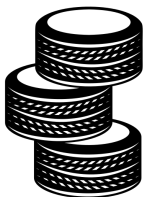




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Mapping the tire supply chain and its microplastics emissions using a multi-stakeholder approach



Sya Hoeke, Jikke van Wijnen, Harold Krikke, Ansje Löhr & Ad Ragas

sya.hoeke@ou.nl



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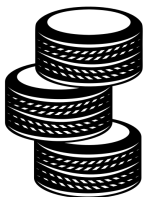
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Mapping the tire supply chain microplastics emissions using stakeholder approach



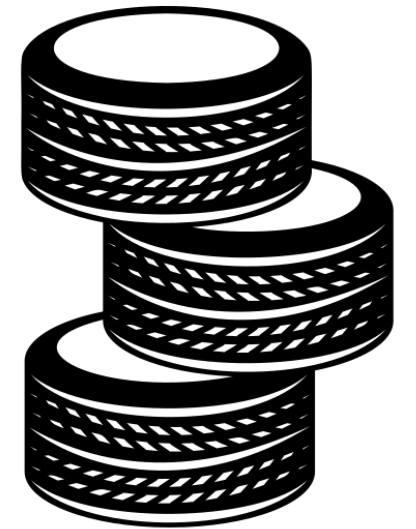
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THE PROBLEM

- Tire and road wear particles are one of the main causes of microplastics in the environment
- Yearly 100.000 tonnes are emitted on European roads
- Tire microplastic are released from different lifecycle stages

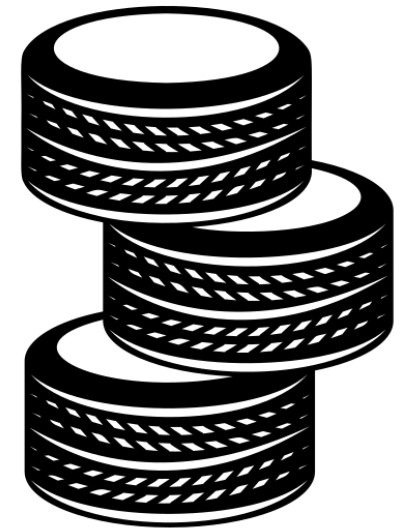




THE PROBLEM

- Tire and road wear particles are one of the main causes of microplastics in the environment
- Yearly 1.3 million tonnes are emitted on European roads
- Tire microplastic are released from different lifecycle stages

Still, the questions remains:
How are we going to tackle this issue?





THE FIRST STEP TOWARDS MITIGATING

We created **an approach** to lay the **foundation** for an effective emission **mitigation strategy** by **mapping** the **supply chain**, its **emissions**, the **stakeholders** involved, their potential roles and interdependencies, all in **close collaboration** with these stakeholders.



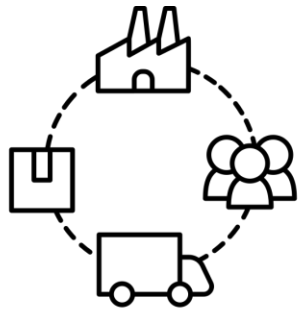
METHODOLOGY

Approach:

1. Mapping the supply chain
2. Identifying stakeholders & Stakeholder Network Analysis
3. Material System Analysis + sensitivity analysis
4. Verify with stakeholders



METHODOLOGY



Mapping the supply chain

Approach:

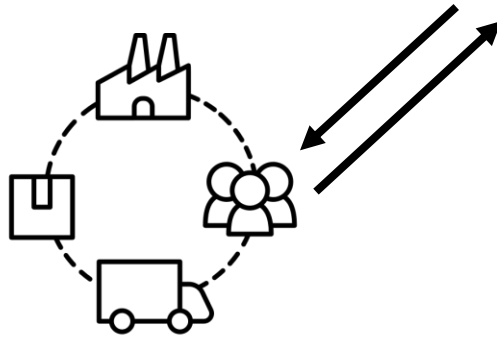
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METHODOLOGY



Stakeholder Network Analysis



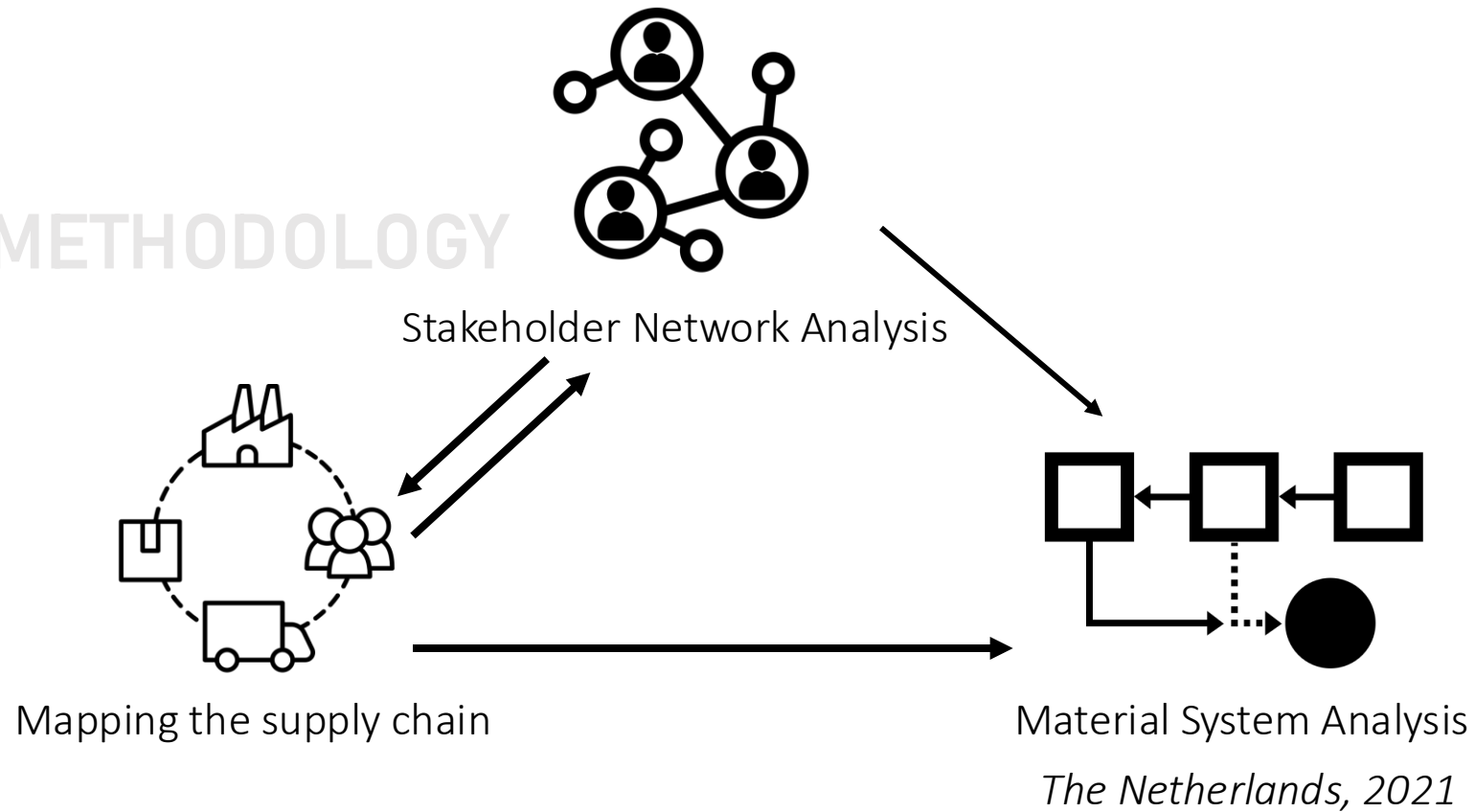
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METHODOLOGY

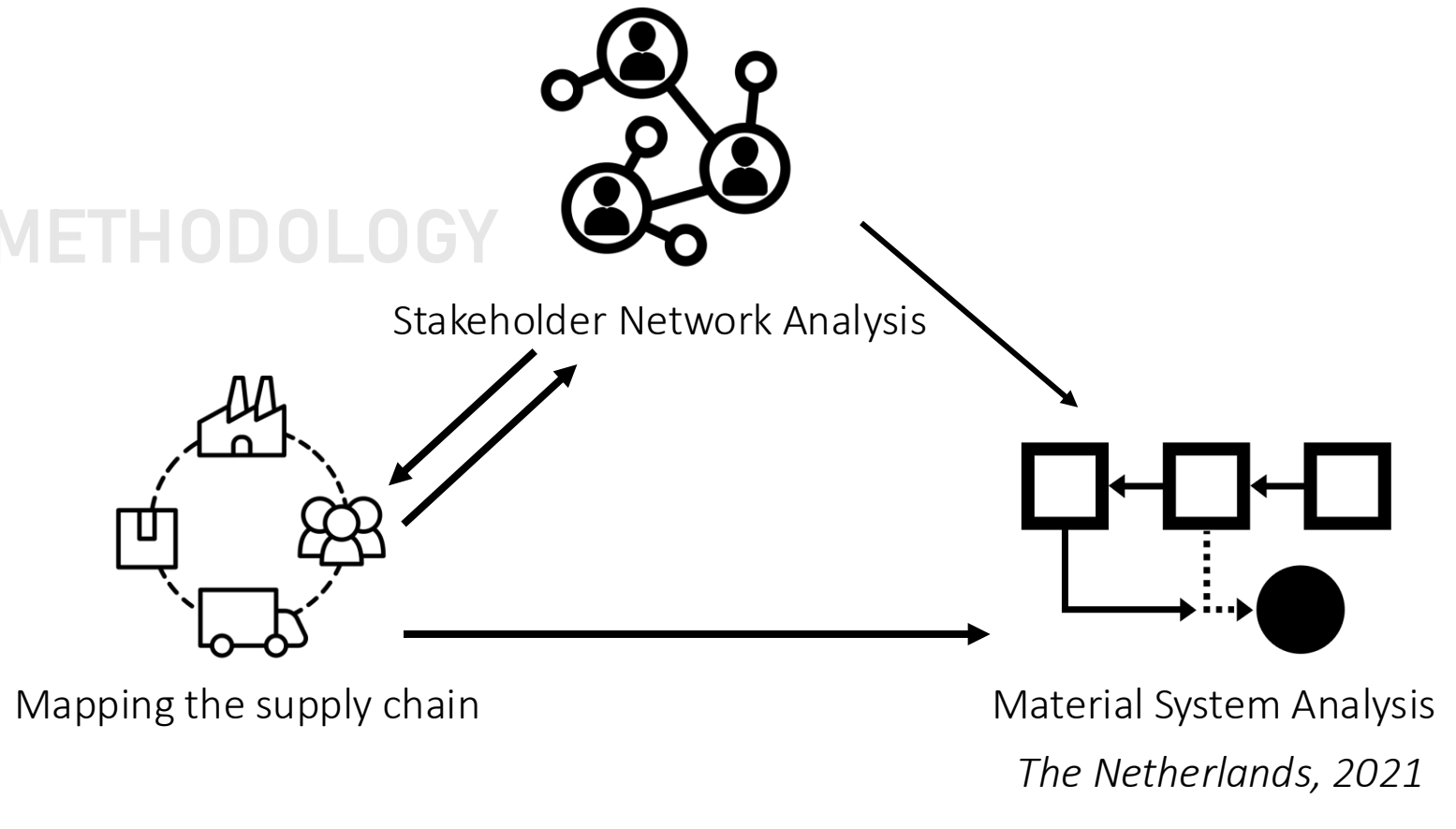


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METHODOLOGY

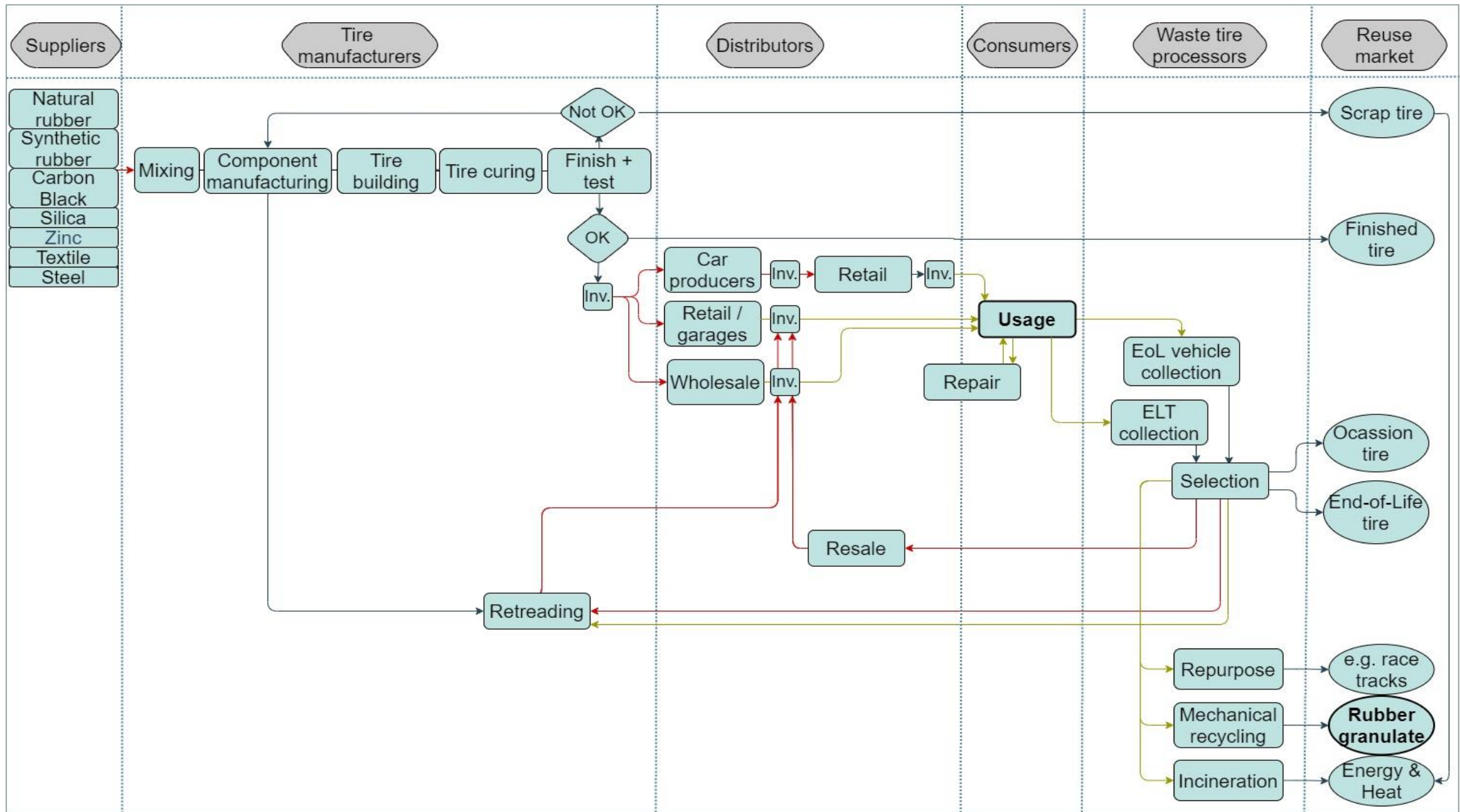


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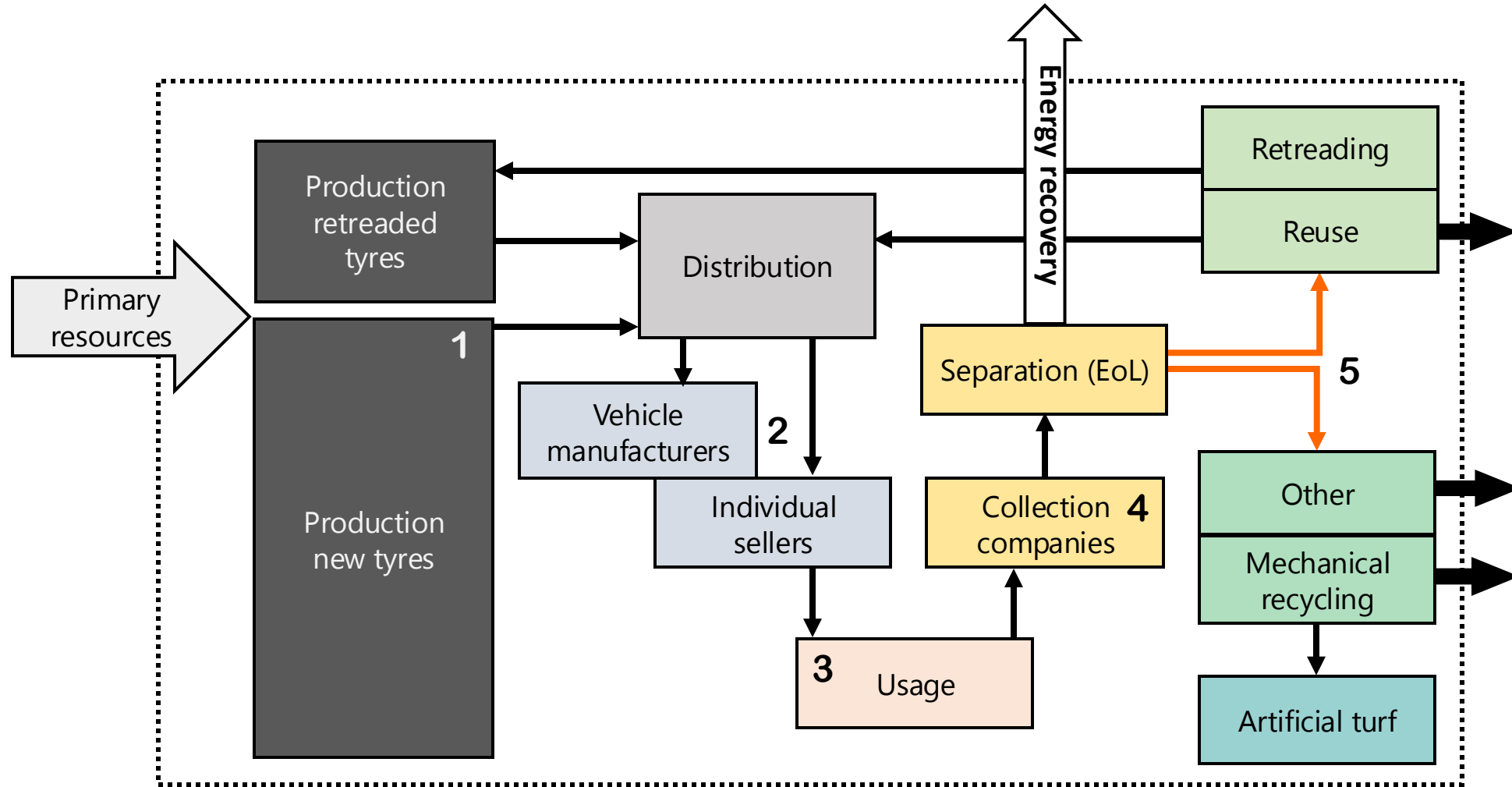
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SUPPLY CHAIN MAP



SUPPLY CHAIN MAP



SUPPLY CHAIN MAP



ETRMA

RecyBEM

Dutch Water Authorities

**Apollo
Vredestein**

Eureau

RIVM

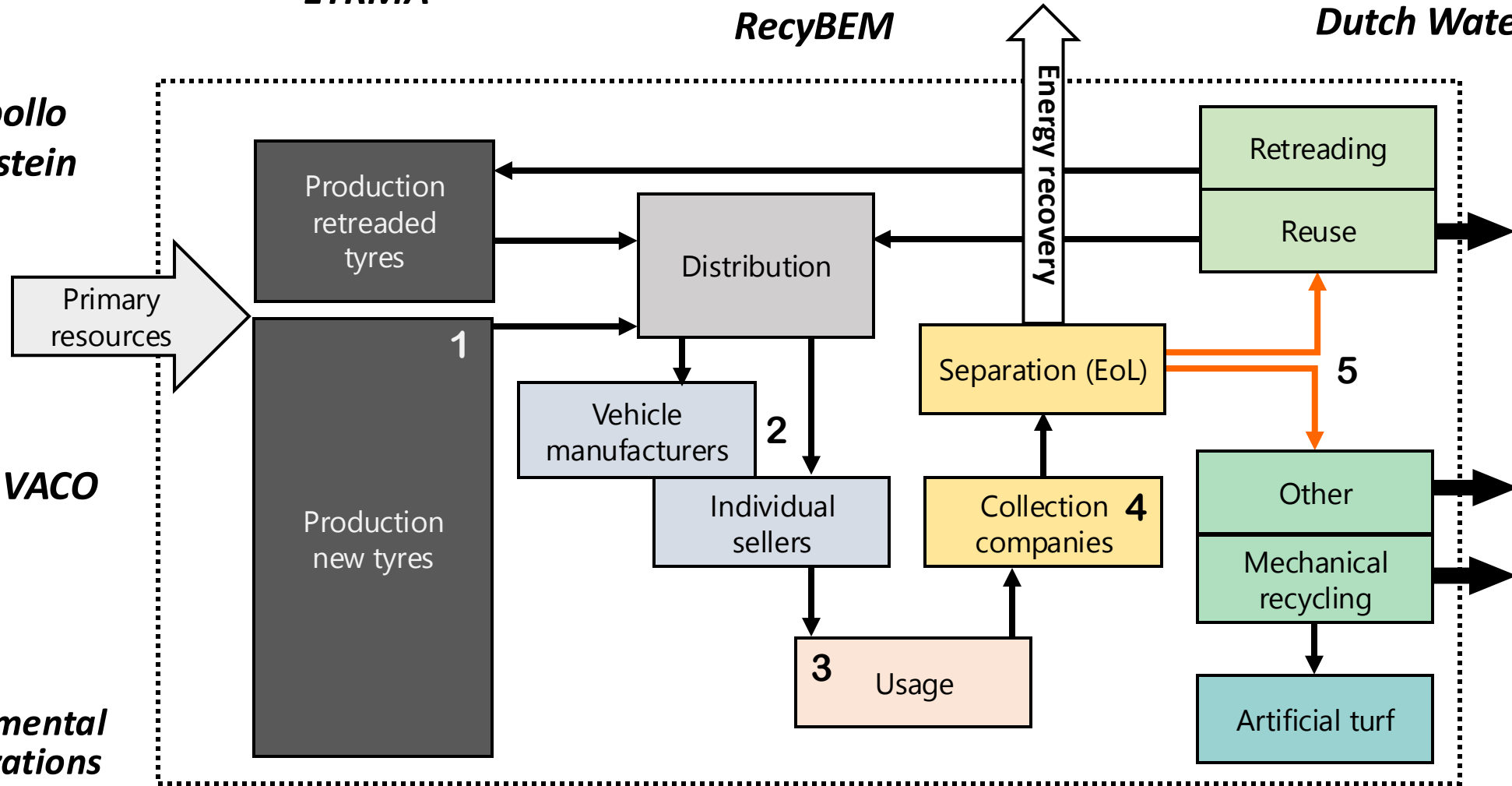
VACO

**Environmental
organizations**

**Asphalt construction
company**

Rijkswaterstaat

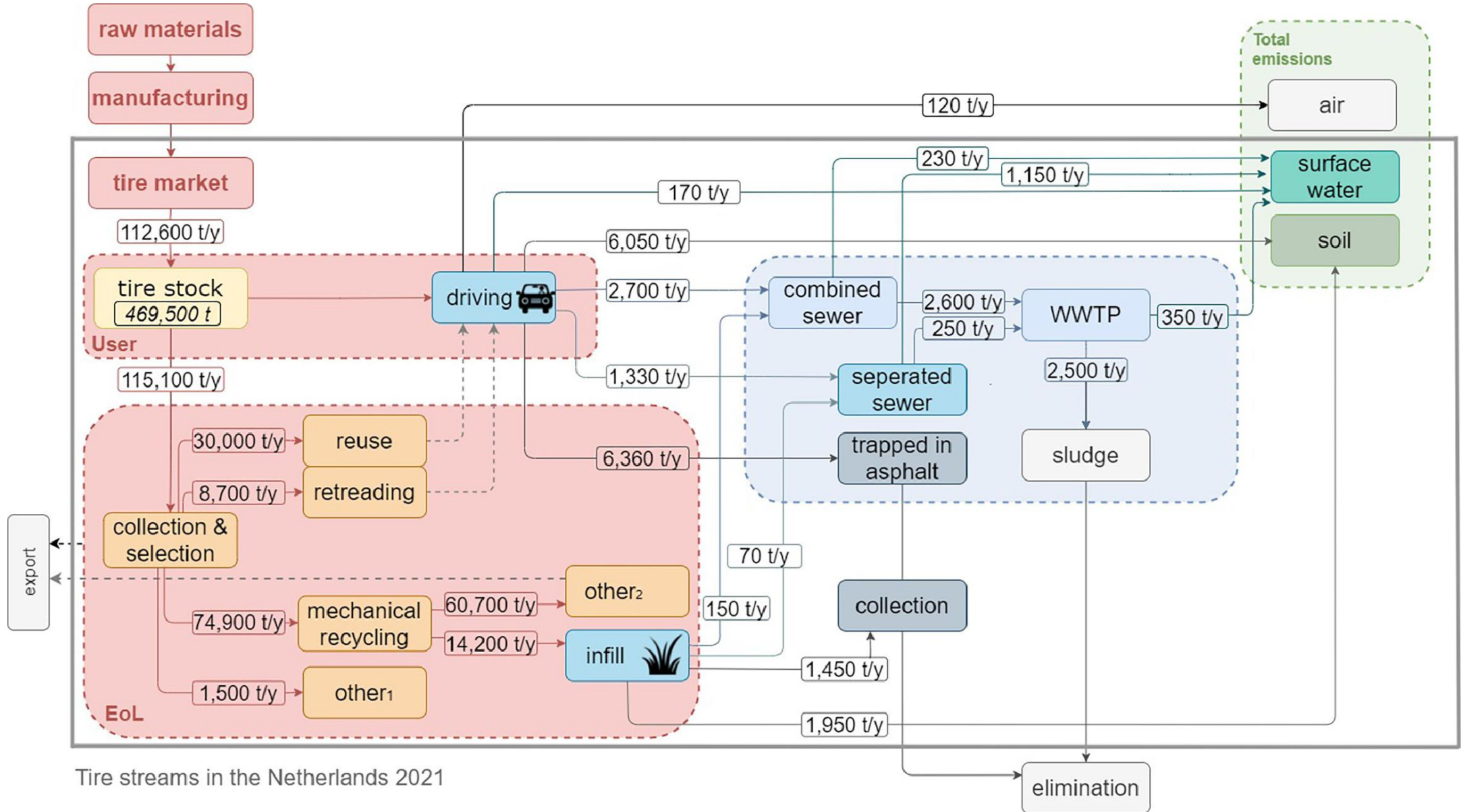
Research institutes



SUPPLY CHAIN MAP



MATERIAL SYSTEM ANALYSIS



Tire streams in the Netherlands 2021



QUANTIFIED EMISSIONS (NL, 2021)

Tire microplastic emission streams in 2021	Mass flow (t/y)	Per capita (kg/cap/year)
Total initial release	20,260	1.16
Generation of TWP from tires (user phase)	16,650	0.95
Initial loss of granules from infill (End-of-Life phase)	3,610	0.21
Total release to the environment	9,900	0.56
Release TWP to the environment	7,880	0.45
Release as infill to the environment	2,040	0.12
Release to soil	8,000	0.46
Release to surface water	1,900	0.11



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Generation of TWP from tires (user phase)	16,650	82%	0.95
Initial loss of granules from infill (End-of-Life phase)	3,610	18%	0.21
Total release to the environment	9,900		0.56
Release TWP to the environment	7,880	79%	0.45
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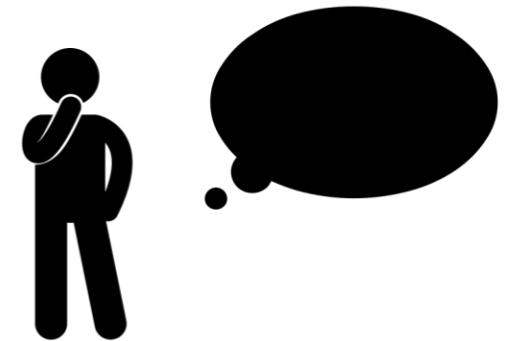
APPLICABILITY OF THE APPROACH

- Approach can be translated to other regions, though regional differences should be accounted for
- Method can be used to assess other types of plastics or pollutants
 - Identify emission hotspots in the supply chain
 - Build common understanding



REFLECTIONS ON STAKEHOLDER COLLABORATION

- Data gathering and validation
- Identify blind spots
- Supply chain as a language to build trust and credibility





FURTHER STEPS

- Current knowledge on mitigation often fragmented, qualitative, lacks systems perspective
- Compare and analyze TWP mitigation measures
- System dynamics model developed to simulate TWP release & test mitigation options



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- Current knowledge on mitigation often fragmented, qualitative, lacks **systems perspective**
- Compare and analyze TWP mitigation measures
- System dynamics model developed to simulate TWP release & test mitigation options



EVEN FURTHER STEPS

- Used the model as a boundary object with stakeholders to facilitate discussion on TWP mitigation
- Feasibility assessment to look at even more dimensions, enablers and barriers
- Ongoing stakeholder discussions planned for Nov–Dec
- Reach out if interested in joining



Take away message

- The study presents a **transdisciplinary approach** to map the supply chain, its **emissions** and the **stakeholders** involved
- We need a **holistic vision** to reach a mitigation strategy that is both founded on academic insights and rooted in reality.

Sya Hoeke, Jikke van Wijnen, Harold Krikke, Ansje Löhr & Ad Ragas

Special thanks to all the stakeholders who participated in this study



Thank you!