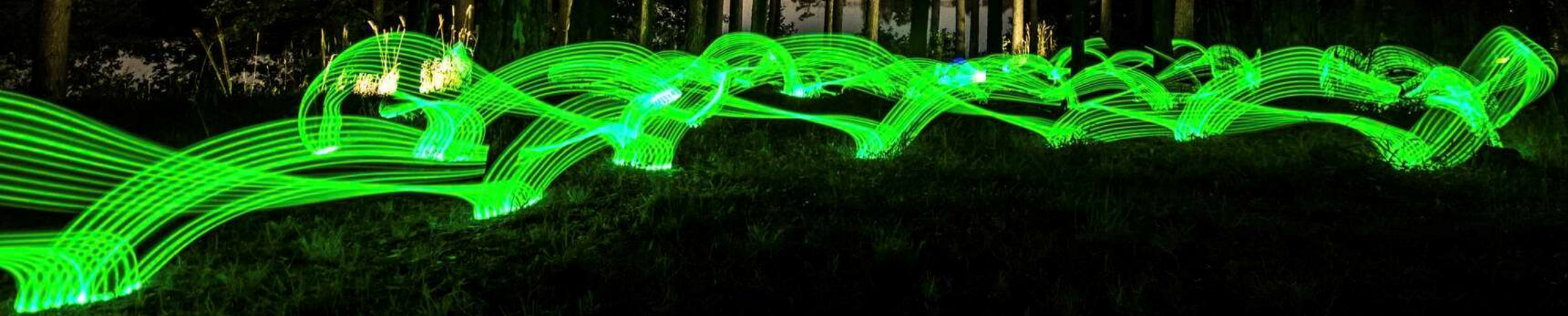


**FINLAND**

# **FINNISH SOLUTIONS FOR SMART FORESTRY**

Strong digital expertise and industrial know-how make Finland a global leader in smart forestry.





# FINLAND

1. FINLAND - SMART FORESTRY SUPERPOWER
2. FULL VALUE CHAIN COLLABORATION
3. LEADING BUSINESS SOLUTIONS
4. WORLD CLASS RESEARCH





# FINLAND

Finland is one of the global superpowers in digitalization and forestry. The new, digital innovations are offering new solutions for the transformation of the industry – to increase the efficiency and safety as well as to offer real-time, accurate and evidence-based decision-making tools.

**#1**

**BEST BUSINESS  
ENVIRONMENT  
IN THE WORLD**  
GLOBAL INNOVATION  
INDEX 2019

**#1**

**MOST STABLE COUNTRY  
IN THE WORLD  
FOR THE 14TH YEAR  
IN A ROW**  
FUND FOR PEACE,  
FRAGILE STATES INDEX 2019

**#3**

**THIRD MOST  
INNOVATIVE  
COUNTRY  
IN THE WORLD**  
BLOOMBERG INNOVATION INDEX 2019

**#3**

**IN SUSTAINABLE  
DEVELOPMENT**  
UN SUSTAINABLE  
DEVELOPMENT REPORT 2020

**2/3**

**OF FINNISH FORESTS OWNED BY  
ORDINARY FAMILIES. THEY PRODUCE  
OVER 80% OF THE WOOD FOR THE  
FOREST INDUSTRY.**  
FOREST.FI

**#1**

**FORESTED COUNTRY  
IN EUROPE**  
FOREST.FI

**90%**

**OF FINNISH  
COMMERCIAL FOREST  
WITH PEFC OR FSC  
CERTIFICATE**  
FOREST.FI

**4**

**NEW SEEDLINGS  
PLANTED FOR EVERY  
TREE HARVESTED**  
FOREST.FI



A photograph of a forest at sunset. A person wearing a bright yellow raincoat is walking away from the camera on a narrow dirt path that winds through a dense forest of tall, thin trees. The ground is covered in lush green moss and low-lying vegetation. The sun is low on the horizon, creating a warm, golden glow that filters through the trees, casting long shadows and highlighting the textures of the forest floor and tree trunks. The overall atmosphere is serene and natural.

**FINLAND**

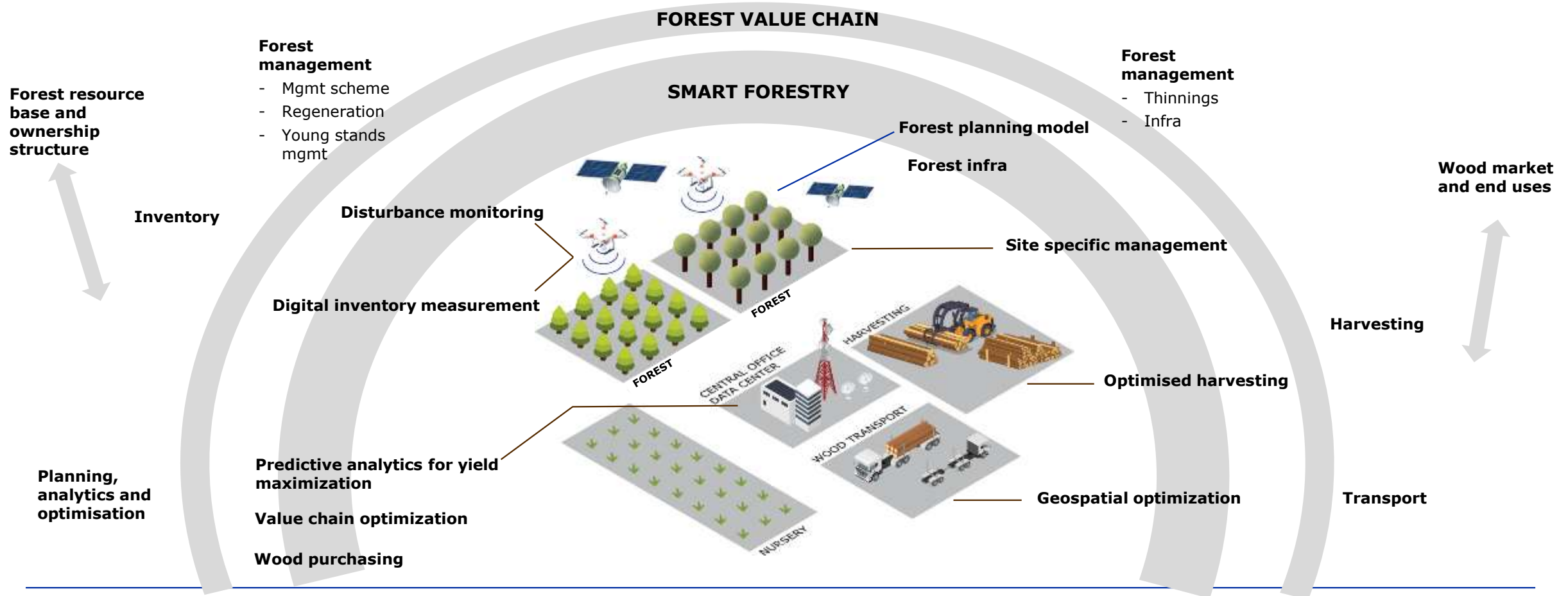
# SMART FORESTRY

The industry is going through an extensive transformation, with inventory, harvesting and management all going digital and data-driven. This means demand for new solutions in which Finland is a world-class provider. The new optimized, demand-based inventory and harvesting methods enhance procurement and harvesting work and efficiency in both use of wood material and equipment usage. Precision forestry transforms the industry from highly manual and analog workflows with broad-brush management prescriptions to a system with digital data capture and planning, granular management prescriptions, and tight operational control.



# SOLUTIONS FOR THE FULL VALUE CHAIN

Smart forestry focuses on digital solutions to improve accuracy and efficiency in the forestry value chain from forestry operations to harvesting and wood transport, including planning, analytics and optimisation





# **SUSTAINABLE HARVESTING METHODS**

Sustainability is an overarching theme of Finnish forest industry. One fifth of Finland's export is coming from forest-based bioeconomy. Healthy and sustainable growth of Finnish forests means more carbon from air bound into trees and into the forest products replacing fossil based materials.

## **PIONEER IN CUT-TO-LENGTH TECHNOLOGY**

The cut-to-length (CTL) wood harvesting method is an example of combining efficiency and environmental friendliness. In the CTL method, timber is processed in the forest according to its intended use. The CTL method leaves the nutrient-rich leaves, needles, limbs, and tops in the forest. In nutrient-poor soil in particular, this ensures that the trees left growing or the regeneration seedlings draw enough nutrients from the soil.

---





## INCREASED PRODUCTIVITY WITH AUTOMATED TRANSPORTATION

The productivity and overall equipment effectiveness (OEE) of forestry in the Nordic countries is on a level of its own in global comparison. New ways to enhance productivity are constantly being researched by large forestry companies and research institutes.

### CASE: STORA ENSO TO TEST A SELF-DRIVING TRUCK

Stora Enso has begun testing an automated truck in its Uimaharju mill area in Joensuu, Finland. The objective of the test is to find out to what extent automated transportation using a self-driving vehicle can reduce emissions and improve safety.

[Read more](#)

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# EFFICIENT FOREST MANAGEMENT WITH DIGITAL TWIN

Public stakeholders in Finland actively collaborate with private service providers to together enhance forest management and timber procurement processes. For instance, the Forest Inventory Program is being updated and maintained as a joint effort of the Finnish Forest Centre and private companies. Nationwide data collected through the program can be widely utilized for forest management and decision-making tasks.

## **For the forest owner the collected forest data offers:**

- information about forest estate
- proposals for forest managements, such as silvicultural treatments and cuttings
- tools for forestry planning
- information about biodiversity e.g. important habitats

## **For the forests operators the forest data offers tools for:**

- harvesting planning
- optimization of wood procurement
- forest road construction
- management of forest draining system
- detection of biodiversity hot spots (important habitats)

[Read more](#)

---





**FINLAND**

# RELATED INDUSTRY ECOSYSTEMS

Finnish forestry expertise is supported by thriving technology ecosystems, most significantly the electronics and sustainability related businesses.

## **LOGISTICS**

[Read more](#)

## **INFORMATION SECURITY**

[Read more](#)

## **SUSTAINABLE MANUFACTURING**

[Read more](#)

## **CONNECTIVITY**

[Read more](#)

## **ANALYTICS AND AI**

[Read more](#)

## **BIO-BASED MATERIALS**

[Read more](#)

## **BIO AND CIRCULAR ECONOMY**

[Read more](#)

## **FOREST ECOSYSTEM DATA**

[Read more](#)

## **PHOTONICS**

[Read more](#)

## **AUTONOMOUS SYSTEMS**

[Read more](#)





# THE NATIONAL BIOECONOMY STRATEGY

The objective of the updated [Finnish Bioeconomy Strategy](#) is to harness the bioeconomy to create new products and services that drive economic growth and employment while promoting the transition to a carbon neutral society. Finnish industries are represented by [Finnish Forest Association](#).

[Finnish Forest Centre](#) is a state-funded organization covering the whole country and tasked with promoting forestry and related livelihoods, advising landowners on how to care for and benefit from their forests and the ecosystems therein, collecting and sharing data related to Finland's forests and enforcing forestry legislation.

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# INVEST IN THE UNIQUE FINNISH SMART FORESTRY

## HIGH QUALITY SUSTAINABLE RAW MATERIAL

World-leading forest data: digital twin of forests for sustainable forest management

Reliable chain-of-custody, certified forests

## DIGITAL INFRASTRUCTURE

Digital infrastructure, data, logistics, security, efficient technology

# 1 in the world in digitalization of wood procurement system

Excellent high-speed data network and data centers

## AGILE BUSINESS ECOSYSTEM

Strong R&D organizations and tradition on Public-Private-Partnership

High potential open innovation ecosystem looking for international partners

Wide political support and long-term commitment in national policy level

## WORLD CLASS, RELIABLE COMPETENCE AT REASONABLE COSTS

Finland's cost level is competitive on human resources and premises.

## MEMBER OF EU

Access to the 500 million people EU market, with free flow of services and people between the member states





# WORLD CLASS FORESTRY RESEARCH

Benefit from the leading forestry research. Finnish universities' and research institutes' multidisciplinary approach accelerates the digital transformation of the industry. The new digital solutions increase the efficiency and safety of the value chain as well as offer real-time, accurate and evidence-based decision-making tools for smart forestry.





# FOREST MANAGEMENT



## Semiautonomous silvicultural machines

Robotization of silvicultural machines has been studied. The aim is to recognize the young trees that should be left to grow, and other trees that can be cut down, with the help of machine vision and laser scanners, as well as instrumentation and automatic motion control of the forestry boom. The developments have been tested with real machines.

[Read more](#)

**A!**

Aalto University  
School of Electrical  
Engineering



## Scalable AI optimization tool for more sustainable and profitable forest management

Deep FRST is developing a tool for AI-optimized forestry that is sustainable and profitable: helping to find optimal forest management, maximizing profit, preserving biodiversity and reducing CO2 emissions.

[Read more](#)

**Deep  
FRST**



## Climate friendly forestry

Natural Resources Institute Finland (LUKE) offers tailored research services and solutions throughout the forest industry value chain. Our knowledge is based on long-term monitoring and field tests. Our focus is on forest resources and mapping, forest optimization and planning systems, simulation of stand dynamics and forest management effects, market analyses, forecasts and valuations.

[Read more](#)

**Luke**  
NATURAL RESOURCES  
INSTITUTE FINLAND



## Silvicultural systems and their influence on forest work productivity, wood production and environmental aspects

Harvesting operations are strongly connected to the silvicultural systems used in forestry. It is important to develop both rotation forestry and continuous cover forestry based logging operations.

[Read more](#)

  
UNIVERSITY OF HELSINKI  
FACULTY OF AGRICULTURE AND FORESTRY



# HARVESTING AND TRANSPORTATION



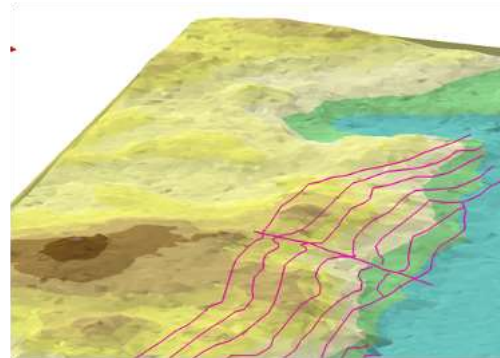
## Semiautonomous forest machines

Hands-on research on heavy-duty semi-autonomous machines and autonomous mobile robots in forestry. For forest harvesters, forest SLAM, i.e. mapping the trees and localizing the machine, and machine vision based measurement for harvester head have been developed. MPC motion control for forest crane and semiautonomous forwarder.

[Read more](#)



Aalto University  
School of Electrical  
Engineering



## Digital harvest planning tool (DHPT)

University of Helsinki is developing a virtual harvesting tool for comparing and evaluating alternative harvesting plans as well as for planning optimal logging trails in the forest. The tool will enhance forest operation's productivity, improve predictability of wood removal and structure of remanding forest stand, and mitigate environmental burden associated with the operations.

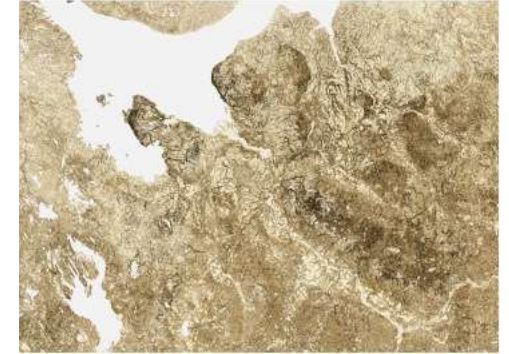
[Read more](#)



## Trafficability Prediction and Route Planning for Forest Machines (TRAM)

The aim of this joint project of Natural Resources Institute Finland LUKE and University of Turku project is to develop machine learning approach for terrain trafficability prediction for forest machines based on mode-data fusion and to develop route planning approaches based of trafficability predictions.

[Read more](#)



## Full advantage of increasingly accurate forest data, and support new harvest and transport processes

By combining machine learning methods with traditional logistics optimization, **VTT** creates more effective & flexible transport planning and scheduling methods that enable faster response to customer demand in the supply chain.

[Read more](#)





# FORESTRY DATA AND ANALYTICS



## Utilization of machine perception in Semiautonomous Forest Machines in Smart Forestry

The machine vision and LiDARs, are needed for improving the productivity and operability i.e. developing machines semiautonomous. This measurement data can also be utilized in updating the forest information system, documenting the quality of harvesting and integrating sustainable nature management into commercial forest management operations.

[Read more](#)

**A!**

Aalto University  
School of Electrical  
Engineering



## Open forest and nature data

**Finnish Forest Centre** collects and shares data related to Finland's forests. The data is open and available online. The data includes information on forest sites and stands, habitats of special importance, water protection and forest use. Forest data is precise: the height of a stand can be determined with an accuracy of two meters.

[Read more](#)



## Forest resource inventory and mapping and forest resource projections, optimization and planning systems

Luke provides customers tailored solutions on forest resource information; services for designing, implementing and developing forest monitoring and mapping systems. Software tools facilitate for example, policy scenario modelling, environmental impact assessment, integrated optimization of wood supply and forest management.

[Read more](#)



## On-line platform for forest monitoring

Our cloud-based platform called Forestry-TEP supports forest inventory and carbon monitoring globally. The user can access free and commercial satellite data, compute value added maps with tools on the platform or own software and share the maps. The platform offers advanced tools for the processing of satellite and airborne laser scanner data.

[Read more](#)





# REMOTE SENSING



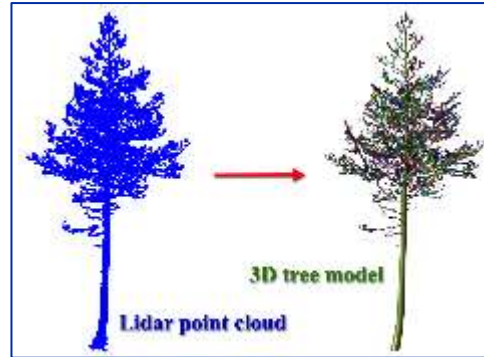
## Towards spectral and structural characterization of forests

Our mission is to develop methods for remote monitoring of forests. We have expertise in Earth observation, spectroscopy, radiative transfer modelling, laser scanning and forestry. Our projects are funded by e.g., Academy of Finland and European Research Council. We also provide education in the MSc Programme in Geoinformatics in Aalto University.

[Read more](#)



Aalto University  
School of Electrical  
Engineering



## Accurate structural 3D models of trees from Lidar data

We develop computational methods for reconstructing accurate structural 3D tree models and measuring lots of useful tree attributes from Lidar data. The Lidar data is collected from ground or from a drone and provides very detailed data for estimating diameters, volumes, stem quality, branch lengths and many other attributes of the trees visible in the data.

[Read more](#)



## Planning of logging trails

Successful placement of logging trails requires analysis of ground properties and tracking of logging trails utilized in previous harvesting operations.

[Read more](#)



## Remote sensing in forest inventory

Machine learning methods based on remote sensing data are developed for forest inventory purposes in collaboration with Natural Research Institute of Finland.

[Read more](#)







# RESEARCH AND DEVELOPMENT HIGHLIGHTS

New technologies to determine the structure and functionality of the forest ecosystem and agile methods for processing forest data.

[Read more](#)



Harnessing the natural properties of lignocellulose to create new sustainable materials.

[Read more](#)







# **SMART FORESTRY SOLUTIONS FOR FULL VALUE CHAIN**

**Remote sensing  
and digital  
inventory**

**Harvesting and  
logistics machinery  
and components**

**Forest  
management and  
enabling  
technologies**

**Consulting  
services**





**FINLAND**

# **REMOTE SENSING AND DIGITAL INVENTORY**

**FINNISH COMPANIES OFFER LATEST SOLUTIONS IN SATELLITE TECHNOLOGY, DRONES, AND SENSOR TECHNOLOGIES, AS WELL AS IN DIFFERENT INVENTORY SOLUTIONS USING AERIAL AND REMOTE MONITORING DATA.**

Satellites, drones, and harvesting machines as sensor carriers provide novel methods of collecting data, such as hyperspectral cameras and x-ray sensing. They provide even more accurate and higher-grade information on forest assets. Live satellite data may also be used for monitoring illegal logging and controlling wildfires





**FINLAND**

# EXPERTS IN LIDAR

## OUR SOLUTION

Arbonaut provides highly accurate information on timber and forest ecosystems by making the most out of LiDAR. This 3D technology creates a 'digital twin of forests' allowing you to make use of the data for 1) planning before going to the field, 2) forest road planning, 3) harvestability, 4) carbon assessment, and 5) forest fire risk mapping, to name a few. LiDAR data increases the prediction accuracy, resulting in less field measurements and less cost, drastically optimizing customers' operations and boosting decision-making.

## BENEFIT FOR THE CUSTOMER

Our private and public sector customers get accurate information on the forest environment, wildfire risks, and other versatile LiDAR applications. By using LiDAR data, Arbonaut's expert team ensures our customers have the necessary information to make better decisions and optimize their operations.

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## COMPETITIVE ADVANTAGE

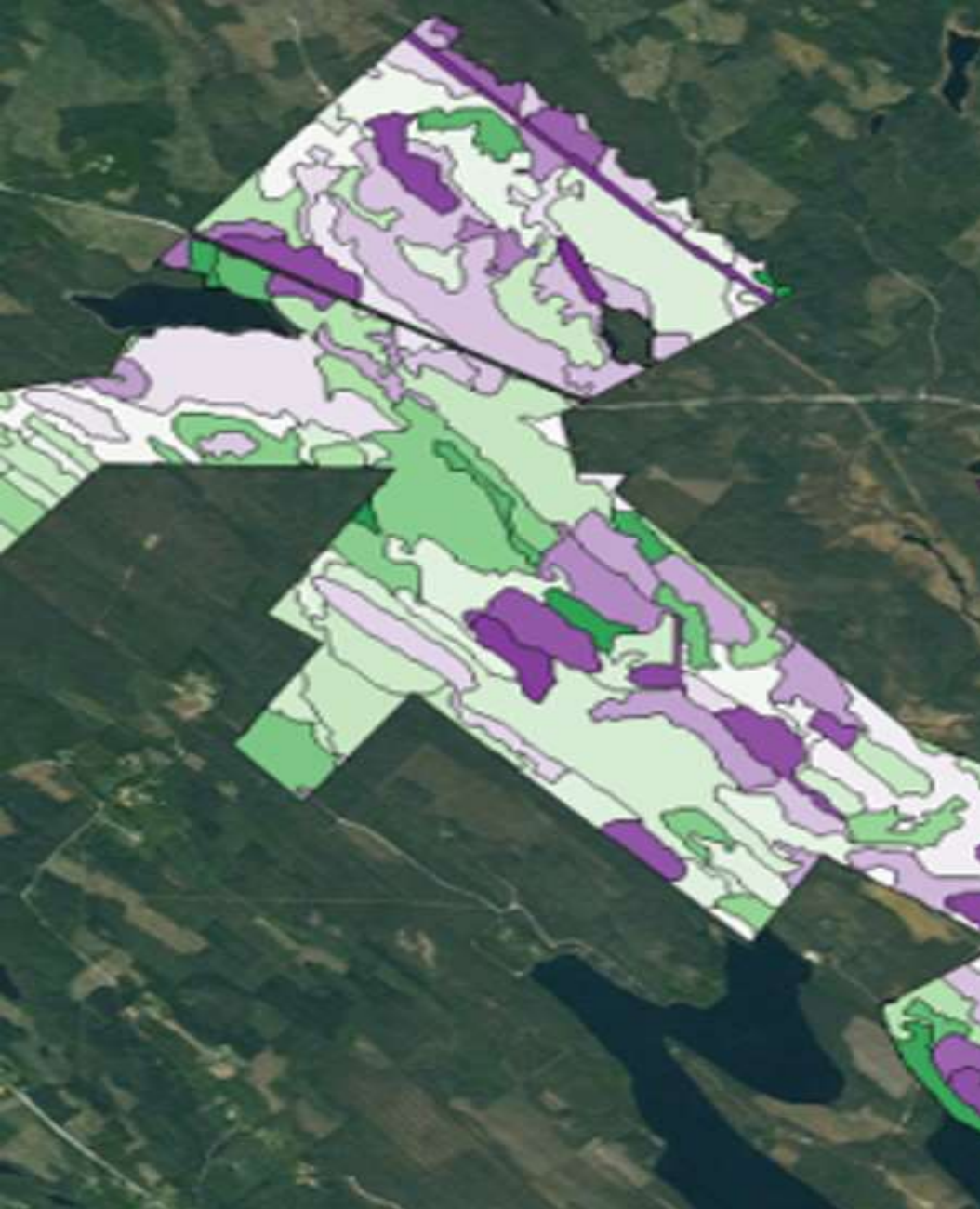
Apart from the adaptable methodology and faster data processing through our in-house tool ArboLiDAR, we offer our customers the advantage of re-using the same LiDAR data for additional, refined analyses, thus reducing costs.

## COMPANY

Arbonaut is an innovation-driven technology company based in the European Forest Capital, Joensuu. As a data collection and processing pioneer, we have completed forest inventories with LiDAR for more than 15 million ha of forests in 10+ countries.

**arbonaut**





**FINLAND**

# WELLBEING AND RISK ANALYSIS SOLUTION

## OUR SOLUTION

Bitcomp utilizes artificial intelligence to analyze forest health stress and wildfire risks. The solution can also detect changes, such as loggings, thinnings and storm and insect damages. The detected risks and changes are shown on a map layer that can be presented on a website or a mobile device. The solution also consists of a communication channel and sending geospatial notifications between user and peers and supporting organization.

## BENEFIT FOR THE CUSTOMER

With the help of Bitcomp EnviNavigator, the customer can detect potential risk areas where forest damages are imminent and take action before the risks emerge. In areas where the forest ownership is fragmented, the solution provides tools for communicating with the forest owners.

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## COMPETITIVE ADVANTAGE

Bitcomp Envinavigator is the only solution already in operational use that can detect changes, create them into map layers and offer easy mobile communication capabilities between the customer and the forest owner, or other forest stakeholders

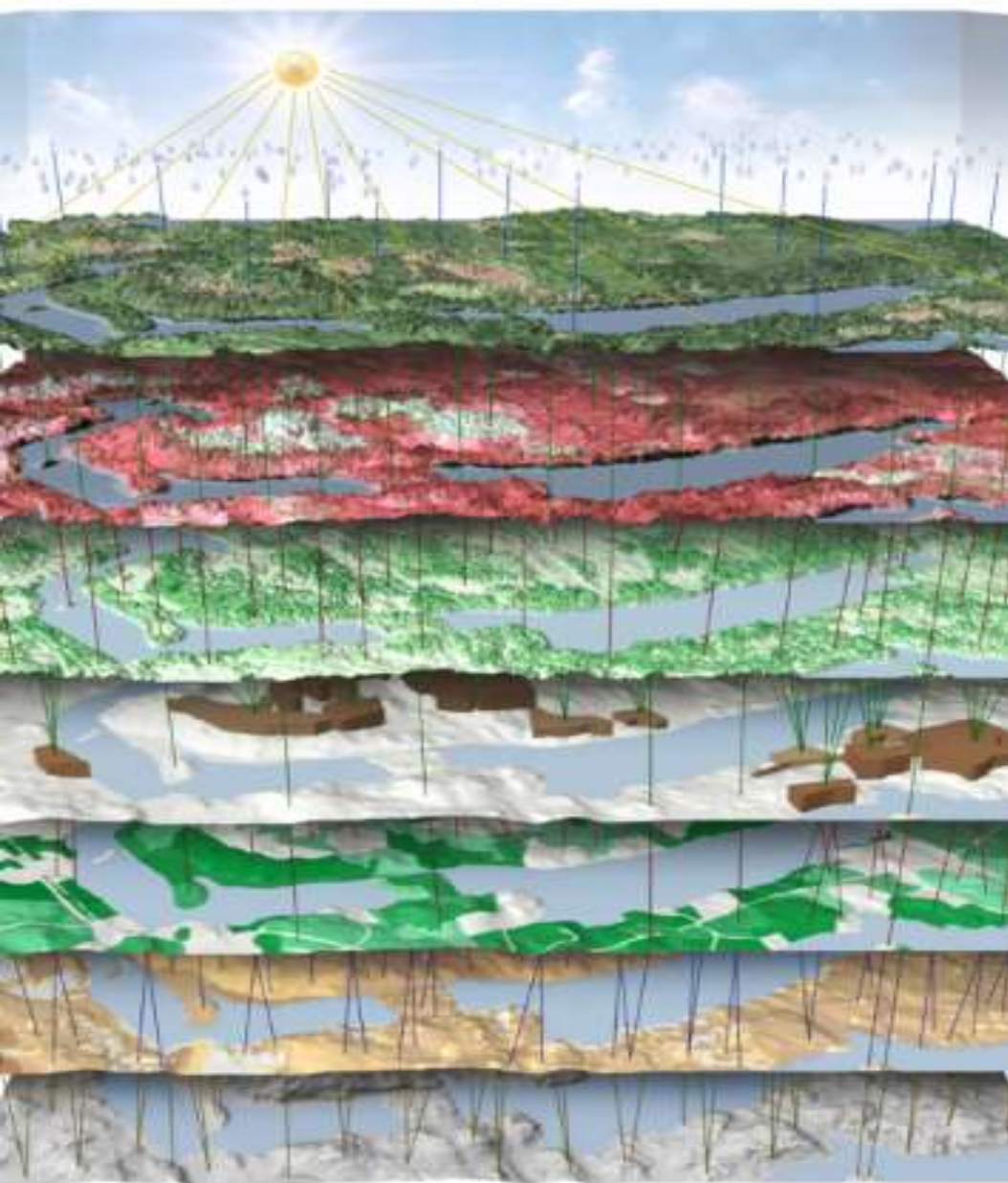
## COMPANY

Bitcomp is the leading intelligent forest solution company and has spearheaded the forest industries digitalization since the -90's. We currently employ almost 100 people in Finland, Poland and Germany.

# Remote sensing







# LINDA FOREST AI MODELS

## OUR SOLUTION

Linda Forest provides market leading insights into forest inventories. We collect climate, geo and process data and crunch this information into AI models that are always updating and evolving. Our customers include some of the largest forest owners and managers in the Nordics and Baltics. We offer tools to support your search for new forests, optimize maintenance of existing forest and decide a worthy selling price. Soon, we are introducing a carbon modelling tool that accurately calculates carbon capture in the managed forest. Linda Forest can help you make better-informed decisions with tools suited for your needs. Our tiered subscriptions guarantee that you only pay for what you need.

## BENEFIT FOR THE CUSTOMER

Linda Forest greatly cuts the need for field visits and provides superior-quality forest inventories – up to three times more accurate than with traditional methods. Also, our up-to-date models and data-driven insights guide you to best investment and upkeep decisions for forestry and carbon offset.

## COMPETITIVE ADVANTAGE

Our multi-layered model captures a great amount of information from dozens of sources to provide a detailed and constantly updating picture of the forest. The magnitude of data creates more accurate predictions and a range of insights, particularly important for monitoring carbon offset projects.

## COMPANY

CollectiveCrunch brings state-of-the-art analytics and innovation to forestry. We make a difference by analyzing vast amounts of climate and geo data to provide unprecedented accuracy and new insights to our forestry and sustainability customers.

**FINLAND**

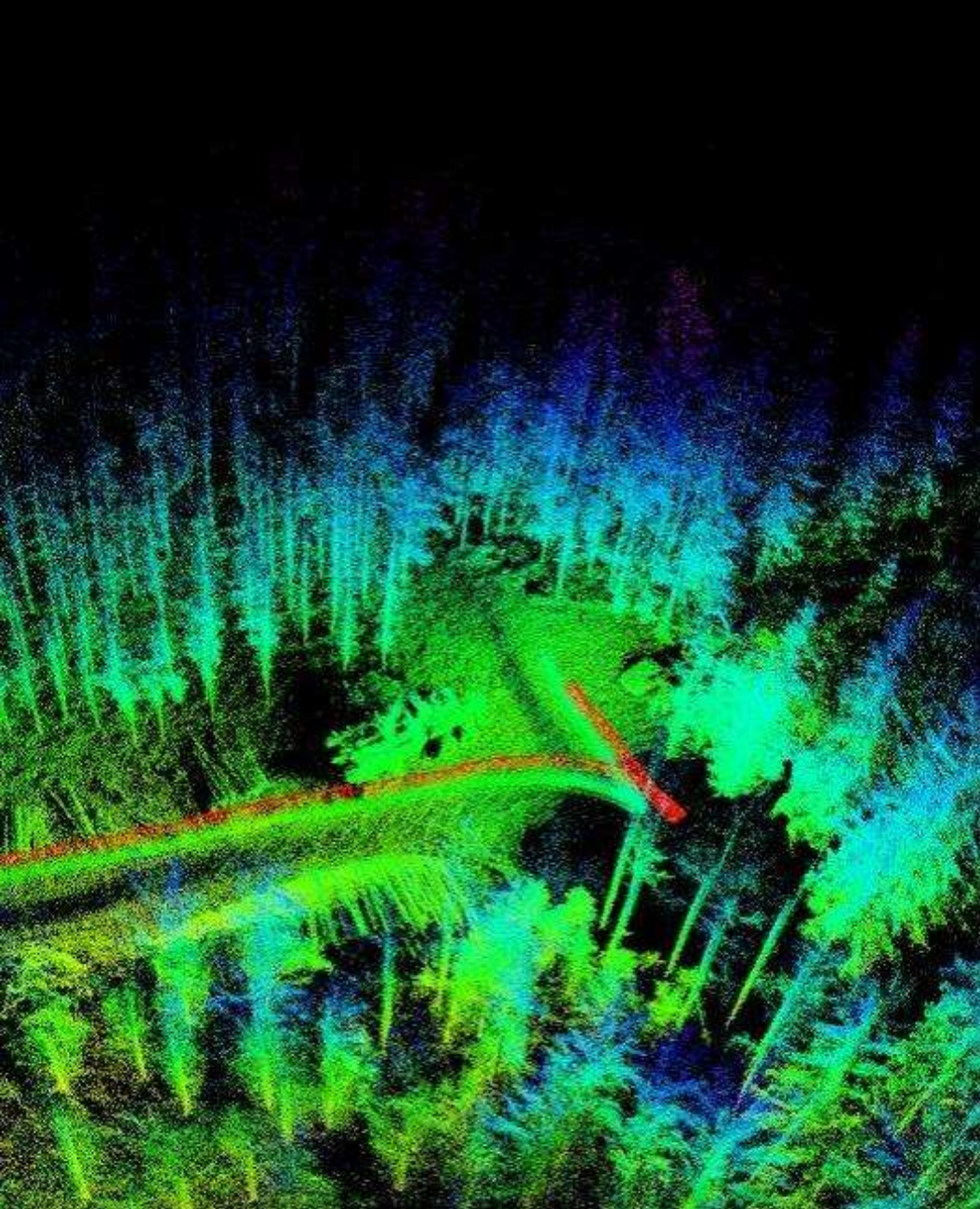
**Contact person: Jarkko Lipponen**

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# GIM-LOCATOR – WHEN GPS IS NOT ENOUGH

## OUR SOLUTION

GIM-Locator utilises 3D-sensors, such as LiDAR, to generate a location estimate. While satellite based location estimate is prone to subtle errors every now and then, GIM-Locator combines different sensor modalities and types and fuses them into one, more reliable and accurate, location estimate. While localising the machine, also an accurate map of the environment can be generated with GIM-Mapper. The format can be point cloud or mesh map with cm level accuracy. The map can be updated continuously if required. With this map and localisation, man and machine can have a shared world model and understanding to plan, direct and document the work.

## BENEFIT FOR THE CUSTOMER

Future in forestry is built on an increased amount of data. Data should be precise and up to date. The productivity improvements require more advanced automation which is dependent on good localisation and accurate model of the environment, which GIM Robotics can deliver this data to you.

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## COMPETITIVE ADVANTAGE

GIM-Locator provides infrastructure free localisation, working in all-weather conditions with unprecedented accuracy. It combines multiple localisation methods and thus is very reliable. The technology is based on solid research continues improving every day with wide knowledge base in GIM.

## COMPANY

GIM Robotics was founded in 2014 as a spin-off, from decades of research in Automation Technology at Aalto University. Since then, GIM has been providing more intelligence to the mobile machines in domains from agriculture to logistics and forestry.







# MONITOR FOREST WITH ACTIONABLE SAR SATELLITE DATA

## OUR SOLUTION

ICEYE SAR satellite imagery is perfectly suited for persistent monitoring of forests throughout the globe. SAR technology enables imaging through clouds, fog and darkness, with frequent global revisits. Receiving accurate information about remote, large forest areas frequently is a challenging task that requires regular employment of remote sensing technologies.

## BENEFIT FOR THE CUSTOMER

Distinguish between forest and non-forest areas. Monitor deforestation, forest degradation, regrowth, forest thinning. Map and measure the extent of deforestation or forest degradation. Monitor infrastructure and activity in the forest area. Analyze tropical forests through clouds, fog and darkness.

## COMPETITIVE ADVANTAGE

ICEYE SAR satellites provide highly accurate, reliable and timely data for a variety of applications during all weather and day or night. Utilization of SAR imaging enables monitoring of large forest areas using a single image and comparing the results over a time period.

## COMPANY

ICEYE empowers commercial and government partners with unmatched persistent monitoring capabilities for any location on Earth. The company helps customers make informed, data-driven decisions to address time-critical challenges in various industries.

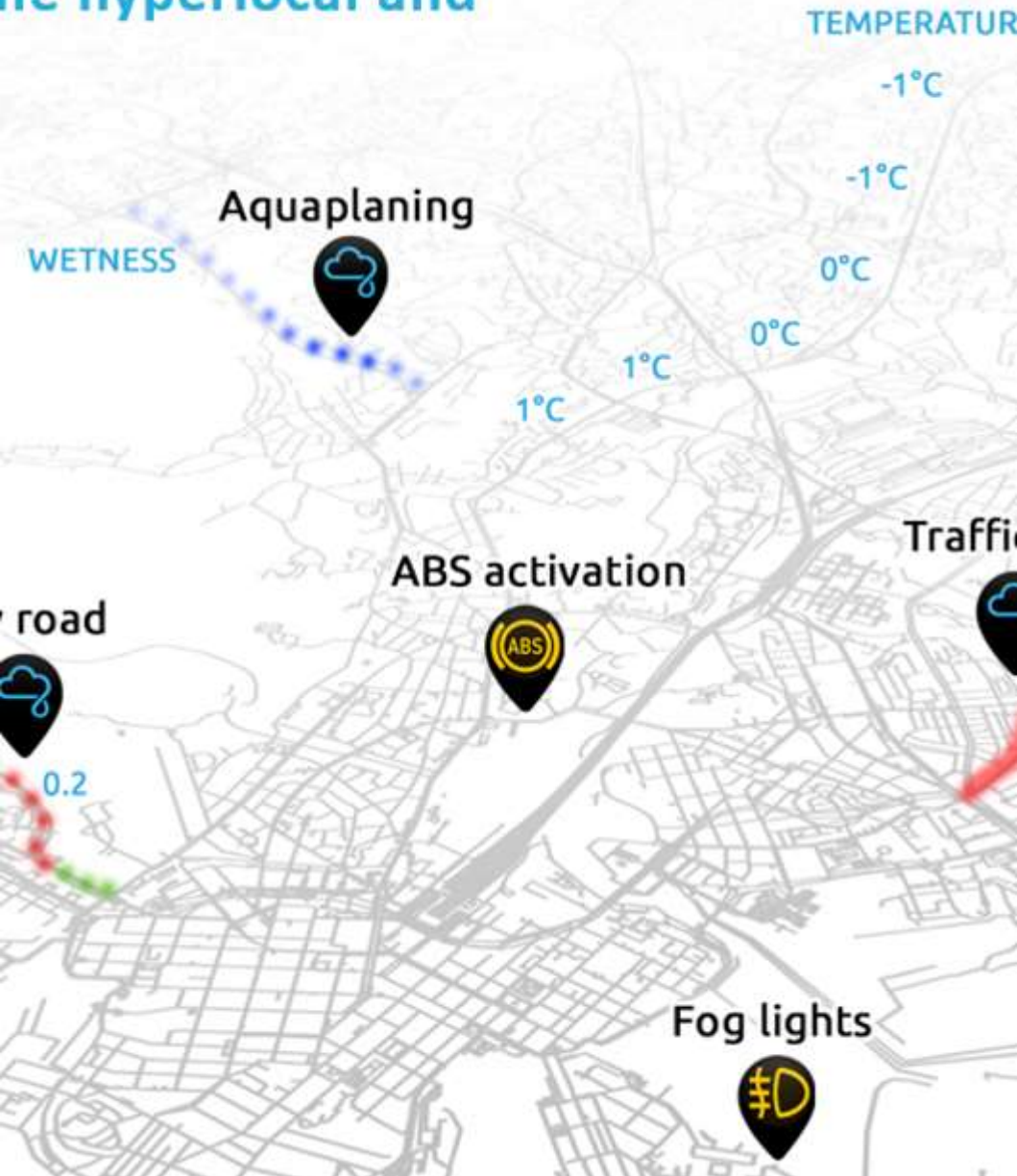
# Remote sensing

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**ICEYE**



he hyperlocal and



**FINLAND**

# KEEPING ROADS SAFE WITH REAL-TIME ROAD WEATHER AND CONDITION INFORMATION

## OUR SOLUTION

RoadCloud provides real-time, comprehensive, and hyperlocal road condition and road weather data. By equipping fleets of vehicles with our high-fidelity sensors, we collect high quality data on the state of the road network. The data is fused with in-car sensor data and machine-learning is used to calculate premium data sets, such as road friction, in real-time. Our optical sensors can distinguish between (black) ice, slush, snow and pooled water in all lighting conditions, which means that winter services vehicles can be routed dynamically to address hazardous driving conditions – increasing safety and reducing the amount of salt needed to cover the road network.

## BENEFIT FOR THE CUSTOMER

Over 50% of forest road costs are spent on maintenance. RoadClouds real-time data enables road owners to respond swiftly to quality problems such as potholes, ruts and washboarding before they deteriorate into more serious damage. Maintained roads save money, improve driver safety and reduce delays.

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## COMPETITIVE ADVANTAGE

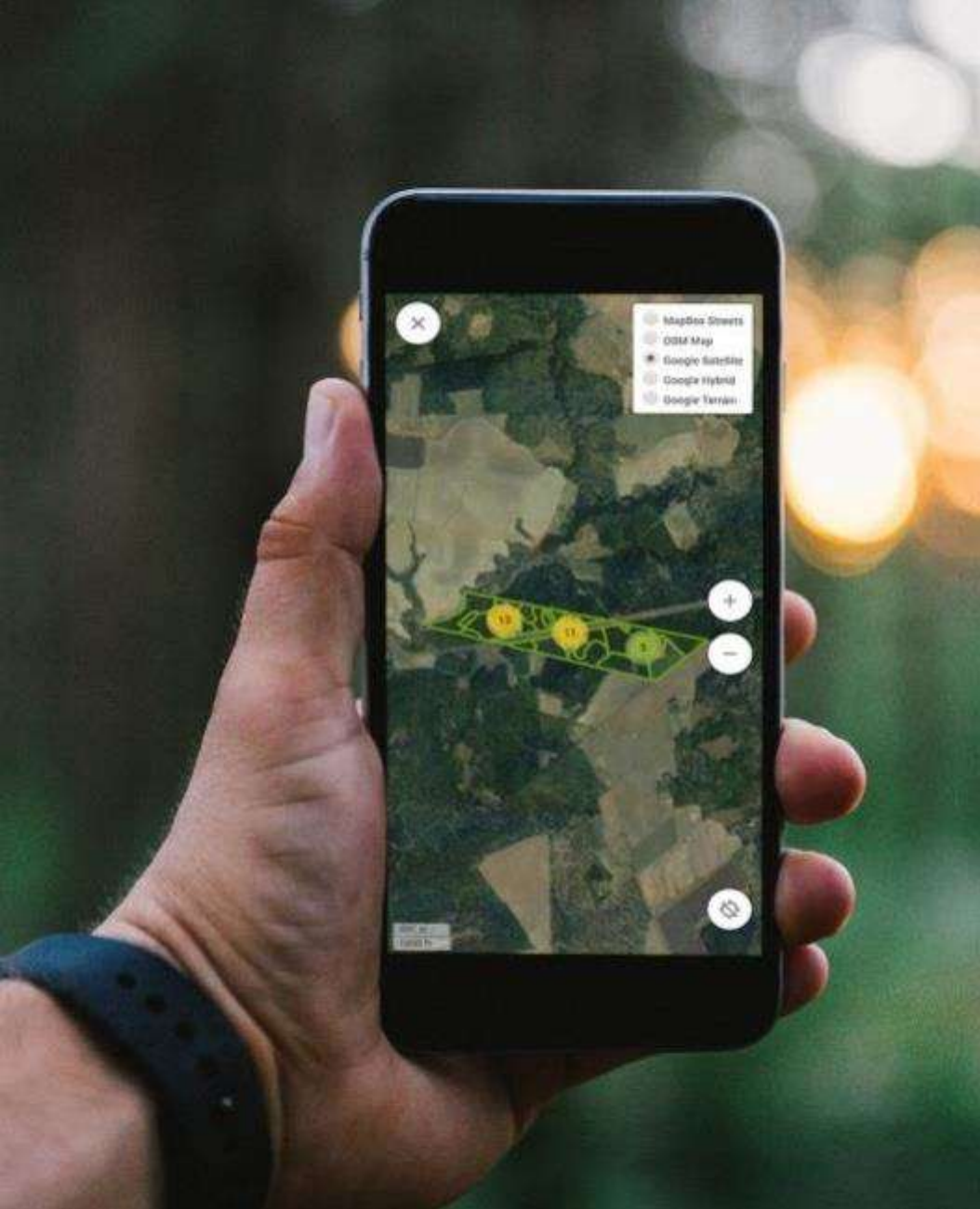
High performance optical road friction sensor and dedicated business intelligence tools for road asset management and predictive maintenance. Senior team with years of tire-road friction and vehicle dynamics research experience at Aalto University in Helsinki.

## COMPANY

RoadCloud was founded in Finland in 2014 to provide information services to make roads safe to drive on in all weather conditions. The team consists of 13 members. We have customers in Finland, Sweden, Germany and Estonia.







# SMART FORESTRY FOR PEOPLE, NATURE, CLIMATE, AND FUTURE

## OUR SOLUTION

Sustainable forestry is now a key requirement for capturing the real value of a forest ecosystem. Smart Forestry, which includes Precision Forestry and Natural Climate Solutions, incorporates a company's objectives and values within modern planning tools and services.

## BENEFIT FOR THE CUSTOMER

Smart Forestry, built on accurate resource data and learning models, allows site-specific management and plan-optimization while considering multiple operational objectives and restrictions. Decision makers can base their choices on objective information while ensuring sustainability along the way.

## COMPETITIVE ADVANTAGE

We offer real precision forestry solutions which integrate forest carbon into our client's core decision-making procedures. As a result, forest management is refined to truly support a sustainable future for our planet.

## COMPANY

We provide our clients with forest planning and optimization tools that enable them to cover all business objectives in their sustainable decision-making processes and to integrate carbon into forest value chains and management strategies.

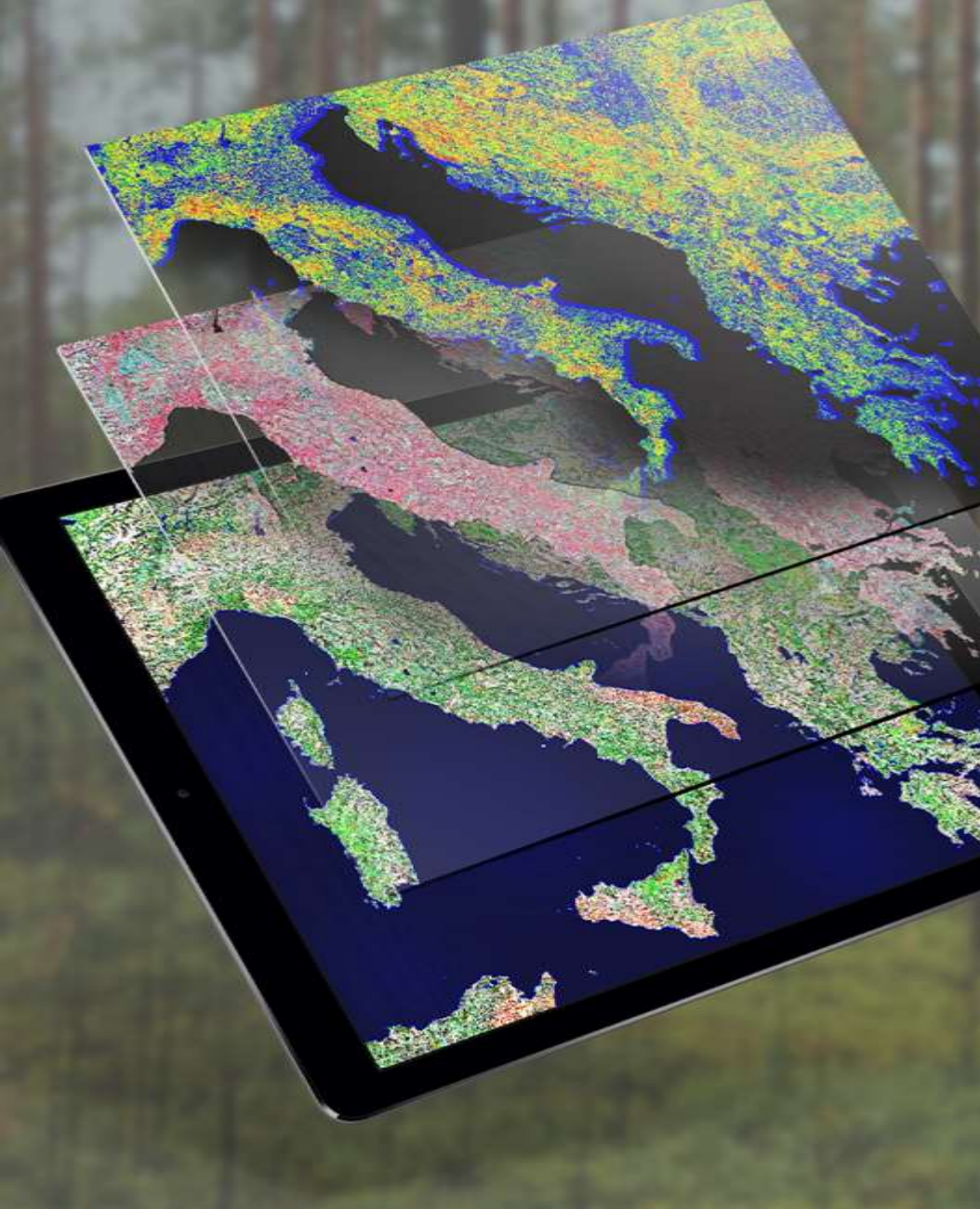
#Data-analytics and platforms

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**FINLAND**

# DYNAMIC SATELLITE-BASED DATA MAPPING AND USE

## OUR SOLUTION

Terramonitor is developing a satellite data-based mapping and analyzing platform. Our automated data acquiring and processing solutions help our forestry players to utilise Space Data in their own processes.

## BENEFIT FOR THE CUSTOMER

We make enable satellite-based data in an easy and usable form from anywhere in the world. Terramonitor gives forestry companies the power to analyze, build and organize new geographical data into concrete information by using up-to-date satellite data and multi-source data.

## COMPETITIVE ADVANTAGE

We help our customers to enrich their existing systems and data to make better business decisions with Space Data. Our products can be easily integrated through an application programming interface (API) or as other data formats for any existing system.

## COMPANY

Terramonitor is developing world's most dynamic satellite-based data mapping and analyzing platform of the globe.

# Remote sensing

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# POINT CLOUD INTELLIGENCE

## OUR SOLUTION

Terrasolid is the industry standard software for point clouds and images processing, developed specifically for the demanding requirements of geospatial, engineering, operations and environmental professionals. Our software suite provides versatile and capable tools to create 3D vector models, feature extractions, orthophotos, terrain representations, advanced point cloud visualizations, etc., no matter the data source, no matter the sensor. The finest tools for calibration and matching of point clouds for LiDAR data are included.

## BENEFIT FOR THE CUSTOMER

Among other things, new laser and imaging technology can be used cost-effectively in forest inventories

## COMPETITIVE ADVANTAGE

There are not many laser and aerial image processing programs on the market yet and we have been working with them for more than 20 years and we are the market leader in this area.

## COMPANY

Terrasolid 30+ years industry experience and more than 20 years in LiDAR business ensures that you have access to reliable and versatile software products that can solve problems extensively.

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# TRESTIMA FOREST INVENTORY SYSTEM

## OUR SOLUTION

Define tree volume, species composition and detailed DBH distribution of stems as part of your field visit just by shooting pictures. Record your trails and mark corners of the forest to be cut with GPS-tags. Machine vision can be utilized to objectively predict quality of the potential logs and bucking simulator can estimate what kind of wood products can potentially be obtained from that particular forest.

## BENEFIT FOR THE CUSTOMER

Measurement is objective and accurate. As low as 5% standard error can be reached for basal area. Measuring one hectare takes less than 5 minutes on average. In addition to traditional stand characteristics, the systems also records e.g. DBH distribution, log/pulp ratio and age.

## COMPETITIVE ADVANTAGE

The only tool available that let's you measure forest inventory just by shooting pictures. Patented technology. Compared to traditional methods you get more detailed data more efficiently.

## COMPANY

Trestima Oy is a Finnish technology company founded in 2012. We manufacture tailored software for forest industry's needs. Our expertise is utilization of machine vision and AI in demanding practical problem solving and harsh environments.

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A yellow and black Ponsse logging machine is shown in a dense forest, surrounded by tall, thin trees. The machine is positioned in the center-right of the frame, facing towards the left. The forest floor is covered with green moss and fallen branches. The lighting is bright, suggesting a sunny day.

**FINLAND**

# **HARVESTING AND LOGISTICS MACHINERY AND COMPONENTS**

**INCREASINGLY ACCURATE HARVESTING DATA HELPS TO  
REDUCE COSTS, INCREASE THROUGHPUT AND MAXIMIZE  
YIELD WHILE SIMULTANEOUSLY CREATING MORE  
SUSTAINABLE FOREST MANAGEMENT SYSTEMS.**

More efficient and controlled harvesting solutions both in the forest and along the logistics chain give the clients of Finnish companies a competitive advantage and increase the efficiency of the whole procurement chain for the benefit of both the harvesting services providers and the production mills.





**FINLAND**

# DRIVE SYSTEMS AND HARVESTER ROTATORS

## OUR SOLUTION

The Black Bruin On-Demand Drive System is a complete transmission solution for tractor-driven trailers and working equipment. The system enables smooth operation of the equipment and is designed for agricultural, forestry and earth-moving applications which often require tractive power in harsh conditions and varying terrain. Black Bruin Harvester Rotators are commonly seen in job sites where others just don't get the job done. Due to durable piston design, the rotator is very accurate in its operation. Accurate Black Bruin rotator maintains torque characteristics throughout its long service life. This means productive and efficient contracting!

## BENEFIT FOR THE CUSTOMER

The additional traction makes it possible to perform tasks in harsh conditions. It also prevents trailers from sinking into wet forests, avoiding damage to arable land or tree roots. Trailers with driven axles save fuel, as heavy loads can be pulled more easily and with a smaller tractor.

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## COMPETITIVE ADVANTAGE

The heart of the drive system is the hydraulic wheel motor which generates tractive power always when needed and for road speeds, can be easily freewheeled. A reliable system with guaranteed component compatibility is an easy solution for an OEM due to less time spent on system integration.

## COMPANY

Black Bruin Inc. is one of the leading manufacturers of radial piston hydraulic motors. Our drive systems are used in a wide range of mobile and industrial applications in agriculture, forestry, construction, mining, marine and recycling industries.

# Forest Industry Companies







# SCANNING SOLUTIONS TO REVOLUTIONIZE SAWMILL INDUSTRY

## OUR SOLUTION

Finnos provides all log scanning equipment for log sorting and saw infeed. Our technology enables full raw material traceability from log sorting to green sorting by fingerprint technology. Our guiding principle is to transform the structures of global sawing industry and generate hysterical business growth for the sawmills.

## BENEFIT FOR THE CUSTOMER

X-ray technology increases yield by 2-5% and enables value maximization through smart sawing pattern optimization. We stand apart from the competition with our expertise in various measurement technologies and software solutions.

## COMPETITIVE ADVANTAGE

The most precise and accurate measurement combined with world class knowledge of utilizing the equipment in various production. Our innovative solutions utilize data collected during sawmill processes with our systems or other existing systems.

## COMPANY

Finnos was established in the beginning of the era of digitalization of the sawmill industry, assuming a pioneering role within the sector.

# Forest Industry Companies

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**FINNOS**





# FUELCONTROL - SOLID FUEL QUALITY CONTROL SYSTEM

## OUR SOLUTION

FUELCONTROL® system measures in real-time the quality of solid biofuels using X-ray technology. It produces real-time moisture and foreign matter data that can be utilized in e.g. fuel pricing, process optimization and protecting of process equipment. The system is ideal for medium-sized and large biopower plants, fuel suppliers, and bio-refineries who wish to improve their production. Our systems are in use in several biopower plants with the size range of 50 to 400 MWth

## BENEFIT FOR THE CUSTOMER

Savings in fuel expenses

Improved plant efficiency

Reduced O&M costs

## COMPETITIVE ADVANTAGE

- Real-time data for various usage like process optimization, fuel purchasing and feedback giving
- Reduces manual work - replaces sampling - Can be installed into existing lines with reasonable investment cost compared to the sampling machines

## COMPANY

Inray offers its clients reliable measuring systems, software, and support services utilizing the latest technology and designed for industrial environments. The company's key competences lie in smart measuring systems integrated in production.

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**INRAY**





**FINLAND**

# EFFECTIVE AND FOREST-FRIENDLY FOREST MACHINES BY A FINNISH MANUFACTURER

## OUR SOLUTION

Jarcrac Forest Finland Oy manufactures light forest machines for environment-friendly forestry. Our product catalogue includes small forwarders, Dual machines, harvesters and also tracked work machines. Our forest machines can be picked with either tracks or wheels. They feel at home in especially difficult and soft terrain, as they are light and have compact dimensions. This enables Jarcrac - machines to minimize ground damage and be very gentle to the forest. The designs are simple and reliable, hence saving material and resources. The engines are made according to the latest European emission standards. (EU Stage V)

## BENEFIT FOR THE CUSTOMER

The customer benefits from superior thinning results in the forest, because working with our machine doesn't require wide trails, hence enabling more valuable trees to be left in the forest and keeping the

soil in good shape. The maintenance costs are also minimal with our simple and reliable design.

## COMPETITIVE ADVANTAGE

Our light machine's advantages are the forest-friendliness and low maintenance costs. The products are designed with the operator in mind, so that maintenance, service and working with the machine are easy and fast to do.

## COMPANY

Jarcrac Forest Finland Oy was started in 2015, with production shifted towards making compact and efficient forest machines. The first machine abroad was sold to Latvia in 2014 and now in 2021 we've sold machines to over 10 countries.

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# IBC - INTELLIGENT BOOM CONTROL

## OUR SOLUTION

A milestone in forest machine technology, Intelligent Boom Control - IBC, is a unique boom control system developed by John Deere. The sensors in the intelligent control system read the harvester head's (in harvesters) and grapple's (in forwarders) position, and the algorithms adjust the boom's trajectories in one easily controlled motion. The operator controls only the harvester head or grapple while the system takes care of the boom joint movements. A boom equipped with IBC is precise, fast and easy to use which directly reflects to increased productivity.

## BENEFIT FOR THE CUSTOMER

IBC works effortlessly. The operator steers the grapple and the boom adjusts automatically to the grapple movement. The operator doesn't have to activate or control the different sections of the boom individually. The boom's electronic end dampening makes the work process fast, pleasant and smooth.

## COMPETITIVE ADVANTAGE

IBC is available for all John Deere Wheeled Cut to Length forest machines. Launched for forwarders in 2013, and for harvesters in 2017. IBC is precise, fast and easy which reflects to increased productivity. A pleasant way of working attracts and increases the working capacity of the operators.

## COMPANY

John Deere Forestry Oy is domiciled in Tampere, Wheeled Cut to Length forest machine product development and the European marketing centre. The company employs 700 people in Finland. John Deere WCTL forest machines are produced in Joensuu, Finland.

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**FINLAND**

# TECHNOLOGY FOR MORE EFFICIENT MATERIAL HANDLING

## OUR SOLUTION

Kesla is a machine engineering group specialized in the marketing and manufacturing of forestry and material handling technology. Tractor attachments offer attachments to tractors, such as loaders, trailers and woodchippers. The range is suitable for different segments in addition to forestry. Truck and industrial cranes include cranes for trucks in forest or city or for stationary installations. Emphasis with the cranes is in user- and service-friendliness and productivity. Logging equipment includes forest machine cranes – forwarder and harvester cranes and harvester heads produced mainly to OEM customers. Kesla is #1 harvester head producer not dependent on any base machine brand.

## BENEFIT FOR THE CUSTOMER

Kesla produces machinery for material handling: truck and industrial cranes, tractor loaders, trailers and woodchippers, forest machine cranes and harvester heads. The machines are brand-independent which makes them compatible with almost any base machine.

## COMPETITIVE ADVANTAGE

The products are based on the deep end-customer knowledge which can be seen in user- and service-friendliness as well as in productivity of machines. We actively study different base machines to fit our machines perfectly. State-of-art control systems created by Kesla enhance user experience.

## COMPANY

The Kesla Oyj's net sales in 2020 was €40 M. Of these, exports accounted for 70 %. Established in Finland in 1960, Kesla has plants in Joensuu, Kesälahti, and Ilomantsi employing around 250 personnel. Kesla's shares are listed on Nasdaq Helsinki Oy.

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# LOGSET - HYBRID TECHNOLOGY IN FOREST MACHINES

## OUR SOLUTION

Climate change is by far the most difficult challenge of the 21st century. Modern societies must invent ways for protecting the planet while simultaneously empowering the economy. Wood-based products are sustainable alternatives when replacing fossil-based solutions. However, forestry needs to be sustainable from the beginning to the end. Sustainable harvesting is the first step in tackling this challenge - and we at Logset have the best solution for it. As the only manufacturer of hybrid harvesters, Logset is the forerunner in sustainable forestry, delivering a real sustainable way to produce timber.

## BENEFIT FOR THE CUSTOMER

A more efficient machine with decreased fuel consumption, diminished CO2 emissions and reduced noise level.

## COMPETITIVE ADVANTAGE

Logset is the only manufacturer of hybrid forest machines.

## COMPANY

Logset is a Finnish forest machine manufacturer located in Koivulahti, near Vaasa. The company was established in 1992. Today it has approximately 100 employees. Logset produces CTL solutions and Logset machines are working in more than 25 countries.

# Forest Industry Companies

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**LOGSET**

**FINLAND**





# THE MASTER OF ROUNDWOOD HANDLING

## OUR SOLUTION

We manufacture material handling machines, grapples and auxiliary products for roundwood handling at woodyards, ports and terminals. Our world-class manufacturing is combined with our practical contractor know-how at woodyards making us a unique company on the market capable of designing, optimizing and delivering solutions to improve your operations. Our physical products are complemented with a full range of services from assembly and training to locally available spare parts and technical support. We are the frontrunner and global market leader in professional roundwood handling solutions.

## BENEFIT FOR THE CUSTOMER

Our tailored solutions minimize your total cost of handled roundwood and emissions produced, while making your operations run at very high availability, predictability, safety and operator comfort. We offer you a long-term partnership with constant improvement and readily available local support.

## COMPETITIVE ADVANTAGE

We are the only manufacturer in the business that also operates woodyards. We can help you to make correct choices regarding layout, dimensioning and logistics flows and provide you with the most robust, productive, energy efficient and safe solutions – optimized for your specific operation.

## COMPANY

Mantsinen has +55 years and +500.000.000m<sup>3</sup> of experience in woodyards. We both manufacture material handling machines and operate at woodyards making us a unique company in the business with unparalleled knowhow and solutions.

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# HARVESTER HEADS, MULTIPURPOSE HARVESTER HEADS AND ENERGY WOOD HEADS

## OUR SOLUTION

We want to offer our customers cost-effective, superb alternatives for logging and special projects in which it is difficult to keep the bottom line in the black by using mainstream machinery

## BENEFIT FOR THE CUSTOMER

The functionalities of the Nisula harvester heads and tree shears make harvesting efficient and fluent. The typical properties of each Nisula products include state-of-the-art manufacturing, straightforward structure and easy maintainability, as well as high-quality materials and components.

## COMPETITIVE ADVANTAGE

Tens of thousands of hours of work in practice – that's how all Nisula products are created. The functionalities of the Nisula harvester heads and tree shears make logging easy and efficient. The Nisula products are characterised by highquality manufacturing, materials and components.

## COMPANY

The modern production facilities in Halli, Jämsä provide a good setting for developing the business in the years to come.

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**NISULA**  
THE FUTURE OF EFFICIENT LOGGING





# NOKIAN TYRES INTUITU EFFICIENT TIRE MONITORING

## OUR SOLUTION

At Nokian Tyres, we have one all-encompassing philosophy: adding peace of mind by making your work safer, more efficient and more sustainable. Nokian Tyres Intuitu™ adds a vital element to tire use: information. Nokian Tyres Intuitu tire pressure and temperature monitoring system uses in-built tire sensors and a Bluetooth connection to a smartphone giving you accurate, real-time information about your tires – ideal for monitoring the tire condition in daily work as well as for managing your entire business. Nokian Tyres Intuitu is currently available for agricultural and forestry tractor tires in selected markets.

## BENEFIT FOR THE CUSTOMER

SAVINGS, SAFETY AND EFFICIENCY. Smart tire pressure monitoring is important for grip and stability as well as fuel consumption and tire service life. High tire temperatures are linked to tire damage and are a safety risk. Nokian Tyres Intuitu makes your entire operation more informed and safer.

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## COMPETITIVE ADVANTAGE

We have been the world leader in forestry tires for decades. And we keep on leaning forward with new innovations, developed with machine manufacturers, tested and proven in rough Nordic forests. All types of machinery – Nokian Tyres has the most technologically advanced solutions in the market.

## COMPANY

Nokian Heavy Tyres, a manufacturer of premium special tires, is a part of the Nokian Tyres Group. Our tires are known for their high quality, long life and safety under demanding conditions. Whatever the forest throws at you – we have a solution.

**nokian  
TYRES**





# HYDRAULIC SOLUTIONS FOR DEMANDING USE (OEMS)

## OUR SOLUTION

NorrDigi system is an integration of multi-chamber cylinders, valves, sensors and electronics, which reduces the installation time and allows for downsizing of many of the major components, keeping the total cost of the machine in balance.

## BENEFIT FOR THE CUSTOMER

Productivity improvement Reduced fuel consumption, CO2 emissions & noise Downsizing of some main components (e.g. pumps) Longer service time between charges Recovery and storing of energy

## COMPETITIVE ADVANTAGE

Enables high performance energy saving motion control Intelligent NorrDigi system only delivers the power needed at any given time Optimised force production and recycling of released operation energy minimise energy losses, excess energy can be stored in accumulators (or batteries) for later use

## COMPANY

Norrhydro has wide experience in providing solutions for hydraulics and linear energy e.g. for forestry, material handling, construction and mining. We solve linear power problems in machines and equipment in a customer-oriented and ecological way.

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# SUSTAINABLE AND ENVIRONMENTALLY FRIENDLY HARVESTERS

## OUR SOLUTION

Ponsse's versatile and efficient harvesters and forwarders guarantee the best productivity, and they adapt easily to all kinds of environments. Harvester heads have a solid structure, powerful functions and precise controls. User-friendly information systems for harvesting control and monitoring.

## BENEFIT FOR THE CUSTOMER

Ponsse Plc is one of the world's largest manufacturers with industry leading range of cut-to-length forest machines and related information systems. Benefits of the cut-to-length method include high work productivity and environmental awareness compared to other types of mechanised wood harvesting. Mechanised wood harvesting using the cut-to-length method provides potential for effective timber supply from small stands and thinnings. Wood can be utilised more accurately and small-diameter timber can also be harvested economically. Productivity per machine unit is high. Switching to the cut-to-length method means diversified felling operations and additional demands on the machine operators.

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## COMPETITIVE ADVANTAGE

Our operations' deep customer orientation and genuine closeness to customers help us understand our customers' actual needs. The development of our innovations and solutions is always initiated and guided by our customers' needs, combined with the possibilities offered by technology.

## COMPANY

Ponsse Plc employs about 1800 persons, it's shares are listed on NASDAQ OMX. In 2020, Ponsse's cumulative net sales amounted to EUR 636.6 (667.4) million. Over the years more than 16.000 PONSSE machines have delivered to customer worldwide.







# **DIGITIZING, AUTOMATING AND MECHANIZING TREE PLANTING**

## **OUR SOLUTION**

Risutec engineers and manufactures tree planting machines and forestry digitizing devices for professional forestry work in commercial and environmental industries. Our equipment are typically used with heavy equipment such as excavators, harvesters and tractors. Tree planting machines take care of all the forestry regeneration stages, such as soil cultivation, planting, irrigation, fertilizing and removes the need to collect harvesting residue. Our digital devices document all the results, giving each tree their location, timestamp and ID within centimeter-accuracy, and show where to plant next, helping to manage large operations and improve operations.

## **BENEFIT FOR THE CUSTOMER**

Our tree planters combine several forestry (re)generation stages into one. This brings cost and time savings, helps with personnel challenges, improves quality and growth and extends planting seasons. Our digital devices bring transparency to field operations and cost savings by automation.

## **COMPETITIVE ADVANTAGE**

Compared to manual and semi-mechanical operations, our equipment increase the efficiency, quality, transparency and operational ease significantly while lowering costs. We have thorough experience in various conditions, which makes us able to fulfill basically any silviculture requirements.

## **COMPANY**

Risutec was founded in 2004. We operate globally and utilize knowledge gained with several large global players. We are familiar with the whole value chain from the nursery to the mill, helping us to understand the needs even beyond planting.

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# OPTIMIZED BEARING CAPACITY IMPROVEMENTS

## OUR SOLUTION

The composition of forest road structures varies densely, with ranging from almost non-existent ones to those properly planned and built. Thus, also the bearing capacity of the roads, as well as its seasonal changes vary strongly. Predicting feasibility of a route directly is thus mostly and impossible task. Our company provides fast and reliable bearing capacity measurements, which enable accurate recognition and planning of necessary improvements.

## BENEFIT FOR THE CUSTOMER

Costs caused by repairing damaged roads are typically several times higher than those related to improvements carried out before the transport. By a measurement based planning, the amounts of material and labor needed for the improvements are can be accurately optimized. Also, the improved transport reliability is crucial for mitigating costs due to inconsistencies in the raw-material supply. Thus, the procedure makes it possible for forest owners and - companies to make significant savings while ensuring a sufficient bearing capacity for their transports.

## COMPETITIVE ADVANTAGE

Our experience and ongoing development have allowed us to optimize our analyzing and planning processes in terms of cost and reliability. It has also given us the capability to take into account dynamic changes in bearing capacity, e.g. caused by seasonal variability and drainage conditions. This unique knowledge and software have allowed us to take material optimization in road improvements one step further.

## COMPANY

West Coast Road Masters is an infrastructure maintenance consulting company based in Pori, Finland. We provide road structure measurements, analyses and planning, in addition to a wide range of other road maintenance related services.

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# THINNING & SOFT TERRAIN HARVESTING FRONT-RUNNERS

## OUR SOLUTION

Thinning is the selective removal of trees to improve the growth rate of the remaining trees. Factors that make thinning challenging are the small yield per hectare and the fact that the remaining trees must not be damaged. Sampo harvesters and forwarders are specifically designed for thinning and soft terrain harvesting, maximising productivity and minimizing the impact to the environment. The product line-up includes the nimble HR46x harvester and the 10 to 12-ton load capacity FR28 and FR48 forwarders for thinning and the all-round HR86 harvester and the 14-ton load capacity FR68 forwarder for regeneration harvesting.

## BENEFIT FOR THE CUSTOMER

Forest contracting is an economic activity that must be profitable. The leading principle of Sampo is to offer customers high-quality, easy to use and productive machines, specifically designed for their needs and with features and a cost structure that allows profitable harvesting when thinning.

## COMPETITIVE ADVANTAGE

Sampo forest machines are designed with special emphasis on the conditions in thinning. Appropriate machine size for thinning, durability and well-thought through machine designs result in capital and running costs clearly lower than those of competitors.

## COMPANY

Sampo Rosenlew Ltd is a well-established manufacturer of cut-to-length forest machines and combine harvesters. The company was founded in 1991, but it has been operating in Pori on the west coast of Finland, for over 150 years.

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# SISU POLAR TIMBER TRUCKS FOR MOST DEMANDING ENVIRONMENTS

## OUR SOLUTION

Multi-axle heavy duty timber trucks designed to meet the most demanding timber transportation conditions and special vehicle/combination weights.

## BENEFIT FOR THE CUSTOMER

Reliability, low operating costs, low fuel consumption, easy operation

## COMPETITIVE ADVANTAGE

Factory ready complete solutions, Diesel-Electric Hybrid technology available for heavy duty trucks, tailored to meet customer needs, unique chassis technology (frame, suspension, axles)

## COMPANY

Sisu Auto's core competences are in the product development and production of trucks and military vehicles. In parallel, vehicle technology consulting services, design and project management, are also key elements in Sisu operations.

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# ONE TIMBER CRANE SCALE



## OUR SOLUTION

Tamtron One Timber scale designed for timber truck cranes combines the innovative features of the Tamtron One display and our new generation strain gauge weighing link. The scale functions wirelessly between the weighing link and Tamtron One display. Installation is quick and the scale is operational in no time. Tamtron's One Timber scale is ideal for vigorous use and round-the-clock operations where precision is essential. As a solution that requires little maintenance, the One Timber scale is intended for severe and harsh working conditions where changing temperature and humidity readings are the norm. The weighing information is transferred electronically from the scale to the cloud.

## BENEFIT FOR THE CUSTOMER

Underloading i.e. not maximizing the loadable amount is bad business and overloading can result in fines. With One Timber scale one can rely that the loaded amount is in line with the vehicle and road legal limits. Weighing while loading saves the time and money.

## COMPETITIVE ADVANTAGE

Tamtron's One Timber scale is designed for fast-paced loading up to capacity of 10t. The weighing information is transferred electronically from the scale to cloud. Weighing information can be stored in One Cloud and made available for various parties within the company and with stakeholders.

## COMPANY

Tamtron Group, established in 1972, is an international manufacturer of scales and weighing information management systems. Tamtron is represented worldwide in over 60 countries. Tamtron Group has 140 employees and annual turnover in 2019 was 23 M€.

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# OEM INDEPENDENT TIP CONTROL FOR FORESTRY CRANES

## OUR SOLUTION

Technion's xCrane PRO brings crane operation to a completely new level with its state-of-the-art tip control. Operators can now control the tip of the boom instead of controlling each cylinder individually. Suitable for controlling the crane in harvesters, forwarders, tractor mounted systems and log trucks. xCrane PRO turns new operators into skilled professionals and increases the productivity even for experts. With features like pre-programmed assistive movements, collision prevention and end cushioning for boom movements, both operator well-being and the lifetime of the crane increases.

## BENEFIT FOR THE CUSTOMER

Our products are designed for the operator, and with the customer in mind. This means that the products are delivered as turnkey solutions that increase productivity and significantly speed up time to market. xCrane is quick to learn, easy to use and offers the best user-experience in the market.

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## COMPETITIVE ADVANTAGE

We create specialized yet future proof products. A good example of this is the xCrane system which is designed for crane control but simultaneously supports other hydraulic functions as well like trailer traction. No software development is needed but the option for customization is always possible.

## COMPANY

Technion Oy is engineering and manufacturing innovative control system solutions for forest machinery. Technion is part of the HYDAC Group, which has operations in nearly 50 countries and can meet the challenges set by customers globally.







# MANAGEMENT SYSTEM FOR SMARTER WOOD HARVESTING

## OUR SOLUTION

CFHarvest is forestry software for harvesting, silviculture, and forestry services. It enables better woodflow and increased forest operations productivity. CFHarvest is a total harvesting management solution offering - handy web-based application for work scheduling - useful on-board application for operation execution and control - clever mobile app for operation in the field CFHarvest works even without a network connection. "We want to be promoting and enabling contractors with the ability to work for several forest companies to increase productivity. This benefits all parties." - Stora Enso

## BENEFIT FOR THE CUSTOMER

For Contractors - Managing mixed fleet operations with one system - Increased revenue per machine - Less time measuring and reporting For Forest Companies - Reduced inventory - Forecast of planned wood flow to roadside storages - Real-time information of harvested wood - Traceability to the wood origin

## COMPETITIVE ADVANTAGE

CFHarvest enables you to manage mixed fleet harvest operations in ONE system, in real-time! CFHarvest enables you to know the productivity of your fleet and thus make the improvements needed. With the information given by CFHarvest, you are also able to reduce both roadside and terminal inventory.

## COMPANY

Trimble is an Industrial Technology company whose Forestry division provides the best system to manage the entire supply chain in forestry. Trimble Forestry has several offices around the world.

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**FINLAND**

# FROM ACCESS CONTROL TO LOGISTICS AND BEYOND

## OUR SOLUTION

Visy Access Gate is an intelligent access control system for industrial facilities. It is currently the de facto access control system in all Finnish forest factories, and integrates together various modalities of access permits: built around our industry leading in-house license plate recognition (LPR), it also supports RFID, ID cards, PIN codes, weighing stations, integration to customer systems, and more. When coupled with the new Visy ONE, a remote booking manager and check-in app, the customer site reaches a new level of productivity, where the gate to the factory is no longer the bottleneck in the process--with industry leading security features.

## BENEFIT FOR THE CUSTOMER

License plate recognition is the most cost-effective solution for access control. Traditionally, LPR has been expensive and labor-intensive to install. The new Visy ONE product line enables industry-leading security with a fraction of the cost with a unique cloud backend and plug-and-play hardware.

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<http://www.visy.fi/>

## COMPETITIVE ADVANTAGE

Visy is the only security company with its own computer vision and AI solution. This extends beyond our world-class license plate recognition accuracy: Visy is a future-proof partner for all your gate automation and logistics needs: from rail OCR to container codes and even 3D measurements of cargo.

## COMPANY

Since 1994, Visy has been deploying cutting-edge solutions to help customers reduce operating expenses, optimize safety and security and increase throughput. Our long tradition guarantees reliability and our forward-looking R&D keeps you up-to-date.







**FINLAND**

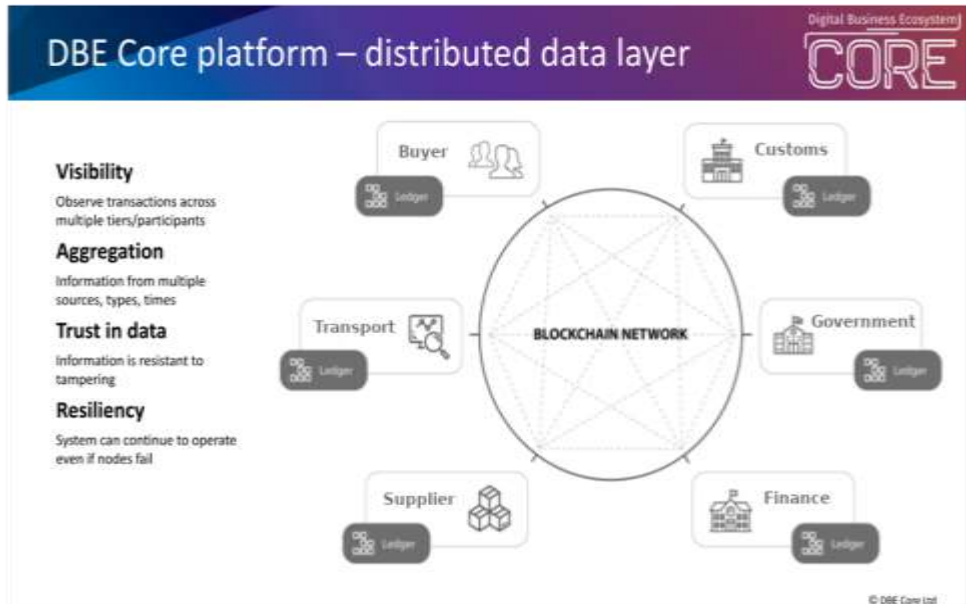
# **FOREST MANAGEMENT AND ENABLING TECHNOLOGIES**

**FINNISH COMPANIES OFFER HIGHLY ADVANCED  
SOLUTIONS FOR SUSTAINABLE FOREST USE  
PLANNING, USING ARTIFICIAL INTELLIGENCE  
ANALYSES ON FOREST COVER GROWTH, CHANGES,  
AND DAMAGE RISKS.**

A rich ecosystem of AI analytics, as well as connectivity, sensor, and machine vision technologies, offer implementations also for the forestry sector.



# DBE CORE PLATFORM FOR SUPPLY CHAIN DATA SHARING



## OUR SOLUTION

DBE Core Platform has been developed for exchanging electronic supply chain documents used in sourcing, purchasing, transportation, logistics and trade finance. The business documents describing these activities, for example order, despatch advice or waybill, utilize EU standards for business (B2B) and for government (B2G). It is possible to exchange product data, such as technical product data, by using buyer, supplier or standard catalogue product names and number spaces. DBE Core Platform supports forest industry maintenance technical data sharing in order to manage Product Life Cycles (PLM). This supports Digital Twin operations.

## BENEFIT FOR THE CUSTOMER

The solution is estimated to offer 30-70 % cost savings, improved data quality (8 % less per data re-entry). Distributed ledgers store all data in an immutable and encrypted form. DLT technology offers trust-based exchange of business critical information. GDPR compliant.

## COMPETITIVE ADVANTAGE

Customers are able to fully control the sharing of their business critical data. Ability to follow the product lifecycle events of a product. Deployment of Linux Foundation Hyperledger and UBL/Peppol open source technology secure the resources and sustainability of the development.

## COMPANY

DBE Core Ltd. was established on 9.3.2018 for the role of an ecosystem company, coordinating necessary supply chain data sharing and integrations to secure a better connected business world based on disruptive technologies.

# Connectivity





# SYSTEM SOLUTIONS FOR NONROAD MOBILE MACHINES

## OUR SOLUTION

Epec provides non-road mobile machine builders system solutions enabling machine automation, digitalization, and electrification. Epec's offering consists of control systems, telematics units & connectivity solutions, displays, mobile electrification systems, assistance & autonomous systems, customized products, application software development and simulation-based systems engineering.

## BENEFIT FOR THE CUSTOMER

With our customers, we continuously co-create and innovate value adding sustainable future technology solutions that make a difference. Epec's solutions are scalable, efficient, safe and connected and we aim to minimize customer's time-to-market for example by using simulation-based engineering.

## COMPETITIVE ADVANTAGE

Epec's strength is the combination of innovative and reliable products and services, know-how of new technology, extensive project management and service experience from different types of applications and operating environments, own modern factory & working in close co-operation with our customers.

## COMPANY

Epec is a system supplier specializing in advanced electronics for non-road mobile machines and commercial vehicles. Epec is a manufacturer with extensive experience in control systems, electric vehicle systems and autonomous functions.

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**EPEC**



# CONTROL SYSTEMS AND CONNECTIVITY SOLUTIONS FOR NON-ROAD VEHICLES



## OUR SOLUTION

Exertus is the control system specialist making an innovative solutions including electronics, software, application development and related services for mobile machinery applications in the field of forestry, mining, construction, logistics and agriculture. All electronic units are developed in-house which gives freedom to create optimal products for customers. Our standard products are offering good variety of electronic control units for mobile machinery applications including main controllers, IO-controllers, displays and connectivity devices. Custom designs are based on the industry proven design elements from our design library which will ensure the cost efficiency and quality.

## BENEFIT FOR THE CUSTOMER

Exertus offers total solutions including everything from control system engineering to production and life cycle services. Our specialists can take also care of an application development when necessary. Comprehensive remote diagnostics toolbox offers ready made tools to support field operations.

## COMPETITIVE ADVANTAGE

We have strong knowledge from the field of non-road vehicles which gives us an exceptional ability to create total control systems and smart solutions in cost effective way. The platforms developed by the company are modern and offer a great flexibility for customization for your needs.

## COMPANY

Exertus has been founded in 2003 at Seinäjoki and all founders are still active in the company. We have been growing in the global markets over the past years. The top quality products are manufactured in Finland.

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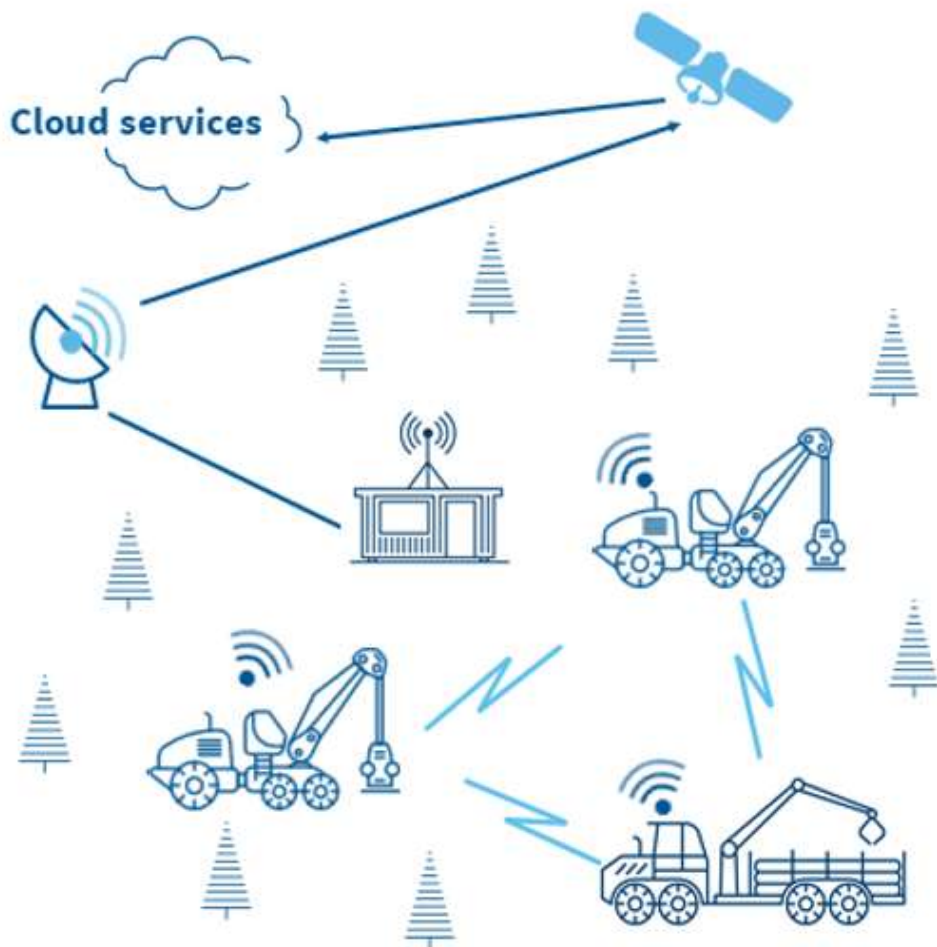
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# CONNECTIVITY FOR SMARTER FORESTRY

## OUR SOLUTION

SATEL offers mission-critical connectivity solutions for:

- Positioning
- Collision avoidance signaling
- Machine to machine commands
- Process control and command
- Progress monitoring
- Predictive maintenance
- Safety signaling
- Mission critical telematics

Typical requirements:

- Ultra-high reliability, often with back-up connectivity
- Cyber security

- Constant and low latency
- Confirmed minimum throughput
- Tolerance for very harsh environments
- Robustness and high quality

## BENEFIT FOR THE CUSTOMER

SATEL solution is customized to meet the customer's field requirements. It improves the quality of work and increases work site safety. It lessens the need for rework – everything is done correctly the first time. Environmental benefits: Lesser fuel consumption and reduced CO2 emissions.

## COMPETITIVE ADVANTAGE

SATEL is independent connectivity expert with good reputation & high reliability. SATEL offers global product availability, and local support and service.

## COMPANY

SATEL is a trusted wireless technology expert and innovator who develops and sells high quality connectivity solutions that enhance the success of our partners by adding value and security to their business through mission-critical connectivity.

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# SATEL

Mission-Critical Connectivity



# and Fibre Supply Ecos



**FINLAND**

## DIGITALIZING WOOD AND FIBRE SUPPLY

### OUR SOLUTION

The new ecosystem platform for digitalized wood and fibre supply

### BENEFIT FOR THE CUSTOMER

- Incoming wood delivery information supports inventory management
- Suppliers can improve their operations when getting back measurement data
- Key information to support raw material provenance
- Supports automation in wood reception process
- Less manual work leading to improved data quality

### COMPETITIVE ADVANTAGE

- One connection to reach all the other connected parties
- Opportunity to open new business relations with connected companies
- Simplified infra and security management with one external connection

### COMPANY

- Made for all sizes of companies to join and be digitalized
- Message exchange with format and code conversions
- Standardized papiNet messages
- Web apps for small companies
- Cloud service, no additional software and hardware needed

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**tieto**  
**ENVY**



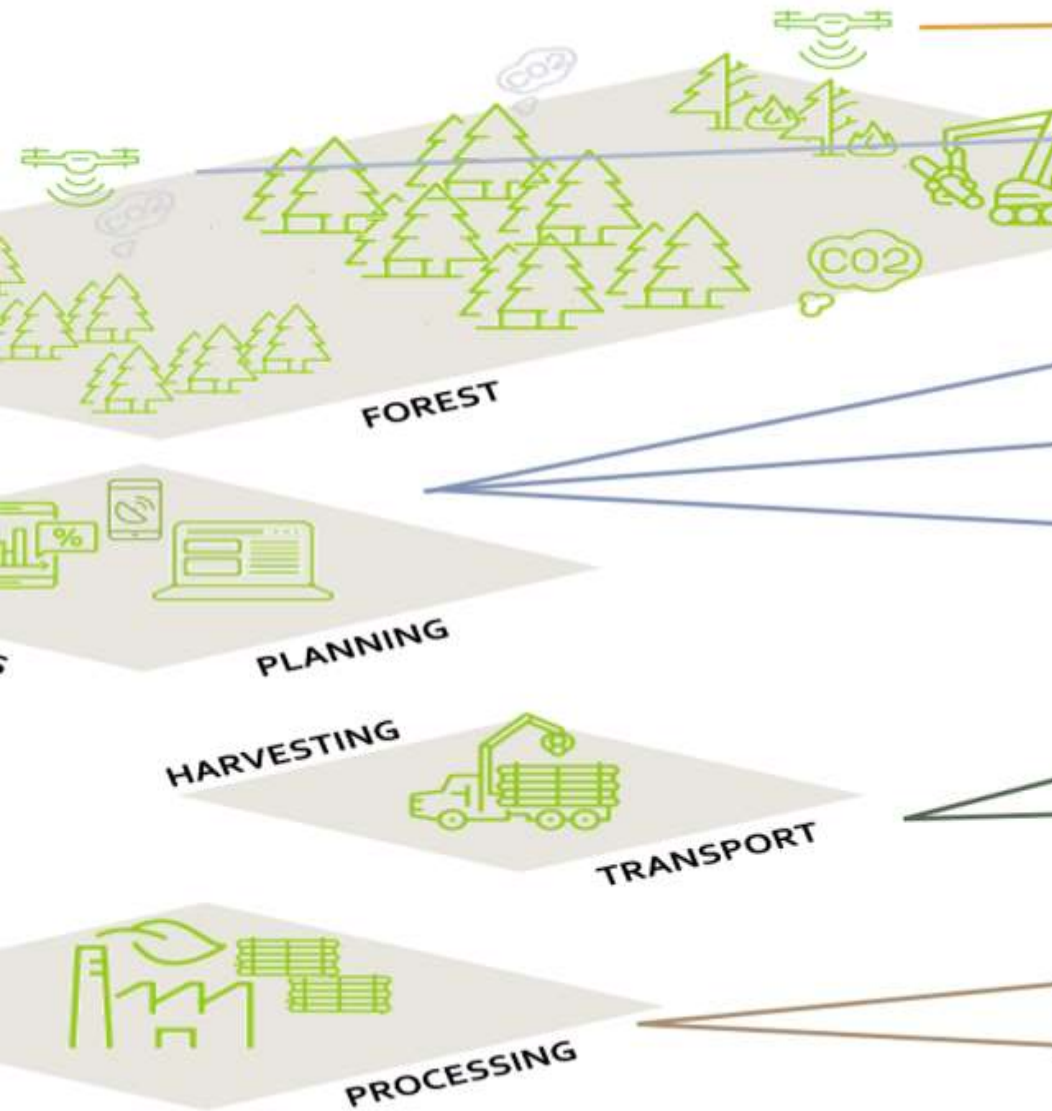
A woman with blonde hair, wearing an orange jacket, is sitting in a blue hammock. The hammock is suspended between two trees in a forest of tall, thin evergreen trees. The woman is smiling and looking towards the camera. The background is a dense forest with many trees and some green foliage in the foreground.

**FINLAND**

# **CONSULTING SERVICES**

**FINNISH COMPANIES' WORLD-CLASS  
EXPERTISE ENABLES OFFERING FORESTRY  
CONSULTING SERVICES GLOBALLY ON THE  
FULL FORESTRY VALUE CHAIN.**





**FINLAND**

# AFRY SMART FORESTRY

## OUR SOLUTION

AFRY Smart Forestry offering developed by AFRY Management Consulting creates value through combining AFRY's forest value chain expertise and the most advanced digital solutions in the market today to allow tree-level data to build a digital twin of the forest, forming a basis for sustainable and precise forest management and yield maximisation. With high-quality inventory data and a world-class simulation and optimisation platform, AFRY is able to serve major players in the market and integrate with forest management systems of all kinds.

## BENEFIT FOR THE CUSTOMER

AFRY's global Smart Forestry centre of excellence with planning and optimisation solutions all planning levels from strategic to operational, throughout the entire forestry and wood sourcing value chain from silviculture and forestry to harvesting and transport.

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## COMPETITIVE ADVANTAGE

Worldwide, long-term knowledge and expertise in best-practices in forestry and wood sourcing. Deep insights into the landscape of digital solutions as well as an own products and high level of forest IT capability. Our Smart Forestry Solutions also cover carbon and financial elements.

## COMPANY

AFRY Management Consulting is the leading advisor to the world's energy, forest and bio-based industries. Our dedicated team provides strategic and operational advice across the value chain, underpinned by deep expertise and market insights.





# METSÄTEHO: MODERN WOOD PROCUREMENT DEVELOPMENT



## OUR SOLUTION

Metsäteho supports the development of its shareholders' wood procurement and wood production operations and improves the operating preconditions for wood supply.

See vision: [Efficient Wood Supply 2025](#)

## BENEFIT FOR THE CUSTOMER

Metsäteho's primary areas of activity include R&D projects, consultancy services, seminars and other communication activities.

## COMPETITIVE ADVANTAGE

Research and development work is based on active networking as well as skills and knowledge of Metsäteho employees.

## COMPANY

**Metsäteho Oy** is a limited company owned by the leading forest industry organisations and companies of Finland and is specialised on research and development (R&D) work and projects.

[www.metsateho.fi](http://www.metsateho.fi)





# CARBON FOOTPRINT DATA SERVICES

## OUR SOLUTION

We offer services for calculating the carbon footprint, mapping emission reductions and compensating the carbon footprint with domestic and foreign compensation projects. As the first and currently only supplier in the Nordic countries Green Carbon carbon units hold attestation for ISO 14064 -standard provided by DNV GL. Our portfolio covers solutions from forest data management for carbon mitigation projects to corporate carbon footprint tools to calculate emissions.

## BENEFIT FOR THE CUSTOMER

A high level of automation in data collection and management gives customer a quick and affordable view to carbon management. The first step to carbon management is to find out where we are in terms of carbon, either in mitigation projects or on a company level. We can provide the data.

## COMPETITIVE ADVANTAGE

Our deep knowledge of Boreal forest management and also carbon reporting in corporate level gives an unique combination to carbon management. High level of automation streamlines the process and raises the level of data accuracy.

## COMPANY

Green Carbon is an expert company specializing in corporate carbon footprint management. Our range of customers are from small office type companies to publicly owned banks. Even still in our early days, we have helped customers around the World.

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# NATURAL RESOURCES MANAGEMENT AND STRATEGIC INVESTMENT ADVISORY

## OUR SOLUTION

Indufor is a global leader in Natural Resources Management, Investment Advisory, and Strategic Industrial Development consulting. Our key strategic services are: - Strategic industrial development within the wood and fibre-based industry & bio-products - Sustainable natural resources and fibre sourcing strategies and optimisation - Business and investment strategies with M&A support - Due diligence with forest resource assessment and mapping - Natural capital and forest valuations - Sustainable finance - Climate change and ecosystem services in forest landscapes - Sustainable natural resources management with smallholders.

## BENEFIT FOR THE CUSTOMER

We provide high-quality services in the forest and forest industry value chains, adding value to our clients and to the affected communities. We support our customers to compete and sustainably grow in international markets, based on our long experience with both public and private client work.

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## COMPETITIVE ADVANTAGE

Global mega-problems require a swift transition towards a green economy and bio-based production. Forests will have an increasingly important role in finding sustainable solutions for global problems. We have a holistic approach, taking into account the ESG elements of sustainable development.

## COMPANY

We have offices in Finland, New Zealand, Australia, the US, and China. We have over 40 years of experience in more than 100 countries and a global, multi-sector staff. We have in-depth experience in natural resources management and forest industry.







**FINLAND**

# AUTONOMY SOLUTIONS FOR PRODUCT DEVELOPMENT

## OUR SOLUTION

We design and deliver solutions for industrial partners who are digitizing their operations. Our core competencies are in mobile transportation, remote control operations and autonomy solutions. We have hands on experience in delivering autonomy solutions. We know how to efficiently and sustainably combine customer's business with latest technology solutions. In case you are searching for new business growth or transforming existing business, we can be your partner in establishing long-term roadmap starting from concept and architectural design aiming to achieve life-cycle business targets.

## BENEFIT FOR THE CUSTOMER

Together with us you can concentrate on your existing business and at the same time speed up development for new features. We can save time and money by guiding you around pitfalls of introducing new technologies. Our track record in intelligent working machines guarantees successful implementation.

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## COMPETITIVE ADVANTAGE

Our team of experts has decades of experience from product development. We are one of the few teams in the world that combines the expertise from ICT and intelligent working machines.

## COMPANY

VTT SenseWay provides engineering services to enterprises in the field of autonomy and digitalization. We are currently designing autonomy solutions for global mining machinery and forestry machinery Original Equipment Manufacturers (OEMs).





# FINLAND

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