PRECISION FORESTRY

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WHAT IS IT?

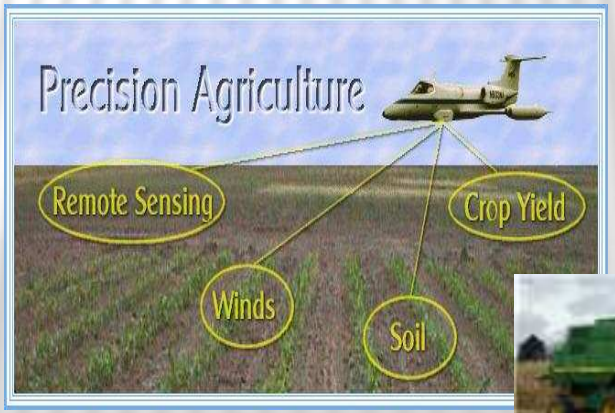
❖ Precision forestry is focused on information and supports economical, environmental and sustainable decision by using high technology sensing and analytical tools.

❖ It provides for highly repeatable measurements, actions and processes to initiate, cultivate, and harvest trees, as well as to protect enhance riparian zone, wildlife habitat, and other environmental resources.

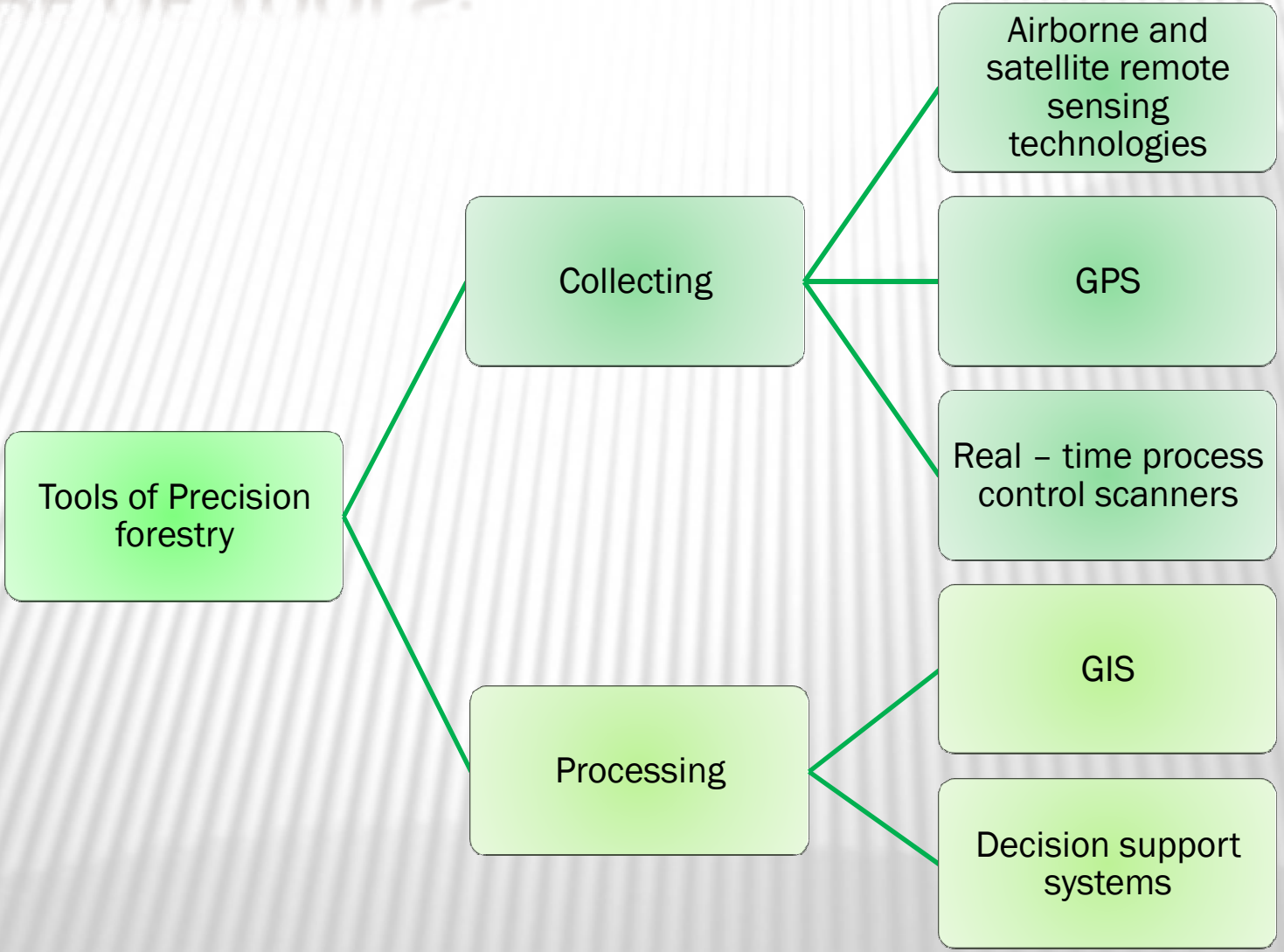
❖ It provides valuable information and linkages among resource managers, the environmental community, manufactures and public policy (Dyck 2001).

Precision forestry is defined by Taylor et al (2002), as planning and conducting site-specific forest management activities and operations to improve wood product quality and utilization, reduce waste, and increase profits, and maintain the quality of the environment.

Principle of precision forestry was based on precision agriculture.
Precision agriculture uses set of tools, which has been successfully introduced and now it is used in precision forestry.



TYPE OF TOOLS:

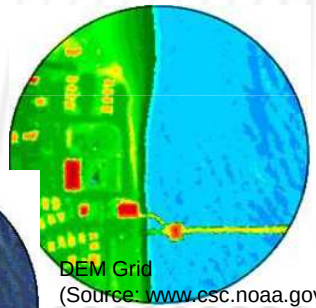


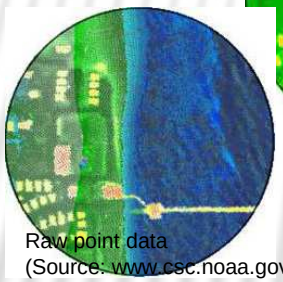
AIRBORNE AND SATELLITE REMOTE SENSING TECHNOLOGIES

LIDAR:
- digital elevation model grid
- contours
- raw point data
- intensity image

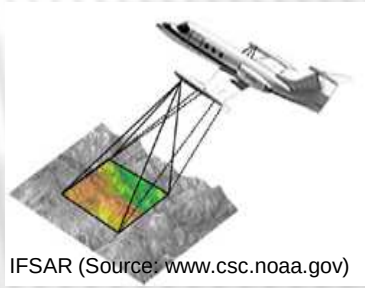

LIDAR (Source: www.csc.noaa.gov)

Utilization of LIDAR:
- Shoreline and Beach Volume Changes
- Flood Risk Analysis
- Water-Flow Issues
- Habitat Mapping
- Subsidence Issues
- Riparian Studies
- Emergency Response
- Transportation Mapping
- Telecommunication
- Planning and Urban Development


DEM Grid
(Source: www.csc.noaa.gov)


Raw point data
(Source: www.csc.noaa.gov)

IFSAR:
- Orthorectified Radar Imagery

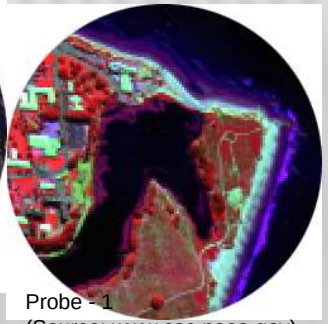

IFSAR (Source: www.csc.noaa.gov)

Utilization of IFSAR:
- Hydrology Modeling
- Flood Risk Assessment
- Land Use and Land Cover
- Mapping
- Earth Crust Deformation
- Monitoring
- Riparian Studies
- Forestry Mapping


ORRI (Source: www.csc.noaa.gov)

Other airborne and satellite remote sensing technologies :
- high spatial resolution images
- multi-spectral
- hyperspectral images.

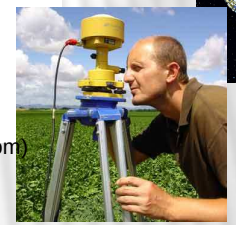

Panchromatic
(Source: www.csc.noaa.gov)


Probe - 1
(Source: www.csc.noaa.gov)

GPS (GLOBAL POSITIONING SYSTEM)

- highly accurate satellite based radio navigation systems
- three dimensional positioning (elevation z and ground coordinates x, y) and time information
- position data single objectives

Handheld computer
(Source:: www.trimble.com)



(Source: www.trimble.com)

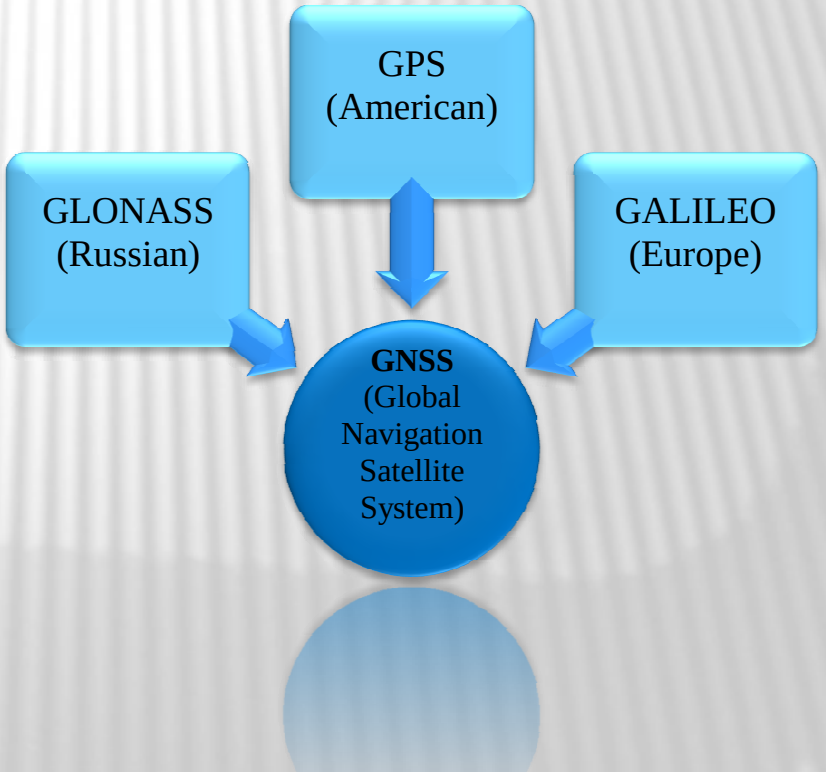
Systems are used for:

✓navigation on the ground and under canopy

✓obtaining accurate coordinate system of flying remote sensing technologies

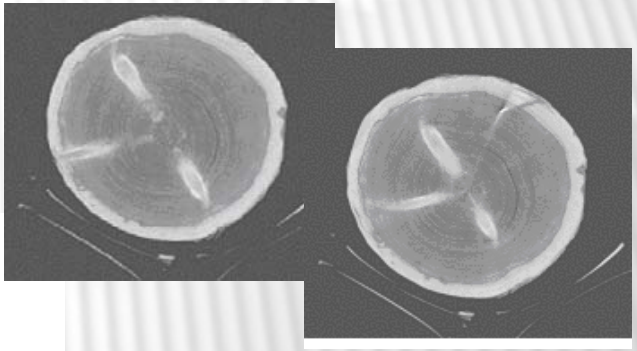
✓navigation and monitor the new forest (wheeled skidder, track skidder) and agriculture technologies

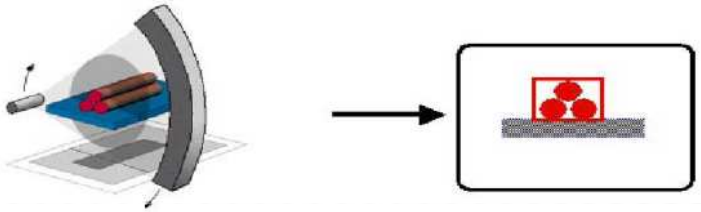
✓ combination by handheld computers using for fieldwork



REAL – TIME PROCESS CONTROL SCANNERS

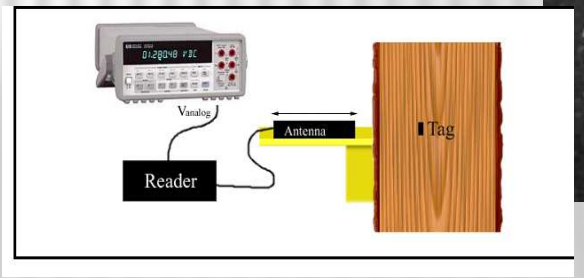
Automated Log Grading System
The result is a defect map from the computed tomography data.





UDD (Ultrasound decay detectors)
It is used to detect decay in trees.

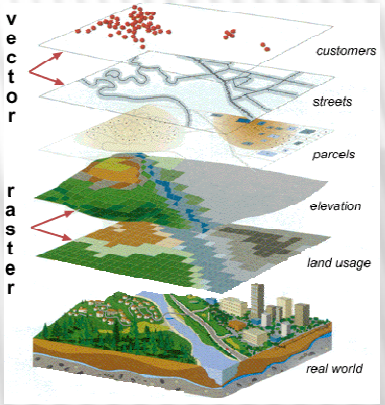
RFID (Radio Frequency Identification)
It is a tag on tree that can gather a wide variety of information about trees and wood in-situ and real-time.



GIS (GEOGRAPHIC INFORMATION SYSTEMS)

GIS is a spatial information system that comprises four basic elements of computer ***hardware***, computer ***software***, ***data*** and ***user***.

GIS deals with ***collection***, ***storage***, ***retrieval***, ***management of data***, ***conversion***, ***analysis***, ***modeling*** and ***display*** spatial data.



Data types from multiple sources:

maps

images

digital products

GPS

text data

tabular data

+

Image analysis

Distance analysis

Spatial analysis

Geostatisticals analysis

Surface analysis

=

Specific images and maps:

Digital Elevation Models

Digital Terrain Models

Topographic Line Maps

Contours,

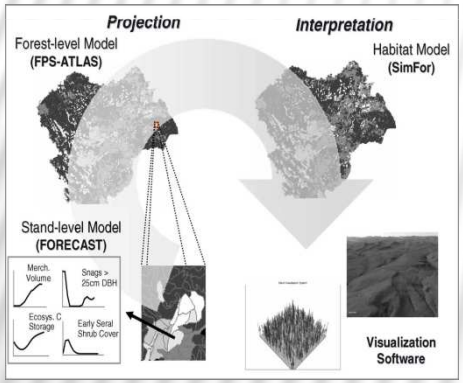
Shaded Relief,

Slope & Aspect

Thematic Maps

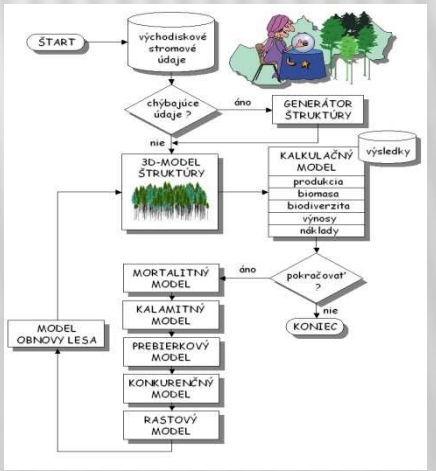
DECISION SUPPORT SYSTEMS

- specific software
- developed for solving specific problems
- offer forecast and factually information
- it can be joined with GIS



Decision support systems deal with:

- ❖ suggesting road networks (PEGGE)
- ❖ planning of forest operations
- ❖ forest inventory



Growth simulator software:

SYBILA, SILVA, MOSES, FOREST, STAND PROGNOSIS MODEL, BWIM and CORKFITS.

WHICH DATA ARE COLLECTED?

Collecting data are characters about:

- trees
- stand
- soil properties
- water supplies
- terrain
- forest resources
- wildlife habitat

23 cm dbh

23 cm DBH

Tree diameter
in breast height
equals 23 cm

„Too small
for harvesting"

Character — **Data** — **Information** — **Knowledge**

Syntax (Formats)" — ***Semantics*** — ***Application Networking***

(Source: Kätsch 2006)

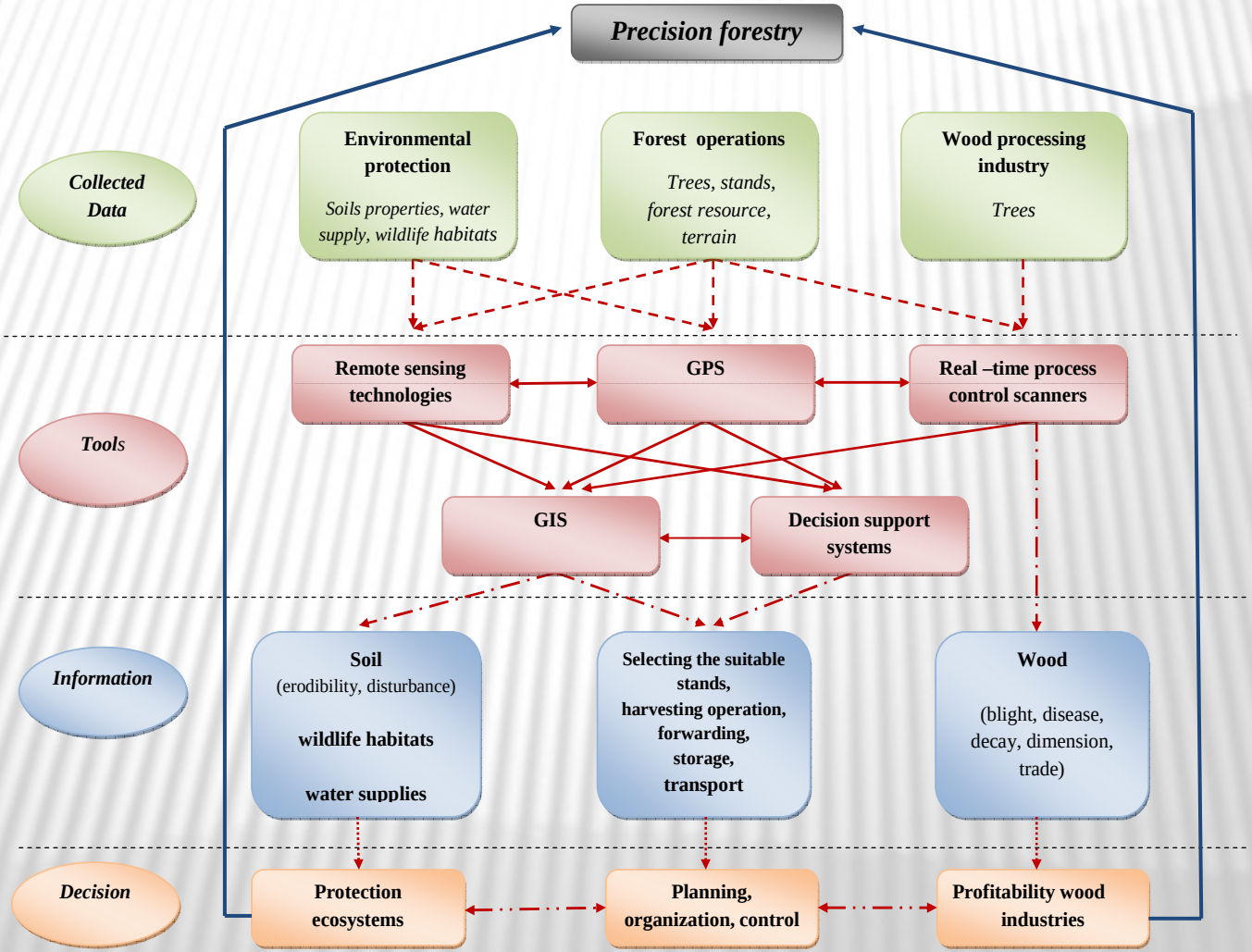
WHERE COULD INFORMATION BE USED AND WHICH?

❖**Forest operations** as selecting the suitable stand, harvesting operation, forwarding, storage and transport wood. Knowledge of information significantly *influence planning, organization, control and duration of forestry work*.

❖**Wood processing** - about wood as dimension, grade, grain, blight disease, stiffness and taper. These information influence production wood products thereby *profitability wood industry*.

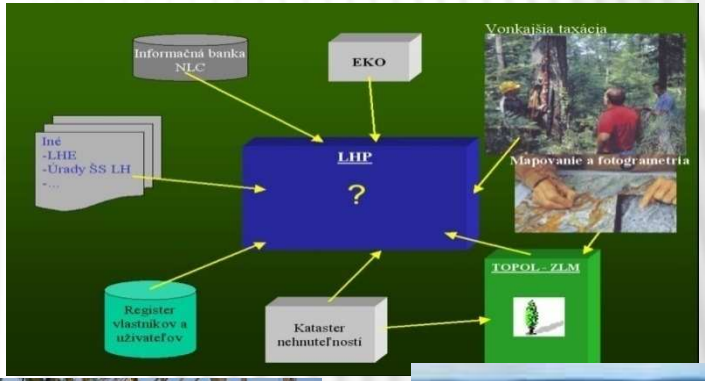
❖**Environmental protection** - about soil as erodibility, disturbance, compaction of soil, and water supply as sedimentation, ditchwater. New information and knowledge has significant function in *protecting unusual ecosystem, part of county so aquatic and wildlife habitat*.

DIAGRAM OF PRECISION FORESTRY



AIMS OF PRECISION FORESTRY:

- improve productivity of forest
- long-tem planning
- global and crop inventory,
- planning of road network (hauling road, skid)
- sustainable utilization of renewable resources
- reducing negative environmental consequences.



THANK YOU