



**Multiple Perspectives and Transdisciplinary approaches
in the Transition to a Bio-based Economy:**

*the prospect for converting mixed food waste into bio-based
chemicals*

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What are the potentials and limitations of combined systems approaches?





Food waste

+



Wheat straw



Friendly bugs



Bioprocess



Paints/coatings



Plastic products

The prospect for converting mixed food waste into bio-based chemicals

- Introducing high value product formation into the biorefinery
- Succinic acid from food waste
- Early phase, complex innovation system
- Research project funded by FORMAS
- 2013-2018

Questions to realize SA from mixed food waste

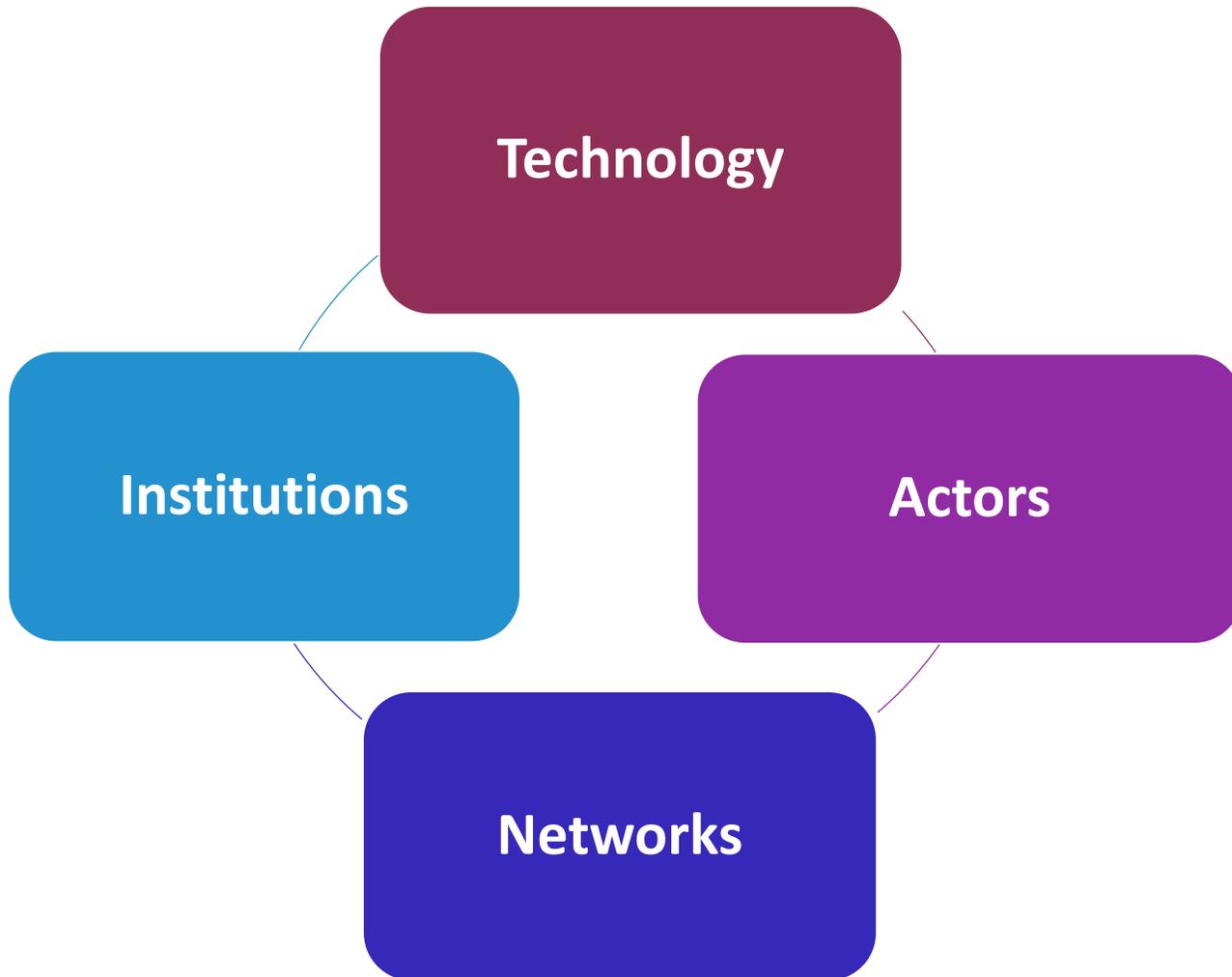
- 1. What is the composition of substances/molecules of the mixed food waste?**
2. How could the carbon source be accessible for e-coli uptake?
3. Is the water content of the mixed food waste optimal for E-coli growth?
4. How does existing rules and regulations influence the possibility to realize SA production?
- 5. How does norms and values in society influence?**
6. How is the future demand on increased SA production?
7. Can the right type of actors mobilize to realize a SA value chain?
- 8. Which capacity of food waste is needed?**
9. Has the current biogas production from food waste or the future SA production the lowest environmental impact?
- 10. Do mixed food waste as a feedstock to SA have a better environmental performance than current cornbased feedstock?**

Technical evaluation based on laboratory cultivation and mechanical testing



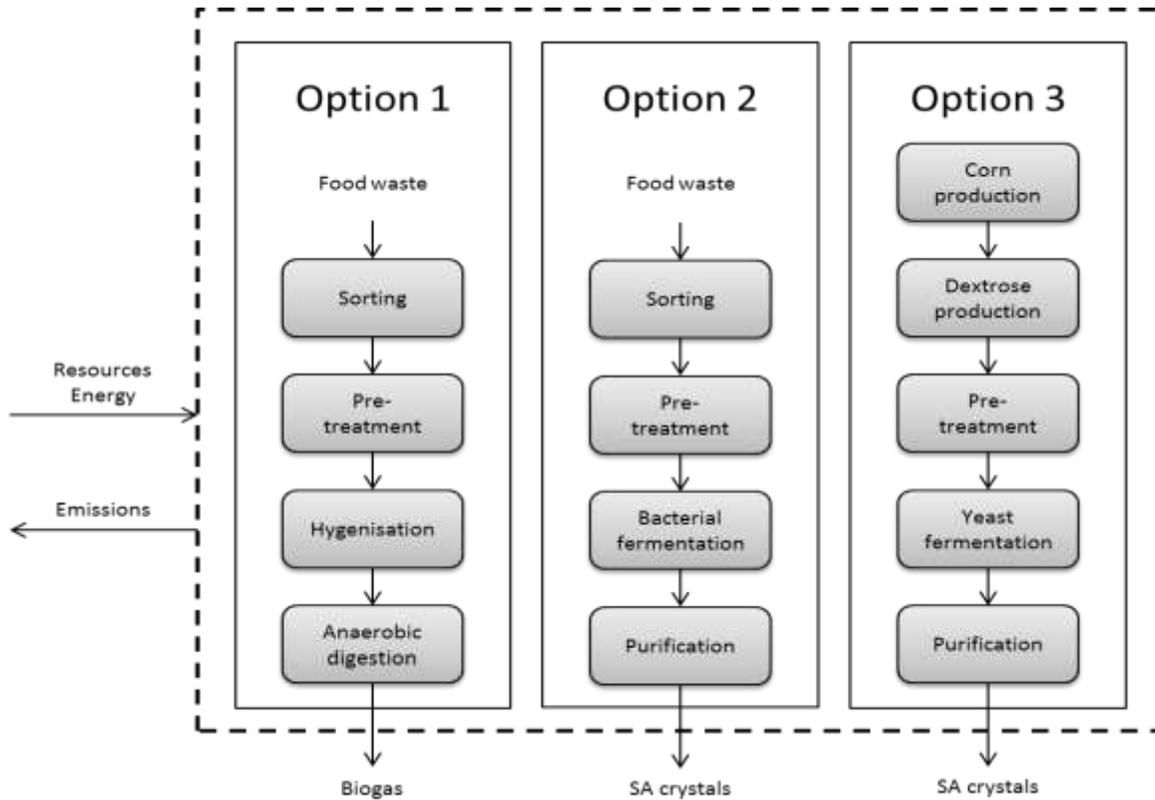
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Social evaluation based on Innovation Systems Analysis



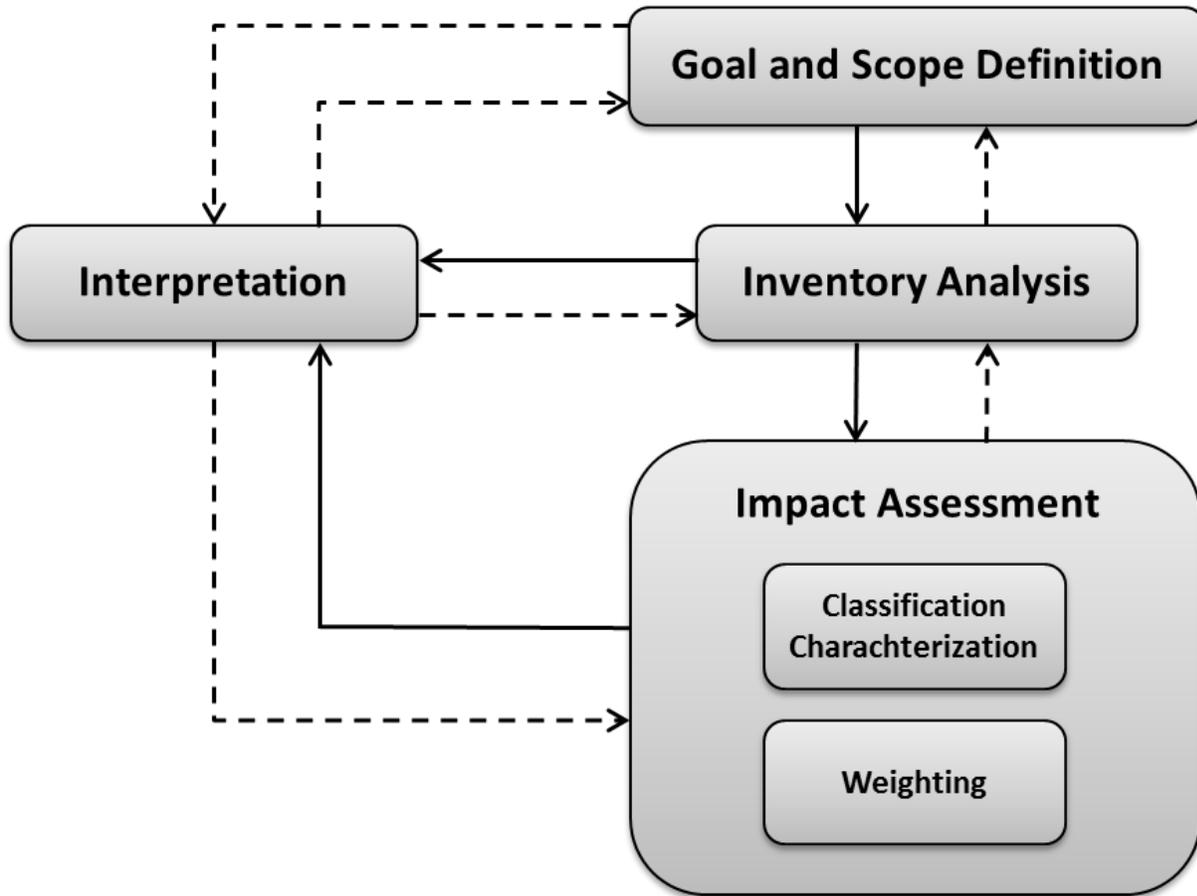
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Resource evaluation based on Material Flow Analysis and Scenario Analysis



8. Which capacity of food waste is needed?

Environmental evaluation based on Life Cycle Assessment

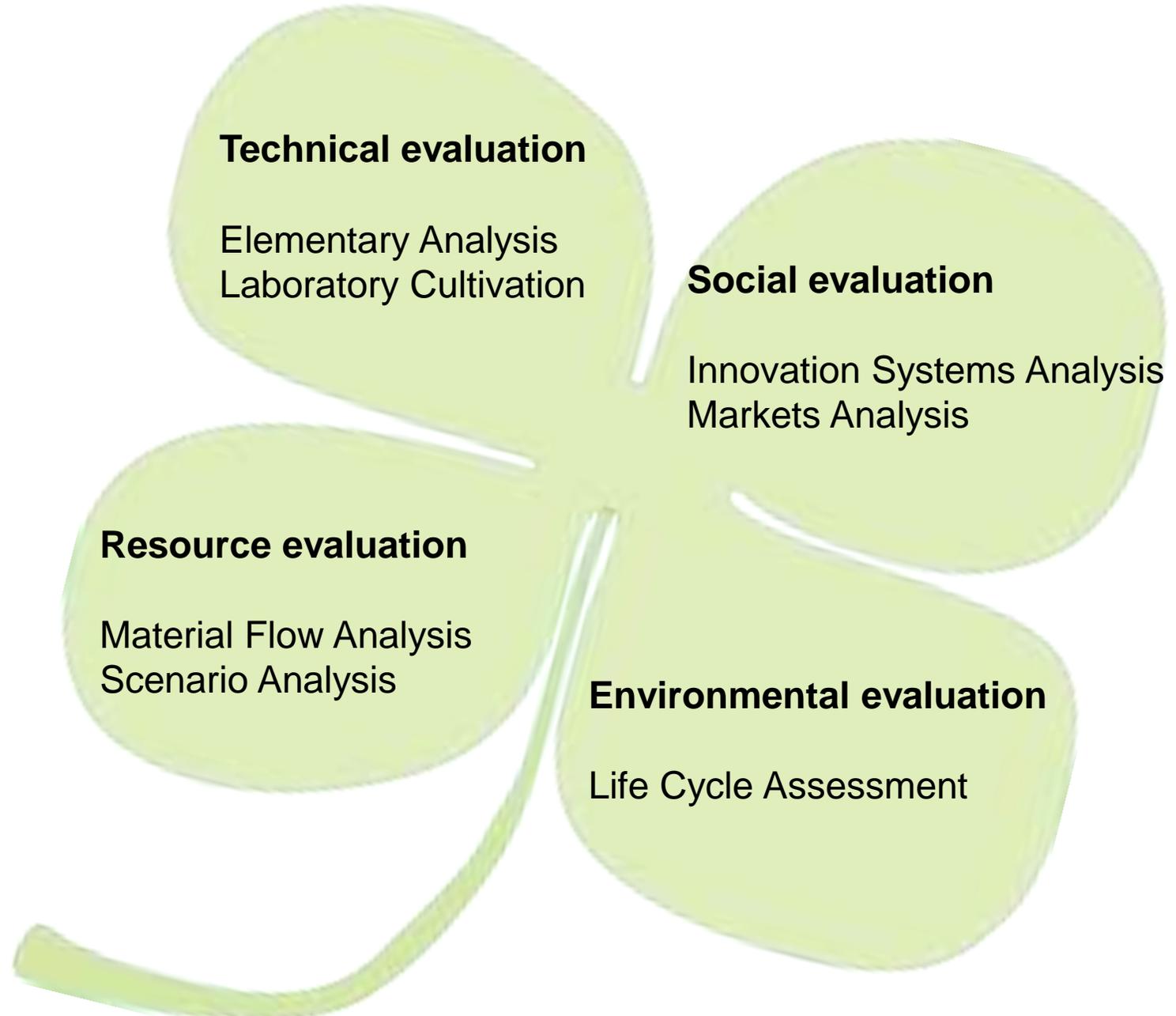


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What are the limitations and potentials of combined systems approaches?

- Different research schools
 - Differences in goal and scope between the approaches
 - Results have to be seen per scale both spatial and temporal.
- They are complementary studies.
- + LCM is about decreasing the negative impact of physical flows in society by approaching the acts and practices of actors in the system.
Therefore, combined systems approaches are needed.

**Knowledge is like a flower,
all leaves together
forms a higher level
of decision-making.**



THANK YOU!

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