



INCREASING EFFICIENCY AND ECONOMIC GAINS IN SUSTAINABLE FORESTRY AND HARVESTING OPERATIONS

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SILVISMART is a digital portal to promote precision forestry developed by the TECH4EFFECT BBI project.

Finding new innovative products to replace fossil-intensive materials is an important step in moving away from petrochemicals towards a more sustainable future. A major societal challenge lies in being able to meet the expected, increasing demand for biomass, such as wood, to supply bio-economies, while ensuring sustainable land management practices.

Precision forestry is a knowledge-based management concept, where digital tools and technology aid data collection and analysis for improved site-specific management aimed at increasing both production and environmental performance. Such

approaches will bring the next breakthrough in efficiency gains in speed and revenue, while ensuring sustainable practices. Better and faster access to information, including benchmarking tools, should have a major impact on planning and decision-making to speed up supply for biomass-based value chains. Examples of such chains are prime saw logs and engineered wood for construction, bark for ropes, sap to bind paint and cellular pulp for clothes.

SILVISMART PART OF TECH4EFFECT

The TECH4EFFECT project engaged in multiple topics and initiatives to research, design and

implement methods and tools, create better business models, and provide digital solutions, such as SILVISMART, to help the forestry sector become more efficient. The fundamental solution for the digital portal SILVISMART is now operational, and TECH4EFFECT is focusing on getting users from across Europe to join the platform.

TECH4EFFECT Project Leader, and Head of Research of the Norwegian Institute of Bioeconomy Research (NIBIO), Rasmus Astrup, said that automatically collecting data from forest operations, and converting that data into business intelligence, could make significant gains in terms of biomass provision,

Onboard computers in harvester cabs make it easier to submit data for precision forestry. Source: Ponsse



Ponsse eight-wheel forwarder, designed to reduce ground compression, carries logs roadside. Source: Ponsse.

efficiency of operations and environment performance.

"In the TECH4EFFECT project, we are actively engaged in developing business and digital tools to increase supply of forest biomass for the emerging European bio-economy. At the same time, we need to ensure that forests are sustainably managed, and that a wide range of desired ecosystem services are provided," he said.

SILVISMART is a key step towards this, offering potential ways for all actors in the harvesting chain to benefit.

COLLECTING AND TRANSFORMING DATA INTO USEFUL INFORMATION WITH SILVISMART

In a perfect world, data from forest operations would be automatically collected, in real-time, from all forests, big and small, across all types of harvesting techniques. This would

give rise to an enormous amount of data that can be transformed into business intelligence and decision support. The data could benefit machine owners and operators, as well as the forest owner and forest manager.

Collected data then has to be systemised, and fed into a database such as SILVISMART, where it is transformed into valuable information which is easily accessible. For the information to have meaning, it is analysed, presented in a visual form, which is easy to understand, and customized to the needs of the different user groups, such as contractors, operators, forest owners and managers.

The data automatically collected from forest machinery consists of several types of data. For example, information about the forest, such as tree species, tree positions, assortments and tree sizes, which

can be used to improve future forest management. Environmental data, such as mapping apps, illustrate the driving patterns of forest machines during operations. This can be used to document and demonstrate sustainable management, which is required for forest certification schemes. Importantly, data about the performance of the contractor and operator, such as harvesting productivity, measured in cubic metres/hectare, as well as fuel consumption, can be used for continuous improvement within the operation.

There are multiple ways in which this data could be used, benefits such as improved digital dataflow between the different actors in the value chain can be achieved, reducing the need for manual paperwork related to both production reporting and sustainability documentation. Personal benchmarking for operators or contractors to allow for continuous improvement and learning would be an additional major step towards efficiency. All of these aspects of data flow would provide detailed and precise forest information that can be used for implementing precision forestry management.

"If you look at the European landscape, there is a lot of untapped potential for the uptake of technological solutions and data sharing which will, in the end, help manage and harvest Europe's valuable timber resources in an efficient and sustainable manner," Astrup explained.

However, this perfect world scenario depends on many real-life situations, industry norms and methods of forest management, which potentially could affect data flow. Digitalisation, in general, is not only about the technology, but

also about the people who use the technology, and about adapting the work processes in order to take advantage of the technological possibilities.

EUROPEAN HARVESTING METHODS

According to a Bloomberg report (2019), global Cut-to-Length (CTL) technology in timber harvesting is expected to make up the largest market share of precision forestry and will be worth \$6.1bn by 2024. The data harvested from CTL technology is already, to a large degree, standardised and ready to be used as part of the overall digitalisation of the forestry sector. In northern Europe, CTL technology is predominant and, according to Bloomberg, more than "90 per cent of logging in Sweden and Finland is carried out by CTL harvester forwarder systems".

When taking this Nordic perspective into consideration, it is useful to remember that not every forest is equal, and the overall predominance of CTL systems of the conifer-dominated boreal forests of Scandinavia cannot directly be transferred to the broadleaf forests of central Europe.

Most of Scandinavia has highly commercialized operations, mainly using CTL harvesters and forwarders. In contrast, mainland Europe mostly has much more variety in harvesting operations ranging from fully mechanized, as in Scandinavia, to more manual operations with chain saws and skidders, tractor-mounted winches and tractor-trailer combinations, or cable yarders.

Automatic data collection from these types of more manual operations are much less developed than for CTL operations, making it a harder case for rapid digitalisation. However, large steps are currently being taken by chain saw manufacturers, for example, to make it possible to also automatically collect data from these manual means.

TECH4EFFECT is adding to the potential for data collection for these types of operations through the Bucking App, aimed at chain saw operators, and the Mapping App that can collect information about the driving patterns of skidders and tractors (www.tech4effect.eu).

Astrup pointed out that increased mechanization and the associated, digital benefits that came with such developments were not only attributed to terrain and forests types, but also by the way the forestry tradition had evolved country-to-country.

"It's all about the speed at which industry has been able to embrace technology and use digital solutions. It has a lot to do with the way people view technological change and how they see the benefit. The predominance of CTL operations in the Nordics makes it an easier case for rapid digitalization but, on the other hand, there may be even greater potential gains through digitalisation in other parts of Europe," he said.

DATA SHARING ATTITUDES

Willingness to share data and information is a key aspect of a more efficient and digital future. Attitudes towards data collection and sharing varies throughout the European forest sector. It is often more open in the Nordic countries, which is sometimes not the case with its mainland counterparts, who are generally more hesitant to share. At times, it could come down to a trade-off as to the perceived benefits of information sharing, versus competitive edge.

A key component in facilitating data sharing and automatic data flow is that independent, reliable systems are in place where the data is safe; where the data collector has full control over what data is being shared; and with whom. Accordingly, the SILVISMART developers are adamant that access

to sharing between different parties is tightly controlled by the individual data provider.

ROAD TO DIGITAL FOREST

Project partners of TECH4EFFECT are currently making adjustments to SILVISMART and, most importantly, interacting with the existing users of the system, hoping to create the perfect world scenario in building a digital efficiency portal for the forest sector. Transforming this machine-captured data into business intelligence, and decision support for continuous improvement purposes could be a game changer. If you wish to join the SILVISMART portal the developers can be contacted at www.silvismart.eu.

ABOUT TECH4EFFECT PROJECT

The project "Knowledge and Technologies for Effective Wood Procurement" (TECH4EFFECT) started on 1 October, 2016 and will run for a duration of five years. With a budget of € 5.2 million it receives €5m in public funding from the Bio-Based Industries Joint Undertaking (BBI-JU), under grant agreement No. 720757. project website <http://www.tech4effect.eu/> <https://www.silvismart.eu/> Check out our video <https://youtu.be/aTrv9aiF-Y8>



TECH4EFFECT Project leader and NIBIO Head of Research, Rasmus Astrup, helping digitise forestry to increase biomass supply. Source: Astrup