

Feedback to operators based on harvester data

NB-NORD workshop on Big data from forest machines
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High demands are put on the operator!

- Accurate measurements, identify stem defects, productivity...
- Digitalisation and big data offer great opportunities to develop tools and systems for feedback and decision support



Continuous feedback is fundamental!

Land Skogsland
Nr 7 6 februari 2004
Affärstidningen för skog och trä



Caterpillars skidder strödd med företagets stora skördaraggregat 1-11-1 75. Det var det enda aggregat i Skogslands test som orkade mäta stamdiametern bra vid normal avverkningstakt.

Usel mätning avslöjad i test

Caterpillar har enda godkända skördaraggregatet

Flera av marknadens skördaraggregat har en usel förmåga att följisamt mäta stamdiametern. Det visar Skogslands test av sju stora aggregat. Den första

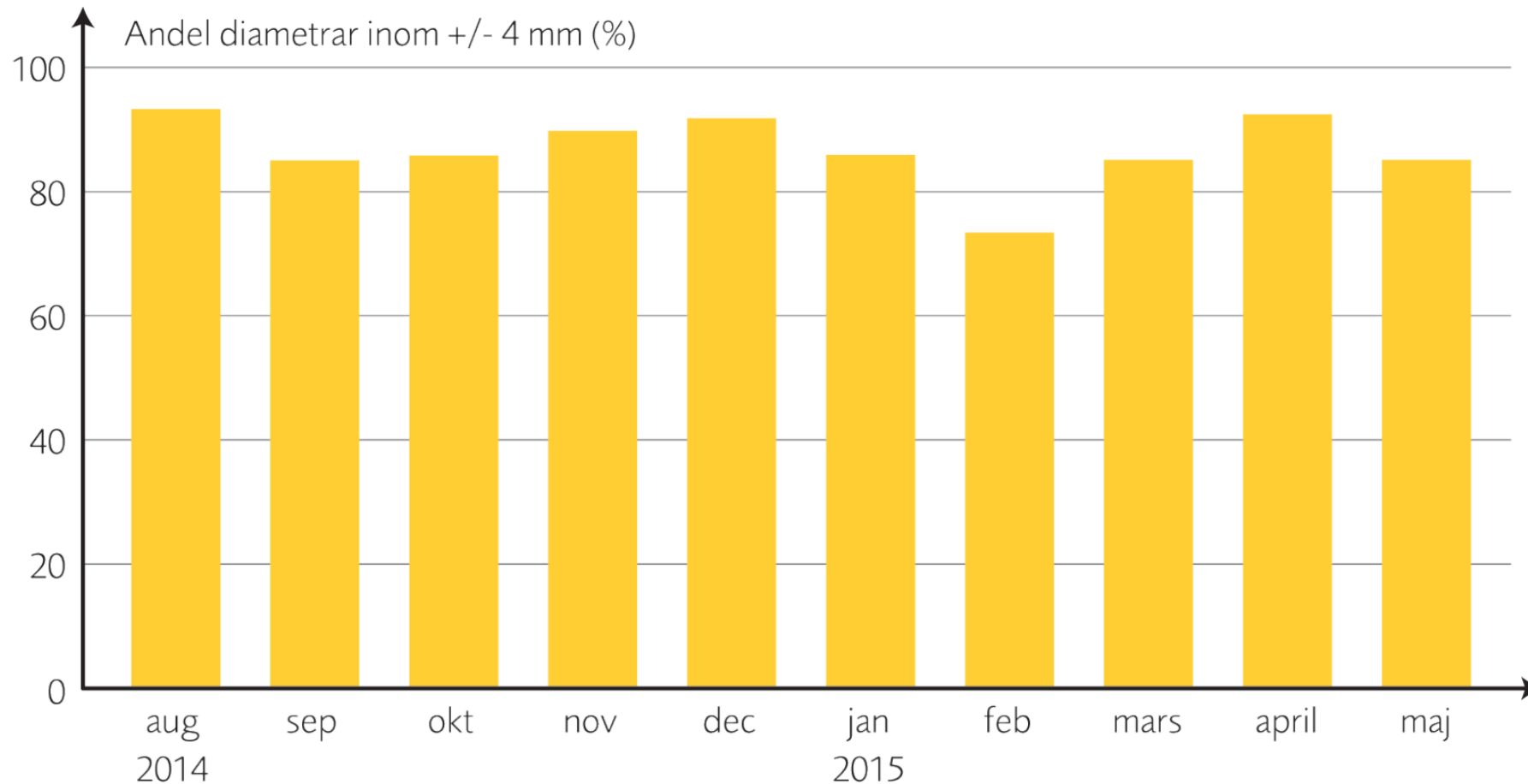
granskning av aggregat i normal avverkningstakt som gjorts. Marknadens storsäljare visade stora brister.



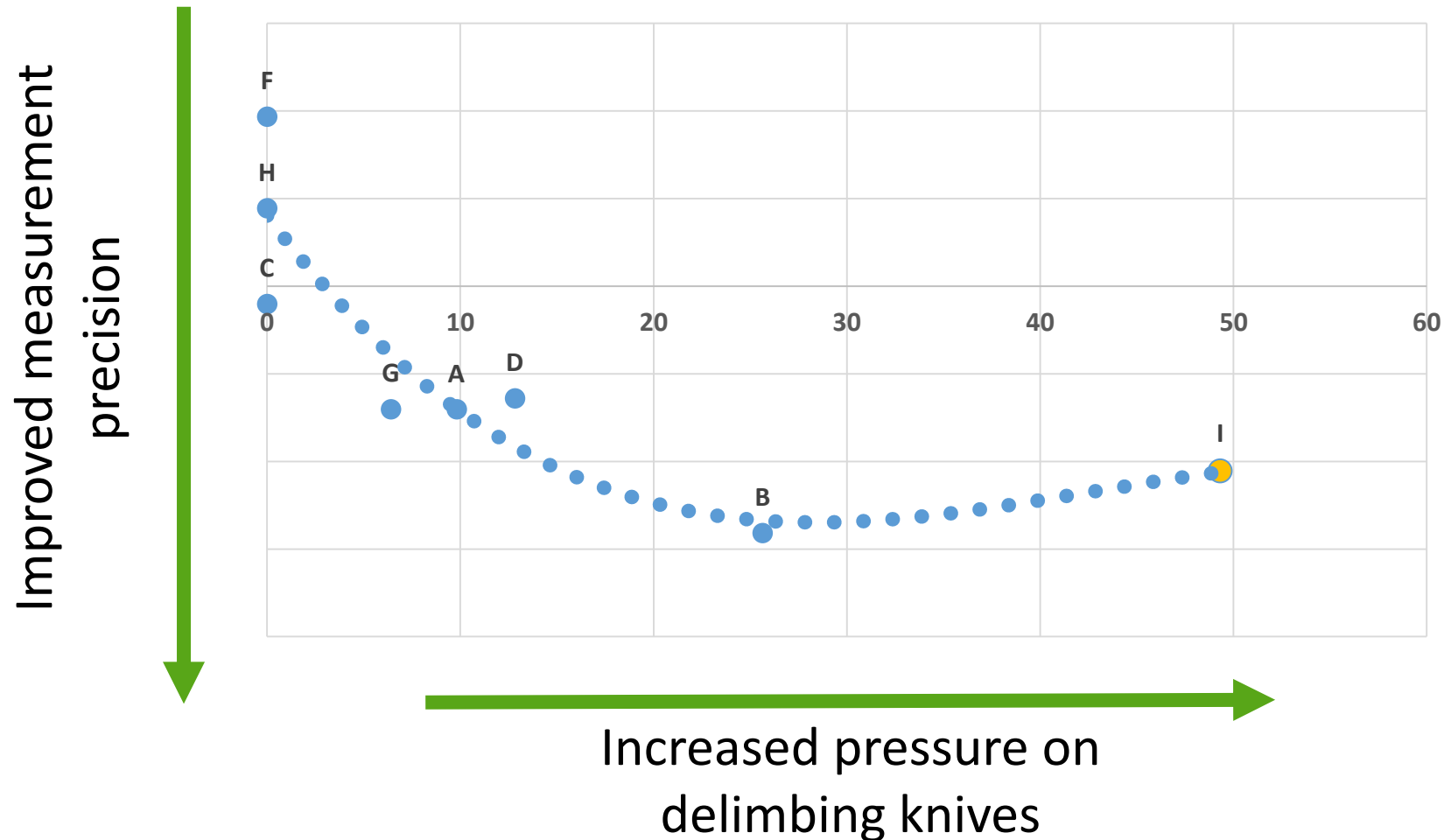
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- **Manual control measurements** of 1-2 stems per 8 hour shift
- **Feedback** from auditor every two weeks
- **Field visit** by auditor 1-2 times annually
- Increasing interest and good results!

Continuous feedback is fundamental!



New tools for identifying bad diameter measurements and advice on settings



Next step – broadening the scope to quality certification of harvesting operations

KPIs log production and quality

	PINE	SPRUCE	BIRCH
Average stem size (m3sub)	0.518	0.361	0.127
Volume (m3sub)	 786.1	 318.4	 3.7
Timber share (%)	 84	 63	
Share of manual cuts in timber (%)	 15	 4	
Share of defect wood in timber dimensions (%)	 5	 23	 100
Top diameter at last cut (mm)	 93	 81	 86
Top diameter at last timber cut (mm)	 169	 148	
Obtained distribution (%)	 84.9	 87	

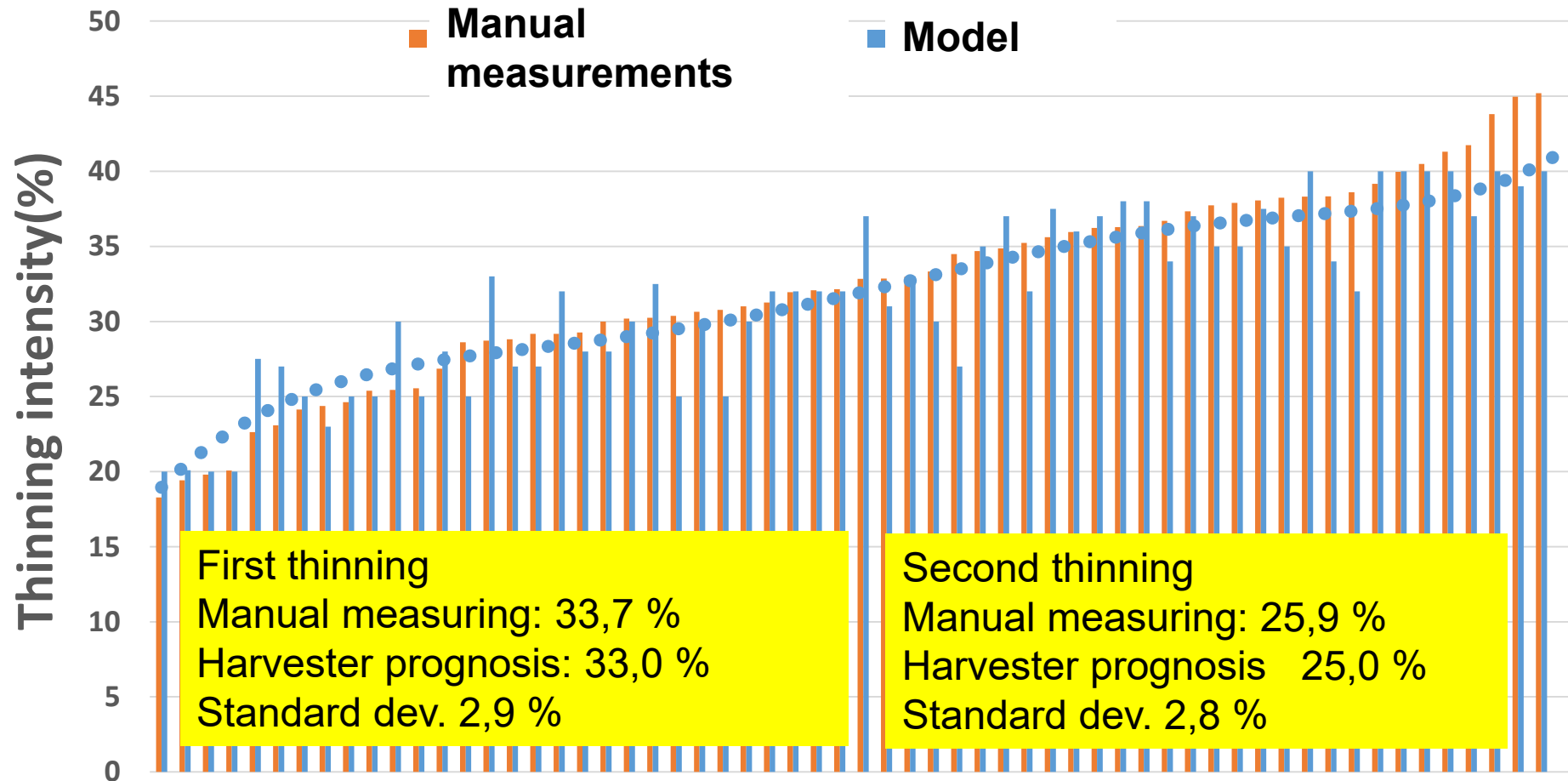
Automatic follow-up of thinning operations



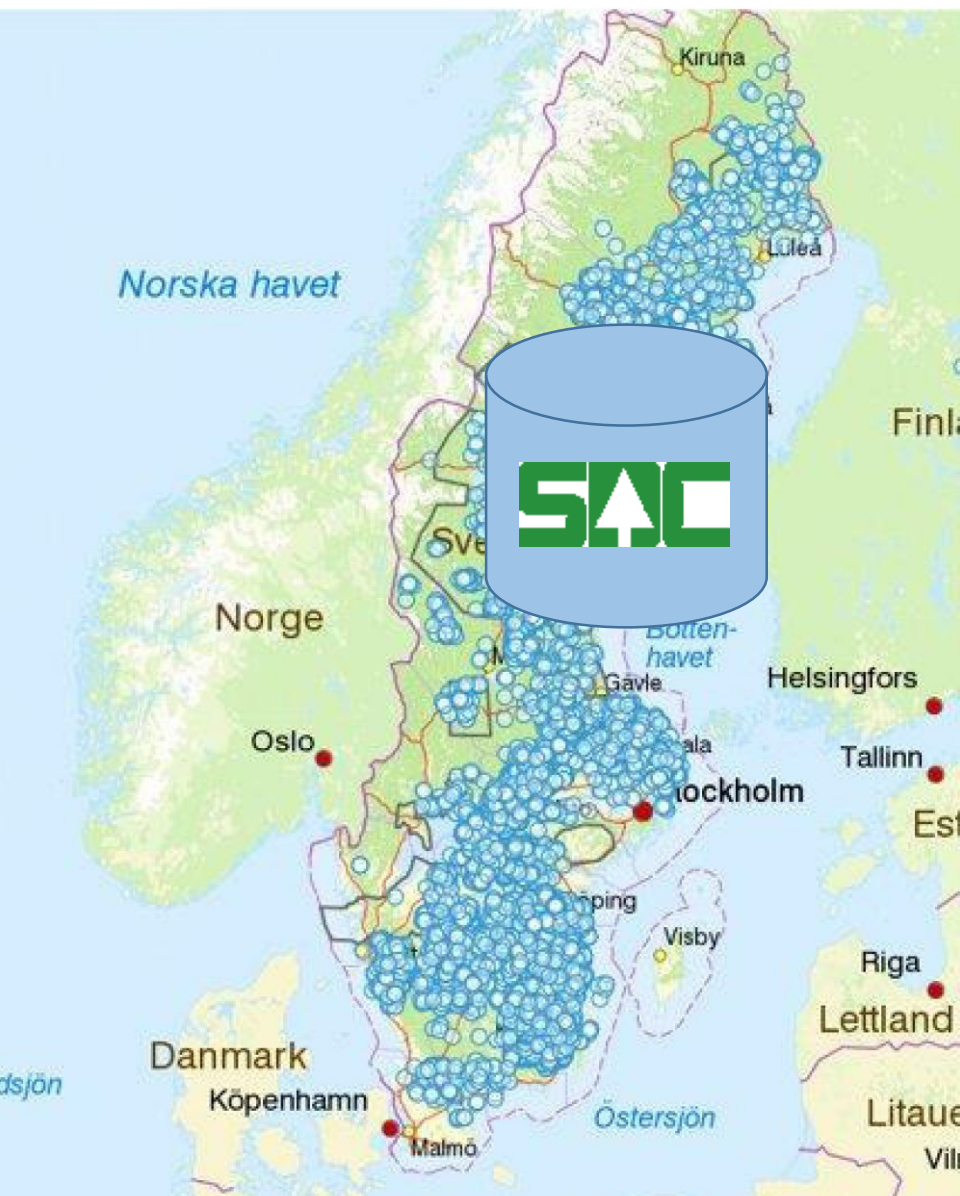
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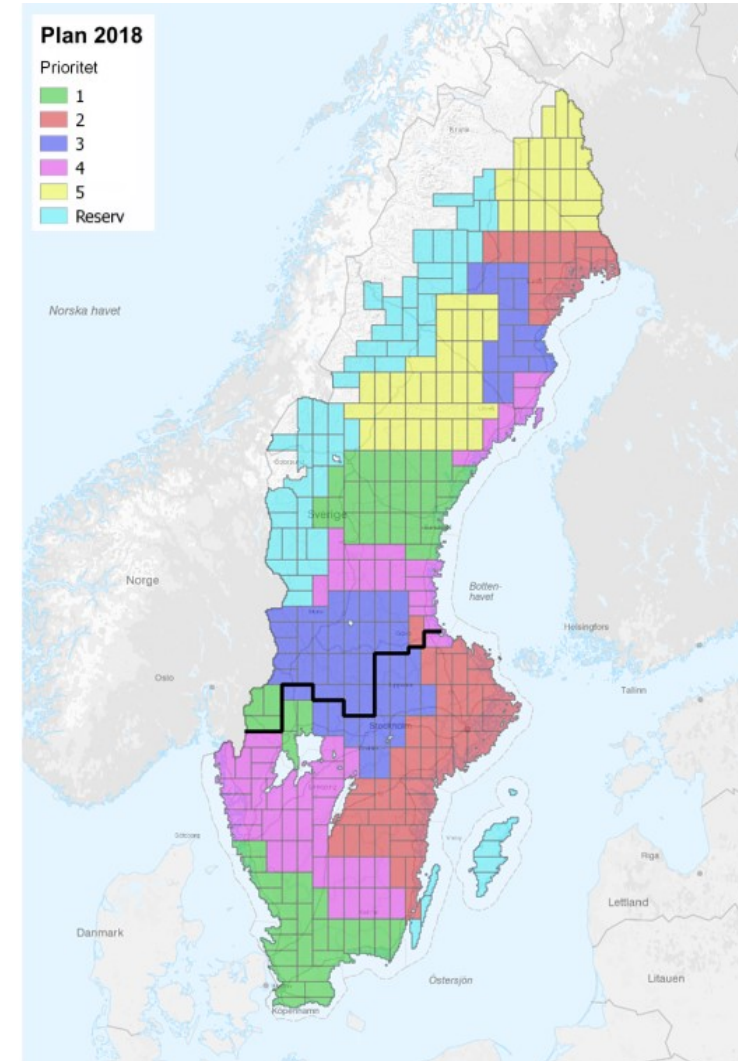
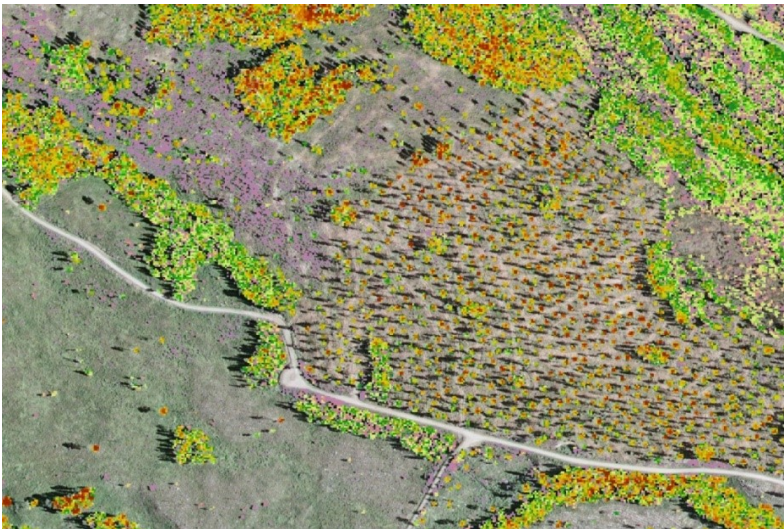
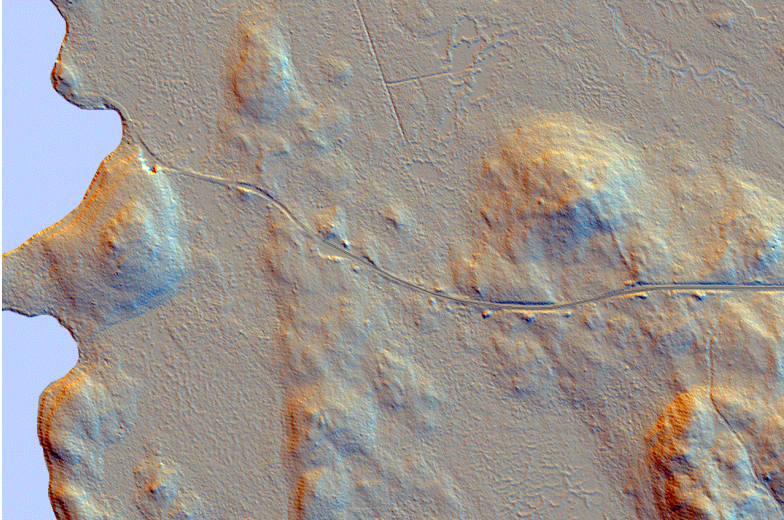
Excellent results and fast implementation



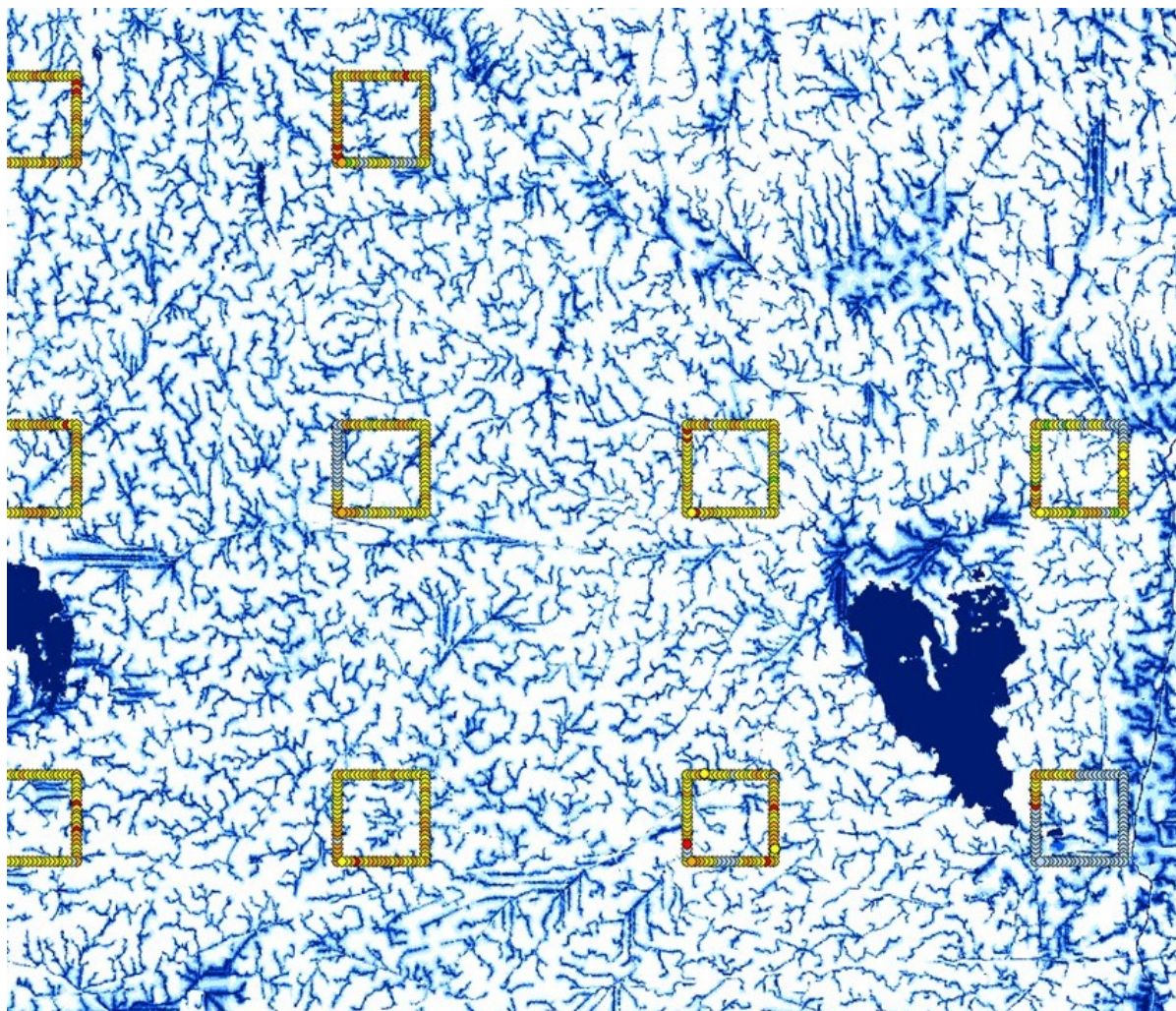
Digital forestry – harvester big data



National laser scanning – digital terrain and canopy models

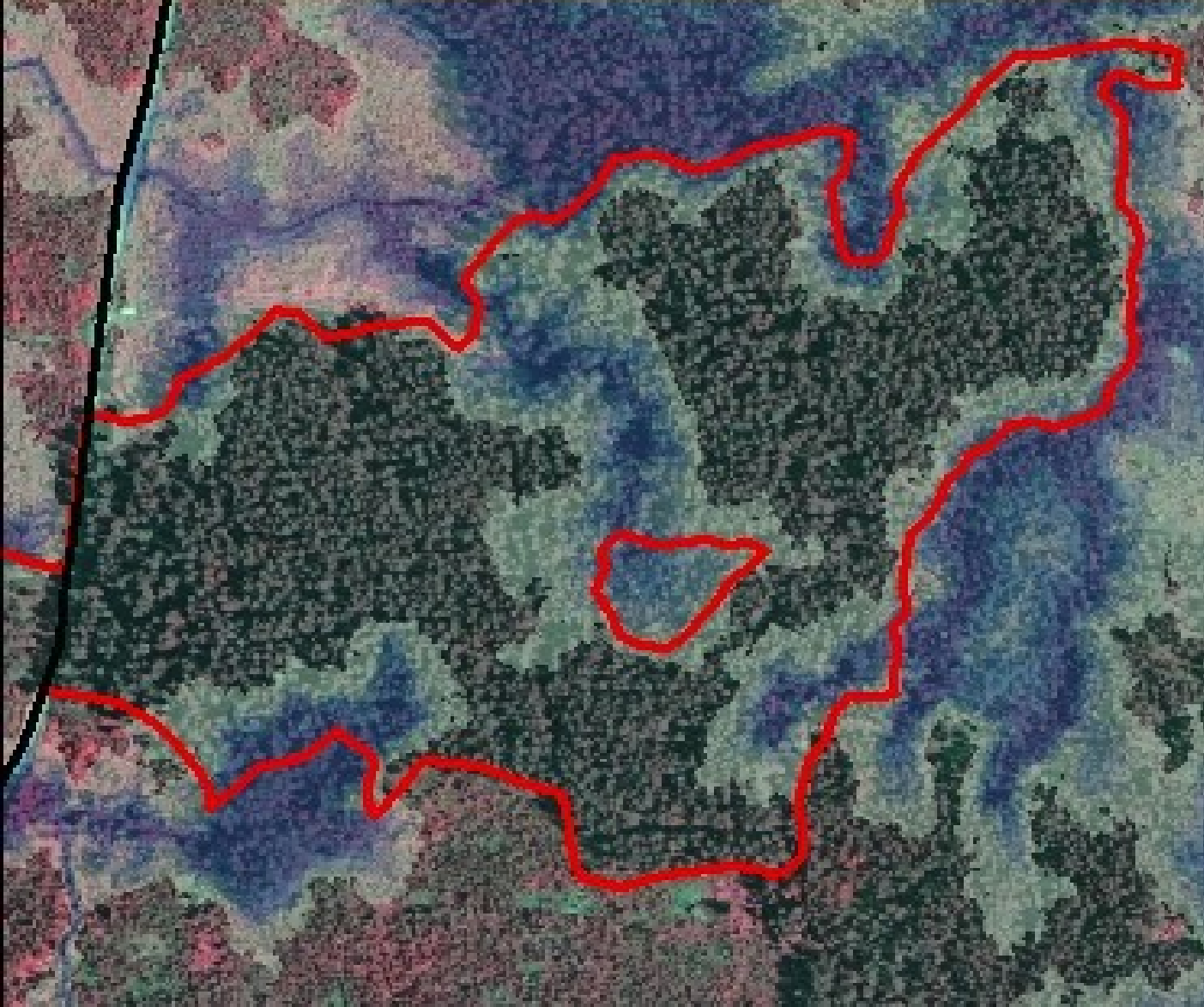


Depth-to-water maps for “traceless logging”



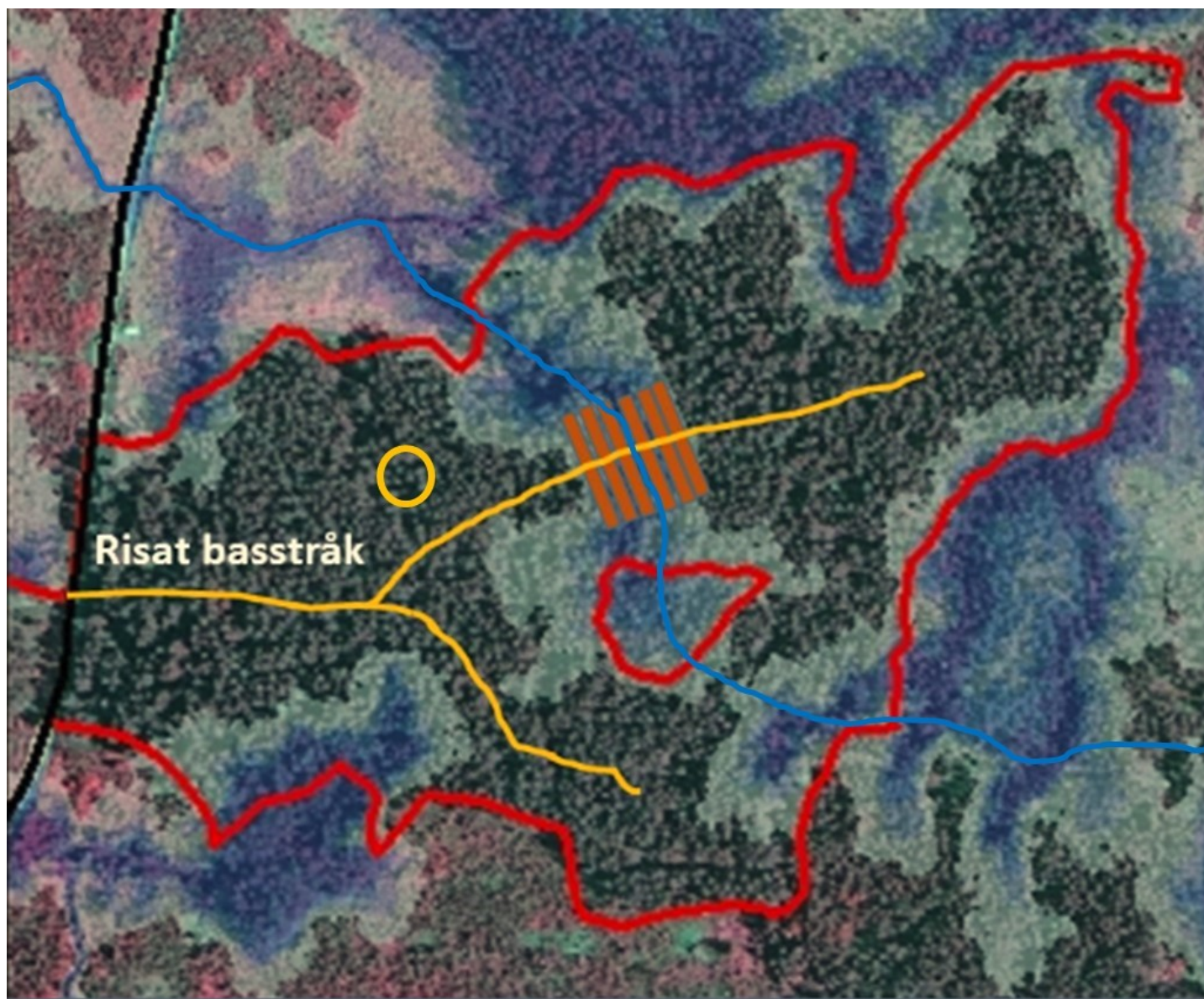
- Different models
 - Skogforsk – the UNB model
 - Swedish forest agency – the Cowi model
- 800 evaluation points, similar results are reached
- The model often indicates too much wetness (ditches, roads, soil types etc.)

Fast implementation – fantastic results!



- 80 % of damages with leakages to water arise within blue areas
- 60 % of all damages arise within blue areas
- During 3 years of using DTW and adopted methods, serious damages has decreased with 80 %

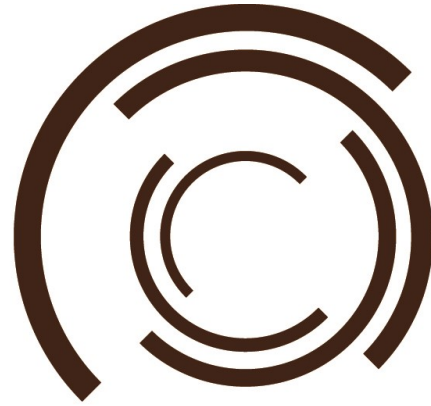
Experiences from machine operators



- Discover wet areas in time
- Facilitates passages (streams and wet areas)
- Facilitates planning of strip roads and landings
- DTW maps are used in most of the logging machines today

Success factors

- Standardization and infrastructure
- Tight collaboration between research – companies – contractors – machine manufacturers
- Companies that want to take the lead and share experiences
- Demo programs



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