Data Visualization Using Web GIS Software

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NKS NordDSS Workshop, Copenhagen, 1.-2.10.2009
Preface

• The importance of World Wide Web has grown

• Different Web GIS Applications have become more popular

• The performance of modern computers have made this development possible

• Many tools available nowadays (commercial and open source)
Advantages 1/2

- Independent of user equipment and hardware location
  - Web browser is all you need to access web-based service from all over the world
- Many different maps available on the Internet
  - Open WMS servers
  - Google Maps
  - etc.
- Possible to access resources independent of their location
- Allows user interaction with maps and production of tailored maps for particular purposes
- Web maps are so widespread that use is intuitive
  - Google Maps, Google Earth, ...
Advantages 2/2

• Use of open standards
  – The Open Geospatial Consortium, Inc.® (OGC)
  – Well documented
  – Highly supported by different applications and programming libraries
  – Examples of open standards
    • Web Map Service (WMS)
    • Geography Markup Language (GML)
    • Web Feature Service (WFS)

• Availability of versatile software components
• Possibility of grant access or publish
Possible problems

• Similar to all the other web-based systems

• Licences
  – For example, you can’t publish Google maps images without licence

• Lack of some features
  – The primary purpose of web browsers is not to browse maps

• Slower in some cases
  – Client-side vector data handling can be very slow
Web Map Service (WMS)

- A Web Map Service (WMS) is a standard protocol for serving georeferenced map images over the Internet that are generated by a map server using GIS data.

- Requests
  - GetCapabilities - returns parameters about the WMS and the available layers
  - GetMap - with parameters provided, returns a map image
  - GetFeatureInfo - returns values at some point
  - DescribeLayer
  - GetLegendGraphic - return legend image

- Responses
  - User can define the response format (JPEG, PNG, etc.)
  - Caching map tiles is used to speed WMS responses
WMS Software

• Servers
  – Open source
    • Mapserver, Geoserver, ...
  – Commercial
    • ArcGIS Server, ...

• Clients
  – Web-based
    • OpenLayers, Mapbender
  – Desktop
    • Quantum GIS (Open Source)
    • ESRI's ArcGIS products, MapInfo Professional (Commercial)
KETALE Web Application: General

- Joint project of STUK and FMI (Finnish Metrological Institute)
  - Multi-user web application with web map visualisation
  - Database-driven application (Turbogears)
  - Modular architecture
  - Open source tools preferred

- Main functions
  - Data acquisition (implements simple request-response pattern and user interfaces for gathering various data and communicating with calculation models)
  - Data management and record-keeping (user logs, task logs, ...)
  - Data visualisation
  - Reporting
KETALE Web Application: Visualization

Dispersion area at 2008-12-03 19:40 UTC

Quantity: Dispersion area
Model: SLAM Advanced (Req. id 50)
NPP source: ECOMIF
Release from 2008-12-03 07:40:00 to 2008-12-03 10:40:00
KETALE Web Application: OpenLayers
KETALE Web Application: Data visualization

- Data is stored in NetCDF files
- Data layer image is generated using Mapserver/Mapscript
- OpenLayers requests data layer
- Parameters
  - LAYERS, TIME, TRANSPARENT, STYLES, OPACITY, FORMAT, REQUEST, SRS, WIDTH, HEIGHT, ...
  - Response is an image
KETALE Web Application: Countermeasures

- Administrative areas can be selected using OpenLayers vector features
KETALE Web Application: WMS

- Open Standard
- Open source tools available => Programming can be minimized
- Not site-specific
  - USVA (Dose-rate Monitoring System of Finland)
WMS and Google Maps support in JRODOS

- The newest version of RODOS system JRODOS has WMS and Google Maps support
Conclusion

• Web Applications provide platform-independent access to data produced by DSS
• Data visualization using Web GIS application is an user-friendly interface to view results
• Open standards preferred (like WMS)
• Useful links
  – OpenLayers: http://www.openlayers.org/
  – OGC: http://www.opengeospatial.org/
  – Mapserver: http://mapserver.org/