What is Cartography?

Cartography is the art and science of making maps. It applies the fundamental scientific procedures of accurate measurement, classification, and the identification of relationships, to create visual models of our complex world.
What then, is a map???

“A map is a graphic representation of the milieu.” (Dent, 1999).

“A symbolized image of geographic reality, representing selected features or characteristics, resulting from the creative efforts of cartographers and designed for use when spatial relationships are of special relevance” (ICA, 1995).

In short, a map is a tool used for sharing and presenting spatial information. I.e., it is a tool for communicating.

Principle Task of Cartography

Communicate geographical information graphically
- basic focus of graphic artist -- beauty
- basic focus of surveyor -- accuracy
- basic focus of cartographer -- communicate the information beautifully and accurately.

Maps as Communication Tools
The Great Communicator

If cartography is a form of communication, the measure of a good map is how well it conveys information to its readers to enlighten, convince, or persuade. Too often the pure aesthetic appeal of a map is equated with its communicational value. Aesthetic issues certainly play a role in effective cartography, but it is the issue of communication that holds the central role in cartographic design.

-taken from the Geographer's Craft - Cartographic Communication Module, Section 3

Map Purposes

The look of a map depends largely on its intended use and intended audience

Examples
- store geographic information
- aid navigation or mobility
- aid analysis, such as measuring or computing
- summarize large amounts of statistical data for forecasting or detecting trends
- visualize what was otherwise invisible

Basic Characteristics of Maps

All maps are:
- Representations of reality via two elements
  - locations and attributes
- Reductions of reality
  - scale
- Transformations of space
  - map projections and coordinate systems
- Abstractions of reality
  - generalization and its components
- Signs and symbolism
  - cartographic symbolization
Abstraction

- The real world is big! Replete, unorganized and extremely complex.
- A map is a representation of the real world that follows certain methodologies of abstraction and construction procedures for making the abstraction methodologies manifest.
- A map has conceptual rather than concrete existence.
- Abstracted phenomena are generally represented by graphics symbols. They can also be represented by data structures.

The Abstraction Process

- Selection: geographic space to be mapped, map scale, projection, aspect, data variables, data gathering or sampling, client needs, familiarization with what is to be mapped (you have to know about what you are mapping).
- Classification: grouping and categorizing; reduction of complexity to organize the mapped information to enhance communication.
- Generalization: involves simplification, elimination, combination and displacement.
- Symbolization: marks which represent data in some logical way.
- Design: "The planning and patterning of any act towards a desired foreseeable end constitutes a design process" An act of synthesis: pulling together disparate elements into something coherent.
Classification & Categorization

- Categories: a unit or a subunit of a larger whole made up of members sharing one or more characteristics
- Categories simplify our environment so we can understand it easily (a contradiction?)
- Humans understand better and faster by simplifying and categorizing the world, (subjective)
- Maps are an important means of simplifying and categorizing things so we can understand them

Symbols and Representation

- We cannot always point to something when we want to communicate about it, so we need something to stand for these objects: symbols
- Symbol: An item representing something else because of relationship, association, convention, or resemblance.
- Symbols are at the basis of natural languages (eg., English), math, statistics, pictorial communication (such as drawings, maps, graphs)
Cartographic Process

- Define an audience
- Determine a scale
- Select a reference system
- Select phenomena based on the purpose of map
- Convert real world phenomena to symbol
- Emphasize certain of selected features or themes
- Generalize or intricate detail is simplified
- Support graphic symbols with the written word using letters, titles and labels

Map Types

- Reference maps
  - General purpose documents that serve as base maps
  - Primary objective is to show the location of a variety of features
  - Phenomena with an emphasis on geometric properties—such as distance, direction, area or aerial extent
- Thematic maps
  - Special purpose documents emphasizing on single “theme” in relation to geometric properties—such as distance, direction, area or aerial extent
  - Primary objective is to show the distribution of a single attribute or the relationship among several attributes

Reference Maps

- Show a variety of features
- Can be at any scale
- Large scale (small area) reference maps have higher positional accuracy; includes topographic maps, site maps
- Small scale (large area) maps are more generalized and less positionally accurate; includes state, country, continental maps
### Thematic Maps
- Concentrate on a single class of phenomena
- Not all such maps are thematic
- Historically, tend to be small scale (show large area) in the past

### Issues in Cartography
- Dorling: a key focus when trying to understand maps is "how the creation and use of maps affects the various ways in which we think of and view the world"
- Monmonier: the "paradox" of cartography: to present a useful and truthful picture, an accurate map must tell white lies
- Krygier & Wood: "Different goals lead to different maps! Frequently the quality of a map is a matter of perspective, not design. This is because a map is a statement locating facts, and people tend to select the facts that make their case. That's what the map is for: to make their case."
- Maps are not objective reflections of a simple reality; they are human created objects imbued with human intent.

### Pros and Cons of Maps
#### Advantages
- Quickly summarize and explain the spatial relationships
- Easier to visualize and understand the spatial patterns
- Solve complex problems

#### Disadvantages
- No single map could show everything (classified and simplified)
- Too much information is not necessarily good
- Maps can be misleading