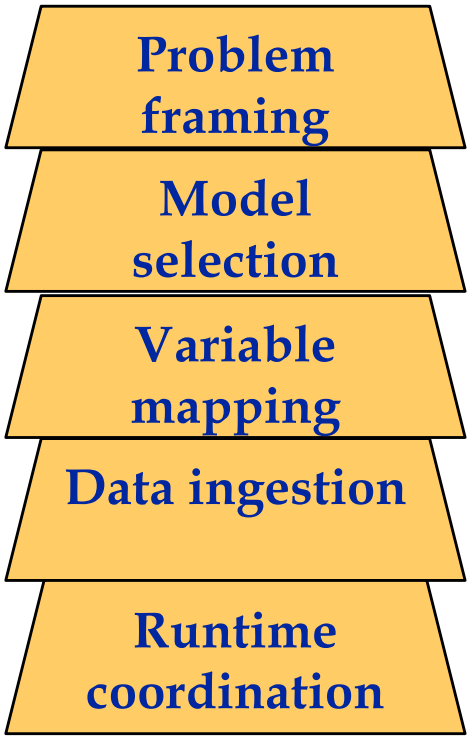
# Integrated Modeling: Bridging Across Disciplines

**Diversity across disciplines:**
- Modeling approaches
- Representative models
- Model variables
- Integration frameworks


**Mediation at many levels**




## Model Coupling

**Interleaved Execution**
*Sliced execution by time tic: first one model, then another, in a round-robin way*
eg: CSDMS

**Implicit Interleaving**
*Collection of equations that are designed to be solved together, then a solver runs them.*
eg: CGE economic models

**Code Merging**
*MPI code to implement all models*
eg: earthquake simulations

**Shared Memory**
*Models share a R/W memory*
eg: Synthetic Information

## Model Combination

**Result Chaining**
*The result of a model is input to another model, as in a workflow*
eg: pSIMS, CEMSA

**Output Comparison**
*Results from several models (or the same model) are aggregated (eg, an ensemble)*
eg: regional weather prediction

**Output Analysis**
*Same model is run with many configurations or parameter values, to do parameter estimation, sensitivity analysis, or uncertainty quantification*

## Model Distribution

**Code Parallelization**
*The model is implemented as parallel code (eg to process each grid cell separately)*

**Interleaved Behavior**
*Individual agents proceed based on information made available to their simulation environment*
Ex: agent-based frameworks

**Integrated Behavior**
*Agents are given several behavior models that determine their actions*