



# Visions and tools for forest and mill integration Part 1

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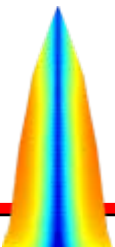


# Varying properties of wood and fibers in the forest



Different  
demands  
on wood  
and fibers  
for mills  
and products

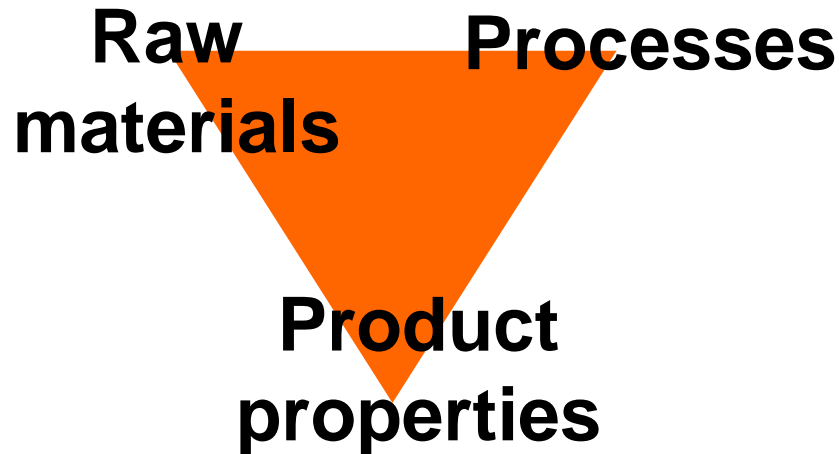
- a problem and an opportunity!



# Objectives of improved wood utilization

- **“Uniformity**  
The wood raw material should support the production of products with uniform properties and quality
- **Freshness**  
As little variation as possible should be added to the natural variation of the fresh wood
- **Control**  
One must control and if possible utilize the natural variation of the wood”

# Integration



**Integrated development of properties:**  
Product – paper – pulp – fiber – wood – tree

**... to reach:**

- Right properties –
- uniform properties –
- efficient production

# Layout of presentation

- **Comments on wood and fiber selection and processing**
- **Approaches to support forest and mill integration under development at STFI**
- **Examples of current and future applications**

(The results shown are not part of the EuroFiber project)

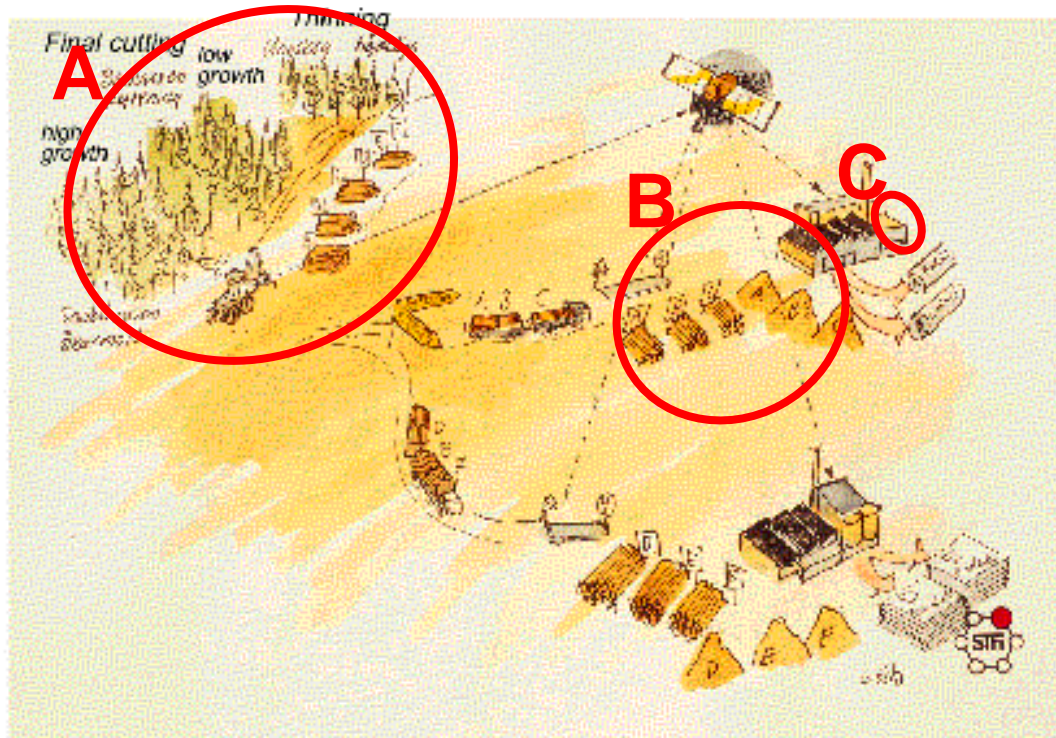




# Selection of wood and fibers

Several opportunities from tree to paper:

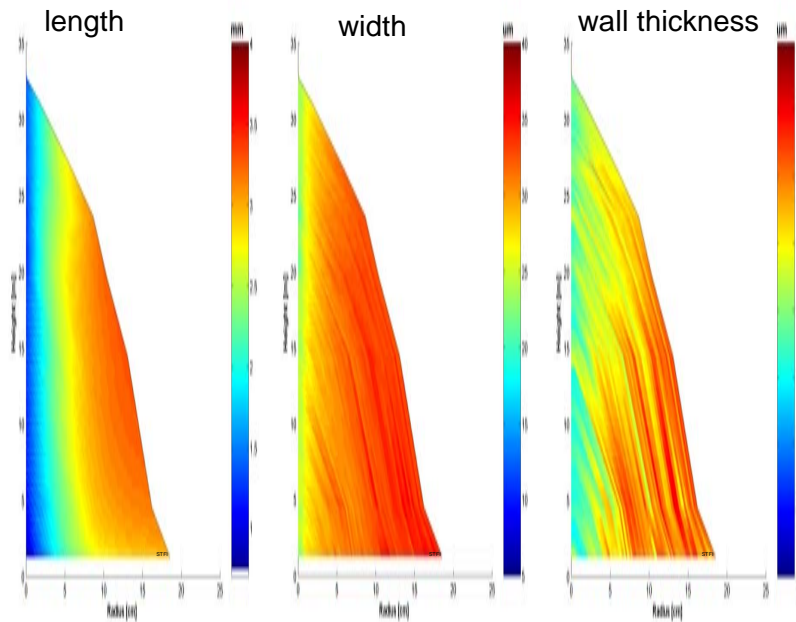
- A.** In the forest (before and after felling)
- B.** In the woodyard
- C.** In the mill (fiber fractionation)



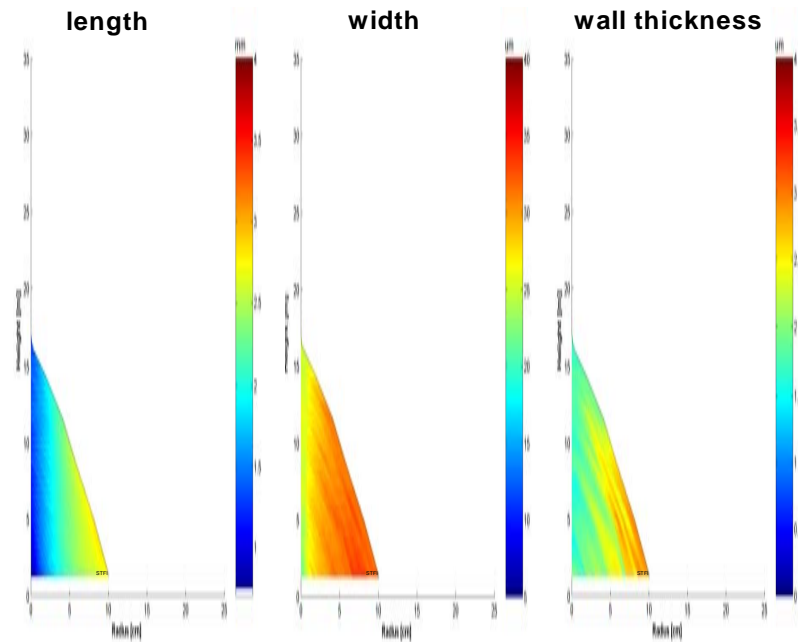
# Typical variations in fiber dimensions

- fiber length, width and wall thickness
- Norway spruce, final cutting and thinning

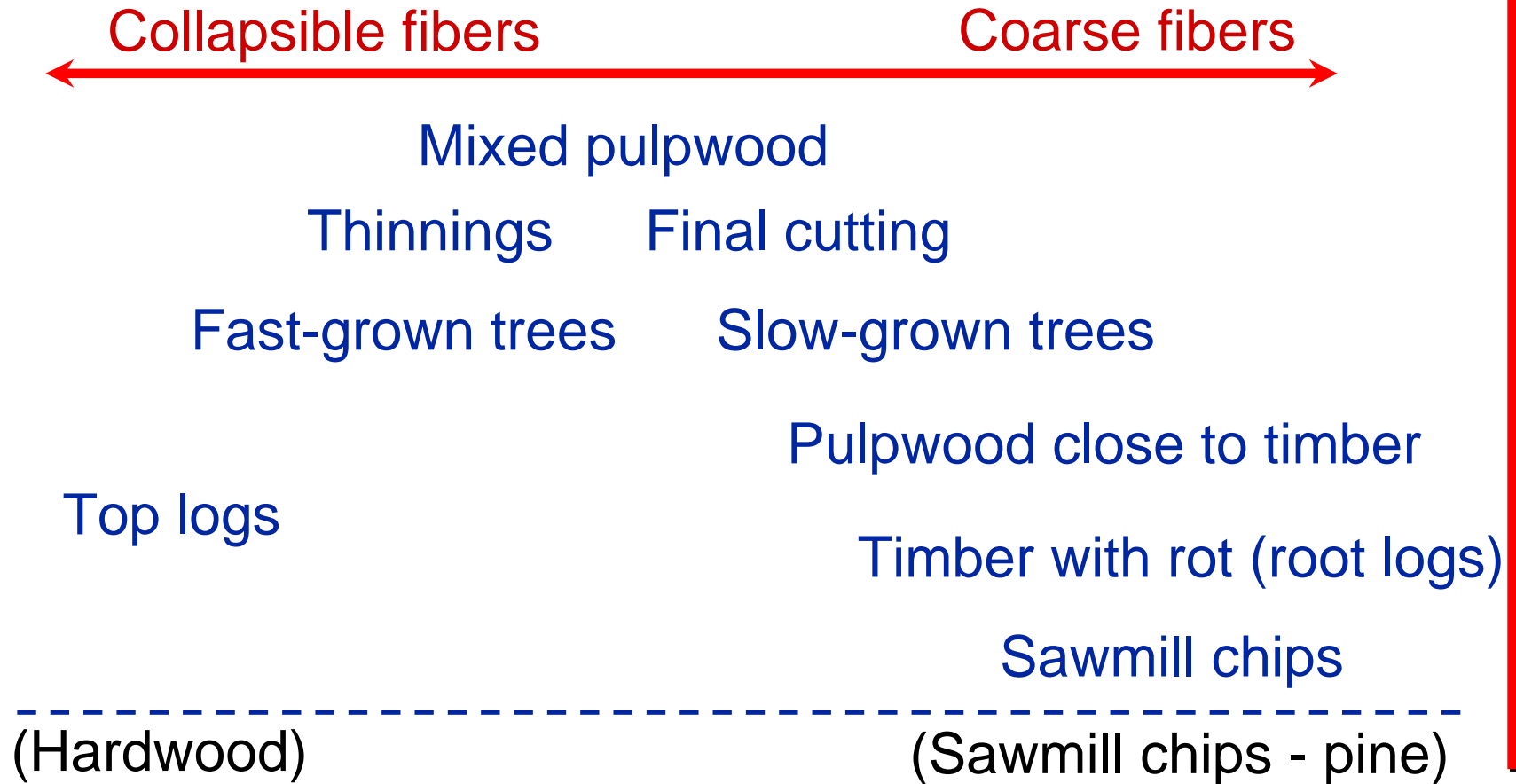
Tree ready for final cutting



Tree ready for thinning



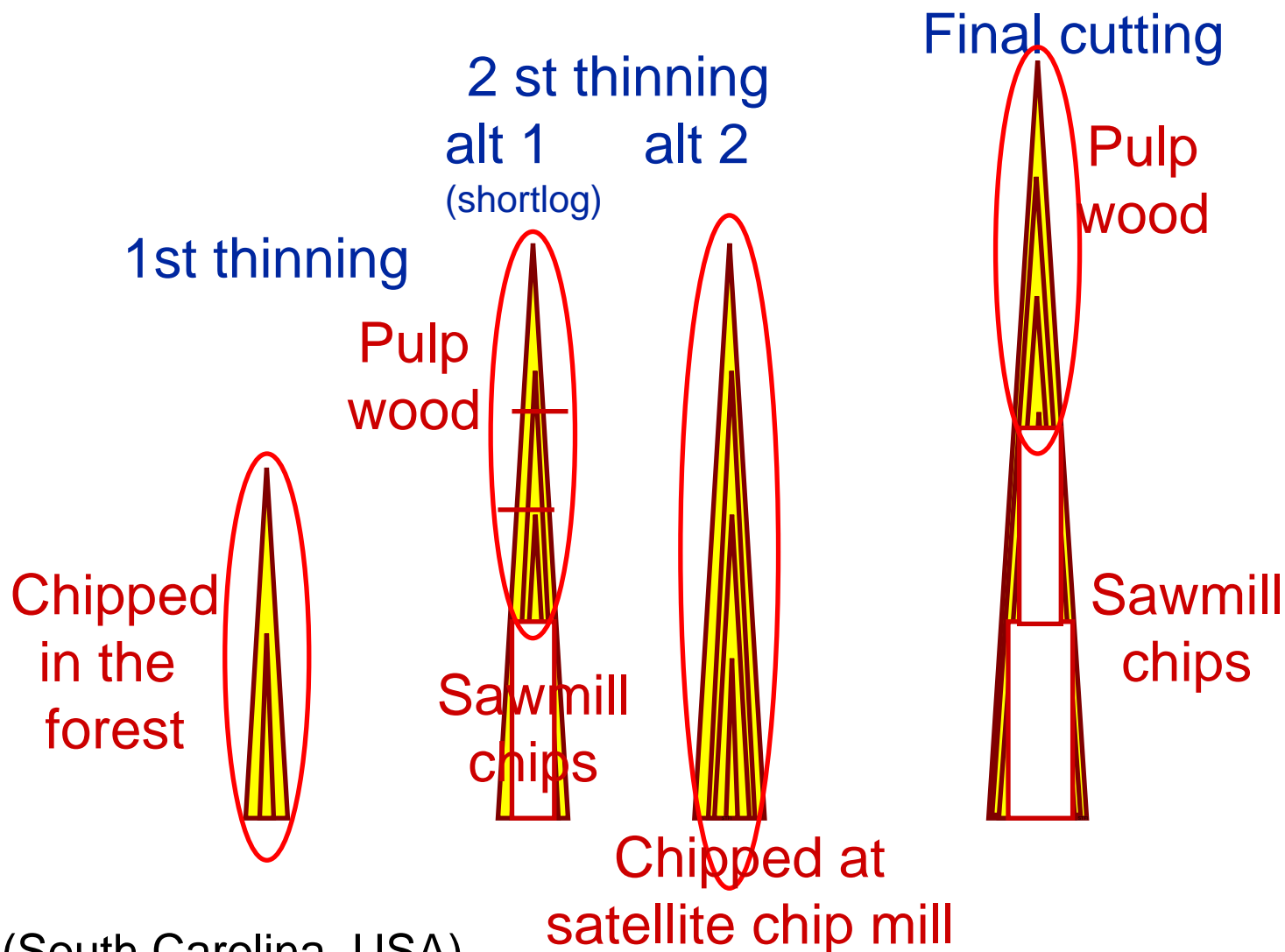
# Illustration of fiber selection: Norway spruce



(principally)



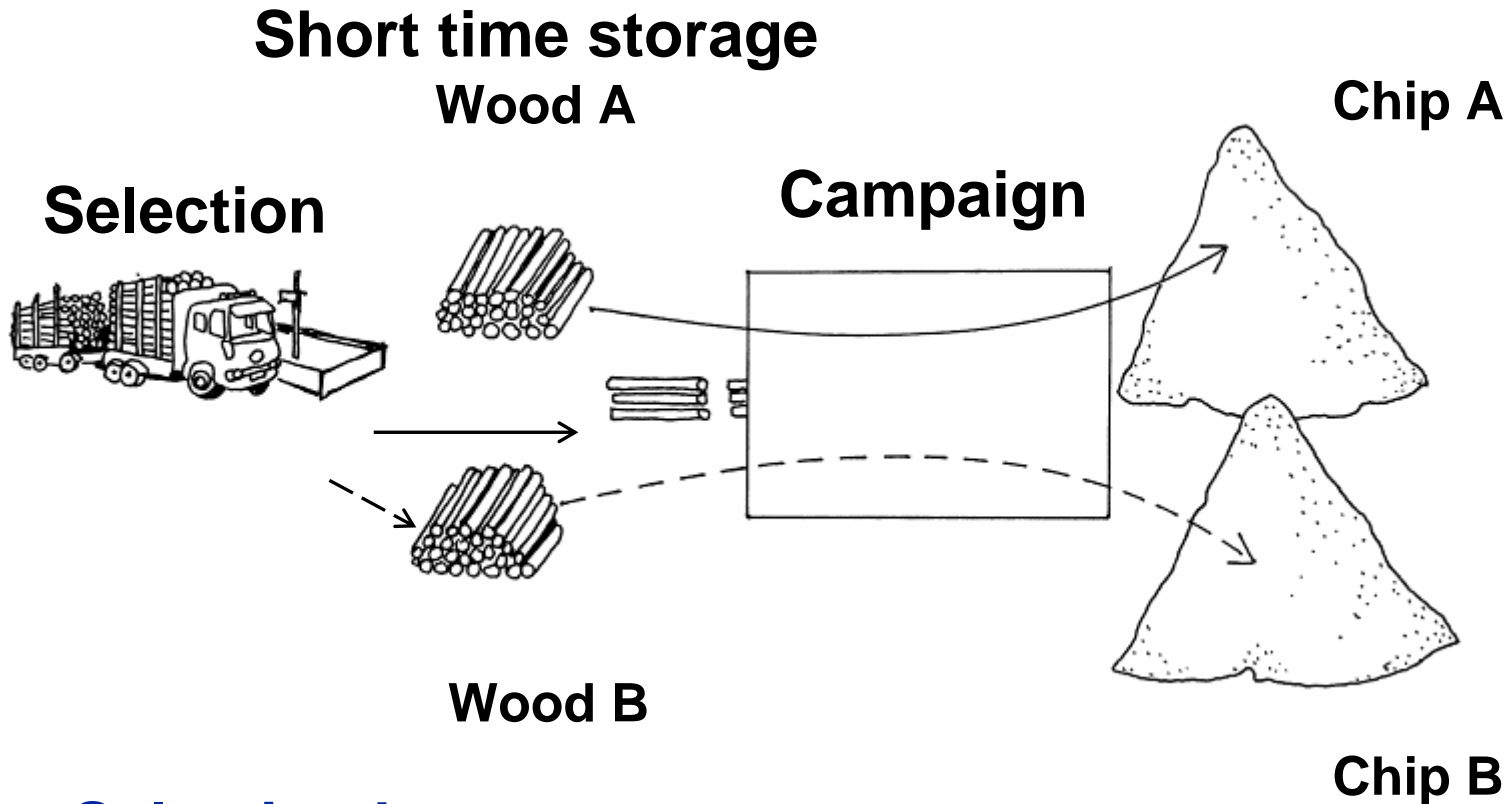
# Illustration of possible fiber selection – North America



(South Carolina, USA)

# Wood selection in the woodyard

- by truck or pile



**Selection by**

- **visual inspection**
- **automatic measurement**

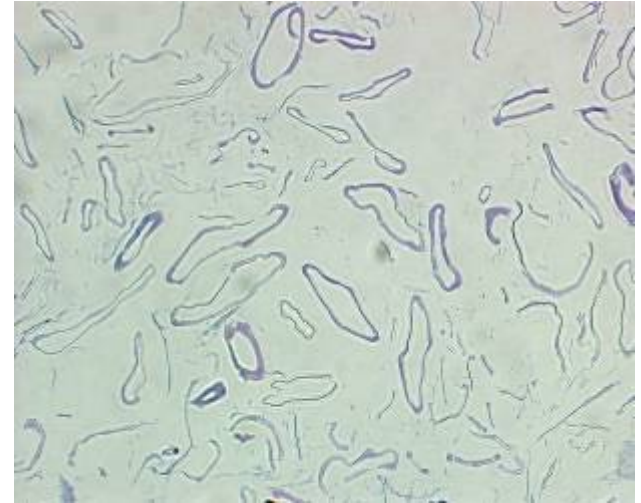
# Fiber fractionation

## Hydro cyclones

**Feed**



**Fine  
fraction**



**Coarse  
fraction**



(Photo: STFI)

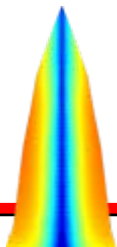
# Selection and separate handling of wood sorts ...

- ... may offer more uniform and suitable fibers
- ... is often most interesting in mills with:
  - + more than one product
  - + multi-layer products
  - + more than one production line
- ... will often bring costs (depends on system). Investments may be needed when introduced.
- To find the optimal alternative, a careful analysis has to be done, considering the entire production chain from the tree to the product



# Selection and separate handling of wood sorts

- **Selection of logs in the forest may provide wood sorts with more specific and uniform fiber properties**
- **Truckwise selection on delivery to the mill may be more straight-forward to introduce but is less selective**



# Today most mills in Scandinavia have introduced selective wood utilization in some form ...

## ... for freshness:

- Reduced wood storages

## ... for uniformity:

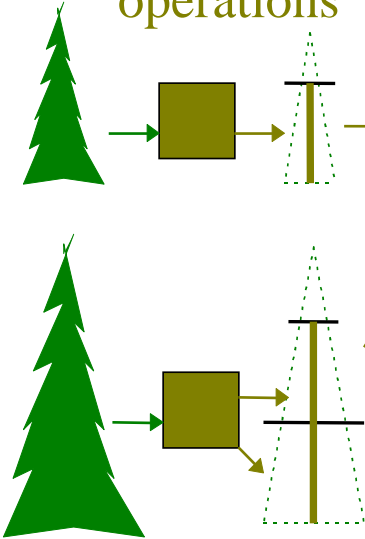
- Homogenization of chips
- Controlled mixing of different chip types or separate processing

## ... for efficiency and robustness:

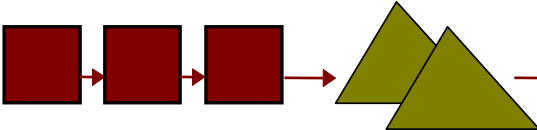
- Straight-forward solutions based on competence

# The selected fibers are developed in the mill for good function in the network of the sheet

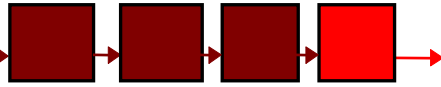
forestry operations



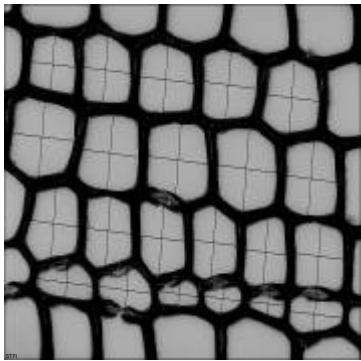
wood operations



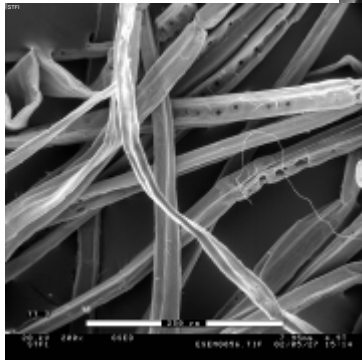
chem. and mek. processes



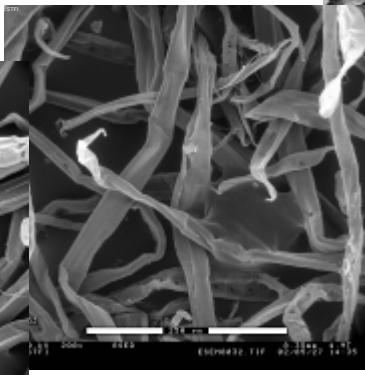
Sawmill



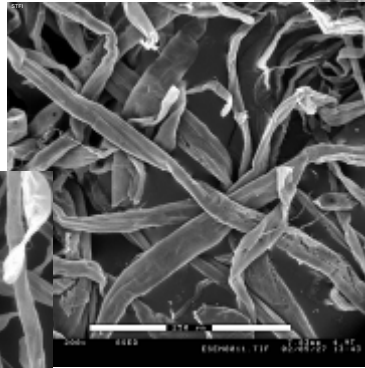
In tree



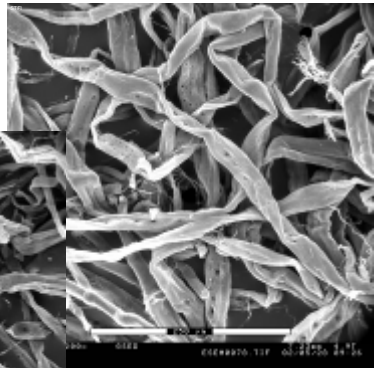
After cooking



After O



After D1



After final screening

(chemical pulp)



**Raw materials:  
suitable and uniform  
properties**

**Processes:  
suitable and uniform  
processing**

**EFFICIENCY**

**Product:  
right and uniform  
properties**