

FINAL REPORT

STSM AT UNIVERSITY OF GHENT, BELGIUM

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This report covers the academic activities within the STSM period stated above at Ghent University, CartoGIS (Prof. Nico de Weghe's group).

GOAL

The overall goals pursued were twofold: building an agent based model of bicyclists' behaviour and starting up to write a paper about the design, implementation and use of this model.

BACKGROUND

The academic products to be delivered within the period of my PhD scholarship are all contained within the project *bikeability- cities for zero emission travel and public health*¹, a three years Danish inter-institutional project, funded by The Danish Council for Strategic Research aiming at understanding bicyclists' spatial behaviour in general and their satisfaction with their trips and surroundings in special.

Specifically, my project deals with agent based modelling of bicyclists' behaviour and the valuation of their surroundings. Developing and implementing such a model meets a series of objectives and research questions:

- *understanding* and *modelling* bicyclists' spatial choices
- *modelling* and classification of breaks and stops within urban journeys

¹ See more at <http://www.bikeability.dk>

- *generation* of scenarios for urban design
- *optimization* of urban design towards enhanced positive experiences of bicyclists

The final delivery of the PhD will at least be comprised of four central papers:

- 1) Snizek, Sick Nielsen and Skov-Petersen: *Mapping Cyclists' Experiences in Copenhagen (in review)*
- 2) Snizek, Claeys Bouuaert, Skov-Petersen and Yeboah: *copenhagenABM, an Agent Based Model of Bicyclists' Experiences in Copenhagen*
- 3) Yeboah, Snizek & Alvanides: *An Agent Based Model of bicyclists' behaviour in Newcastle, UK (working title)*
- 4) Snizek, Zebitz & Jagielska : *An Agent Based Model of a Street Segments explaining Interactions between eight different Types of Bicyclists (working title)*

CONCRETE WORK

During the stay in Ghent the focus was set upon starting up the work for paper 2. In the beginning of the period the ODD of the agent based system was completely written in revision one. The ODD, short for **Overview, Design concepts and Details**, defines a model from an overall viewpoint of the purpose down to the implementation in detail like for example the interplay agents in-between. Firstly published in 2006 (Grimm et al. 2006) it has been frequently used bridging the gap between scientists as well as between scientists due to its standardized nature. After completing the ODD and a in-depth discussion with Prof. Van de Weghe and Post-doc dr. Tijs Neutens we began working on the implementation. The following parts of the agent based modelling system were implemented within rePast, an agent based modelling toolkit (Charles M Macal 2010) and repastcity (Crooks 2012):

- **entry points** : auto selection of entry points from a series of point data representing addresses within geographic zones
- **exit points**: auto selection of exit points from a series of point data representing addresses within geographic zones
- **decision matrix**: a mechanism for local choices at intersections as shown in (Skov-Petersen, Kefaloukos, and Snizek 2010) was implemented formally, awaiting results from WP3 of the bikeability project

- **Danish datasets:** both the road network as well the zoning model of the Danish Traffic Survey were adapted and implemented.

Summing up, the requirements planned for the stay in Ghent were met; having a model that runs at this stage was not really expected. In terms of relations between the institution a co authorship of Manuel Claes Booyyaert was achieved.

Best regards



Bernhard Snizek

LITERATURE

- Charles M Macal, Michael J North. 2010. "Agent-Based Modeling and Simulation." *Winter Simulation Conference (WSC)* (January 1): 1–13.
- Crooks, AT. 2012. "The Integration of Agent-Based Modelling and Geographical Information for Geospatial Simulation." *Agent-Based Models of Geographical Systems*.
- Grimm, Volker, Uta Berger, Finn Bastiansen, Sigrunn Eliassen, Vincent Ginot, Jarl Giske, John Goss-Custard, et al. 2006. "A Standard Protocol for Describing Individual-Based and Agent-Based Models." *Ecological Modelling* 198 (1-2) (September): 115–126. doi:10.1016/j.ecolmodel.2006.04.023.
- Skov-Petersen, Hans, Pimin Kefaloukos, and Bernhard Snizek. 2010. "Kvintus.org - a Choice Based Agent-Based Simulation Model Integrated with Google

Maps." *Proceedings for the Fourth International Conference on Monitoring and Management of Visitor Flows in Recreational and Protected Areas* (December 15): 1-4.