

# Sensing the City

## *Validating GPS Tracking Data with BT Scanning Registrations*



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# Delft from Above

How, when and what for are you using the city centre?



**35 students, 35 families, 35 Bluetooth scanners**

***Student project (BSc-5): Approaching participants, collecting data, processing data, visualization, reporting, presenting***

# Context

- **Sensing the City**
  - Delft from Above
  - 70 GPS + 35 Bluetooth scanners in City Centre
  - 1 week trajectory data collection
- **GPS: positioning (selected participants only)**
  - Full trip trajectories, crossing city centre
- **Bluetooth: proximity (all active users)**
  - point to point trajectories

*Image: Jan Gehl, Gehl Architects*

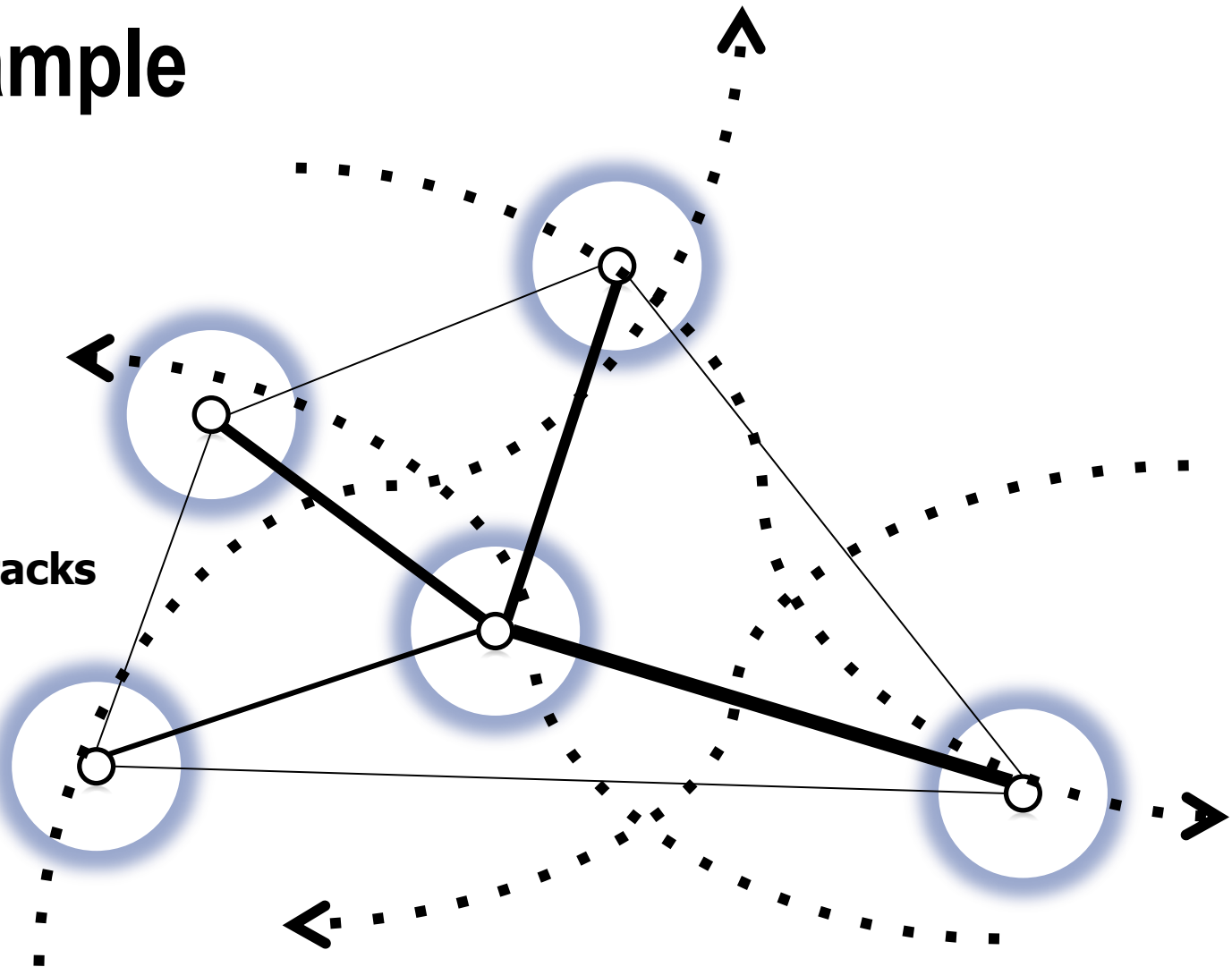
# Example

**BT nodes**

**BT legs**

**GPS tracks**

**Used GPS tracks**



# Scene & Potential

- **GPS + BT : *enrich BT-pattern by GPS tracks (routes between points / Tartu2014)***
- **BT+GPS : *validate GPS sample by BT registrations***

**GPS devices *visible* for BT scanners (!)**

- **GPS+BT : *validate BT scan area (!)***

Image: Jan Gehl, Gehl Architects

# Research Question & Approach

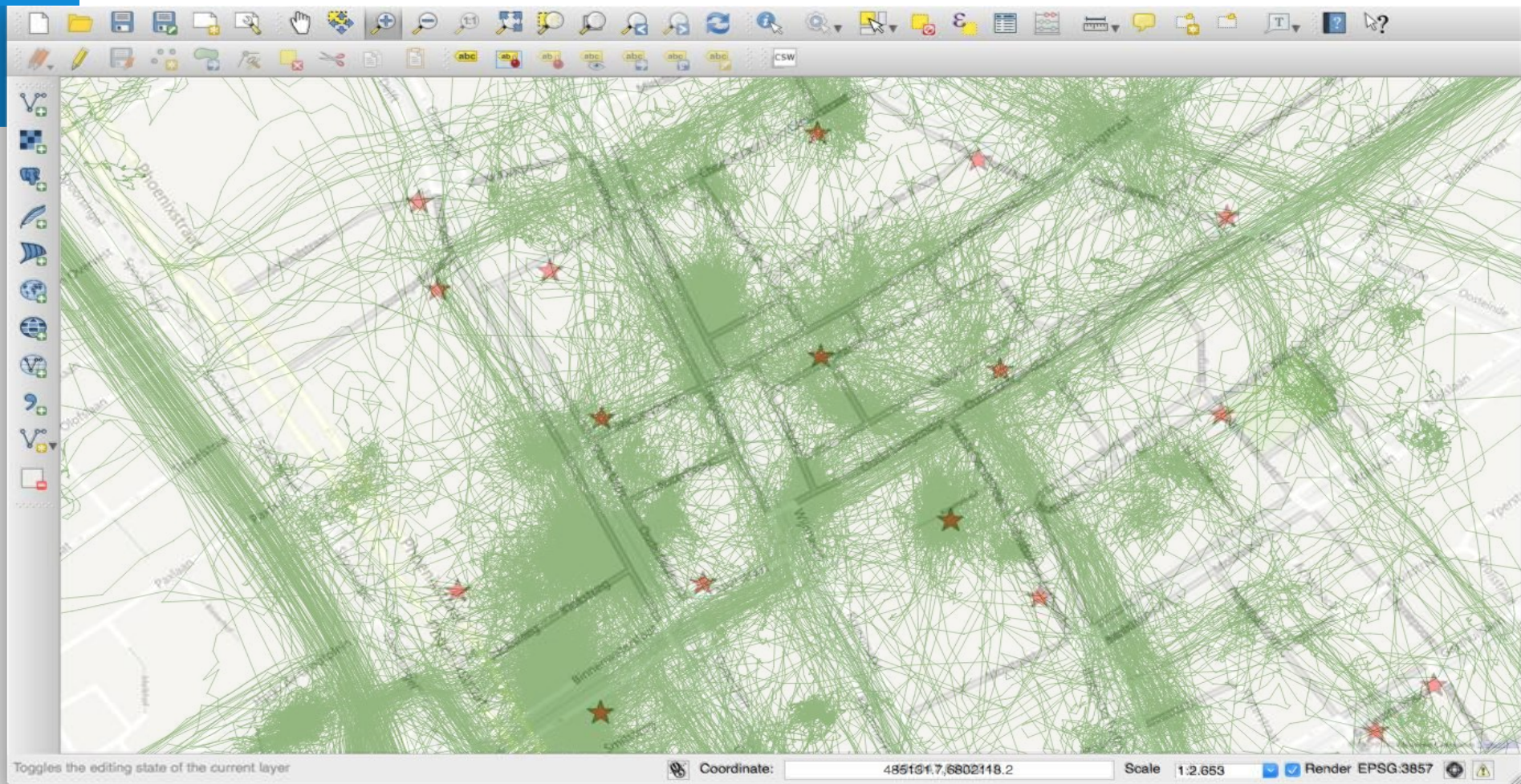
Can we use BT data to validate GPS tracks and how? *Do the patterns match?*

- ① Select BT data (trajectories only)
  - a. SUB: Select BT trajectories of GPS devices
- ② Reduce GPS tracks to BT pattern
  - a. Only GPS tracks which intersect with BT nodes
- ③ Compare pattern BT versus GPS
  - d. Compare subset of scanned GPS devices

Image: Jan Gehl, Gehl Architects

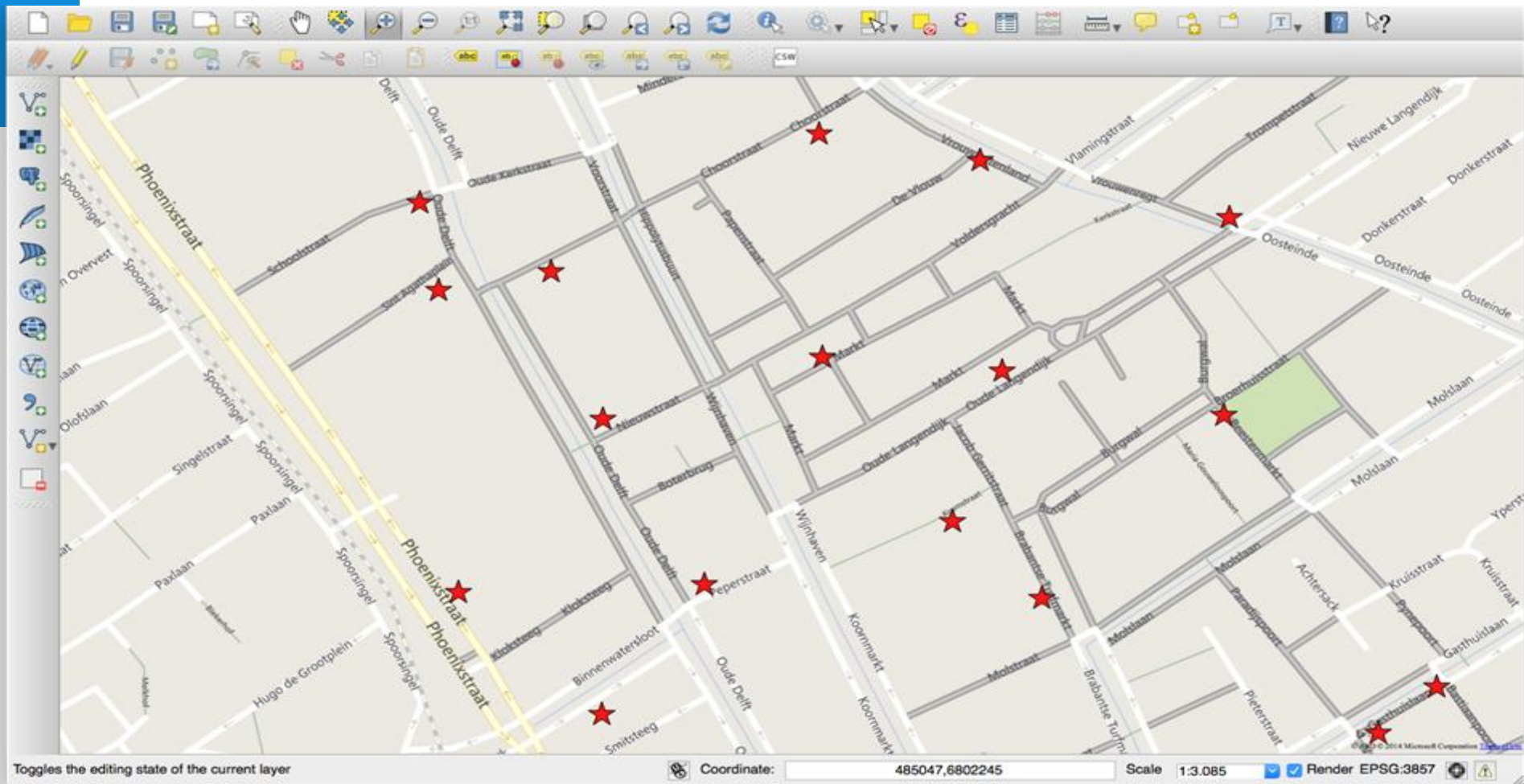


# RAW (unprocessed) GPS



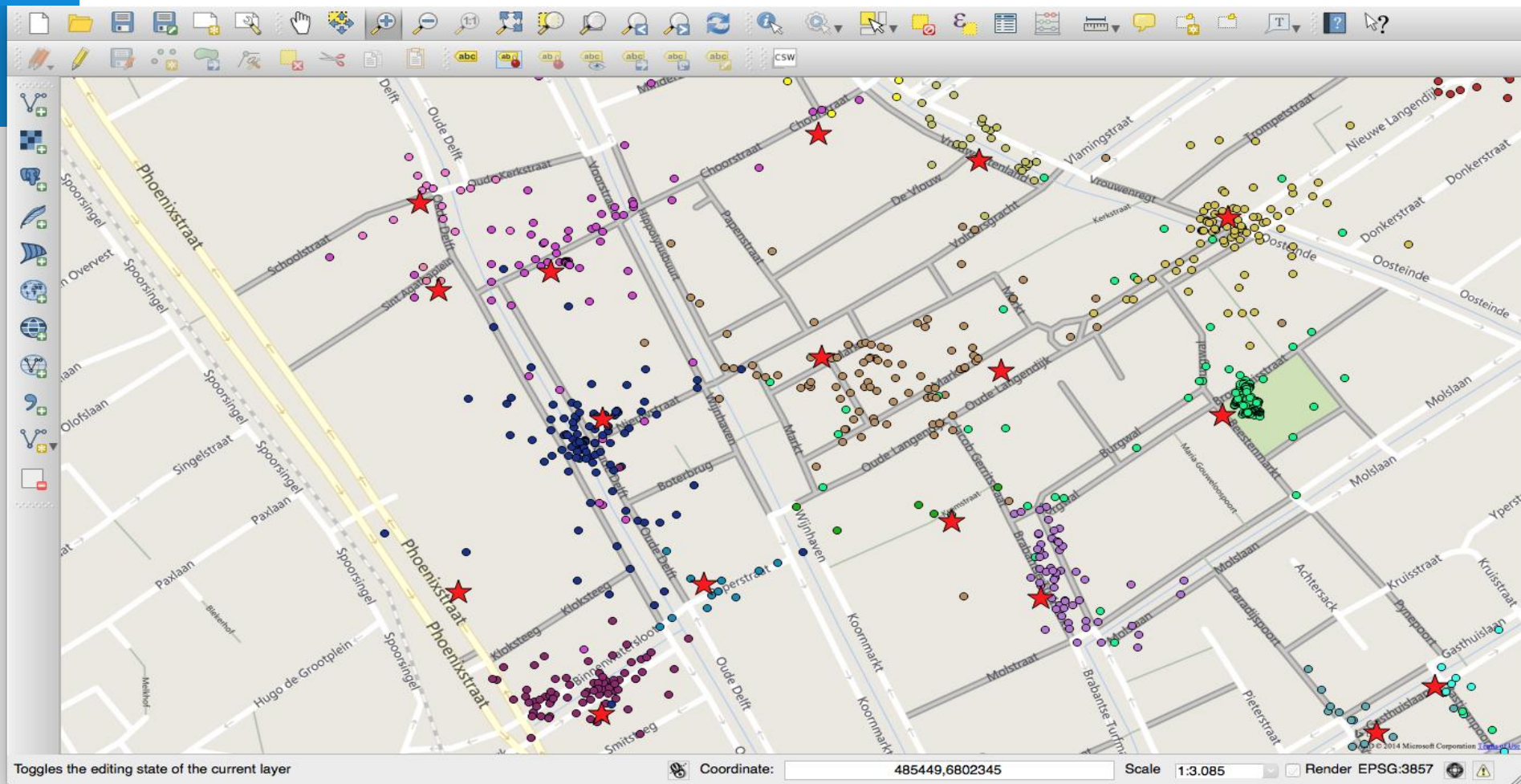


# Location Bluetooth scanners





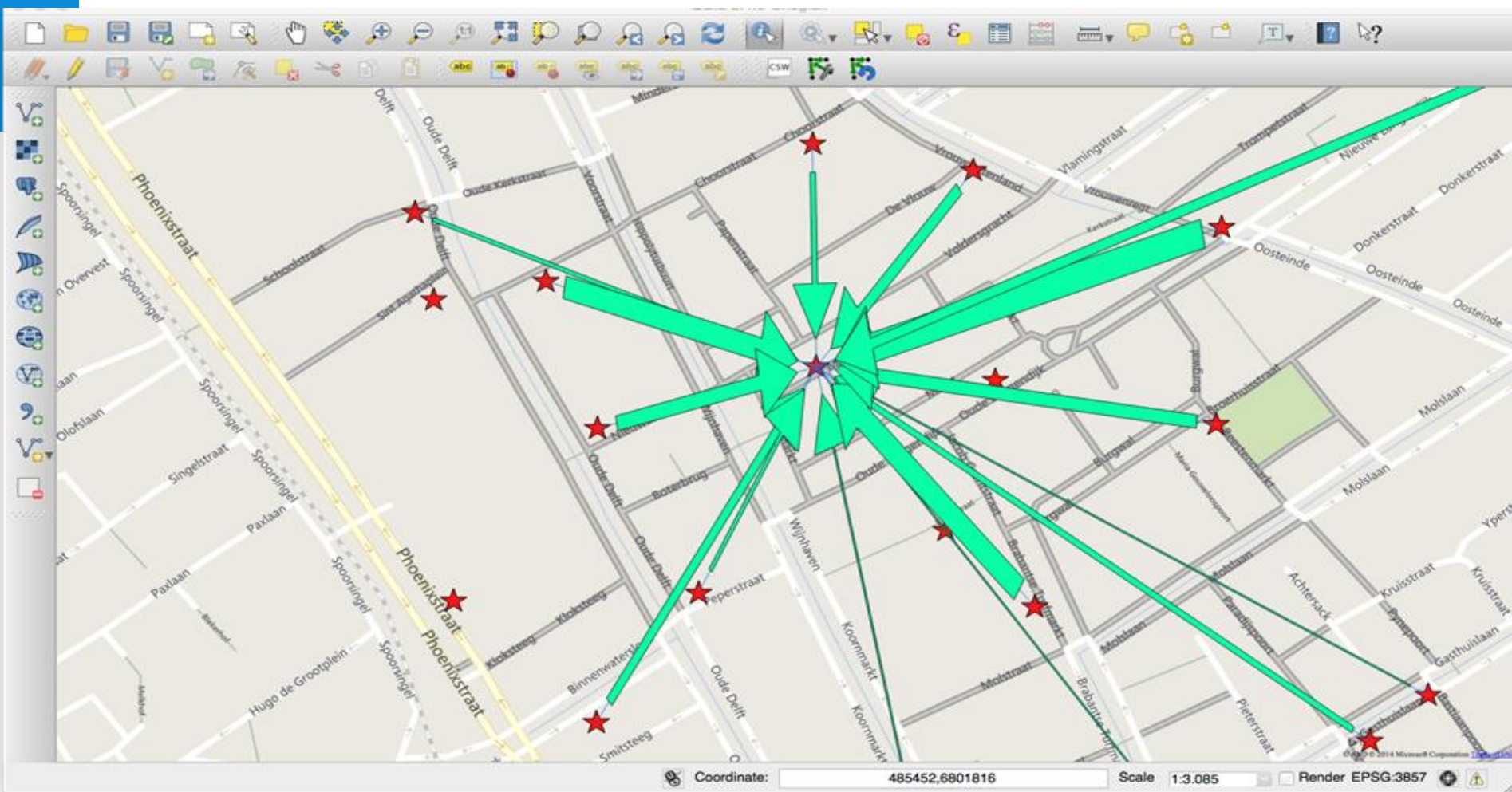
# GPS registrations by BT scanners







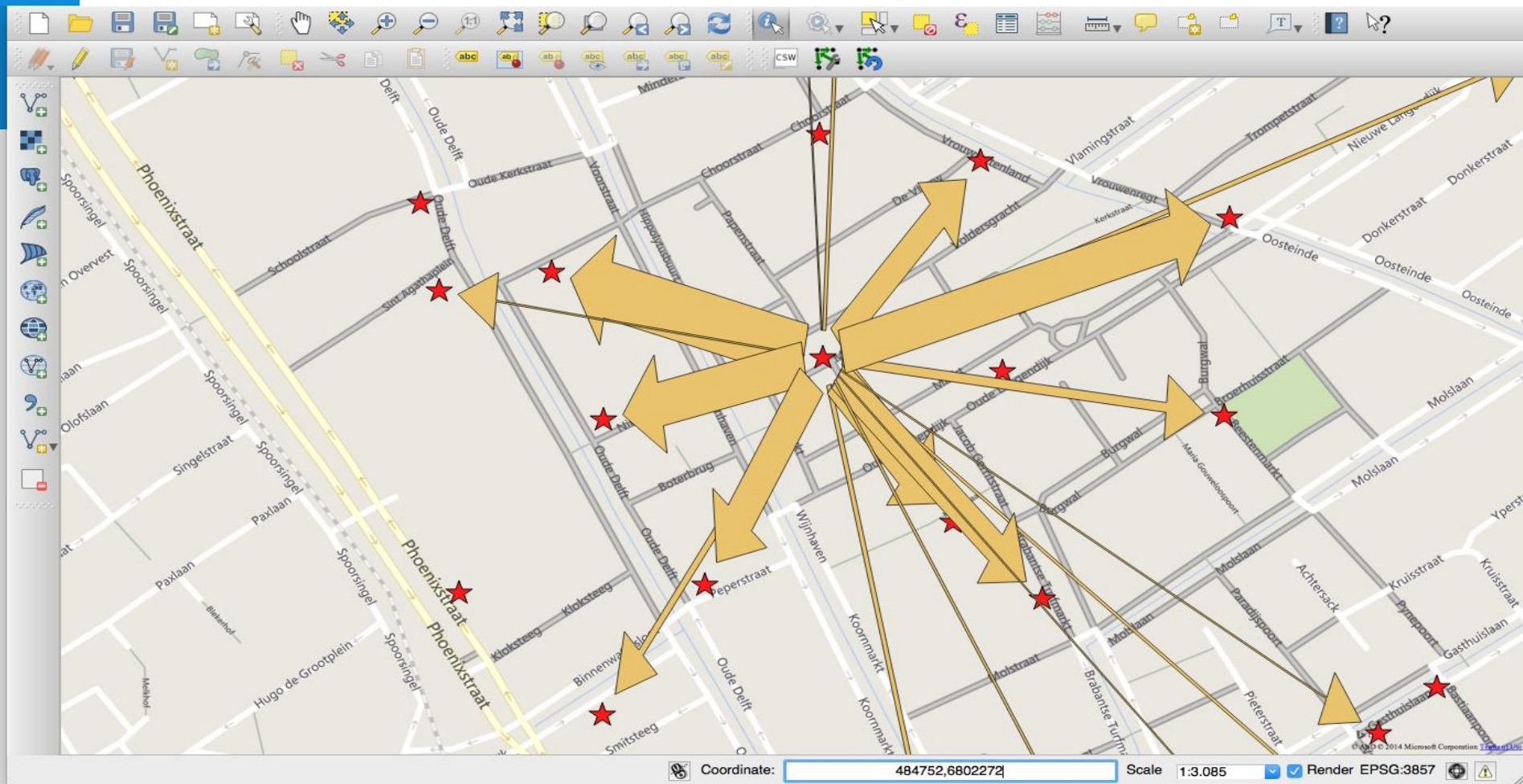
# BT /Access to #314 (N2N)



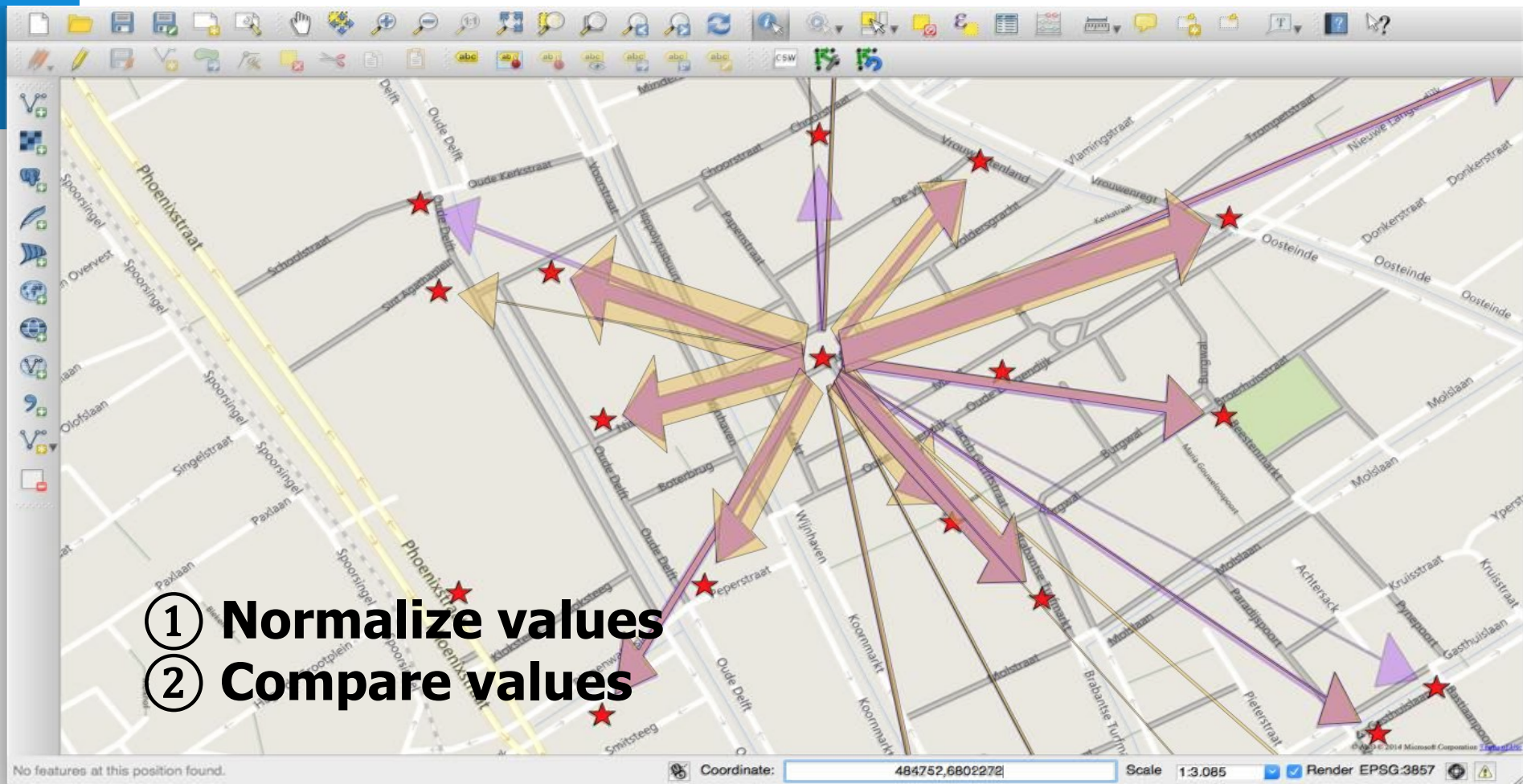
The screenshot displays a QGIS application window. The main map area shows a street network in a city, with a central point marked by a red star. From this central point, several thick purple arrows radiate outwards, each pointing to another red star located at various intersections and points along the streets. The streets are labeled with names such as Phoenixstraat, Oude Delft, Kerkstraat, and others. The interface includes a toolbar at the top with various icons for map navigation and editing. At the bottom, the status bar shows the text "No features at this position found.", the coordinate "485247,6801906", the scale "1:3.085", and the render settings "Render EPSG:3857".



# GPS /Destinations from #314 (N2N)



# How to compare...?



# Result

- Insight in detection area of BT scanners
- Validation of GPS trajectories based on BT detections
- Enrich BT trajectories with real routes between nodes based on GPS data
- *Issue: population/sample of BT & GPS (\_biased?!)*
- *Future: further assessment of fusion of GPS & BT trajectories (now per node, not full pattern)*

Image: Jan Gehl, Gehl Architects