The SEAMLESS-IF software platform

System for Environmental and Agricultural Modelling;
Linking European Science and Society - Integrated Framework

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Context

EC and the estimation of the impact of political decisions on agriculture

XXIème s., new rules to consider

⇒ SEAMLESS European Project
  Estimations for 50 years
  Duration of the project 4 years

CAPRI model → Estimation at regional scale

Ecology (reduce pesticides, ...)

Country Borders Opening
  (exchange, migration, ...)

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How to proceed?

Levels of organization considered and modelling options

Political Decisions

Levels of organization
- Biophysical
  - Global
  - Earth system
  - National
  - Biosphere
  - Regional
  - Ecosystem
  - Farm
  - Community
  - Field
  - Population

- Economic
  - CAPRI

- Social
  - ?
  - ?

Modelling options:
- Improve CAPRI
- Build a new simulation model
- …
Material and Method

Adopted solution: reuse of Sim. Mod. available in Europe, as much as possible...

To be partner of the project, a scientific team:

- Has a running simulation model available
  ⇒ Adaptation of the Simulation Model...

- Is involved in one of the required fields of research (scientific recognition … Network)
  ⇒ Elaboration of the simulation model

Steps of the software platform construction:

Year 1&2:

- Scientific: revisit / construction of the simulation models
  - Computer science: (i) Elaboration of the computer system and (ii) Association of existing model independently of their scientific status / final objective
    ⇒ End of year 2: Running Prototype (No scientific value)

Year 3

- Integration of the simulation models in SEAMLESS-IF and tests

Year 4

- Evaluation of SEAMLESS-IF on agronomic test zones
  ⇒ End of year 4: Final Release
Selection of the simulation models

Levels of organization:
- Global
- Earth system
- National
- Biosphere
- Regional
- Ecosystem
- Farm
- Community
- Field
- Population

Biophysical
- Landscape
- APES

Economic
- GTAP
- CAPRI
- FSSIM
- Dev. countries

Social
- Labour

Results: Year 0

Can be built using the existing knowledge…

Ewert et al., 2006
Results: Year 0

Composition of the simulation models

Levels of organization
- Global
- Earth system
- National
- Biosphere
- Regional
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- Community
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Biophysical
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Quid of the up and down scaling?
How to exchange data between the simulation models?

XXX: Can be build using the existing knowledge…

Ewert et al., 2006
Results: Year 0

Solution for up and down scaling

Up and down scaling:
- Elaboration of specific models
- Loops
Results

Support media for simulation model coupling and data exchange

Reuse of OpenMI media developed by the LIFE European program.
Results

Running prototype (end of year 2)

- Indicator Calculator
  - CAPRI
  - EXPAMOD
  - FSSIM-MP
  - APES
  - FSSIM-AM

Final release (end of year 4)

- SEAMCAP
- EXPAMOD
- FSSIM-MP
- APES
- FSSIM-AM

(Aitersum et al., 2006)

(Aitersum et al., 2008)
Simulations

Input and test zones: data from GTAP

(Ittersum et al., 2009)
Income declines in all regions
Losses vary between -2.5 and -16%, with an average decline of -6%.

Example: change in agricultural income

<table>
<thead>
<tr>
<th>Product</th>
<th>Price change (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meat</td>
<td>-5.0</td>
</tr>
<tr>
<td>Cereals</td>
<td>-3.8</td>
</tr>
<tr>
<td>Vegetables &amp; perennials</td>
<td>-2.9</td>
</tr>
<tr>
<td>Dairy products</td>
<td>-2.0</td>
</tr>
<tr>
<td>Oilseeds</td>
<td>-1.7</td>
</tr>
<tr>
<td>Arable crops</td>
<td>-1.6</td>
</tr>
<tr>
<td>Oils</td>
<td>-0.9</td>
</tr>
<tr>
<td>Animal products</td>
<td>0.7</td>
</tr>
</tbody>
</table>

(Ittersum et al., 2009)
Conclusion

SEAMLESS-IF in one word = RE-USE  ⇒ simulation programs, coupling support media, Data, …

SEAMLESS-IF available @ http://www.seamlessassociation.org/

Interest of such project:

Create collaboration (network ?) between research teams in regards to a common objective

Difficulties and Benefits:

Elaborate a common vocabulary of several research domains and disciplines…

(Janssen et al., 2009)
Thanks for your attention.