SSbD4CheM

Optionality and systems thinking in SSbD with prospective LCA

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SSbD4CheM aim

Integrate science-based approaches and innovative technologies into a comprehensive toolbox & data management ecosystem to proactively identify and address hazards and risks, fostering the design of safer, sustainable products and processes across sectors and value chains.

- This includes:
  - Alternative methods for safety assessment
  - Validating in-vitro tools for a variety of substances and materials
  - Assessing safety and sustainability across the product life cycle
  - International collaboration and stakeholder engagement

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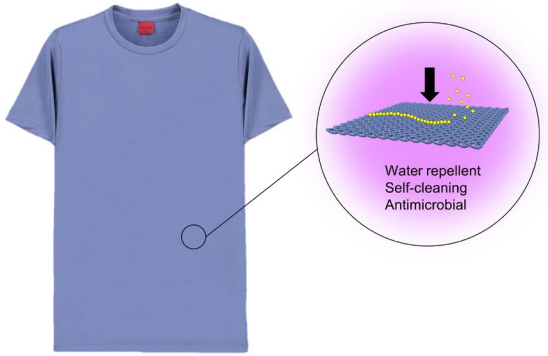
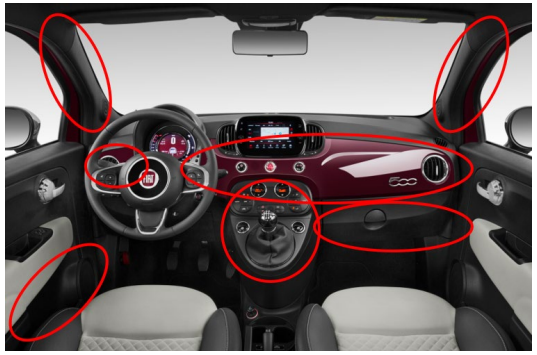
SSbD4CheM demonstrators



Apparel textiles

- **Material:** Coating PLA & PET using atmospheric plasma polymerization.
- **Investigating:** Material & energy use, by-products, and VOC emissions.



Automotive interiors

- **Material:** Thermoplastic matrix with cellulosic fillers.
- **Investigating:** VOC emissions and their impact on humans & environment.

Cosmetics

- **Material:** Nano-cellulose additive.
- **Investigating:** Impact on environment, skin, and inhalation.

Bio-based materials & **reduced input** of (non-renewable) materials

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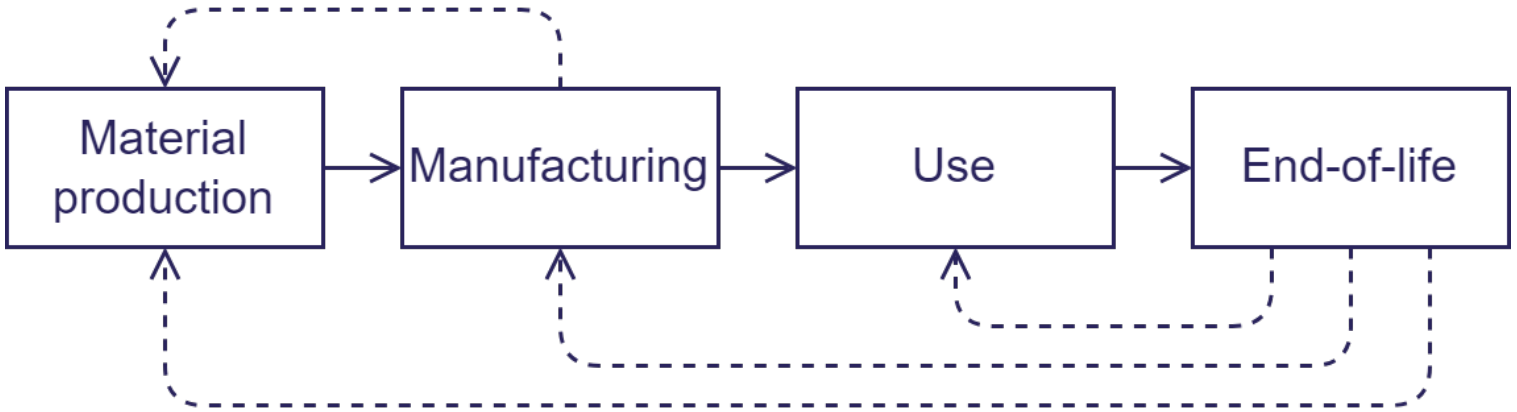
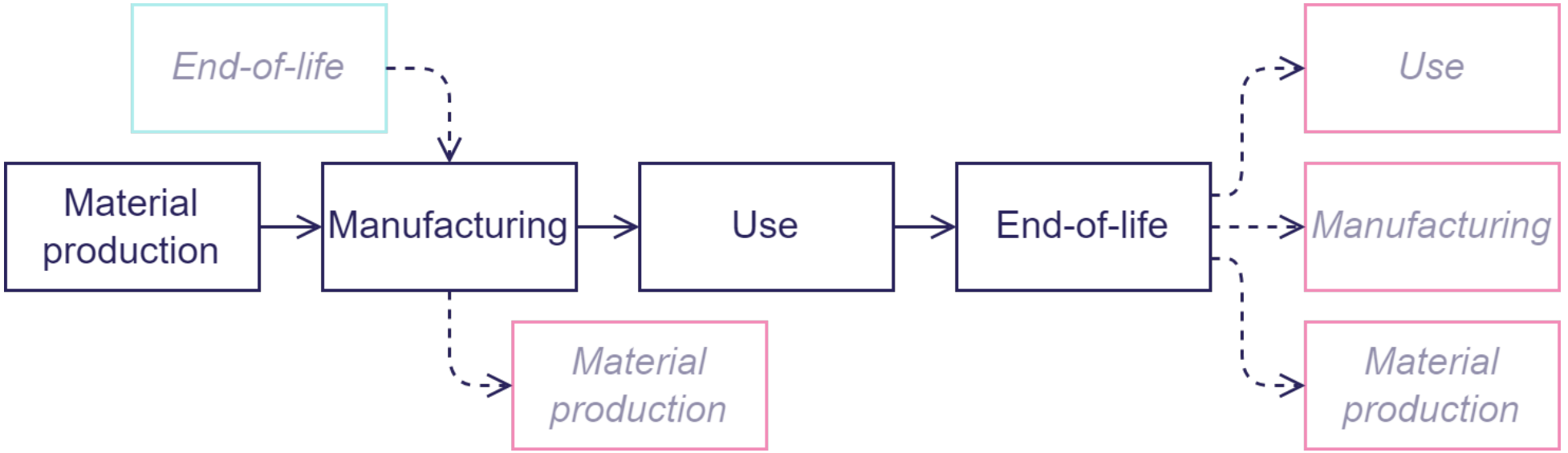
Circularity





- Temporal delays
- Diverse value chains
- Unknown context:
  - Functions
  - Value
  - Demand
  - …
- Fitness of LCA?

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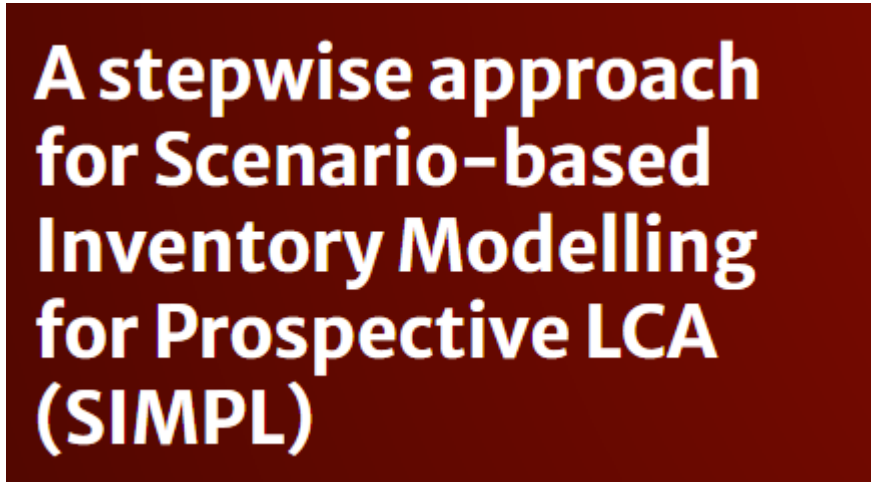
Systems thinking

- Beyond cradle-to-gate
- Beyond cradle-to-grave

Possible futures

- Learning, scaling, transforming
- Policy, regulation, markets
- Shifting and emerging environmental impacts



Langkau, S., Steubing, B., Mutel, C. et al. (2023)

https://doi.org/10.1007/s11367-023-02175-9

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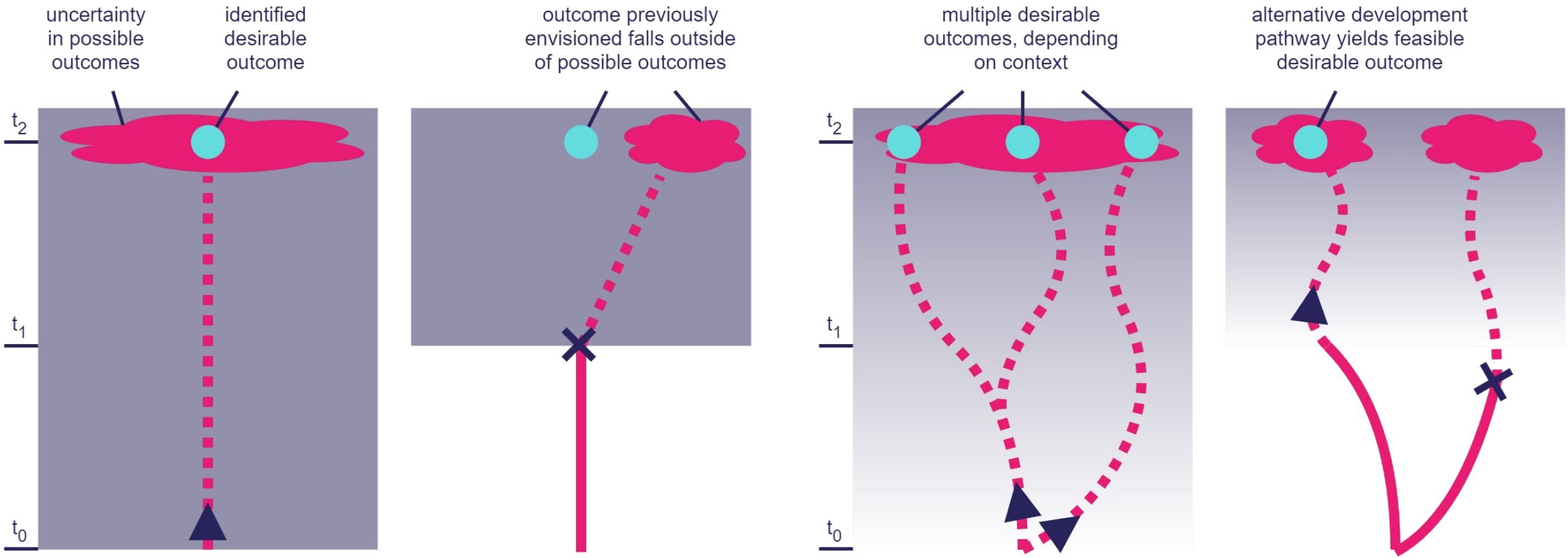
Optionality



See also:

- Teodoro, J.D., Doorn, N., Kwakkel, J. *et al.* (2022) Flexibility for intergenerational justice in climate resilience decision-making: an application on sea-level rise in the Netherlands. https://doi.org/10.1007/s11625-022-01233-9
- Wright, G., & Goodwin, P. (2009). Decision making and planning under low levels of predictability: Enhancing the scenario method. https://doi.org/10.1016/j.ijforecast.2009.05.019

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Conclusion

- To enable SSbD, prospective LCA can empower designers grappling with uncertainty:
  - Gain insight into the broader system
  - Imagine the system in diverse futures
  - Create optionality

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THANK YOU FOR YOUR ATTENTION

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Project partners

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