Hierarchical GML Modeling of Transportation Networks

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OUTLINE

- Project OneMap
- Network Generalization
- Proposed Methods
- GML Road Modeling
- Tiger Line Data
- Examples
- Demo
- Remarks

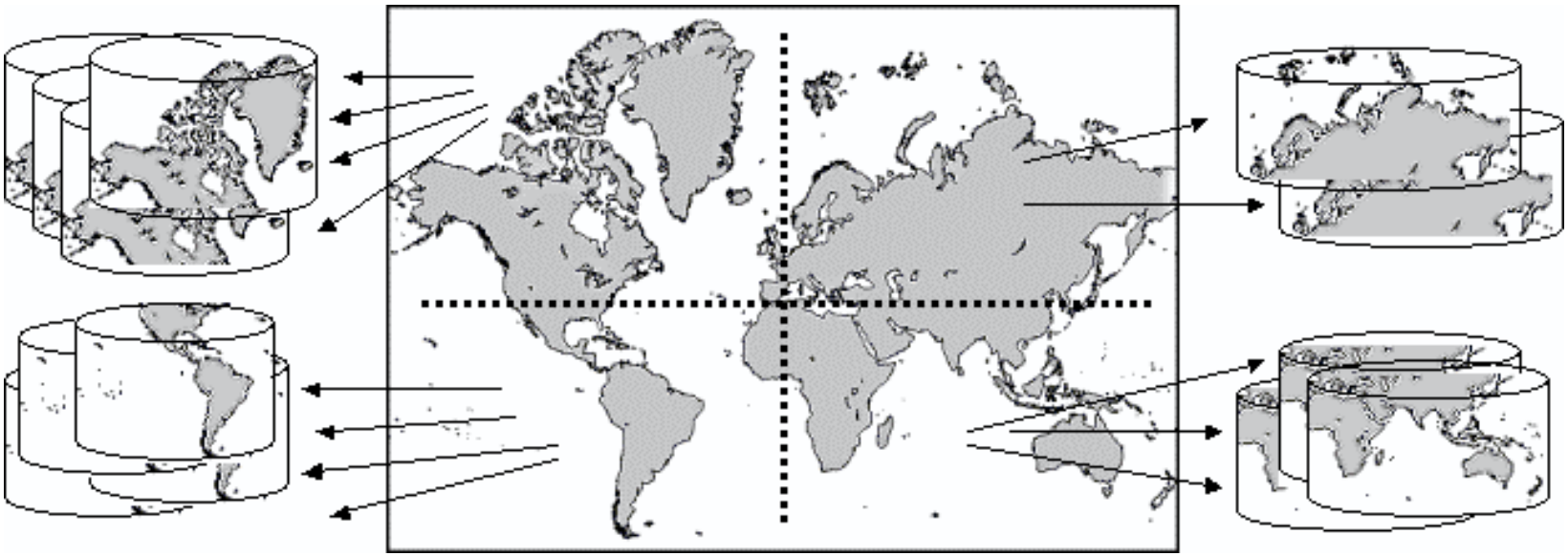
Project OneMap

- Open/free source
- Open/free content
- Open managment
- Open standards/formats

- Is currently in a beta stage
- Will enter ”production” phase in 2004 (?)

OneMap Repository

Simplistic and sustainable storage infrastructure



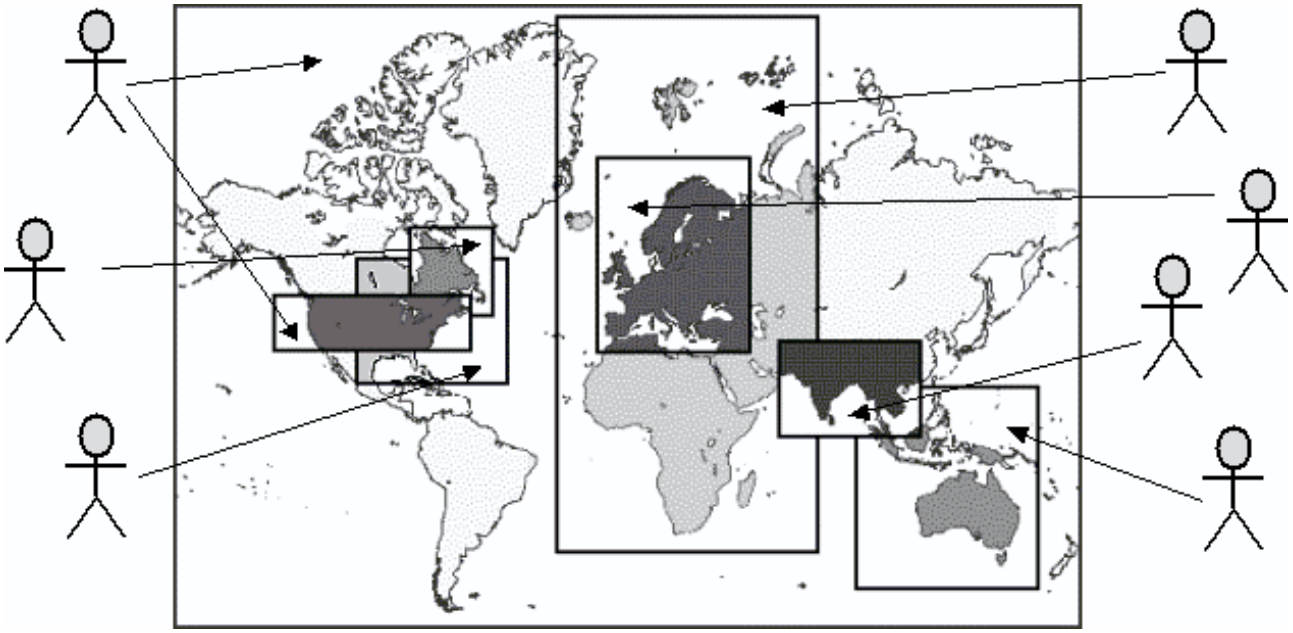
Redundant and distributed storage

Adapative quad tree tesselation

Multiple levels of detail

Incremental Map Construction

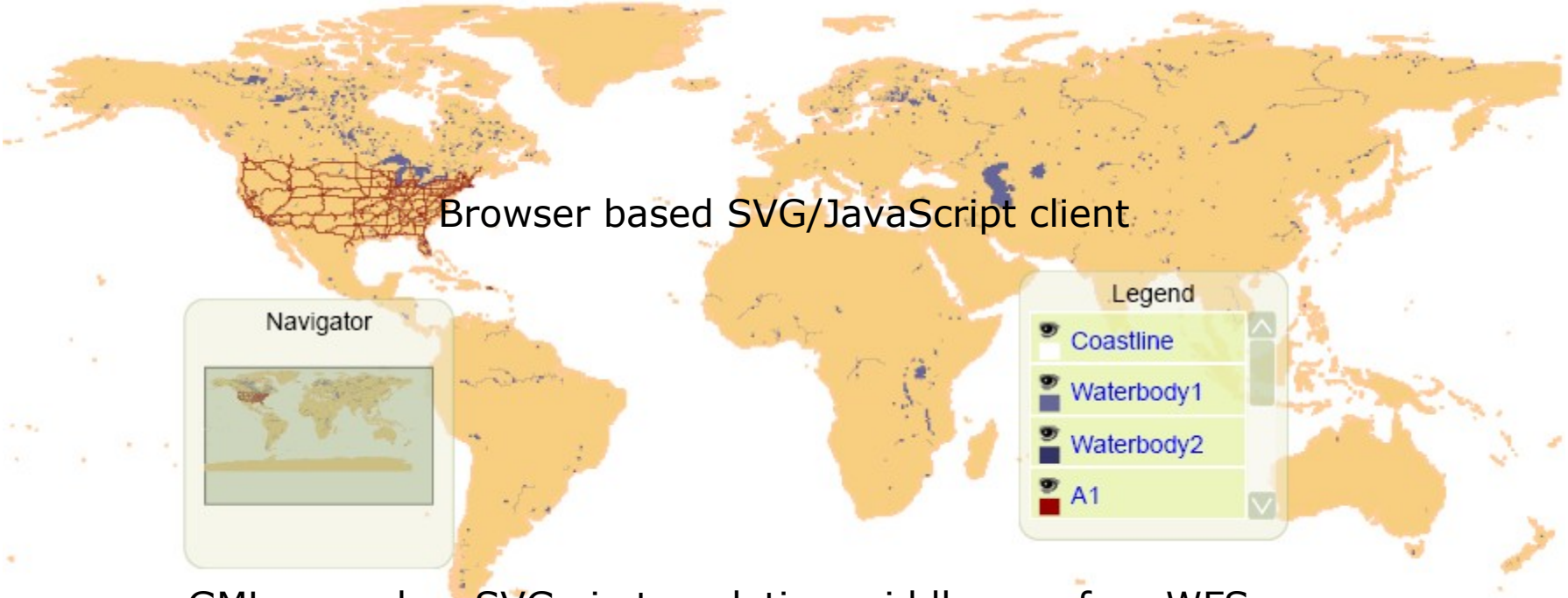
Submissions will be harmonized and accepted/rejected in peer review processes.



The Feature Catalog will be dynamically constructed and maintained...also by peer review processes.

OneMap Gateway

Free access to free geodata



Browser based SVG/JavaScript client

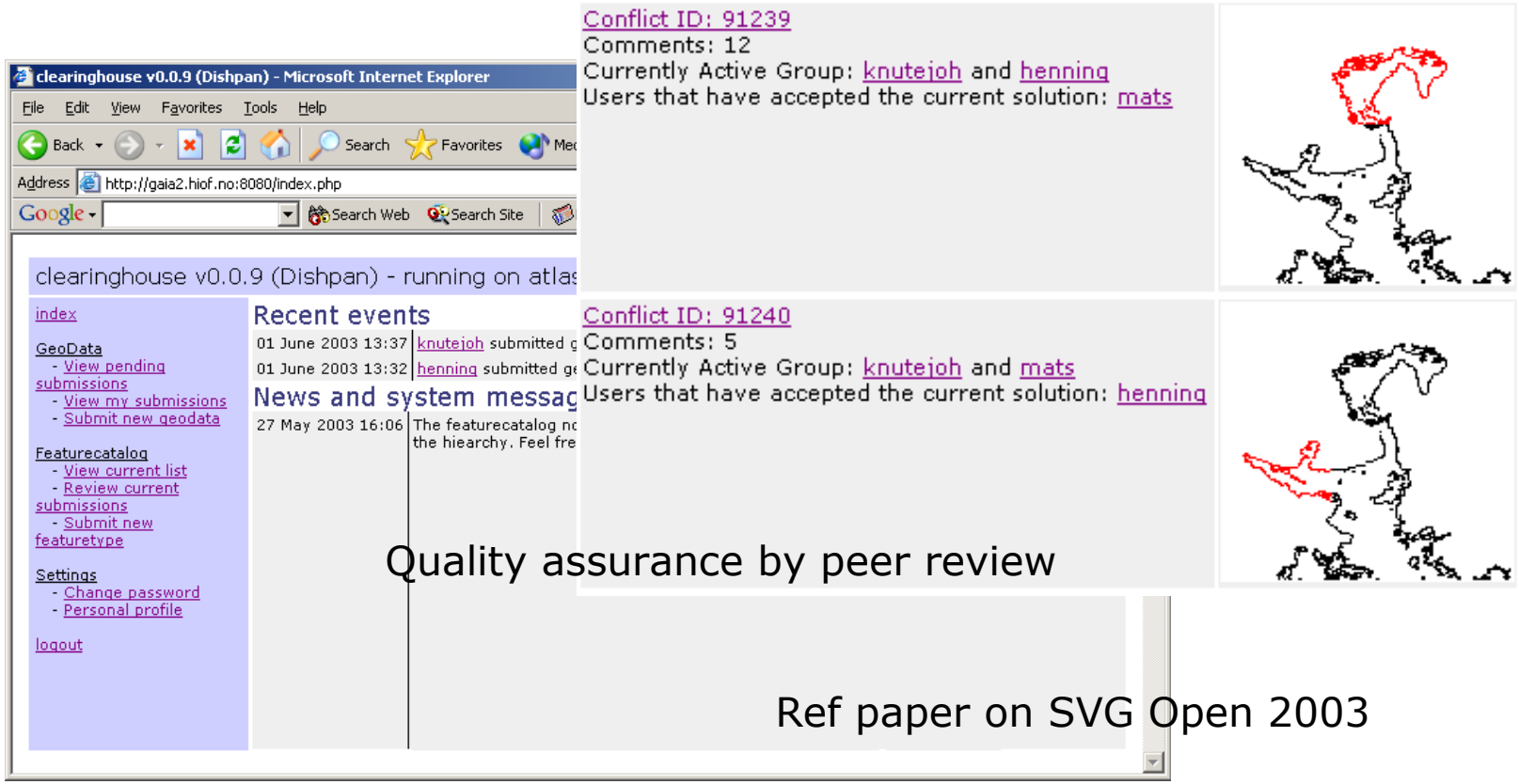
GML served as SVG via translation middleware fromWFS server

or

GML directly from WFS server

OneMap Clearinghouse

Any party or person may submit their geodata
(or modifications of existing geodata)

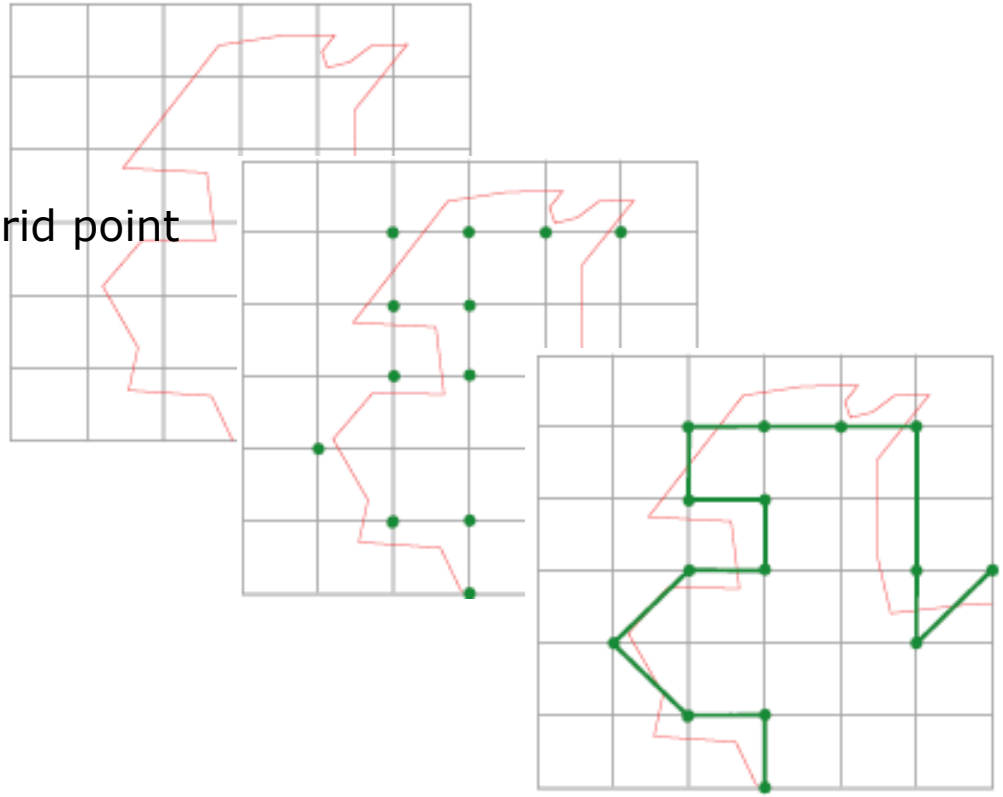


Quality assurance by peer review

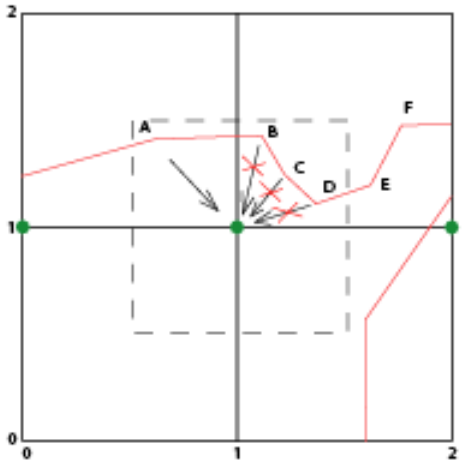
Ref paper on SVG Open 2003

Grid Approximation

Overlay the grid representing your wanted level detail (resolution)

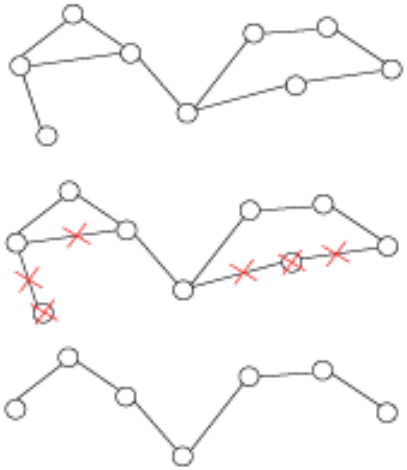


Snap points to nearest grid point



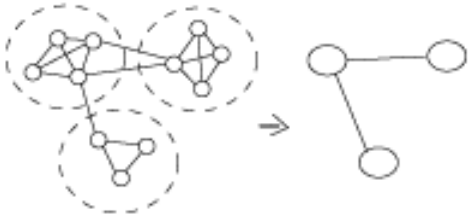
Discard redundant points

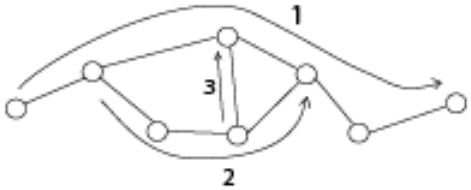
Network Generalization



Selection/deletion

Clustering





Stroke ordering (Thomson)

Road Class Grouping

Most road data incorporates some kind of classification

US Census Tiger Line Files: CFCC codes

+ Class A3 (green):
"Secondary and Connecting Road".

A1 (red) and A2 (blue)
A1: "Primary Highway With Limited Access"
A2: "Primary Road Without Limited Access".

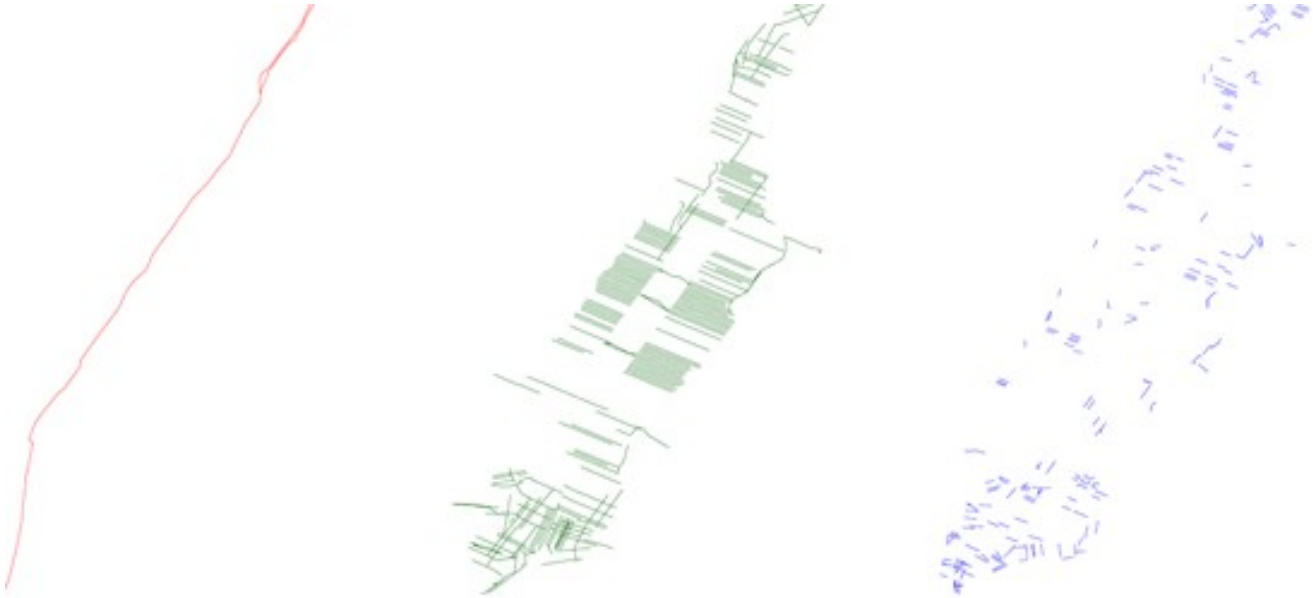
+ A4 (purple, "Local, Neighborhood, and Rural Road"),
A6 (brown, "Road with Special Characteristics") and
A7 (cyan, "Road as Other Thoroughfare").

Class A5 ("Vehicular Trail") is, by no surprise, not present in the dataset.

Stroke Extent Grouping I

Strokes are constructed by joining consequtive segments with same road name

657 to 1314 meter



Larger than 10.5 km

164 to 328 meter

Stroke Extent Grouping II

OneMap Road Model

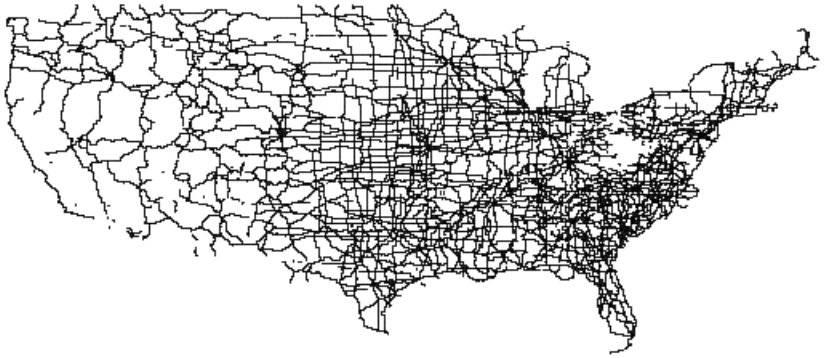
- Extremely narrow GML 3 profile
- Base schema builds on the GML 2 gmlpacket approach, where properties are modeled as zero or more property/type/value triples
- Minor extensions to support:
  - Segmentation of linear geometries
  - Multiple levels of detail
  - Quad tree tesselation
  - Clearinghouse metadata

Tiger Line Files Case

US Census data, updated 2002

Free ftp download, total of 35 GB zipped, 350 (?) GB unzipped

Well structured, well documented



120 millions points for road data only

Demo

- Do not expect MapQuest-like response times! …remember we are piping megabytes of XML data…not small gifs.
- The components are extremely beta. Last minute code changes were made 6 hours ago.
- We have chosen to (possibly) expose you to undocumented features of the system, rather than playing safe.

Final Remarks I

- Network generalization is a hard problem.
- Our approach seems to work well in the OneMap context.
- GML is used in virtually all components of OneMap.
- XML based environments makes it possible to reuse components, such as parsers, and take advantage of many high grade tools (often free and open source).
- Schemas define formats used in input, exchange between different components, storage and output.
- Schemas provides an efficient means for defining sound and (relatively) unambiguous formats.
- Many applications (e.g. OneMap) do not need all of the GML 3 functionality, and should definitely use extended profiles.
- Constructing good GML profiles is not easy.

Final Remarks II

- We need more free tools and more free data to in order to adopt GML on a broad basis.
- If not, the GeoWeb will be powered by a a small number of large and dominating vendors and content providers.

DO YOU…

- Have some free geodata?
- Have some free, open software?
- Have some ideas?
- Have some students in need of interesting topics for their projects and thesises?
- Have a spare server or two?
- Want to have some fun?

Then, join the OneMap community!

www.onemap.org

…and come visit us at our poster stand in the exhibition, and get a live demo or two!