GreenLane
– fast tracking value and resilience in industrial wood supply

Dag Fjeld, NIBIO (SLU)
Norway (Sweden)

GreenLane group

Oceanic

- NIBIO (D.Fjeld, L.R.Gobakken)
- AllSkog Forest Owners Assoc.

Sub-Artic

- Skogforsk (K.Westlund, L.Eliasson)
- Norra Forest Owners Assoc.

Continental

- BOKU (C.Kanzian, T.Holzfeind, P. Rauch, C.Kogler)
- Austrian Federal forests (Öbf)

June 2019-Dec 2021, 705' €

Introduction

Goal - Develop *virtual supply chain laboratory environments* enabling value-tracking and interactive testing of harvesting and transport responses to challenging climate scenarios.

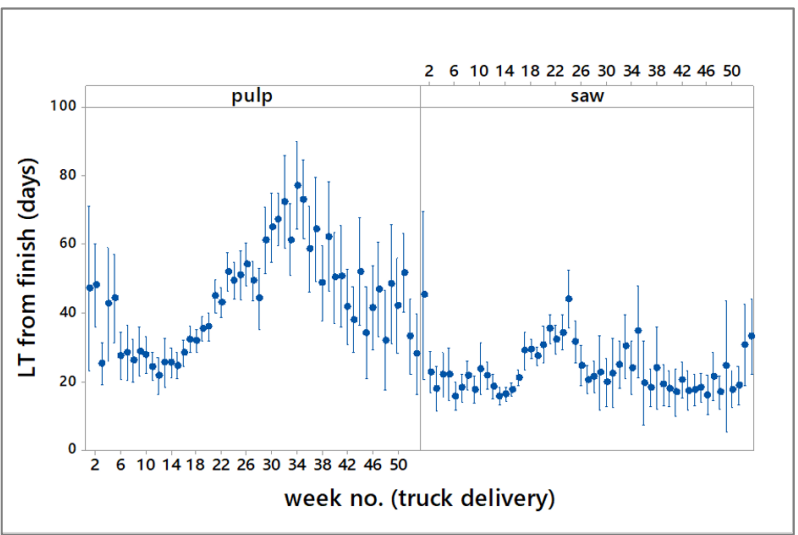**Using weather-driven models for wood quality and trafficability.**

How close can we get to «everyday supply chain management» in virtual environment?
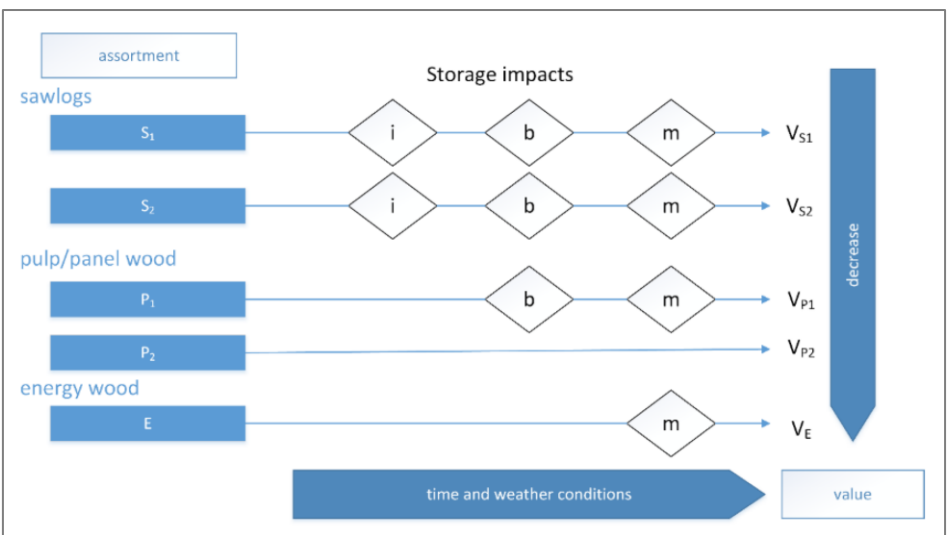
Results – weather-driven value-tracking (IBM)

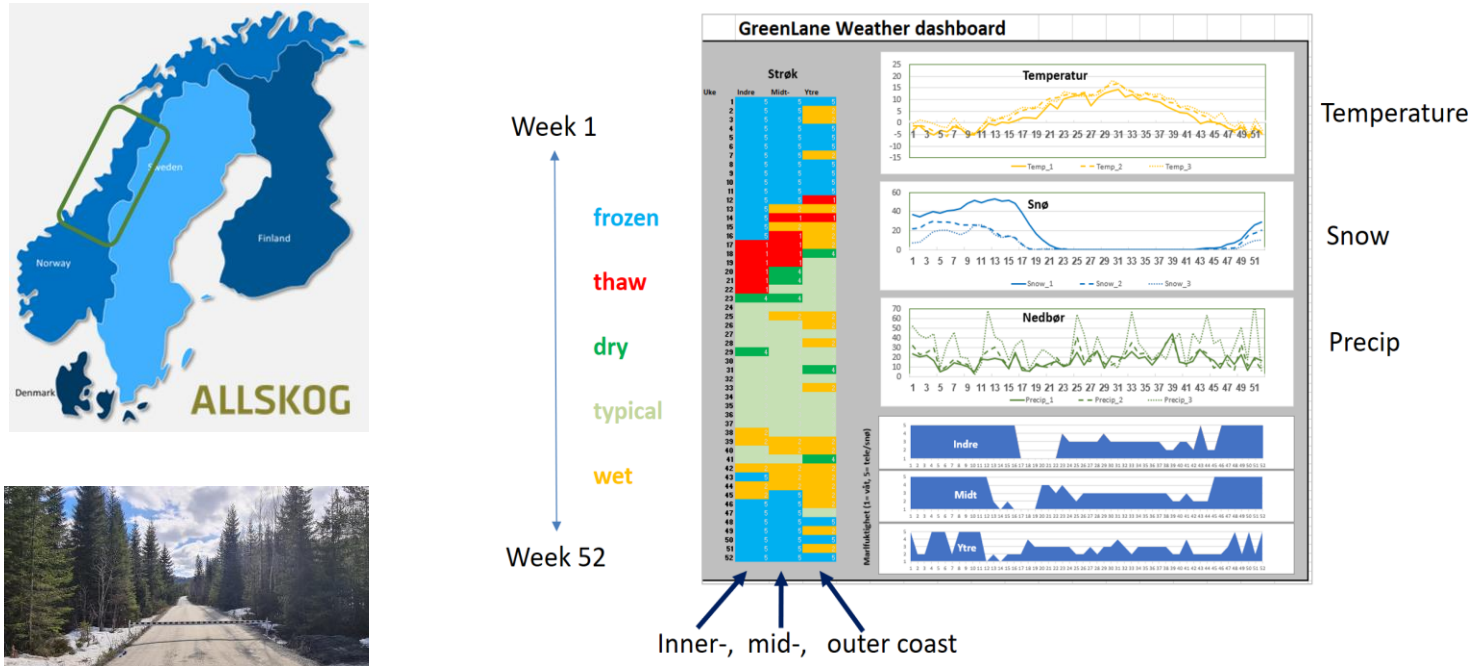## Problem – long lead times

Solution – GreenLane IBM*

Lead-time (LT) tracking of logs from harvesting to mill delivery, with wood quality deterioration according to storage conditions and duration

I=insects **B**=blue stain **M**=moisture

Digital twin for simulation; Kanzian et al. (2022)

Results - weather-driven trafficability (RBC)

Model site moisture status to match with trafficability classification

RBC = relative bearing capacity

Digital twin for simulation; Fjeld et al. (2022)

Results – stakeholder workshop approach

Three different workshop approaches to find development paths towards reduced lead times and log value loss.

1. **Sub-artic (northern Sweden)** - development of the weather/accessibility scenarios and testing effects of <u>alternative transport decision rules</u>.
2. **Continental-montane (Austria)** – stakeholders experiment with <u>transport and terminal capacities</u> and experience the effect on lead-times and value loss.
3. **Oceanic (Norway)** - run as a team exercise with <u>coordinating purchase, production and transport management</u> for maximum net forest value (delivery bonus-degrade loss).

The respective approaches vary with respect to sophistication/complexity (simulation) and workshop duration (2-8 hrs).

How to best use virtual supply chain laboratories in stakeholder workshops?

Results – Oceanic case
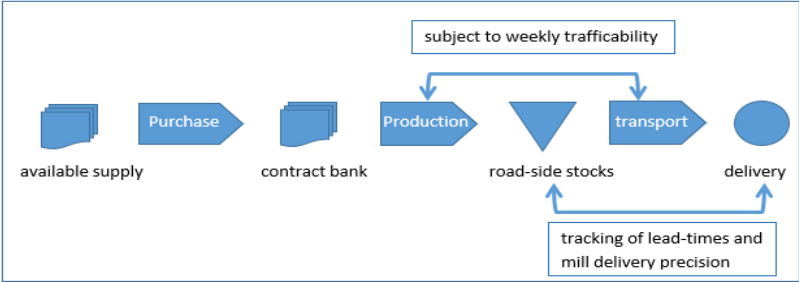
Team	Relocation distance (km)	Average transport distance (km)	Variation in truck capacity utilization (%)	Delivery bonus (NOK)	Value loss (NOK)	Net value (NOK)
1	1251	63	16	1 031 000	229 152	801 848
2	910	84	10	775 000	552 803	222 197
3	823	67	3	**1 106 200**	**219 972**	**886 228**
5	793	85	2	781000	89 835	691 165
6	354	80	1	**1 101 000**	**81 645**	**1 019 355**

Highest net value

dependent on team capability

to vary production in relation to transport

Impacts

Preserving log value requires professional insight and skills in supply management

Logistics challenges are typically dynamic and complex to solve. Principles learned via practical problem-solving

*A **key impact path** is training*

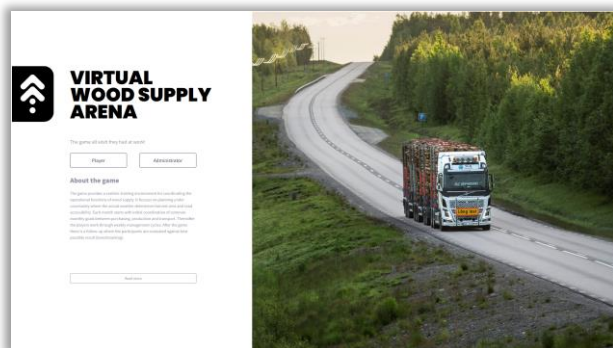# On-line **Virtual Wood Supply Arena**

12-week scenario over 4 hrs
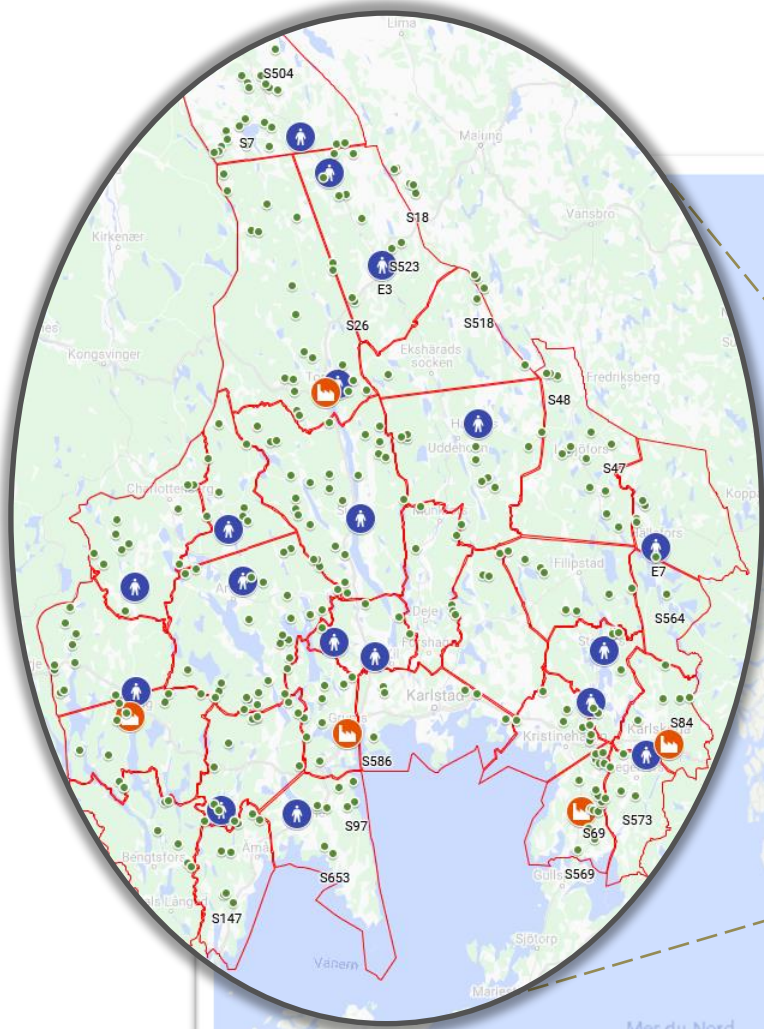**10 production teams, 10 trucks**
5 assortments to 3 sawmills, 2 pulpmills

Weekly weather
- 4 week weather prognosis
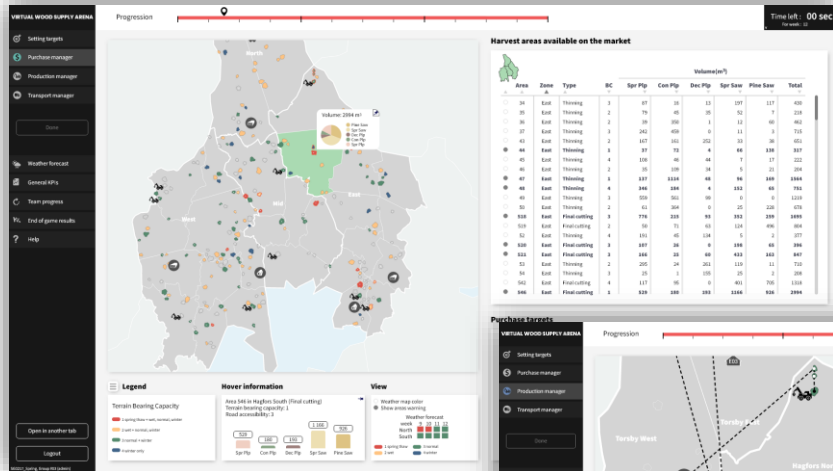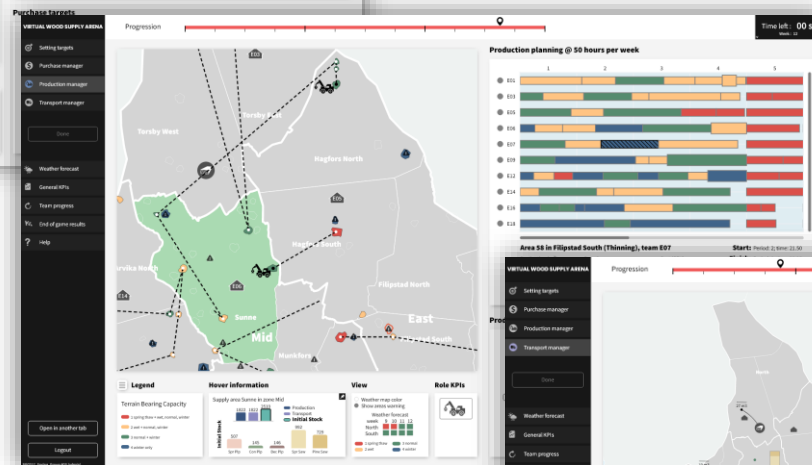- 2 climate zones, 4 trafficability classes
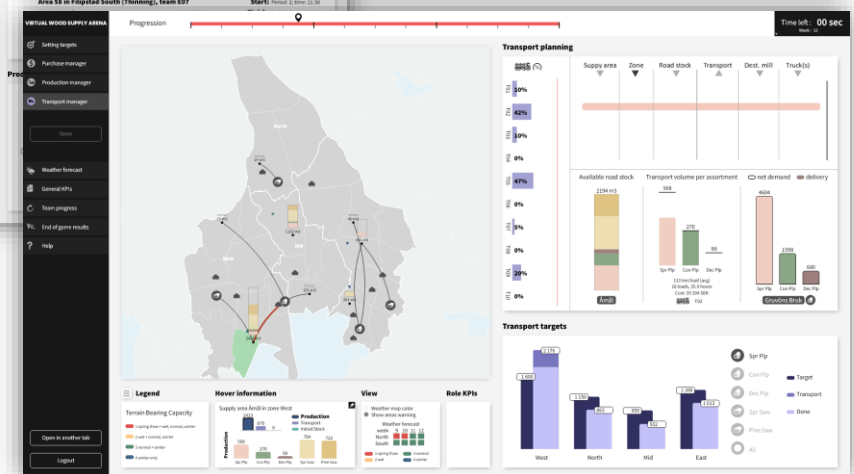
VIRTUAL WOOD SUPPLY ARENA

Purchase

Production

Transport

VIRTUAL WOOD SUPPLY ARENA

Difficulties mastered are opportunities won

Contact
dag.fjeld@slu.se
philippe.marier@forac.ulaval.ca
mikael.ronnqvist@gmc.ulaval.ca

ForestValue

The value of scientific cooperation

MultiStrat (2016-2018) **Multimodal strategies for more resilient wood supply**

GreenLane (2019-2021) **Fast tracking value and resilience in industrial wood supply**

Main advantages
- insight through diversity
- common frameworks for analysis

Thank you!

Dag.Fjeld@slu.se
Lars.Eliasson@skogforsk.se
Christian.Kanzian@boku.at

ForestValue

Website: https://forestvalue.org/
Twitter: https://twitter.com/ForestValue2017
LinkedIn: https://www.linkedin.com/groups/12110816/