Showcasing the potentials of Agent Based Modelling for Industrial Ecology research

Challenges and perspectives for future pathways

International Industrial Ecology Day - 2024

Life Cycle Thinking for Complex Systems Initiative
[complexity.lca@gmail.com]
[complexitylca.github.io]

November 21st , 2024

Today's agenda

1. **Where if? Using spatial, building-stock-driven simulations to explore construction circularity strategies in Gothenburg, Sweden**
   Jonathan Cohen
   Chalmers University of Technology

2. **Coupling agent-based modelling with territorial LCA to support agricultural land-use planning**
   Tianran Ding
   Luxembourg Institute of Science and Technology

3. **Empirical agent-based modelling of circular business models: incorporating dynamic LCA and MFA from a consumption perspective**
   Ryu Koide
   National Institute of Environmental Studies & Technical University of Delft

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Why do we need complexity science methods in Industrial Ecology?

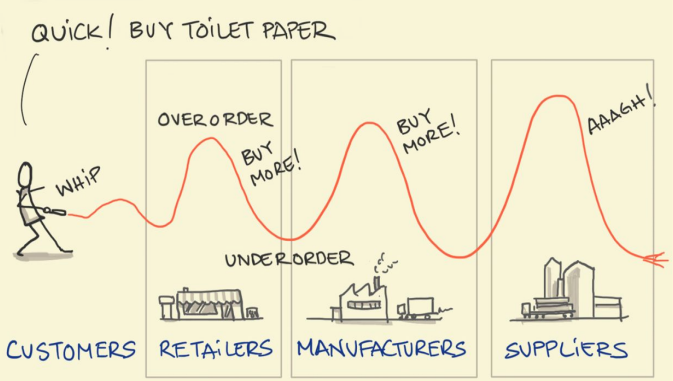
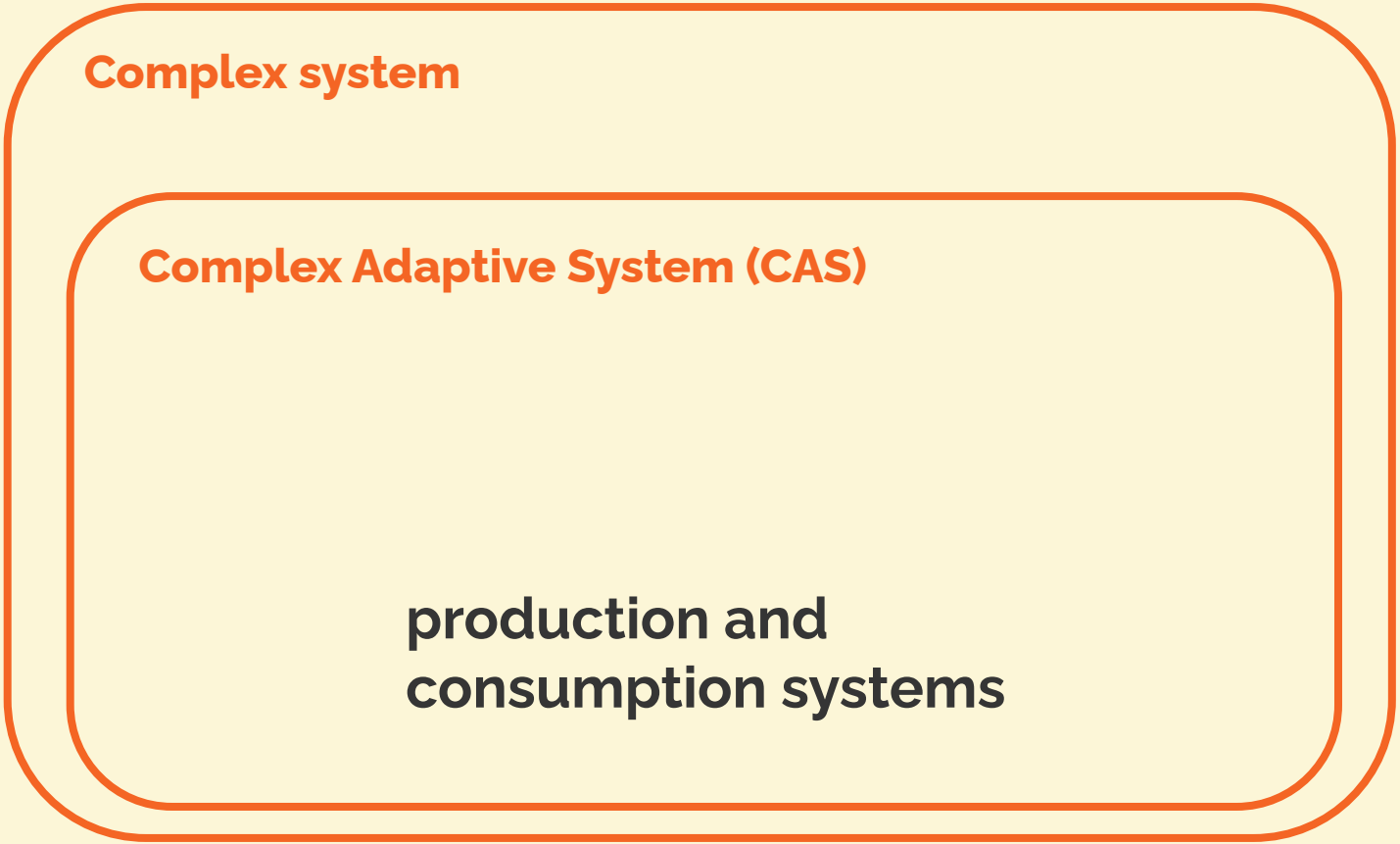


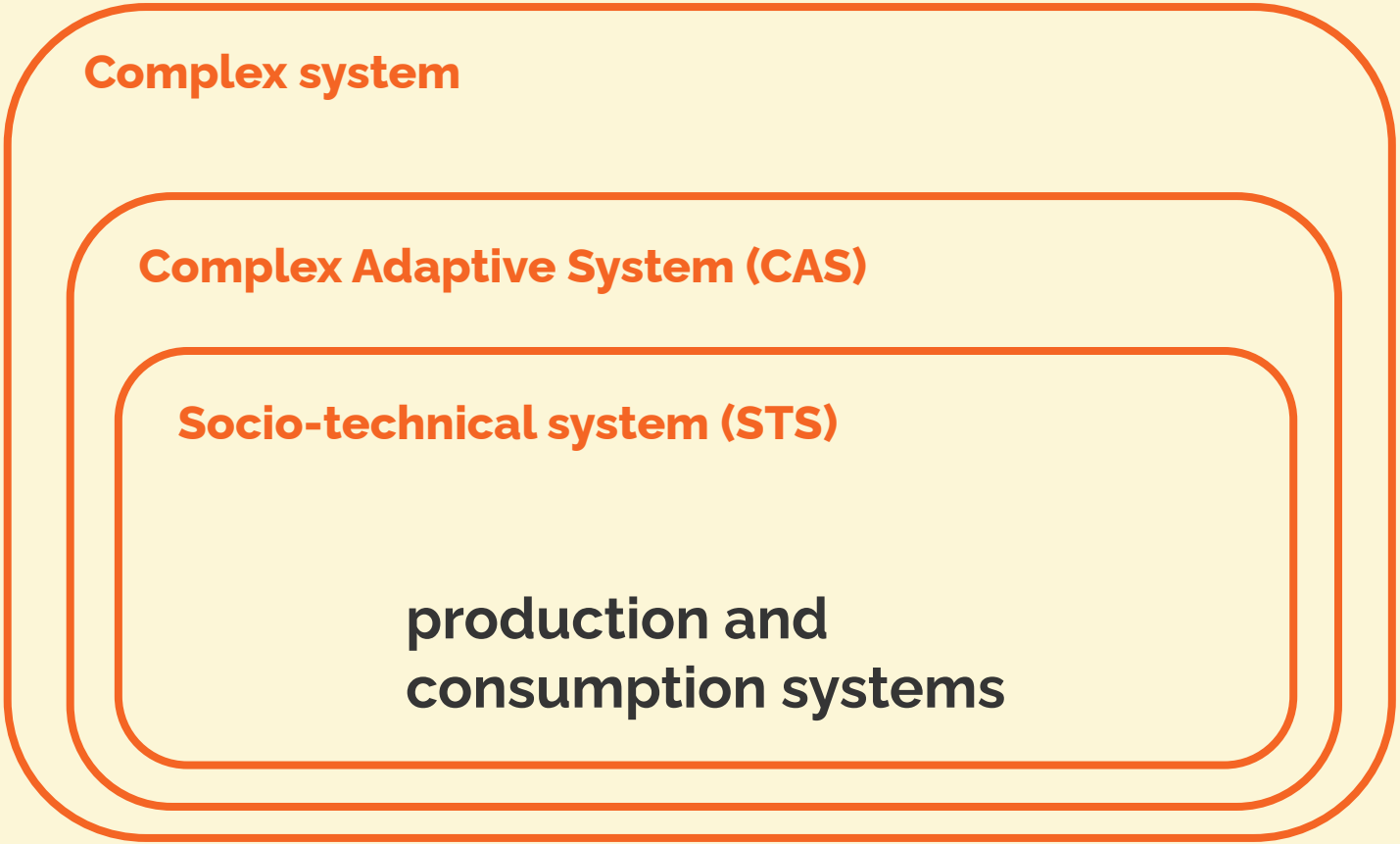
Image from sketchplanations.com

Production and consumption systems are complex since they are highly intertwined networks that results from the human interactions

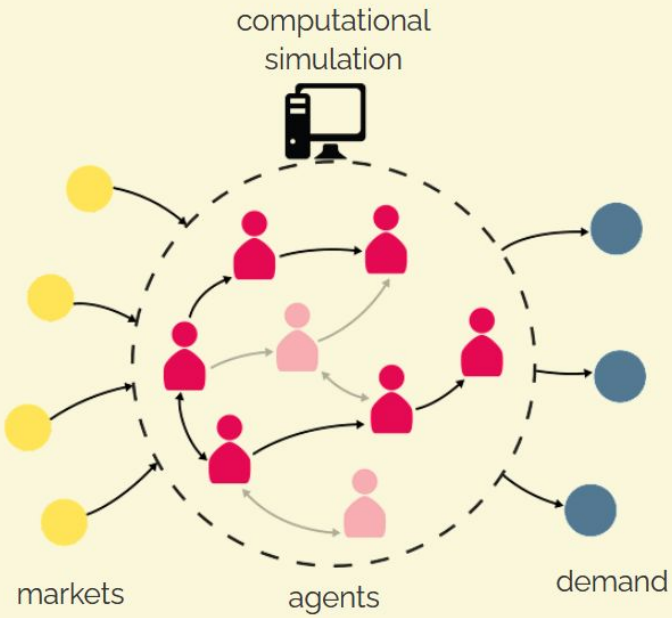
Complex system

production and
consumption systems


Complex system
Complex Adaptive System (CAS)
production and
consumption systems


Complex system
Complex Adaptive System (CAS)
Socio-technical system (STS)
production and
consumption systems

Agent Based Modelling (ABM) is a popular paradigm that allows to study **complex systems**



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- **Life-Cycle thinking for sustainability** (e.g., LCA, Input-Output, etc)
- **Complexity-driven methodologies** (i.e., ABM, network analysis, simulation methods)
- **Complex Adaptive Systems** (e.g., socio-technical systems, techno-ecological networks)

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- **Promote the use of complexity-oriented methods in combination with life-cycle thinking approaches.**

> provide a platform

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> beyond domains

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> Chalmers University of Technology

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> National Institute for Environmental Studies

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Coupling agent-based modelling with territorial LCA to support agricultural land-use planning

Summary

1. Complex decision making
   (Spatiality and circularity in construction)
2. Complexity on the production
   (farmers' behaviors and interventions)
3. Complexity on the consumption
   (consumers' behaviors affect circularity strategies)

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Interactive session

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Thank you!

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