

A CASE STUDY OF NATURAL SURVEILLANCE IN TALLINN

Studying the correlation between crime rates, spatial configuration and perception.





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Surveying illumination in public spaces: a prototype

SPIN Unit 2014

Goal of the project

This paper represents the first step of a pilot study initiated in Tallinn by MTÜ Spatial Intelligence Unit (SPIN Unit) in collaboration with the Politsei- ja Piirivalveamet (Police and Border Guard Board). Our study aims at deploying into the city of Tallinn the latest academic and practical knowledge about the spatial context of urban crime, by creating fresh links between advanced spatial analysis, geo-statistical monitoring of offences and the development of a technique to survey and map illumination in public spaces as a prime example of our methodological approach.

The project is expected to bring upon at least two tangible benefits: (i) A more complete description of existing crime-patterns, risk areas, times, and vulnerable environment types as opposed to relatively safe or 'defensible' areas and types, to help the planning and coordination of police work. (ii) Better understanding of the likely effects and performance of newly planned urban areas, both locally and city-wide, to facilitate evaluation of plans and professional communication for their improvement.

Work on both present and future urban landscapes acknowledges the complexity of crime and disorder as a research subject and the important societal, as opposed to situational, origins of crime. Our project is based on the belief that the spatial or urban context of crime deserves a more detailed study, as it may likely lead to improvements both in police practice and its citizen approval.

In the following sections, we present a short review of the starting points for this research. We also introduce the very first prototype of a device realised by SPIN Unit to conduct a quantitative survey of the illumination of public space.

Crime and space

Following the publication of C. Ray Jeffery's book "Crime prevention through environmental design" in 1971, a new, vast and multidisciplinary field of research started to develop innovative theories, methods and models to study how environmental design plays an important role in the reduction of opportunities for criminal behaviour in public space. Although this very first publication highlighted the relevance of biological and environmental determinants of crime events, the reference point in the fields of architecture and planning is the defensible space theory developed by Oscar Newman (1972). Newman develops his

Extending background knowledge

*Scientific article for the Estonian
geographers' association under peer review*



Socio-economic theories

Environmental theories

Socio-economic theories

Sampson & Groves - social disorganisation

“The main factors for the occurrence of crime are found in the heterogeneity of poverty, racial and ethnic, and residential mobility patterns”



Socio-economic theories

Cohen & Felson - routine activity

“Crime depends on the availability of attractive targets, the motivation of the offenders and the absence of capable guardianship”



Socio-economic theories

Wilson & Kelli - broken window

“One act of vandalism may cause an escalation into more serious crimes”



Environmental theories

Newman - defensible space

“Architectural and urban design to be one of the factors that could foster or prevent the occurrence of crime”



Environmental theories

Stanley - community policing

“When the urban space is recognised by the local community, this will act to protect it from antisocial behaviours”



Environmental theories

Jacobs - natural surveillance

“Environmental design and social behaviours are variables of an organised complexity that can promote or discourage antisocial behaviours”



Environmental theories

Illumination in public space

“Efficient lighting system for public space was found to be a good deterrent to the occurrence of crime, not only during the night time but in daytime as well”



Extending background knowledge

*Scientific article for the Estonian
geographers' association under peer review*



Socio-economic theories

Environmental theories



**Studying natural
surveillance in Tallinn**



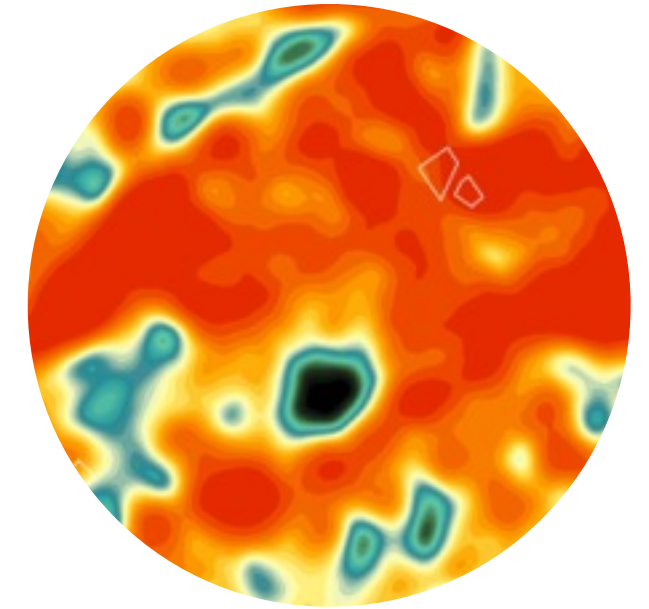
Visibility

Mapping the capability of see
and being seen



Environmental design

Analysis spatial and perceived
accessibility



Crime rates

Geo-statistical analysis of crime
occurrence

**Correlation between accessibility and
public illumination (demonstrated)**

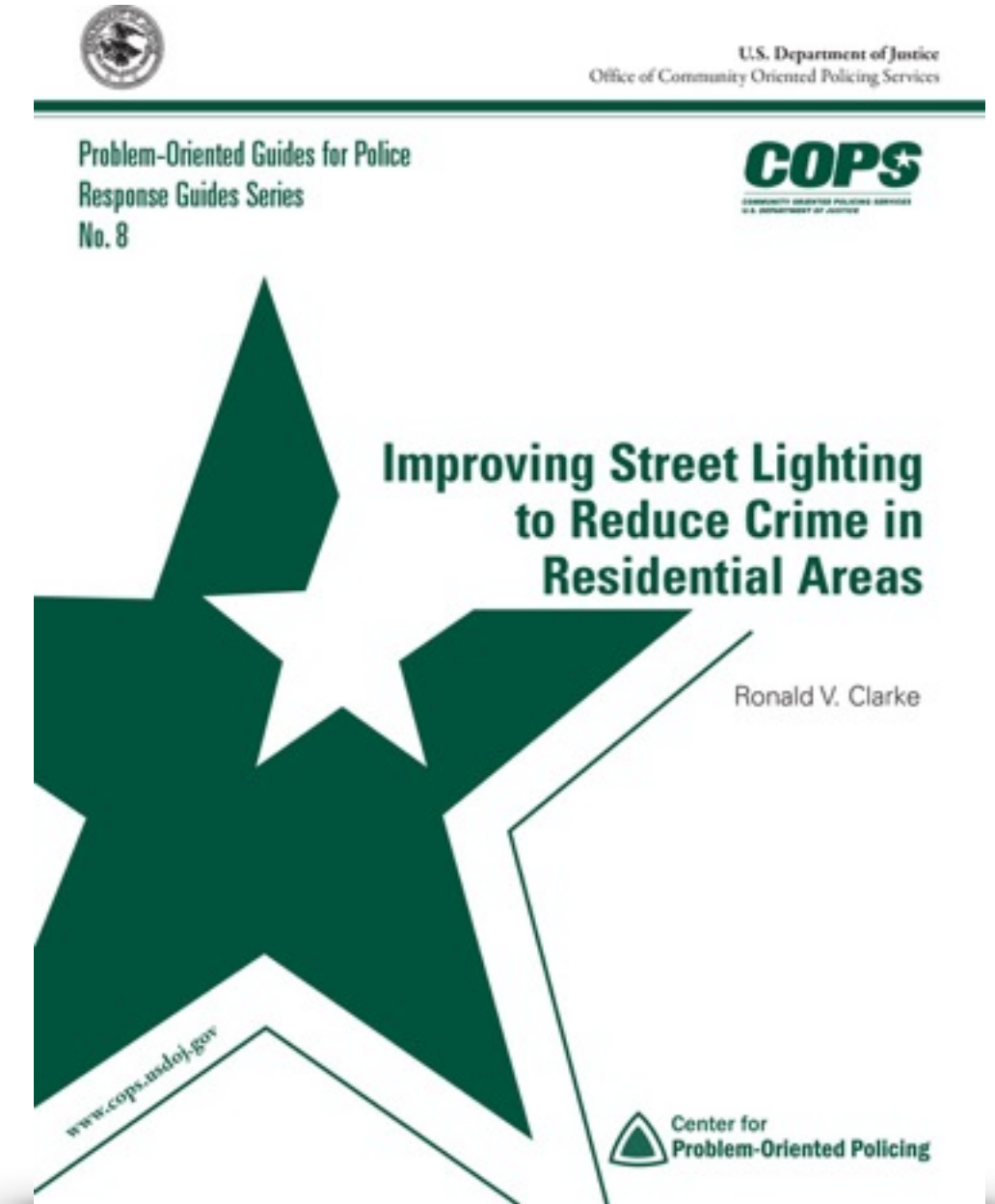
**Correlation between crime
and accessibility**

Can we help fighting crime through urban design?

SPIN Unit measuring street light intensity

Illumination in public space

To produce a cartography of luminosity of public space it is necessary to measure the amount of light from the ground level, where people walk, drive and ride, rather than using statistical models to predict how the public space is illuminated.






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Sistema Integrato Roma Sicura - SIRS

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Struttura Organizzativa

Ufficio Sicurezza - Coesione Sociale - 'Patto Roma Sicura'

Struttura organizzativa e Poteri Sostitutivi

Accesso Civico

Organigramma

Suggerimenti e reclami

Normativa

Sistema Integrato Roma Sicura - SIRS

Sistema Integrato Roma Sicura - SIRS



IL PROGETTO

Obiettivo primario del SIRS, il Sistema Integrato Roma Sicura è contribuire alla definizione della "mappa del rischio urbano", così come previsto nel III Patto per Roma Sicura stipulato da Roma Capitale, Prefettura, Provincia di Roma e Regione Lazio.

Il sistema, realizzato dall'Ufficio Coordinamento Politiche della Sicurezza - Patto Roma Sicura, si configura come uno strumento di monitoraggio dinamico e di supporto alle decisioni, trasversale rispetto alle competenze dell'Amministrazione, in grado di sfruttare in maniera integrata le informazioni prodotte dai diversi Uffici e/o Dipartimenti, coniugando l'analisi dei processi e la statistica dei fenomeni con la loro dimensione geografica, per una lettura organica di tutti i fattori (degrado, abusivismo, disordine urbano, ecc.) che concorrono a rendere alcuni territori più esposti ai problemi d'insicurezza.

Grazie al SIRS, l'Amministrazione dispone di **uno strumento di supporto alle decisioni in merito alla sicurezza integrata** per la pianificazione e il coordinamento degli interventi in funzione delle urgenze, al fine di fornire al cittadino una più rapida ed efficace risoluzione dei problemi, a difesa e salvaguardia della vivibilità e della coesione sociale, ma anche a beneficio della prevenzione del rischio.

Il SIRS si configura **come un'applicazione WebGIS, finalizzata all'acquisizione, all'analisi, al monitoraggio e alla storicizzazione delle informazioni inerenti le tematiche correlate alla sicurezza urbana**, accessibile mediante i Web browser più diffusi attraverso la connessione alla rete Intranet di Roma Capitale. Grazie a un'interfaccia utente flessibile e user-friendly e all'integrazione nel sistema di una piattaforma di Business Intelligence (BI), l'utente può consultare e interrogare le informazioni in maniera interattiva, esportare i dati selezionati, scegliendo tra i diversi formati standard disponibili (Word, Excel, Csv), ma anche, attraverso specifici cruscotti, effettuare elaborazioni statistiche correlate da indici e indicatori.

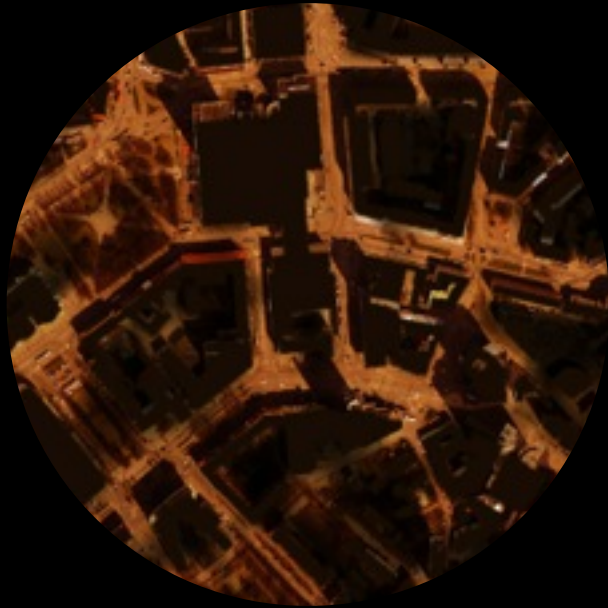
A CHI SI RIVOLGE IL PROGETTO

Il sistema può raggiungere la più ampia utenza interna all'Amministrazione, specialistica e non. La profilazione dei servizi e degli utenti è resa possibile attraverso un ambiente Web dedicato, che consente a un utente Amministratore di dettagliare le funzionalità e i dati del SIRS sulla base

- Integrated security system for Rome
 - Constantly updated geo-database with any sort of information regarding antisocial behaviour in the city.
 - Real-time monitoring centre
 - Focusing on movida (loud night life) as it is one of the main problem in Rome today
 - Mapping prostitution on streets
 - Mapping the presence of homeless
 - Mapping complains of loud people
-
- Actual crimes are mapped by the residence address of the offender, making it impossible to actually draw a map of crime
 - Public illumination is modelled based lamp post location rather than actual surveys
 - City official are not using it

PUBLIC ILLUMINATION

Light intensity per segment —> accessibility of each segment = **correlation!**



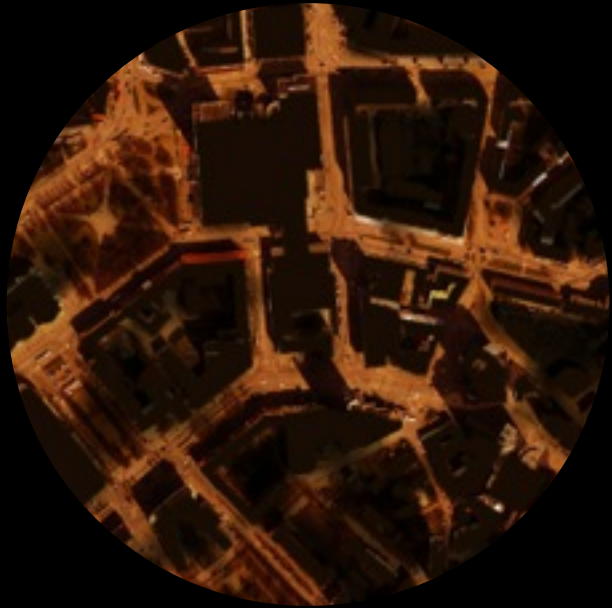
Visibility

Mapping the capability of see
and being seen



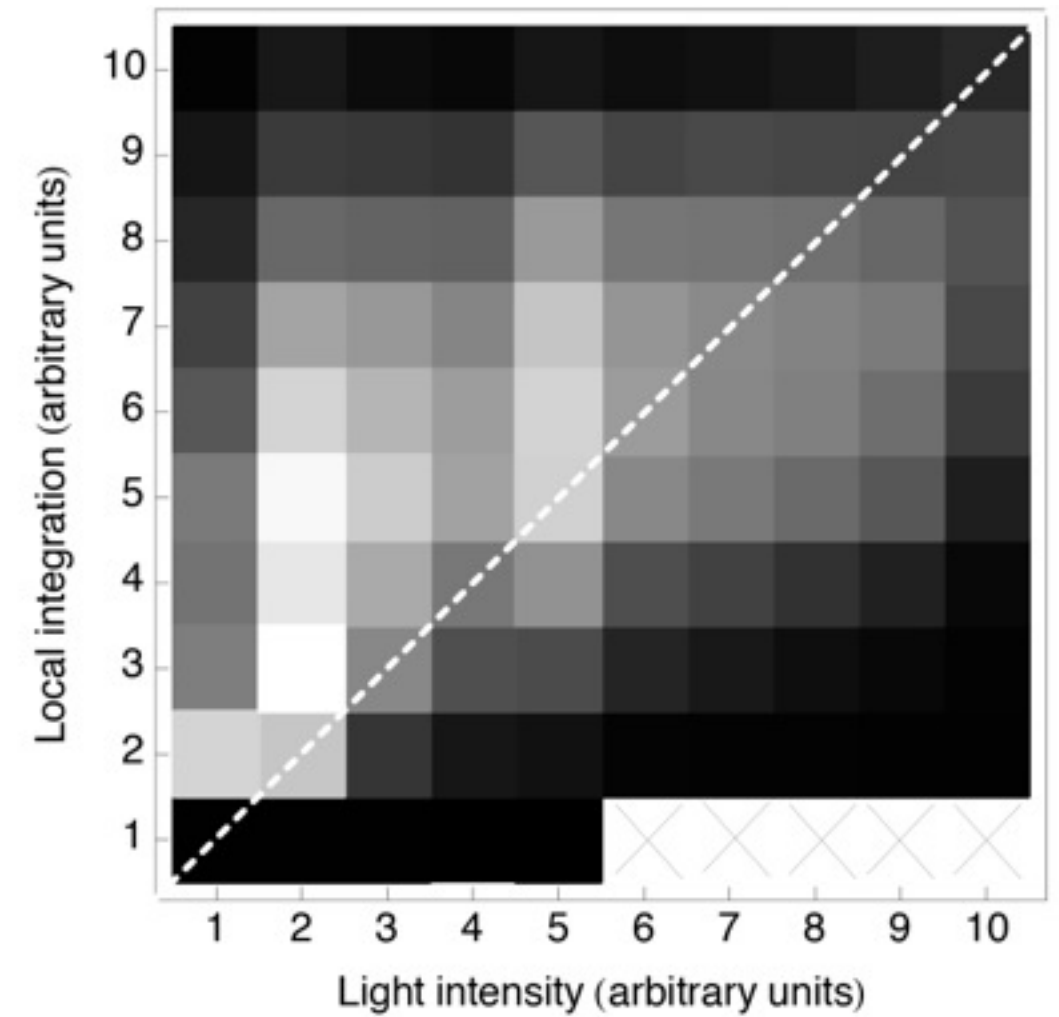
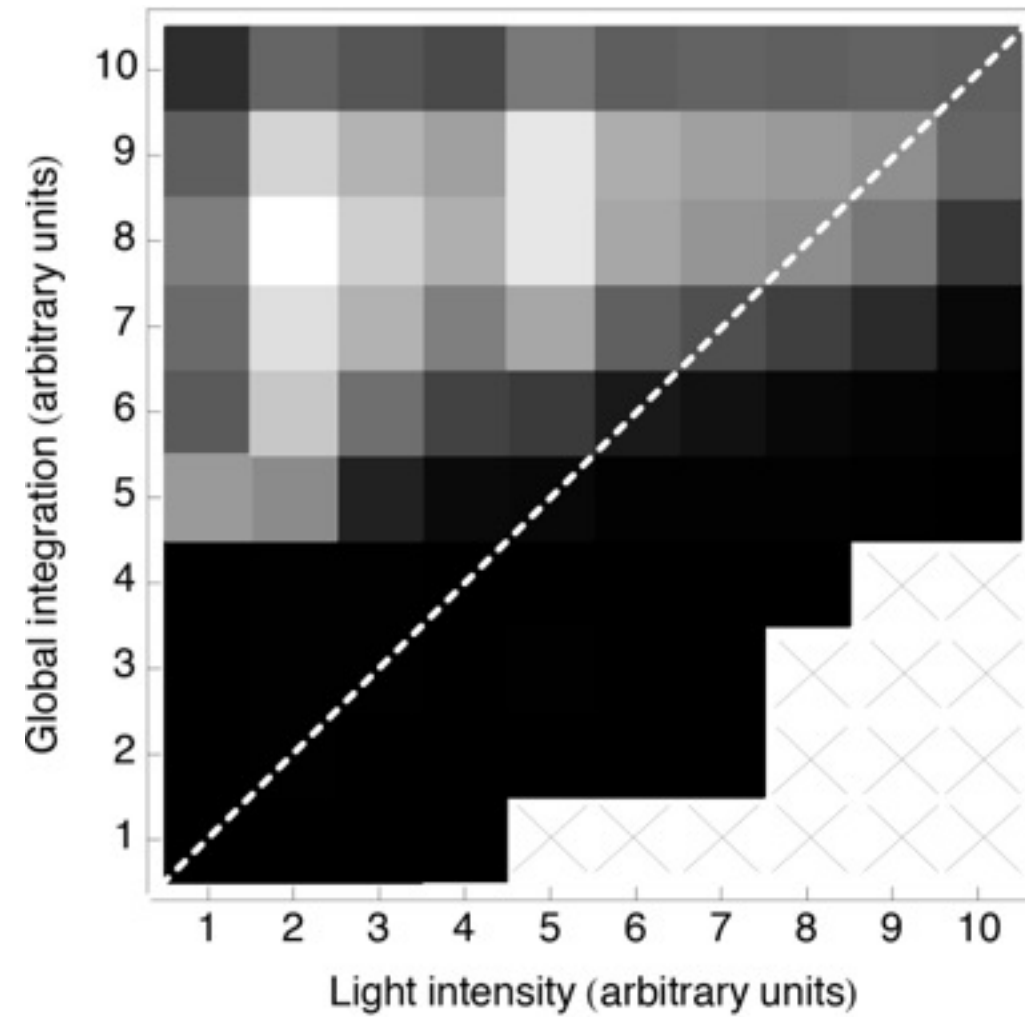
PUBLIC ILLUMINATION

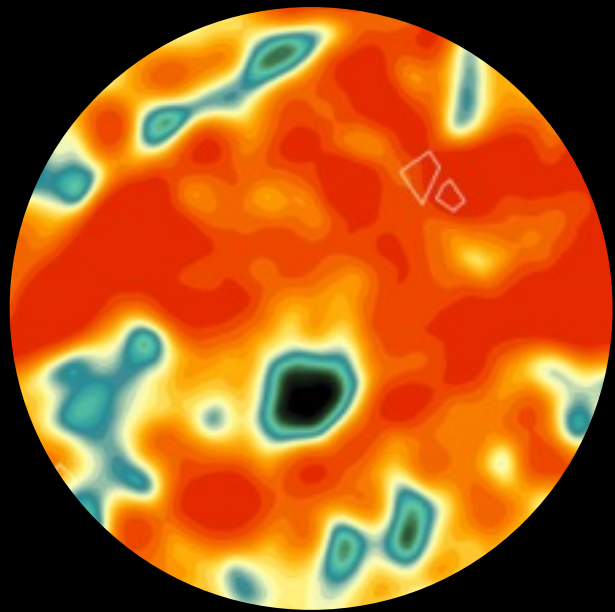
Light intensity per segment $\rightarrow$ accessibility of each segment = **correlation!**



Visibility

Mapping the capability of see
and being seen





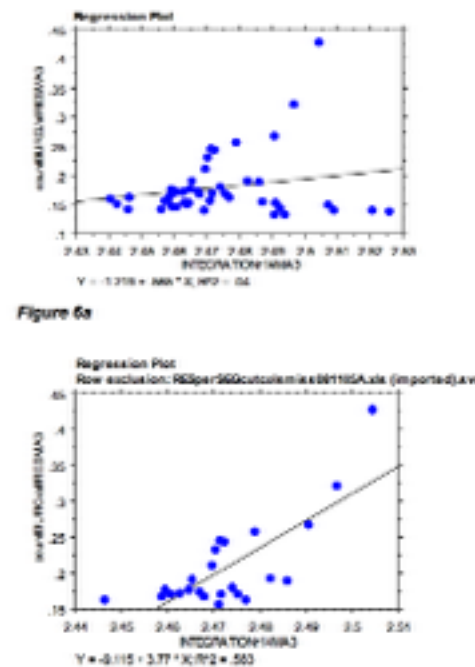
Crime rates

Geo-statistical analysis of crime occurrence

Space Syntax theory

Hillier, Bill, and Ozlem Sahbaz. 2005. High Resolution Analysis of Crime Patterns in Urban Street Networks.

In this accurate study carried out by Hillier at the University College of London, certain crime typologies and spatial accessibility were found to be linearly correlated



Graffiti



Drugs

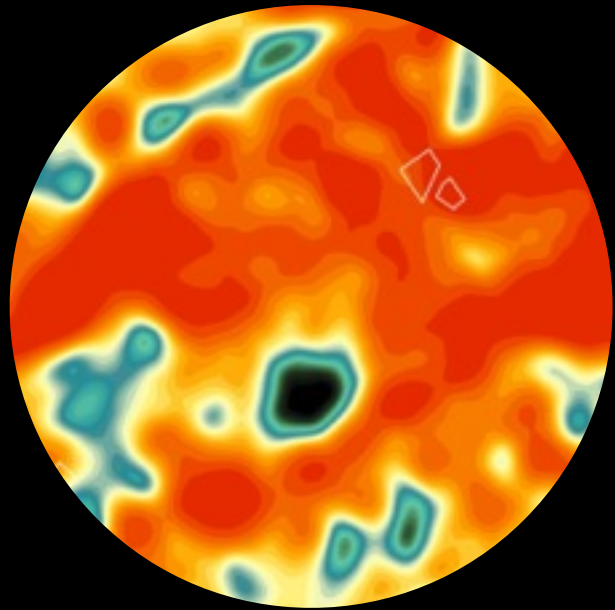


Theft



Violence

REPLICATING THE STUDY IN TALLINN
From street network to segments' network



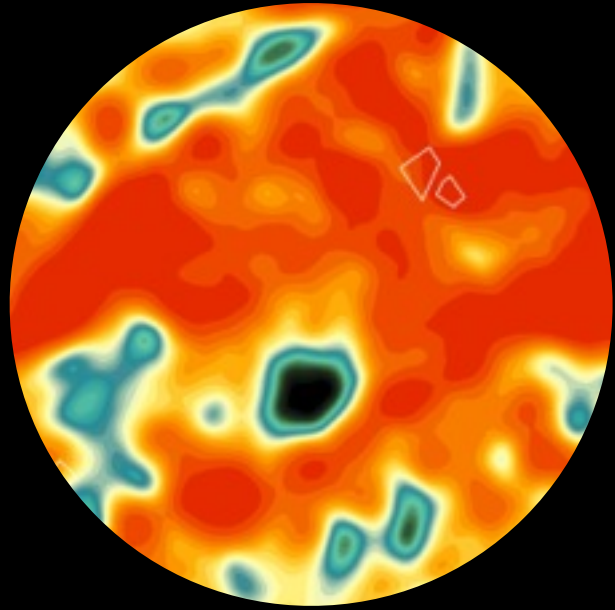
Crime rates
Geo-statistical analysis of crime
occurrence



Street network



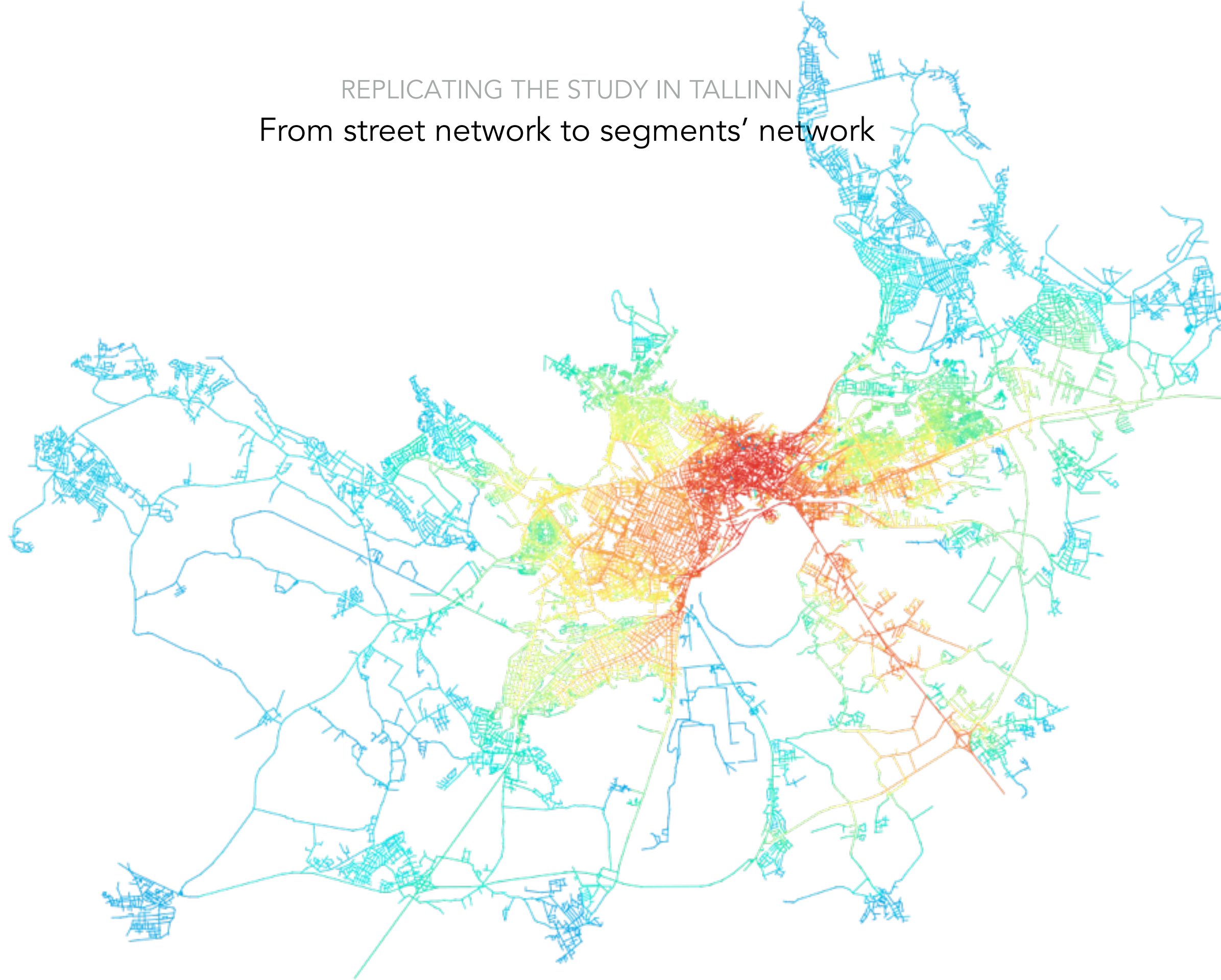
Segment network



Crime rates

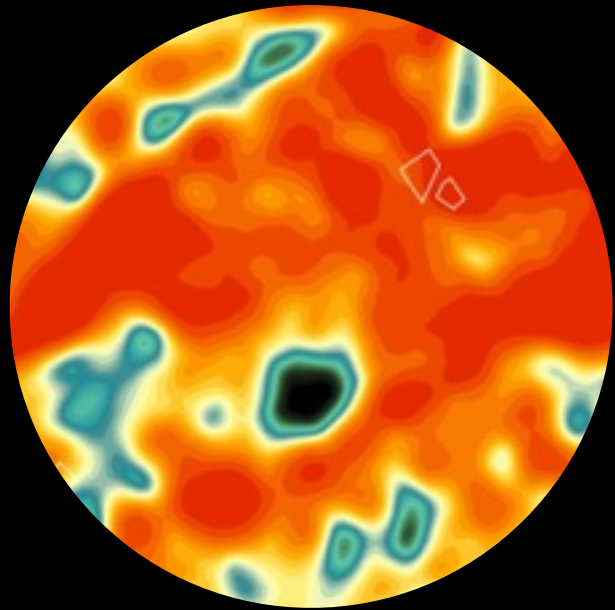
Geo-statistical analysis of crime occurrence

REPLICATING THE STUDY IN TALLINN
From street network to segments' network



GEO-STATISTICAL ANALYSIS

Crime density per segment $\rightarrow$ accessibility of each segment = **correlation?**



Crime rates

Geo-statistical analysis of crime occurrence



Crime events



Crime events per segment



2 case studies

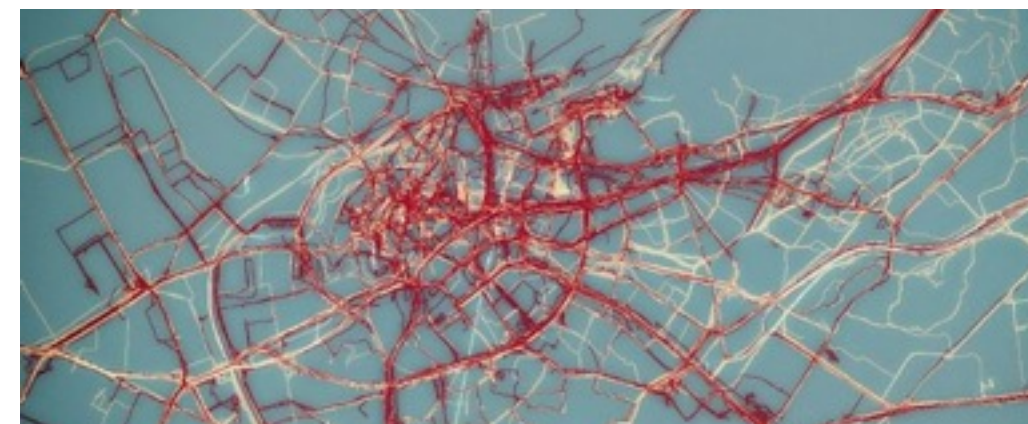
Geostatistics + perception and movement

NATURAL SURVEILLANCE

Other relations to segments network

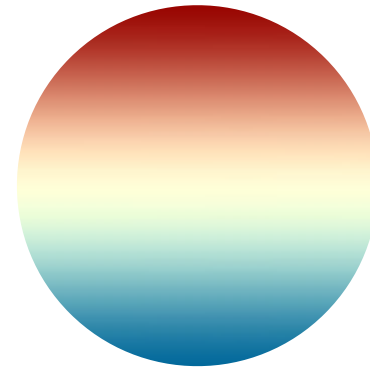


- Number of windows facing a segment
- Number of entrances facing a segment
- Use of space: we will use GPS traces of people's movement in Tallinn per segment





Studying correlation between crime typologies and accessibility



Studying correlation between crime typologies and public illumination



Two case studies to focus on natural surveillance



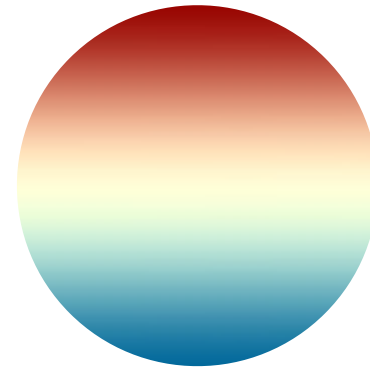
Report and a series of cartographies



Panu Lehtovuori will present the results at the CPTED program in August 2014



Studying correlation between crime typologies and accessibility



Studying correlation between crime typologies and public illumination



Two case studies to focus on natural surveillance



FUTURE



Horizon 2020



Workshop in EKA



Scientific publication



Research ideas?