

CPTED MAPPING & ANALYSES IN THE DIGITAL AGE

ICA CPTED Conference
Calgary, Canada, 8 August 2017

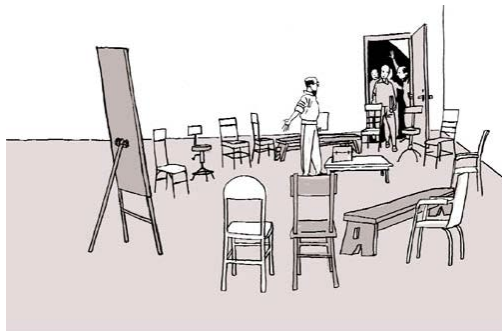
Bo Grönlund, architect, prof. emeritus;

COST TU 1203 CRIME PREVENTION THROUGH URBAN DESIGN AND PLANNING

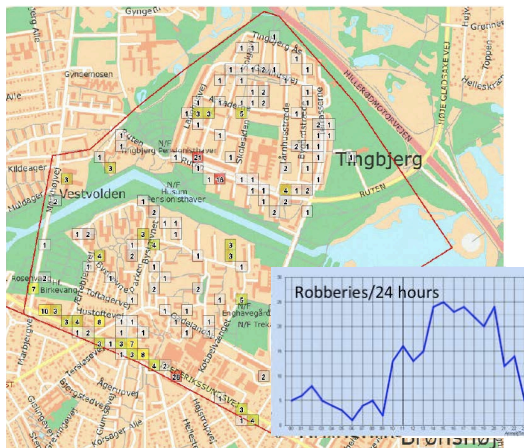
CPTED Europe (CP-UDP) – from norms to place solutions



1990s: **Norms** (mainly general how to build advice), e.g. Danish Standards 1990 on the prevention of violence and vandalism in the built environment (urban approach)



2002/2007: **Process** advice added, e.g. CEN 14383:2. Stakeholders (interested parties). Analyses of districts (crime, etc.). Process circle - Quality management: plan-do-check-act-



2012/2017: **Place specific solutions** based on GIS crime data added. Weisburd et al "The Criminology of Place". EU COST TU 1203 "GIS Mapping". Place studies in e.g. Stockholm and Danish cities.

Crime/km² varies in DK from 6000 to zero /year. Socio-economic factors can't explain the great variation in crime/km².

Mapping for CPTED in the digital age- BIG DATA is out there

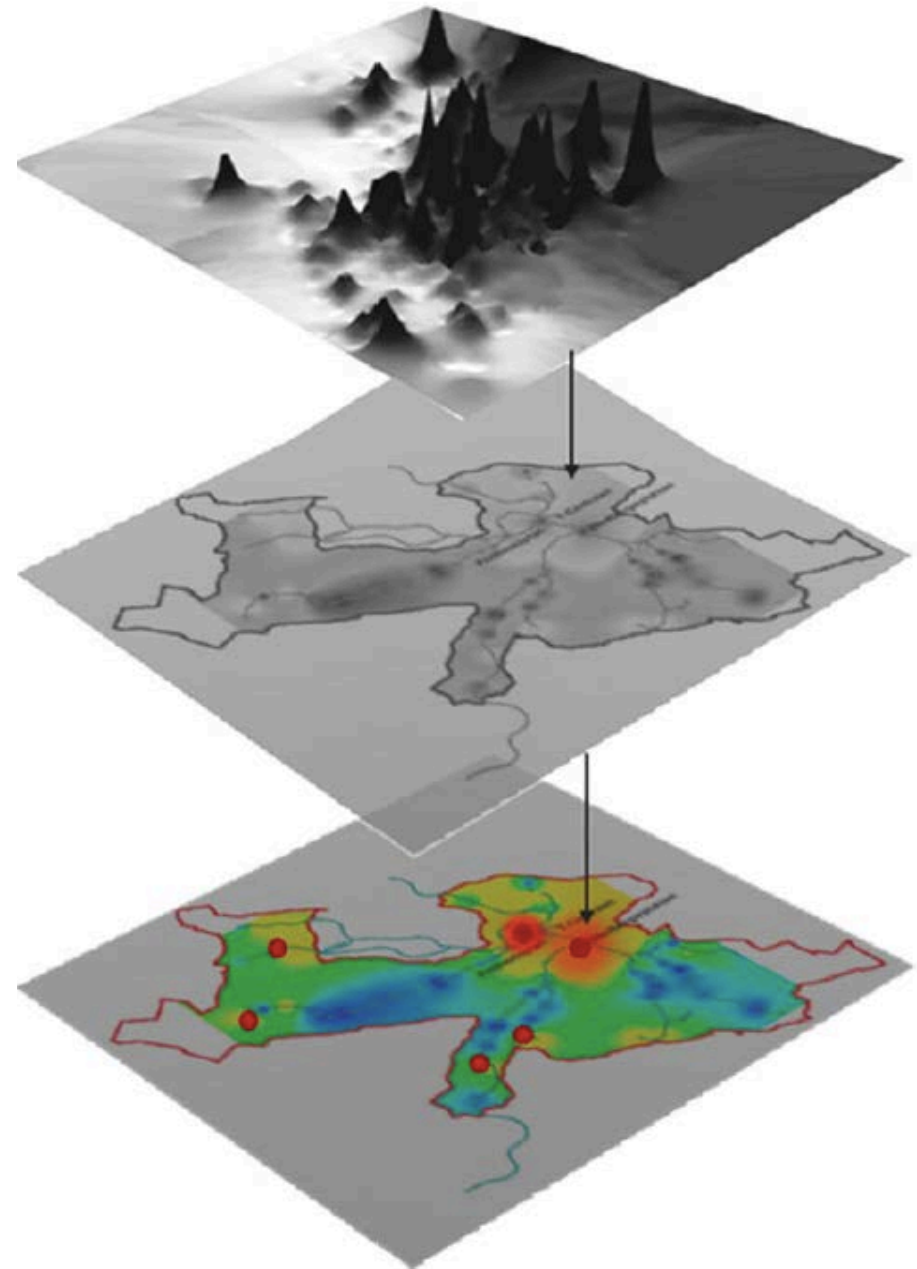
We can do many CPTED things with the tools we have already, but mapping has entered the digital age more than a decade ago.

There are now so many more possibilities to analyse different things in an efficient way and do systematic statistical correlations of relations of aspects with very localised data.

You might even simulate the outcome of CPTED changes to some degree.

With GIS (Geographical Information Systems) you can work with combinations of located data and different kinds of maps in many layers for multiple analyses.

This takes can take place based CPTED consulting and research to a new level.



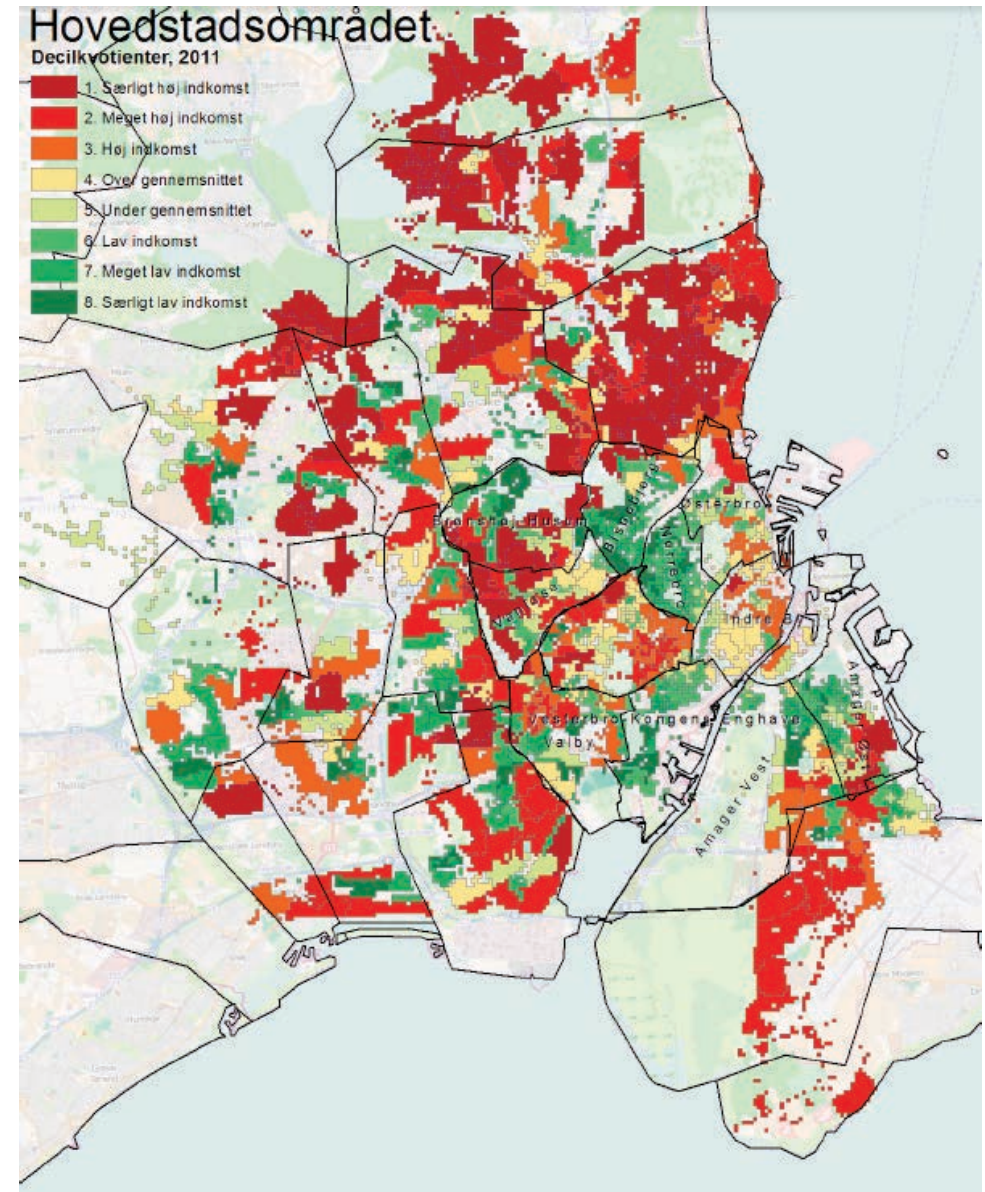
Mapping for CEPTED in the digital age – segregations maps with much more detail

Socio-economic segregation maps:
ethnic, income, age, etc.

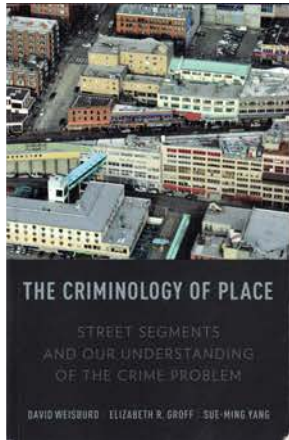
These kind of maps does not necessarily say where there is crime or fear of crime, but they can be used for background information and possibly for correlation analyses later.



Ethnic segregation in and around Manhattan, NYC., in the 2010 census. Blue is White, green is Black, orange is Hispanic, red is Asian, brown is Other



Residential segregation by income in the Copenhagen metro area in 2011 based on a 100x100 meter grid. Red is high income, green is low.



The importance of place for CPTED

- Crime is place specific - as Weisburd argues in "The Criminology of Place", 2012.

He showed that in Seattle 50% of the crime was on 5-6% of the street segments, and 20% was on 1% of the street segments

- Place is defined as a specific location with its built environment and spatial arrangements, the people there, its activities, and the history and stories of the place, i.e. it also includes the time dimension (*my definition*)

- Crime varies with place much more than just demographic and socio-economic conditions

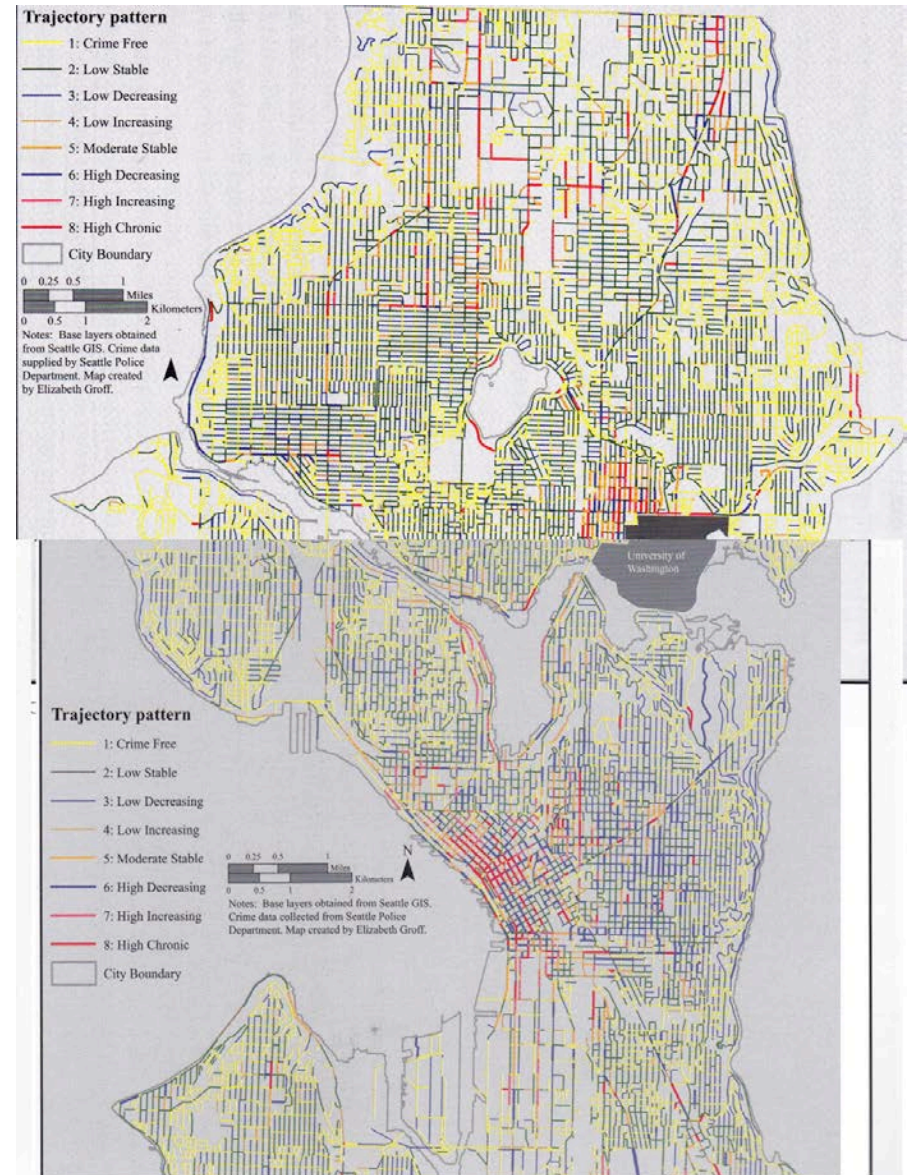


FIGURE 4.3 Spatial Distribution of Trajectory Patterns (Central Seattle)

Mapping for CPTED in the digital age

At the place level crime is often a rare event, so to see the relation between crime and space you need several years of data.

Police crime data relates to the criminal laws in each country – this means you need to make sure that data can be compared across time. There are also dark numbers of crime (not reported).

The accuracy of the maps also depends on the geo-coding system. GPS coding is not yet common for police data. This often means the geo-data is not perfect. If specific addresses are missing then data may not show up in the map, e.g. crimes in parks don't show up.

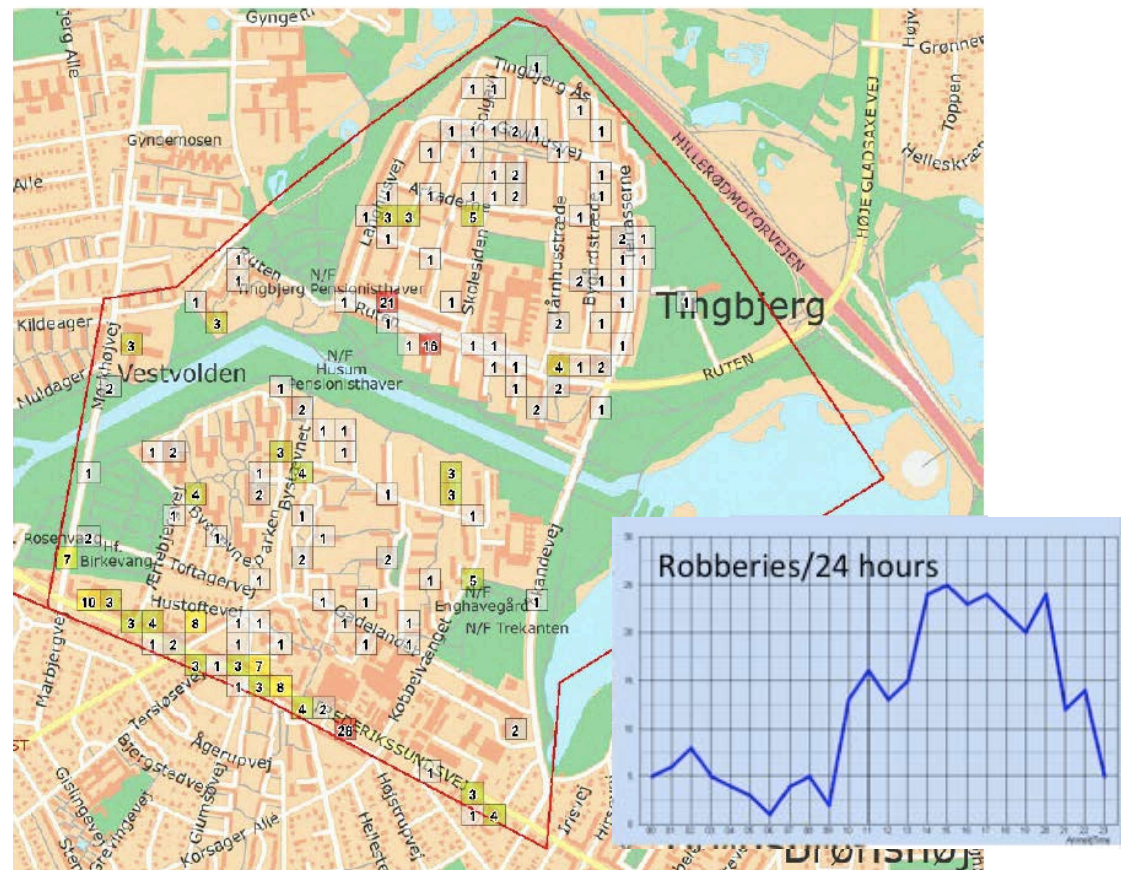
Example below:

Tingbjerg-Husum, Copenhagen – Robberies 2007-2014 in a 50x50 meter grid

NB! Some red dots may be data without house number. These are automatically plotted in the middle of the street.

Robberies are concentrated in the main-streets, but the risk to the individuals depends on the relative rate of robberies to the pedestrian flows. No robberies show up in the parks, because of no addresses there.

Data from the Danish Police POLMAP system in 2015



Mapping for CPTED in the digital age

COST TU 1203 has made a survey in 25 countries asking about police data issues, victimisation studies, fear of crime studies, user-interactive-mapping through mobile phone apps and web-GIS - and more.

To the right is a table with the result of the police data questions by country.

The table shows:

- Who keep the police crime data
- Lowest aggregation level of public police data
- Lowest aggregation level available for researchers

The questions of the correctness of data and maps are very important:

- Accuracy and availability of geo-coded data
- Validity and reliability of map plotting
- Possible aggregation levels (basic data or aggregated) – there are both country and city differences in the possibilities.

Tabel 2.x Overview of availability of geo-data on crime in 18 countries

	Official records kept by	Event place (lowest aggregation level)	Lowest aggregation level for research for available
Austria	-	-	-
Belgium	Federal Police Authority	Streetname / number	-
Bulgaria	Regional Police Departments/ Criminal Investigation department	Streetname / number	Freely accessible data is available at district level only. [Bulgaria is divided into 28 districts [NUTS3 level]]. Upon request Regional Police Departments could provide access to data for the area they are responsible for. Generally one RPD is responsible for one municipality (265 municipalities in Bulgaria [LAU1 level]). Sometimes, as for example the capital city of Sofia, the city is divided into districts (24 for the capital city of Sofia) and each district is controlled by a single RPD. https://opendata.government.bg/dataset/statisticheski-danni-za-prestapnostta/resource/52927b1a-8a47-48aa-a96c-fce2709b0581
Czechia	-	-	-
Denmark	Police and Danish Statistics	Streetname / number	Possible use only with specific approval from the police / Datatilsynet (Datatilsynet does not have to be involved if the crime maps are for confidential use by a municipality)
Finland	Police	Geo-coded and adress*	Possible use only with specific approval from the police (National Police Board)
France	The Police, the Gendarmerie (Department of Homeland Security), the SDMAS (firemen), passenger transportation companies (train, subway, bus and tramway), social housing landlord	Streetname and number	Only for an official "Study of Safety" for urban planning, architectural specific project or security camera project. For prevention campaigns such as road safety, domestic violence or women victim of violence, victimization investigation, etc
Germany	Police Headquarters	Streetname and number	Data available on neighbourhood level
Greece	Police at the local, peripheral and central level. Aggregate	Streetname and number	Publicly available aggregate data published at the Greek Police web page (http://www.astynomia.gr/)
	court data are collected and published through the National Statistical Authority of Greece.		There is a possibility to negotiate access to specific crime events through direct contacts and application at the local level and/or the Ministry of the Interior and Administrative Reconstruction (http://www.minadmin.gov.gr/)
Hungary	Police	Streetname and number	The smallest aggregation level is districts in Budapest or settlements in the country
Ireland	-	-	-
Israel	-	Streetname and number, but varies with the crime-incident report	The ability to access this information is limited due to the privacy protection law and it can be permitted by the Information Security Department of the Ministry of Justice
Italy	-	-	-
Lithuania	Police	Streetname/number	Not available/no geo coding
Macedonia	-	-	-
Netherlands	Police department , central bureau of statistics	Geo-coded (recent) or adress	Certain crime types public available on 4 digit postcode level and/or municipality level Other/ lower aggregation after official permission via privacy officer police department. Specific crime reports also available at WODC (research & documentation centre)
Norway	Politidirektoratet, Statistisk sentralbyrå	Geo coded and adress	Freely available at municipality level. Otherwise with permission from Politidirektoratet (a very long application process)
Poland	police	Streetname and number	Data only available after specific approval from the police
Portugal	Ministry of Interior (d atacollection)/ Ministry of Justice (data analyses and dissemination)	Streetname and number	Only available at parish level (districts within a municipality), Otherwise special permission is necessary.
Romania	Police	Street name and number	Reports on districts/areas/specific locations are not available, only at levels of country, cities, or counties' towns and communes. After asking permission from the police, by making a inquiry for info access based on our national law 544/2002 regarding free access to info of public interest.
Serbia	-	-	-
Slovenia	Police	Police station area	The name of the street where the event occurred (under police special approval) or the area of the police station (in general, no police approval needed)
Spain	Police and central statistical agency	Street name and number	Only available at neighbourhood level
Sweden	The police headquarters, other local and regional organisations such as Transportation companies, security companies, other related companies, BRÅ – the National Crime Prevention Council (victimization data)	Streetname and number	Often requires approval, letter of intention (research) and appropriate commitments in data gathering, storage and diffusion
UK	-	-	-

Mapping for CPTED in the digital age

Victimisation studies might solve issues with dark numbers of crime as they give a more true picture over all.

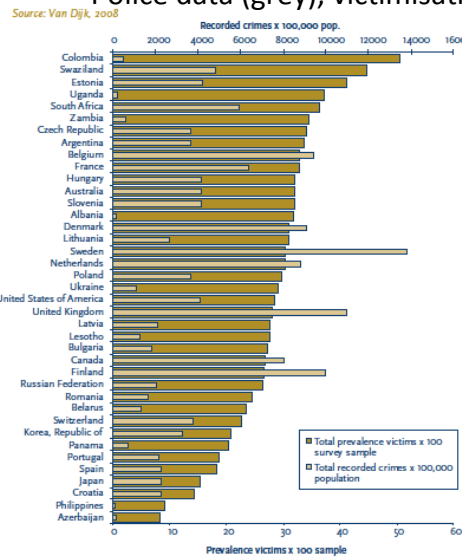
Victimisation studies are interview based. This means you have a limited number of respondents, issues of representativeness as well as low geographic detail (i.e. a rather high aggregation level of data from a geographic point of view).

Victimisation needs to be asked for a specific duration of time (e.g. a year).

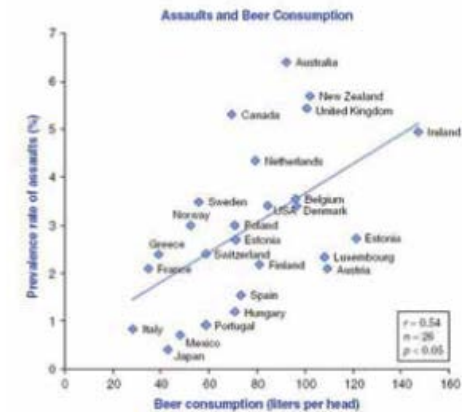
Fear of crime studies can be done in basically the same way.

ICVS= International Crime Victim Survey

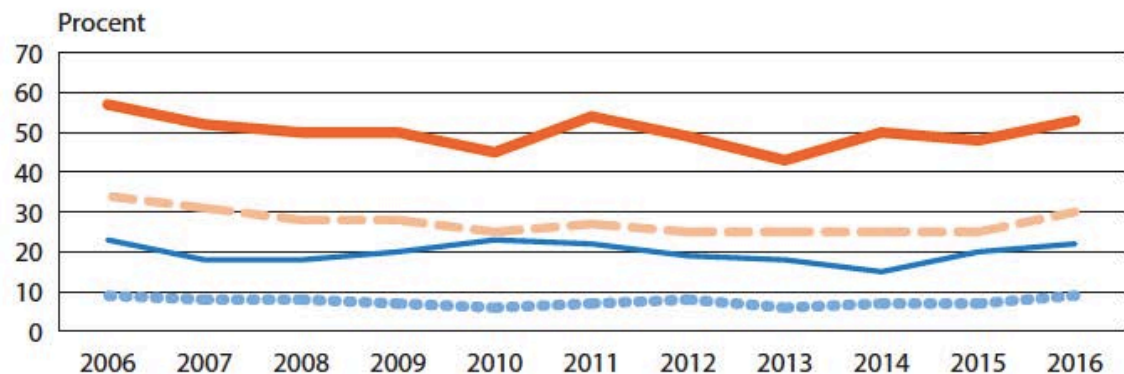
Below ICVS summary:
Countries' dark numbers of crime:
Police data (grey), victimisation (brown)



Below: Different countries - beer consumption vs. violence (victimisation ICVS data)



Sweden: Study by BRÅ (The national crime prevention board)
Fear of crime outdoors in own housing are late evening – "ghetto" areas and non "ghetto" areas: Women (red) and Men (blue)



Mapping for CPTED in the digital age

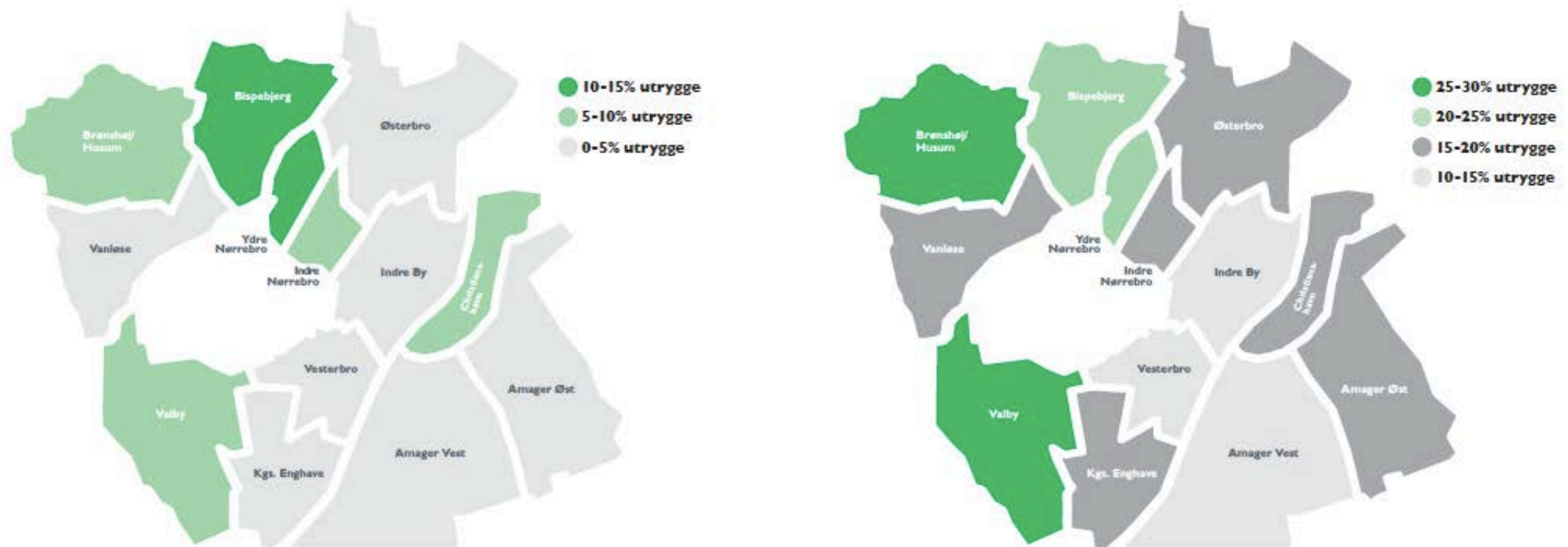
Safety mapping in the City of Copenhagen in 2016 done by the municipality itself:

These two examples are based on a combination of police data, victimisation data and fear of crime data.

Left map: Daytime safety. Right map: Evening safety.

Light grey is most safe. Full green is most unsafe.

These maps are not detailed enough for actual CPTED work – but could be a start

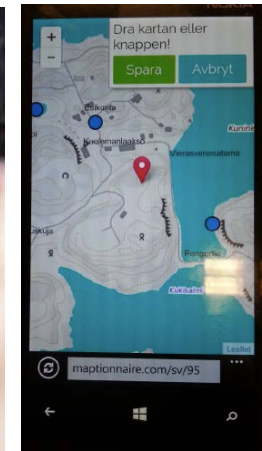


Mapping for CPTED in the digital age

Interactive user mapping through mobile phone apps and web-based GIS – to get more detail or when other data is not available.

Here the example of the "Maptionnaire" tool: Building questionnaires, collecting data, analysing, visualising and communication.

Example from Helsinki.



Build and manage

Editor Main View

Questionnaires

Questionnaire	Status	Response data	Actions
Questionnaire 777	OK edit	Response data	
Demonstration questionnaire	OK edit	Response data	
Questionnaire 778	OK edit	Response data	Delete
Muisteluja Lake Vuoksi 2008	OK edit	Response data	
Vanhusten ikäsuomen haasteet jyvökylässä	OK edit	Response data	
Tervä all elements	OK edit	Response data	
Muisteluja ja tulosten keräys	OK edit	Response data	Delete
Maptionnaire Maptionnaire käyttöajanko 3.8.2015 klo 13-23.30	OK edit	Response data	
Demonstration questionnaire	OK edit	Response data	
Example response data for analysis	OK edit	Response data	

Support material

Maps Images

Collect data

- All houses of the city center
- A place with high importance for the city (you can request your place)
- A place with historical and cultural significance
- Official parks by name
- A place that should be developed
- A place that should be left as is
- An important place in the urban area (you can attach your photographs)
- A meeting place
- A local and important place
- An important place for leisure activities
- A place that provides services
- A beautiful place
- No comment/other

Analyze, visualize and communicate

Try it out...
www.maptionnaire.com

Mapping for CP-UDP in the digital age

Maptionnaire:

An example of place based data collection on perceived safety in the neighbourhood of Kikkijärvi in Esbo near Helsinki showing routes and points with different aspects.



Some kinds of maps you still better do by observing the place out there

Human activities mapping: here flows of pedestrians and bikes that might vary from over 10.000/hour to 0.

Below left: Tingbjerg- Husum, Copenhagen (numbers)

Below right: Bispehaven, Aarhus, DK (width of red lines representing flows (0 to 250/hour))

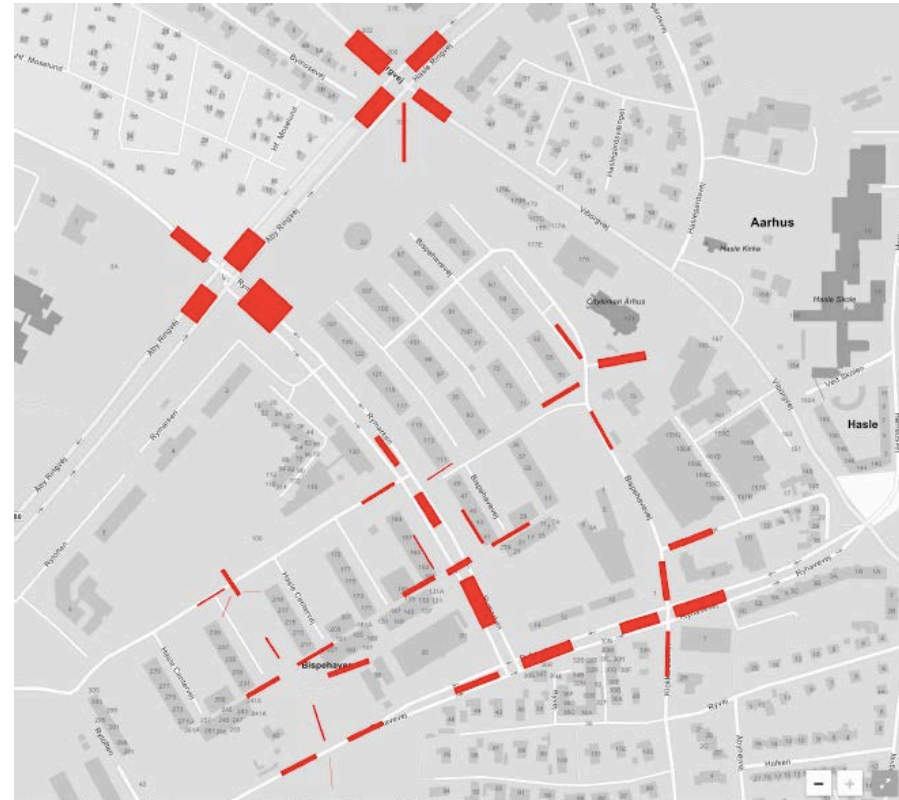
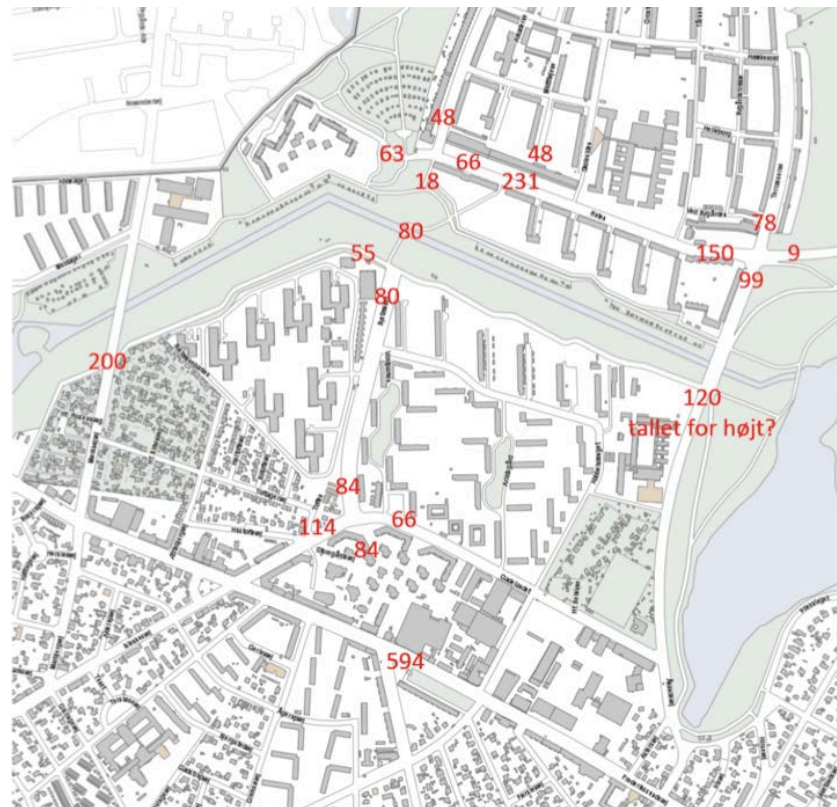
Many places too few people is part of the problem - very often in the suburbs. Good mapping is still manual headcounts – automation often too difficult.



Crowding: Less than 2 sq.meters/person (pick-pocketing might happen)

Urban centrality: at least 1000 people / hour

Basic urban level: at least 100 people / hour. Lowest level for continuous natural surveillance



Mapping the time dimension

Built environment mapping - time dimensions:

- Important to map situations by time of the day, day of the week, and seasons.
- Very big differences of day and night situations.

Below: Day and night in the same places in Odense, DK.

Right: A light map of London by night – e.g. parks are dark.

NB! Light maps can be recorded by drones (with permits)



Existing and proposed infrastructure

FÆRDELSNET FOR BLØDE TRAFIKANTER - INTEGRATION 2015 OG OPTIMAL LØSNING

RUMLIG SYNTAKSANALYSE 2015



RUMLIG SYNTAKSANALYSE OPTIMAL LØSNING



Mapping for CPTED in the digital age – looking for correlations



Robberies in East London – Hiller & Sahbaz, 2008

Above: Robberies in East London plotted on a space syntax map. It shows most robberies are on or close to well integrated streets (highstreets).

Mapping has to be done in the specific context depending on the users and situations.

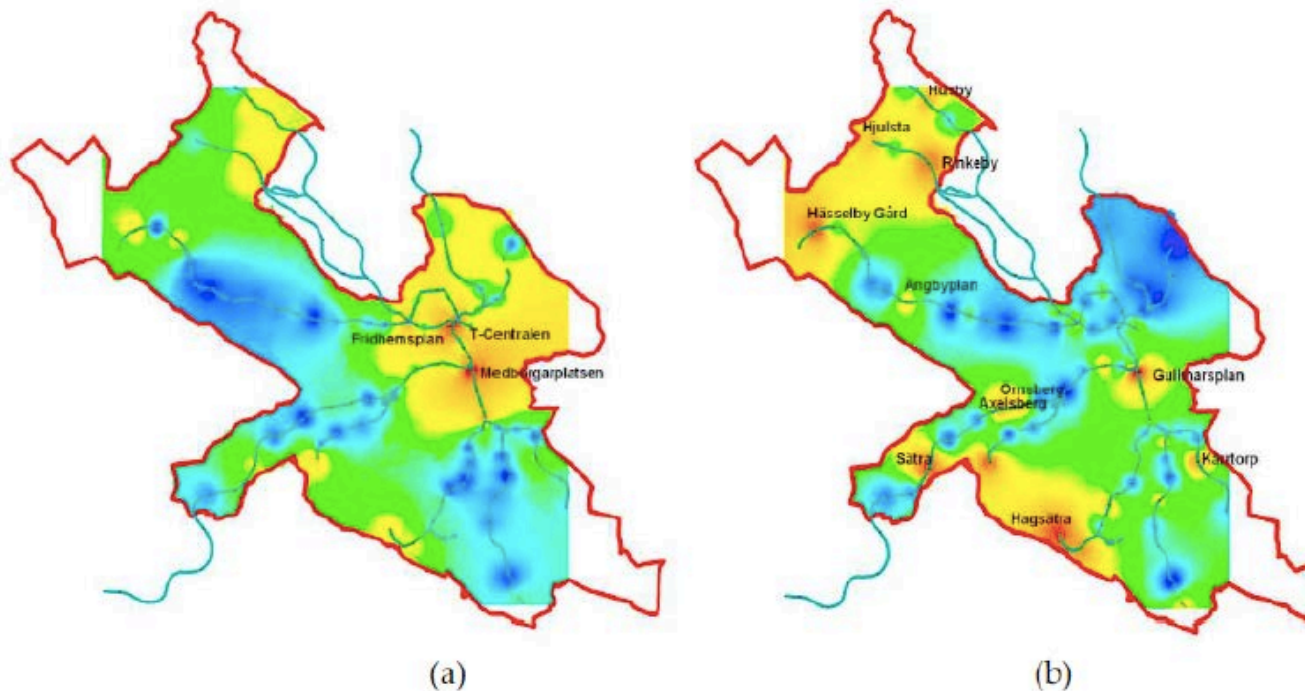
Mapping for CP-UDP in the digital age – looking for correlations

Correlating the maps - Vania Ceccato example, Stockholm 2005-2008

Violence around metro stations (hot colours are high concentrations, cold colours are low concentrations).

a) The raw police data hot spots of violence plotted on the map on top of the metro line system

b) The raw data relativized in accordance with the daytime population in the station catchment area – here the crime in the city centre looks much less (= the risk to each individual is lesser seen this way). The really dangerous "hot spots" are now in other places on the map !



Mapping for CPTED in the digital age



A researcher:



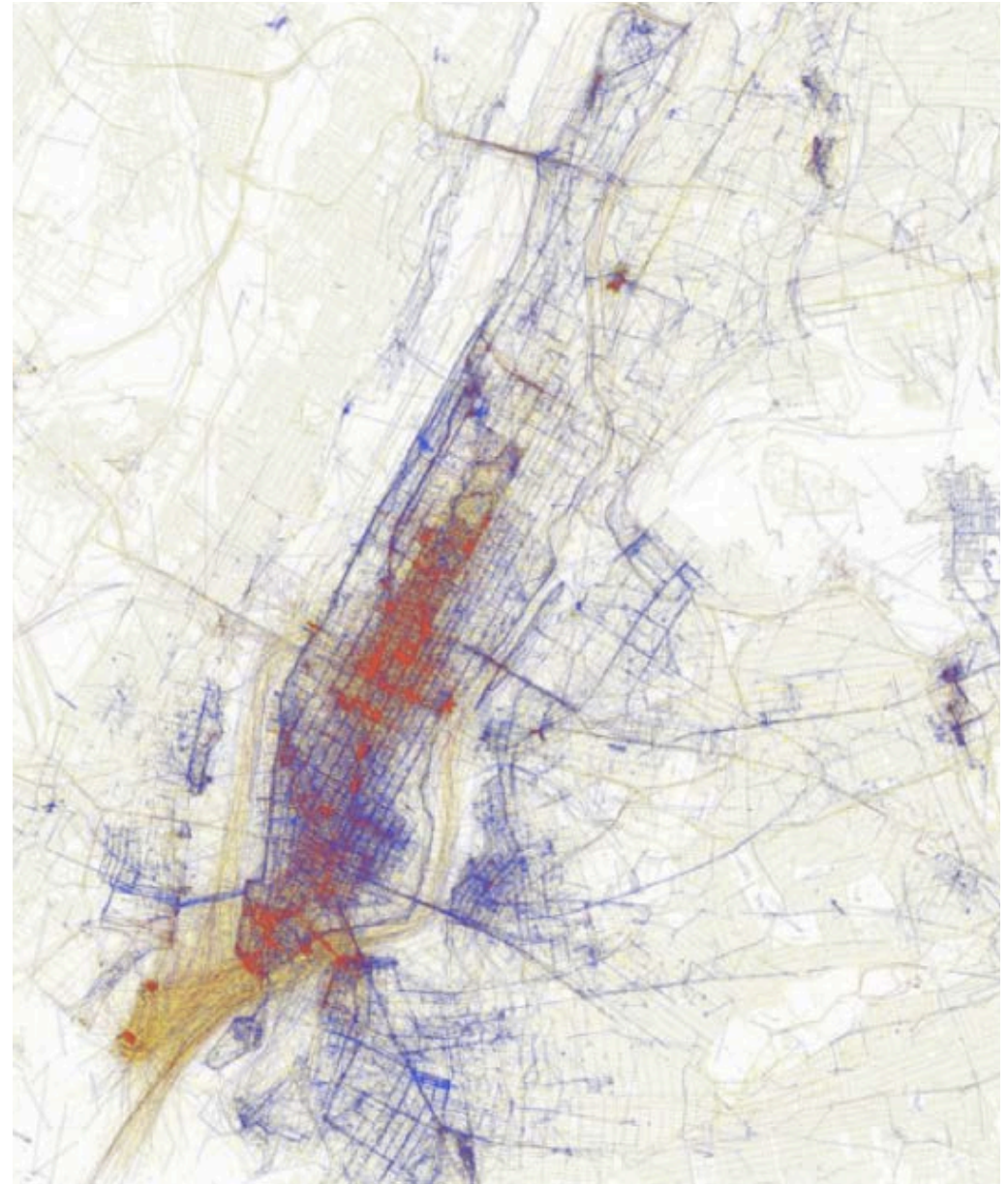
A CPTED consultant

The data collection and mapping needs are partly different for CPTED researchers and consultants.

Research is about details one by one time in longer time projects. The purpose is knowledge.

Consultants need quick overviews and the solutions are often compromises between many different objectives. The purpose is action.

Both need to use the new digital analytic possibilities.



Tourists (red) and locals (blue) – map created by Eric Fisher from big data mining in the Flickr photo database on the Internet. Example: New York City. Eric has made similar maps for more than 20 cities in the world.

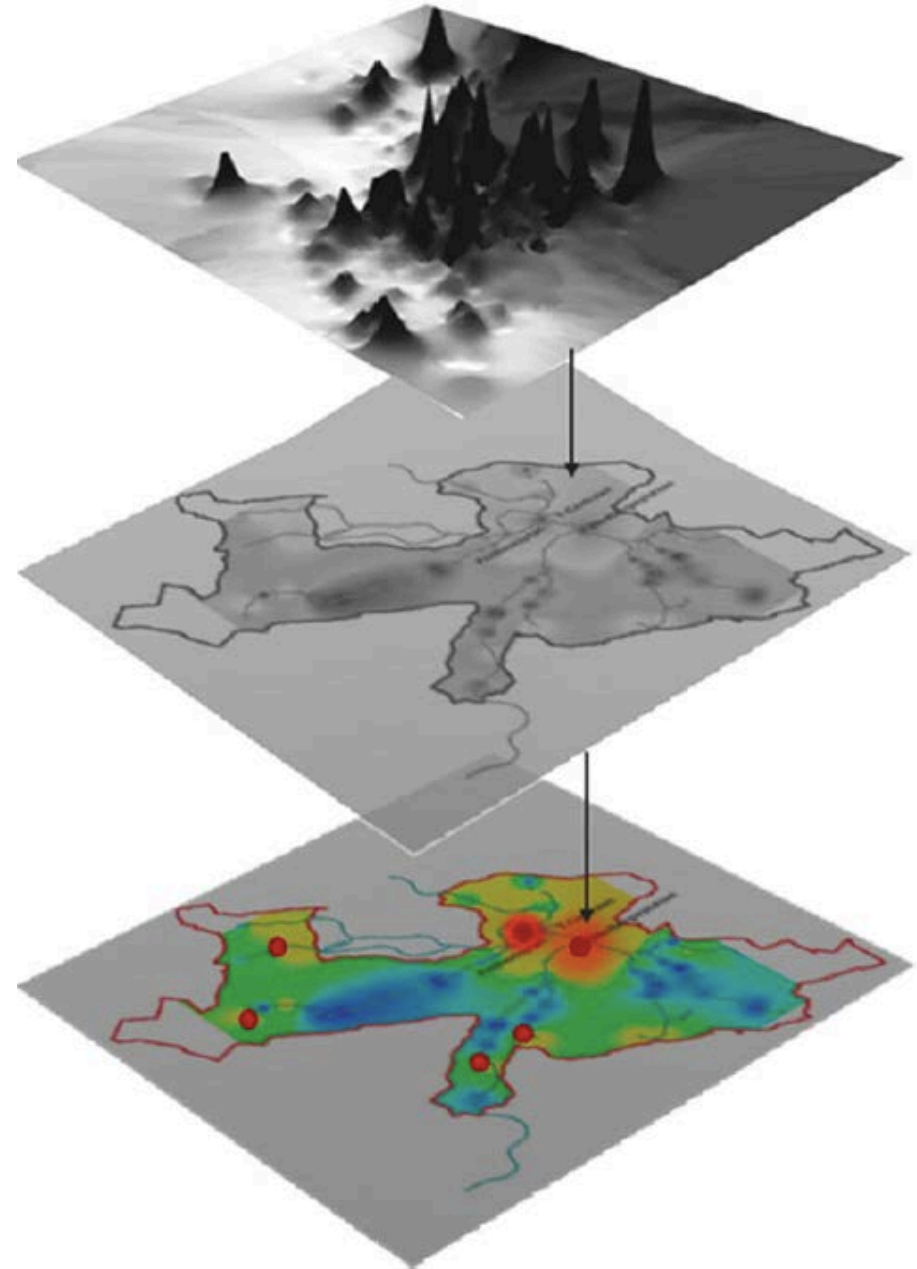
Summing up

We have seen that there are now many new possibilities to advance the research, practice and teaching of CP-UDP.

If these new possibilities shall be used in a good way, a lot of barriers need to be removed concerning easy access to relevant data and affordable costs of the use of these data.

We also need to develop specific apps and software packages for CPTED to be used with GIS – both "universal" and more specific ones tailored to data situations in different countries and cities.

We are far behind e.g. SECURITAS in London, who already has access to police data, besides all the data SECURITAS collect themselves.



Strategic Questions

What will happen to CPTED in relation to Big Data, including police data?

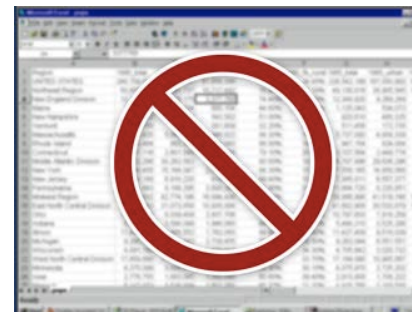
Will the police and other government institutions be able to give us the data?

Will the large global security companies take over the safety data issues – with or without CPTED in house?

How can we strengthen CPTED professionals access to and work with big data, including police data?

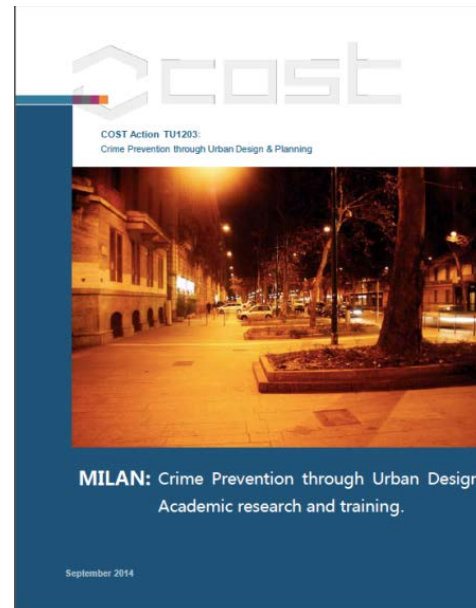
Shall we start to cooperate with other organisations concerning data and analyses, e.g. IACA?

How can ICA certification incorporate the big data issues and the access to vulnerable data?

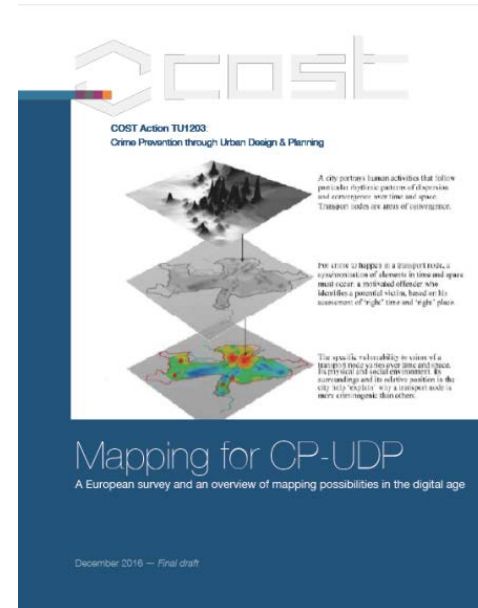


Thank you !

Milan Cost report on manual mapping methods (left)



Milan Cost report on mapping in the digital age (right, forthcoming)



<http://costtu1203.eu/>



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