Servitization in Industry

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PPU231 – Production and Product Service Systems

Learning Objectives

Today: Be able to understand, describe and articulate what servitization means for manufacturers and using known models for PSS

- *LO1: Describe and apply risk and safety concepts and use engineering tools to analyze, evaluate, and reduce risks;*
- *LO2: Explain, implement and distinguish various prevailing maintenance concepts;*
- *LO3: Recognize and evaluate future maintenance concepts;*
- ***LO4: Interpret, describe and evaluate Production and Product Service Systems;***
- *LO5: Demonstrate how existing production systems or products can be designed, developed and provided as Production or Product Service Systems;*
- *LO6: Differentiate, select and develop actions to improve production systems or products during the whole life-cycle.*

Readings (Following Course PM)

- **Paper 1: Tukker, A., Van den Berg, C. & Tischner, U. (2006) Chapter 2 "Product-services: a specific value proposition"** in : Tukker, Arnold, and Tischner, Ursula, eds. "New Business for Old Europe : Product-Service Development", Competitiveness and Sustainability. Sheffield, South Yorkshire, GBR: Greenleaf Publishing.
  - ***Introduces one well known model resolving types of Product Service Systems***

- **Pre-announcement:**

Paper 6: Isaksson, O., Larsson, T.C. & Rönnbäck A.O. (2009) "Development of product-service systems: challenges and opportunities for the manufacturing firm", Journal of Engineering Design 20 (4), 329-348

  - ***Outlines challenges and opportunities for manufacturing industries***
  - ***Reading for Feb 13 Lecture (08:00-10:00)***

Servitization?


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Discussion: What role does the car have in these pictures. Compare!

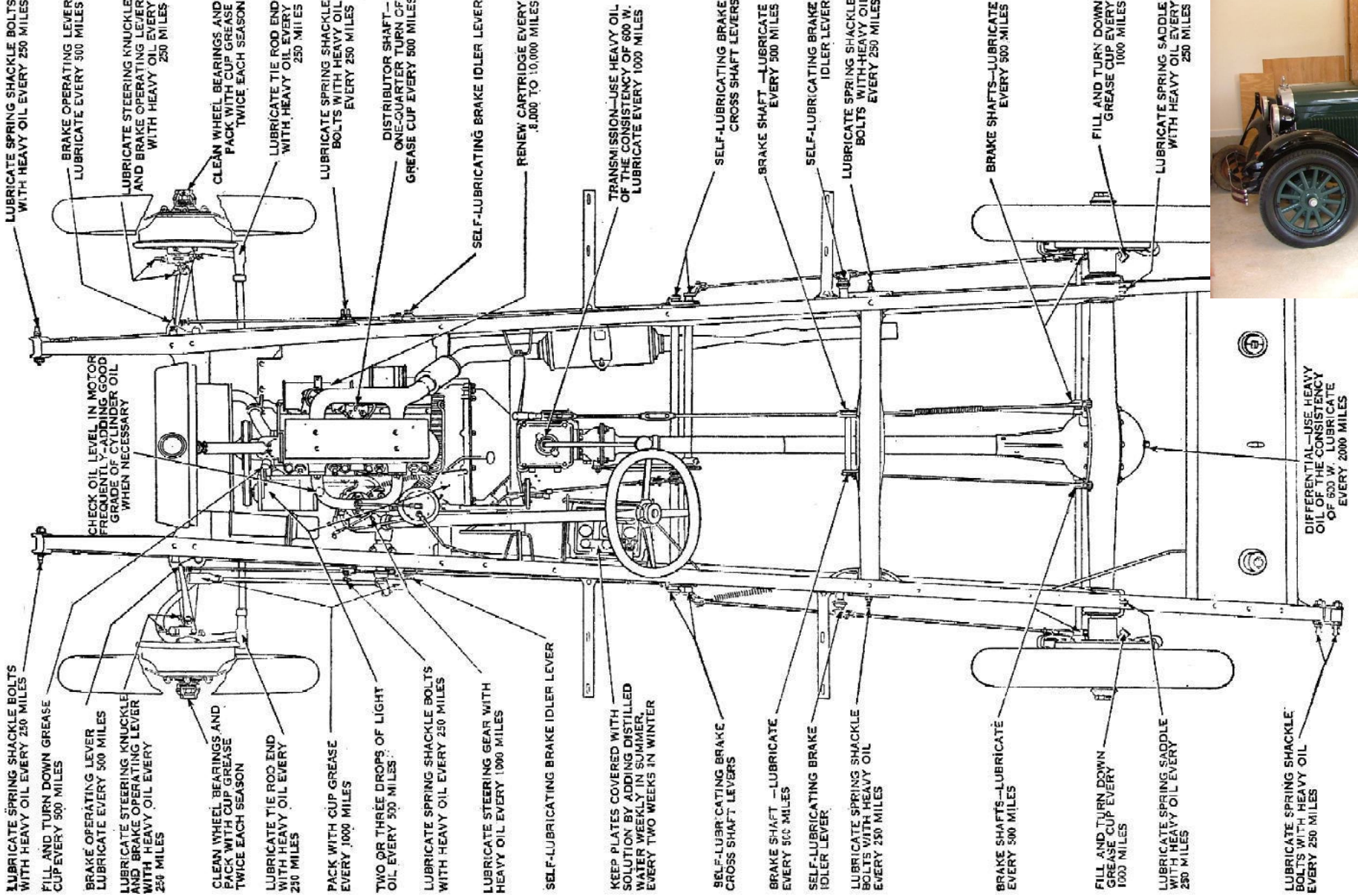


Fig. 14—Lubrication Chart

This chart may be removed and tacked on Garage wall for reference.

1928 Chevrolet

http://chevy.oldcarmanualproject.com/chevyowner/28cim41a.htm

1. From Ownership to accessability

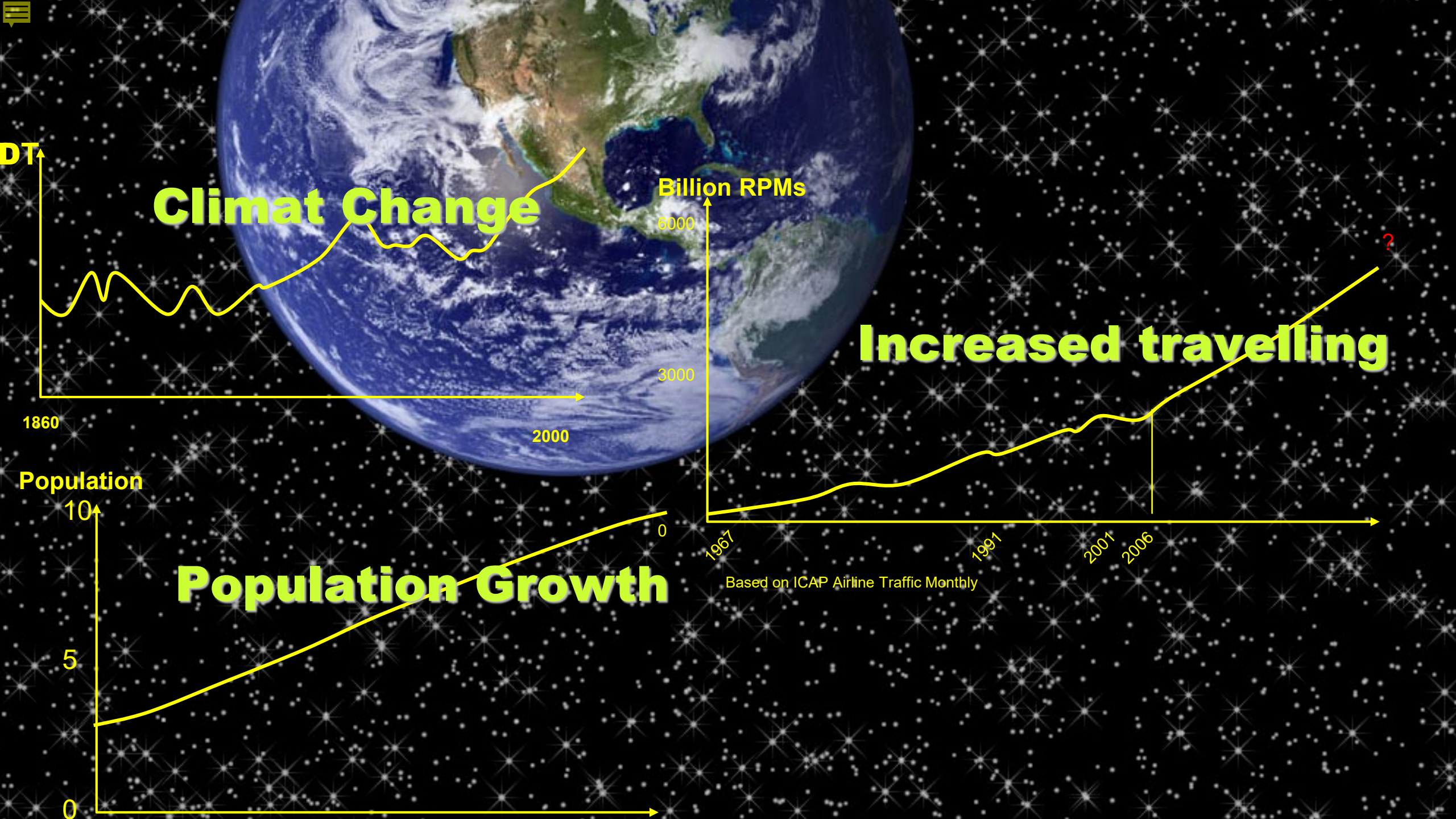
The customer view.

- **Value increasingly associated to the use of product, as opposed to ownership**
- **Product Technologies require increasingly specialized know-how**

The root for better products, or solutions...

"I really don't want to own another laptop, mobile phone or TV ever again... that's not to say I don't want to use the latest and greatest of these products, but I don't want to buy and own more future landfill."

NETFLIX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1860
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?
Increased travelling
1967
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Population
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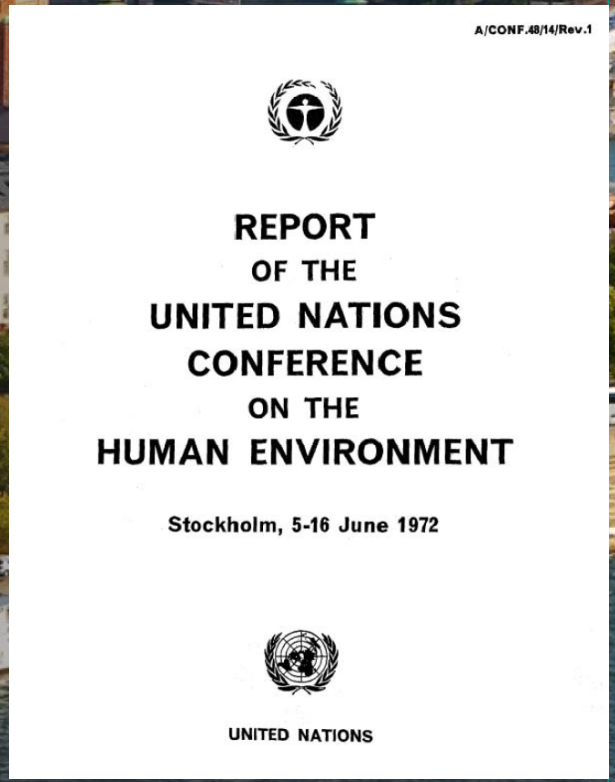
Population Growth

1972

OECD – PPP
UN Conference, Stockholm


A/CONF.48/14/Rev.1

REPORT
OF THE
UNITED NATIONS
CONFERENCE
ON THE
HUMAN ENVIRONMENT

Stockholm, 5-16 June 1972

UNITED NATIONS

PPP – Poluter Pays Principle

OECD recommended the Polluter Pays Principle

PRINCIPLES OF EU ENVIRONMENTAL LAW

Functions of PPP

Main function according to OECD recommendation:

- Allocation "of costs of pollution prevention and control measures to encourage rational use of scarce environmental resources and to avoid distortions in international trade and investment."
- The polluter should bear the expense of carrying out the measures "decided by public authorities to ensure that the environment is in an acceptable state" (OECD 1972)

http://ec.europa.eu/environment/legal/law/pdf/principles/2%20Polluter%20Pays%20Principle_revised.pdf

2. Transfer of responsibility

Responsibility of products increasingly retained with manufacturer

Effects from Transfer of Ownership from user to producer

- Example Hawker Harrier.
  - From spare parts sales to re-design

- Change in business model swapped revenue to cost…

Summary of underlying trends

- **1. Value in using rather than owning Products**
- **2. Responsibility transfered from User to Provider**

Example:
Fuel Cell Car MIRAI from Toyota

Implications of servitization for industry

- Use focus increase the importance of customer relationship through life
  - Availability of product functionality increase in importance
- Increased ownership after produced come with risk and opportunity
  - Risk? Revenue from ”spare parts sales”
  - Opportunity?: Maintain relationship with customer, and better control of ones technologies in the ”field”

Servitization in Manufactring Industry?

Basic business principles for manufacturing industry

Time

FUNCTIONALITY, PERFORMANCE AND UTILITY

$$\text{Value} \sim \frac{\text{Benefit}}{\text{Cost}}$$

More on Value will come later in course

EFFICIENCY IN TIME; COST AND QUALITY

Basic business principles for manufacturing industry – first look

Time

FUNCTIONALITY, PERFORMANCE AND UTILITY

$$\text{Value} \sim \frac{\text{Benefit}}{\text{Cost}}$$

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EFFICIENCY IN TIME; COST AND QUALITY

Basic business principles for manufacturing industry

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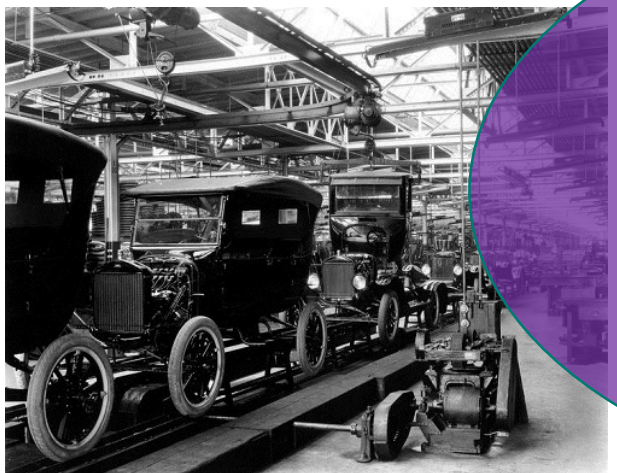
More on Value will come later in course

EFFICIENCY IN TIME; COST AND QUALITY

Services increasingly important for manufactures

Service platforms, upgrades, adaption, integration, leasing, insurance, subscription, life-style, ..

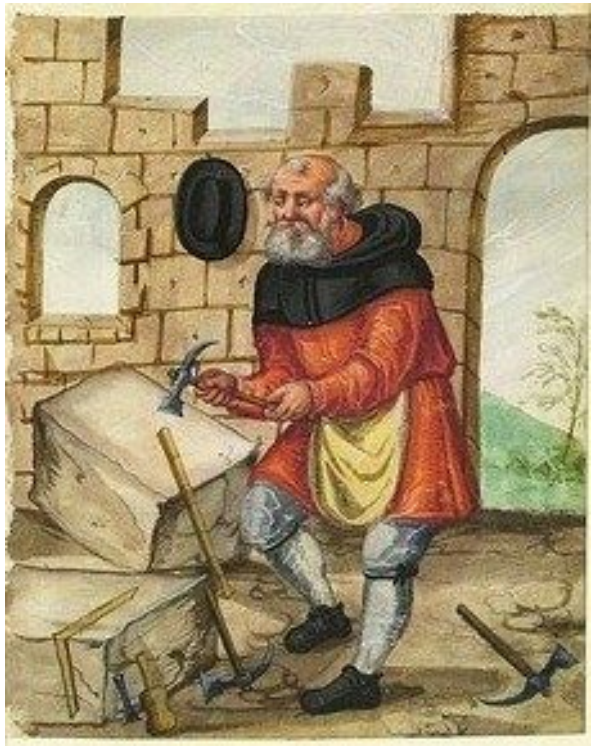


Condition based maitenance, coordination, leasing, flexibility, upgradeability, leasing, ..

$$\text{Value} \sim \frac{\text{Benefit}}{\text{Cost}}$$

More on Value will come later in course

PSS – A reaction to industrialization?

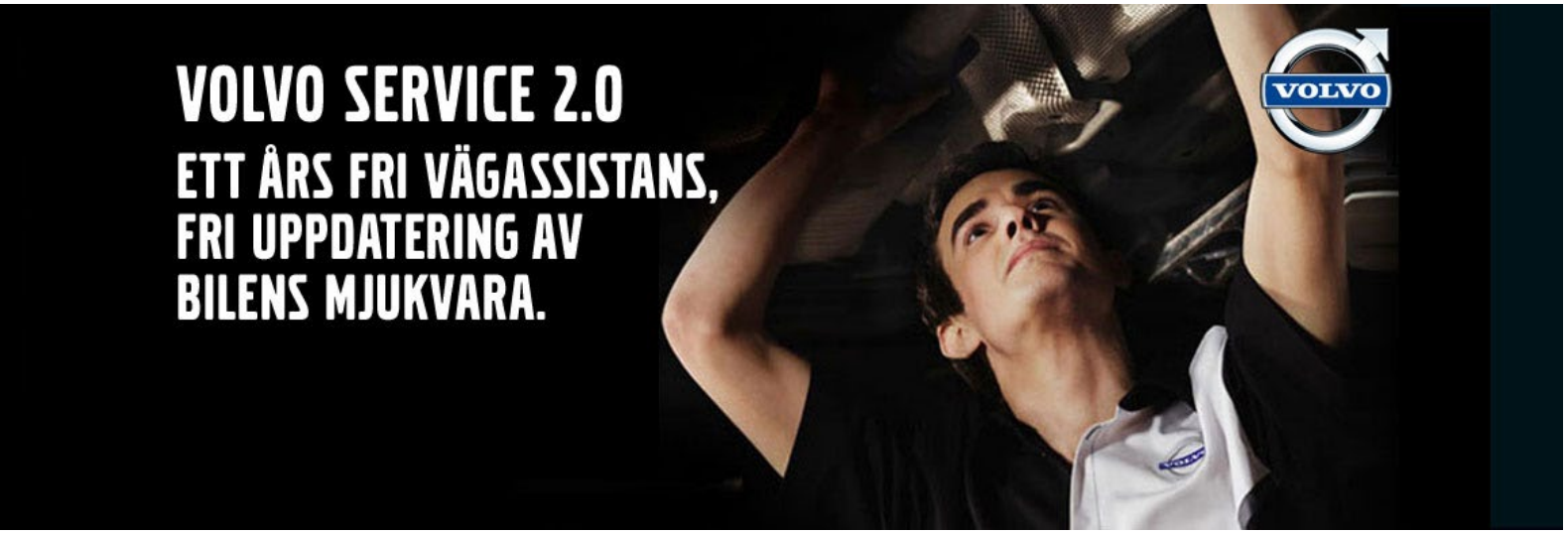


Scale of production distance co-workers from users

”… importance of customer relationship… ”

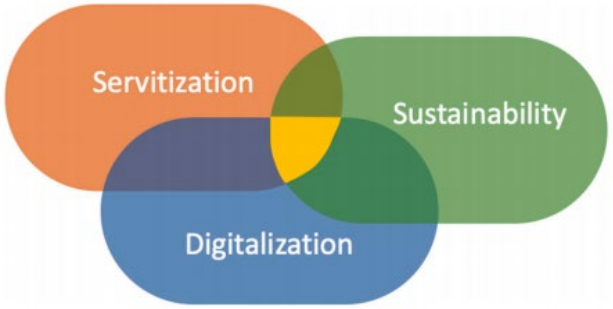
Customized kitchens – a good example where customer and provider (carpenter) co-invent, design and produce solutions

Regaining contact with the end user…



- Volvo Car offer Service package including software upgrades and road side assistance
- *Discuss: Consequences (Pros and Cons) for Customer and Provider (Manufacturer)?*

To what extend do manufacturing companies see servitisation as a business driver?



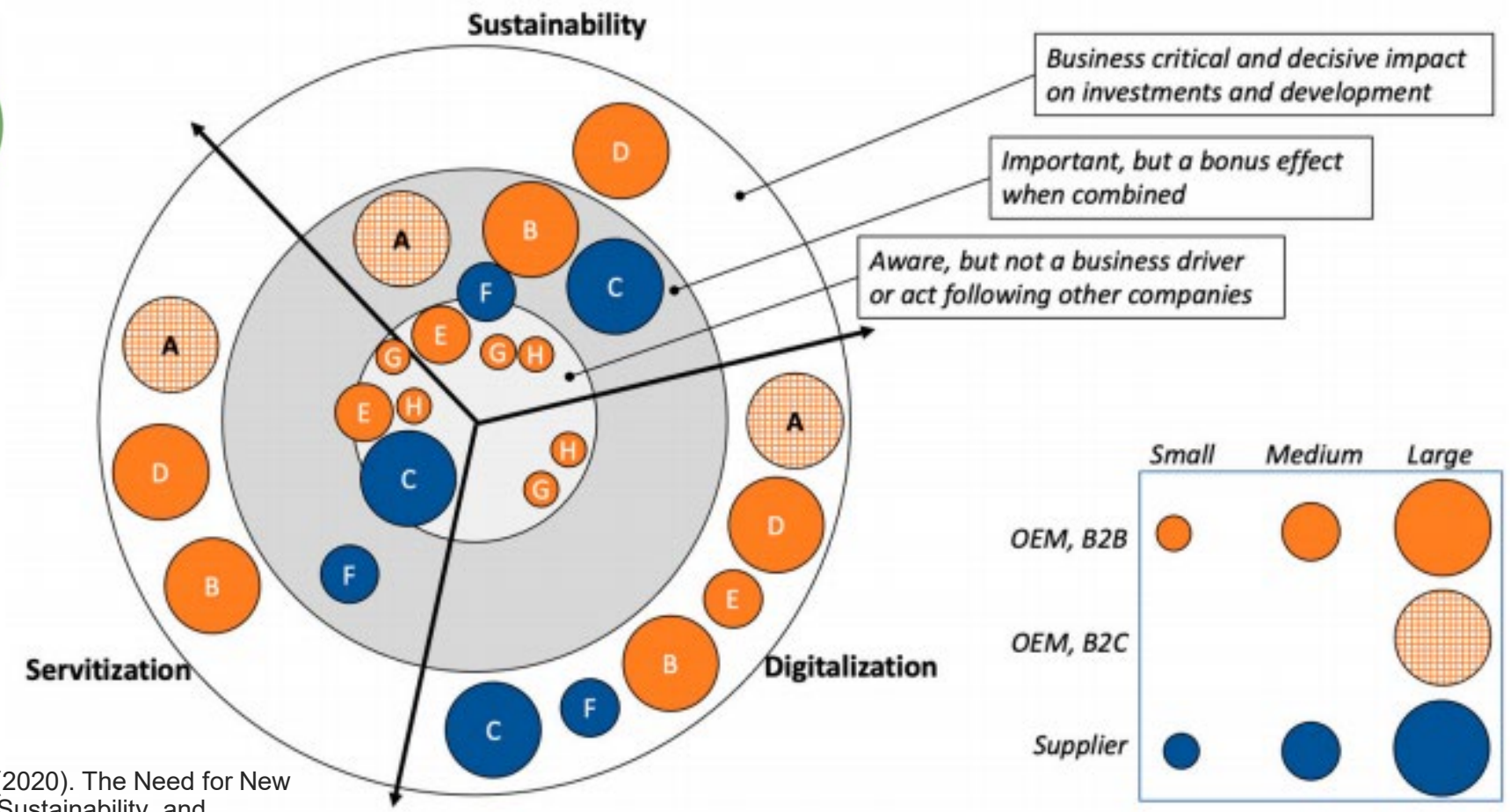
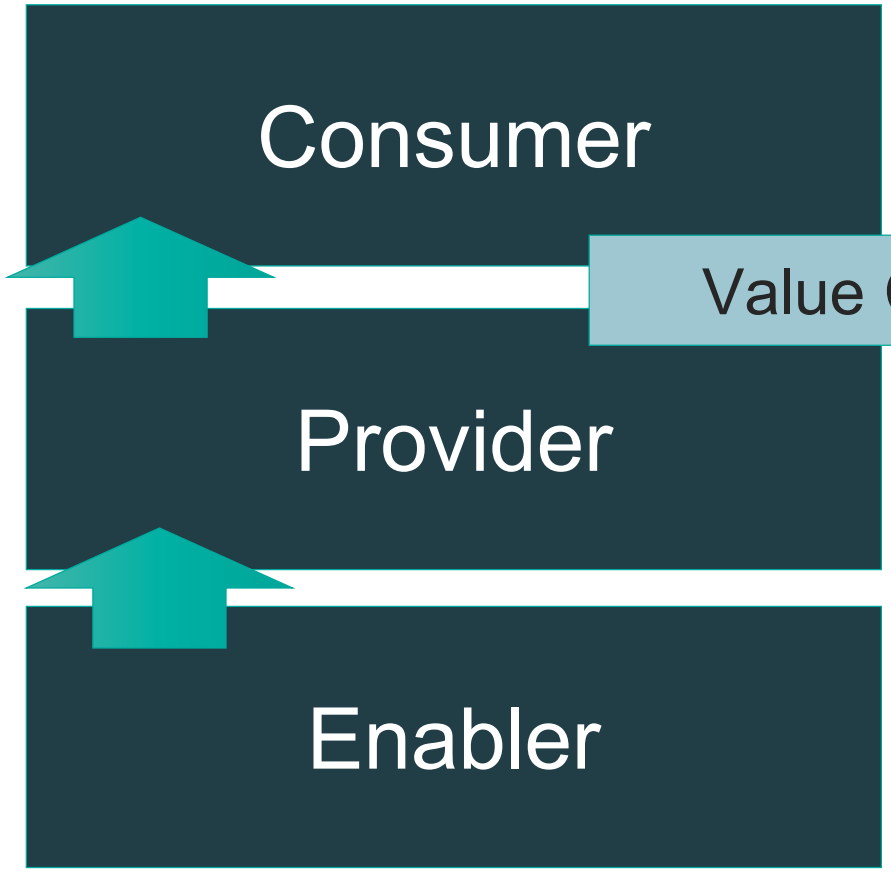


Figure 5. An overview of the focus and ambition of the studied companies.

Hallstedt, S. I., Isaksson, O., & Öhrwall Rönnbäck, A. (2020). The Need for New Product Development Capabilities from Digitalization, Sustainability, and Servitization Trends. *Sustainability*, *12*(23), 10222.

”New” supply chain?



Typically the one (person(s) of organisation(s)) using the products

Provides the Product-Service System to the Consumer, e.g. a manufacturing company (OEM)

Provides technologies, infrastructure or services that the providers need to mix into the PSS

Consequences for manufactures

- **Shifting to servitization impact**
  - **Business models – the way to offer solutions and ensure revenue**
- **Shifting preferences and behaviour of users**
  - **Creates, and threatens, established products and business models**
- **Obsolesence**
  - **Technology in products have largely different life cycles.**

"'Power-by-the-Hour', a Rolls-Royce trademark, was invented in 1962 to support the Viper engine on the de Havilland/Hawker Siddeley 125 business jet. A complete engine and accessory replacement service was offered on a fixed-cost-per-flying-hour basis. This aligned the interests of the manufacturer and operator, who only paid for engines that performed well" (Rolls Royce)

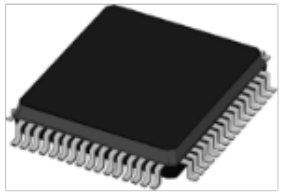
Changed user behaviour

http://futureofcarsharing.com/

Changed Customer Behaviour

Changes user behavior is common, but difficult to forsee

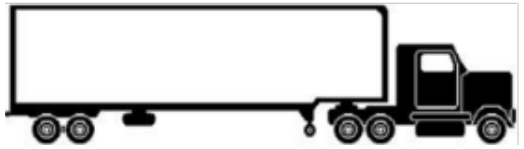
Obsolescence



New Electronics Production Life

4-7 Years

Expected Machine Life



25-30 Years

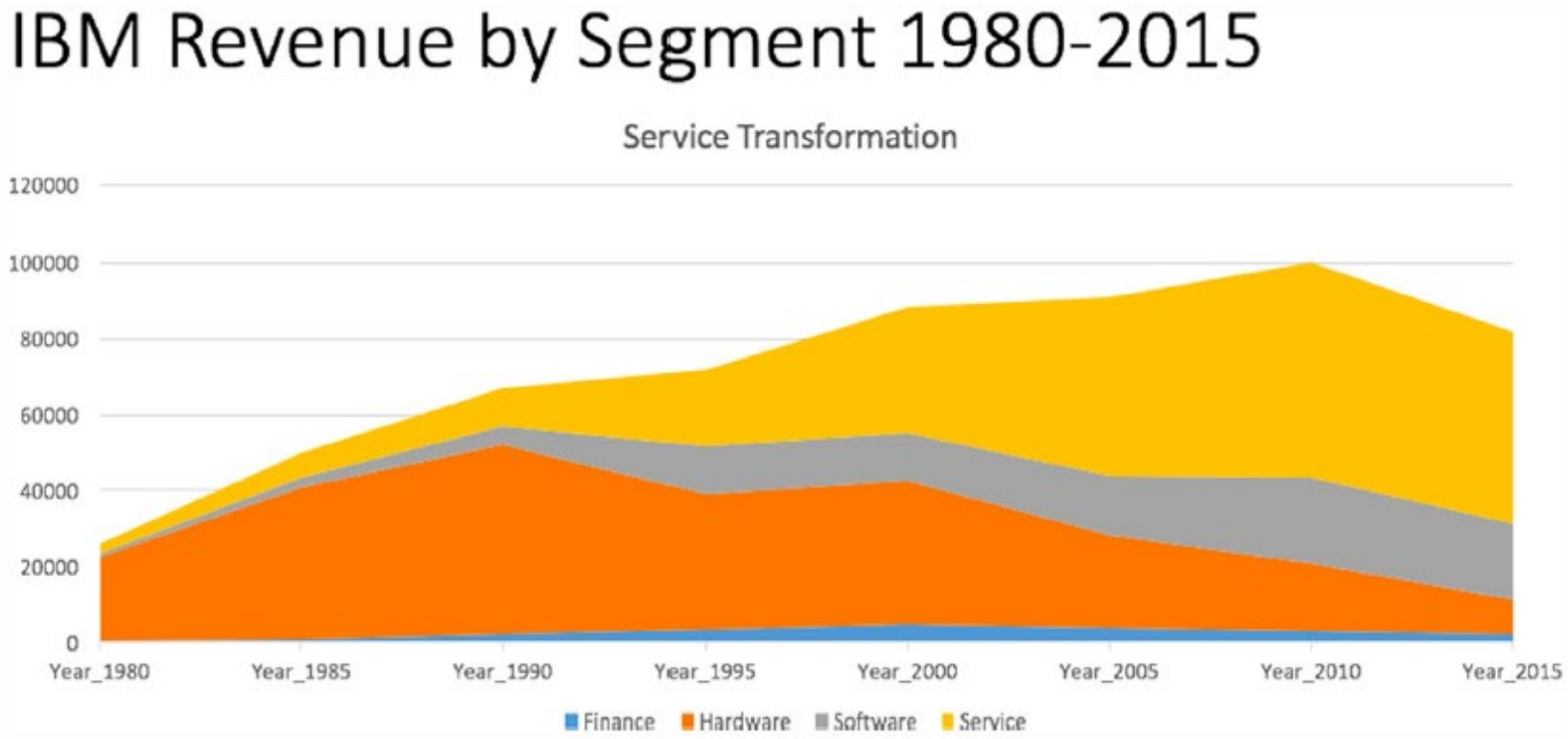
- Technology has different life expectency
- Advanced products comprise of a mix of HW, SW and Electronics – Services needed to ensure functionality (upgrades, maintenance etc).
- Incentive for manufacturers to retain ownership through life

http://srcelectronics.com/remanvalueprop/

RE START 0900

Are manufacturers becoming service providers and what are their arguments?

Service transition



Spohrer, J S (IBM Director) *IBM's service journey: A summary sketch* Industrial Marketing Management, (2017) 167-172

- **IBM from Hardware dominant to service dominant revenue streams**

Benefit from PSS as summarised by Annarelli et al (2016)

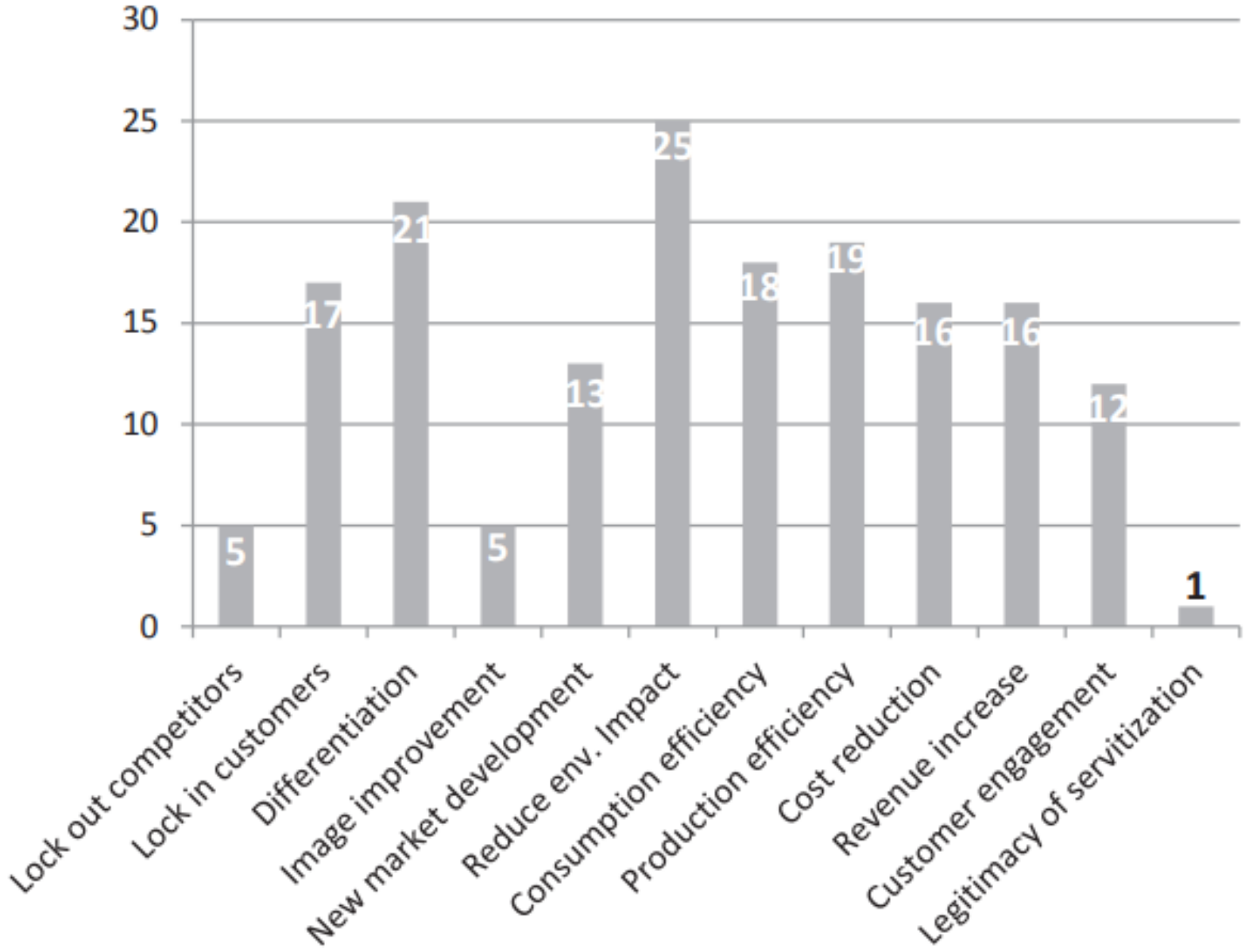


Fig. 4. Histogram of PSS benefits.

A. Annarelli et al. / Journal of Cleaner Production 139 (2016) 1011e1032

Product-Service Systems (PSS)

Basics of Product-Service Systems - PSS

- **“Product Service Systems, put simply, are when a firm offers a mix of both products and services, in comparison to the traditional focus on products”**

- **Also referred to as “Functional Product”, “Integrated Product Service Systems” etc.**

More Definitions of PSS

- PSS *” a system of products, services, supporting networks, and infrastructure that is designed to be competitive, satisfy customers' needs, and have a lower environmental impact than traditional business models"*[5]

- A PSS is pre-designed system of products, service, supporting infrastructures, and necessary networks that is a so-called *dematerialize* solution to consumer preferences and needs”

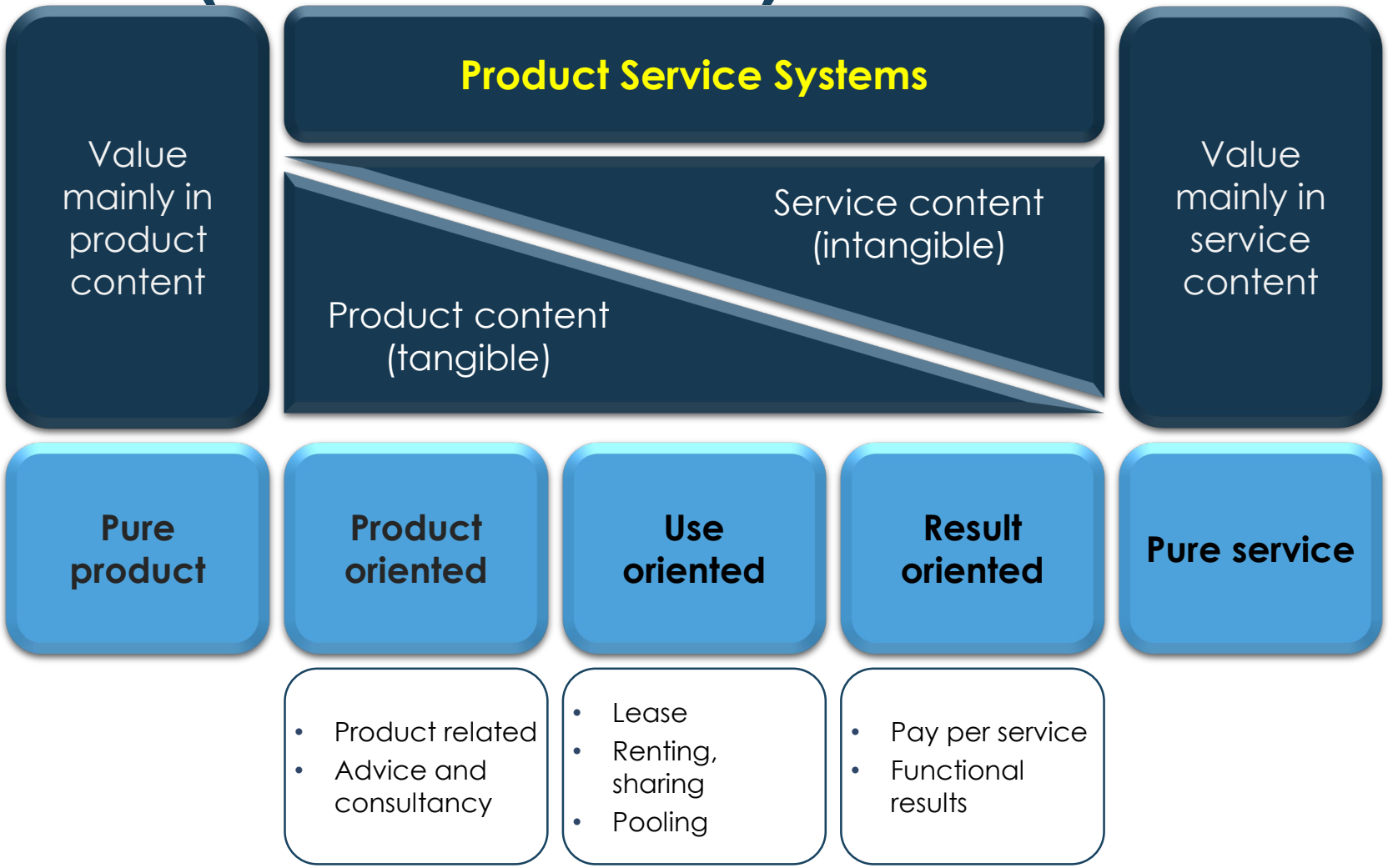
Mont, O., "Sustainable Services Systems (3S): Transition towards sustainability?"; Towards Sustainable Product Design, 6th International Conference, October 2001, Amsterdam, The Netherlands. Centre for Sustainable Design. 2001-11-09

A ”Service Landscape” terminology

- A **Product–Service System** is an integrated product and service offering that delivers value in use.
- **Servitization** involves the innovation of an organisation’s capabilities and processes so that it can better create mutual value through a shift from selling product to selling Product–Service Systems.
- A **Servitized Organisation** designs, builds and delivers one or more integrated product and service offerings that deliver value in use.
- The **Global Value System** is the globally distributed network of suppliers, customer and partners who have to co-operate to ensure that integrated product and service offerings deliver value in use.

Neely, A. Exploring the financial consequences of the servitization of manufacturing (2008).
Oper Manag Res 1, 103–118 https://doi.org/10.1007/s12063-009-0015-5

Different PSS (From Tukker)



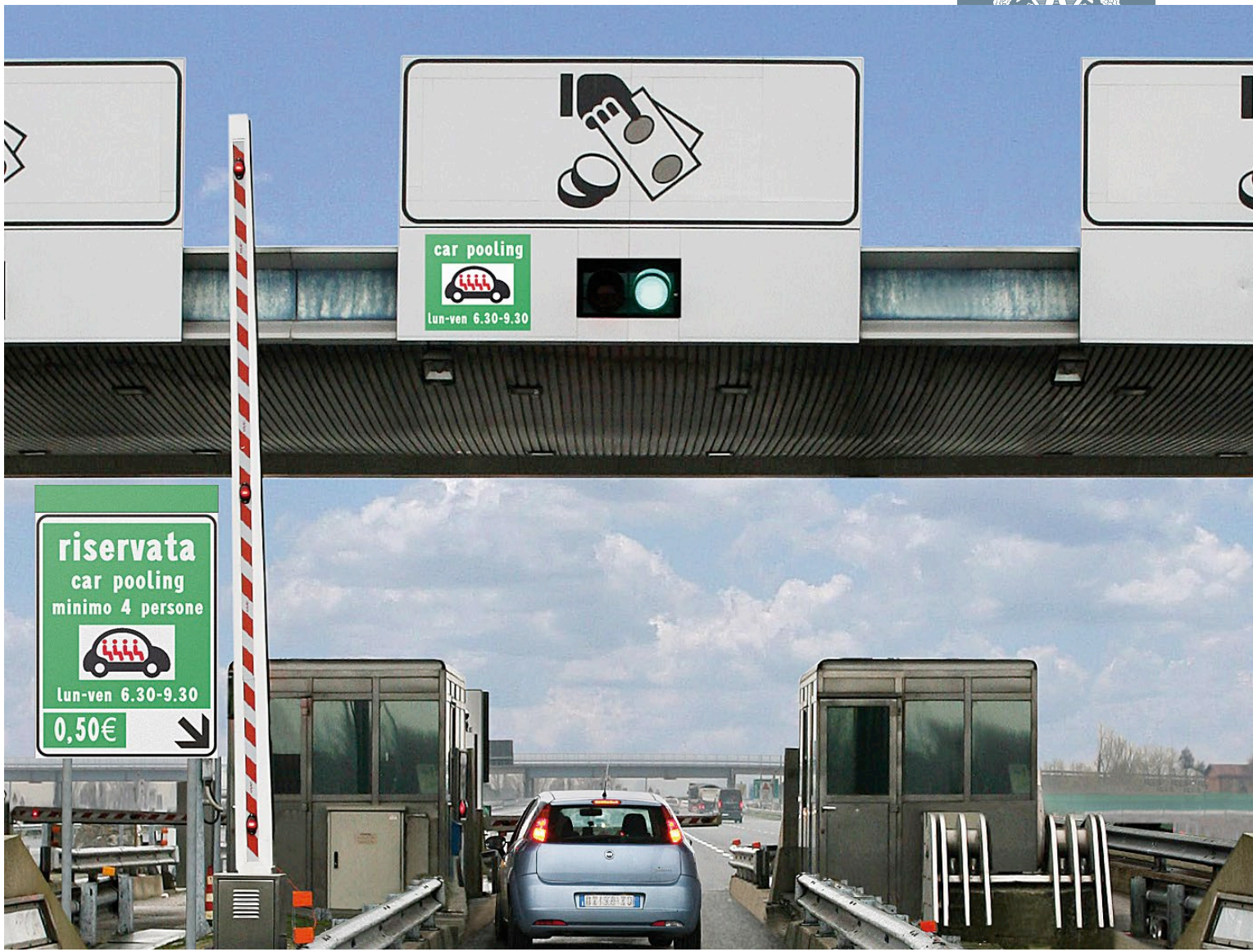
Product-oriented PSS

- Ownership of the tangible product is ***NOT*** transferred to the customer, while included in the original act of sale are additional services (e.g. maintenance, repair, re-use, recycling, training, consulting, etc.)

Use-oriented PSS

- Ownership of the tangible product is retained by the service provider.
- Functions of the product are sold via modified distribution and payment systems

- **Carpooling.com** enabled drivers to offer available seats and passengers to book a ride. People choose who they want to ride with, how much space they need, and what they are willing to pay.



Result-oriented PSS

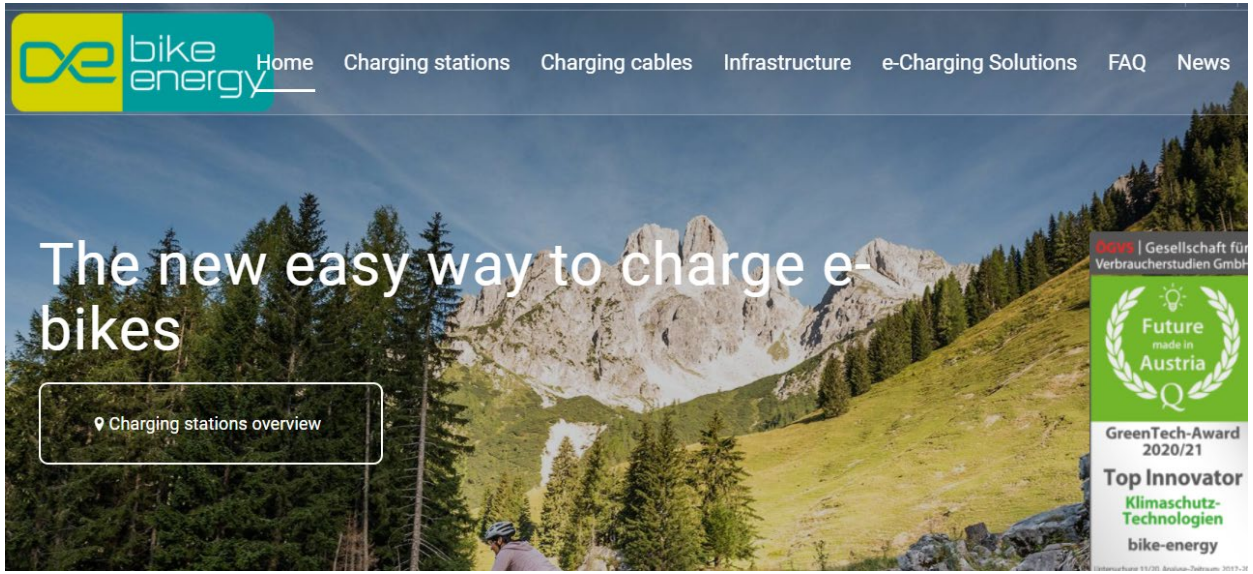
- Selling the result or capability instead of a product
- The producer maintains ownership of the product and the customer pays only for the provision of agreed results

- **Zipcar** provided a fleet of cars strategically located around the city. Users access the cars with a smart card, paid for in advance. They can either pay a fixed hourly fee or a membership programme **that bills for actual use**.

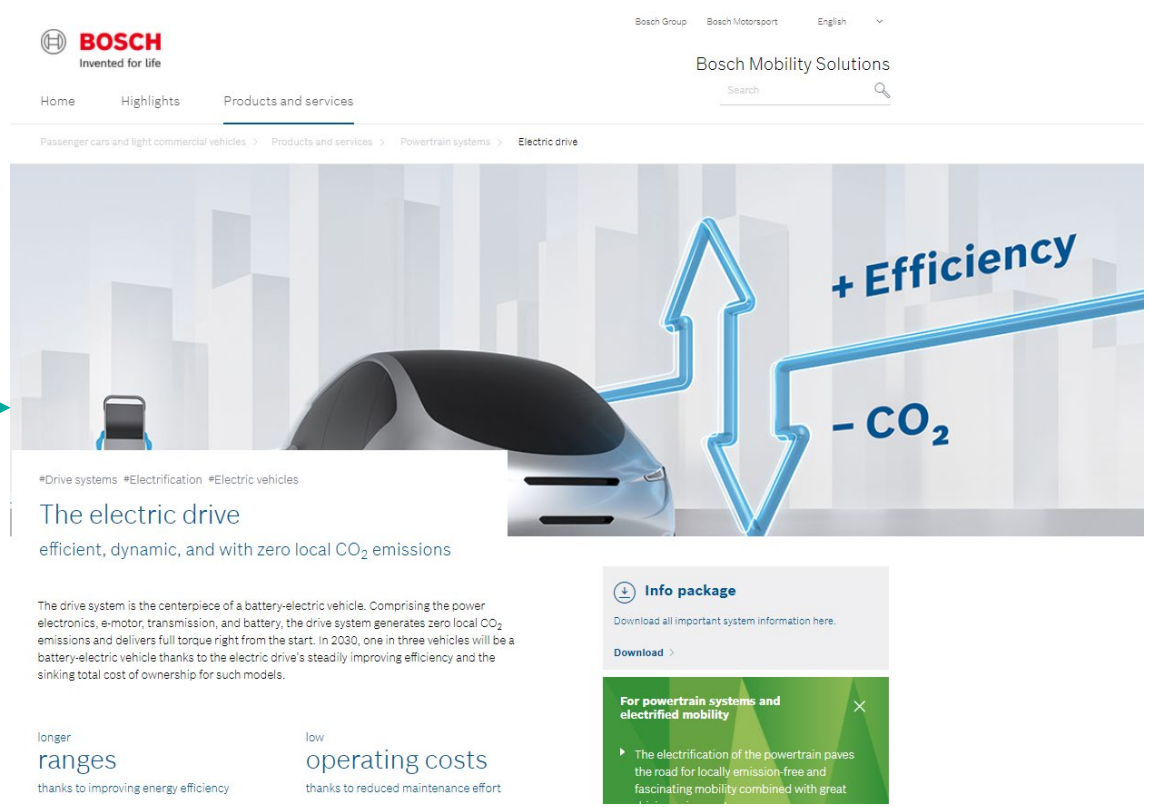
Implications for manufacturers

Introduction of services ”opens” opportunies (innovation, revenue..) and bring

”threats” (accountability, cost) through lifecycle of products and new competitors



Role between manufactures can change



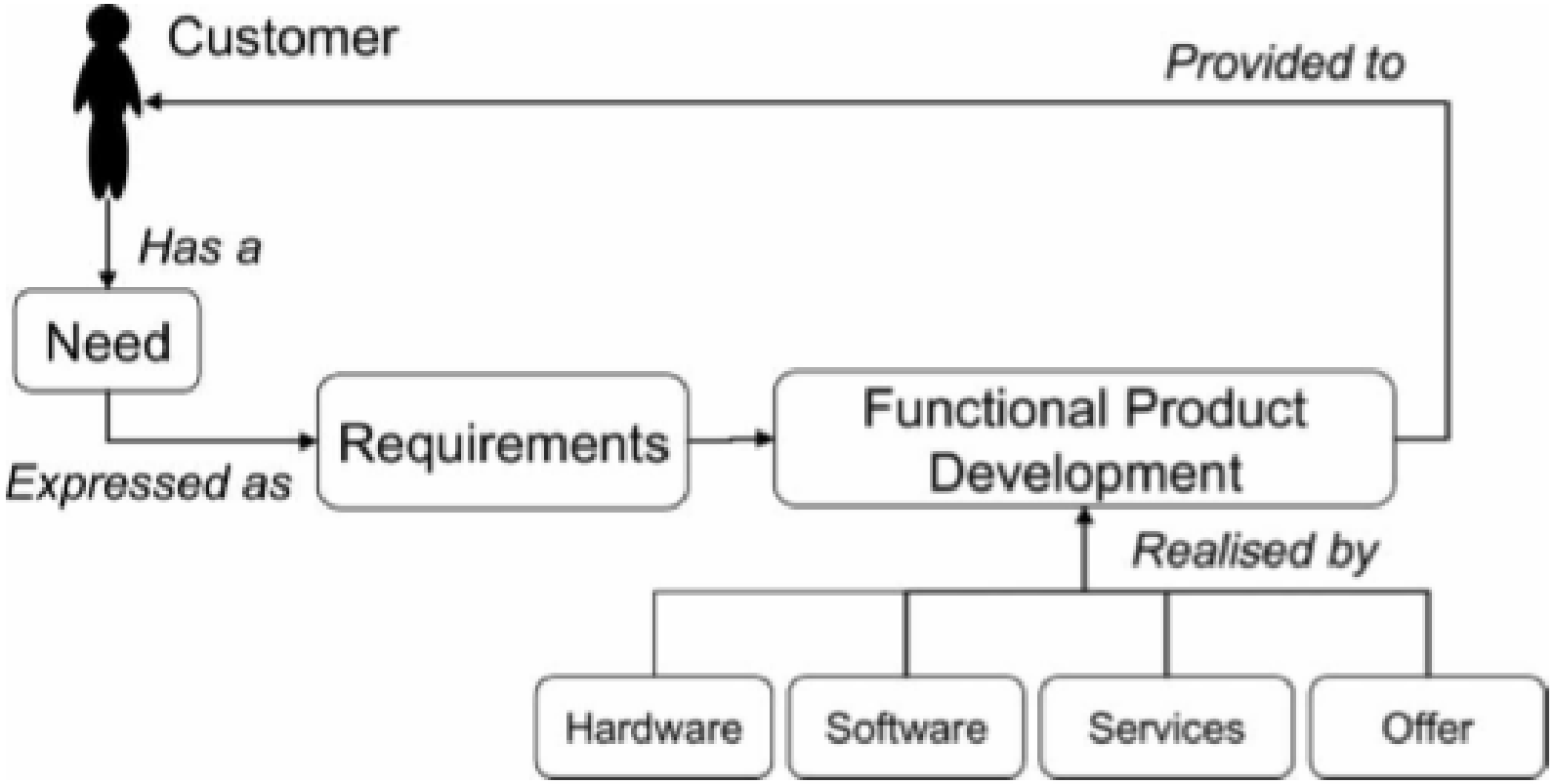
E.g. a generator supplier may become a powertrain solution provider in automotive.

Powertrain is considered as core technology for automotive manufactures

Implications, cont

- Retained ownership of products
  - Increased responsibility through product life
    - May have a high economic impact and risk
  - Possiblities for re-manufacturing
    - Opening for ”smart” and ”circular” business
    - Where and how to remanufacture? Logistics, Design, ..?
  - Changed revenue-streams
    - ”Spare parts sales” not a good source of revenue
  - Opportunities for technology changes post-manufacturing
    - Can replace systematically obsolete or poor technologies
    - Can extend life through technology replacement and upgrades

Manufacturers expected to develop ”Solutions”

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Development of product-service systems: challenges and opportunities for the manufacturing firm

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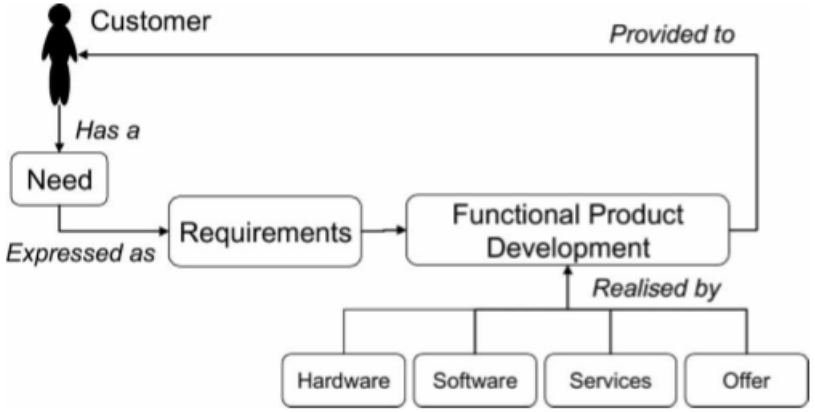
.. but struggle with including SW and even more Services into the logics



Means to enable PSS development will be treated in more depth at a coming lecture

Massimo will present some techniques for service design tomorrow Friday – Ola on the next lecture on Developing PSS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Summary

Servitization is slowly increasing in importance, and shift the focus from ownership to use of resources, equipment, products

- **This increases incentives for Manufacturers to ”own” their products over time**
- **Opens for ”re-manufacturing”, ”Maintenance”, Availability services, leasing, …**
- **Also a ”mind shift” challenge for classical manufacturing**
  - **Need to adapt and change in industry**

References

In addition to course literature, material in this lecture was derived from

- Hallstedt, S. I., Isaksson, O., & Öhrwall Rönnbäck, A. (2020). The Need for New Product Development Capabilities from Digitalization, Sustainability, and Servitization Trends. *Sustainability*, *12*(23), 10222., Available on line
- Neely, A. Exploring the financial consequences of the servitization of manufacturing (2008). *Oper Manag Res* **1,** 103–118 https://doi.org/10.1007/s12063-009-0015-5 Available on line
- Annarelli, A., Battistella, C., & Nonino, F. (2016). Product service system: A conceptual framework from a systematic review. *Journal of Cleaner Production*, *139*, 1011-1032. Access here
- Mont, O., "Sustainable Services Systems (3S): Transition towards sustainability?"; Towards Sustainable Product Design, 6th International Conference, October 2001, Amsterdam, The Netherlands. Centre for Sustainable Design. 2001-11-09