



Naviki

A Process to fuse Bicycle Tracks automatically

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Outline



- ▶ Comparison of navigation systems for cyclists
- ▶ Provision of tracks
- ▶ Automatic integration
- ▶ Quality control

Research and Development Project



**Fachhochschule
Münster** University of
Applied Sciences



Labor für
Software Engineering



Federal Ministry
of Education
and Research

Research and Development Project



- ▶ Project duration till September 2010
- ▶ Team of the Software Engineering Laboratory at the University of Applied Sciences Münster
 - Project leader: Prof. Dr. Gernot Bauer
 - Public relations: Achim Hennecke
 - Research and Development: Sven Luzar
 - Five additional team members

Public authority routing portals

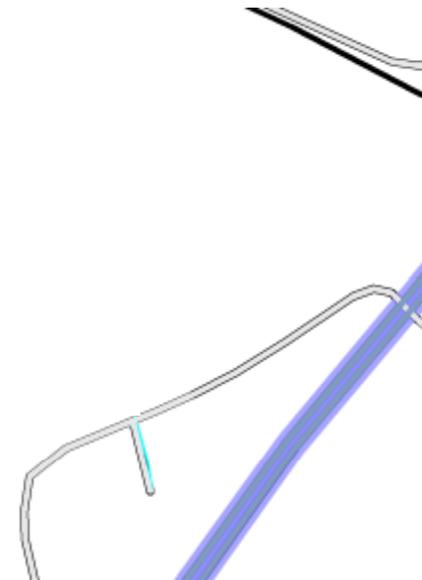
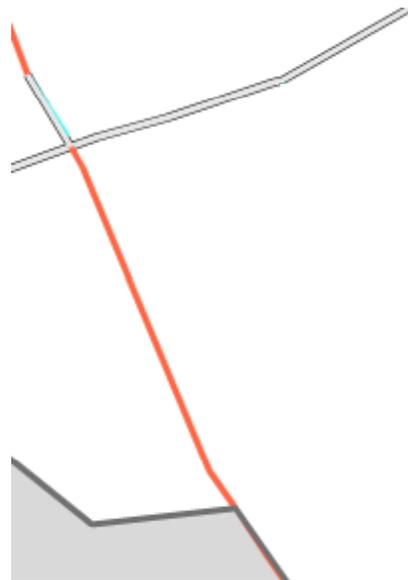


- ▶ Routing portals of public authorities
 - + Routing between each source and destination in a restricted area
 - + Reviewed, high-quality routes
 - Insufficient mesh density
 - = Bounded regions
- ▶ Track sharing networks
 - Provision of single tracks (no routing)
 - Doubtful quality and often semiprofessional
 - + High bike specific data volume
 - + Community and individual documentation

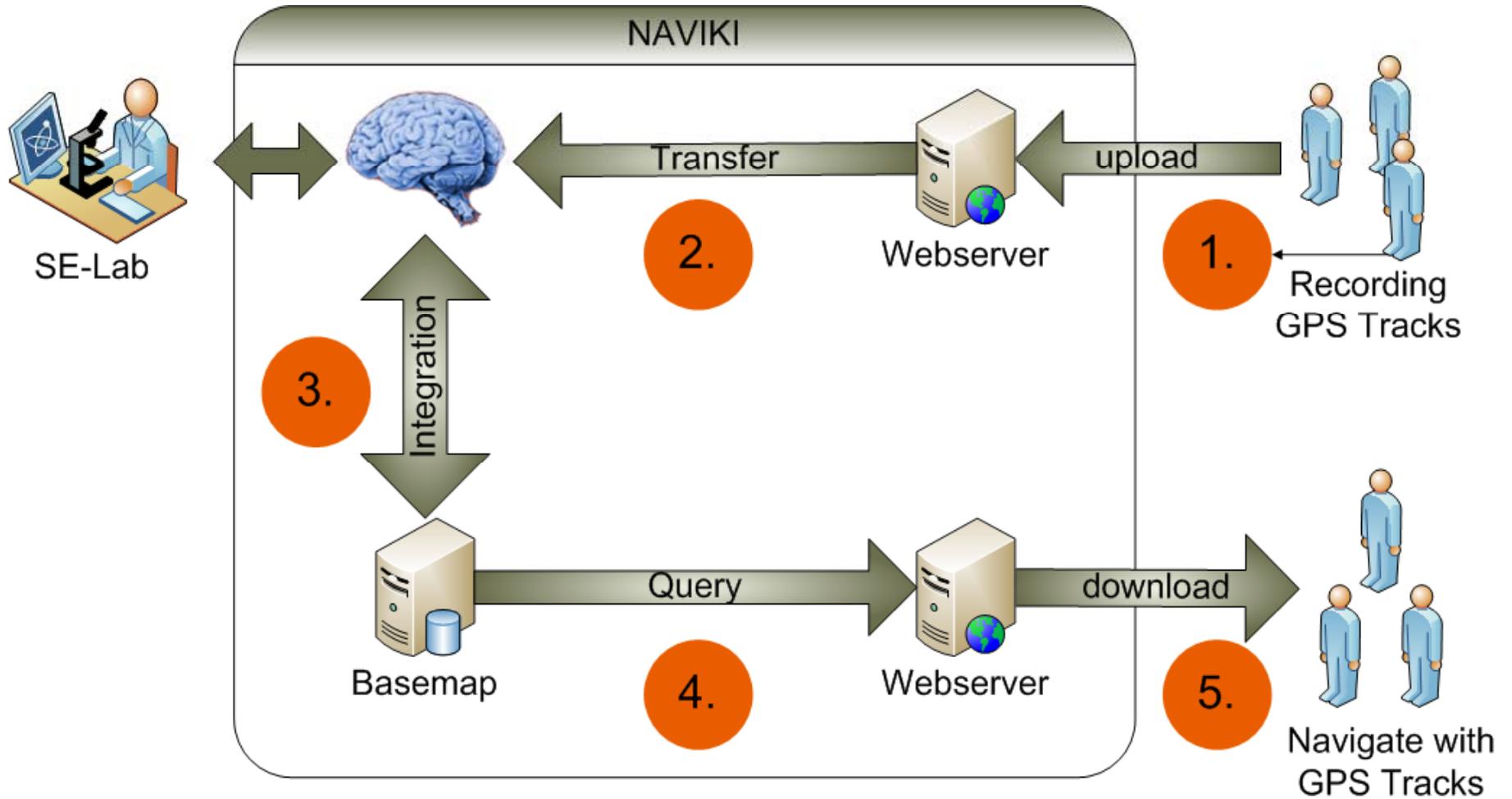
OpenStreetMap



- + High data volume
- + Community and individual documentation
- Technical usage
- Users must draw the map by hand



Steps to apply the Naviki system



Recording



Wege einfach
per Handy
aufzeichnen



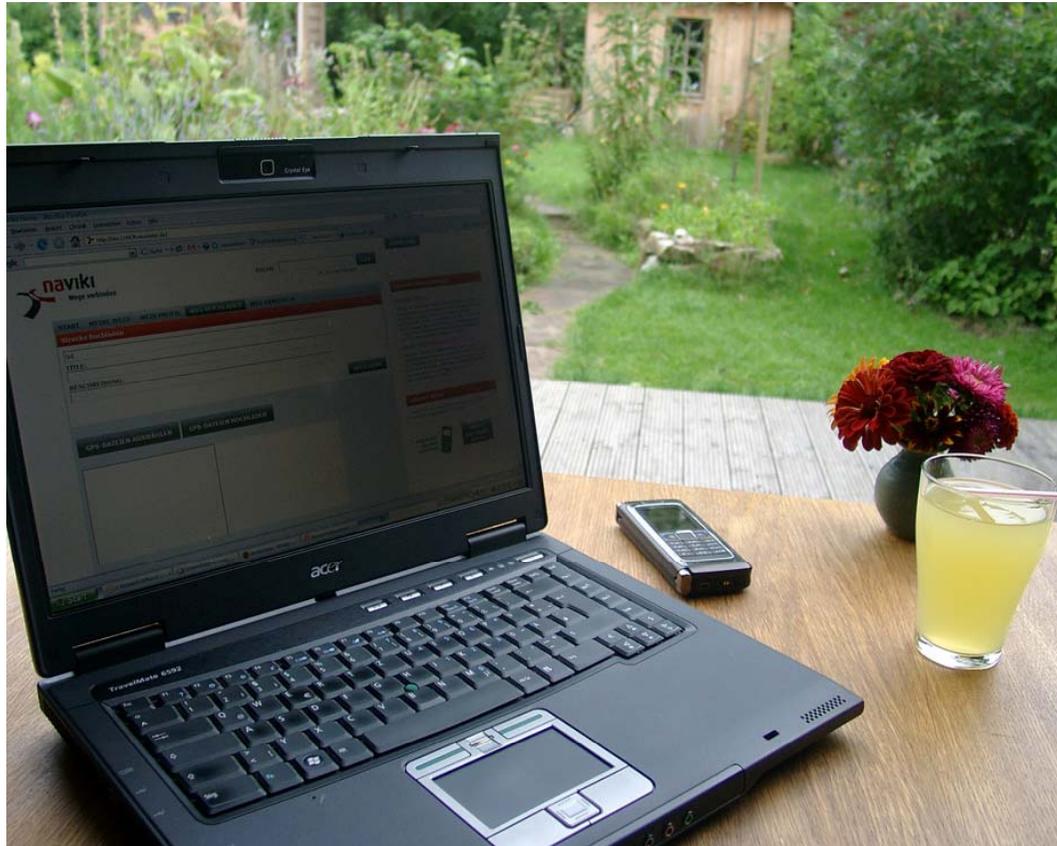
**HANDY
SOFTWARE**
kostenlos

A promotional graphic with an orange border. On the left, the text "Wege einfach per Handy aufzeichnen" is written in a dark font. In the center is a small icon of a mobile phone. On the right, a dark green rectangular box contains the text "HANDY SOFTWARE" in white, bold, uppercase letters, with "kostenlos" (free) written below it in a smaller font.

New mobiles are able to record tracks.
Naviki offers free software for recording.

www.naviki.org

Upload at Naviki



Simple transmission from a GPS-Device to the Naviki Internet portal.

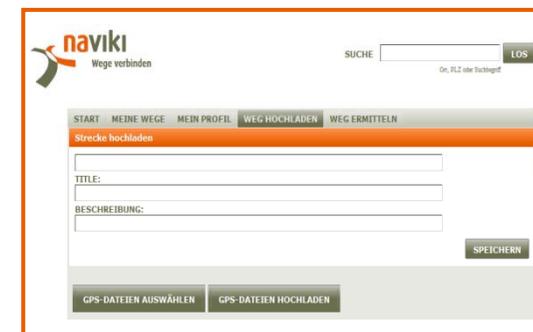
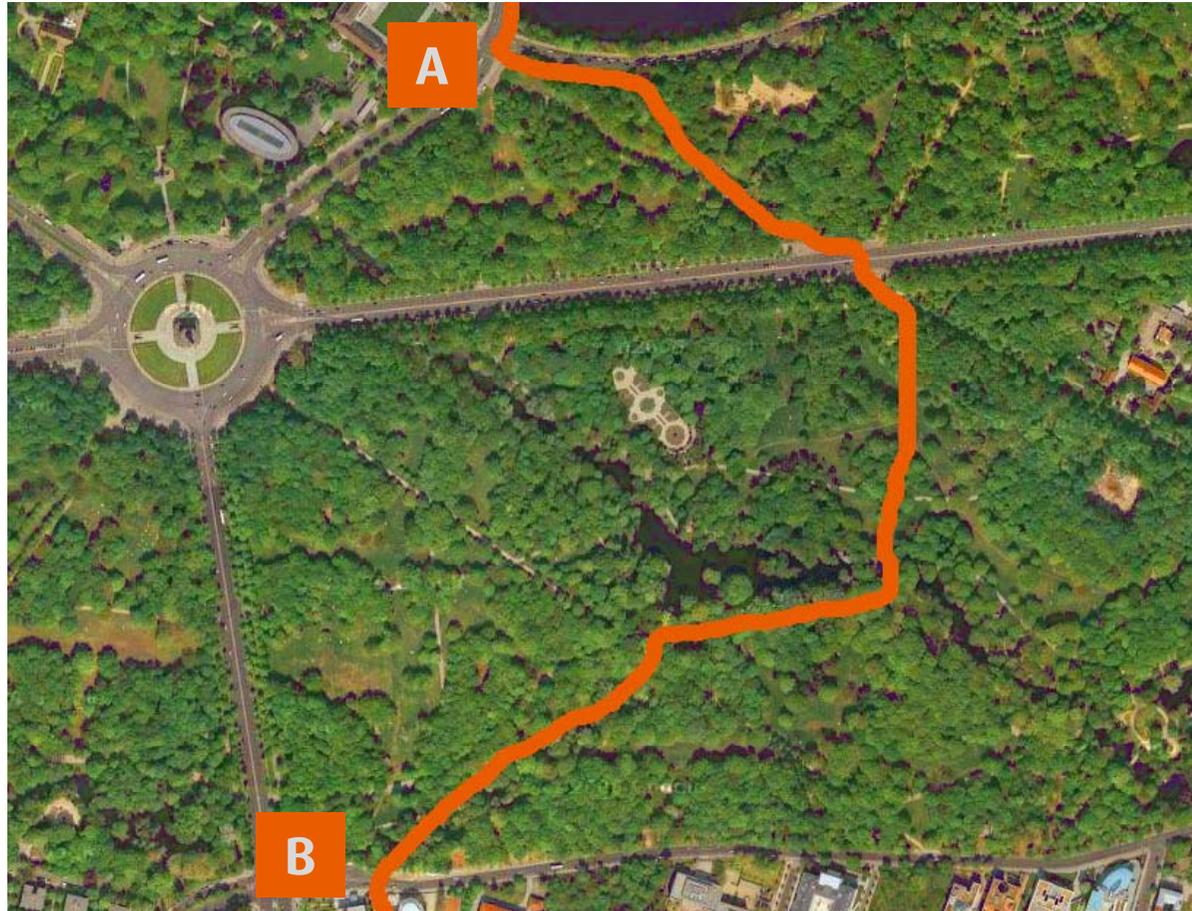
Provision of tracks



Base: Map or aerial photograph

A screenshot of the naviki web interface. At the top left is the naviki logo and the text "Wege verbinden". To the right is a search bar with the text "SUCHE" and a "LOS" button. Below the search bar is a navigation menu with "START", "MEINE WEGE", "MEIN PROFIL", "WEG HOCHLADEN", and "WEG ERMITTELN". The "WEG HOCHLADEN" option is highlighted. Below the menu is a form titled "Strecke hochladen" with fields for "TITLE:" and "BESCHREIBUNG:". There is a "SPEICHERN" button to the right of the description field. At the bottom of the form are two buttons: "GPS-DATEIEN AUSWÄHLEN" and "GPS-DATEIEN HOCHLADEN".

Provision of tracks



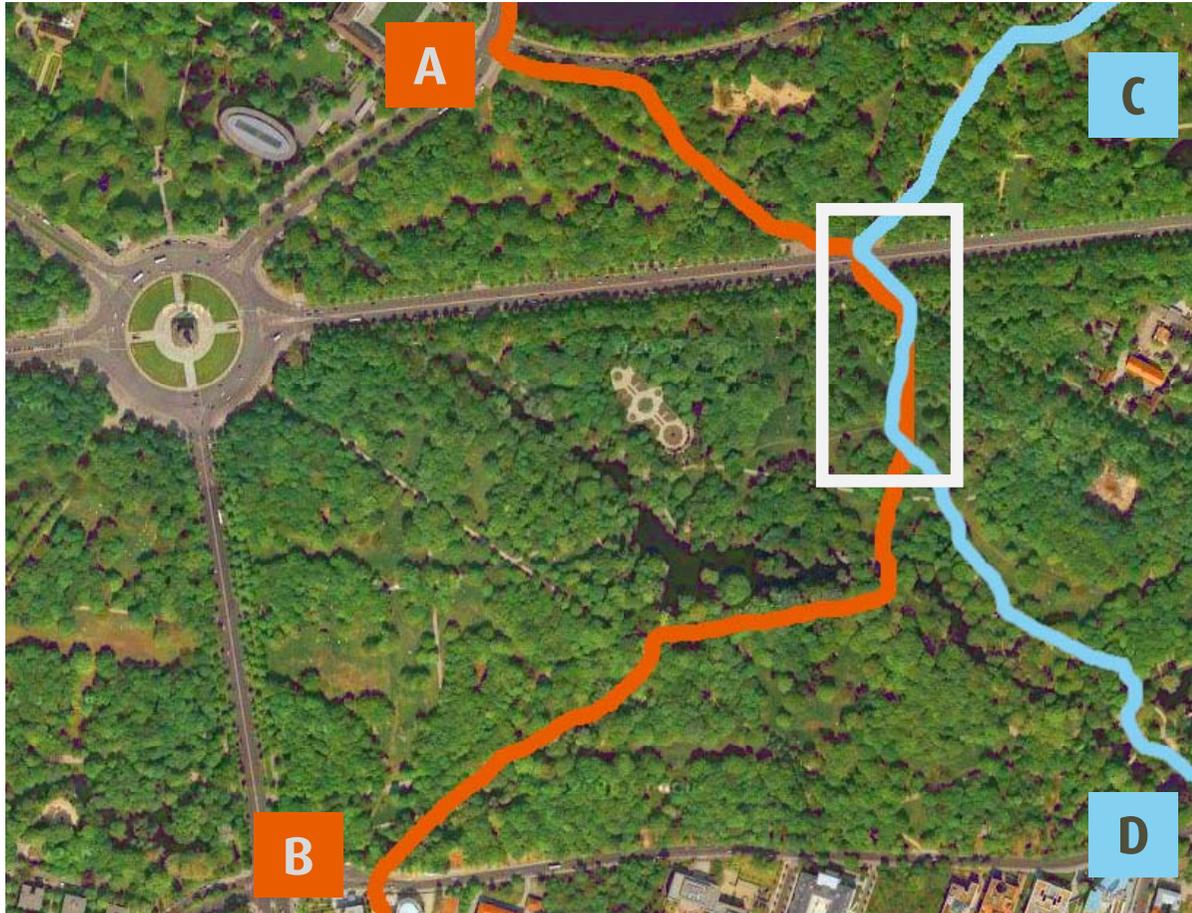
Integration of tracks by uploading the tracks to the Naviki internet portal.

Provision of tracks



Users successively add ways.

Automatic integration



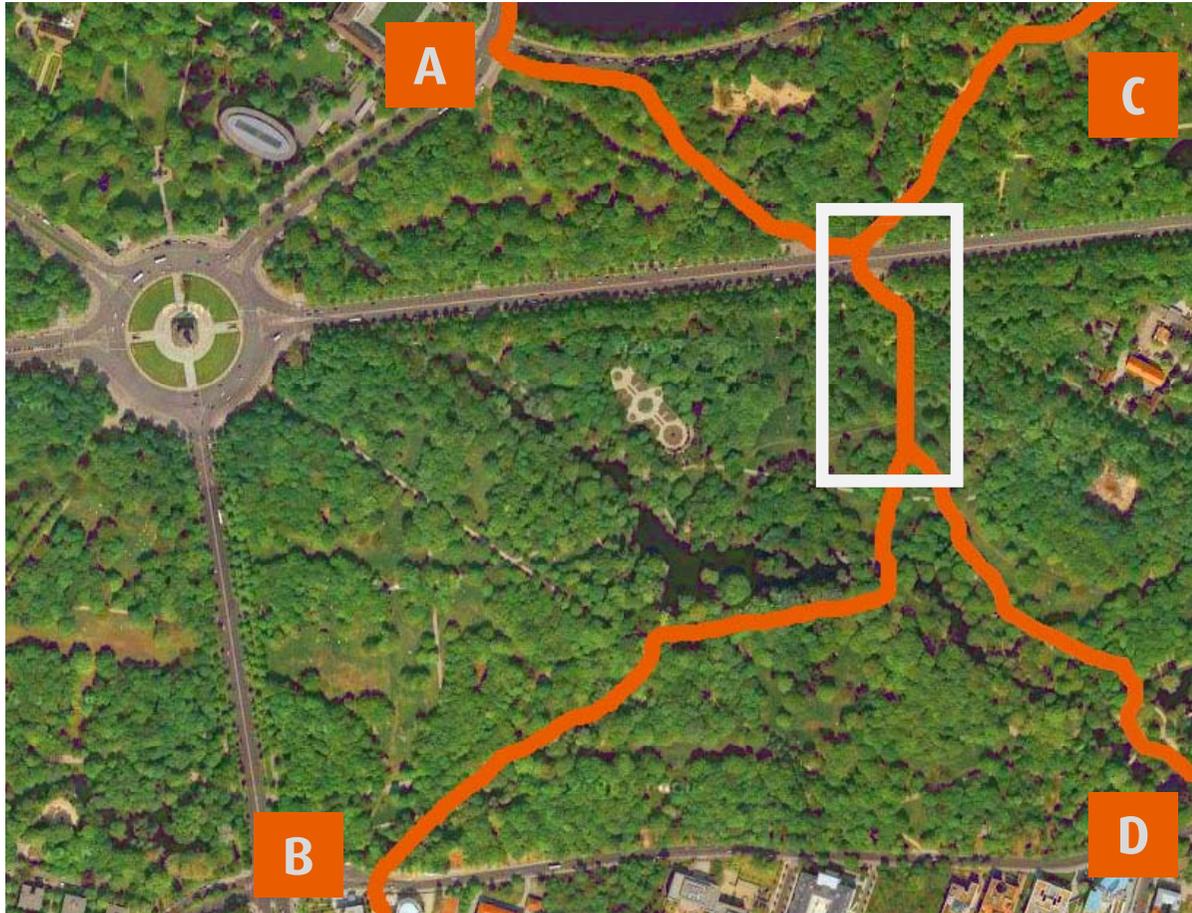
Automatic adjustment between nearly equal track sections.

Automatic integration



Naviki identifies routing nodes and integrates different paths into a mesh.

Automatic integration



Naviki assembles nearly equal track sections into one single segment.

Automatic integration



A huge integrated mesh emerges.

Increasing mesh



The integrated mesh increases through user generated content.

Increasing mesh



The integrated mesh increases through user generated content.

Increasing mesh



The integrated mesh increases through user generated content.

Increasing mesh



The integrated mesh increases through user generated content.

Increasing mesh



The integrated mesh increases through user generated content.

Increasing mesh



The integrated mesh increases through user generated content.

Increasing mesh



The integrated mesh increases through user generated content.

Quality control



- ▶ Automatic quality improvement through integration

Improvement in quality



On routing requests Naviki prefers frequently uploaded track segments.

- ▶ Automatic quality improvement through integration
- ▶ Social control mechanisms
 - Valuation method for users and tracks 
 - Comments
 - Alerts and disqualification for unsuitable track sections
- ▶ Additionally: Classification through public authorities
 - Assignment of attributes

Naviki mapbase



- ▶ Mapbase: currently Google Maps and OSM
 - Wide distribution
 - No regional boundaries
 - Familiar usage
 - Fast
 - Adapted for the specific requirements of Naviki
- ▶ Mapbase is exchangeable
 - Maps from public authorities



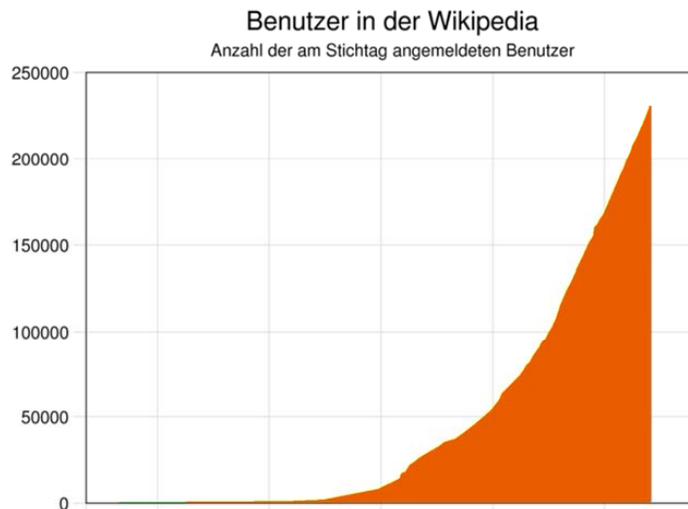


Benefits for users



- ▶ Attractive, simple and fast usage
- ▶ Free decision whether to use the public mesh only or also the user generated network
- ▶ Individual preferences during search requests (Attributes for the segments and environments)
- ▶ Additional individual statistics
- ▶ Networking between users
- ▶ Supraregional uniform information desk
- ▶ Free of charge

- ▶ Disposition to articulate oneself on the Internet
Example: Success story of Wikipedia since 2003



- Volume
- Actuality
- Reliability

- ▶ Worthwhile engagement for bicycle traffic
- ▶ Pleasure

Roadmap



- ▶ Today (September/October 2008)
 - Some functions visible
 - No public access

- ▶ Spring 2009
 - Expanded scope of operations
 - Public start up
 - Growing data volume

- ▶ Till summer 2010
 - Complete scope of operations
 - Widespread and accepted by users



www.naviki.org