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# Measuring and Monitoring Progress Towards the Circular Economy - Application to the Heavy Vehicle Industry

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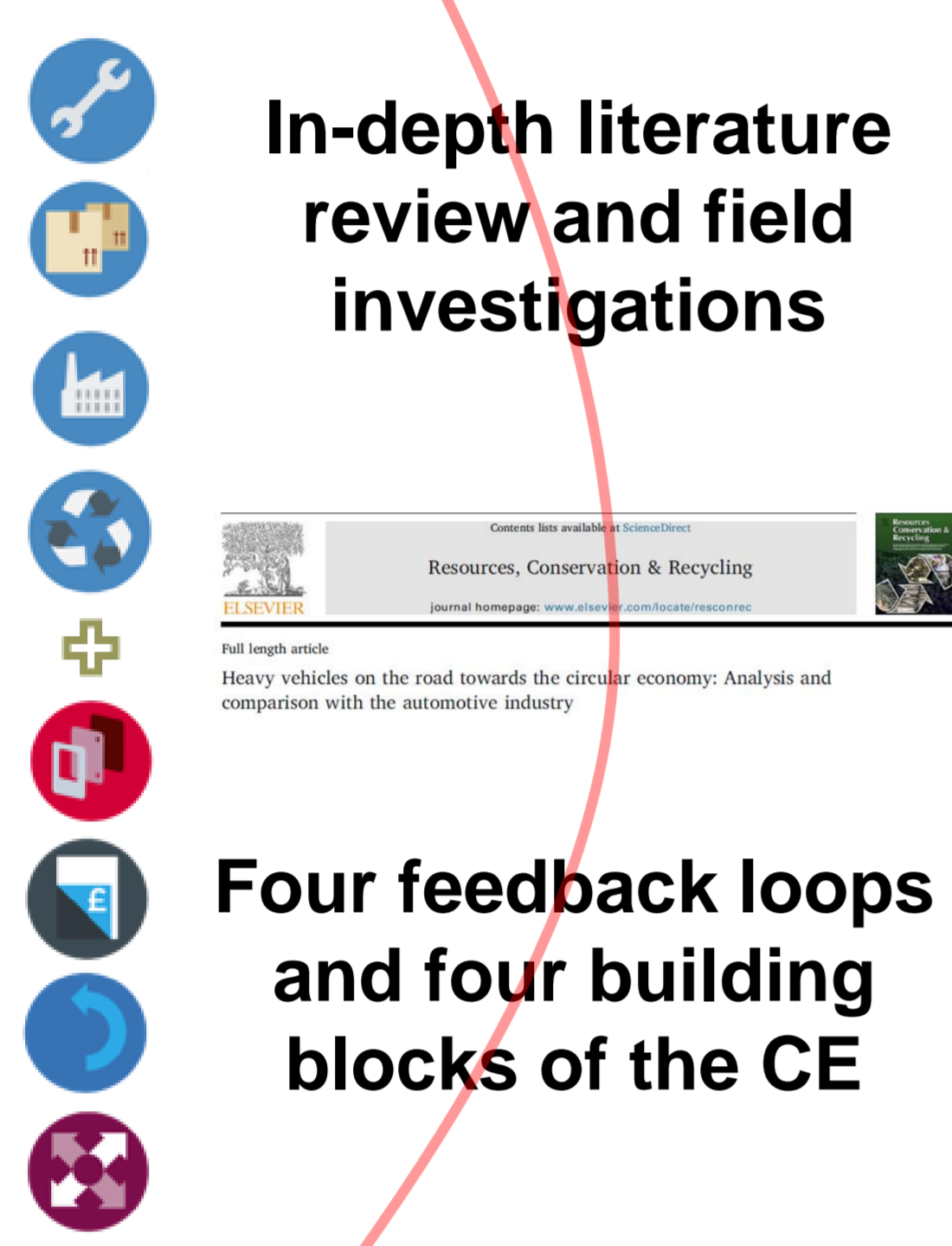
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**Towards a Circular Economy of Heavy Vehicles**

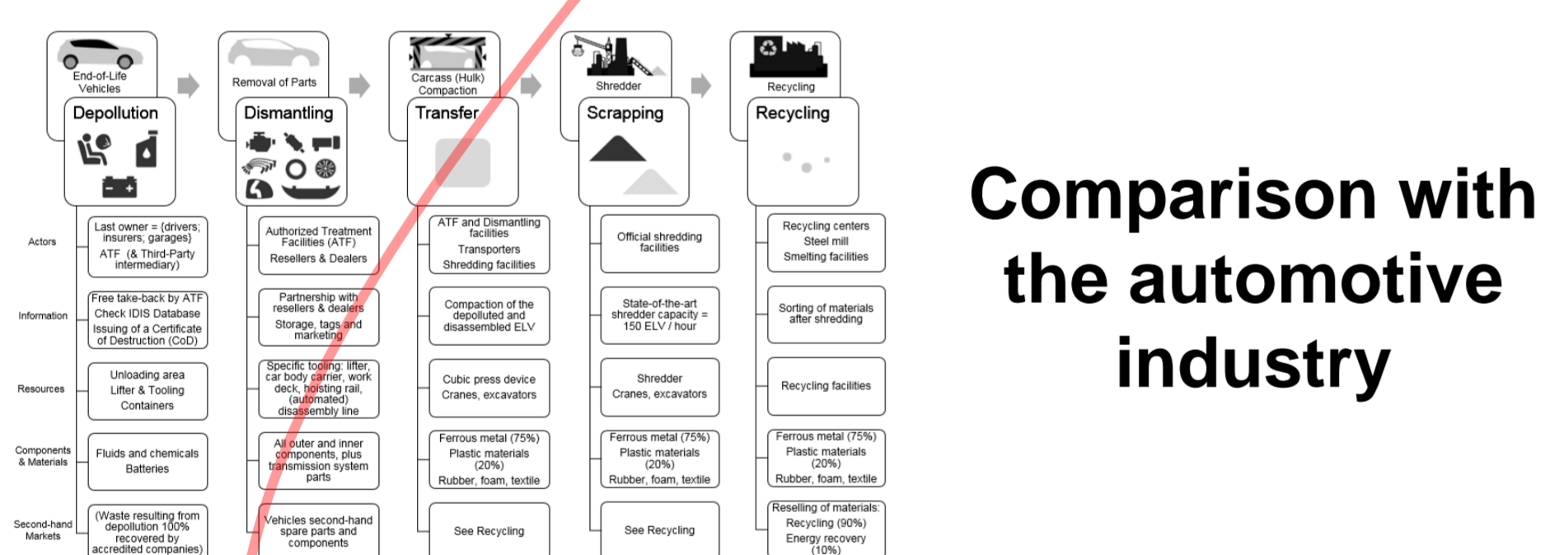
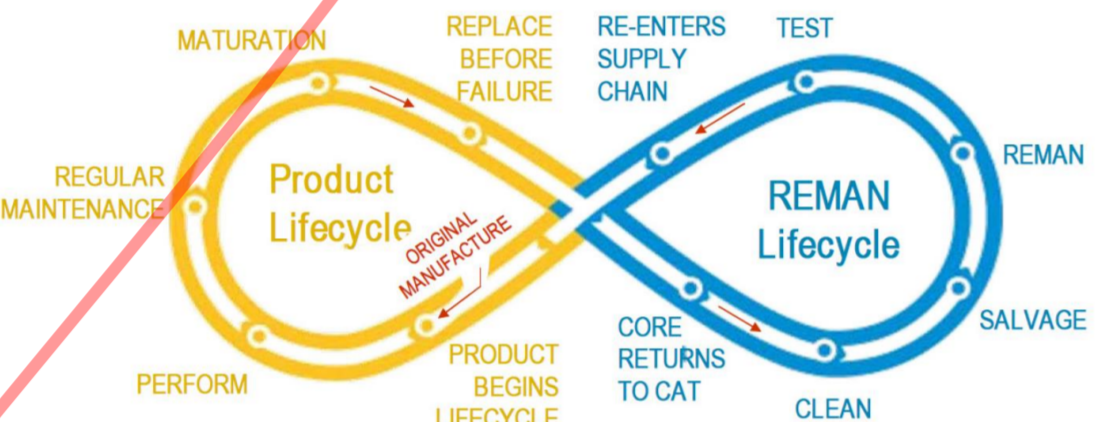


Absence of EoL regulations, lack of infrastructures, illegal exports, env. burden, eco. loss, etc.

- Resources used
- Desk-based research
  - Field-based research
  - Research papers
  - Reports
  - Regulations
  - Websites
  - Databases
  - Internship
  - Interviews:
    - in person during planned meetings;
    - by audio;
  - Site visits
  - Thematic day: conference and workshop



Identification of best practices and key action levers to close-the-loop



**Application on an industrial pilot study with Manitou Reman**

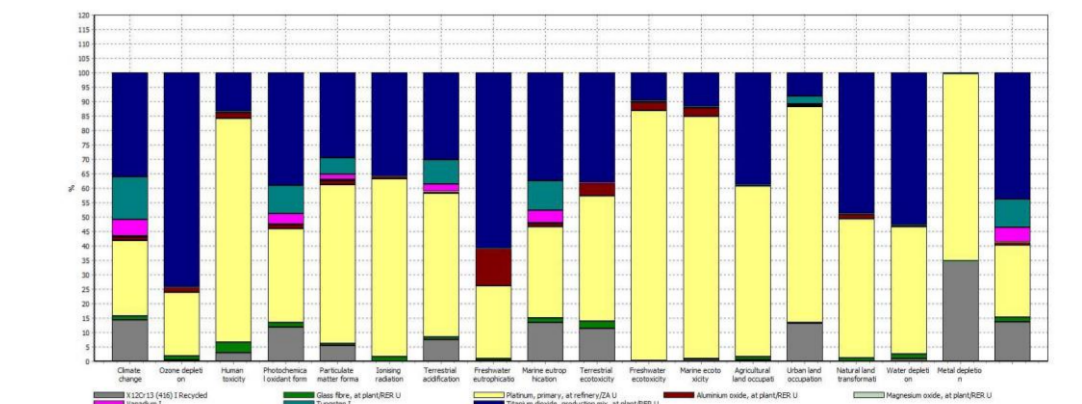
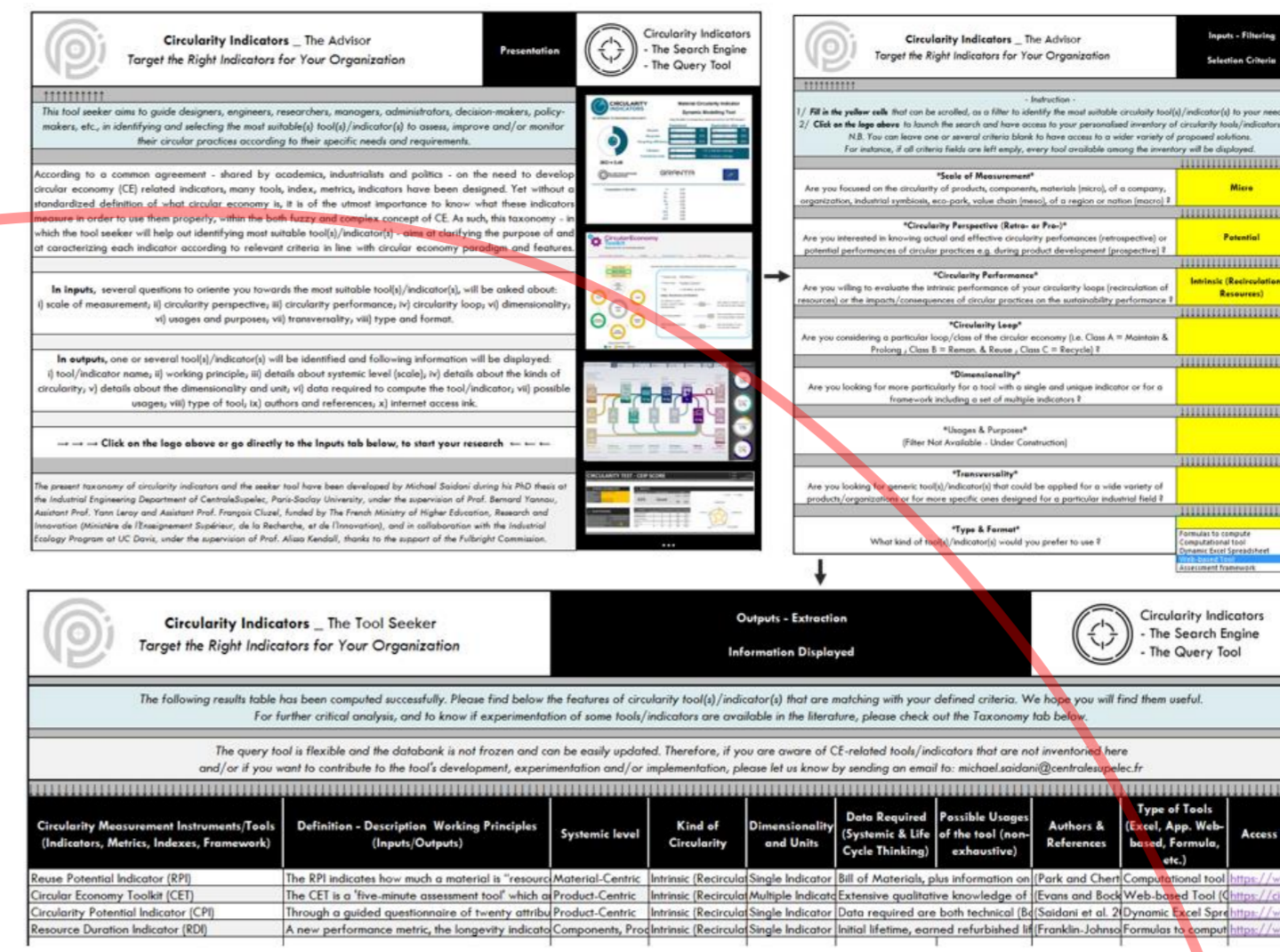
Features of the brand new heavy vehicle	Features of the used heavy vehicle	Economic and environmental costs of the dismantling operations
Parts breakdown	Bill of materials with mass, components geographical origin, production price and brand new selling price	Current stock vs. monthly sale
		Economic and environmental comparison between reuse, remanufacturing and recycling, for each component, where possible
		Selected end-of-life option

Eco, env, tech, org, analysis of the reconditioning of a used machine



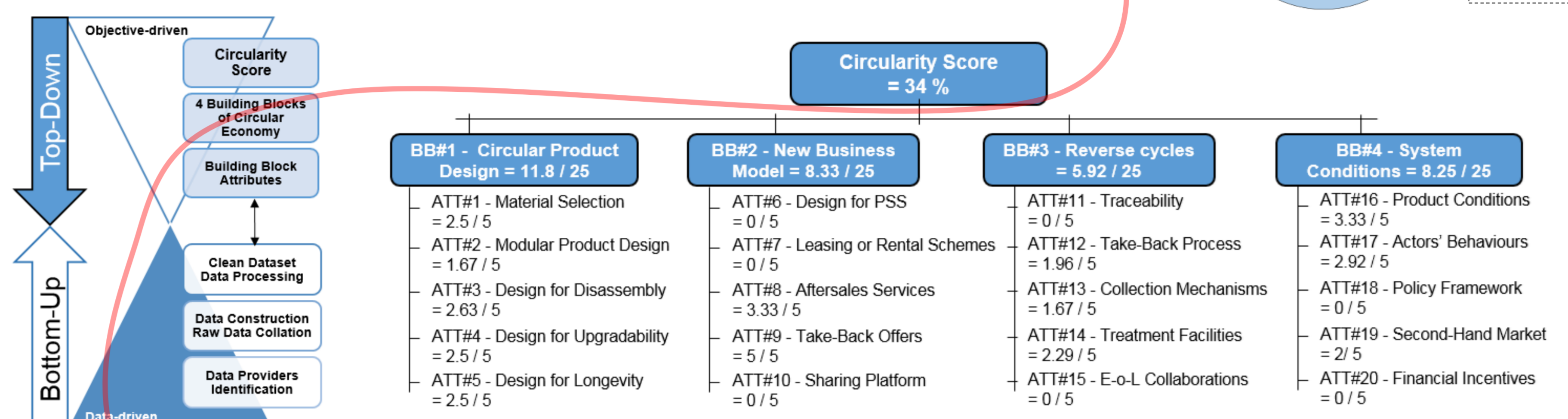
**Assess - Circularity Indicators adapted to Designers and Industrialists**

Important degree of fuzziness and limitations  
 Growing number of circularity indicators



Life-Cycle Impact Assessment

Need-based taxonomy of 50 sets of CI  
 "CI: The Advisor" Excel-based query tool

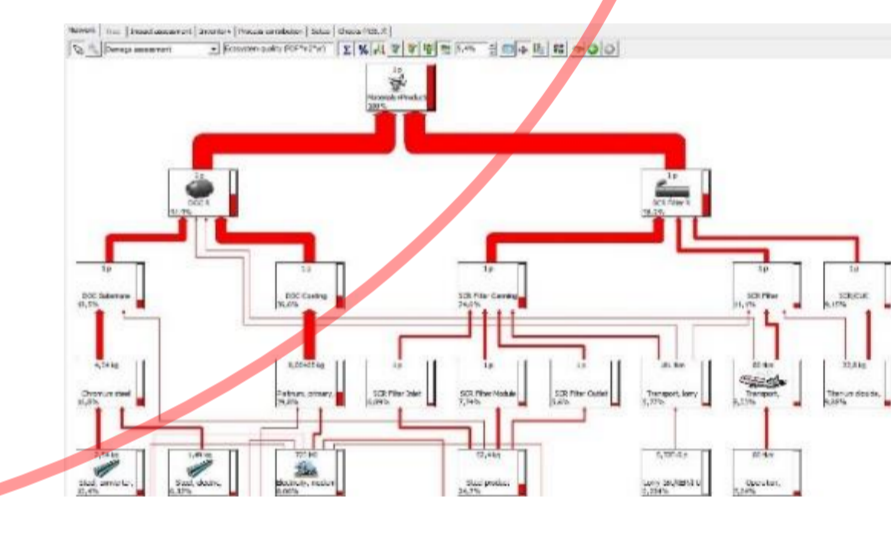
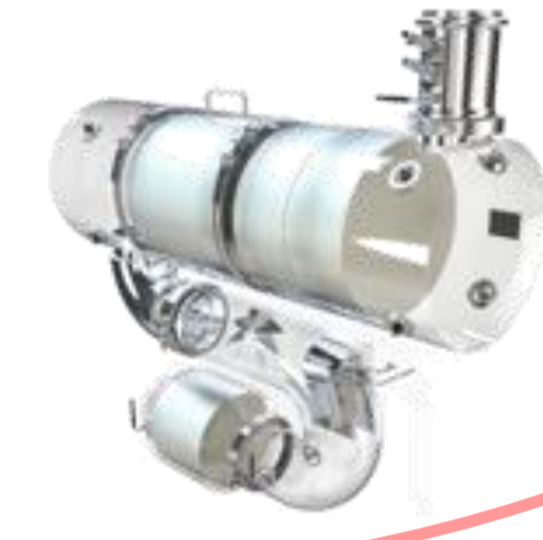
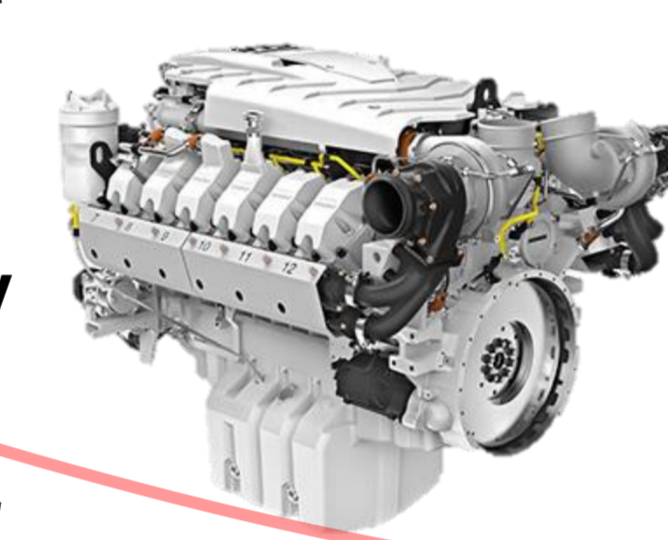


Development of a Circularity Potential Indicator, including 20 attributes, based on the 4 building blocks of the CE



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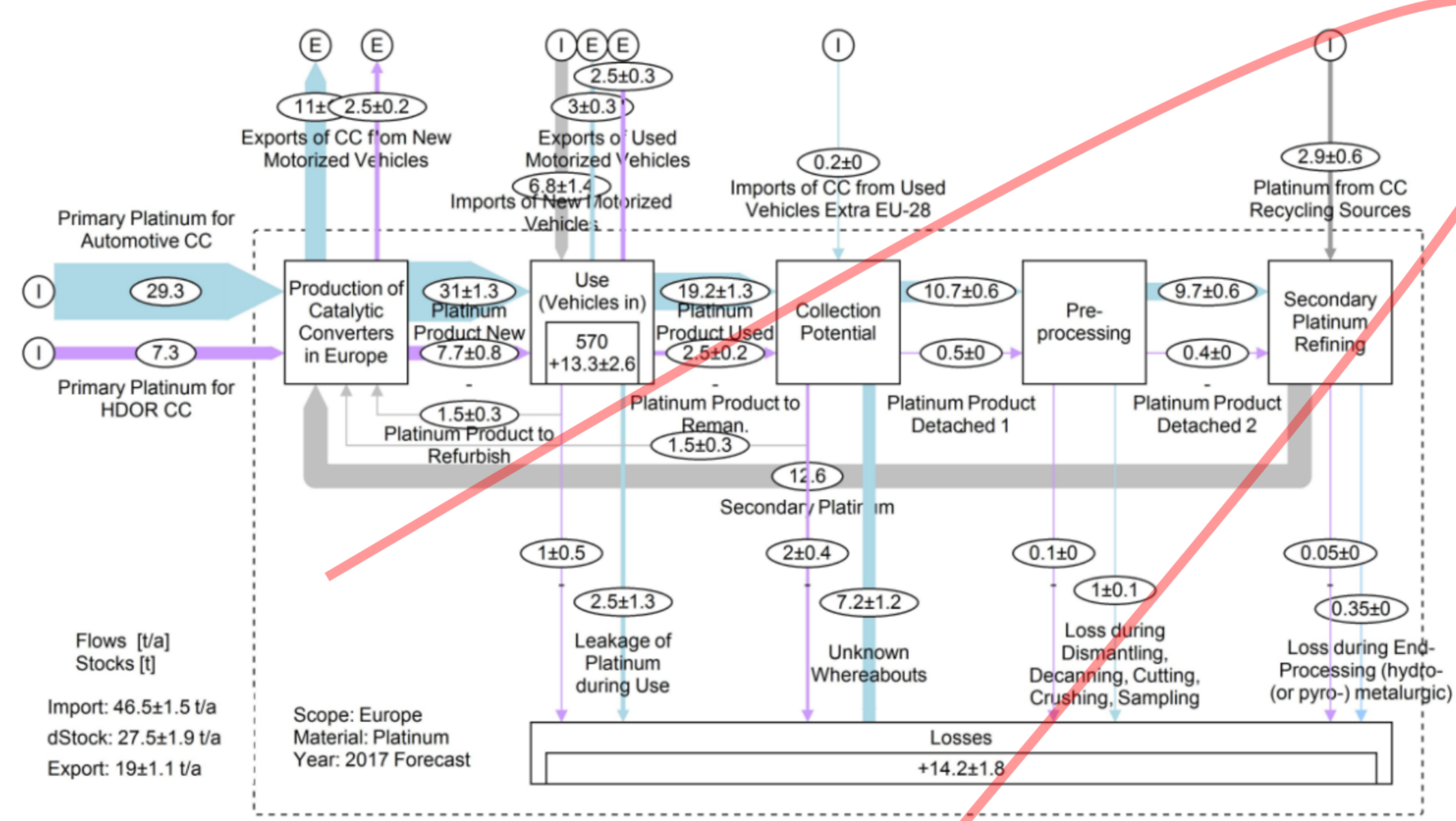
Application on an Industrial Case Study



System Modeling

**Improve - How to "Close-the-Loop" on Platinum from Catalytic Converters?**

Highlight of important economic and environmental value buckets for European stakeholders



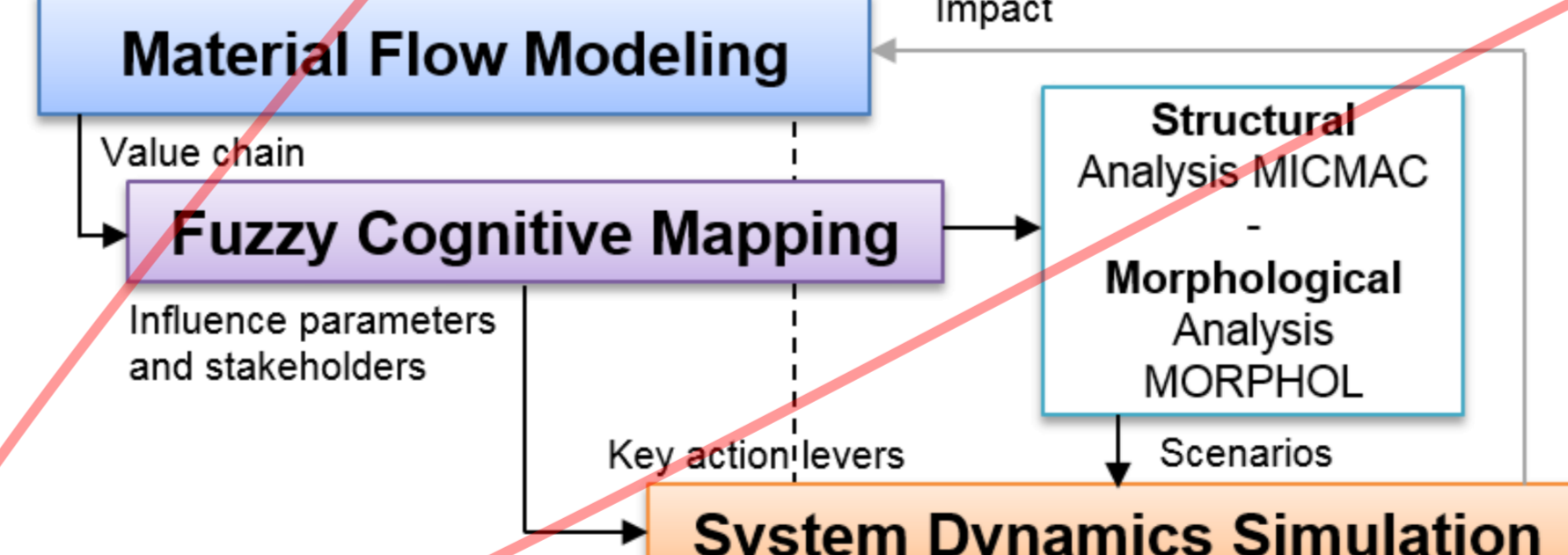
12th Society And Materials International Conference

2017 Joint Conference ISIE and ISSST

Presentations at French & International Conferences

IF Steelman, m2p, ArcelorMittal, SAM 12

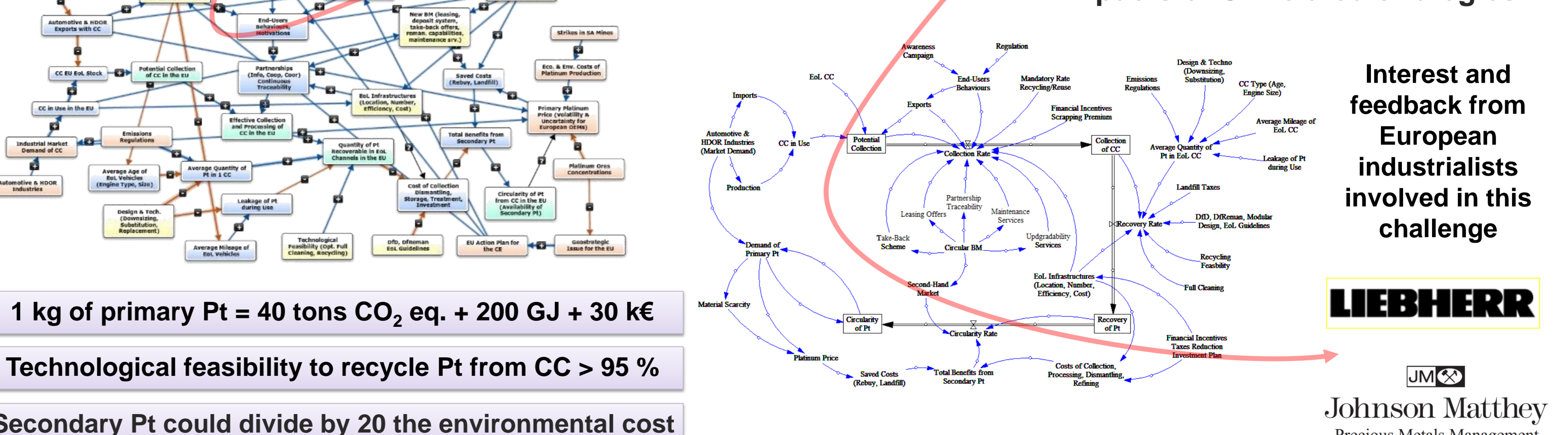
Designing a multi-tool method to model and simulate circularity performance



Liste des variables

Variable	Unit	Impact
1. Recycled Content (CC in EU)	%	High
2. Quality of Pt recovered from CC	%	High
3. Quantity of Pt recovered from CC	kg	High
4. Quantity of Pt in CC in EU	kg	High
5. Amount of Pt recovered from CC	kg	High
6. CC in EU	kg	High
7. CC in EU (incl. Pt)	kg	High
8. CC in EU (incl. Pt) (incl. Pt)	kg	High
9. CC in EU (incl. Pt) (incl. Pt) (incl. Pt)	kg	High
10. CC in EU (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt)	kg	High
11. CC in EU (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt)	kg	High
12. CC in EU (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt)	kg	High
13. CC in EU (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt)	kg	High
14. CC in EU (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt)	kg	High
15. CC in EU (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt)	kg	High
16. CC in EU (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt)	kg	High
17. CC in EU (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt)	kg	High
18. CC in EU (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt)	kg	High
19. CC in EU (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt)	kg	High
20. CC in EU (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt) (incl. Pt)	kg	High

"What if?" scenarios to evaluate the environmental and economic impacts of CE related strategies



- 1 kg of primary Pt = 40 tons CO<sub>2</sub> eq. + 200 GJ + 30 k€
- Technological feasibility to recycle Pt from CC > 95 %
- Secondary Pt could divide by 20 the environmental cost

Interest and feedback from European industrialists involved in this challenge

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Johnson Matthey Precious Metals Management