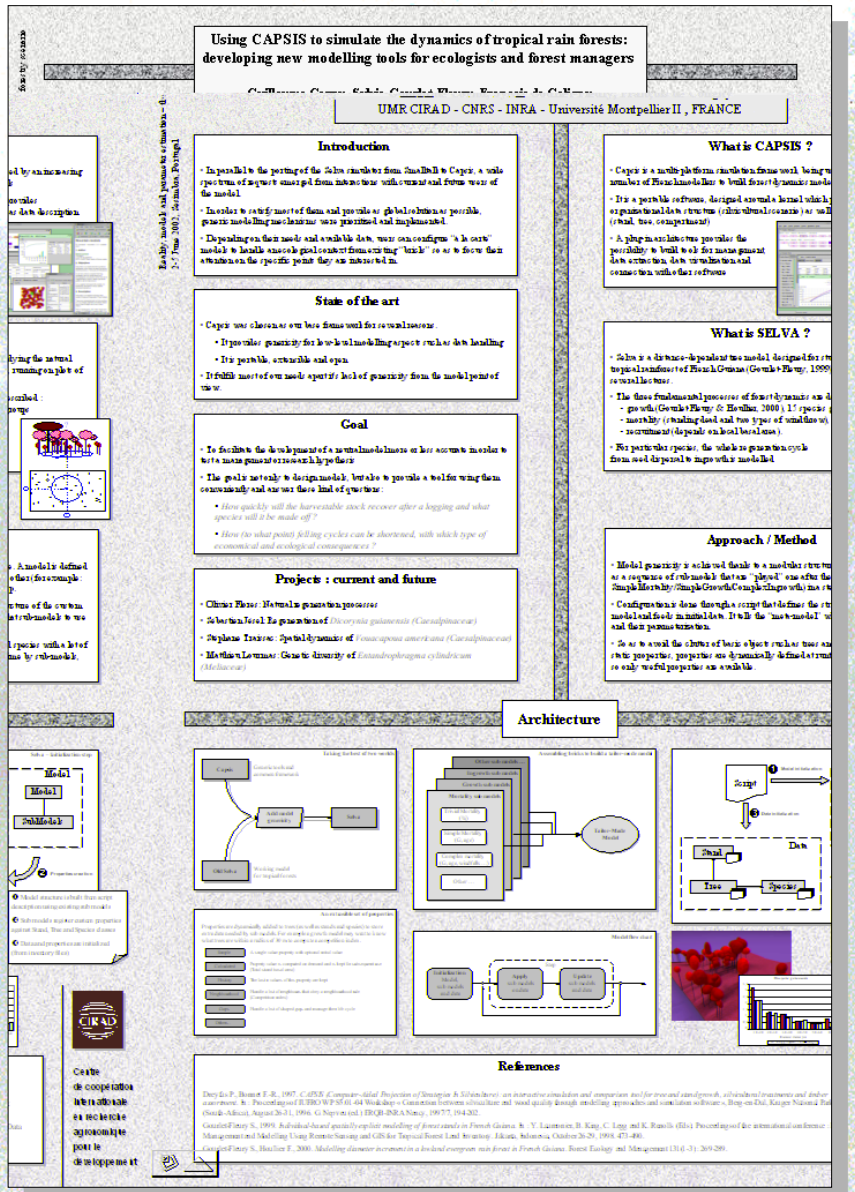
Poster Sesimbra



Using CAPSIS to simulate the dynamics of tropical rain forests: developing new modelling tools for ecologists and forest managers

Selva

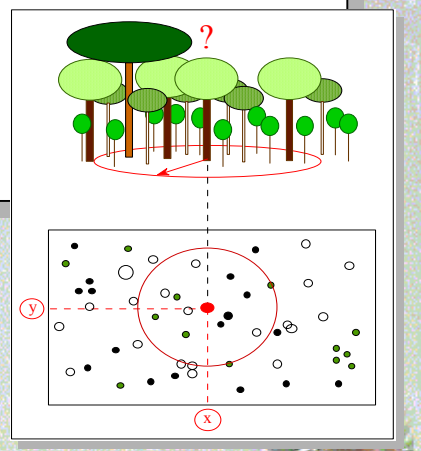
- Portage du simulateur Selva de SmallTalk vers Java et Capsis
- Pas uniquement portage mais refonte et abstraction pour faciliter le développement de points spécifiques
- L'objectif est d'avoir une boîte à outils de modélisation tropicale et que quelqu'un uniquement intéressé par la régénération de l'Angélique puisse se construire un modèle gris à partir des briques de base pour simuler la forêt autour

SELVA en bref

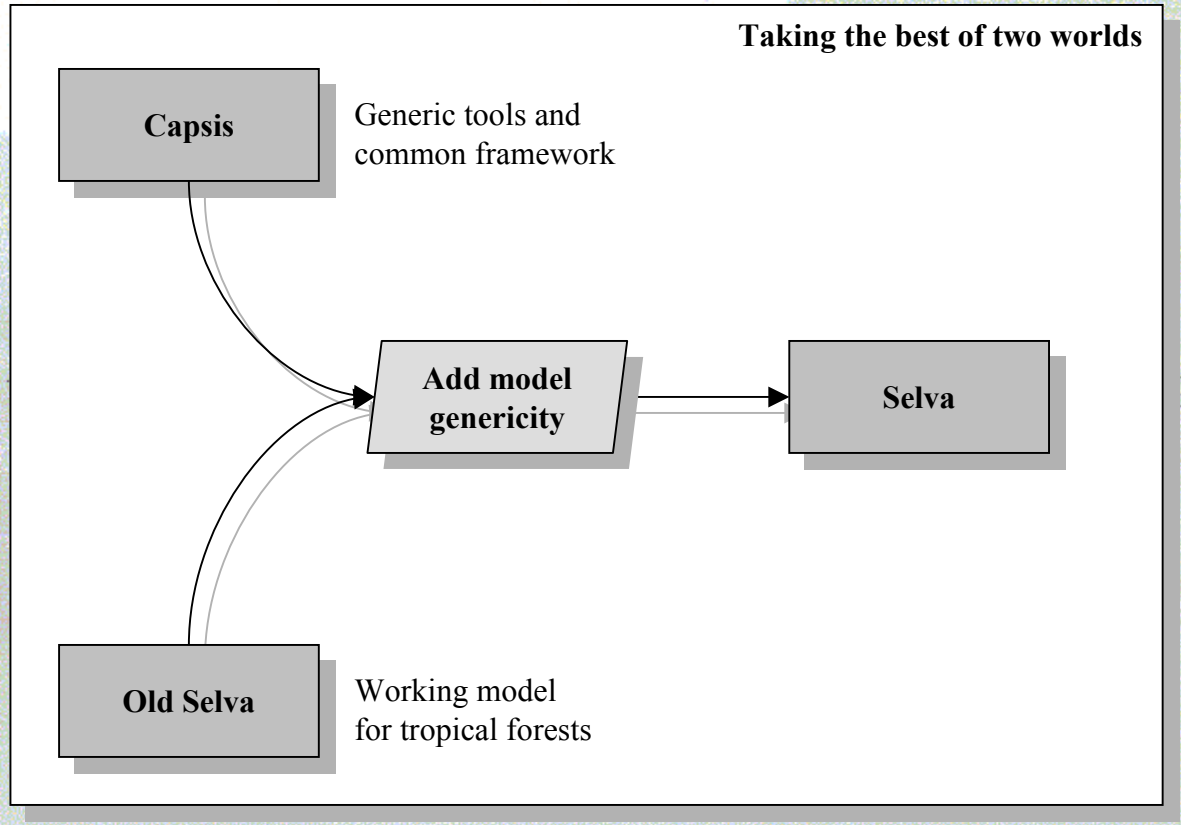
• Selva is a distance-dependent tree model, designed for studying the natural tropical rainforest of French Guiana (Gourlet-Fleury, 1999), running on plots of several hectares.

• The three fundamental processes of forest dynamics are described :
  - growth (Gourlet-Fleury & Houllier, 2000), 15 species groups
  - mortality (standing dead and two types of windthrow),
  - recruitment (depends on local basal area).

• For particular species, the whole regeneration cycle from seed dispersal to ingrowth is modelled



Garder le meilleur



Approche

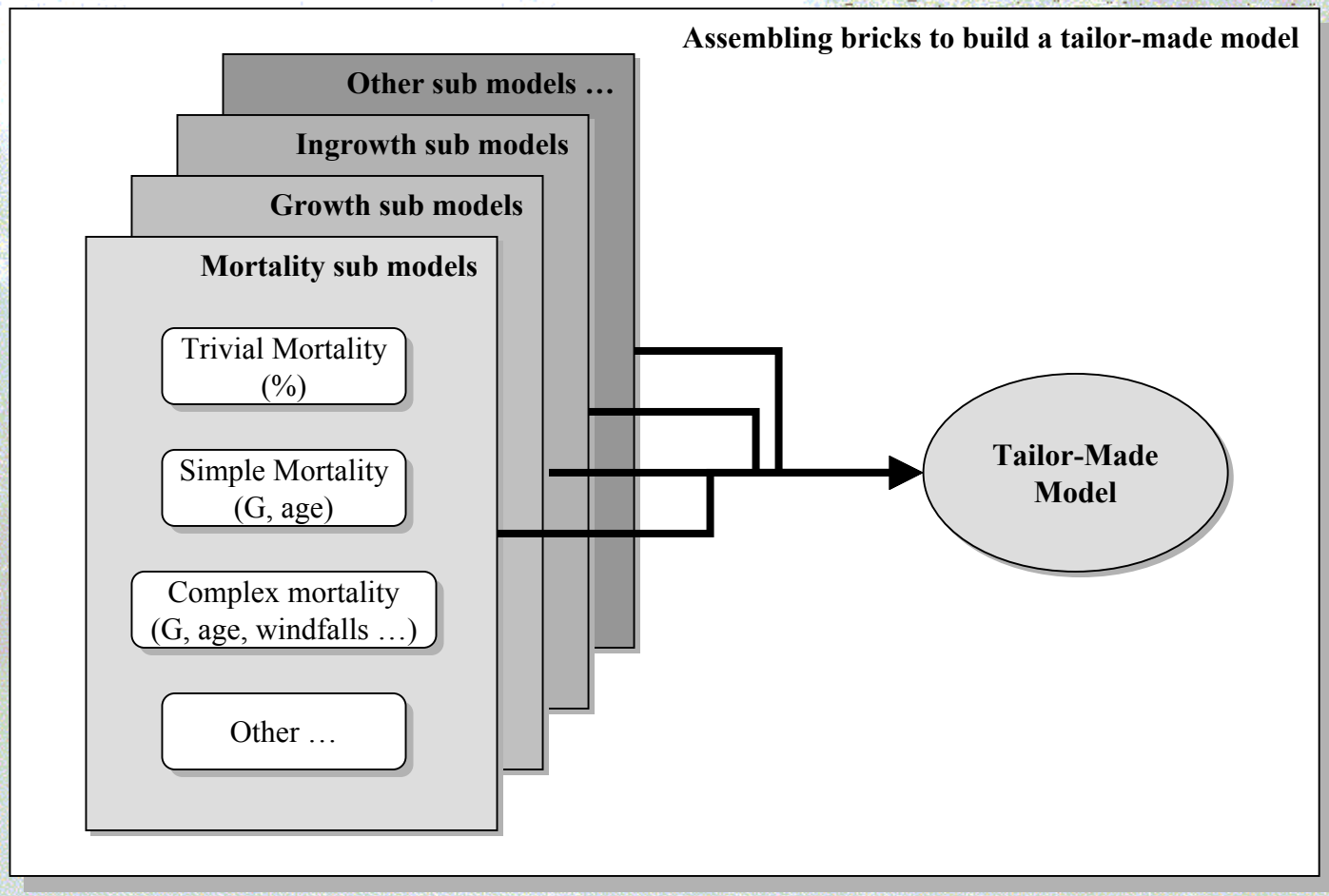
• Model genericity is achieved thanks to a modular structure. A model is defined as a sequence of sub-models that are “played” one after the other in a step. For example:

SimpleMortality/SimpleGrowth/ComplexIngrowth

• Configuration is done through a script that defines the structure of the custom model and feeds in initial data. It tells the “meta-model” what sub-models to use and their parameterization.

• So as to avoid the clutter of basic objects such as trees and species with a lot of static properties, properties are dynamically defined at runtime by sub-models, so only useful properties are available.

Assembler des briques



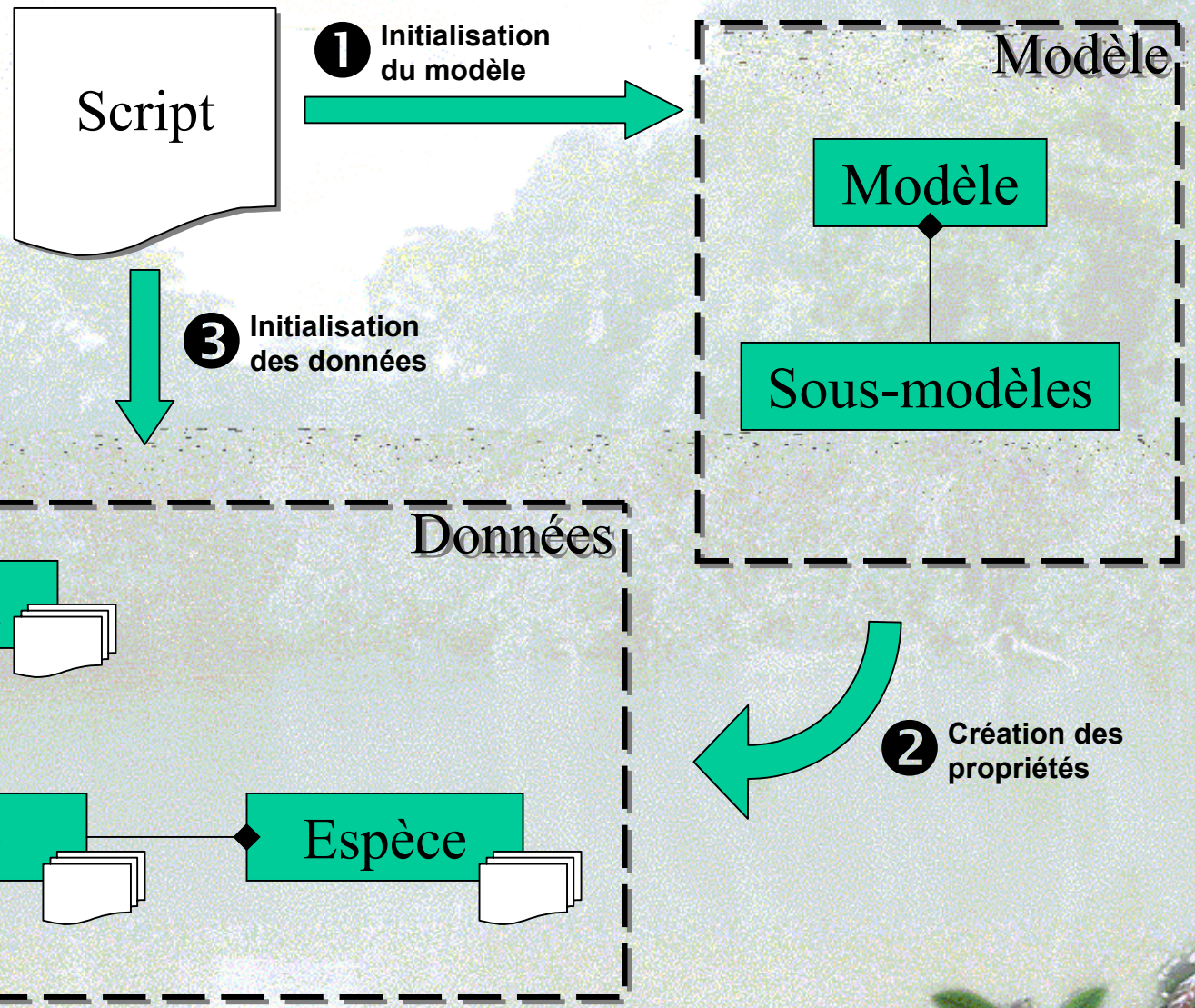
Des propriétés extensibles

An extensible set of properties

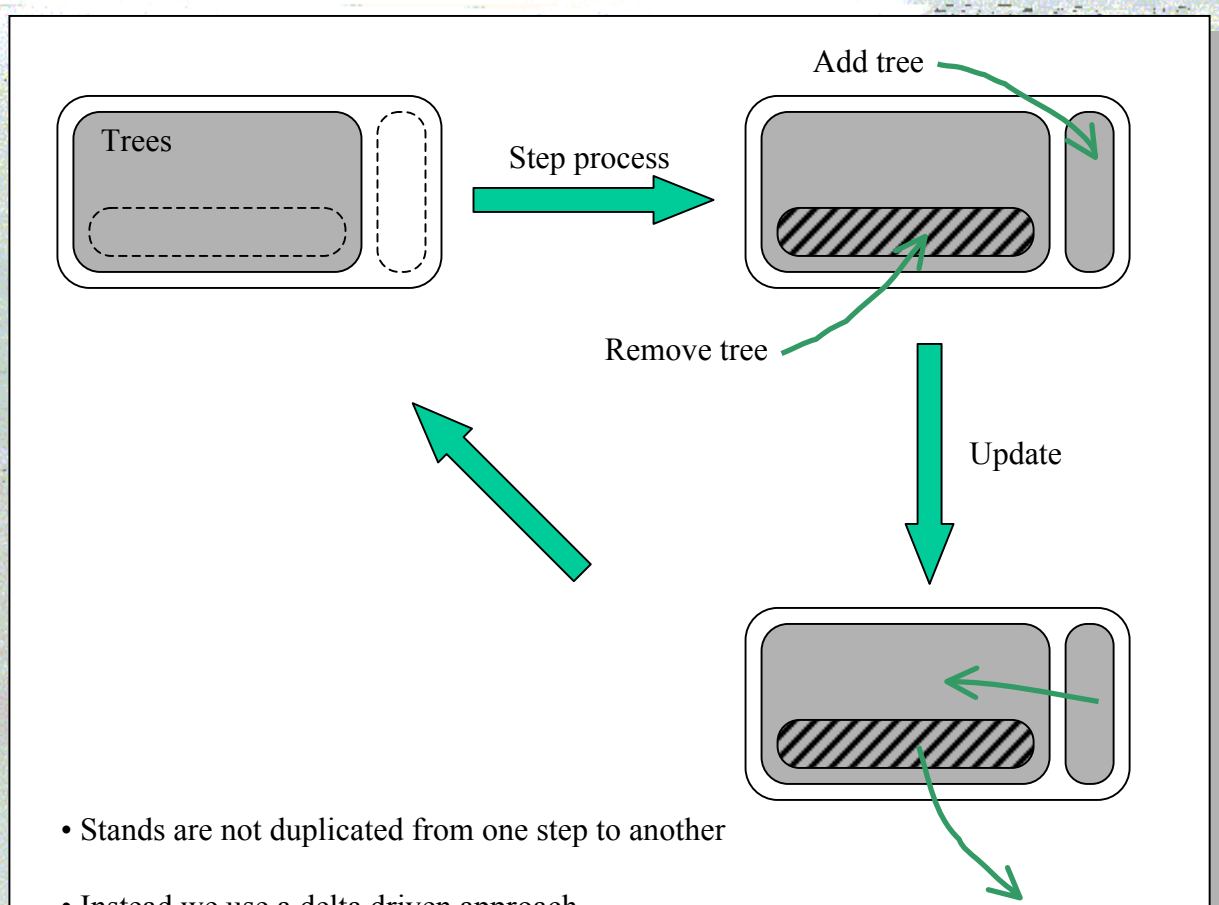
Properties are dynamically added to trees (as well as stands and species) to store extra data needed by sub models. For example a growth model may want to know what trees are within a radius of 30 m to compute a competition index.

Simple	A single value property with optional initial value
Calculated	Property value is computed on demand and is kept for subsequent use (Total stand basal area)
History	The last n values of this property are kept
Neighbourhood	Handle a list of neighbours that obey a neighbourhood rule (Competition index)
Gaps	Handle a list of shaped gaps and manage their life cycle
Others …	

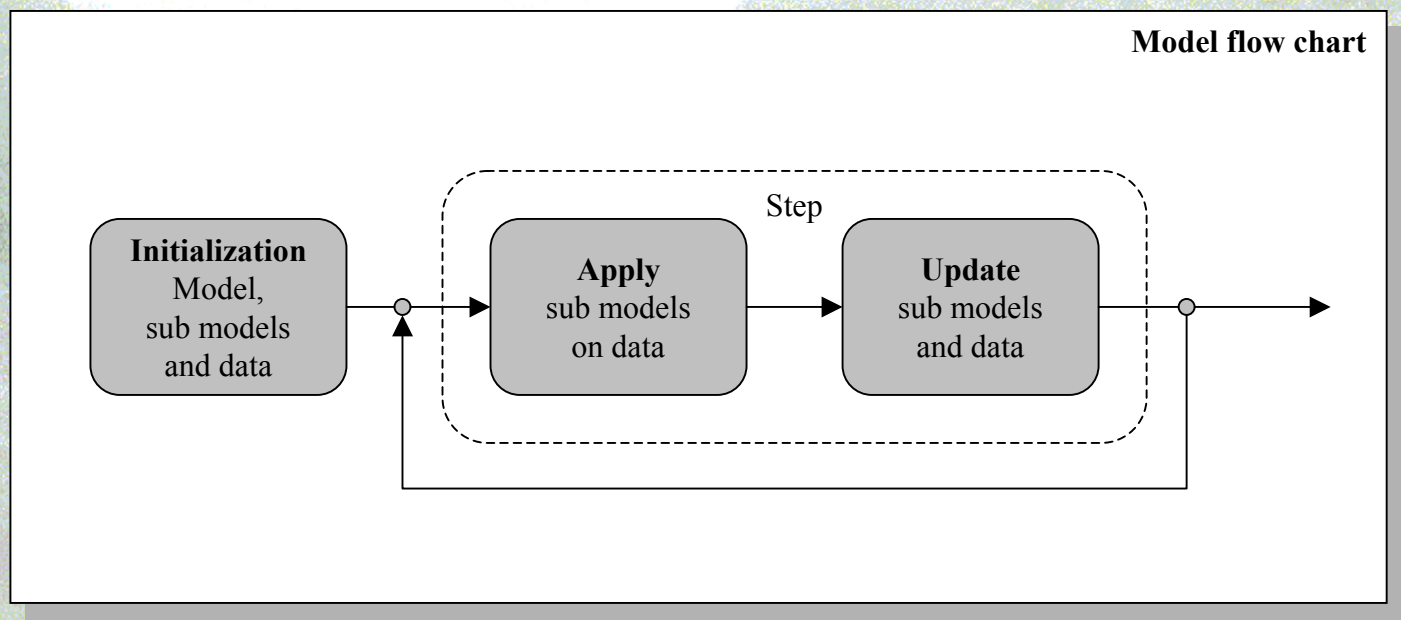
Selva - Synoptique



Cycle des arbres



Mécanique


Model flow chart
Step
Initialization
Model,
sub models
and data
Apply
sub models
on data
Update
sub models
and data

Exemple de script

```
#import "selva.test"
#log_level 10
#log_file "paracou.log"

description = "Petit essai de simulation"

//! Choix des sous-modeles
subModels = (
  submodels.SimpleDeathSubModel {
    killer = killers.StandingDeadKiller {
      a=4.96
      b=3.42
    }
  },
  submodels.GrowthSubModel {
    grower = DummyGrower {
      increment = 1
    }
  },
  DummyIngrowthSubModel
)

//! Definition des especes
species = (
  SelvaSpecies {
    name = "Angelique"
    inventoryCodes = ( 103 )
    grower = growers.Gourlet13Grower {
      a=1     b=2     c=1
      d=0.5   m=0.3   K=1
      residualCorrelation=0.5
      residualMean=0.1
      residualDispersion=0.1
      neighbourhoodStrategy=neighbourhoods.BigTreesWithinRadius {
        radius=30
        minDbh=20
      }
    }
  }
)

//! chargement du peuplement
stand = SelvaStand {
  trees = SelvaInventoryReader {
    filename = "data/test.inv"
  }
}

do describe

do simulate(5) timed

//! Impression des resultats
do print
```

Projets : actuels et futurs

- Olivier Flores: Natural regeneration processes
- Sébastien Jésel: Regeneration of *Dicorynia guianensis (Caesalpinaceae)*
- Stéphane Traissac: Spatial dynamics of *Vouacapoua americana (Caesalpinaceae)*
- Matthieu Lourmas: Genetic diversity of *Entandrophragma cylindricum (Meliaceae)*