

SE:Kond2LIFE - WP-1a

# Efficient remanufacturing of car parts

Erik Sundin and Jelena Kurilova-Palisaitiene

Division of Environmental Technology and Management

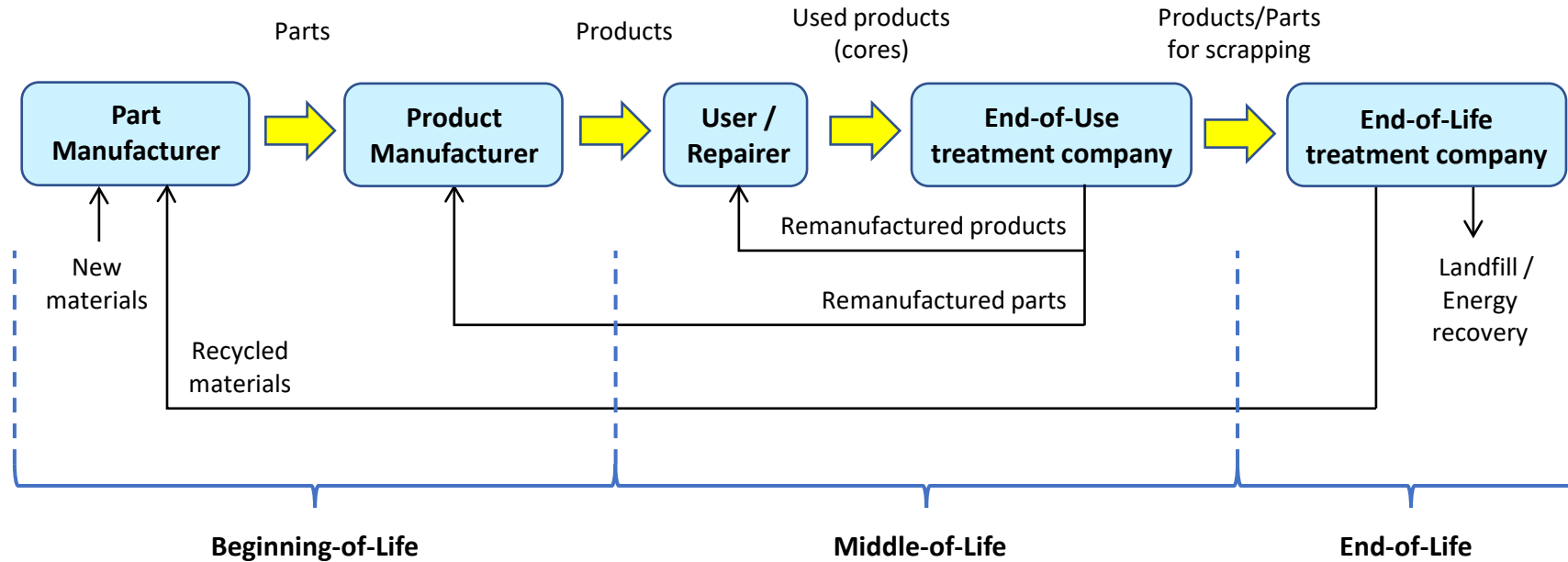
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

Linköping University, Sweden

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# The product life cycle



*Legend:*  
 = Forward (linear) material flows  
 = Reverse material flows

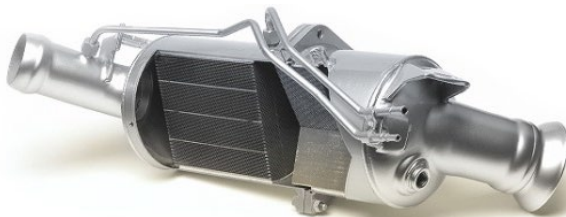




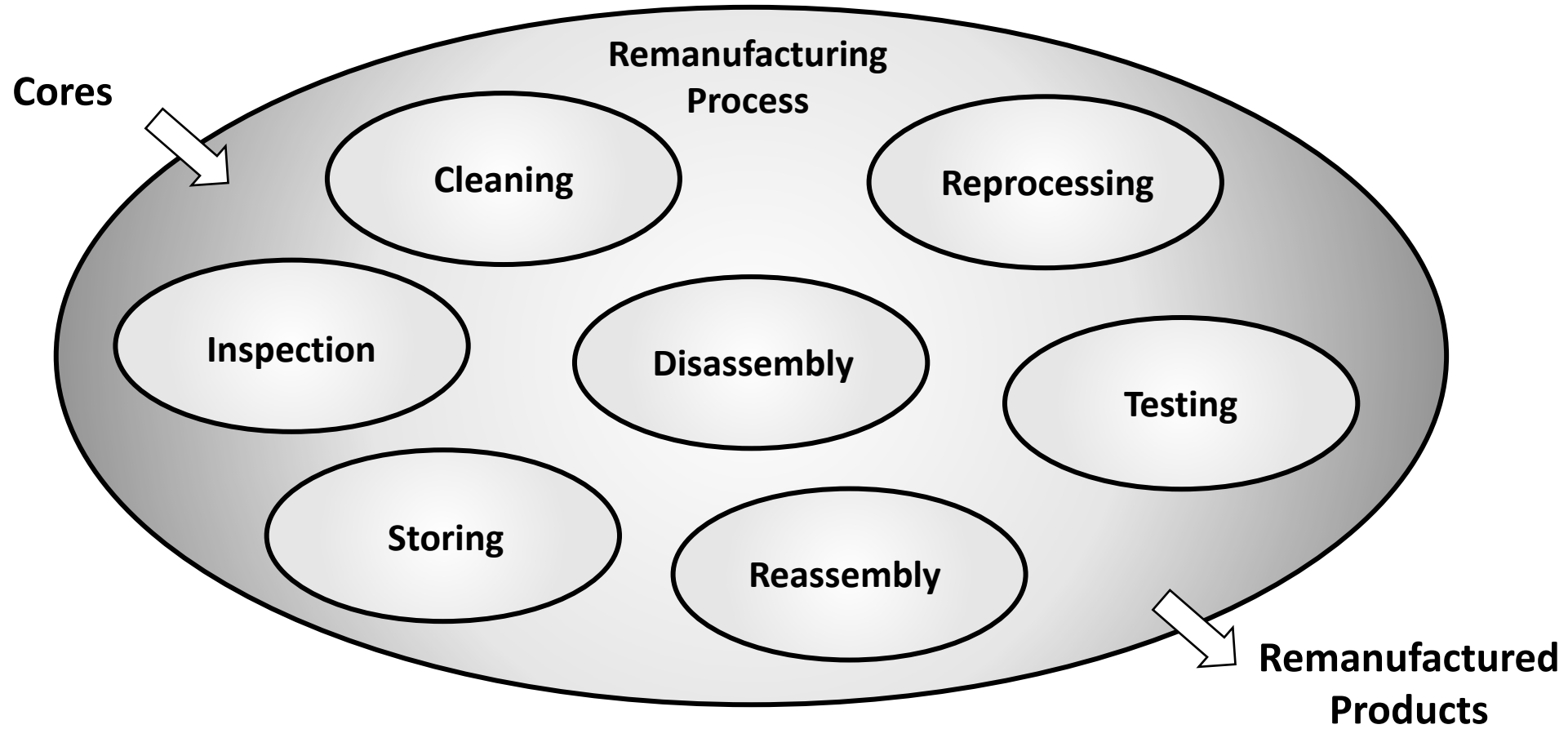
# What is remanufacturing?

**Remanufacturing (sv. återtillverkning)** means that you take a used product and restore it to like-new or better-than-new condition in an industrial process.

This could mean for a whole product or only a part of a product - e.g. a diesel particle filter or brake caliper from a car.

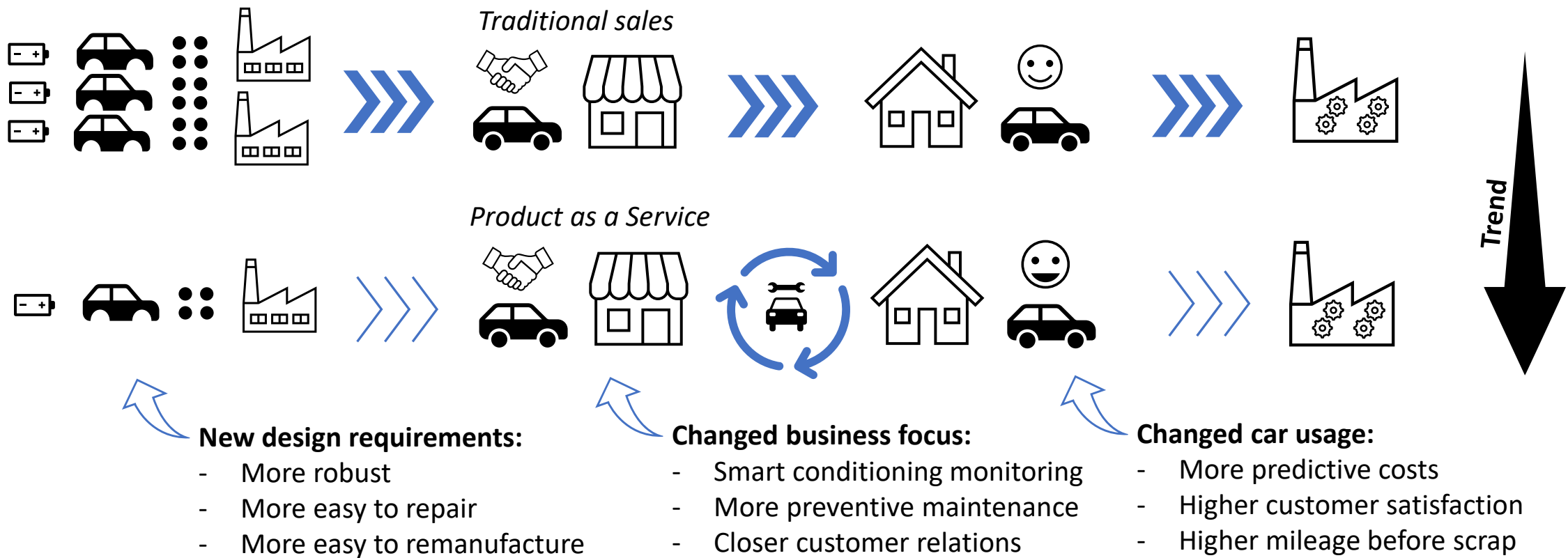


# What is remanufacturing?



# Product as a Service (PaaS)

## Changes in product and component flows



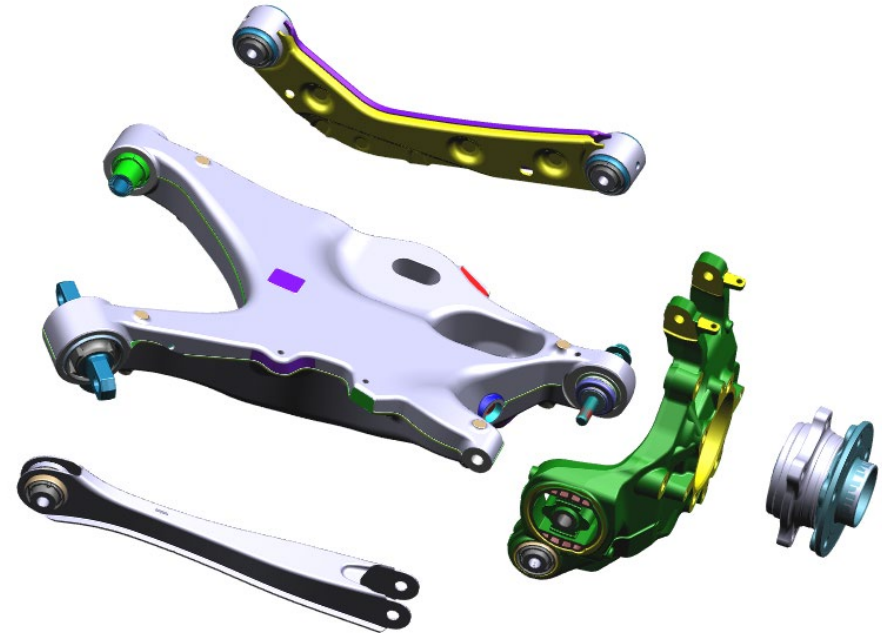
# WP-1a - Efficient remanufacturing of car parts

**Goal:** to plan and develop time- and cost-efficient processes and systems

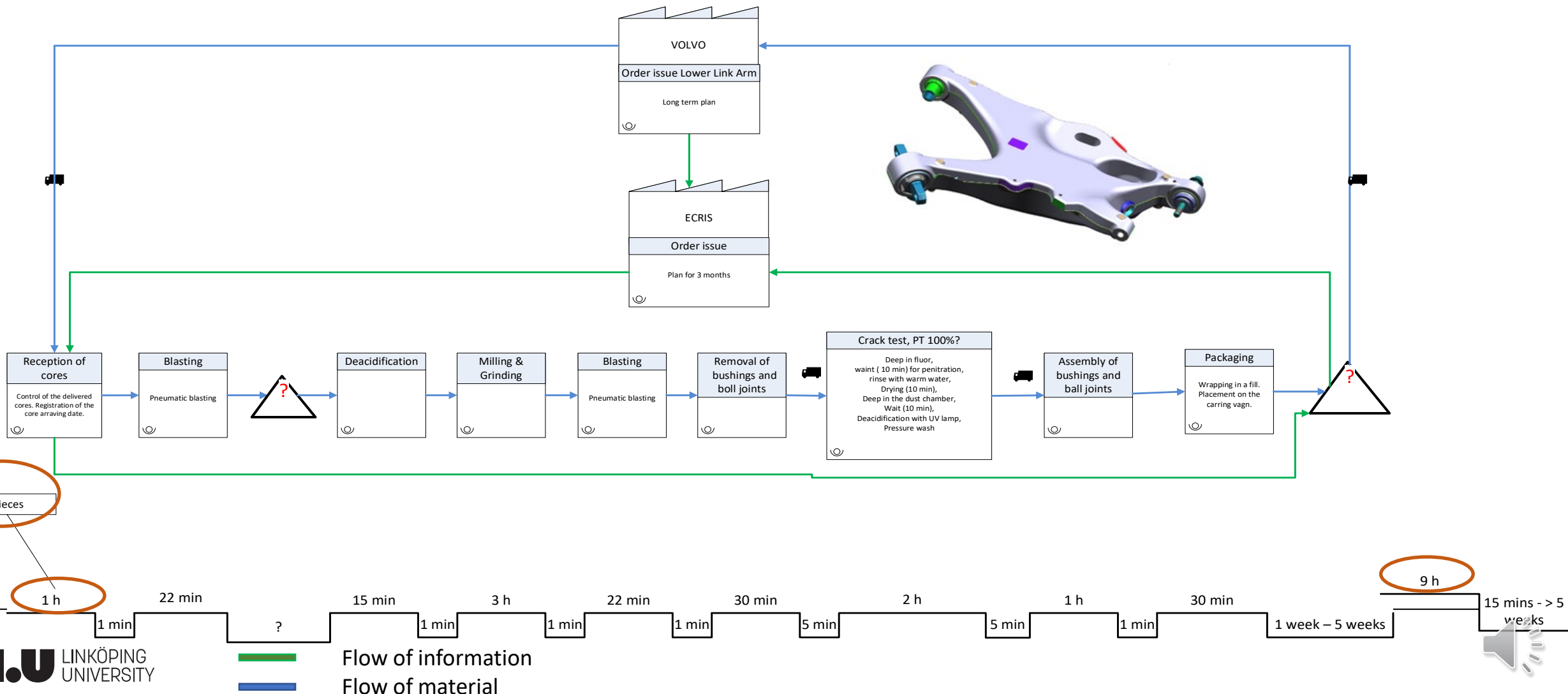
## Existing systems:

The systems at ECRIS and JB are well-functioning and efficient due to:

- High competence to remanufacture
- Well-established reverse logistics
- Access to original car part drawings
- Good access to spare parts
- Loyal to the original equipment manufacturer (OEM): Volvo Cars



# Value Stream Mapping of Link arm



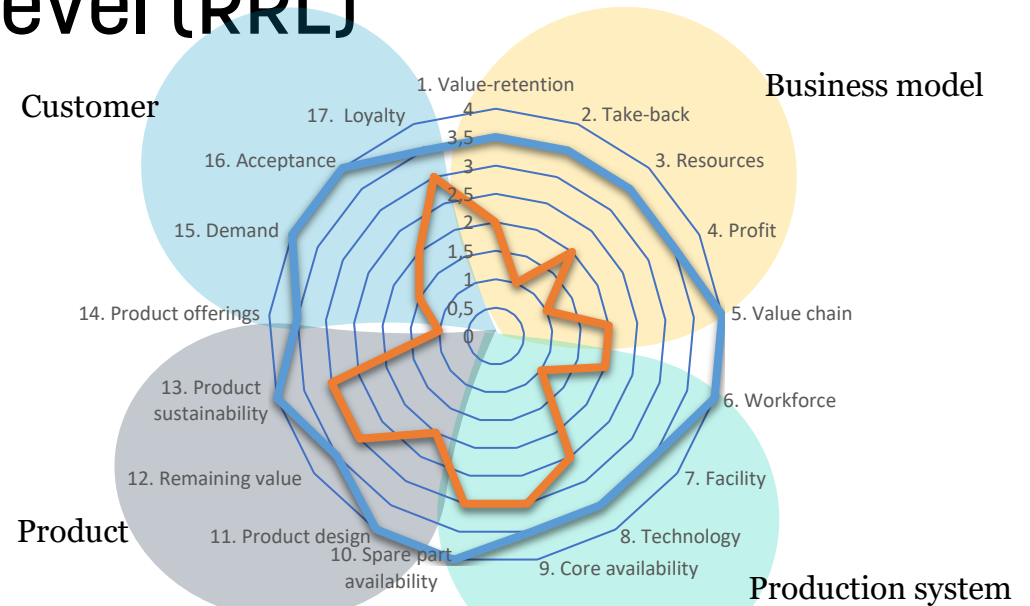
# REMOMETER®

## Remanufacturing Readiness Level (RRL)

2 hour-assessment of a manufacturer's/product owner's remanufacturing potential/maturity in:

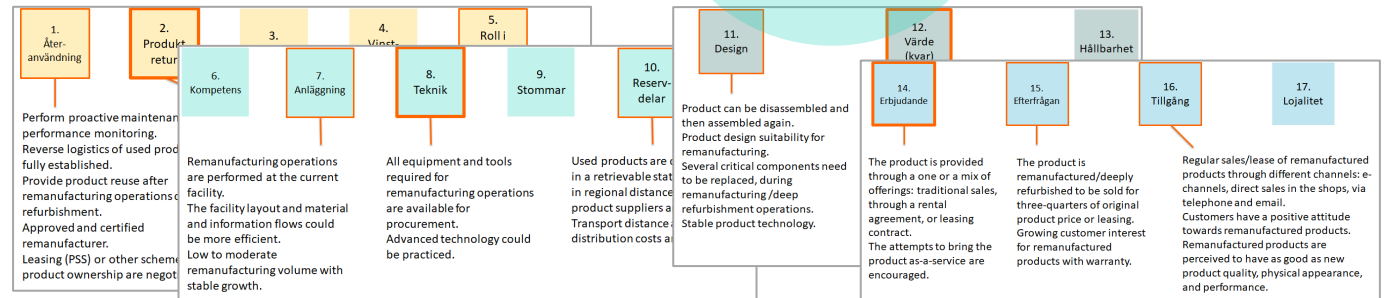
- Business model
- Production system
- Product
- Customer

to identify strengths and weaknesses to focus on.



### REMOMETER®

A decision support tool on how remanufacturing can become a key to a manufacturer's strategy towards CE by Jelena Kurilova-Palisaitiene  
 jelena.kurilova@liu.se  
 www.remometer.com





# Future electric vehicle remanufactured parts

Attributes for selecting future remanufacturing parts:

## Economic

Market

Price/Value

Economic lifetime

Remanufacturing volumes

Collaboration with:

- Part supplier (OEM)

- Insurance company

Core collection costs

## Technology

Remanufacturability:

- Accessibility

- Disassemblability

- Testability

- Robustness

- Affinity/Originality

- Backward compatibility

High quality/Technical lifetime

Access to spare parts

## Environment

Material scarcity

Material and weight

Resource efficiency

Climate impact

Transport possibilities



## Disassembly of a Volvo XC90 T8 (Hybrid, year 2019)

Car part	Economic	Technology	Environment	
<b>1. Engine</b>	High value, need	High quality, possible to disassem.	Neodym, Energy use(?)	} Interesting parts but what are the requirements and who can reman them?
2. Inverter	High value	High quality, possible to disassem.	Gold and copper	
3. Charger	OK value	High quality, possible to disassem.	Gold and copper	
<b>4. Link arm (lower)</b>	OK value	Possible to disassemble	Aluminum	
<b>5. Spindle</b>	OK value, need	Possible to disassemble, NDT	Aluminum	
6. Nave				} Traditional remanufacturing
7. Link arm (upper)			Sheet metal	
8. Strut			Sheet metal	
9. Support frame				
10. Console				



# Future remanufacturing of engines

Engines have a high value, long lifetime, high volumes which makes them likely to be remanufactured in the future. Aspects to consider:

1. Product development and manufacturing at Volvo Cars needs to consider repairs, disassembly and remanufacturing of electric engines
2. Set remanufacturing requirements on electric engines
3. Cooperation between actors (suppliers, manufacturers, workshops, remanufacturers, dismantlers, insurance companies) in the value network
4. Sharing the responsibility among the actors in the value network to build up an efficient remanufacturing of electric engines
5. Sharing profit and cost among the actors in the value network
6. Study environmental aspects at system level



# Open for collaboration regarding remanufacturing

## Subjects:

- Starting up remanufacturing
- Making remanufacturing efficient
- Economic evaluations of remanufacturing
- Life cycle assessments of remanufacturing
- Design for remanufacturing

## Methods:

- RIFF / RemPro
- REMOMETER
- MiniMIFA
- 5AFIR



**Erik Sundin**

Tel: 013-286601

E-mail: [erik.sundin@liu.se](mailto:erik.sundin@liu.se)

Web: <https://liu.se/medarbetare/erisu71>



**Jelena Kurilova-Palisaitiene**

Tel: 013-282714

E-mail: [jelena.kurilova@liu.se](mailto:jelena.kurilova@liu.se)

Web: <https://liu.se/medarbetare/jelku39>



**Johan Vogt Duberg**

Tel: 013-286892

E-mail: [johan.vogt.duberg@liu.se](mailto:johan.vogt.duberg@liu.se)

Web: <https://liu.se/medarbetare/johvo34>







# Thanks for listening!

Erik Sundin and Jelena Kurilova-Palisaitiene

Division of Environmental Technology and Management

Department of Management and Engineering

Linköping University, Sweden

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