



HAL
open science

Combined Argumentation and Simulation to Support Decision

Rallou Thomopoulos, Bernard Moulin, Laurent Bedoussac

► **To cite this version:**

Rallou Thomopoulos, Bernard Moulin, Laurent Bedoussac. Combined Argumentation and Simulation to Support Decision. IEA/AIE, Jun 2017, Arras, France. lirmm-01580585v2

HAL Id: lirmm-01580585

<https://hal-lirmm.ccsd.cnrs.fr/lirmm-01580585v2>

Submitted on 19 Jun 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Combined argumentation and simulation to support decision

Example to assess the attractiveness of a change in agriculture

Research context

Objective: decision support, based on:

information

models



Qualitative
argumentation

**EVALUATION
OF
ALTERNATIVES**

Quantitative
*systems
dynamics*

Cultural alternatives

1) Cereals in monoculture



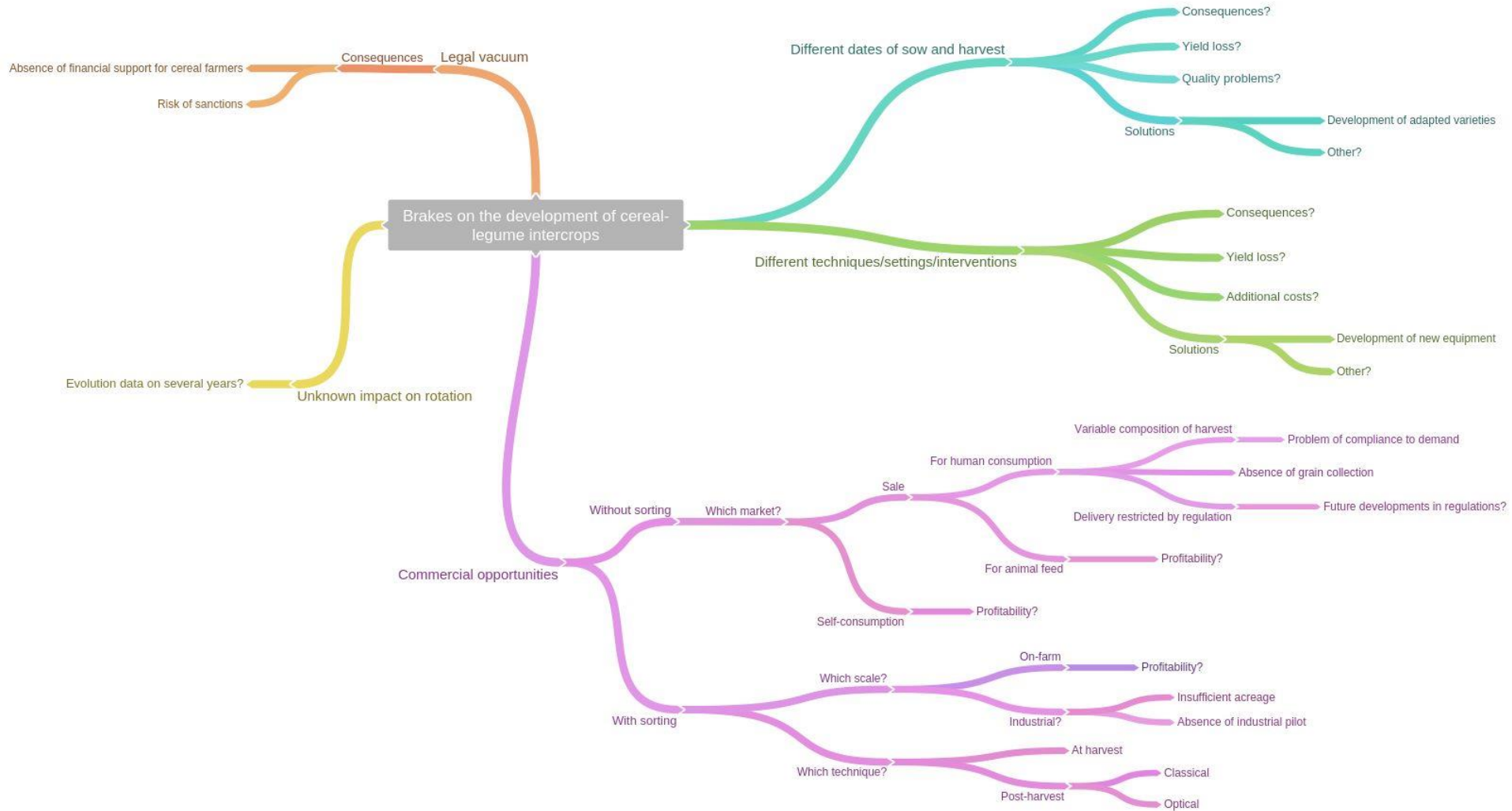
2) Associated with legumes



Arguments (1)

- + improved soil fertility
 - + reduction of organic nitrogen fertilizers, expensive and inefficient
 - + higher protein content of harvested grain, which is a quality criterion for durum wheat
 - + better control of weeds
 - + better resistance against plant aggressors
 - + more stable yields despite climate variability.
-
- non-synchronized optimal dates for sowing and harvest of the two species
 - variable composition of harvest
 - specific sorting operation required for human consumption
 - lack of distribution and valorization networks
 - restricted marketing possibilities due to the absence of a regulatory state for cereal-legume intercrops
 - discouraging European aid policies.

Arguments (2)



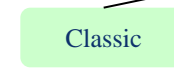
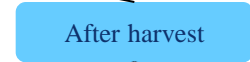
Arguments (3) – After-harvest sorting

Id	Arg. type	Explanation	Option	Criterion	Intended use
13	+	Optical sorting type effective technology exists	After-harvest optical sorting	Technical	Commercialization of separate grains
14	-	Optical sorting type technology is costly	After-harvest optical sorting	Economic	Commercialization of separate grains
15	+	Prices for optical sorters are trending downwards	After-harvest optical sorting	Economic	Commercialization of separate grains
16	-	100% extraction of wheat and legume during classic sorting is impossible, since some of the broken legume grains have the same size as some of the wheat grains	After-harvest classic sorting	Technical	Commercialization of separate grains
17	+	A 3-batch sorting is possible: easily separable wheat, easily separable pea, non-separable wheat and pea mix	After-harvest classic sorting	Technical	Commercialization of separate grains
18	-	In case of 3 batches, the question of the use of the non-separable wheat and pea mix still remains	After-harvest classic sorting	Economic	Commercialization of separate grains
19	+	The non-separable batch may be used for own consumption or for commercialization in animal feed	After-harvest classic sorting	Economic	Commercialization of separate grains
20	-	The 3-batch solution is still costly, since it requires handling, several repetitions, and leads to a lower financial benefit of the non-separable batch	After-harvest classic sorting	Economic	Commercialization of separate grains

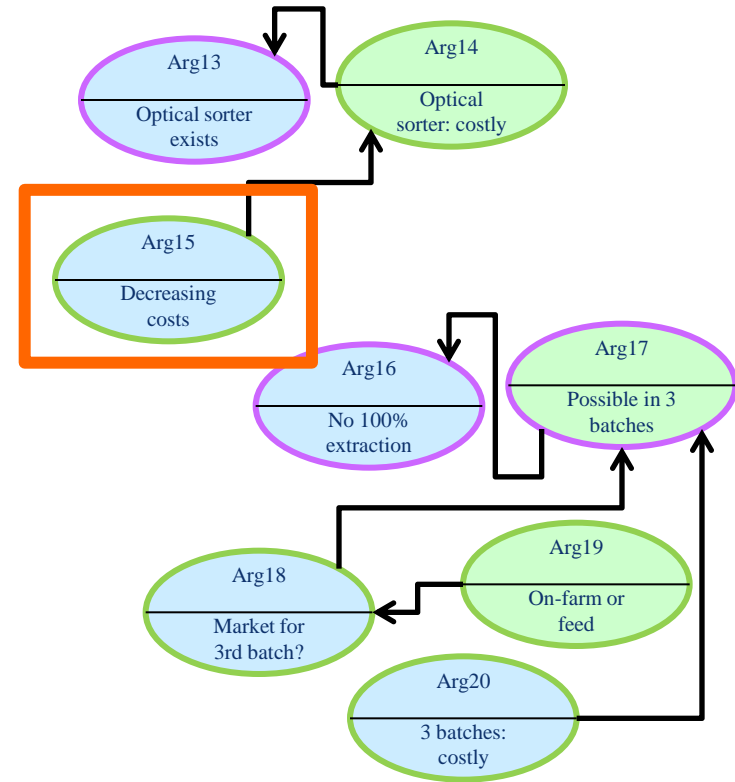
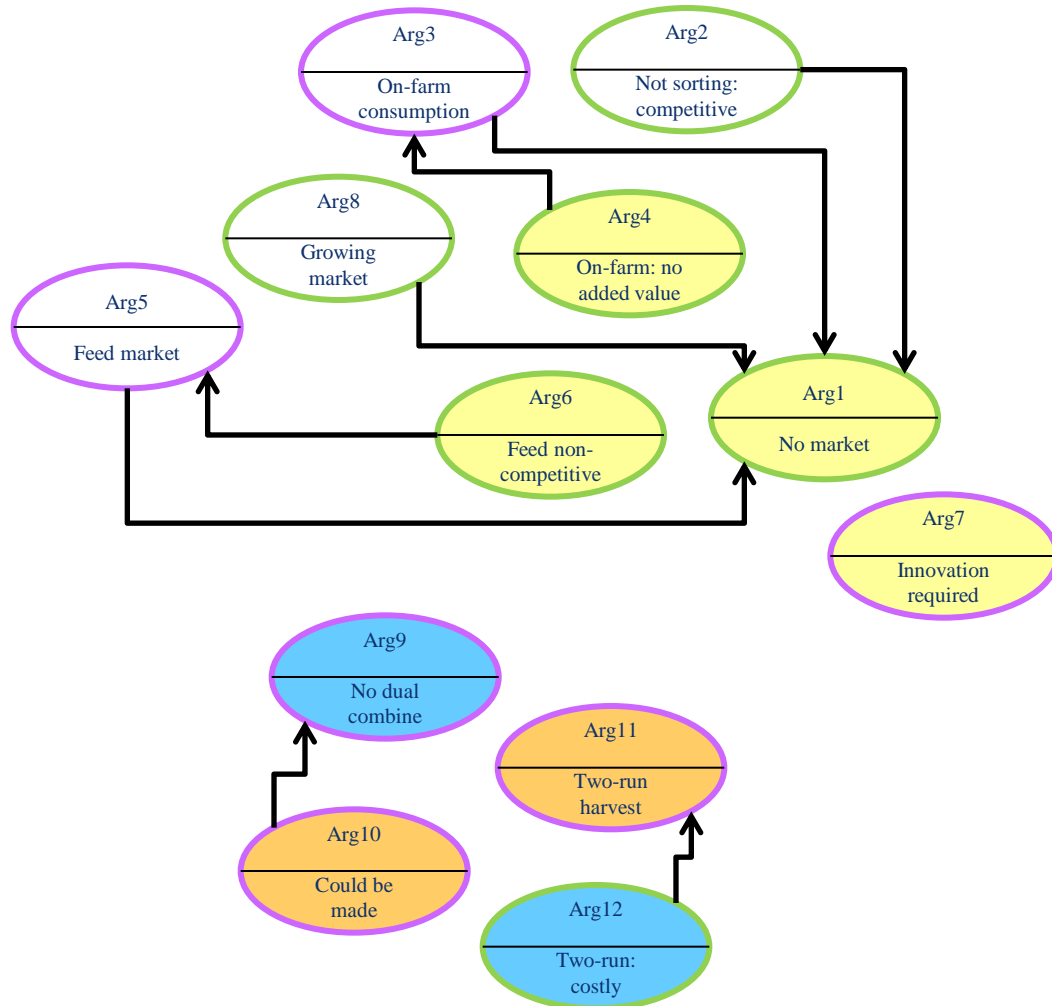
Criterion



Action



Arguments (4)



Systems dynamics translation?

The system:

a set $X = \{t, x_1, \dots, x_n\}$ of variables

Distinguished variables (option/goal, controlled/imposed)

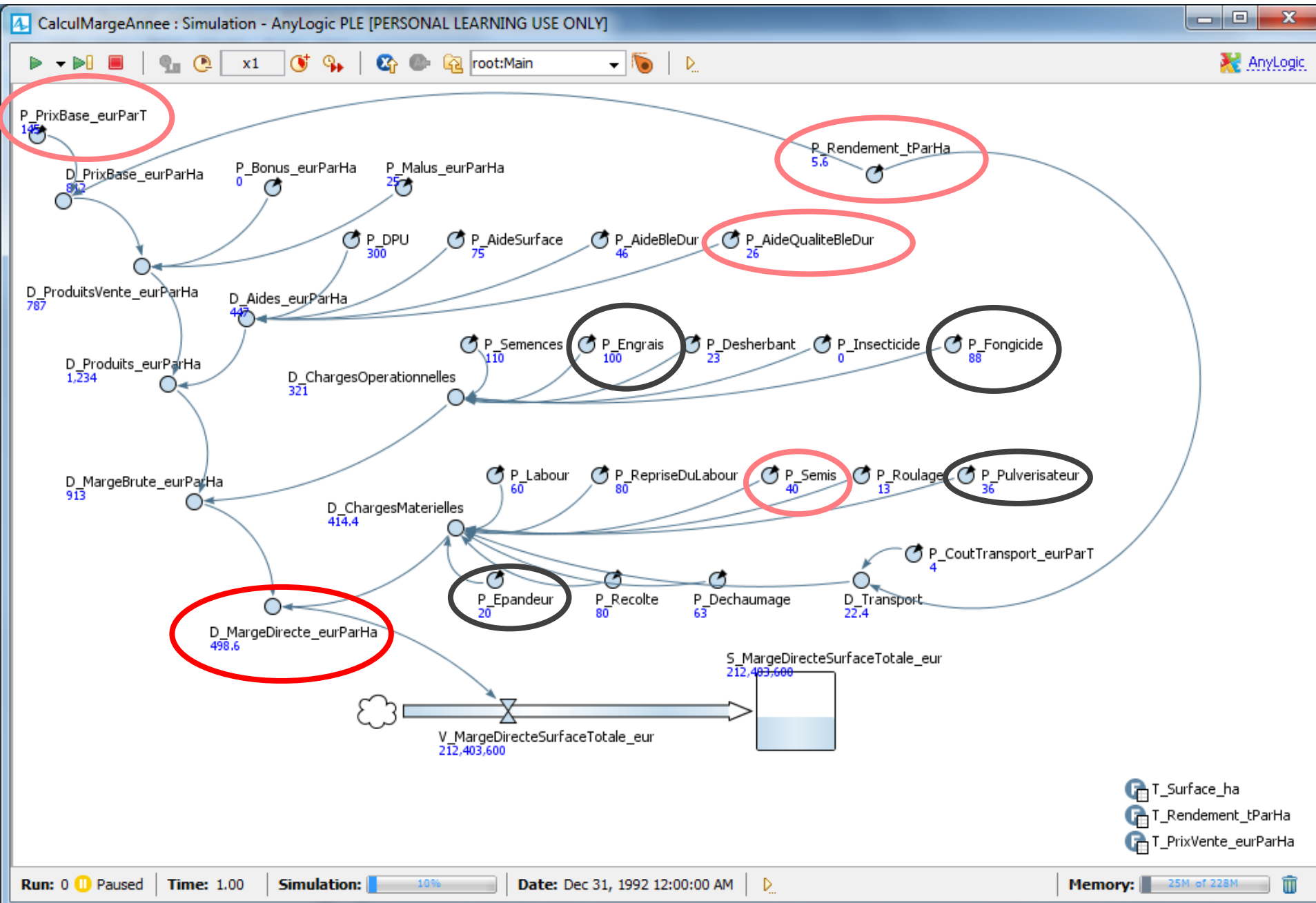
Argument:

a triplet $\langle o, x_g, J \rangle$

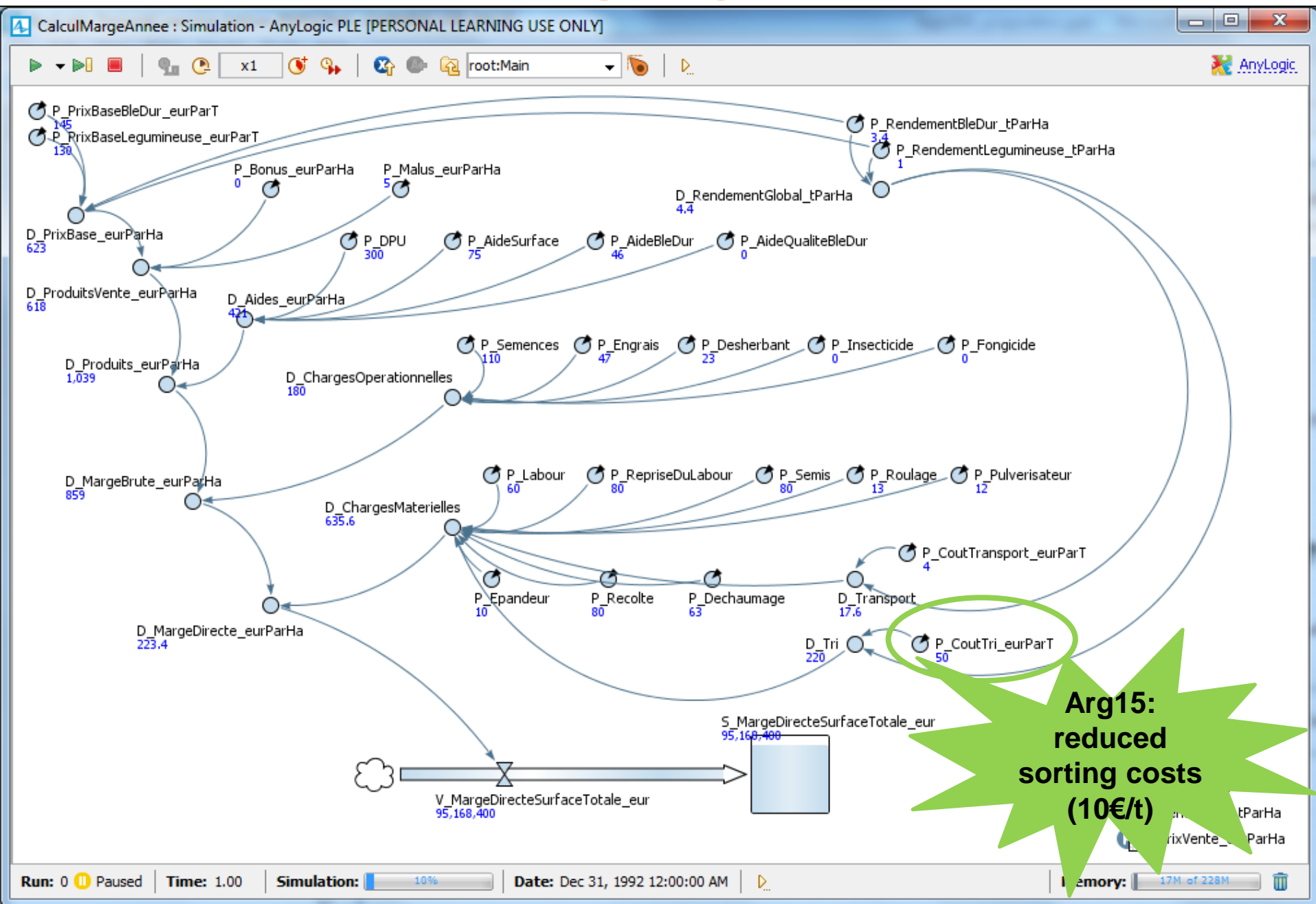
Test Argument 15:

\langle Intercrops with post-harvest sorting,
half-net margin,
reduced sorting costs \rangle

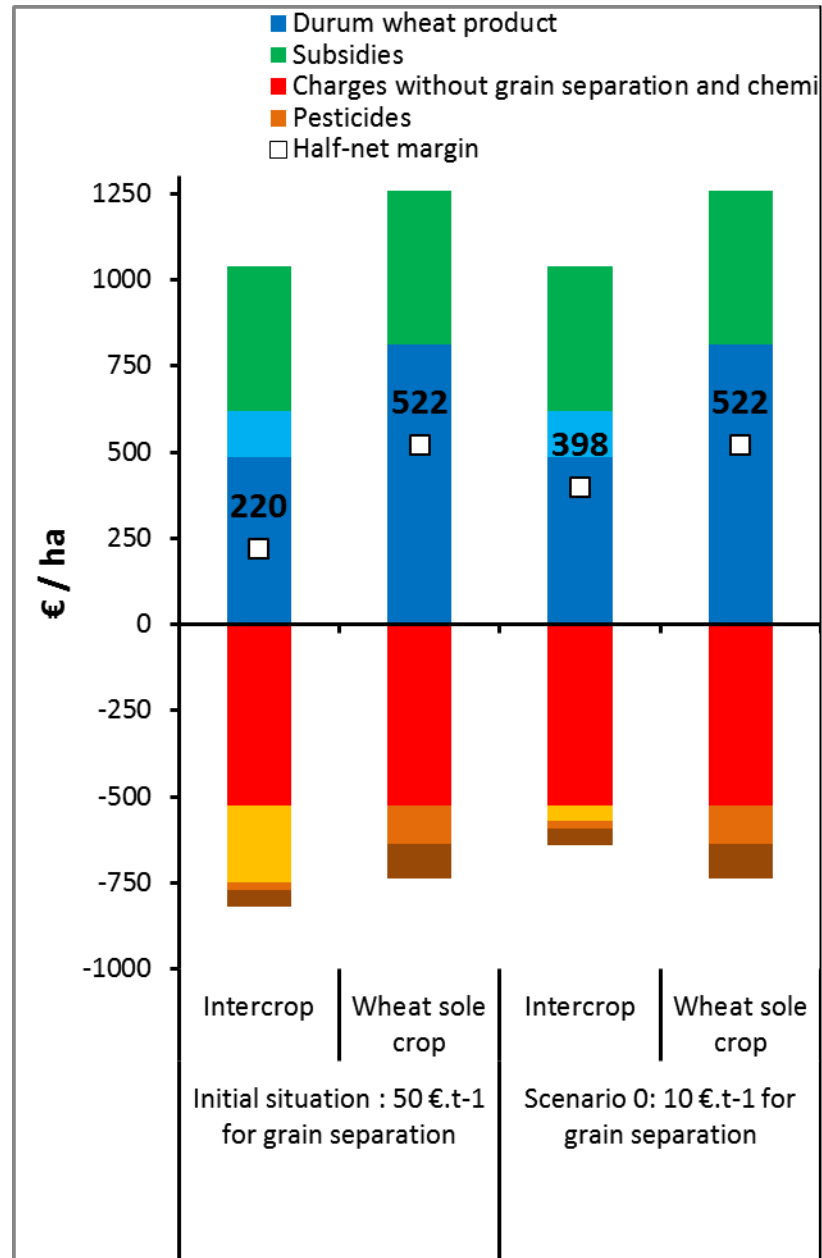
Initial simulations – sole Durum wheat



Simulating Argument 15



Comparison of scenario results



Conclusion: Towards what-if scenarios

