# *Cartographic Principles: Making Maps*

Resource Note #5

2001 Census Consortium

September 2005

# *Preface*

- The Resource Note is intended to increase our understanding of and broaden our knowledge base on key subject areas that are fundamental in building our capacity in numeric and geographic analysis.
- It is not an in-depth or comprehensive discussion of the subject matter.
- It highlights certain relevant and important areas that deserve our attention and consideration.
- It is intended to be informal and informative.

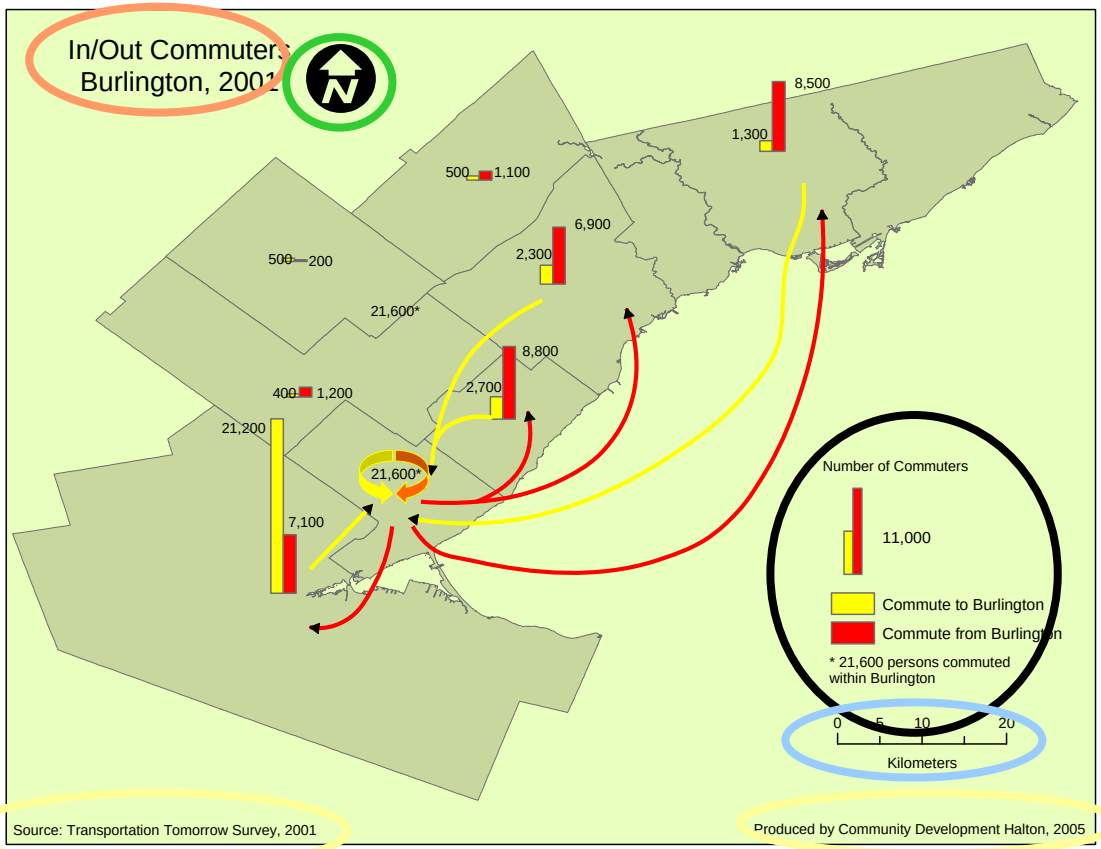
# *Introduction*

- This is the fifth Resource Note (Note 1 – Census Geography, Note 2 – Census Data, Note 3 – PCensus Database, Note 4 – Geocoding)
- The focus is on cartographic and map design principles that help us to create effective and accurate maps
- When we use ArcGIS to produce a map, we become a "cartographer"
- Cartography is an art, a science and a technique, there are no strict rules to follow but guidelines and principles to help us to produce an effective map
- This note covers two areas of interest: basic elements of a map and map design
- **Comments and Suggestions from Dr. Sebastien Caquard, Post Doctoral Fellow, Geomatics and Cartographic Research Centre, Carleton University are gratefully appreciated.*

# *Cartographic Communication*

- A map is a powerful communication tool
  - allows us to convey information and findings that are difficult to express verbally
- Unlike verbal communication, the cartographer has little control over how the map user will view and interpret the map
- The measure of a good map is how well it conveys information to its readers to enlighten, convince, or persuade.

# *Basic Elements of a Map*




Title

Legend

North Star

Scale bar

Source

# *Title*

**It is the story line (purpose) of your map**

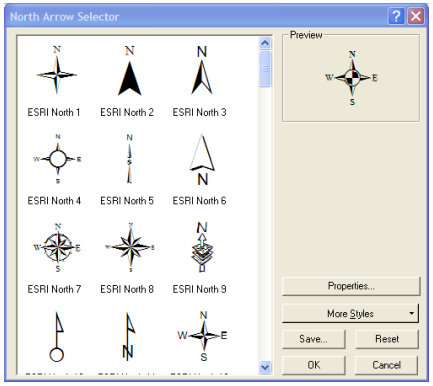
- pick the words that accurately describe what your map is about
- should be **simple** and **clear**
- It could be neutral – ***The housing in New Orleans*** or oriented – ***The housing crisis in New Orleans***
- should be the most prominent text
- what information you want to convey to your audience
- a short title may suffice if your audience knows the subject matter

# *Legend*

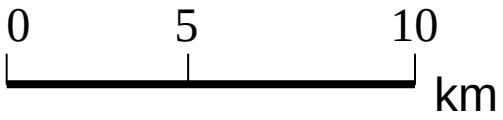
- Legend is the textual translation of graphic elements – a key to explain your symbols
- List symbols used on your map and what they represent
  - avoid ambiguousness and reduce confusion
  - should appear exactly as they are found in the body of your map
  - may omit familiar symbols (e.g. roads, river, lakes...)
- For quantitative information, round values are often sufficient and easier to understand (e.g. choose 95,000 instead of 94,654). You may loose a bit in terms of value accuracy (which is not even sure) but you would gain a lot in terms of cartographic communication.

# *North Arrow*

- Orient the reader who is unfamiliar with the area
- choice of a north arrow style is personal preference
- By convention North is up in western countries. In this case North arrow is not necessary.
- Usually the simpler the better for the North arrow.
- If the North is not up, the North arrow should be easily visible



# *Scale*

- Inform reader of how much area is covered or how far among locations
  - three types of scale representation:
    - Verbal: One centimetre equals one kilometre
    - Numeric: 1:25,000
    - Graphic: 

- If a map is reduced in size, graphic representation will remain accurate but verbal representation will be in error, so maps should almost always include a graphical scale with ROUND values to help the user, textual and numeric scales are usually not relevant

# *Source*

- List where the data came from
  - who and when data was collected or produced
- List who produced the map
  - individuals or organizations
  - date

# *Map Design – Goals*

- Clarity
- Order
- Balance
- Visual Contrast
- Visual Hierarchy

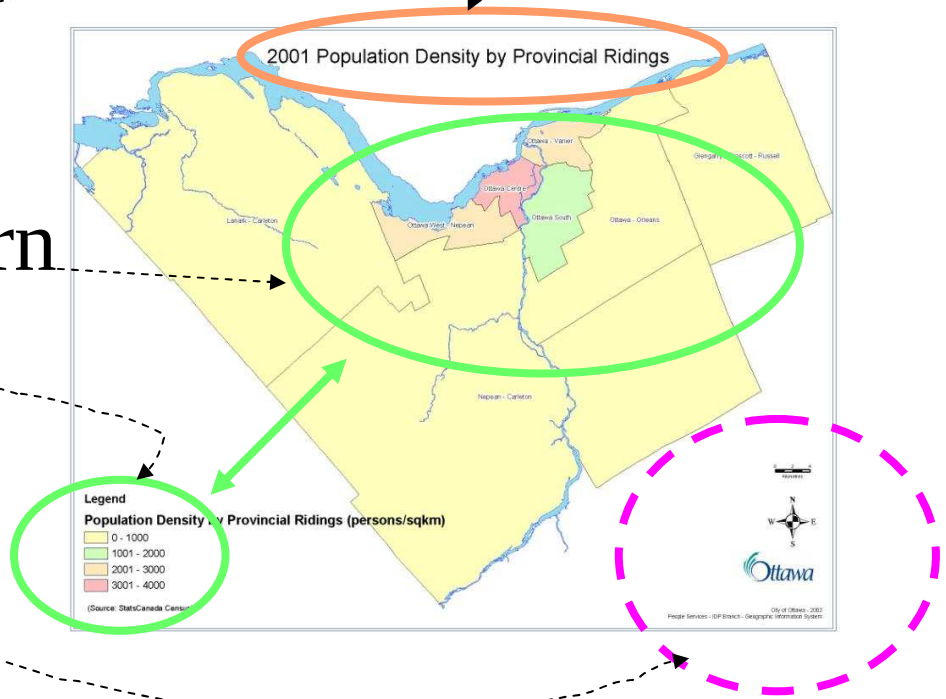
# *Clarity*

- Conceptual:
  - careful selection of information
  - elimination of unnecessary information
  - meaningful legend
- Visual:
  - Avoid overlapping symbols and names
  - Use a small number of related symbols or patterns
  - Limit the number of different fonts
  - Lettering is also important:
    - Lettering can be used for nominal but also ordinal purpose
    - Choice of **the font**: Do not multiply the number of fonts on a map
    - It is usually not the main information so not too big (min. size: 6 or 7 pts)
    - There are some lettering conventions (e.g. water names are usually in italic and blue)
  - Use symbols that are consistent with their connotative meanings (red for hot, blue for water)

# *Order*

- Map readers tend to follow this order:

1. title
2. overall pattern
3. legend
4. other data



# *Balance*

- Keep reader's attention focused
- Keep map body as large as possible avoid crowding other elements


Unbalanced

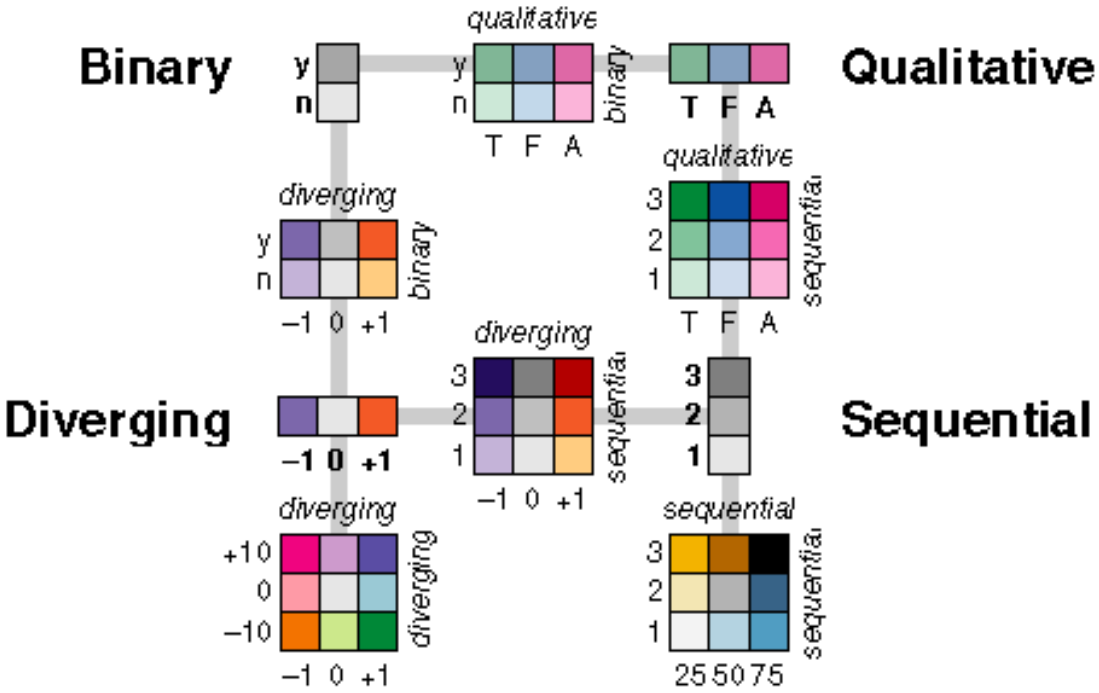

Balanced

# *Visual Contrast*

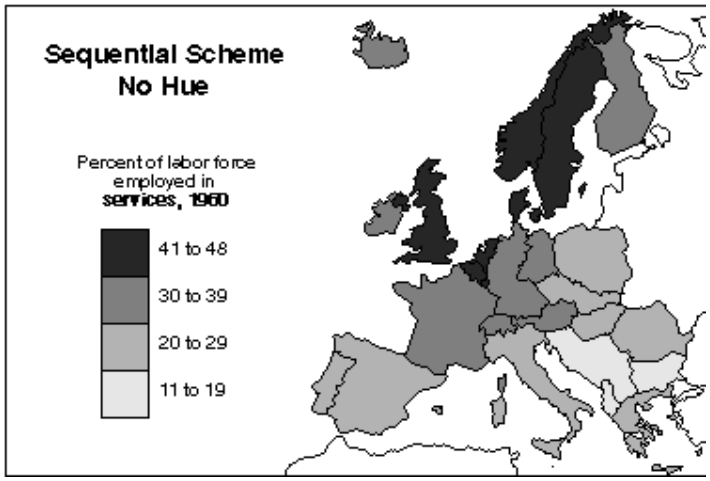
- Map becomes more interesting and easier to the readers if there are variations in
  - thickness of line
  - shading patterns
  - intensity of colour
  - **some basic rules about colours**:
    - Bigger is the mark & better will be identified the colour (mostly efficient on areas)
    - It can be combined with shape to increase the differentiation
    - Colour is influenced by the surrounding colours (a yellow surrounded by a purple will have a totally different visual then if surrounded by a white)
    - By careful with yellow on white (it spreads out…)
  - Eye perceives 2 kinds of tone/shade in the spectrum on each sides of the yellow (slide)
    - The warm tones: from Yellow to red (used to represent the positive values)
    - The cold tones: from yellow to purple (used to represent the negative values)
    - This double perception is used to design Bi-Polar colour progression
- However, too much visual contrasts can be distractive

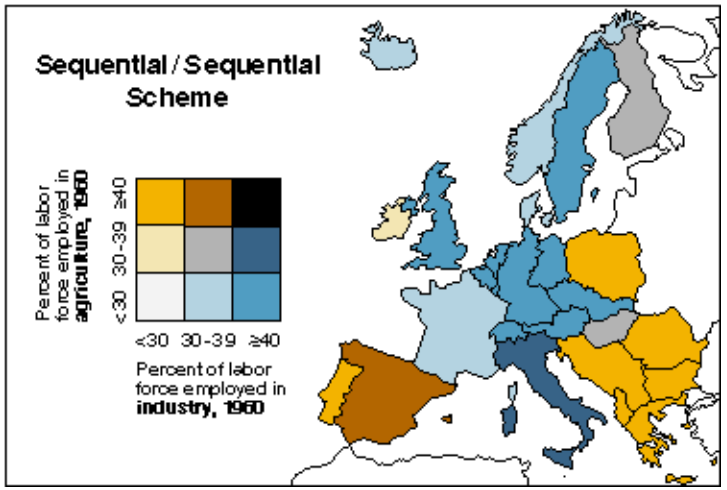
# *Colour Use Guidelines for Mapping and Visualization*

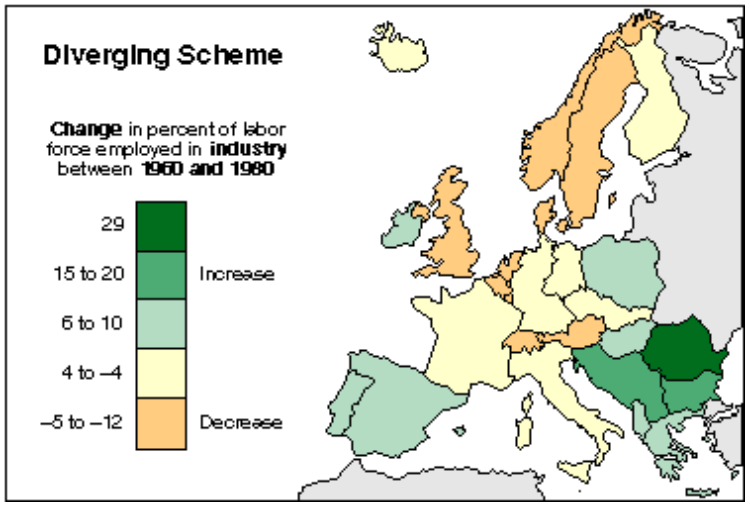
- For a good introduction to this subject, please refer to the work by Cynthia Brewer (http://www.personal.psu.edu/faculty/c/a/cab38/ColorBrewerBeta2.html)

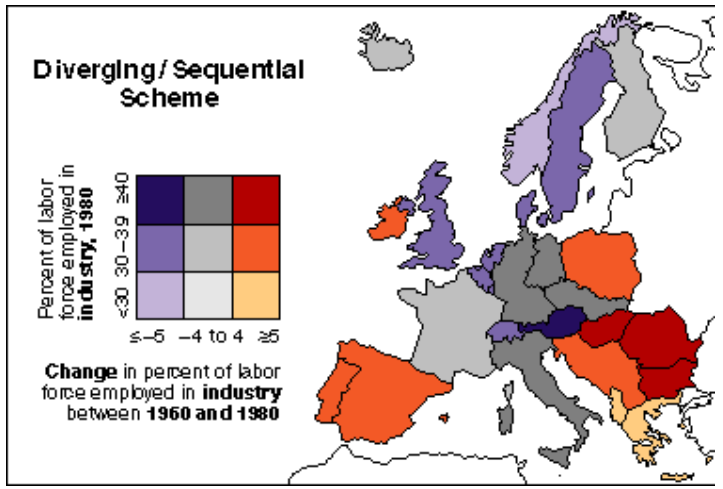


# *Colour Use Guidelines for Mapping and Visualization – Examples*



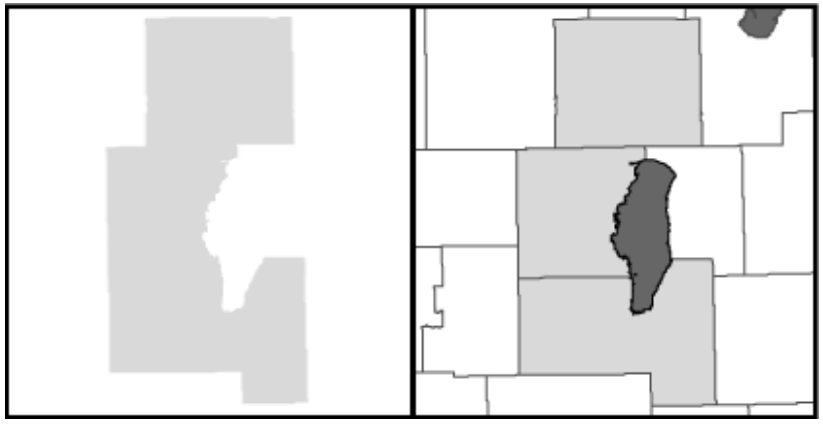



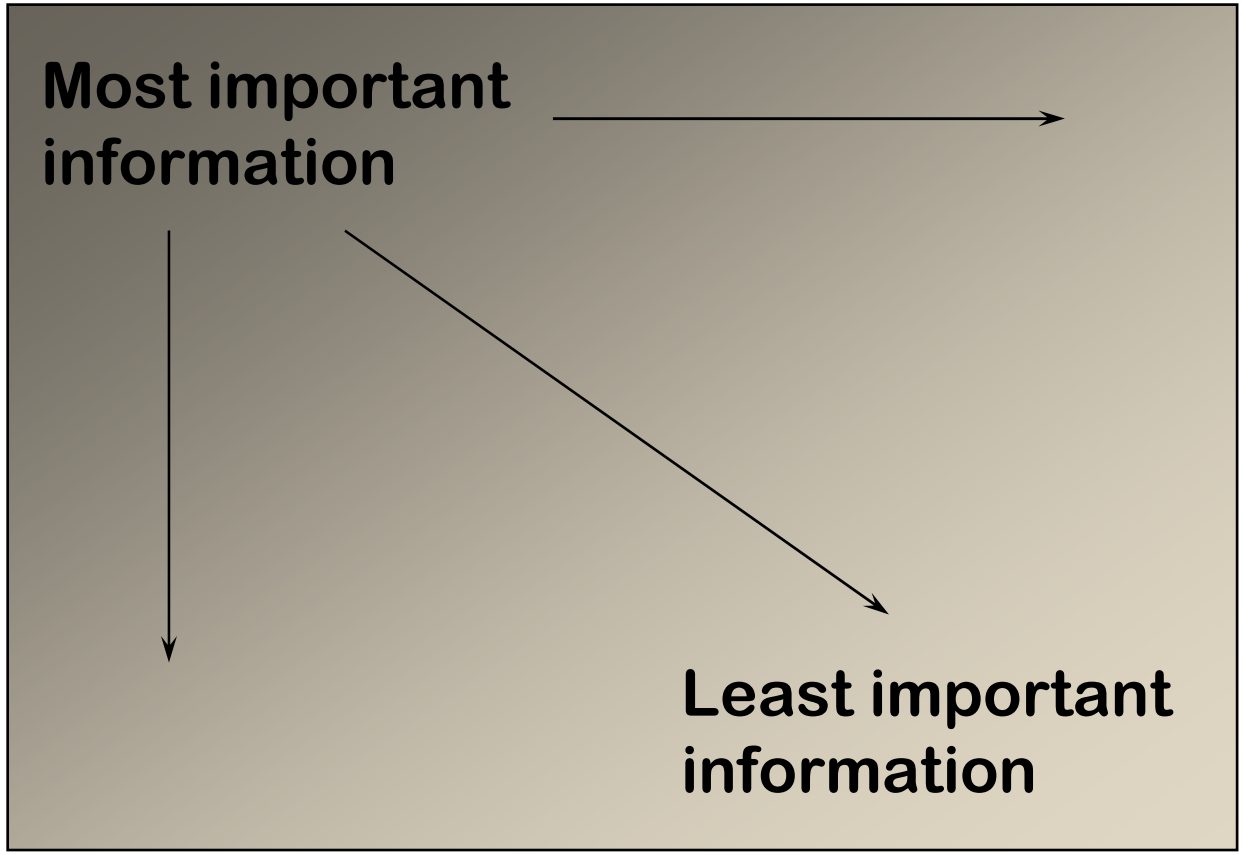



# *Visual Hierarchy*

- Reflects levels of importance
- Separate images into foreground and background
- In general, darker or stronger colours and shading patterns, closed forms and small areas tend to be interpreted as foreground



# *Balance Elements within the visual hierarchy and frame of the map*



# *Map Design*

- Simplicity is the key
  - "… it is not what you put in that makes a great map but what you take out…"
  - the design stage is complete when you can take nothing else out

# *What Have We Learned?*

- Importance of cartographic communication
  - Mapping is representing some perspectives on the reality, not an "abstract". Somebody chose the topic, the data, the analytical method, the map background, the title, the color, the support, etc.
  - For this reason maps are never neutral nor objective, they are oriented (not necessarily on purpose though) and subjective!
  - It is very important to understand their power of persuasion.
- Cartography is an art, a science and a technique
- There is no strict rules but guidelines and principles in map making
- Basic elements of a map
- Basic principles of map design

# *Any questions or comments?*

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*Thank You*