A Data Model for Seamless Pedestrian Navigation

Carolin Kucharczyk, Lucia Tyrallová, Lasse Scheele, Hartmut Asche

University of Potsdam | Geoinformation Research Group

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Background

- Research project supported by German Federal Ministry of Education and Research (BMBF), 2014-15
- Cooperation partners:
  - Geoinformation research group, University of Potsdam
  - Institute for social research and social economy (iso), Saarbruecken
- Feasibility study on area-wide, cost-effective pedestrian navigation
- Focus on dedicated data acquisition

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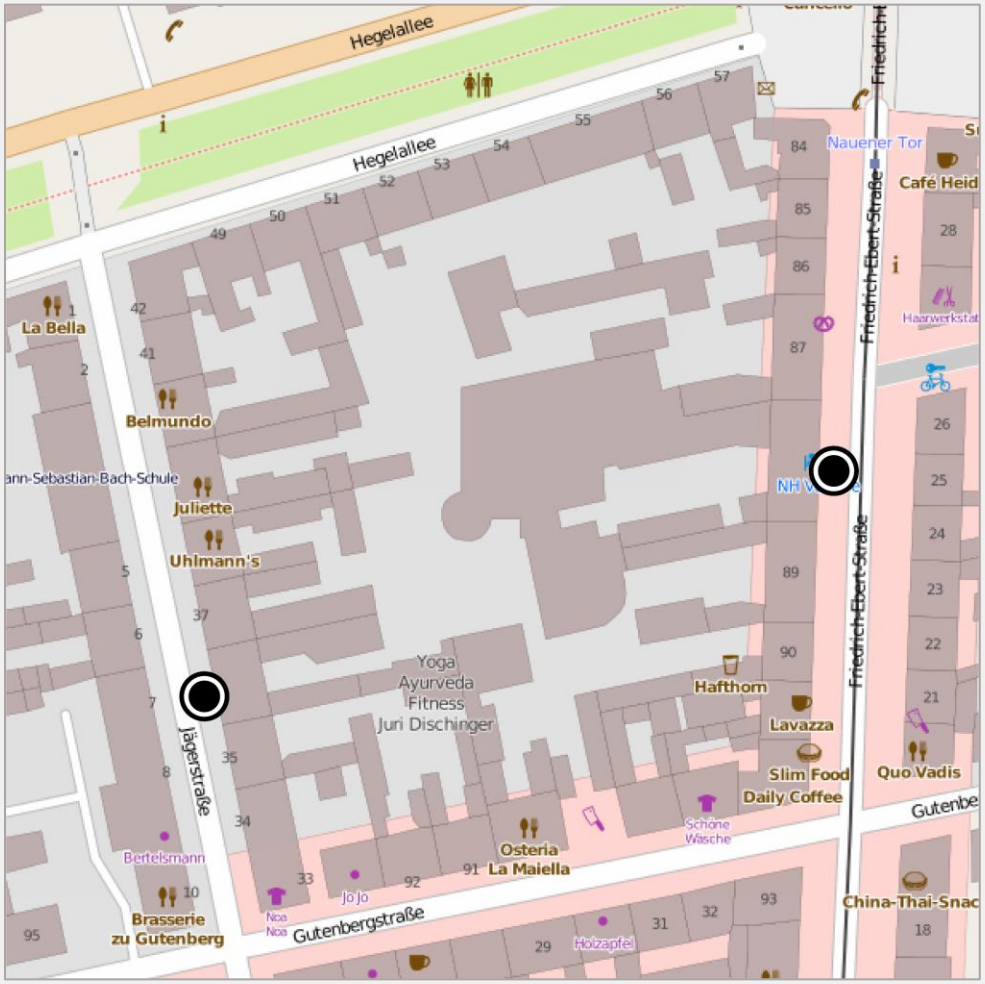
Motivation

- Research topic ‘pedestrian navigation’ offers a broad range of different coherent themes
- Scientific communities only focus on limited issues, such as landmarks, communication of spatial information, spatial perception and orientation, technical aspects…
- Status, validation, acquisition and processing of dedicated area-wide geospatial data for pedestrian navigation has not been subject of systematic research
- Relevant objects for pedestrian navigation have so far not been systematically collected and are not widely available as a consequence, resulting in data gaps or redundancies

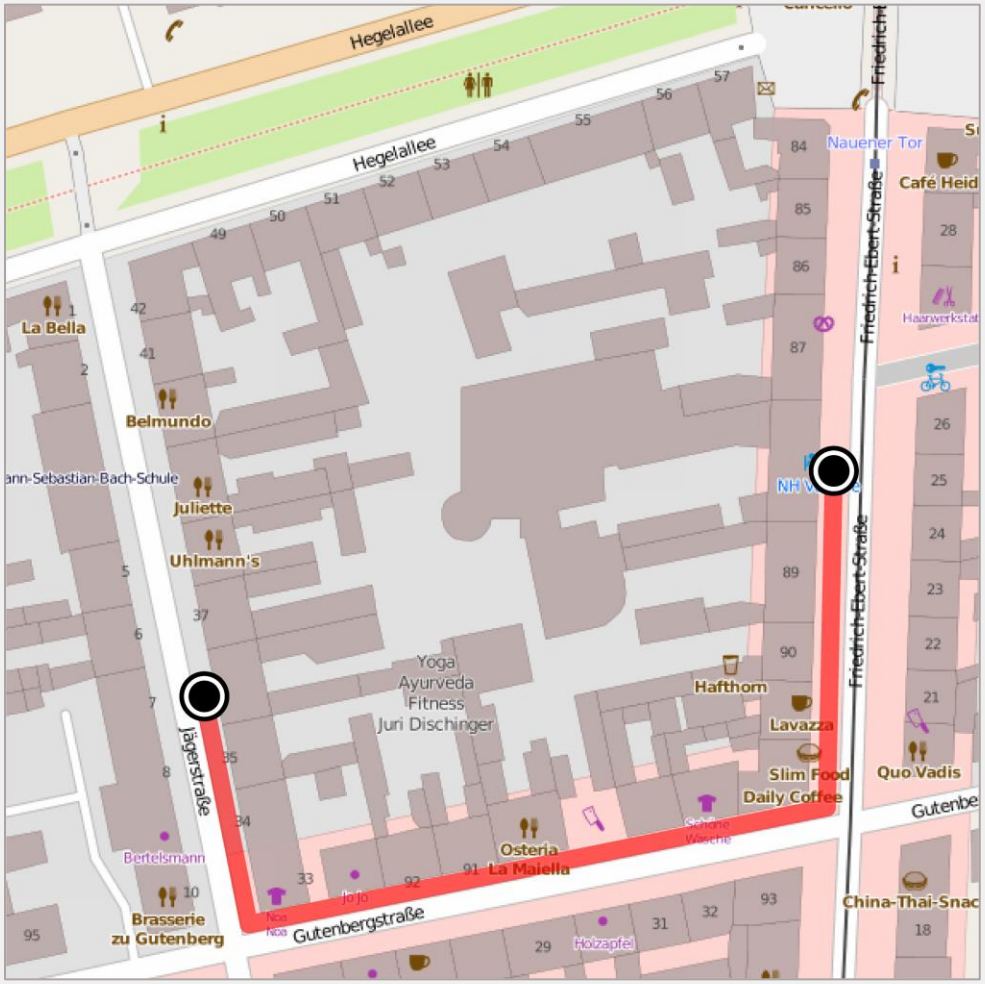
Establishment of geospatial database adjusted to pedestrian-specific requirements is of paramount importance!

Dedicated pedestrian navigation data – What for?



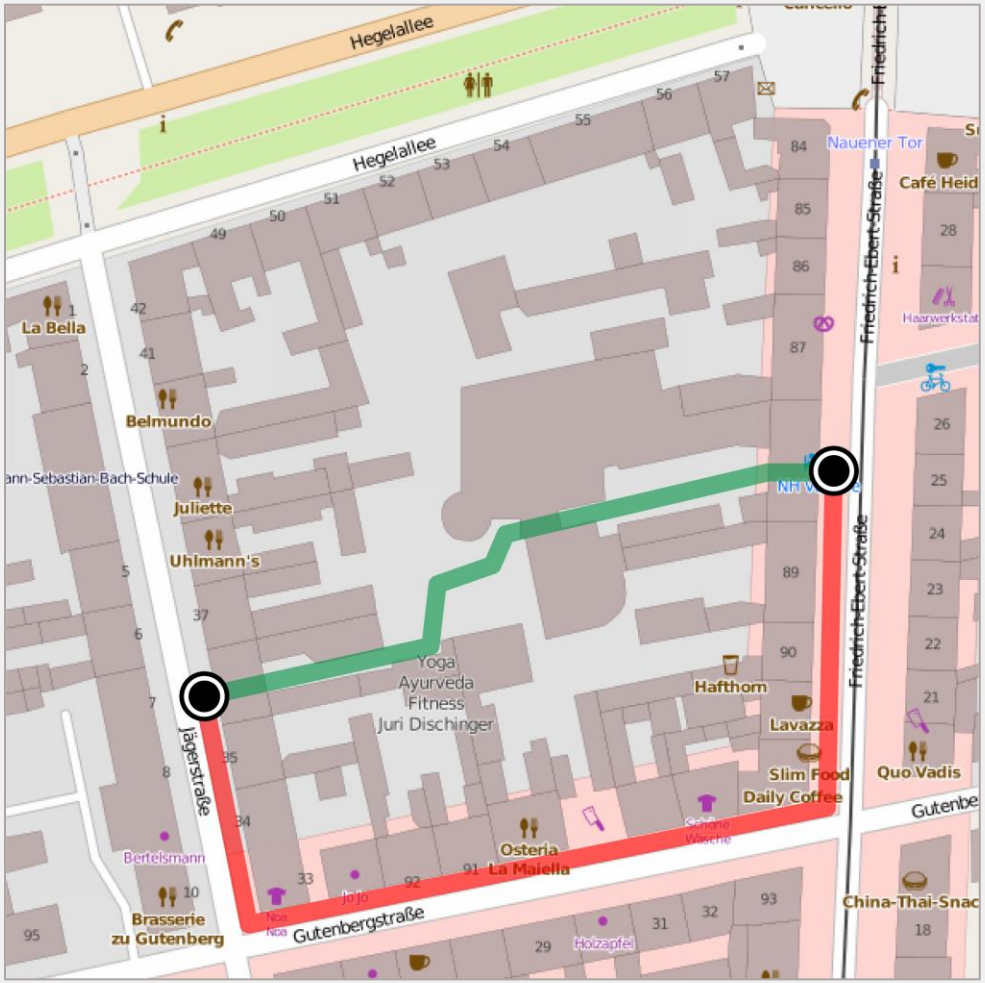
- Problem: best route from A to B ?

Dedicated pedestrian navigation data – What for?



- Problem: best route from A to B ?
- Navigation based on OSM data: on pavement, around block

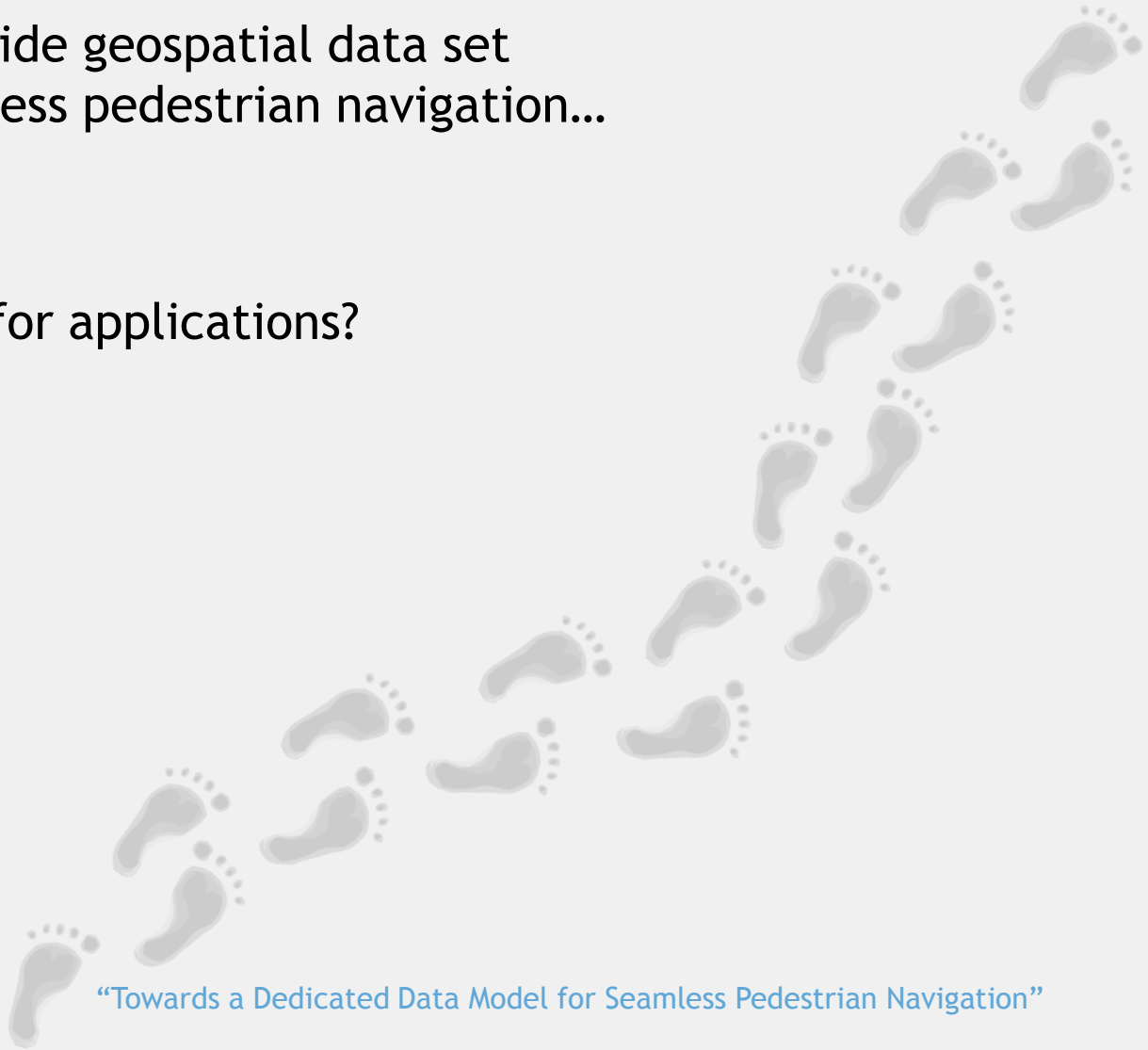
Dedicated pedestrian navigation data – What for?



- Problem: best route from A to B ?
- Navigation based on dedicated pedestrian navigation data: passage through publicly accessible courtyards (shorter way)

Research objectives

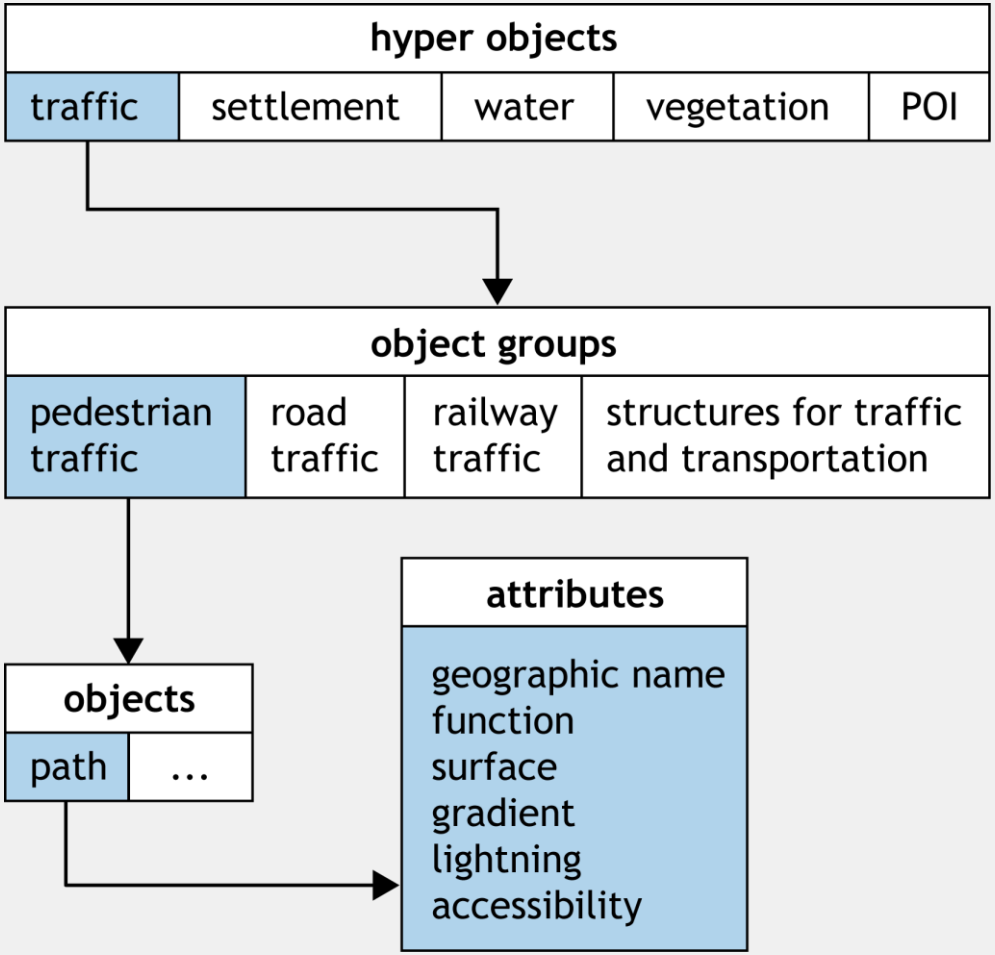
- How can an area-wide geospatial data set dedicated to seamless pedestrian navigation…
  - be build up,
  - be validated,
  - be made usable for applications?



Research methods

- Abstraction of the real world
  - Identification and selection of geospatial objects relevant to pedestrian navigation
  - Conceptualisation of application-specific data model
  - Structuring in a feature catalogue
- Validation of the model with reality: Test area, ground truth
- Testing and determination of suitability of selected methods:
  - Data acquisition: Examination of existing databases (commercial, free, official)
  - Data acquisition: Remote sensing
  - Data acquisition: Crowdsourcing
  - Data processing: Data fusion

Feature catalogue concept for pedestrian navigation



- feature catalogue as abstraction of geospatial reality (model)
- generic, modular and scalable system
- *thematic* data for orientation and navigation
- *topographic* data for geospatial reference

Conclusion

- Targeted project results:
  - Definition and implementation of dedicated geospatial data model for pedestrian navigation
  - Concept of area-wide (nationwide) geospatial pedestrian navigation database
  - Definition and implementation of process chains of data acquisition and harmonisation
- Processes need to be automated as far as possible
- Quality assessment is indispensable

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Questions? Suggestions? Feedback?

Contact Carolin Kucharczyk | carolin.kucharczyk@uni-potsdam.de

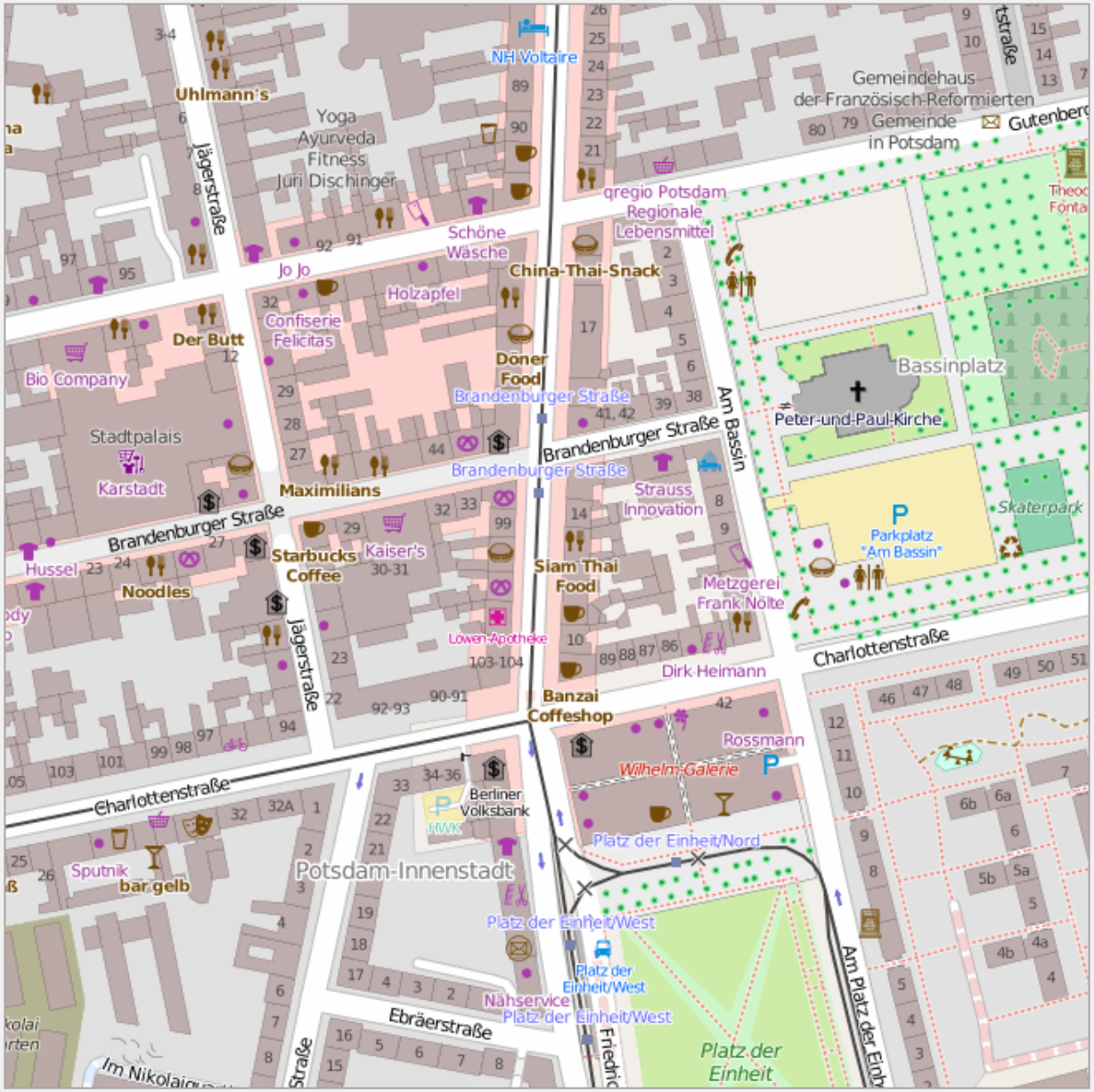
University of Potsdam | Department of Geography

Web www.geographie.uni-potsdam.de/geoinformatik

Geoinformation research group

Test area

City centre of Potsdam, Germany



Pedestrian navigation – What's special?

- Pedestrian navigation characterised by greater degree of freedom of movement in geographical space
- Unlike vehicle navigation, pedestrian movement not strictly restricted to built infrastructure, such as streets/roads or pavements
- Instead, context-specific individual route selection and spatial action characteristic of pedestrians' spatial actions
- Pedestrian-specific orientation, navigation information primarily communicated by graphic media
- We are all pedestrians – Audience broad and heterogeneous, hence identification and research of specific subgroups relevant

Pedestrian navigation – Research objectives

- Identification of orientation and navigation information required for pedestrian navigation in general or specific subgroups, e.g the elderly
- Assessment of area-wide (nationwide) data availability at cost-effective terms
- Definition of acquisition, validation, processing, integration strategies of geo-spatial data dedicated pedestrian navigation
- Development and implementation of automated data acquisition and filtering process
- Proof-of-concept for urban and rural areas test sites
- Definition of need for further research