

Discuss Last Weeks Exercise: [Introduction to Model Builder Combining Automating Vector GIS Operations](#)

- Hopefully you now have an idea of how combinations of GIS operations can be chained together to generate new information that may be useful in decision-making context.
- It is important to be able to look at geoprocessing models, to look at the individual procedures, and consult their help documentation to see what they do. It is useful to run models by right-clicking on the yellow boxes one at a time, and evaluating the result, so that you understand what each step is doing. This is a very powerful way of storing and exchanging, explaining and improving on an understanding of how places work.
- This is where we move from a very elementary view of the nuts and bolts of Models, Data, Mapping and Associative Procedures, to the doorstep of where our understanding of GIS and data explodes.
- We have explored two fundamental patterns for organizing and associating sets of observations. The **Vector-Relational** model, which uses rows in tables to represent things and conditions; and The Raster model that uses regular arrangements of cells to represent locations and the conditions that may have been observed or somehow conjectured to exist there.
- Both of these fundamental patterns for organizing information about things, conditions and relationships has its own language of procedures for transforming and exploring associations between data-sets.
- In both Raster and Vector-Relational toolkits, the output of one procedure is a new data-set that can be the input another procedure. It is wonderfully amazing to see the sophisticated models that can be made by chaining these procedures together!
- The Trollypop Demonstration data-set which we have used for the last couple of exercises, and will use again this week, includes a couple of toolboxes: **pbVectorDemo** and **pbRasterDemo**, which demonstrate a few more fundamental patterns of vector and raster modeling. Some but not all of these models are described in the tutorial web pages: [Vector-Relational Procedures](#), and [Raster Patterns in ArcMap](#). In any case, you can learn a lot about how these models work by opening them up, looking inside each procedure, and running each yellow box and then exploring the results.

Raster Overlay Analysis

IN the first half of this course, in our exploration of vector-relational data and the sorts of associations and transformations that we can make with them, we have been dogged by a couple of problems related to the categorical nature of our representations. This application of categories, like 21 classes of land use, or spatial categories like census block groups or counties, causes us all sorts of worries about how well we can represent the conditions, things and relationships that are critical for our specific decision-making context. The vector objects are treated as homogeneous and indivisible, even though the reality we are concerned with is almost always more complicated.

Today we are going to look at [a new toolkit for data organization and analysis](#) that gets us over some of the technical problems of awkward indivisible objects. Rasters, like the elevation model we explored last week divide a geographical area into congruent cells. Rather than representing discrete things, rasters represent locations that are enmeshed in a network of spatial relationships.

Because raster data are organized according to regularly spaced locations (cells), there are many sorts of relationships that can be evaluated very systematically using raster tools. In our [conceptualization of spatial mechanisms](#) we know that mediating conditions, like winds or barriers or easier travel corridors make a difference in the real world. Raster tools offer many ways of modeling these.

With great power comes great responsibility! It is time to revisit our framework for Evaluating [GIS Models in Decision-making Situations](#). At this stage in the class, we can finally get to two remaining cells in our matrix regarding the evaluation of GIS procedures that are employed to simulate spatial mechanisms.

The cell-based organization of rasters is that it makes it easy to look at relationships among layers. This is why today's topic, Raster Overlay Models is a very common means to understand the interaction of several independent data models that may explore multiple aspects of a decision-making situation.

Historical Moment: Cartographic Modeling,

- [Ian McHarg: Design with Nature](#),
- [Space-Based Platforms for Geographic Observation](#)
- [Dana Tomlin and Map Algebra](#).

Continued on next page.

The Language of Rasters and Map Algebra: See these helpful notes from ESRI

- [What is the Spatial analyst Extension?](#)
- [Solving Spatial Problems](#) and [Conceptual Models](#)
- [Types of Operations](#)
- [An Overview of the Spatial Analyst Tools](#)

Break

[Demo Introduction to Cartographic Modeling](#)

Read through homework assignment.