IAMC
Physical Earth Systems
Human Earth Systems
Integrated Assessment Modeling Consortium
iamconsortium.org
Founded 2007

# EVALUATION AND DIAGNOSTICS SWG

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# Evaluation & Diagnostics

**Part of a larger process of model validation including:**

- Documentation
- Intercomparison
- Evaluation & Diagnostics
- Behavior testing
  - Hindcasting
  - Stylized facts



Schwanitz et al., 2013, Env. Mod. Software 50, 120-131
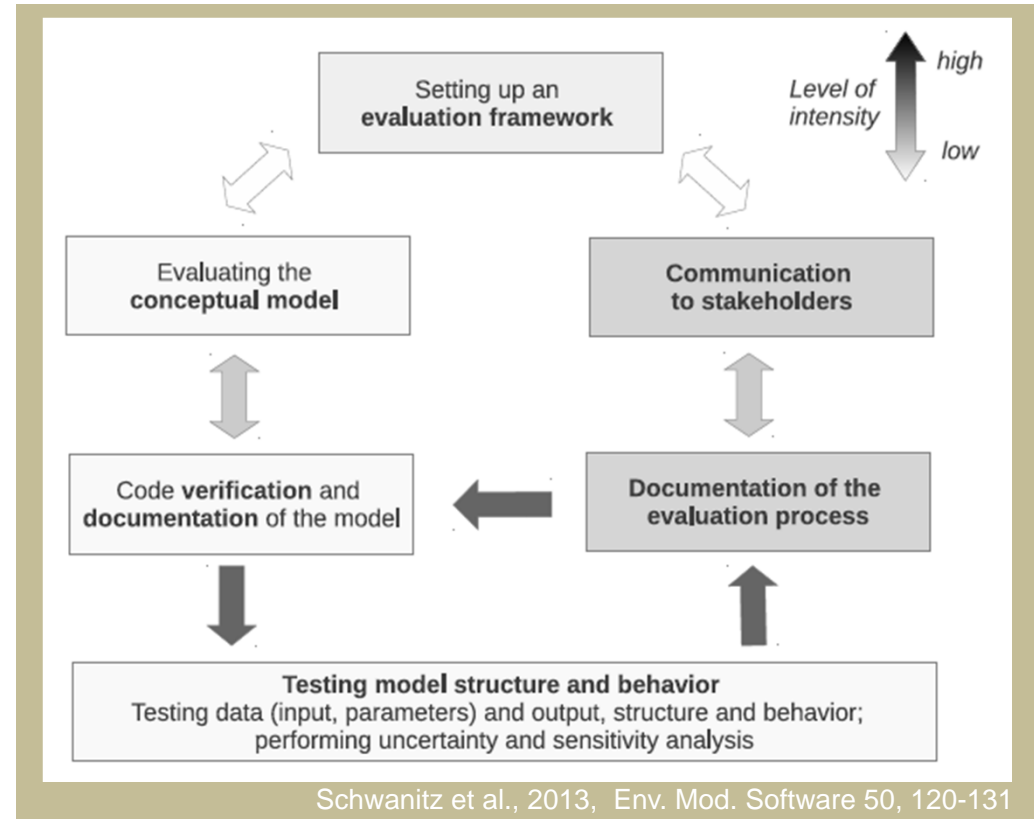
# IAM evaluation is an **open-ended process** of testing, learning & improving a model and its performance

**Evaluation criteria for IAMs**

*appropriateness* — is model purpose and design consistent with the research question?

*interpretability* — are model results clearly interpretable in light of model structure and parameterisation?

*verifiability* — are model results repeatable or is model structure accessible to 3$^{rd}$ parties?
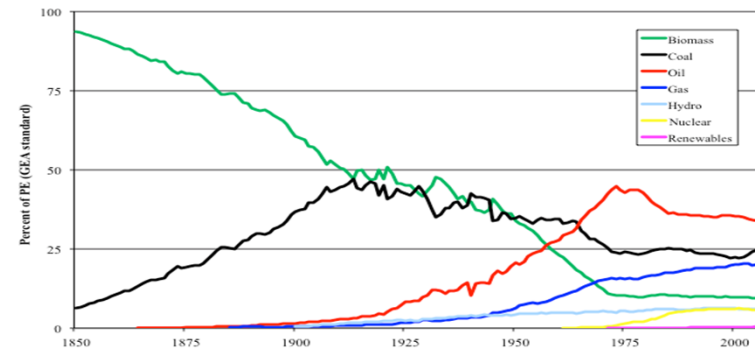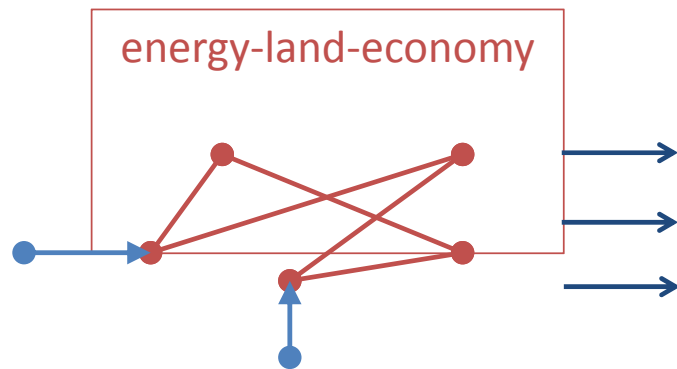
*credibility* — is model seen as <u>good enough</u> for its intended purpose by <u>both users and modellers</u>?

*usefulness* — do model insights help understand uncertainties, trade-offs, alternatives?

Wilson et al., 2017, Evaluating Process-Based Integrated Assessment Models of Climate Change Mitigation, IIASA Working Paper WP-17-07; pure.iiasa.ac.at/14502/1/WP-17-007.pdf

# Different **evaluation methods** are used with IAMs, particularly to test structural validity



energy-land-economy

behavioural validity

structural validity

model checks

transparent
documentation

expert
review

sensitivity
analysis

model
inter-comparisons

diagnostic
indicators

simple models

historical
trends

generalisable historical
patterns

historical simulations

Wilson et al., 2016, IIASA Working Paper WP-17-07

# Looking back at IAMC 2017

Last year we asked the question:

Organize an examination of how we validate our models?

# This E&D SWG Session

- Discuss steps to facilitate and streamline model documentation and evaluation activities in the IAM community

- with a view to IPCC AR6 and in particular Annex C on scenarios and modelling methods of the WG3 report

# *Transparency* – Big steps forward

**Close-up transparency**

- Open source!
- But steep learning curve, definitely for modellers
- IIASA/IAMC *Interactive scenario explorer*

**Long-distance transparency**

- AR5 *Metrics and Methodology* Annex
- High-level descriptions of models/multi-model studies

*Slide shown by Jim Skea in his presentation on AR6 during Tuesday's plenary*

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# Mid-range transparency:
# for users rather than producers

- *What questions are the models answering?*

- *What are the limitations?*

- *How do they actually work?*

  - Costs of key technologies
  - Underlying socio-economic assumptions
  - Mitigation options available in models (especially land-related options)
  - Resource potentials (especially biomass)
  - Representation of agent decision-making
  - Valuation of co-benefits
  - Discounting/intertemporal issues
  - Treatment of economic dimensions ("costs", GDP, consumption, investment etc)

*Slide shown by Jim Skea in his presentation on AR6 during Tuesday's plenary*

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