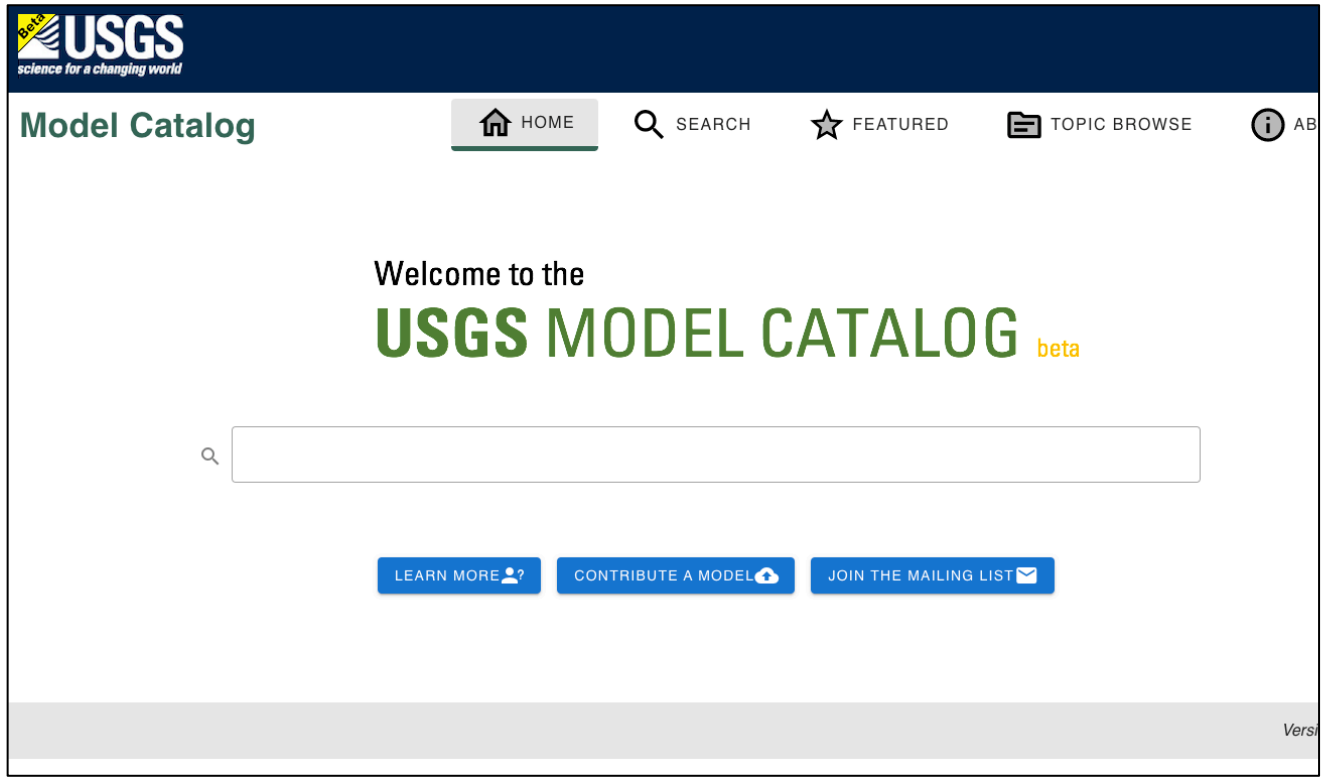
Integrated Modeling Workshop and the USGS Model Catalog

Closing plenary update



Project coordinator: Leslie Hsu, lhsu@usgs.gov

Project Team: Brandon Serna, Amanda Liford, Grace Donovan, Viv Hutchison, Sky Bristol, Tristan Wellman

Science Analytics and Synthesis, Core Science Systems

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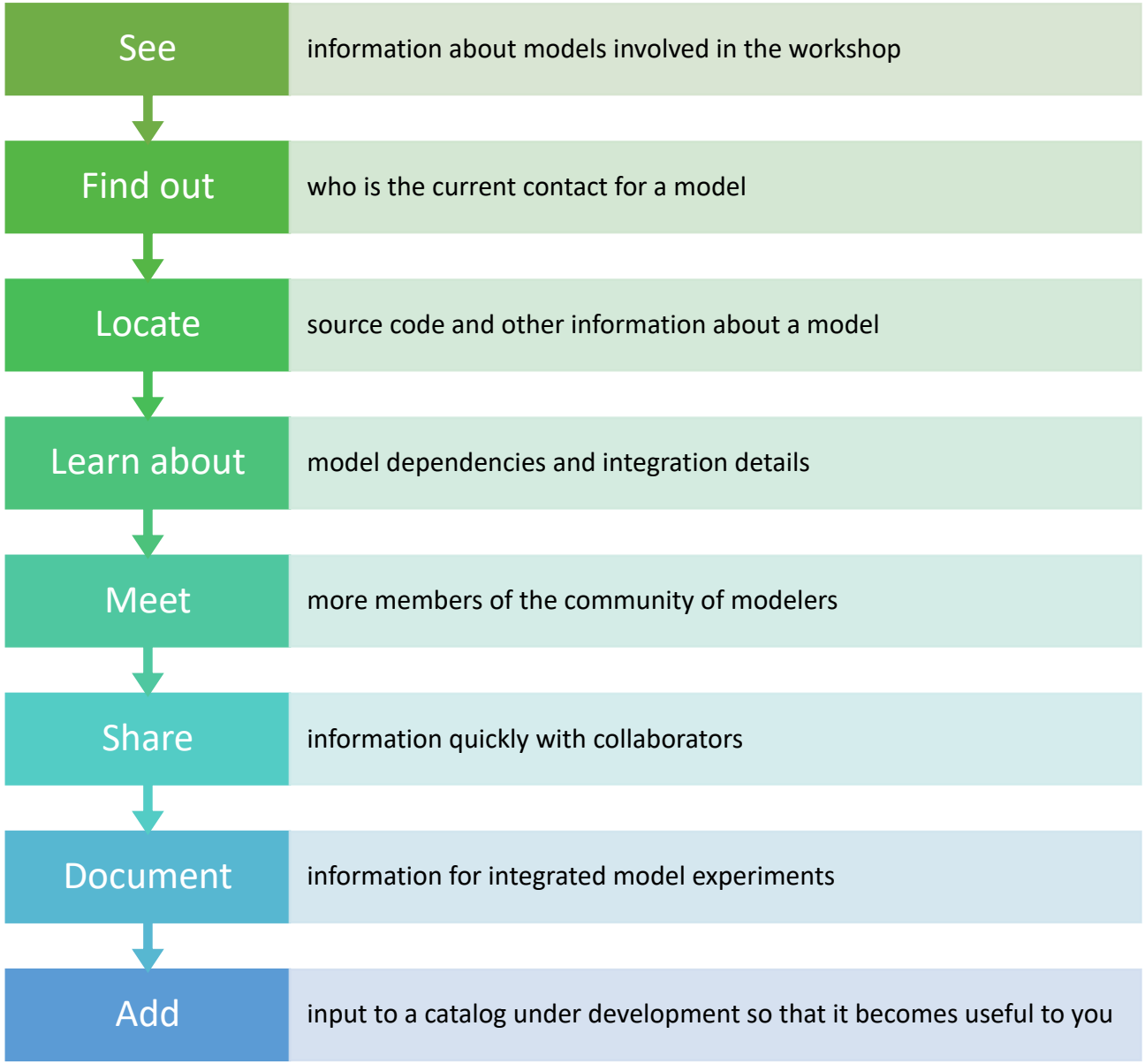
These slides describe a collaboration between the **Integrated Modeling Workshop** and the **USGS Model Catalog project** that will enable participants to



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USGS Model Catalog Goals

- Make USGS models more discoverable, accessible, and usable
- Compile and augment model information from other sources
- Offer features for model producers and users that are not available elsewhere
- Highlight and promote best practices in scientific modeling to improve modeling capacity at the USGS
- Build and connect the community of modelers

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Basic Profile 13 fields

describes where to get more information and basic information on how the model could be used

Field	Description
Model Name	Name of the model, including acronyms
Model Version	Version of the model, i.e., 2.0
Web Links	An organizational website or repository, if available
Abstract	Description or summary of the model, including its purpose or goals and the type or formalism of the model (e.g., system dynamic, agent based model, machine learning), preferably accompanied by relevant keywords
Originator(s)	Name(s) and contact information of the developer(s)/author(s)
Release Date	Date of release
Last Update	Date of last update
Organization	USGS or external
Mission Area	USGS mission area this model most clearly aligns with
License	OSI-approved (Open-Source Initiative) license
Citation	How to cite the software
Identifier	Location where the model is posted or published (e.g. PID or DOI)
Language	Computer language or platform used for programming

Adapted from https://openmodelingfoundation.github.io/standards/documentation/

Advanced Profile +18 fields (1 of 2)

Version, Methods and Theoretical Foundation

Field	Description
Version Updates	Changes since the last version (if the model is an update) including bug fixes, new features, or other substantive modifications, where appropriate.
Requirements	All software and/or hardware requirements needed to run the model and replicate any published results
Dependencies	All data dependencies needed to run the model and replicate any published results
Installation	Information on how to install the model so that it can be run (e.g., compilation and/or execution instructions)
Assumptions	Assumptions: What are the key assumptions made that define the dynamics of the model?
Structure	Model structure: provide a flow diagram of the model.
Equations	Equations: What are the equations of the model?
Temporal Information	Temporal resolution, time stepping, and units
Spatial Information	Spatial dimensionality, resolution, extent, grid type if relevant
Limitations	Limitations, domain ranges: What is this model specifically NOT intended to do.

Adapted from https://openmodelingfoundation.github.io/standards/documentation/

Advanced Profile (2 of 2)

Implementation
- Input/Output and Variables
- Validating installation
- Model evaluation, uncertainty, and sensitivity

Field	Description
Input/Output and Variables	Key input parameters and their values and domain ranges and units (minimum input requirements for model operation and default values, where appropriate); control variables; Key output variables and domain ranges
Conditions	Initial conditions
Functions	Forcing functions that affect the dynamics of the model.
Example	Provide sample runs that illustrate the dynamics of the model.
Evaluation	Model evaluation, uncertainty, and sensitivity
Benchmarks	Describe or provide benchmarks for validation of your model
Usage	Measure of use / community support (citations, forks, commits, members)
References	References to reports or publications where the model is used

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Adapted from https://openmodelingfoundation.github.io/standards/documentation/

Additional model profile information suggested

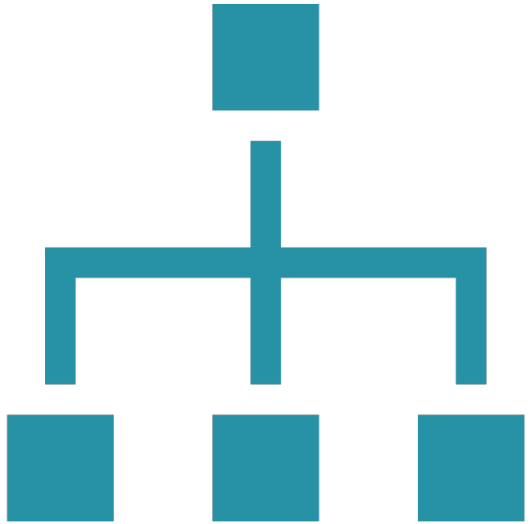
- Distinction between models and frameworks
- Coupling Framework (ESMF, MCT, CSDMS, OpenMI)
- Components (for multi-process models)
- Parallel processing model (Open MP, MPI)
- Containerized version available?
- GUI or command line?
- Link to post processing tools or other tools

Frameworks vs. Modules

For frameworks with multiple modules

- List components as a first step
- Indicate tight or loose coupling
- Coupling tools or methods used

There's an importance to defining terms and precision of language so that different modelers can be on the same page.



Computational Testbeds

"Infrastructure that lets you understand model and data integration and performance"

- Advanced Profile fields discussed and suggested:
  - Benchmarking
  - Governance
  - Library of results
  - Types of data on which models are evaluated
  - Protocols/Workflows
  - Ontologies
  - Compute Platform
  - APIs
  - Software

Challenges

Terminology and Categorization

Coupling of process-driven and data-driven models

Appropriate custom views for different audiences

Content population and maintenance – streamlining and automating

Next steps

- Next version of the information model
- Population and verification of model pages
- Alignment with existing practices
  - Software Release in USGS
  - Leverage existing documentation workflows
- Help define terminology
- Keep listening to user needs
- Facilitate spaces for the modeling community to learn from each other
- data.usgs.gov/modelcatalog

Thank you

- **Peter Claggett** (CBLCM)
- **Nate Collier** (ILAMB)
- **Richard Niswonger** (GSFLOW)
- **Rich Signell** (COAWST)
- **Chris Vernon** (Demeter, CERF, MOSART-WM)
- **Jacob Zwart** (PRMS-SNTemp-EnKF, GLM-FABM-AED)
- And *many* others for your conversations…

Instructions to submit a basic profile (easy!)

Complete the profile **by October 9** to allow time for follow-up and reporting back by the end of the workshop. 15-30 minutes of your time will greatly help the catalog effort.

1. **Go to this Google Sheet** and locate the model for which you can submit information. (Create a row if your model is not yet listed.)
2. **Enter your name** in Column F “Basic profile volunteer”
3. Click the link in Column G and **fill out the form**
4. **Contact Leslie Hsu** (lhsu@usgs.gov) with any questions or if you’d prefer to fill this out in a 30 minute phone call.

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Thank you

from the Model Catalog Team

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