Development of an Integrated Resource Information System – WW-IRIS

Background

Sustainable forest management and wood industries profit from forest resource information with high spatial and temporal resolution. This information is especially important to make correct planning decisions under difficult market conditions. Forest inventories based on sample plots commonly provide this information but are highly restricted regarding the spatial and temporal resolution. The WW-IRIS project aims on resolving these restrictions by combining forest inventories with airborne laser scanner (ALS) data.

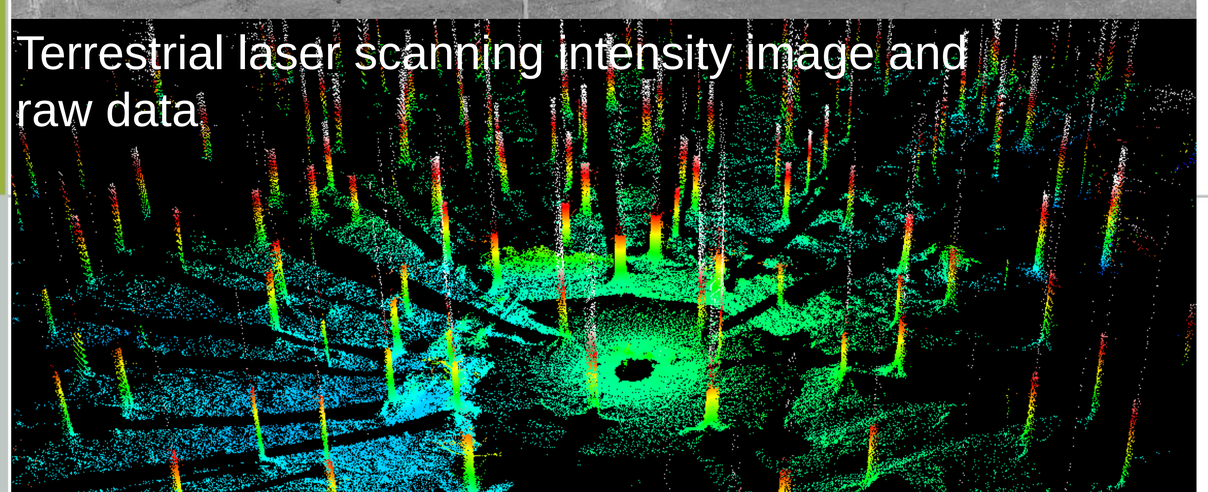
Aims

The major research objectives of the WW-IRIS project, which were developed on the basis of the identified needs of the forest industries, are:

1) Development and optimization of laser scanner methods for assessment of wood qualities and quantities at high spatial resolution and validation of these methods across countries.

2) Further improvement of the information flow regarding wood resources along the forest/wood-products chain by adapting forest information and planning systems to utilize improved information from laser scanner aided inventories.

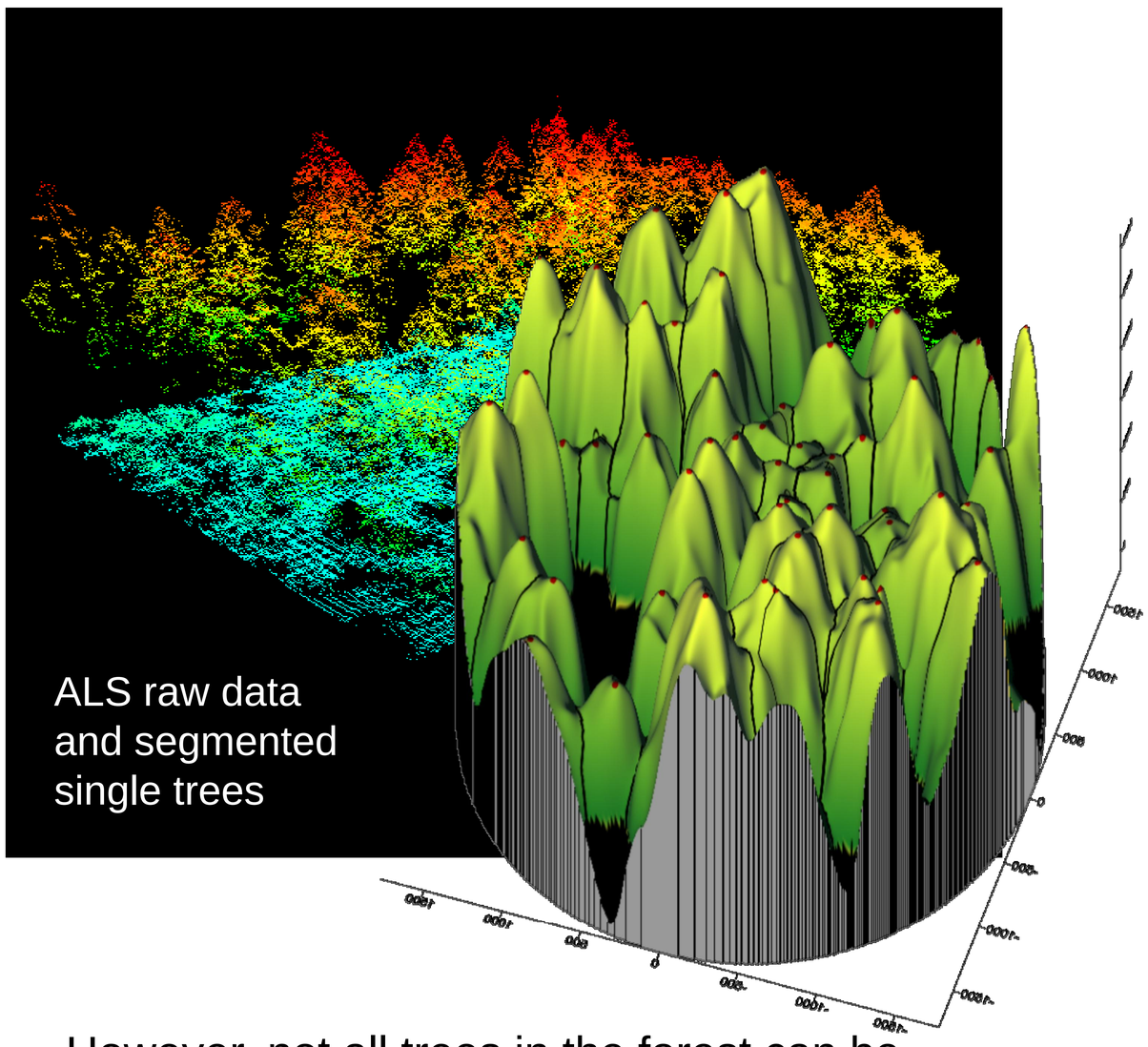
To produce valuable results, the research objectives were transposed into solid tasks in close cooperation with forest stakeholders represented in the advisory board of the project.



Terrestrial laser scanning intensity image and raw data

Results

The 3D structural information of the forest derived from ALS data can be used to detect and measure trees. Several teams within the project worked on the development of algorithms for segmentation of individual trees. These algorithms are currently being evaluated in a common effort on data sets from the participating countries.



ALS raw data and segmented single trees

However, not all trees in the forest can be detected, even with the most advanced algorithms. Therefore, other teams have developed approaches which predict the missing trees and thus allow for unbiased estimates.

Methods were developed allowing product recovery from pre-harvest inventories with airborne laser scanning data trained by terrestrial laser scanning or harvester data. In a following step, the field data can be imputed based on airborne laser scanning of an inventory area to predict stem attributes for forest stands without ground measurements.

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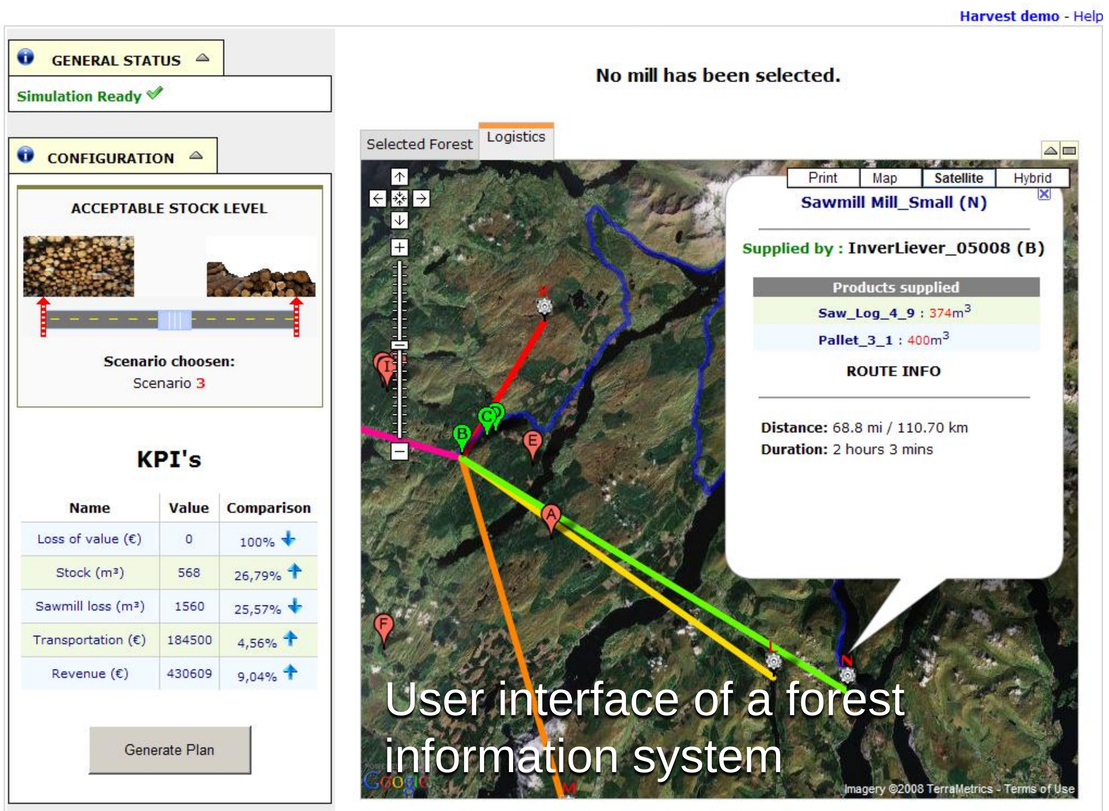
Results (continued)

Another important research topic within the project is the identification of tree species and the prediction of tree species-specific attributes using ALS data. Several peer reviewed scientific articles from researchers within WW-IRIS regarding this subject were published or are currently in press.

To support the forest owners in providing more information about the resource to their customers, research work on the prediction of timber quality-related parameters (e.g., branch properties along the stem) has been carried out.

The information provided by an ALS-based inventory will be different compared with more traditional inventories. Several partners aim at adapting forest information systems to optimize the usage of the newly available data to improve consistency and responsiveness. The operational, tactical and strategic planning processes will therefore require changes.

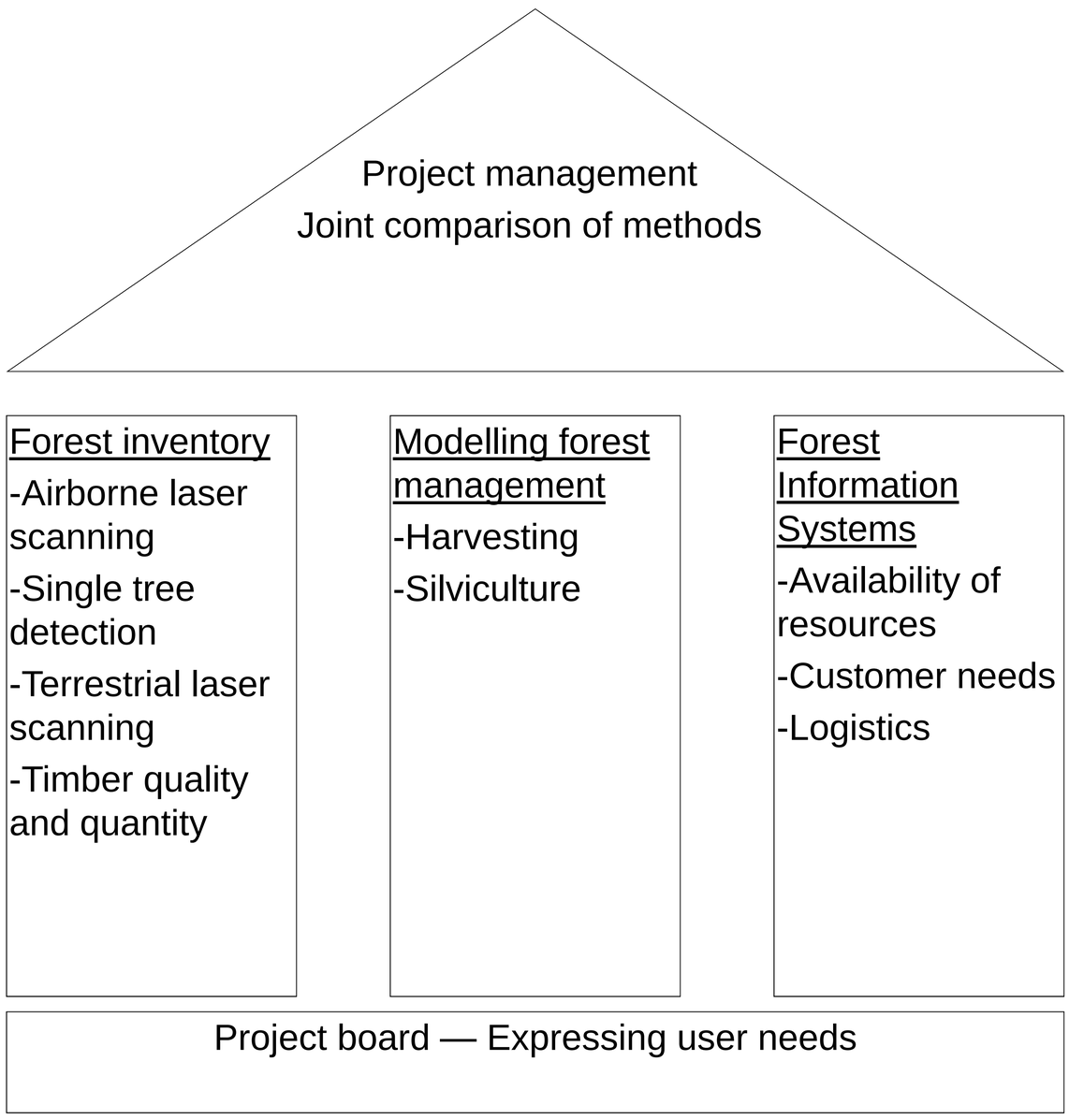
The new forest information systems will further provide the possibility to match the requirements of the wood industry and the available resources of the forest owner with respect to timber amounts and qualities. Also an logistics interface will be implemented in the information systems.



User interface of a forest information system

Project structure, consortium and funding

The 14 scientific and industrial partners from 5 European countries receive funding during 1.1.2008 - 21.12.2010 by the WoodWisdom ERA-NET program of the EU. The consortium is lead by Prof. Erik Næsset of the Norwegian University of Life Sciences.



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