

Deepening the Paradigm shift: Revisiting the integration of LCA and Chemical Process Design for Sustainability

86th LCA Discussion Forum – Safe- and Sustainable-by-Design

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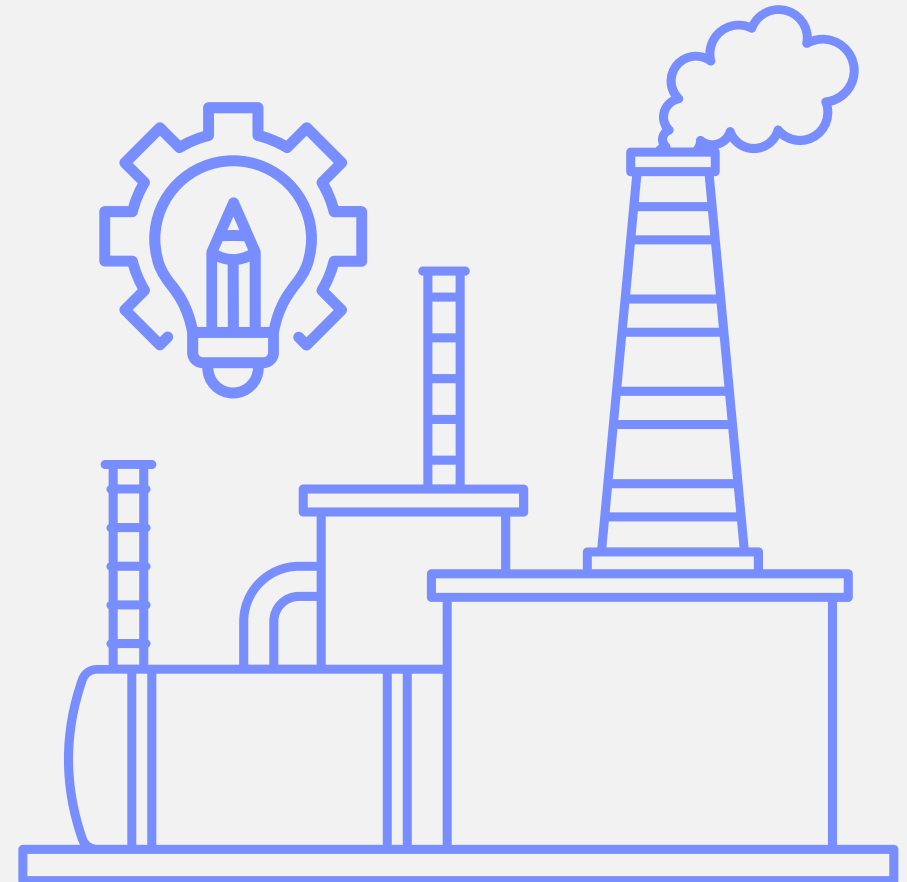


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Agenda

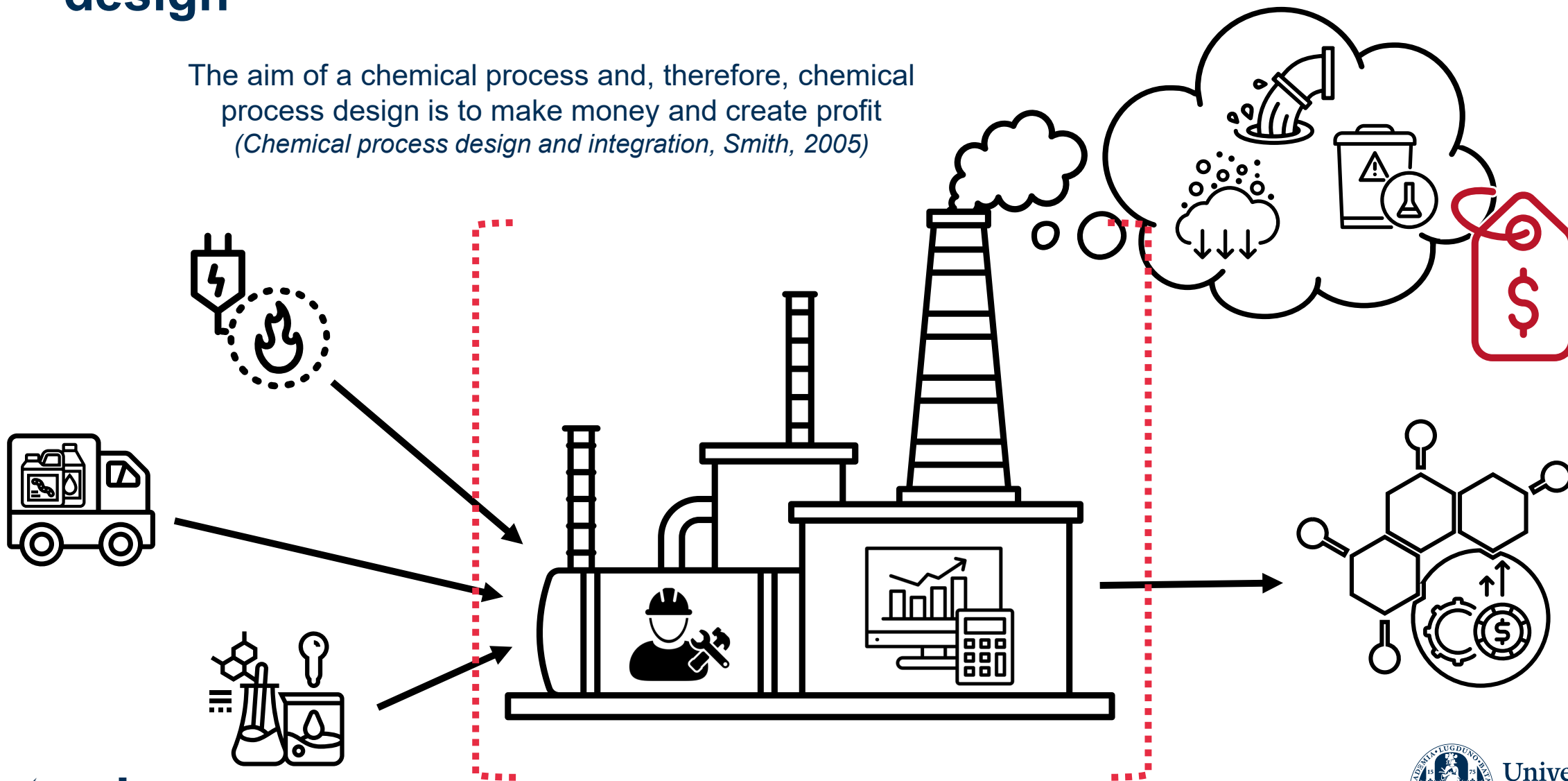
1. Introduction:
The need for a paradigm shift
2. Examining the integration of LCA and process modeling
3. Examining the system boundaries and function of integrated LCA and process design approaches
4. Conclusion:
Next steps in the paradigm shift

Introduction

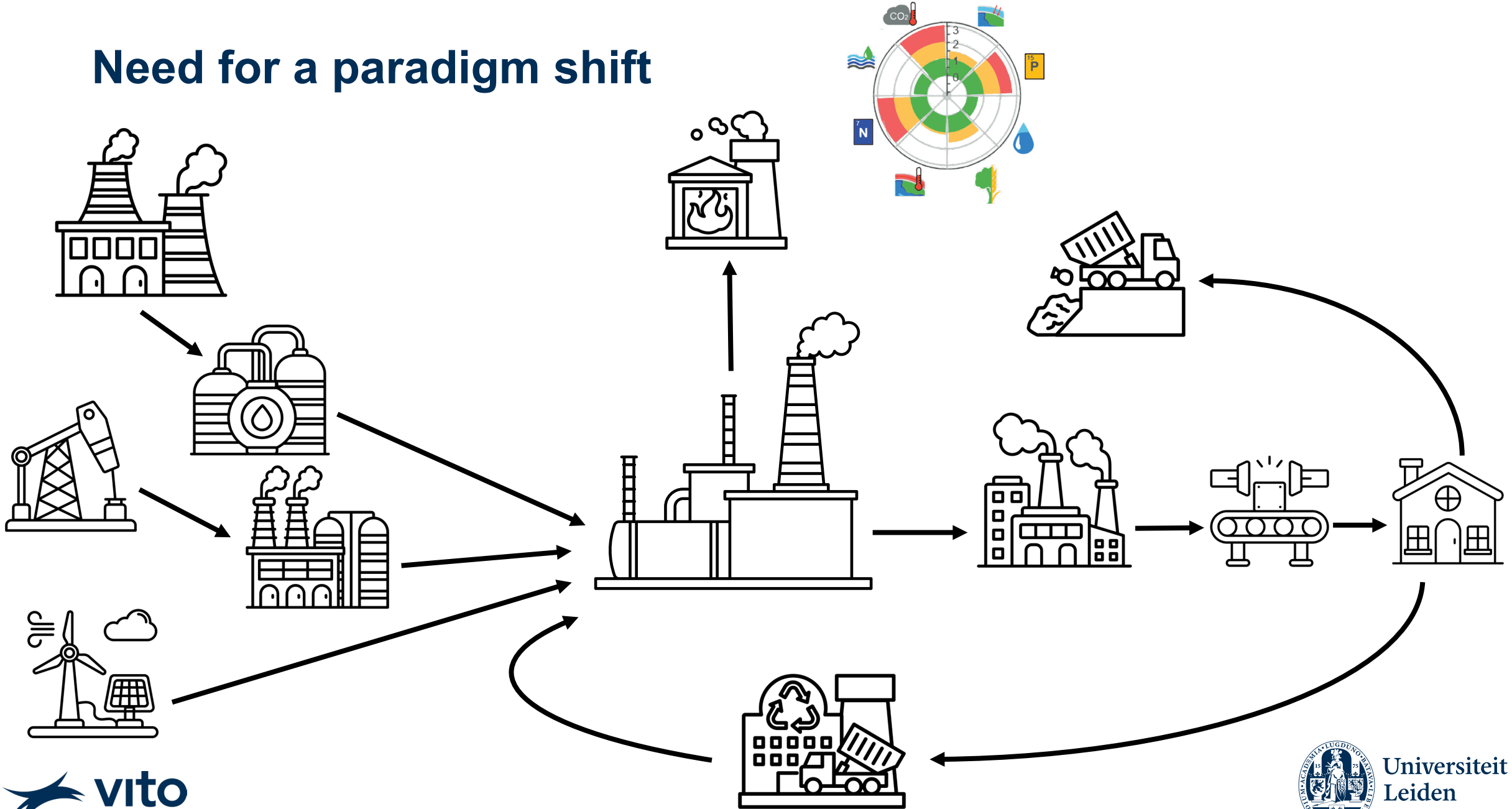


The current paradigm in chemical process design

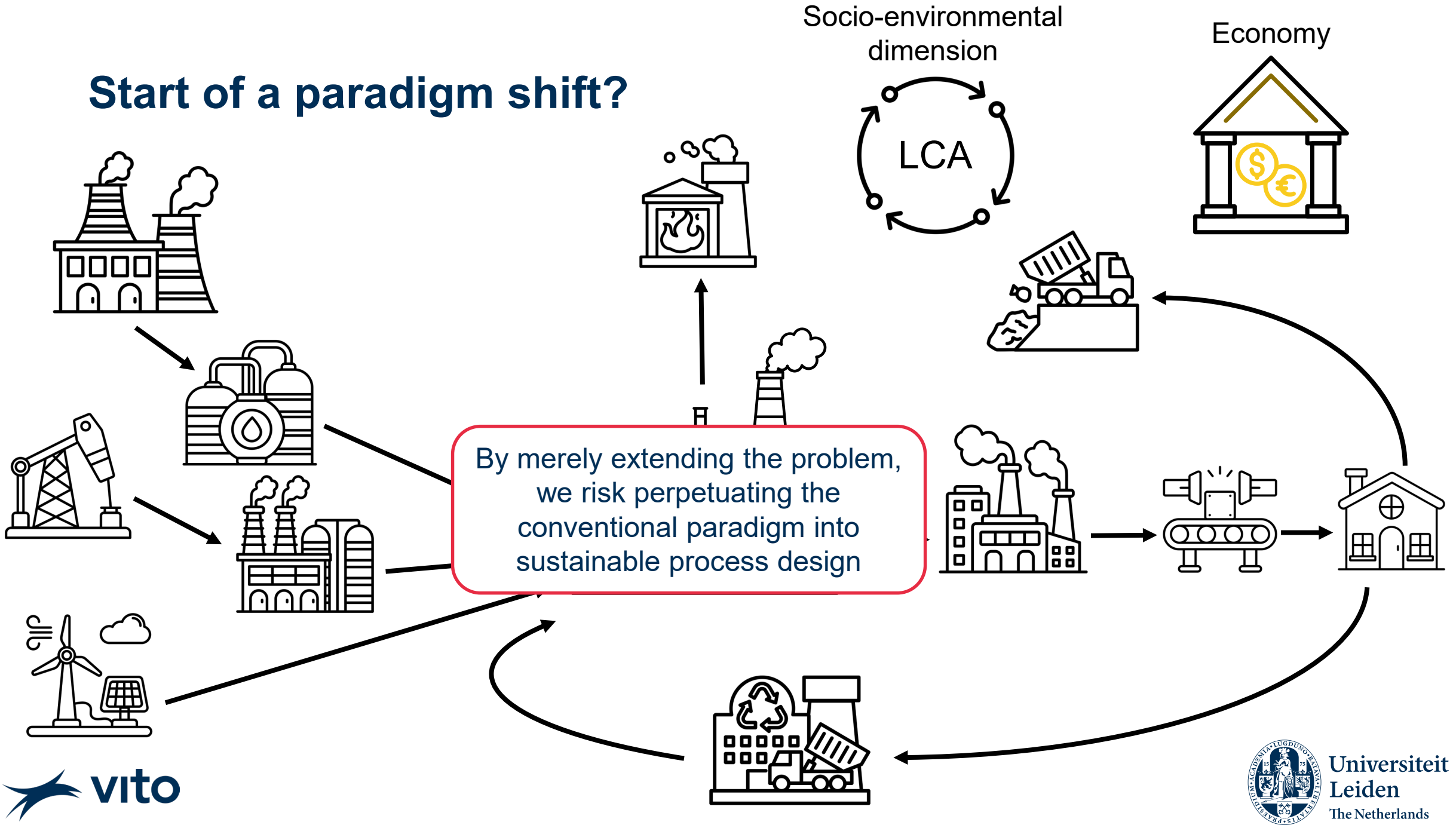
The aim of a chemical process and, therefore, chemical process design is to make money and create profit
(Chemical process design and integration, Smith, 2005)



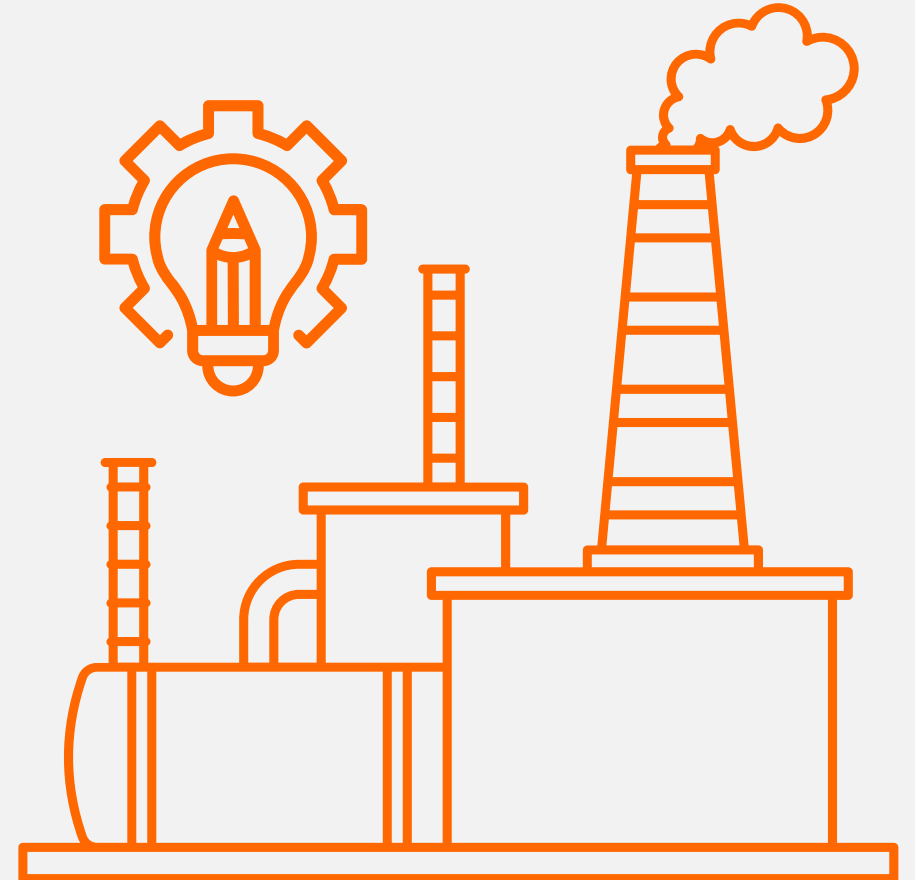
Need for a paradigm shift



Start of a paradigm shift?

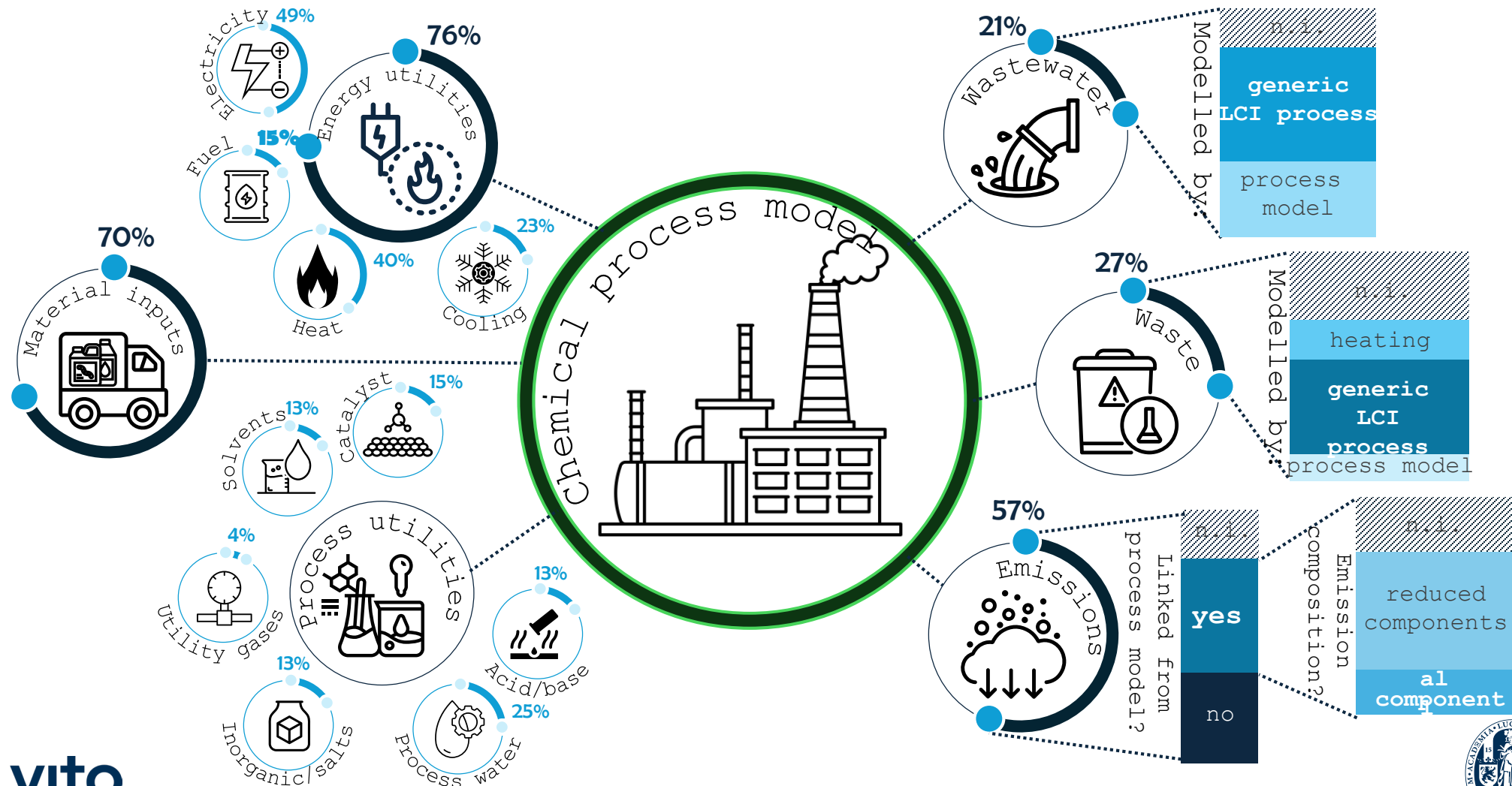


Review Results and Discussion



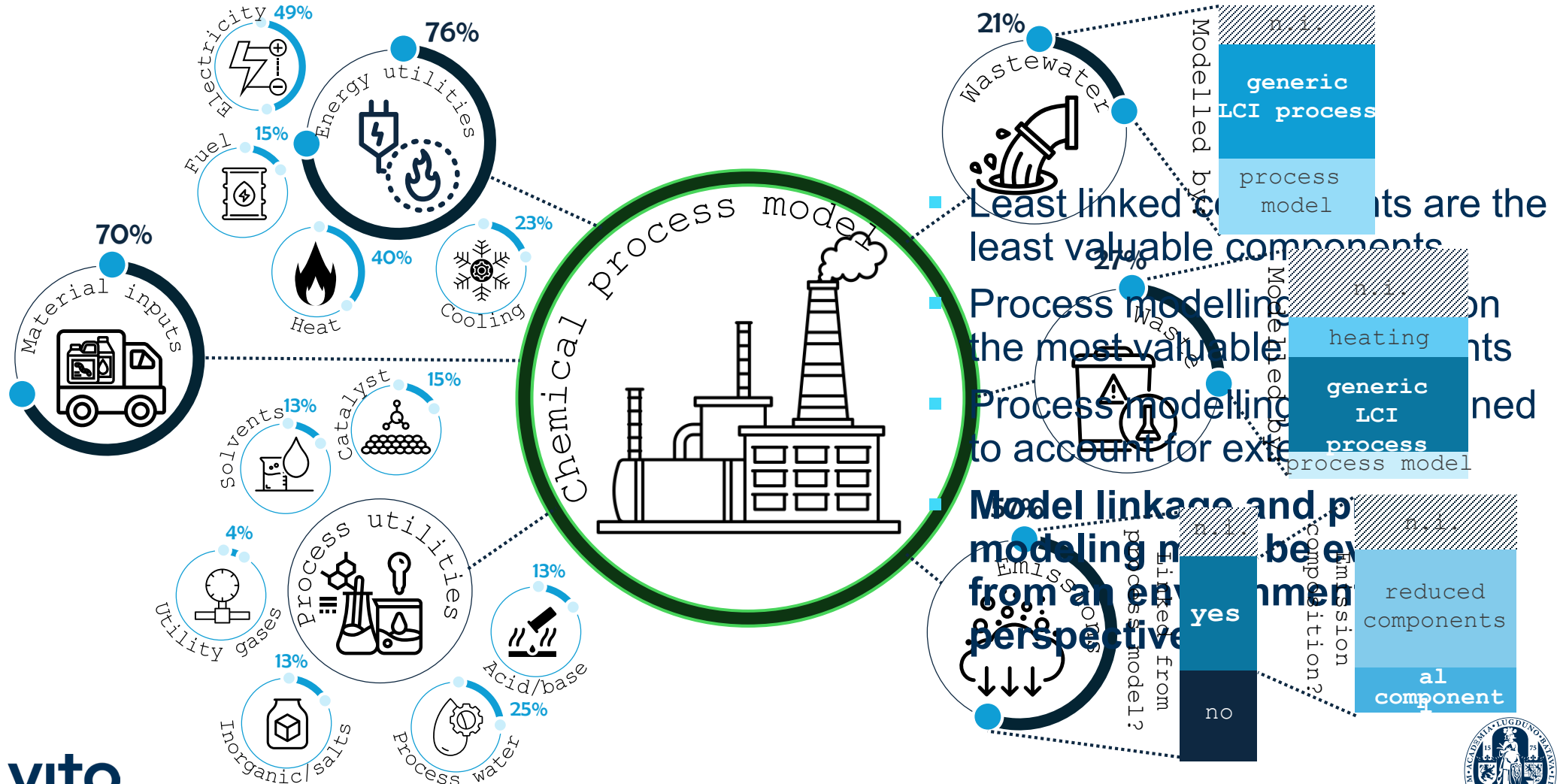
Life cycle inventory and process model integration

Linking process components from process model to LCA



Life cycle inventory and process model integration

Uncovering conventional process design paradigm dependency



Scope of the integrated process design studies

Examining the system boundaries and the function

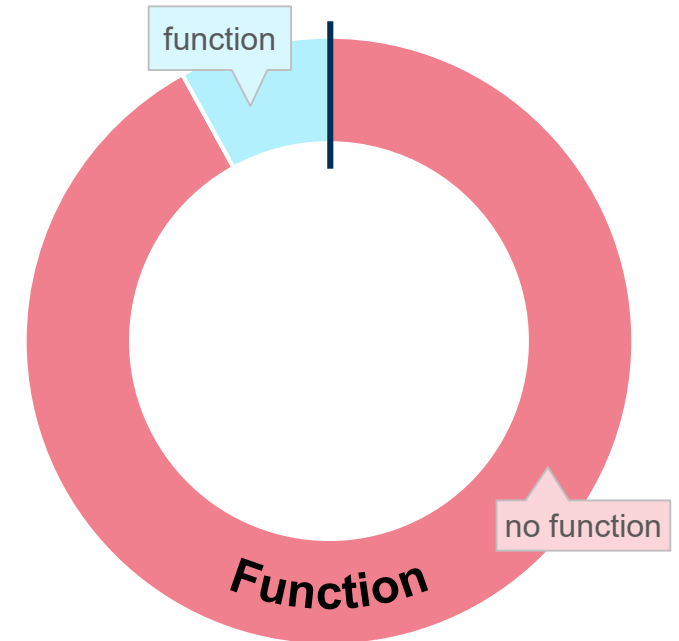
- Systematically neglecting essential impacts due to system boundary
- No function defined therefore no use and end-of-life phases considered
- Producer perspective, whose responsibility ends at the factory gate

User function perspective

- Different use and end-of-life scenarios
- Essentiality
- End-of-life treatment at a design stage
- Circularity strategies
- Alternative systems outside a technology space

Underlying concepts of LCA need to be integrated in-depth, or else we risk hiding the conventional process design paradigm behind environmental impact results.

boundaries



Conclusion

- Assemble existing methodological improvements
- Modelling and reporting guidelines
- Re-evaluate process modeling and model linkage to LCA from an environmental perspective.
- Internalize concepts and philosophy of LCA
- Integrating functionality based on a user's perspectives

Beyond

- LCA is not sufficient to account for sustainability. Need to account for social and non-quantifiable aspects
- The hegemonic economic system deeply shapes our process design methods and techniques

Thank you!



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