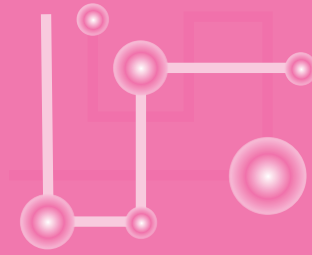


# THE NORDIC TESTBED NETWORK



The results, benefits  
and added value from the  
Nordic-Baltic collaboration to  
support digital advancements  
in the bioeconomy sectors

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**T**he Nordic region faces global challenges: climate change, biodiversity loss, and the growing need for more sustainable and resilient food and energy systems. These challenges are closely connected to our welfare, competitiveness, and environmental sustainability. The bioeconomy (agriculture, forestry, fisheries and aquaculture) plays a central role in addressing them by providing renewable materials, sustainable food, and green energy while supporting rural development and economic resilience.

The region's rural and coastal areas hold great potential to drive the green transition, but this potential depends on strong digital infrastructure, accessible services, and relevant digital competencies. By further developing these areas, the Nordic countries can promote inclusive growth, improve resilience, and ensure that innovation benefits society as a whole. Strengthened Nordic cooperation across borders and sectors is essential for achieving this transition and for securing a sustainable and competitive future.

This report presents the Nordic Testbed Network, a collaborative platform bringing together testbed researchers, and industry partners across the Nordic and Baltic bioeconomy. The report outlines the network's purpose, goals and testimonies from members who describe how participation in the network helps them stay up to date with technological developments, learn from other sectors, and establish concrete collaborations. It also looks ahead, presenting a shared vision for how the network will continue to grow, strengthen Nordic cooperation, and create lasting value for a more digital, sustainable, and resilient bioeconomy.



**Jonas Rönnerberg, head of SNS and NKJ**

## THE ROLE OF DIGITALISATION IN THE BIOECONOMY SECTORS

The Nordic countries are at the forefront of the green transition, and digitalisation plays a vital role in making the bioeconomy more sustainable, competitive, and resilient. By integrating digital technologies into bioeconomy sectors, the region can improve resource efficiency, reduce environmental impact, and strengthen long-term economic and social resilience.

Digital tools such as automation, data analytics, and smart sensors enable more precise production systems, support circular use of resources, and make it possible to make informed decisions throughout the value chain from forests and farms to fisheries and food industries. These technologies improve productivity, transparency, and traceability, and make it easier to monitor environmental and social impacts.

## WHY TESTBEDS?

Testbeds are physical or virtual environments where businesses, academia and other organisations can interact in the development, testing and introduction of new products, services, processes or organisational solutions in selected areas. A well-designed testbed has effectively integrated both "hardware" (equipment, physical facilities etc.) and "software" (competence, organisation, service offerings etc.).

To harness the full potential of digitalisation, access to state-of-the-art development platforms is essential. Testbeds provide environments where innovative digital solutions, technologies, and data-driven methods can be developed, validated, and shared across sectors and borders.

Recognising this need, the Nordic Testbed Network was established to support the digital transformation of the bioeconomy by connecting facilities, expertise, and stakeholders throughout the region. The network promotes collaboration, knowledge exchange, and interoperability between systems, helping to unlock the value of data while maintaining security and integrity. In this way, digitalisation – guided by cooperation, openness, and innovation – becomes a key driver of a resilient, sustainable, and inclusive Nordic bioeconomy.

## **BACKGROUND TO THE INITIATIVE**

The Nordic Testbed Network is managed by Nordic Forest Research (SNS), Nordic Agri Research (NKJ) has received funding from the Nordic Council of Ministers' working group on fisheries, and is aligned with initiatives such as the North Digital Declaration and the Nordic Bioeconomy Program. It is based on the initiative 'Digitalisation in the Nordic bioeconomy' undertaken by SNS and NKJ during 2018, which highlighted testbeds as an important part of strengthening the Nordic and Baltic bioeconomy's profitability and competitiveness.

## **THE NORDIC ADDED VALUE OF THE NETWORK**

The Nordic and Baltic countries are global frontrunners in both digital transformation and bioeconomy development. Across the region, there are numerous testbeds working on digital solutions that support the green transition. However, testbeds are often highly specialised and require significant resources to operate effectively.

By linking these facilities into a common network, the Nordic Testbed Network creates added value through collaboration and knowledge exchange. The network enables sharing of experiences, methods, and technologies, ensuring that expertise is used efficiently and that testbed resources can benefit more people and organisations – regardless of where they are located.

Through this joint effort, knowledge and technologies can move more easily across borders, creating synergies between sectors and countries. This helps increase access to innovation infrastructure for startups, SMEs, and research institutions throughout the region. By connecting testbeds across the Nordic and Baltic countries, the network turns individual facilities into parts of a shared ecosystem. This is resource optimisation in practice.

The network also contributes to a stronger joint Nordic and Baltic voice in European and international cooperation. It enhances visibility, facilitates participation in EU-funded programmes, and strengthens the region's position as a leader in sustainable digital innovation.



## **KEY BENEFITS AND RESULTS VALUED BY NETWORK MEMBERS/TOP MEMBER-RECOGNIZED BENEFITS AND OUTCOMES OF THE NETWORK**

### **Staying up to date with the latest developments**

The network functions as a platform where members can get updates from invited experts on the latest developments on topics most important for them. It is also an important platform for knowledge sharing amongst the members. For the members it is not only important to receive updates and getting tips from people working on similar challenges. The network is also an important channel for members to share the results from their own work. Through the network they are given easy access to a highly relevant and engaged audience.

### **Cross-sector learning on shared technologies**

One of the network's strengths is that it offers learnings between the sectors within the bioeconomy; agriculture, forestry, fishery and aquaculture. These sectors all use the same technology and digital tools but have had different levels of progress in the development and implementation of them. The network in this way offers more learning opportunities than networks limited to individual sectors and reduces the tendency of siloing.

### **A catalyst for concrete collaboration**

The network has enabled concrete collaboration. The members have been able to connect with likeminded people who share the same challenges and interests during network activities and events. While they might have known of each other from before, the network has facilitated those dialogues and meetings necessary to move from acquaintance to trusted friendship – from awareness to concrete collaboration. Further, the network has enabled members to share their connections with businesses and startups that are searching for the type of infrastructure and collaboration that testbeds around the Nordic-Baltic region are offering.

## THE LATVIAN INSTITUTE OF AQUATIC ECOLOGY



Anda Ikauniece

■ **ANDA IKAUNIECE** is a senior researcher and marine biologist at the Latvian Institute of Aquatic Ecology (LIAE), a public research institute based in Riga and an agency of Daugavpils University. The institute provides scientific support to regional partners seeking to use coastal resources sustainably, promote local development, and improve the state of the marine environment.

Anda recognizes that digitalisation is becoming increasingly relevant, not only for sea-based cultivation but also for other marine uses. "You don't have to measure everything manually anymore", she explains. "By using sensors that record temperature, salinity, and other environmental parameters, we can access real-time data that enables more informed decisions, improving cultivation practices while reducing environmental impact."

The Latvian Institute of Aquatic Ecology has been a member of the Nordic Testbed Network since 2021 and values the opportunity to engage with other testbeds – even those focused on different sectors – that face similar challenges.

"You might not see it at first glance, but having a connection to green testbeds is important. In the network, you meet others who face the same problems we do, and who may already have ideas on how to solve them. This exchange of ideas is an opportunity to learn from each other, to share knowledge and best practices, and to strengthen collaboration."

## TROËDSSON FORESTRY TELEOPERATION LAB AND OULUZONE+

Tobias Semberg



■ **TOBIAS SEMBERG** works at the Troëdsson Forestry Teleoperation Lab, part of Skogforsk in Sweden. The forestry sector is currently facing a shortage of skilled machine operators, a challenge that the lab aims to address by developing remotely operated forestry machines.

By removing the operator from the machine, a new type of work environment can be created, one that is more social and less physically demanding. Operators are no longer exposed to whole-body vibrations, and since machines no longer need to be designed around human comfort and safety, they can be made smaller, lighter, and with less impact on the ground.

For Tobias, the Nordic Testbed Network has provided valuable opportunities to connect with like-minded researchers and gain insights on how to move forward.

”You always get suggestions on what to do next, what sensor or camera to use, or maybe a different type of lens. All those ideas inspire you to test new approaches and develop a better system. Just by sharing what you’re working on, you get a lot of useful feedback and inspiration in return”, says Tobias Semberg.

Through the network, the lab connected with the Finnish testbed Ouluzone+, which is developing other types of working machines that use similar technologies. Although the two testbeds focus on different environments and machine types, they share many of the same challenges; creating valuable opportunities for learning and collaboration.

”The Nordic Testbed Network has given us the chance to meet other testbeds working on similar challenges. Ouluzone+ is one example, and we’ve had some great collaborations with them. Without the network, I don’t think we would have met them, or the other testbeds we’ve visited”, says Tobias Semberg.



■ **TOMAS KLINGSTRÖM** is the coordinator of Gigacow at the Swedish University of Agricultural Sciences (SLU), a network of commercial dairy farms. This infrastructure enables testing of new technologies and evaluation of how emerging data sources can contribute to more profitable and sustainable agriculture.

By facilitating collaboration between the technology sector and agriculture, Gigacow helps bridge the gap between two industries that often operate separately. According to Tomas, this interaction is crucial and helps prevent many missed opportunities.

”Since only about 3% of the population works in agriculture, there are a lot of missed opportunities simply because engineers don’t know enough about farming, and vice versa. What we’re trying to do as part of the testbed network is to make it easier to bring new technology into the sector”, says Tomas Klingström.

Recently, Gigacow has been testing new types of activity sensors; smart tags developed by a Finnish company that they were able to connect with through the Nordic Testbed Network. The company, originally focused on smart tags for the reindeer industry, was looking to expand into cattle, and their technology now enables Gigacow to track animal activity both indoors, in the barn, and outdoors on the pasture.

”We now have a collaboration with a company willing to share the data”, says Tomas Klingström.

## **WORKING FORWARD: PLANS FOR CONTINUED VALUE CREATION FOR A DIGITAL AND SUSTAINABLE BIOECONOMY**

### **Lessons learned**

#### *Testbeds are important platforms – but have scarce resources*

Testbeds are dependent on knowledge and technology transfer and meeting people is considered by some of the members to be of most value, but there is often a lack of time to travel for events.

#### *Securing funding for the testbed is an on-going challenge*

Testbeds are often dependent on continuous project funding, and many testbed members express that securing funding for the development of their testbed is one of the most difficult parts of their work.

#### *Active coordination is needed*

There is a need for active coordination of the network to maintain continuous contact with members, identify needs for exchange between testbeds, analyse synergies in technology development, and conduct external analysis.

## **FUTURE PLANS AND PRIORITIES**

#### *Carefully curated activities founded in member needs*

To ensure that all members benefit from the network, we will continue to organise activities which combines current updates, information on funding opportunities and opportunities for knowledge exchange that are carefully selected based on the requests from our members. An important task moving forward is to ensure a balance in the amount of network activities and include shorter updates, such as news connected to societal or political changes, as is appreciated and recommended from members.

#### *Enable collaboration through matchmaking and facilitation of early-stage project development*

Several members highlight the network's role in enabling collaboration and see potential for supporting joint funding applications. Moving forward, increased knowledge sharing on funding opportunities and insight into members' ongoing or planned projects are key. Matchmaking and early-stage project facilitation can be strengthened through physical meetings, enabled by travel support for members. Providing an overview of relevant calls and fostering visibility of member activities will lower the threshold for collaboration and accelerate the development of joint initiatives – turning early ideas into concrete projects more efficiently.