Cross Forest

INEA/CEF/ICT/A2017/1566738

Cambric - (CAlidad de la Madera en Bosques mIxtos)

Simulations at https://www.simanfor.es

Felipe BRAVO
Cristóbal ORDÓÑEZ

Co-financed by the Connecting Europe Facility of the European Union

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Index

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- Input data. Selection
- Models and taxa.
- Industry requirements.
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- Results.
- Future developments and expectations

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1. Cross-Forest DSI.
Use of project resources.

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- Digital Service Infraestructure (DSI) of Cross-Forest project
  - Linked Open Data (LOD)
    - Data: National Forest Inventories (NFI), Land Use Maps, …
    - Ontologies
      - National Forest Ontology: General and for each country
      - Simple Positions Ontology
      - EPSG ontology
      - Simple Measure Ontology
  - Caléndula (SCAYLE), High Performance Computing (HPC)
- Pilot project CAMBrIc – CAlidad de la Madera en Bosques mIxtos

CAMBrIc focuses in simulate different management alternatives to generate a data base with wood quality in Spain.
Target stands: mixed and pure stands of: *Pinus sylvestris, Pinus pinaster, Pinus nigra, Fagus sylvatica, Quercus pyrenaica, Quercus robur* and *Quecus petraea.*

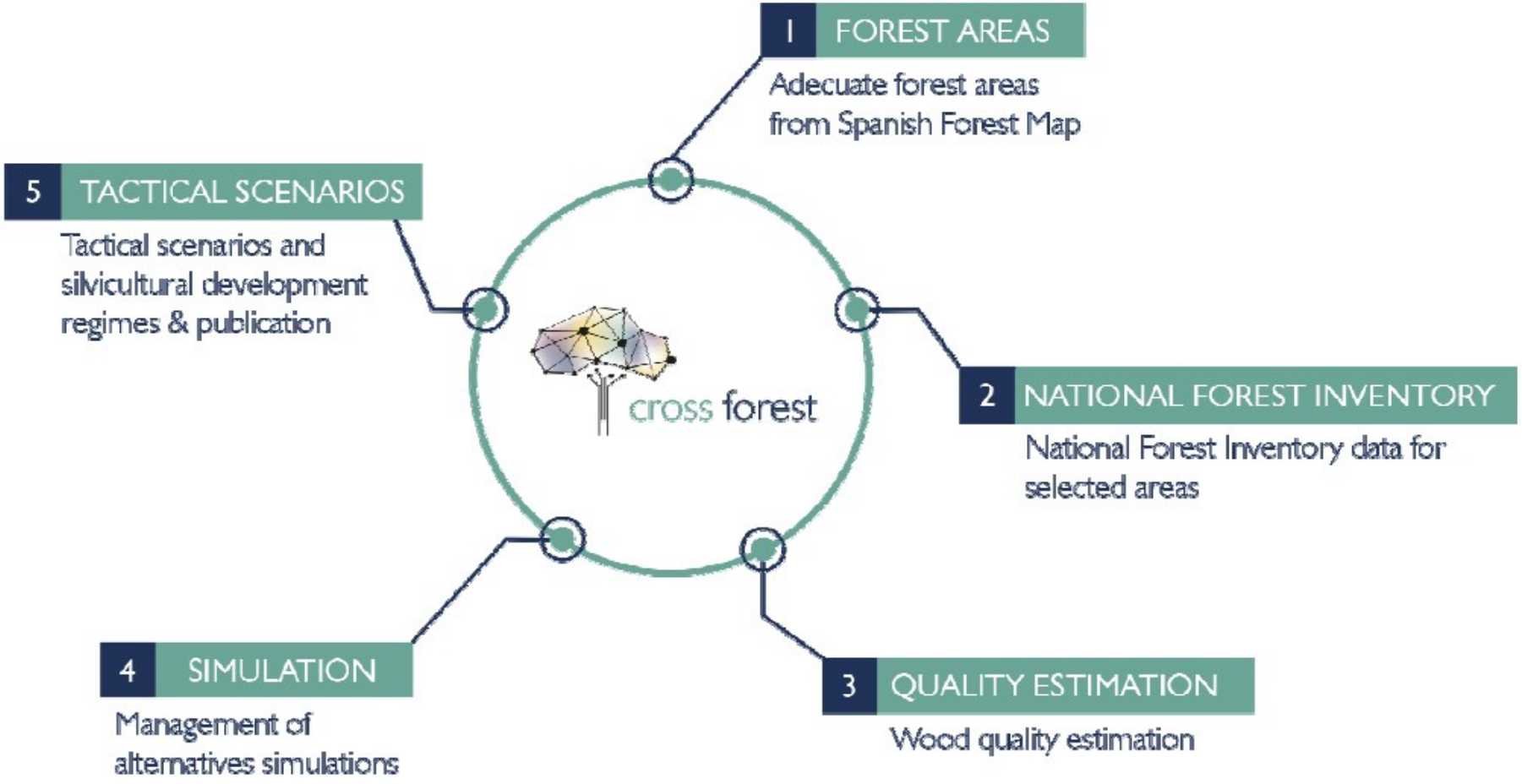

Figure 2. CAMBrIC Pilot Workflow

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2. Input data. Selection.

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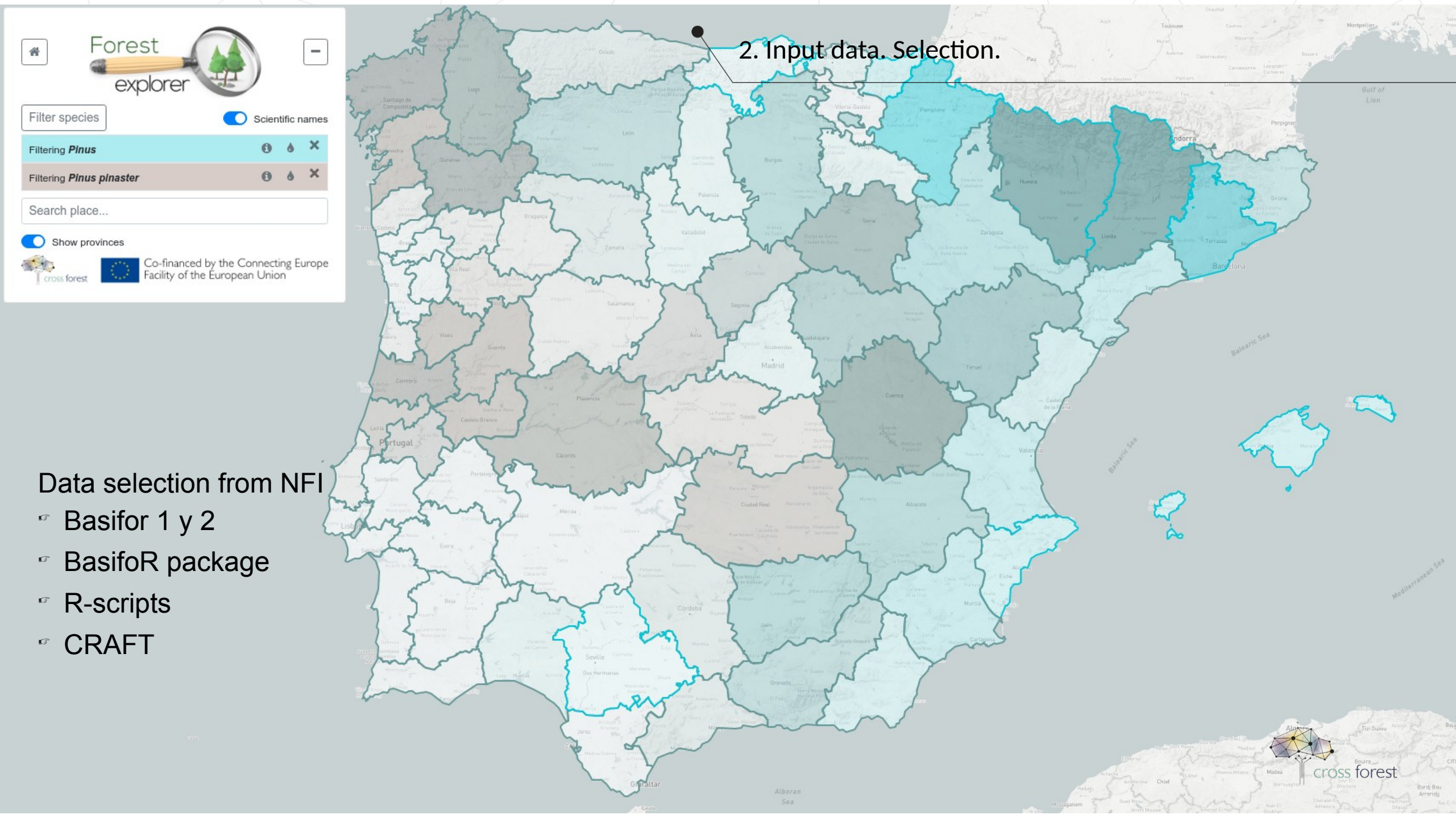

Data selection from NFI

- Basifor 1 y 2
- BasifoR package
- R-scripts
- CRAFT

Basifor

BASIFOR

Archivo Herramientas Ventana Ayuda

Acerca de...

BASIFOR 2.0

herramienta para manejo de bases de datos del IFN2 e IFN3.

Organismos Participantes:

Versión 2.0 (Año 2002):
Universidad de Valladolid
Proyecto financiado por la Dirección General de Conservación de la Naturaleza, Ministerio de Medio Ambiente.

Versión 1.0 (Año 2000):
- Universidad de Valladolid
- Instituto de Investigaciones Agrarias (INIA)
- Universidad Politécnica de Madrid
- Dirección General de Conservación de la Naturaleza
- TRAGSATEC

Programa financiado por la CICYT mediante el proyecto nº 1FD97-0879

Dirección de contacto:
Felipe Bravo Oviedo. fbravo@pvs.uva.es
E. T. S. Ingenierías Agrarias, Universidad de Valladolid, Campus de Palencia

Aceptar

Bases de datos seleccionadas

Código	Descripción	Parcelas	Pies Mayores
05	Ávila. IFN2.	1382	14377
Total parcelas y pies mayores seleccior		1382	14377

Opciones de cálculo

Índices de diversidad estructural | HCB, CR, HLCW, LCW

General | **Ecuaciones de cubicación**

Método de cálculo
- ○ Usar las ecuaciones del IFN
- ◉ Usar las ecuaciones del IFN, salvo en los casos definidos por el usuario
- ○ Usar solo ecuaciones definidas por el usuario — Definir Ecuaciones

Variables

Seleccionar las variables que se desean calcular, según ecuaciones de IFN :
- ☑ VCC (Volumen Maderable con Corteza)
- ☐ VSC (Volumen Maderable Sin Corteza)
- ☐ IAVC (Incremento Anual del Volumen con Corteza)
- ☐ VLE (Volumen de Leñas Gruesas)

Especial Alcornoques
- ☑ SDCH (Superficie de descorche)
- ☑ IDCH (Intensidad de descorche)

Aceptar | Cancelar | Ayuda | Calcular

Herramienta de Corte

Definir Criterios

Matorral | Estadillo 1 | Estadillo 2 | Pies Menores | Informe

Especies | Var. Masa | UTM | Municipios | Parcelas

Especie: 21 (Pinus sylvestris)

Área Basimétrica (en m2/ha o %): > ____

Nº Pies Mayores (en pies/ha o %): > ____

Especies seleccionadas:

Especie	AB	Nº PM
21	> 75%	> 500

El resultado será combinación: ◉ Y (todos) ○ O (alguno)

Aplicar Criterios:

◉ Uno: (Especies) ○ Varios:

☐ Especies ☐ Matorral
☐ Masa ☐ Estadillo1
☐ UTM ☐ Estadillo2
☐ Municipios ☐ Pies Menores
☐ Parcelas

Cada parcela del resultado debe cumplir: ◉ todos los criterios ○ algún criterio

☐ Eliminar parcelas con cero pies mayores

☑ IFN2 ☐ IFN3 ☐ Comparativa

Resumen del corte

Nº Parcelas: 34
Nº PiesMayores: 1048
Nº Pies menores: 23
Nº Especies: 3
Nº parcelas con 0 pies mayores:

Lista de especies: 21 (34), 25 (0)

Guardar a fichero | Mostrar corte

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BasifoR R-package
https://cran.r-project.org/web/packages/basifoR/index.html

cran.r-project.org/web/packages/basifoR/index.html

basifoR: Retrieval and Processing of the Spanish National Forest Inventory

Data sets of the Spanish National Forest Inventory are processed to compute tree metrics and statistics. Function dendroMetrics() controls most of the routines.

Version:	0.3
Depends:	R (≥ 2.10), RODBC
Imports:	foreign, Hmisc, httr, measurements, stats, utils
Published:	2021-03-05
Author:	Wilson Lara, Cristobal Ordonez, Felipe Bravo
Maintainer:	Maintainer: Wilson Lara <wilarhen at gmail.com>
License:	GPL-3
NeedsCompilation:	no
CRAN checks:	basifoR results

Downloads:

Reference manual:	basifoR.pdf
Package source:	basifoR_0.3.tar.gz
Windows binaries:	r-devel: basifoR_0.3.zip, r-release: basifoR_0.3.zip, r-oldrel: basifoR_0.3.zip
macOS binaries:	r-release (arm64): not available, r-release (x86_64): basifoR_0.3.tgz, r-oldrel: basifoR_0.3.tgz

Linking:

Please use the canonical form https://CRAN.R-project.org/package=basifoR to link to this page.

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2. Input data. Selection.

R script

- csv files as input:
  - Tree and plot level data from NFI
- Species and mixtures as criteria
- Age as compulsory data for monospecific stands
- Geographic area as criteria
  - MFE
- Output as format available for use in simanfor
  - csv files (plot and tree)
  - Excel file

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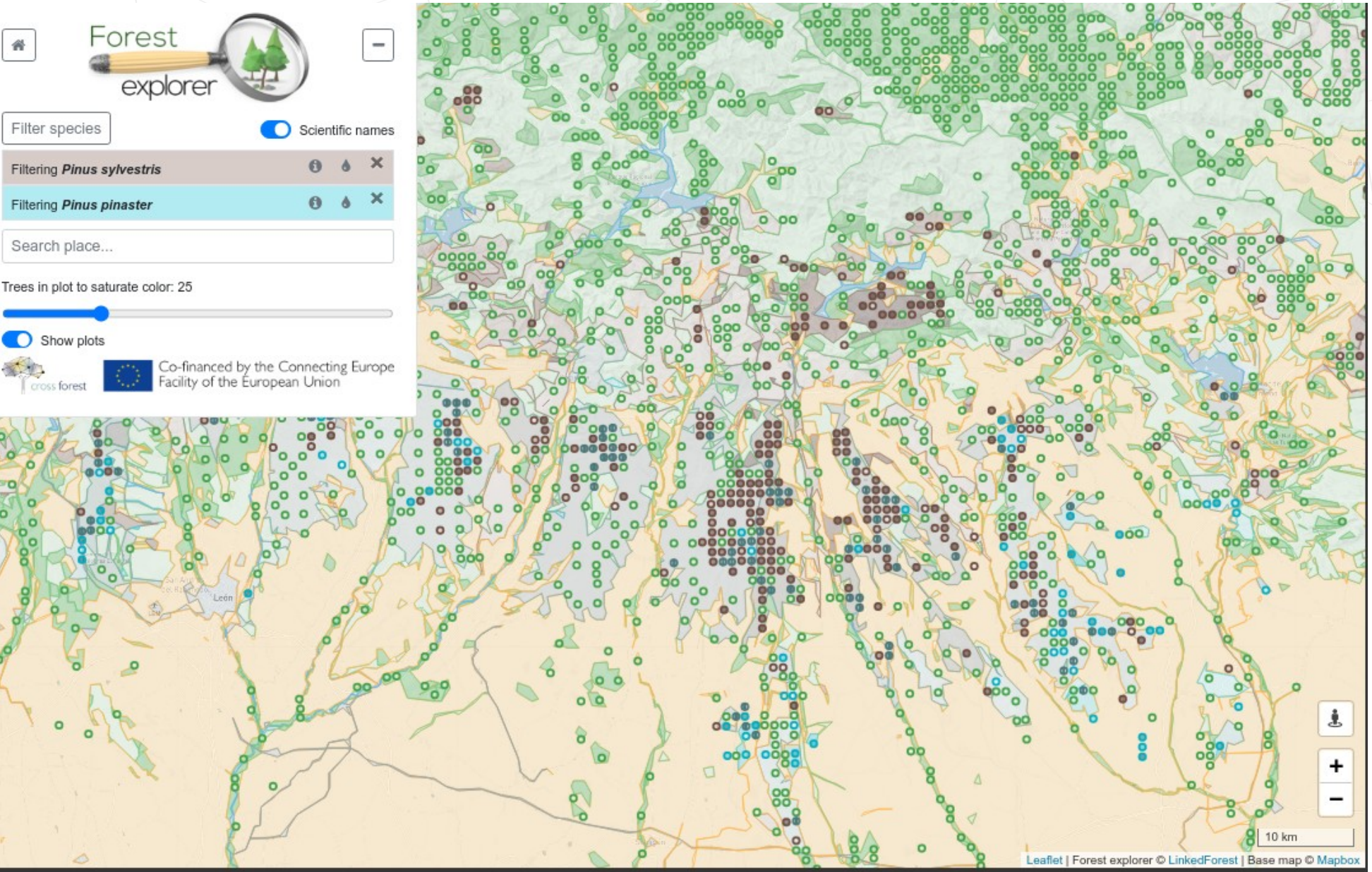
2. Input data. Selection.



CRAFTS

- Gathering data from project DSI
- JSON or csv file format
- Powerful queries hiding SPARQL complexity

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3. Models and taxa.

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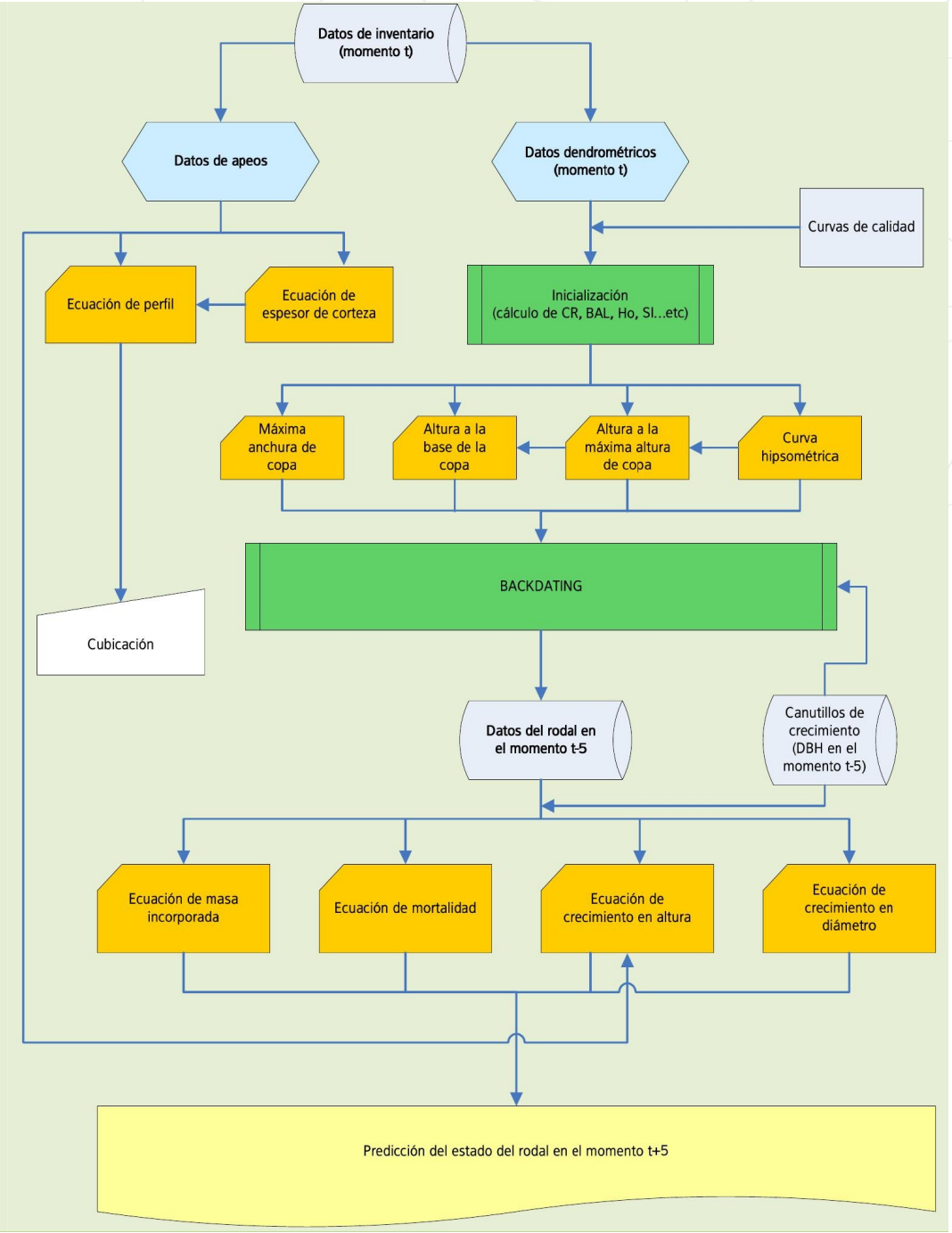

3. Models and taxa.

- Mixed stands
  - M1_PnigPsyl
  - M2_PpinPsyl
  - M3_FsylPsyl
  - M8_PsylQpyr
- *Pinus nigra* stands
  - Pnigra_Cat
  - Pnigra_CyL
- *Pinus nigra* stands
  - Ppinaster_Gal_costa
  - Ppinaster_Gal_interior
  - Ppinaster_PIb
  - Ppinaster_SIb
- *Pinus sylvestris* stands
  - Psylvestris_AVE
  - Psylvestris_Cat_plantacion
  - Psylvestris_Cat_natural
  - Psylvestris_Gal
  - Psylvestris_Ibero
  - Psylvestris_Mad
  - Psylvestris_StCentral
- *Quercus pyrenaica* stands (Qpyrenaica)
- *Quercus pyrenaica* stands (Qrobur_Gal)

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4. Industry requirements.

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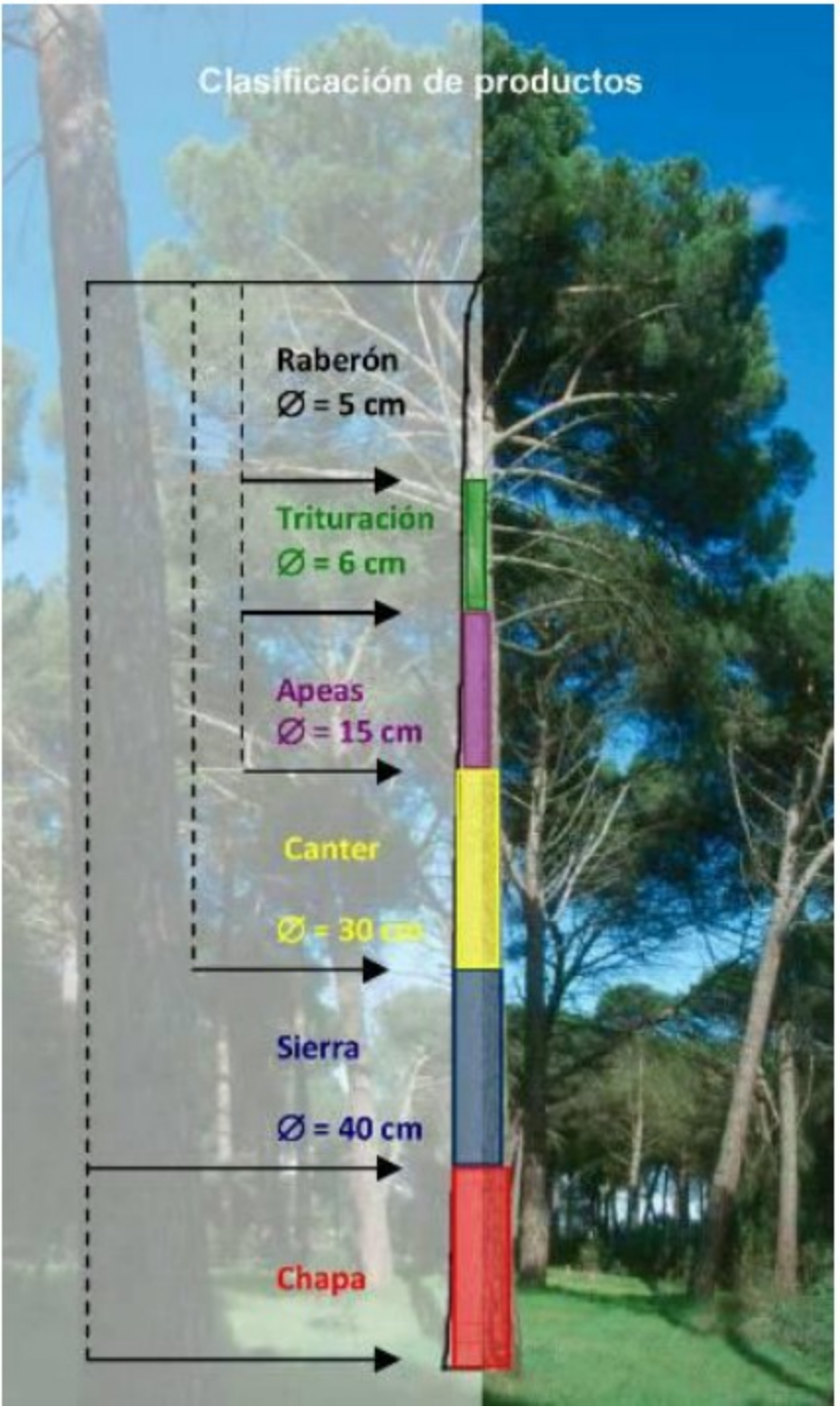

Wood quality assesment:

- Size estimation: taper equations
  - Uses depending on size
- Knot estimation
- IFN indicators

All requirements are implemented throught the growth model adapted for each species or taxon.

- Prunning effect
- Total volume by sizes

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5. Silviculture alternatives.

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Alternative management scenarios (Duncker et al, 2012):

(1) Pasive: **Forest reserve**
(2) Low: **Close to nature silviculture**
(3) Medium: **Multi-objective**
(4) High: **Intensive silviculture**
(5) Intensive: **Short rotation plantations**

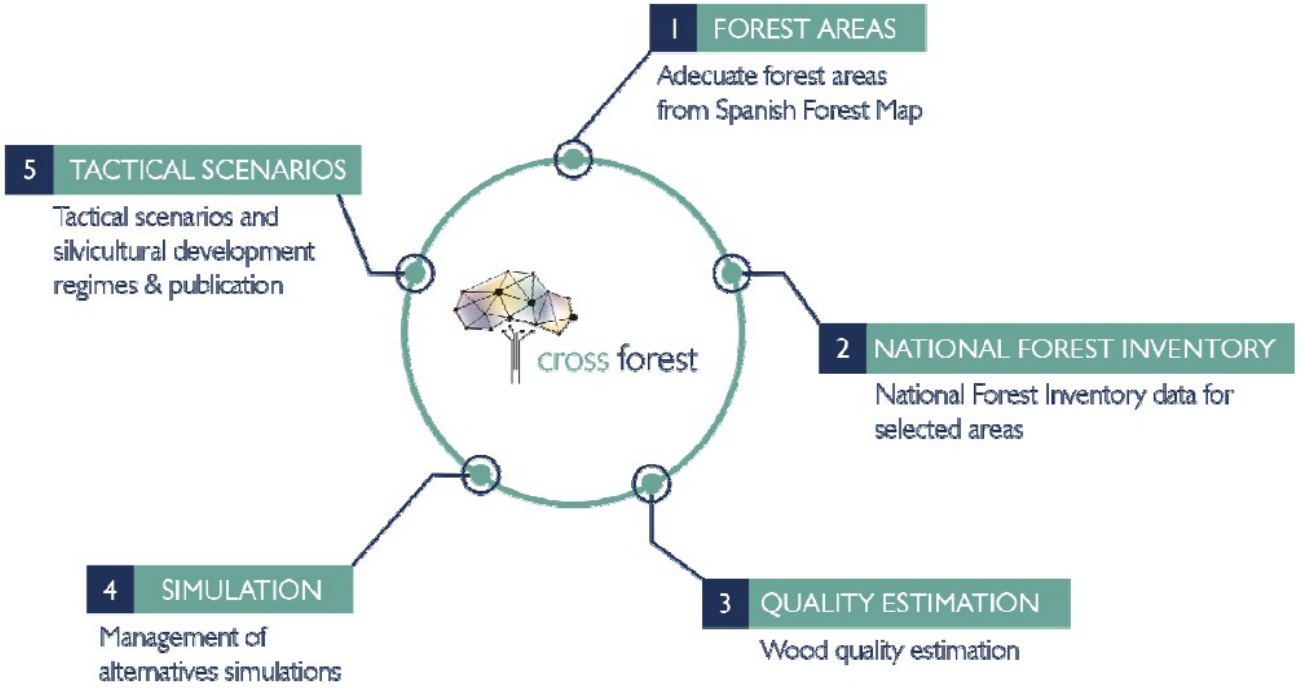

Figure 2. CAMBrIC Pilot Workflow

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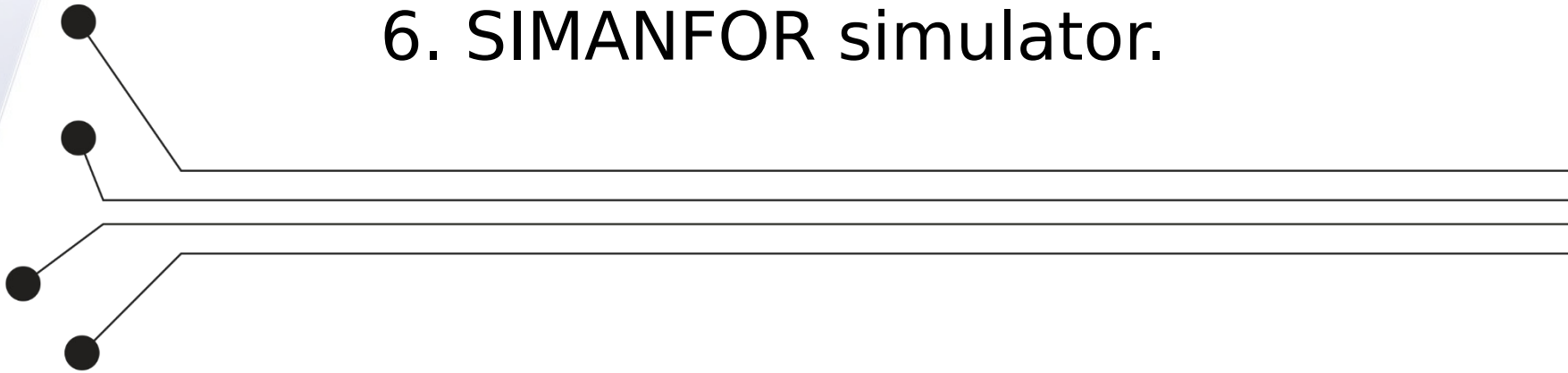
6. SIMANFOR simulator.



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Uses

- Model development and evaluation
- Forest simulation and inventory projections
- Desing of silviculture management alternativas

Objetives

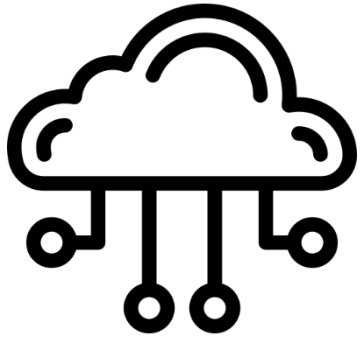
- Forest Planing and management
- Education
- Research and development

SIMANFOR

Tecnology

Platforms

Devices



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6. SIMANFOR.

SIMANFOR

en

Support System for the Simulation of Sustainable Forest Management Alternatives

About us

SIMANFOR is a web application that allows simulating sustainable forest management alternatives.

SIMANFOR integrates different modules to manage forest inventories, simulate and project different stand conditions (using algorithms and prediction and projection formulas), query systems, simulation outputs and security system.

SIMANFOR is multiplatform and support forestry dynamic multilevel models (from tree to stand level)

Click here to download the user account request form. Once filled, you must send it to the following email address: simanfor.data@forest.uva.es

Research

iuFOR Instituto Universitario de Investigación en Gestión Forestal Sostenible · UVa · iap Escuela Técnica Superior de Ingenierías Agrarias Palencia · Universidad de Valladolid

Development

s|ngular

Funds

European Commission Innovation and Networks Executive Agency · cross forest

SIMANFOR

en

- Inventories
- Models
- Scenarios
- Help
- Legal
- Log out

Help

Help resources

- SIMANFOR Blog
- User manual
- Inventory Data Template
- Modelizer manual
- Unsuscribe from SIMANFOR
- Personal data management in SIMANFOR - Spanish
- Personal data management in SIMANFOR - English

Terms of use

SIMANFOR is subject to some conditions of use that you should know since when using the application you accept them in an inherent way. Click here for the SIMANFOR Terms of Use .

¿How to quote SIMANFOR?

The use of SIMANFOR should be cited as follows:

Bravo F, Ordoñez C, 2021. SIMANFOR: Support system for the simulation of sustainable forest management alternatives. Available at www.palencia.uva.es/SIMANFOR

In addition, the use of each model included in the system must be cited according to the proposed appointment form for each of them.

Credits

Original idea: Felipe Bravo Oviedo (UVa).

Coordination: Felipe Bravo Oviedo (UVa), Cristóbal Ordóñez Alonso (UVa).

Development: S|ngular

PC version, available for linux like and windows

```
################################################################################################
RUN OPERATION: Corta
################################################################################################
################################################################################################
RUN OPERATION: Ejecución de modelo
################################################################################################
#----------------------------------------------------------------------------------------------- #
     Running: Pinus pinaster mesogeensis model (Sistema Ibérico Meridional). Plot: 1.0
#-----------------------------------------------------------------------------------------------#
#----------------------------------------------------------------------------------------------- #
     Running: Pinus pinaster mesogeensis model (Sistema Ibérico Meridional). Plot: 2.0
#-----------------------------------------------------------------------------------------------#
#----------------------------------------------------------------------------------------------- #
     Running: Pinus pinaster mesogeensis model (Sistema Ibérico Meridional). Plot: 3.0
#-----------------------------------------------------------------------------------------------#
################################################################################################
RUN OPERATION: Corta
################################################################################################
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#----------------------------------------------------------------------------------------------- #
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#-----------------------------------------------------------------------------------------------#
#----------------------------------------------------------------------------------------------- #
     Running: Pinus pinaster mesogeensis model (Sistema Ibérico Meridional). Plot: 3.0
#-----------------------------------------------------------------------------------------------#
################################################################################################
RUN OPERATION: Ejecución de modelo
################################################################################################
#----------------------------------------------------------------------------------------------- #
     Running: Pinus pinaster mesogeensis model (Sistema Ibérico Meridional). Plot: 1.0
#-----------------------------------------------------------------------------------------------#
#----------------------------------------------------------------------------------------------- #
     Running: Pinus pinaster mesogeensis model (Sistema Ibérico Meridional). Plot: 2.0
#-----------------------------------------------------------------------------------------------#
#----------------------------------------------------------------------------------------------- #
     Running: Pinus pinaster mesogeensis model (Sistema Ibérico Meridional). Plot: 3.0
#-----------------------------------------------------------------------------------------------#
PRINTING YOUR PLOT 1.0 EXCEL OUTPUT...
PRINTING YOUR PLOT 2.0 EXCEL OUTPUT...
PRINTING YOUR PLOT 3.0 EXCEL OUTPUT...
```

HPC version, installed in Caléndula

```
##############################################################################
##                                                                          #
##            Bienvenido a Calendula / Welcome to Calendula                 #
##               SCAYLE Supercomputacion Castilla y Leon                    #
##              SCAYLE Castilla y Leon Supercomputing Center                #
##                                                                          #
##  This is a private server!!! All ssh login attempts are logged and       #
##  monitored by our staff. All unauthorized login attempts will be         #
##  investigated and reported to local authorities.                         #
##                                                                          #
##  The user (you) must know and comply the security regulations            #
##  as security policies, as every SCAYLE systems and users are under       #
##  them. Security regulations and policies are available for reading.      #
##                                                                          #
##  If your have any login problem please contact helpdesk at               #
##  Phone: +34 987 293160 or email us                                       #
##  Email: soporte@scayle.es                                                #
##  Security Regulations and Policies: https://extranet.scayle.es           #
##                                                                          #
##############################################################################

CALENDULA[ uva_iufor_1_3@frontend2 ~]$ cat ~/simanfor/scripts/sim010.job.sh
#!/bin/bash
# numero de cores que serán reservados
#SBATCH -n 1
# particion en donde se ejecutara el trabajo
#SBATCH -p haswell
# limites que se aplicaran al trabajo
#SBATCH -q normal
# nombre
#SBATCH -J sm4_simul_sim010-from1to22500
# tiempo maximo de ejecucion (p.e. 2 dias). Maximo permitido: 5 dias
#SBATCH --time=120:00:00
# archivos de salida y de error
#SBATCH -o sm4_simul_sim010-array_%A_%a.o
#SBATCH -e sm4_simul_sim010-array_%A_%a.e
# directorio de trabajo por defecto
#SBATCH -D .
# notificaciones por email relacionadas con la ejecucion del trabajo
#SBATCH --mail-user=angelcristobal.ordonez@uva.es
#SBATCH --mail-type=ALL
#SBATCH --array=1-22500
ROOT=/home/uva_iufor_1/uva_iufor_1_3/simanfor/simulator
SCNR=/scratch/uva_iufor_1/uva_iufor_1_3/sim010/scenario/scnr_sp999_${SLURM_ARRAY_TASK_ID}_4-100.json
# carga de las variables necesarias para usar Python 3.7.7
module load python_3.7.7
# ejecution of simulator
python $ROOT/src/main.py -s $SCNR -logging_config_file $ROOT/config_files/logging.conf
CALENDULA[ uva_iufor_1_3@frontend2 ~]$
```

7. Results

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7. Results

SIMANFOR			Zona de estudio					Inventario		simulat.en.10.60							
			Monte					Parcela		1							
			Composición específica			999		Modelo		999							
			ID especie principal (IFN)					Escenario		Experimento HPC sim002							
		Masa antes de la corta				Masa extraída			Masa después de la corta				Masa muerta			Masa incorporada	
Edad (años)	Ho (m)	N (pies/ha)	Dg (cm)	G (m2/ha)	V (m3/ha)	N (pies/ha)	Dg (cm)	V (m3/ha)	N (pies/ha)	Dg (cm)	G (m2/ha)	V (m3/ha)	N (pies/ha)	Dg (cm)	V (m3/ha)	N (pies/ha)	G (m2/ha)
25	12,11	1111	11,21	10,97	64,26												
30	13,68	1229,63	13,09	16,54	114,1								2,21	11,21	0,1	120,83	1,72
35	15,25	1322,88	14,71	22,47	174,75								2,7	13,09	0,22	95,95	1,55
40	16,7	1398,37	16,12	28,56	244,09								3,33	14,71	0,39	78,82	1,41
45	18,01	1436,94	17,46	34,4	316,93								4,16	16,12	0,65	42,73	1,02
50	19,21	1465,75	18,68	40,15	393,54								4,98	17,46	0,99	33,79	0,93
55	20,12	1524,01	19,87	47,24	486,74								5,94	18,68	1,44	64,2	2,33
60	21,06	1571,36	20,91	53,96	580,54								7,56	19,87	2,18	54,91	2,09
65	21,97	1610,09	21,83	60,29	673,59								9,46	20,91	3,14	48,19	1,88
70	22,83	1639,3	22,68	66,2	764,77								11,65	21,83	4,37	40,86	1,69
75	23,65	1661,16	23,44	71,68	853,41	166,12	18,43	60,05	1495,05	23,93	67,25	853,41	14,12	22,68	5,87	35,98	1,52
80	24,46	1510,29	24,68	72,27	876,67								12,73	23,93	6,13	27,97	1,26
85	25,25	1519,33	25,38	76,89	957,38								14,95	24,68	7,83	23,99	1,11
90	26,02	1522,11	26,05	81,11	1034,42								17,32	25,38	9,76	20,1	0,97
95	26,76	1519,41	26,68	84,92	1107,46								19,76	26,05	11,9	17,05	0,83
100	27,5	1511,41	27,28	88,33	1176,29								22,22	26,68	14,22	14,23	0,71
105	28,22	1498,22	27,86	91,34	1240,69								24,64	27,28	16,67	11,45	0,58
110	28,93	1480,19	28,43	93,98	1300,58								26,94	27,86	19,18	8,91	0,47
115	29,63	1457,77	28,99	96,25	1356,02								29,04	28,43	21,7	6,62	0,35
120	30,33	1431,22	29,55	98,17	1406,98								30,89	28,99	24,17	4,33	0,24

Resumen | Metadatos | Parcelas | Nodo 0 - Pies mayores | Nodo 1 - Pies mayores | Nodo 2 - Pies mayores | No ...

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CAMBrIc is generating a new data base (**open linked data**) and will be published in CrossForest DSI with information about wood quality for all analyzed taxa

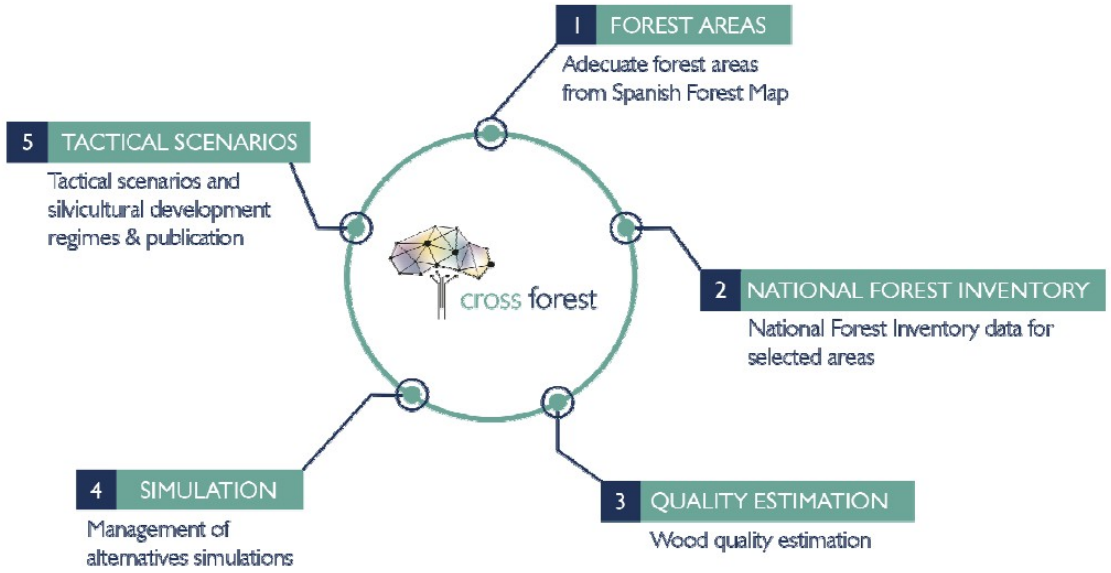

Figure 2. CAMBrIC Pilot Workflow

This DSI will be useful for different target user (forest managers – public and private, wood and biomass industry chers and rural development advisers) who can implement planning systems in light of this information.

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A test for 89996 randomly generated plots has been simulated in Caléndula for 7 days:

- Slurm Array Job from 1 to 22500 (4 plots by job) Began 24/3/21 17:31
- Slurm Array Job from 1 to 22500 Ended 31/3/21 9:29

Real plot simulation are being prepared for all suitable plots from second and third Spanish National Forest Inventory

8. Future developments and expectations

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- LiDAR inventories integration
- Map selection inventories
- Output publication as OLD
- Growth and yield model development for relevant species and mixtures

Thanks for your attention!

Felipe BRAVO, fbravo@pvs.uva.es
Cristóbal ORDÓÑEZ, a_cristo@pvs.uva.es

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