Global 3D Models with Local Content

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Outline

- Project OneMap
- Geospatial Web Services Specifications
- Local Content
  - Geotagging with mobil devices
- Global 3D Models
  - Building and browsing transient Digital Earths from distributed, heterogeneous sources
- Final Remarks

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Project OneMap

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

www.onemap.org

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OGC and the Interoperable GeoWeb

- The Open Geospatial Consortium (OGC) is "an international industry consortium of 259 companies, government agencies and universities participating in a consensus process to develop publicly available interface specifications."

- OGC specifications support "interoperable solutions that "geo-enable" the Web, wireless and location-based services, and mainstream IT."

- Vision: "A world in which everyone benefits from geographic information and services made available across any network, application, or platform."

- Mission: "… to deliver spatial interface specifications that are openly available for global use."

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OGC Web Services

- ## Web Map Service (WMS)
  - Map images defined by area, layers and styling
  - ISO standard from November 2004

- ## Web Coverage Service (WCS)
  - In particular elevation models over a given area and with specified resolution

- ## Web 3D Service (W3DS)
  - Draft specification January 2005
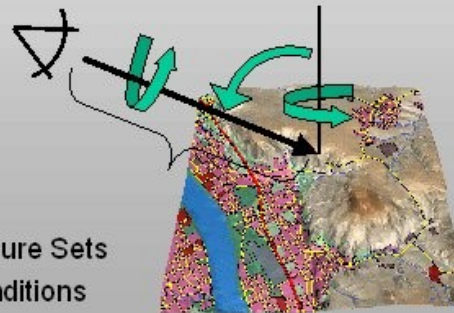 - 3D VRML composite VRML models based on geodata

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OGC Web Map Service (WMS)

- A Web Map Service (WMS) produces **maps** of georeferenced data.

- A "map" is defined as a visual representation of geodata; a map is **not the data itself**.

- **GetCapabilities** returns service-level metadata, which is a description of the service's information content and acceptable request parameters.

- **GetMap** returns a map image whose geospatial and dimensional parameters are welldefined.

- Defines a URL syntax that invoke each of these operations.

- An XML encoding is defined for service-level metadata.

- **Provides a "backdoor" to otherwise closed geodata repositories**

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Web 3D Service (W3DS)

- A Web Map Service (WMS) offers **3D (VRML) models** of georeferenced data.

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Local Content:
Geotagging with Mobile Devices

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Been-There-Done-That Infrastructure

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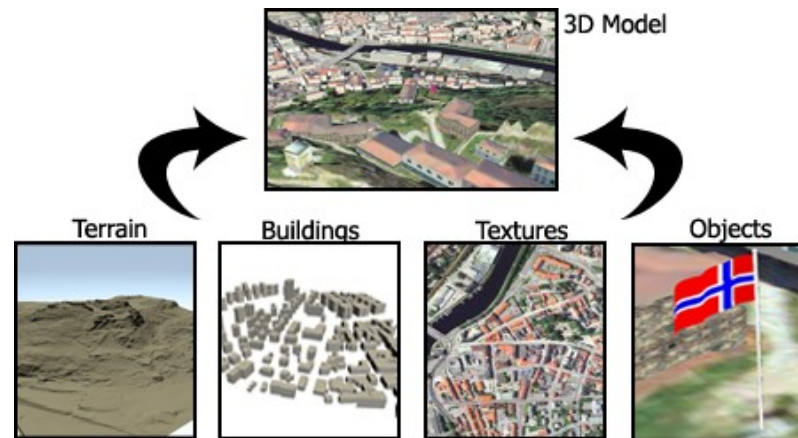**Halden, Norway, 02/02/05**
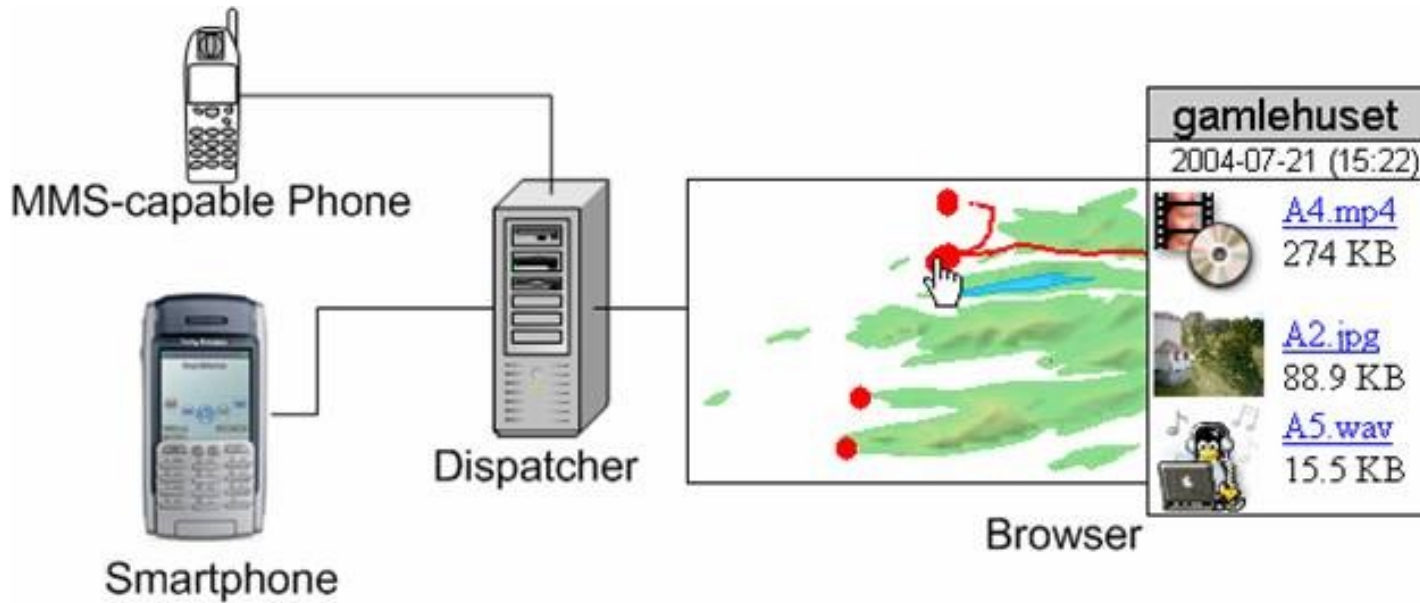
Applications

- Journalism
  - Conflicts, large area events, local happenings, citizen journalism vs. big media
- Disaster Management and Search & Rescue
  - Both remote and local
- Field Maintenance
  - Power lines, sewage systems, transportation
- Insurance Claims
  - Location, date and rich documentation
- City Planning
  - Site documentation, input to decision making processes

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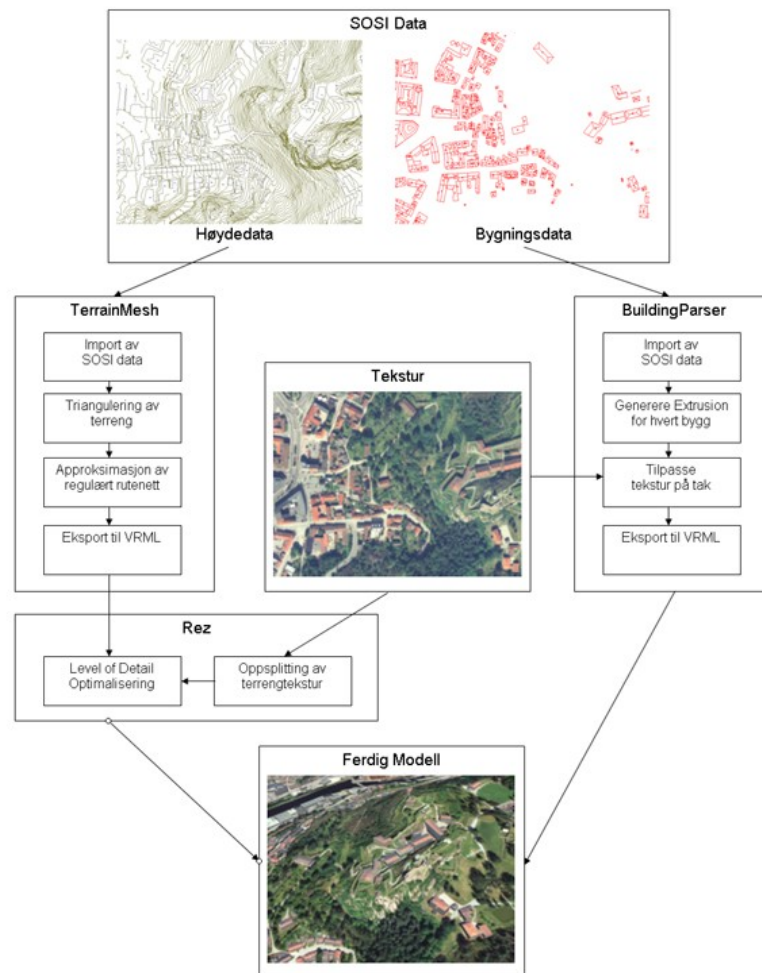**Halden Project VR Workshop 2005**
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The OneGlobe Framework

- 3D browsing of vast amounts of geospatial data
- Heterogenous, distributed sources
- Integrated in a multiresolution (LOD) VRML structure
- Content is accessed (and partly generated) on demand
- Three main data types:
  - Terrain model (from WCS providers)
  - Textures (WMS servers)
  - 3D Feautures (buildings etc.)

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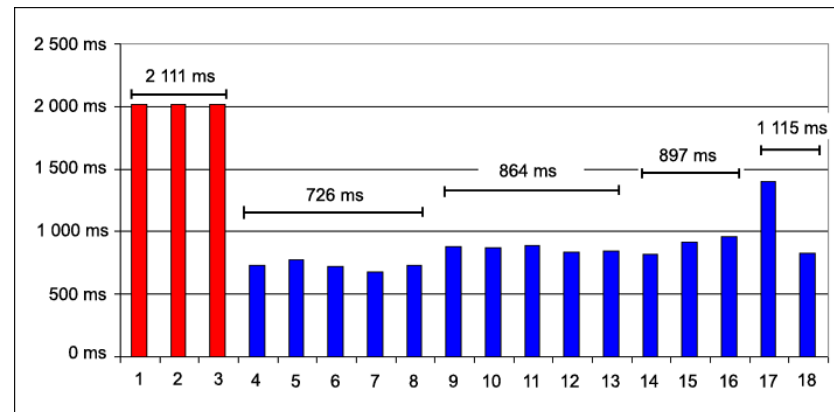**Halden, Norway, 02/02/05**

Data Sources

- Global multiresolution terrain model based on the GTOPO30 data (1 km resolution)
- Local terrain grid generated by triangulation of height contours (1 m equidistance)
- Global texture from Blue Marble
- Regional and local textures from Norwegian WMS providers
- Local textures from 0.5 m resolution orthophotos
- Buildings, roads etc. from local vector maps (1:1000).
- 3D objects from various sources (IFE)
- Annotations from the Been-There-Done-That server

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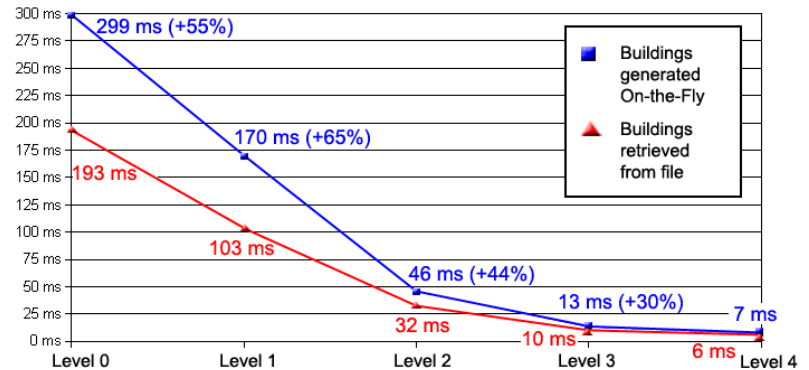**Halden Project VR Workshop 2005**
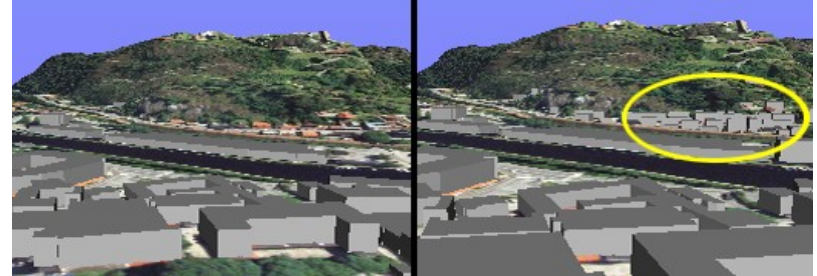**Halden, Norway, 02/02/05**

Server side caching

- To minimize lag in the services chains, various server side caching methods have been implemented
- Pre-caching and purging of content is based on heuristics called Likelihood of Utilization
- Caching may easily reduce lag by 50% or more

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On-the-fly construction of buildings

- 3D building objects may be generated on demand from 2D geodata (footprint + height), by for instance simple extrusion

- Ensures that retrieved content is as updated as possible, since we go directly to the sources that maintain the original data

- Causes suprisingly little overhead, around 50%, which is indeed acceptable, in particular in combination with efficient caching

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Final Remarks

- Low cost / low tech solution
- All tools in Been-There-Done-That and OneGlobe are free (and mostly open-source)
- The users only need a modest computer/mobile phone and a standard browser
- Both server and client side is platform independent
- The servers are mid range desktop workstations
- The geospatial content is free (a special thank to Halden Municipality for making local data available)
- All development have been done by students
- The frameworks are highly configurable due to the extensive use of standards and widely used specifications
- More details to be found in (Misund et. al.):
  - "Annotating Mobile Multimedia Messages with Spatiotemporal Information" (to be published in International Journal of Geographic Information Sciences)
  - "OneGlobe –Building and Browsing a Transient Digital Earth from Distributed, Heterogeneous Sources" (submitted to ScanGIS 2005)

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Thank you for your attention!

Thanks to IFE for permission to use the ESA Columbus space module, their manikin and the MTO lab model, …and for interesting discussions.

Thanks to Halden Kommune for granting us free access to their geodata.

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