

Analysing ASSOCC for reuse

This is a basic test for reusing "Agent-based Social Simulation of the Coronavirus Crisis" (ASSOCC, 2024). It is all about using a simple KISS approach and reusing all possible artefacts (including published text) to fit the E22 incident (Länsstyrelsen Skåne, 2024; Trafikverket, 2024).

It gives these basic steps:

- Go through the design and documentation to see how it works and how it is structured.
- Analyse the ASSOCC agent model and its implementation of strategies.
- Add a new agent strategy template for all agents in this E22 scenario.
- Implement an agent strategy for a driver in a vehicle.
- Do a first test where 1000 ordinary passenger cars get stuck in a queue. How will the passengers react?

ASSOCC and how it works

(ASSOCC, 2024 How it works)

We have developed a [NetLogo](#) simulation consisting of a number of agents that exist in a grid. Agents can move, perceive other agents, and decide on their actions based on their individual characteristics and their perception of the environment. The environment constrains the physical actions of the agents but can also impose norms and regulations on their behaviour. E.g. the agents must follow roads when moving between two places, but the environment can also describe rules of engagement such how many agents can occupy a certain location. Through interaction, agents can take over characteristics from the other agents, such as becoming infected with the coronavirus, or receive information.

Basic change is "infected" where agent behaviour is more like "What has happened and start looking for answers"

Agents

Agents have needs and capabilities, but also personal characteristics such as risk aversion or the propensity to follow the law. Needs include health, wealth and belonging. Capabilities indicate for instance their jobs or family

situations. Agents need a minimum wealth value to survive which they receive by working or subsidies (or by living together with a working agent). In shops and workplaces, agents trade wealth for products and services. Agents pay tax to a central government that then uses this money for subsidies, and the maintenance of public services such as hospitals and schools.

A basic perspective on a social agent. It might be a bit too basic for E22 incident.

Places

Places represent homes, shops, hospitals, workplaces, schools, airports and stations. By assigning agents to homes, different households can be represented: families, students rooming together, retirement homes, three generation households and co-parenting divorced agents. The distribution of these households can be set in different combinations to analyse the situation in different cities or countries.

It might be a bit too focused on virus infections. For the E22 incident one would like a more generalised template.

Policies

Policies describe interventions that can be taken by decision makers. For instance social distancing, testing or closing of schools and workplaces. Policies have complex effects for the health, wealth and well-being of all agents. Policies can be extended in many different ways to provide an experimentation environment for decision makers.

It might be a bit too focused on virus infections. For the E22 incident one would like a more generalised view on implementing policies.

Conceptual design

The design of the ASSOCC framework is based on theories from sociology that describe individual behavior as a result of a combination of basic values, motives and affordances over many contexts. In ASSOCC these theories have been implemented as a combination of three types of needs: the psychological needs, the social needs and the physical needs. Together they determine the reaction of agents to policies and their physical and social context.

A short description of the conceptual architecture of ASSOCC is available [here](#).

Need a deeper analyse. Se separate document looking at the ASSOCC conceptual architecture above.

Tools

The simulation is built on Netlogo with a visual interface in Unity. The Netlogo model can be used standalone. For the scenarios, we use the Unity interface for better visualisation of the simulation.

Code: *the complete source code is available under a Creative Commons Attribution-NonCommercial 4.0 International License, at <https://github.com/lvanhee/COVID-sim>. Note that this is the beta version of the code as we are developing it. You can expect that new versions will be appearing everyday. Please report any bugs or functionalities that you miss!*

In order to use or experiment with the different scenarios, packages will be made available soon, also in the github page and reachable from the [scenarios](#) page.

Need a deeper analyse. Se separate document analysing the ASSOCC code repository.

Documentation

Documentation: *the complete description of the agent-based model, using the ODD protocol (Overview, Design concepts, and Details) can be found [here](#) (updated 19 June 2020). A short overview of the [disease and contagion model](#) is also available.*

More documentation is available upon request.

Need a deeper analyse. Se separate document analysing the ASSOCC ODD.

References

- ASSOCC. (2024). Home. <https://simassocc.org/>
- Länsstyrelsen Skåne. (2024). Rapport om händelseutredning - Oberoende utredning av trafikstoppet på E22 3-5 januari 2024. Hämtad från <https://www.lansstyrelsen.se/download/18.5ed9862f18e5a6122ae21b30/1711437213592/10480-2024%20Rapport%20om%20h%C3%A4ndelseutredning%20->

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[%20Oberoende%20utredning%20av%20trafikstoppet%20p%C3%A5%20E22%203-5%20januari%202024\(28265019\)%20\(0\)_TMP.pdf](#)

Trafikverket. (2024). *Utvärdering händelsen på E22, Snöovädet den första veckan i januari 2024*. Hämtad från <https://trafikverket.diva-portal.org/smash/get/diva2:1846901/FULLTEXT02.pdf>