

Modèles de simulation dynamiques
et processus de décision

System Dynamics Models
and the decision making process

La Dynamique des Systèmes

Une méthodologie et une technique de modélisation
des systèmes
développée par Jay W. Forrester au MIT il y a 50 ans.

System Dynamics

A system methodology and a system modeling technique
developped by Jay W. Forrester at the MIT 50 years ago.

See: E.F. Wolstenholme. 1983. « System Dynamics: a system methodology or a system modelling technique », *Dynamica* Vol.9. Part.II

Les grands principes des modèles de Dynamique des Systèmes:

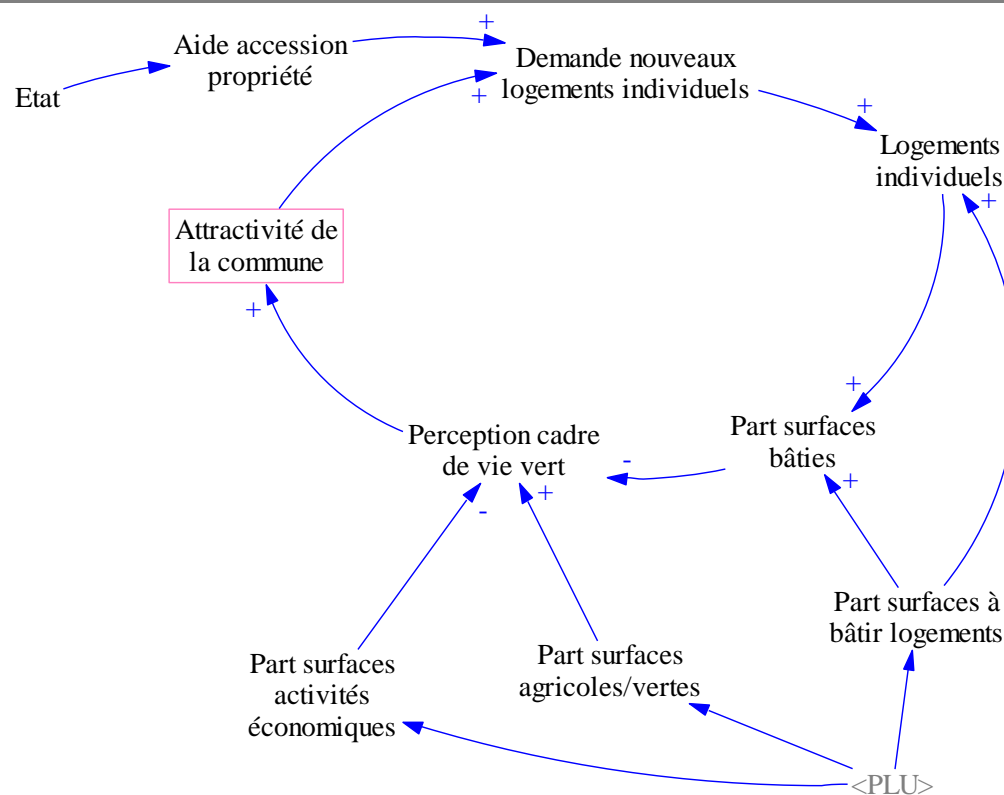
1. Une approche dite *systemique* comprenant des boucles de rétroaction positives et négatives

Main principles of the System Dynamics models:

1. A *system* approach with negative and positive feedback loops

Un diagramme de boucles causales (exemple)

A causal loop diagram (example)



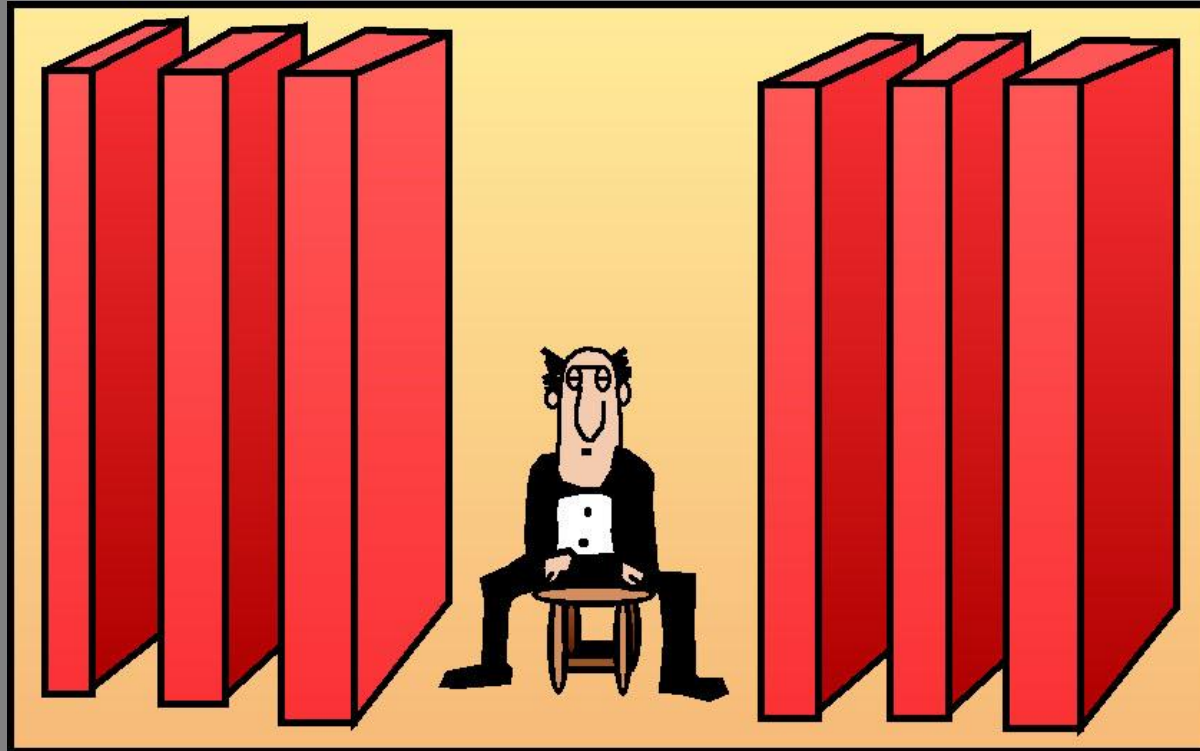
(diagramme extrait du modèle Dynacité – Complexio –
Projet financé par l'ADEME 2007-2008)

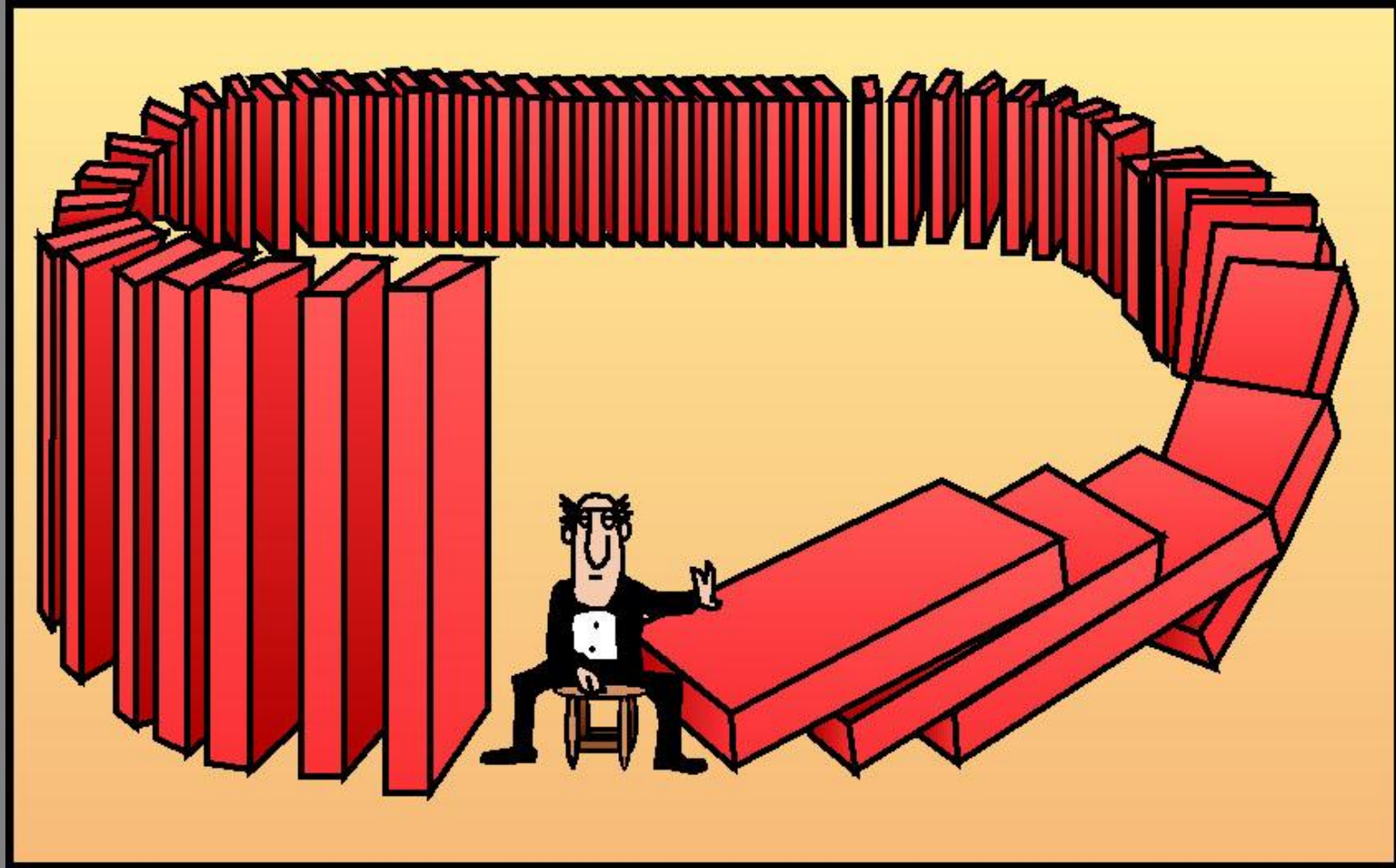
Les grands principes des modèles de Dynamique des Systèmes :

2. des délais (ou retards) dans les relations entre variables;

Main principles of the System Dynamics models :

2. delays between variables;





Drawing from the *New Yorker* (1970?)

Les grands principes des modèles de Dynamique des Systèmes:

- l'existence de relations non-linéaires entre variables
(relation de non proportionnalité entre cause et effet)

Main principles of the System Dynamics models:

- the existence of non-linear relationships between variables

Pourquoi réaliser des simulations informatiques?

1. Comprendre le fonctionnement (complexe) d'un système au cours du temps;

Why computer simulations?

1. Understanding the (complex) behavior of a system over time;

Pourquoi réaliser des simulations informatiques?

2. Tester des hypothèses, des scénarios (*que se passerait-il si...?*), faire de la prospective (futurs possibles), etc.

Why computer simulations?

2. testing hypotheses, '*What if ...?*' scenarios, possible futures, etc.

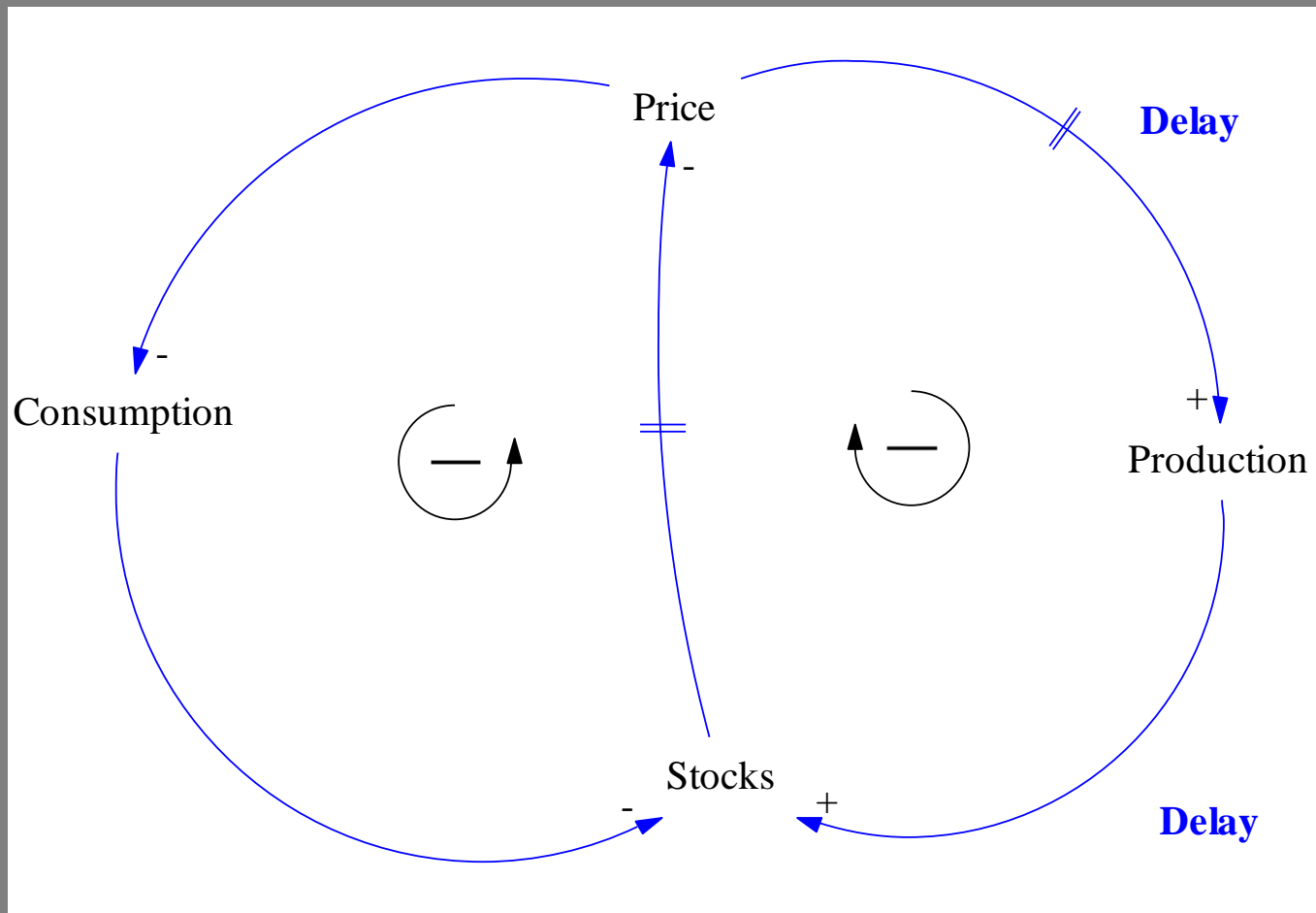
Pourquoi réaliser des simulations informatiques?

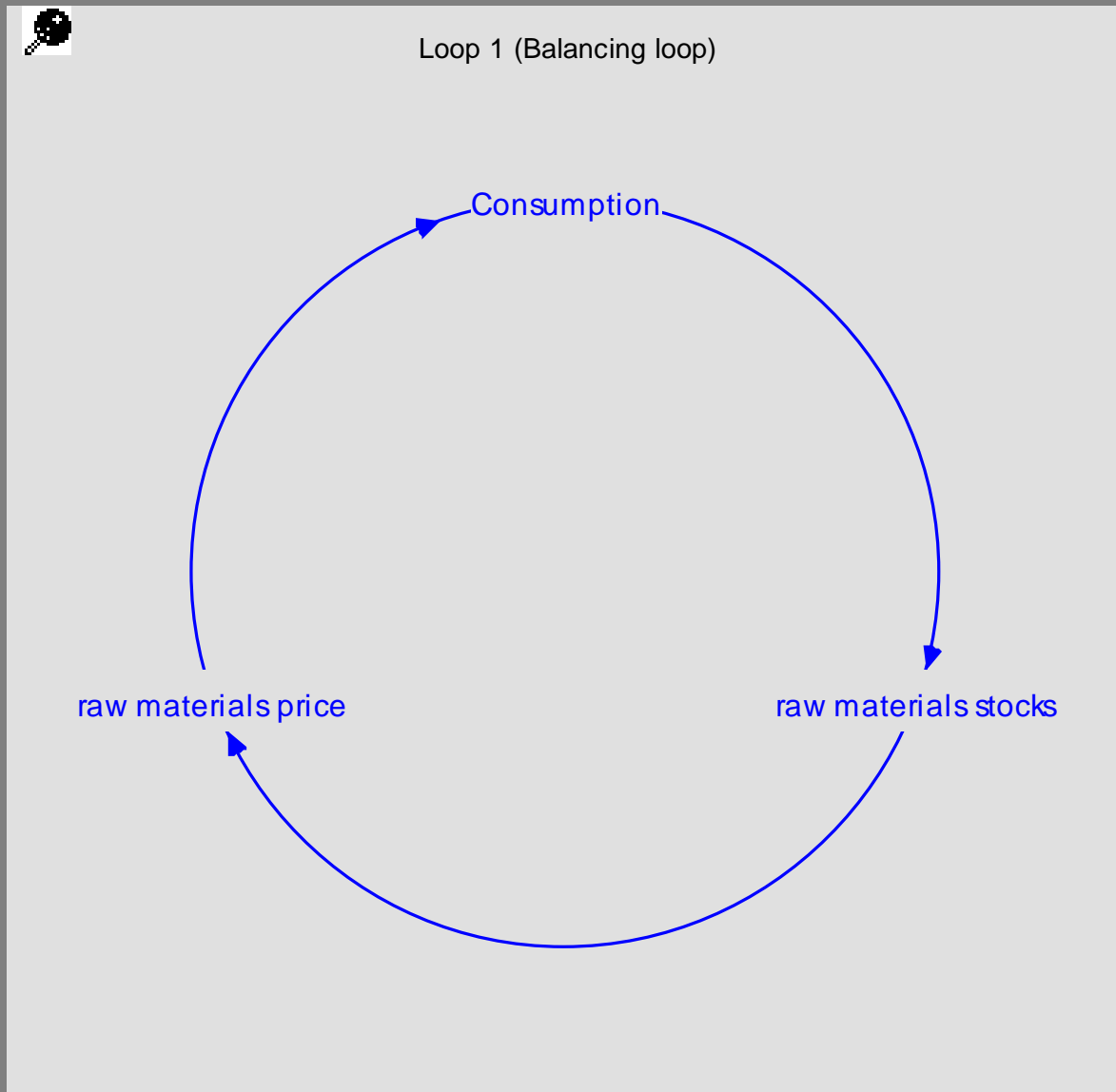
3. Créer des outils d'aide à la décision.

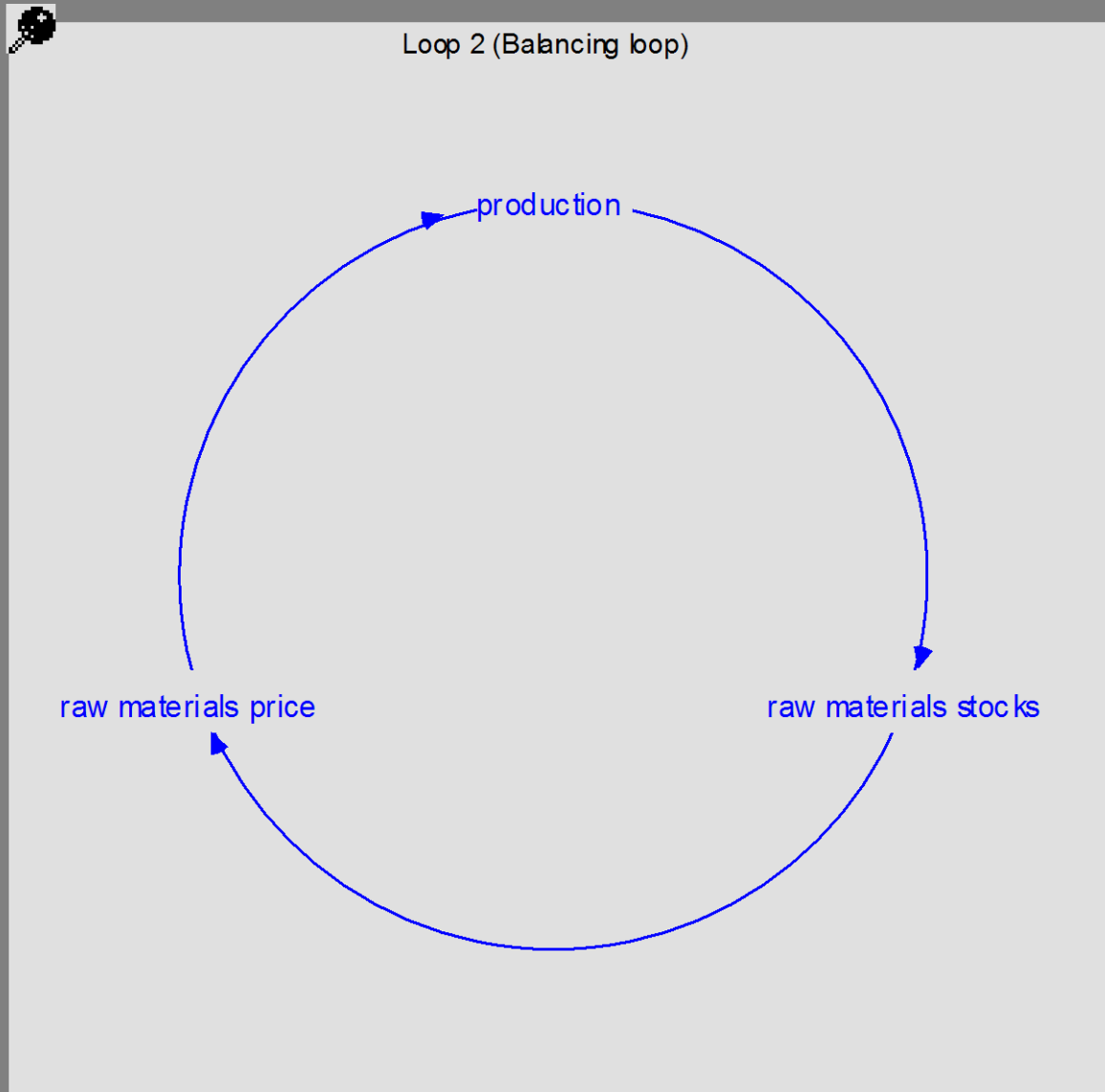
Why computer simulations?

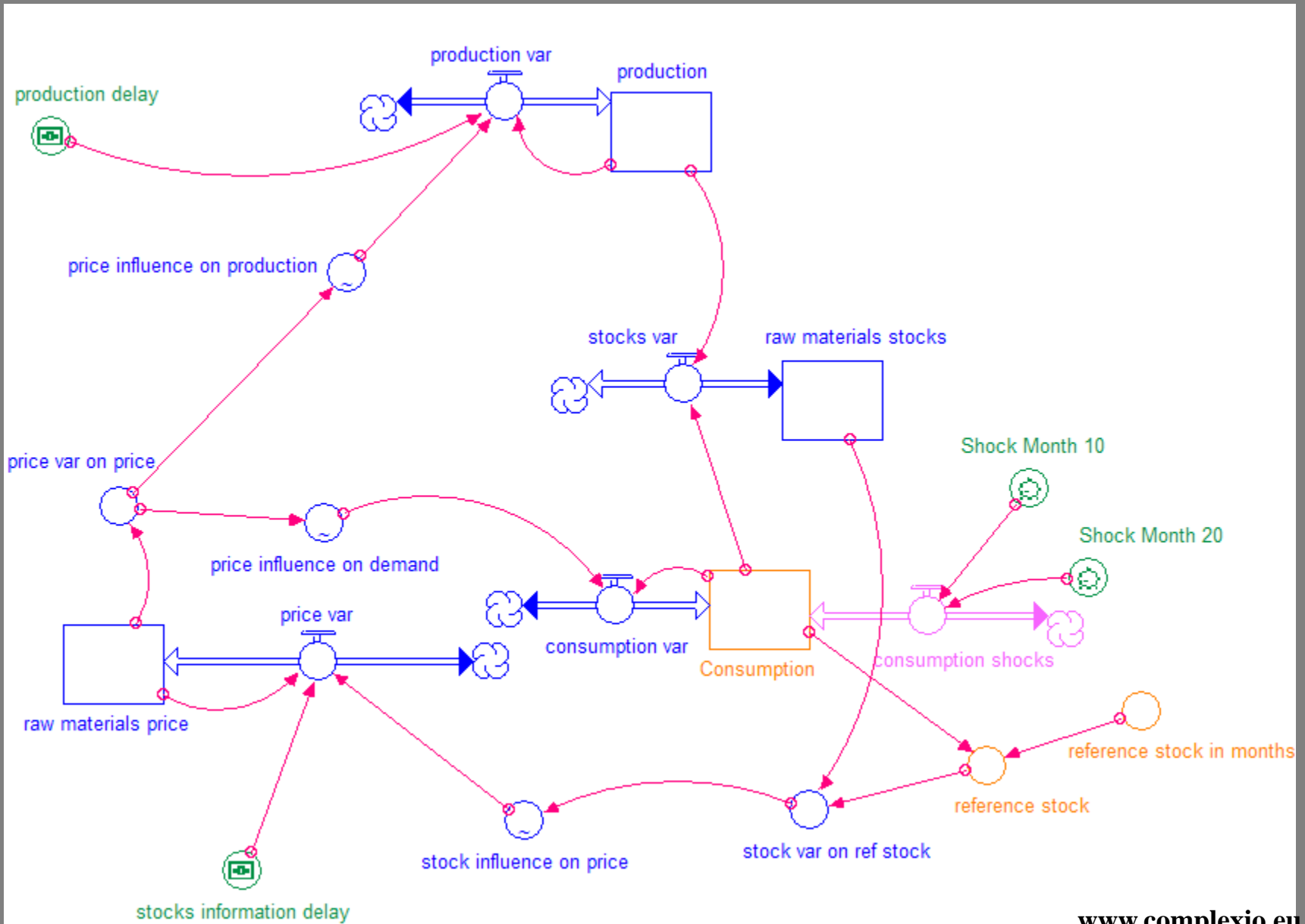
3. Creating decision support tools.

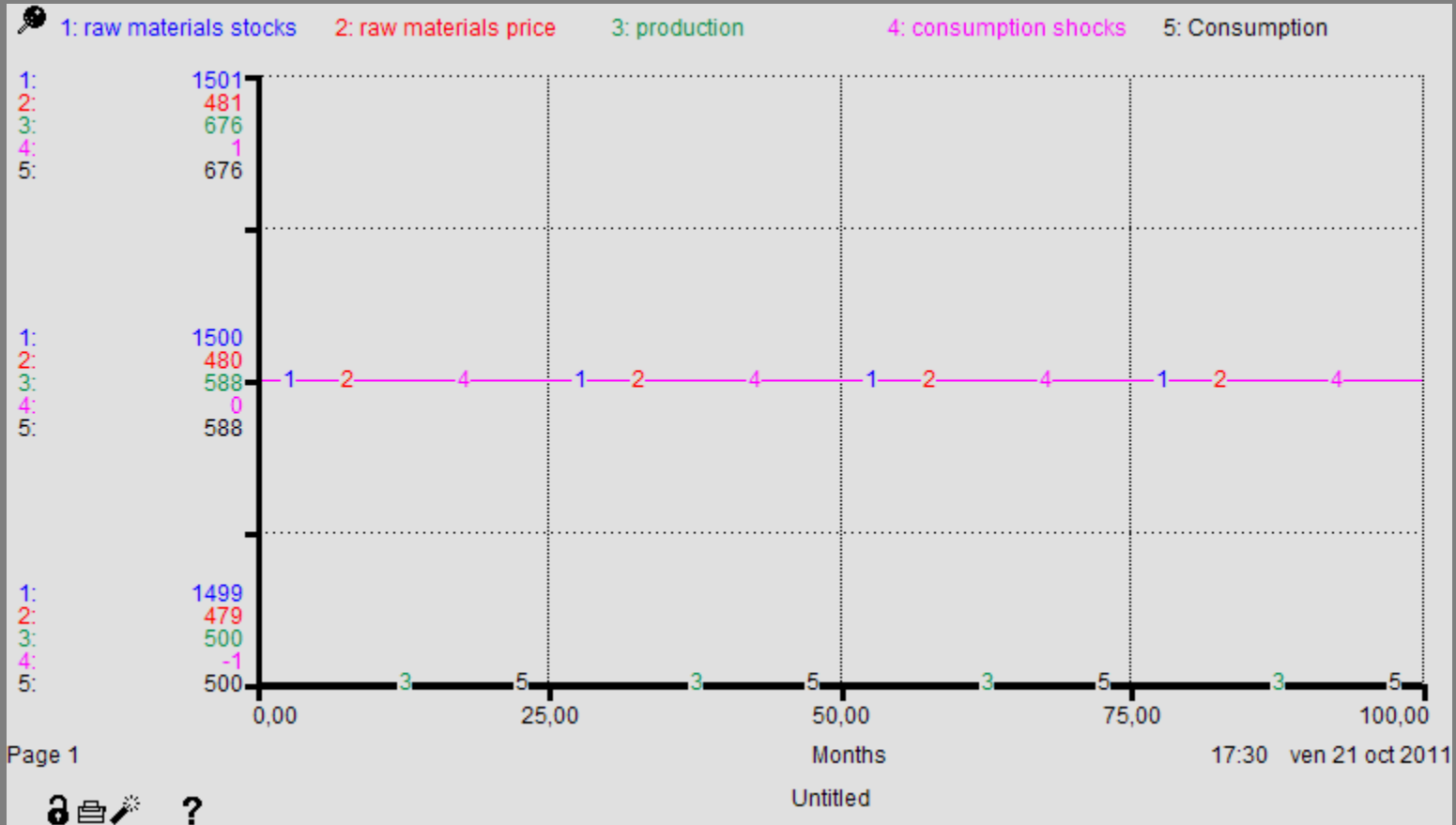
Comprendre les mécanismes de base d'un marché de matières premières
Understanding the basic mechanisms of a raw materials market

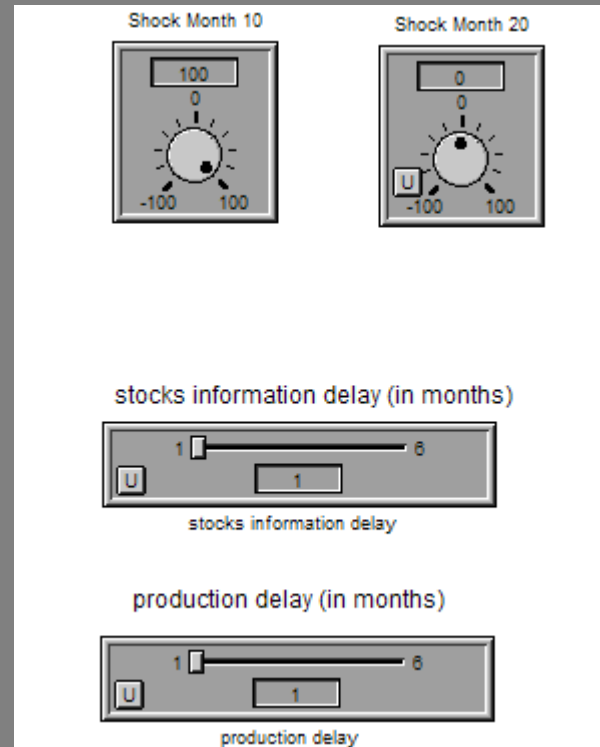


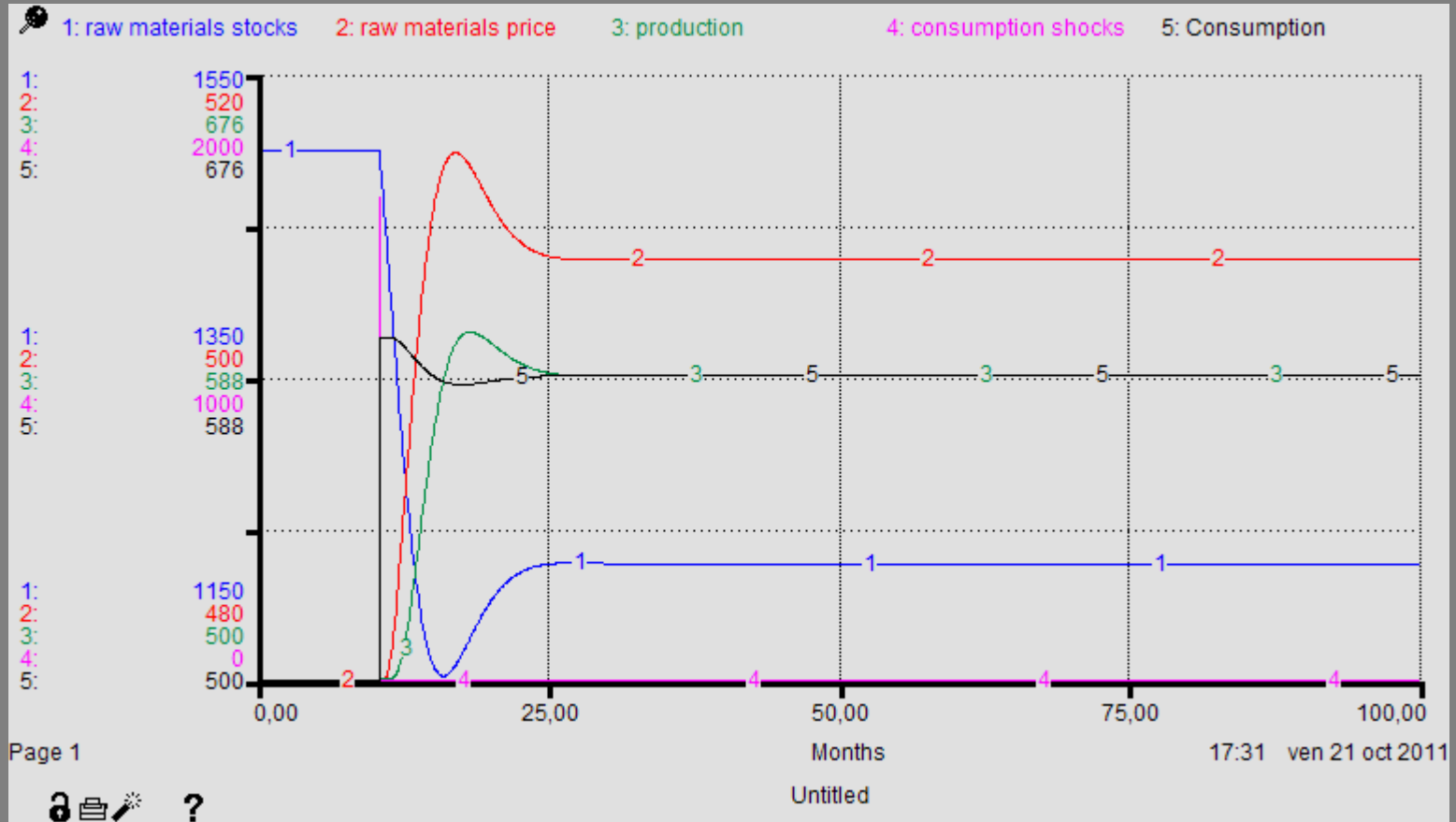












Shock Month 10

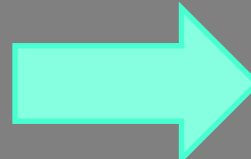
Shock Month 20

stocks information delay (in months)

stocks information delay

production delay (in months)

production delay

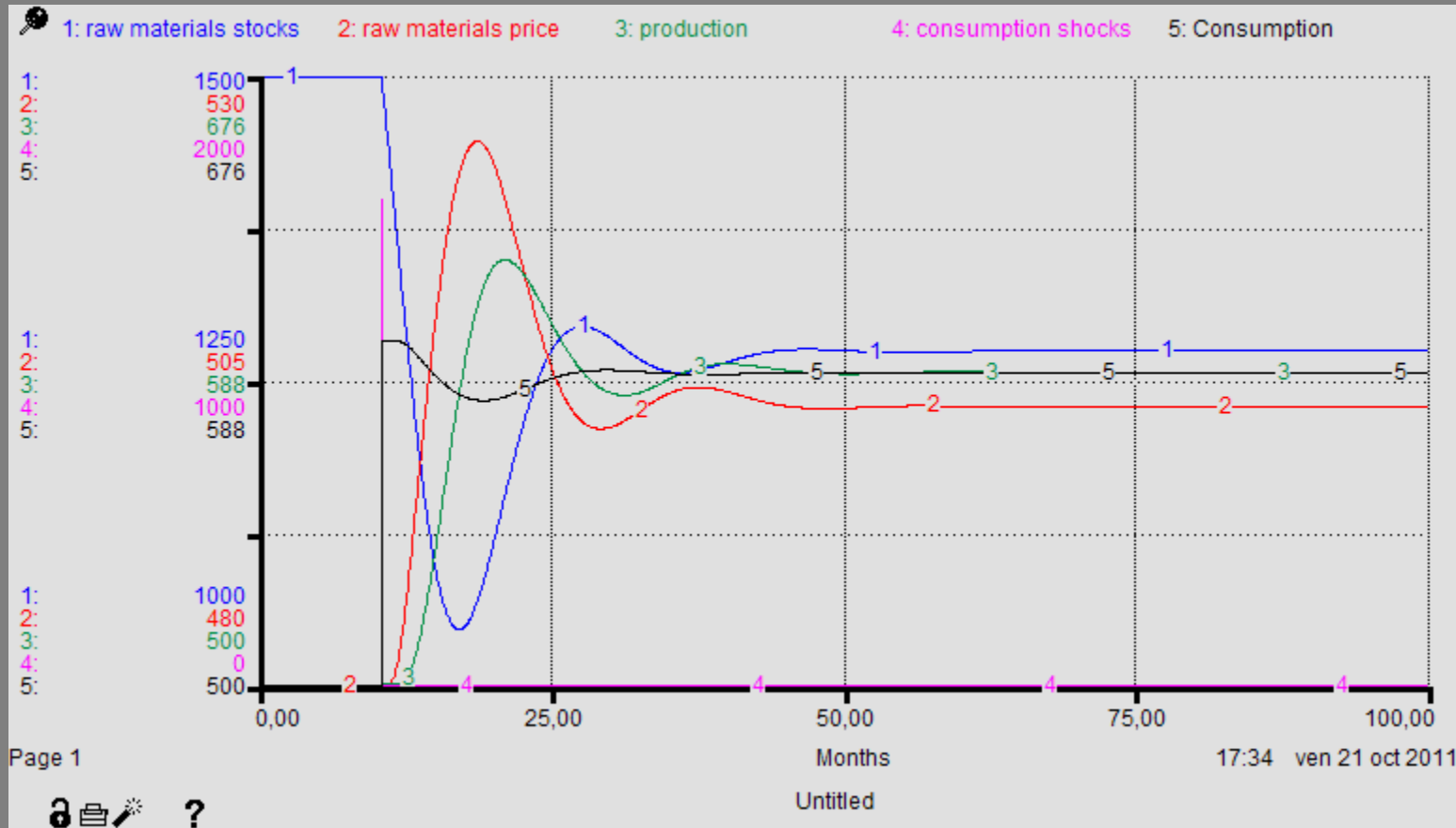


stocks information delay (in months)

stocks information delay

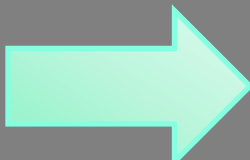
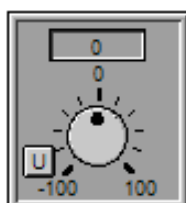
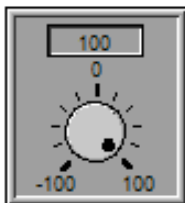
production delay (in months)

production delay



Shock Month 10

Shock Month 20



stocks information delay (in months)



stocks information delay

production delay (in months)



production delay

stocks information delay (in months)

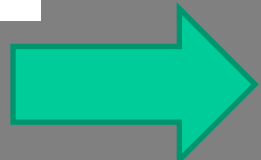


stocks information delay

production delay (in months)



production delay



stocks information delay (in months)

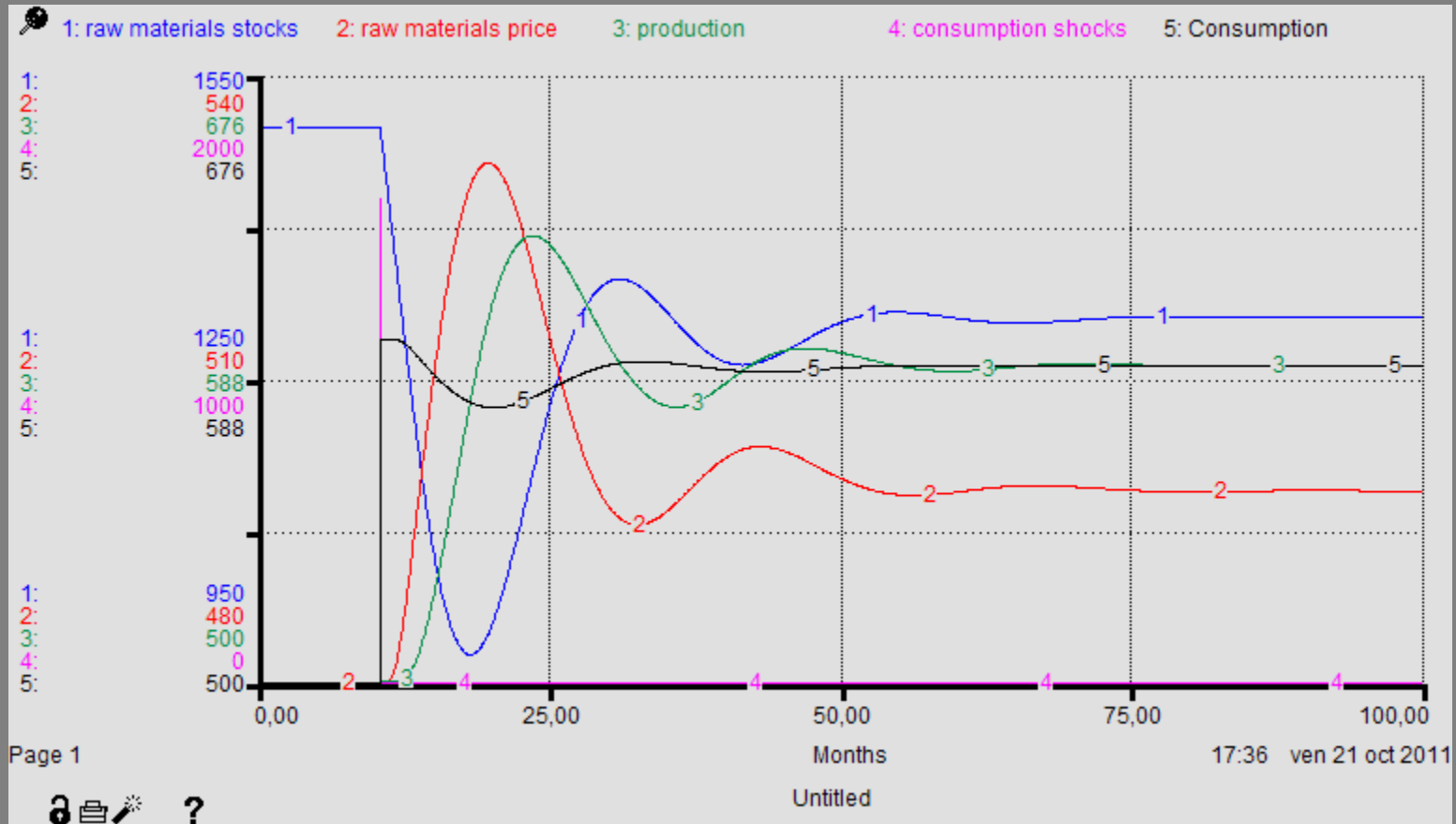


stocks information delay

production delay (in months)



production delay



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