ESSA@Work 2012 - Application Form (deadline: 1 May 2012)

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Did you also submit a paper for the ESSA conference? No

ABOUT YOUR WORK

 1. Abstract (max. 250 words)

Modal Shift from Road to Rail: How can ABM/S help?

Encouraging modal shift from road to rail is still a major challenge for policy makers, despite the increasing cost of private transport and congestion on the roads. For policy makers it is important to understand how different policy interventions will change commuter behaviour across different groups or individuals.

Colleagues from the Human Factors (HF) group have collected data (surveys and focus groups) and used Cognitive Work Analysis (CWA) to analyse the barriers preventing a modal shift. Constraints were identified for:
- different journey types
- different passenger groups
- for a range of different situations

I proposed to use agent-based modelling and simulation (ABM/S) for conducting some exploratory research on the topic (re-using the data they have collected). We plan to test the long term effects of policy interventions on different populations (e.g. people with different preferences or attitudes; specific populations to develop localised strategies).

For this to be a success we would first need to develop some commuter archetypes. We would then need to develop agent templates that would allow us to consider the differences in behaviour defined by the commuter archetypes. Using these agent templates we would be able to implement a multi-agent simulation model representing real world scenarios (using archetype ratios to represent the real world population mix).

In our research we have two goals: We want to develop multi-dimensional commuter archetypes using the collected data and we want to translate these archetypes into agent templates that we can use for building ABMs.

 2. The most important questions that you want to discuss:

Q1: How does the HF data help us with the design and implementation of commuter agents? How can we translate the collected (descriptive) information into something that we can use to define multi-dimensional archetypes and agent templates? How would they look like?

Q2: What kind of questions will we be able to answer with our ABM? We want to better understand the dynamics of the system and produce some recommendations for policy makers. But what exactly does this mean from an ABM perspective?

Although there are many ABM papers on crowd movement and transport logistics these focus either on technical aspects or use very abstract agents. We did not find any papers focusing on modelling commuter behaviour, informed by empirical and contextual data.

3. What kind of expert(s)/peers do you think would be valuable for dealing with your questions?

- Someone who is familiar with crowd / transport modelling
- Someone who uses mainly empirical data in her / his models
- Perhaps an Ecologist or someone with an OR background
- Franziska Kluegl (Oerebro University)
- Marco A. Janssen (Arizona State University)
- Wander Jager (University of Groningen)

4. Provide a short CV about yourself and state your research interests (max. 250 words total)

Agent-Oriented Discrete Event Simulation (AO-DES) is a novel stochastic approach to study the dynamics of complex socio-economic systems. It links agent-based modelling (which focuses on modelling entities and their behaviours) and traditional discrete event simulation (which focuses on the processes within systems). There are numerous application opportunities to use this approach for enhancing the modelling and analysis of human-centric operations and service systems in fields like Operations Research, Energy Policy, Management Science and the Digital Economy. However, methods still need to be further developed, tested, and standardised.

My research goal is to establish AO-DES as an alternative to the predominately mathematic methods currently used by researchers and practitioners. Besides I am interested in the application of different types of modelling and simulation to support Risk Assessment.

5. What input do you bring by participating ESSA@WORK?
a) What is your research discipline and expertise?
- Operations Research; Modelling of Human Behaviour; Energy Policy Modelling
b) What skills do you have?
- Software: AnyLogic
- Programming in Java and C++
- Empirical data collection
c) What is your experience in developing a social simulation?
- Experience level in social simulation: Reasonable
- I use DES/ABS in research for 10 years now
- I teach "Simulation for Computer Scientist"
d) In what stage of developing your simulation project are you?
- For this particular project I am currently writing the funding proposal but I have some experience with similar models (of shopping behaviour and energy user behaviour)
e) What other research fields are you interested in or which fields easily connect with yours?
- Organisational Psychology
- Behavioural Economics
- Sociology