



Location-based activity reporting of forest operations using components of open source GIS

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Contents in brief

- Characterization of Finnish forestry environment
- Our application: reporting the progress of forestry operations
- Possibilities and requirements for further development



Forests in Finland

- Boreal forests
- Low number of tree species, but often mixed stands
- Pine and spruce dominated
- Small trees, high density
- No short-rotation plantations



Characterization of Finnish forestry

- The Scandinavian forest industry is using species-specific timber sortiment data in their wood resource management systems
- Different species compositions and timber sortiments, such as sawn timber and pulp wood, are transported from the forest to different mills depending on their chemical processes and requirements for timber dimensions
- Satellite image products don't allow detailed delineation of trees, conifers are difficult to differentiate from aerial image material, and LiDAR-based remote sensing haven't proved suitable for species recognition. Thus field data acquisition techniques are required.



Business environment and needs

- The forest industry is consuming wood at a rate of about 80 million m³/a. Most of the wood is bought from private forest owners. The Finnish forest industry performs some 150 000 annual timber transactions with private forest owners.

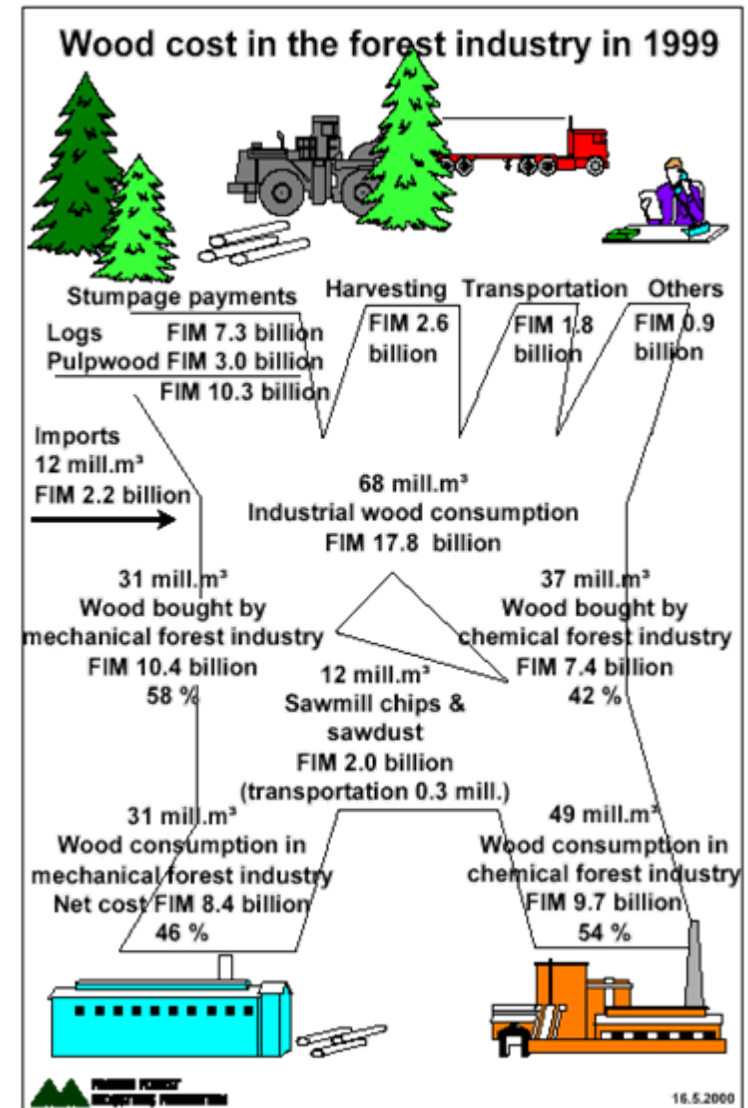
➔ **Need to identify available forest resources and harvesting possibilities**

- Forest industry also uses further 12 million m³/a of imported wood. More than 80% of the import come from Russia.

➔ **Need to report the source of wood**

- Annually, large areas of forest regeneration stands need to be monitored.

➔ **Continuous need to monitor field operations in detail**



Applications of digital forestry

- Finland is an innovative developer and user of the latest high-technology, which also reflects to the field of forestry
- Our IT-sector has developed many applications for paper and forest industry
 - XML-based data transfer for some data
 - Harvester communication and GPS systems
- Different web-based services are becoming common among forest owners
 - Electronic forest management plans



Reporting the progress of forestry operations

- How to monitor forestry operations performed by a contractor?
 - Progress? Actual cut? Quality?
 - Often a long geographical distance exists between the forest owner and the property
- An online reporting practice by using a mobile phone + GPS receiver, which are required e.g. for safety reasons



If only a few attributes are needed, SMS can be used in communication

SMS Servers Replacing PCs in India



Sean Blagsvedt and Rajesh Veeraraghavan of Microsoft Research India ([blog](#)) presented at ETel last week. They told us about some amazing work they have been doing with mobile phones and SMS servers.

The SMS servers are being used to power an MSR project designed to test replacing PCs with SMS servers in the village of Warana ([map](#)). Mobile phones are used by farmers to access their data. In their system mobile phones become the client and SMS is used to communicate with the server.

Source: <http://radar.oreilly.com> (Mar 6, 2007)



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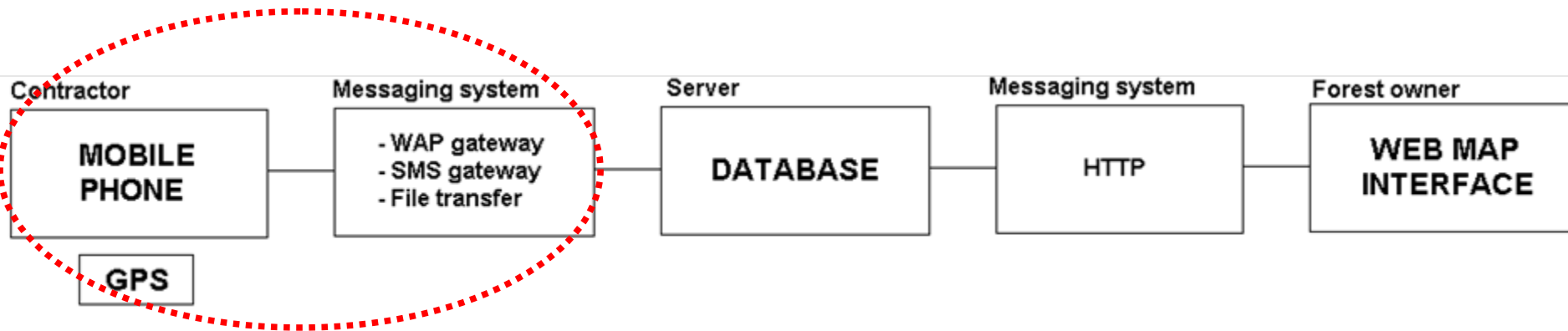
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Our application

- Not in operative use
- Educational purposes
 - Demonstrating forestry students how spatial data management could be applied in the field of forestry
 - The code is modified during the exercise hours to gain a better understanding – thus it needs to be simple enough
- This presentation describes a skeleton on which to build



The structure of the application



- The most error-prone part?
- Three alternative ways for the “Phone-DB” connection
 - Wireless Application Protocol (WAP)
 - Short Message Service (SMS)
 - Cable transfer



Components

- Data acquisition device
 - Mobile phone + (bluetooth-)GPS ~ 500 €?
 - J2ME (Java) environment
- Database
 - PostgreSQL + PostGIS
- Map interface for monitoring
 - MapServer



Phone

- Java ME specification
- Mobile Information Device applet (MIDlet)
- Location API
 - `QualifiedCoordinates`: lat., long., alt., accuracy
 - Register a listener and get periodic location updates at application-defined intervals
- A `TextField` for the attribute data
- A menu for selecting a proper connection method

`GPSPidlet.java`, `GPS.java`

Source codes at <http://cc.joensuu.fi/~jvauhkon/FOSS4G/>



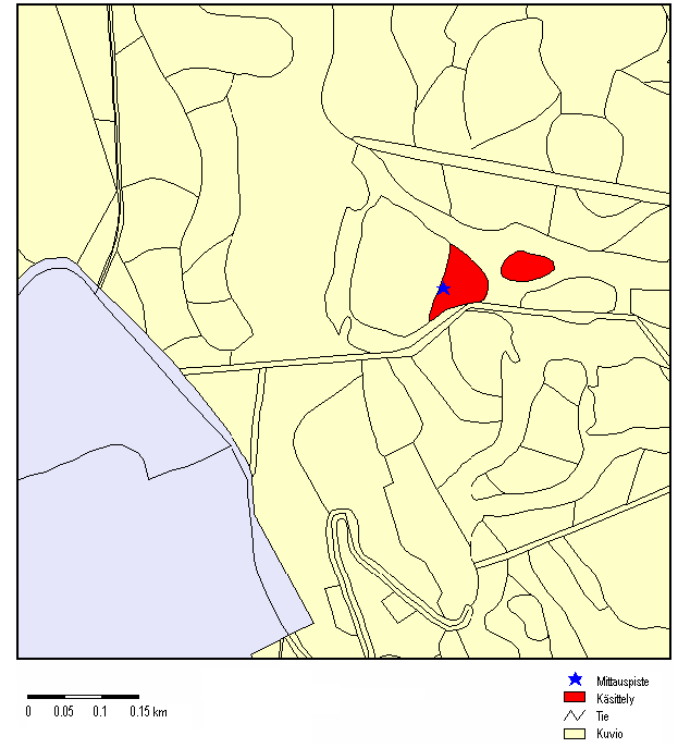
Server / database

- PHP script receives the input data and handles the DB connection
 - WGS84-based latitude and longitude are transferred to Finnish Uniform Coordinate system (KKJ)
 - A stand identifier corresponding to the coordinates is fetched from the DB; the surveyor is informed with the ID
 - The attribute data is stored to the DB
- The information content could be further examined at this stage...
- [Source codes](#)



Map interface

- Only a simple example
- Currently, no attention is paid to user identification, etc.
- [Source codes](#)



Special requirements

- Certain parts of a forest information system require extra attention in order to ensure data quality
 - Availability; Data consistency; Error assessment
 - Emphasis on the data acquisition
- An online reporting practice would enable a direct connection to DB and thus possibly improve the quality
 - A possibility to control the information content
 - A possibility to instruct the surveyor in real time



Conclusions

- The existing OpenGIS components are ideal for the presented purposes
 - The current implementation can easily be modified for...
 - other geometrical features
 - different attributes
 - other (inventory) purposes, devices or platforms
- FOSS4G2008: “*An Option for Developing Nations*”
 - ➔ Other ways to “re-use” existing equipment and software components?



Thank you!

Questions?

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<http://cc.joensuu.fi/~jvauhkon/FOSS4G/>

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