ROSE WOOD 4.0 Sustainable Wood for Europe

Best practices and digital innovations for sustainable wood mobilisation

Full collection of 100 factsheets

rosewood-network.eu

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Author: Uwe Kies, InnovaWood

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Abstract

ROSEWOOD4.0 harnesses digital solutions and knowledge transfer along the forest value chain to reinforce the sustainability of forest resilience and wood mobilisation in Europe. This report documents a selection of 100 Factsheets of *Best practices and Innovations* (BP&I) in forest management, wood supply and forest-based industries exploiting relevant digital technologies and industry 4.0 solutions. It comprises the first batch of 50 initially selected BP&I (deliverable D1.3) plus the second batch of 50 additionally selected BP&I, presenting an overview of the full selection of 100 BP&I. All BP&I were jointly identified and validated by the project partners.

The consortium represents a living community of 21 organisations from 17 countries, organised in five European Regional Hubs which reach out to an even larger group of local stakeholders. The different categories and types of solutions that have been jointly identified by the Hubs are described and their relevance for wood mobilisation in Europe is pointed out.

The BP&I factsheets are published in a *Knowledge Platform for Regional Forest Innovation*, which is an open, multilingual repository created by the consortium to enable the widest possible dissemination of results. The complete BP&I selection with links to all online factsheets are included in the report. Spreading this knowledge in Europe will help practitioners and professionals to gain a better understanding of how the digital transformation in forestry can improve sustainable forest management and ecosystem resilience and thus benefit a more competitive forest-based sector in rural regions.

The platform is accessible at: forestinnovationhubs.rosewood-network.eu

Acknowledgment

The ROSEWOOD4.0 project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 862681. The knowledge platform was developed by Steinbeis Innovation gGmbH (Germany), InnovaWood (Belgium), CESEFOR Foundation (Spain) and the European Forest Institute (Finland), with contributions from 17 consortium partners: the National Forest Centre (Slovakia); CluBE Cluster of Bioeconomy and Environment of Western Macedonia (Greece); FORZA Agency for Sustainable Development of the Carpathian Region (Ukraine); Tretorget Ltd (Norway); Łukasiewicz Research Network - Wood Technology Institute (Poland); CEKOM Competence Centre Ltd. for Research and Development (Croatia); Bern University of Applied Sciences (Switzerland); AIEL Italian Agroforestry Energy Association (Italy); Lapland University of Applied Sciences (Finland); Paper Province (Sweden); Slovenian Forestry institute (Slovenia); State Enterprise for Forestry and Timber North Rhine-Westphalia (Germany); Forest Research Centre, School of Agriculture, University of Lisbon (Portugal); LUKE Natural Resources Institute Finland (Finland); HCS Wood Cluster Styria ltd (Austria); CNPF Centre National de la Propriété Forestière (France) and PRO WOOD Regional Wood Cluster (Romania).

Contact

Uwe Kies, WP1 leader
InnovaWood asbl
uwe.kies@innovawood.eu
linkedin.com/in/uwekies

Anthony Salingre, project coordinator
Steinbeis Innovation gGmbH
anthony.salingre@steinbeis-europa.de
steinbeis-europa.de

Eduard Mauri, WP4 leader
European Forest Institute
eduard.mauri@efi.int
efi.int

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1.1 Purpose and joint approach

1.1.1 A Knowledge Platform for Regional Forest Innovation

The digital transformation is also leading to disruptive changes in land management and rural areas. Forest ownership, forest management and forest-based industries which rely on wood as main resource will encounter tremendous changes in their business practices and production processes in an increasingly more connected world. Furthermore, digital technologies enable to reach a deeper understanding of ecosystem processes, climate change and related risks and have the potential to overcome barriers and bottlenecks of fragmented supply chains and small enterprises that are typical for the forest-based sector. There is a common need to gain a better understanding of the new trends and potentials of the digital transformation for all concerned actors and stakeholders in the sector.

The ROSEWOOD4.0 project has therefore developed the *Knowledge Platform for Regional Forest Innovation*, a new open portal with a large collection of best practices and digital innovations in the European forestry sector. This initiative aims to harness digital solutions and boosts knowledge transfer connecting multiple actors along the forest value chain to reinforce the sustainability of forest resilience and wood mobilisation in Europe.

- The platform is a 'one-stop shop' that simplifies sharing knowledge about sustainable, efficient, and data-driven management of Europe's forests. It is free to use for any forestry practitioner or other interested user, from the public and private actors to policymakers and researchers, to any individual interested in forestry.
- It contains a collection of over *100 Factsheets* highlighting outstanding Best practices and innovations (BP&I) in forestry from more than 15 European countries. The factsheets contain short abstracts, visuals, videos, additional materials, website links, and the contact details of the organisations who developed these solutions.
- With a user-friendly interface and a multi-lingual search option, the open access repository helps direct sharing and transfer of these practices and innovations to practitioners in forestry and wood industries all over Europe.

The open knowledge platform is online at:
forestinnovationhubs.rosewood-network.eu

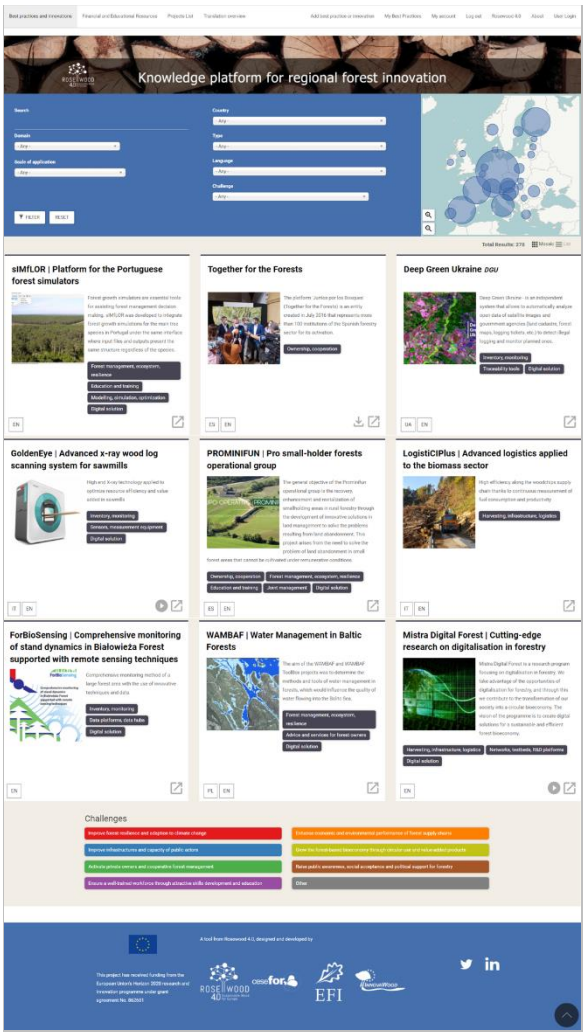
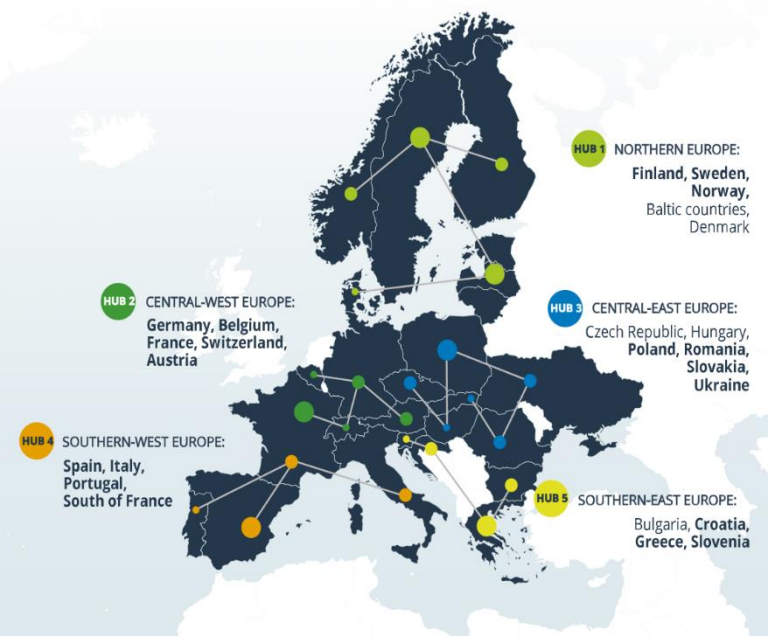


Figure 1 Preview of the R4.0 Knowledge platform

1.1.2 A European-wide collaborative collection of knowledge and solutions

The *Knowledge Platform for Regional Forest Innovation* has been developed by the ROSEWOOD4.0 consortium funded under Horizon 2020. The platform connects and facilitates exchange between the different regions for wider replication and uptake of practices across Europe: a best practice in forest management from one country can be useful and applicable in another country, and vice versa.



To facilitate this exchange, the consortium has established a network of *Regional Hubs* connecting multiple organizations along the forest value chain in Europe, which are grouped per geographical location and common conditions. Through a series of surveys, validation workshops and the elaboration of regional roadmaps, these regional teams identified the most relevant best practices within their region and among the other Hubs.

The BP&I collection is thus relevant for professionals, landowners, researchers and any other stakeholders in forestry and related sectors who can benefit from learning new ways of managing forests towards resilience, sustainability, and socio-economic impacts.

Figure 2 European map of Rosewood 4.0 Regional Hubs

The knowledge platform has been developed by the following partners: Steinbeis Innovation gGmbH (project coordinator, Germany), InnovaWood asbl (WP1 Leader, Belgium), EFI European Forest Institute (Finland), and the CESEFOR Foundation (Spain) with contributions from the whole consortium:

- Northern Europe Hub: Lapland University of Applied Sciences (Finland); Tretorget Ltd (Norway); Paper Province (Sweden); LUKE Natural Resources Institute Finland (Finland)
- Central-Western Europe: HCS Wood Cluster Styria (Austria); BFH Bern University of Applied Sciences (Switzerland); State Enterprise for Forestry and Timber North Rhine-Westphalia (Germany)
- South-Western Europe: CESEFOR Foundation (Spain); Forest Research Centre, School of Agriculture, University of Lisbon (Portugal); CNPF Centre National de la Propriété Forestière (France); AIEL Italian Agroforestry Energy Association (Italy)
- Central-Eastern Europe Hub: Łukasiewicz Research Network - Wood Technology Institute (Poland); National Forest Centre (Slovakia); FORZA Agency for Sustainable Development of the Carpathian Region (Ukraine); PRO WOOD Regional Wood Cluster (Romania)
- South-Eastern Europe Hub: Slovenian Forestry institute (Slovenia); CEKOM Competence Centre Ltd. for Research and Development (Croatia); CluBE Cluster of Bioeconomy and Environment of Western Macedonia (Greece)

1.1.3 Joint survey and validation

The factsheet selection is based on a larger survey and assessment carried out by the consortium under WP1. The main notable steps included the following:

1. A broad screening in the Regional Hubs allowed to build up a long list of potential BP&I with over 450 entries covering the whole range of topics in digital-supported solutions in forestry.
2. With the help and feedback of regional experts and stakeholders in validation workshops, each Regional Hub team assessed the long list and identified their own selection list of BP&I of main interest. These include BP&I that are of interest only to the national partner (Hub internal priority) as well as BP&I of mutual interest from different Hubs (transnational priority).
3. This assessment of the full survey collection (report D1.2) was then used to build regional roadmaps which also addressed opportunities to transfer BP&I between regions (report D2.1).
4. A subset of the 50 most relevant BP&I was concluded and selected as first batch of factsheets for the knowledge platform (report D1.3).
5. To complete the full selection, another round of reviews followed, from which the second batch of 50 BP&I was selected, paying attention to a balanced distribution of topics and types of solutions.

This whole set of 100 factsheets has now been prepared by the partners and published online in the knowledge platform. Further editing and translations of factsheets is ongoing and will soon be completed.

1.2 Definitions and classifications

1.2.1 Best practices and innovations

A '*best practice*' (BP) is defined as an effective, superior technological or social solution to a typical common problem or barrier. A BP can consist of a specific improved product, tool, or process (e.g. a machine or a technique), but it can also represent a more complex system solution (e.g. a sophisticated information system, a management system, or a legal or governance process or multi-actor initiative). A BP is a state-of-the-art implementation of a solution with latest (digital) technology, that has a representative character.

A specific implementation of a BP in a local context can be called a 'best practice case'. For example, a lot of quite similar digital management platforms for private owners exist in different countries, which can be all considered as different cases of the same BP. These will also be selected, and the best ones presented to the other Hubs. Main aim is here to improve collaboration and knowledge exchanges between the different tools.

In contrast, an '*innovation*' is defined as a very novel solution that has been developed and tested so far only in an experiment, pilot or a demonstration project, but which is usually not yet implemented on a larger scale or under real market conditions. The level of maturity of an innovation is usually assessed by the Technology Readiness Level (TRL). Innovations are also relevant in knowledge transfer projects such as ROSEWOOD4.0, because they go beyond the current state-of-the-art and provide new impulses for local solutions.

Note that innovation does not only refer to the advancement of a technology or system, but also to the wider adoption of an existing, proven technology or system in another context, e.g. another sector or country (this can also be described as 'social innovation').

1.2.2 Categorization approach for BP&I

Digitalisation applies a variety of modern information technologies to the specific problems and bottlenecks of the forestry sector. A classification scheme of four main categories (Table 1) was developed to organize the of BP&I factsheet collection. The categories highlight typical groups of BP&Is and provide an effective structure for the repository, allowing the user a practical way to query and navigate the knowledge platform.

Table 1 Classification concept of Rosewood 4.0 Best practices and innovations

Domains
1. Inventory, assessment, monitoring
2. Ownership, cooperation
3. Forest management, ecosystem services
4. Forest disturbances, risks
5. Harvesting, infrastructure, logistics
6. Products, markets, trade
7. Forest-based bio/circular economy
8. Innovation management, hubs, clusters
9. Education, training, transfer
10. Financing, funding schemes

Challenges
1. Improve forest resilience and adaption to climate change
2. Improve infrastructures and capacity of public actors
3. Activate private owners and cooperative forest management
4. Ensure a well-trained workforce through attractive skills development and education
5. Enhance economic and environmental performance of forest supply chains
6. Grow the forest-based bioeconomy through circular use and value-added products
7. Raise public awareness, social acceptance and political support for forestry

Hubs | Countries	
1-NE Northern Europe	NO – Norway FI – Finland SE – Sweden
2-CWE Central Western Europe	AT – Austria CH – Switzerland DE – Germany
3-SWE South Western Europe	FR – France ES – Spain PT – Portugal IT – Italy
4-CEE Central Eastern Europe	PL – Poland SK – Slovakia RO - Romania UA - Ukraine
5-SEE South Eastern Europe	SI – Slovenia CR – Croatia GR – Greece
6-EU	multiple countries

Types of Solutions
1. Sensors, measurement equipment
2. Data platforms, data hubs
3. Advice and services for forest owners
4. Joint forest management
5. Marketing platforms
6. Collaboration platforms, logistical hubs
7. Smart machinery, equipment
8. Traceability tools
9. Modelling, simulation, optimization
10. R&D platforms, testbeds, cocreation
11. Training, educational actions
12. Funding schemes, grants, contests
13. Awareness, infoportals, campaigns
14. Circular bio-based products

The classifications address the following aspects:

Domains correspond to main parts or activities along the forest-wood value chain from management of the forest ecosystem to final products and markets. The focus of ROSEWOOD4.0 lies on the forestry and raw material supply side, but final products and end uses are also considered in the sense that they can create higher demand for mobilization of wood. Note that BP&I can relate to several domains.

Challenges address typical needs and barriers to wood mobilisation encountered by stakeholders in their regional contexts. These groups are helpful to guide users to potential solutions starting from a common problem or area of interest for improvement. Each BP&I has been attributed to one main challenge as potential solutions to this challenge. A colour code has been applied in the platform to group BP&I of a same challenge also in a visual manner.

Types of solutions group together similar technological concepts with a focus on digital systems. It is important to differentiate typical digital approaches and/or business models that are widely applied to operationalize these solutions. The different types are explained in more detail with examples in chapter 2.

Hub and Country refer to the region and national context of a BP&I according to the geographical location of the solution. The collection contains mainly BP&I identified within the countries of the consortium, but the knowledge platform is designed to include any country, including the multilingual function for all EU official languages. A special class '6-EU' is defined to categorize EU consortia.

Additional categories that are also implemented as filters in the knowledge platform are '*Language'* and '*Scale of application*' (local, regional/sub-national, national, cross-border/multi-lateral, continental).

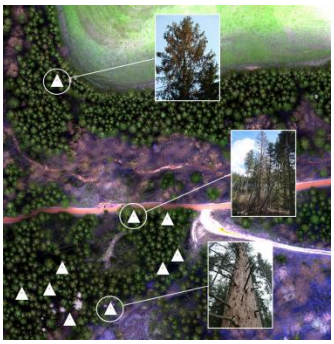
2 Overview of solutions

The following chapters give an introduction to the variety of identified types of progressive solutions which adopt digital technologies to the specific challenges in forestry and wood-based products. Each different type of solution is illustrated with three selected examples of a best practice. These factsheets can be viewed in the Rosewood 4.0 Knowledge Platform (weblinks in blue).

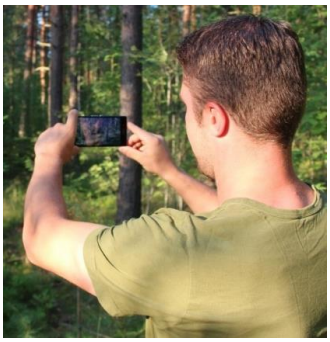
2.1 Technologies and measures for better forest management

2.1.1 Sensors, measurement equipment

A large group of digitalisation solutions comprises tools that enable easier, more precise and efficient ways of collecting data and measuring information in forests. They include a wide range of measuring devices, specialised sensors and apps that have been developed for their specific use in forest assessments. A lot of companies and start-ups have been emerging in recent years that offer tailored information services for surveying, analytical assessment and regular monitoring of forests.



***Festmeter Wöls**, Austria*
Bark beetle detection via multi-spectral airborne sensing



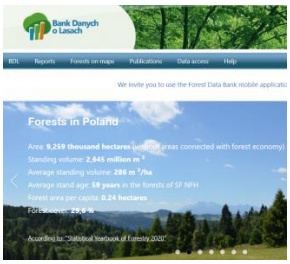
***Trestima**, Finland*
Forest inventory system using mobile applications for measurements

***AJA by foldAI**, Germany*
Environmental sensors for real-time forest ecosystem monitoring

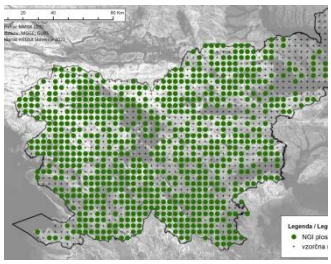
Figure 3 Best practice examples of sensors and measurement equipment

2.1.2 Data platforms, data hubs

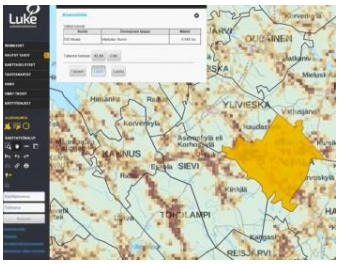
Public forestry actors such as state forest administrations, ministries or research centres are elaborating advanced data collections which are made accessible through special data portals, warehouses, and web-based portals. Typical portals combine available baseline data from national land registers, forest inventories, environmental surveys and other monitoring schemes. These data hubs evolve to integrate more and more different thematic datasets, layers and analytical options, to make the data better usable and to allow addressing more complex questions. Interesting developments are that open data approaches are gaining in importance and that also novel approaches such as citizen science can be found.



***Forest Data Bank**, Poland*
Data warehouse for forest information



***National Forest Inventory**, Slovenia*: Regular forest resource monitoring



***Biomass-Atlas**, Finland*
Web-based forest resource map service

Figure 4 Best practice examples of data platforms and data hubs

2.1.3 Advice and services for forest owners

Supporting private forest landowners through dedicated advice and useful practical information is the main purpose of a wide variety of online platforms, advisory services and programmes. Across European countries, many public and private actors have undertaken major efforts to set up such information services and support programmes, which can engage with a larger number of smallholder forest owners and thus bring more forest land into proper active management. A main common goal of all these solutions is to make it very easy for private persons who lack practical experience to get quick access to useful knowhow and guide them to professional advisors and service providers. User-friendly online platforms at your fingertips enable lay persons to take decisions how to manage your property. Successful advisory services take into account the large diversity of landowners regarding their knowledge, attitudes and values about forest management.

***Metsään.fi**, Finland*
eServices for Forest Owners and Service providers

***La forêt bouge** (forest is moving), France:* Online portal to activate private forest owners

***Melhor eucalipto** (Better eucalypt), Portugal*: Demonstrate proper plantation management

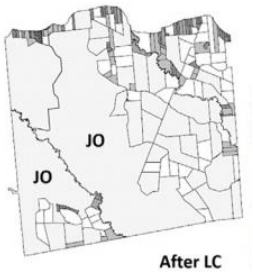
Figure 5 Best practice examples of advice and services for forest owners

2.1.4 Joint forest management

To overcome disadvantages and barriers of smallholder forest ownership and gain scale in forest management, a large variety of approaches have been developed and tested across Europe how to improve ownership structures. These aim at different solutions to bundle forest owners and/or forest land parcels into larger units that enable more effective management. The approaches differ according to their degree of grouping, association, aggregation and/or even merging of land units or owners, including both more voluntary, temporary concepts as well as more long-term, permanent reorganisations of structures. A critical element to make these approaches successful is a sound, transparent information baseline to enable proper decision-making. Specific measures such as land mensuration or forest stock assessment are quite data-intensive and thus benefit a lot from enhanced digitalized technologies.

Forest Area Aggregation, *Portugal:* Grouping landowners to facilitate forest management

PROMINIFUN*, Spain* Small-holder forests operational group to solve land abandonment



Jointly Owned Forests and Forest Land Consolidation in Finland

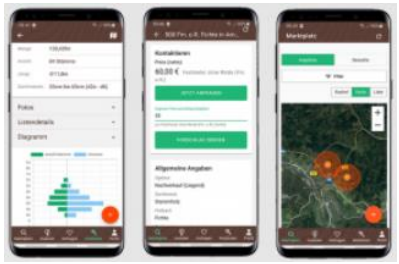
Figure 6 Best practice examples of joint forest management

2.2 Solutions to facilitate business and cooperation in the wood supply chain

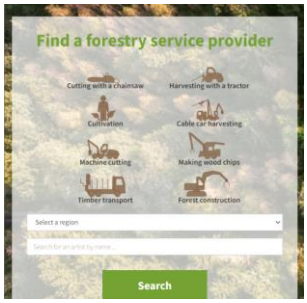
2.2.1 Marketing platforms

e-business solutions have also seen wide deployment in forestry in recent years. Many examples of online marketplaces for timber and forestry services can be found in European countries, which facilitate business partnering and transactions especially also in rural areas.

Kuutio*, Finland* Online timber marketplace



Forstify*, Germany* App for easy timber purchase and trade



MojGozdar *(My Forester) Slovenia* - Quality assessment of forestry contractors

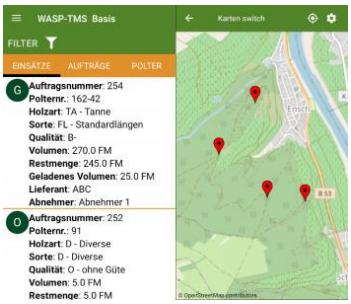
Figure 7 Best practice examples of marketing platforms

2.2.2 Collaboration platforms, logistical hubs

Another important group of digital business solutions are specialised IT platforms that enable collaboration of different actors in the forestry supply chain, e.g. forest managers, harvesting contractors, transport companies, timber traders and forest-based industries. These systems facilitate direct communication and data transactions for a more efficient coordination of processes and workflows among the various actors. Some of these systems offer quite advanced solutions with an entire portfolio for all forestry-related activities, and interoperability with various commonly used other IT systems.

***WoodForce**, Finland*
Software for harvesting and forestry services

***Forest HQ**, Ireland*
Forest land management and operations system



***WASP Logistik**, Germany,*
Wood logistics platform

Figure 8 Best practice examples of collaboration and logistical platforms

2.2.3 Smart machinery, equipment

Forestry work processes rely increasingly on high tech equipment. A lot of R&D is being carried out to deploy industry4.0 technologies in the sector for the common goals to optimize workflows, increase performance and ensure safety and health conditions for workers in the forest and industries.

***Forwarder2020**, EU/Germany*
Smart Forwarder for sustainable and efficient forest operation and management

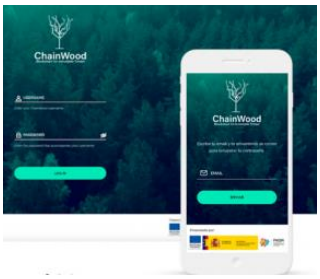
***HiVision**, Finland*
Virtual reality support for crane operators

***AVATAR**, EU/Germany*
Smart real time feedback and training system for forest machine operators

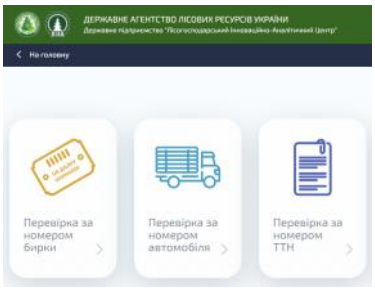
Figure 9 Best practice examples of smart machinery and equipment

2.2.4 Traceability tools

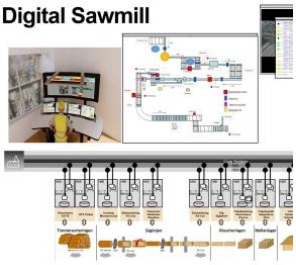
A specific challenge for the forest-based sector is to establish ways to provide traceable data about the origin of wood. There is a need for transparent, credible and verifiable data which can ensure that the wood has been sourced from sustainably managed forests. Secondly, traceability of wood is also key for better control of performance and quality in industrial wood processing chains. A range of digital tracing solutions are currently being developed, tested and deployed together with companies. The main challenge for these advanced tools is to find effective, applicable setups that can work for all involved actors the various contexts (from local to cross-border or even global wood supply chains).



***ChainWood**, Spain*
Blockchain for Inmutable Timber



Electronic timber tracking
in Ukraine



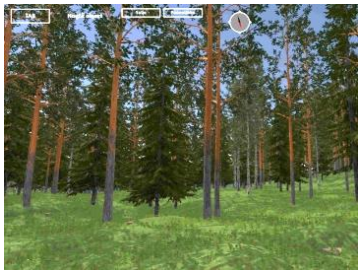
***DigiWood**, Sweden*
Digital sawmill traceability tools

Figure 10 Best practice examples of traceability tools

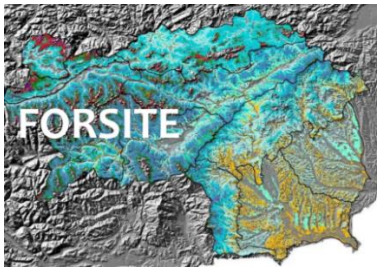
2.3 Enhancing research and innovation in digital solutions

2.3.1 Modelling, simulation, optimization

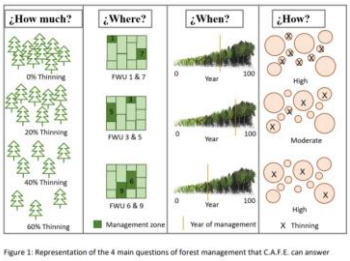
Digitalisation and big data allow to model forest ecosystems at a new level of complexity. This enables to study the impacts of forestry management interventions and related impacts in much more detail. Such knowledge is becoming more and more widely accessible in various information systems and decision support tools for professionals, experts as well as lay persons. Gaining better insight into complex relationships of ecological factors, climate change and adaptation options will be key to enhance forest management for better long-term resilience and sustainability.



***Virtuaalimetsä 2.0**, Finland*
Virtual Forest application to visualize forest properties



***FORSITE**, Austria*
Dynamic ecological forest site classification



***C.A.F.E.**, Spain*
Carbon, Aqua, Fire & Eco-resilience DSS

Figure 11 Best practice examples of modelling, simulation and optimization tools

2.3.2 R&D platforms, testbeds, cocreation

R&D in digitalisation of forests is progressing fast. To integrate various R&D directions and better exploit synergies of sharing knowledge and results, special R&D platforms dedicated to digitalisation in forestry and forest-based industries have emerged in various countries. They establish basic research, testbeds, and demonstration projects for ground-breaking digital transformation of the sector. R&D activities are guided by needs of industry and aim to stimulate co-creative innovation. Companies can engage more easily with research centres and support a faster market entry or rollout.

***SmartForest**, Norway*
Bringing Industry 4.0 to the Norwegian forest sector

***Mistra Digital Forest**, Sweden*
Cutting-edge research on digitalisation in forestry

***KWH4.0**, Germany*
Center of Excellence Forest and Timber 4.0

Figure 12 Best practice examples of R&D platforms and testbeds

2.4 Supporting measures for a competitive forest-based sector

2.4.1 Training, educational actions

Ensuring that people who own and work with forests have access to a good education and training is a key challenge for the entire sector. Especially the wider adoption of new digital solutions will require a lot of additional training and qualification both of managerial staff technicians and workers. A variety of training programmes that have been specifically designed for landowners and professionals in forestry can be identified in European countries. They also show good examples to include modern communication tools, multimedia, eLearning solutions and social media. This is especially important to make the sector also attractive for the future generations of students and apprentices.

***Skogkurs**, Norway*
Forestry Extension Institute for practitioners and landowners

***I'm training for my woods**, France*
Training portal for private forest owners

***Marteloscopes**, EU/Switzerland*
Demo plots for silvicultural training of forestry practitioners

Figure 13 Best practice examples of training and education

2.4.2 Funding schemes, grants, contests

Access to funding is essential to support the wider adoption of solutions by practitioners, including good management practices and novel technological concepts. This category includes typical funding schemes for forestry and rural development, but also more unconventional schemes such as cascade funding or hackathons, which are especially interesting to stimulate novel approaches and involve more companies in innovation and demonstration.

***KEMERA Funding**, Finland*
Governmental subsidy for sustainable forestry

***Evergreen Innovation Camp**, Austria*: Hackathon for university students and start-ups

***SecureChain**, EU/Netherlands*
Innovation voucher scheme for forest bioenergy pilot projects

Figure 14 Best practice examples of funding schemes, grants and contests

2.4.3 Awareness, info portals, campaigns

Raising the awareness of the public about the major role of forests for the environment, the economy and the social contexts is of major importance. Many national and regional communication platforms have been established for this purpose, which also make extensive use of new digital formats and social media. Their aim is to contribute to a better understanding and image of the sector, highlighting the innovative trends and benefits of active forest management and sustainable wood products for the wider society.

Forest Finland
Communication platform of the Finnish forest sector

***Woodvetia**, Switzerland*
Swiss national wood promotion programme

***Holzbaukarte**, Austria*
Wood construction map online info portal

Figure 15 Best practice examples of awareness, info portals and campaigns

3 Selection results

This chapter describes the full set of 100 BP&I selected and prepared by the Regional Hub partners to be of main interest for further dissemination and exchange.

- The full BP&I selection combines the *first Batch A* (D1.3) and the *second Batch B* (this deliverable) as of 29 December 2021.
- The distributions of the BP&I according to the classifications per domain, type of solution and geographical reference are analysed.
- Tables 1, 2 and 3 provide the complete list of the 100 BP&I sorted according to different categories.
- The full factsheets are accessible in the *Knowledge Platform* via the online ***weblinks***. Right mouse-click on a link will open the factsheet in the default browser. A factsheet contains a short abstract, visual items (pictures, logos, videos), and additional information (categories, contacts, additional resources, references), providing quick access to the original information source via further weblinks.

BP&I project origin: The selection contains 22 BB&I identified during the first Rosewood project (2018-2020) and 78 BP&I identified during the Rosewood 4.0 project (2020-2022).

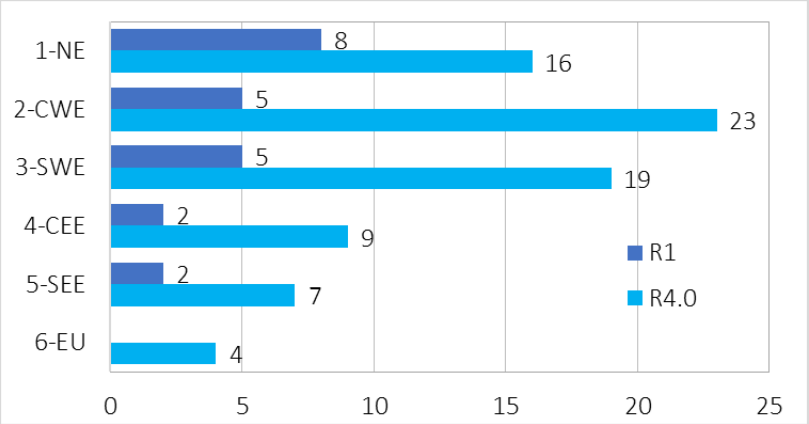


Figure 16 Number of selected BP&I per EU project origin and Hub (n total = 100)

Figures 17-22 and Tables 1-3 use the following abbreviations:

Regional Hubs: NE Northern Europe / CWE Central-Western Europe / SWE South-Western Europe / CEE Central-Eastern Europe / SEE South-Eastern Europe / EU whole EU / INT international

Origin: R1 Rosewood (2018-2020), R4.0 Rosewood 4.0 (2020-2022).

Batches: First Batch A, Second Batch B [see Table 3 on p.30 ff].

3.1 Domains and Types of Solution

3.1.1 Distribution according to Domains

The majority of selected BP&I relate to solutions for improved '5. Harvesting, infrastructure, and logistics' (Figure 17). Lots of industry 4.0 technologies in forestry are already well established here, as performance gains can lead to significant reductions of unit costs. These tools are tailored specifically to work processes in forestry companies, and can be rather easily adopted. This group clearly raised a high interest among Hub members. Other main areas are '1. Inventory, monitoring', '9. Education, training' and '2. Ownership, cooperation'. The last third of BP&I are diverse and fall under the remaining six other domains. Overall, the different domains are well distributed across the five Hubs.

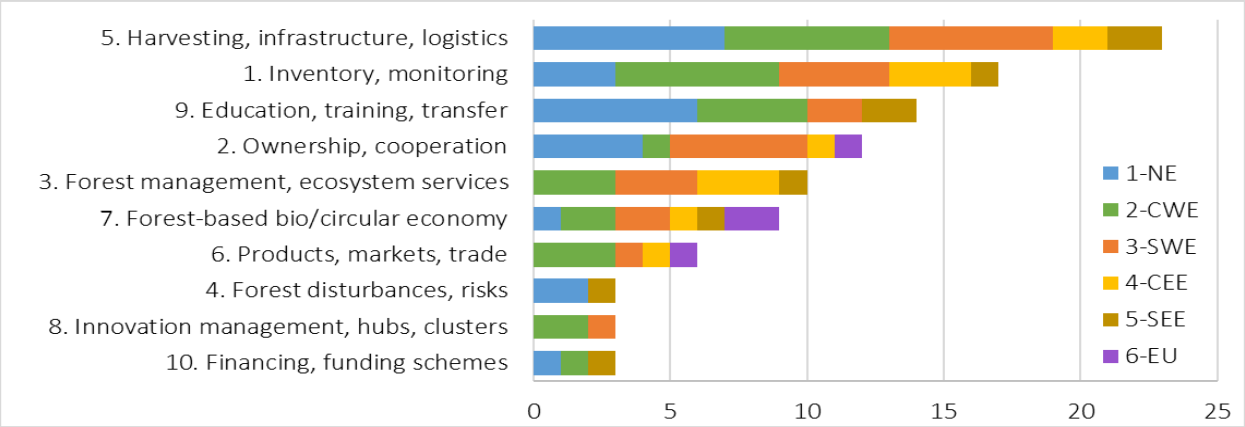


Figure 17 Number of selected BP&I per Domain and Hub (n = 100)

3.1.2 Distribution according to Types of Solution

Figure 18 shows that the most relevant types in the selection are '3. Advice and services for forest owners', '6. Collaboration platforms…', '1. Sensors…', '2. Data platforms…' and '9. Modelling…': each include 10 or more selected examples. The other types are more specific solutions and have a lesser number per group.

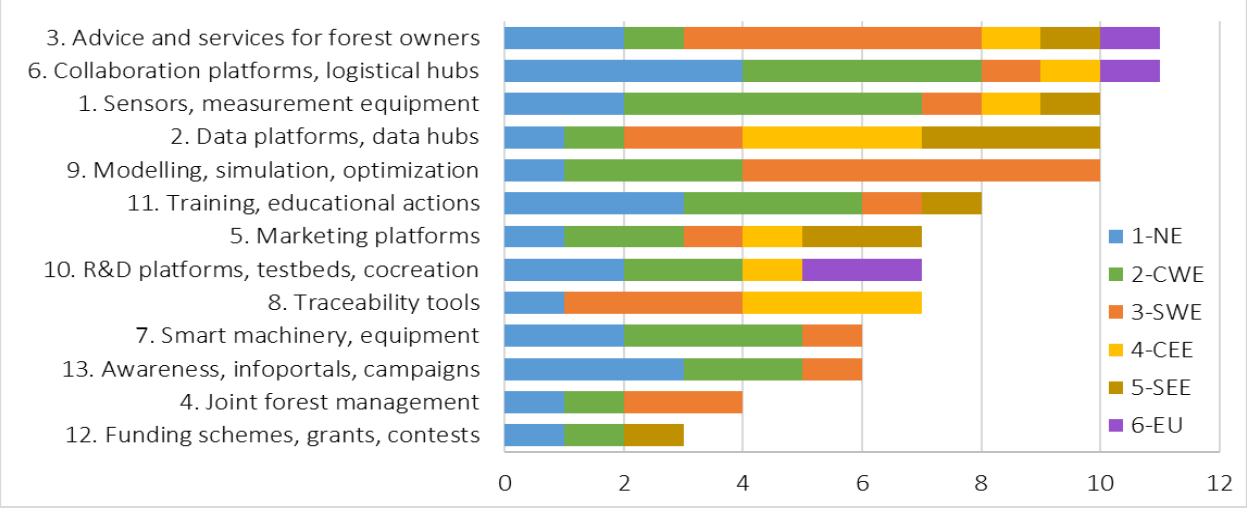


Figure 18 Number of selected BP&I per Type of Solution and Hub (n = 100)

3.1.3 Selection according to Domains and Types of Solution

Table 2 List of BP&I selection sorted per Domain and Types of Solution

Solution	Hub	Country	Domain / BP&I Factsheet (Link)	Web	Video	Origin
1. Inventory, monitoring						
1. Sensors, measurement equipment	1-NE	FI	Trestima | Forest inventory system	Web		R4.0
	2-CWE	AT	Festmeter | Bark beetle detection	Web		R4.0
	2-CWE	DE	LogBuch | Simple and efficient forest data collection	Web		R1
	4-CEE	PL	PROZEL | Forecasting threats to forest ecosystems using an innovative electronic system for the recognition of odours	Web		R4.0
2. Data platforms, data hubs	1-NE	FI	Biomassa-atlas | Web-based forest resource map service	Web		R4.0
	2-CWE	DE	Waldinfo NRW | Forest information system NRW	Web		R4.0
	3-SWE	ES	Cross-Forest | Digital Service Infrastructures to integrate models supporting forest management and forest protection	Web		R4.0
	4-CEE	PL	BDL | Forest Data Bank	Web	Video	R4.0
	5-SEE	SI	NFI | National Forest Inventory	Web	Video	R4.0
6. Collaboration platforms, logistical hubs	2-CWE	IE	Forest HQ | Online system to manage land, inventories and operations	Web		R4.0
8. Traceability tools	4-CEE	UA	Electronic timber tracking in Ukraine	Web	Video	R4.0
9. Modelling, simulation, optimization	1-NE	FI	Virtuaalimetsä 2.0 | Virtual Forest 2.0 Innovation	Web	Video	R1
	2-CWE	DE	iWald | Forest growth simulation app	Web		R4.0
		DE	Virtueller Wald | Virtual Forest	Web		R1
	3-SWE	ES	SISREP | Management and analysis of reforestations on agricultural land			R4.0
		ES	ForestMap | Calculate your forest inventory online	Web		R1
		ES	ForestLiDARioja | Forest inventory and fuel model map using remote sensing technologies	Web	Video	R4.0
		FR	Climafor | Carbon accounting tool	Web	Video	R4.0
2. Ownership, cooperation						
2. Data platforms, data hubs	4-CEE	PL	LasInfo | Integrated information system for national parks, nature conservation and forest management	Web		R4.0

Solution	Hub	Country	Domain / BP&I Factsheet (Link)	Web	Video	Origin
3. Advice and services for forest owners	1-NE	FI	Metsään.fi | eServices for Forest Owners and Service providers	Web		R1
		NO	ALLMA | Forestry plan	Web		R4.0
	3-SWE	FR	La forêt bouge | The forest is moving	Web	Video	R1
		FR	RESOFOP | RESeau d'Observation économique de la FOrêt Privée	Web		R1
	6-EU	EU	SIMWOOD | Sustainable Mobilisation of Wood	Web		R4.0
4. Joint forest management	1-NE	FI	Jointly Owned Forests and Forest Land Consolidation in Finland			R1
	2-CWE	DE	Forest cooperative societies: land consolidation of jointly owned community forests in NRW, Germany	Web		R4.0
	3-SWE	ES	PROMINIFUN | Pro small-holder forests operational group	Web		R4.0
		PT	Areas Florestais Agrupadas | Forest Area Aggregation		Video	R4.0
5. Marketing platforms	1-NE	FI	Kuutio | Online timber marketplace	Web		R1
11. Awareness, infoportals, campaigns	3-SWE	ES	Together for the Forests	Web		R4.0
3. Forest management, ecosystem services						
1. Sensors, measurement equipment	2-CWE	DE	AJA | Environmental sensors for real-time forest ecosystem monitoring	Web		R4.0
	5-SEE	CR	DetectIT | Save our forests	Web	Video	R4.0
2. Data platforms, data hubs	4-CEE	PL	ForBioSensing | Comprehensive monitoring of stand dynamics in Białowieża Forest supported with remote sensing techniques	Web		R4.0
3. Advice and services for forest owners	2-CWE	AT	HolzMobRegio | Climate fit and wood mobilisation model region Graz	Web		R4.0
	3-SWE	PT	e-globulus | Knowledge transfer platform towards sustainable forest management	Web		R4.0
		PT	Melhor eucalipto | Better eucalypt	Web		R4.0
	4-CEE	PL	WAMBAF | Water Management in Baltic Forests	Web		R4.0
9. Modelling, simulation, optimization	2-CWE	AT	FORSITE | Dynamic ecological forest site classification	Web	Video	R4.0
	3-SWE	ES	C.A.F.E | Carbon, Aqua, Fire & Eco-resilience DSS	Web		R4.0
10. R&D platforms, testbeds, cocreation	4-CEE	SK	LignoSilva INFRA | Innovative forestry research centre with 3D CT scanner technology	Web	Video	R4.0

Solution	Hub	Country	Domain / BP&I Factsheet (Link)	Web	Video	Origin
4. Forest disturbances, risks						
1. Sensors, measurement equipment	1-NE	SE	Arboair | Detecting bark beetles with AI	Web	Video	R4.0
2. Data platforms, data hubs	5-SEE	SI	Invazivke | Web infoportal about invasive species	Web		R4.0
7. Smart machinery, equipment	1-NE	FI	PONSSE | Firefighting equipment for forwarders	Web		R4.0
5. Harvesting, logistics, safety						
1. Sensors, measurement equipment	2-CWE	DE	FOVEA | Photo-optical wood pile measurement	Web		R4.0
		DE	Roadscanner | Forest road condition monitoring sensor	Web		R4.0
2. Data platforms, data hubs	3-SWE	FR	eMoBois | Data exchange platform for forest industries	Web		R1
3. Advice and services for forest owners	3-SWE	FR	ForLog | Forêt Logistique Conseil	Web		R1
	5-SEE	SI	WCM | WoodChainManager	Web		R1
5. Marketing platforms	3-SWE	PT	Forscope | Forest Supply Chain Optimization System			R4.0
	5-SEE	SI	MojGozdar (My Forester) | Quality assessment of forestry contractors	Web	Video	R1
6. Collaboration platforms, logistical hubs	1-NE	FI	Joint wood terminals		Video	R1
		FI	WoodForce | Forestry software for harvesting	Web		R1
		FI	LogForce | Planning tool for forestry contractors	Web		R1
		NO	FeltGIS | Forest suppply chain communication tool	Web	Video	R4.0
	2-CWE	DE	WASP | Wood logistics platform	Web		R4.0
7. Smart machinery, equipment	1-NE	SE	HiVision | Virtual reality support for crane operators	Web	Video	R4.0
	2-CWE	CH	Forwarder2020 | Smart Forwarder for sustainable and efficient forest operation and management	Web		R4.0
		CH	Kollegenschutz4.0 | Work safety improvement system for forest operations			R4.0
	3-SWE	FR	EXTRAFOR | Exoskeletons for forest work	Web		R4.0
8. Traceability tools	3-SWE	ES	ChainWood | Blockchain for Inmutable Timber	Web		R4.0
		IT	WoodChain | Blockchain applied to PEFC c.o.c.	Web		R4.0
	4-CEE	RO	TimFlow | WoodTracking System	Web	Video	R1
		RO	SUMAL 2.0 | Digital Wood Tracking	Web		R4.0

Solution	Hub	Country	Domain / BP&I Factsheet (Link)	Web	Video	Origin
6. Products, markets, trade						
5. Marketing platforms	2-CWE	DE	Forstify | App for timber trading	Web		R4.0
	4-CEE	PL	e-drewno.pl | Forest stock market	Web		R4.0
6. Collaboration platforms, logistical hubs	2-CWE	AT	WoodLogistics | Modular logistics platform for wood supply chains	Web		R4.0
		AT	BioRES | Biomass trading centres calculation tool	Web		R4.0
	6-EU	EU	MUSIC | Market Uptake Support for Intermediate Bioenergy Carriers	Web		R4.0
8. Traceability tools	3-SWE	IT	LegnOK | EUTR operators platform	Web		R4.0
7. Forest-based bio/circular economy						
1. Sensors, measurement equipment	3-SWE	IT	GoldenEye | Advanced x-ray wood log scanning system for sawmills	Web		R4.0
5. Marketing platforms	5-SEE	SI	RecAPPture | Mobile application for collection of used wood	Web	Video	R4.0
6. Collaboration platforms, logistical hubs	3-SWE	IT	RILEGNO | National wood collection and recycling network	Web		R4.0
	4-CEE	RO	EGGER wood waste recycling	Web		R1
8. Traceability tools	1-NE	SE	DigiWood | Digital sawmill traceability tools	Web		R4.0
10. R&D platforms, testbeds, cocreation	6-EU	EU	BASAJAUN | Building A Sustainable Joint Between Rural and Urban Areas Through Circular And Innovative Wood Construction Value Chains	Web		R4.0
		EU	Build-in-Wood | Build-In-Wood, The eco-benefits of building with wood	Web		R4.0
13. Awareness, infoportals, campaigns	2-CWE	AT	Holzbaukarte | Wood construction map	Web		R4.0
		CH	Woodvetia | Swiss national wood promotion programme	Web		R1
8. Innovation management, hubs, clusters						
5. Marketing platforms	2-CWE	CH	Lignum | Wood Industry Central Switzerland	Web		R4.0
10. R&D platforms, testbeds, cocreation	1-NE	NO	SmartForest | Bringing Industry 4.0 to the Norwegian forest sector	Web		R4.0
		SE	Mistra Digital Forest | Cutting-edge research on digitalisation in forestry	Web		R4.0
	2-CWE	DE	Wood Supply 4.0 | Smart Wood Supply Chain Management	Web		R4.0

Solution	Hub	Country	Domain / BP&I Factsheet (Link)	Web	Video	Origin
		DE	KWH4.0 | Center of Excellence Forest and Timber 4.0	Web	Video	R4.0
9. Education, training, transfer						
2. Data platforms, data hubs	5-SEE	CR	Public data of forests	Web	Video	R4.0
7. Smart machinery, equipment	2-CWE	DE	AVATAR | Advanced Virtual Aptitude and Training Application in Real Time	Web		R4.0
9. Modelling, simulation, optimization	3-SWE	PT	sIMfLOR | Platform for the Portuguese forest simulators	Web		R4.0
11. Training, educational actions	1-NE	FI	Science Centre Pilke |	Web		R4.0
		NO	Drones in forest operator education at Solør High School	Web	Video	R4.0
		NO	Skogkurs | Forestry Extension Institute	Web	Video	R4.0
	2-CWE	CH	Marteloscopes | Demo plots for silvicultural training of forestry practitioners	Web		R1
		CH	CAS | CAS / Forest management and new technologies	Web		R4.0
		DE	KomSilva | Communication assistance and public relations in forestry	Web		R1
	3-SWE	FR	Je me forme pour mes bois | I'm training for my woods	Web		R4.0
	5-SEE	CR	CIA2SFM | European cooperation for innovative approach in sustainable forest management training	Web	Video	R4.0
13. Awareness, infoportals, campaigns	1-NE	FI	Forest Finland | Communication platform of the Finnish forest sector	Web		R4.0
		NO	Think Wood | Info campaign of the Norwegian forest sector	Web		R4.0
		NO	Women in Forestry Association	Web		R4.0
10. Financing, funding schemes						
12. Funding schemes, grants, contests	1-NE	FI	KEMERA | Financing of Sustainable Forestry	Web		R1
	2-CWE	AT	Evergreen Innovation Camp - Hackathon	Web		R4.0
	5-SEE	GR	SecureChain | Small and medium enterprises securing future-proof bioenergy chains	Web	Video	R4.0

3.2 Challenges for Wood Mobilisation

3.2.1 Distribution according to Challenges

The challenge of highest interest addressed in the factsheet selection is '5. Enhance economic and environmental performance', which is clearly a core topic of digitalisation (Figure 19). It is notable that certain types of solutions are more dominant or are found exclusively under certain challenges (Figure 20).

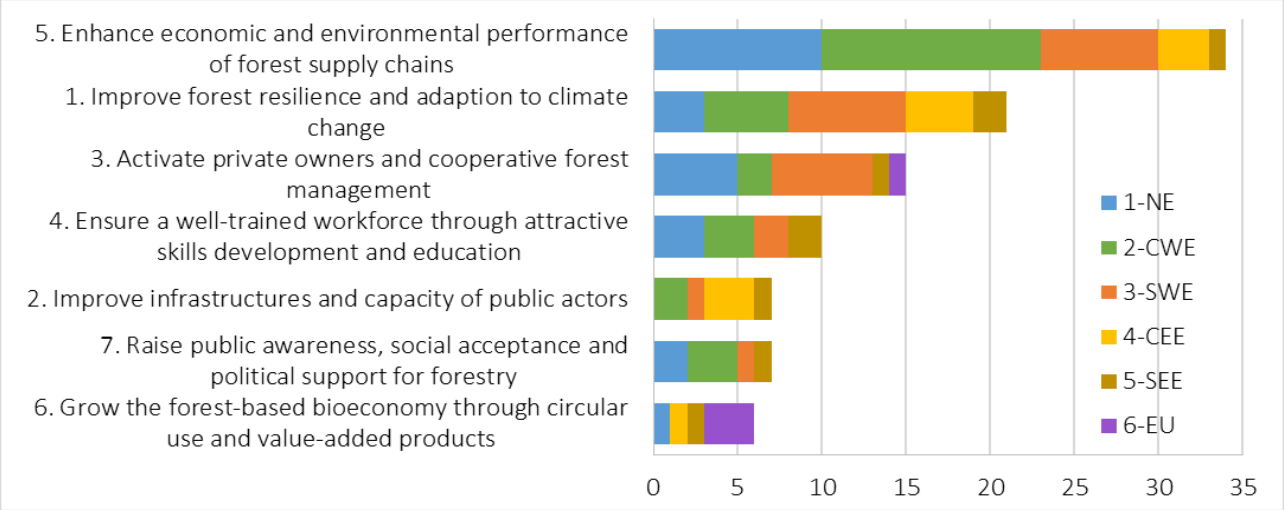


Figure 19 Number of selected BP&I per Challenge and Hub (n = 100)

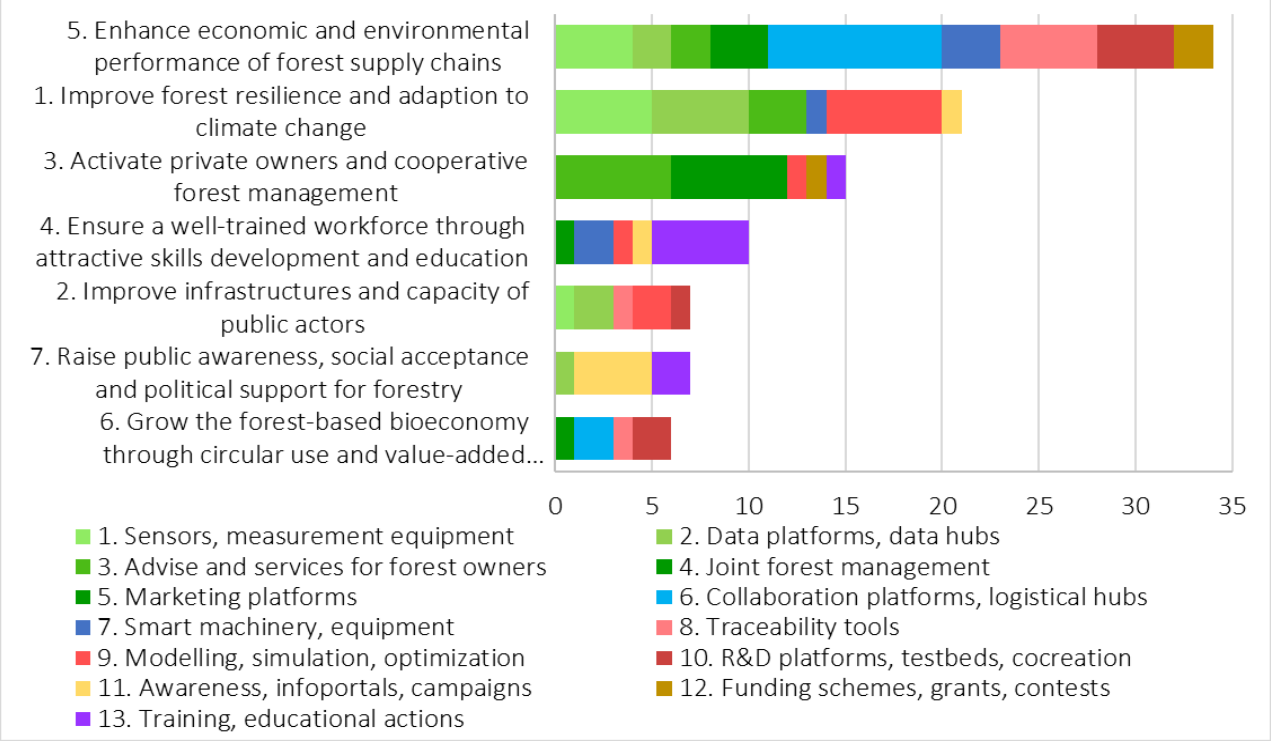


Figure 20 Number of selected BP&I per Challenge versus Type of Solution (n = 100)

3.2.2 Selection according to Challenges

Table 3 List of BP&I selection sorted per Challenge and Domain

Domain	Hub	Country	Challenge / BP&I Factsheet (Link)	Web	Video	Origin
1. Improve forest resilience and adaption to climate change						
1. Inventory, assessment, monitoring	2-CWE	AT	Festmeter | Bark beetle detection	Web		R4.0
		DE	Waldinfo NRW | Forest information system NRW	Web		R4.0
		DE	iWald | Forest growth simulation app	Web		R4.0
	3-SWE	ES	SISREP | Management and analysis of reforestations on agricultural land			R4.0
		ES	ForestMap | Calculate your forest inventory online	Web		R1
		FR	Climafor | Carbon accounting tool	Web	Video	R4.0
	4-CEE	PL	PROZEL | Forecasting threats to forest ecosystems using an innovative electronic system for the recognition of odours	Web		R4.0
2. Ownership, cooperation	4-CEE	PL	LasInfo | Integrated information system for national parks, nature conservation and forest management	Web		R4.0
3. Forest management, ecosystem services	2-CWE	AT	FORSITE | Dynamic ecological forest site classification	Web	Video	R4.0
		DE	AJA | Environmental sensors for real-time forest ecosystem monitoring	Web		R4.0
	3-SWE	ES	C.A.F.E | Carbon, Aqua, Fire & Eco-resilience DSS	Web		R4.0
		PT	Melhor eucalipto | Better eucalypt	Web		R4.0
		PT	e-globulus | Knowledge transfer platform towards sustainable forest management	Web		R4.0
	4-CEE	PL	ForBioSensing | Comprehensive monitoring of stand dynamics in Białowieża Forest supported with remote sensing techniques	Web		R4.0
		PL	WAMBAF | Water Management in Baltic Forests	Web		R4.0
	5-SEE	CR	DetectIT | Save our forests	Web	Video	R4.0
4. Forest disturbances, risks	1-NE	FI	PONSSE | Firefighting equipment for forwarders	Web		R4.0
		SE	Arboair | Detecting bark beetles with AI	Web	Video	R4.0
	5-SEE	SI	Invazivke | Web infoportal about invasive species	Web		R4.0
8. Innovation management, hubs, clusters	3-SWE	ES	Cross-Forest | Digital Service Infrastructures to integrate models supporting forest management and forest protection	Web		R4.0
9. Education, training, transfer	1-NE	NO	Think Wood | Info campaign of the Norwegian forest sector	Web		R4.0

Domain	Hub	Country	Challenge / BP&I Factsheet (Link)	Web	Video	Origin
2. Improve infrastructures and capacity of public actors						
1. Inventory, assessment, monitoring	2-CWE	DE	Virtueller Wald | Virtual Forest	Web		R1
	3-SWE	ES	ForestLiDARioja | U Forest inventory and fuel model map using remote sensing technologies	Web	Video	R4.0
	4-CEE	PL	BDL | Forest Data Bank	Web	Video	R4.0
		UA	Electronic timber tracking in Ukraine	Web	Video	R4.0
3. Forest management, ecosystem services	4-CEE	SK	LignoSilva INFRA | Innovative forestry research centre with 3D CT scanner technology	Web	Video	R4.0
5. Harvesting, infrastructure, logistics	2-CWE	DE	Roadscanner | Forest road condition monitoring sensor	Web		R4.0
9. Education, training, transfer	5-SEE	CR	Public data of forests	Web	Video	R4.0
3. Activate private owners and cooperative forest management						
1. Inventory, assessment, monitoring	1-NE	FI	Virtuaalimetsä 2.0 | Virtual Forest 2.0 Innovation	Web	Video	R1
2. Ownership, cooperation		FI	Metsään.fi | eServices for Forest Owners and Service providers	Web		R1
		FI	Jointly Owned Forests and Forest Land Consolidation in Finland			R1
		FI	Kuutio | Online timber marketplace	Web		R1
	2-CWE	DE	Forest cooperative societies: land consolidation of jointly owned community forests in NRW, Germany	Web		R4.0
	3-SWE	ES	PROMINIFUN | Pro small-holder forests operational group	Web		R4.0
		FR	La forêt bouge | The forest is moving	Web	Video	R1
		FR	RESOFOP | RESeau d'Observation économique de la FOrêt Privée	Web		R1
		PT	Areas Florestais Agrupadas | Forest Area Aggregation		Video	R4.0
	6-EU	EU	SIMWOOD | Sustainable Mobilisation of Wood	Web		R4.0
3. Forest management, ecosystem services	2-CWE	AT	HolzMobRegio | Climate fit and wood mobilisation model region Graz	Web		R4.0
5. Harvesting, infrastructure, logistics	3-SWE	PT	Forscope | Forest Supply Chain Optimization System			R4.0
	5-SEE	SI	WCM | WoodChainManager	Web		R1

Domain	Hub	Country	Challenge / BP&I Factsheet (Link)	Web	Video	Origin
9. Education, training, transfer	3-SWE	FR	Je me forme pour mes bois | I'm training for my woods	Web		R4.0
10. Financing, funding schemes	1-NE	FI	KEMERA | Financing of Sustainable Forestry	Web		R1
4. Ensure a well-trained workforce through attractive skills development and education						
5. Harvesting, infrastructure, logistics	2-CWE	CH	Kollegenschutz4.0 | Work safety improvement system for forest operations			R4.0
	3-SWE	FR	EXTRAFOR | Exoskeletons for forest work	Web		R4.0
	5-SEE	SI	MojGozdar (My Forester) | Quality assessment of forestry contractors	Web	Video	R1
9. Education, training, transfer	1-NE	NO	Women in Forestry Association	Web		R4.0
		NO	Drones in forest operator education at Solør High School	Web	Video	R4.0
		NO	Skogkurs | Forestry Extension Institute	Web	Video	R4.0
	2-CWE	CH	Marteloscopes | Demo plots for silvicultural training of forestry practicionners	Web		R1
		CH	CAS | CAS / Forest management and new technologies	Web		R4.0
	3-SWE	PT	sIMfLOR | Platform for the Portuguese forest simulators	Web		R4.0
	5-SEE	CR	CIA2SFM | European cooperation for innovative approach in sustainable forest management training	Web	Video	R4.0
5. Enhance economic and environmental performance of forest supply chains						
1. Inventory, assessment, monitoring	1-NE	FI	Trestima | Forest inventory system	Web		R4.0
		FI	Biomassa-atlas | Web-based forest resource map service	Web		R4.0
	2-CWE	DE	LogBuch | Simple and efficient forest data collection	Web		R1
		IE	Forest HQ | Online system to manage land, inventories and operations	Web		R4.0
2. Ownership, cooperation	1-NE	NO	ALLMA | Forestry plan	Web		R4.0
5. Harvesting, infrastructure, logistics	1-NE	FI	Joint wood terminals		Video	R1
			WoodForce | Forestry software for harvesting	Web		R1
			LogForce | Planning tool for forestry contractors	Web		R1
		NO	FeltGIS | Forest suppply chain communication tool	Web	Video	R4.0
			SmartForest | Bringing Industry 4.0 to the Norwegian forest sector	Web		R4.0

Domain	Hub	Country	Challenge / BP&I Factsheet (Link)	Web	Video	Origin
		SE	HiVision | Virtual reality support for crane operators	Web	Video	R4.0
			Mistra Digital Forest | Cutting-edge research on digitalisation in forestry	Web		R4.0
	2-CWE	AT	WoodLogistics | Modular logistics platform for wood supply chains	Web		R4.0
		CH	Forwarder2020 | Smart Forwarder for sustainable and efficient forest operation and management	Web		R4.0
		DE	FOVEA | Photo-optical wood pile measurement	Web		R4.0
		DE	WASP | Wood logistics platform	Web		R4.0
		DE	Wood Supply 4.0 | Smart Wood Supply Chain Management	Web		R4.0
	3-SWE	ES	ChainWood | Blockchain for Inmutable Timber	Web		R4.0
		FR	eMoBois | Data exchange platform for forest industries	Web		R1
		FR	ForLog | Forêt Logistique Conseil	Web		R1
		IT	WoodChain | Blockchain applied to PEFC c.o.c.	Web		R4.0
	4-CEE	RO	TimFlow | WoodTracking System	Web	Video	R1
		RO	SUMAL 2.0 | Digital Wood Tracking	Web		R4.0
6. Products, markets, trade	2-CWE	AT	BioRES | Biomass trading centres calculation tool	Web		R4.0
		DE	Forstify | App for timber trading	Web		R4.0
	3-SWE	IT	LegnOK | EUTR operators platform	Web		R4.0
	4-CEE	PL	e-drewno.pl | Forest stock market	Web		R4.0
7. Forest-based bio/circular economy	3-SWE	IT	GoldenEye | Advanced x-ray wood log scanning system for sawmills	Web		R4.0
		IT	RILEGNO | National wood collection and recycling network	Web		R4.0
8. Innovation management, hubs, clusters		CH	Lignum | Wood Industry Central Switzerland	Web		R4.0
		DE	KWH4.0 | Center of Excellence Forest and Timber 4.0	Web	Video	R4.0
9. Education, training, transfer	2-CWE	DE	AVATAR | Advanced Virtual Aptitude and Training Application in Real Time	Web		R4.0
10. Financing, funding schemes	2-CWE	AT	Evergreen Innovation Camp - Hackathon	Web		R4.0
	5-SEE	GR	SecureChain | Small and medium enterprises securing future-proof bioenergy chains	Web	Video	R4.0
6. Grow the forest-based bioeconomy through circular use and value-added products						
5. Harvesting, infrastructure, logistics	6-EU	EU	MUSIC | Market Uptake Support for Intermediate Bioenergy Carriers	Web		R4.0
	1-NE	SE	DigiWood | Digital sawmill traceability tools	Web		R4.0

Domain	Hub	Country	Challenge / BP&I Factsheet (Link)	Web	Video	Origin
7. Forest-based bio/circular economy	4-CEE	RO	EGGER wood waste recycling	Web		R1
	5-SEE	SI	RecAPPture | Mobile application for collection of used wood	Web	Video	R4.0
	6-EU	EU	BASAJAUN | Building A Sustainable Joint Between Rural and Urban Areas Through Circular And Innovative Wood Construction Value Chains	Web		R4.0
		EU	Build-in-Wood | Build-In-Wood, The eco-benefits of building with wood	Web		R4.0
7. Raise public awareness, social acceptance and political support for forestry						
1. Inventory, assessment, monitoring	5-SEE	SI	NFI | National Forest Inventory	Web	Video	R4.0
2. Ownership, cooperation	3-SWE	ES	Together for the Forests	Web		R4.0
6. Products, markets, trade	2-CWE	AT	Holzbaukarte | Wood construction map	Web		R4.0
		CH	Woodvetia | Swiss national wood promotion programme	Web		R1
9. Education, training, transfer	1-NE	FI	Forest Finland | Communication platform of the Finnish forest sector	Web		R4.0
		FI	Science Centre Pilke	Web		R4.0
	2-CWE	DE	KomSilva | Communication assistance and public relations in forestry	Web		R1

3.3 Regional Hubs and Countries

3.3.1 Distribution across Hubs

The BP&I selection is distributed unevenly across the Hubs (Figure 21). The majority of BP&I were identified in the Central-Western Europe (CWE), the Northern Europe (NE), and the South-Western Europe (SWE) Hubs. The reason is that these represent the largest Hubs in terms of number and size of countries, plus these are the technologically most advanced countries in digitalisation. Nevertheless, to achieve a good European coverage, it was ensured that also at sufficient number of cases from the other Hubs was included.

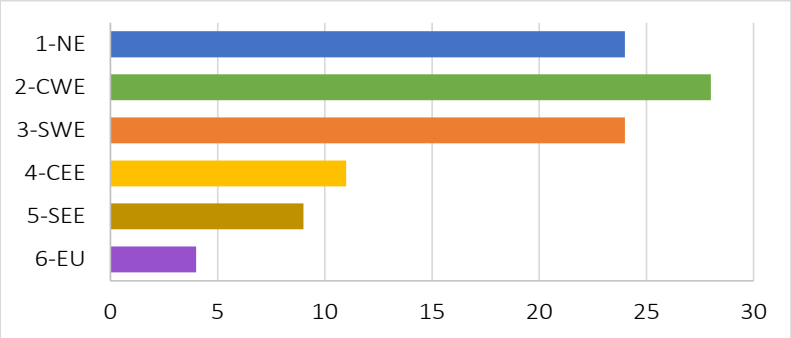


Figure 21 Number of selected BP&I per Regional Hub (n = 100)

3.3.2 Distribution across Countries

The BP&I selection includes cases from 18 countries in Europe (Figure 22). The largest sets of cases are identified in Germany (DE) and Finland (FI), followed by Spain (ES), Norway (NO), Austria (AT), and France (FR). These BP&I cases raised the highest interest among the consortium partners. In addition, four European projects were selected as interested BP&I cases for collaborative approaches.

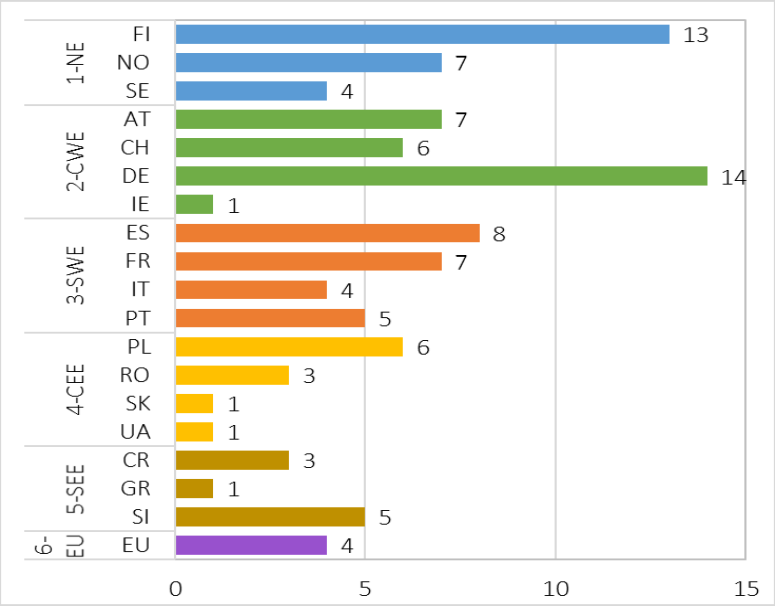


Figure 22 Number of selected BP&I per Hub and Country (n = 100)

3.3.3 Selection per Country

Table 4 List of BP&I selection sorted per Hub and Country

Note: First batch „A“ refers to D1.3. Second batch „B“ has been added in this deliverable D1.5.

Country	Hub / BP&I Factsheet (Link)	Web	Video	Origin	Batch
	1. Northern-Hub				
Finland	Trestima | Forest inventory system	Web		R4.0	B
	Biomassa-atlas | Web-based forest resource map service	Web		R4.0	A
	Virtuaalimetsä 2.0 | Virtual Forest 2.0 Innovation	Web	Video	R1	A
	Metsään.fi | eServices for Forest Owners and Service providers	Web		R1	A
	Jointly Owned Forests and Forest Land Consolidation in Finland			R1	B
	Kuutio | Online timber marketplace	Web		R1	B
	PONSSE | Firefighting equipment for forwarders	Web		R4.0	B
	Joint wood terminals		Video	R1	A
	WoodForce | Forestry software for harvesting	Web		R1	B
	LogForce | Planning tool for forestry contractors	Web		R1	B
	Forest Finland | Communication platform of the Finnish forest sector	Web		R4.0	B
	Science Centre Pilke	Web		R4.0	B
	KEMERA | Financing of Sustainable Forestry	Web		R1	A
Norway	ALLMA | Forestry plan	Web		R4.0	B
	FeltGIS | Forest suppply chain communication tool	Web	Video	R4.0	B
	SmartForest | Bringing Industry 4.0 to the Norwegian forest sector	Web		R4.0	B
	Think Wood | Info campaign of the Norwegian forest sector	Web		R4.0	B
	Women in Forestry Association	Web		R4.0	A
	Drones in forest operator education at Solør High School	Web	Video	R4.0	A
	Skogkurs | Forestry Extension Institute	Web	Video	R4.0	A
Sweden	Arboair | Detecting bark beetles with AI	Web	Video	R4.0	A
	HiVision | Virtual reality support for crane operators	Web	Video	R4.0	A
	Mistra Digital Forest | Cutting-edge research on digitalisation in forestry	Web		R4.0	B
	DigiWood | Digital sawmill traceability tools	Web		R4.0	A
	2. Central-Western Hub				
Austria	Festmeter | Bark beetle detection	Web		R4.0	B
	HolzMobRegio | Climate fit and wood mobilisation model region Graz	Web		R4.0	A
	FORSITE | Dynamic ecological forest site classification	Web	Video	R4.0	B

Country	Hub / BP&I Factsheet (Link)	Web	Video	Origin	Batch
	WoodLogistics | Modular logistics platform for wood supply chains	Web		R4.0	B
	BioRES | Biomass trading centres calculation tool	Web		R4.0	A
	Holzbaukarte | Wood construction map	Web		R4.0	B
	Evergreen Innovation Camp - Hackathon	Web		R4.0	A
Switzer-land	Kollegenschutz4.0 | Work safety improvement system for forest operations			R4.0	A
	Forwarder2020 | Smart Forwarder for sustainable and efficient forest operation and management	Web		R4.0	A
	Woodvetia | Swiss national wood promotion programme	Web		R1	A
	Marteloscopes | Demo plots for silvicultural training of forestry practicionners	Web		R1	B
	CAS | CAS / Forest management and new technologies	Web		R4.0	B
	Lignum | Wood Industry Central Switzerland	Web		R4.0	A
Germany	Waldinfo NRW | Forest information system of NRW	Web		R4.0	A
	LogBuch | Simple and efficient forest data collection	Web		R1	A
	iWald | Forest growth simulation app	Web		R4.0	A
	Virtueller Wald | Virtual Forest	Web		R1	A
	Forest cooperative societies: land consolidation of jointly owned community forests in NRW	Web		R4.0	A
	AJA | Environmental sensors for real-time forest ecosystem monitoring	Web		R4.0	B
	Roadscanner | Forest road condition monitoring sensor	Web		R4.0	A
	FOVEA | Photo-optical wood pile measurement	Web		R4.0	B
	WASP | Wood logistics platform	Web		R4.0	B
	Wood Supply 4.0 | Smart Wood Supply Chain Management	Web		R4.0	B
	Forstify | App for timber trading	Web		R4.0	B
	AVATAR | Advanced Virtual Aptitude and Training Application in Real Time	Web		R4.0	A
	KomSilva | Communication assistance and public relations in forestry	Web		R1	A
	KWH4.0 | Center of Excellence Forest and Timber 4.0	Web	Video	R4.0	A
Ireland	Forest HQ | Online system to manage land, inventories and operations	Web		R4.0	B
	3. South-Western Hub				
Spain	ForestMap | Calculate your forest inventory online	Web		R1	B
	SISREP | Management and analysis of reforestations on agricultural land			R4.0	B
	ForestLiDARioja | Forest inventory and fuel model map using remote sensing technologies	Web	Video	R4.0	A

Country	Hub / BP&I Factsheet (Link)	Web	Video	Origin	Batch
	PROMINIFUN | Pro small-holder forests operational group	Web		R4.0	B
	Together for the Forests	Web		R4.0	B
	C.A.F.E | Carbon, Aqua, Fire & Eco-resilience DSS	Web		R4.0	A
	ChainWood | Blockchain for Inmutable Timber	Web		R4.0	A
	Cross-Forest | Digital Service Infrastructures to integrate models supporting forest management and forest protection	Web		R4.0	A
France	Climafor | Carbon accounting tool	Web	Video	R4.0	A
	La forêt bouge | The forest is moving	Web	Video	R1	A
	RESOFOP | RESeau d'Observation économique de la FOrêt Privée	Web		R1	B
	eMoBois | Data exchange platform for forest industries	Web		R1	B
	ForLog | Forêt Logistique Conseil	Web		R1	B
	EXTRAFOR | Exoskeletons for forest work	Web		R4.0	B
	Je me forme pour mes bois | I'm training for my woods	Web		R4.0	B
Italy	WoodChain | Blockchain applied to PEFC c.o.c.	Web		R4.0	B
	LegnOK | EUTR operators platform	Web		R4.0	A
	GoldenEye | Advanced x-ray wood log scanning system for sawmills	Web		R4.0	B
	RILEGNO | National wood collection and recycling network	Web		R4.0	A
Portugal	Areas Florestais Agrupadas | Forest Area Aggregation		Video	R4.0	A
	Melhor eucalipto | Better eucalypt	Web		R4.0	B
	e-globulus | Knowledge transfer platform towards sustainable forest management	Web		R4.0	B
	Forscope | Forest Supply Chain Optimization System			R4.0	A
	sIMfLOR | Platform for the Portuguese forest simulators	Web		R4.0	B
	4. Central-Eastern Hub				
Poland	PROZEL | Forecasting threats to forest ecosystems using an innovative electronic system for the recognition of odours	Web		R4.0	A
	BDL | Forest Data Bank	Web	Video	R4.0	A
	LasInfo | Integrated information system for national parks, nature conservation and forest management	Web		R4.0	B
	ForBioSensing | Comprehensive monitoring of stand dynamics in Białowieża Forest supported with remote sensing techniques	Web		R4.0	B
	WAMBAF | Water Management in Baltic Forests	Web		R4.0	B
	e-drewno.pl | Forest stock market	Web		R4.0	A
Romania	TimFlow | WoodTracking System	Web	Video	R1	A
	SUMAL 2.0 | Digital Wood Tracking	Web		R4.0	B
	EGGER wood waste recycling	Web		R1	A

Country	Hub / BP&I Factsheet (Link)	Web	Video	Origin	Batch
Slovakia	LignoSilva INFRA | Innovative forestry research centre with 3D CT scanner technology	Web	Video	R4.0	A
Ukraine	Electronic timber tracking in Ukraine	Web	Video	R4.0	A
	5. South-Eastern Hub				
Croatia	DetectIT | Save our forests	Web	Video	R4.0	A
	Public data of forests	Web	Video	R4.0	A
	CIA2SFM | European cooperation for innovative approach in sustainable forest management training	Web	Video	R4.0	B
Slovenia	NFI | National Forest Inventory	Web	Video	R4.0	B
	Invazivke | Web infoportal about invasive species	Web		R4.0	A
	WCM | WoodChainManager	Web		R1	B
	MojGozdar (My Forester) | Quality assessment of forestry contractors	Web	Video	R1	A
	RecAPPture | Mobile application for collection of used wood	Web	Video	R4.0	B
Greece / EU	SecureChain | Small and medium enterprises securing future-proof bioenergy chains	Web	Video	R4.0	A
	6. European initiatives (several countries)				
EU	SIMWOOD | Sustainable Mobilisation of Wood	Web		R4.0	B
	MUSIC | Market Uptake Support for Intermediate Bioenergy Carriers	Web		R4.0	B
	Build-in-Wood | Build-In-Wood, The eco-benefits of building with wood	Web		R4.0	B
	BASAJAUN | Building A Sustainable Joint Between Rural and Urban Areas Through Circular And Innovative Wood Construction Value Chains	Web		R4.0	B

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— rosewood-network.eu
— info@rosewood-network.eu
— twitter.com/NetworkRosewood
— linkedin.com/in/rosewood-network

Authored and promoted by:

STEINBEIS-EUROPA-ZENTRUM
EFI
INNOVAWOOD
cesefor Castilla y León Wood & Forest Services Center
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