The Flexwood concept : how to respond to changes in the markets ?

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Innovawood/UNECE/FAO Seminar 22 April 2013
Innovation in the Forest-based sector

Content

- Challenges in the wood supply chain

- R&D approach to support progressive evolution

- Flexwood results through collaborative research

- Perspectives

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Challenges in the supply chain

- Wood as a raw material
- Natural hazards
- Market fluctuations
- Habits and behaviours of the stakeholders
- Demanding society towards sustainability

→ Flexibility & Innovation are needed if the industry wants to adapt and be reactive
  - Organisation schemes
  - Technology toolkit

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General approach to support change in the wood supply chain

- Understanding of the current status and need analysis
- Choice of a strategy and related objectives
- Definition of performance indicators to monitor progress
- Development and integration of required solutions
  - Organisation schemes
  - Technical solutions
  - Logical components and information infrastructure
- Change management
- Test and evaluation

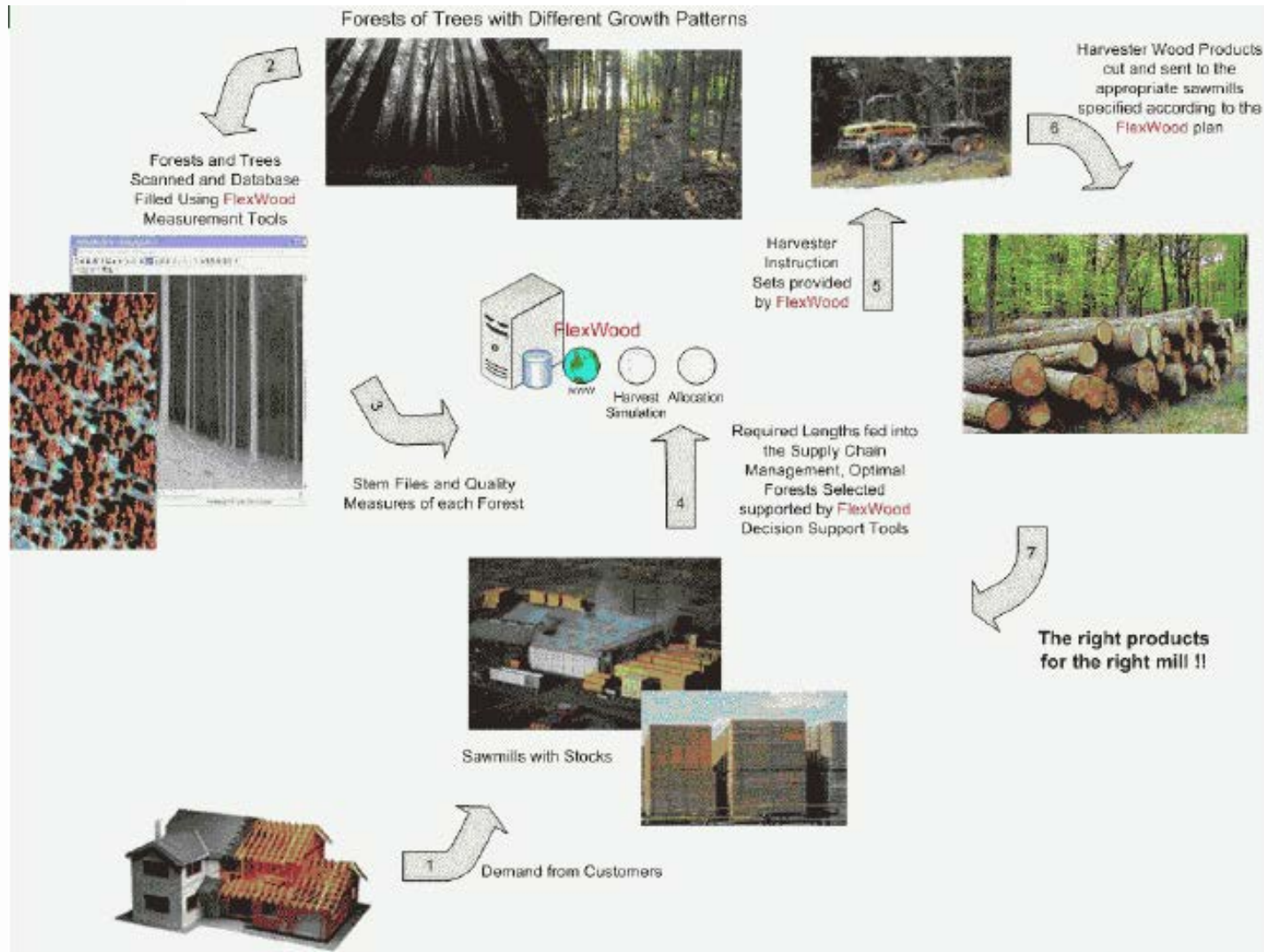**FCBA Institut technologique**   Forêt   Cellulose   Bois – construction   Ameublement

The Flexwood concept

Keywords

Information-based process

Information interchange

Automation

Optimisation

Flexibility and ability to change

Forests of Trees with Different Growth Patterns

Forests and Trees Scanned and Database Filled Using FlexWood Measurement Tools

Stem Files and Quality Measures of each Forest

Sawmills with Stocks

Demand from Customers

Harvest Simulation   Allocation

Required Lengths fed into the Supply Chain Management, Optimal Forests Selected supported by FlexWood Decision Support Tools

Harvester Instruction Sets provided by FlexWood

Harvester Wood Products cut and sent to the appropriate sawmills specified according to the FlexWood plan

The right products for the right mill !!
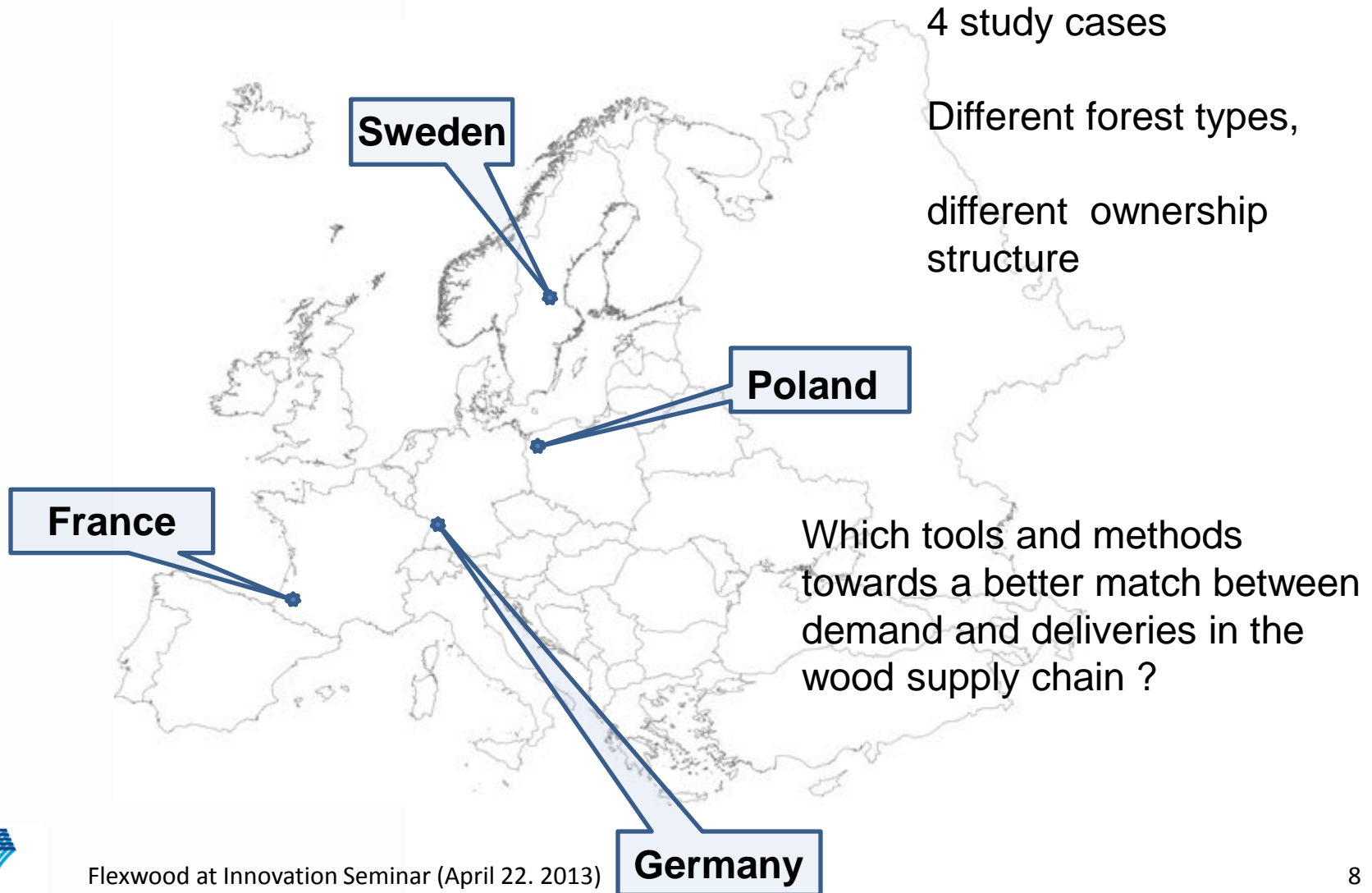
Flexwood system components

- Description of Industrial requirements

- Forest resource assessment with remote sensing

- Understanding of the supply chain thanks to modeling and simulation

- Process optimisation (Harvesting, logistics, wood processing)

- Information and service exchange through IT infrastructure
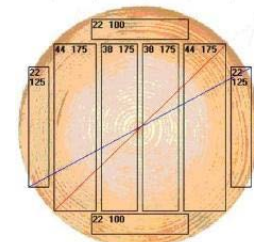
Application of the Flexwood concept

4 study cases

Different forest types,

different ownership structure

Sweden

Poland

France

Which tools and methods towards a better match between demand and deliveries in the wood supply chain ?

Germany

Introduction to the French Flexwood case study in Aquitaine

- The case study is centered on *supply companies* and their dedicated role in the local supply chain:
  - Supply round wood to local mill with specific demand (depending on their process line)
  - Organize logging operations in the forest stand in which they acquired standing trees to be harvested
  - Provide their sub-contractors with relevant instructions so that stand are harvested and produce logs in adequacy with clients' demands

- The purpose is to evaluate how novel solutions can contribute to improve planning of logging operations in accordance to client's demand

FLEXWOOD	Round wood specification	Resource Inventory	Supply chain modeling	Harvesting optimization	IT infrastructure
Application Output	Enhanced round wood specifications	Block description including quality information on the Stem level	Description of the local WSC (Input for SWOT analysis)	Simulation of different harvest instructions & product-mixes	Web-application to present the newly available info and query on it

From data collection at the plot level…
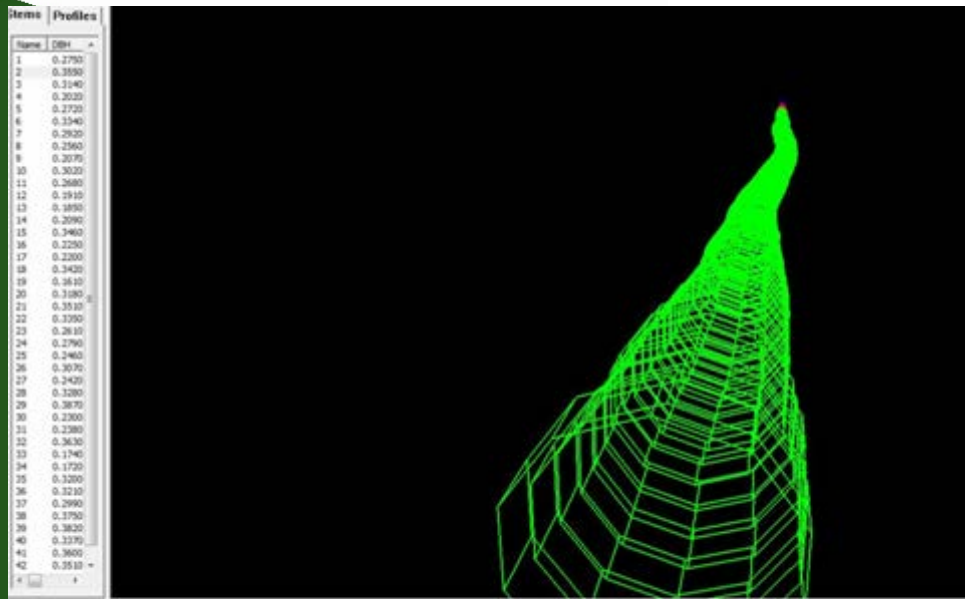

TLS in a maritime pine plot

- Data collection on 12m circular plots
- Data processing including branchiness:
  - Height of 1st live branch (clumps of needles)
  - Height of 1st dead branch
- Integration of allometric functions to calculate Total Height and Total-taper
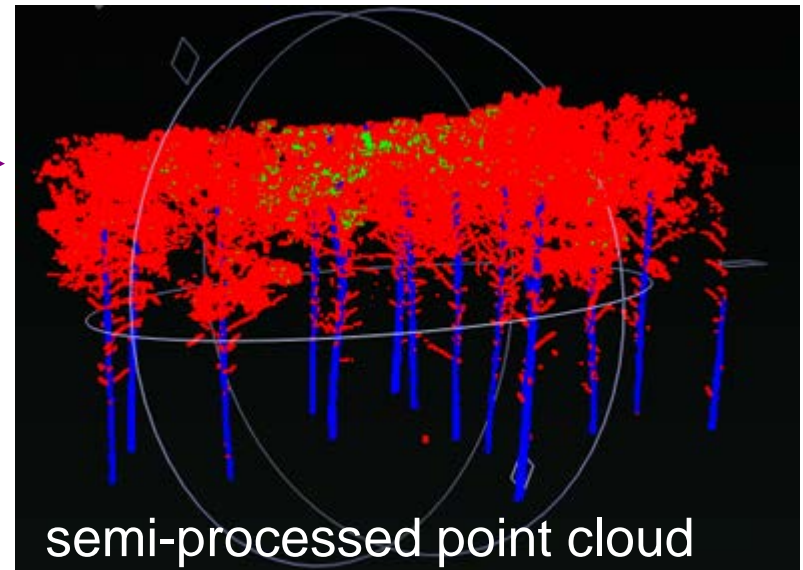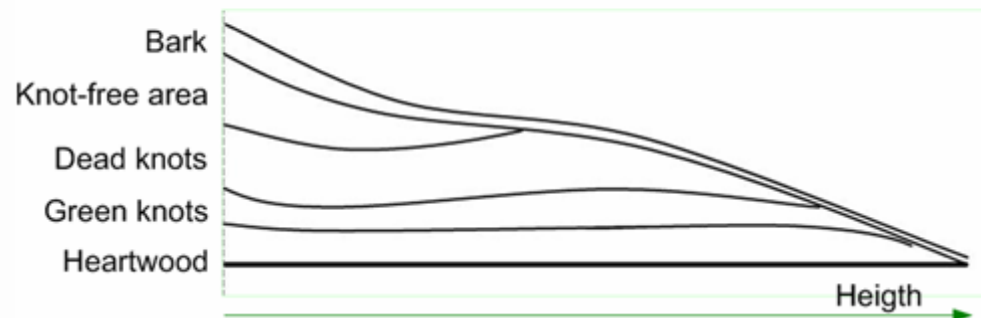

semi-processed point cloud

… to information on the sample stems

- Calculation every 10 centimeters
- Inner-wood properties calculated thanks to quality model (Moreau J. 2010) and information collected on the branches
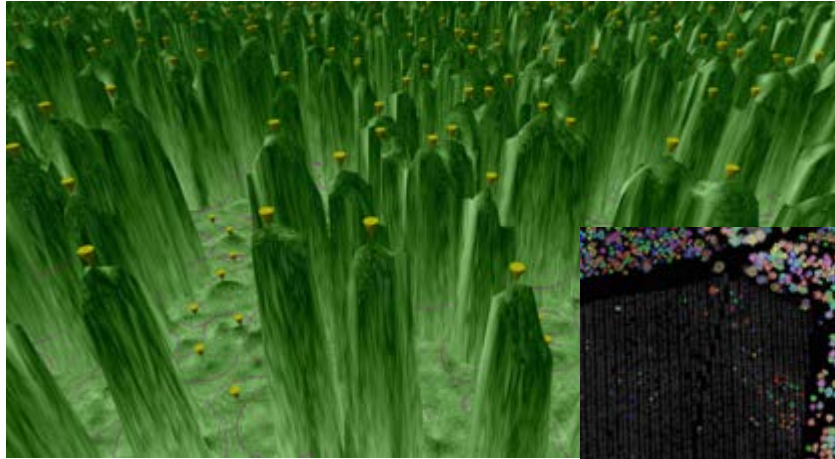
Inner-wood characteristics distributed along the stem according to heigth and radius

Bark
Knot-free area
Dead knots
Green knots
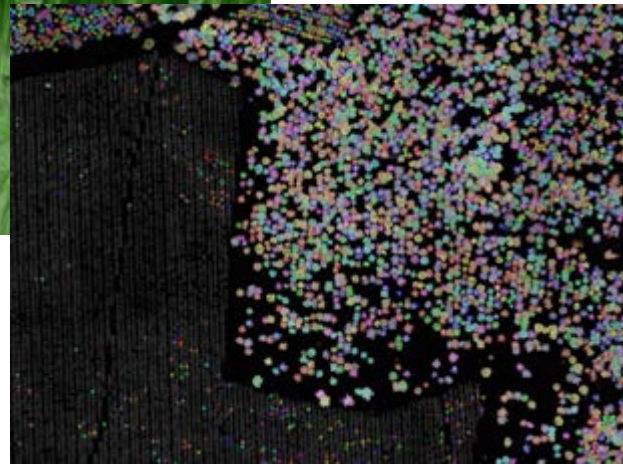Heartwood

Heigth

SEVENTH FRAMEWORK PROGRAMME

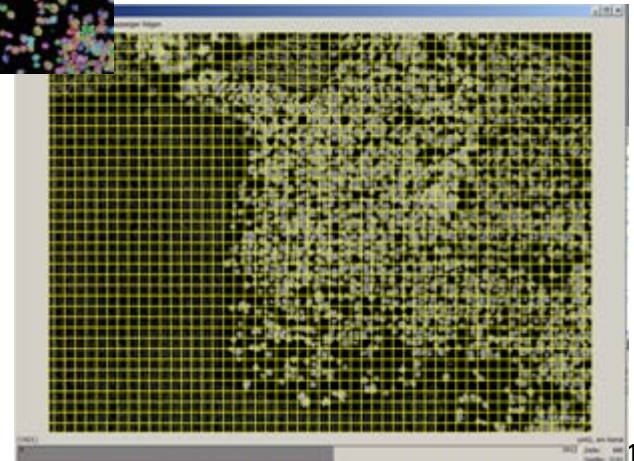# And pre-harvest inventory on the stand level

→ Elevation Model

→ Stocking (nb)

⌐→ Estimation of volume (Grille 10x10m)

Aerial information is combined with terrestrial data to generate enhanced information on the stand level

Toolkit

- Integration of the modules and functionalities in a user-interface which:
  - Displays information on the resource (stand level)
  - Enables specification of log products and creation of harvesting instructions potentially driven by different priorities (Volume, Price…)
  - Predicted harvest results with bucking simulation

- Ready for "harvest planning experiments" with the professional practitioners (Gascogne, CAFSA, Smurfit Kappa)

Exploitation for harvest operation planning

- 6 potential ways to value information and newly tested tools

- Planning before harvest (x4)
  - e.g. Investigation on the optimal harvest of a specific product

- Control after harvest (x2)
  - E.g. comparison between prediction and actual harvest


- Practitioners' feedback on improvement leads

Perspective in Aquitaine

- Encouraging results from Flexwood arrive at a time when local stakeholders gather to face logistic & supply chain challenges in a collective approach…

- …which is crucial when considering the implementation of Flexwood concept at operational scale:

  - Pooling of efforts is mandatory to reach critical mass for Data collection, processing and delivery as a service
  - Connection is needed with other ICT inspired tools and methods developed for forest-based actors in a collaborative approach (e.g. in France: EXPLOTIC, éMOBOIS…)
  - Standardization (e.g. wood product description) should be integrated to guaranty proper data exchange and interoperability

Evaluation of concept through the 4 study cases

- 6 indicators to guide the evaluation of concept
  - *Organization*: Productivity; Storage rate
  - *Economy €* : Inventory costs ; Production to value
  - *Service*: Time before delivery ; Perfect order fulfillment

- Results were really dependant on the current situation and the level of integration with existing tools

Facilitation factors for quick implementation of LIDAR technologies
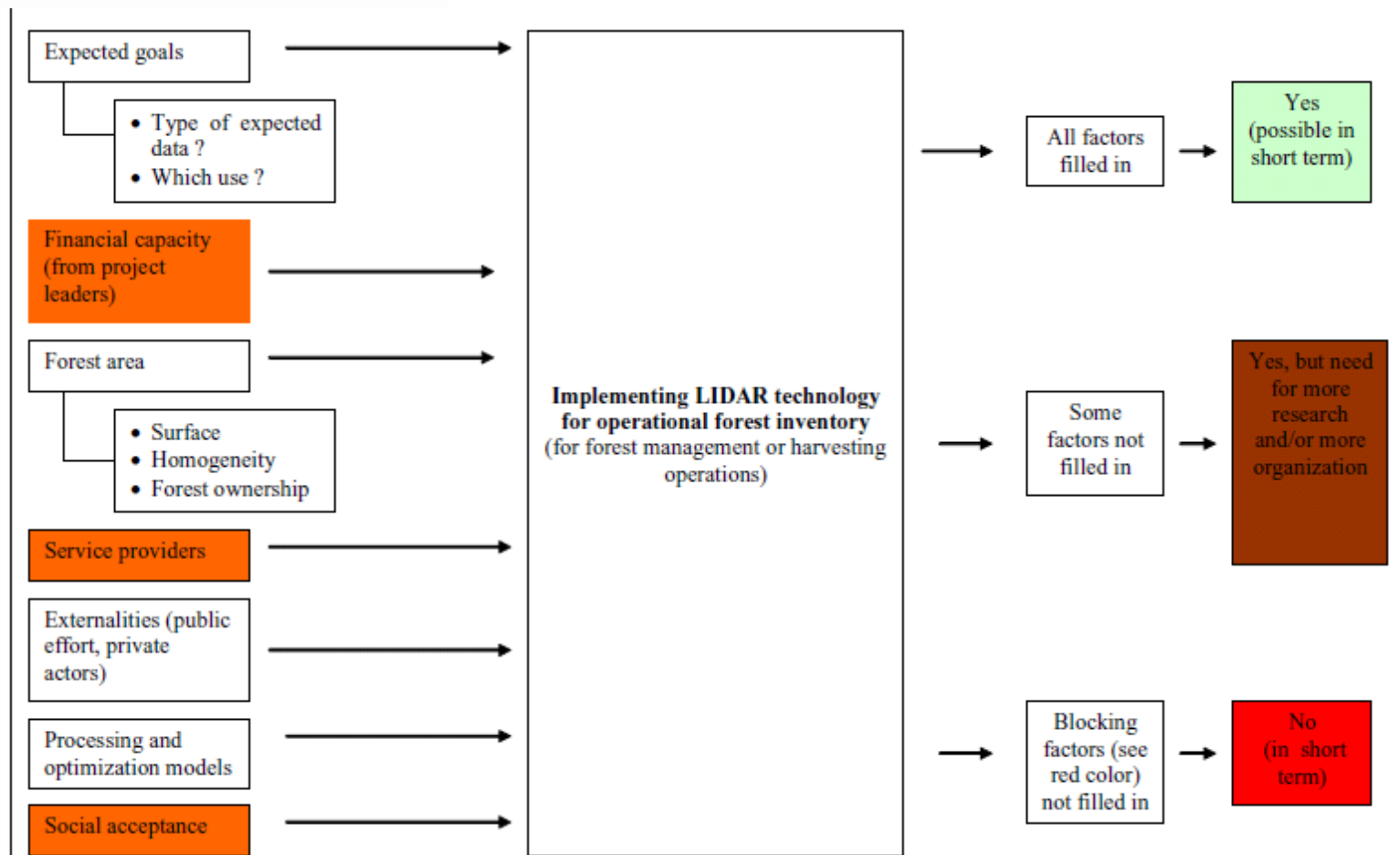
conclusion

- Encouraging results and positive feedback from participating companies

- Leads for improvements on technical issues

- But also significant need for progress on transfer methods to ensure real implementation of these innovations in the supply chain

Thank you!

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FlexWood Project Partners

Topics for presentations and posters (see www.fec2014.fcba.fr)

1. Managing interactions between logging operations and forest ecosystems services

2. Answering specific challenges in harvesting technologies and working methods

3. Being innovative in transportation solutions and logistics

4. Better working conditions and educational programs

5. Organizational innovations and other strategies for a better planning and monitoring of forest operations in specific contexts

6. Implementing Precision Forestry concepts for improved wood-supply-chains

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