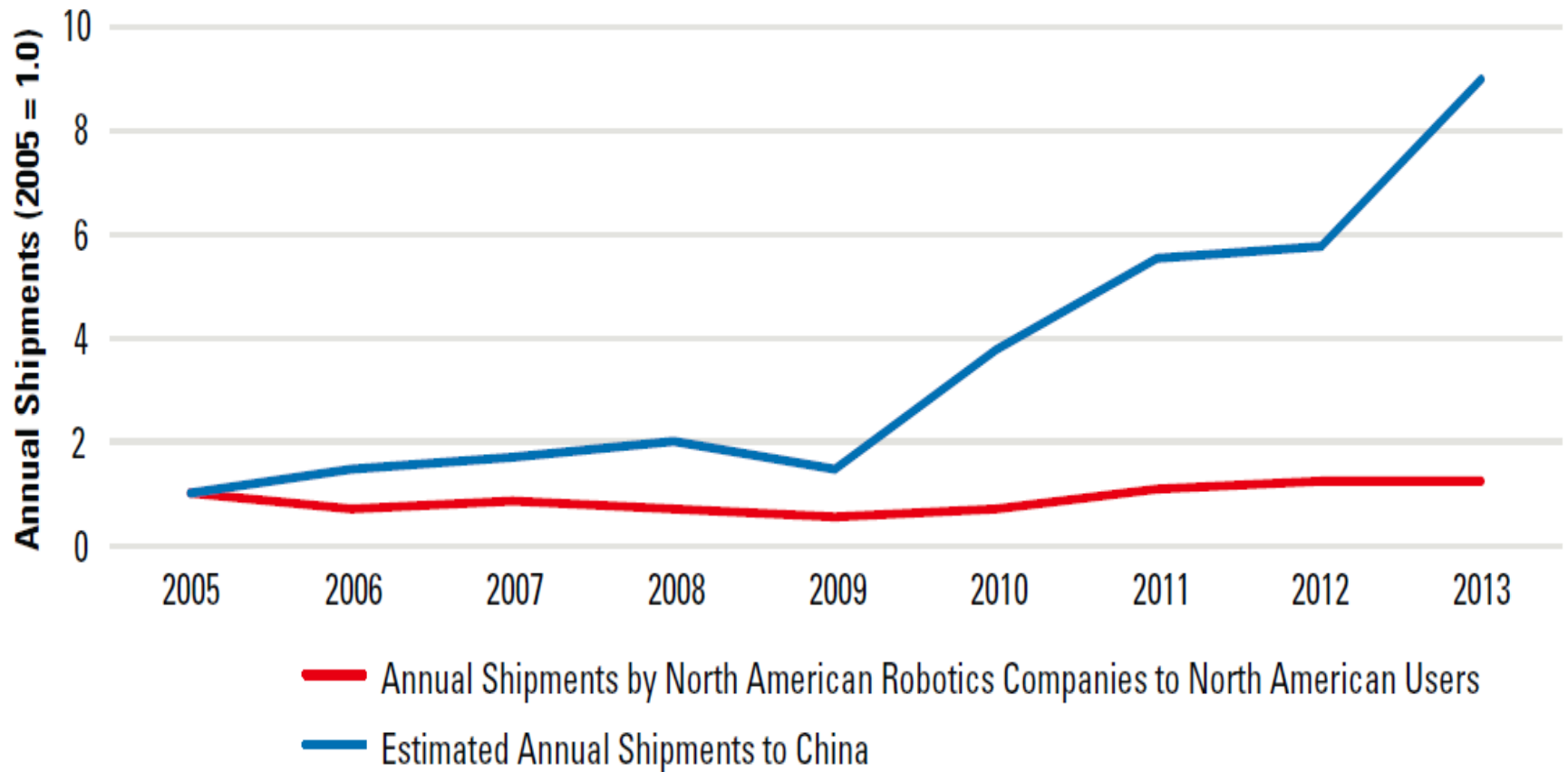
# Labour rates growing much faster in China





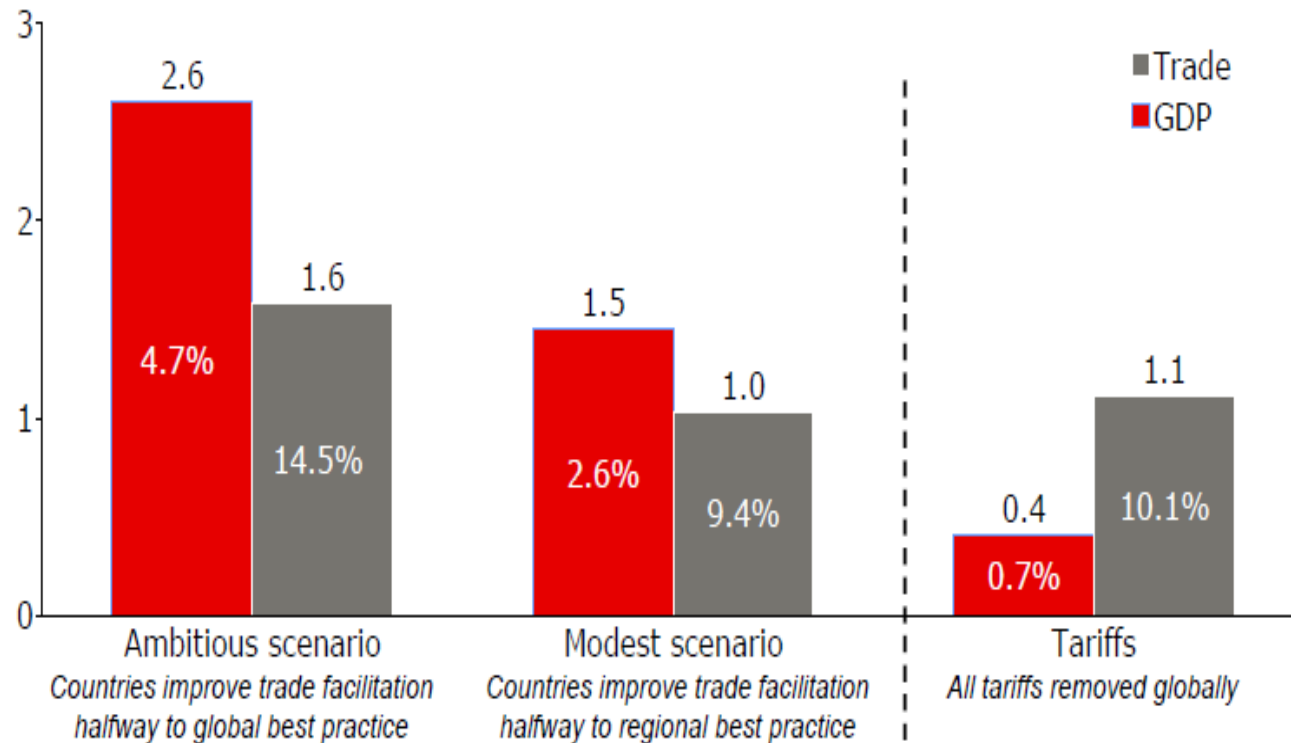
## Robotics use in USA and China

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## Reducing supply chain/trade barriers has a larger effect than removing tariffs

Increase in trade\* and GDP (trillion US\$)

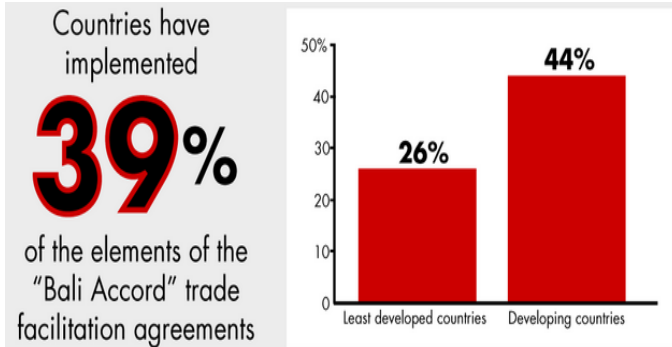


**The GDP effect of reducing supply chain/trade barriers is much higher than for tariffs**

\*Based on export value; includes only the effect of "Border Administration" and "Telecommunication and Transport Infrastructure".

Source: Ferrantino, Geiger and Tsigas, *The Benefits of Trade Facilitation - A Modelling Exercise*. Based on 2007 baseline.

# Easing trade barriers: Progress and opportunities



**73** countries have adopted "Single Window" systems that link trading companies to Customs and other government agencies



But the Bali Accord focuses primarily on easing border barriers ...

**Border Administration**

- Customs efficiency

... leaving room for further progress on other supply chain barriers

**Market Access**

- Quotas
- Import fees
- Local content requirements

**Telecom and Transport Infrastructure**

- Transport infrastructure
- Transport service
- Use of electronic tracking

**Business environment**

- Regulations
- Security

Reducing these other Supply chain barriers to trade could

Increase trade by **15%**

Increase global GDP by nearly **5%**

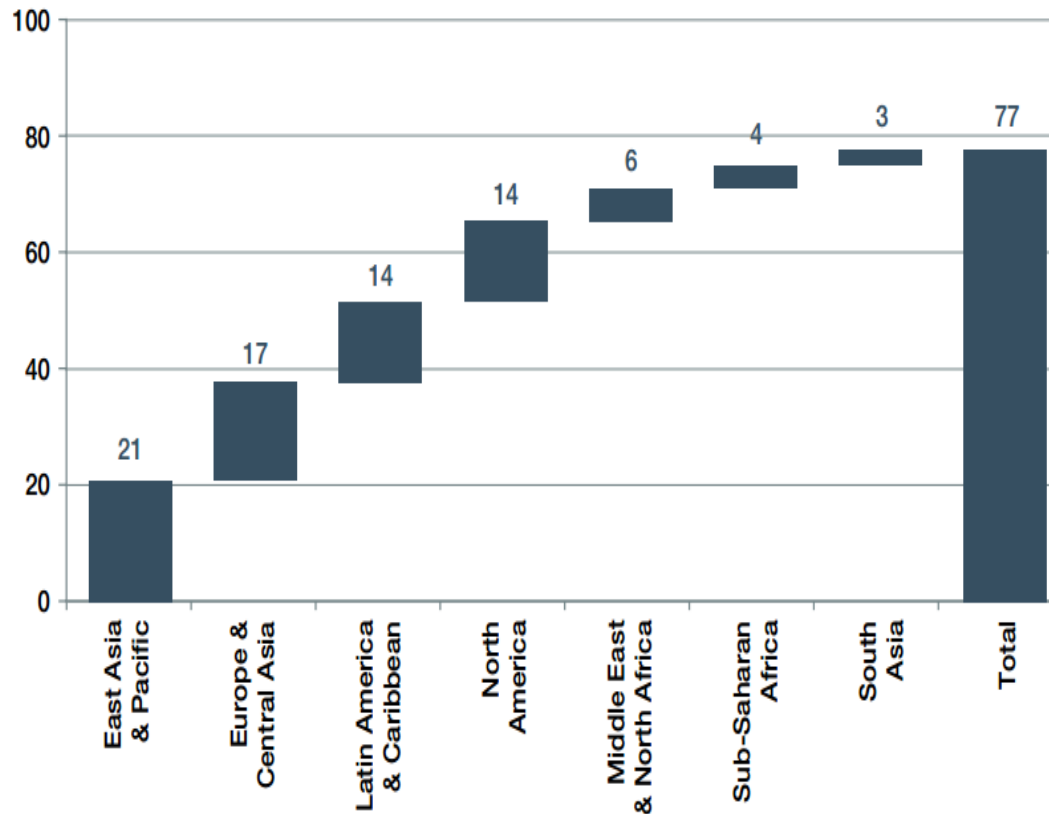
Which is worth

**6X**

More than removing ALL TARIFFS

# Potential cost savings in maritime trade

Potential cost savings \$ billion halfway to cost best practices  
*Imports and exports by container*



# \$77bn

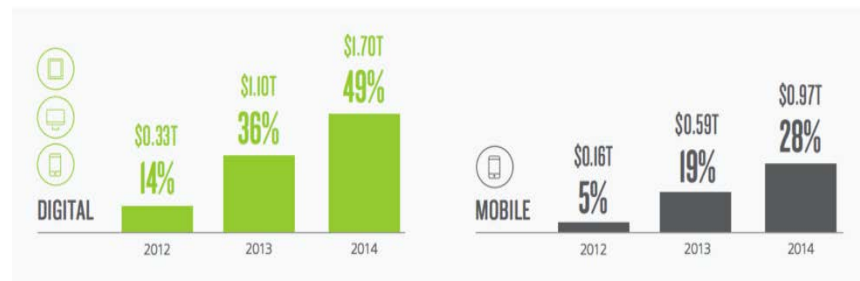
annual global cost savings

This does not include further savings in capital costs that can be generated from streamlining import and export times

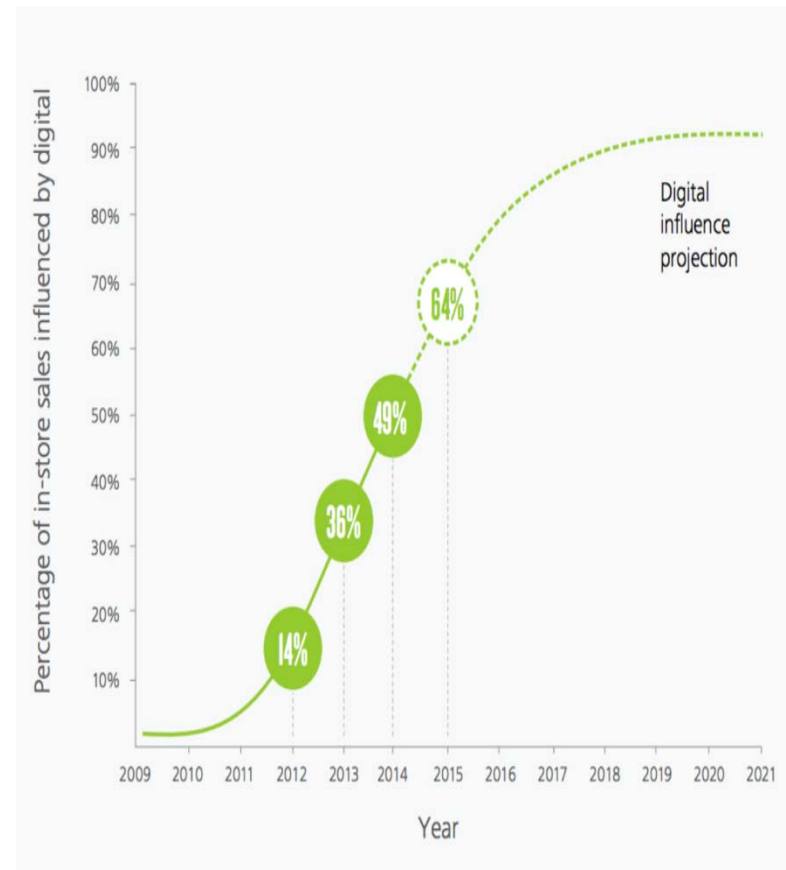


# Thinking about the journey of the omnichannel consumer

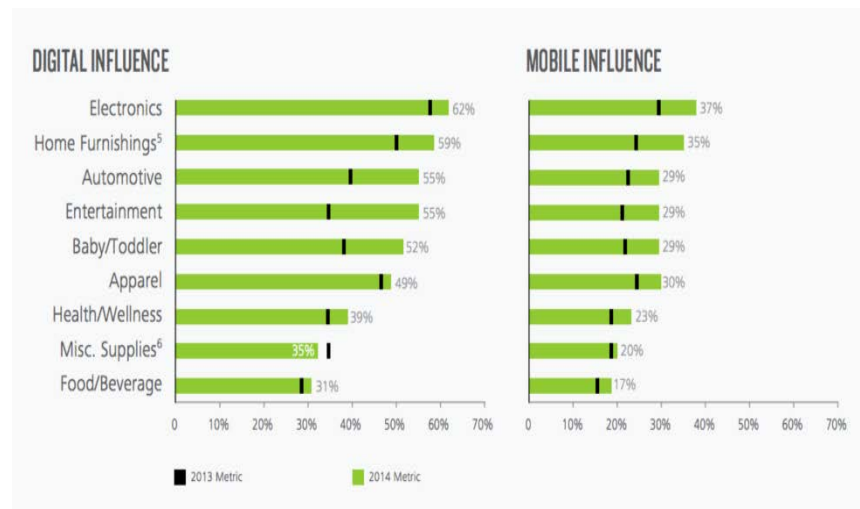
## Influence of digital and mobiles on in-store retail sales



## Growing digital influence on stores



## Influence of digital on in-store retail sales by category



# Myth and Reality of China's Manufacturing

## Myth

- “Made in China” products can be seen everywhere.
- China is becoming a world production center.

## Reality

- China is currently a “Manu-factory”, not a manufacturing powerhouse yet.
- Current manufacturing paradigm cannot be sustained (labor costs, resource consumption, environmental damage, etc.).
- Chinese government has realized that it needs to upgrade its manufacturing industry and move to higher value-added manufacturing.



### **Professor Jun Ni**

Shien-Ming (Sam) Wu Collegiate Professor of Manufacturing Science  
The University of Michigan, Ann Arbor, MI, USA; Honorary Dean, University of Michigan-  
Shanghai Jiao Tong University Joint Institute, China; Member of the World Economic  
Forum Global Agenda Council on the Future of Manufacturing

# Manufacturing Companies in China

- **State-owned-enterprises**
  - Large, slow, and monopolized operations, not competitive in global markets
  - Plenty of financial capitals or access to financial resources
- **Multi-national corporations**
  - Technology leaders
  - Strong control and support from the headquarters
- **Privately-owned-enterprises**
  - Agile, mostly small/medium size, some very large
  - Lack of technological sophistication

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# Challenges Facing Chinese Manufacturing

- Damage to environment
- Depletion of natural resources
- Rapid increase in production costs
- Shrinkage in export markets
- Slow-down of Chinese economy
- Competition from other low wage countries
- Lack of innovative products and key manufacturing know-hows and equipment



**China Is Moving Toward Sustainable Manufacturing – with the Rest of the World**



# Wants and Needs

- Most Chinese manufacturers **want** to move up in the manufacturing value chain.
- They also **want** to be the innovators of high-value added products.

But,

- Chinese manufacturers **need** first to establish their manufacturing core competence.
- They **need** to fully understand the know-hows, know-whys and be able to move beyond copying.

# Chinese Government's Strategies

- Strategically regulate the costs of various resources to preserve the resources and to eliminate non-competitive enterprises
- Reduce resource- and energy-intensive industries (e.g., cement, steels, glass production facilities)
- Raise the environmental protection requirement to force technology upgrading
- Increase investment for R&D and education
- Emphasize science and education (科教兴国 → 科教强国 → 科教立国)
- Promote “One-Belt and One-Road” strategies
- Establish Asia Infrastructure Investment Bank

# China's Manufacturing Strategies

- Create a “China Manufacturing 2025” three-step national strategy (to transform and upgrade manufacturing industry, particularly 10 selected key industries)
- Establish national innovation strategies (协同创新, coordinated innovation among industry, academia and government)
- Leverage capital market to accelerate technology innovation and transformation
- Open up new stock markets for innovative companies



# China's Manufacturing Strategies

- Push for “Internet +”, “Smart Manufacturing”, and “Robotic Automation”
- Promote entrepreneurship nationwide and new IP management policies
- Devalue RMB currency
- Promote oversea M&A (merge and acquisition)
- Emphasize workforce development and talent recruitment

# Ten Key Strategic Areas

- 1) New Generation IT Industry
- 2) High-end CNC Machines and Robotics
- 3) Aerospace Industry
- 4) Marine Engineering Equipment and High-tech Ships
- 5) Advanced Rail Road Equipment
- 6) New Energy Vehicles
- 7) Electric Power Generation Equipment
- 8) Agriculture Equipment
- 9) New Materials
- 10) Biomedicine and High-performance Medical Equipment

# Main Messages

- China's manufacturing industry has entered a critical and challenging period, and we will see major transformations in the next decade and beyond.
- Manufacturing R&D has received significant government attention and funding in China. They are catching up quickly in terms of depth and breadth of Mfg R&D.
- Chinese government has made manufacturing a key national priority and established comprehensive national strategies to transform and upgrade manufacturing industry.

# Digitalization is powering industry innovation that is rapidly transforming the automotive ecosystem

## Technological progress:

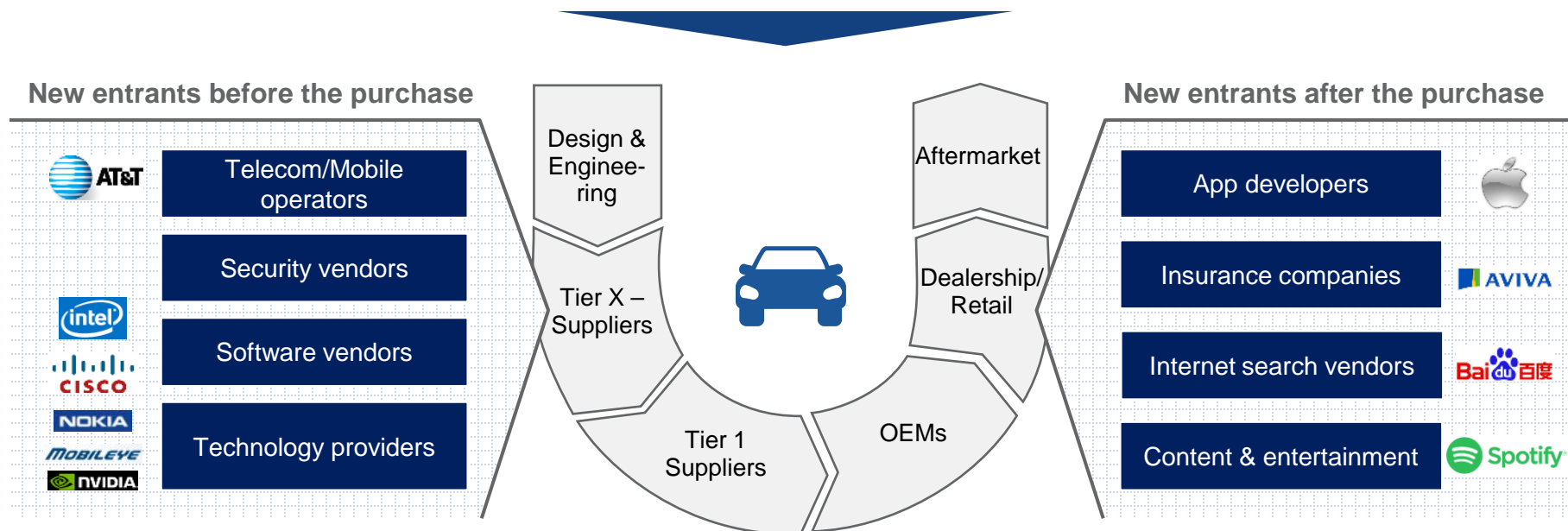
- Ubiquitous connectivity
- Autonomous driving technology
- Digitalization of manufacturing & supply chain

## Consumer dynamics:











- Changing lifestyle
- Expectation of digital engagement and experience
- Drive for individualization

## Emerging ecosystem:

- Vehicle integrated into multi-modal transportation
- New opportunities to partner within and outside traditional industry
- Growing role of cities authorities



# With digitalization, new entrants challenge the traditional automotive segments and create new segments introducing new business models

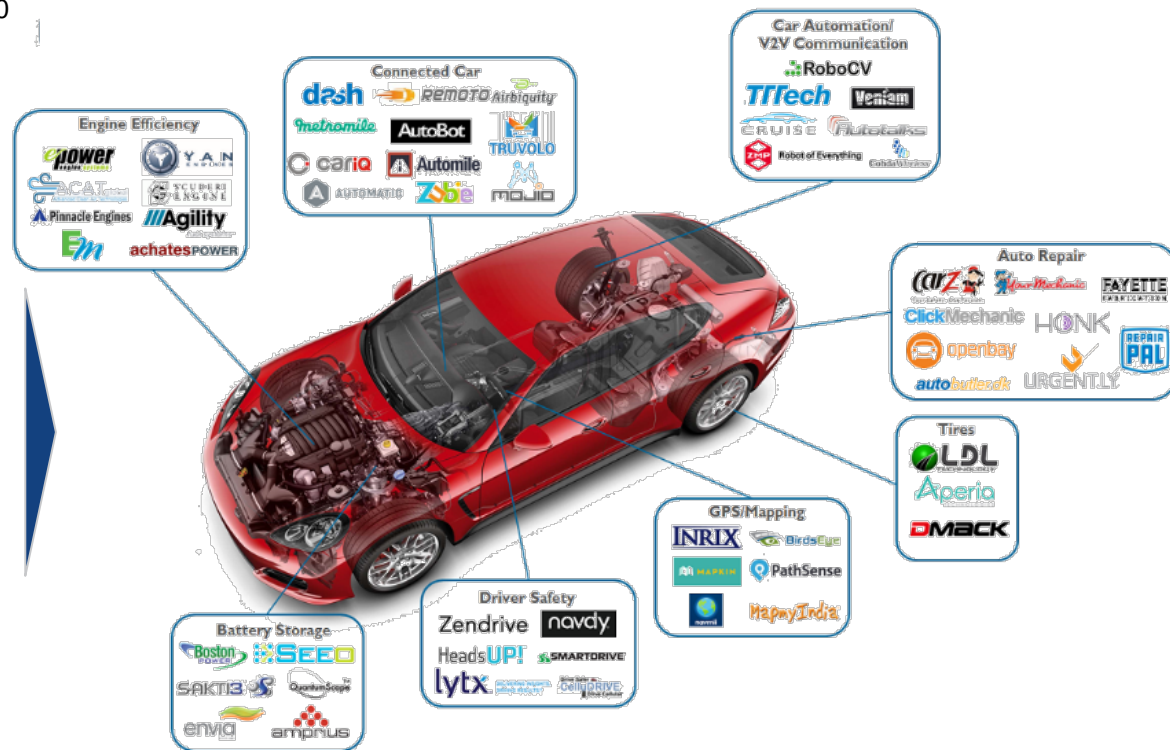
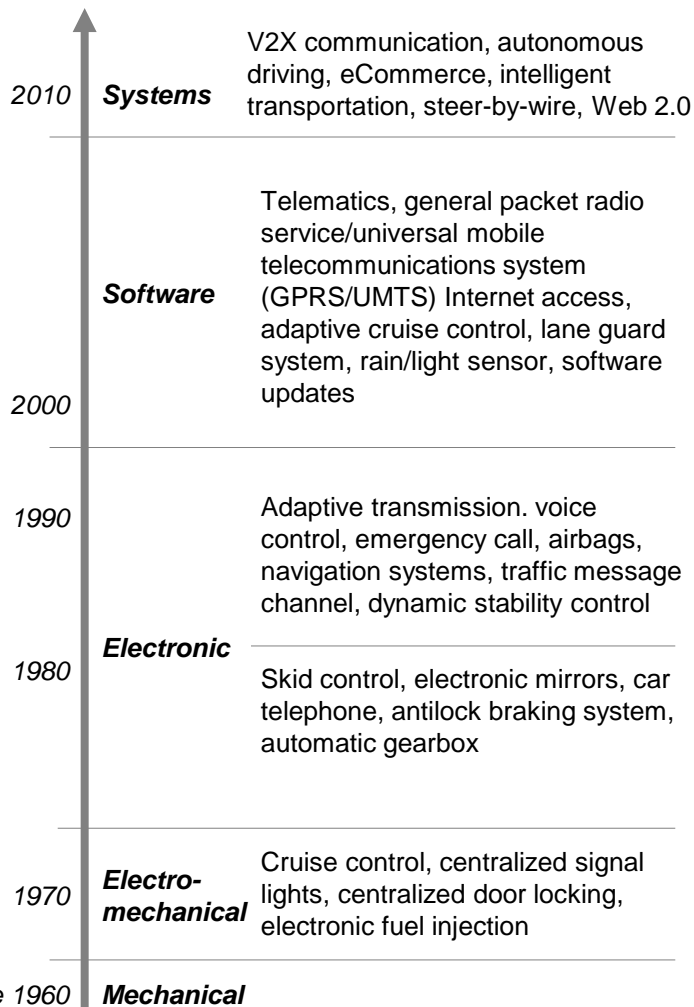
	Tier-1 Auto Suppliers	Auto Manufacturers	Retailers	Aftermarket	"Non Traditional" Industry Segments	
					Connectivity & Media	Mobility on Demand
<b>Traditional Peers</b>					<ul style="list-style-type: none"> <li>Traditional Radio Broadcasting</li> <li>Stored Media (CDs, USBs)</li> </ul>	<ul style="list-style-type: none"> <li>London Black Cabs</li> <li>Yellow Cabs</li> <li>Radio Taxis</li> <li>Hertz Car Rentals</li> </ul>
<b>New Entrants</b>						
<b>New Business Opportunities</b>	<ul style="list-style-type: none"> <li>Growing relevance of digital components for features of interaction, connectivity and automation</li> </ul>	<ul style="list-style-type: none"> <li>Digital companies:                             <ul style="list-style-type: none"> <li>Manufacturing self-driving cars</li> <li>Retrofitting with self-driving features</li> <li>Introducing innovative vehicle designs and architectures</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>B2C retail witnessing increased transparency, with reviews, pricing comparisons and other information to guide purchase behavior</li> <li>B2C retail challenged to become increasingly digital</li> </ul>	<ul style="list-style-type: none"> <li>Large opportunity to shift aftermarket from mechanical support to retrofitting existing fleet to enable digital activities</li> <li>Advent of preventive and at-your-doorstep services</li> </ul>	<ul style="list-style-type: none"> <li>Media &amp; Connectivity providers creating a customized in-vehicle digital eco-system</li> </ul>	<ul style="list-style-type: none"> <li>Mobility services shifting mindset around vehicles as services to be consumed vs. products to be owned</li> </ul>

Notes:  
 Most of the new entrants do not have a significant scale of business and the level of available financial reporting to be quantitatively represented in the profit pools  
 Source: World Economic Forum, Accenture Analysis

# The digital penetration in vehicles keeps growing and start-ups are competing aggressively for their share of the pie

## Evolution of Electronics in Vehicles

## Emerging Start-ups by Vehicle Components



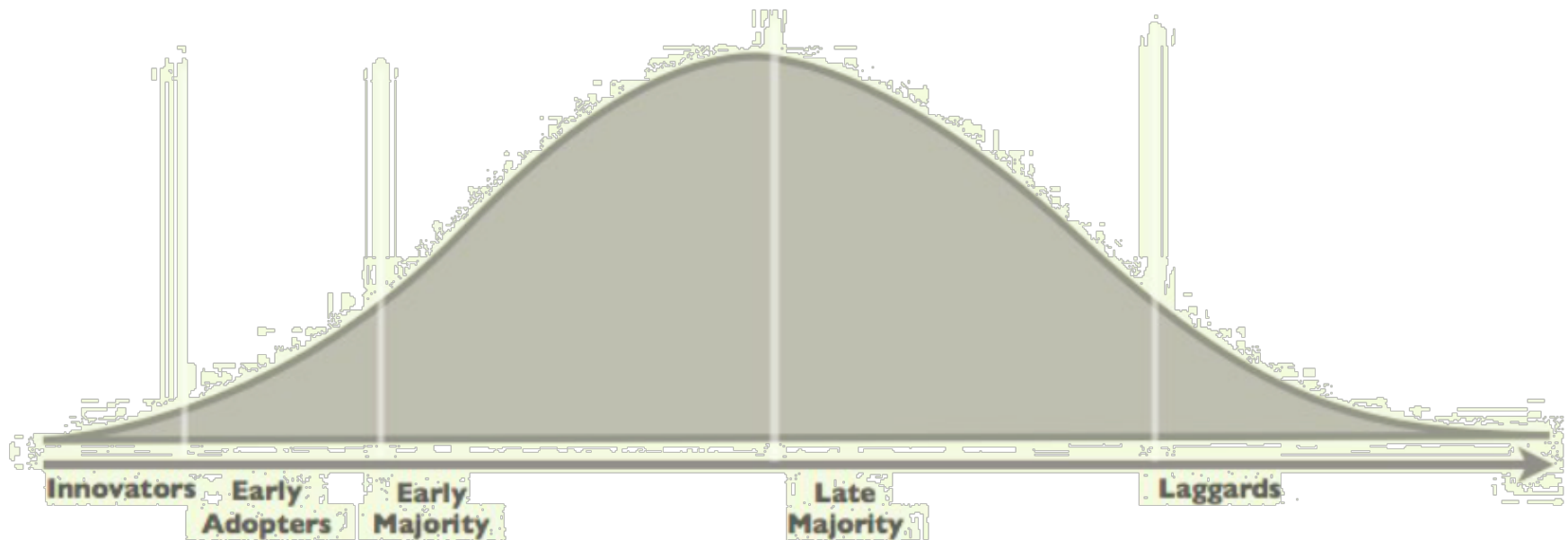
Source: Frost & Sullivan, CB Insights

# We explored the question of what the automotive industry will look like in 2020 – products, services, design & production

<b>Products service definition</b>	Artificial intelligence	The car will be a platform that connects to different ecosystems	Personalization downloaded from the cloud	Apple and Google will be OEMs	Driver assist – self driven – personal assistant	Exchange transport for other services
	The car will be my personal assistant	Non-traditional partnerships	Service differentiators will decline	Shift from product development	Location-based services	Infotainment to enhance experience
<b>Design</b>	Providing a platform on top of the hardware	Fail fast and fail cheap	Utilize the shark fin model	Personalization of products	Integration of the car's lifecycle	Regulation of the environment
	Some products will be public goods	Integrate the car to be part of a lifestyle	Physical collaboration of product platforms	Utilize vehicle as sensor / data collector	Use testing environments more frequently	Shift from hardware to software
<b>Production</b>	3D printing to disrupt the supply chain	Shorter product lifecycles	Demand made-to-order	Flexible product lifecycles	Increased efficiency of complex supply chains	
	Change in buyer-supplier relationships	Win-win partnerships in the supply chain	Reduction of manufacturing time	Reduction of manufacturing costs	Partnerships to add value in the supply chain	

# Disruptive innovation follows a new pattern (1/2):

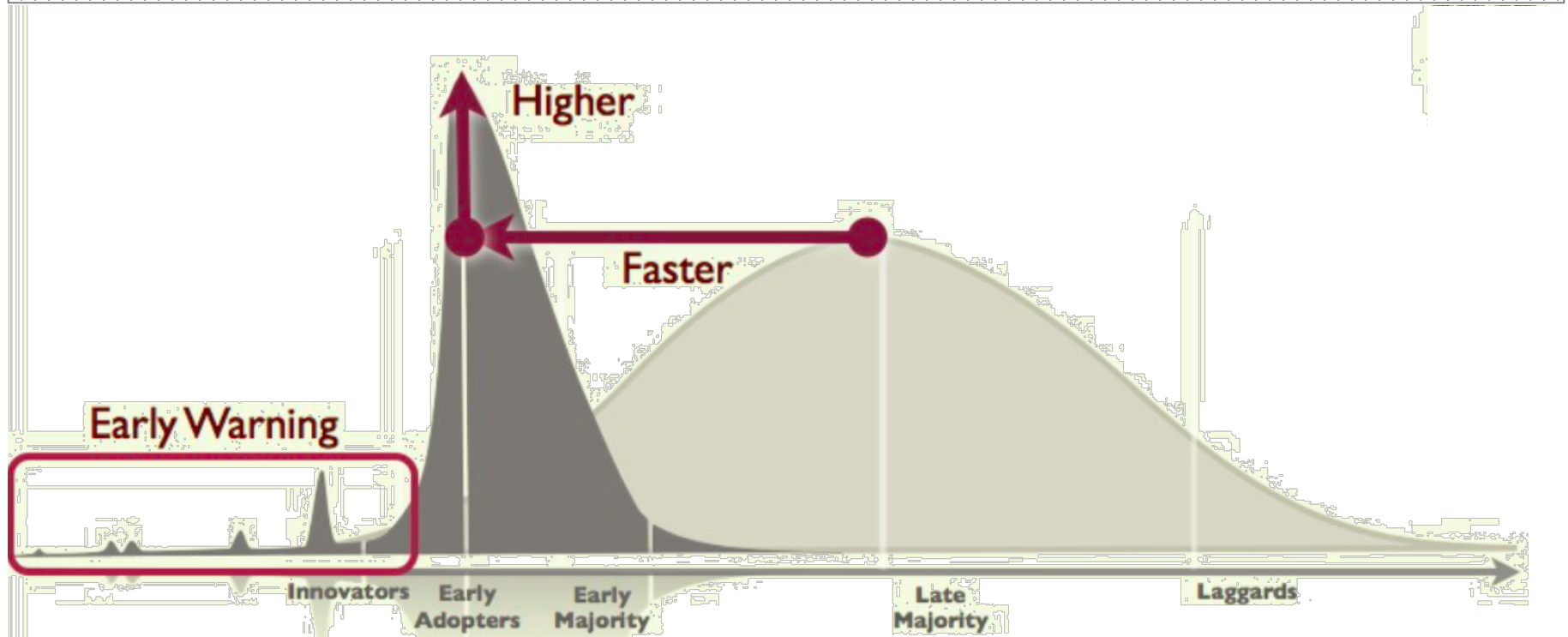
Innovation as we know it...





## Disruptive innovation follows a new pattern (2/2)

### Innovation in a Network Economy



**Disruptive innovation follows a “Sharkfin Curve” (higher and faster) creating need to identify the early warning signals in order to participate**