Insights from a „model operations“ group

Lavinia Baumstark, Potsdam 17.01.2014
„Model Operations“? What for?

Models = common good of a working group
Model maintenance and technical coordination is needed
Its importance increases with increasing model size
Conflict of interest between work on scientific issues and model maintenance

→ Model Operations group
Tasks / Goals

Increase efficiency in model development

Organizing
- **Set up** commonly used platforms *(e.g. Redmine)*
- **Introduce** guidelines and standards **for code development and documentation**

Consulting
- **Assist model developers in** technical questions *("help desk")*
- **Giving advice in** numerical optimization issues
- **Having an overview about the full spectrum of** code development in RD3

Programming
- **Developing own** tools as requested **by the working groups**
- **Implement ideas of** code optimization/run time reduction
„Model Operations“ in RD3 at PIK

Range of coverage

- Model Operations
- ESM & Macro & Landuse
- RD3
- PIK
- Extern

Group Agenda / Research Focus:
Increase Efficiency

Model efficiency tools
- code optimization
- modularization

Work efficiency tools
- standardization
- technical consulting
- management tools

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Examples for increasing efficiency

1. Coding Etiquette
2. Subversion Management (SVN)
3. Synchronization of Models
4. Platform for coordination (Redmine)
5. Standard for inter-model communication
6. …
Example 1: Coding Etiquette

Collection of guidelines for writing Code:

• Item Naming
• Units
• Commenting
• Introduction of mathematical formulas
• …

• Also: tools for renaming/checking code
Example 1: Coding Etiquette

Old:

```plaintext
labbal(t, regi)$(t.val ge p_year_first).
    vari(t, regi, "lab")
    =e=
    datalab(t, regi);
```

New:

```plaintext
q_labbal(t, regi)..
    v_vari(t, regi, "lab")
    =e=
    p_datalab(t, regi);
```
Example 2: Subversion Management (SVN)

- Manages changes to files and directories happening over time
- All previous versions are available, including deleted files
- Collaborating on the same source code is easier
Example 3: Synchronization of Models

MAgPIE

- main.gms
  - [113] sets.gms
  + [114] include.gms sets
  + [117] declarations.gms
  + [118] include.gms declarations
  + [121] input.gms
  - [122] include.gms input
    + [5] 10_fbask.gms
    + [6] 11_scenarios.gms
    + [7] 12_coupling.gms
    + [8] 13_tc.gms
    + [3] endo.gms
    - [4] exo.gms
      + [3] declarations.gms
      + [4] input.gms
      + [5] presolve.gms
      + [5] ts_corrected.gms
    + [9] 14_emissions.gms
    + [10] 15_nr_impact.gms
    + [12] 18_residues.gms

REMIND

- main.gms
  - [4] DIR "scenario/in"
  - [26] config.gms
  - [31] sets.gms
  + [32] include.gms sets
  - [33] sets_calculations.gms
  - [38] declarations.gms
  + [9] include.gms declarations
    + [5] 10_climate.gms
    + [6] 20_taxes.gms
    + [7] 30_biomass.gms
    + [3] exogenous.gms
    + [4] hoogwijk.gms
    + [5] magpie.gms
      - [3] sets.gms
      - [4] declarations.gms
      + [5] datainput.gms
      - [6] equations.gms
      - [7] preloop.gms
      - [8] bounds.gms
      - [9] presolve.gms
      - [10] postsolve.gms
    + [8] 31_fossil.gms
    + [9] 35_transport.gms
    + [10] 80_optimization.gms

Modularization:
- Clear definition of interfaces between modules and core
- Possibility to work at new realization of a module without interference of existing realizations
- Common structure
- Common tools
Example 4: Platform for coordination (Redmine)

Model Operations Wiki:
- Tutorials
- Issues
- Support Forum

Forums

- Thoughts & Comments
  A place for general discussions related to Model Operations
- Questions / Problems
  Here you can ask your questions or discuss your problems in model development
Model Inter-comparison File format (.mif):

- Tool developed for model communication
- Provides a standard for model input and output
- Helpful for inter-model comparison and coupling models
Thank you for your attention!

Questions are welcome