IN-SYLVA France: National research infrastructure for adaptive management in forests

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A research infrastructure to tackle the challenges of global change in forests

◇ Context: **Global Change** and the **socio-economic environment** (energetic/ecological transitions) increase the pressure on forests and wood-based products.

◇ Needs: **Innovation in forest management** to ensure forests ecosystem services sustainability and adaptation to global changes.

⇒ The **National Research Infrastructure IN-SYLVA France**, has been nominated to the **French roadmap for research infrastructures** in March 2018, coordinated by INRAE.

⇒ IN-SYLVA France is a response to the social, economic and environmental challenges described in The National Forest and Wood Programme.

◇ **In-Sylva France brings together the research facilities of all French institutes working on forest management** : INRAE, CIRAD, ONF, FCBA, CNPF, OFB, and University of Rouen Normandie.

◇ It's originality is to leverage **sylvicultural, biogeochemical** and **genetic tools** to elaborate an adaptive and sustainable approach to the management of forest stands.

=> **IN Sylva France contributes to all scientific objectives (GOS) of the Ecology and Biodiversity research division (ECODIV) of INRAE**

IN-SYLVA France is ...

An answer to challenges	Using sciences	To create innovations
Global change adaptation	Forest sciences, Biochemistry, Genetics.	Breeding new varieties
Sustainability	**With dedicating services**	Guiding species choice in plantation forest
Forest ecosystem services		Stand Renewal and Structure
Regulation of biological cycle	In-Situ	New silvicultural itineraries for adaptive management
Forests in transition	In-Lab	
Biological invasions	In-Silico	Wood harvest intensity
Bioeconomy		

Services for scientific communities

In-Situ* services:

◇ **27 networks; 5000 forest sites; 4000 ha.**

◇ An experimental **network** of IN-SYLVA France includes several sites spread over a given territory (regional - national).

◇ One site includes several treatments.

◇ The objective is to multiply the pedo-climatic conditions to test a panel of treatments.

◇ The networks are divided into **4 main themes** :
Forest genetic resources
Cross-effect of silviculture and genetics
Stand renewal and silviculture
Ecosystem services and silviculture
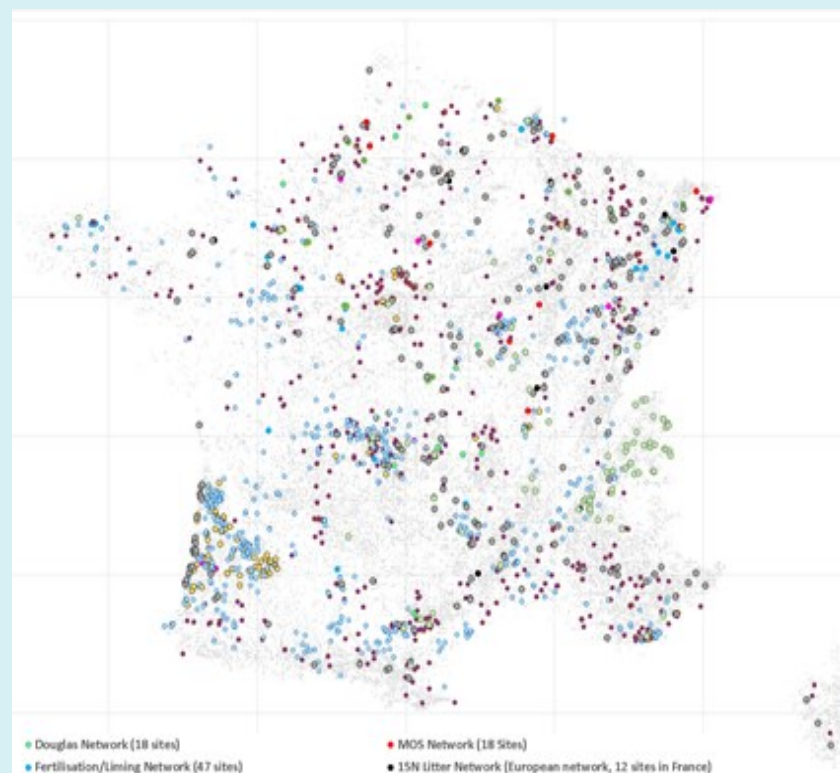
In-Lab* services:

◇ **Analytical platforms are specialized** in functional ecology, biogeochemistry, xylosciences, genetics, vegetative multiplication.
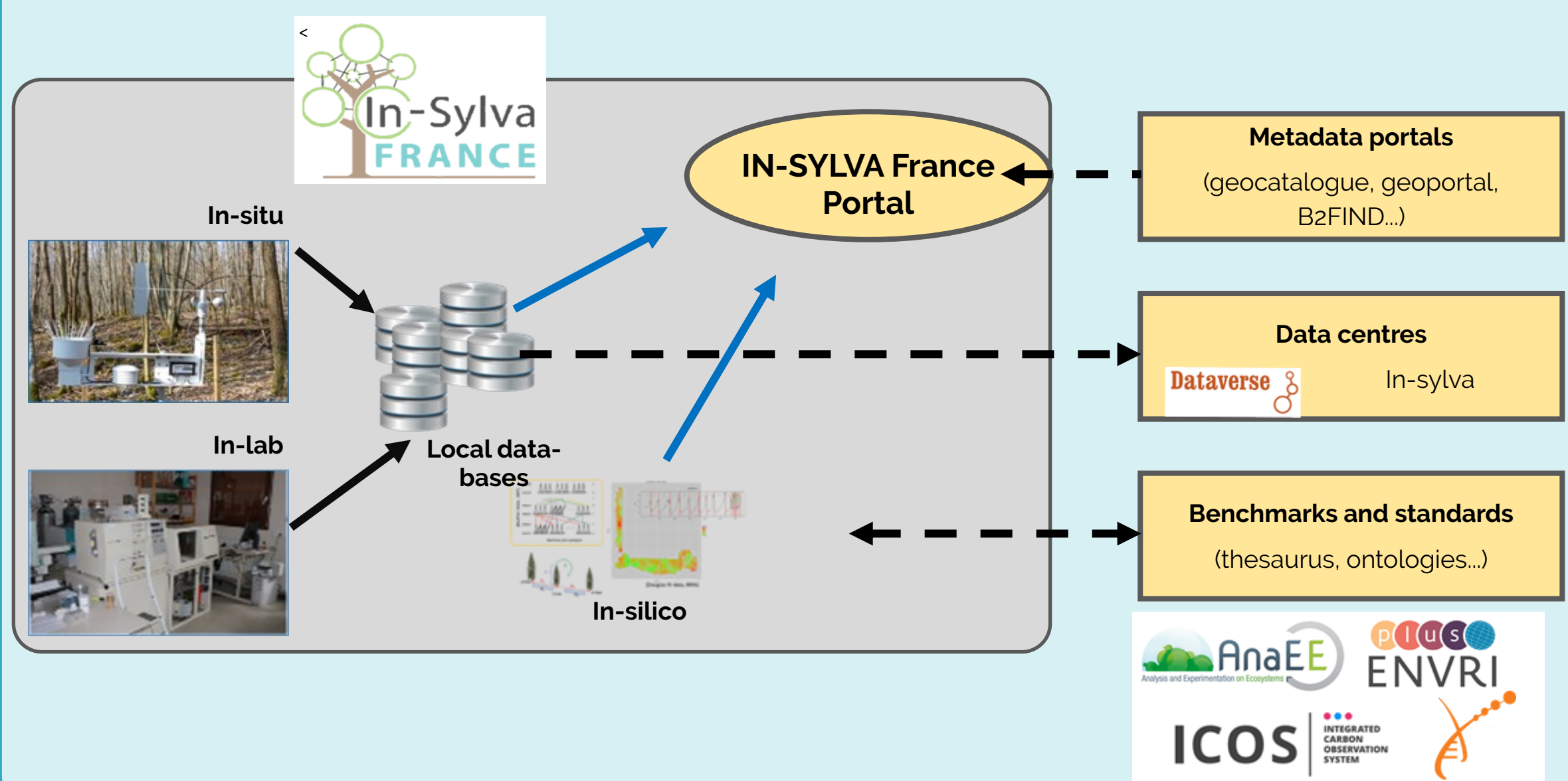
In-Silico* services:

◇ Databases and information systems, analyses software and simulators

◇ IN-SYLVA France information system

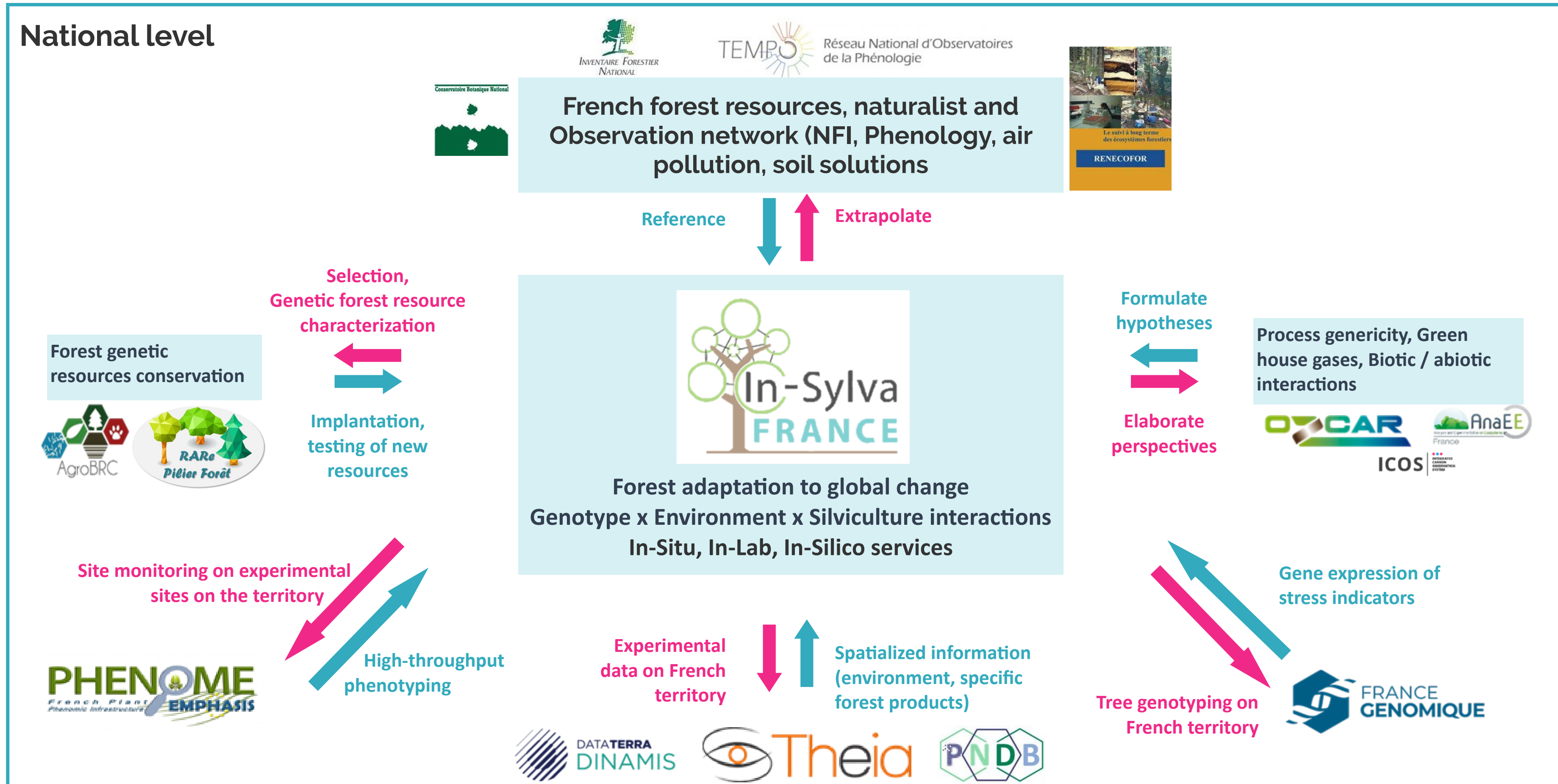*In-Situ, In-Lab and In-Silico permanent services are supported by **partners**

IN-SYLVA France information system

IN-SYLVA France information system federates local information systems of partners distributed in a national and international landscape

Website: http://w3.avignon.inra.fr/bas_insylva/login?requestType=search

## A research infrastructure with an European ambition

National level

French forest resources, naturalist and Observation network (NFI, Phenology, air pollution, soil solutions)

Forest adaptation to global change
Genotype x Environment x Silviculture interactions
In-Situ, In-Lab, In-Silico services

European level

European Union Centre for the Adaptation of Forests to global change (IN-SYLVA Europe)
Starting community in genetics TREES4FUTURE, extended to other domains by integrating:

◇ Observation and experimentation field networks (France: In-Situ services of IN-SYLVA France, ICP-Forests, TREEDIVNET…, Germany: The LONG-TERM YIELD Experiment, Sweden: SILVABOREAL in Sweden,..),

◇ High throughput analytical platforms (in functional ecology, wood sciences, plant health..),

◇ Forest dynamics modelling and socio-economical platforms.

Organisation
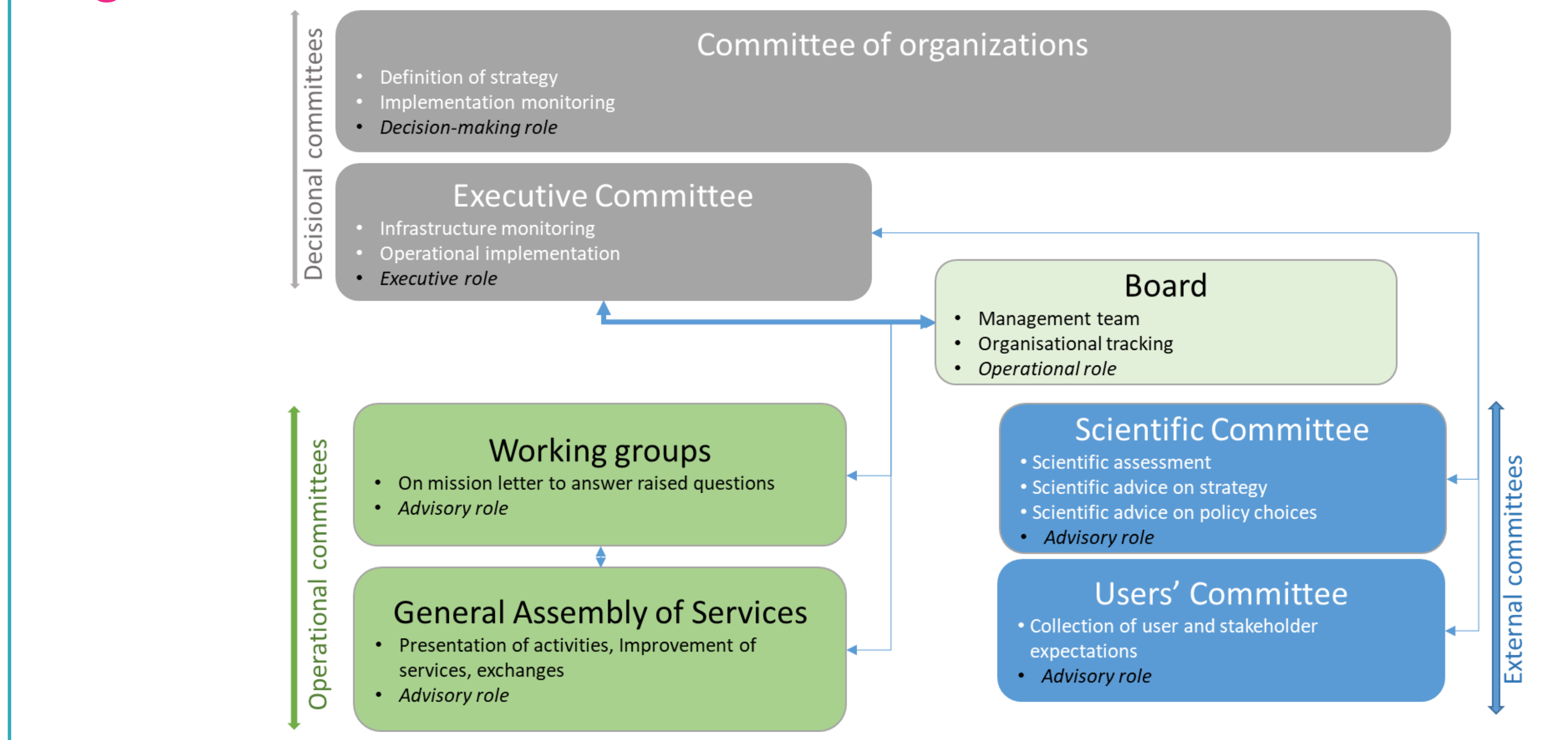
Perspectives

Enhanced capacity:

◇ State of the art field tools (environmental characterization, tree measurements, data transmission).

◇ High throughput analytical platforms (soil and vegetation).

◇ Flowchart of samples between facilities (comprehensive data sets).

Improved spatial data: High resolution and high quality sources (satellites, air flights, drones) and analytical techniques (optic, lidar, radar, spectrometry).

Virtual (In-Silico) experiments: « Virtual experiments » interfaces that take into account forest science challenges (climate change, ecosystem services etc…), for **research** and **academic or vocational training**.