# Applying Google Maps and Google Street View in environmental criminological research

Should criminologists be feeling lucky!?

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# Introduction

## Widely used on daily basis …

- 1 billion monthly users, most popular smartphone app
- Address information, route planner etc.

## … and 'discovered' by some scientific disciplines

- Geography, archaeology, biology, social sciences
- Remote sensing, data visualization and data collection

## What about criminology?

- Only a handful of studies
- Potentially powerful instruments

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# Google Maps & Street View in criminology

## New research questions

- Target selection of burglars with online instruments

- Street View and local crime figures

- Feedback offline awareness space and online target selection

## Addition to methodological toolkit

- Data collection

  - Google Maps in offender interviewing

  - Virtual neighborhood audit

  - Google Maps API

- Method

  - Re-assessing established research practices

  - Data visualization

# New research questions (1)

Are burglars likely to rely on GM & SV to select a suitable target (Van Daele et al. 2012)?

Burglars' target selection process

- Area and target attributes affect target choice

- Targets selected while executing routine activities

- What about 'online searches' and GM & SV?



Experiment with 66 undergrad students criminology

- "Find a suitable house to burglarize"

- Multiple target selection strategies

  - Incl. make use of GM & SV, photograph to simulate burglary

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# New research questions (2)

## No spontaneous use of GM & SV

- 2 out of 18 participants reported spontaneously using GM & SV
- Photograph request made participants look for targets near their home

## Offline awareness space guides online search strategy

- GM & SV made target selection process easier
  - Participants checked familiar targets
  - GM & SV allow to double check!

## Other research questions

- Feedback offline awareness space & online searching behavior
- Burglars' online target selection (cf. Van Daele et al. 2012)
- Natural experiment: does availability of SV affect crime figures

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# Google Maps in offender interviewing (1)

Maps in offender interviewing (cf. Summers et al. 2010)

Sketch maps & cartographic maps are powerful tools but have their limits

- Sketch maps: size of paper, drawing ability, relate to cartographic map
- Carto maps: scale of map determines detail of information

GM 'custom maps' environment might offer solution

- Add layers of content (e.g., POI, images, videos, labels etc.)
- Draw lines, shapes etc.
- Add route descriptions
- Measurement tools
- Can be shared and co-authored

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# Google Maps in offender interviewing (2)

Advantages of 'custom maps' environment

- Size and scale become irrelevant
- Sketch map directly linked to cartographic map

Disadvantages of 'custom maps' environment

- Drawing ability unaffected
- Familiarity with GM

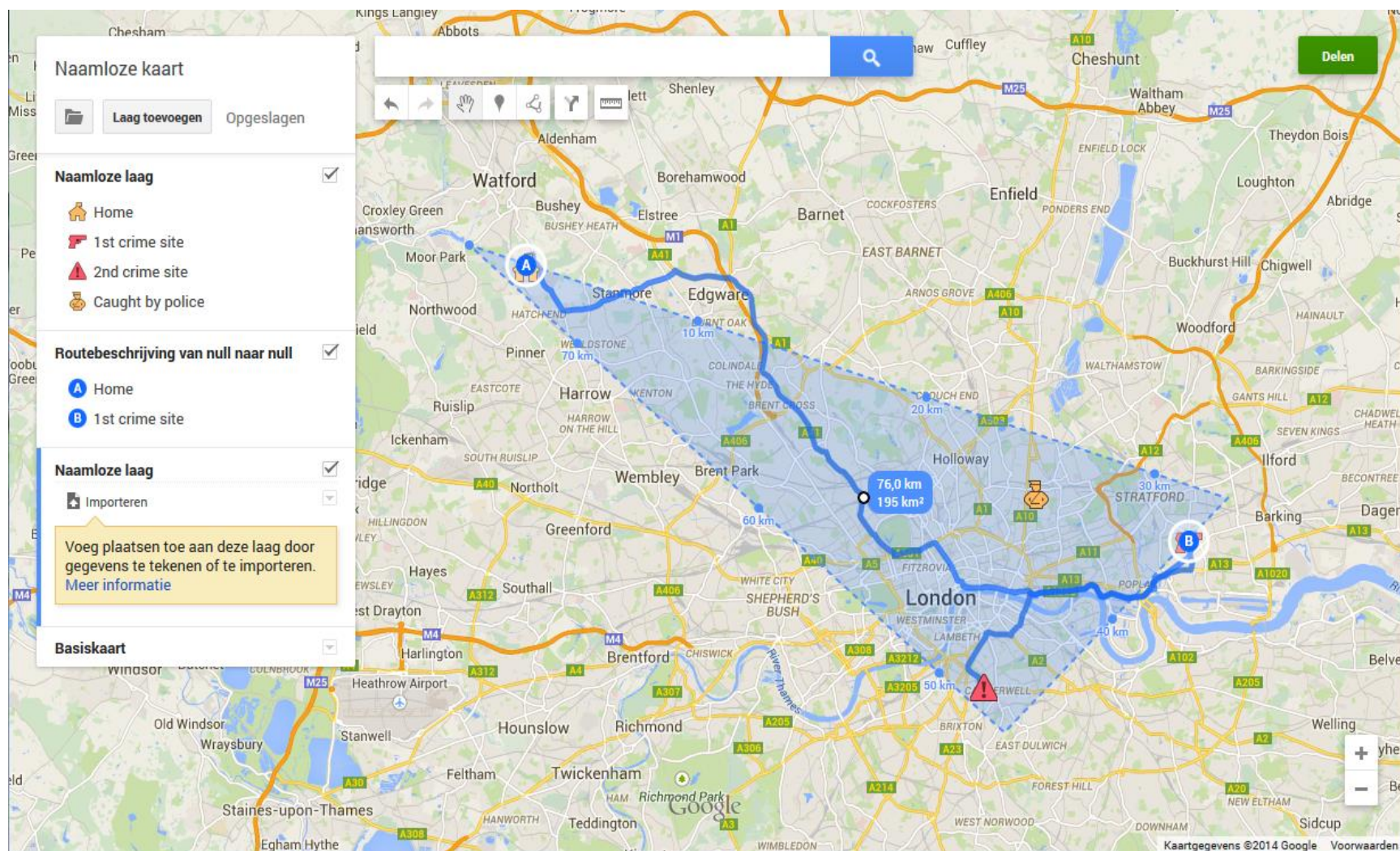research    publications    conferences    consultancy

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# Example 1: Google Maps 'custom maps' environment

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# Virtual neighborhood audits (1)

Data collection through GM & SV

- Systematic social observation (SSO) is cost and time intensive
- SV offers many advantages (Kronkvist 2013)

Already successfully applied in public health studies (e.g., Odgers et al. 2010, Rundle et al. 2010)

Advantages of using SV

- Validity and reliability are acceptable
- Cost and time effective
- Collection of additional information or cross-checking existing information is straightforward

Disadvantages of using SV

- Qualitative assessments are not straightforward
- Quality of imagery
- Temporal variability in imagery

Future data collection strategies

- Mobile apps & SSO – access GM & SV on the spot for additional information
- International comparative research from a single location

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# Virtual neighborhood audits (2)

SV has already been used to collect data in criminology

## Fujita (2011)

- Car theft
- SV imagery to estimate number of vehicles on street segments (incl. make, model & generation)

## Kronkvist (2013)

- Disorder & victimization
- SV used to assess levels of physical disorder in Swedish neighborhoods

## Apps (2012)

- Effects of physical & social features on burglary
- SV used to assess house design

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# Example 2: Street View image with map insert

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# Google Maps APIs

API = application programming interface

Geocoding API
- Batch geocode  address information
- Returns xy-coordinates or address information (reverse geocoding)

Places API
- Automatically query Google database for place information
- Returns location, business hours, price categories etc.
- Additional information via Places Details API

Directions API
- Returns directions between set of locations for a range of transport modes

Distance Matrix API
- Returns recommended travel distances and times for address matrix

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# Re-assess established research practices (1)

Improve measurement of crime-dettering effect of CCTV cameras
  (Caplan et al. 2011)


Crime-dettering effect of CCTV cameras is limited

- Only where camera is present

- Only when offenders are aware of camera presence, are convinced camera is monitored and swift reaction will follow

- CCTV camera has limited line of sight


Improved measurement acknowledges limited line of sight

- Before: observe viewshed in camera control room, transplant onto map, expensive, difficult to replicate

- Caplan et al. use GM aerial photography to improve measurement

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# Example 3: CCTV camera viewshed measurement using GM aerial imagery (Caplan et al. 2011: 262)

Fig. 1 Shaded region within the circular buffer exemplifies a viewshed drawn using a Google Aerial Photograph

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# Re-assess established research practices (2)

New method is equally reliable as previous method

Additional advantages

- Less time-consuming
- Replicability of method

SV could be included to further increase viewshed measurement

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# Data visualization (1)

Use GM to visualize criminological data and make results accessible to a broad audience

Krimistat.si project (Eman et al. 2013)

- Make crime mapping accessible and understandable for a broad audience
- Combine recorded crime data with socio-economic variables
- Display enriched crime data through GM

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# Example 4: dog shootings by police officers

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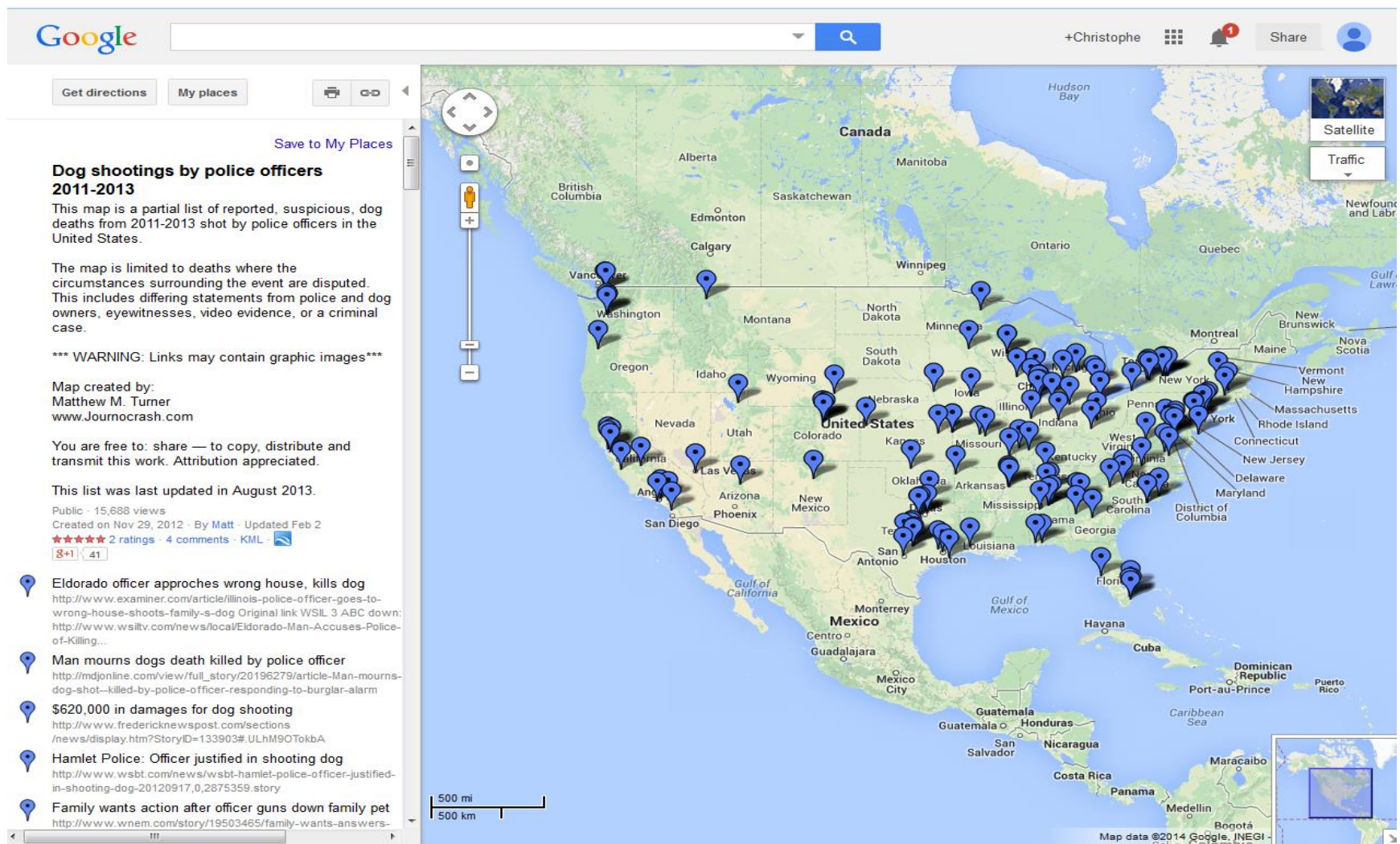
# Example 5: maps.met.police.uk

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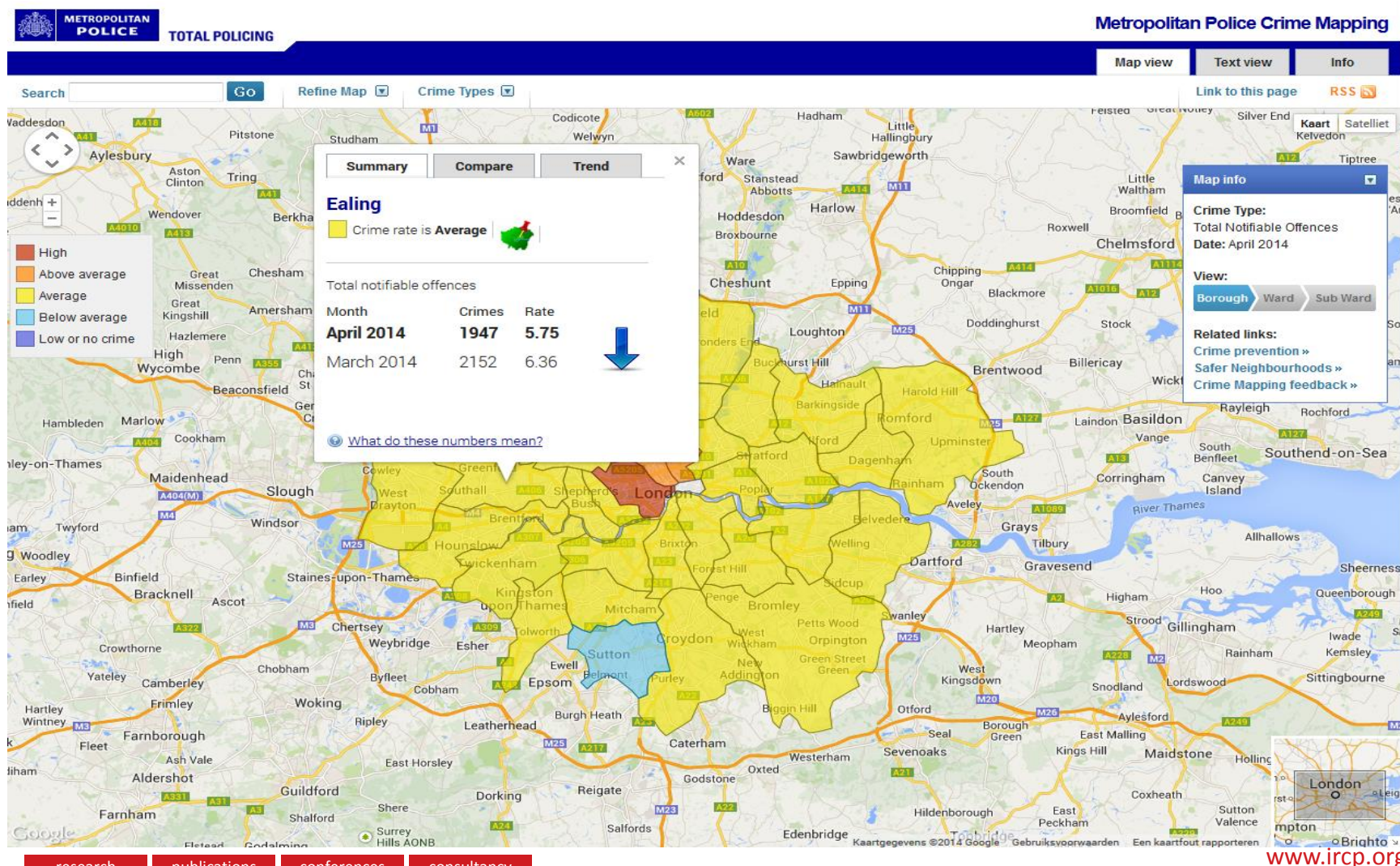
# Discussion (1)

## GM & SV in criminological research

- Only a handful of studies so far, but potentially powerful instruments

## New research questions come to mind

## Primary focus on 'methodological tools'

- Data collection: interviews, neighborhood audits
- Method: improve measurement, visualize data

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# Discussion (2)

## Major advantages

- Usability
- Accessibility
- Cheap

## Major weaknesses

- Privacy policy, general ToS and additional ToS
  - Might affect offenders' consent to participate
  - Explicitly prohibits 'instructional information about illegal activities'
- Some familiarity with (basic) programming for advanced use

## Further reading

- Vandeviver, C. (in press). Applying Google Maps and Google Street View in environmental criminological research. *Crime Science*.

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