Map Design & Layout

Adapted from
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US Fish & Wildlife Service

Disclaimer

Remember:

Cartography is *"The art & science of maps and mapping"*

so . . .

Portions of this class may be more like an ART class influenced by the likes, dislikes, and abilities of the teacher!

What we'll cover today

The Map Design Process
– **Map Size, Scale, Content, Symbologyand Typographics.**
• **Map Layout**
– **Title, Legend, Scale Bar, Inset Map, Date, Informational Note, and Company Identifier.**

The Map Design Process

• Choosing a Map Size

• Elements of a map composition

• The Design Filter

• Planar Organization of Visual Elements

Choosing a Map Size

First ask yourself these questions:

• **What does the end user want or need?**
• **Can you physically produce the desired size?** (i.e. output limitations?)
• **Are there publishing, framing, or laminating restrictions or limitations?**
• **Will the data be legible or useful at the desired size?**

Map Size Rule of Thumb

If left to you to determine map size, produce it at the *smallest* size feasible.

Common Mapping Sizes

Letter	8.5" x 11"
Legal	8.5" x 14"
Ledger	11" x 17"
USGS Quad	24" x 30"
"2x3"	24" x 36"
"3x4"	36" x 48"

Standard Media Sizes

ANSI Media

A	=	8.1" x 9.66"
B	=	10.6" x 15.7"
C	=	15.7" x 20.6"
D	=	21.6" x 32.7"
E	=	33.6" x 42.7"

Elements of a Map Composition

Elements of a Map Composition

|	
Title and Subtitle	**Mapped and Unmapped Areas**
Legend	**Borders and Neatlines**
Scale Bar	**Graticules and Grids**
Inset Map	**Map Symbols**
Credit Note	**Place Names and Labeling**
Date	
Logo	
North Arrow	
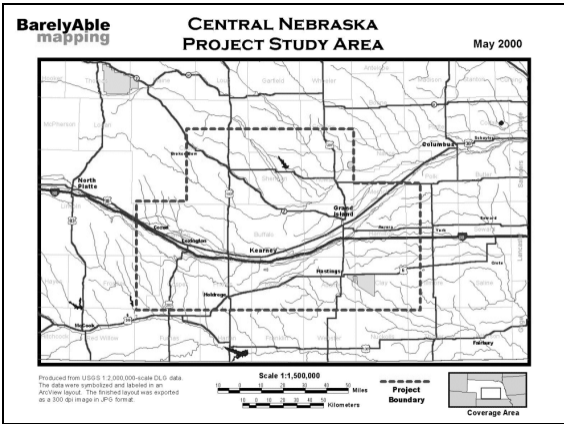
CENTRAL NEBRASKA PROJECT STUDY AREA
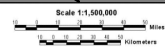
Title - Usually draws attention by virtue of its dominant size; serves to focus attention on the primary content of the map; may be omitted where captions are provided but are not part of the map itself.

Title

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Legend - The principal symbol-referent description on the map; subordinate to the title, but a key element in map reading; serves to describe all unknown symbols used.

Project Boundary

Map legend - The principal symbol-referent description on the map; subordinate to the title, but a key element in map reading; serves to describe all unknown symbols used.

Map Scale - Usually included on a thematic map; it provides the reader with important information regarding linear relations on the map; can be graphic, verbal, or expressed as an RF.

Scale 1:1,500,000
Miles
Kilometers

More on Map Scale

Map scale is a unit of measurement on the map related to the appropriate number of same units on the Earth's surface and is usually stated as a representative fraction (RF).
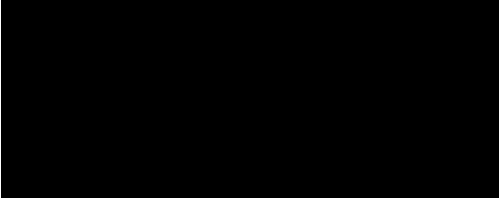
For example: 1/24,000 or 1:24,000 scale One (1) unit on the map represents 24,000 units on the ground (1 inch = 24,000 inches which equates to 1 inch = 2000 feet).
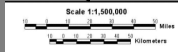

Map Scale	1/40 inch represents	1 inch represents	1 centimeter represents	1 mile is represented by	1 kilometer is represented by
1:2,000	4.200 ft	56.000 yd	20.000 m	31.680 in	50.00 cm
1:5,000	10.425 ft	139.000 yd	50.000 m	12.670 in	20.00 cm
1:10,000	6.952 yd	0.158 mi	0.100 km	6.340 in	10.00 cm
1:15,840	11.000 yd	0.250 mi	0.156 km	4.000 in	6.25 cm
1:20,000	13.904 yd	0.316 mi	0.200 km	3.170 in	5.00 cm
1:24,000	16.676 yd	0.379 mi	0.240 km	2.640 in	4.17 cm
1:25,000	17.380 yd	0.395 mi	0.250 km	2.530 in	4.00 cm
1:31,680	22.000 yd	0.500 mi	0.317 km	2.000 in	3.16 cm
1:50,000	34.716 yd	0.789 mi	0.500 km	1.270 in	2.00 cm
1:62,500	43.384 yd	0.986 mi	0.625 km	1.014 in	1.60 cm
1:63,360	0.025 mi	1.000 mi	0.634 km	1.000 in	1.58 cm
1:75,000	0.030 mi	1.180 mi	0.750 km	0.845 in	1.33 cm
1:80,000	0.032 mi	1.260 mi	0.800 km	0.792 in	1.25 cm
1:100,000	0.040 mi	1.580 mi	1.000 km	0.634 in	1.00 cm
1:125,000	0.050 mi	1.970 mi	1.250 km	0.507 in	8.00 mm
1:250,000	0.099 mi	3.950 mi	2.500 km	0.253 in	4.00 mm
1:500,000	0.197 mi	7.890 mi	5.000 km	0.127 in	2.00 mm
1:1,000,000	0.395 mi	15.780 mi	10.000 km	0.063 in	1.00 mm

## Map Scale Rule of Thumb

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Scale 1:1,500,000

Miles

Kilometers

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Inset Map or Location Diagram – This informs the map user of the context of the map, i.e. *the big picture*. This will keep the user from having to guess the location of the map.

Coverage Area

Informational or Credit Note - Can Include the map's data source, an indication of their reliability, dates, and other explanatory material.

Produced from USGS 1:2,000,000-scale DLG data. The data were symbolized and labeled in an ArcView layout. The finished layout was exported as a 300 dpi image in JPG format.
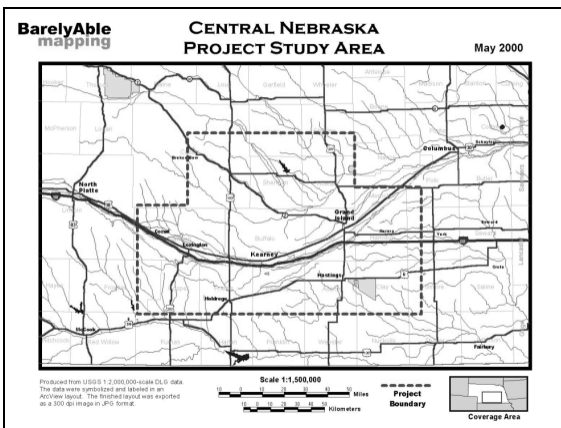

Credits - Can Include the map's data source, an indication of their reliability, dates, and other explanatory material.

Date – Use if the time of a map's publication is a factor. This may also work well as part of the Sub-title.

May 2000

BarelyAble
mapping

Company Identifier or Logo – Take credit where credit's due. Make sure to use a high quality logo, especially for partnering agencies.

BarelyAble
mapping

CENTRAL NEBRASKA
PROJECT STUDY AREA

May 2000

Produced from USGS 1:2,000,000-scale DLG data.
The data were symbolized and labeled in an
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Scale 1:1,500,000

Miles
Kilometers

Project
Boundary

Coverage Area

Feature Content

"Too many features are too much,
too little features ain't enough"

Rules of Thumb

- **Find a balance that portrays enough information without making the map appear cluttered or busy.**
- **Show the necessary features along with enough supporting features for clarity.**

USGS

Central Nebraska

Elements of a Map Composition

Map Symbols - Wide variety of forms and functions; the most important elements of the map, along with the geographical areas rendered, designer has little control over the their location because geography must be accurate.

Place names and labeling - The chief means of communicating with maps; serve to orient the reader on the map and provide important information regarding its purpose.
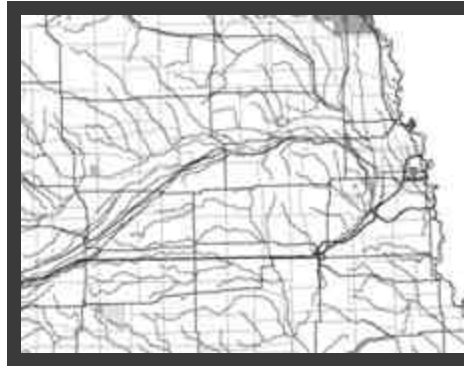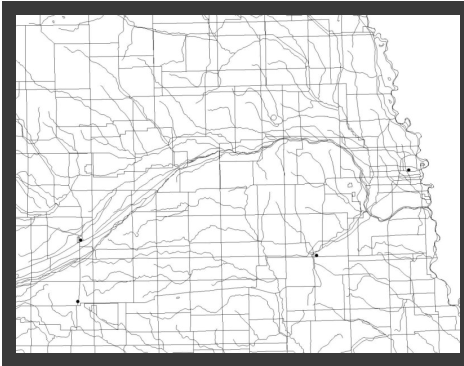
Map Symbols

- **Symbols represent objects that can not be depicted in their true shape or size.**
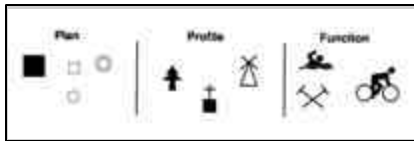
Map Symbols

- **Varying sizes and colors help to distinguish the qualitative or quantitative differences among like symbols.**

Text Styles Rules of Thumb

- **Do not use too many typefaces on a map.**
- **Avoid ornate text styles** *(difficult to read).*
- **Don't use too thin of text because it may not reproduce well.**
- **Use different type sizes to show varying levels of importance of features, but no more than 4 to 6 different sizes per map.**

Elements of a Map Composition

Mapped and Unmapped Areas - Objects, land, water, and other geographical features important to the purpose of the map; make the composition a map rather than simply a chart or diagram.

Graticules and Grids- Often omitted from thematic maps today; should be included if their locational information is crucial to the map's purpose; usually treated as background or secondary information. Grids show the same information, but display it across the body of the map and not just along the neatline.

Elements of a Map Composition

Borders and Neatlines - Both optional; borders can serve to restrain eye movement; neatlines are finer lines than borders, drawn inside them and often rendered as part of the graticule; used mostly for decoration.
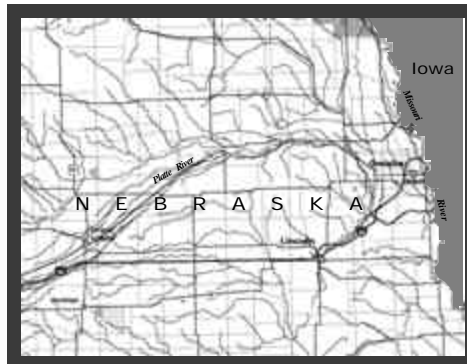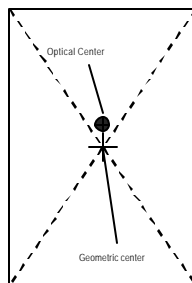

Break here for class to make a map

Planar Organization of the Visual Elements

- **Balance**
- **Focus of Attention**
- **Internal Organization – "*Intraparallelism*"**
- **Figure and Ground Organization**
- **Contrast and Design**
- **Line Contrast**

Balance

The two centers of an image space.

The designer should arrange the map's elements around the natural (optical) center, rather than the geometric center.
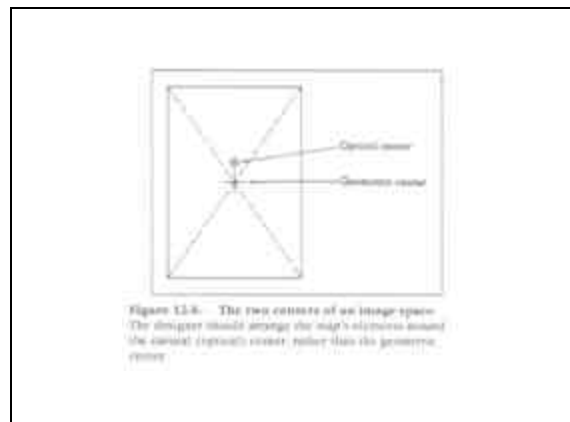
Figure 12-8. The two centers of an image space. The designer should arrange the map's elements around the natural (optical) center, rather than the geometric center.

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Visual Balance

- Visual balance results from two major factors: weight and direction.
- Visual weight depends on location.
- Elements at the center of a composition pull less weight than those lying of the tracks of the structural net.
- An object in the upper part of a composition is heavier than one in the lower part.
- Objects on the right of a composition appear heavier than those on the left.
- The weight of an object increases in proportion to its distance from the center of the composition.

Visual Balance
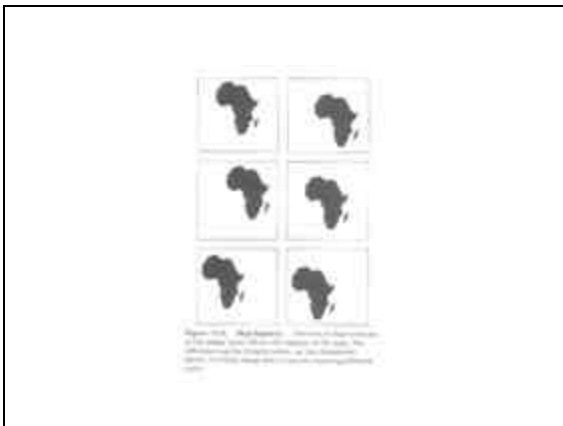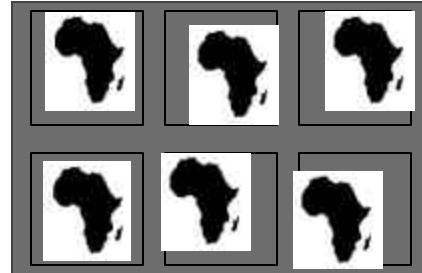
Focus of Attention

- Readers eye normally follows a path from upper left through the optical center to lower right.
- Point of greatest natural emphasis is where a line of space division intersects either the focus or field circles of attention.

Focus of Attention

Internal Organization

- "Intraparallelism"
- Technique for giving structure to the graphic elements at the planar level.
- Reduces tension in perception.

Internal Organization

Figure & Ground Organization

- **Most important perceptual tendency to cartography.**
- **Figures become the object of attention in perception, standing out from the background.**
- **Objects that are intellectually important to a map should be rendered so as to make them appear as figures.**
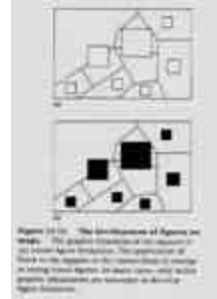
Internal Organization

Contrast & Design

- **Contrast is fundamental in developing Figure - Ground.**
- **Visual contrast provides the ability of the eye to discern differences.**
- **Map elements that have little contrast are easily lost in the total visual package.**
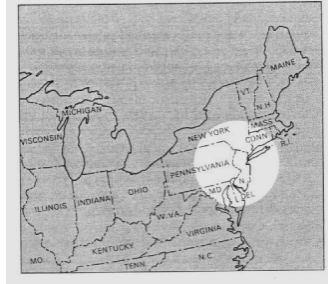- ***Contrast must be a major goal of the designer.***

Line Contrast

Texture Contrast
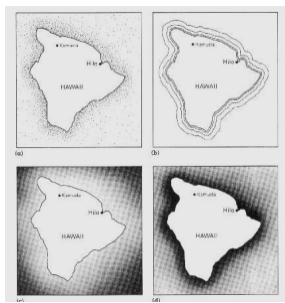
Variation of Detail
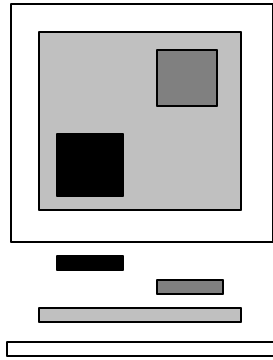
Value Contrast

Value Contrast

Value Contrast

Visual Hierarchy

- The visual hierarchy is the intellectual plan for the map and the eventual graphic solution that satisfies the plan.
- Objects that are important intellectually are rendered so that they are visually dominant within the map frame.

Typographics

Making the Map Readable through Intelligent Use of Typographics.

Map lettering is an integral part of the total design effort and should not be relegated to a minor role. Lettering on the map functions to bring the cartographer and map reader closer together and makes communication possible.

Type Elements

Selecting Type

- **The legibility of individual letters is of paramount importance, especially in smaller type sizes. Choose a typeface in which there is little chance of confusion between c and e or i and j.**
- **Select a typeface with a relatively large x-height relative to lettering width.**
- **Avoid extremely bold forms.**

Selecting Type

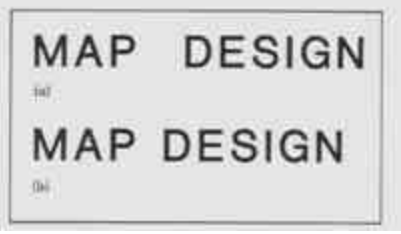**Do not use decorative typefaces on the map; they are difficult to read.**

Type Size

- **The system of specifying type size in the United States and Britain is based on division of the inch into 72 parts called points. A point equals .0138 in (.351 mm). Thus 72 points equals .9962 inches.**
- **Specify a type size that is large enough to be easily read.**
- **Professional cartographers rarely use type smaller than 4 or 5 points usually setting a lower limit of 6.**

Letter Spacing

Word Spacing

Lettering

Four major goals

- **Legibility**
- **Harmony**
- **Suitability of reproduction**
- **Economy and ease of execution**

Lettering

The Use of CAPITALS and lowercase

General Rule: Inside the feature, capitals; outside, lower case with initial capital.

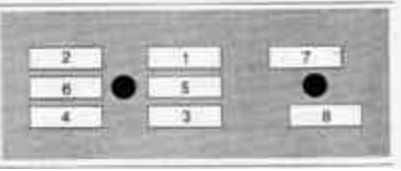
Labeling Point Features

Labeling Point Features

Labeling Linear Features

- **General rule is that labels should be set solid and repeated as many times along the feature as necessary to facilitate identification.**
- **Ideal location of a label for a linear feature is above it, along a horizontal stretch if possible.**
- **Labels for rivers should slant in the direction of the river's flow (assuming the label is italic, which is preferred.)**

Labeling Linear Features

Labeling Areal Features

- Curved lines of letters should be gentle and smooth , and the curve should be constant for the entire word
- Do not hyphenate names and labels.
- If a line of lettering is not horizontal, make certain it deviates significantly from the horizontal so that its placement will not look like a mistake.

Labeling Areal Features

- Do not locate names and labels in a way that the beginning and ending letters are too close to the feature's borders.
- Choose a plan for lettering placement of the entire map in accordance with the normal left-to-right reading pattern.
- Never position names so that parts of them are upside down.

Placement of Titles & Legends

Placement of Titles & Legends

- Suggested Reading: