Forestry Thematic Exploitation Platform

Earth Observation Open Science 2.0

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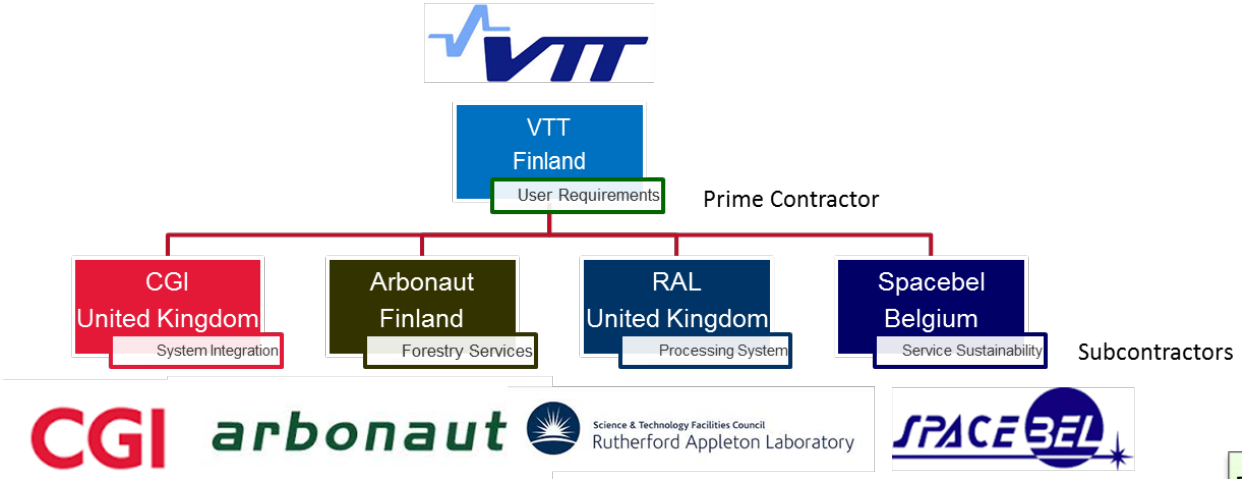
and the Forestry TEP Team

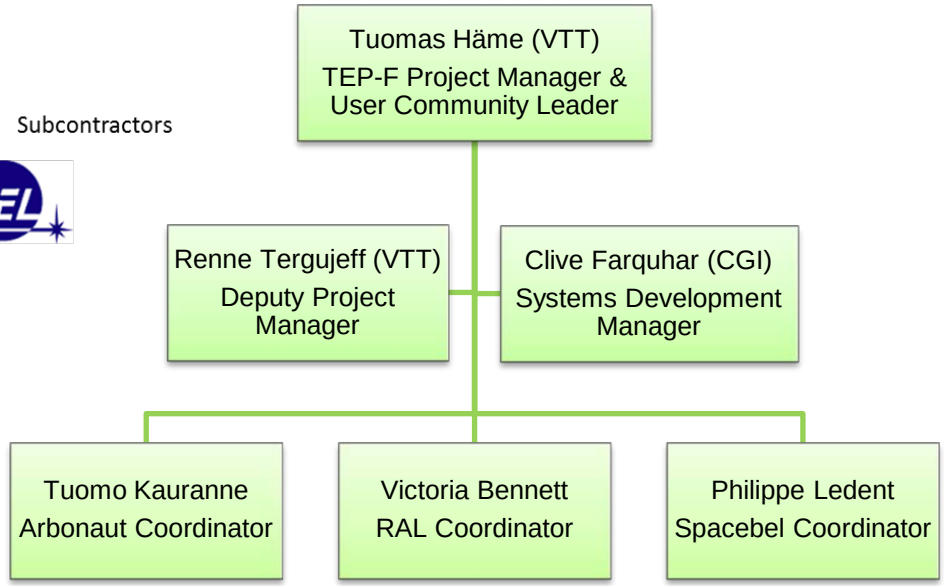
forestry
tep

Objective

- One-stop shop for forestry remote sensing services for the academic, operational public and commercial sectors
- Move away from model where each user works in their own ‘silo’
- Reduce the costs of data acquisition from miscellaneous sources with varying formats and processing levels
- Self-service environment with support
- 30 months from March 2015 – Definition Phase 1 being completed

Our team


VTT
Finland
User Requirements
Prime Contractor
CGI
United Kingdom
System Integration
Arbonaut
Finland
Forestry Services
RAL
United Kingdom
Processing System
Spacebel
Belgium
Service Sustainability
Subcontractors
CGI
arbonaut
Science & Technology Facilities Council
Rutherford Appleton Laboratory
SPACEBEL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Manager
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Systems Development
Manager
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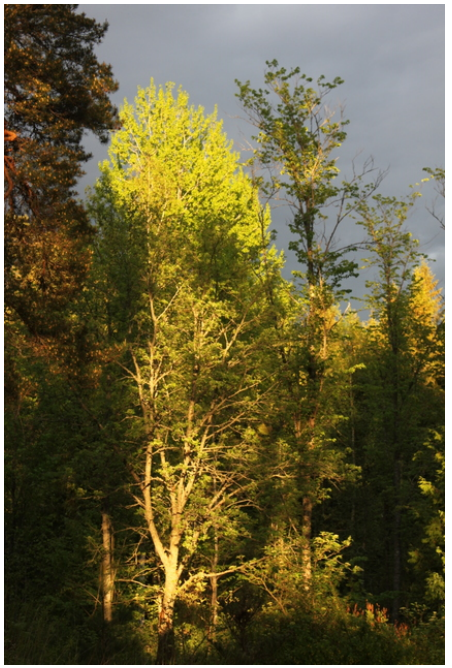
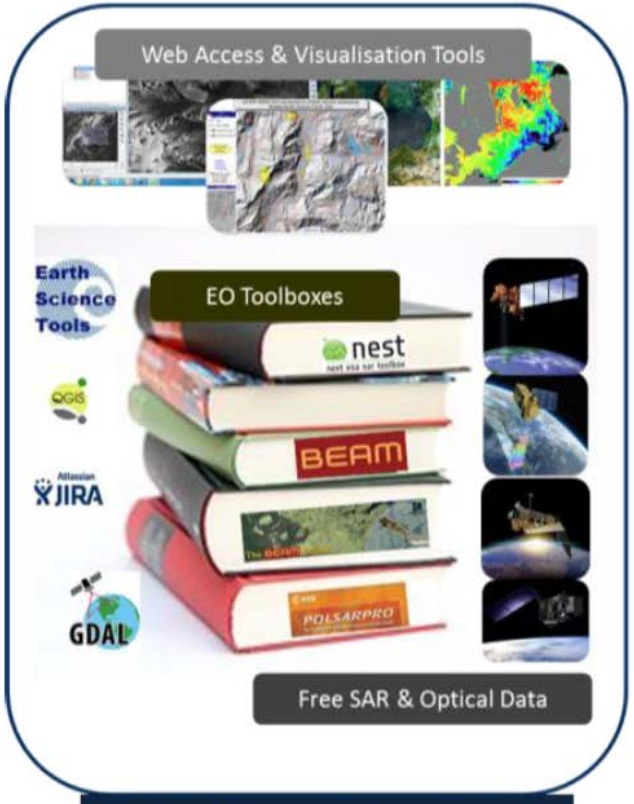
Arbonaut Coordinator
Victoria Bennett
RAL Coordinator
Philippe Ledent
Spacebel Coordinator

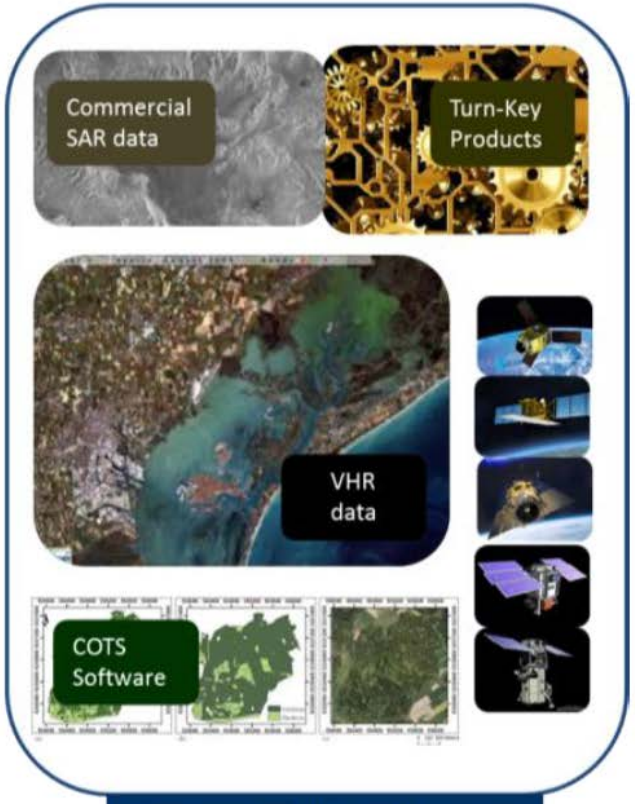
Serving foresters, administration, scientists, service providers, NGO’s globally



Forest Thematic Platform



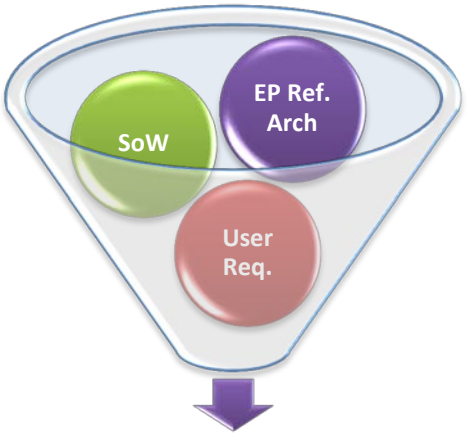
Free of Charge Component



Commercial Component

Technical Solution - Design Drivers

- Community & impact driven
- Deliver a smart ICT-based solution in a user-friendly environment
- Enable infrastructure independence
- Scalable as per usage, cost effective solution
- Open Source Software driven
- Standards based (e.g. OGC Web Services)
- EO-SSO integration
- Integrated accounting & quota management
- Implements data access policies



F-TEP Solution

Forestry-TEP Service Layers

SaaS

- F-TEP platform end users relies on this layer to deliver EO applications over the web
- End-users focus on data exploitation and collaboration activities

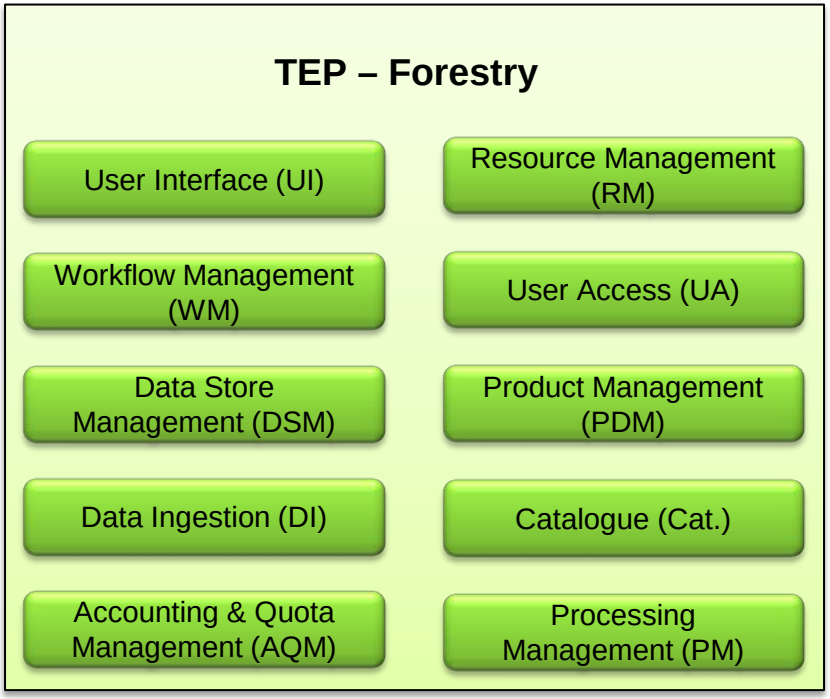
PaaS

- F-TEP platform expert users rely on this layer to develop and test their applications and to deploy it for the benefit of forestry community
- Service providers access this layer to integrate their services (data, software etc.)

IaaS

- This layer comprises of the hardware and software that constitute the F-TEP platform
- This layer provides the complete platform infrastructure including the underlying hardware and software

F-TEP Building Blocks



1. **User Interface (UI):** Front-end of TEP system; allows data selection, data processing, collaboration activities
2. **Workflow Management (WM):** Provides access to various workflows and its management
3. **Data Store Management (DSM):** Provides access to EO data abstracting different repositories
4. **Data Ingestion (DI):** Enables populating data storage and catalogue
5. **Accounting & Quota Management (AQM):** Tracks resources (data, ICT, software) usage and enables pay-per-use model
6. **Resource Management (RM):** Allocates ICT resources as per demand, supports cloud bursting
7. **User Access (UA):** Provides user authentication & authorisation
8. **Product Management (PDM):** EO data visualization and data dissemination tools
9. **Catalogue (Cat.):** OpenSearch based Metadata catalogue for data discovery
10. **Processing Management (PM):** Provides access to WPS for processing needs

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Apps | - Etusivu | Il Du... | Asetukset - Tar... | Arno Klein's bin... | Google | ESA Corporate ...

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FTEP USER #1

- DASHBOARD
- PROJECTS
- GEOBROWSER
- DATA BASKETS
- PROCESSING
- JOBS
- CALENDAR
- COMMUNITY
- STATISTICS
- FORESTRY WIKI
- CLOUDBOARD

News

Global Forest Watch @globalforests 21h

Dams in #Brazil now "methane plants" due to gas #emissions from improper forest removal blog.globalforestwatch.org/2015/10/guest-... pic.twitter.com/LR0mm5MbDY

Retweeted by forestry tep

Expand

forestry tep @forestry_tep 4h

pic.twitter.com/DdxAs1XB1u

Messages

Direct Chat 3

Alexander Pierce 23 Jan 2:00 pm

The data you sent for processing yesterday has some interesting results

23 Jan 2:05 pm Sarah Bullock

You better believe it!

Alexander Pierce 23 Jan 5:37 pm

There's a space conference in South America ..

Type Message ... Send

Notifications

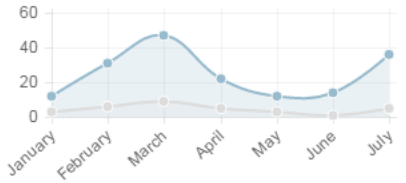
Completed

#0003 - BOL 19 DATA
No of series: 421
Success!

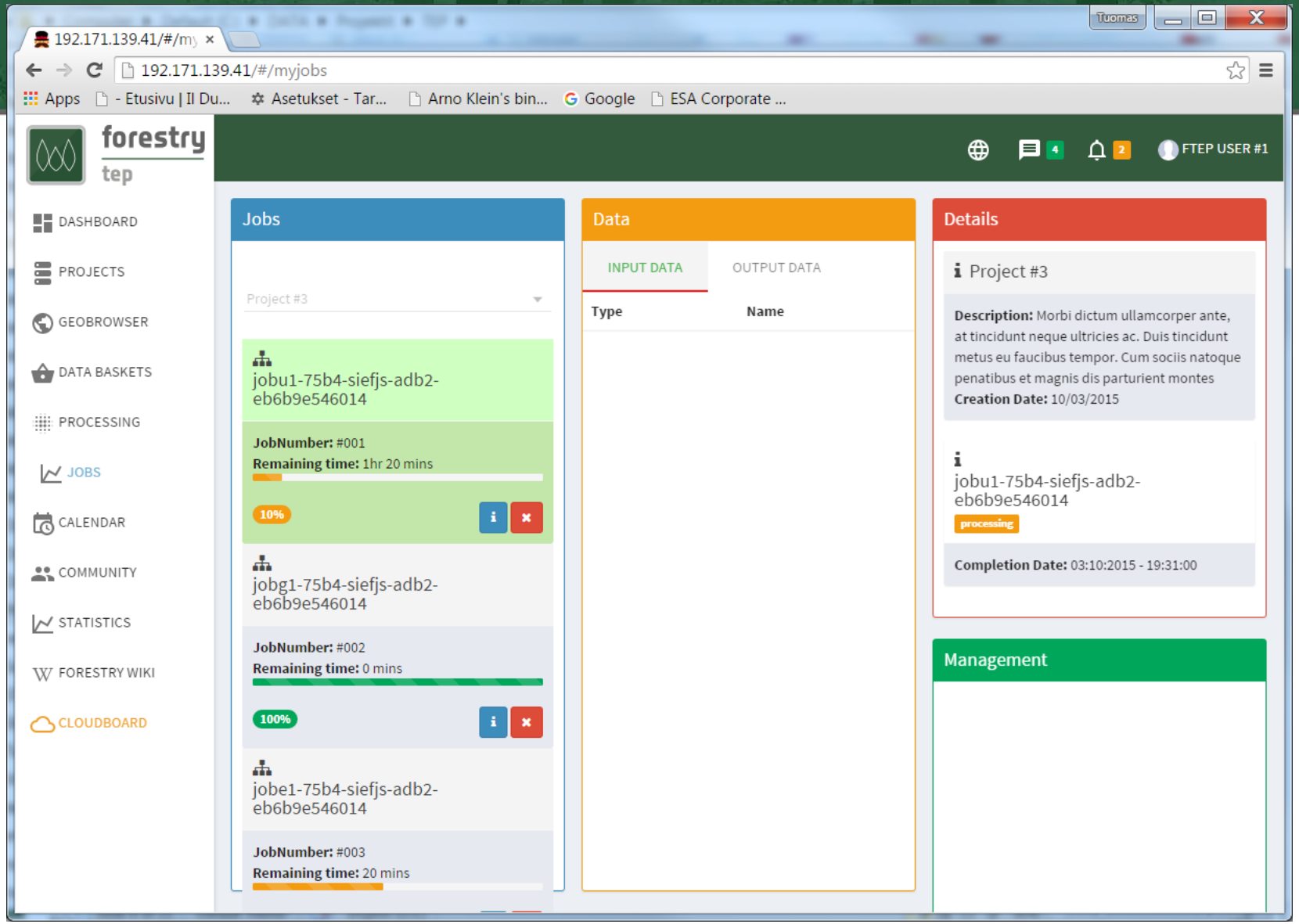
#0003 - BOL 19 DATA
No of series: 421
Success!

Statistics

Processing success/fails 2015



Geobrowser slide here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Apps
- Etusivu | Il Du...
Asetukset - Tar...
Arno Klein's bin...
Google
ESA Corporate ...
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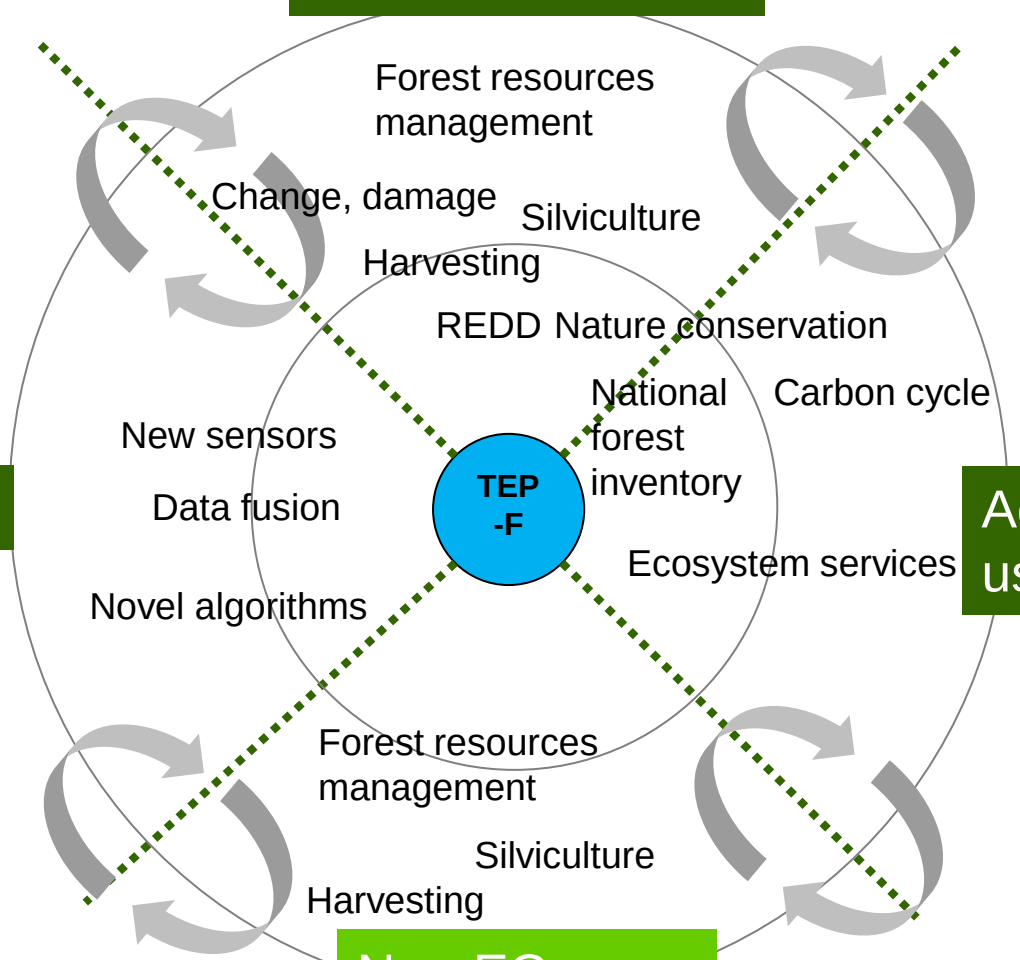
FTEP USER #1
DASHBOARD
PROJECTS
GEOBROWSER
DATA BASKETS
PROCESSING
JOBS
CALENDAR
COMMUNITY
STATISTICS
FORESTRY WIKI
CLOUDBOARD
Jobs
Project #3
jobu1-75b4-siefjs-adb2-eb6b9e546014
JobNumber: #001
Remaining time: 1hr 20 mins
10%
jobg1-75b4-siefjs-adb2-eb6b9e546014
JobNumber: #002
Remaining time: 0 mins
100%
jobe1-75b4-siefjs-adb2-eb6b9e546014
JobNumber: #003
Remaining time: 20 mins
Data
INPUT DATA
OUTPUT DATA
Type
Name
Details
Project #3
Description: Morbi dictum ullamcorper ante, at tincidunt neque ultricies ac. Duis tincidunt metus eu faucibus tempor. Cum sociis natoque penatibus et magnis dis parturient montes
Creation Date: 10/03/2015
jobu1-75b4-siefjs-adb2-eb6b9e546014
processing
Completion Date: 03:10:2015 - 19:31:00
Management

TEP Forest evolution

Routine end users

- Acquire required products easily through TEP
- Develop new services or products to increase offering



Research users

- Develop and share new algorithms or EO products for the research community through TEP
- Share ideas & enable collaboration

Advanced expert users

Administrator users make it all happen

Non-EO users

User Type	What they do	Key user needs
Forest and climate research community	Varies from developing own products to using existing products	Multi temporal & multi-sensor data, ability to tweak algorithms
Forest owners and managers	Monitor forest state and plans	Accurate and timely products (resource pool, damage, accessibility, etc.)
Forest certification organisations	Granting certificates of sustainable forestry	Information on good and sustainable forest management
Regional/national forest administration	Collect information on national forest resources to support forest planning and management	Timely information on forest status of forest (clear cuts, shrub abundance, etc.)
International Initiatives, research programmes and panels	Coordination of satellite image acquisition, pre-processing and delivery	Support to coordination activities
International development banks	Evaluation of forest state and resources; establishing markets for forest ecosystem services	Timely and accurate information forest resources and their dynamics including deforestation and forest degradation
Sustainable development NGOs	Economic and policy decisions affecting forests	Reliable and easy-to use products on forest cover, degradation, fragmentation, etc. (requiring also historical data)
UN organisations	Capacity building for the UN member countries on national forest inventories and REDD	Easy-to-use and freely distributable image analysis tools; access to pre-processed low-level products
Value adding (SME) industries	Collect and refine satellite and ancillary data for value added products to satisfy customer needs	Information on the amount and location of forest resources, monitoring of change

User scenarios 1 - EO Data Exploitation

- Products for the user himself
- Non-experienced user, e.g. state government, forest administration
- Looking for available data, products, services, push button functionality
- E.g forest cover map, change map, vegetation index

User scenarios 2 - New EO Service Development

- Service for others to use
- Service company, institutional user
- Looking for versatile tools, computing power, simple charging model
- E.g. forest cover and biomass mapping service, change mapping service, degradation mapping service

User scenarios - New EO Product Development

- Products for himself or for selling
- Academic user, value adding ‘factory’, institutional user
- Looking for versatile tools, computing power, simple charging model in case of commercial activity
- e.g. forest cover and biomass maps, change maps, degradation maps, primary productivity

User geographic area of interest

- From continental to local
- Academic research community operates often over smaller areas than the research centers or administrations
- Radar community with continental to global focus an exception

What do the users want? 1/2

- **Data, Data & Data**
  - Also preprocessed data download a common interest
  - High expectations for Sentinels
  - Many academic users do not mind downloading large data volumes
- One stop-shop-for data, services development, products
- All academic users are not necessarily experts in EO data analysis
- Most users did not consider own algorithm implementation a central requirement – exceptions being candidate giant users UN-REDD and the Joint Research Centre

What do the users want? 2/2

- Use of in-situ data important
- Functionality to compute confusion matrices and root mean square errors for assessing accuracy
- User privacy very important for most users, including academics
- Very simple user interface commonly required but the academics not so concerned about it
- Willingness to pay higher with the private and administrative users than with the academic sector – expectations for public funding
- Communication network and even internet connection an issue outside Europe

Target communities and their needs

- Primary user communities identified
  - Close collaboration users
  - Key users
  - ESA will define additional users during the project
- Diversity in user requirements
  - *E.g.* spatial resolution, processing levels, source data, geographic area
- Similar requirements
  - Easy access to a range of specific products
  - Timely access to data
  - Access to wide set of data types
- Key challenge to encourage the user community to use the TEP

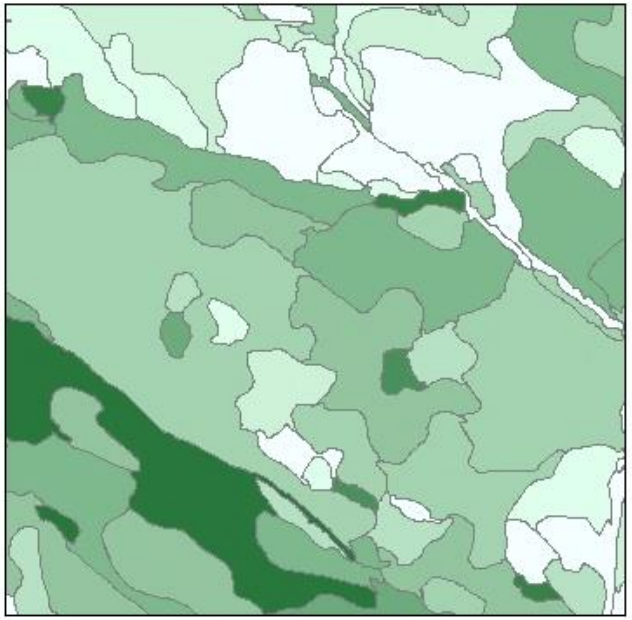
Pilots in Mexico and Finland

Monitoring of forest carbon in Mexico

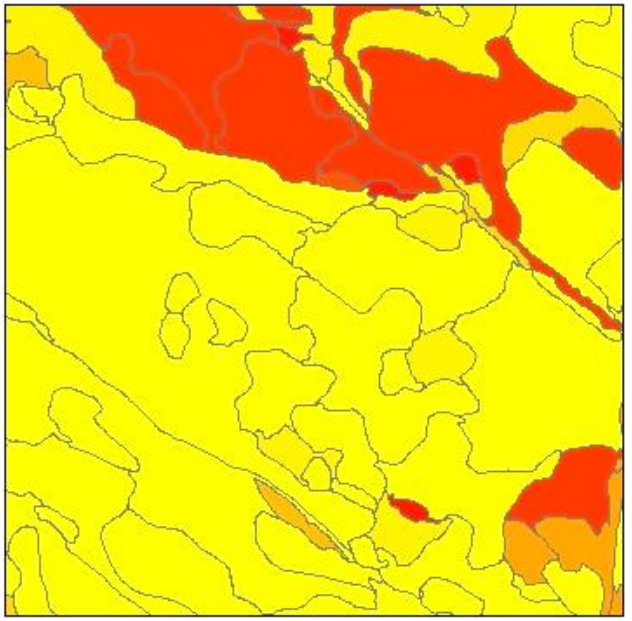
Mapping of harmful broadleaved shrubs on regeneration areas

Pilot projects

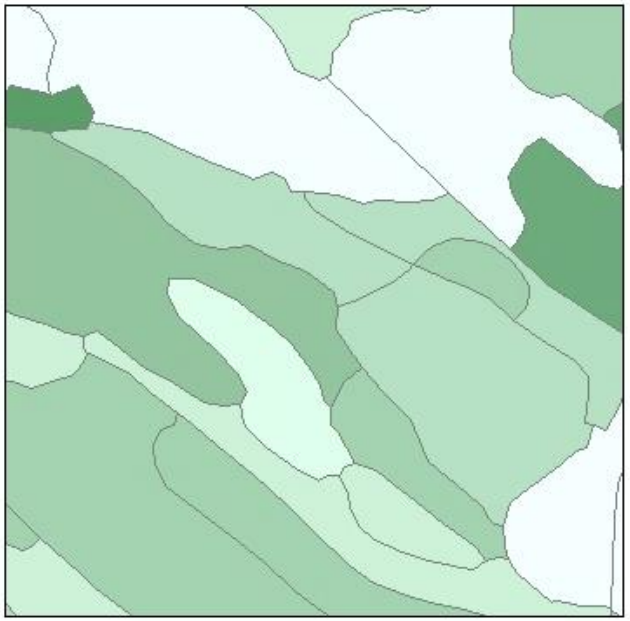
	Pilot 1 (Mexico)	Pilot 2 (Finland)
Region	Mexico: Chiapas and Durango states	Finland
Area covered	73,311 km^2 (Chiapas) and 123,317 km^2 (Durango)	338,424 km^2
Key outputs	Forest cover mapping and change detection Carbon accumulation: AccuCarbon DUE Innovator III	Forest cover mapping and change detection
Key data used	Sentinel-1 SAR, Sentinel-2 Optical	Sentinel-2 Optical
In-situ data	1: Durango university ground sample network 2: from ESA pilot project EducEO	Collected by forestry centre during standard field work
Key users involved	Ministry of Environment and Natural History of the state government of Chiapas University of Durango	Finnish Forest Centre (part of Ministry of Agriculture and Forestry)



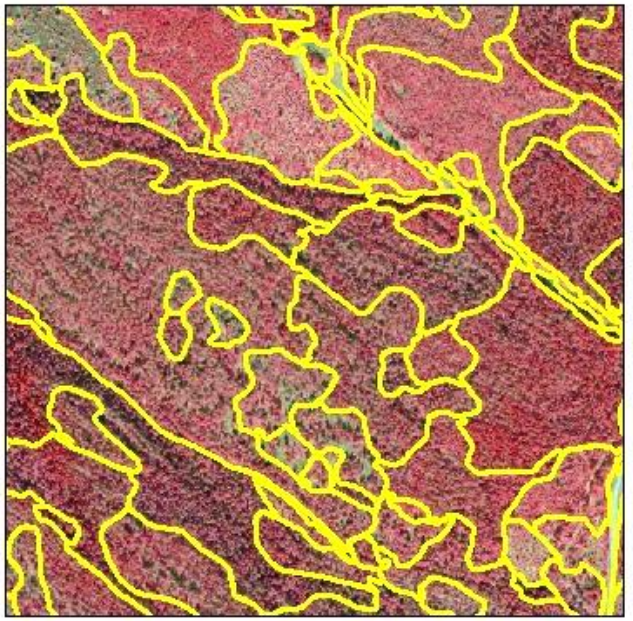
Stem Volume (total)

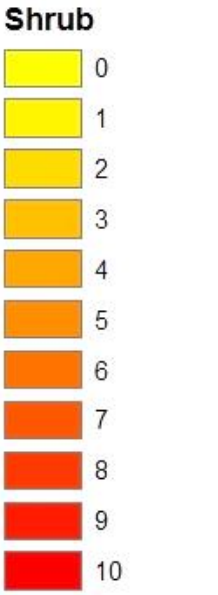


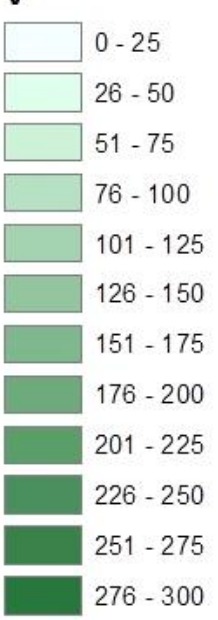
Shrub

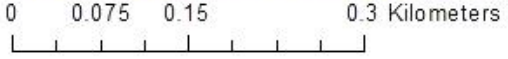


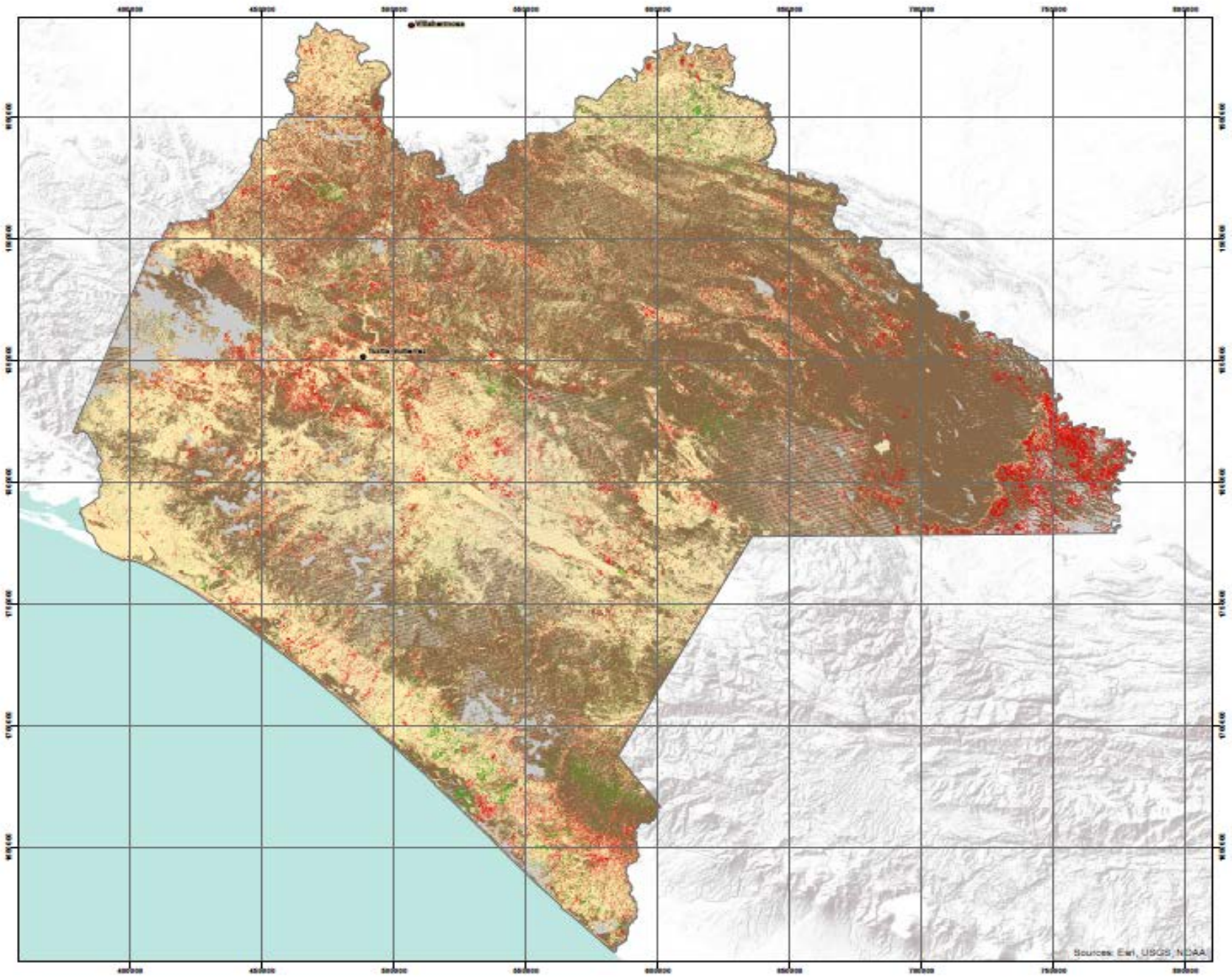
Tornator stands











ReCover

ReCover Map ID: MX-16000-LAN-LAN-FCH-1990-2010-V1

Forest change map 1990-2010

Chiapas State, Mexico

Location Diagram

Legend

- forest all years
- non-forest to forest
- non-forest all years
- no data
- forest to non-forest

Cartographic Information

Map projection: UTM Zone N15 , Datum: WGS84

Scale: 1: 1 400 000 for A3 print

N

Interpretation

The purpose of this overview map is to support CONAFOR, CONABIO, CONANP and the Chiapas State authorities (Mexico) to support efforts to curb deforestation and forest degradation with the particular reference to the REDD (Reducing Emissions from Deforestation and forest Degradation) mechanism.

The maps shows forest cover change between years 1990 and 2010.

The change map was compiled by applying change detection and land cover classification techniques to image mosaics that were produced from data of Landsat TM/ETM 4, 5 and 7 from years 1990, 1995, 2000, 2005, and 2010.

Data Sources

Imagery Source
Landsat - satellite. Resolution 30 m, resampled to 28 m.
Dates range from 06/12/1987 to 29/03/2011

Background / Ancillary Layers
Google Basemap (Terrain layer)
Chiapas borders (Shapefile)

Framework

Map produced the 04.09.2013 by VTT
©VTT

To get more information on this mapping go to:
http://www.reconcile.gmes.eu/

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arbonaut

This research leading to these results has received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 282910

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Summary

- As a whole, user needs are similar
- High user expectations (unrealistic taken project volume into consideration?)
- Single platform for all forestry EO services from data access to product download required
- Capability for data download requested more than expected
- IT capability can vary a lot, in particular lack of fast communication networks outside Europe
- Other platforms of national authorities should be considered
- Project progressing as planned

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