

Citizen well-being in a neighborhood

Ir. G. Slinderland and Dr.ir.I. Nikolic

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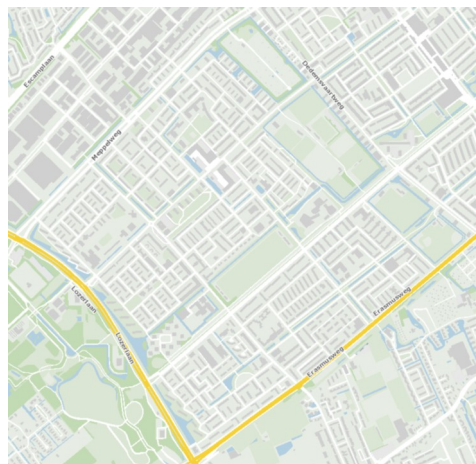
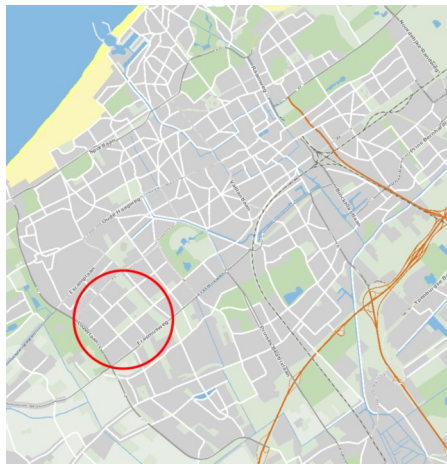
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1 Background information

1.1 Context

The case is situated in the City of The Hague. This city is one of the most fragmented and diverse cities in The Netherlands. This means that people from many different backgrounds are living together and in some neighbourhoods this could complicate the management of liveability and safety problems. Examples of problems in the neighbourhood, affecting *liveability and sense of safety* are hang youth, drug abuse, lonely elderly, litter and lack of community/social space. We use Bouwlust¹, the area bounded by the Meppelweg, Dedemvaartsweg, Erasmusweg and Lozrelaan, as a case study neighbourhood.

¹ <https://www.openstreetmap.org/#map=16/52.0417/4.2647&layers=N>



1.2 Actors

Citizens want to have a liveable and safe neighbourhood. Dependent on their life situation and interest, they have time/opportunity/resources to contribute to initiatives that improve the neighbourhood. An example of such an initiative is Tegelweetjes² (QR codes). For this initiative, QR codes are placed on tiles in the neighbourhood at relevant locations and contain information about that specific place (e.g. what kind of activities are going on, the history of the place, or a particular person). Other citizens believe the municipality is responsible for a safe city, for which they pay taxes.

The municipality of The Hague implements policies to deal with liveability and safety issues across different departments. The municipality struggles to effectively improve safety and liveability. They want to involve citizens in this process, and have developed and implemented several policies for this, but procedures are still top-down. Two main policies that the municipality has to directly influence the liveability and safety in the neighbourhood are the community workers and the police.

Community worker (*opbouwwerker*): Hired by Stichting Mooi, subcontracted by the municipality to help citizens whom want to do something in their neighbourhood, e.g. start an initiative, to do so. Are in contact with the active citizens who are engaged with the neighbourhood. Usually more than 1 in a neighbourhood. They are in a position to enthuse different groups – youngster, elderly, ...

Local police officer (*wijkagent*): Works in one neighbourhood and has a lot of local knowledge about “his/her” neighbourhood. Knows where potential problems might arise through their local contacts, and keeps in contact with community workers and municipality about this. Usually more than 1 in a neighbourhood.

² <https://www.tegelweetjes.nl> Note that Tegelweetjes is a project currently running in another area in The Hague, but that we for this case pretend they are also in Bouwlust.

2. Purpose of the model

2.1 Goal

Understand how municipal policies influence the perceived livability and safety (PLS) of agents.

What are budget allocation priorities that lead to high and stable perceived livability and safety in a neighborhood?



2.2 Your task

- Build the model
- Explore behavior
- Answer RQ
- Report your modeling process

The model assumptions mechanisms and metrics are the minimum required elements. Your model must have these implemented to be considered complete. Optional *nice to have features* are (much) more challenging model elements for those groups that have previous ABM experience or want to dive deeper and are denoted in *italics*. You can implement any or all of them, or add your own refinements as you see fit, but clearly show why/how you did this. Adding *nice to have features* to your model has a positive but limited effect on your grade.

3. Model elements

3.1 Citizens

There are 27,505 inhabitants in Bouwlust. The properties of individuals are randomly and independently distributed as follows. *Probabilities are not independently distributed, and follow a consistent and defensible logic.*

- 37% has children
- 60% has a job
- 50% is religious
- 12% takes part in initiatives

Please use these defaults, but make the values changeable in the model.

Citizen perform 0 or more activities every day, depending on their personal situation, and have a chance to experience interactions with each other, police and community workers. They also experience problem youth, litter, burglaries and community activities.

Citizens have a random location where they live. *Citizens only live in the residential area of the map.*

Activities are:

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- recreational walk (2/7 days); walk through neighbourhood
- going to and from work (5/7 days); Work is assumed to be at the nearest map edge
- bring and take kids from school (5/7 days); go to nearest school
- shopping (3/7 days); go to the nearest supermarket
- place of worship visit (1/7 days); go to nearest religious building
- join neighbourhood activity (1/7 days); go to nearest neighbourhood initiative

Citizens can walk everywhere on the map. *Citizens can only walk on the roads and take the shortest path to their destination. Not every citizen has the same experience of the problems then encounter, and the degree to which events influence their PLS is dependent on their personal situation (such as yes/no kid, yes/no work etc.)*

3.2 Police

A police officer walks from police station to problematic points (locations of problem youth, burglaries of significant amounts of litter) and back every day. *An officer is allowed to spend a specific fraction of the day doing rounds, and the officer must be back to the station before their shift ends. The amount of influence an officer has on PLS is dependent on amount of time they spent at each problem point.*

During their walk, they can talk to citizens they encounter. Police can prioritize specific types of issues, and actively visits these first. With decreasing overall PLS they more actively engage with the citizens.

3.3 Community worker

Starting at the community centre, walks to a number of ongoing neighbourhood initiatives, and has to be back to the centre and the end of their day. Community worker can only support a limited number of initiatives. Is approached by citizen agents, especially citizens who are active in a citizen initiative (or want to start one). Citizen meeting a community worker either on the street or at the activity increases PLS moderately. *Community worker has the same kind of behaviour as police, limited time and influence proportional to time spent at initiative.*

3.4 QR Codes

Every location has a QR code, as well as each neighbourhood initiative. Citizens can scan the QR code when they pass the location and they receive extra info. Interacting with a QR code has no, limited or medium positive impact on the PLS. The impact is initially randomly distributed and reflects different quality of information available. *The amount of increase is dependent on the frequency of visits of the community worker to the activity the QR code is associated with, as each visit updates the information and makes it a bit more useful. As frequency of visits decreases, the impact also decreases. A citizen that has used a certain threshold number of QR codes becomes active and wants to start an initiative.*

3.5 Problem youth

Problem youth are observed by the citizens on hot spots on a regular basis and the youngsters move throughout the neighbourhood, they are not always at the same hot spot. Locations where they like to hang around are: shopping mall and schools. These groups create litter at locations they spend time in. Police presence causes them to change to a suitable new random location. *Problem youth are groups of citizens, that join / leave a specific group due to various influences of police and community workers. If a group is larger than 20 persons, it splits into two.* Problem youth observations by citizens lower their PLS. More initiatives in the city means less problem youth.

3.6 Litter

Litter is created randomly throughout the city, as well as by problem youth. The more often citizens observe litter, the lower their PLS is. *The frequency of litter appearing randomly is directly proportional to PLS.* Every week, litter is cleaned up, which fraction of it is determined by the effort of the municipality. *Different locations, other than problem youth spots have non-random littering mechanisms, determined by the number and kinds of citizens that visit them.*

3.7 Burglaries

Burglaries happen randomly to citizens. This strongly reduces their PLS. After a burglary, police visits the citizen, if it has enough time and resources, which increases their PLS, but not as much as the burglary lowers it. Each accidental interaction with police increase the PLS slightly. *Citizens can also hear about burglaries from other citizens, or police officers, which causes their PLS to decrease.* *A low overall PLS means more burglaries happen.*

3.8 Neighbourhood initiatives

At this moment there are 5 neighbourhood initiatives. These are events taking place at a random location in the neighbourhood. They are regularly visited by a community worker and by citizens. Each visit by a citizen increases their PLS by a limited amount. Each visit by a citizen increase the viability of the initiative by a small amount, each visit by the community worker increases the viability by a moderate amount. Then the viability drops below a certain threshold, the initiative dissipates. More initiatives result in a higher PLS in general. A high PLS, above some settable threshold means lower probability of (citizen and/or municipality) initiatives, since when everyone thinks it's all going great in the neighbourhood, there is not much motivation to start initiatives. There needs to be a "matter of concern" for citizens to start doing something. Below a certain threshold of PLS, the probability of random citizens starting initiatives starts increasing. Whenever a citizen starts an initiative, their PLS is highly increased. *Probability of starting an initiative is dependent on the personal history of the citizens, the more negative experiences a person has, the higher the chance that they will start an initiative.*

3.9 Social interaction

Social interaction happens when two agents physically meet in the neighbourhood. Each meeting between two citizens has an overall PLS correlated probability for interaction. When an interaction occurs, both citizens have a limited increase of PLS. Interaction between police and citizens has a high increase in PLS, and is inversely proportional with the overall PLS. *During interactions between citizens, police and community workers there is exchange of experiences with litter, problem youth, burglaries and community initiatives. Depending on the type of experience and the properties of the citizen, individual PLS is affected in different fashion.*

3.10 Environment

We deal with the map of the neighbourhood Bouwlust. Next to buildings, roads, water and green spaces, map has a number of locations: religious buildings, neighbourhood initiatives, schools, supermarkets, community centre and police station.

The environment has weather patterns, modelled on realistic weather patterns influences how much time citizens spend outside, community worker activities and the number of robberies.

3.11 Time

The model will run for 3 years, keeping in mind that an initiative takes 6 months from start to finish. A day ends when every citizen has returned home.

4. Metrics

Key model metric is the individual and overall **perceived liveability and safety**

PLS is a compound result of individuals experiencing:

- Problem youth
- Litter
- Burglaries
- Neighbourhood initiatives
- Social interaction
- QR codes

5. Levers

These are controllable by the municipality

- Number of citizen initiatives that municipality can support
- Number of police officers.

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- Number of community workers.
- Number of garbage collectors cleaning litter.
There are 2 police officers, 3 community workers, 4 garbagecollectors.
Currently there are 5 initiatives, and the municipality can support maximum of 10

Municipality has 100 units of money. Police officer costs 10 units, community worker 5, garbage collector 4 and an initiative 2.

6. Guidelines, submission and grading

6.1 Guidelines

When creating your model, considered the following:

- Make the model narrative before you start the code!
- Make sure to clarify your assumptions.
- Feel free to extend and complicate matters as much as you like, but watch the time!
- Getting all steps done is much more important than making an accurate / rich model!
- If you can't figure out how to write the code, come with a clear algorithm on paper and ask us.
- Prepare your questions before the practicals!

6.2 Submission

During the theory exam, every student (every group member individually) submits a zip file as answer to question 2. The submission meets the following requirements:

- **Every** file has name1_student number1_name2_student number2_ prefix.
 - for example: nikolic_314159_warnier_424242_slingerland_271828_project.zip
 - but also: nikolic_314159_warnier_424242_slingerland_271828_model.nlogo
 - and nikolic_314159_warnier_424242_slingerland_271828_report.pdf
- report in **pdf** format only
 - NO doc/docx/whatever
 - NO code in the report
- .nlogo files
- analysis code (R/Excel/python/)
- raw data used for analysis

6.3 Grading

The grading will be based on :

- Does it run?
- Does it break? Easily?

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- Does it generate some phenomena you can identify?
- Did you perform the verification?
- How did you set the experiments up?
- How well did you do the analysis? - how well are you interpreting the data?
- Did you answer the questions?
- Coding – how well are using the NetLogo language / did you read the manual
- Reporting – structured and clear report