UMEÅ UNIVERSITET

Report: Micro-project

Project Details

Title: Transdisciplinary Energy & Social Simulation Models for Sustainable Urban Development (TESSim4City)

TAIGA Focus Area: Social AI (SAI)

Start date: 202404 End date: 202504

Responsible person(s): Loïs Vanhée, Computer Science

Summary

Umeå Commun has the development of Tomtebo Strand as a milestone project, a sustainable, carbon-neutral district that serves as a landmark project for the EU on how a city can achieve a green transition. Such an ambitious and innovative project requires advanced foresight on a wide array of overlapping ramifications, from paradigm shifts on energy management to the reciprocal impact of this district on its future inhabitants. In such a situation, in which activities involve complex processes with little availability of empirical evidence, simulations are a straightforward tool for supporting the high-stakes decisions that need to be taken.

Towards fulfilling this potentiality, converging interests were identified between, on the one hand, city representatives, and on the other hand, scientists from relevant disciplines, through a series of workshops that further grew during the TAIGA days. This project is dedicated to scale up these converging interests to a long-term, working collaboration with high social impact on local communities.

Method

The project implemented as the first cycle of an iterative simulation development loop (i.e. acquiring and identifying stakeholder needs, acquiring theoretical insights on how to model such a need, model development, validation). The aim is the development of a basic simulation that is sufficiently rich for showing non-trivial emerging behaviors.

Key activities include:

- Transdisciplinary meetings for identifying of key aspects of importance for the various involved disciplines

- Development of an energy model specialized to Tomtebo strand
- Development of a social simulation model specialized to Tomtebo strand
- Transdisciplinary meetings for identifying how these models can be integrated with each other
- Development of an integrative model bridging the energy model and the social simulation model
- Demonstration and feedback gathering from relevant external stakeholders
- Planning for follow-ups as research papers and projects

Internal collaborators: Erik Eklund, Jonah Sjostrom, Michael Jalmby, Thomas Molen (Umeå Commun); Camilla Andersson, Maria Nilsson (UMU, public health, communication); Gireesh Nair, Itai Danielski, Thomas Olofsson (UMU, energy); Cezara Pastrav, Frank Dignum, Loïs Vanhée (UMU, CS/AI, social simulation)

Additional involved members: Nina Rismalm (project coordinator Umeå Kommun); Linda Gustafsson (Gender Equality Officer, Umeå Kommun); Liv Oberg (project coordinator, Umeå Kommun), Cecilia Aketch Akanga.

Results

TransSim4City achieved its primary aims

- Acquisition of transdisciplinary intellectual, social and technological capital, through
    - preliminary prototypes integrating the theoretical and technological input from multiple disciplines
    - establishment of operating collaborative networks involving multiple disciplines
    - involvement of stakeholders from other sectors (Umeå Kommun)
    - A “for social good” applications towards supporting the development of more sustainable city development
    - a mapping of available and potentially available resources (e.g., databases)
    - systematic identification of stakeholders’ needs and interests for expanding the activity
    - establishment of plans for the activity to provide further benefits through paper writing and the identification of practical plans for external funding

Resource allocation

1. Personnel costs (inc overhead): 100.000 SEK
2. Material costs: 0 SEK
3. Travel costs: 0 SEK
4. Other costs (specify): 0 SEK

Costs for booking rooms & fika were removed as freely available rooms could be used and reallocated for covering additional researcher time.

Evaluation

Altogether, through working together, the project developed and demonstrated the collaborative viability an interdisciplinarity community of actors seeking to achieve a social good purpose. This foundation provides the necessary social grounding (e.g., direct contacts with working collaborators) and formal claims (e.g., technological demonstrators) for stepping up the activity to the next level, including writing papers and grant proposals; hence providing a key opportunity for stepping up the development of the whole activity.

In other words, the project directly addresses the primary purposes of TAIGA: UMU has successfully developed a new niche of activity, having acquired access to specific AI methods (social simulation) crossing multiple disciplines (e.g., CS, physics, energy, epidemiology, communication) in a social good context (sustainable development) involving local actors (Umeå Kommun) in which UMU stands as a national and international leader.

While additional results are always a welcome addition (e.g., submitted papers and projects), the ambitious nature of the project required significant investments in theoretical, conceptual, collaborative, and technological development across a broad network --a large part of which was covered by external funds and researchers' passion. Given the limited resources available for the project, the results go beyond the operational expectations set by the project by a significant margin towards directly addressing the missions and ambitions set by TAIGA.

Responsible person(s) Date: 20250508

Loïs Vanhée