Deliverable D.8.06

Exploitation plan handbook

WP 8 – Openness with other activities, dissemination and exploitation of results

Task 8.2 – Exploitation, business planning and IPR & licensing policies

Revision: Final

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<table>
<thead>
<tr>
<th>Dissemination level</th>
<th>Contributor(s)</th>
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<td>Stefano Marrazza (Compolab), Seppo Huurinainen (MHG), Diego Greifenberg (Greifenberg), Michele Andreolli (GraphiTech), Gianni Picchi (CNR)</td>
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| Due date | 3/1/2017 |
| Submission Date | 07/02/2017 |
REVISION HISTORY AND STATEMENT OF ORIGINALITY

Revision History

<table>
<thead>
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<th>Author</th>
<th>Organisation</th>
<th>Description</th>
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<tr>
<td>1.0</td>
<td>30/11/2016</td>
<td>Alex Poveda</td>
<td>Treemetrics Ltd.</td>
<td>Definition of the document.</td>
</tr>
<tr>
<td>2.0</td>
<td>17/1/2017</td>
<td>Alex Poveda</td>
<td>Treemetrics Ltd.</td>
<td>Final draft.</td>
</tr>
<tr>
<td>2.1</td>
<td>18/1/2017</td>
<td>Umberto Di Staso, Federico Devigili</td>
<td>GraphiTech</td>
<td>Quality Check</td>
</tr>
<tr>
<td>2.2</td>
<td>19/01/2017</td>
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<td>GraphiTech</td>
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<tr>
<td>2.3</td>
<td>07/02/2017</td>
<td>Umberto Di Staso</td>
<td>GraphiTech</td>
<td>Changed “Unfair Advantage” to “Company Advantage”</td>
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Statement of originality

This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.
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## Acronyms

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<th>Description</th>
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<tr>
<td>UAV</td>
<td>Unmanned aerial vehicle</td>
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<tr>
<td>TLS</td>
<td>Terrestrial Laser Scanner</td>
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<td>KER</td>
<td>Key exploitable result</td>
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<tr>
<td>TRL</td>
<td>Technology Readiness Level</td>
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<tr>
<td>ROI</td>
<td>Return of Investment</td>
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<tr>
<td>GPS</td>
<td>Global Positioning System</td>
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<tr>
<td>FAO</td>
<td>Food and Agriculture Organization of the United Nations</td>
</tr>
<tr>
<td>RFID</td>
<td>Radio-Frequency IDentification</td>
</tr>
<tr>
<td>PEFC</td>
<td>Programme for the Endorsement of Forest Certification</td>
</tr>
<tr>
<td>FSC</td>
<td>Forest Stewardship Council</td>
</tr>
<tr>
<td>PLC</td>
<td>Programmable Logic Controller</td>
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<tr>
<td>GIS</td>
<td>Geographic Information System</td>
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<tr>
<td>SOA</td>
<td>Service Oriented Architecture</td>
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<td>REST</td>
<td>Representational state transfer</td>
</tr>
<tr>
<td>ERP</td>
<td>Enterprise Resource Planning</td>
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<td>ICT</td>
<td>Information and Communication Technology</td>
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<td>TBD</td>
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1 Introduction

1.1 Purpose of the document

The final objective of this deliverable is to present an Exploitation plan handbook for SLOPE project, including an overview of the potential products and services to be offered, their position in the market and recommend market strategies for successful commercialisation of these products and services.

This document includes the results of the SLOPE Exploitation Strategy Seminar (ESS) with participation of external experts from European Commission and the Slope partners.

The aforementioned selected external experts are listed below:

1. Senior expert: KALLAI Tunde
2. Junior expert: PANNIER Frédérique
3. Administrative expert: Alessia MELASECCE GERMINI

The main objective of this deliverable is to identify each of the services and product that can be offered to the industry as result of the Slope project, the identification of the key exploitable project results, business scenarios, identifying the target market, competition and internal competencies. This document will include a business model that will analyse the market segments, financial and risk analysis.

The product and services offered has been agreed with the partners involved in each case, detailing how they intend to exploit the knowledge from this project. Each of the individual exploitation plans have be integrated into an overall exploitation plan, taking into account the particular strategy and market positioning of those partners involved.
2 Overview of the current scenario

Mountains in Europe occupy near to the 35% of the land area and are mostly covered by forests. Forestry operations in mountain areas are seldom performed by the harvester/forwarder system, being the sector still characterized by manual felling and extraction of timber by cable cranes. Due to the limits posed by steep terrain conditions, poor road network of mountain areas, limited storage and operational room, harvesting and extracting systems are more expensive and less flexible compared to the cut-to-length systems based on wheeled machines, commonly found in flatland forests of EU Nordic Countries.

Powerful and intelligent machines must be developed for forest works in steep terrain. This is the gap that SLOPE tries to fill in by developing an integrated system, from forest information system to logistic transportation that allows optimization of the forest production in mountain areas.

The products and services produced from the Slope project are focused on the optimization and monitoring of the harvesting activity and the tracking and sales of the timber product obtained from the harvesting.

The whole process of timber production starts with the forest property. The owner of the forested land who desires to manage the forest for productive use will define a plan for efficiently and correctly exploit his property. These plans include “forest management plans” for long term planning and pre-operational plans, created before the harvesting activity begins.

The purpose of the plans is to optimize the production in terms of benefit, selecting the trees that meet the market requirements. The harvesting plan is done by professional foresters (private or public) which generally will perform at least a basic inventory study, an analysis of age, species, terrain characteristics, natural boundaries, environmental characteristics, soil type and health, forest and public road network as well as any other relevant facility. Harvest plans are generally related to single of few parcel properties where the harvesting operation will take place.

2.1.1 Harvesting planning

Once defined the parcels to be harvested in the near future a forester will visit the plot for marking the trees and defining a more detailed inventory of those plants. This operation will generate a more detailed estimation of the commercial value of the standing trees to be harvested (stumpage value). Furthermore, tree marking is probably the most important silvicultural task: by defining which trees are to be harvested (and which are supposed to remain) the forester will define the future development of the forest and its characteristics (economic, environment and soil protection, etc.) but will also influence the following steps of the harvesting process. Currently models based on tree diameter and height are used to estimate the timber volume and timber products,
these models have a limited accuracy due to the fact that are created based on regional information and they may be created significant years ago. Current measurement techniques such as Terrestrial Laser Scanner (TLS), UAV and 3D modelling can increase the accuracy of the pre-harvest timber product estimations.

The right estimation of the timber assets is very important for forest owners, as usually based on the result of the inventory, and using the stumpage value as a reference, the standing forest is sold in an auction. This might be missing, for instance when the forest owner is also undertaking harvest operations.

2.1.2 Harvesting activities and storage

The harvesting company will now enter the parcel for planning the operations and ask for the cutting permissions to the competent authority. This is the stage when the cable yarder lines (hauling corridors) are designed, together with landing area, storage pads, logistic aspects (truck or tractor turning points), etc. All of this planning is done in person, walking in the forest and with the support of maps. GPS devices are more and more popular for identifying the boundaries of the parcel.

![Cable yarder lines](image)

**Figure 1: Cable yarder lines**

The actual harvest operations will begin when all the above tasks are successfully accomplished and the season/weather conditions (no snow or heavy rain) allows safe operations.

The forest workers are instructed to cut-to-length according to production plans and customer expectations, taking into consideration the individual properties and the presence of defects inside each log. The products of harvesting include timber/logs and residues, which can be converted in fuel biomass. Both products must be promptly removed due to the limited storage area typically available at landing pads in mountain forests.
2.1.3 Timber transport and sale

In general, residues are directly chipped and delivered to the end user. The log assortments are piled in intermediate storage areas, possibly close to public roads and accessible to timber-trucks. Volume, quality classes and overall value of the timber piled is calculated at the intermediate storage area by a professional forester, providing a detailed description of the assortments and their corresponding value.

The stock may be then sold in the second auction. If a sawmill directly bought the standing forest and contracted a forest company for the harvesting operations. The end user will contract a company for transportation to the facility deposit yard once purchased the desired assortments and volume. Here the logs are further sorted according to the requirements and the organization of the yard. This raw material will now be available as an operative stock for processing according to the industrial requirements of the end user.
3 Product and Services Opportunity

The demand for sustainable forest planning and management is increasing within the global forest industry. Forest managers have to find the balance between society’s increasing demands for forest products and societal benefits, and the preservation of forest health and diversity. Sustainable management of forest resources includes determining, in a tangible way, how to use these resources today to ensure benefits, health and productivity in the future.

Harvesting planning and optimization is an important foundation for sustainable forest management. This results in an increasing demand for forest resources measurement and monitoring during the life cycle of the forest. However, the use traditional methods have been proven not always cost-efficient for this new challenges, the main constraints for forest managers and landowners is the cost of the labour-intensive collection and management of the data and the activities related with the harvesting and extraction of the timber.

The use of new techniques should provide forest managers and landowners with more cost-efficient solution to facilitate a sustainable and economically viable forest management.

Opportunity for better operational harvesting planning

Operational harvesting planning are required in most European countries before proceed with the harvesting activity. Operational plans are developed for each individual harvest area, based mainly on site inspections. Maps of the harvesting block, showing a detailed plan of the activities to occur are required. Major points to be covered in the Operational Plan include identifying:

- harvest area (usual size of 50-100 ha), location and boundaries (which should follow topographic or natural features);
- areas to be excluded from harvesting through prescriptions for flora and fauna protection, water quality protection, or other identified reasons;
- silvicultural prescriptions to be adopted for different forest types;
- methods of tree marking for selection and protection;
- volume of wood to be removed by species and size classes;
- Location, design, construction, maintenance and closure of roads, landings, log ponds and skid tracks to minimise disturbance to forest, soil and water resources.

The current methods to create these operations plans are based on a significant labour intensive work including field inventory, the use of forest models analysis, technical GIS
skill to create maps and harvesting managers for the final decision making. In addition, when using cable crane in mountain areas engineering skills are required to plan the correct set up of the crane and other machinery in the field.

The outputs of this work are usually a document with a set of maps including the location and design of the different infrastructure and silvicultural prescriptions. These outputs need to be shared within the different people involved in the project, this is currently done via email or paper maps.

There is margin of improvement regarding the provision of new tools to facilitate the different analysis by automating the forest inventory analysis, GIS analysis and planning of the cable crane. There is also a significant opportunity to combine these tools in a single platform (currently several software are used to process this information), enabling virtual collaboration of the different staff involved in the collection and analysis of the information required for the harvesting plan.

On top of the opportunity for integration, automation and sharing of the harvesting plans, there is also an opportunity to improve the quality of the inventory data used. This data is used as base for the decision making and currently is mainly based on measurement of the trees that provide a rough estimation of the tree volume based on models. The use of new techniques such as Terrestrial Laser Scanner, scan the real shape of the tree and allow the creation of accurate 3D models of each single tree scanned. The use of these 3D models will provide a better estimation of the forest resources and facilitate the decision making.

The volume of timber harvested annually in Europe is 735 million m³ and 756 million m³ in North America, with a worldwide total of 3,359 million m³. Most of these harvesting operations are planed carefully before the operation starts representing a potential opportunity for better harvesting planning systems.

There is a clear trend of increasing the harvesting operations that require harvesting planning. New regulations are requiring more and better amount of information regarding harvesting plans in most countries around the world. As the technology develops and social concerns about deforestation increase, harvesting plans need to be more detailed. A study based on FAO’s FRA 1990 dataset (updated to 1995 in 1997) estimated that there would be a considerable increase in the global round-wood supply from 1.800 billion m³ in 2000 to 2.275 billion m³ in 2040, which would largely be met by production from plantations. Although the productive forest plantation area was estimated at only 116 million ha, or about 3 percent of the global forest area, in the year 2000, the study predicted that plantations would meet 35 percent of the global round-wood supply in that year, rising to 44% by 2020 and 46% by 2040. In quantitative terms, this indicates that the industrial round-wood production from plantations would increase by 67%, from 624 million m³ in 2000 to 1043 million m³ in 2040.
These figures shown a clear trend in increasing of the harvesting operations linked to even greater increase of the requirement for more detailed harvesting operation plans using new technologies.

**Opportunity for timber tracking**

New regulations (e.g. 2010 EU Timber Regulation) and certification schemas (FSC, PEFC) require that forest owners and managers ensure that the wood was coming from where its suppliers claimed. This is a global issue included in the United Nations Resolution 23/1 on “strengthening a targeted crime prevention and criminal justice response to combat illicit trafficking in forest products, including timber”. This resolution promotes the development of tools and technologies that can be used to combat the illicit trafficking of timber.

Reducing illegal logging could substantially increase revenue from the legal trade in timber and halt the associated environmental degradation, but law enforcement and timber traders themselves are hampered by the lack of available tools to verify timber legality.

The use of new technology such as RFID system integrated in forest machines, transportation fleet and forest workers (chainsaw operator, forester) can offer a unique capacity to track and trace both trees and timber logs during the different stages of the supply chain. This technology will help forest owners and managers to meet their requirements of traceability regarding legal requirements and timber certification.

At present, the main certification schemes, PEFC and FSC, cover a forested area of 236 M ha and 183 M ha respectively worldwide (in Europe the certified area is 95.5 M ha and 81.8 M ha respectively). Currently, most traceability systems are based on documents that require manual input and are not completely reliable. Therefore, there is a potential opportunity that a significant part of this certified forest will adopt automated traceably systems in the future in order to reduce costs and improve reliability.

**Opportunity for timber sales platform**

Wuudis Service developed in parallel in SLOPE project is a holistic mobile and web service platform for real time forest management, care work and harvesting monitoring, and online purchase and sales of timber enables documentation in details and tracking of purchased timber down to forestry and even compartment level. Having features and functionalities in place for easy data sharing between all stakeholders in the value chain, Wuudis works for certification schemes as well.

**Opportunity for innovative machinery**

In forestry work, although increasingly automated it is difficult to create a supply mechanization chain because forestry areas are always different and changing.
Slope project has created a system of communication among machines, an automated supply chain where man relies completely on artificial intelligence and has a control task to perform from plants evaluation to the morphological definition, to the electronic marking of trees until harvest, weighting, calibration, the creation of an assortment classified and logistic transport.

As for the machines developed by Greifenberg, they will soon be implemented in the price list of products and marketed. As regards TECNO carriage, it will be equipped with a series of accessories such as the electronic scale, the tilt sensors, the optimization system of consumption and consequently pollution abatement, the back-up data system with Wi-Fi for the collection and storage of daily production data. The tag reading system with retractable antenna and automated radio control for the release of chockers will be offered as optional.

The very first feedback we expect is the users’ immediate idea of a carriage that as well as having an excellent efficiency on the automatic work, provides an overview on the status of the forestry installation, on production rates and on the ability to inform on the status of works.

The chockers are undergoing further development in Greifenberg R&D office to make them lighter and therefore easier to use. They are going to be launched on the market by mid-2017. This type of chockers controlled directly by carriage will prevent the operators from manual operations being it a fully automated discharge.

Among our clients, forestry harvesting companies, the Rope Launcher has been the most welcomed product.

The potential selling price of 15,000 Euros elicited enthusiasm and interest. Many users’ operators have already contacted Sales office with purchase requests. Greifenberg has been working with ENAMA for approval, since there are no guidelines and specific regulations available at the moment to proceed with the CE mark. They believe, therefore, that the approval work is in progress hoping to be able to build the first set for the end of 2017 and beginning of 2018.
3.1 Overview of the Services offered

After some iteration with the different SLOPE consortium members, the final services proposed are presented in Table 1.

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<tr>
<th>Product ID</th>
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<tr>
<td>1</td>
<td>Detailed digital model of forest</td>
</tr>
<tr>
<td>2</td>
<td>3D Harvesting and planning tool</td>
</tr>
<tr>
<td>3</td>
<td>Automatic tracking and traceability system for timber products</td>
</tr>
<tr>
<td>4</td>
<td>Wuudis e-commerce platform</td>
</tr>
<tr>
<td>5</td>
<td>Novel sensorized, intelligent machine</td>
</tr>
<tr>
<td>6</td>
<td>Synthetic rope launcher</td>
</tr>
<tr>
<td>7</td>
<td>Automatic chokers</td>
</tr>
</tbody>
</table>

These products and services can be defined as follows:

3.1.1 Product/Service 1: Detailed digital model of forest viewable by many parties

Large areas of forest can be surveyed in a small amount of time, changes in technology have occurred since the start of the project making aerial data capture easier and more cost effective, data sets can be shared with planners, foresters, and prospective buyers.

3.1.2 Product/Service 2: Forest Planning Platform with 3D forest models

A real-time interactive 3D geographical visualization system for 3D forest models acquired from UAV/TLS to help planning, simulation and monitoring of forest production activities. Features include: visualization of 3D forest model, open data, cable crane setup, slope analysis, measurements, working area setup, truck routing as well as spatial queries on the forest for timber product breakdown, cost analysis, cost forecasts and reporting.

3.1.3 Product/Service 3: Automatic tracking and traceability system for timber products

The system integrates manual and automatic management and reading of RFID tags throughout the supply forest supply chain. In a market-adaptability focus the data
management and transfer system may provide the following services singularly or in a unique service:

a) tracking of single tree/log items and bulk goods along the supply chain;
b) trace timber products with full details of location and date of key actions (felling, extraction, transformation, transportation);
c) transfer quality parameters and instructions for optimal handling/transformation by mean of the same RFID system, maximizing added value (e.g. optimal value recovery).

3.1.4 Product/Service 4: Wuudis mobile and web service

Wuudis is an independent and neutral mobile and web service including forest management plan in the pocket service, timber and biomass online sales and purchase service, and also a bidding service for forestry care works. Competitor’s solutions (forest management plan in the pocket, in Finland) are closed services targeted at own customers/members only.

3.1.5 Product/Service 5: Sensorised processor head with wood classification grading

On the base of an existing processor head, we designed a novel sensorised, intelligent machine that is able to provide wood classification grading within the forest. The new machine adds automatic grading capabilities during tree processing, a feature not available in the market.

3.1.6 Product/Service 6: Crane rope launcher for timber extraction

A system made to launch a synthetic rope from the beginning to the end of a cable line in order to facilitate the placement of its main cable. The system helps reducing the number of hours required to setup a cable line as well as the physical effort for the forest operators increasing the productivity and the margins.

3.1.7 Product/Service 7: Automatic chokers to unhook timber logs

Automatic chokers that allow the operator to unhook the logs without the need of getting close to them, thus enable the forestry operator to stay in a safe position. These automatic chokers present the advantage of directly interacting with the PLC of the motorized cable carriage produced by partner Greifenberg. This innovative feature allows the user to perform the unloading operations without the presence of an operator. When lowering the load, Techno checks the dynamometer and when the zero value is reached, it directly sends the open command to the chokers.
4 Potential users and other stakeholders

The different services defined in the previous section may have different type of users, but there are four of them that are common to the services 1, 2, 3 and 4. These potential users are:

- **Public and private forest owners-managers:** private or public forest owners, usually forestry companies or state agencies that own or manage a vast forest area. This type of users usually performs their own forest management and they have departments focused on inventory analysis and harvesting. This type of users is interested in innovative systems in order to optimize and control the harvesting operations. They also have a big influence in the market, not only because of their market share, but because they are often custodians of forestry standards.

- **Other forest owners** include small forest owners. They usually own one or a few forest with reduced area (less than 50 ha) located in a specific geographical region. These owners usually have limited resources and are directly involved in most management stages. However, their limited resources and knowledge make it necessary to include the support of a management company. The small owners can be organized in forest grower associations representing the forestry owners and providing advice to technicians and forest owners. Forest owners can also be part of a certification group.

- **Forest Management Companies** can manage from 50 ha to thousands of ha in some cases. Usually forest management companies have a small or medium size operation that may be relatively geographically dispersed. The average of the forest sizes under management can change between countries. Management companies generally provide both a full and partial service to the forest owner.

- **Harvesting Companies:** These are contractors who provide the harvesting and logistical support to the harvesting procedure. These are usually contracted by large forest owners and forest managers. These operators seek to complete the forest harvesting and deliver the product to the sawmill in the most cost efficient and timely manner to reduce their overheads. Their contract is negotiated prior to the commencement of the harvest so unforeseen costs must be avoided. The harvesting companies will beneficiate of all the services offered, for better planning the operations and improve the efficiency in the forest.

Other potential customers include:

- **Timber mills.** This type of customers can potentially be directly benefited by the tracking service and the e-commerce platform offered by Service 3 and 4. They may also be interested in the information offered by the sensorised processor head (product/service 5)
The Target customers for each service are summarised in Table 2.

**Table 2: Target customers**

<table>
<thead>
<tr>
<th>Product ID</th>
<th>Product/Service</th>
<th>Target customers</th>
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<tbody>
<tr>
<td>1</td>
<td>Detailed digital model of forest</td>
<td>Public and Private Forest Owner-Manger, Other Forest Owners, Management Companies, Harvesting Companies</td>
</tr>
<tr>
<td>2</td>
<td>3D Harvesting and planning tool</td>
<td>Public and Private forest Owner-Manager, especially the companies looking for new technology, Other Forest Owners, Management Companies</td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Companies</td>
</tr>
<tr>
<td>---</td>
<td>----------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>3</td>
<td>Automatic tracking and traceability system for timber products</td>
<td>Public and Private forest Owner-Manger&lt;br&gt;Other Forest Owners, especially producers’ groups with certified forests&lt;br&gt;Management Companies&lt;br&gt;Harvesting Companies</td>
</tr>
<tr>
<td>4</td>
<td>Wuudis e-commerce platform</td>
<td>Public and Private Forest Owner-Manger&lt;br&gt;Other Forest Owners, especially producers’ groups with certified forests&lt;br&gt;Management Companies&lt;br&gt;Harvesting Companies&lt;br&gt;Other Timber Buyers</td>
</tr>
<tr>
<td>5</td>
<td>Novel sensorised, intelligent processor head machine</td>
<td>Harvesting Companies&lt;br&gt;Timber mills&lt;br&gt;Processor head manufacturers</td>
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</tr>
</tbody>
</table>
5 Market Analysis

5.1 Market overview

The Slope services domain is related to the forest goods market, more specifically linked with the timber harvesting, tacking and sales, providing a valuable service to plan the harvesting, facilitating the harvesting process and providing a platform to sale the timber assets. Main marketable products of most forests today are wood for use as construction timber, fuel wood, pulp and paper. In most countries, the forestry sector is quite small especially in comparison with competing industries (e.g. cement, synthetic fibres) and others based on natural resources. Competition from other more profitable land uses, mainly agriculture, is also an historical important issue. Also, the forest industry is often fragmented and spread out across a country. The small size of the industry restricts the development of suppliers, subcontractors, service providers and other supporting infrastructure, and fragmentation makes it difficult to achieve economies of scale and other efficiency gains.

The industry is generally slow to adopt new technology. This is partly related to its small size and fragmentation: it has not been viable for technology suppliers to serve countries where the market is fragmented or simply too small. In some countries, the forest industry continues to compete without much new technology by simply relying on good access to raw materials and using existing assets that are mostly depreciated (FAO, 2012). The Slope product and services will provide a competitive and ground breaking solution that will allow these small companies access to these cutting-edge technologies and at a compelling price point.

5.2 Identification of the target markets for each service and product

The goal for each service and product is to achieve a country specific targeted market share. European markets will be the first markets to capture for most services due that the partners already have some commercial agreements, with several public and private companies within their current business.

Specific product such as the Synthetic rope launcher and the Automatic chokers will be focused in countries where the use of cable crane timber extraction is used (mountain areas) and other services such as the Digital model of forest, 3D Harvesting and planning tool, Automatic tracking and traceability system for timber products and Wuudis e-commerce platform are more scalable to any country with forest plantations. Finland, Italy, Ireland, UK and Austria will the initial target countries for these services, due that the partners already have some commercial experience in these countries.
5.2.1 **Product/Service 1: Detailed digital model of forest**

Initially the detailed digital model of forest will be associated with the Product/service 2, providing the test base data for the creation of 3D forest models. Therefore, the target market in this regard is detailed in the next point, studding the market size of the Service 2. As the product evolves, this will be applicable to other forestry platforms or as a whole in forestry operations.

5.2.2 **Product/Service 2: Forest Planning Platform with 3D forest models**

The Forest Planning Platform with 3D forest models solution will target forest owners, forest management companies and harvesting companies in a first stage. Europe has 16 million private forest owners. Studies conducted by UNECE Forestry Departments and by the Confederation of European Forest Owners (CEPF) have provided the statistics on the size of the forest areas, the split between public and private ownership\(^1\), and the number of private forest owners in the member countries. These include some of the leader countries regarding forestry in Europe, France and Germany have a large number of private owners that can benefit of the Forest Planning Platform with 3D forest models service.

**Table 3: Number of the private forest owners and producer organizations for CEPF.**

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of producer organisations</th>
<th>Private forest owners</th>
<th>Members</th>
<th>Share (%)</th>
<th>Total private surface (ha)</th>
<th>Member surface (ha)</th>
<th>Share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>8</td>
<td>150,000</td>
<td>54,800</td>
<td>37%</td>
<td>2,525,645</td>
<td>837,500</td>
<td>33%</td>
</tr>
<tr>
<td>Denmark</td>
<td>8</td>
<td>25,000</td>
<td>5441</td>
<td>22%</td>
<td>335,000</td>
<td>76,800</td>
<td>23%</td>
</tr>
<tr>
<td>Estonia</td>
<td>47</td>
<td>55,000(^a)</td>
<td>2000</td>
<td>4%</td>
<td>925,675</td>
<td>100,000</td>
<td>11%</td>
</tr>
<tr>
<td>Finland</td>
<td>1</td>
<td>920,000</td>
<td>131,032</td>
<td>14%</td>
<td>11,800,000</td>
<td>5,300,000</td>
<td>45%</td>
</tr>
<tr>
<td>France</td>
<td>30</td>
<td>3,500,000</td>
<td>100,200</td>
<td>3%</td>
<td>10,500,000</td>
<td>1,800,000</td>
<td>17%</td>
</tr>
<tr>
<td>Germany</td>
<td>Germany(^b)</td>
<td>2,000,000</td>
<td>379,000</td>
<td>19%</td>
<td>4,823,723</td>
<td>3,500,000</td>
<td>- 50%(^a)</td>
</tr>
<tr>
<td>Latvia</td>
<td>0</td>
<td>150,000</td>
<td>-</td>
<td>-</td>
<td>1,300,000</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Lithuania</td>
<td>15</td>
<td>232,000</td>
<td>-</td>
<td>-</td>
<td>800,000</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Norway</td>
<td>7</td>
<td>120,000</td>
<td>40,000</td>
<td>33%</td>
<td>6,000,000</td>
<td>3,500,000</td>
<td>58%</td>
</tr>
<tr>
<td>Portugal</td>
<td>30</td>
<td>400,000</td>
<td>12,000</td>
<td>3%</td>
<td>3,280,000</td>
<td>1,200,000</td>
<td>37%</td>
</tr>
<tr>
<td>Sweden</td>
<td>6</td>
<td>335,805</td>
<td>107,369</td>
<td>32%</td>
<td>11,813,000</td>
<td>6,375,000</td>
<td>54%</td>
</tr>
<tr>
<td>Total</td>
<td>4,702</td>
<td>7,887,805</td>
<td>831,842</td>
<td>11%</td>
<td>54,193,043</td>
<td>22,690,500</td>
<td>42%</td>
</tr>
</tbody>
</table>

Large portion of the private owners have their forests managed by forestry management companies. These figures show the potential of number of uses using this system.

\(^1\) [http://www.cepf.net/SiteCollectionDocuments/annual_reports/CEPF-AnnualReport-FY15.pdf](http://www.cepf.net/SiteCollectionDocuments/annual_reports/CEPF-AnnualReport-FY15.pdf)
5.2.3 **Product/Service 3: Automatic tracking and traceability system for timber products**

The system integrates manual and automatic management and reading of RFID tags throughout the supply forest supply chain including forest managers, harvesting companies and timber mills. This solution can be applicable as a whole in most temperate forestry operations that require traceability of trees and timber logs. This product may be especially interesting for forest owners that require PEFC and FSC certification.

Chain of custody companies - PEFC and FSC schemes - could be the first adopters/promoter of the system. These organizations do not own forest themselves, but provide certification of sustainability to forest owners and forest industries. FSC producer groups and big companies can also be a target.

At present, the main certification schemes, PEFC and FSC, cover a forested area of 236 M ha and 183 M ha respectively worldwide (in Europe the certified area is 95.5 M ha and 81.8 M ha respectively). Currently PEFC and FSC principles and criteria include a monitoring section with references to the traceability of the forest products. In a boarder sense certification is all about traceability and document what you claim. On this regard, the proposed traceability system based on RFID can facilitate the claim of forest owners and forest owners group schemes to obtain the FSC and PEFC certification. Currently FSC and PEFC standards do not include directly the RFID or any other method of monitoring or traceability and it is up to the national Stewardship Standards to specify the indicators regarding monitoring and traceability.

As result of these certification requirements, there is a potential market for the proposed tracking and traceability system that will address a part of the forest owners’ groups with certified forest providing a cost-effective solution for traceability that will facilitate the certification of their forests.

Forest certification and chain of custody of timber products is an increasingly strong topic seeking for effective and reliable solutions. An example is given by the recent publication Illegal Logging and Related Timber Trade (2016), IUFRO World Series Vol. 35. Forest certification and chain of custody of timber products is an increasingly strong topic seeking for effective and reliable solutions. An example is given by the recent publication Illegal Logging and Related Timber Trade (2016), IUFRO World Series Vol. 35.

Furthermore, the developed system allows for process optimization beyond the pure traceability requirements.

5.2.4 **Product/Service 4: Wuudis mobile and web service**

Wuudis is an independent and neutral mobile and web service including forest management plan in the pocket service, timber and biomass online sales and purchase service, and also a bidding service for forestry care works. Competitor’s solutions (forest
management plan in the pocket, in Finland) are closed services targeted at own customers/members only.

5.2.5 **Product/Service 5: Sensorised processor head with wood classification grading**

The volume of timber harvested annually in Europe is 735 million m³, North America is 756 million m³ and Africa 688 million m³, with a worldwide total of 3,359 million m³. This equates to 178,000 harvesters operating daily worldwide and 140,000 forwarders operating daily, which represents the extent of the market.

At European level, the Food and Agriculture Organisation of the United Nations in 2010 (FAO, 2010) assessed the total forest stock in the UK was 379 million m³, Sweden is 3,358 million m³, France 2,584 million m³ and Ireland is 74 million m³. This vast stock and the increasing demand for forest products highlights the importance of efficient production and the key value Slope can bring to the industry.

In 2013 in the UK 11 million m³ of timber products were harvested an increase of 7% from 2012 and 15% since 2005 (Forestry Commission, 2014), Sweden harvested 90 million m³ in 2013 an increase of 25% since 2005 (SLU, 2014) and France harvested 66 million m³ in 2010 an increase of 6% from 2005 (Tissot and Kohler, 2013).

UNECE and FAO identify a 20% shortfall between supply and demand for Western European wood and fibre requirements through 2020 which is 150 million m³ (United-Nations, 2005). Demand for timber is constantly increasing. From 1987 the average global consumption of wood increased on average by 0.3% per year, and the estimated annual wood consumption in 2007 was around 3.5 billion cubic meters (FAO, 2007a).

In 2012, only the round-wood production was estimated around in 1.7 billion m³ worth $54.9 billion dollars ($32.27 mean price per cubic metre).

A study based on FAO’s FRA 1990 dataset (updated to 1995 in 1997) estimated that there would be a considerable increase in the global round-wood supply from 1.800 billion m³ in 2000 to 2.275 billion m³ in 2040, which would largely be met by production from plantations. Although the productive forest plantation area was estimated at only 116 million ha, or about 3 percent of the global forest area, in the year 2000, the study predicted that plantations would meet 35% of the global round-wood supply in that year, rising to 44% by 2020 and 46 percent by 2040 (Table 4). In quantitative terms, this indicates that the industrial round-wood production from plantations would increase by 67%, from 624 million m³ in 2000 to 1043 million m³ in 2040.

**Table 4: Projections on industrial round-wood supply**

<table>
<thead>
<tr>
<th></th>
<th>million m³</th>
<th>% of total round-wood supply</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2000</td>
<td>2020</td>
</tr>
<tr>
<td>Africa</td>
<td>16</td>
<td>38</td>
</tr>
<tr>
<td>Asia</td>
<td>112</td>
<td>213</td>
</tr>
</tbody>
</table>
According the Jürgensen et al. study, times-series data for the period 2000–2012 on the industrial round-wood production illustrates three trends that recurred in all observed countries. In many countries in Latin America and Asia, the industrial round-wood production from plantations had increased considerably since 2000 (e.g. in Chile, China, Brazil, Indonesia, Malaysia, Myanmar, Thailand, Uruguay and Vietnam). In Argentina, Australia, New Zealand and the United States of America, production in plantations increased as well, although at a considerably slower pace. In European countries (Portugal, Spain and Turkey) and in South Africa, the trend was basically stagnant since 2000, with some noticeable ups and downs during the reference period.

5.2.6 Product/Service 6: Crane rope launcher for timber extraction and Automatic chokers to unhook timber logs

Cable systems have been used traditionally throughout the world to extract timber from difficult, steep sites. Expertise has been developed, not surprisingly in countries such as Austria, the Czech Republic, Japan, Norway and Scotland, where a large proportion of forestry is located on steep terrain. There has been a decline in recent years in the use of cable systems throughout Europe (with the exception of Austria where the utilisation of cabling systems has doubled over the past 10 years). This has been due mainly to the cheaper cost and increased capability of harvester and forwarder combinations on steep terrain. The relatively low productivity of cable systems when compared to ground-based systems can significantly reduce profit margins. Some feel the utilisation of cabling systems will increase as more stringent environmental constraints are imposed on sensitive sites. Additional harvesting costs will have to be met if operations are to be carried out in such a manner.

Since cabling systems are generally costly to operate, planning the operation is vital to create modern techniques for efficient harvesting. Recent innovation in relation to continuous processing and delayed processing techniques has made cabling systems more productive.

The creations of low cost and automated process and reduction of the intense labour associated with these timber harvesting techniques is a big opportunity that will decide the profitability of the cable crane systems in the future.
5.3 Value Chain

The horizontal and vertical components of SLOPE demonstrating the value chain of SLOPE and its interactions with 7 key exploitable results is shown in Figure 2.

Slope products and services could act as a vertical integration, covering several steps of the value chain. The products and services produced by slope are related to one another bringing large portions of the supply chain under the common Slope umbrella.

Figure 2: Schema of the 7 KERs with the value chain of SLOPE

The maturation of the relationships created in the SLOPE project leads to a vertical integration of services and products within the consortium partners. However, in this first stage of the commercialisation, some of the services and products may not formally be linked to the next Slope service in the value chain.

However, this “vertical” chain cannot function in isolation and an important aspect of the value chain approach is that it also considers “horizontal” impacts on the chain, such as input and finance provision, extension support and the general enabling environment. A major subset of value chain development work is concerned with ways of linking forest owners to harvesting companies, and hence into the value chains. A big bulk of forestry value chains involves sales to harvesting companies from independent forest owners. Such arrangements frequently involve contract in which the forest owner undertakes to supply agreed quantities of timber, often at a price that is established in advance. Harvesting companies often also agree to support the farmer through input supply, land preparation, extension advice and transporting products to their premises.
6  Competitive analysis

6.1  Key competitors

The main competitors are the following:

6.1.1  Product/Service 1: Detailed digital model of forest viewable by many parties

The potential competitors for this service are other survey companies using UAV sensors. Currently there are a relative low number of competitors in the market due that the UAV for commercial is the relatively new in the market and the cost of the UAV devices was a restriction for companies. But this situation is changing with the increase on UAV survey demand and the reduction of the UAV devices cost.

Despite other companies may perform UAV survey, the service offered here is very specific to forestry and the methodology used is unique in the market. This service optimises the data obtained from UAV by combining this information with Terrestrial Laser Scanner (TLS). TLS scans are used to obtain the specific shape of the tree from the ground and this is used for the creation of local models based on TLS and UAV parameters. This methodology has only been used in research studies and there is not commercial company in the market offering anything similar for commercial use.

6.1.2  Product/Service 2: Forest Planning Platform with 3D forest models

Technology providers providing software solutions for forest planning and management may be considered the direct competitors of this service. This includes few private companies and some public bodies offering planning tools to foresters and forest owners.

Remsoft and Cengea are a sustainable, spatial optimization planning, and wildfire management systems. This system is one of the most well-established and broadly used currently on the market. This system requires a significant and costly implementation only accessible by big forest owner companies, with several thousands of hectares at their disposal. These systems are more focused in medium and long term planning based on models. They use a limited number of inventory parameters to perform predictions (DBH, Tree Height, Stocking, age, etc.) but cannot create 3D models of the forest or use single tree information to select individual trees (they are based on averages).

Most systems are based on forest inventory applications (e.g. Timber Cruise) linked to traditional callipers. While achieving a level of improvement in field data capture they are not comparable with the integrated TLS measurement solution as detailed in this solution. Some forest inventory software (e.g. OfficeDog "http://www.fountainsamerica.com/twodog") has a desktop application that provides calculation of some basic statistics, allowing for the export of data in different formats.
and providing basic reports using tables. This software is not considered as a serious competitor because the Slope solution provides a more detailed information linked with a 3D model of the forest and several tools to facilitate the planning of harvesting operations.

Companies offering GIS solutions (i.e. ArcMap, QGIS, etc.) may also be considered competitors, but usually these products are not focused on forestry and require specific skills to know how to use them. Therefore, usually the target customers for these solutions are trained foresters with specific skill in GIS. The service offered does not aim to replace the current GIS solutions when these are required to perform more complex analysis, but offer a simplified alternative for specific analysis used by non-expert foresters, forest owners and harvesting companies.

Fusion from the USDA, ArboLiDAR from Arbonaut, Taaka from Metsähallitus and Forest Management Toolkit are the main software providers for analysing remote sensing data focused on the forestry sector. However, these systems are standalone systems focused on analysis of specific earth observation data sources. These systems are not linked with the field data analysis or integrated with forest management tools.

The threat of potential new competitors is low given the complexity of the problem and the time required for the consortium partners to independently validate the current solution.

6.1.3 Product/Service 3: Automatic tracking and traceability system for timber products

Alternative systems are based on documentation control. The proposed system can integrate and simplify the current control system rather than substituting it (which is still possible). The competitive advantage of this system lies in the automation of the timber products tracking that will increase the reliability of the information, reduce human errors and provide a more cost-effective solution when comparing tracking based on sheets and paper forms.

6.1.4 Product/Service 4: Wuudis mobile and web service

Thanks to standardized forest information and government’s strategy to boost forest big data there are several competitors against Wuudis in Finland. All big forest industries like UPM Kymmene, Stora-Enso and MetsäGroup as well as forest management associations have developed their own apps and web services for forestry management and data sharing between forest owners and the organization. However, all the competitor solutions in the market (forest industry, Bitcomp, Silvadata) are closed solutions aiming at complete dependency of this particular service provider or timber buyer.

In contrast Wuudis is a neutral and independent service targeted at the whole value chain offering standard interfaces (SOA, REST) for easy integration to any player. In near future Wuudis will cover also ERP functionalities (for contractors) in the same service platform.
In France, Maforet is developing quite a similar service as Wuudis considered rather as a partner than competitor.

6.1.5 **Product/Service 5: Sensorised processor head with wood classification grading**

There are several processor head manufacturers such as Ponsee, Waratah, John Deere, etc. All these companies produce processor head with similar characteristics, but there is no other company worldwide selling something similar to intelligent processor head developed in the Slope project.

Currently the commercial processor head does not have included any system to stick RFID tags in the logs. The use of sensors similar to the used in this project to provide a grading of the timber is also unique and there is not any commercial processor head with these or similar characteristics.

6.1.6 **Product/Service 6: Crane rope launcher for timber extraction and Product/Service 7: Automatic chokers to unhook timber logs**

There are limited companies selling cableways to support timber harvesting operations using the cable crane method. Greifenberg has identified 12 companies in Europe, 5 Austrian, 2 Germans, 2 Slovenian, 1 Swiss, 1 Italian and 1 Polish competitors.

There is no other company worldwide selling something similar to the Crane rope launcher or an automatic chokers developed in the Slope project.

6.2 **Slope Solution Innovation**

The project integrates information from remote sensing, Unmanned Aerial Vehicles (UAV) and on-field surveying systems (TLS), to support macro and local analysis to characterize forest resources. Spatial information will be integrated with multi-sensor data in a model for Sustainable Forest Management and for optimization of logistics during forest operations. Intelligent technologies have been integrated in the cable crane/processor head to measure different data for the assessment of the assortment quality. Different Non-Destructive Testing methods, as well as pioneering chemo-metric analysis, have been tested during the project. Different traceability systems will be coupled to chemo-metric data, to trace the material, from the site throughout the supply chain. Information about material origin, quality and availability have been integrated in a unique system for planning, monitoring and reporting, accessible online and available in real time to a series of operators.

The integration and post-processing of data collected by SLOPE will be used for further optimization of the mountain forest models, silviculture routines as well as selling and auction processes between forest owners and harvesting companies.
6.2.1 **Product/Service 1: Detailed digital model of forest viewable by many parties**

With the innovative systems introduced by the SLOPE project the forest owner can easily acquire more detailed data about his forest property in the inventory/planning phase. Services 1 makes possible to generate a very detailed dataset with a cost-efficient system. UAV images are used for a first screening and characterization of the forest areas. This data is combined with in-field laser scanners. Data generated for all sources are harmonized for the generation of a 3D forest model. The model obtained includes a highly-detailed canopy and terrain definition, as well as a full inventory of standing trees and the potential timber assortments in each single stem (bucking prevision).

6.2.2 **Product/Service 2: Forest Planning Platform with 3D forest models**

This service includes a completely web solution, globally scalable, supporting different forest actors. It has a level of interactivity based on 3D visualization of the forest model based on the data resulting from Service 1.

This can be used for a "virtual marking", identifying the trees to be felled according to their position, characteristics and commercial value. The model will be integrated with all the available digital data, such as property limits, road network (public, forest, etc.), protected areas, soil types, etc. Such detailed information, provided in an easy-to-use interface will return a reliable estimate of the stumpage value and harvest costs of the forest. It will allow the owner to better understand the real value of its property, as well as facilitate the development of new forest management plans or update the existing ones.

The model will also assist the chain of harvesting operations. This can be used for the definition of the stumpage value either for selling the standing forest or for contracting the harvesting service. Following, a professional forester inspects the property for the final tree marking considering all the results of 3D forest model and supported/guided by a digital map and GPS. The forester may confirm the virtual marking or change it according to the result of his survey. The forester may also decide to exclude the pre-selected tree from the harvest operations for a number of reasons not detectable by digital sensor (e.g. protected nesting birds). The forest database will be updated with all new information.

6.2.3 **Product/Service 3: Automatic tracking and traceability system for timber products**

This automatic tracking and traceability system is the first auto-ID system integrated in forest machines, transportation fleet and forest workers (chainsaw operator, forester). This system is combining the RFID technology, widely available with the devices and machines used during the raw timber supply chain, creating a unique system capable to track and trace both trees and timber logs.
6.2.4 **Product/Service 4: Wuudis mobile and web service**

In comparison with other competitors, Wuudis is a neutral, independent and free service for forest owners (freemium service). Wuudis is a holistic service with open interfaces compared to competitors’ solutions targeted at forest owners only. This platform will cover also Enterprise resource planning (ERP) for contractors in the next year.

6.2.5 **Product/Service 5: Sensorised processor head with wood classification grading**

This machine adds automatic grading capabilities during tree processing, a feature not available from other competitors in the market. The grading capability reduces uncertainties and errors in manual wood quality grading, providing real-time evaluation of wood under several different indices. Knowing in advance the wood quality, allows the owner to maximise its profits.

6.2.6 **Product/Service 6: Crane rope launcher for timber extraction**

Despite the relative technological simplicity of this machine, its concept is unique in the market. This is a brand new product that can save days of manual work when compared with the current process of manually bring the heavy rope uphill.

6.2.7 **Product/Service 7: Automatic chokers to unhook timber logs**

These automatic chokers present the advantage of directly interacting with the PLC of the motorized cable carriage produced by Greifenberg. This innovative feature allows to perform the unloading operations without the presence of an operator. When lowering the load, Tecno checks the dynamometer and when the zero value is reached, it directly sends the open command to the chokers.

6.3 **Unique Selling points**

Based on the information detailed in this section, Table 5 summarised the Unique Selling Points for each product.

<table>
<thead>
<tr>
<th>Product ID</th>
<th>Product/Service</th>
<th>Unique Selling Points</th>
</tr>
</thead>
</table>
| 1          | Detailed digital model of forest | - Easier and more cost effective aerial data capture  
- 3D forest model combining UAV and TLS |
| 2          | 3D Harvesting and planning tool | - Completely web solution  
- 3D visualization of the forest model  
- Virtual harvesting planning tool |
|   | Automatic tracking and traceability system for timber products | - First auto-ID system integrated in forest machines, including transportation fleet and forest workers (chainsaw operator, forester).  
  - Capability of track & trace both trees and logs.  
  - Online service to retrieve the information |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Wuudis e-commerce platform</td>
<td>Wuudis is a neutral, independent and free service for forest owners (freemium service). Contractors and timber and biomass buyers pay a commission fee per successful deal only. No annual fees.</td>
</tr>
<tr>
<td>5</td>
<td>Novel sensorised, intelligent machine</td>
<td>The grading capability reduces uncertainties and errors in manual wood quality grading, providing real-time evaluation of wood under several different indices. Knowing in advance the wood quality, allows the owner to maximise its profits.</td>
</tr>
</tbody>
</table>
| 6 | Synthetic rope launcher | - Unique product in the market to automate this process.  
  - Reduced cost  
  - Significant savings |
| 7 | Automatic chokers | Increased productivity and safety. Communication with the cable carriage. |
7 Business model

7.1 General Exploitation model

The main challenge is how the vertical and horizontal products and service can work individually and also together in certain common services. SLOPE as an open innovation platform can offer an open access for any engineering companies, products and services and in e-Commerce transactions in forest and timber industry.

Joint-exploitation plans including several project parents are prioritised, however some of the products and services will be exploited by individual companies within the consortium.

Table 6: Parents involved in the services exploitation

<table>
<thead>
<tr>
<th>Product ID</th>
<th>Product/Service</th>
<th>Type of Product</th>
<th>Exploitation</th>
<th>SLOPE Partners involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Detailed digital model of forest</td>
<td>Service</td>
<td>Joint-exploitation</td>
<td>COASTWAY: UAV survey and analysis</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TREEMETRICS: TLS survey and forest models</td>
</tr>
<tr>
<td>2</td>
<td>3D Harvesting and planning tool</td>
<td>Software as a Service</td>
<td>Joint-exploitation</td>
<td>GRAPHITECH: 3D GIS visualization</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>MHG: web and mobile service provider</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>COASTWAY: Aerial Surveys</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TREEMETRICS: TLS Analysis &amp; Forest warehouse</td>
</tr>
<tr>
<td>3</td>
<td>Automatic tracking and traceability system for timber products</td>
<td>Service</td>
<td>Joint-exploitation</td>
<td>CNR: Overall traceability system</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ITENE: Intelligent truck system</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TREE: Field Mobile App</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>COMPOLAB: Stapling system</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>MHG: Forest information system</td>
</tr>
<tr>
<td>4</td>
<td>Wuudis e-commerce platform</td>
<td>Software as a Service</td>
<td>Individual exploitation</td>
<td>MHG: web service provider</td>
</tr>
</tbody>
</table>
7.2 Service-level Business Model

Business model options have been elaborated and checked against the business strategies of all partners. CEB Seminar as a methodology helped to produce the structure of a solid business plan with some aspects for a better financial analysis. A summary for each exploitation model is defined for each service as following:

7.2.1 Product/Service 1: Detailed digital model of forest viewable by many parties

**Problem/Opportunity**

There is an opportunity to improve the quality of the inventory data used. This data is used as base for the decision making and currently is mainly based on basic measurement of the trees that provide a rough estimation of the tree volume based on models. The use of new techniques such as Terrestrial Laser Scanner, scan the real shape of the tree and allow the creation of accurate 3D models of each single tree scanned. The use of these 3D models will provide a better estimation of the forest resources and facilitate the decision making.

**Alternative Solutions**

Alternative solutions are based on forest inventory with poor imagery that does not allow forest managers to identify single trees or estimate the forest timber assets at tree level. These alternative solutions provide an average for the entire forest areas without taking into account internal forest variations.

**Solution**

Aerial and field survey using UAV and TLS to generate a 3D model of the forest. This solution uses a drone to fly the forest periodically following the same flight path.
Key Metrics

This service is based on a survey activity. The forest area to be surveyed, number of customer request and revenue are the main Key metrics to evaluate the service.

Unique value proposition

As mentioned in the previous sections, the unique value proposition is based on the following points:

- Provision of a service that covers the whole forest not just samples
- Data can be used by planners, valuers, harvesters, scientists
- The method is not restricted to seasons
- A small team can survey a large area

Company Advantage

The unique combination of UAV and TLS provide accurate 3D models based on real tree shape and UAV tree delineation. Stand models are used to inference the model across the entire forest reducing the number of field samples.

In addition, Coastway has UAV licensed pilots and experience in health and safety issues related with UAV survey, this is a competitive advantage for other survey companies that do not provide UAV services.

Channels

The main communication channel for this product is through the extended partner’s networks. Also through demonstrations, shows, articles and forestry magazines where the partners are participating.

The partners in charge of this product will also contact the Forest Certifications bodies to demonstrate the product and create a partnership that will facilitate the dissemination of marketing material using the Certifications bodies’ networks.

Customer Segments

Identified customer segments are the following:

- **Forest Owners** interested in exploiting and selling the wood in their forest;
- **Forest Managers** interested in exploiting data acquired by UAV/TLS;
- **Harvesting Companies** interested in planning the harvesting operations and purchasing timber.
• **Government bodies** interested in estimating the forest resources in a specific area.

**Early Adopters**

Forest Management companies (i.e. Forest surveys providers), interested in the visualization and management of their acquired data in an interactive way.

**Cost Structure**

Identified Cost structures can be separate in four main sub-categories:

- Acquisition cost: covering the survey and data analysis
- Sales and Marketing costs: including the marketing personnel, fairs and workshops and advertising
- R&D cost: further R&D will be carried out, assigned 10-20% of the resources every year

**Revenue Streams**

Survey fees are the main source of revenue. Users will have to pay to have access to the survey data and analysis performed, including the forest 3D model.
7.2.2 Product/Service 2: Forest Planning Platform with 3D forest models

Problem/Opportunity

Logistics and planning operations are one of the main cost items for companies that deal with acquisition and transportation of goods. This issue is critical in cases in which logistic operations will be conducted in areas in which the environmental orography constitutes one of the main cost variables.

The aforementioned scenario is the main problem that the SLOPE 3D harvesting and planning tool plans to optimize, offering complex state of the art tools, designed following a holistic approach in combination with operators and final users on-field experience. The SLOPE 3D Harvesting and Planning tool not only offers tools that may be applied in every context, but also tailored analysis performed over the specific area of interest, including working area, nearest sawmills, gas stations, multi-typology routing instructions.

Alternative Solutions

Alternative solutions deal mainly by exploiting the on-field experience of forester and operators, without any ICT state-of-art instrument used for planning purposes.

Solution

A real-time interactive 3D geographical visualization system for 3D forest models acquired from UAV/TLS to help planning, simulation and monitoring of forest production activities. Features include: visualization of 3D forest model, open data, cable crane setup, slope analysis, measurements, working area setup, truck routing as well as spatial queries on the forest for timber product breakdown, cost analysis, cost forecasts and reporting.

Key Metrics

GeoBrowser3D, the technology behind the solution is basically a web portal. The value and the performance of a SaaS (software as a service) like the one being provided is often measured by the amount of active, paying users, customer retention and churn rate, customer lifetime value and recurring revenue. Active users and recurring revenue are the key metrics to evaluate. Customer retention rate and churn rates, how many users you are keeping and how many you are losing over time, are also very important to SaaS business because they impact recurring revenue, customer satisfaction levels and growth of the business. The customer lifetime value measures the average amount of money a customer brings in over the entire time they do business with a company.

Unique value proposition

As mentioned in the previous sections, the SLOPE 3D harvesting and planning tools is almost unique in the forestry industry: it integrates ICT state-of-art technologies that will improve the whole productivity chain.

By the use of the instruments offered, the following benefits are highlighted:
- Easy organization of work and logistics
- Easy cost and revenue estimation
- Solution adaptable for different needs
- Real time information about the forest status and value

Compared with existing solutions, the 3D harvesting and planning tool offers: completely web solution, globally scalable, supporting different forest actors. It has a level of interactivity based on 3D visualization of the forest model that is difficult to achieve from other competitors. At the time of writing, besides some very experimental online tools, there are no competitors with this level of technology.

**Company Advantage**

Fondazione GraphiTech experienced 13 years of experience in information visualization and in particular GeoVisual Analytics. Specific competences are needed to entirely replicate the developed solution. The aforementioned assumption is enforced by the fact that, at the time of writing, there aren’t on the marked harvesting and planning software with the same degree of technology and functionalities available through the SLOPE 3D Harvesting and Planning tool.

**Channels**

The main communication channel for our product is through its official website, available at [http://geobrowser3d.com](http://geobrowser3d.com), as well as targeted newsletter to the GraphiTech mailing list, built upon 13 years of partnership with national and international enterprises, SMEs, public body and individuals (2300+ email addresses composed by 1700+ International and 800+ Italian contacts). Social networks, as well as Twitter, Facebook and LinkedIn constitutes good instruments to reach large number of possible stakeholders.

Participation to targeted international Fairs, e.g. EIMA International ([http://www.eima.it](http://www.eima.it)) and/or KWF-Expo ([http://www.kwf-tagung.org](http://www.kwf-tagung.org)), will boost the dissemination of the final product directly to a huge audience of stakeholders, as well as participation at domain-related conferences and workshops, e.g. Formec ([https://www.formec.org](https://www.formec.org)).

**Customer Segments**

Identified customer segments are the following:

- **Forest Owners**: interested in exploiting and selling the wood in their forest;
- **Forest Surveyors**: interested in exploiting data acquired by UAV/TLS;
- **Harvesting Companies**: interested in harvesting operations.
Through the Communication Channels identified in the previous section, in particular Fairs and Workshops, it will be possible to reach a huge number of possible stakeholders belonging to the aforementioned segments.

**Early Adopters**

Pilot companies (i.e. Forest surveys providers), interested in the visualization and management of their acquired data in an interactive way

**Cost Structure**

Identified Cost structures can be separate in four main sub-categories:

- Updates and customization of the system: for this category, it is not possible to establish a detailed cost, by the fact that development costs are strictly related to customization asked by the customer. For what concerns bug fixing, maintenance of the system and customers support, a full time experienced developer is needed.

- ICT costs. ICT costs are proportional to the number of users and the amount of data, computational power and bandwidth required to each user. If initially ICT costs can be a significant percentage of the total cost with the number of user increasing this amount will diminish. An initial estimation of the costs can be of 1000€ per year minimum not including additional costs per user which should be minimal.

- Sales and Marketing costs: it requires a 50% marketing manager for social media and web news. Moreover, Fairs and Workshops costs have to be taken into consideration, due to the fact that, for the identified fairs, boots and registration costs will be the following
  - EIMA: 160 EUR + VAT / square meter + 750 subscription
  - KWF: 118 EUR + VAT / square meter + 250 EUR services
  - FORMEC: 270 EUR registration fee

- Customer acquisition costs: are mainly related to costs described in the previous items.

**Revenue Streams**

Revenue streams can be separated in three main sub-items:

- Subscriptions fees: the main source of revenue where users have to pay periodically to keep the access to the data, to use the services and to be provided of assistance.
- Customization fees: for customization of the web portal, development of custom features and harmonization and ingestion of data.
- Data selling fees/revenue share: for revenues coming from the sharing of data with third parties.

7.2.3 **Product/Service 3: Automatic tracking and traceability system for timber products**

**Problem/Opportunity**

New regulations and certification schemas (FSC, PEFC) promotes the development of tools and technologies that can be used to combat the illicit traffic of timber.

Currently, most traceability systems are based on documents that requires manual input and are not completely reliable. Therefore, there is a potential opportunity that a significant part of this certified forest will adopt automated traceability systems in the future in order to reduce costs and improve reliability.

The use of new technology such as RFID system integrated in forest machines, transportation fleet and forest workers (chainsaw operator, forester) can offer unique capacity to track and trace both trees and timber logs during the different stages of the supply chain. This technology will help forest owners and managers to meet their requirements of traceability regarding legal requirements and timber certification.
Alternative Solutions

Alternative systems are based on documentation control. The proposed system can integrate and simplify the current control system rather than substituting it (which is still possible). The competitive advantage of this system lies in the automation of the timber products tracking that will increase the reliability of the information, reduce human errors and provide a more cost-effective solution when comparing tracking based on sheets and paper forms.

Solution

The system integrates manual and automatic management and reading of RFID tags throughout the forest supply chain. In a market-adaptability focus the data management and transfer system may provide the following services singularly or in a unique service:

a) Tracking of single tree/log items and bulk goods along the supply chain

b) Trace timber products with full details of location and date of key actions (felling, extraction, transformation, transportation)

c) Transfer quality parameters and instructions for optimal handling/transformation by mean of the same RFID system, maximizing added value (e.g. optimal value recovery)

Key Metrics

The tracking and traceability system include a service to retrieve the RFID information from a central database. The value and the performance of this service like the one being provided is often measured by the amount of active, paying users, customer retention and churn rate, amount of tracing requests and recurring revenue. Active users, number of requests and recurring revenue are the key metrics to evaluate.

Unique value proposition

As mentioned in the previous sections, this tracking and traceability system is the first auto-ID system integrated in forest machines, transportation fleet and forest workers (chainsaw operator, forester). This is also unique in the capacity to track and trace both trees and timber logs and integrate the tracking with inventory and harvesting data that enables the user to know exactly the amount of timber associated with each timber log.

Company Advantage

Slope services and product provides a company advantage to this tracking service, making this service unique regarding the integration with other services and products such as the integration in harvesting machines (slope harvesting head), transportation fleet and forest workers (Slope App) and enable information form the inventory data, using a 3D model described in service 1 and service 2.

Channels
The main communication channel for this product is through its extended partner’s networks. Also, through demonstrations, shown, articles and forestry magazines where the partners are participating.

The partners in charge of this product will also contact the Forest Certifications bodies to demonstrate the product and create a partnership that will facilitate the dissemination of marketing material using the Certifications bodies’ networks.

Customer Segments

Identified customer segments are the following:

- **Forest Owners and managers**: interested in exploiting and selling the wood in their forest, especially the forest owners with certified forests.
- **Harvesting and Transport companies**: interested in improve the logistic of the harvesting operations and transport.
- **Timber mills**: working with certified products that need to demonstrate the traceability of the timber.

Early Adopters

The early adopters of this service will be the forest owners and managers, especially certified producer groups that need to demonstrate traceably of the timber products to the certification bodies’ auditors.

Cost Structure

Identified Cost structures can be separate in four main sub-categories:

- **Hardware cost**: The cost of hardware is mainly related to the electronic device and RFID tags. These costs will be transferred to the final users that will be in charge of acquiring these devices and RFID tags from external providers. The tracking system sold is based on the software installed in the app and the online service to retrieve the data.

- **ICT costs**: ICT costs are proportional to the number of users and the amount of data, computational power and bandwidth required to each user. If initially ICT costs can be a significant percentage of the total cost with the number of user increasing this amount will diminish.

- **Sales and Marketing costs including marketing personnel, fairs, workshops and advertising.**

- **Salary costs in addition to the Sales and Marketing personnel.**

- **R&D costs**, assigned up to 40% of the resources to improve the system in the first year and 10-20% of the resources in the followings.
Revenue Streams

Revenue streams can be separated in two main sub-items:

- Subscriptions fees as the main source of revenue. Users will have to pay periodically to keep the access to the data, services and assistance.
- Revenue from advertising in the system web page and mobile app will be also studied.

7.2.4 Product/Service 4: Wuudis mobile and web service

In one sentence, Wuudis Service makes forest asset management easy. It brings all forest information into pocket and enables bidding, data sharing in different user roles and in very easy way on home sofa covering feedback from the field as well. The standard service including online bidding of care works and timber sales is offered as free for forest owners. Service providers pay 10% and timber buyers 3% commission per successful deal, access to invitations to tender is free of charge.

All add value services have a scaling price tag and are sold online as annual SaaS to both customer segments, forest owners and service providers. See more at business canvas below:
Problem/Opportunity

Even though the technology and basic knowledge has changed in the last decade, the forest management and timber sales process has not been developed much. Through the decades, the forest owners managed the forest themselves, usually connected to a local network of foresters and harvesting companies that were able to help in the most complex task such as the final harvesting. The owner was able to contact local harvesting companies and timber mills and negotiate the sales of their forest. This has changed dramatically resulting with more and more forest owners now living in cities far from their properties, and usually having an occupation with no connection with forestry. This is a challenge for timber buyers and timber owners to be in contact and negotiate the sales process.

Alternative Solutions

All Finnish paper and pulp companies (MetsäGroup, Stora-Enso, and UPM Kymmene) have their own apps and web services for their committed customers like forest management associations (Metsäselain). Competitor’s solutions in Finland are closed services targeted at own customers/members only. Also Bitcomp Oy is providing own app, Kantoon. In France, Mavoret is developing quite a similar service as Wuudis (competitor or partner).
Solution

Wuudis is an independent and neutral mobile ad web service including forest management plan in the pocket service, timber and biomass online sales and purchase service, and also a bidding service for forestry care works.

Key Metrics

The value and the performance of this service like the one being provided as SaSS is often measured by the amount of requests, subscriptions and recurring revenue.

Unique value proposition

Wuudis is a neutral, independent and free service for forest owners (freemium service). Contractors and timber and biomass buyers pay a commission fee per successful deal only.

Company Advantage

Wuudis provide an open business ecosystem that provides a strong competitive advantage. The solution is customer oriented ensuring the acceptance by the customer.

Channels

The main communication channel for this product is through making noise with social media tools and e-marketing. Communication experts in this field will be in charge of the success of the marketing channels. Traditional marketing material such web site and advertising will be also used.

Customer Segments

Identified customer segments are the following:

- Forest Owners and managers interested in selling the wood in their forest
- Forest entrepreneurs related with timber sales and management
- Timber buyers looking for a place where to find reliable information about forest assets for sale

Early Adopters

The early adopters of this service will be the forest owners, especially those that are looking to sale their forest in better conditions or do not have a proper connection with timber buyer networks.

Cost Structure

Identified Cost structures can be separate in three main sub-categories:
ICT costs, proportional to the number of users and the amount of data, computational power and bandwidth required to each user. If initially ICT costs can be a significant percentage of the total cost with the number of user increasing, this amount will diminish.

Sales and Marketing costs, this includes the marketing personnel, fairs and workshops and advertising.

Customer acquisition cost including the personnel and marketing cost, demos and customisations and other overheads costs.

**Revenue Streams**

Revenue streams can be separated in three main sub-items:

- Commission based fees
  SaaS license fee per package are the main source of revenue. Users will have to pay for premium and related services.
- Revenue from advertising in the system web page and mobile app will be also studied.

### 7.2.5 **Product/Service 5: Sensorised processor head with wood classification grading**

**Problem/Opportunity**

Wood quality grading is one of the key points in wood supply chain. At the present, wood quality grading is performed on standing trees before cutting and in the sawmill when the logs have been purchased. This is time consuming and has a significant cost.

This processor head enables wood usage optimization by providing more data to the operator to take the decisions and comparing with the inventory data.

In addition, uncertainties and errors in wood quality grading can be solved with this solution. At the present, wood quality experts provide a quality assessment and grading based on the expertise. In a lot of cases this is subject to the operator judgment.

Finally, linked to the tracking and traceability service (service 3), this processor head includes an automated RFID mechanism that allows to identify each log produced.

**Alternative Solutions**

Currently, wood quality experts provide quality assessment and grading by means of their own expertise (visual inspection) and sometimes using specific tools and devices (i.e. stress wave evolution systems). Other quality controls are performed in the sawmill by means of specific tools and technologies.

**Solution**
The system is based on a sensorised processor head that is able to perform wood grading directly on the field on the processor head. This provides real time wood grading and cutting optimization. In addition, RFID tagging system allows traceability if connected with a database of log information.

**Key Metrics**

The key metrics for this service and product are:

- Number of units sold: processor head produced and sold.
- Number of user using partially or fully the service offered. The user can use different services associated to the processor head such as the grading or the RFID for timber tracking. This services can be used combined or separately. The number of user using each service is a valuable key indicator.
- Customer satisfaction questionnaires

**Unique value proposition**

The unique value proposition for this solution can be summarised as following:

a) **Wood classification grading within the forest.** Indeed the developed machine provide log grading classification during tree processing (tree debranching and log cutting), directly in the harvesting site.

b) **Reduction of uncertainties and errors in wood quality grading.** Grading performed by means of cross correlation of the data obtained by several sensors properly mounted on the machine. Errors in wood quality grading are strongly reduced.

c) **Reduction of money losses and reduce time in the wood supply chain.** The machine performs wood grading while processing the trees, saving time in the whole wood supply chain. Furthermore, sawmills do not need to acquire tools for wood grading, saving money and time in wood processing.

d) **Improvement of traceability in the wood supply chain.** Each log is marked with an RFID label before cutting and the label is directly associated in the SLOPE database to log quality information and origins.

**Company Advantage**

The processor head designed and developed in this project is a strong mechanical, hydraulic, electrical and electronic solution developed by Compolab that required more than 2 years of development, including some of the most innovative techniques for timber grading designed with the support of CNR experts. This makes unlikely other company can develop a similar system in the short time.
Channels

The main communication channel for this product is through the use of the exiting partners’ networks including Compolab and CNR. This includes business to business meetings, local dealers, demonstrations and shows where the partners are participating.

In addition, direct contacts with processor head manufacturer will be carried out to ensure a strong hardware manufacturing and selling.

Customer Segments

Identified customer segments are the following:

- **Forests and wood owner** should be very interested in innovative systems in order to optimize harvesting operations
- **Wood processing industry** should be very interested to the sensorised harvester head due to log quality grading capabilities
- **Energy production industry**
- **Processor head manufacturers** should add sensorised harvester head in their product catalogue and/or automatic label system to existing processor head

Early Adopters

The early adopters will be the wood processing industry and in particular the processor head manufacturer.

Cost Structure

Identified Cost structures can be separate in four main sub-categories:

- **Customer acquisition cost**: The cost of hardware is mainly related to the tools and equipment required to support the services related to the processor head.
- **ICT costs** include Software license costs and facilities to support the services related to the processor head.
- **Customer acquisition costs**, this includes the marketing personnel, fairs and workshops and advertising.
- **Salary costs**, these costs are the addition of the Sales and Marketing, ICT, marketing, support and management personnel.

Revenue Streams

The main revenue will be associated with the processor head selling associated services such as the grading and tracking system.
Training courses and material as well as patents will be also a source of revenue.

### The Lean Canvas

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
<th>Unique Value Proposition</th>
<th>Company Advantage</th>
<th>Customer Segments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Wood quality grading is one of the key point in wood supply chain. 2. At the present, wood quality grading is performed on standing trees (before cutting) and in the sawmill (when the log have been purchased); this is time and money consuming. 3. Uncertainties and errors in wood quality grading. 4. At the present, wood traceability is not adequate. 5. Wood usage optimization.</td>
<td>Wood grading performed directly on the field in the process head. Real-time wood grading allow cutting optimization. RFID tagging system allow traceability connected with database of log information.</td>
<td>We design a machine that is able to provide wood classification grading within the forest. We design a machine that reduces uncertainties and errors in wood quality grading. We design a machine that reduces uncertainties and errors in wood quality grading. We design a machine that reduce money losses and reduce time in the wood supply chain. We design a machine that improve traceability in the wood supply chain.</td>
<td>Strong mechanical hydraulic, electrical and electronic design competences.</td>
<td>Forests and wood owner. Wood processing industry. Energy production industry.</td>
</tr>
</tbody>
</table>

**Key Metrics**
- Number of designed machines
- Number of realized machines
- Customer satisfaction questionnaires

**Alternative Solutions**
- Wood quality experts provide quality assessment and grading. Other quality controls are performed in the sawmill by means of specific tools and technologies.

**Problem/Opportunity**

The number of hours required to setup a cable line as well as the physical effort for the forest operators, result in a significant cost for harvesting companies. The setup of the cable lines is currently a manual process involving several people. Automated solutions can reduce this cost and increase the productivity and margins.

Regarding current chokers, these are not usually connected to the PLC of the cable carriage, requiring the presence of a dedicated operator in charge of the chokers.

**Alternative Solutions**

Current solutions are manual work with dedicate operators to these tasks that are time consuming and require a significant amount of personnel.

**Solution**

Greifenberg developed two new hardware that will mitigate these problems:

- Crane rope launcher for timber extraction
- Automatic chokers to unhook timber logs
- The Crane rope launcher is a system made to launch a synthetic rope from the beginning to the end of a cable line in order to facilitate the layout of its main cable. The system helps reducing the number of hours required to setup a cable line as well as the physical effort for the forest operators.

- The automatic chokers allow to unhook the logs without the need of getting close to them, thus enabling the forestry operator to stay in a safe position. These automatic chokers present the advantage of directly interacting with the PLC of the motorized cable carriage produced by partner Greifenberg. This innovative feature allows to perform the unloading operations without the presence of an operator. When lowering the load, Tecno checks the dynamometer and when the zero value is reached, it directly sends the open command to the chokers.

**Key Metrics**

The key metrics for these products are:

- Number of units sold for each device (Crane rope launcher and automatic chokers): this will help to evaluate the market acceptance of the products.

- Number of repairs requests: this will help to evaluate the quality of the solution and provide information for future development.

**Unique value proposition**

The unique value proposition for these products is focused on increase the productivity of the harvesting operation. These two hardware are unique in reducing the time and cost of the operations and increasing the safety of the operators.

**Company Advantage**

These new hardware are unique products in the market developed according the Slope project’s needs. The uniqueness of the products and expertise of Greifenberg that took two years to develop these devices is a strong competitive advantage.

**Channels**

The main communication channel for this product is through the use of the exiting partners’ networks, mainly Greifenberg. This includes machinery importers and dealers.

The partner in the Slope forestry consortium will also present this solution in demonstrations and shows where the partners are participating.

**Customer Segments**

Identified customer segments are the following:
- **Forest harvesting companies** that are interested in exploiting the timber resources in mountain areas using the cable crane method.

- **Montage companies** that are supporting the harvesting companies exploiting the timber resources using the cable crane method. These companies are in charge of the installation of the crane and required machinery.

### Early Adopters

The forest harvesting companies using the cable crane method are the main customer and early adopter of this solution.

### Cost Structure

Identified cost structures can be separate in three main sub-categories:

- **Hardware cost**: The cost of hardware is mainly related to the tools and equipment required to manufacture both the crane rope launcher and the automatic chokers.

- **Sales and Marketing costs**: this includes the marketing personnel, fairs and workshops and advertising.

- **Salary costs**: Other personnel cost, including support service and management personnel.

### Revenue Streams

The main revenue will be associated with the direct sales of the hardware equipment.
7.3 Slope platform

SLOPE represents a great challenge for whole project in terms of global platform as a services marketplace. This platform can act as the potential integration space of whole value chain offering a unique shared economy model. This is a holistic business model that creates value by bringing together consumers and producers.

Slope has been developed as a flexible platform. The core of Slope system is based on a server and database that are accessible online for the different applications. Some of these applications can work separately or combined. For example the 3D model and planning service (service 2) is feeding with information in the Slope database, this information is collected for survey companies such as UAV surveyor (Service 2) and forest measurement companies using a Slope mobile application. The information is accessible to all the partners and can feed other services such as the tracking system (Service 3) and the Wuudis (service 4). The intelligent processor head (service 5) can also interact with the Slope database, providing information of the timber that has been cut to the Slope database. This information can be used for the tracking system and by Wuudis to retrieve the trees and timber logs that has been cut. But Slope is not only an integrated suite of software products. It goes behind the underlying technology, creating the whole business and building a network.
A system integrating several SLOPE services is presented in Figure 3. This platform may link in the future services such as Wuudis with other services such as the 3D forest model, tracking system and intelligent processor head.

Figure 3: SLOPE platform integrating several services

Owners

The owners of the Slope platform are the different partners that may run one or several services based on the Slope platform. The different partners make available the different tools and applications and provide the transition to the end users. Based on these services the owners gain a benefit that can be shared or based on the usage of the application.

Producer

Producers will create supply or respond to consumer demand. These can be calcified as following:

- **Forest Managers** will provide the data to generate the 3D models (inventory end model data) that will be used by the end user. Using Slope tools, Forest Managers can interact with the end users providing a better service.
- **Harvesting Companies** will work similar to the Forest Managers, providing data from the harvesting operation to the Slope system to better interact with the end users.
- **Forest Public Bodies** with public forest information available that can be added to the Slope system to be used by the end users.
Consumers will create the demand of using Slope services. These can be calcified as following:

- **Forest owners** will be one of the main consumers by using the SLOPE tools for an easy solution for forest information management.
- **Harvesting companies** will act as consumer too, when they are looking for information produced from Management Companies to plan the harvesting activity.
- **Timber buyers** are one of the main consumers when they are looking for information produced from Management Companies and Harvesting companies regarding the amount of timber that there is in the forest.
- **Certification** will act as consumer when asking for the reports coming from the tracking system.

Both Consumers and Producers will be the main customers of the Slope services. Producers will pay for the access to these tools and the consumers will pay for the access to the results that the producers are offering.

**Partners**

**Slope partners** can act as Technology partners to support other partners within the consortium for a specific service.

**External partners** include the HW manufacturers for the processor head, RFID tags and readers. Slope partners will try to partner with these companies to ensure a reliable supply of HW that will support the Slope services.

**Forest Certification Bodies**, Slope partners will try to partner with the certificate bodies in order to gain support for the tracking system (Service 3) and extend this support to other services

**Management Companies**, Slope partners will try to partner with the Management Companies to ensure a reliable number of customer action as producers and user their network to increase the number of consumers.
8 Rollout

8.1 Time to market the solution

The different SLOPE services and products are in different stages of development and commercialisation.

- **Services and products ready for commercialisation**

  The services that are ready for commercialisation are the Automatic chokers and the Wuudis e-commerce platform and will be brought to market in the coming months.

- **Products pending for authorisation**

  The Synthetic rope launcher is also technically ready for commercialisation. However, due to the type of machine, an authorisation from the authorities is required before the commercialisation. Greifenberg is working into complete the authorization process.

- **Products that require additional development**

  The Detailed digital model of forest and 3D Harvesting and planning tool require additional development before the commercialisation to refine the analysis and improve the data workflow.

  The Automatic tracking and traceability system for timber products also require a further development step. An industrial partner (producer of timber processor heads) would be of great importance for accelerating this stage of development as well as commercialization. Contacts have been made with small producers and further efforts will be addressed to bigger companies. Six months of work might be needed to improve the robustness of the whole system and further test the truck monitoring system.

  Finally, the Sensorized Processor head also requires further development regarding the selection of the best quality grading system for the first commercial version of this hardware. Table 7 provides an overview of the time to market for each product/service together with its costs and TRL.
Table 7: Time to market

<table>
<thead>
<tr>
<th>Product ID</th>
<th>Product/Service</th>
<th>TRL</th>
<th>Cost to bring the product to market</th>
<th>Time to market</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Detailed digital model of forest</td>
<td>TRL 6</td>
<td>40k€</td>
<td>6 Months</td>
</tr>
<tr>
<td>2</td>
<td>3D Harvesting and planning tool</td>
<td>TRL 6</td>
<td>40k€</td>
<td>6 Month</td>
</tr>
<tr>
<td>3</td>
<td>Automatic tracking and traceability system for timber products</td>
<td>TRL 6</td>
<td>40k€</td>
<td>6 Month</td>
</tr>
<tr>
<td>4</td>
<td>Wuudis e-commerce platform</td>
<td>TRL 8</td>
<td>10-15k€</td>
<td>Ready to go to pilots world wide</td>
</tr>
<tr>
<td>5</td>
<td>Novel sensorized, intelligent machine</td>
<td>TRL 6</td>
<td>TBD</td>
<td>6 - 12 months</td>
</tr>
<tr>
<td>6</td>
<td>Synthetic rope launcher</td>
<td>TRL 9</td>
<td>15 k€</td>
<td>6 Month (based on certification time)</td>
</tr>
<tr>
<td>7</td>
<td>Automatic chokers</td>
<td>TRL 9</td>
<td>Ready for the market</td>
<td>6 Month</td>
</tr>
</tbody>
</table>
9 Appendix

The following chapter details the results obtained with the help of the exploitation booster service provided by the European Commission regarding the shaping of the exploitation activities and main exploitable results for the future of the Slope project.

9.1 Key Exploitable Resources

9.1.1 Detailed digital model of forest

<table>
<thead>
<tr>
<th>KER 2: Detailed digital model of forest</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of the results</td>
<td>Detailed digital model of forest viewable by many parties.</td>
</tr>
<tr>
<td>Innovativeness introduced compared to already existing products and services</td>
<td>Aerial survey of forests, previously surveyed on foot.</td>
</tr>
<tr>
<td>Unique selling point</td>
<td>Large areas of forest can be surveyed in a small amount of time. Changes in technology have occurred since the start of the project making aerial data capture easier and more cost effective. Data sets can be shared with planners, foresters and prospective buyers.</td>
</tr>
<tr>
<td>Product and service market size</td>
<td>Applicable as a whole in forestry operations. Its applicability will depend mostly on market acceptance and willing-to-pay. Accuracy may vary depending on the terrain slope and the type of forest.</td>
</tr>
<tr>
<td>Market trends and public acceptance</td>
<td>UAV use in agriculture, forestry and engineering has been accepted as the norm and a solution to many problems such as access, disease monitoring and mapping.</td>
</tr>
<tr>
<td>Product and service positioning</td>
<td>Forest Inventory.</td>
</tr>
<tr>
<td>Legal or normative or ethical requirements (need for authorisations, compliance to standards, norms, etc.)</td>
<td>Flying permissions required on a country basis. Time required to have them may vary from weeks to months, but it is decreasing.</td>
</tr>
<tr>
<td>Competitors and incumbents</td>
<td>Limited fixed wing aerial survey competitors. Costs are an issue.</td>
</tr>
<tr>
<td>Early adopters and first customers</td>
<td>Forestry companies and state owned land.</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>Cost of implementation - bringing product and service to the “market” (before exploitation)</td>
<td>€40k</td>
</tr>
<tr>
<td>Time to market</td>
<td>6 Months.</td>
</tr>
<tr>
<td>Foreseen product and service price</td>
<td>Case by case depending on days, size, complexity, etc.</td>
</tr>
<tr>
<td>Adequateness of consortium Staff</td>
<td>N/A</td>
</tr>
<tr>
<td>External experts and partners to be involved</td>
<td>Liaison with forest knowledge by country.</td>
</tr>
<tr>
<td>Status of IPR: background (type and partner owner)</td>
<td>Coastway</td>
</tr>
<tr>
<td>Status of IPR: foreground (type and partner owner)</td>
<td>Coastway</td>
</tr>
<tr>
<td>Status of IPR: use the results from the exploitation Form</td>
<td></td>
</tr>
<tr>
<td>Partner/s involved expectations</td>
<td>I expect the use of UAV's in Forestry to grow with new technology.</td>
</tr>
<tr>
<td>Sources of financing foreseen after the end of the project</td>
<td>Venture Capital.</td>
</tr>
</tbody>
</table>

**9.1.2 3D Harvesting and planning tool**

<table>
<thead>
<tr>
<th>KER 4 - 3D Harvesting and planning tool</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of the results</td>
<td>A real-time interactive 3D geographical visualization system for 3D forest models acquired from UAV/TLS to help planning, simulation and monitoring of forest production activities. Features include: visualization of 3D forest model, open data, cable crane setup, slope analysis, measurements, working area setup, truck routing as well as spatial queries on the forest for timber product breakdown, cost analysis, cost forecasts and reporting.</td>
</tr>
<tr>
<td>Innovativeness introduced compared to already existing products and services</td>
<td>Completely web solution, globally scalable, supporting different forest actors. It has a level of interactivity based on 3D visualization of the forest model that is difficult to achieve for other competitors.</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Unique selling point</td>
<td>Real-time planning on flat and mountainous terrains, visualization of entire wood forest stands (timber products), tree by tree analysis with the ability to simulate and estimate costs of harvesting operations.</td>
</tr>
<tr>
<td>Product and Service market size</td>
<td>Forest owners, harvesting companies and foresters interested on planning and reasoning on forest resources.</td>
</tr>
<tr>
<td>Market trends and public acceptance</td>
<td>Growing market demands for this type of solutions, although usability and acceptance from potential customers needs to be further inspected.</td>
</tr>
<tr>
<td>Product and service positioning</td>
<td>Online, subscription based product.</td>
</tr>
<tr>
<td>Legal or normative or ethical requirements (need for authorisations, compliance to standards, norms, etc.)</td>
<td>No specific requirements, but a better compliance of the forest information system with forest standards is advisable.</td>
</tr>
<tr>
<td>Competitors and incumbents</td>
<td>Besides some very experimental online tools, there are no competitors with this level of technology.</td>
</tr>
<tr>
<td>Early Adopters and first customers</td>
<td>Pilot companies (i.e. Forest surveys providers), interested in the visualization and management of their acquired data in an interactive way.</td>
</tr>
<tr>
<td>Cost of implementation - bringing product and service to the “market” (before Exploitation)</td>
<td>40k€</td>
</tr>
<tr>
<td>Time to market</td>
<td>6 Months</td>
</tr>
<tr>
<td>Foreseen product and service price</td>
<td>Monthly fee based on the user type, amount of functionalities required and number of surveys.</td>
</tr>
<tr>
<td>Adequateness of consortium staff</td>
<td>The consortium skills and human resources are adequate for the achievement of the KER.</td>
</tr>
</tbody>
</table>
### External experts and partners to be involved

Pilot companies to drive sales.

### Status of IPR: Background (type and partner owner)

- 3D GIS visualization: GraphiTech
- Web service: MHG
- Aerial Surveys: Coastway
- TLS Analysis, Forest warehouse: Treemetrics

### Status of IPR: foreground (type and partner owner)

- 3D Visualization Technology: GraphiTech
- Forest Information System database: MHG
- Forest model generation: Coastway, Treemetrics

### Status of IPR: use the results from the exploitation form

TBC

### Partner/s involved expectations

Commercialization of the system, involvement for testing of the system.

### Sources of financing foreseen after the end of the project

Venture capital, loans, other European, national, regional grants, own financing and collaborative agreements.

---

### 9.1.3 Automatic tracking and traceability system for timber products

<table>
<thead>
<tr>
<th>KER - Automatic tracking and traceability system for timber products</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description of the results</strong></td>
<td>Automatic tracking and traceability system for timber products.</td>
</tr>
<tr>
<td><strong>Innovativeness introduced compared to already existing products and services</strong></td>
<td>The system integrates manual and automatic management and reading of RFID tags throughout the supply forest supply chain. In a market-adaptability focus the data management and transfer system may provide the following services singularly or in a unique service:</td>
</tr>
<tr>
<td></td>
<td>- Tracking of single tree/log items and bulk goods along the supply chain.</td>
</tr>
<tr>
<td></td>
<td>- Trace timber products with full details of location and date of key actions (felling, extraction, transformation, transportation).</td>
</tr>
</tbody>
</table>
- Transfer quality parameters and instructions for optimal handling/transformation by mean of the same RFID system, maximizing added value (e.g. optimal value recovery).

<table>
<thead>
<tr>
<th>Unique selling point</th>
<th>First auto-ID system integrated in forest machines, transportation fleet and forest workers (chainsaw operator, forester). Unique in the capacity to track/trace both trees and logs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product and service market size</td>
<td>Potentially applicable as whole in most temperate forestry operations that require traceability of trees and timber logs. This product may be interesting for forest owners that require PEFC and FSC certification. At present, the main certification schemes, PEFC and FSC, cover a forested area of 236 M ha and 183 M ha respectively worldwide (in Europe the certified area is 95.5 M ha and 81.8 M ha respectively). Currently PEFC and FSC principles and criteria include a monitoring section with references to the traceability of the forest products. In a broader sense certification is all about traceability and document what you claim. In this regard, the proposed traceability system based on RFID can facilitate the claim of forest owners and forest owners group schemes to obtain the FSC and PEFC certification. Currently FSC and PEFC standards do not include directly the RFID or any other method of monitoring or traceability and it is up to the national Stewardship Standards to specify the indicators regarding monitoring and traceability. As result of these certification requirements, there is a potential market for the proposed tracking and traceability system that will address a part of the forest owners groups with certified forest providing a cost-effective solution for traceability that will facilitate the certification of their forests.</td>
</tr>
<tr>
<td>Market trends and public acceptance</td>
<td>Forest certification and chain of custody of timber products is an increasingly strong topic seeking for effective and reliable solutions. An example is given by the recent publication Illegal Logging and Related Timber Trade (2016), IUFRO World Series Vol. 35. Furthermore, the developed system allows for process optimization beyond the pure traceability requirements.</td>
</tr>
</tbody>
</table>
| Product and service positioning | The service will be used in timber supply chains (forest to timber industry), with the potential to provide in a unique tool, the services of chain of custody, tracking service of goods,
| Legal or normative or ethical requirements (need for authorisations, compliance to standards, norms, etc.) | Optimization of processes (linking quality/quantity data to the items). |
| Companions and incumbents | Compliance with the FSC and PEFC certification principles and criteria, and national indicators. |
| Competitors and incumbents | Alternative systems are based on documentation control. The proposed system can integrate and simplify the current control system rather than substituting it (which is still possible). The competitive advantage of this system lies in the automation of the timber products tracking that will increase the reliability of the information, reduce human errors and provide a more cost-effective solution when comparing tracking based on sheets and paper forms. |
| Early adopters and first customers | Chain of custody companies - PEFC and FSC schemes could be the first adopters/promoter of the system. These organizations do not own forest themselves, but provide certification of sustainability to forest owners and forest industries. FSC producers groups and big companies can also be a target. |
| Cost of implementation - bringing product and service to the “market” (before exploitation) | Cost of implementation will depend on the specific application of the service. For simple and mostly manual traceability systems, the service is basically ready for market. More automated and competitive service will require further development for implementing the Auto-ID concepts on key stages of the timber supply chain. Upgrade of the processor head RFID system would require about 30-60,000 € depending on the base processor type. Upgrade of intelligent transportation system and/or fixed point bulk reading (e.g. at sawmill gate) will require about 10-30,000 €. Additional 50k€ are required to put everything together in a more robust way, with a customization regarding SW and management of information. |
| Time to market | Most of the system is ready for the market. Auto-ID in the timber processor will require a further development step. An industrial partner (producer of timber processor heads) would be of great importance for accelerating this stage of development as well as commercialization. Contacts have been made with small producers and further efforts will be addressed to bigger companies. Six months of work might be
<table>
<thead>
<tr>
<th>Foreseen product and service price</th>
<th>needed to improve the robustness of the whole system and further test the truck monitoring system.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adequateness of consortium staff</td>
<td>The SLOPE consortium brings most of the staff required to implement such system from the technical point of view, but it is possible that external resources are needed for marketing and sales purposes.</td>
</tr>
<tr>
<td>External experts and partners to be involved</td>
<td>During the project, contacts have been established with industries and companies providing RFID tags, readers and software. In case of business-oriented applications, the flexibility of including these actors into the service may be an added value. CAEN_RFID is a leading industry in RFID readers development and related software (encrypted codes for contrasting illegal uses).</td>
</tr>
<tr>
<td>Status of IPR: background (type and partner owner)</td>
<td>TREE: field mobile app.</td>
</tr>
</tbody>
</table>
| Status of IPR: foreground (type and partner owner) | CNR: Overall traceability system  
ITENE: Intelligent truck system  
TREE: Field Mobile App  
COMPOLAB: Stapling system  
MHG: Forest information system |
| Status of IPR: use the results from the exploitation form | Achieve a more robust implementation of the system, bulk reading of trucks, have a flexible system that can adapt to different traceability conditions. Increase the use of RFID and digital monitoring systems as way to facilitate certification and forest management in general. |
| Partner/s involved expectations | PEFC financing for practical applications |

### 9.1.4 Wuudis e-commerce platform

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-founded by the European Commission</td>
</tr>
</tbody>
</table>
### Description of the results

Commercialized Wuudis mobile and web service including e-commerce service for forest owners, contractors, timber and biomass buyers and sellers, and other stakeholders in forestry value network. Currently Wuudis (www.metsapaikka.fi) has around 2500 users (freemium) and 120 khas downloaded forest management plans in Finland (Nov. 2016).

### Innovativeness introduced compared to already existing products and services

Wuudis is an independent and neutral, mobile and web service including forest management plan in the pocket service, timber and biomass online sales and purchase and a bidding service for forestry care works. Competitor’s solutions (forest management plan in the pocket, in Finland) are closed services targeted at own customers/members only.

### Unique selling point

Wuudis is a neutral, independent and free service for forest owners (freemium service). Contractors and timber & biomass buyers pay a commission fee per successful deal only.

### Product and Service market size

Europe has 16 million private forest owners and 100k contracting companies and timber & biomass buyers. Private forest ownership is common in numerous US states and Canadian provinces too. Wuudis is an excellent solution for state and regional forest organizations worldwide.

### Market trends and public acceptance

Digitalization is penetrating into forestry too. Just as Finnish example MetsäGroup is handling 30% of care work orders and 25% of timber deals electronically through its own e-service after 18 months of launching.

More and more elderly people (60+ years) buy and use smart phone with multiple apps on it. Most of people are already familiar with web stores, e-banking etc. electronic services.

### Product and Service positioning

Wuudis is a holistic service with open interfaces otherwise competitors’ solutions targeted at forest owners only. Next year Wuudis will cover also ERP functionalities (for contractors) in the same service platform.

### Legal or normative or ethical requirements (need for authorisations, compliance to standards, norms, etc.)

By now Wuudis contains standardized forest information in Finland and the UK. In practice every country, even regions, have own procedures regarding forest inventory data. On the other hand, in near future Copernicus satellite based forest inventory data can be integrated as background forest inventory data in Wuudis. In addition, the service allows free creation of forest.
management plan by user thanks to drawing tools and free information fields.

### Competitors and incumbents
All Finnish paper and pulp companies (MetsäGroup, Stora-Enso, and UPM Kymmene) have their own apps and web services for their committed customers like forest management associations (Metsäselain). Also Bitcomp Oy is providing his own app: Kantoon.

In France, Mavoret is developing quite a similar service as Wuudis (competitor or partner).

### Early adopters and first customers
Technically/digitally oriented forest owners who themselves are active in management and care work operations. Typically owning bigger forests than average forest owners. In parallel forest investment foundations/companies to make business more transparent through information sharing via Wuudis.

### Cost of implementation - bringing product and service to the “market” (before exploitation)
Local forest standard and language translation and implementation required. Will take 2-3 man months altogether (10-15 k€).

### Time to market
Ready to go to pilots worldwide.

### Foreseen product and service price
10% commission from care work deals, 3-5% commission from timber and biomass purchase deals (depending on additional services like CO2 tracking or certification and chain of custody).

In addition:
- 50 € yearly for forest owners.
- 100 € yearly for contracting companies.

### Adequateness of consortium staff
Communication expert excellent at making noise through social media tools and e-marketing still missing. Other staff in place.

### External experts and partners to be involved
We are on search of strong partners like farmers’ and forest owners’ unions and cooperative banks for powerful marketing

### Status of IPR: background (type and partner owner)
Wuudis is a spin-off company of MHG Systems developing more supporting novel services like remote sensing tools, carbon footprint monitoring). Wuudis has all IPR rights

### Status of IPR: foreground (type and partner owner)
Wuudis has all IPR rights for apps etc. related with Wuudis service.
### Status of IPR: use the results from the exploitation form

Regarding Slope FIS exploitation we are a bit sceptic, because Slope solution is a prototype only. Some modules like Wuudis as a separate service is ready for markets after localization actions.

### Partner/s involved expectations

Committed to market and sell Wuudis via reliable partner network to other European countries (France, UK, Sweden, and Norway). Partner network under search and development in above mentioned countries. Also Horizon2020 SME instrument application (phase 1) submitted in November for market expansion in France and the UK.

### Sources of financing foreseen after the end of the project

Wuudis is about to close 1st round funding (200 k€+200 k€) for internalization and finalizing e-commerce service. In addition MHG has secured Horizon2020 funding for remote sensing services development on top of Wuudis, and as a new business field.

### 9.1.5 Novel sensorized, intelligent machine

<table>
<thead>
<tr>
<th>KER 3 - Novel sensorized, intelligent machine</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description of the results</strong></td>
<td>On the base of an existing processor head, we designed a novel sensorized, intelligent machine that is able to provide wood classification grading within the forest.</td>
</tr>
<tr>
<td><strong>Innovativeness introduced compared to already existing products and services</strong></td>
<td>The new machine adds automatic grading capabilities during tree processing, a feature not available in the market.</td>
</tr>
<tr>
<td><strong>Unique selling point</strong></td>
<td>The grading capability reduces uncertainties and errors in manual wood quality grading, providing real-time evaluation of wood under several different indices. Knowing in advance the wood quality, allows the owner to maximise its profits.</td>
</tr>
<tr>
<td><strong>Product and Service market size</strong></td>
<td>Potentially applicable in almost all forestry harvesting operations.</td>
</tr>
<tr>
<td><strong>Market trends and public acceptance</strong></td>
<td>The Slope innovations have increased the knowledge of the company in its construction sector.</td>
</tr>
<tr>
<td><strong>Product and service positioning</strong></td>
<td>Timber extraction service.</td>
</tr>
<tr>
<td><strong>Legal or normative or ethical requirements (need for authorisations, compliance to standards, norms, etc.)</strong></td>
<td>Machinery directive of the European community.</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>Competitors and incumbents</strong></td>
<td>Other processor head manufacturer (Ponsee, Waratah, etc.).</td>
</tr>
<tr>
<td><strong>Early adopters and First Customers</strong></td>
<td>Processor head manufacturers.</td>
</tr>
<tr>
<td><strong>Cost of implementation - bringing product and service to the “market” (before exploitation)</strong></td>
<td>Regarding the wood quality grading system, a deeply analysis of the most suitable sensors is necessary.</td>
</tr>
<tr>
<td><strong>Time to market</strong></td>
<td>6 - 12 months.</td>
</tr>
<tr>
<td><strong>Forseen product and service Price</strong></td>
<td>Additional price for each machine sold with these optionals (may vary depending on the type of sensor).</td>
</tr>
<tr>
<td><strong>Adequateness of consortium Staff</strong></td>
<td>SLOPE consortium is adequate. A processor head manufacturer should be added.</td>
</tr>
<tr>
<td><strong>External experts and partners to be involved</strong></td>
<td>Processor head manufacturer.</td>
</tr>
<tr>
<td><strong>Status of IPR: background (type and partner owner)</strong></td>
<td>Greifenberg: excavator where the processor head is mounted.</td>
</tr>
</tbody>
</table>
| **Status of IPR: foreground (type and partner owner)** | Compolab: machine design solutions  
CNR: quality grading algorithms  
BOKU: quality grading algorithms |
| **Status of IPR: use the results from the Exploitation Form** | |
| **Partner/s involved expectations** | Additional testing on the field, reengineering of some hardware and software parts of the system to simplify the grading system. |
| **Sources of financing foreseen after the end of the project** | Investment from head processor manufacturers, H2020 funding (SME instrument, regional funding). |
### 9.1.6 Synthetic rope launcher

<table>
<thead>
<tr>
<th>KER 5 - Synthetic rope launcher</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description of the results</strong></td>
<td>A system made to launch a synthetic rope from the beginning to the end of a cable line in order to facilitate the layout of its main cable.</td>
</tr>
<tr>
<td><strong>Innovativeness introduced compared to already existing products and services</strong></td>
<td>The system helps reducing the number of hours required to setup a cable line as well as the physical effort for the forest operators. This allows increasing productivity and margins.</td>
</tr>
<tr>
<td><strong>Unique selling point</strong></td>
<td>There is nothing similar on the market, the cost for the machine construction are limited due to its simplicity and the selling price can be contained. Considering that it can save days of manual work, its ROI can be fast.</td>
</tr>
<tr>
<td><strong>Product and service market size</strong></td>
<td>All the harvesting companies operating in mountainous areas.</td>
</tr>
<tr>
<td><strong>Market trends and public acceptance</strong></td>
<td>As there is nothing similar, it is expected little to no competition.</td>
</tr>
<tr>
<td><strong>Product and service positioning</strong></td>
<td>Forest machines sector.</td>
</tr>
<tr>
<td><strong>Legal or normative or ethical requirements (need for authorisations, compliance to standards, norms, etc.)</strong></td>
<td>Requires compliance with the Machinery Directive of the European community.</td>
</tr>
<tr>
<td><strong>Competitors and incumbents</strong></td>
<td>In the field of forest cableways: 5 Austrian, 2 Germans, 2 Slovenian, 1 Swiss, 1 Italian and 1 Polish competitors</td>
</tr>
<tr>
<td><strong>Early adopters and first customers</strong></td>
<td>Public bodies.</td>
</tr>
<tr>
<td><strong>Cost of implementation - bringing product and service to the “market” (before exploitation)</strong></td>
<td>The rope launcher is ready for the market. It is only missing the proper certifications.</td>
</tr>
<tr>
<td><strong>Time to market</strong></td>
<td>Depending on the certification time.</td>
</tr>
<tr>
<td><strong>Foreseen product and service price</strong></td>
<td>Cost of the rope launcher is estimated in 15k€.</td>
</tr>
<tr>
<td><strong>Adequateness of consortium staff</strong></td>
<td>Greifenberg has designed, tested and manufactured the product, having all the competences for production and selling of the product.</td>
</tr>
<tr>
<td><strong>External Experts/Partners to be involved</strong></td>
<td>ENAMA (Ente Nazionale Meccanizzazione Agricola) has been involved for the certification of the machine.</td>
</tr>
<tr>
<td>Status of IPR: Background (type and partner owner)</td>
<td>N/A</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Status of IPR: Foreground (type and partner owner)</td>
<td>Greifenberg: design testing and construction of the machine.</td>
</tr>
<tr>
<td>Status of IPR: use the results from the Exploitation Form</td>
<td>N/A</td>
</tr>
<tr>
<td>Partner/s involved expectations</td>
<td>N/A</td>
</tr>
<tr>
<td>Sources of financing foreseen after the end of the project</td>
<td>Self-funding</td>
</tr>
</tbody>
</table>

### 9.1.7 Automatic Chokers

<table>
<thead>
<tr>
<th><strong>KER 6: Automatic Chokers</strong></th>
<th><strong>Description</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of the results</td>
<td>Automatic chokers that allow unhooking of the logs without the need of getting close to them, thus enabling the forestry operator to stay in a safe position.</td>
</tr>
<tr>
<td>Innovativeness introduced compared to already existing products and services</td>
<td>These automatic chokers present the advantage of directly interacting with the PLC of the motorized cable carriage produced by partner Greifenberg. This innovative feature allows to perform the unloading operations without the presence of an operator. When lowering the load, Techno checks the dynamometer and when the zero value is reached, it directly sends the open command to the chokers.</td>
</tr>
<tr>
<td>Unique selling point</td>
<td>Increased productivity and safety. Communication with the cable carriage.</td>
</tr>
<tr>
<td>Product and service market size</td>
<td>All the harvesting companies operating in mountainous areas.</td>
</tr>
<tr>
<td>Market trends and public acceptance</td>
<td>Automatic chokers are not new to the market and accepted as a valid solution.</td>
</tr>
<tr>
<td>Product and service positioning</td>
<td>Forest machines sector. Accessory for motorized cable carriage.</td>
</tr>
<tr>
<td><strong>Legal or normative or ethical requirements (need for authorisations, compliance to standards, norms, etc.)</strong></td>
<td>Machinery directive of the European community.</td>
</tr>
<tr>
<td><strong>Competitors and incumbents</strong></td>
<td>In the field of forest cableways: 5 Austrian, 2 Germans, 2 Slovenian, 1 Swiss, 1 Italian and 1 Polish competitor.</td>
</tr>
<tr>
<td><strong>Early Adopters and First Customers</strong></td>
<td>Private companies.</td>
</tr>
<tr>
<td><strong>Cost of implementation and bringing product and service to the “market” (before exploitation)</strong></td>
<td>Chokers are ready for the market.</td>
</tr>
<tr>
<td><strong>Time to market</strong></td>
<td>Chockers will be listed under six months in the new price list.</td>
</tr>
<tr>
<td><strong>Foreseen product and service price</strong></td>
<td>For chokers connected to the carriage will be about 900 euro</td>
</tr>
<tr>
<td><strong>Adequateness of consortium staff</strong></td>
<td>Greifenberg has designed, tested and manufactured the product, having all the competences for production and selling of the product.</td>
</tr>
<tr>
<td><strong>External experts and partners to be involved</strong></td>
<td>ENAMA (Ente Nazionale Meccanizzazione Agricola) has been involved for the approval of the machine.</td>
</tr>
<tr>
<td><strong>Status of IPR: background (type and partner owner)</strong></td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Status of IPR: Foreground (type and partner owner)</strong></td>
<td>Greifenberg: design testing and construction of the machine.</td>
</tr>
<tr>
<td><strong>Status of IPR: use the results from the Exploitation Form</strong></td>
<td>TBC</td>
</tr>
<tr>
<td><strong>Partner/s involved expectations</strong></td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Sources of financing foreseen after the end of the project</strong></td>
<td>Self-funding</td>
</tr>
</tbody>
</table>
Annex I – Common exploitation booster support services

Common Exploitation Booster
Support services for ongoing R&I projects across the FP7 and H2020

How to help R&I projects to reach the market, stakeholders and potential users?
How to exploit the R&I results and meet expectations of different project partners?
How to communicate better internally or externally, follow market evolution, and consider competing solutions and financial opportunities?

Common Exploitation Booster services aim to bridge the gap between research results and exploitation by helping the project consortia in:

- raising awareness on exploitation possibilities and exploitation planning;
- clarifying issues, exploring solutions and actions, anticipating possible conflicts for successful exploitation;
- setting up roadmaps for the long-term sustainability of the project results;
- creating value out of novel knowledge (recognising exploitable results, creating revenues, improving skills, standardization or patenting, finding pathways for future work).

**BASIC PRINCIPLES**

- The consultancy services are paid from the EC Horizon 2020 Common Support Centre budget. The projects cover their own logistical expenses.
- The services are implemented by external consultants under confidentiality agreement.
- The services are available for all ongoing projects under any area of FP7 or H2020.
- Common Exploitation Booster provides four types of service, suited for projects and results in different phases of maturity.
- A project consortium can benefit from the Common Exploitation Booster only once and from one type of service.
- The services are requested by the EC project officer and confirmed with the project coordinator before starting the service.

**HOW TO APPLY?**

EC project and policy officers, or coordinators can propose projects for Common Exploitation Booster services by filling in the submission form: [https://ec.europa.eu/eusurvey/survey/CommonExploitationBooster_service_request](https://ec.europa.eu/eusurvey/survey/CommonExploitationBooster_service_request)

- Project information (project number, total budget, number of partners, coordinator email)
- Type of service
- Place and timing of ESS/BPD/BPE service (e.g. in context of project consortia or clustering meeting)

In case of BPE service, the proposals should identify a group of related projects for the service.

More information: [EC_CSC-Exploitation-Support@ec.europa.eu](mailto:EC_CSC-Exploitation-Support@ec.europa.eu)
## COMMON EXPLOITATION BOOSTER SUPPORT SERVICES

<table>
<thead>
<tr>
<th>Service Description</th>
<th>Details</th>
</tr>
</thead>
</table>
| **Analysis of Exploitation Risks (AER)** | The service will support the partners to identify risks and potential obstacles to the future exploitation of the project's results within and outside the consortium and tackle questions like:  
- Which exploitable results do the project partners aim to generate?  
- What form(s) can the exploitation of these results take? How to enable it?  
- What is each partner contribution to the project, what are their different exploitation strategies, are the expectations of partners compatible and coherent?  
Outputs: Report on exploitable results, a map of risks and exploitation recommendations. |
| **Exploitation Strategy Seminar (ESS)** | The service will provide a platform (1/2 - 1 day seminar) to discuss results and design a roadmap toward exploitation. Expert will facilitate discussion and provide guidance on issues like:  
- Recognition of exploitable results and exploitation expectations of the partners  
- Definition or clarification of the exploitation strategy of different project results  
- Follow-up actions and how to connect with relevant actors  
Outputs: Exploitation report (4-8 pages) and background research report. |
| **Business Plan Development (BPD)** | The service includes a virtual or face-to-face collaborative workshop, and entails support for developing a complete business plan, including issues such as:  
- The consortium's operational and financial objectives, the plans for their achievement  
- Coaching the partners in pitching their exploitable results  
- Describing in a clear and effective way the business, the products/services, the market, competition, operations and management, and financial estimates  
- Accessing risk capital providers and other innovation financing actors  
Outputs: Business plan (15-25 pages) and practiced pitches. |
| **Brokering and Pitching Event (BPE)** | The service provides assistance with the design and preparation for an event that brings together project partners and other relevant actors, with issues such as:  
- Facilitating groups of projects to meet and discuss their results in order to create synergies and generate new ideas for further exploitation of research results  
- Training on pitching and presenting results to potential users, investors or collaborators,  
- Assistance in finding relevant actors in the innovation-dissemination-upake chain (end-users, industrial suppliers, standardisation bodies, risk capitalists, business angels etc.)  
Outputs: Report of the event, practice and feedback on pitches, connections to relevant actors. |
Annex II – ESS report

Exploitation Report

for

«Integrated processing and Control Systems for Sustainable Production in Farms and Forests (SLOPE) »

Project Number

604129

Provided by:

Tunde Kallai
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1 Introducing the ESS

An Exploitation Strategy Seminar (ESS) is a brainstorming seminar to identify the risks and potential obstacles for exploitation and analyse how to address them.

On the basis of an Analysis of Exploitation Risks, project partners and the appointed Expert work together to identify:

- key exploitable project results;
- project partners that will invest time and effort in each result;
- intentions of each partner with regard to the dissemination and use of all results;
- conflicts of interest and weaknesses in the exploitation path/plan.

Possible remedies, precautions or actions are discussed by the partners.

After the ESS, the Expert prepares a report summarising the results of the seminar for project partners and European Commission.
2 Executive Summary

Project abstract:

Mountains in Europe occupy ~35% of the land area and are mostly covered by forests. Forestry operations in mountain areas are seldom performed by the harvester/forwarder system, being the sector still characterized by manual felling and extraction of timber by cable cranes. Due to the limits posed by steep terrain conditions, poor road network of mountain areas, limited storage and operational room, harvesting and extracting systems are more expensive and less flexible compared to the cut-to-length systems based on wheeled machines, commonly found in flatland forests of EU Nordic Countries.

Powerful and intelligent machines must be developed for forest works in steep terrain. This is the gap that SLOPE tries to fill in by developing an integrated system, from forest information system to logistic transportation, that allows optimization of the forest production in mountain areas.

The project integrates information from remote sensing, Unmanned Aerial Vehicles (UAV) and on-field surveying systems (TLS), to support macro and local analysis to characterize forest resources. Spatial information will be integrated with multi-sensor data in a model for Sustainable Forest Management and for optimization of logistics during forest operations. Intelligent technologies have been integrated in the cable crane/processor head to measure different data for the assessment of the assortment quality. Different Non-Destructive Testing methods, as well as pioneering chemometric analysis, have been tested during the project. Different traceability systems will be coupled to chemometric data, to trace the material, from the site throughout the supply chain. Information about material origin, quality and availability have been integrated in a unique system for planning, monitoring and reporting, accessible online and available in real time to a series of operators.

The integration and post-processing of data collected by SLOPE will be used for further optimization of the “mountain forest models”, silviculture routines as well as selling and auction processes between forest owners and harvesting companies.

<table>
<thead>
<tr>
<th>Key Exploitable Results (1)</th>
<th>KER 1</th>
<th>Automatic tracking and traceability system for timber products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leading partner: CNR</td>
<td></td>
<td>First auto-ID system integrated in forest machines, transportation fleet and forest workers (chainsaw operator, forester). Unique in the capacity to track/trace both trees and logs. Potentially applicable as whole in most temperate forestry operations that require traceability of trees and timber logs. The proposed system can integrate and simplify the current control system rather than substituting it (which is still possible). The competitive advantage of this system lies in the automation of the timber products tracking that will increase the reliability of the information, reduce human errors and provide a more cost-effective solution when comparing</td>
</tr>
</tbody>
</table>
tracking based on sheets and paper forms. Most of the system is ready for the market. Auto-ID in the timber processor will require a further development step. Chain of custody companies - PEFC and FSC schemes could be the first adopters/promoter of the system.

KER 2)
**Detailed digital model of forest**
Leading partner: COASTWAY

Aerial survey of Forest, previously surveyed on foot: large areas of forest can be surveyed in a small amount of time, changes in technology have occurred since the start of the project making aerial data capture easier and more cost effective, data sets can be shared with planners, foresters, and prospective buyers. Applicable as a whole in forestry operations in 6 months, depending mostly on market acceptance and willing-to-pay. Accuracy may vary depending on the terrain slope and the type of forest.

KER 3)
**Novel sensorized, intelligent machine**
Leading partner: COMPOLAB

A new machine (processor head) adding automatic grading capabilities during tree processing, a feature not available in the market. This feature reduces uncertainties and errors in manual wood quality grading, providing real-time evaluation of wood under several different indices. Knowing in advance the wood quality, allows the owner to maximise its profits. Potentially applicable in almost all forestry harvesting operations and adoptable by processor head manufacturers. Requires 6-12 months of further testing and tuning on the field.

KER 4)
**3D Harvesting and planning tool**
Leading partner: GRAPHITECH

A real-time interactive 3D geographical visualization system for 3D forest models acquired from UAV/TLS to help planning, simulation and monitoring of forest production activities. Features include: visualization of 3D forest model, open data, cable crane setup, slope analysis, measurements, working area setup, truck routing as well as spatial queries on the forest for timber product breakdown, cost analysis, cost forecasts and reporting. Completely web solution, globally scalable, supporting different forest actors. It has a level of interactivity based on 3D visualization of the forest model that is difficult to achieve from other competitors. Requires 6 months to be put in production but...
can be adopted by forest owners, harvesting companies and foresters interested on planning and working on forest stands.

KER 5)

Synthetic rope launcher

Leading partner: GREIFENBERG

A system made to launch a synthetic rope from the beginning to the end of a cable line in order to facilitate the layout of its main cable. The system helps reducing the number of hours required to setup a cable line as well as the physical effort for the forest operators. This allows to increase the productivity and the margins. There is nothing similar on the market but there is a number of competitors that must be taken in account. Costs for machine construction are limited due to its simplicity and the selling price can be contained. Considering that it can save days of manual work, its return of investment can be fast.

Greifenberg has designed, tested and manufactured the product, having all the competences for production and selling of the product. The product is missing only the certifications before being sold.

KER 6)

Automatic chokers

Leading partner: GREIFENBERG

Automatic chokers allow to unhook the logs without the need of getting close to them, thus enabling the forestry operator to stay in a safe position. These automatic chokers present the advantage of directly interacting with the PLC of the motorized cable carriage produced by partner Greifenberg. This innovative feature allows to perform the unloading operations without the presence of an operator. When lowering the load, Tecno checks the dynamometer and when the zero value is reached, it directly sends the open command to the chokers.

Greifenberg has designed, tested and manufactured the product, having all the competences for production and selling of the product. The product is ready for the market and the target customers are all the harvesting companies operating in mountainous areas.

KER 7)

Wuudis e-commerce platform

Leading partner: MHG

Commercialized Wuudis mobile and web service including e-commerce service for forest owners, contractors, timber and biomass buyers and sellers, and other stakeholders in forestry value network. Currently Wuudis
(www.metsapaikka.fi) has around 2500 users (freemium) and 120 khan downloaded forest management plans in Finland (Nov. 2016). Wuudis is an independent and neutral mobile & web service including forest management plan in the pocket service, timber and biomass online sales and purchase service, and also a bidding service for forestry care works. Competitor’s solutions (forest management plan in the pocket, in Finland) are closed services targeted at own customers/members only.

Wuudis is a spin-off company of MHG Systems developing more supporting novel services like remote sensing tools and carbon foot print monitoring. Wuudis has all IPR rights and is already on the market since November 2016. Target customers are the 16 million private forest owners and the 100k contracting companies and timber & biomass buyers.

Figure 1. Schema of the 7 KERs with the value chain of SLOPE
3 Exploitable Results

3.1 List of Exploitable Results

<table>
<thead>
<tr>
<th>No.</th>
<th>KER name</th>
<th>Leading partner</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>KER 1) Automatic tracking and traceability system for timber products</td>
<td>Leading partner: CNR</td>
</tr>
<tr>
<td>2</td>
<td>KER 2) Detailed digital model of forest</td>
<td>Leading partner: COASTWAY</td>
</tr>
<tr>
<td>3</td>
<td>KER 3) Novel sensorized, intelligent machine</td>
<td>Leading partner: COMPOLAB</td>
</tr>
<tr>
<td>4</td>
<td>KER 4) 3D Harvesting and planning tool</td>
<td>Leading partner: GRAPHITECH</td>
</tr>
<tr>
<td>5</td>
<td>KER 5) Synthetic rope launcher</td>
<td>Leading partner: GREIFENBERG</td>
</tr>
<tr>
<td>6</td>
<td>KER 6) Automatic chokers</td>
<td>Leading partner: GREIFENBERG</td>
</tr>
<tr>
<td>7</td>
<td>KER 7) Wuudis e-commerce platform</td>
<td>Leading partner: MHG</td>
</tr>
</tbody>
</table>
3.2 Exploitable result No 1

3.2.1 Characterization of the result

<table>
<thead>
<tr>
<th>KER 1 - Timber Traceability System</th>
<th>Provide below a short description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of the Result</td>
<td>Automatic tracking and traceability system for timber products</td>
</tr>
<tr>
<td>Innovativeness introduced compared to already existing Products/Services</td>
<td>The system integrates manual and automatic management and reading of RFID tags throughout the supply forest supply chain. In a market-adaptability focus the data management and transfer system may provide the following services singularly or in a unique service: a) tracking of single tree/log items and bulk goods along the supply chain; b) trace timber products with full details of location and date of key actions (felling, extraction, transformation, transportation); c) transfer quality parameters and instructions for optimal handling/transformation by mean of the same RFID system, maximizing added value (e.g. optimal value recovery).</td>
</tr>
<tr>
<td>Unique Selling Point</td>
<td>First auto-ID system integrated in forest machines, transportation fleet and forest workers (chainsaw operator, forester). Unique in the capacity to track/trace both trees and logs.</td>
</tr>
<tr>
<td>Product/Service Market Size</td>
<td>Potentially applicable as whole in most temperate forestry operations that require traceability of trees and timber logs. This product may be interesting for forest owners that require PEFC and FSC certification. At present, the main certification schemes, PEFC and FSC, cover a forested area of 236 M ha and 183 M ha respectively worldwide (in Europe the certified area is 95.5 M ha and 81.8 M ha respectively). Currently PEFC and FSC principles and criteria include a monitoring section with references to the traceability of the forest products. In a boarder sense certification is all about traceability and document what you claim. In this regard, the proposed traceability system based on RFID can facilitate the claim of forest owners and forest owners group schemes to obtain the FSC and PEFC certification. Currently FSC and PEFC standards do not include directly the RFID or any other method of monitoring or traceability and it is up to the national Stewardship Standards to specify the indicators regarding monitoring and traceability. As result of these certification requirements, there is a potential market for the proposed tracking and traceability system that will address a part of the forest owners groups with certified forest providing a cost-effective solution for traceability that will facilitate the citizen of their forests.</td>
</tr>
<tr>
<td>Market Trends/Public Acceptance</td>
<td>Forest certification and chain of custody of timber products is an increasingly strong topic seeking for effective and reliable solutions. An example is given by the recent publication Illegal Logging and Related Timber Trade (2016), IURO World Series Vol. 35. Furthermore, the developed system allows for process optimization beyond the pure traceability requirements.</td>
</tr>
<tr>
<td>Product/Service Positioning</td>
<td>The service will be used in timber supply chains (forest to timber industry), with the potential to provide in a unique tool, the services of chain of custody, tracking service of goods, optimization of processes (linking quality/quantity data to the items).</td>
</tr>
<tr>
<td>Legal or normative or ethical requirements (need for authorisations, compliance to standards, norms, etc.)</td>
<td>Compliance with the FSC and PEFC certification principles and criteria, and national indicators.</td>
</tr>
<tr>
<td>Competitors/Incumbents</td>
<td>Alternative systems are based on documentation control. The proposed system can integrate and simplify the current control system rather than substituting it (which is still possible). The competitive advantage of this system lies in the automation of the timber products tracking that will increase the reliability of the information, reduce human errors and provide a more cost-effective solution when comparing tracking based on sheets and paper forms.</td>
</tr>
<tr>
<td>Early Adopters - First Customers</td>
<td>Chain of custody companies - PEFC and FSC schemes could be the first adopters/promoter of the system. These organizations do not own forest themselves, but provide certification of sustainability to forest owners and forest industries. FSC producers groups and big companies can also be a target.</td>
</tr>
<tr>
<td>Cost of implementation - bringing product/service to the &quot;market&quot; (before Exploitation)</td>
<td>Cost of implementation will depend on the specific application of the service. For simple and mostly manual traceability systems, the service is basically ready for market. More automated (and competitive) service will require further development for implementing the Auto-ID concepts on key stages of the timber supply chain. Upgrade of the processor head RFID system would require about 30-60.000 € depending on the base processor type. Upgrade of intelligent transportation system and/or fixed point bulk reading (e.g. at sawmill gate) will require about 10-30.000 €. Additional 50k€ are required to put everything together in a more robust way, with a customization regarding SW and management of information.</td>
</tr>
</tbody>
</table>
| Time to market | Most of the system is ready for the market. Auto-ID in the timber processor will require a further development step. An industrial partner (producer of timber processor heads) would be of great importance for accelerating this stage of development as well as commercialization. Contacts have been made with small producers and further efforts will be addressed to bigger companies. 6 Months of work might be
<table>
<thead>
<tr>
<th>Foreseen Product/Service Price</th>
<th>To be estimated based on the results of D 6.043</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adequateness of Consortium Staff</td>
<td>The SLOPE consortium brings most of the staff required to implement such system from the technical point of view, but it is possible that external resources are needed for marketing and sales purposes.</td>
</tr>
<tr>
<td>External Experts/Partners to be involved</td>
<td>During the project, contacts have been established with industries and companies providing RFID tags, readers and software. In case of business-oriented applications, the flexibility of including these actors into the service may be an added value. CAEN_RFID is a leading industry in RFID readers development and related software (encrypted codes for contrasting illegal uses)</td>
</tr>
<tr>
<td>Status of IPR: Background (type and partner owner)</td>
<td>TREE: Field Mobile App</td>
</tr>
</tbody>
</table>
| Status of IPR: Foreground (type and partner owner) | CNR: Overall traceability system  
ITENE: Intelligent truck system  
TREE: Field Mobile App  
COMPOLAB: Stapling system  
M.I.H: Forest information system |
| Status of IPR: use the results from the exploitation form | TBC |
| Partner/s involved expectations | Achieve a more robust implementation of the system, bulk reading of trucks, have a flexible system that can adapt to different traceability conditions. Increase the use of RFID and digital monitoring systems as way to facilitate certification and forest management in general. |
| Sources of financing foreseen after the end of the project | PEFC financing for practical applications |
### 3.3 Exploitable result No 2

#### 3.3.1 Characterization of the result

<table>
<thead>
<tr>
<th>KER 2: Forest Mapping with UAV</th>
<th>Provide below a short description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description of the Result</strong></td>
<td>Detailed digital model of forest viewable by many parties</td>
</tr>
<tr>
<td><strong>Innovativeness introduced compared to already existing Products/Services</strong></td>
<td>Aerial survey of Forest, previously surveyed on foot</td>
</tr>
<tr>
<td><strong>Unique Selling Point</strong></td>
<td>Large areas of forest can be surveyed in a small amount of time, changes in technology have occurred since the start of the project making aerial data capture easier and more cost effective, data sets can be shared with planners, foresters, and prospective buyers</td>
</tr>
<tr>
<td><strong>Product/Service Market Size</strong></td>
<td>Applicable as a whole in forestry operations. Its applicability will depend mostly on market acceptance and willing-to-pay. Accuracy may vary depending on the terrain slope and the type of forest</td>
</tr>
<tr>
<td><strong>Market Trends/Public Acceptance</strong></td>
<td>UAV use in Agriculture, Forestry, Engineering has been accepted as the norm and a solution to many problems such as access, disease monitoring, mapping</td>
</tr>
<tr>
<td><strong>Product/Service Positioning</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Legal or normative or ethical requirements (need for authorisations, compliance to standards, norms, etc.)</strong></td>
<td>Flying permissions required on a country basis. Time required to have them may vary (weeks to months) but it is decreasing</td>
</tr>
<tr>
<td><strong>Competitors/Incumbents</strong></td>
<td>Limited fixed wing aerial survey competitors. Costs are an issue</td>
</tr>
<tr>
<td><strong>Early Adopters - First Customers</strong></td>
<td>Forestry companies, state owned land</td>
</tr>
<tr>
<td><strong>Cost of implementation - bringing product/service to the “market” (before Exploitation)</strong></td>
<td>€40k</td>
</tr>
<tr>
<td><strong>Time to market</strong></td>
<td>6 Months</td>
</tr>
<tr>
<td><strong>Foreseen Product/Service Price</strong></td>
<td>Case by case (Depending on Days, Size, Difficulties, etc.)</td>
</tr>
<tr>
<td><strong>Adequateness of Consortium Staff</strong></td>
<td>NA</td>
</tr>
<tr>
<td><strong>External Experts/Partners to be involved</strong></td>
<td>Liaison with forest knowledge by country</td>
</tr>
<tr>
<td><strong>Status of IPR: Background (type and partner owner)</strong></td>
<td>Coastway</td>
</tr>
<tr>
<td><strong>Status of IPR: Foreground (type and partner owner)</strong></td>
<td>Coastway</td>
</tr>
<tr>
<td><strong>Status of IPR: use the results from the Exploitation Form</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Partner/s involved expectations</strong></td>
<td>I expect the use of UAV’s in Forestry to grow with new technology</td>
</tr>
<tr>
<td><strong>Sources of financing foreseen after the end of the project</strong></td>
<td>Venture Capital</td>
</tr>
</tbody>
</table>
### 3.4 Exploitable result No 3

#### 3.4.1 Characterization of the result

<table>
<thead>
<tr>
<th>KER 3 - Intelligent harvesting machine</th>
<th>Provide below a short description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of the Result</td>
<td>On the base of an existing processor head, we designed a novel sensorized, intelligent machine that is able to provide wood classification grading within the forest.</td>
</tr>
<tr>
<td>Innovativeness introduced compared to already existing Products/Services</td>
<td>The new machine adds automatic grading capabilities during tree processing, a feature not available in the market</td>
</tr>
<tr>
<td>Unique Selling Point</td>
<td>The grading capability reduces uncertainties and errors in manual wood quality grading, providing real-time evaluation of wood under several different indices. Knowing in advance the wood quality, allows the owner to maximise its profits.</td>
</tr>
<tr>
<td>Product/Service Market Size</td>
<td>Potentially applicable in almost all forestry harvesting operations.</td>
</tr>
<tr>
<td>Market Trends/Public Acceptance</td>
<td>The Slope innovations have increased the knowledge of the company in its construction sector</td>
</tr>
<tr>
<td>Product/Service Positioning</td>
<td>Timber extraction service</td>
</tr>
<tr>
<td>Legal or normative or ethical requirements (need for authorisations, compliance to standards, norms, etc.)</td>
<td>Machinery Directive of the European community</td>
</tr>
<tr>
<td>Competitors/Incumbents</td>
<td>Other processor head manufacturer (Ponsee, Waratah...)</td>
</tr>
<tr>
<td>Early Adopters - First Customers</td>
<td>Processor head manufacturers</td>
</tr>
<tr>
<td>Cost of implementation - bringing product/service to the “market” (before Exploitation)</td>
<td>Regarding the wood quality grading system (sensors), a deeply analysis of the most suitable sensors is necessary.</td>
</tr>
<tr>
<td>Time to market</td>
<td>6 - 12 months</td>
</tr>
<tr>
<td>Foreseen Product/Service Price</td>
<td>Additional price for each machine sold with these options (may vary depending on the type of sensor)</td>
</tr>
<tr>
<td>Adequateness of Consortium Staff</td>
<td>SLOPE consortium is adequate. A processor head manufacturer should be added</td>
</tr>
<tr>
<td>External Experts/Partners to be involved</td>
<td>Processor head manufacturer</td>
</tr>
<tr>
<td>Status of IPR: Background (type and partner owner)</td>
<td>Greifenberg: excavator where the processor head is mounted</td>
</tr>
<tr>
<td>Status of IPR: Foreground (type and partner owner)</td>
<td>Compolab: machine design solutions CNR: quality grading algorithms BOKU: quality grading algorithms</td>
</tr>
<tr>
<td>Status of IPR: use the results from the Exploitation Form</td>
<td></td>
</tr>
<tr>
<td>----------------------------------------------------------</td>
<td>---</td>
</tr>
<tr>
<td>Partner/s involved expectations</td>
<td>Additional testing on the field, reengineering of some hardware and software parts of the system to simplify the grading system</td>
</tr>
<tr>
<td>Sources of financing foreseen after the end of the project</td>
<td>Investment from head processor manufacturers, H2020 funding (Sme instrument, regional funding)</td>
</tr>
</tbody>
</table>
3.5 Exploitable result No 4

### 3.5.1 Characterization of the result

<table>
<thead>
<tr>
<th>KER 4 - Forest Harvesting Planner</th>
<th>Provide below a short description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description of the Result</strong></td>
<td>A real-time interactive 3D geographical visualization system for 3D forest models acquired from UAV/TLS to help planning, simulation and monitoring of forest production activities. Features include: visualization of 3D forest model, open data, cable crane setup, slope analysis, measurements, working area setup, truck routing as well as spatial queries on the forest for timber product breakdown, cost analysis, cost forecasts and reporting.</td>
</tr>
<tr>
<td><strong>Innovativeness introduced compared to already existing Products/Services</strong></td>
<td>Completely web solution, globally scalable, supporting different forest actors. It has a level of interactivity based on 3D visualization of the forest model that is difficult to achieve from other competitor.</td>
</tr>
<tr>
<td><strong>Unique Selling Point</strong></td>
<td>Real-time planning on flat and mountainous terrains, visualization of entire wood forest stands (timber products), tree by tree with the ability to simulate and estimate costs of harvesting operations.</td>
</tr>
<tr>
<td><strong>Product/Service Market Size</strong></td>
<td>Forest owners, harvesting companies and foresters interested on planning and reasoning of a forest stand.</td>
</tr>
<tr>
<td><strong>Market Trends/Public Acceptance</strong></td>
<td>Growing market demands for this type of solutions, although usability and acceptance from potential customers needs to be further inspected.</td>
</tr>
<tr>
<td><strong>Product/Service Positioning</strong></td>
<td>Online, subscription based product</td>
</tr>
<tr>
<td><strong>Legal or normative or ethical requirements (need for authorisations, compliance to standards, norms, etc.)</strong></td>
<td>No specific requirements, but a better compliance of the forest information system with forest standards is advisable.</td>
</tr>
<tr>
<td><strong>Competitors/Incumbents</strong></td>
<td>Besides some very experimental online tools, there are no competitors with this level of technology</td>
</tr>
<tr>
<td><strong>Early Adopters - First Customers</strong></td>
<td>Pilot companies (i.e. Forest surveys providers), interested in the visualization and management of their acquired data in an interactive way.</td>
</tr>
<tr>
<td><strong>Cost of implementation - bringing product/service to the &quot;market&quot; (before Exploitation)</strong></td>
<td>40k€</td>
</tr>
<tr>
<td><strong>Time to market</strong></td>
<td>6 Months</td>
</tr>
<tr>
<td><strong>Foreseen Product/Service Price</strong></td>
<td>Monthly fee based on the user type, amount of functionalities required and number of surveys</td>
</tr>
<tr>
<td><strong>Adequateness of Consortium Staff</strong></td>
<td>The consortium skills and human resources are adequate for the achievement of the KER.</td>
</tr>
<tr>
<td><strong>External Experts/Partners to</strong></td>
<td>Pilot companies to drive sales</td>
</tr>
</tbody>
</table>
| Status of IPR: Background (type and partner owner) | 3D GIS visualization: Graphitech  
Web service: MHG  
Aerial Surveys: Coastway  
TLS Analysis, Forest warehouse: treemetrics |
|-----------------------------------------------|
| Status of IPR: Foreground (type and partner owner) | 3D Visualization Technology: GraphTech  
Forest Information System database: MHG  
Forest model generation: Coastway, Treemetrics |
| Status of IPR: use the results from the Exploitation Form | TBC |
| Partner/s involved expectations | Commercialization of the system, involvement for testing of the system |
| Sources of financing foreseen after the end of the project | Venture capital, loans, other European, national, regional grants, own financing, collaborative agreements |
3.6 Exploitable result No 5

3.6.1 Characterization of the result

<table>
<thead>
<tr>
<th>KER 5 - Rope launcher Easer</th>
<th>Provide below a short description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of the Result</td>
<td>A system made to launch a synthetic rope from the beginning to the end of a cable line in order to facilitate the layout of its main cable.</td>
</tr>
<tr>
<td>Innovativeness introduced compared to already existing Products/Services</td>
<td>The system helps reducing the number of hours required to setup a cable line as well as the physical effort for the forest operators. This allows to increase the productivity and the margins.</td>
</tr>
<tr>
<td>Unique Selling Point</td>
<td>There is nothing similar on the market, the cost for the machine construction are limited due to its simplicity and the selling price can be contained. Considering that it can save days of manual work, its ROI can be fast.</td>
</tr>
<tr>
<td>Product/Service Market Size</td>
<td>All the harvesting companies operating in mountainous areas</td>
</tr>
<tr>
<td>Market Trends/Public Acceptance</td>
<td>As there is nothing similar, it is expected</td>
</tr>
<tr>
<td>Product/Service Positioning</td>
<td>forest machines sector</td>
</tr>
<tr>
<td>Legal or normative or ethical requirements (need for authorisations, compliance to standards, norms, etc.)</td>
<td>Requires to comply with the Machinery Directive of the European community</td>
</tr>
<tr>
<td>Competitors/Incumbents</td>
<td>in the field of forest cableways: 5 Austrian 2 Germans 2 Slovenian 1 Swiss 1 Italian 1 Polish competitors</td>
</tr>
<tr>
<td>Early Adopters - First Customers</td>
<td>Public bodies</td>
</tr>
<tr>
<td>Cost of implementation - bringing product/service to the &quot;market&quot; (before Exploitation)</td>
<td>The rope launcher is ready for the market. It is only missing the proper certifications.</td>
</tr>
<tr>
<td>Time to market</td>
<td>Depending on the certification time</td>
</tr>
<tr>
<td>Foreseen Product/Service Price</td>
<td>Cost of the rope launcher is estimated in 15k€.</td>
</tr>
<tr>
<td>Adequateness of Consortium Staff</td>
<td>Greifenberg has designed, tested and manufactured the product, having all the competences for production and selling of the product</td>
</tr>
<tr>
<td>External Experts/Partners to be involved</td>
<td>ENAMA (Ente Nazionale Meccanizzazione Agricola) has been involved for the approval of the machine</td>
</tr>
<tr>
<td>Status of IPR: Background (type and partner owner)</td>
<td>NA</td>
</tr>
<tr>
<td>Status of IPR: Foreground (type and partner owner)</td>
<td>Greifenberg: design testing and construction of the machine</td>
</tr>
<tr>
<td>Status of IPR: use the results from the Exploitation Form</td>
<td>NA</td>
</tr>
<tr>
<td>Partner/s involved expectations</td>
<td>NA</td>
</tr>
</tbody>
</table>
**Sources of financing foreseen after the end of the project**

<table>
<thead>
<tr>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-funding</td>
</tr>
</tbody>
</table>
### 3.7 Exploitable result No 6

#### 3.7.1 Characterization of the result

<table>
<thead>
<tr>
<th>KER 6: Automatic Choker</th>
<th>Provide below a short description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of the Result</td>
<td>Automatic chokers that allow to unhook the logs without the need of getting close to them, thus enabling the forestry operator to stay in a safe position</td>
</tr>
<tr>
<td>Innovativeness introduced compared to already existing Products/Services</td>
<td>These automatic chokers present the advantage of directly interacting with the PLC of the motorized cable carriage produced by partner Greifenberg. This innovative feature allows to perform the unloading operations without the presence of an operator. When lowering the load, Tecno checks the dynamometer and when the zero value is reached, it directly sends the open command to the chokers.</td>
</tr>
<tr>
<td>Unique Selling Point</td>
<td>Increased productivity and safety. Communication with the cable carriage.</td>
</tr>
<tr>
<td>Product/Service Market Size</td>
<td>All the harvesting companies operating in mountainous areas</td>
</tr>
<tr>
<td>Market Trends/Public Acceptance</td>
<td>Automatic chokers are not new to the market and accepted as a valid solution</td>
</tr>
<tr>
<td>Product/Service Positioning</td>
<td>Forest machines sector. Accessory for motorized cable carriage</td>
</tr>
<tr>
<td>Legal or normative or ethical requirements (need for authorisations, compliance to standards, norms, etc.)</td>
<td>Machinery Directive of the European community</td>
</tr>
<tr>
<td>Competitors/Incumbents</td>
<td>In the field of forest cableways: 5 Austrian, 2 Germans, 2 Slovenian, 1 Swiss, 1 Italian, 1 Polish competitor</td>
</tr>
<tr>
<td>Early Adopters - First Customers</td>
<td>Private companies</td>
</tr>
<tr>
<td>Cost of implementation - bringing product/service to the &quot;market&quot; (before Exploitation)</td>
<td>Chokers are ready for the market</td>
</tr>
<tr>
<td>Time to market</td>
<td>Chockers will be listed under six months in the new price list</td>
</tr>
<tr>
<td>Foreseen Product/Service Price</td>
<td>For chokers connected to the carriage will be about 900 euro</td>
</tr>
<tr>
<td>Adequateness of Consortium Staff</td>
<td>Greifenberg has designed, tested and manufactured the product, having all the competences for production and selling of the product</td>
</tr>
<tr>
<td>External Experts/Partners to be involved</td>
<td>ENAMA (Ente Nazionale Meccanizzazione Agricola) has been involved for the approval of the machine</td>
</tr>
</tbody>
</table>
### Status of IPR: Background (type and partner owner)

<table>
<thead>
<tr>
<th>Status of IPR: Background (type and partner owner)</th>
<th>NA</th>
</tr>
</thead>
</table>

### Status of IPR: Foreground (type and partner owner)

<table>
<thead>
<tr>
<th>Status of IPR: Foreground (type and partner owner)</th>
<th>Greifenberg: design testing and construction of the machine</th>
</tr>
</thead>
</table>

### Status of IPR: use the results from the Exploitation Form

<table>
<thead>
<tr>
<th>Status of IPR: use the results from the Exploitation Form</th>
<th>TBC</th>
</tr>
</thead>
</table>

### Partner/s involved expectations

<table>
<thead>
<tr>
<th>Partner/s involved expectations</th>
<th>NA</th>
</tr>
</thead>
</table>

### Sources of financing foreseen after the end of the project

<table>
<thead>
<tr>
<th>Sources of financing foreseen after the end of the project</th>
<th>Self-funding</th>
</tr>
</thead>
</table>
3.8 Exploitable result No 7

3.8.1 Characterization of the result

<table>
<thead>
<tr>
<th>KER 7 - Wuudis</th>
<th>Provide below a short description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description of the Result</strong></td>
<td>Commercialized Wuudis mobile and web service including e-commerce service for forest owners, contractors, timber and biomass buyers and sellers, and other stakeholders in forestry value network. Currently Wuudis (<a href="http://www.metsapaikka.fi">www.metsapaikka.fi</a>) has around 2500 users (freemium) and 120 khas downloaded forest management plans in Finland (Nov. 2016).</td>
</tr>
<tr>
<td><strong>Innovativeness introduced compared to already existing Products/Services</strong></td>
<td>Wuudis is an independent and neutral mobile &amp; web service including forest management plan in the pocket service, timber and biomass online sales and purchase service, and also a bidding service for forestry care works. Competitor's solutions (forest management plan in the pocket, in Finland) are closed services targeted at own customers/members only.</td>
</tr>
<tr>
<td><strong>Unique Selling Point</strong></td>
<td>Wuudis is a neutral, independent and free service for forest owners (freemium service). Contractors and timber &amp; biomass buyers pay a commission fee per successful deal only.</td>
</tr>
<tr>
<td><strong>Product/Service Market Size</strong></td>
<td>Europe has 36 million private forest owners and 100 k contracting companies and timber &amp; biomass buyers. Private forest ownership is common in numerous US states and Canadian provinces too. Wuudis is an excellent solution for state/regional forest organizations world wide</td>
</tr>
<tr>
<td><strong>Market Trends/Public Acceptance</strong></td>
<td>Digitalization is penetrating into forestry too. Just as Finnish example MetsaGroup is handling 30% of care work orders and 25% of timber deals electronically through its own e-service after 18 months of launching. More and more elderly people (60+ years) buy and use smart phone with multiple apps on it. Most of people are already familiar with web stores, e-banking etc. electronic services.</td>
</tr>
<tr>
<td><strong>Product/Service Positioning</strong></td>
<td>Wuudis is a holistic service with open interfaces otherwise competitors' solutions targeted at forest owners only. Next year Wuudis will cover also ERP functionalities (for contractors) in the same service platform</td>
</tr>
<tr>
<td><strong>Legal or normative or ethical requirements (need for authorisations, compliance to standards, norms, etc.)</strong></td>
<td>By now Wuudis contains standardized forest information in Finland and the UK. In practice every country, even regions, have own procedures regarding forest inventory data. On the other hand in near future Copernicus satellite based forest inventory data can be integrated as background forest inventory data in Wuudis. In addition, the service allows creation of forest management plan by user freely thanks to drawing tools and free information fields.</td>
</tr>
<tr>
<td>Competitors/Incumbents</td>
<td>All Finnish paper and pulp companies (MetsäGroup, Stora-Enso, UPM Kymmene) have own apps and web services for their committed customers like forest management associations (Metsäselain). Also Bitcomp Oy is providing own app, Kantoon. In France, Mavoret is developing quite a similar service as Wuudis (competitor or partner)</td>
</tr>
<tr>
<td>Early Adopters - First Customers</td>
<td>Technically/Digitally oriented forest owners who themselves are active in management and care work operations. Typically owning bigger forestries than average forest owners. In parallel forest investment foundations/companies to make business more transparent through information sharing via Wuudis.</td>
</tr>
<tr>
<td>Cost of implementation - bringing product/service to the “market” (before Exploitation)</td>
<td>Local forest standard and language translation and implementation required. Will take 2-3 man months altogether (10-15 k€).</td>
</tr>
<tr>
<td>Time to market</td>
<td>Ready to go to pilots world wide</td>
</tr>
<tr>
<td>Forseen Product/Service Price</td>
<td>10% commission from care work deals, 3-5% commission from timber and biomass purchase deals (depending on additional services like CO2 tracking or certification/chain of custody). In addition add value services for forest owners 50 € per year and for contracting companies 100 € per year</td>
</tr>
<tr>
<td>Adequateness of Consortium Staff</td>
<td>Communication expertise at making noise through social media tools and e-marketing still missing. Other staff in place.</td>
</tr>
<tr>
<td>External Experts/Partners to be involved</td>
<td>We are on search of strong partners like farmers/forest owners’ union and cooperative banks for powerful marketing</td>
</tr>
<tr>
<td>Status of IPR: Background (type and partner owner)</td>
<td>Wuudis is a spin-off company of MHG Systems developing more supporting novel services like remote sensing tools, Carbon footprint monitoring. Wuudis has all IPR rights</td>
</tr>
<tr>
<td>Status of IPR: Foreground (type and partner owner)</td>
<td>Wuudis has all IPR rights for apps etc. related with Wuudis service.</td>
</tr>
<tr>
<td>Status of IPR: use the results from the Exploitation Form</td>
<td>Regarding Slope FIS exploitation we are a bit skeptic, because Slope solution is a prototype only. Some modules like Wuudis as a separate service is ready for markets after localization actions.</td>
</tr>
<tr>
<td>Partner/s involved expectations</td>
<td>Committed to market and sell Wuudis via reliable partner network to other European countries (France, UK, Sweden, Norway), Partner network under search and development in above mentioned countries. Also Horizon2020 SME instrument application (phase 1) submitted in November for market expansion in France and the UK.</td>
</tr>
<tr>
<td>Sources of financing foreseen after the end of the project</td>
<td>Wuudis is about to close 1st round funding (200 k€+200 k€) for internalization and finalizing e-commerce service. In addition MHG has secured Horizon2020 funding for remote sensing services development on top of Wuudis, and as a new business field.</td>
</tr>
</tbody>
</table>
4 Recommendations

<table>
<thead>
<tr>
<th>Issues</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>The 7 KERs are representing the combination of linear vs linear and platform based joint-products/services</td>
<td>The main challenge is how the vertical and horizontal products and service can work individually and also together in certain common services. If we are talking about SLOPE as an open innovation platform, it can offer an open access for any engineering companies, products and services and in e-Commerce transactions in forest and timber industry.</td>
</tr>
<tr>
<td>The individual or joint exploitation plans can better positioning the products/services by joint-ownerships</td>
<td>It is recommended to build joint-exploitation plans by the evaluated 7 KERs, but also keep the individual exploitation plans in some KERs. Per MoM: No.1 (tracking system), No.4 (3D harvesting planning tool) and N3 are representing joint-ownerships -No.2, No.5, No.6 and No.7 are individual.</td>
</tr>
<tr>
<td>The pplt schema (value chain + KERs) well represent the balance of the horizontal and vertical products and services (linear vs platform approach) in the whole value chain</td>
<td>With this approach it is proposed to talk continuously about the shared economy platform model even this is a &quot;conservative industry&quot; and maybe too big step for SLOPE. Forests could increasingly act as a backbone of sustainable economies. The main actors and not only companies can recognise an advance from their own bottom line, and help ensure that forests thrive.</td>
</tr>
<tr>
<td>The analysis of the LEAN Business Model Canvas is a good way not only to analyse the 9 units but better understand the synergy between the new product and its related market</td>
<td>Look at beyond LEAN business model canvas. Why ? Because the commercialisation phases/process starting with the good knowledge of the customers and market. Forest companies of the future will expand their business model beyond delivering products to providing an array of crucial services to communities. Timber revenue will still be important, but successful companies will have supplemented their income from the fast-growing new markets that emerge from the increasing scarcity of ecosystem services.</td>
</tr>
<tr>
<td>Branding SLOPE as an integrated product on several level of integration.</td>
<td>WUUDIS represent a great challenge for whole project in terms of global selling platform. But also as a platform for the potential integration space of whole value chain if SLOPE with this approach SLOPE should offer a unique shared economy model. This system will allow the integration of other SLOPE product. Regarding FSC, it is required further technology, during or after the project lifecycle? Further discussion is needed among the project partners and the main stakeholders of SLOPE.</td>
</tr>
<tr>
<td>Definitions: “Revenue model” dilemma in the engineering firm</td>
<td>Revenue model means all channels from where your income is expected. In case of the knowledge intensive service activities, like in engineering companies, the Services in the upstream (e.g. service and maintenance) are typically closely connected to the manufacturing firm, and hence, more or less part of the production process. On the contrary, the downstream services (e.g. logistics and sales) are far less connected to the manufacturing firm, and the production process. But an engineering firm must work with business development manager to understand the customer needs and the market trends and market demand. Please read the 5 generations of the Innovation models: <a href="https://www.oecd.org/sti/inno/34624034.pdf">https://www.oecd.org/sti/inno/34624034.pdf</a></td>
</tr>
</tbody>
</table>
5 Internet Links

Key words “forest management information system”


The forests in Haryana are classified as Reserve Forests, Protected Forests, Unclassed Forests, Areas closed U/S 38 of Indian Forest Act, 1927 and Areas closed U/S 4 & 5 of Punjab Land Preservation Act, 1900. Blocks of Reserve Forest areas are mainly confined to the Shivalik ranges in Panchkula and Yamunanagar districts... Great emphasis has been given to Agro-forestry and Farm-forestry.

1. Haryana Forest Management and Information System
   (i) Master Database Management System
   (ii) Forest Offence Management System
   (iii) Nursery Stock Management System [...]  

Key words “sustainable forest engineering practices”

Sustainable forest engineering practices http://www.loggingon.net/guidelines-for-forest-engineering-practices_news_op_view_id_995

Forest Engineering South Africa (FESA) has recently published their updated “Guidelines for Forest Engineering Practices in South Africa”. The guide has been developed as a management tool to provide generic guidelines for forest engineering activities (harvesting, transport and roads) in order to promote sustainable forest engineering practices. These guidelines have their origins in the South African Harvesting Code of Practice, developed in 1992. This was then updated in 1999 and renamed the Guidelines for Forest Engineering Practices in South Africa. This 2014 update is the third edition. These guidelines were developed to be used in conjunction with FESA’s other more technical logging manuals. [...]  

Key words “forest management information system”


The Forest Management Information System (FMIS) is envisaged as an integrated system which will be used to support the planning, implementation and monitoring of multi-objective forest management activities. The FMIS can be used for strategic, tactical and operational planning and implementation, and operational control in and across administrative units and levels of the organizational hierarchy. Besides the databases and models required to support decision-making in the many programs of the Department, the FMIS also has the ability to maintain current forest inventories and generate maps of spatially-oriented data (e.g. attributes of entities depicted on a map, such as population of a village, whose location can be fixed on a map). The components of the FMIS, which will necessarily be linked, are a Monitoring Information System (MIS), a Geographic Information System (GIS), and an Image Processing System. [...]

Co-founded by the European Commission
6 Related projects

Most of the SLOPE project partners have long year experiences in the participation in the European and international projects. They created a list of the related projects.¹

- **Trees4Future** (FP7 INFRA-2011-1.1.13) is an Integrative European Research Infrastructure project that aims to integrate, develop and improve major forest genetics and forestry research infrastructures, providing the wider European forestry research community with easy and comprehensive access to currently scattered sources of information (including genetic databanks, forest modelling tools and wood technology labs) and expertise. Involved partners: CNR, BOKU

- **BISYPLAN** - The Bioenergy System Planners Handbook - part of the INTERREG IVC Regional Initiative “BIO-EN-AREA”. The BIO-EN-AREA project aims at exchanging and transferring experiences among partners in order to increase their capacities to favour and optimize the use of bioenergy. The Bioenergy System Planners Handbook is addressed to those responsible for planning and decision making about regional and/or local energy infrastructure. The handbook is available on-line (http://bisyplan.bioenarea.eu) in English, Italian, Estonian and Greek. It aims to increase the quality of biomass system commissioning and procurement. Involved partner: CNR

- **SATMODO** - The SATMODO project is aimed at the round-wood timber harvesting market, by facilitating “live” monitoring of harvest processes. To date, the availability of real-time or near real-time harvest process data has been limited, as the facility to send the data from remote harvest vehicles has been hampered by the lack of reliable data transmission technologies. The SATMODO project specifically addresses this issue by utilizing both satellite and terrestrial wireless transmission technology as a means of providing data transmission pathways for the live harvest data. Involved Partner: TREEMETRICS

- **FLEXWOOD** (FP7 – Cooperation, 2009-2012). Within the EU-project “FlexWood” a modern, logistic system was developed, which integrates advanced quality and quantity information on wood resources, measured in the forest with novel technologies. It offers optimisation models for tactical and operational planning (bucking, harvesting, allocation of wood). It therefore models and enhances processes for novel and more flexible concepts for mill production and helps to improve the information transfer between all stages of the wood supply chain to create new knowledge for decision-making. Involved partner: BOKU, TREEMETRICS.

- **ARANGE** (FP7 – Cooperation, 2012-2015). The project seeks to develop and evaluate strategies for the multifunctional management of mountain ranges throughout Europe covering a wide range of forest types, socio-economic conditions and cultural contexts. The project addresses on timber production, protection against gravitational natural hazards, the role of forests in climate change mitigation via carbon sequestration as well as bioenergy production, and nature conservation and the maintenance of biodiversity. Involved partners: BOKU (Coordinator)

- **INFRES** (FP7 – Cooperation, 2012-2015). The project aims to accelerate the technological development and open new paths to EU’s renewable targets by producing research-based knowledge, technological solutions and service innovations for forest residue feedstock supply. Involved partners: CNR, BOKU.

¹ DoW Page 86-87.
- **LogistEC** - sustainable biomass supply chains in terms of environmental, economic and social impacts – (FP7) focuses on improvement of all biomass value chain components and assesses the sustainability in terms of environmental, economic and social impacts. Innovative techniques for crop management, biomass harvesting, storage and transport provide a possibility to increase biomass supply whilst keeping costs down and minimizing adverse environmental impacts. Involved partner: MHG
- **Developing and Piloting a Platform and Database for Biomass and Bioenergy Resource Assessment** (EEP Indonesia). A distributed monitoring and planning platform for biomass feedstock and land use will be developed for a pilot area. It will use remote sensing information for base information production, and involve local stakeholders in the process both as producers of ground truth data, enabling better predictions of feedstock resources, and as users of the resulting wall-to-wall resource information using the web-based resource planning solution. Involved partner: MHG
- **BRiseDE** (ICT-PSP, 2010-2012). This project has developed a complex service based infrastructure for geographical information accessible through a multiplatform 3D client in a fully interoperable way. Involved Partner: GRAPHITECH (Coordination).
- **I-SCOPE** (ICT-PSP, 2012-2015). This project is beginning the development of smart city services based on 3D urban models to support mobility of physically and visually impaired users, to assess solar energy potential and to map urban noise. Involved Partner: GRAPHITECH (Coordinator).
- **FR_EVUE** - Validating FRight Electric Vehicles in Urban Europe (FP7-Transport). ITENE is in charge of the Spanish pilot regarding the use of ICT solutions and electric vehicles for freight transport. ITENE will monitor the environmental impact of the vehicles in Spain by means of CANBUS technology. CANBUS results of FREVUE will be used as a base for monitoring the impact of the vehicles in the SLOPE project.
- **CO3**: Collaboration Concept for Comodality (FP7 Transport). CO3 is a business strategy enabling companies throughout the supply chain to set up and maintain initiatives to manage and optimise their logistics and transport operations by increasing load factors, reducing empty movements and stimulate comodality, through Horizontal Collaboration between industry partners, thereby reducing transport externalities such as greenhouse gas emissions and costs. ITENE participates in this project. Results from CO3 may be used in SLOPE to optimise logistic business models applied to the forestry sector.
- **WINN**: European Platform Driving KNOWledge to INNovations in Freight Logistics. CNC Logistics acts as coordinator; ITENE takes part of CNC group. The SLOPE consortium can obtain direct information via ITENE about logistics from the platform developed in WINN project.
- **SUNSHINE** - Smart Urban Services for Higher Energy Efficiency (ICT-PSP Programme). The goal of the project is to deliver an open toolkit supporting interoperable standards, for the following smart energy services: 1) energy assessment of buildings ("ecomaps") and their energy pre-certification; 2) Heating/cooling forecast and alerts, based on optimised model of buildings and local forecasts; 3) Optimisation of power consumption through interoperable open middleware for Advanced Metering Infrastructure (AMI) for Automatic Meter Reading (AMR) based on open standards. Involved Partner: GRAPHITECH (Coordinator), TN-NET, EPS
7 Related patents

Listed patents have been found on https://app.octimine.com/search and www.espacenet.com

1. Publication number: WO2014112154A1

Title and Abstract:
Farm work machine, farm work management method, farm work management program, and recording medium recording farm work management program

A farm work machine (1) capable of operating in a variety of work modes and comprising: a communications unit (5) that reads farm work information from a management centre database in which farm work information for each farm work sector is stored; a work mode setting unit (46) which sets work modes; a work mode comparison unit (53) that compares set work modes set by the work mode setting unit and registered work modes included in the farm work information read from the database; and a display data generation unit (55) that generates display data for displaying, on a display, the read farm work information and the comparison results from the mode comparison unit.

IPC Class:
A01D41/12, G06Q50/02

Inventors:
IKEDA HIROSHI, TAKAHARA KAZUHIRO

Also published as:

2. Publication number: WO2015062209A1

Title and Abstract:
Visualized optimization processing method and device for random forest classification model

Disclosed is a visualized optimization processing method for a random forest classification model. The method comprises: for a random forest classification model which has been constructed, estimating the degree of correlation between various decision trees of the random forest classification model via out-of-bag data; constructing a correlation matrix using the degree of correlation between various decision trees of the random forest classification model; according to the correlation matrix, by means of the dimension reduction technology, acquiring a visual pattern of the random forest classification model in a space with dimensions fewer than three; and according to the visualized pattern of the random forest classification model, conducting optimization processing on the random forest classification model, so that the upper limit of a second generalization error of the processed random forest classification model does not go beyond the upper limit of a first generalization error of the random forest classification model prior to processing. By means of the above-mentioned method, the present invention can reduce the number of decision trees in the random forest classification model and reduce the memory space required by the
random forest classification model, and can also improve the prediction speed and accuracy at the same time.

IPC Class:
G06F17/30

Inventors:
HE CAIFENG, LI JUNJIE, GUO XIANGLIN,

Also published as:
CN104572786A


3. Some other patents:

WO2014142317A1
Forest type analysis device, forest type analysis method and program
G06T PASCOCORP 15/03/2013 18/09/2014 Top 25% Bottom 75% 359

US6H620H
Conifer growth stimulation and forest management
C03C COSC 12/11/1987 04/04/1989 Bottom 75% Bottom 75% 355

US6424967B1
Method and apparatus for querying a cube forest data structure
8 Related standards

SLOPE intensively used the standardization in order to exploit the impacts of the project result by the Open Data and Open Source based approach in two ways:

At first, SLOPE ensured that the research results produced by the project were aligned with existing and emerging standards from the relevant communities, for example: ISO, CEN, OGC – Open Geospatial Consortium (of which GRAPHITECH is member), and for Forest Information Standardization (Tapio) and Timber Logistics Standardization (papiNET FWS/StanForD 2010 of which MHG is a member).

Another important Standard for Forest Harvesting machines for control, reporting, monitoring of logging production was the StanForD standard2 which is adhered to by the majority of the machine manufacturers.

The main CEN technical committees monitored by the SLOPE consortium during WP8 were:

- CEN/TC 144 Tractors and machinery for agriculture and forestry (AFNOR)
- CEN/TC 142 Woodworking machines – Safety
- CEN/TC 147 Cranes – Safety
- CEN/TC 175 Round and sawn timber
- CEN/TC 225 AIDC technologies
- CEN/TC 278 Road transport and traffic telematics
- CEN/TC 287 Geographic Information
- CEN/TC 400 Project Committee – Horizontal standards in the fields of sludge, biowaste and soil (DIN)

Second, SLOPE provided feedback to the standardisation process by experiences, lessons learned, and research results also through the establishment of new pre-standardisation groups and contributing to on-going standardisation efforts. GRAPHITECH maintained working relations with standardisation organisations of geographic information, namely with the OGC. Extension to location-related standards were presented to OGC Technical Committee meetings and then proposed as extension/change of existing standards, as OGC best practice and as candidate OGC standards.

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2 http://www.skogforsk.se/en/About-skogforsk/Collaboration-groups/StanForD/StanForD-2010/
9 Other relevant information

Minutes of Meeting of the virtual seminar on 19th of December.2016

SLOPE Exploitation Booster Service

Introduction
- Daniele Magliocchetti: Introduction of the project and participants
- There are two types of business models (Linear vs. platform approach)
- Tunde Kallai: It is important to define the contents and characterization of background and foreground Intellectual Property Rights (IPR). Also, define the market, competitors, value chain, etc. This will provide a good overview of the problem we can find in the market.

KER review

KER 1. Timber Traceability System (CNR)
- Definition: Timber tracking using RFID tags
- TRL 7-8. This is not in pre-commercial phase.
- Market position: Further research is required. The main aim is to know the extra value of this solution in comparison with other solutions.

KER 2. Forest Mapping with UAV (Coastway)
- Definition: Detailed digital model of forest
- Innovation: The use of LiDAR in UAV is a new technology that Coastway aims to use to model the forest areas.
- TRL 6: Some extra development is required.
- Market position: In general UAV is more used in agriculture but there is a big opportunity to be exploited in forestry. Currently there is not EU competitors regarding
- Tunde Kallai: Can you provide services to governments?
- Enda: Yes, currently we are studying with Irish government for monitoring of forest plantations.
- Tunde Kallai: have you knowledge on Machine to Machine data management? which can be really a high added value as IoT service of your KER.
- Daniele and Enda: Automation of the solution is not available. Data need to be processed using SW from the UAV manufactory.
KER 3. Intelligent Machine (Compolab)

- Novel harvesting machine from a pre-existing prototype.
- New components were added to measure, analyze and communicate data.
- Innovation: Unique sensors for quality grading.
- **First prototype (TRL 5-6)**. It is required significant work to make this machine more reliable. It depends on the sensor, some are more developed than others.
- Difficult to answer to market position due to the innovation and non-forestry background of Compolab.
- Further support for market position is required by Compolab.
- Gianni Picchi: some timber exploitation operations are only focused on volume of timber. In this case this system is not competitive, but in cases where the timber quality is important (e.g. in mountains) this system is far superior to the current systems.
- Different sensor can be combined together of single option. This add more flexibility
- The tagging system is the most developed add-on in comparison with other sensors.
- The potential for this solution is very high.
- Tunde Kallai: How do you see this market in the coming years?
- Gianni Picchi: increasing. Currently the requirement for sensors has a big potential to assess the timber in the forest instead of the mills.
- Tunde Kallai: the linear approach will be old fashion also in your domain right? This is not only about the canvas. The future approach is in the company production and selling is more the combination of both. Linear and to sell on a marketplace with smart services.
- A linear modality will be handy to penetrate in the market. A combined solution with other data from the consortium will add more value to the solution. But the stand-alone service can also work.

KER 4. 3D harvesting planning tool (GraphiTech)

- **Definition**: Online platform to understand the data of a specific forest stand, specifically the amount of timber and quality of the timber. Can be used to assess the stand, monitoring and planning. This solution is more focused on the planning for this first stage.
- Gather data and how to use this data to plan the activities related to forest harvesting.
- Involvement of other partners: Coastway and Treemetrics (data providers) and MHG (forest data model). In addition, Itene (iTuck system) may also be included but this is more related to the first KER.
- It is very dependant of the data.
- **Innovation**: this is a unique solution in the market. The features offered are unique.
- TRL 6
- It requires at least 6 months to be ready for the market.
- Partnership with Coastway and Treemetrics or other providers is required.
- Tunde Kallai: this result can be a stand-alone product or a part of some other monitoring tools or services??
- Daniele Magliocchetti: It can work as stand-alone product or integrated with other products.

- **Position in the market**: Market size and position are not defined in this moment
- Tunde Kallai: A strong business model and plan is needed to build up, in case of stand-alone product.
- Daniele: This is right, a strong business model is required and also a strong partnership with providers is important.
- Tunde Kallai: mainly to ensure the sustainability and the growth on the global market.
KER 5. Automatic chokers (GREIFENBERG)

- **Definition**: Automatic chokers that allow to unhook the logs without the need of getting close to them, thus enabling the forestry operator to stay in a safe position.
- **Innovation**: Increased automation and integration with the carriage system.
- **TRL**: 8-9.
- **Position in the market**: In Europe forests are smaller and the devices are lighter. European competitors are more similar to this solution. However, the current chokers are not integrated and the need to have a specific remote control. Nobody in the market has developed a complete automatic choker. In a small survey with customers, they had a very positive reaction regarding the idea of automatic chokers. There is a competitive advantage regarding to be the first in the market and for this reason the commercialization needs to be fast.

KER 6. Robe launcher (GREIFENBERG)

- **Definition**: A system made to launch a synthetic rope from the beginning to the end of a cable line in order to facilitate the layout of its main cable. Currently this operation is done manually.
- **Innovation**: This solution use a compressed air to launch a synthetic cable in the forest, and the operators only need to collect the cable in the end-point, reducing significantly the work required with current metal cables.
- **TRL**: 9. But there are problems with the homologation. GREIFENBERG is working to homologate this tool as working machine. This type of machine is not currently included in any EU normative.
- **Tunde Kallai**: Who is in charge of the Certification?
- **The company developing the machine. All machines need to be CEE certified. This requirement meet the EU law, but this type of machine is not defined in the EU normative. The certification process requires several documentations related to technical and health and safety aspects.**
- **Position in the market**: This machine is unique in the market with a big advantage. This machine could capture most of the market related to the cable crane harvesting.

KER 7. Wuudis (MHG)

- **Definition**: Commercialized Wuudis mobile and web service including e-commerce service for forest owners, contractors, timber and biomass buyers and sellers, and other stakeholders in forestry value network.
- **Innovation**: It is a unique service regarding a “holistic” system including not only management but also sales and other aspects. Currently Wuudis has around 2500 users. This is standard in Finland and other countries. The idea is to implement this country by country based on inventory data in XML format. Currently looking for funding in France and other countries in EU.

- **Tunde Kallai**: WUUDIS represent a great challenge for whole project in terms of global selling platform. But also as a platform for the potential integration space of whole value chain if SLOPE with this approach SLOPE should offer a unique shared economy model.
- **Seppo**: This system will allow the integration of other SLOPE product. Regarding FSC, it is required further technology.
Summary of KER review

Tunde Kallai: SLOPE has three scenarios:
1. to arrive and demonstrate the individual exploitation plans.
2. to show the combination of both directions: linear and platform based in theory.
3. to provide a demo of the shared economy based platform which might be the first in the world.

Seppo & Daniele: Point 1 and 2 will be addressed within the project. The 3rd point needs further study. The combination of the platform is a combination of linear and vertical services. The perfect business model of SLOPE is the integration of vertical and horizontal KERs.

Tunde Kallai: my question is; do you agree with our schema KERs? ALL: yes

Tunde Kallai: We are the players of the same value chain, because we are working for the same market. So, we need to identify our market. There are 10 basic questions:

1. Who would pay for my product or service?
2. Who has already bought from me?
3. Am I overestimating my reach?

Tunde Kallai: Reach some current customers to have a more realistic approach (interviews and surveys). This will provide an easy view of market demand.

4. What does my social network think about?

Tunde Kallai: You are working in your extended network. Therefore, you can reach stakeholders and have more realistic approach.

5. Am I making assumptions only based on my personal knowledge and experience?

Tunde Kallai: You can define very well your primary market and target users based on this.

6. What’s my revenue model?
7. How will I sell my product or service?

Tunde Kallai: Do you have a strategy that can determine your target market? Look at the branding aspect (E.g. SLOPE) or each one will use your own branding.
8. How did my competitors get started?

9. How will I market my customers?

Tunde Kallai: Market research, demographic and geographic. How to locate your customer service.

10. Is there room to expand my target market?

- Tunde Kallai: High potential to expand to a global market for the beginning. Do not wait until the 2nd - 3rd year but start to the beginning.

- Tunde Kallai: do you plan to build a common exploitation plan of SLOPE or only keep the individual exploitation plans?

Some things are individual, so there is not a real need to sell them under SLOPE brand (i.e. hardware). Other services required several partners involved (i.e. 3D model), in this case a common brand can be create. In addition, the TRL is different for each product. Therefore, it will be a combination of both approaches.

- Tunde Kallai: SLOPE as a BRAND and platform of whole value chain and also to add the individual exploitation plans.

- Tunde Kallai: where you can use the KERs LEAN canvas and plus the Platform based Canvas too, where SEPO can work a bit more. KERs owners preparing their own individual exploitation plans and SLOPE as an umbrella of each KERs will create his own platform. Lead by SEPO.

KERs are products based on joint-effort.

- Daniele Magliocchetti: Not all the KERs are joint-effort

- Tunde Kallai: ok..if not joint..the individual exploitation plan can be prepared by its individual owner.

- Tunde Kallai: how many KERs are based on joint-ownership?

- Daniele Magliocchetti:

  - No.1 (tracking system) and No.4 (3D harvesting planning tool) are joint-ownership.

  - No.2, No.5, No.6 and No.7 are individual.

- Stefano Marrazza: KER3 is a mix of the machine developed by Compolab, but CNR is providing some the sensor technical knowledge. This could be included under the SLOPE brand. Therefore, this KER is joint-ownership between Compolab and CNR.

- Tunde Kallai: We have one platform holistic approach. For your individual and joint KERs you should use the following materials:

1. Characterisation of KERs

2. LEAN Canvas

3. IPR table, what we try to fill it now.
- Filling of the IPR table form

Break

Review of the CANVAS manual
- Modified canvas based on Osterwalder for R&D projects. It is based on 4 questions:
  - Who is my customer?
  - What is “She/he” problem?
  - How does “She/he” solve the problem now?
  - Is our solution more efficient than the current one?
- Review of canvas:
  - This canvas is divided in two blocks “Product” and “market”.

PROBLEM
- This is starting with the customer problem
  - Tunde Kallai: Did you start with a brainstorm with you users?
  - Gianni Picchi: explained that they interview the Trento forest authorities and this is how the project started.
  - Tunde Kallai: open innovation = from ideation till the market with the early stage involvement of your users / target groups.
  - Tunde Kallai: 90% of the startuppers are failed because they don’t know well their users /future customers. 4 Key questions to start:
    - Who is “he”
    - What is “his” problem
    - How does he solve the problem now
    - Is our product more efficient in solving this issue?

CUSTOMER SEGMENT
- Tunde Kallai: Early adopters - Who Are Your First Clients?
  - Diego and Enda pointed out that their customer will be the ones that the already are buying their products. Enda explained that the new customers regarding UAV survey would be more focused on forestry instead of agriculture.
UNIQUE VALUE PROPOSITION

- Value proposition in one line in the middle of the canvas. If you should define your Unique Value Proposition (from problems and customers), you should analyze Solution and Key Metrics from Product side and Unfair advantage and Channels...from the Market side.
- Loredana Pancheri: GREHENBERG is using during the year a business plan.
- Tunde Kallai: How do you get feedback to your business plan?
- Loredana: From the commercial people and customer questionnaire and informal contact with clients. Usually we fill in a marketing mix plan based on Products and Services which aim to meet needs
- Tunde Kallai: Do you plan include some sections about Marketing and branding strategy?
- Daniele: we may do if we decide to go with the SLOPE projects. We do not have a lot experience, but we can write some information.
- Tunde Kallai: I would like to know we have 6 Lean Canvas and 1 platform based filled up already?!
- Daniele: There are only 5. The one missing and missing parts will be delivered within the next days.

SOLUTION

- What is revenue model?
- Tunde Kallai: Revenue model means which type of the Business models are you using. Like Premium(Freemium/+). Pricing strategy: all channels from where your income is expected,
- Stefano Marrazza: We are not clear in the value chain, because we are an engineering company that develops products based on direct request by the customer but do not usually participate in the sales process of these products.
- Tunde Kallai: Do you have a business development manager in your company?
- Stefano Marrazza: Not for the moment
- Tunde Kallai: we have to fill it up together, because the present status of your canvas is not sufficient
- Tunde Kallai: there is a new EU program to hire Business development Manager for free, for young engineering companies. like Erasmus’plus for SMEs payed by the EU. (MobiliseSME: A new Erasmus-like exchange scheme for the staff of SMEs, Link: http://mobilisesme.eu/index.php/en/home/)

CHANNELS

- Tunde Kallai: Path to customers = Channels, via local sellers, via business network of your big customers, via B2B meetings,
- Tunde Kallai: how you get your customers = via social network? like XING, LinkedIn, Twitter ?, local selling points, early adopters; forest owners, etc.
- Diego Graffenberg: we could try to sell it as an accessory/optional to heads to head manufacturers or directly to users, if it is feasible to sell it
- Tunde Kallai: Key Metrics: key activities you will measure to track the success (e.g. units sold, users registered, retaining users, paying customers, number of complaints ...), but in any case you must have a business model. That can be a combination of service and engineering, if you
offer engineering skills. You should have a pricing strategy. You cannot survive the market for longer period if you don’t have a combined service strategy, with a clear business model.

PLATFORM CANVAS

- Tunde Kallai: this is a different approach to be concentrated in the different actors involved. Seppo, you very clearly identify the 4 key actors

- Seppo: explanation of Contractors and timber buyer for operational actions. Beside the contractors are the partners. The main actors are: Owners, Partners, Customers and Developers

- Tunde Kallai: You are the owners of the products. The consortium because you are working under joint-ownership. Concerning the IPR this is important,

- The ownership of the solution is more vertical in the case of MHG.

- Tunde Kallai: The main challenge is how the vertical and horizontal products and service can work individually and also together in certain common services. If we are talking about SLOPE as an open innovation platform, it can offer an open access for any engineering companies, products and services and in e-Commerce transactions in forest and timber industry

- Tunde Kallai: The platform does not need to be focused on sales, but can be related to the development of other prototypes including owners, partners and customers.

- Seppo Huurinainen: this may not work for forestry due that forest industry is conservative and they may do not want to share information in an open platform.

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- Tunde Kallai: Keep all the other KERs as linear

- Daniele Magliocchetti: there is another platform approach for the 3D modelling and planning service (KER4)

- Tunde Kallai: Keep all KER linear. The platform is an option, but too early and too big step for all of you. Keep KER 1-6 linear and KER 7 platform

- Jose Angel: What about Exploitation Plan: structure and content?

- Tunde Kallai: We had a discussion about the joint, individual approach in Exploitation plan. I need one - one template of each participants and also a List of Participants

Actions:
- CNR 1. Complete the missing Lean Canvas.
- ALL 2. To fill it up all LEAN Canvas
- ALL 3. Provide feedback forms
- ALL 4. List of Participants
- Tunde Kallai: 5. Send Exploitation Report to make comments
- Tunde Kallai: 6. Send Synthesis Report to make comments