Effective Map Design

- Effective map design involves many decisions on the part of the cartographer

Mapped Area, Scale and Layout
- Map design is contingent upon the interaction between three factors:
  1) the mapped area (e.g. study area, city, county, country, continent, world)
  2) the desired scale of the map (e.g. 1:24,000, 1:1,000,000) and
  3) the paper size of the layout (e.g. 8.5 x 11 inches, 36 x 42 inches)
- Any change in one of these factors affects the other two
- In most cases, it is the scale that is dictated by the desired map area and paper size
- And the map scale then determines the level of abstraction and generalization on the map

Purpose, Use and Audience
- To create an effective map layout, it is critical to plan ahead

  1) Know the purpose of your map
     - What is important?
       - Dictates the level of abstraction
         - What layers of information will go on the map?
       - Dictates the level of generalization
         - What level of detail can be shown?
         - What data sources are most appropriate?

  2) Know how the map will be used
     - Publication in a journal, PowerPoint or large format conference presentation?
       - Dictates the scale of the map, font sizes, symbolization, abstraction and generalization
         - Journal - Assume that the reader has time to study the map
           - But the map will be at a very small scale
           - Is the map grayscale or color?
             (Grayscale maps are more difficult to symbolize – not as many colors available)
           - Fonts can be very small
         - PowerPoint – Assume that the reader will only have a few seconds to study the map
           - Keep the map as simple as possible (use as few layers as possible)
           - Use color, large fonts, fewer labels/annotation
         - Conference format - Assume that the reader has time to study the map up-close
           - The map will be at a large scale
           - Can use color in symbology, small fonts, many labels/annotation
           - Map can be less abstract (more layers) and less generalized (detailed data)

  3) Know your audience
     - Is the map being created for the general public or professional in a discipline?
       - Maps for the general public
         - Maps for the general public should be kept as simple as possible
         - Simplify the symbology and legend - and avoid technical jargon
       - Maps for professional in a discipline
         - Can use discipline-specific terms on the map and the legend
         - Maps for a technical audience can use discipline-specific technical terms

     - Are people familiar with the area being mapped?
       - This will determine whether or not a location map necessary
Arrangement of Map Elements
- maps are composed of cartographic elements
- a good map design seeks to balance the arrangement of map elements on the layout

- map elements
  - title (subtitle) - should inform the reader what the map is about - do not use TX
  - map body (area being mapped) - make it as large as possible on the paper
  - map scale(s) - verbal, bar(s) and/or representative fraction
  - map symbols - should be intuitive (e.g. blue for river and lakes, dark green for forest)
  - also note that symbology is applied to features and used for mapping quantitative data
  - map legend - ask what is necessary to interpret the map
  - not all features need to be represented in the legend
  - north arrow - if used, select one that conforms to the text/label style
  - text - include appropriate credits and explanations
  - place names and other labels - use hierarchical labels or annotation
  - larger cities should be in a larger font size – smaller cities use a smaller font size
  - always use blue italics for water features such as rivers, lakes, seas and oceans
  - location map (or inset map) - use if necessary - depends on the audience
  - graticules (e.g. latitude and longitude, UTM) - can be used in place of a north arrow
  - border and neatlines - if used, align with map color theme
  - cartouches - decorative titles or emblems used by map publisher - mostly antique maps
  - embellishments - decorative art on antique maps – often photographs on a modern map

Note: - the arrangement of elements should be balanced and sized appropriately
- there should be no large areas of empty white space on the map

Cartouches
- cartouches - decorative titles or emblems used by map publisher - mostly antique maps
- modern equivalent might a county or state seal - or a department logo

Embellishments
- embellishments - decorative art on antique maps
  - e.g. ships drawn to fill in the empty map space associated with an ocean
  - e.g. art work around the margins of a map
  - modern equivalent might be the inclusion of photographs on a map

Map Design: Caprock Canyons State Park

Map design is contingent upon the interaction between three factors.
  - Mapped area – Caprock Canyons State Park
  - Map scale – 1:24,000
  - Paper size – 20 x 24 inch

Plan Ahead
  - What is the purpose of the map? – general reference map
  - How will the map be used? – distributed as a large format (20 x 24 inch) PDF
  - Who is the audience? – general public

Cartographic Process
- select the data layers needed for the map
- evaluate data sources
- download and organize the data
- develop a map design (layout)
- symbolize the data
- add labels and annotation

Copyright© 2015, Kevin Mulligan, Texas Tech University
GIST 3300 / 5300
Geographic Information Systems

Map Design / Caprock Canyons

Effective Map Design
- mapped area, scale and layout size
- purpose, use and audience
- arrangement of map elements
- cartouches and embellishments

Caprock Canyons Map Project
- evaluate data sources
- download, extract and organize data
- design a layout (arrange elements)
- symbolize features
- add annotation
Map design is contingent upon the interaction between three factors:

- **Mapped Area**
  - (study area, city, county, country, continent, world)

- **Map Scale**
  - (1:24,000, 1:1,000,000)

- **Paper Size**
  - (8.5 x 11, 36 x 48)
Map Design

In most cases, it is the scale that is dictated by the other two:

Mapped Area (given)

Paper Size (given)

Map Scale
(1:24,000, 1:1,000,000)

- dictates the level of abstraction
  - how many different layers can be displayed

- dictates the level of generalization
  - which data sources are most appropriate
Map Design

To create an effective map design it is critical to plan ahead:

1) know the purpose of your map
2) know how the map will be used
3) know your audience
Map Design

Geographic Information Systems

Texas Counties

Scale
1:7,000,000

8 point font
8.5 x 11 paper

Miles

Geographic Information Systems
Map Design

Texas Populated Places

Scale
1:7,000,000

8 point font
8.5 x 11 paper

Geographic Information Systems
Map Design

Texas Populated Places Over 10,000

8 point font
8.5 x 11 paper

Scale
1:7,000,000

Miles

Geographic Information Systems
Map Design

Texas Populated Places Over 10,000

Amarillo
Lubbock
Midland
El Paso
Austin
San Antonio
Laredo
Corpus Christi
Brownsville
Dallas

Scale
1:7,000,000

8 point font
8.5 x 11 paper
Map Design

To create an effective map design it is critical to plan ahead:

1) know the purpose of your map

   - what is important?
     - what message are you trying to convey?

   - dictates level of abstraction
     - what layers of information will go on the map

   - dictates levels of generalization that are acceptable
     - what data sources are most appropriate
Map Design

To create an effective map design it is critical to plan ahead:

2) know how the map will be used

- publication in a journal
- PowerPoint presentation
- large format conference poster presentation
- road atlas?
Map Design

To create an effective map design it is critical to plan ahead:

3) know your audience

- general public

- professionals in a discipline

- are people familiar with the area being mapped?
Map Design

An effective map design also seeks to balance the arrangement of map elements on the layout.

Map elements:

- **title (subtitle)** - inform the reader what the map is about - do not use TX!
- **map body (area being mapped)** – make as large as possible
- **map scale** - verbal, bar(s) and/or representative fraction
- **map symbols** - make the symbols intuitive - blue italics for rivers, lakes
- **map legend** - ask what is necessary to interpret the map
- **north arrow** - select one that conforms to the label/text style
- **text** - credits, data sources and explanations
Map Design

An effective map design also seeks to balance the arrangement of map elements on the layout.

Map elements:

place names and other labels - use hierarchical labels or annotation

location map or inset map - use if necessary

graticules - use if necessary - latitude and longitude, or UTM

borders and neatlines - if used, align with the map color theme

cartouches - decorative tiles and/or emblems used by the map publisher

embellishments - decorative stand-alone art or photographs on map

Lastly, consider the arrangement of these map elements!
Map Design

Map critique …

what is wrong with this map?
Map Design

Map critique …

what is wrong with this map?
Map Design

Map critique …

Much better
Map Design

Mapping quantitative data

A. Wheat Harvested in Kansas, 1993

Percent of Land Area

- 0 to 9.8
- 10.2 to 19.3
- 20.6 to 28.1
- 30.7 to 40.6
- 54.9 to 58.5

B. Wheat Harvested in Kansas, 1993

Contour Lines Represent Percent of Land Area

C. Wheat Harvested in Kansas, 1993

Thousands of Acres

- .7
- 222.2
- 443.7

D. Wheat Harvested in Kansas, 1993

- = 12,000 Acres of Wheat
Map Design

Mapping quantitative data

A) Wheat Harvested in Kansas, 1993 (unstandardized)

B) Wheat Harvested in Kansas, 1993 (standardized)

Raw data

Normalized data
Map Design

poor figure ground

better figure ground

Figure Ground
- distinguishing land from water
Map Design

Cartouches

Decorative map titles and/or emblems used by the publisher - often provides useful information about the map

1500’s – scrolls
1600’s – coats of arms
1700’s – very decorative
1800’s – fell out of use

David Rumsey cartouche page
Map Design

Cartouches

Modern equivalent would be an agency seal.
Map Design

Embellishments - decorative stand-alone art.
Embellishments - decorative stand-alone art
- first map of the Pacific - by Abraham Ortelius in 1589
Map design is contingent upon the interaction between three factors:

- **Mapped Area** (Caprock Canyons)
- **Map Scale** (1:24,000)
- **Paper Size** (20 x 24 inch)
Map Design: Caprock Canyons

Plan Ahead
what is the purpose of the map?
how will the map be used?
who is the audience?

The Cartographic Process
what data layers do we need
evaluate data sources
download and organize the data
develop a map design (layout)
symbolize the data
add labels and annotation
GIST 3300 / 5300
Geographic Information Systems

Map Design / Caprock Canyons

Effective Map Design
- mapped area, scale and layout size
- purpose, use and audience
- arrangement of map elements
- cartouches and embellishments

Caprock Canyons Map Project
- evaluate data sources
- download, extract and organize data
- design a layout (arrange elements)
- symbolize features
- add annotation
Map Design

Map design is contingent upon the interaction between three factors:

- **Mapped Area**
  - (study area, city, county, country, continent, world)

- **Map Scale**
  - (1:24,000, 1:1,000,000)

- **Paper Size**
  - (8.5 x 11, 36 x 48)
In most cases, it is the scale that is dictated by the other two:

- Mapped Area (given)
  - Paper Size (given)
    - Map Scale
      - (1:24,000, 1:1,000,000)

- dictates the level of abstraction
  - how many different layers can be displayed

- dictates the level of generalization
  - which data sources are most appropriate
Map Design

To create an effective map design it is **critical to plan ahead**:

1) know the purpose of your map

2) know how the map will be used

3) know your audience
Map Design

Texas Counties

8 point font
8.5 x 11 paper

Scale
1:7,000,000

Miles
0 50 100 200 300 400

N

Geographic Information Systems
Map Design

Texas Populated Places Over 10,000

8 point font
8.5 x 11 paper

Scale
1:7,000,000

Miles
0 50 100 200 300 400

Geographic Information Systems
Map Design

Texas Populated Places Over 10,000

16 point font
8.5 x 11 paper

Scale
1:7,000,000

Miles

Geographic Information Systems
Map Design

To create an effective map design it is critical to plan ahead:

1) know the purpose of your map

   - what is important?
     - what message are you trying to convey?

   - dictates level of abstraction
     - what layers of information will go on the map

   - dictates levels of generalization that are acceptable
     - what data sources are most appropriate
Map Design

To create an effective map design it is critical to plan ahead:

2) know how the map will be used

- publication in a journal
- PowerPoint presentation
- large format conference poster presentation
- road atlas?
Map Design

To create an effective map design it is critical to plan ahead:

3) know your audience

- general public

- professionals in a discipline

- are people familiar with the area being mapped?
Map Design

An effective map design also seeks to balance the arrangement of map elements on the layout.

Map elements:

- **Title (subtitle)** - inform the reader what the map is about - do not use TX!
- **Map body (area being mapped)** – make as large as possible
- **Map scale** - verbal, bar(s) and/or representative fraction
- **Map symbols** - make the symbols intuitive - blue italics for rivers, lakes
- **Map legend** - ask what is necessary to interpret the map
- **North arrow** - select one that conforms to the label/text style
- **Text** - credits, data sources and explanations
Map Design

An effective map design also seeks to balance the arrangement of map elements on the layout.

Map elements:

- place names and other labels - use hierarchical labels or annotation
- location map or inset map - use if necessary
- graticules - use if necessary - latitude and longitude, or UTM
- borders and neatlines - if used, align with the map color theme
- cartouches - decorative tiles and/or emblems used by the map publisher
- embellishments - decorative stand-alone art or photographs on map

Lastly, consider the arrangement of these map elements!
Map Design

Map critique …

what is wrong with this map?
Map Design

Map critique …

what is wrong with this map?
Map Design

Map critique …

Much better
Map Design

Mapping quantitative data

A. Wheat Harvested in Kansas, 1993

B. Wheat Harvested in Kansas, 1993

Percent of Land Area

- 0 to 9.8
- 10.2 to 19.3
- 20.6 to 28.1
- 30.7 to 40.6
- 54.9 to 58.5

Contour Lines Represent Percent of Land Area

C. Wheat Harvested in Kansas, 1993

Thousands of Acres

- .7
- 222.2
- 443.7

D. Wheat Harvested in Kansas, 1993

- = 12,000 Acres of Wheat

Geographic Information Systems
Map Design

Mapping quantitative data

A. Wheat Harvested in Kansas, 1993 (unstandardized)

B. Wheat Harvested in Kansas, 1993 (standardized)

Raw data

Normalized data
Map Design

Figure Ground
- distinguishing land from water

poor figure ground

better figure ground
Map Design

Cartouches

Decorative map titles and/or emblems used by the publisher - often provides useful information about the map

1500’s – scrolls
1600’s – coats of arms
1700’s – very decorative
1800’s – fell out of use

David Rumsey cartouche page
Map Design

Cartouches

Modern equivalent would be an agency seal.
Embellishments - decorative stand-alone art.
Map Design

**Embellishments** - decorative stand-alone art
- first map of the Pacific - by Abraham Ortelius in 1589
Map design is contingent upon the interaction between three factors:

- **Mapped Area** (Caprock Canyons)
- **Map Scale** (1:24,000)
- **Paper Size** (20 x 24 inch)
Map Design: Caprock Canyons

Plan Ahead

what is the purpose of the map?
how will the map be used?
who is the audience?

The Cartographic Process

what data layers do we need
evaluate data sources
download and organize the data
develop a map design (layout)
symbolize the data
add labels and annotation