Challenges for researchers with changing forest and building industries

Charlotte Bengtsson, CEO

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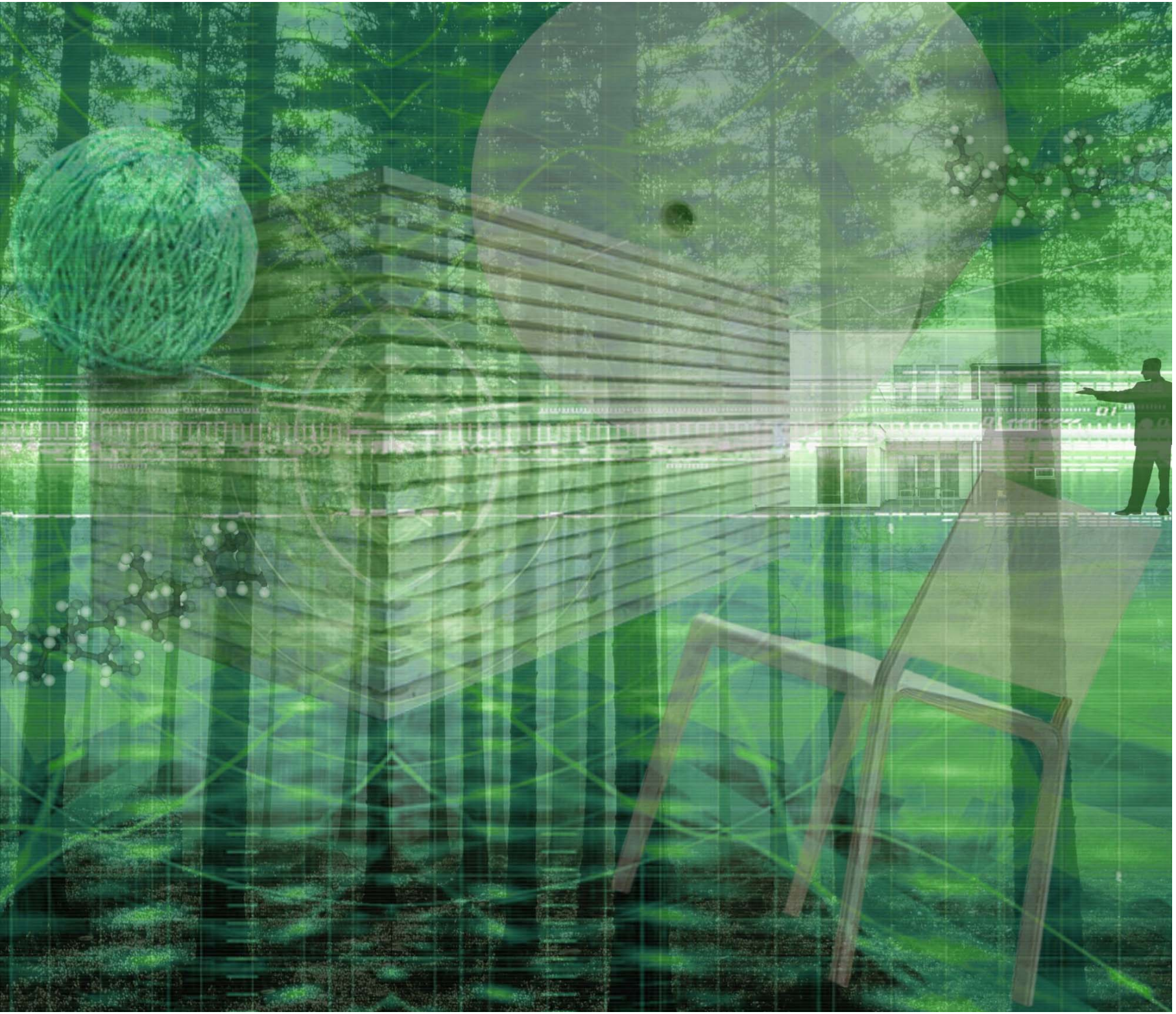

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Outline

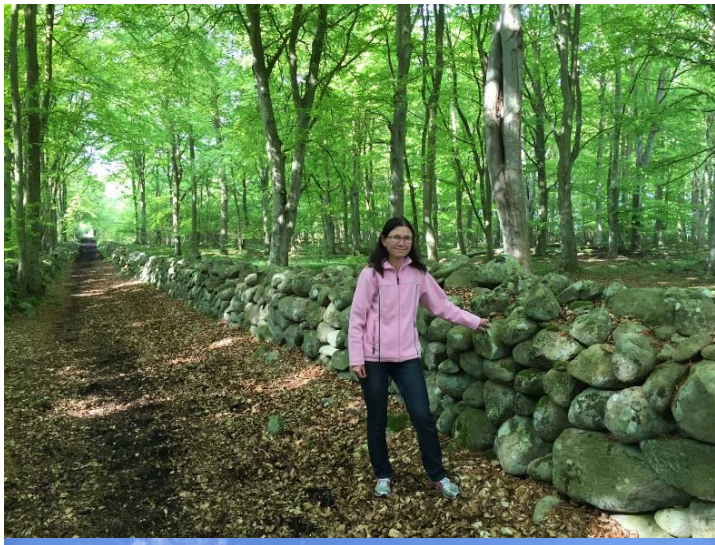
- Who am I
- Very short about Skogforsk
- More timber buildings
- Researcher challenges
- Conclusions and thoughts

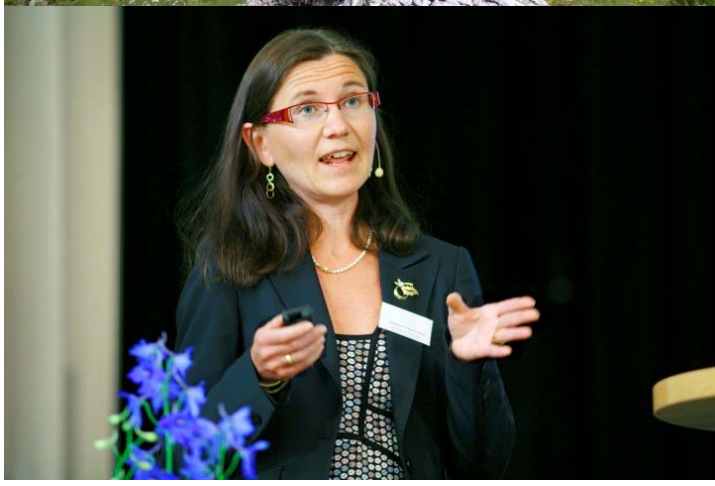
Short about me

- MSc in Civil Engineering, 1994
- PhD in Timber Engineering, 1999
- Prof in Wood Construction, 2008

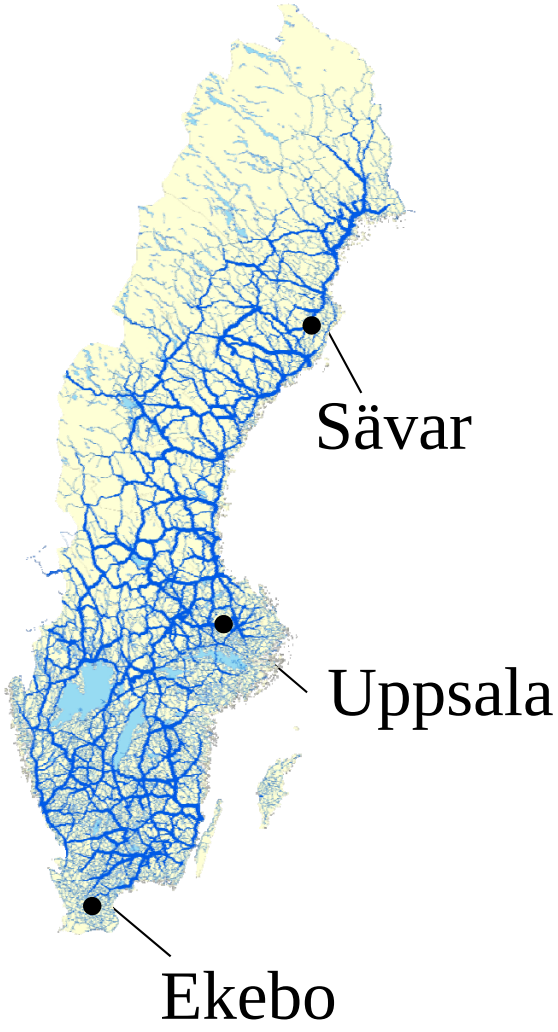
- Manager SP Wood Technology, 2008 – 2014
- CEO Skogforsk 2015 -

- Researcher, grading of timber, durability, modified wood, glued wood products…
- European standardisation, structural timber
- Board member in several reserch foundations dealing with wood research and forestry





Skogforsk in brief



Forestry and the government in collaboration

Applied research, development and innovation for a sustainable and profitable forestry

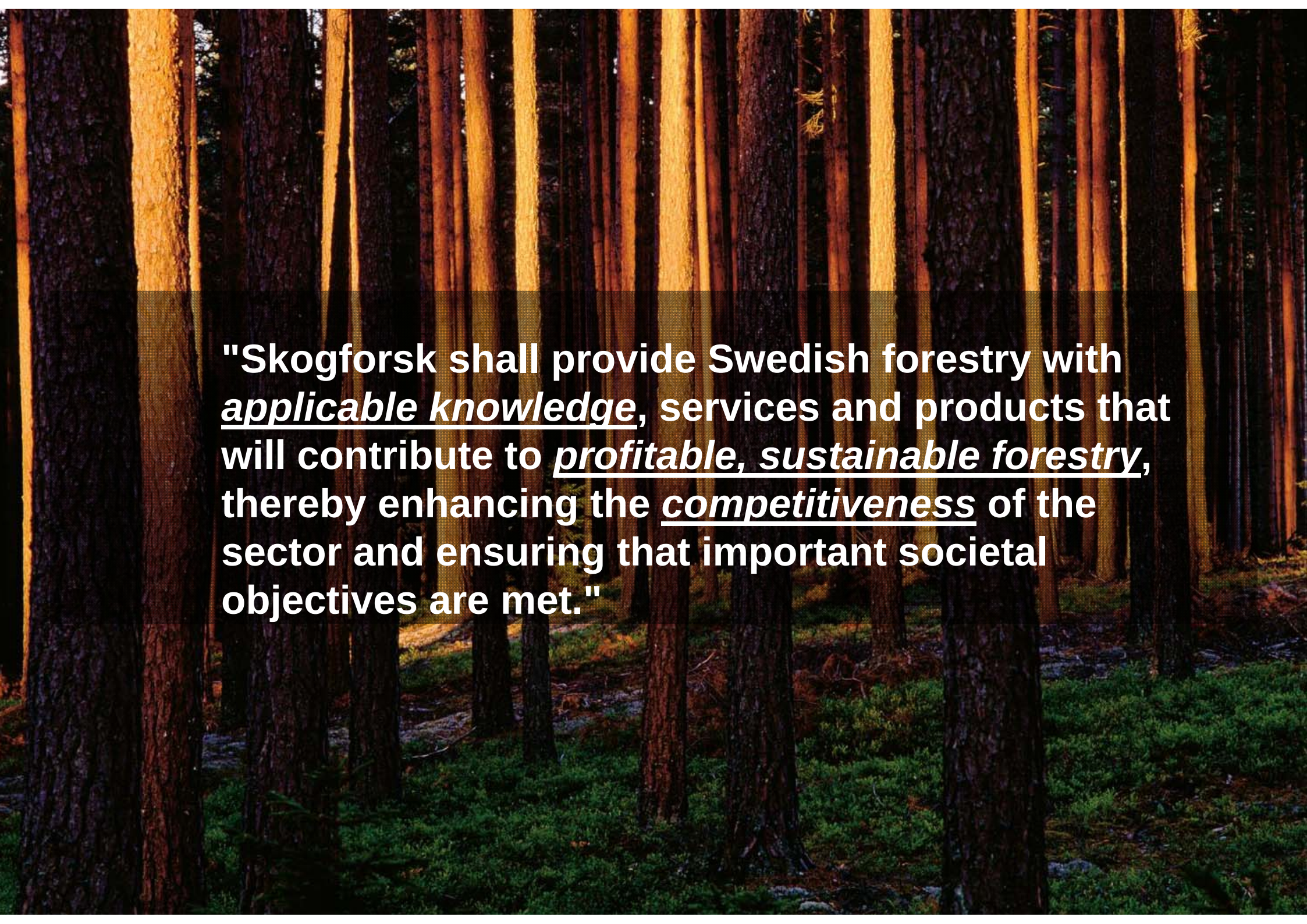
Approx 110 employees in three locations

Research areas:

- Forest Production
- Wood Supply

Communication of knowledge

Seed- and fieldservice, nurseries


"Skogforsk shall provide Swedish forestry with applicable knowledge, services and products that will contribute to profitable, sustainable forestry, thereby enhancing the competitiveness of the sector and ensuring that important societal objectives are met."

EV7

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Research organisation

Two research areas. Six programmes.

Forest Production

Marie Larsson-Stern

Wood Supply

Magnus Thor

Tree Breeding, North	Tree Breeding, South	Silviculture & Environment	Operations and Products	Forest Energy	Planning
					
Bengt Andersson Gull	*Bo Karlsson*	*Isabelle Bergkvist*	*Rolf Björheden*	*Maria Iwarsson Wide*	*Gert Andersson*

EV7

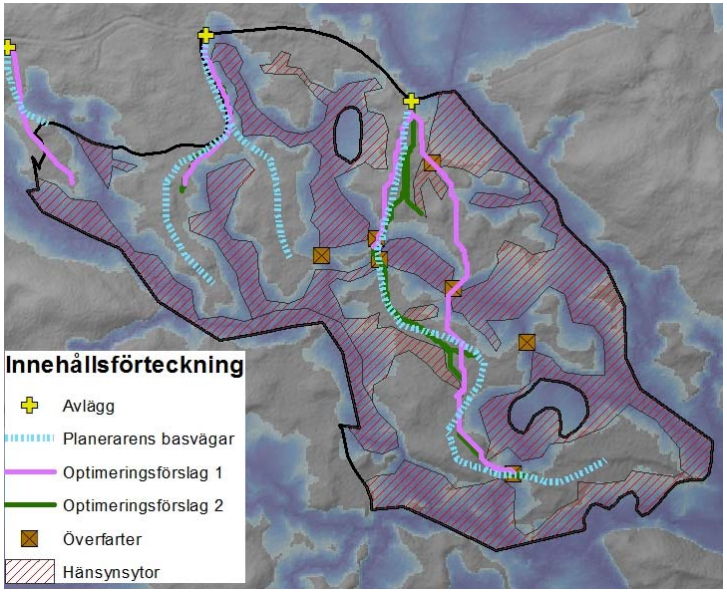
Det är något stök med vissa färgval. Den här gröna och blå färgen ingår inte i den grafiska profilen.

Jag vill ha en generell genomgång av färgerna så att de matchar våra sex grundfärger. Sedan kan man välja att jobba med olika transparens för att få variation vid behov.

RGB-koderna framgår av vår grafiska profil.
Erik Viklund; 2013-08-12

Productive and gentle forest operations

- financed by Swedish forestry (50 MSEK through Skogforsk's Board of Directors)



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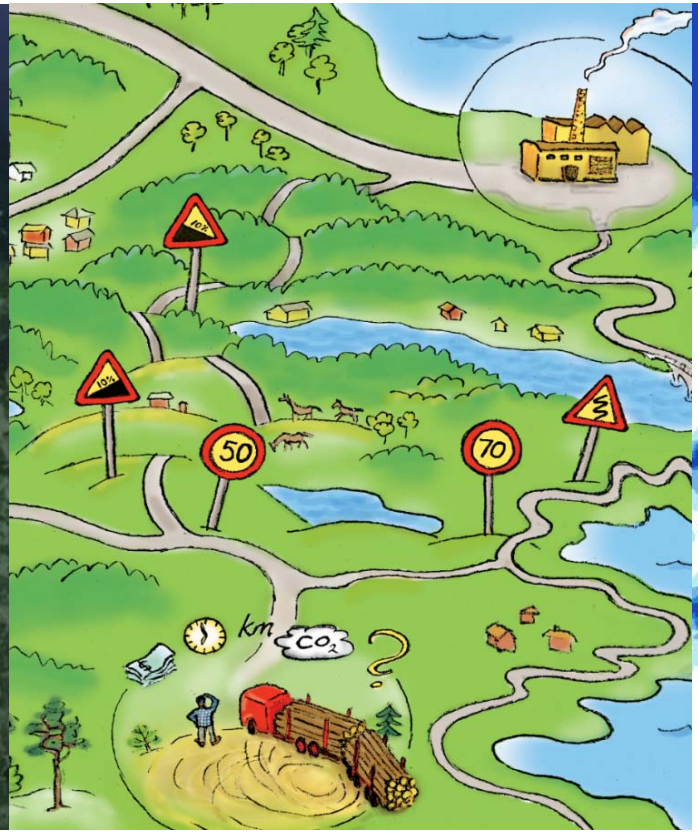
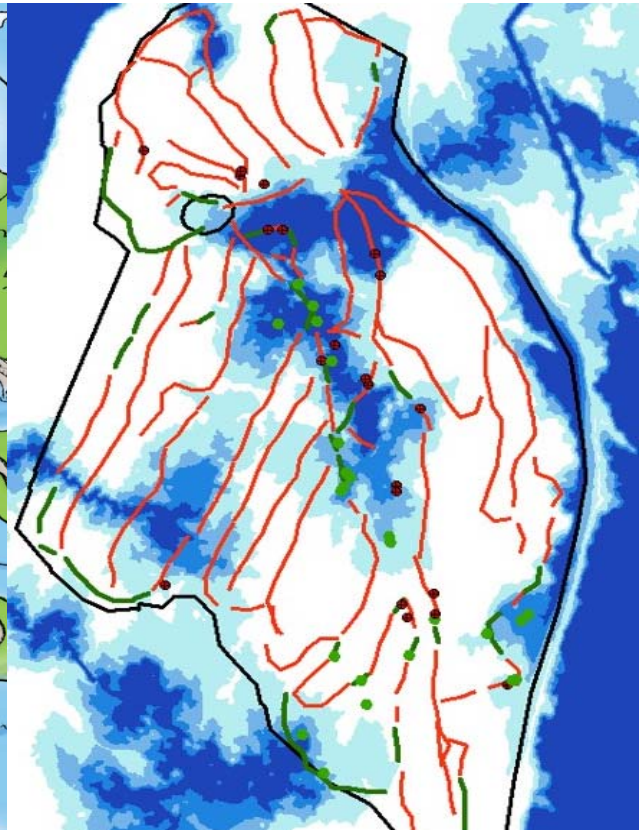
Decision support for operational harvest planning

Calibrated route finder



Rut formation and DTW - index



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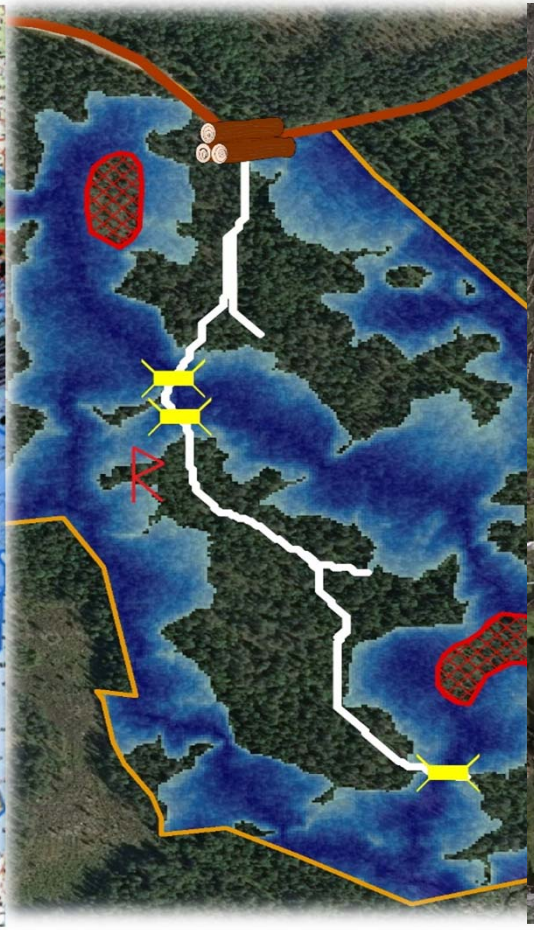
Educational Tool for wood flow optimization



BestWay – Next generation of forwarder planning

Logging in uneven-aged forests

Strategic investments in forest roads

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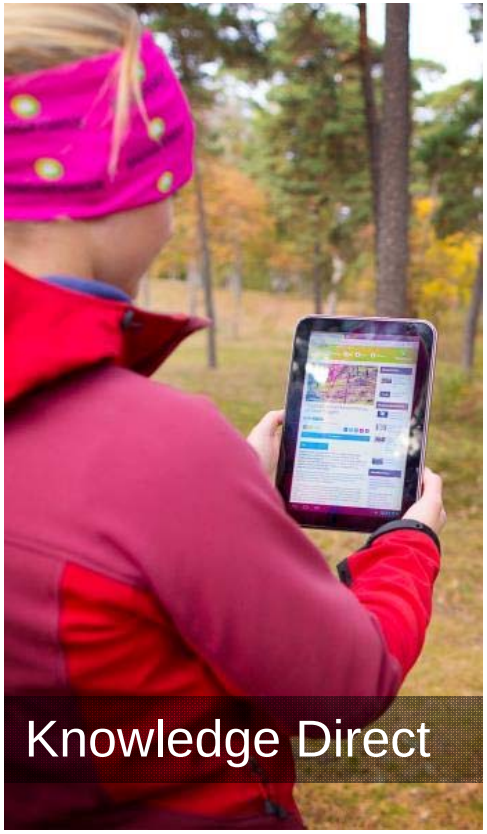
Some of our communication channels, www.skogforsk.se



Forestry – many aspects and interests

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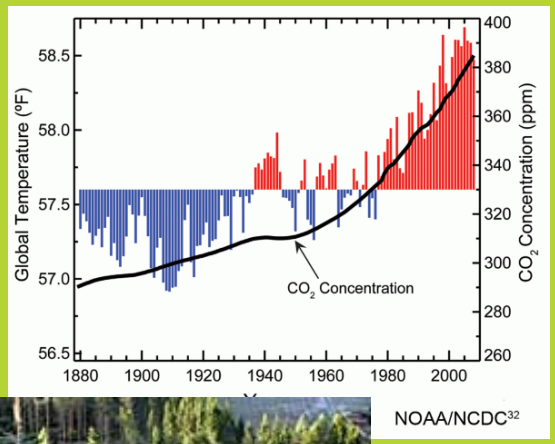


NOAA/NCDC[32]

Looking ahead – big picture

- Compliance
  - Climate change
  - Public confidence
- Attractiveness
  - Skills development
  - Sustainable market for manufacturers
- Adaptability
  - New technology in forestry applications

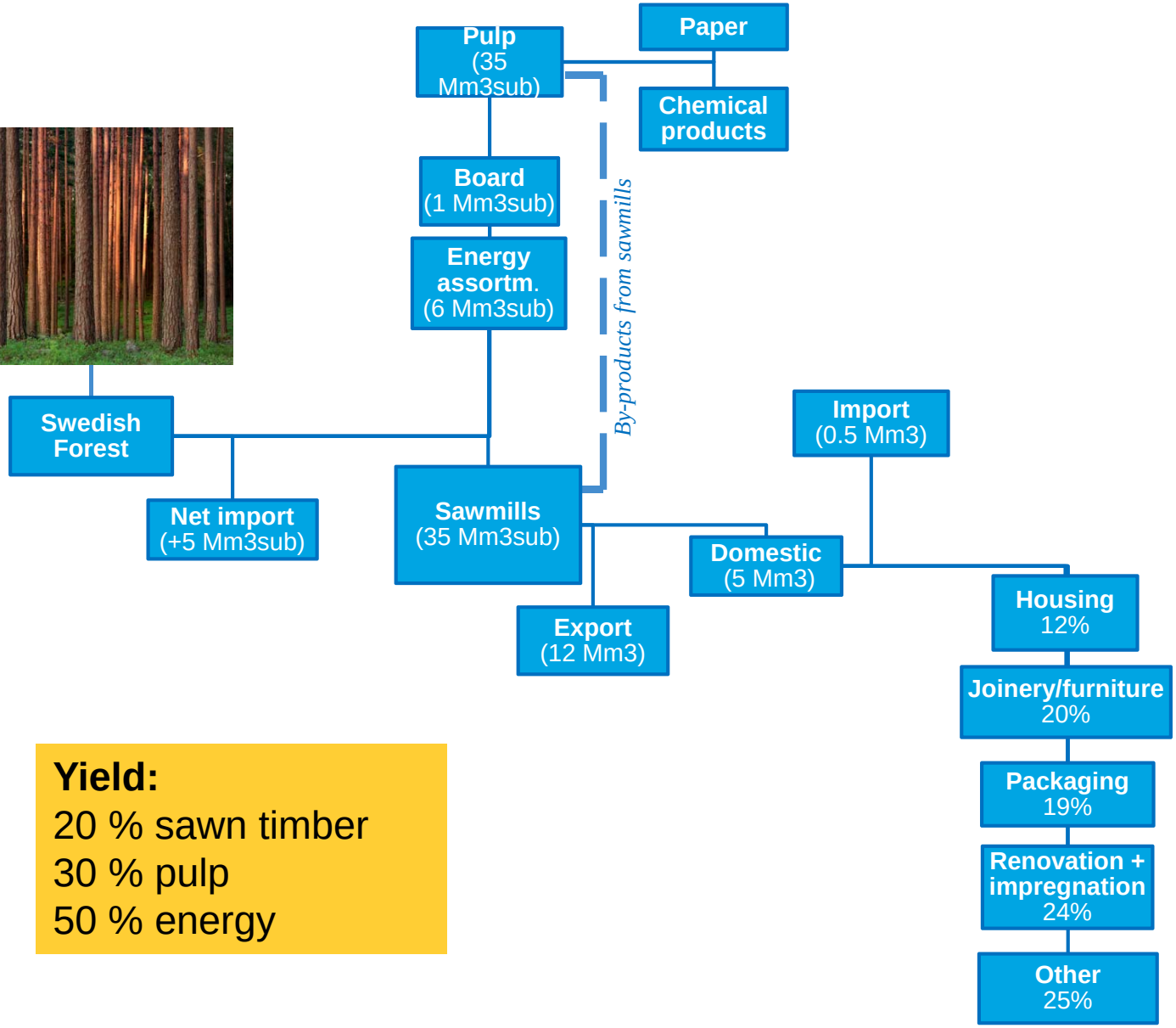
Productivity & profitability

But this is not enough…

- Decreasing costs, of course necessary…
- Increasing value added, new products and new markets are needed
- The pace of innovation within the industry must increase
- Powerful R&I efforts are needed
- **The forest industry value chains must be renewed**

- **NEW COLLABORATION**

Raw material and value flows in wood mechanical industry



Yield:
20 % sawn timber
30 % pulp
50 % energy

Value added in relation to sawn timber

1.5 x

20-30 x

2 x

1.5 x

3-10 x

Construction & Living approx 70 %

Source: "Agenda Trä"

Long tradition of building prefabricated one-family houses (since 1930 approx)

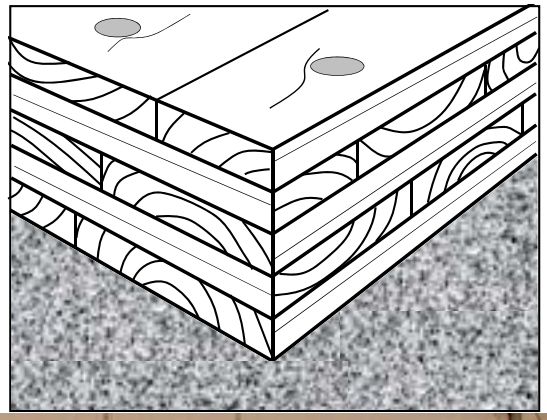
Development

Ca 1900	Building of timber houses (multi storey) in cities stop
1940-	USA: Miljons of apartments are built with timber frame
1994	Change in building code in Sweden => Multi storey timber houses are allowed
1994-2000	Development program for techniques on Nordic basis. Weak market development.
2000-2004	Weak interest from big building companies. Building of student houses is successful
2004-	A number of timber based building systems are developed
2010-	10-15 % of the market for new multi storey houses

Challenges (with solutions)

- Sound
- Vibration
- Stability
- Connections
- Weather protection
- Durability
- Fire safety
- Energy efficiency
- Development of components

But this is not enough!




LINDBÄCKS
rationellt byggande – sunt boende

Building process volume elements

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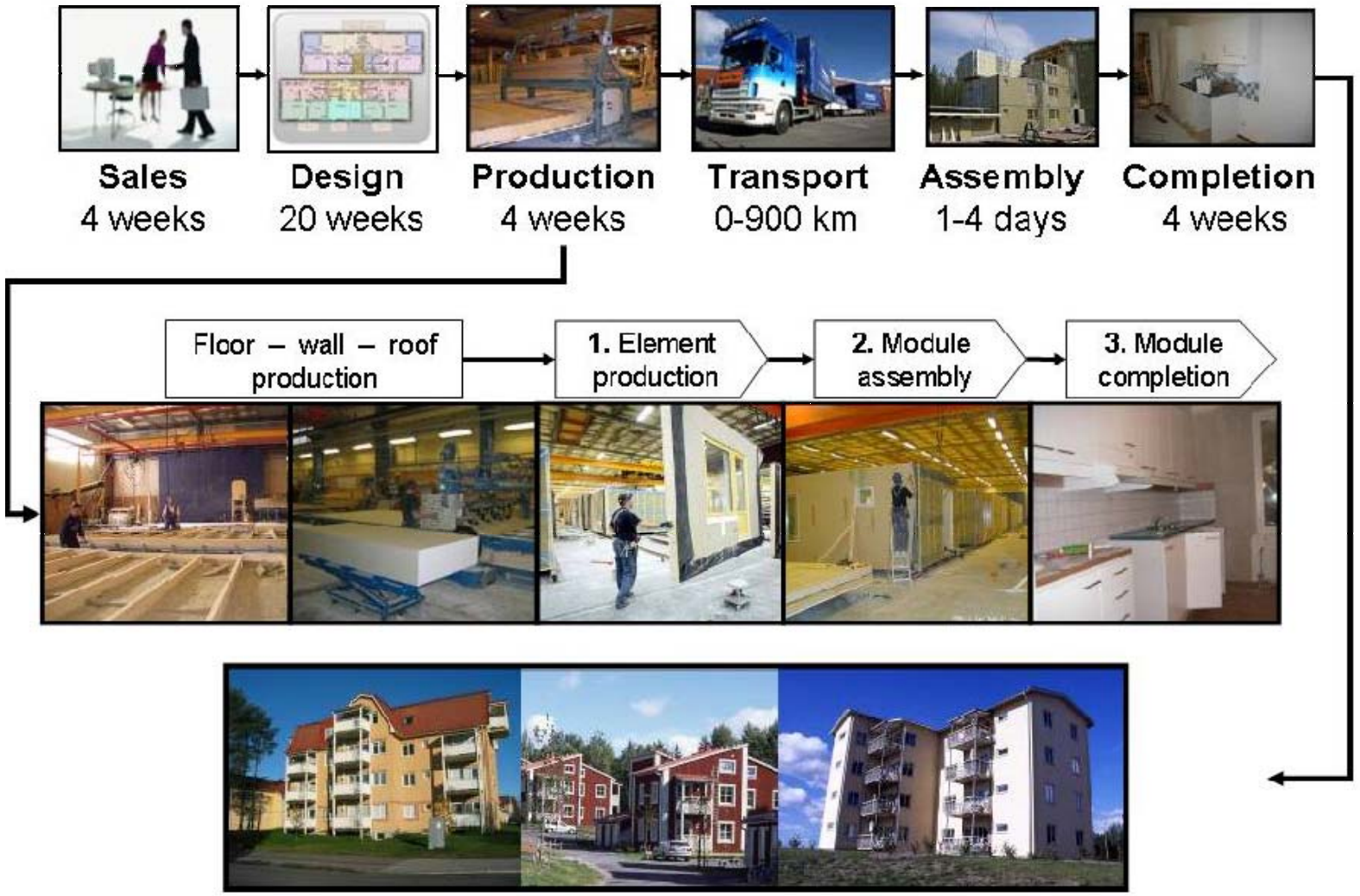

Remember

- Wood is the only renewable building material
- Wood is suitable for prefabrication in a factory – cost efficient, good for quality assurance
- Building with wood adds value

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Small timber bridges

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Large timber bridges

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Parking house in Skellefteå

Other constructions…

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Research shows wood is good for the climate

Comparative research shows that using a timber-framed construction in buildings instead of a concrete one is good for the climate. The studies have been carried out by researchers at Mid Sweden University in collaboration with, among others, Finnish researchers.

Carbon-dioxide balance in the production of a four-storey building

The carbon-dioxide balances for two otherwise identical houses – one with a timber frame and the other with a concrete one – have been compared over a 100-year period. The wooden building was constructed in Wälludden, part of Växjö, and the researchers have also calculated the carbon-dioxide balance for an identical building with a concrete frame.

The figure shows net emissions of around 96 tonnes of carbon-dioxide from the building with the concrete frame, while the building with the timber frame produces no emissions; instead it had a net uptake of 150 tonnes of carbon dioxide (a positive value means net emissions, a negative value means net uptake).

Building with timber frame

Reference building with concrete frame

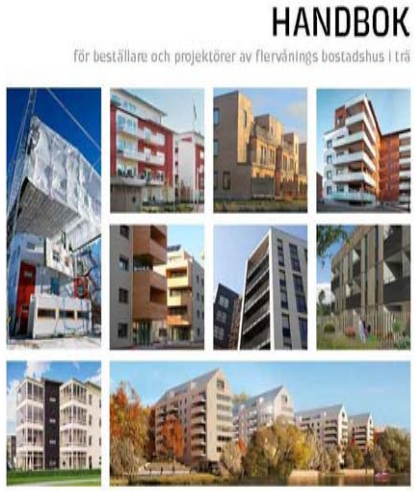
The analyses take into account energy consumption in the production and distribution of the building materials used, as well as the construction of the building. In the case of the wooden building it is assumed that the by-products from harvesting of the forest and production of sawn timber are used as biofuel and thus replacing fossil fuels. In the case of the concrete building, the uptake of carbon dioxide by the cement through the carbonisation process has been taken into account. It has also been assumed that the harvested trees are replaced by new saplings that bind carbon dioxide through photosynthesis. The carbon from the harvested trees is stored in the wood as long as the material still exists.
It is assumed that once the buildings have been demolished the wood will be used to replace fossil fuels.

Potential

- Wood construction in earthquake areas
- Renovation
- Extending houses with more storeys
- Development within the sawmill industry to produce elements/components
- Product development/New innovations

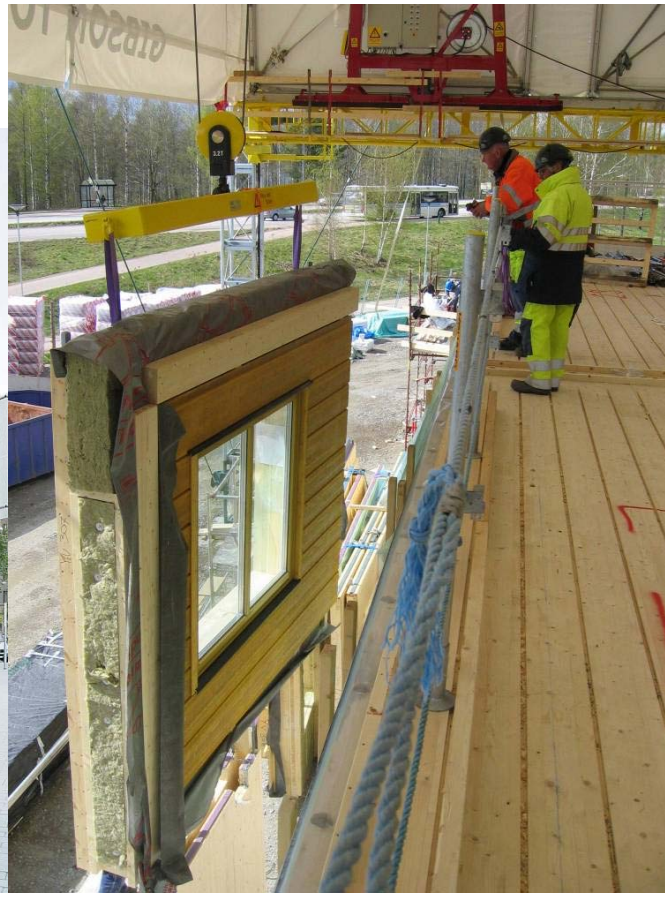
Summary

- Building multi storey timber houses, well established today
- Building with wood is part of the solution for increased housing
- Building with wood is natural in a biobased economy
- Continue to document building projects and build up knowledge
- Stretch the boundaries, major buildings, infrastructure solutions ...
- Time for next challenge, more biobased!



Still unexploited challenges

- Building in an effective and industrialised way
- Use the wood resource so it creates value
- Environmental/climate advantages
- A new business sector: Timber construction



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From forest to building in use

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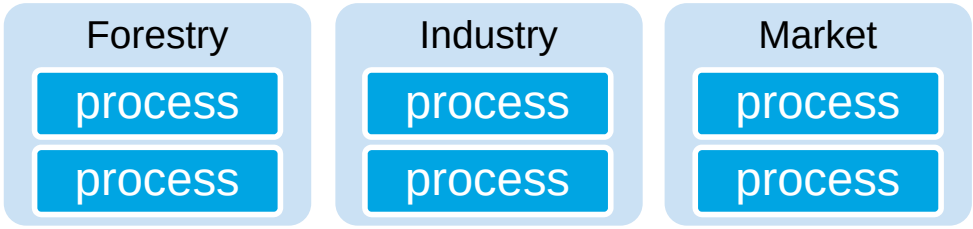
Supply Chain Management

- enhanced coordination and cooperation

Trad:



With SCM:

Maximize supply chain surplus

Right time now for change towards more biobased

- Knowledge of the need for a change
- More biobased buildings and products require forestry with high acceptance (gentle operations, workers environment, maintained biodiversity…)
- ”Big data” opens new possibilities (both in forestry and in industrial processes afterwards)
- Lots of need for R&I in different constellations

Conclusions and thoughts

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- Focus on value instead of volume
- Productivity and profitability is necessary but do we measure and evaluate in the right way?
- Is our toolbox up to date?
- Maintaining and developing new deep knowledge and at the same time be open for collaboration with new competences
- Developing new collaboration (new partners and new ways of collaborating)
- Scrutinize ”old thruths” and test new ways of measuring and evaluating
- Academia – Institute - Industry

Challenge for research or for next SSAFR conference

- Papers in which the borders between different parts of the value chains are explored
- New research ideas which improve the value chain in the forest industry
- Our contribution to the biobased future is important!

Thanks for listening!

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