Overview of the Modeling Process

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This very brief module provides a very general set of points about the overall modeling process.

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1. Simple overview.

Here is the simple overview presented in the SEM Essentials-Summary Points module. The other modules provide a variety of illustrations of the various parts of the process.
I have published three different treatments of the SEM workflow process. In my book, I walk through an example to illustrate the intent of sequential learning about a problem. In 2010, we expounded on model specification choices and the grounding needed for decisions in the field of ecology. In 2012, we proposed a 3rd-generation implementation for SEM and some additional steps in the process.
From a science perspective, one of our objectives has been to expand the advice given, as well as the procedures that link questions to answers. There has been a substantial gap in the literature on SEM dealing with the ends of the process. On the front-end, how do we formally translate theoretical ideas into models in a “revealed” fashion. On the back-end, there are many possible uses for our hard-earned parameter estimates. This potential is largely untapped because of a lack of attention by SEMers to issues that are bread-and-butter of “modelers”.

What we aspire to is a comprehensive system for quantitatively examining general theoretical ideas.
These are the guidelines given in the Ecosphere paper. They are also elaborated on in a new book chapter my colleagues and I have coming out*.

A digression on sample size.

Rules of thumb for sample size –
• First, there are problems with any guidance on sample size.
• Second, simulations show we would really like to have huge sample sizes (see Model Evaluation module)
• People often talk about absolute sample sizes (e.g., 200 best, 100 OK, 50 minimal). But, it depends on model complexity (and signal-to-noise ratios)

(1) We would love to have 20 samples per parameter
(2) It would be helpful to have 10 samples per parameter
(3) We hope to have a minimum of at least 5 samples per estimated parameter
(4) It is claimed that Bayesian estimates are stable with as few as 2.5 samples per parameter.

Here is just a very little bit about sample size.