

VSJF, 2016-11-19

Peak Car Panel

Smarter, cleaner, fewer? Demand shifts and technological innovation from the carmakers' perspective



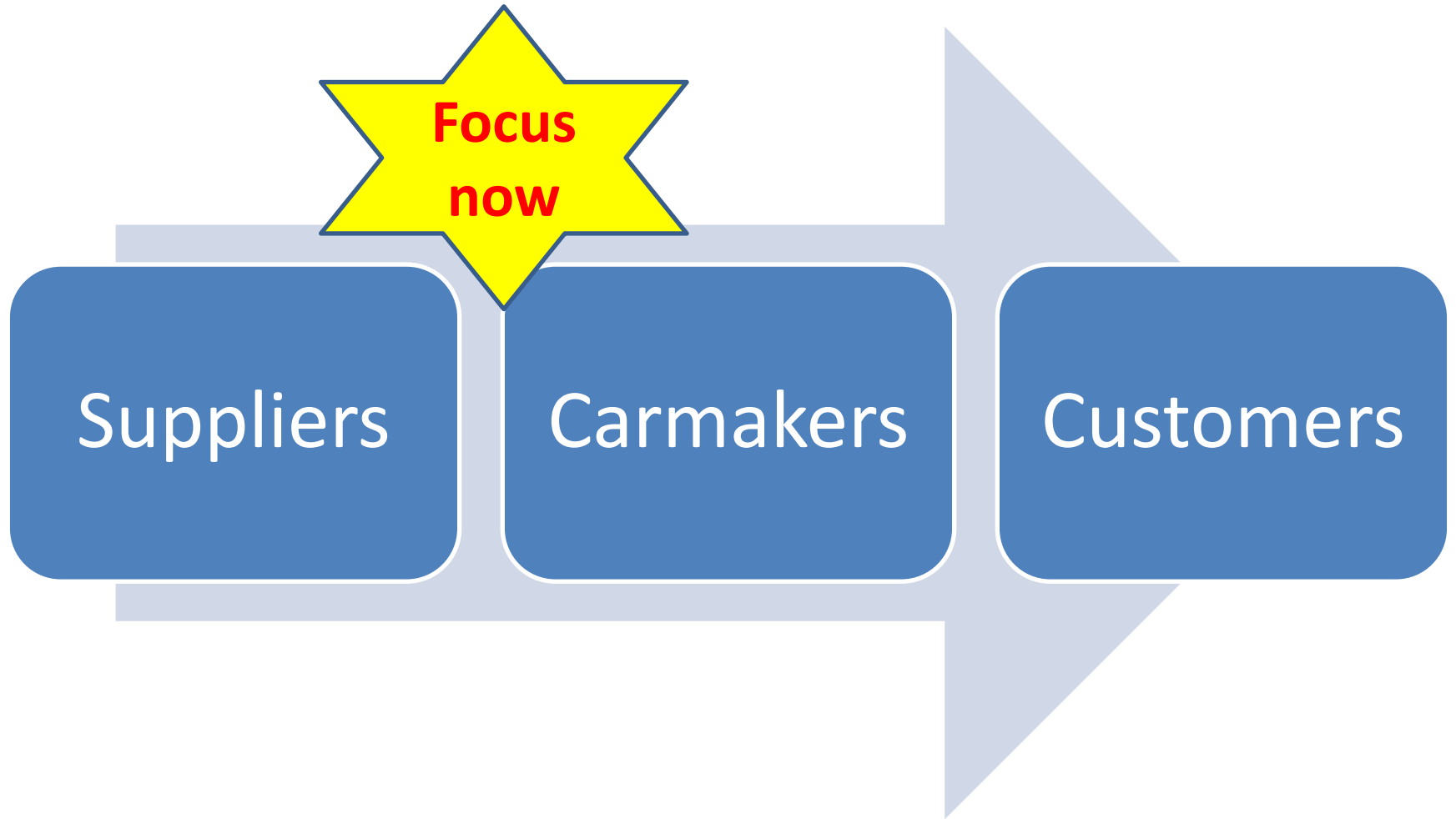
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Our three presentations focus on different facets of the Peak Car discussion



Peak car (Japan)?

Different interpretations

INDUSTRY

- ...peak of **car assembly in Japan**?
- ...**decline of Japanese carmakers**?

TECHNOLOGY

- ... decline of the **internal combustion engine** car?
- ...the end of **carmaker dominance** of value chains?

BUSINESS MODEL

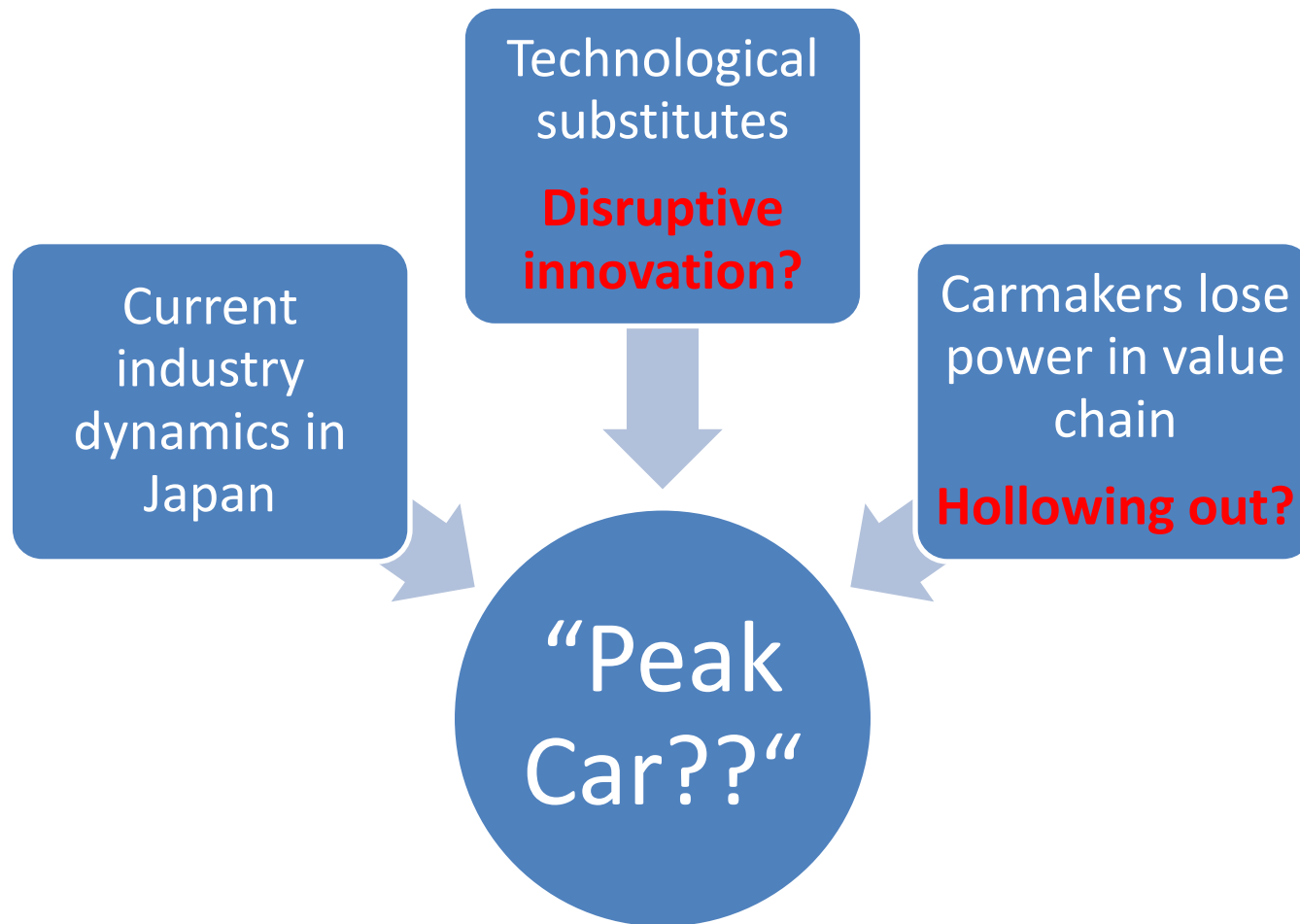
- ...**disruptive innovation** of the automotive industry **business model** towards service?

Key questions

What are sources of (in)stability in the automotive industry?

Who will collect the spoils of upcoming innovations in the industry?

Central concerns: Disruptive innovation and hollowing out





JAPANESE AUTOMOTIVE INDUSTRY DYNAMICS

Industry view: Peak car (Japan)?

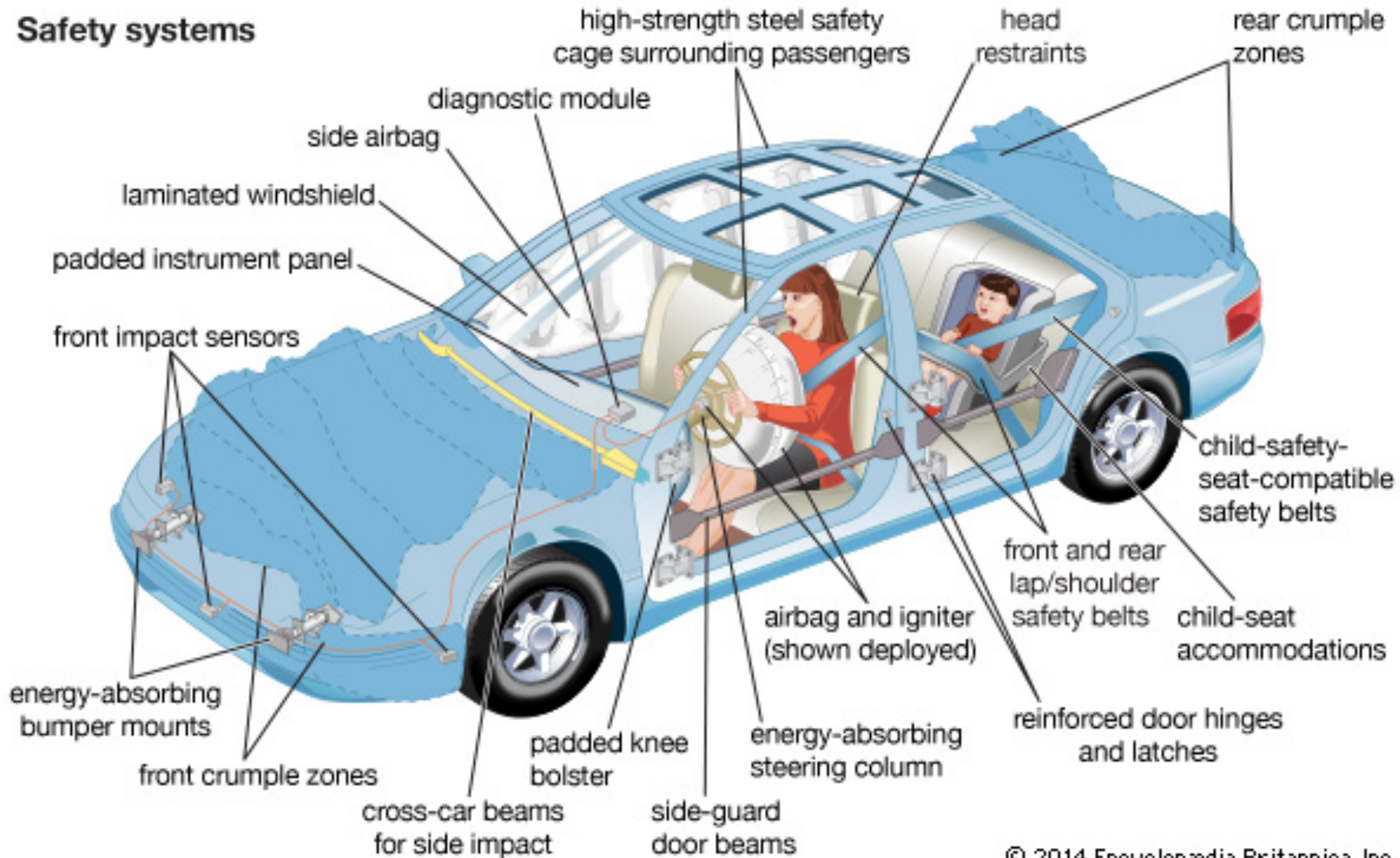
- Declining revenue & profit (after record fiscal year 2016)
 - Yen appreciation
 - Shrinking domestic market...
- Peak for Japanese carmakers?
 - Unlikely for large firms such as Toyota, Nissan who benefit from incumbent advantages and international value chains
 - Likely for small players such as Mazda, Suzuki, Subaru who might lack scale to sustain necessary R&D investments (emission/drive-train diversity, safety/automation)
- Peak for domestic production?
 - Further decline very likely, increased focus on emerging markets
 - Counter-pressures:
 - Political commitments to keep production in Japan (Toyota: 3 Mio., Nissan: 1 Mio.)
 - Mother-plant model, dependence on stable local supply base

Two distinctions are central to the discussion

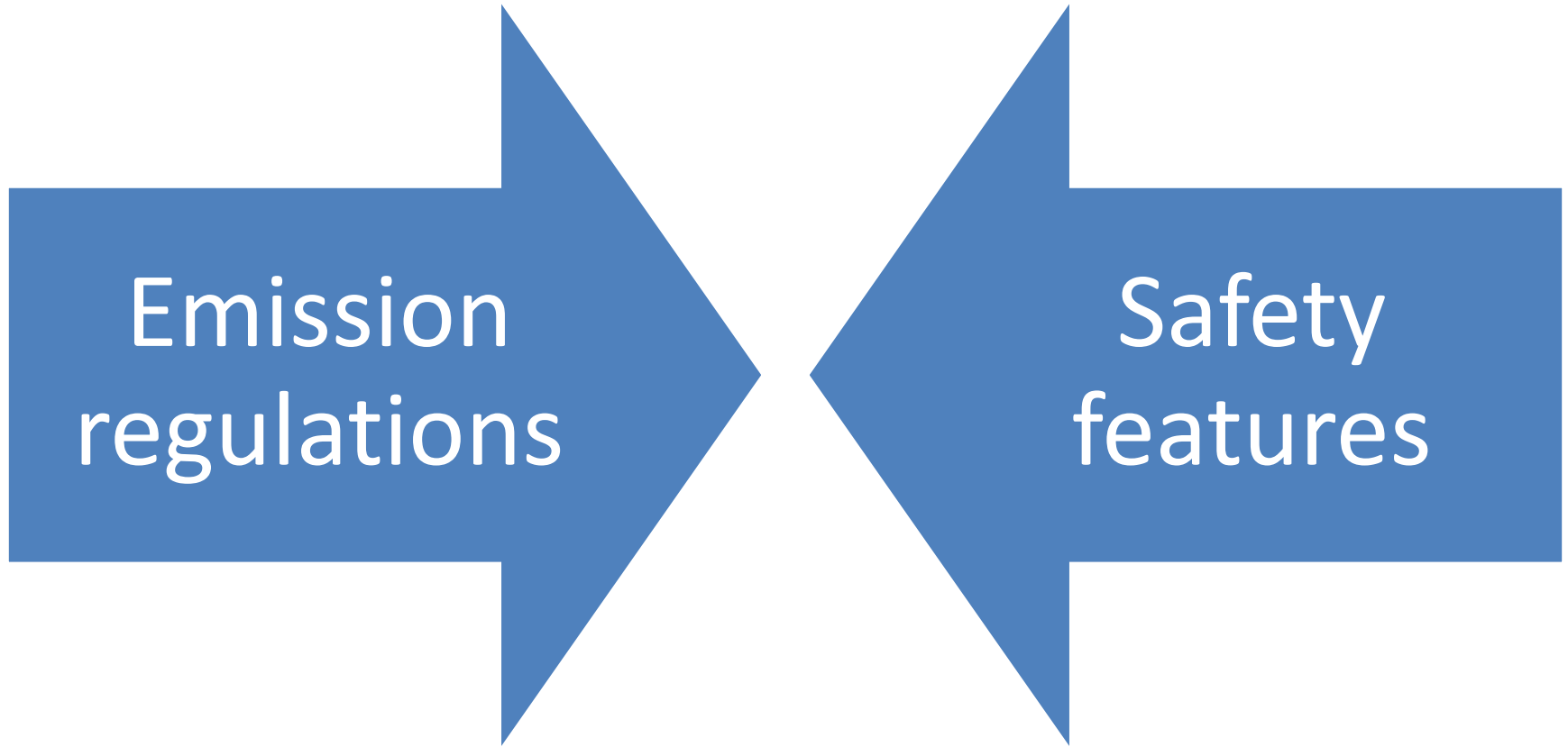
- Integral / Modular product architectures
- Disruptive / Sustainable innovation



Safety systems



Emission and safety/automation requirements increase the **competition by functionality**



mike olbinski photography

DISRUPTIVE INNOVATION AHEAD?

Definition

**Disruptive innovations
originate in low-end or
new-market footholds**

Disruptive innovation #1:

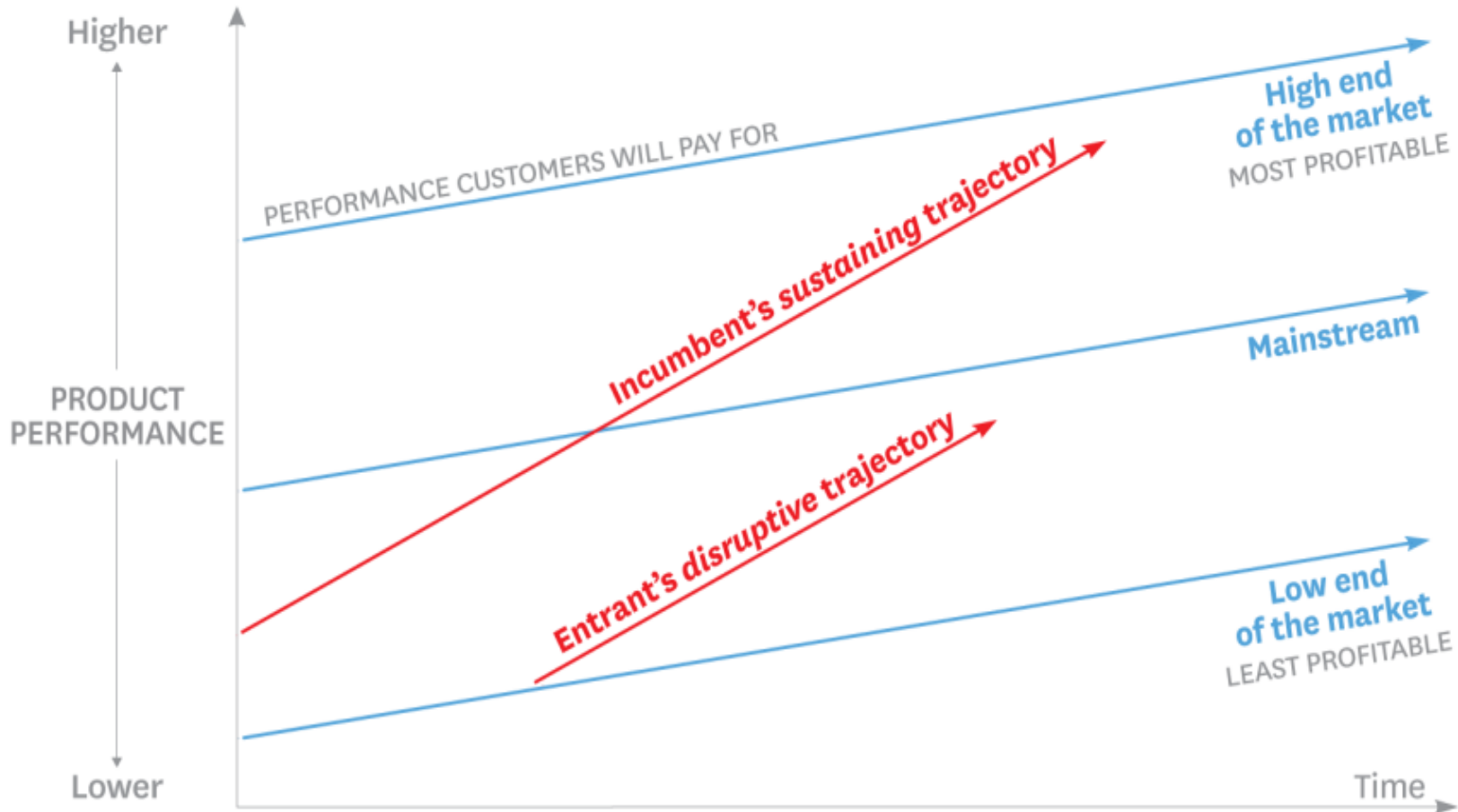
“Low-end footholds”

- “*Low-end footholds* exist because incumbents ... pay less attention to less-demanding customers. In fact, incumbents’ offerings often overshoot the performance requirements of the latter. This opens the door to a disrupter focused (at first) on providing those low-end customers with a “good enough” product.”

Disruptive innovation #2: “New market footholds”

- “In the case of *new-market footholds*, disrupters create a market where none existed. Put simply, they find a way to turn nonconsumers into consumers.”

What innovation is “disruptive”?



Successful, but not
a “disruptive innovation” #1

U B E R

- Neither **low-end** nor **new-market** foothold
- Success more related to high taxi market regulation
- **New competition, not ‘disruption’**



Successful, but not a “disruptive innovation” #2



- Neither new consumers nor low-end entry
- Entry into **contested high-end niche market**
- **New competition, not ‘disruption’**





PEAK CAR(MAKER)?

From WINTEL to 'Google Inside'?

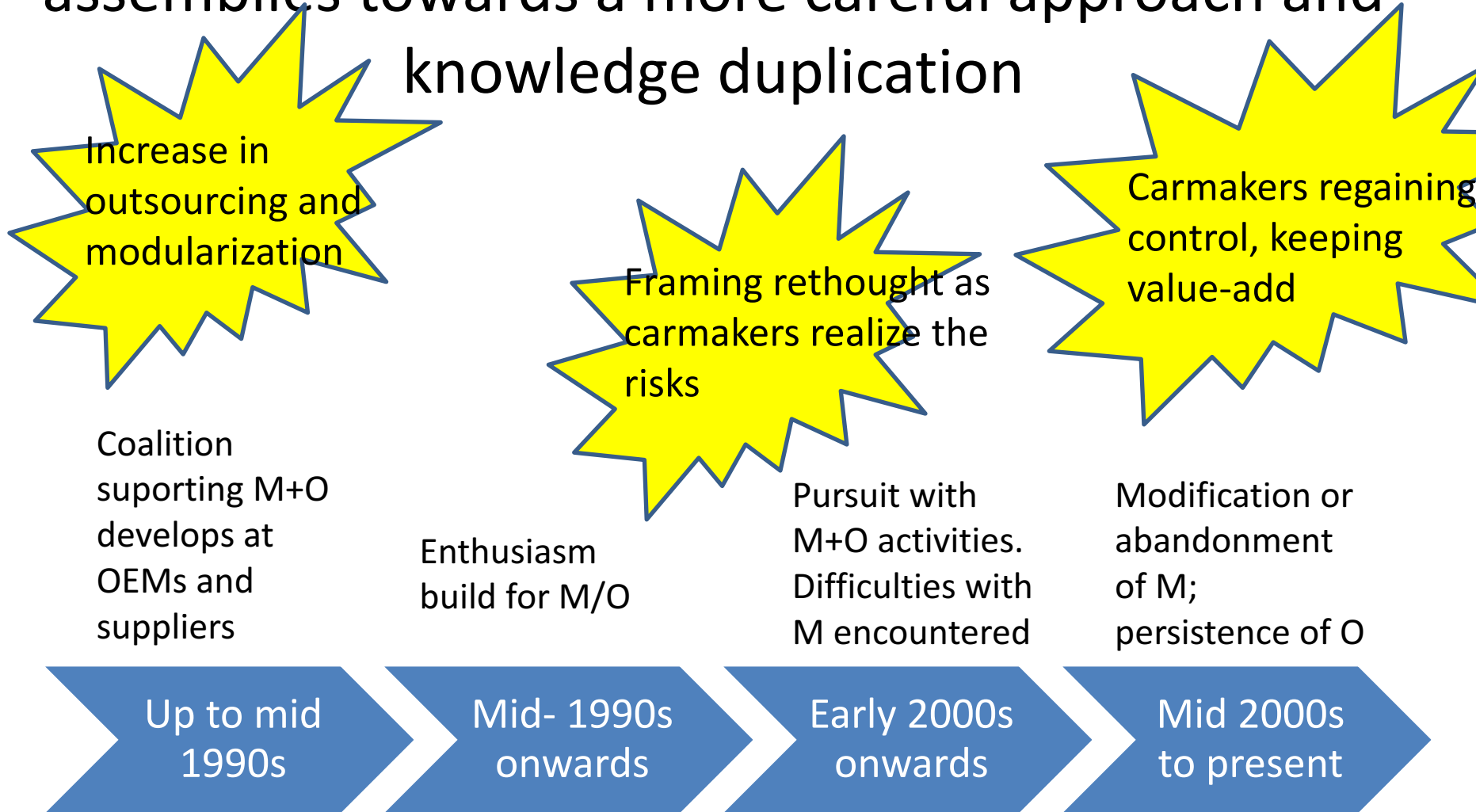


- Modularity** in the Computer Industry
- Close mapping of part to function
 - Open, standard interfaces

Modularization in the automotive industry – substantial need for systems integration remains

- Modules as used in the Automotive industry are not really 'modular', the Computer industry metaphor does not hold
 - No direct mapping of part to function
 - Substantial inter-component interdependencies
 - Often proprietary designs belonging to or customized for carmakers
 - Substantial systems integration required

Realizing the risk: The automotive industry has shifted from the liberal outsourcing of key sub-assemblies towards a more careful approach and knowledge duplication



Note: M+O = Modularization and Outsourcing

Some examples of alternative approaches to the original modularization idea

- Example Toyota:
 - Achieve access to supplier specialization advantages by close collaborative design
 - Retain close quasi-hierarchical control
 - Retain **closed, proprietary standards**
- Example Hyundai:
 - Some, but limited modularization
 - **Quasi-hierarchical control** over key supplier Mobis
- Example VW:
 - MQB platform approach, sharing core assemblies across multiple carlines
 - Main gain from economies of scale, restricting design engineer parameters
 - **Proprietary (closed) design**

Incumbent carmakers react to increasing risks of modularization and new technologies. They have substantial advantages in this struggle

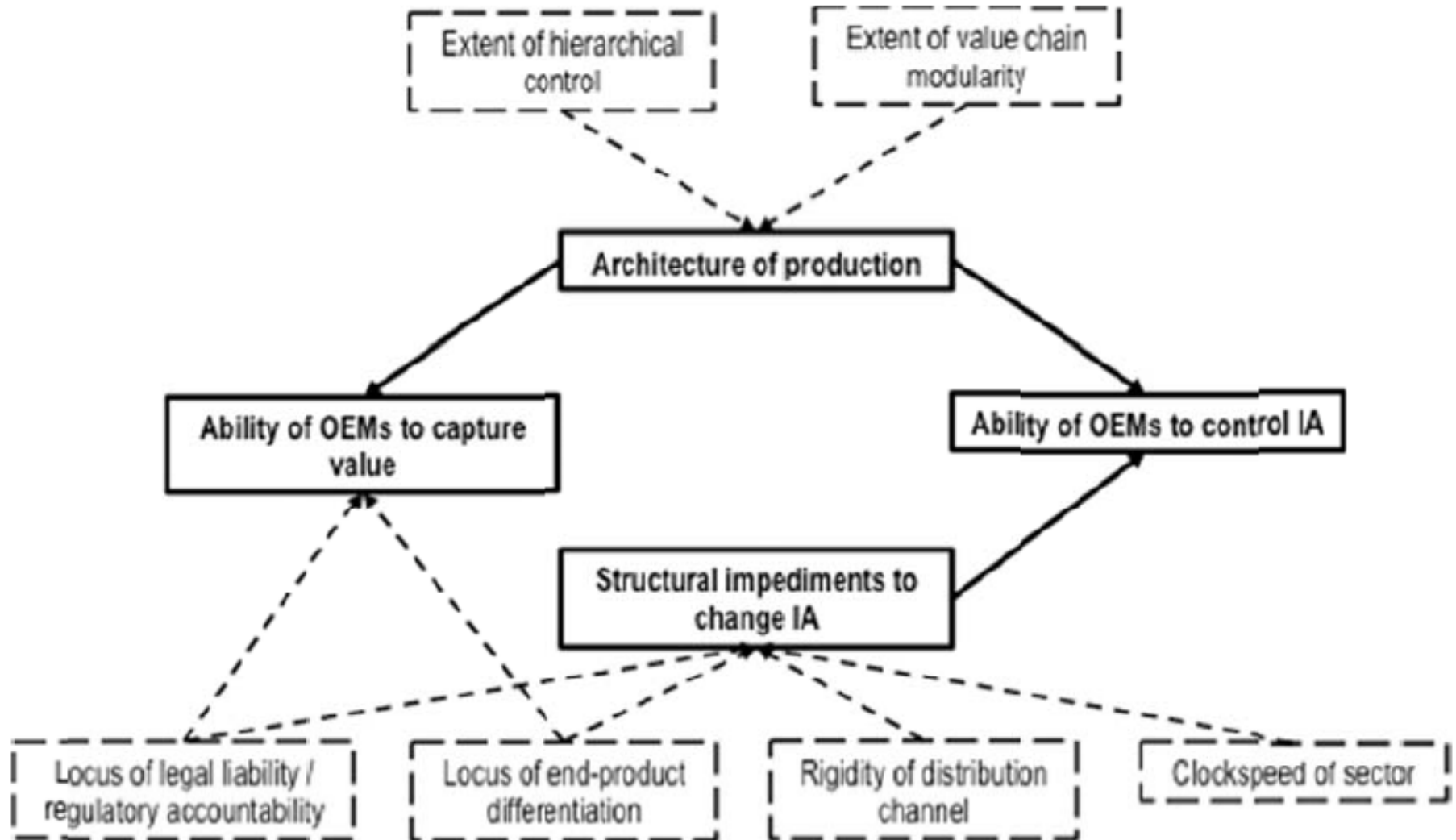
- Proprietary designs and IPR
- Certification and legal accountability
- Link with final customers
- Access to distribution
- Substantial funds
- Strong knowledge of integral manufacturing

'Modularity' in the automotive industry

- Started with sub-assemblies (soon termed 'modules') in manufacturing
- Outsourcing of sub-assemblies started in the 1990s, including quality testing
- Bolstered by the popularity of the 'core competence' model (Prahalad & Hamel 1990)
- Scope increased to sub-assembly design in the mid-1990s
- Carmakers pushed for creation of mega-suppliers that could act as full-service suppliers to take over purchasing, design, production of sub-assemblies
- In early 2000s: problems with quality and supplier coordination emerged, led carmakers to re-establish control over designs and reversed the hope for a hands-off delegation of tasks
- Modularity now largely interpreted as outsourcing of sub-assembly with substantial systems integration by the carmaker

- ‘Real’ modularization with open standard interfaces tried out in the 1990s, now largely abandoned
- Carmakers retain substantial quasi-hierarchical control despite (?) outsourcing
- Japanese carmakers have reaped some of the expected benefits of modularization without it in their close relational supplier collaboration in R&D and part design

What drives carmakers' structural dominance?



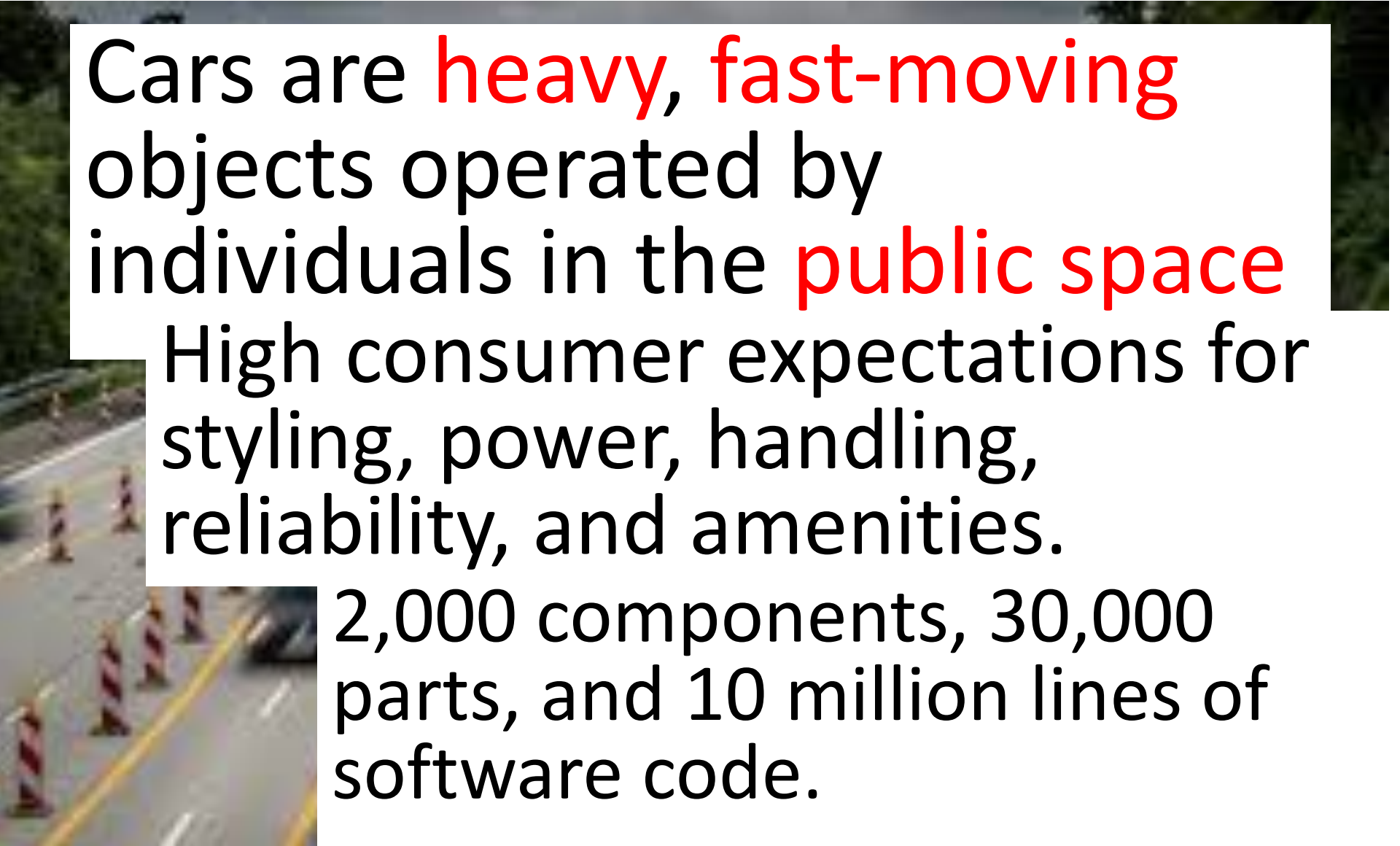
**ZOOMING OUT:
SOURCES OF STABILITY IN THE
AUTOMOTIVE INDUSTRY**

What makes cars a special product? **Safety** and **high expectations** result in **extreme complexity**

Cars are **heavy, fast-moving** objects operated by individuals in the **public space**

High consumer expectations for styling, power, handling, reliability, and amenities.

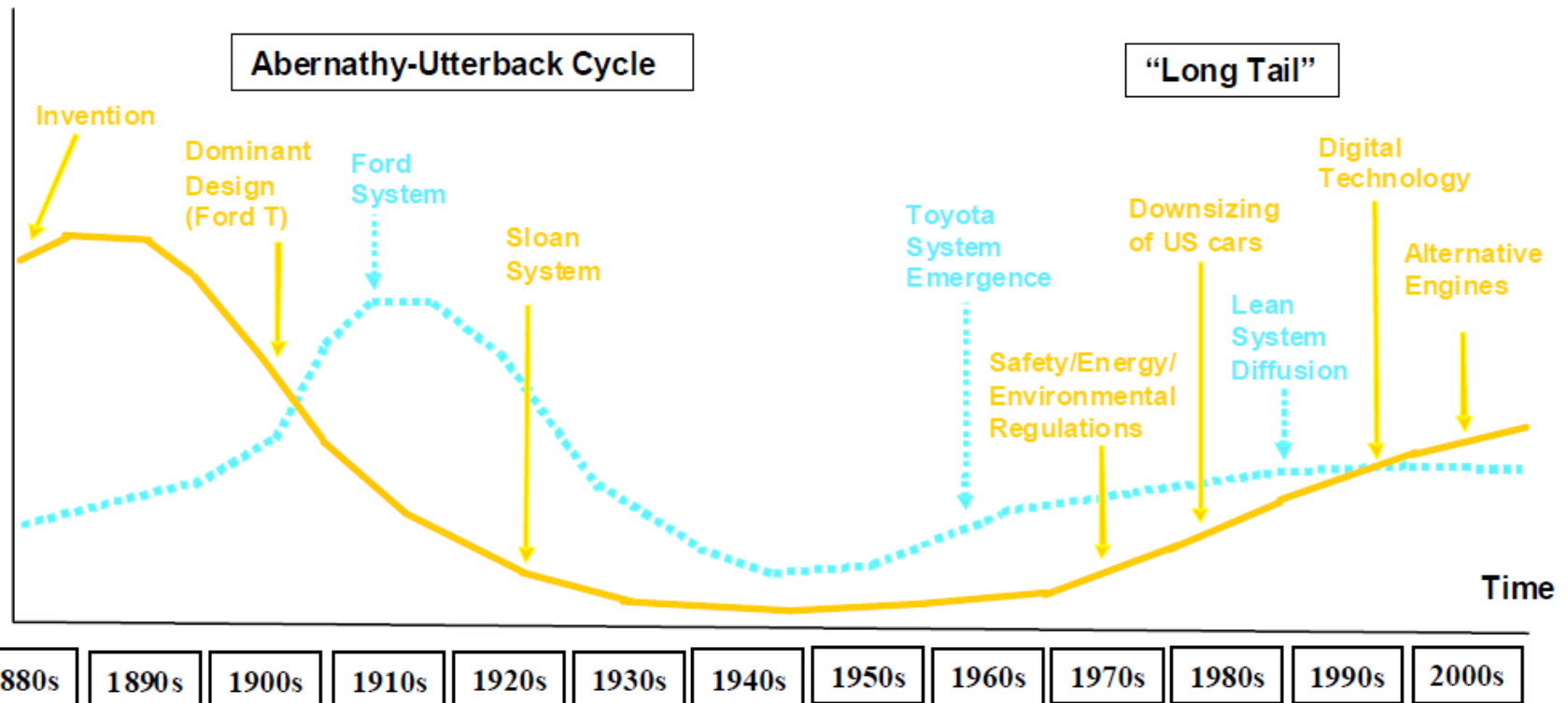
2,000 components, 30,000 parts, and 10 million lines of software code.



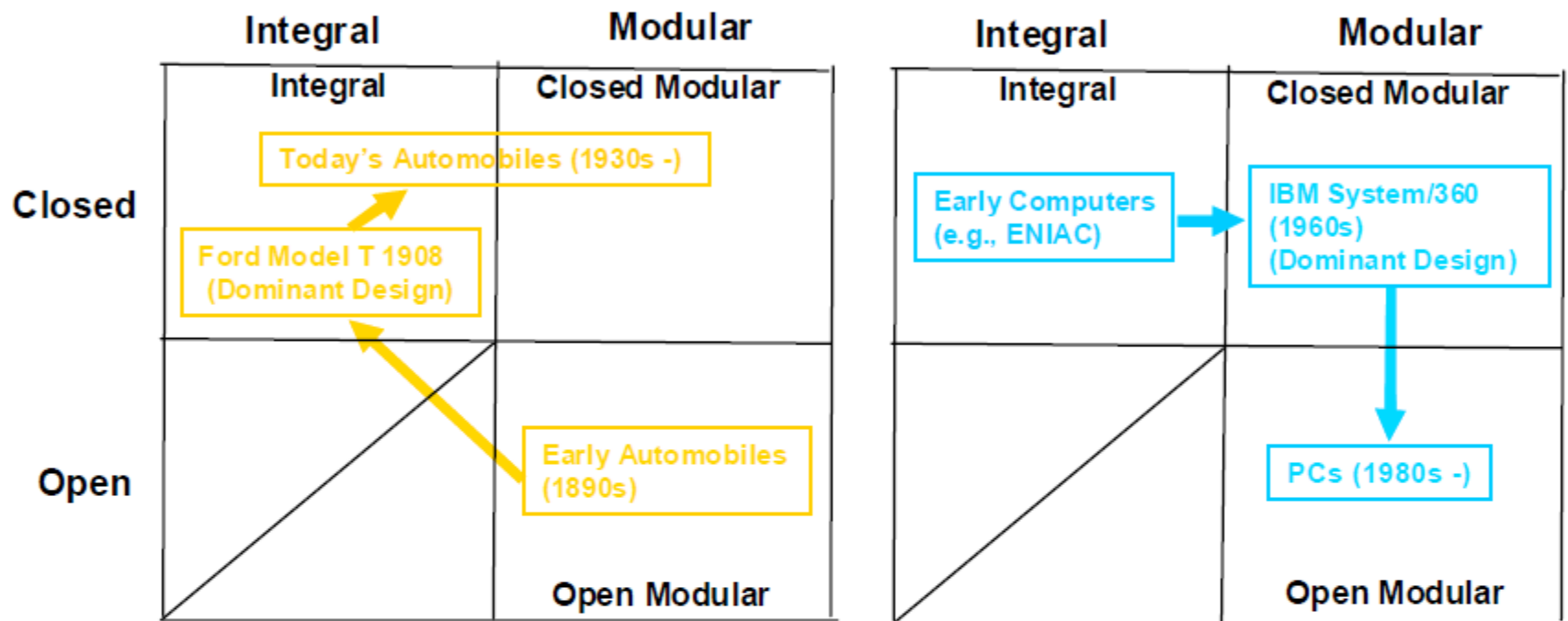
1880s to 2010s:

What explains the recent surprising stability of the automotive industry?

Rate (frequency)
of Innovation

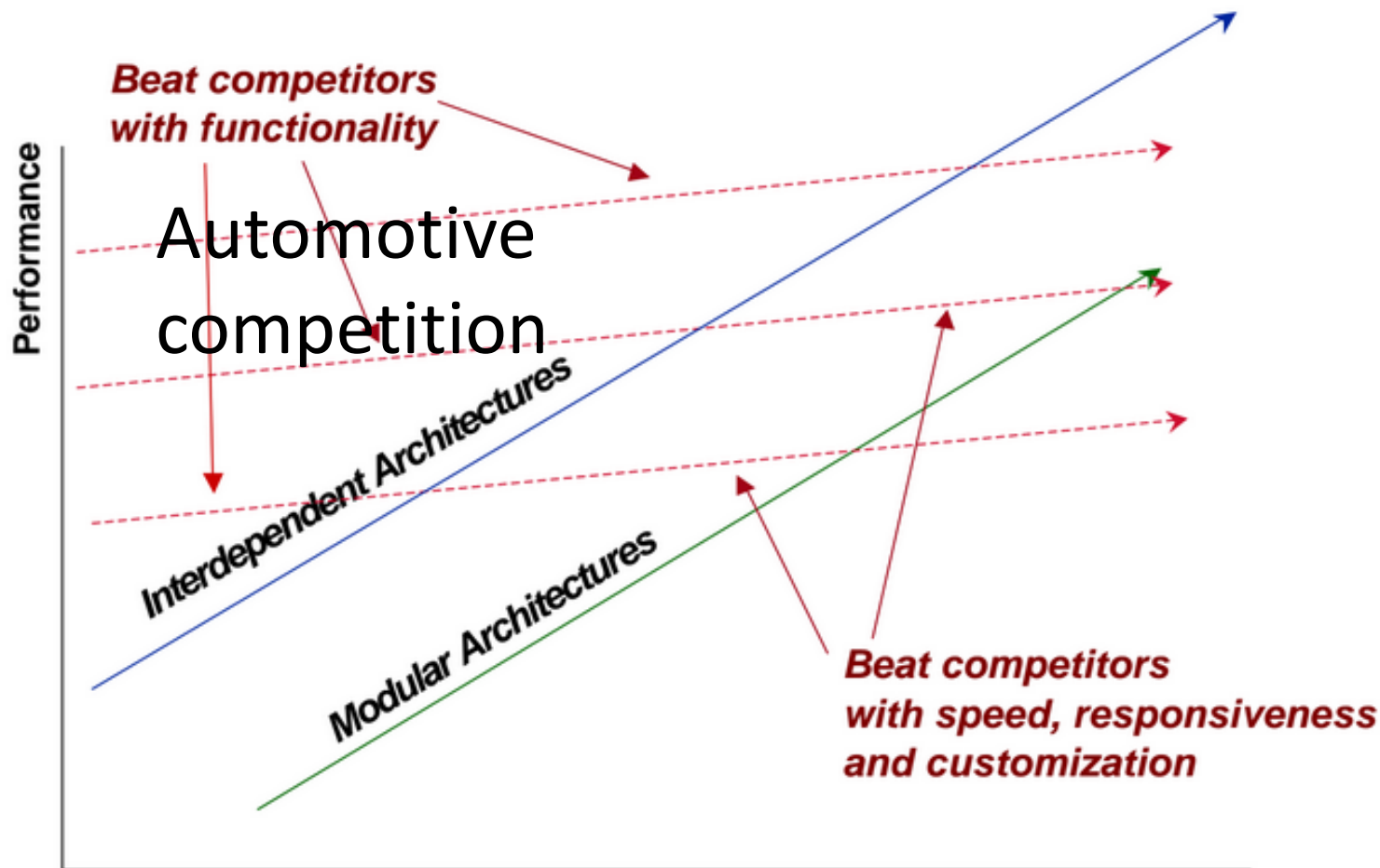


The automotive industry moved towards highly integrated architecture – quite unlike the Computer Industry

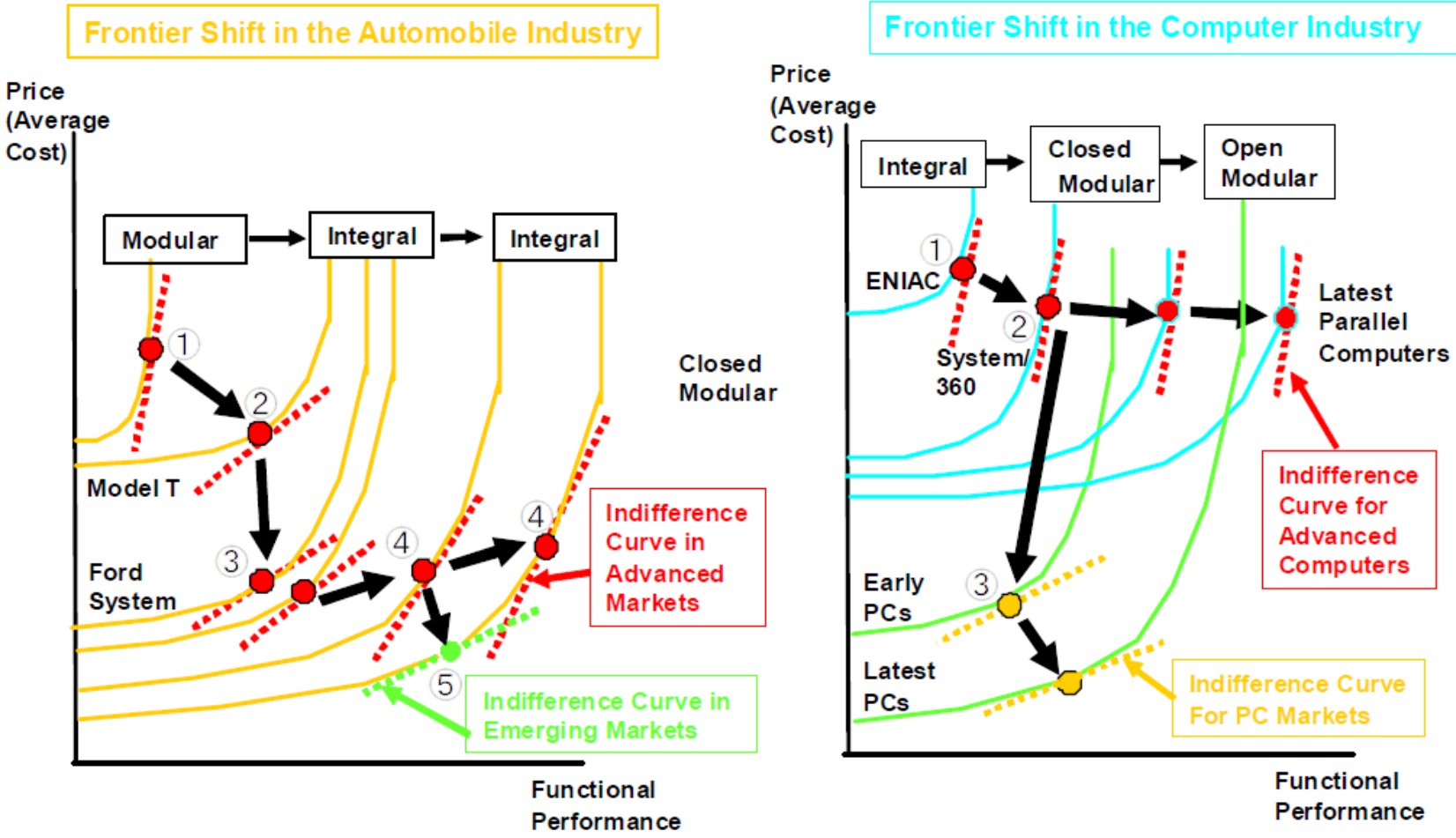


1 Sequences of Automobile and Computer Industries

Integral and modular architectures follow different approaches to achieve competitive advantage



Functionality-driven competition reigns in the current (and likely: future) automotive industry



Source: Fujimoto, Takahiro (2014): The Long Tail of the Auto Industry Life Cycle. Journal of Product Innovation Management, 2014;31(1):8–16. DOI: 10.1111/jpim.12076

In sum: **Confusion of terms** increase the sense of automotive peak/crisis, **substantial barriers of entry** remain

- Disruptive innovation not really 'disruptive'
- So called modularity not really modular
- Systems integration remains the key competitive advantage of carmakers
- Given the industry environment, this is a very strong barrier of entry and remains a substantial advantage for incumbents

Outlook:

‘Reign of the dinosaurs’ continues



=Continuity of substantial incumbent advantage in the automotive industry

Peak car? Some tentative conclusions

- ...peak of **car assembly in Japan**? **Very likely**, already passed
- ...**decline of Japanese carmakers**? **Unlikely** for large incumbents, given substantial incumbent advantages. **Consolidation** likely due to increased R&D requirements (emissions, safety/automation...)
- ... decline of the **internal combustion engine**? Certainly, though **hybrids will likely dominate** for the next decades
- ...the end of **carmaker dominance** of value chain? **Unlikely** in the near future given sustained integral architecture and strong carmaker advantages (proprietary designs etc.).
- ...**disruptive innovation** of the automotive industry **business model** towards service? **No disruptive innovation**, instead **increasing hybridization** between production & service niches. Incumbents strongly invested in capturing emerging business models

Thank you for your attention.

Do not hesitate to contact me for any questions.

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