The 3-Steps Reliability Assessment

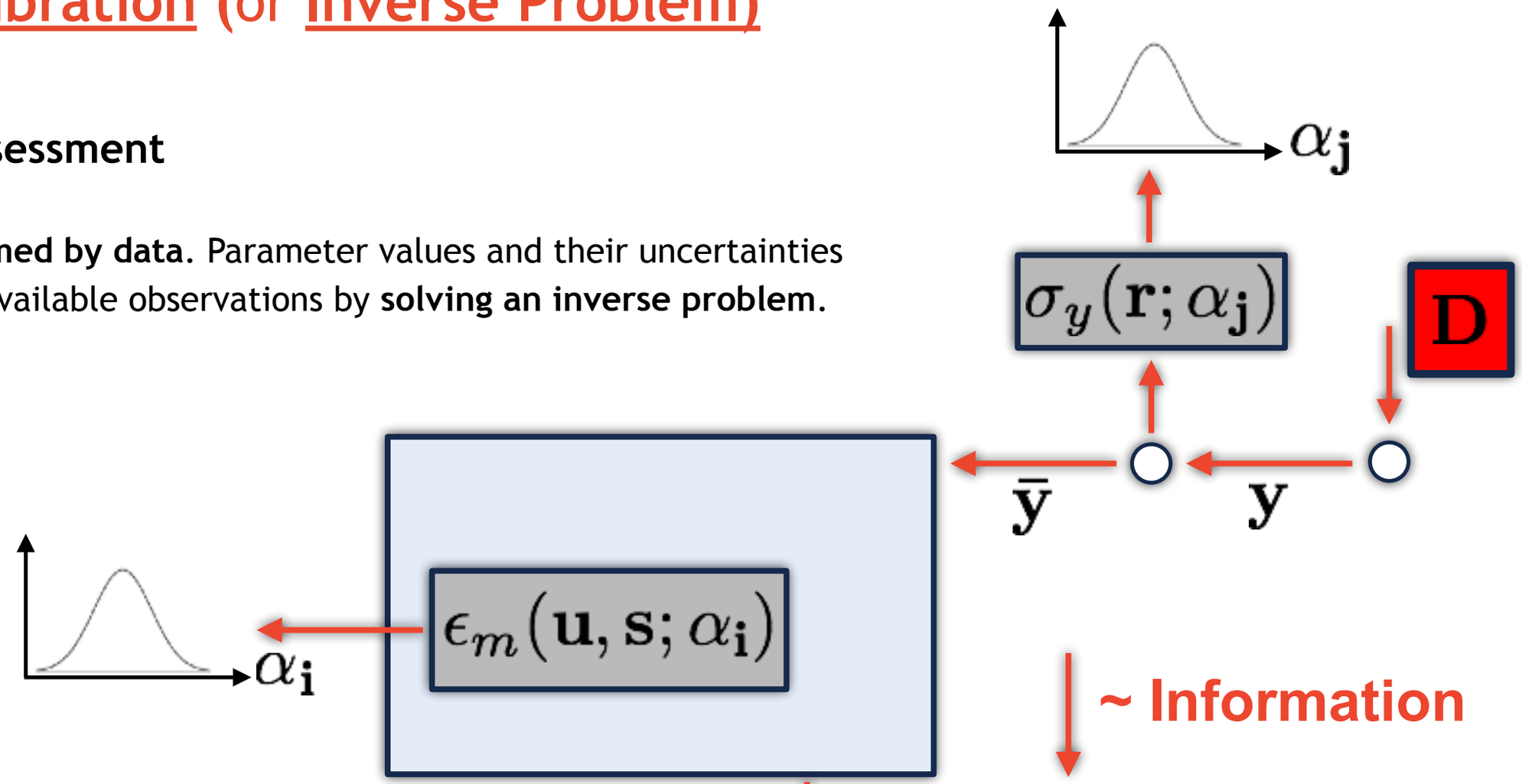
(Or Predictive Estimation): The probabilistic quantification of predicted experimental and computational outcomes with identified and quantified uncertainties.
It is comprised of 3 components:

- **Model Calibration** (or **Inverse Problem**)
- **Validation (or Model Prediction)**
- **Predictive Assessment (or Estimation of the Validation Regime)**

The 3-Steps Reliability Assessment

- **Model Calibration (or Inverse Problem)**
- **Validation**
- **Predictive Assessment**

The model is **informed by data.** Parameter values and their uncertainties are inferred from available observations by **solving an inverse problem.**



The use of probability to represent uncertainty naturally leads to the formulation of the calibration problem as Bayesian (**Bayesian Inference**):

Posterior **Likelihood** **Prior**

$$p(\theta,\alpha|\mathbf{D},\mathcal{M}) = \frac{\mathcal{L}(\theta,\alpha;\mathbf{D},\mathcal{M})\ \mathbf{p}(\theta,\alpha|\mathcal{M})}{\int \mathcal{L}(\theta,\alpha;\mathbf{D},\mathcal{M})\ \mathbf{p}(\theta,\alpha|\mathcal{M})\ \mathbf{d}\theta\mathbf{d}\alpha}$$