

Exploration, Understanding, and Research			
	1. Theory Building	2. Theory Testing	3. Problem-Space Mapping
Purpose	Hypothesize a mechanism to explain an observed social fact	Provide 'synthetic world' for experimental design or human-subject interaction	Synthesize knowledge and identify gaps or inconsistencies
Boundary	Narrow – leave only what is sufficient to generate reference behavior	Medium – structures driving all plausible behavior modes	Very broad and detailed – include everything which may relate to the research question
Data Requirements	Primarily qualitative, abstract	Best-guess parameterization, order of magnitude	Primarily qualitative, details add opportunities to learn
Analysis	Simulation of theoretical mechanism to explain its operation	Simulation and moderate sensitivity testing within operating range	Simulation optional, process of modeling adds value
Example Question	<i>"What theory explains the emergence of collective behaviors?"</i>	<i>"How do managers actually make stocking decisions?"</i>	<i>"What do we need to know to understand cyber-bullying?"</i>
Decision Making and Policy Design			
	4. Policy Development	5. System Design	6. Forecasting
Purpose	Identify optimal settings for control 'levers'	Design of <i>structural</i> changes to a system	Predict future behavior of system in which decisions do not influence system outcomes
Boundary	Medium to broad – include structures relevant to behavior outside expected operating regime	Broad – include plausible structural changes with controls	Medium to broad, exclude or less influential elements
Data Requirements	Strong quantitative data with uncertainties	Strong where possible (new structure has unknowns)	Strong quantitative data with parametric and structural uncertainties
Analysis	Robust static and dynamic optimizations	Extensive comparison of behavior with/without policy throughout parameter space	Extensive simulation and uncertainty estimation
Example Question	<i>"How do I optimally schedule production starts?"</i>	<i>"Will a cash-for-clunkers policy reduce global emissions?"</i>	<i>"What will the wholesale price for cocoa be in 12 months?"</i>
Interacting Within a System			
	7. Teaching Systems Thinking	8. Training Operators	9. Mediation
Purpose	Use models of well-known systems to build insight for structurally similar ones	Provide a 'flight simulator' environment to train reactions	Capture and integrate stakeholder perspectives to facilitate dialog
Boundary	Narrow – highlight the primary structural mechanisms	Medium – structures driving behavior for all training cases	Medium to broad – include diversity of perspectives without diluting core issues
Data Requirements	Qualitative, drawing on parallel cases	Medium – sufficient for fidelity from user's perspective	Varies with community. Purely qualitative models for facilitation may lead to <i>policy development</i> models
Analysis	Students interact with models to explore behavior	Simulations exploring the various behavior modes help design training scenarios	
Example Question	<i>"What can epidemiology teach us about fashion cycles?"</i>	<i>"What signals does a facility operator need to practice handling emergencies?"</i>	<i>"How can police and residents work together to secure the community?"</i>