

SMARTEES models in the international ABM context

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- Social innovation policy modelling for sustainability
- For sustainability, you need to think in complex ways to be effective (Nexus challenge)
 - Problems and objectives both are heavily interdependent
 - There are feedbacks and trade-offs.
 - Unpredictable step changes
 - Reinforcing responses



Sustainability crisis and reaching the required level of complexity

- Sustainability challenges in the global crisis are not about „technological, political or managerial fixes“
- They are about contingent and changeable social, economic, political and cultural orders
- They are about behavioural change, discussing conflicts between objectives, and societal transformations on a big scale
- They are about psychological motivations and cultural values
- „The most crucial feature of emerging understandings of Nexus challenges, then, is that they are not just scientific and technological. Ideas that there exist single technological „solutions“ to such massive, complex, pervasive and intensely-interlinked societal challenges, are highly instrumental simplifications“ (Andy Stirling).

- Sustainability issues translate into transformation requirements for whole societies
- Responses do not just require new technologies: they are mostly about social innovation
- This encompasses all parts of society including behavioural change of citizens, new policy and coordination mechanisms, and new economic arrangements

Participative approaches

- Our „experimental societies“ currently have a hard time to learn how to participatively **coordinate transformation processes around global challenges by „co-design“**
 - Participation, inclusion, stakeholder involvement, citizen engagement
 - Inter-sectoral networks, focus on quality relationships
 - Power sharing and negotiation
 - Continuing conflict resolution and mediation
 - Process-based system perspectives and complexity characteristics
 - Transparency, anticipation, adaptiveness and responsiveness
- “**Co-creation** is joint creation and evolution of value with stakeholding individuals, intensified and enacted through platforms of engagement, virtualised and emergent from ecosystems of capabilities, and actualised and embodied in domains of experiences, expanding wealth-welfare-wellbeing” (Ramaswamy, V., Ozcan K. (2014): The Co-Creation Paradigm. Redwood City: Stanford University Press)
- “**Community-based participatory research** is an orientation to research that emphasizes “equitable” engagement of partners throughout the research process, from problem definition, through data collection and analysis, to dissemination and use of findings to help effect change” (Cacari-Stone et al. 2015: 1615)
- Perspective on “complex social systems” where multiple entities interacting with one another
- **Adaptation to local conditions**
- Important: Governance and facilitation arrangements (conflict management, leadership styles fostering democratic foundations and include techniques giving room to transparency, opinion formation and inclusion of different stakeholders)
- All co-design approaches claim “that because of their developmental and adaptive approach, outputs are more likely to be **fit-for-purpose**, acceptable, valuable, and enduring than the outputs of a comparable effort organized to conventional “logic model” principles” Greenhalgh et al. 2016: 406)



- Simulation models reproducing social innovation dynamics of selected cases
- Using the HUMAT integrated framework
- Artificial societies representing a large city or small island population
- Agents/people can develop and change their opinions; can be more or less sensitive to norms and the expertise of others, and they can grow social networks to communicate with one another.
- Netlogo
- ODD protocol

SMARTTEES: Social Simulation of Social Innovation Scenarios with ABM

- Holistic mobility plans
- Islands and renewable energy
- District regeneration
- Mobility in super-blocks
- Energy efficiency against fuel poverty

-> Policy sandbox tool



It is about future

The advantages of using ABM and social simulation for SMARTEES

- The appraisal of potential social **futures** is a huge research challenge connected to complexity
- Realistic models were required that can represent the interaction dynamics between society and innovation for anticipating, monitoring, evaluating and improving the societal impact of social innovations.

Achievements of the SMARTEES models:

- Scenario simulations with data at the case level
- Using the potential to build on an existing model (HUMAT)
- Innovative modelling approach in social simulation building on the inter- and transdisciplinary research partnership involving partners and stakeholders to project societal techno-futures.



It is about context

The advantages of using ABM and social simulation for SMARTTEES

- Context matters!
Perceptions/attitudes and practices vary between countries, regions and communities (norms and values in-use, technology status, economic models, civil society sentiments, and legislative, executive and judicial characteristics).

Achievements of the SMARTTEES models:

- Empirical case studies for comparison collecting data on social innovation practices based on a theory-grounded comparison framework from social research
- Mixed-methods approach in SMARTTEES using local data for calibrating agents



It is about policy modelling

The advantages of using ABM and social simulation for SMARTTEES

- ABM are about people, housing, traffic, transport/freight, shopping etc.
- Complex, non-linear dynamics can be modelled and simulated
- Quantitative methods can produce dynamic maps using large databases
- Qualitative methods can help to understand and describe the behaviours, processes, strategies and contexts of agents in realistic simulations (ABM)

Achievements of the SMARTTEES models:

Experiments can be used to give an indication of the likely effect of a wide variety of policy measures
Empirical ‘Un-observables’, such as knowledge flows in innovation or learning of agents, can be measured

All of this is important for policy support



It is about participation

The advantages of using ABM and social simulation for SMARTEES

- Heterogeneous interests need to be negotiated in conflict-prone discussion arenas with high uncertainty requiring many loops, permanent de-briefings and societal reflections
- To include stakeholder perspectives and expertise in policy modelling activities increases the complexity of models

Achievements of the SMARTEES models:

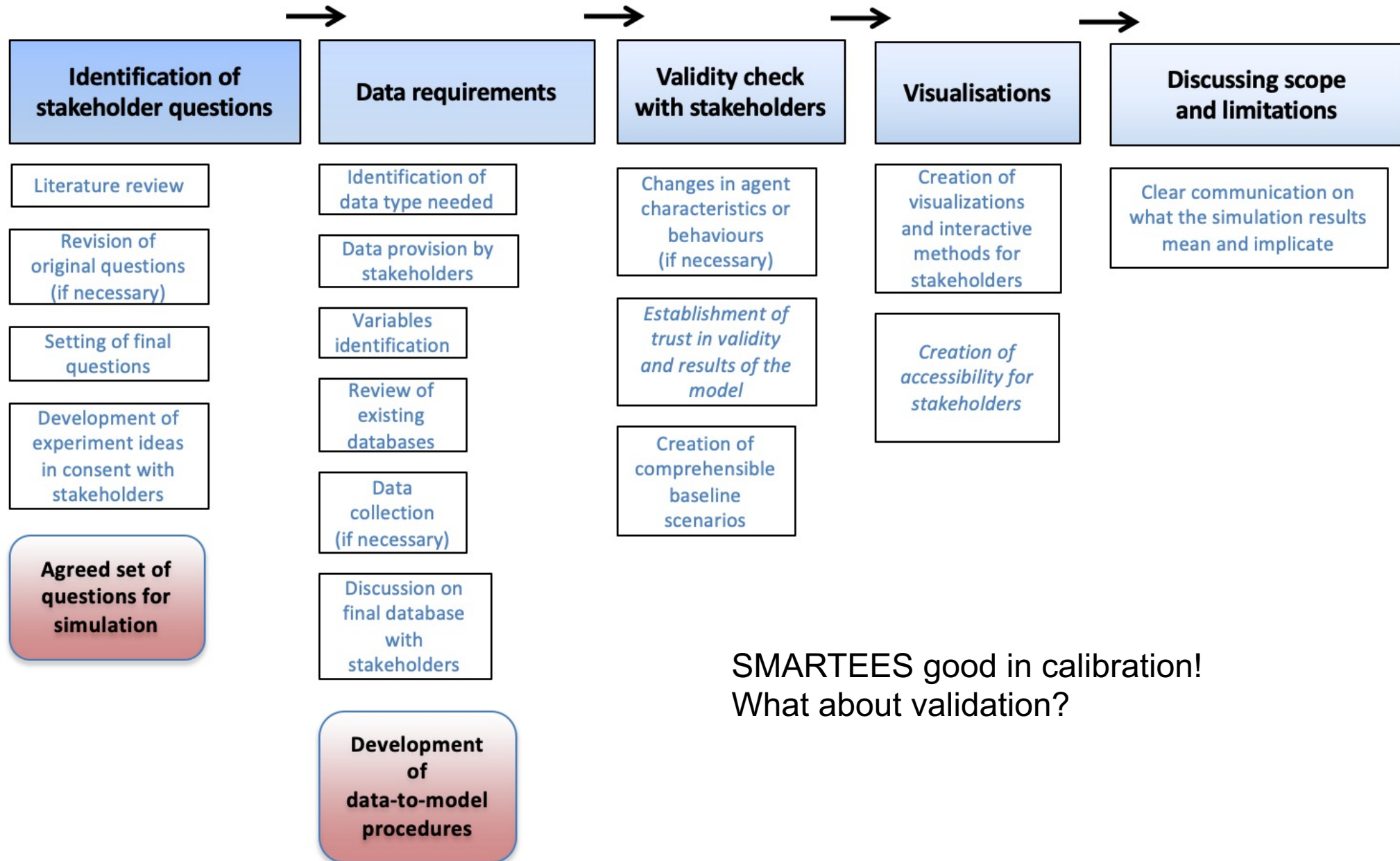
- The models engage implicit and explicit knowledge of stakeholders/non-scientists to create computational models of the system of interest
- Stakeholders co-formulating and structuring the problem
 - Suggest description
 - Suggest solution
 - Test policy interventions
 - decision-making

- Narrow focus of models compared to case study designs
- Focus on diffusion models (SI acceptance, adoption etc.) with restricted dynamics
- Reaching the required level of complexity?
- Was difficult to see how empirical qualitative research enters the social simulation world: *Values matter!* Social innovation takes place in a context-specific societal value framework
 - Inter- and transdisciplinary research: Empirical social research centred around the organisation and coordination of multi-stakeholder engagement at case study level relying on participatory and interactive formats
- How to really "do" innovation? What about implementation?
 - Co-creation for better innovation solutions: supporting participative decision making and production of more responsible innovation adapted to context-specific social value requirements; using a co-design approach to empower the inter- and transdisciplinary partnership. For each context, the stakeholding societal groups need to "own" and advice specific problem solutions to carry them through accepted and supported implementation to successful outcome.

Though there is a stakeholder-driven approach, there does not seem to be model co-design

- For local social innovation it is suggested, "that technologies and work practices are best co-designed using participatory methods in the workplace setting, drawing on such common-sense guiding principles as staff being able to access and control the resources they need to do their jobs and insisting that processes should be minimally specified to support adaptive local solutions" (Greenhalgh et al. 2016: 406)
- The tension between context and one-fits-all models: Are there any unifying bedrock elements overcoming context-dependency allowing for global models, an ABM about the general mechanisms with context-specific instantiations etc.?

What about the co-design process with policymakers?



Thanks for your attention!

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<https://technologyandinnovation.sociology.uni-mainz.de>

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