AMSTERDAM INSTITUTE FOR
ADVANCED METROPOLITAN SOLUTIONS

1 General Project Information

Project title:	City Rhythm

Principal investigator:	Dr. Caroline Nevejan

Lead partner:	TU Delft

Project partners:	Alterra, Wageningen University
	DataLab Amsterdam, City of Amsterdam

Project start date:	1 September

Project duration:	1 year

Total project budget:	198.800

AMS funding requested:	20.000

1 Title

City Rhythm

2 Project leader

Dr. Caroline Nevejan, Associate professor,

Delft University of Technology

Faculty of Technology, Policy and Management

(Buiding 31)

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3 Project partners

Delft University of Technology:

- Professor Brazier, system engineering
- Dr.Ir. Mariëlle van den Hengst, intelligence & security informatics
- Vacature: research assistent

Wageningen University and Research/Alterra:

- Ir. Jandirk Bulens, spatial knowledge systems
- Vacature: researcher

Data Lab, City of Amsterdam:

- Ger Baron - CTO of Amsterdam

4 Problem statement

What is the (general) metropolitan/urban challenge that you want to address or contribute to? What is the scientific problem that you want to solve?

The urban challenge we address is to enhance the sense of security in a specific neighbourhood by stimulating social cohesion through the creation of shared rhythms. Rhythms are patterns that move through space and time. Rhythm is the variation in repetition in specific context (Huijer 2015). Previous research indicates that shared rhythm has a high impact on citizen's sense of safety. It deeply affects urban life (Lefebre 2004)

The scientific challenge is (1) to identify and correlate different rhythms in large data sets, (2) to make (through visualization of data rhythms) these complex data understandable for lay people, (3) to create a rhythmic simulation that offers rhythm analyses for possible intervention.

5 Objectives

With the transformation of the welfare state into a participatory network society and sharing economy, rhythms adapt constantly (Nevejan & Brazier 2011) . As a result people adapt their movements and way of doing things. Because big data offer new kinds of real time feedback, citizens find new modes of organizing themselves. TomTom®indicates current traffic jams and AirbnB® for example changes the way tourists visit cities. They stay longer, spend more in local neighbourhoods, and cause rhythms in neighbourhoods to oscillate.

In a 24/7 economy no rhythm is given, while for people rhythm is fundamental to survival and well-being (Damasio 2004, Nevejan 2007). The relation between the space of places (offline reality) and the space of flows (online reality) is unclear (Castells 2011). This research anticipates that rhythm is one of the dynamics that connects these two spaces. Rhythm defines our physical well-being, it defines our day-to-day aesthetic experiences (Dewey 1934) and defines how people engage (Gill 2015). With the many data that are collected in network societies new paths of policymaking by using these data in significant ways open up (Helbing 2015). This research explores rhythm as a perspective for working with physical and large dataset in relation to one another.

In education, in healthcare, in transport, in energy management and in many other sectors rhythm is fundamental to smooth organization and satisfactory interaction. Rhythmic design, beyond functional requirements of specific services, contributes to more balanced societal interactions, to a higher sense of safety of those involved. It is argued to be a new field of the social sciences (Michon 2016) Also in daily personal practice, one can argue that rhythm feels like free energy, anything in tune with a rhythm requires less energy to accomplish. This study explores if and how rhythm is core to processes of emergence in social and architectural contexts (Nevejan & Brazier 2012, Sefkatli 2016). Outcomes of this research indicate how rhythms can be communicated, it indicates what happens when rhythms are disrupted and it indicates how rhythmic interventions can benefit societal cohesion.

City Rhythm is an explorative 'research through design' project (Zimmerman et al 2010) that studies shared rhythm in neighbourhoods for improving the sense of safety of residents in those neighbourhoods. City rhythm identifies and correlates a variety of rhythms in the social, ecological and technological domain. Through interviews, observation and analysis of the City Council datasets, rhythms are identified which affect people's sense of connectedness, trust and safety (Nevejan & Brazier 2015, Gill 2015). These rhythms are then visualized.

Rhythms of energy use, transport, schools, ICT data, garbage collection, opening hours of shops and businesses, people who walk their dog, and many more are studied and selected to be made tangible and understandable in relation to each other so that lay people can understand.

Eventually this explorative study focuses on identifying how rhythms can be manipulated for a better understanding of possible interventions to enhance shared rhythms that support social cohesion in specific neighbourhoods and improve people's sense of safety (Den Hengst, De Jong, Nevejan, Brazier 2017).

In this research project we identify the most significant datasets and data acquisition for the identification of shared rhythms (1). We study how police, city councils and citizens can manipulate these rhythms (2). We introduce a first sketch of a method of rhythm analyses for specific neighbourhoods to become aware of the rhythms people share and identify possible interventions to improve shared rhythm (3).

The research will be conducted in and with the DataLab of the City of Amsterdam. Amsterdam contributes with its over 900 datasets, Wageningen University contributes its specific research into spatial data. TU Delft is project leader and creates the simulation and studies with artistic and design partners and with students how these data can be unfolded to make sense to lay people, offer policy analyses and identify interventions for rhythmic design.

The Digitale Steden Agenda, an initiative of Dutch City Councils G4 and G32, has organized five other cities in the Netherlands to assist in financing and validating the research: Zaanstad, Helmond, Rotterdam, Den Haag en Zoetermeer. The assumption is that the work that is carried out with the Amsterdam DataLab will be very useful for other cities as well. Amsterdam participation includes:

- Collaboration with of the Amsterdam Data Lab
- Insight into city challenges and involvement of stakeholders
- Use of city data and access to city departments
- Access to and feedback from the city network of stakeholders/partners
- City to act as launching-customer

6 Deliverables

Deliverables of the research are:

- Explorative methods and tools for identifying rhythms in physical and data realities
- Better understanding of how large datasets indicate rhythms and break of rhythms
- A first understanding of how rhythmic interventions can become part of policymaking
- A pilot simulation in which shared rhythm can be manipulated.
- Opening conference and workshops on City Rhythm for stakeholders involved
- Several workshops between administrators, professors, designers, students and artists.
- A publication of the research trajectory and results for stakeholders and their city council members.
- A closing conference in which results are presented
- A larger research proposal with national and international partners.

For the city of Amsterdam this research creates new perspectives on the use of large datasets for policymaking and urban planning. The pilot-simulation offers new ways of analysis of problematic situations as well as exploration of rhythm as a driver in design processes of to be developed areas. Output of the research for Amsterdam is a pilot simulation in which shared rhythm can be manipulated.

The project creates the foundation for a new set of tools for policymaking and urban planning based on rhythmic intervention and design. Such tools are of interest to a variety of future clients. The ICT department of the city council of Amsterdam is one of the target users of outcomes of this research. Also the five partner cities that co-finance and validate results are target users of outcomes of this research.

During the research new data sets are acquired and/or modified for being used in relation to one another, in this case in a rhythmic simulation of a neighbourhood. Outcomes will be of benefit to the open data platform. Also, outcomes are expected to offer new ways of data analyses.

In scientific papers we report on the identification of the significant rhythms in specific neighbourhoods, the process of making complex data available to lay people and the initial framework of rhythm analyses we aim to develop.

In the coming year a mature research proposal will be written for the next 4 years that will build on the results of this explorative study.

7 Work breakdown

This study is a rather short study of only one year. All partners will come together regularly. In an iterative process the research will be shaped.

The first half-year is geared towards creative exploration in the DataLab and in the physical environment. Students and artists are invited to contribute. The second half year is focused on making visualizations and identifying possibilities for intervention.

Every three months there is a *presentation moment* with all stakeholders. Results are evaluated and new experiments and design are formulated. In one year we will go through 3 iterations before we present our final results.

Of each partner specific expertise is used in these meetings and in the tasks to be carried out:

Caroline Nevejan: project leader and social scientist

Frances Brazier: self-organization and systems design

Mariëlle den Hengst: computer science and specialist in real time data analysis

Jandirk Bulens: Geo scientist and specialist in spatial systems

Ger Baron: CTO of Amsterdam and specialist in future policy frameworks

The vacature of TU delft will be research assistant and organize all the stakeholders at specific moments in time. The vacature of Wageningen University assists in bringing previous AMS and Wageningen research available to this project.

8 Planning

Hereunder is presented an indicative planning. The number 1- 3 indicate intensity of attention and execution.

Activity	09	10	11	12	01	02	03	04	05	06	07	08
Exploration GroundTone of Neighbourhood	3	3										
Exploration Possible Interventions			3	3	3							
Designing Method and Models Rhythm Visualization	1	1	2	2	3	3	3	3	2	2	2	
Writing new Research Proposal					2	2	2	2				
Writing Papers on City Rhythm					2	2	2	2	2			
Validating Methods and Models		1			1	2	2	2		3	3	
Presentation of Results					1			1				3
Book for City Councils about Results City Rhythm									3	3	3	3

This explorative research will be designed as we go along. The attachment details activities with students in the first quarter. Activities for the second quarter will be defined at the end of the first. Design and Artistic Research will start in September to identify the right focus (i.e. specific groups of people) to be analysed in DataLab

activities. Results from the first quarter are input for conceptual design in the second quarter, to link/integrate physical observations and large data sets. In close collaboration with Amsterdam DataLab in the third quarter all activity is in artistic research and design. Different visualizations and designs are tried out, and validated together with contributing city partners regularly. The results of this project will be compiled in a well-illustrated book for city councils, and presented during the final event..

Find below an impression of the first quarter:

(SPG = Student Project group)

	Skill labs	Tasks	Result
Week 1		Intervention cycle Forming student groups of 6 Opening Conference on Rhythm	City SPG's defined and connected. Desk research on City executed and published
Week 2	Write a column Interview technique	Each student does 2 interviews. Whole group makes sure this is a diverse sample of population in neighbourhood	Publish video of interview Publish summary of interview Make a visualization of acquired data with group
Week 3	Observation skills Write a report	Every student does a different observation in the neighbourhood of minimally 6 hours	Make report on observation Visualize shared data of the group
Week 4	Observing ecologies Spatial flows	Every group creates complex bio schemes and identifies specific elements in specific neighbourhood	Report on ecology in neighbourhood Visualize shared group results
Week 5	Reading meaning in Big Data	Work with civil servants to look at the different datasets that seem relevant. Make invite for neighborhood to see your results	Make a table with different datasets and what they can tell us
Week 6	Visit to DataLab	Visualize possible big data outcomes with	Make report on insight of specific data own

	Amsterdam	imaginary data	neughbrhood and insight at Big DataLab
Week 7		Integrate all rhythms you have explored	Make visualization and presentation
Week 8	Presentation trial and training	Present in Neighborhood your work Make workshop with residents to create feedback on your work	
Week 9		31 rst of October Present the City Rhythm of your neighborhood to supervisors and be graded.	

9 Project budget

See Attached Excel File

10 Project financing

Amsterdam contributes € 20.000 (ex BTW) and provides access to and collaboration with its DataLab as a central place for executing the research on and with the larger datasets. DataLab contribution is estimated as €30.000 in kind.

Five other Dutch cities finance each €20.000 ex BTW. They are the stakeholders and will provide feedback during the "presentation moments". They expect to be able to use the results in their own regions.

AMS contribution of € 20.000 euro's and participation will affect the data analysis and will make it possible to include high level visualization.

11 Project steering and governance

It is a small research project and does not need a lot of layers in governance. The steering group consists of one person per partner who participates in the research. Project leader and chair of the steering group is Dr. Caroline Nevejan.

Each of the partners (TU Delft, Alterra/Wageningen University, City of Amsterdam and AMS) nominates one person who in case of disagreement will participate in an ad hoc steering group.

Based on this explorative study we will be able to identify possibilities for rhythm methods and tools for policy making, urban planning and citizen participation.

The tool and methods developed are expected to make a significant difference in future urban developments

If such tools show to be highly relevant, we aim to identify a larger research opportunity either in the Netherlands (NWO or STW) or in Europe's Horizon 2020 or EIT context for further development of such tools.

Also, in the context of this exploratory study we cannot work with live real time data, which is where we expect applications to have high relevance. This is the next step.

12 Risks and risk mitigation

The first and most significant risk we face is offending privacy feelings and regulations when analysing and visualizing rhythms. With the expert team we anticipate we can deal with this concern in our exploratory study by working with partial datasets and with data purposefully provided by participants in the research. In this explorative phase we can create and use synthetic data based on real data.

Secondly there is always a creative risk in making visualizations. The Data Lab of Amsterdam's expertise and experience in such challenges will be embraced. Fortunately we have diversity in both the partners and stakeholders involved, and in the designers and artists, to make a difference.

13 Key references of lead partner and/or submitters

TU Delft

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15 Annex

Please provide:

- Letters of Commitment of collaborating partners, committing to the (cash and/or in-kind) contributions and activities mentioned in this AMS proposal and acknowledging the AMS ground rules and AMS financial guidelines.

The Ground Rules of AMS

Although research and valorization projects may vary in size, maturity of the consortium and maturity to the market, all projects should adhere to the ground rules of AMS. Adherence to the ground rules should be secured during the acquisition and start-up of projects/programs:

Scope: all projects will fit with the scope of AMS and will focus on research, design and experimentation for creating 'metropolitan solutions' (see description of scope and themes in AMS Research and Valorization Strategy document).

Value platform: all projects will either/both make use of the value platform (e.g. living labs, facilities, AMS data platform, network) or/and will contribute to it.

Amsterdam: all projects/programs conduct part of the activities in the Amsterdam metropolitan area ("made in Amsterdam") and/or address challenges in the Amsterdam metropolitan area ("made for Amsterdam").

Leverage knowledge base: all projects will tap into the knowledge base of WUR and/or TU Delft, and will be complemented by MIT if possible.

Scientific rigor: all projects will be scientifically sound. This may vary from scientific excellence in fundamental research to a scientifically sound approach to product testing or experimentation.

Value creation: all projects must have preapproved governance and IP arrangements that stimulate valorization of research results by project partners and/or by entrepreneurs that valorize results through spin-offs or startups.

Co-financing: all projects have co-financing secured in binding contracts before spending budget allocated to the project/program by AMS.