Geographic relevance in mobile services

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Outline

- LBS: the shortcomings
- Geographic relevance as an extensions of GIR & LBS
- Definition & conceptualisation of geographic relevance
- The different conceptions of location & space
- Links to other papers

Mobile usage of geographic information

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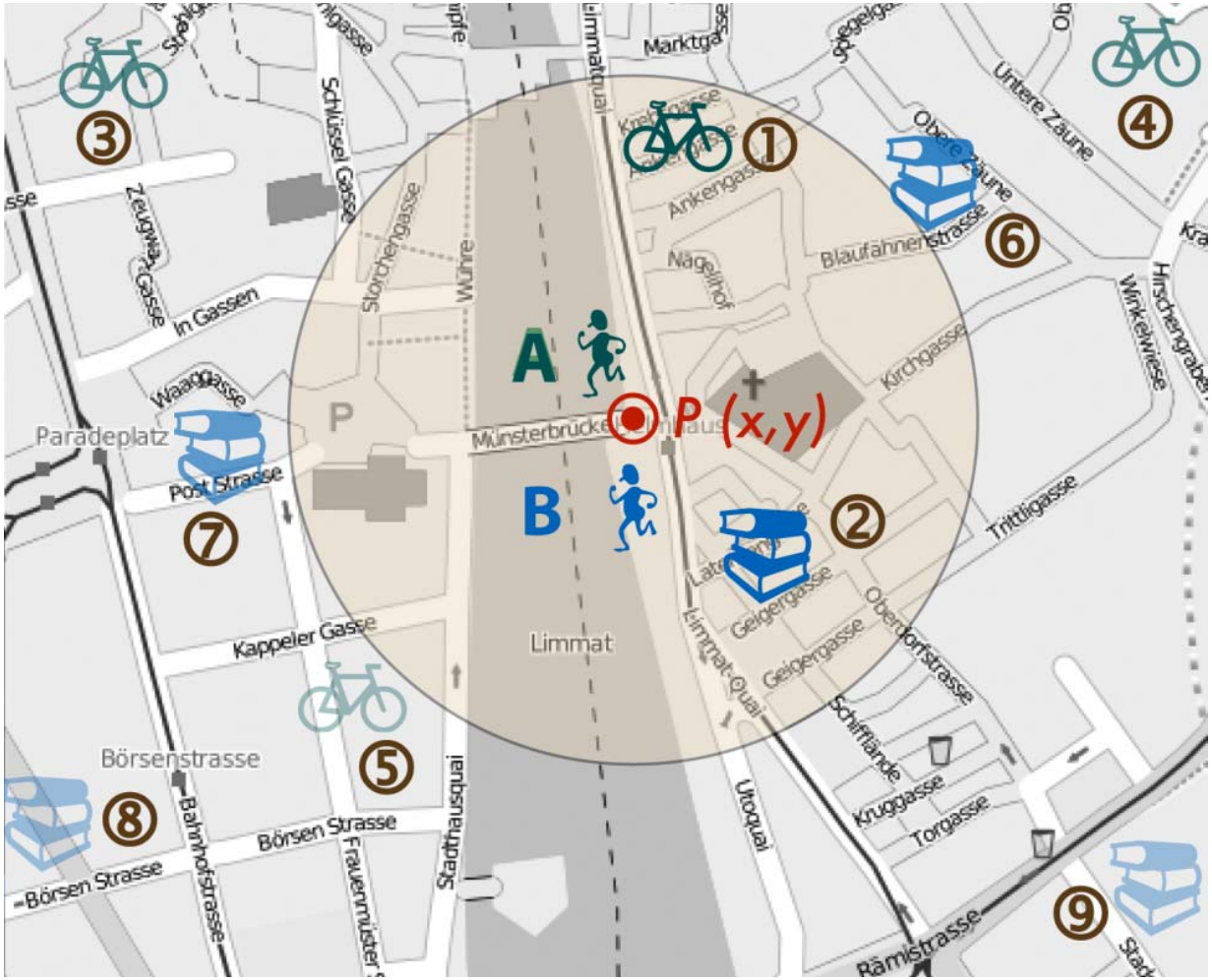
- **cognitive** capacity / **workload** -> information overload
- time & capacity for information extraction
- limitations of resources
  - **small Display** -> lack of space, & spatial overview
  - interaction possibilities
- movement
- changing usage **contexts** and user **activities**
- geo-locating (GPS, network, ...)
- digital **representation**
  - high flexibility
  - dynamic adaptation of information

Why location is not always enough



two users at the same location:

- … share the location
- … perform different activities
- … have different information needs

- … hence need different information in a representation of geographic space

Shortcoming of LBS and other mobile services

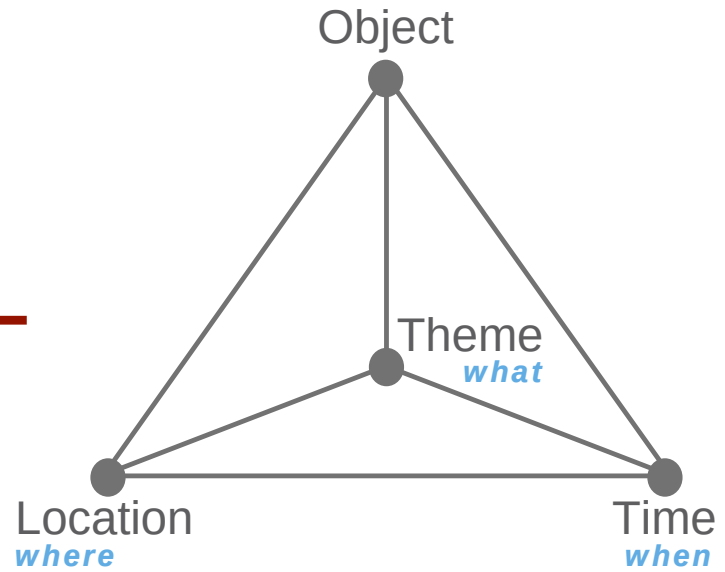
- utility of service / information often lacking
  - mismatch, overload, and irrelevance of information provided
  - lacking awareness of usage context (relevance)
  - LBS use simplistic, binary relevance concept applying buffers
- usability often unsatisfying
  - representation of information not adapted to the mobile usage situation
  - lacking consideration of cognitive abilities

Differences to GIR & LBS

- application of **different representations**:
  - GIR: Documents / Images
  - GeoRel: Objects, Maps

- maps
- geo-databases
- images
- documents
- sound
- speech
- video

representations

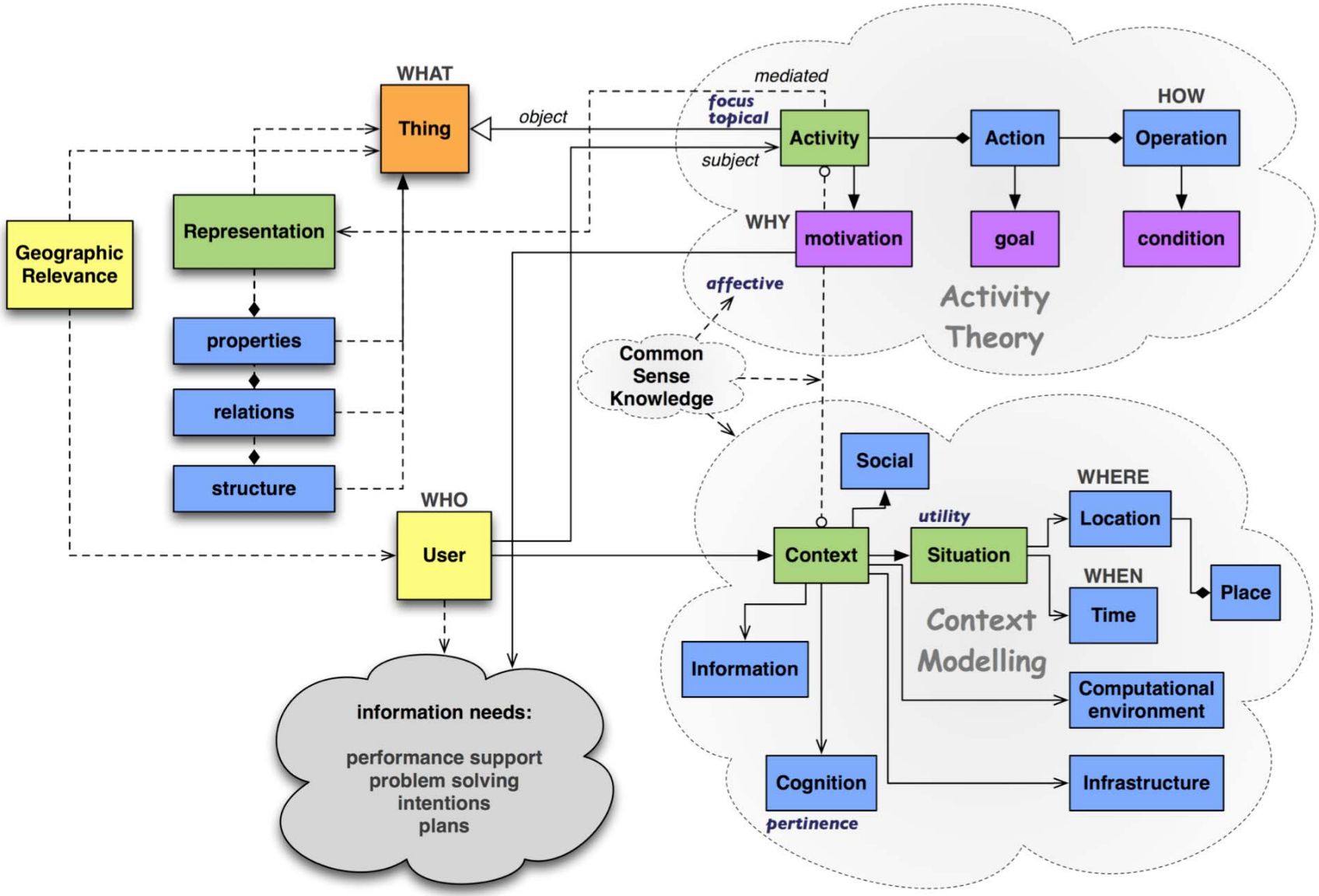


- using **more contextual relations**:
  - LBS: location, theme
  - GeoRel: location, place, time, activity, theme, intention, goal

GeoRel Project Objectives

- extension of current LBS / GIR in the following ways:
  - shifting the location-based perspective to a **relevance-based perspective**, including the spatial, temporal, topical, and motivational dimensions.
  - considering the relation of information needs with information objects within the **mobile usage context**.
  - exploiting **geography as a unifying framework** for a broader understanding of relevance by the nexus of location (where), time (when), and objects (what), i.e. geographic relevance.
  - employing more sophisticated **spatial concepts** for filtering content than simple distance-buffer selections.
  - developing **assessment methods** for geographic relevance
  - developing **suitable representations of geographic relevance** within mobile services or applications.

Conceptual model of geographic relevance



Defining geographic relevance

- geographic relevance denotes how connected and applicable some information is to the matter at hand, expressed as context, and how properly it supports decision-making or solving a problem in that context.

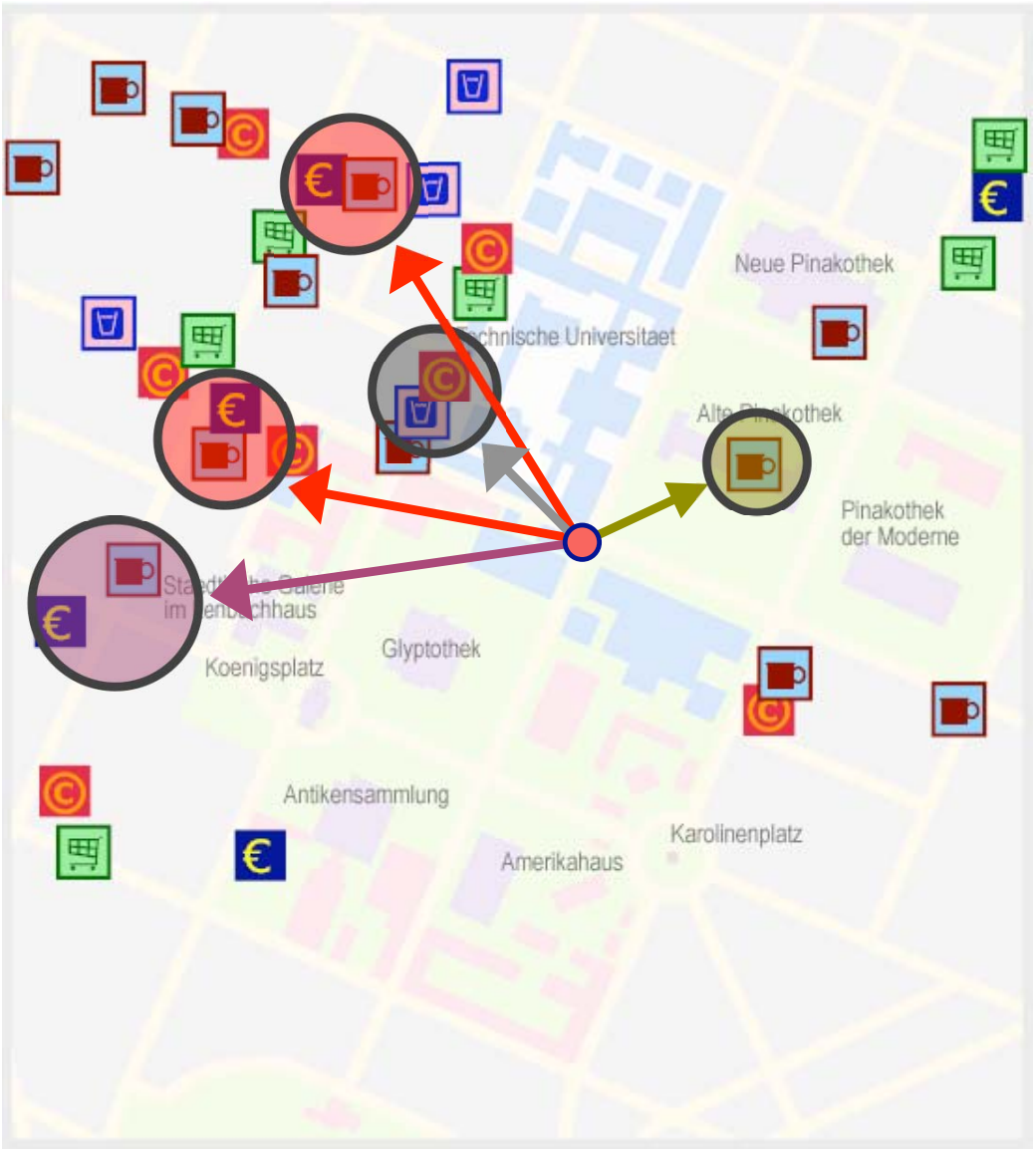
- relevance of geographic information in relation to space, time, user interests, display, activities, goals, requests, etc.
- based on fundamental geographic concepts:
- spatio–temporal **distances**
- spatio–temporal **constraints** (e.g. accessibility within a network -> time geography)
- geographic **associations** (e.g. neighbourhood relationships)

Intuitive geographic relevance

generally objects are relevant for a mobile user, if they:

- are **closer** (proximity, co-location)
- are **accessible**
- are **current**
- are **visible / audible**
- or one of their **attributes** are required for a successful performance of an **activity** or task
- have the **potential as a solution** to a problem
- are related or connected to **existing knowledge** or **experiences** of a user
- have a high **information content**
- are in the **focus of attention**
- are **usable**, **functioning**, **open**
- ...

Relevance of geographic objects

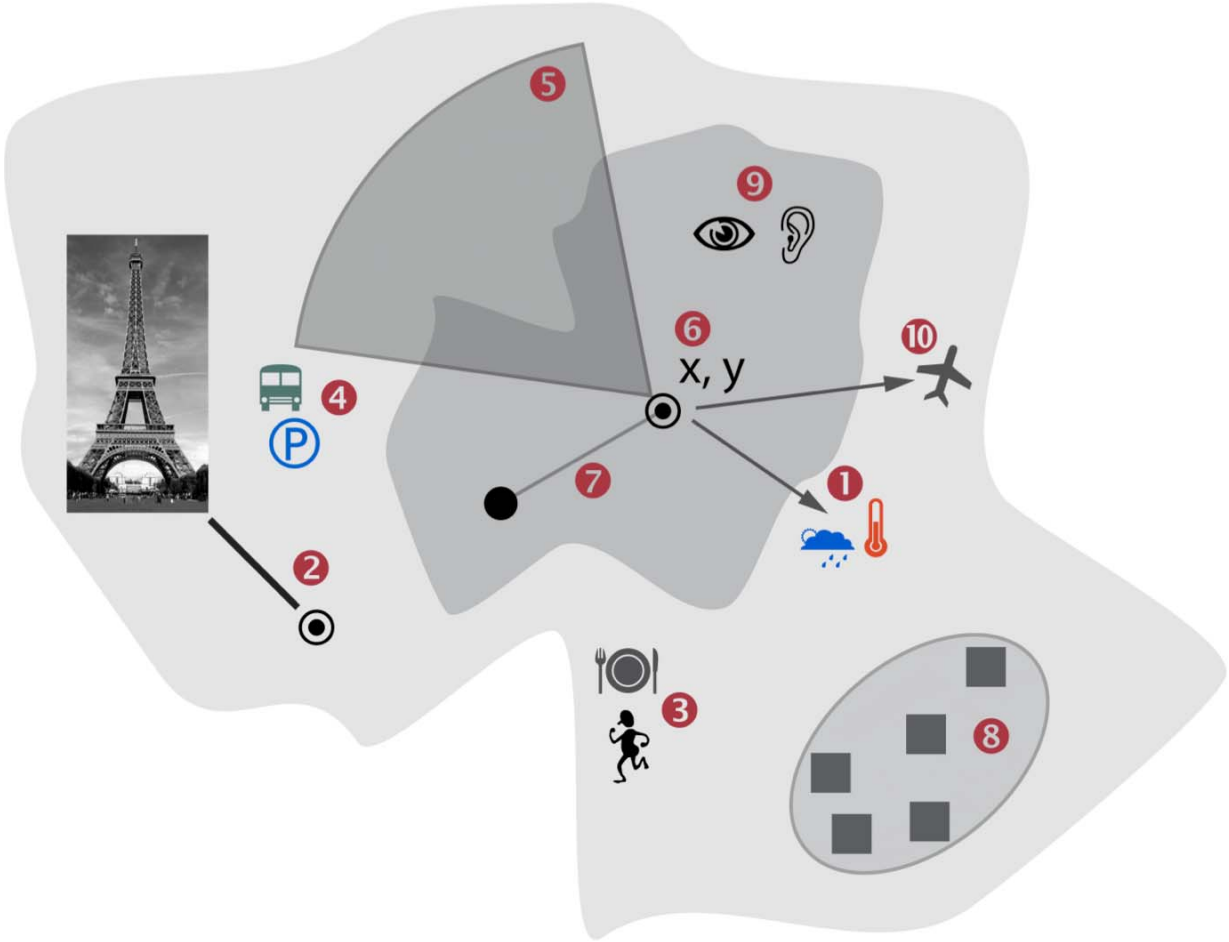


- spatial relevance: r_{spa}
  distance to position
- temporal relevance : r_{tim}
  distance to current time
- thematic relevance : r_{the}
  semantic distance; relation to category of query

- **combined total relevance r_{tot}**

⇨ may yield different results than the independent use of single relevance dimensions

Space & Place in geographic relevance



location / space:

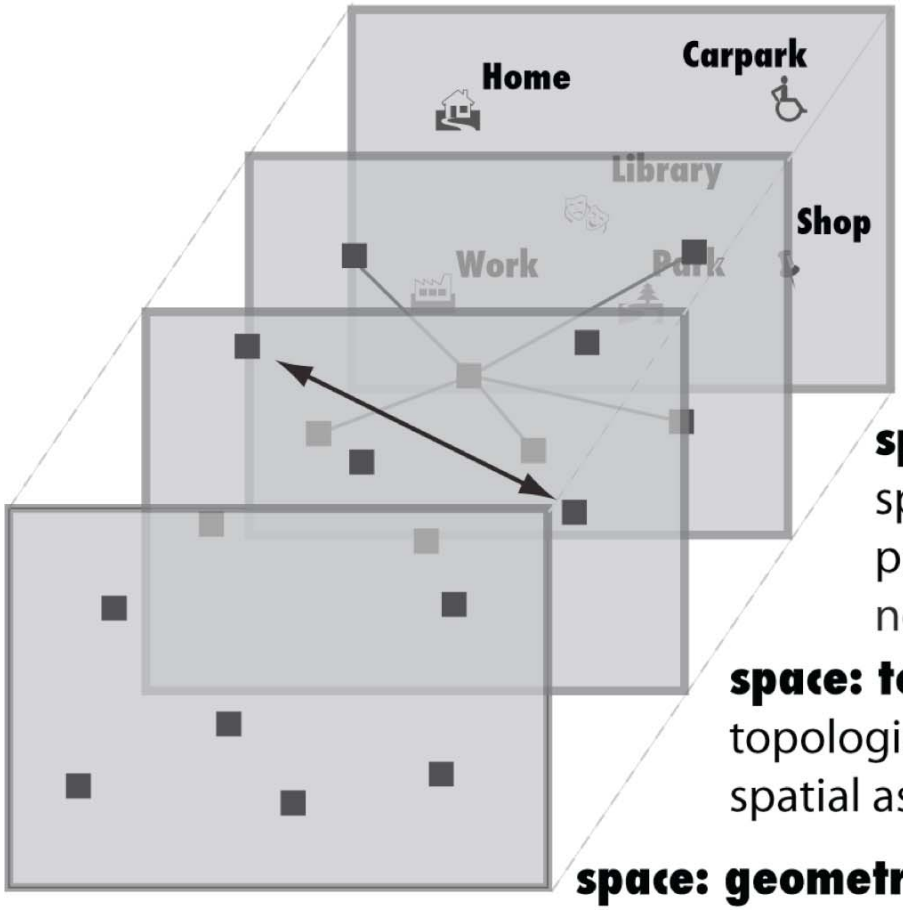
1. *location as index*
2. *location as place*
3. *location for an activity*
4. *association, neighbourhood*
5. *future locations*
6. *geometrical*
7. *topological*
8. *structural*
9. *perceptual space*
10. *semantical*

- **location as query parameter**
- **location as information attribute**

Different conceptions of space

- conceptions of space need to be addressed at different levels:
  - ***(geo)metrical*** (locations, distance, direction): this conception of space is useful in determining proximities.
  - ***topological*** (spatial relations and associations): for assessing the relevance based on accessibility connectivity in a network, i.e. a topological conception of space is more adequate.
  - ***structural*** (spatial configurations/layout, patterns): certain arrangements of objects or object densities can have an influence on their relevance
  - ***semantic*** (e.g. places, regions; functions and qualities of places): some places are more relevant than others due to a specific meaning attached to them.
  - ***perceptual*** often the part of space that can be directly perceived and experienced is more relevant than more distant locations.

Different conceptions of space



place **region** (category)

space: semantic
functions, properties/qualities, hierachies, similarity, causal relations

space: structural
spatial configuration/layout/composition; patterns; densities; district, edge, path, node, landmark

space: topological
topological relations, co-locations, spatial association, neigbourhood order

space: geometrical
location, metrics, spatial distance, direction

Links to other papers

- Edwardes: location, space, place, region
- Ehlen et al.: relevance, spatial relevance, relevance assessment
- Svee et al.: time geography, accessibility, activity patterns
- Magnusson et al.: understanding the information needs of users for tasks in different contexts; filter data and only present what is important
- Manasseh et al.: personalisation
- Böhmer et al.: filtering LBS based on context
- Doty: granularity of spatial information
- Lee et al.: perceptual space

Questions

- Thank you – questions ?