Supply Chain - Supply Ecosystem

Risks to the supply chain - From transport delays to cyber events

2.4.2019

Otto Kocsis, Principal Business Interruption & Resilience

Risk Engineering

Overview

Supply Chain - Supply Ecosystem: Risks to the supply chain

1. Real **Supply Chain Claim – Examples**
2. What is **Procurement**, **Value Chain**, **SC-Management**, **Resilience**?
3. Let's look at the Automotive Supply Chain: **Modules** - **SC-Ecosystems**
4. The **Procurement** - Mind-Set
5. Key **Supply Chain Risk Characteristics**
6. First steps in **Supply Chain - Risk management** - Case Study

Why Resilience is of relevance?
Events …. and their Business Impact

Rank **insured loss**
Rank **total loss**

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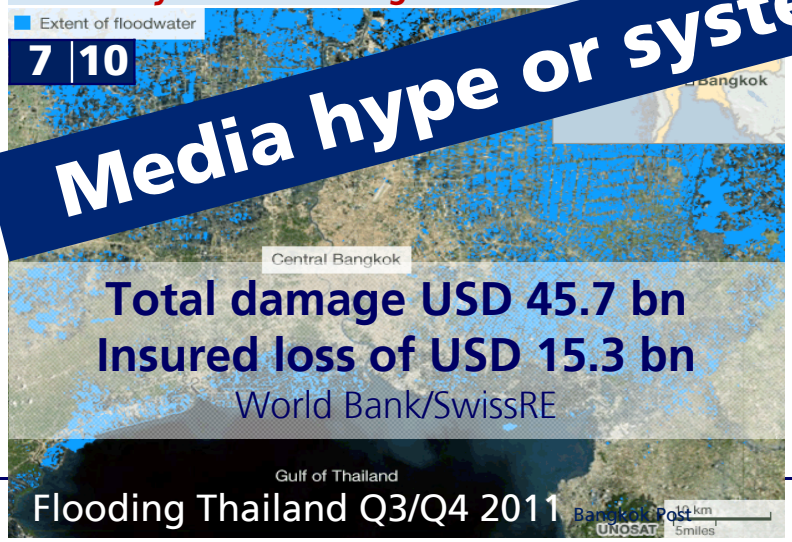
Cyber: if it really hurts ⇨ BI: 2.5-3bn$

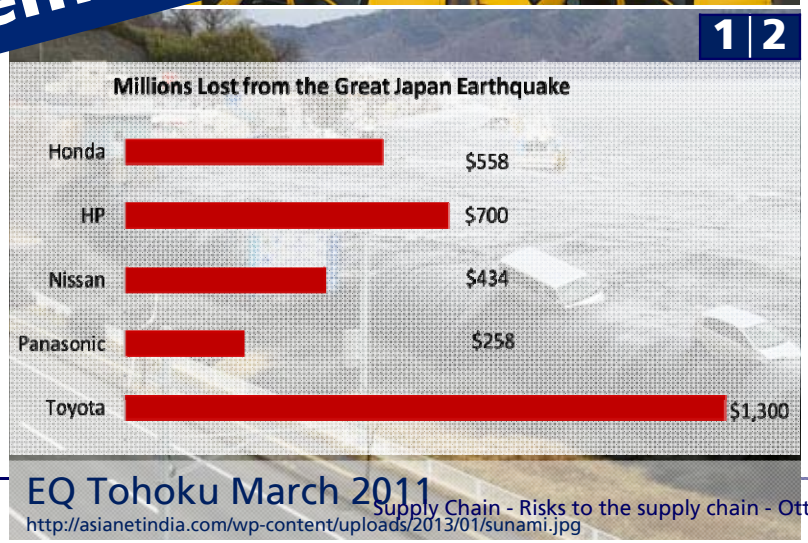
- **Merck**&Co **2*300 mUSD** - API restored 13.12.2017
- **TNT ~300 mUSD** BBC 20.9.2017, restore 1.10.17
- **Saint-Gobain ~393mUSD**
- **Maersk ~300 mUSD** FT 16.8.2017
- **Ukraine Government: Kiew Airport,**
- **FedEx Corp 300 mUSD, WPP** advertising**, Evraz** steel**, Rosneft, Mondelez Int. 100mUSD**
- **UK consumer goods: Feckit Beckinser 110M£**
- **Ransomware NotPetya:** 27.6.2017 **disk wiper**, ***not*** *from experienced cyber operator****;*** affected **2'000 organizations** in 65 countries
- **NOT only manufacturing**!

Media hype or systematic vulnerability?



Total damage USD 45.7 bn
Insured loss of USD 15.3 bn
World Bank/SwissRE

Flooding Thailand Q3/Q4 2011



EQ Tohoku March 2011
http://asianetindia.com/wp-content/uploads/2013/01/sunami.jpg

Claim in Supply Chain

Huge often unmanaged exposures in supply chains

CBI claim to insurance market ~ hundreds of millions $

Audi BMW DaimlerChrysler FIAT Ford GM

Jaguar Mercedes-Benz Opel Paulstra Tesla Motors

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2nd and 3rd explosions water & molten magnesium

Production Stop at more than 5 OEM

Alternative Production:

- Salvage of dies, shift production to UK/Ireland –fly over dies
- Daily freight flights UK ⇔ Detroit to ship the magnesium interior car components to the manufacturers
- Gross Profit of Magnesium Meridian is not be big enough to account for ICOW!

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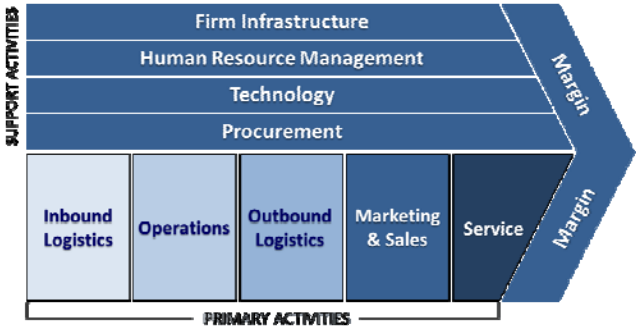
1. PROCUREMENT 2. VALUE CHAIN 3. SUPPLY CHAIN MANAGEMENT

Exchange at your tables and come up with definitions

1. PROCUREMENT includes all strategic, tactical, operational and administrative **activities to supply the company with goods and services** with the highest process efficiency, including all value adding activities to reach and secure success and **competitive advantage.**

Supply Management combines Operational and Strategic Procurement



2. A **VALUE CHAIN** is a **series of activities** & processes (incl. support activities) performed in an industry by one or several companies **to deliver & sell a product** or service **in the market**.

Globalization has not only made global business more efficient, it has caused Interconnectivity; as companies are jointly producing in global, lean & fragmented value chains.

3. SUPPLY CHAIN- , VALUE CHAIN-, VALUE NETWORK MANAGEMENT

Strategic and long-term cooperation of all companies along the value chain through all tiers of suppliers to the end-customer.

Supply Chains often focuses on the upstream part of a value chain.

What is **Resilience?**

- You all have heard the term Resilience
- What does it mean?
- How is it used in Risk Management & insurance context?

Exchange at your tables and come up with *your* definition

a) **Reflect** first each of you for yourself – alone

b) **Share it:** Listen to each one of your groups – avoid group think

c) Compile the **Resilience understanding of your table**

d) **Prepare to present**

You have 10’-15’ time

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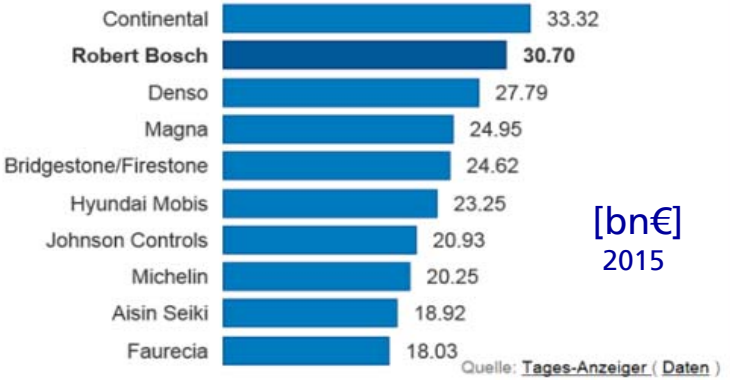
Supply chain complexity: Management of many suppliers

Automotive industry has
highly complex supply chain

20%-75% of components (cost) sourced externally
outside own production *

Turnover of Automotive Suppliers



* Deloitte: Sub-supplier Management; Directed Parts in Automotive Industry 2/2018

Automotive Industry

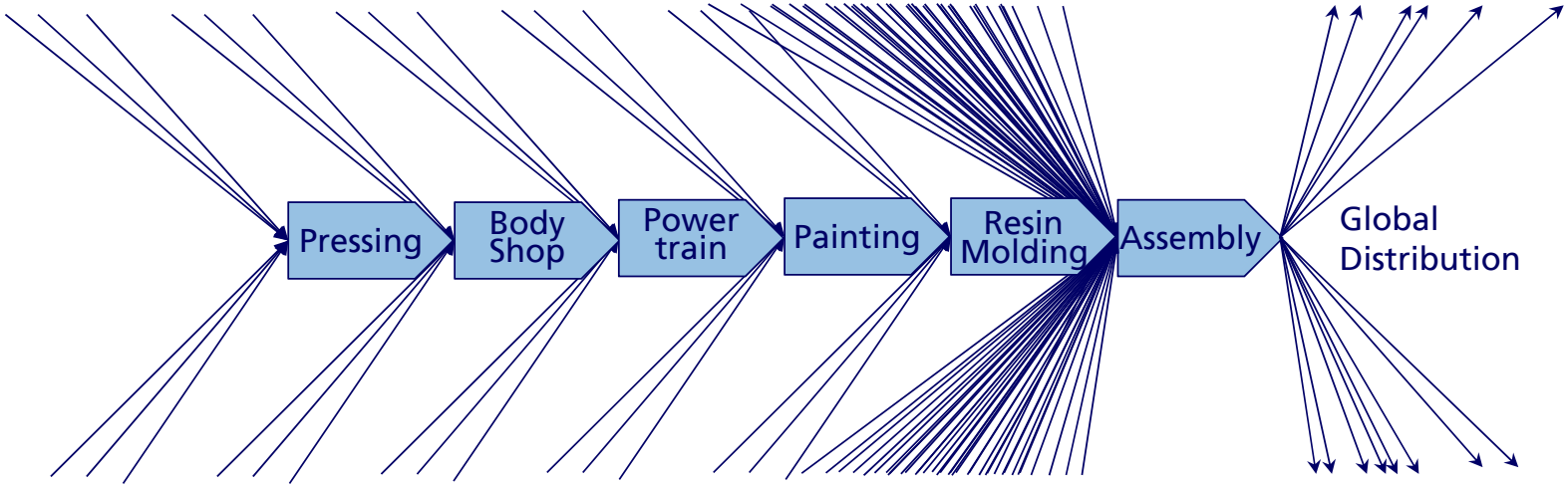
Characteristics – Risk & Insurance considerations

Topic	Description	Insurance considerations
1. **Consolidated** industry 2. **highly automated** production processes 3. Many **sole source high-tech components**	▪ small number of very **large assembly plants**. manufacturing process, for **car body** is fully **automated**, while **final assembly** is done **manually**. ▪ An OEM's range of **vertical production 25% - 30%** ▪ Cars consist of up to **30'000** specialized **parts**; automotive manufacture and assembly has become a highly **complex production process** with very **lean logistics** as well as bottleneck operations. ▪ production plants shifted to emerging markets ..	▪ Property TIV of assembly plant often 1 - 10 bn USD , ▪ several fire areas. ▪ **highly efficient production -> BI exposure** ▪ bottlenecks often: paint shop, engine manufacture ▪ Clarify cover: PD or marine; Exposure in long transportation routes between sites
Flexibility requirement	▪ "**build-to-order**" production ⇨ proliferation of models ▪ **Standardization & modularization of components** engines on few platforms ▪ production of many models flexibly on same assembly line (modification times 1 h)	▪ Risk Assessment on common platforms/engines/components for different models; ▪ This gain in flexibility can leverage resilience but also increase bottlenecks and vulnerability.
▪ **Production** in **global** supply chains ▪ **local risk management**	▪ Global OEM partnerships are set-up to leverage on economies of scale and share R&D expenses ▪ Automotive Supply Chain Ecosystems	▪ Risk assessment on relationship in supply chain and reliability of critical alternatives ▪ Global partnerships often not leveraged as alternatives for capacity and capabilities .

Automotive Supply Chain

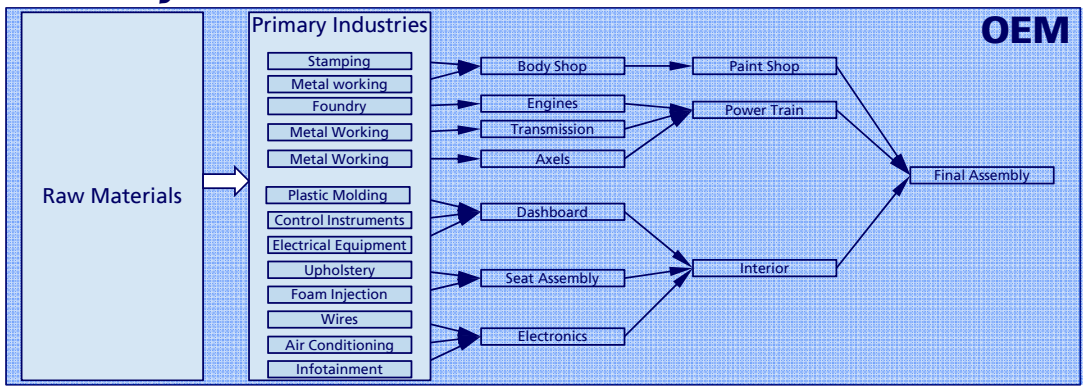
Structure of the Automotive Supply Chain

- Assembler: **Thousands** of specialized components are assembled
- In reality it is rather a network than an assembly line only



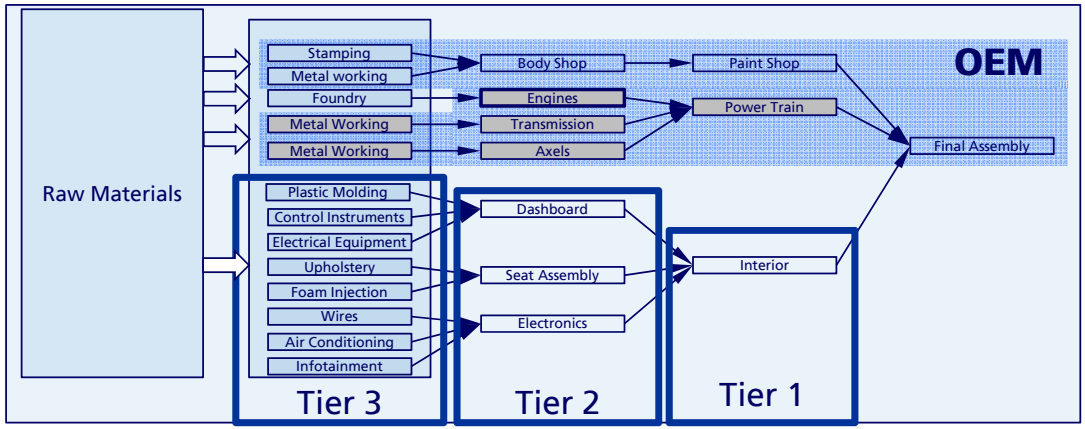
Changes in Automotive Supply Chains

Formerly



Vertical integration of car production:
From mines to finished cars

Today



- OEM reduce influence to network of suppliers
- Fragmentation
- Limited Visibility
- Partnerships between manufacturing giants ⇨ **horizontal integration**

Ext. sourced components as % of total car costs

2004	19%	*
2014	40%	*
2018	20%-75%	**

*Supply Chain Risk; Manners-Bell
** Deloitte: Sub-supplier Management; Directed Parts in Automotive Industry 2/2018

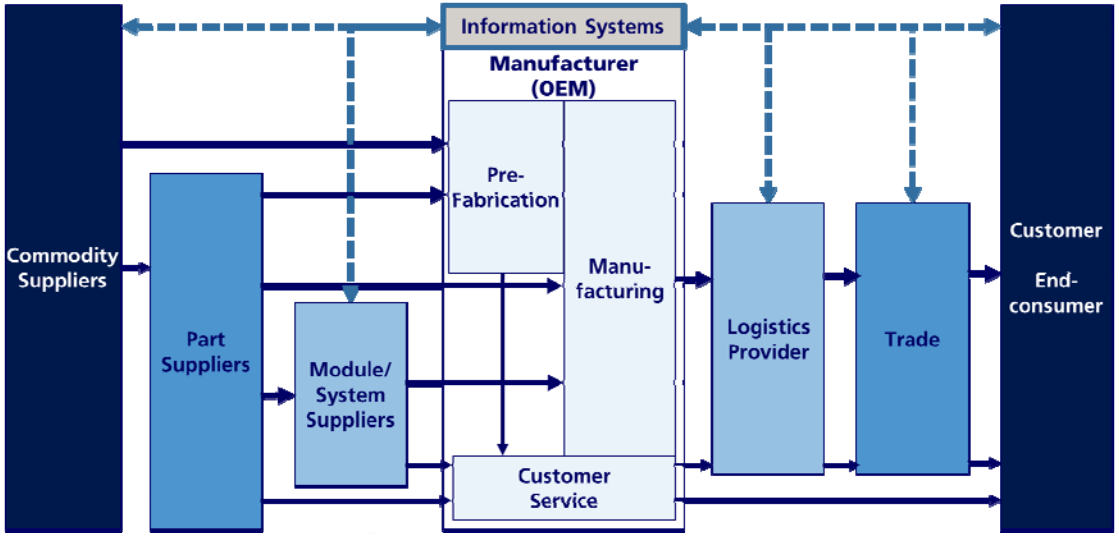
VW Touran: **25'000** (– 30'000) parts of which up to **80% are external**

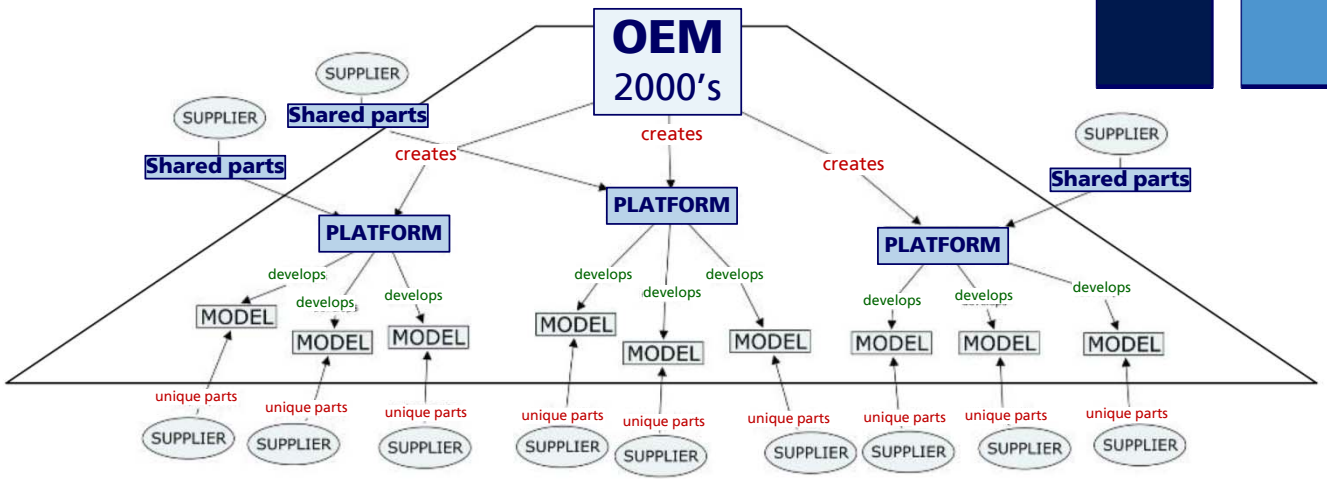
Structural changes in use of Platforms & Modules

Reduction of complexity ⇨ also cost reduction

Elements of complexity reduction

- Use of same platforms to create different models
- Use of shared parts
- "build to order" – reduce inventory





Near-Shoring to New Markets of Automotive Suppliers

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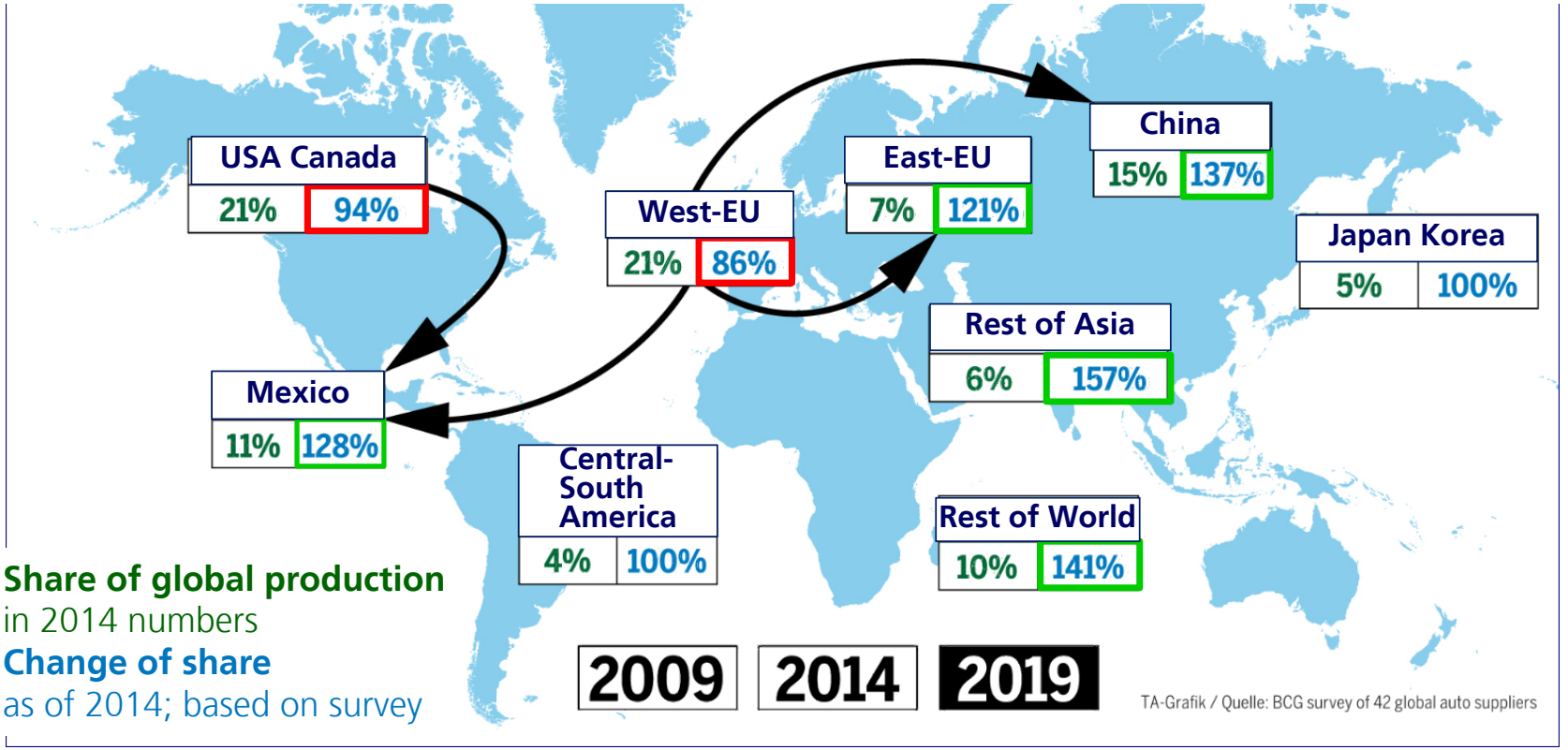
Automotive manufacturers move their production closer to new markets



Share of global production
in 2014 numbers
Change of share
as of 2014; based on survey

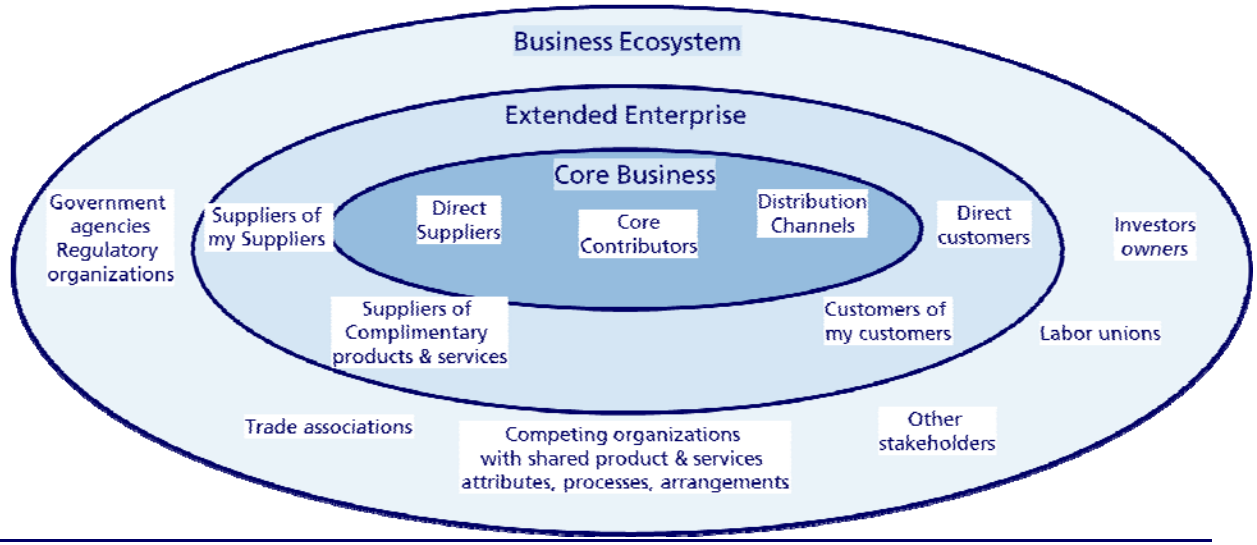
Business ecosystem *

A dynamic structure of interconnected organizations that depend on each other

- An **economic community** supported by a foundation of **interacting organizations**.
- The economic community **produces goods and services** of value to customers.
- The member organisms also include **suppliers, lead producers, competitors, and other stakeholders**.
- Over time, they **coevolve their capabilities and roles**, and tend to align themselves with the directions set by one or more central companies.

Roles of Ecosystems – esp. context of digitization:

- Production & innovation in Supply Chains
- Innovation clusters



*1993 Harvard Business Review; James F. Moore

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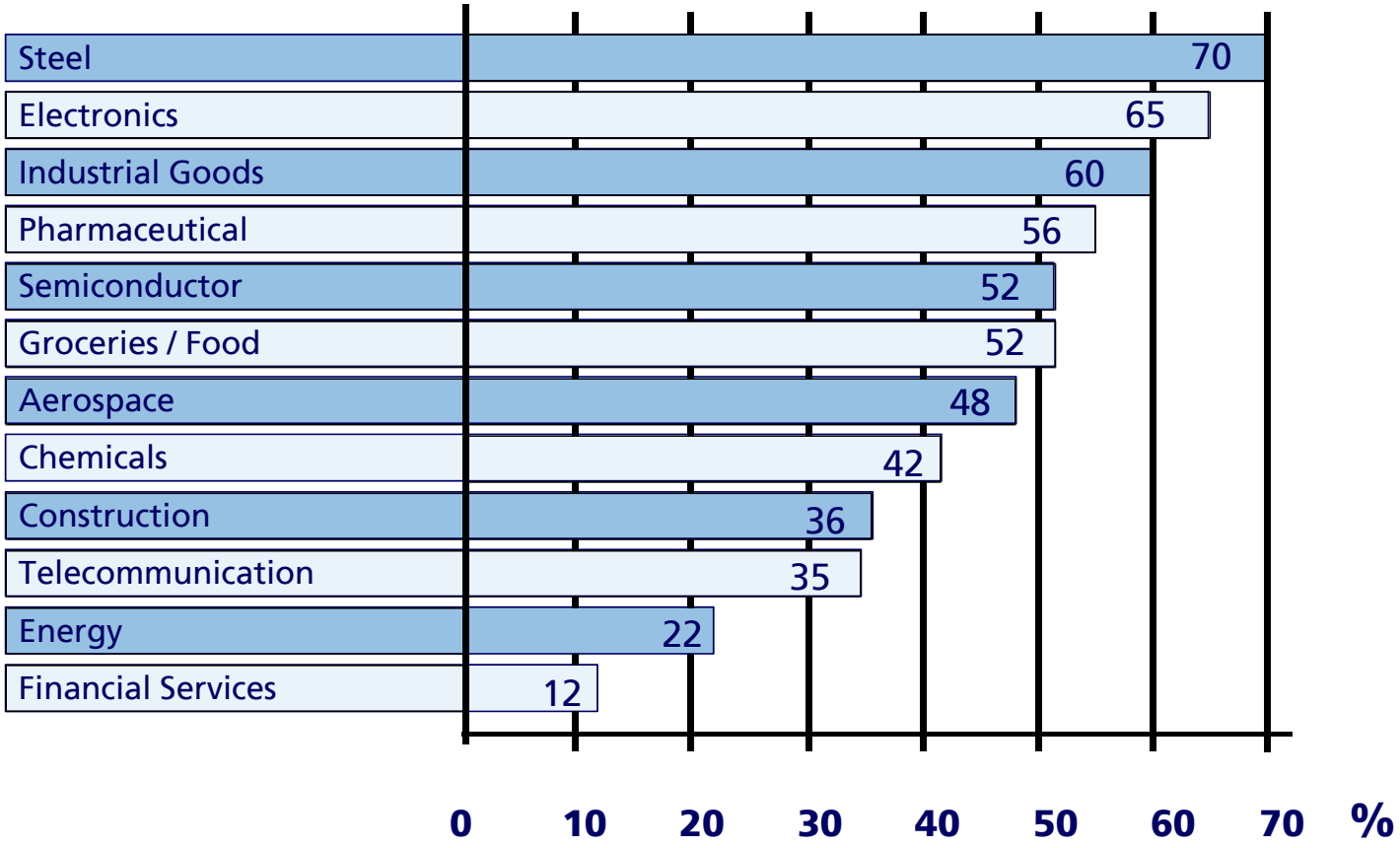
How important is Procurement?

Share of Procurement Costs in Sales Of Selected Sectors **[%]**



Where would you position the Automotive Supply Chain with respect to share of procurement costs?

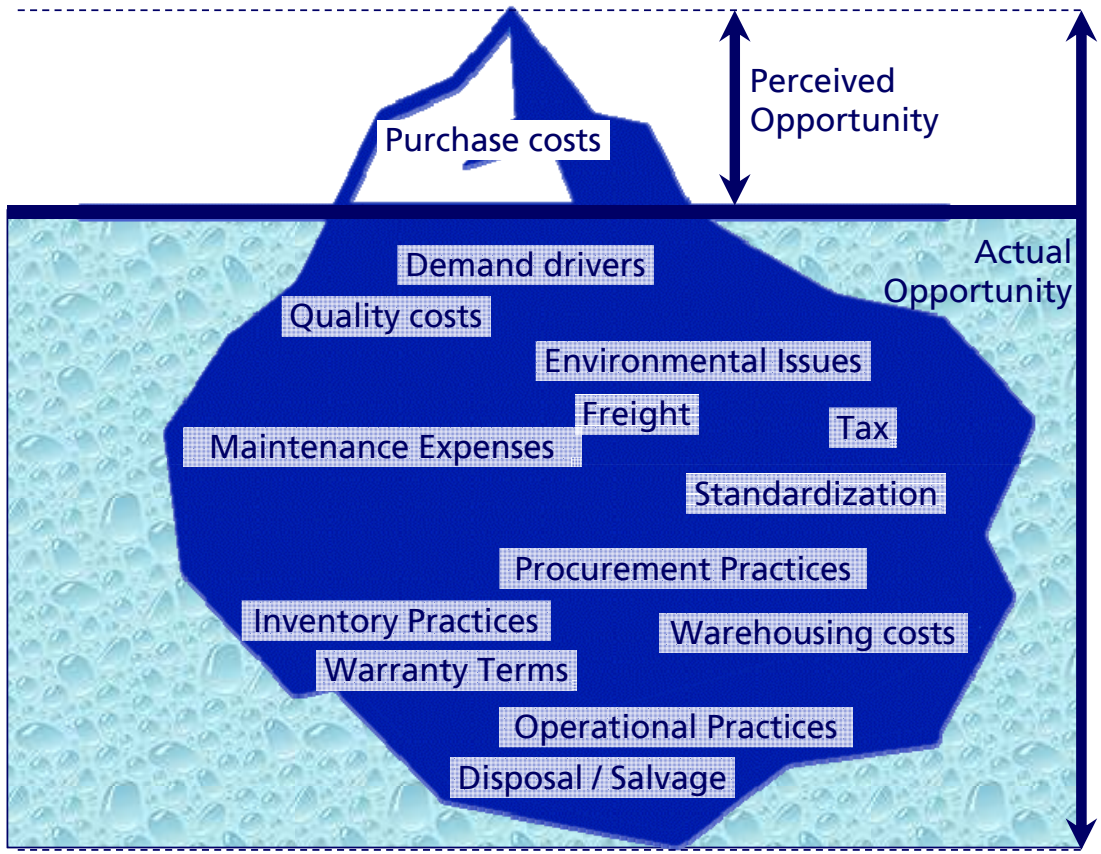
Source: Droege & Comp. 2010

SUPPLIER SELECTION CRITERIA – CARTER'S 10CS

Which of These Criteria are RISK Related?

1. **Competency** – best in class
2. **Capacity** – Production volume
3. **Commitment** to quality
4. **Control of processes**
5. **Cash** - financial standing
6. **Cost** - full cost of the products
7. **Consistency** in Quality
8. **Culture** - same values & ways of operating
9. **Clean** - environmental awareness
10. **Communication** / Compliance

TOTAL COST OF OWNERSHIP – More Than the Obvious



A = Acquisition Cost 25-40%

Lifetime Costs
O = Operating Costs
T = Training Costs
M = Maintenance Costs
W = Warehousing Costs
E = Environmental Costs
60-75%

S = Salvage Value

Total Cost of Ownership = A + (O+T+M+W+E) - S

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CATEGORY MANAGEMENT

A Cross-functional Global Approach - Enables & Requires Entrepreneurship & Collaboration

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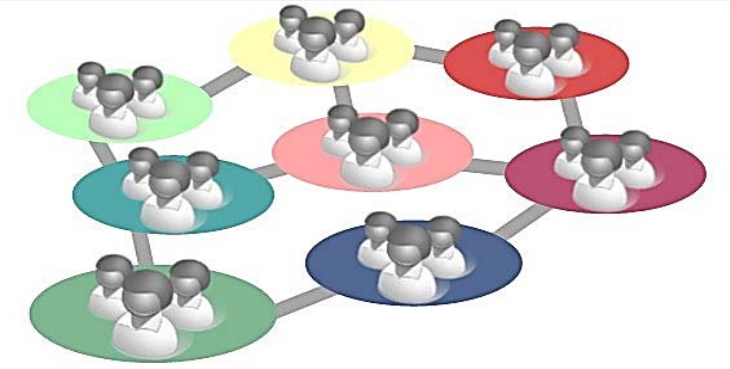
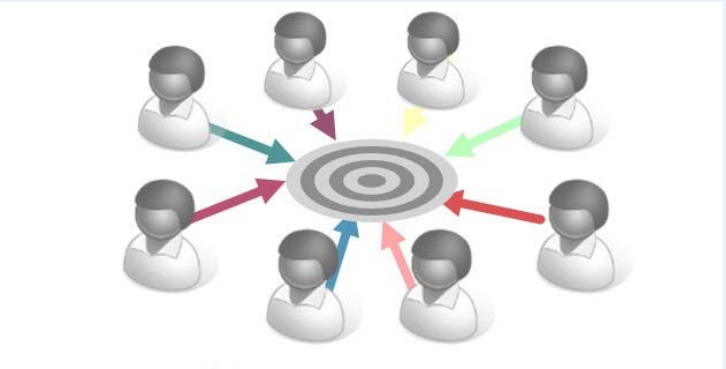
- "The strategic management of **PRODUCT GROUPS** through trade partnerships which aims to maximize sales & profit by satisfying consumer needs"
- **Group commodities, parts, modules and services** based on the **ability of the market to supply** not on the basis of organizational boundaries.

Functional and Regional Teams



- Silo thinking - no global sharing of volume & know-how
- Limited bundling
- Lack of communication and collaboration
- Multiple handoffs

Global Category Teams



- Entrepreneurship
- Cross-functional alignment & decision making
- Cross-regional collaboration
- Results und innovation oriented

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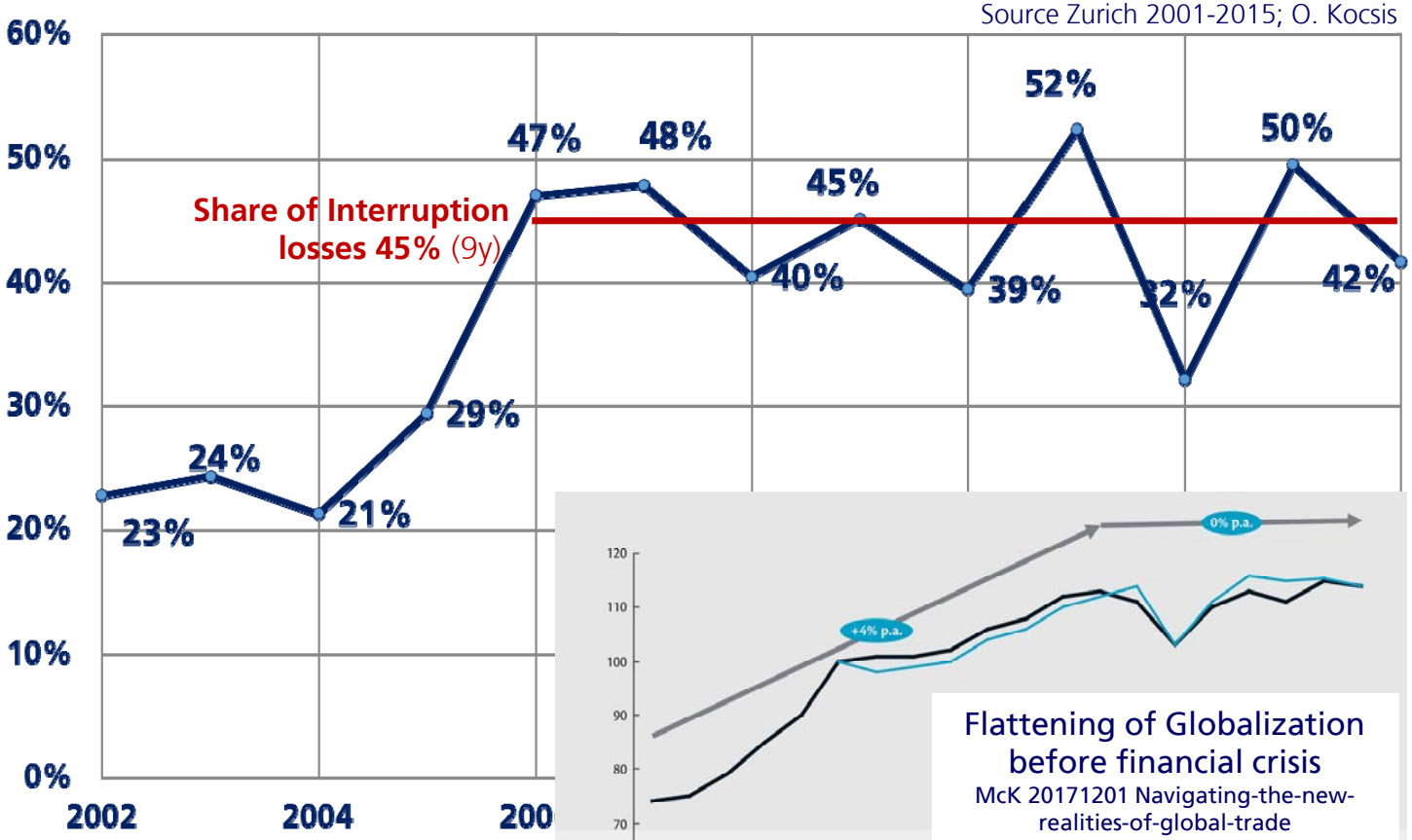
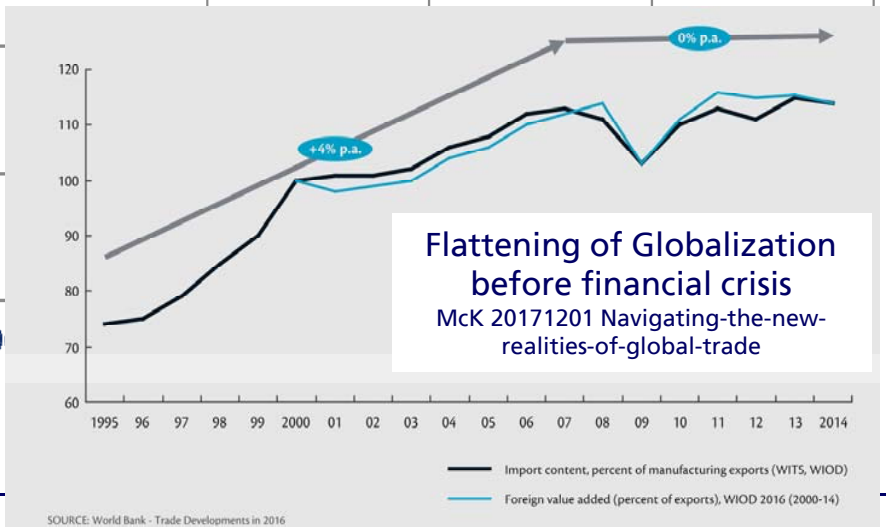
Share of Interruption-Claims as Share of Property Claims

has doubled from 23% (2002-2005) to 45% (2006-2014)

Source Zurich 2001-2015; O. Kocsis





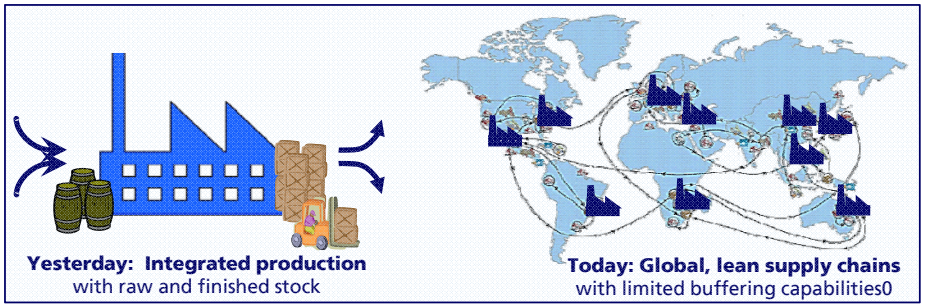
Flattening of Globalization before financial crisis

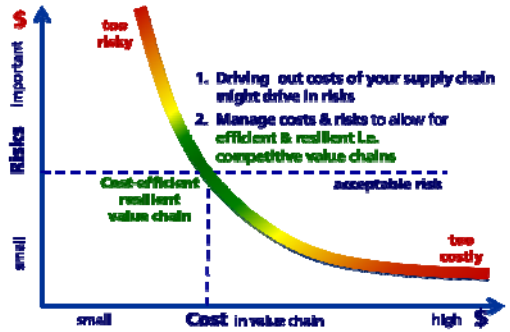
McK 20171201 Navigating-the-new-realities-of-global-trade

Heavy tail of interruptions

Claims bigger than ..	..have a share of Interruption-Claims of ...
All Claims	45%
> 2.5 MUSD	46%
> 5 MUSD	48%
> 10 MUSD	50%
> 25 MUSD	53%
> 100 MUSD	64%
10 biggest claims	80%

Globalization has Changed our Economy





Business Model

1. **Global value chains**
2. **Interconnectivity:** Lean value chains
   ⇨ uncoupled sites get coupled (bull whip effect)
3. **Outsourcing**: Fragmentation of value chains
   ⇨ focus on core competencies / reduce complexity
4. Increased **productivity = profit per investment** ⇨ drives BI exposures
   productivity increase [1964-2014] by 2.5

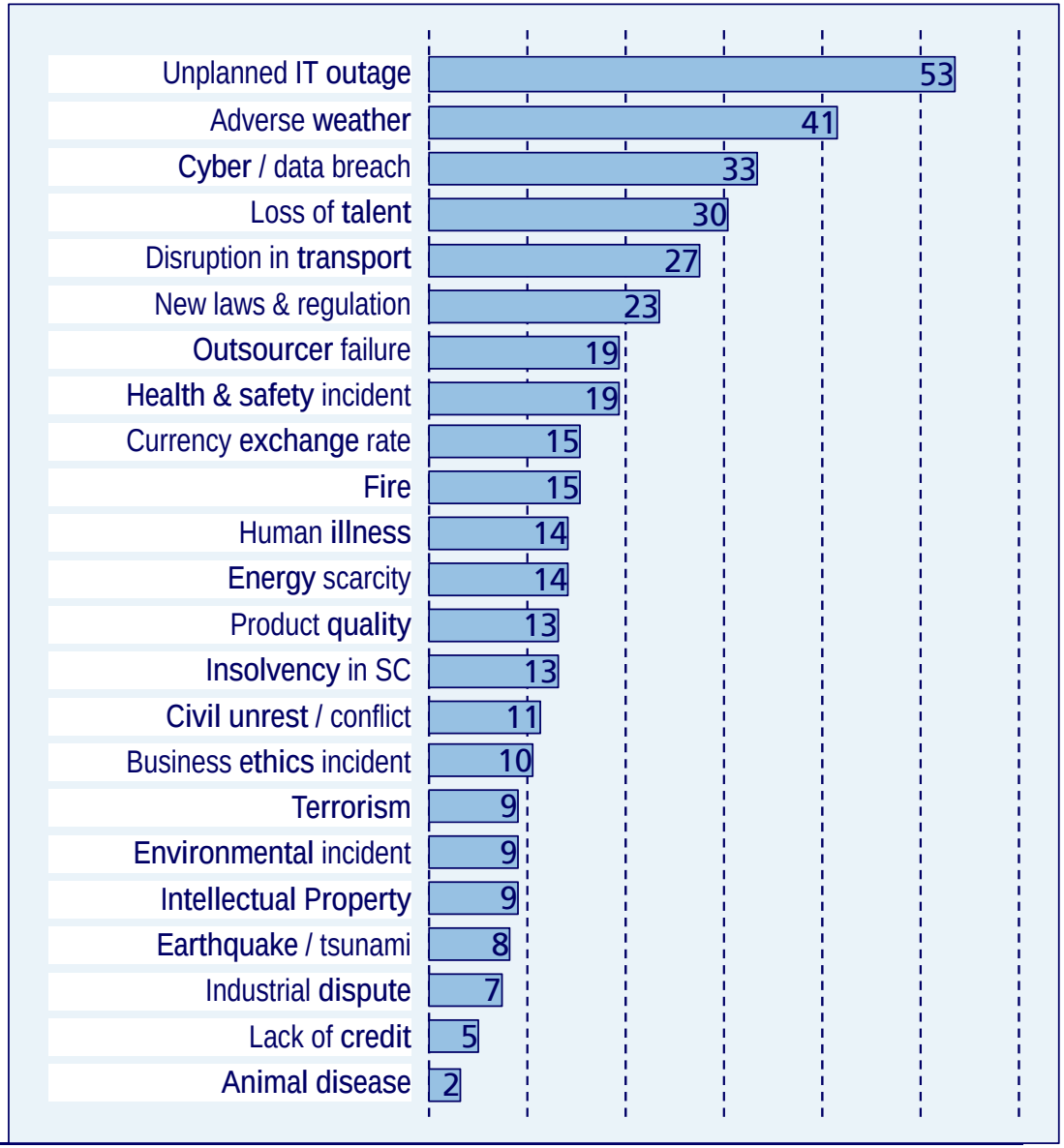
Market

5. Customized, **complex product portfolios**
6. **Time pressure:** time to market + shorter product life cycles
7. **Volatility** in customer demand

Causes of SC Interruptions in 2018

Research conducted by Zurich
and BCI Institute since a decade
N=376

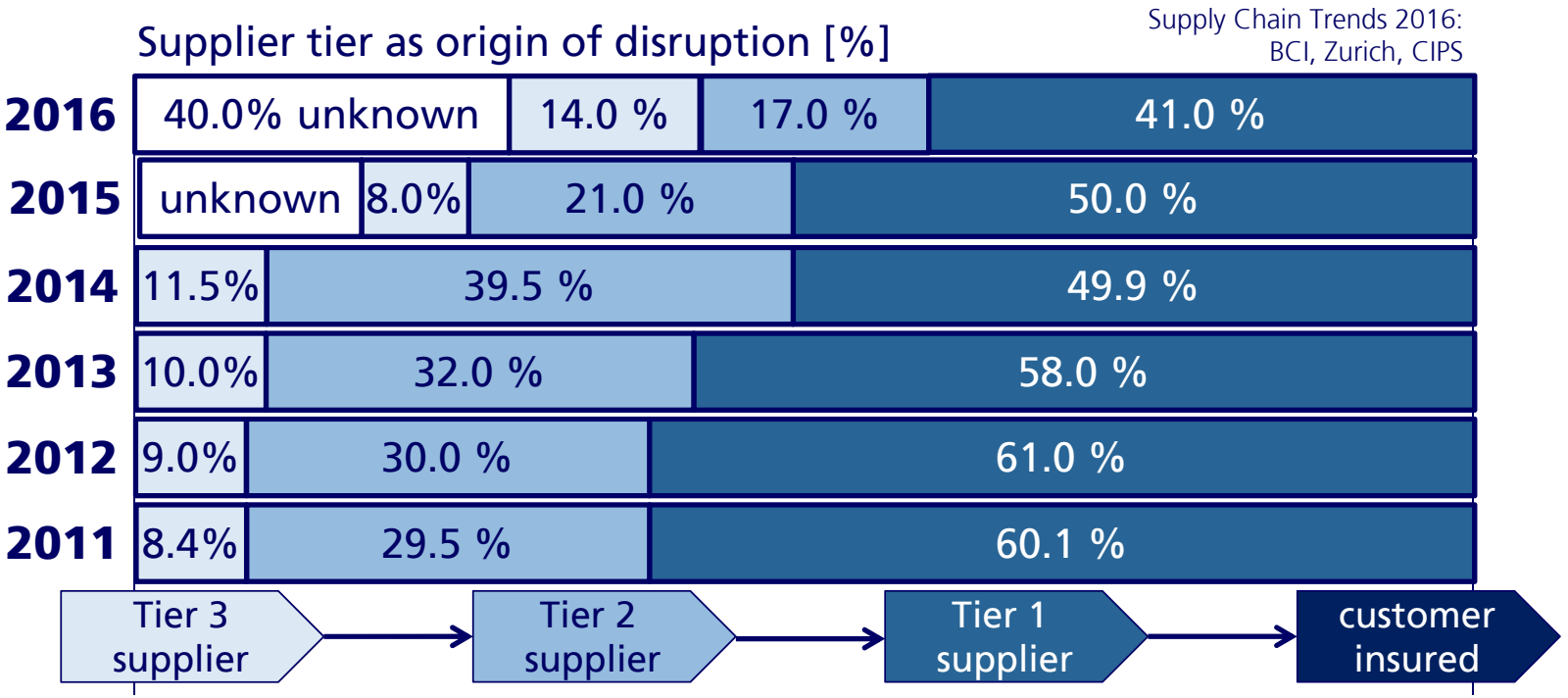
Supply chains are exposed to
much broader risk than the insured risks
(fire, lightening, explosion, NatCat,
water, collision, subsidence)



Source: Supply Chain Resilience Report 2018; BCI – Zurich, research collaboration since 2009

Where in supply chain do interruptions occur?

More than 50% of disruptions originate below Tier 1



- Number of linked partners grows with tiers
- **Interruptions more and more caused from higher tiers**

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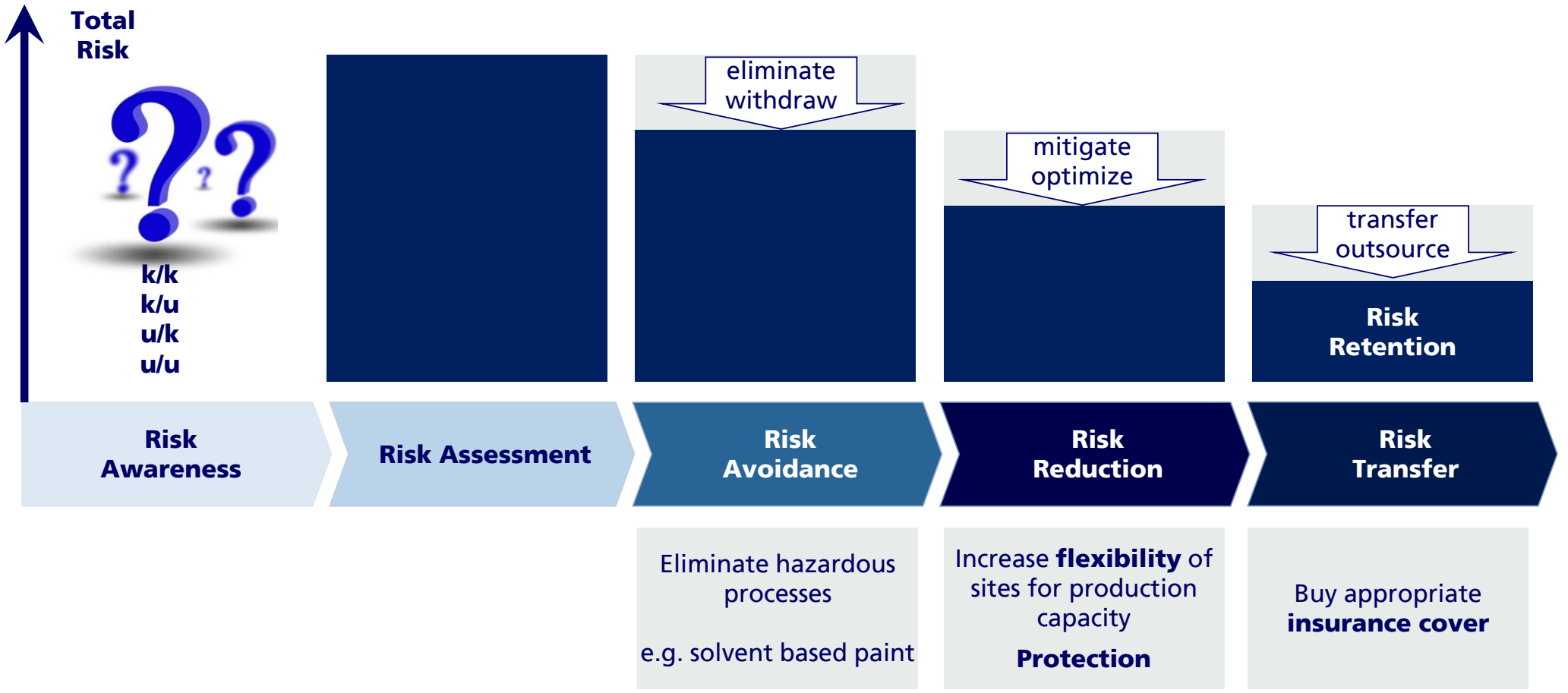
Risk Management Process Steps

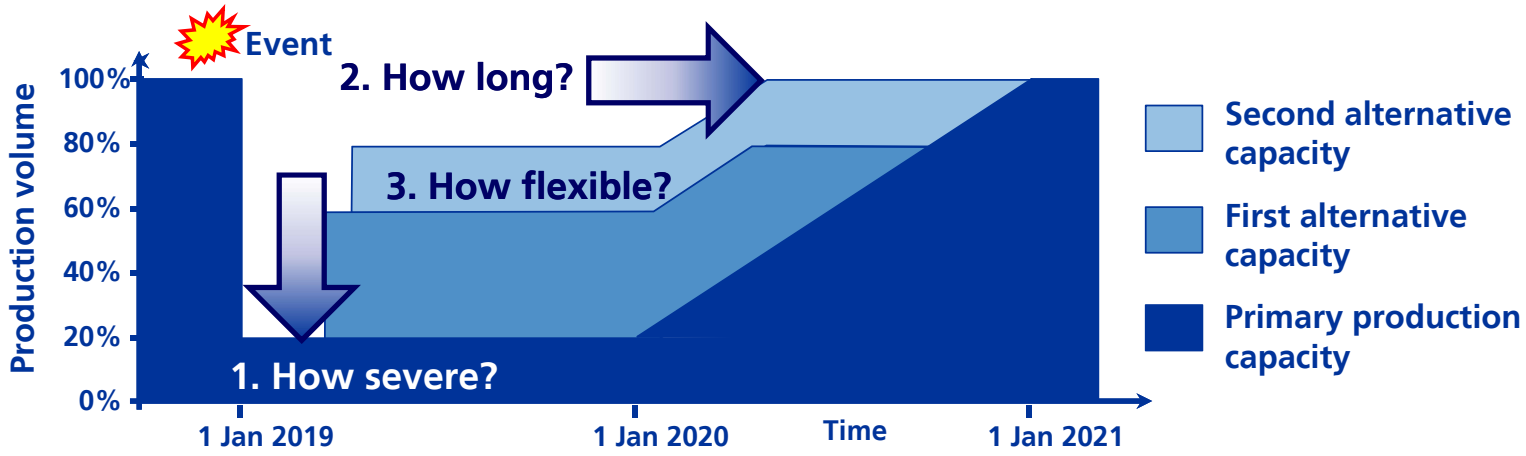


How we measure Resilience?

IDENTIFICATION of **CRITICAL** **Interruption Risk Exposures**

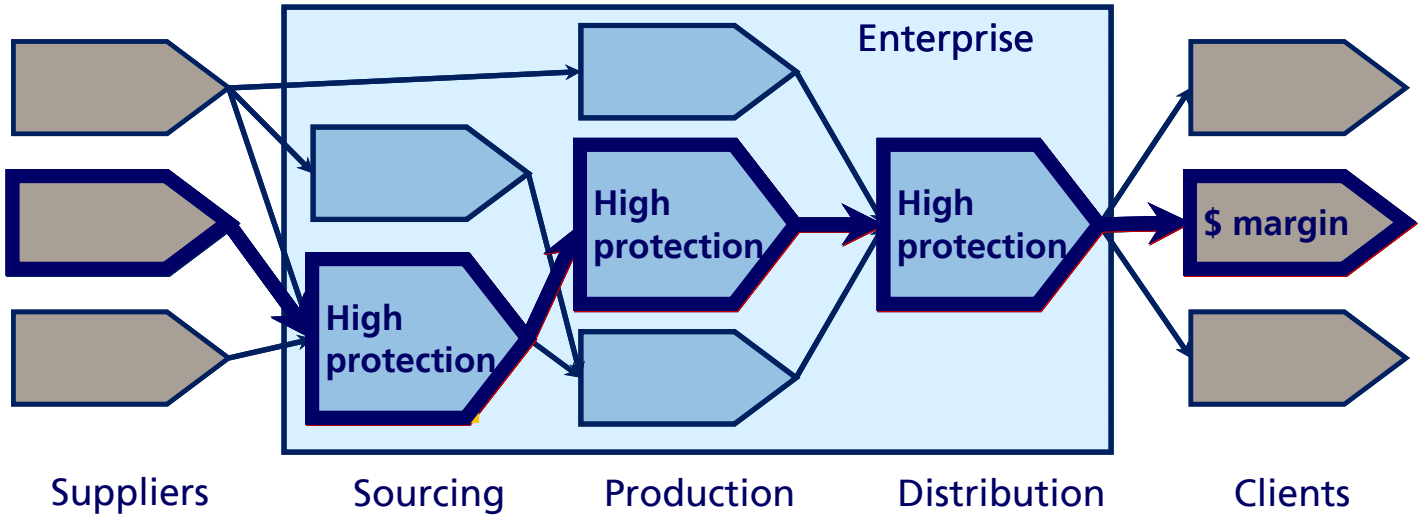
Critical Interruption risk exposure has 3 elements:

1. Large impact on turnover & profit of business unit
2. Long / important interruption
3. No, unreliable alternative



Risk Management along the Value Chain

Top-down & bottom-up

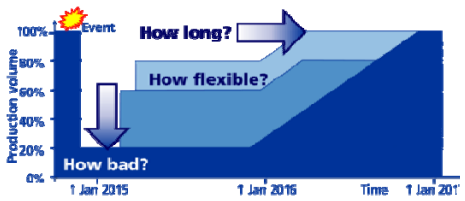


- **Focus on Key Business Units**: Important share of **turnover**
- **Identify Crown Jewels : Key value creation processes** for **key products**
  Components with important share in key products
  Structure & bottlenecks, boundaries of crown jewels
- Identify/assess **Key Risks** along key value creation process: how bad, long & flexible
- Understand **Impact** of interruption within organization
- Decide on targeted **Protection Measures** from an groupwide perspective

Overcome Vulnerability for Competitive Advantage

How we support customers in the INTERCONNECTIVITY challenge

Site BI risk exposure

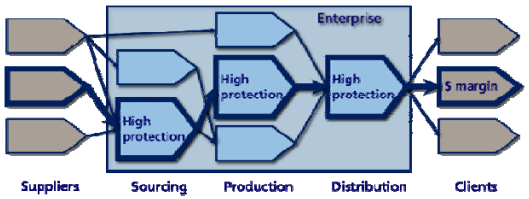


Business Interruption (BI), Contingent Business Interruption (CBI), Supply Chain (SCI), **RISK EXPOSURE** of component **on site** – **"local severity"**

Recovery Characteristics: Production impact (how bad?), recovery time (how long?) & alternatives (how flexible/costly?)

Key Risk factors: critical **equipment**, **building**, 3rd party **utilities**, …

Internal &ext. Value Chain



Identify **CROWN JEWELS***: Key value creation processes for key products

- Impact to turnover & profit of group at outage of component / supplier
  ⇨ **Criticality** of component/supplier ⇨ potential claim amount estimate
- **Measure**: **Leverage** of local BI exposure of component / supplier in group
- Understanding of **criticality** is required also for BI from cyber

Internal Value chain
- owned by insured & covered by BI insurance incl. interdependencies
- Insured has granular information available
- Insured has influence to implement Risk Improvement Advice

External Supply Chain (often >1'000 suppliers)
- Covered by CBI-, SC-insurance (broader cover)
- Insured has less info and possibility to influence risk quality;
- Aim of insured: identify/prioritize suppliers with big impact on sales&profit

Since Globalization has changed the way we do business, (we produce today in global value chains) we have to adapt our Risk Management approach and move to **Resilience**.

Digital support helps to resolve the supply chain risk management challenge.

* McKinsey: CROWN JEWELS in *A-new-posture-for-cybersecurity-in-a-networked-world, March 2018*

Vertical vs. horizontal Integration

Vertical integration:

- "Make or Buy"-Decisions
- Supply chain of a company is owned by company

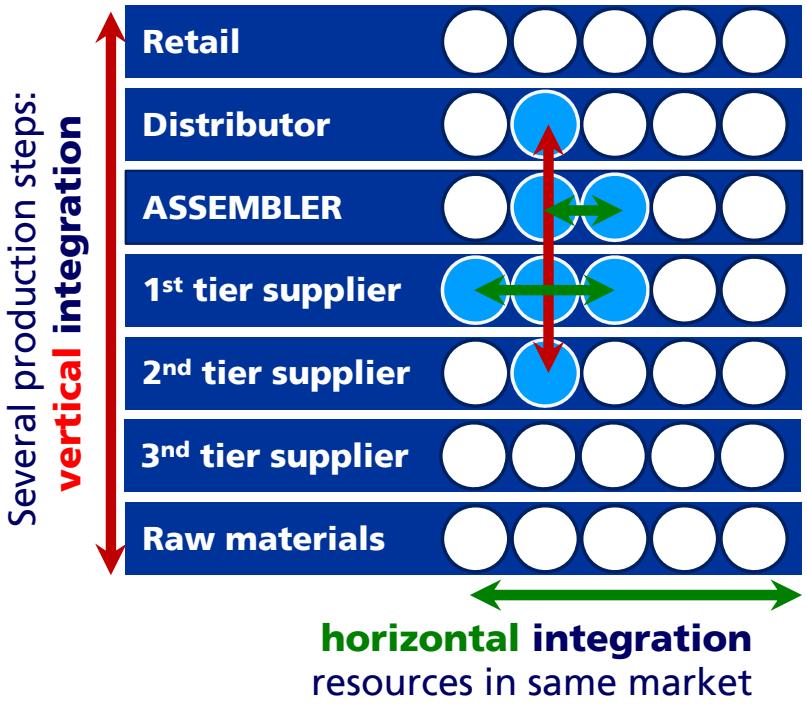
E.g.: Ford River Rouge Complex 1928, from iron ore to car

Horizontal integration:

Company acquires competitor of same stage of production in same industry to create market power

E.g.:

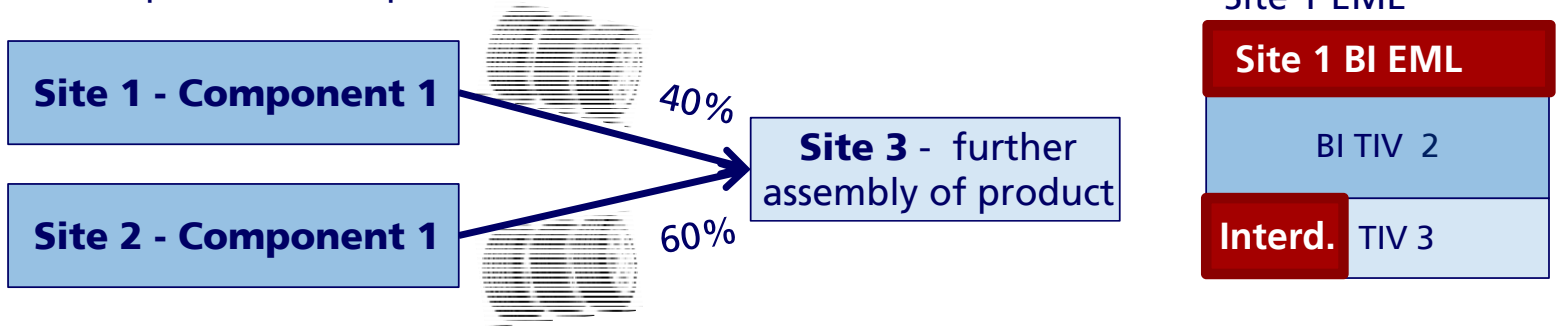
- Heinz & Kraft Foods merge March 25th, 2015;
- Lafarge Holcim merger of equals 2015



2 Basic Cases in Interdependency Analysis

Propagation of business interruption in the value chain

a. HORIZONTAL INTEGRATION: Damping of business interruption (BI) in group
Redundant resources to produce same component (site 1 & site 2)
No free production capacities



b. VERTICAL INTEGRATION: Leveraging of business interruption in group
"Orchestrated production" – **every site contributes one component**

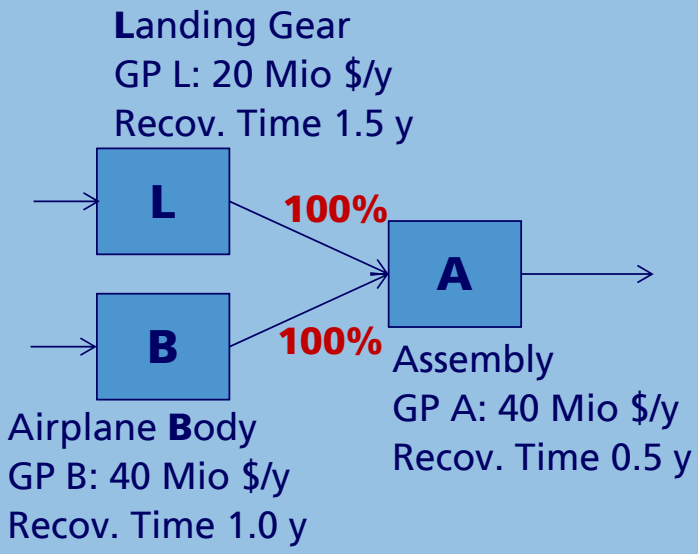
Case 1: Vertically integrated company

Work in groups of 2 participants

- Company with 3 sites: Landing Gear L, Airplane Body B and Assembly site A
- Site specific Gross Profits (GP) and Recovery Times (Recov. Time)

Tasks:

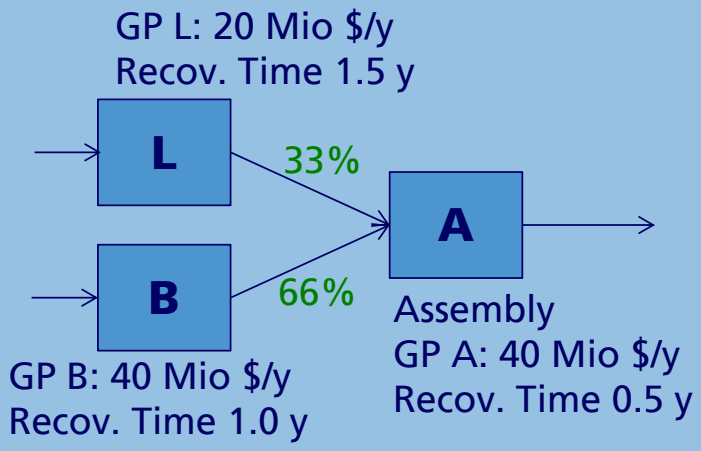
1. Calculate site BI loss exposures. (BI Loss = Gross profit * Recov. Time) Which site has highest site specific BI loss exposure?
2. Calculate Groupwide BI loss exposures. Which site has highest groupwide BI loss exposure? (no buffer stocks!)
3. Can groupwide BI loss be bigger than site BI loss? Why?



Case 2: Horizontally integrated company

Work in groups of 2 participants

- Company with 3 sites:
  share of site L 33%, share of site B 66%, Assembly site A
- Site specific Gross Profits (GP) and Recovery Times (Recov. Time)

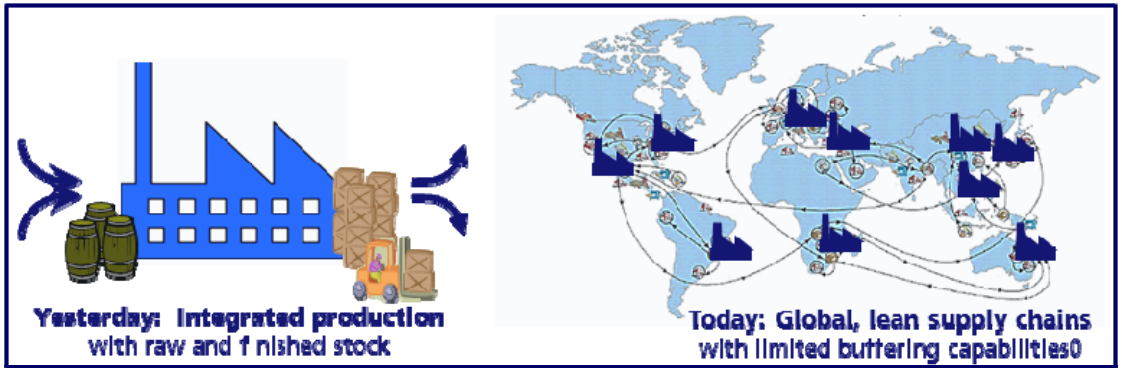


Task:

1. Calculate site BI loss exposures. Which site has highest site specific BI loss exposure?
2. Calculate Groupwide BI loss exposures. Which site has highest groupwide BI loss exposure?
3. Compare site and groupwide BI loss exposures with of the "vertically integrated company" exercise!

Supply Chain - Supply Ecosystem

Risks to the supply chain - From transport delays to cyber events



Discussion Q&A

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