



Future challenges integrating multiple modes of experimentation

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Passive/active, physical/computer

	Passive (not model-based)	Active 1: identification (model-based)	Active 2 Utilities (strongly model based)
Physical experiments	Observational study, surveys	Controlled experiment	Special algorithms
Computer experiments	Monte Carlo, LHS, Space-filling	Factorial and optimum design	EVOP

Simulation

- Simulators should carry the seeds of their own sensitivity, design, emulation
- Automatic differentiation
- Adjoint methods etc
- Work at different resolutions
- No funds to build large simulators unless simpler ones have been validated

“Simulation without identification is like driving a car blind”

- At least match averages to eg census data
- Develop special measurement/sensors
- Sensor location is a type of design
- Formal elicitation of expert judgement, not just naïve guess-values
- Avoid needless detail: every needless detail is an unidentified/unidentifiable parameter
- More stochastic, less deterministic
- Concentrate on the objectives

“We live in a spider’s web of extremes”

- Much risk is associated with extremes
- Simulate/experiment directed to extremes
- Understand dependence: copulas, Bayes nets, vines, networks
- Percentiles!!
- Interactions
- World financial crisis: “Dynamics of Dependence in Collateralized Debt Obligation”
Choros-Tomczyk, Haerdle, Overbeck 06/09/11
ENBIS-11 Coimbra.