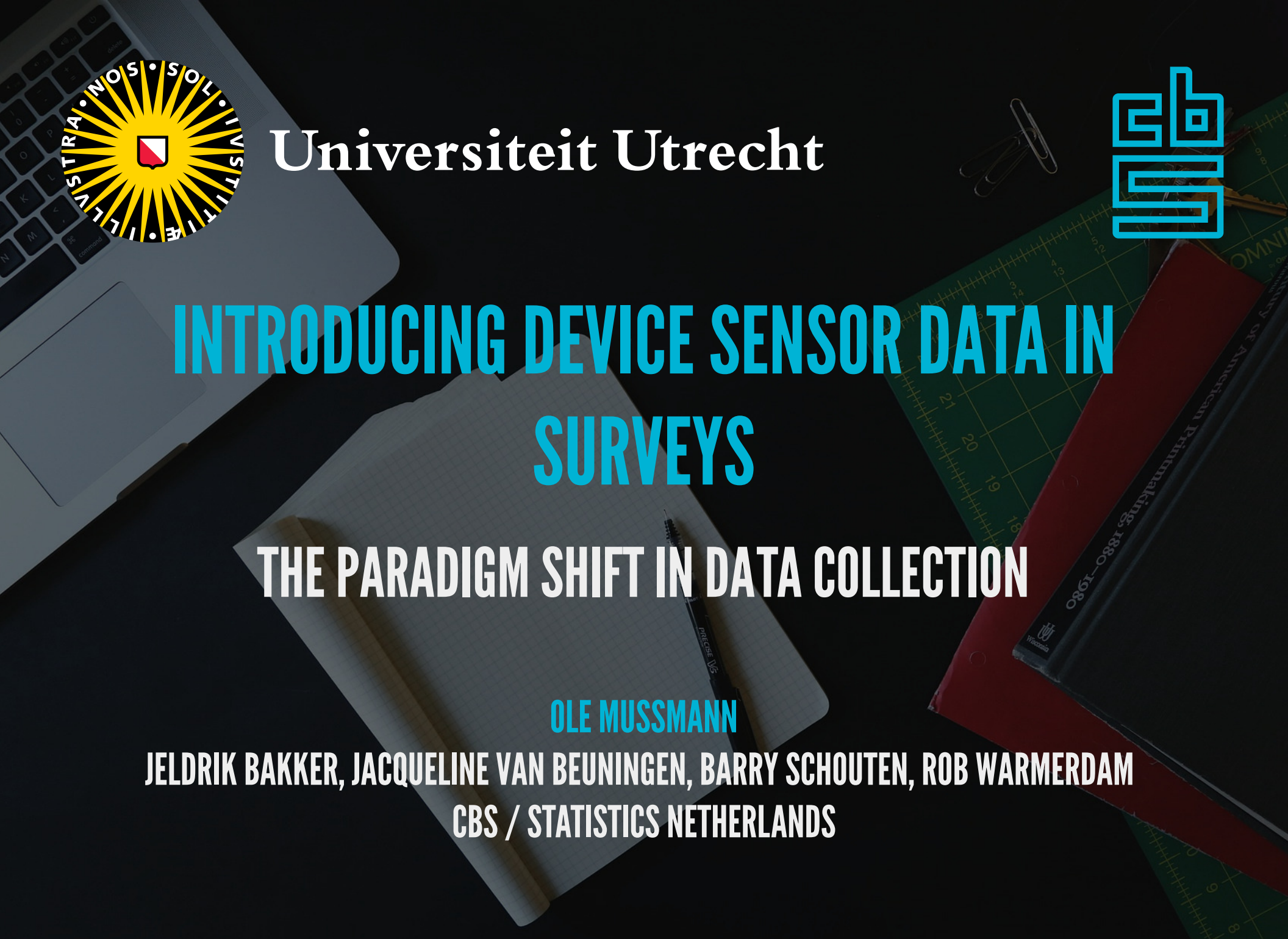


Universiteit Utrecht

INTRODUCING DEVICE SENSOR DATA IN SURVEYS

THE PARADIGM SHIFT IN DATA COLLECTION

OLE MUSSMANN

JELDRIK BAKKER, JACQUELINE VAN BEUNINGEN, BARRY SCHOUTEN, ROB WARMERDAM

CBS / STATISTICS NETHERLANDS


Video: Would You Like to Take a Survey

Video: Would You Like to Take a Survey

LIMITATIONS OF QUESTIONNAIRES

- Who is your internet provider? ...?
- What is your grip strength? ...?!
- Workouts per week? 3. At least.
- Do you take drugs? Nope.
- ...

WHAT IF WE DON'T NEED TO ASK?

Measure automatically.

- Ease the burden on the respondent.
- Get *independent* data with *different* biases and noise.
- Create added value by *giving back* information.

SENSORS IN MOBILE PHONES

3D touch	accelerometer	ambient light
battery	bluetooth	camera
cellular	fingerprint	gps
gyroscope	heart rate	humidity
magnetic field	microphone	nfc
pressure	proximity	wifi
wireless charging	thermometer	...?

MEASUREMENTS IN BLAISE

https://blaise.cbs.nl/measure

(how it works)

Data Measurement Survey

What is your name?

Ole

What is your browser string?

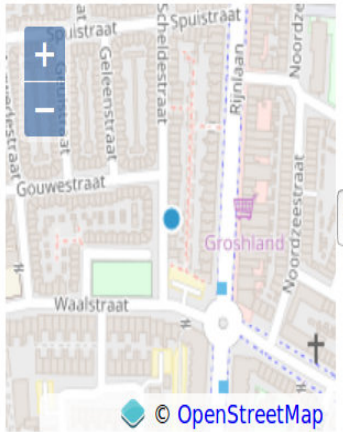
Browser string: Mozilla/5.0 (X11; Ubuntu; Lir

What is your battery level?

Battery API not working in this browser. -1

Where are you?

Geolocation: lat: 569218.9914158982, long: 6813736.60651292, accuracy: 5614 m



569218.9914158982; 68137

Next

JAVASCRIPT API EXAMPLES

Support is browser-specific.
Everything in color is specific to *your* device.

Try it yourself: isbjornlabs.com/js

USER AGENT

Gives information about the browser type and version, the rendering engine and the operation system type and version.

Mozilla/5.0 (X11; Linux x86_64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/57.0.2987.133 Safari/537.36

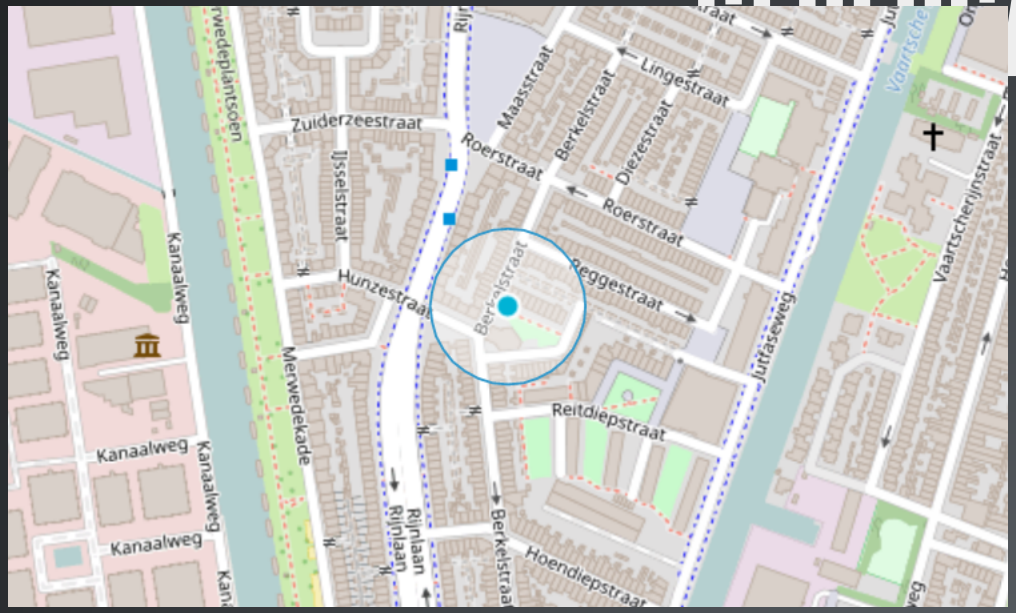
AMBIENT LIGHT

Ambient luminous flux is not supported.

NETWORK INFORMATION

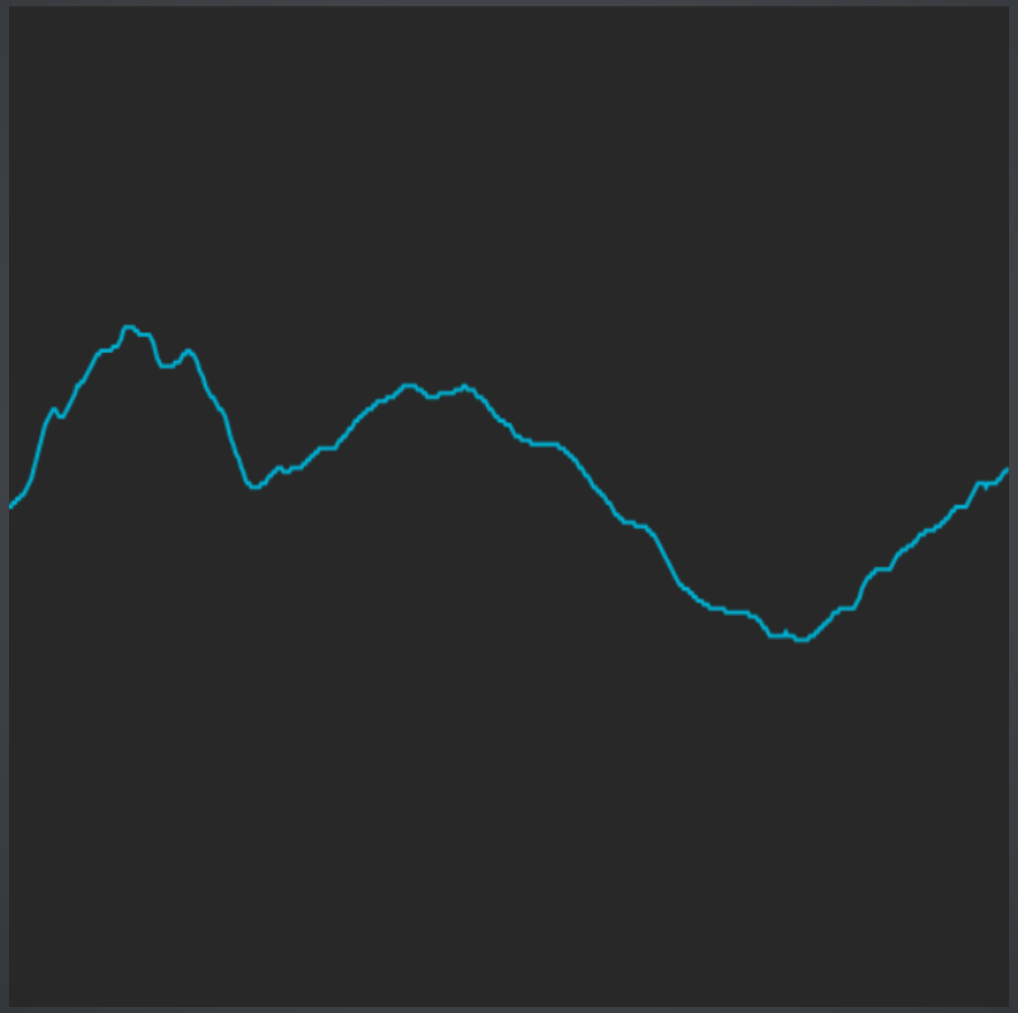
- The connection type is not supported.

GEOLOCATION



Longitude	5.1143
Latitude	52.0704
Accuracy	57 m

AUDIO



Code: Modified from webaudio-scope by fadams under ASL 2.0

VIDEO / PHOTO

Code: Modified from webaudio-scope by fadams under ASL 2.0

DEVICE ORIENTATION

compassneedscalibration event not supported

Coordinates: (0, 0, 0)
Position absolute? true

Acceleration: (0, 0, 0) m/s^2

Acceleration including gravity: (0, 0, 0) m/s^2

Rotation rate: (0, 0, 0)

Interval: 0 milliseconds

VOICE INTERACTION

Name

Type your first name.

VOICE INTERACTION

Hi Ole!

Name

Ole

Do you like online ads?

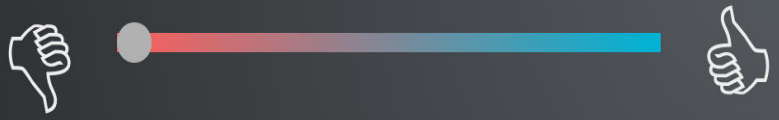
Speak your answer.

VOICE INTERACTION

Name

Ole

Do you like online ads?



Why no adblocker?

Speak your answer.

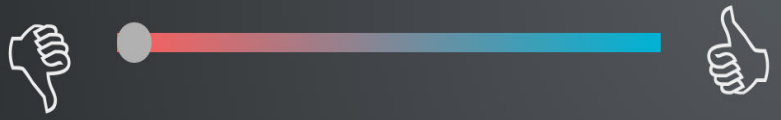
Ads are allowed.

VOICE INTERACTION

Name

Ole

Do you like online ads?



Why no adblocker?

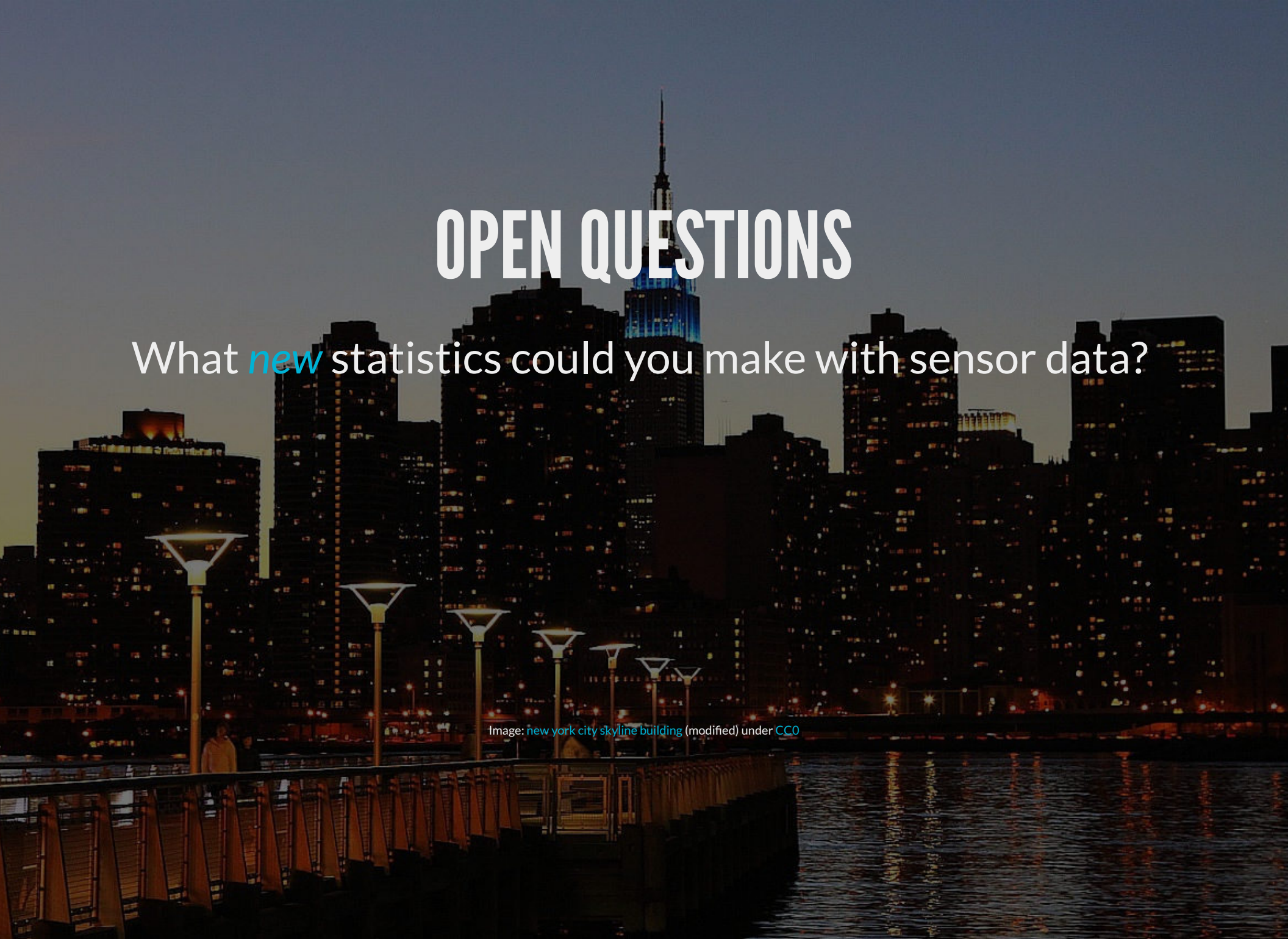
Good question maybe I should install an ad blocker then.

Thank you for participating.

OPEN QUESTIONS

What statistics could you *complement* with sensor data?

Image: city old architecture old town (modified) under CC0



OPEN QUESTIONS

What *new* statistics could you make with sensor data?

Image: new york city skyline building (modified) under CC0

SENSOR DATA FOR CBS

These are the six topics in consideration for CBS.

Sorted by ascending complexity.

Image: CBS Heerlen (modified) under CC0

1. RELOCATION AND TIME-SPENDING

- Use mobile phones to deduce travel times and locations
- Deduce modes of transportation
- Ask *context specific* questions
- Derive purposes and behaviour for work, shopping, leisure?

2. INTERNET USE AND -BEHAVIOUR

- Determine internet service provider
- Measure internet speed: upload / download / ping
- Determine browser type, operation system type
- Monitor internet usage for a short time (~ 1week)

3. EXPENSES AND BUYING BEHAVIOUR

- Use cell phone camera to scan receipts
- Geotag photos to determine shops or malls
- Monitor internet usage for online shopping

4. HEALTH AND FITNESS

General	obesity, calorie intake	photos
	blood pressure	connected devices
	heart rate	wearables, phones
Sensory	hearing and vision	games
	reaction time	games
	reading	phones
Motoric	movement	phones, wearables
	sedentary behaviour	phones, wearables
	grip strength	phones, 3D touch

5. PERSONAL AND PROF. LIVING CONDITIONS

- Measure
  - Noise levels
  - Amount of light
  - Temperature
  - Vibrations
- Determine room size / dimensions with echo
- Ask *context specific* about perceived safety
- Use cheap attachments to determine air quality

6. MENTAL AND EMOTIONAL STATES

Infer sociableness, state of mind and emotions through

- Contacts and address book
- Incoming and outgoing calls
- Relocation measurements
- Pattern and behaviour recognition

LINKS

Contact	bo.mussmann@cbs.nl
This Talk	https://isbjornlabs.com/fedcasic2017
	https://isbjornlabs.com/js
Blaise Questionnaire	http://blaise.cbs.nl/measure
JavaScript API Compatibility	http://caniuse.com/#cats=JS%20API
Code	https://github.com/AurelioDeRosa/HTML5-API-demos
	http://openlayers.org/en/latest/examples/
	https://github.com/fadams/webaudio-scope
Slide Framework	https://github.com/hakimel/reveal.js