



TECHNISCHE
UNIVERSITÄT
DRESDEN

Faculty of Environmental Sciences, Department of Geosciences, Institute for Cartography

- TileGen - An open source Software for applying cartographic Generalisation to Tile-Base Mapping

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DRESDEN
concept
Exzellenz aus
Wissenschaft
und Kultur

0. Structure of the presentation

1. Motivation

2. Facts & Terms

3. TileGen - Concept

4. TileGen - Implementations

5. Conclusion & Outlook

1. Motivation

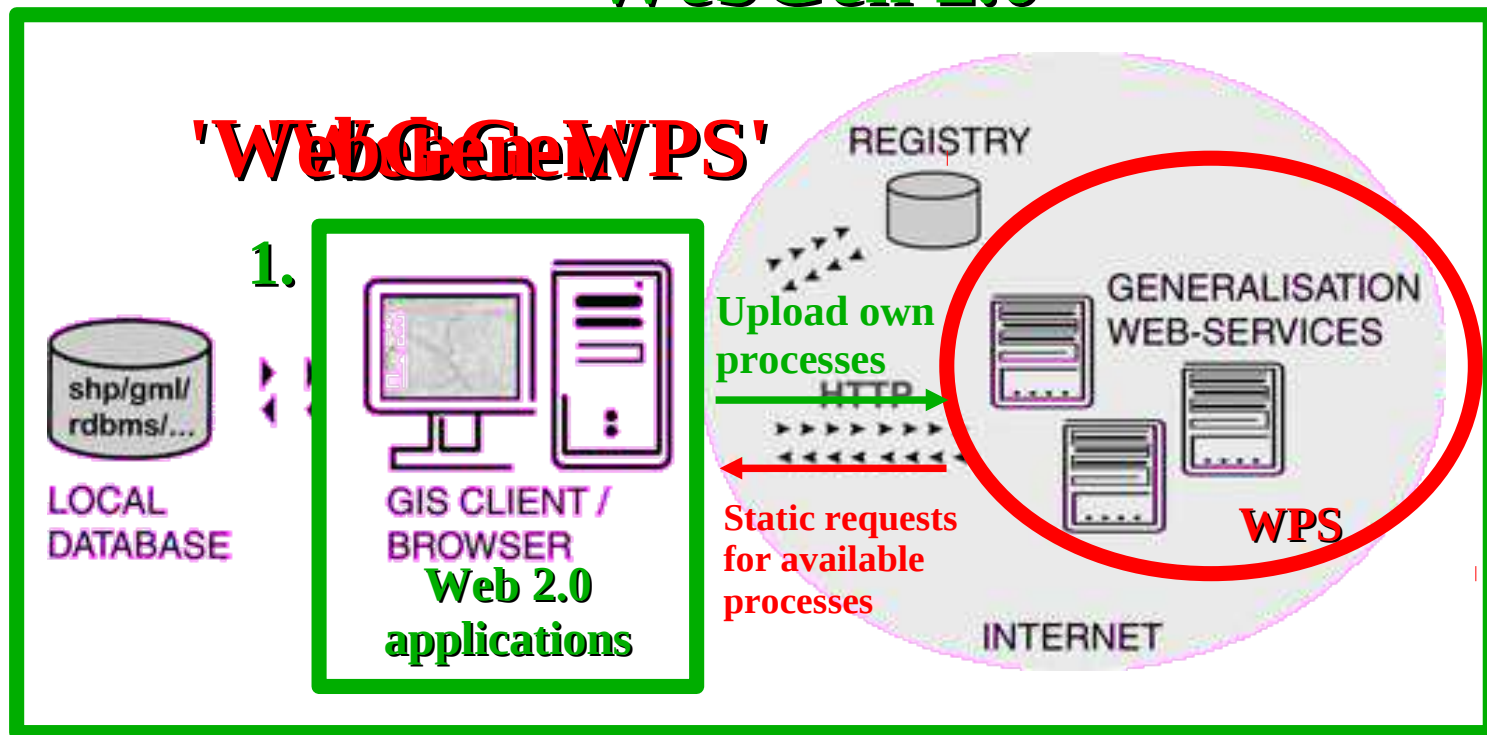


source: en.wikipedia.org/wiki/Web_2.0

1. Motivation – Web Generalisation Services

'WebGen 2.0'

2.





2. Facts & Terms

tile
tile-based mapping system
tile-based
Mapnik
tile-based mapping
tile-based map
cartographic parameter
renderer
Web 2.0
automatic rendering

What is a tile-based mapping system?

map tiles

Tile-based mapping system

Data &
cartographic
definition



Rendering &
Storing of
Tiles



Downloading &
Assembling of
Tiles



2. Multiple image tiles are used to virtualize a single map view

3. Image tiles are accessible using a discrete addressing scheme

4. Tiles are sent to client with minimal processing – as much as possible is done ahead of time

(cf. Sample & Ioup 2010)

Tasks to set up a tile-based mapping system

Klammer, R. & Burghardt, D. (2012): Approaches for enhancing tile - based mapping with cartographic generalisation. In: Proceedings 15th ICA Workshop on Generalisation and Multiple Representation, Istanbul, Turkey

manual generalization

1st: organize geospatial data

(prepare a tile-based map)

→ primary 'language': GIS (SQL, shapefile, ...)

2nd: define cartographic parameters

(prepare ...)

→ primary language: ...

3rd: initiate automatic rendering

(generate ...)

→ primary language: Python

automatic generalization

4th: build a mapping framework

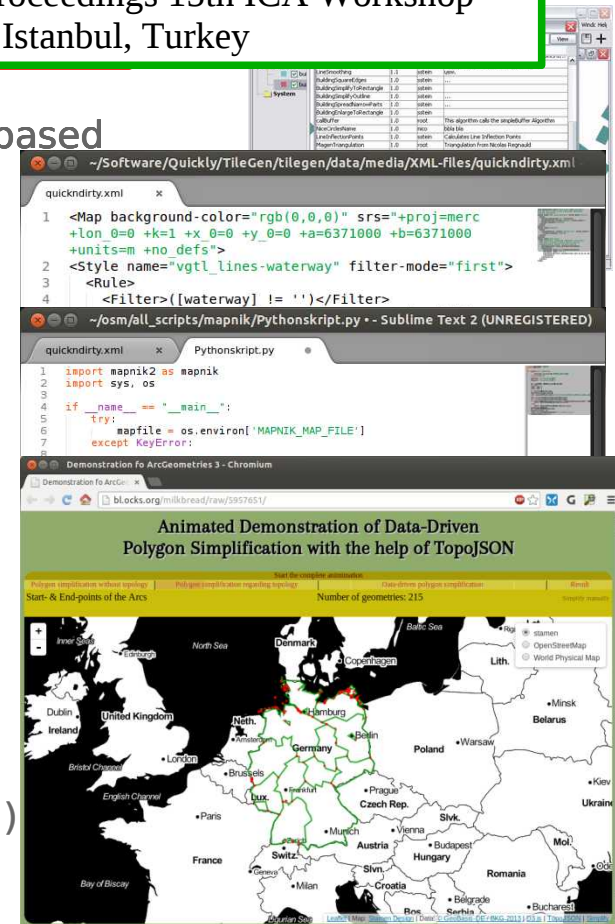
(display ...)

→ primary language: JavaScript

[5th: add mash-ups, interaction, statistics, etc. (refine ...)]

→ primary language: JavaScript

TileGen



3. TileGen – The Concept

1. Graphical User Interface, for visual:

- definition of cartographic parameters
- evaluation of (carto-) graphic quality (readability & legibility)
- semantic selection and classification (schematic transformations)

2. Automatic Topological Evaluation

3. Test and Define Spatial Transformations

4. Export WPS-Execute-Parameters for automatic processing

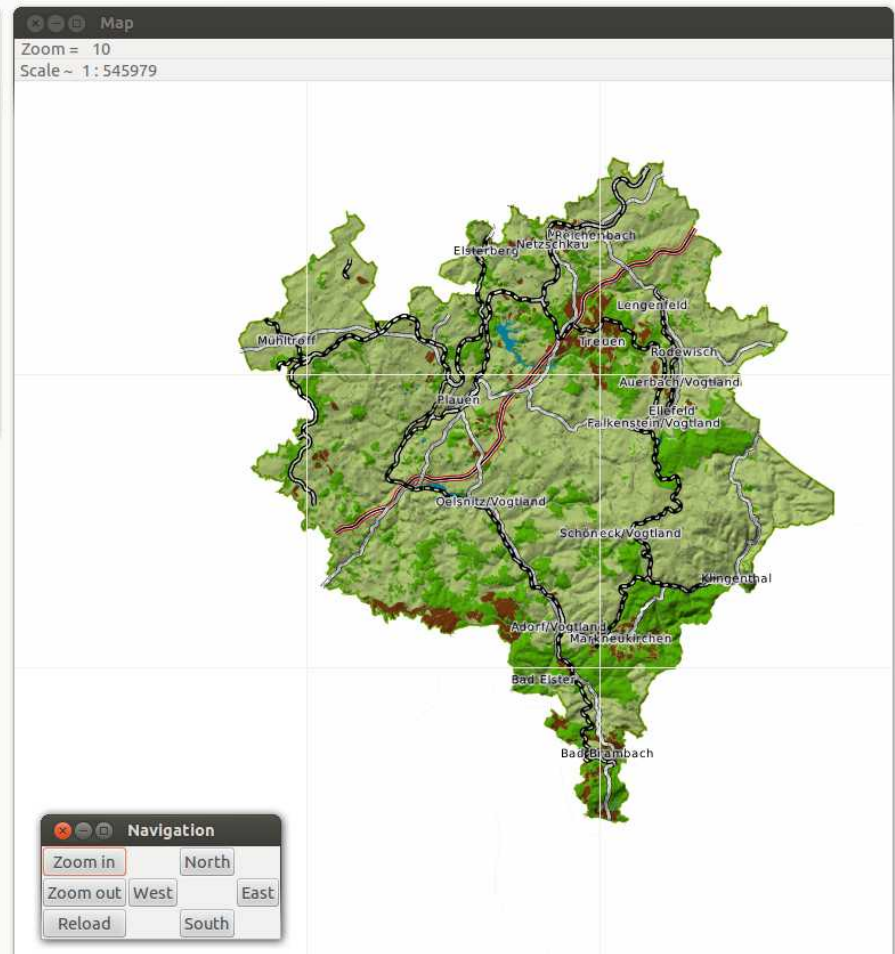
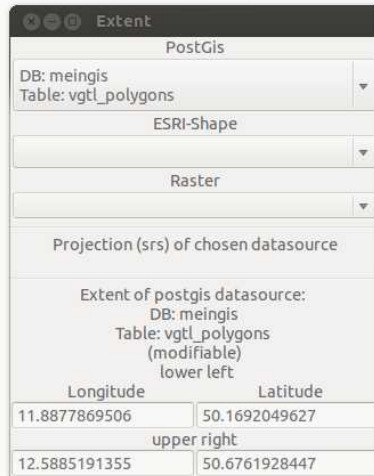
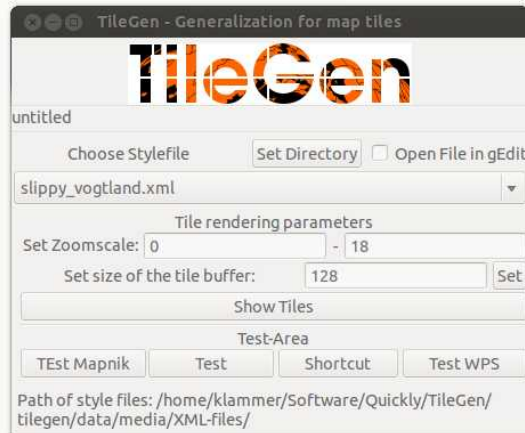
4. TileGen - Implementation



PostgreSQL



WebGen-WPS



Styling and Information retrieval

Immediate preview

evaluate topographic
constraints

Read XML-file

Define
cartographic parameters

The screenshot displays the TileGen application interface. The main window is titled 'TileGen - Generalization for map tiles'. It features a 'Choose StyleFile' dropdown menu with 'slippy_vogtland.xml' selected. Below this, there are input fields for 'Set Zoomscale' (0) and 'Set size of the tile buffer' (128). A 'Test Mapnik' button is visible. The 'Path of style files' is shown as '/home/klammer/Software/Quickly/TileGen/tilegen/data/media/XML-files/'.

A secondary window titled 'Styling' is open, showing 'Choose Geometry' with 'vgtl_polygons' selected. It includes a 'Set layer' dropdown, a 'Set style' dropdown with 'vgtl_polygons-buildings', and a 'Set rule' dropdown with '([building]='yes') 0.0 25000.0'. Below these, there are settings for 'polygonSymbolizer', 'Fill-opacity:1.0', 'Gamma:1.0', and 'Fill:rgb(223,36,36)'. A 'Show preview' button and a color picker are also present.

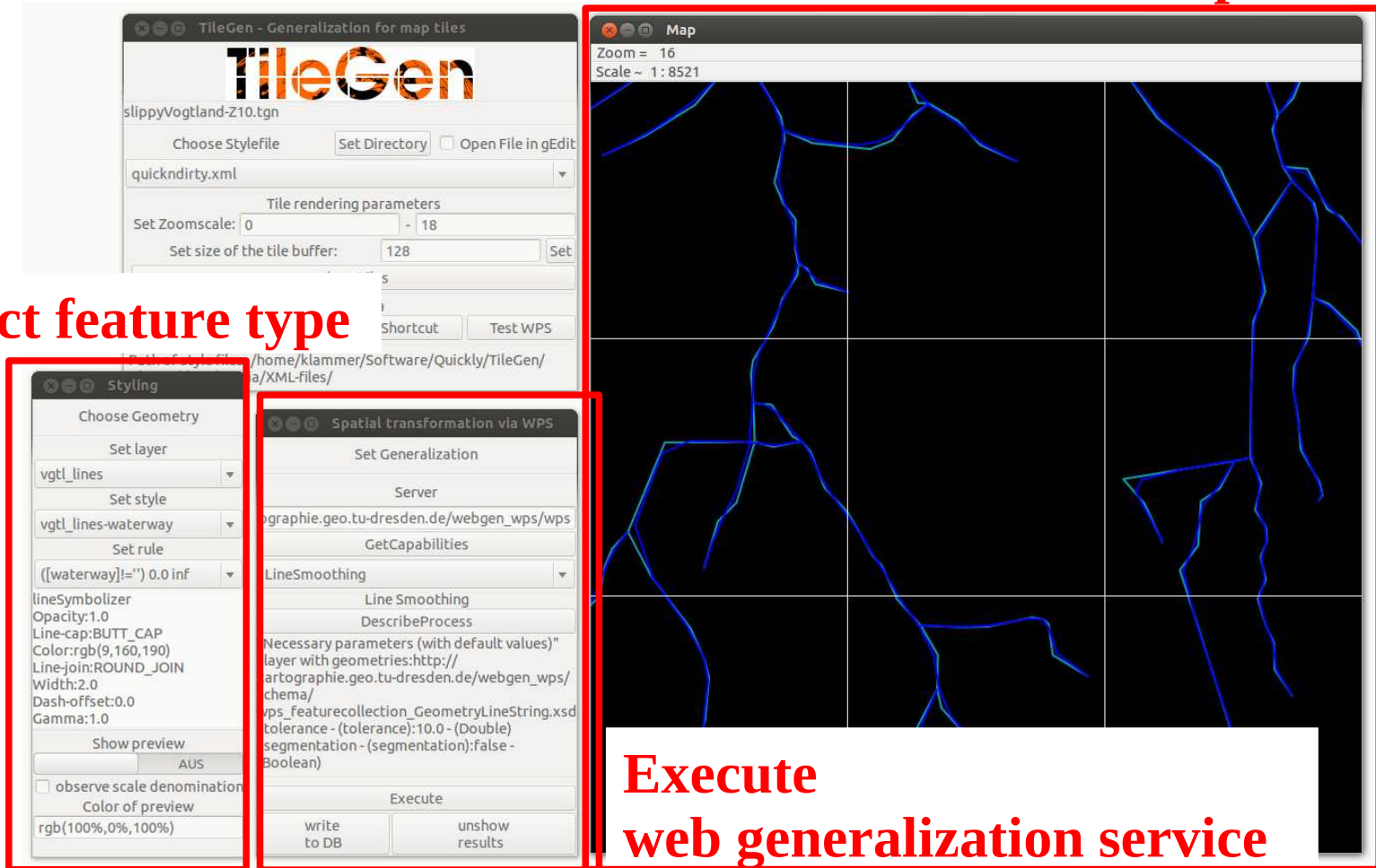
A third window titled 'Information retrieval' is open, displaying a table of geometrical information for three tiles. The table has three columns, each representing a different tile (x:2185 | y:1379, x:2186 | y:1379, and x:2187 | y:1379). Each column lists the tile's extent (a bounding box of coordinates) and the number of features and contacted features.

Tile= x:2185 y:1379	Tile= x:2186 y:1379	Tile= x:2187 y:1379
Extent: 1340399.72801, 6535671.6665 1350183.66763, 6545455.60612 12.041015625, 50.5134265263 12.12890625, 50.5692828656 Features:150 Contacted:	Extent: 1350183.66763, 6535671.6665 1359967.60725, 6545455.60612 12.12890625, 50.5134265263 12.216796875, 50.5692828656 Features:91 Contacted:	Extent: 1359967.60725, 6535671.6665 1369751.54687, 6545455.60612 12.216796875, 50.5134265263 12.3046875, 50.5692828656 Features:609 Contacted:
Tile= x:2185 y:1380	Tile= x:2186 y:1380	Tile= x:2187 y:1380
Extent: 1340399.72801, 6525887.72688 1350183.66763, 6535671.6665 12.041015625, 50.4575040204 12.12890625, 50.5134265263 Features:275 Contacted:	Extent: 1350183.66763, 6525887.72688 1359967.60725, 6535671.6665 12.12890625, 50.4575040204 12.216796875, 50.5134265263 Features:946 Contacted:	Extent: 1359967.60725, 6525887.72688 1369751.54687, 6535671.6665 12.216796875, 50.4575040204 12.3046875, 50.5134265263 Features:145 Contacted:
Tile= x:2185 y:1381	Tile= x:2186 y:1381	Tile= x:2187 y:1381
Extent: 1340399.72801, 6516103.78725 1350183.66763, 6525887.72688 12.041015625, 50.4015153228 12.12890625, 50.4575040204 Features:178 Contacted:	Extent: 1350183.66763, 6516103.78725 1359967.60725, 6525887.72688 12.12890625, 50.4015153228 12.216796875, 50.4575040204 Features:132 Contacted:	Extent: 1359967.60725, 6516103.78725 1369751.54687, 6525887.72688 12.216796875, 50.4015153228 12.3046875, 50.4575040204 Features:44 Contacted:

Spatial Transformation

Evaluate result of processing

Select feature type



The screenshot displays the TileGen application interface, which is used for generalization of map tiles. The interface is divided into several panels:

- TileGen - Generalization for map tiles:** The main window showing the title, a file path (slippyVogtland-Z10.tgn), and various settings like 'Choose Stylefile' (quickndirty.xml), 'Set Directory', 'Open File in gEdit', 'Tile rendering parameters' (Set Zoomscale: 0 to 18, Set size of the tile buffer: 128), and buttons for 'Shortcut' and 'Test WPS'.
- Styling:** A panel for selecting geometry and styling. It includes 'Choose Geometry' (Set layer: vgtl_lines, Set style: vgtl_lines-waterway, Set rule: ([waterway]!="") 0.0 inf), a 'lineSymbolizer' section with various properties (Opacity: 1.0, Line-cap: BUTT_CAP, Color: rgb(9,160,190), Line-join: ROUND_JOIN, Width: 2.0, Dash-offset: 0.0, Gamma: 1.0), a 'Show preview' button, and a 'Color of preview' section (rgb(100%,0%,100%)).
- Spatial transformation via WPS:** A panel for setting generalization. It includes 'Set Generalization' (Server: cartographie.geo.tu-dresden.de/webgen_wps/wps), 'GetCapabilities', 'LineSmoothing', 'DescribeProcess', 'Necessary parameters (with default values)' (layer with geometries: http://cartographie.geo.tu-dresden.de/webgen_wps/schema/wps_featurecollection_GeometryLineString.xsd, tolerance - (tolerance): 10.0 - (Double), segmentation - (segmentation): false - Boolean), and buttons for 'Execute', 'write to DB', and 'unshow results'.
- Map:** A panel showing the result of the processing, displaying a map with blue lines representing waterways. The map includes a zoom level (Zoom = 16) and a scale (Scale ~ 1:8521).

Execute
web generalization service

5. Conclusion

- proof-of-concept implementation
- general feasibility of concept demonstrated
- visual feedback supports definition of cartographic parameters
- WebGen-WPS applicable, but should be developed to:
 - enable Web2.0 communication structure
 - good to have also evaluation processes



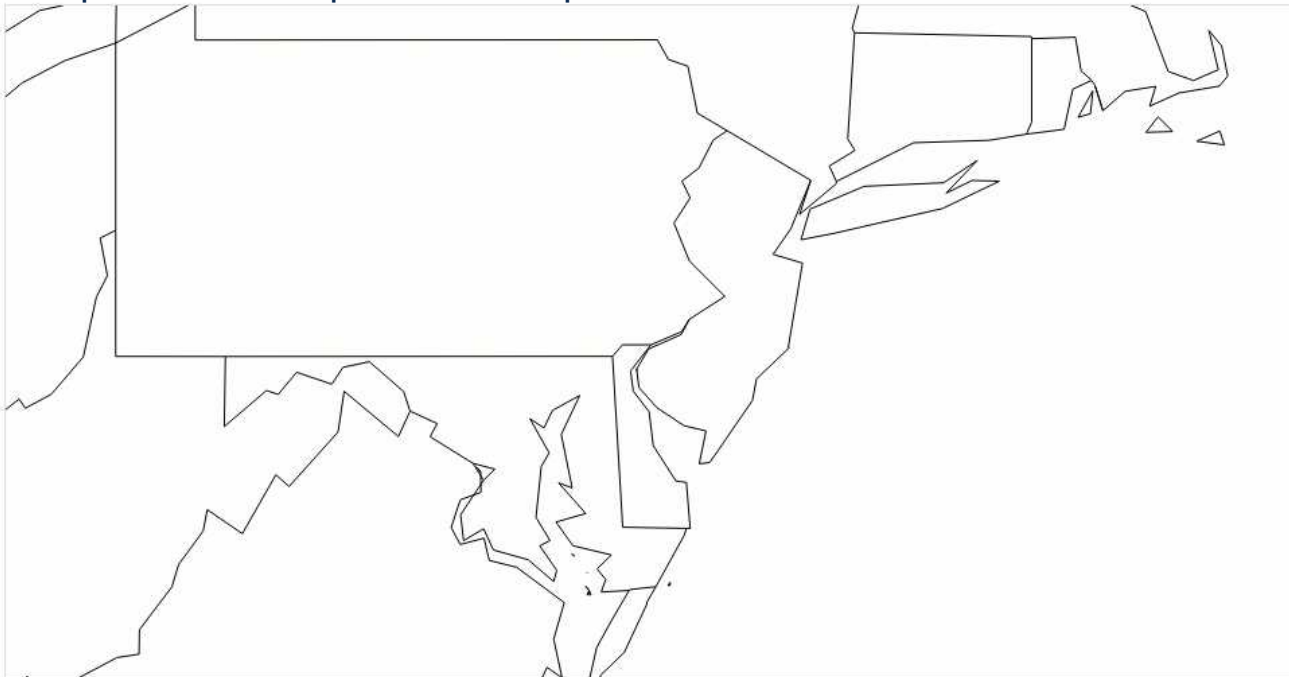
5. Outlook

- implement export & automatic processing
- outsource topologic evaluation to WebGen
- implement as online-tool
- further experiments on client-applications

Other Web2.0 Applications???

JavaScript-frameworks build with
D3.js, Leaflet.js & TopoJSON

For example...scale dependent simplification



Resources & Contact

About TileGen:

<https://github.com/milkbread/TileGen>

About WebGen:

http://kartographie.geo.tu-dresden.de/webgen_docs/

About me:

Ralf.Klammer@tu-dresden.de

<http://wwwpub.zih.tu-dresden.de/~rklammer>

Thank you for your attention!
Questions!?!

*“Whether for good or bad,
online mapping is currently
in a tile-based era and will
likely be so for the
foreseeable future”*

Michael P. Peterson (2012)

The Tile-Based Mapping Transition in Cartography.
In: L. Zentai, J. R. Nunez (eds.): *Maps for the Future,
Children, Education and Internet*. Lecture Notes in
Geoinformation and Cartography, 5:151-163.