Geog 462: Digital Cartographic Design

LECTURE 1: Introduction

Gregory Elmes

Fall 2005

Major Points About the Course

- CONCEPTS AND PRINCIPLES OF CARTOGRAPHY
  - Cartography an ancient art and science
    - Long established, long history
  - Implications of the digital revolution
- GRAPHICACY – a fundamental skill
  - Literacy, numeracy
  - Spatial thinking and reasoning
- OPPORTUNITY TO LEARN SOFTWARE
  - Marketable Skills
- LEARNING TOGETHER
  - Dr. Elmes is NOT an infinite font of cartographic or digital knowledge!!!
    - Use the resources, especially your fellow students
    - Don’t be bounded by the course outline

CONCEPTS AND PRINCIPLES OF CARTOGRAPHY

- Text: Thematic Cartography and Visualization - Terry Slocum
  - 2nd edition 2004, revised expanded
- SOME TRUTH WITH MAPS - MacEachren
  - The Roles of Maps
  - Cartographic Language
  - Abstracting Reality
  - Visualization Quality and the Representation of Uncertainty
  - Composing the Display

CONCEPTS IN CARTOGRAPHY

Cartography is an ancient art:
Long history
Multi-cultural

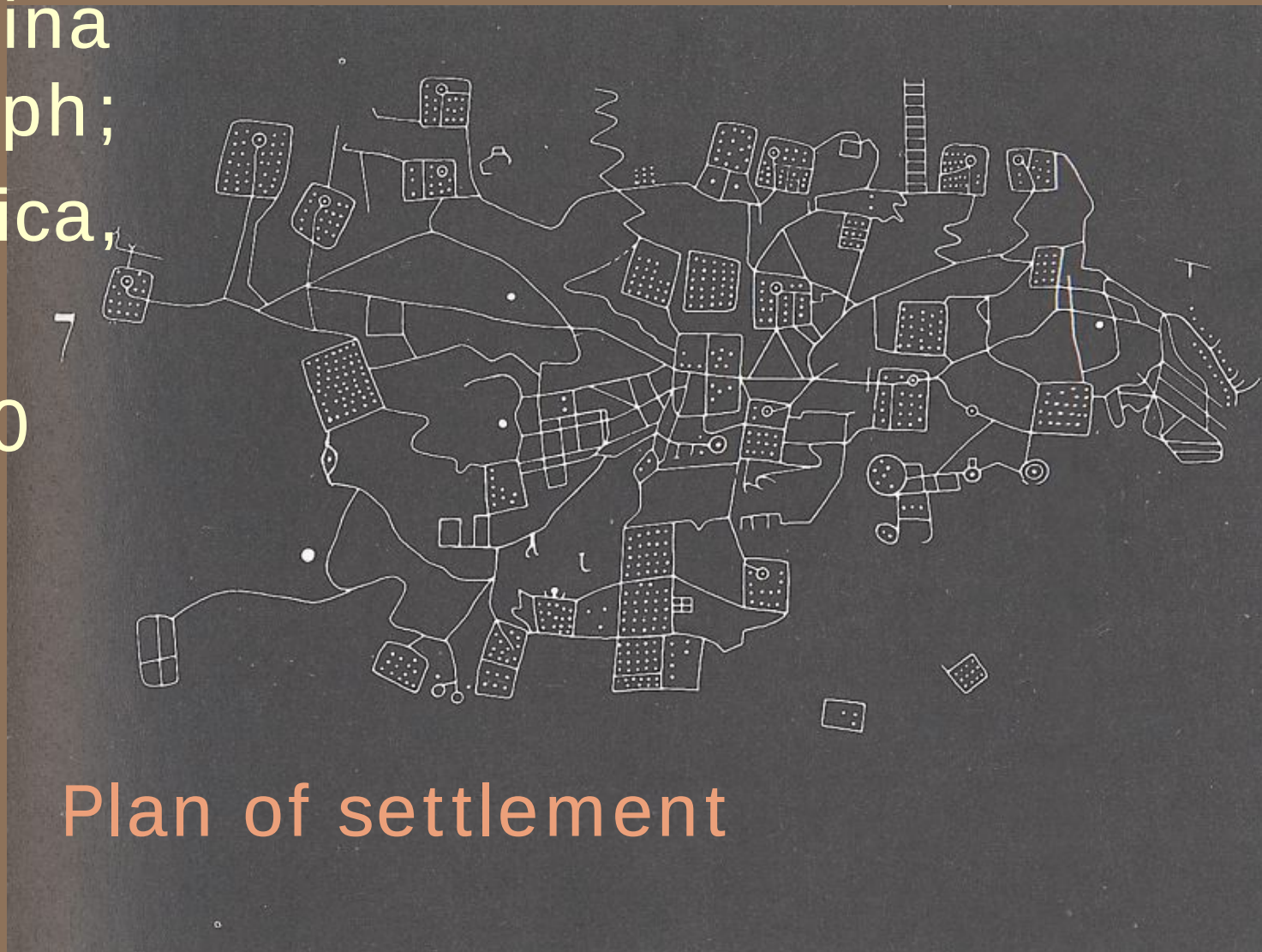
The Garden of Eden

Medieval world map – Arabic 1472 AD

Medieval cosmology

The First Known Map?

The Bedolina Petroglyph; Valcamonica, Italy, Circa 2500 BCE



Plan of settlement

A medieval image of the earth, from an early 15th Century manuscript *L'Image du Monde* by Gautier de Metz.

What do you notice about this image?

What is symbolized on this map?

How is it symbolized?

The British Library

Medieval Arabic world map copied in the nineteenth century from an original made in 1472 CE.

The British Library

Detail from a Chinese world map of 1644, showing the Great Wall and Europe in the top-left corner.

Maps are a product of culture, history and science

- Maps are cultural artifacts, comparable in history to arms and amour, musical instruments, or ships.
- Almost all cultures have developed maps, but with enormously varying degrees of sophistication and intent.
- Their origin is instinctive, in that they are products of both the intellect and the imagination in confronting problems in reality. For example ...?

From: **Outer Worlds and Inner Worlds: An Introduction to World Maps**
The British Library | By: Peter Whitfield 2002.

- **MAPS ARE SOCIALLY CONSTRUCTED**

Maps: a product of culture, history and science

- Maps face severe practical constraints in their construction and their use:
  - Maps have evolved because they were of fundamental importance.
  - Maps have acquired an aesthetic dimension,
  - Their forms have been influenced by belief, art, imagination, and symbolism as well as by empirical knowledge.

- Cartographers can take account of these interacting forces and try to analyze the way in which they have shaped the evolving world map.
- But the history of mapping is not a science: it can describe but not ultimately explain

From: **Outer Worlds and Inner Worlds: An Introduction to World Maps**
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A dialog between mapmakers and reality

- The most striking fact of the dialog is that the world map represents a reality which, although **present to our senses**, is **perpetually out of reach.**
- The world map has always been shaped not by science alone, but by religion, commerce, politics, art, and obsession.
- Historically, themes such as divine power, the natural elements, secular ambitions, recur constantly and are expressed more often than pure geography. These influences have been at times conscious, at times unconscious. Throughout the greater part of history the sources of knowledge lay in inherited authority and beliefs, not in reason or experience, and these sources have left their imprint unmistakably on the world map.
- Moreover, the forms in which even scientific knowledge is expressed are constantly evolving, mirroring the societies from which they spring.

“Why make a map?”

- What use is a map?
  - Do you believe what you see on a map?
  - Do maps lead or mislead?
  - Do maps unite or divide?
- Monmonier “How to Lie with Maps”.

Invasion	Roots
Route	Goals
Nation	Religion
Escape	Destruction
Arrival	Surveillance
Direction	Deceit
Identity	Pride
Education	Etc.

Computer Cartography

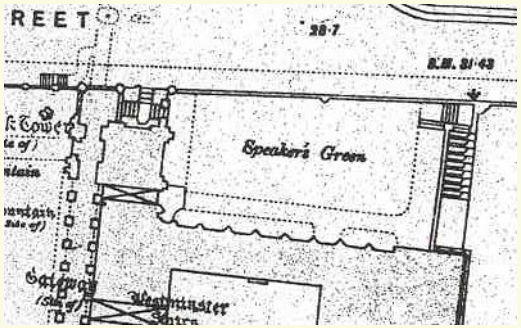
- Automated Cartography versus Computer Assisted Cartography/ Design -what's the difference?
- Technological balance
  - Pens to chips
  - Particular sets of methods and techniques appropriate to the technology
- Analytical emphasis
  - Theoretical and mathematical underpinnings
- Rules of map making

Cartographic Design Principles for GIS

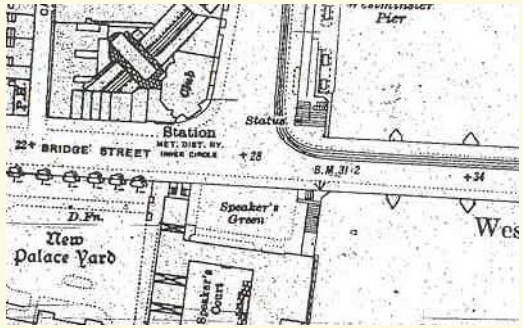
- Three processes common to all maps:
  - 1. Reduction (scale)
    - National Map Accuracy Standards:
    - on maps < 1:20,000, 90% of all locations must be within 0.02" (0.5 mm) of actual location.
  - 2. Selection -- abstraction
  - 3. Symbolization
- Communication concepts

SCALE

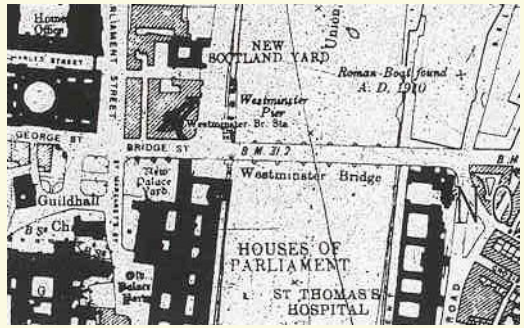
http://www.bl.uk/collections/map_scale.html



Ordnance Survey 5 feet to the mile (1:1056)



Ordnance Survey 25 inches to the mile (1:2534)



Ordnance Survey 6 inches to the mile (1:10560)

Ordnance Survey 1 inch to the mile.(1:63360)

Ordnance Survey 1/4 inch to the mile.(1:253440)

World 1:1000000

Selection

- What to include
- What to leave out
  - Conscious decisions
  - Unconscious decisions
- Commission
- Omission

Some Important Map Elements

- 1.Title & subtitle
- 2.Legend
  - Example of RULES: For choropleth maps, do not have overlapping values. For classification of interval/ratio data, leave no gaps between boxes, for nominal variables, leave gaps.
- 3. Sources/Credits
- 4. Scale
- 5. Direction
- 6. Coordinate system,

including grid reference

- 7. Graphic Primitives:

margins / frame lines, logos,

- 8. Insets
- 9.Typography
- 10.Symbology

For choropleth maps, increasing darkness (decreasing color value) with increasing numeric value
Keep same hue & chroma, or use a color ramp

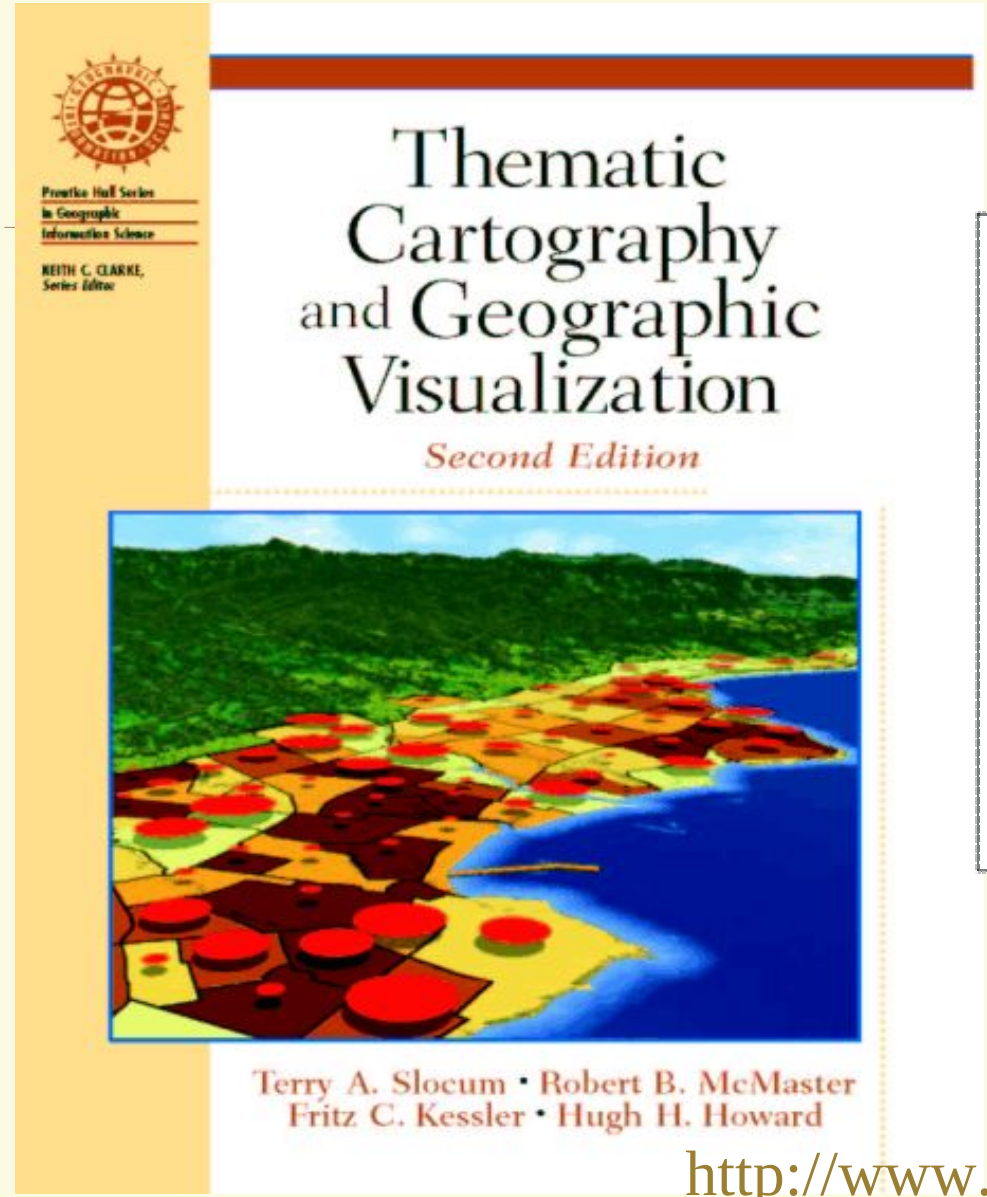
The Parts of a Map: Map Elements

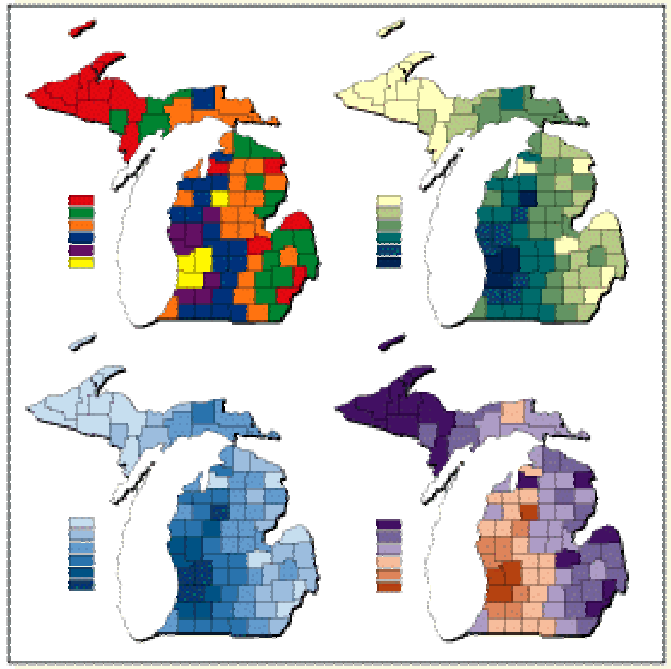
Important Map Elements

- Do not consider the preceding as a checklist for what **must** be on a map, but as a checklist for what to consider.
  - A part of the selection decisions process
- There may be other items to consider…

Communication Concepts

- Readers' "flow" through the map consideration of purpose & audience
  - figure to ground
  - clarity & legibility (e.g. consider size of text and other symbols for size of map output)
- Other considerations
  - page size
  - explanatory text
- DESIGN CONCEPT – clearly understood and to the front of the mind





http://www.prenhall.com/slocum/

SUMMARY

- Cartographic Language
- Graphic Representation - Abstraction
- Visualization
- Displaying Data
- Communication
  - AUDIENCE
- Map Composition
- Presentation

- The END (of the beginning …)
  - ANY QUESTIONS?