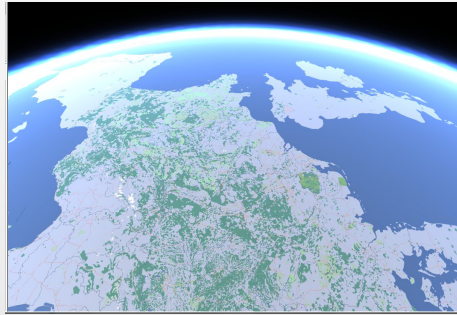


Creating a worldwide 3D globe from user-generated data



<http://giscience.uni-hd.de>



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Marcus GÖTZ, Alexander ZIPE

Chair of GISCience
Department of Geography
University of Heidelberg

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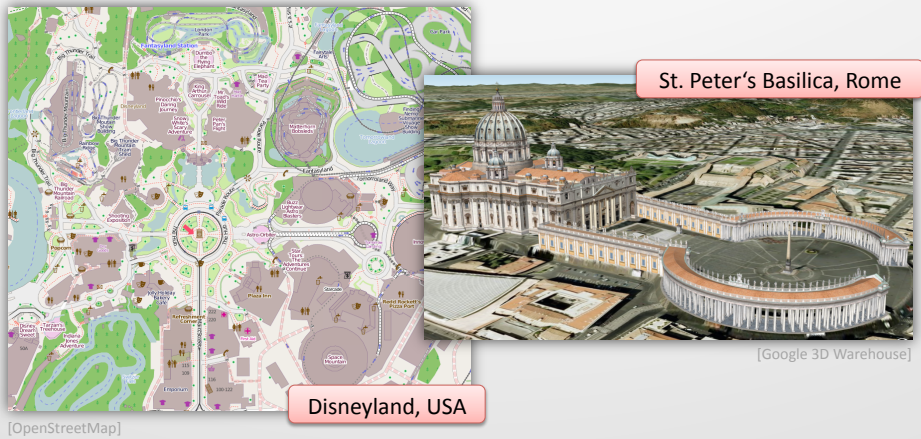
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Compiling 3D Cities – a new approach

- How about... Crowdsourcing 3D City Models...?
 - Motivated voluntary mappers have shown their potential to do it!



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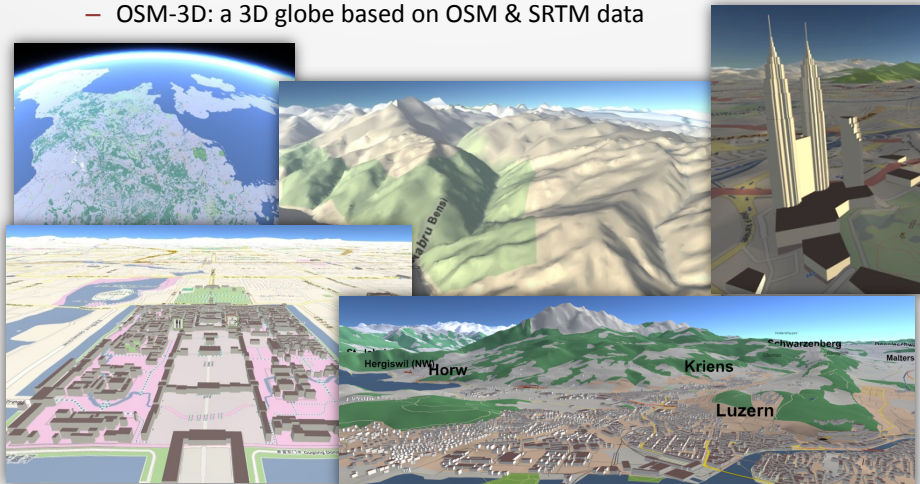
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OSM-3D

- Only few „bottom-up“ approaches based on VGI so far
 - OSM-3D: a 3D globe based on OSM & SRTM data



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http://osm-3d.org

osm-3D

Permalink
GetFullInfo
GetAddress

GDI3D GIScience

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Get Directions

From:

To:

Add Waypoint Remove Waypoint Clear

Get Directions

Settings

Layers

Terrain

- Mapnik
- Osmarender
- Mapquest
- Aerial Images
- Buildings
- Street Names
- Populated Places
- Nature Labels
- Accommodation
- Eating
- Education
- Enjoyment
- Health
- Money
- Post
- Public Facilities
- Public Transport
- Shops
- Traffic

OSM-3D Project Homepage
Information, Screenshots, Videos
There is also a downloadable version of the globe.

Default Controls:

- Left mouse button: pick location and pan around
- Right mouse button or wheel: zoom in and out, rotate around picked location
- Both mouse buttons or center button: tilt or current position and look around
- Alt key: slower navigation
- Plus key: faster navigation

Note for Mac OS X Users: hold alt key to emulate right mouse button. Press and hold mouse button to open the popup menu.

W3DS Server status: ■

Created by Anne Schilling
2011 University of Heidelberg,
Department of Geography, GIScience

Some of the data used here is derived from OpenStreetMap, is under the Creative Commons Attribution-Share Alike 2.0 License. The 3D height data was provided by SRTM30 PLUS, a product of the NASA, JPL, Caltech and U.S. Dept. of Agriculture, Farm Service Agency. The Navigator client software is open source and has been published under GPL 2. It is hosted on SourceForge. Server software is maintained by GIScience, Department of Geography, University of Heidelberg. If you want to customize and embed the client app into your own page, please get in contact with us and provide a backup to osm3d@uni-heidelberg.de

OSM-3D: Tokyo, Dubai...

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3D-VGI

Prerequisites

- Prerequisites for 3D-VGI are better than ever
 - low-cost hardware, service-based photogrammetry



[© Microsoft]



[© Autodesk / genbeta.com]

- Increasing awareness & interest in 3D in our society
 - Collaborative capturing of 3D geo-information becomes possible



[plasticjungle.com]



[areamobile.de]

Québec City, 17/05/2012



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3D-VGI

Current Issues

1. No 3D support in (OSM's) simple data model
 - Complex 3D modelling is difficult
2. No mature and wide-spread 3D viewer
 - Crucial for people's motivation to do 3D mapping
3. Not enough tools for users to contribute various 3D information in different LoDs
 - Users must be supported/enabled to *directly* map 3D content



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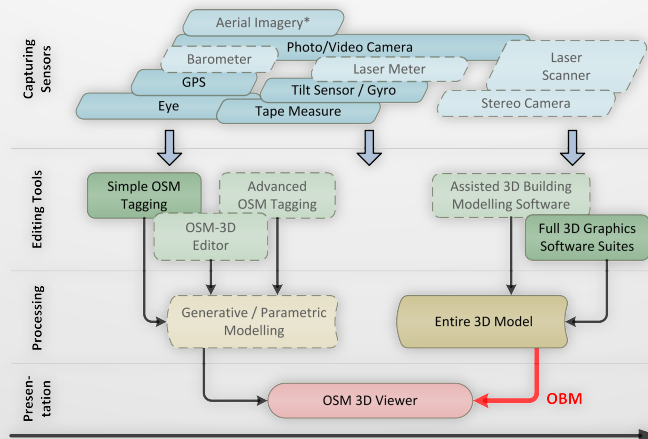
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3D-VGI

Future Directions

- Broad range of capturing/editing/visualisation tools
- Research about appropriate data structures & workflows



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DETAIL /
EFFORT

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Building Generation

Several OSM keys contain relevant information for the building

- **Direct height:** *height, building:height*
- **Indirect height:** *levels, building:levels, building:levels:aboveground*
- **Elevation:** *building:min_level, building:min_height*
- **Roof Shape:** *building:roof:shape, building:roof:style, building:roof:type*
- **Roof Colour:** *building:roof:colour, building:roof:material*
- **Facade Colour:** *building:colour, building:facade:colour, building:cladding*
- **Additional Roof Attributes:**
 - *building:roof:extent*
 - *building:roof:orientation*



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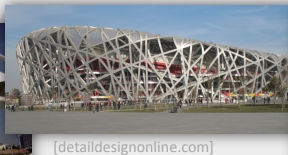
OpenBuildingModels.uni-hd.de

Vision

- What?
 - Free-to-use repository for 3D architectural building models
 - Link models to OSM or use them for other applications

- Why?

a) Not each and every building is taggable...



b) It is feasible! There exists already a huge 3D community

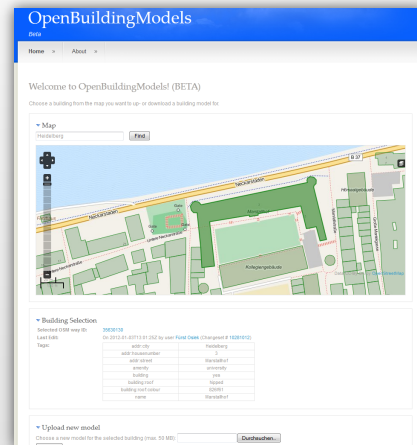
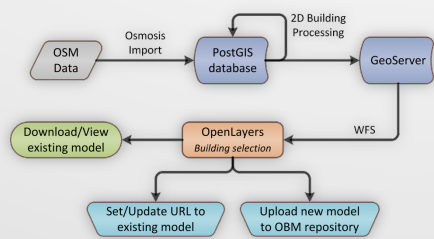
→ cf. *Google 3D Warehouse, OpenSceneryX.com, Archive3D.net, Free3DModels.org, Shapeways.com*



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Prototype

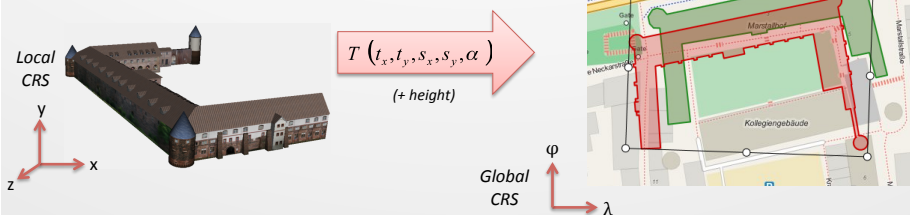
- Current state: prototypical web-platform
 - Process building outlines from OSM ways
 - Provide them as a WFS (GeoServer)
 - User can select building
 - Upload 3D model to repository



OpenBuildingModels.uni-hd.de

Challenges

- Geo-referencing
 - Match with existing OSM groundplan



- Plus...
 - Interoperability of different 3D data formats
 - Collaborative editing of architectural 3D models
 - Multiple LoDs, quality
 - Performance
 - ...



OpenBuildingModels.uni-hd.de

Benefit

- Integration into OSM-3D
 - great leap forward towards collaborative 3D city models
 - Significant improvement of LoD
 - „Non-taggable“ buildings are particularly important (landmarks)
 - Beneficial for many applications



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Conclusion

- Recent VGI projects have shown their potential
- New: 3D-VGI, “citizens as **3D**-sensors”
- Main requirements:
 - Suitable data structures for crowdsourced 3D-modelling
 - Broad range of capturing and editing tools, viewers
- OpenBuildingModels is one effort to advance this field
- It is primarily intended for users with 3D modelling skills
- Collaboratively created 3D city models can be greatly enhanced with such a repository of architectural 3D models

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Future Work

- Continue work on OpenBuildingModels platform
- Repository for 3D models of other, prototypical objects
 - e.g. trees, technical facilities, street furniture...
- Further research challenges in "Crowdsourcing 3D virtual cities"
 - Facade modelling, Roof modelling
 - Research on suitable capturing methods, data structures, modelling/editing tools etc. for crowdsourced approach



Thank



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