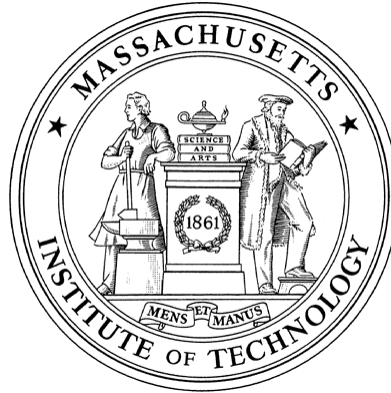


**Massachusetts Institute of Technology
Department of Urban Studies and Planning**



**11.204: Planning, Communications & Digital Media
Fall 2002**

Lecture 6: Tools for Transforming Data to Action

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I. Overview

- Planners Use a Variety of Tools to Manipulate Data
- Planners Process Data to Advocate Action (*A Theoretical Approach to Transforming Data to Action*)
- US Census Data Are Accessible and Useful to Planning Professionals
- Introduction to the Planning Tool We Call "GIS"
- How Planners Transform Data (*In Practice*)

II. What are data and how are they integral to the planning process?

To propose future action, planners collect, analyze, and synthesize many forms of data. This lecture will begin with the question, "What are data?" So far, we have explored data that exist in the form of digital photographs and video, yet planners often utilize other tools to analyze problems and generate solutions. For example, when data are collected,

they take the form of numeric values and graphic images that can be manipulated by computerized spreadsheets, databases, charting and mapping systems. This lecture will examine an array of tools and how they are used to transform data to action.

Tools (for Collecting, Analyzing, and Presenting Data)

Text, photographs, and video

Charts, graphs, and spreadsheets

Databases

Geographic information systems

Products

Dreamweaver, Photoshop

Excel

Access

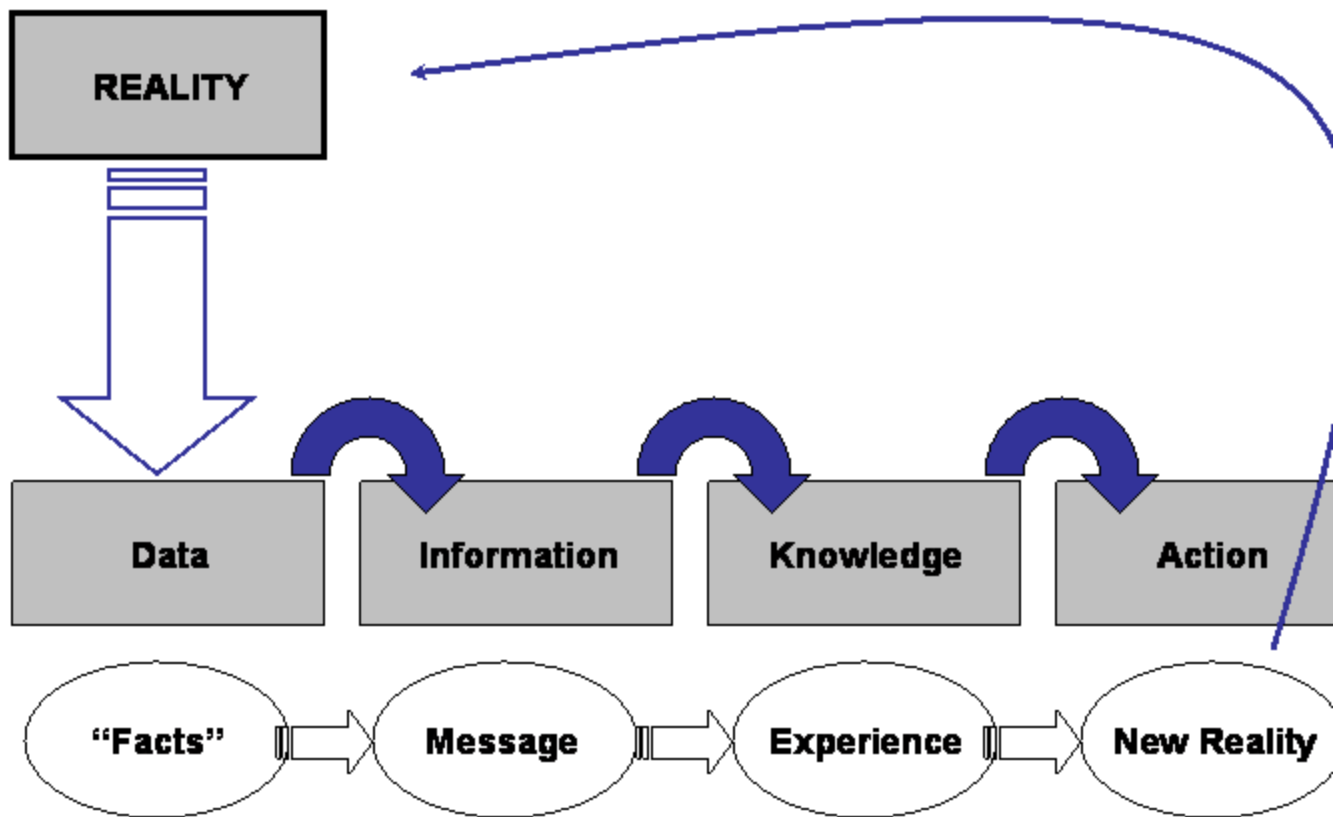
ArcView

Keep in mind, there are other tools (sketches, tangible models, etc.). These are the ones we'll focus on for this course.

Are digital video stories a more subjective representation of place than a map of MHI?

How do planners transform data to action? (A theoretical approach)

- What are data?
- Why do planners concern themselves with data? *(To understand current conditions and predict change)*
- What should planners keep in mind while **collecting** data? *(Data attempt to represent reality)*
- **Analyzing** data? *(Human beings create information; information informs experience)*
- **Presenting** data? *(Knowledge is packaged to promote particular actions)*



The knowledge progression, from data to wisdom
Sena and Shani; Modified by Lorlene Hoyt

III. US Census Data (*Interlude*)

- National census of population mandated by the [Constitution of the United States](#) - -- "*reality*"
- Conducted every ten years (mail survey) --- "*data*"
- A source for demographic data with a wide geographic scope
- Representatives (and taxes) are apportioned based on census counts
- Impacts distribution of Federal dollars (*schools, employment services, highway assistance, housing construction, programs for the elderly, etc.*)
- View some Census data at [2000 Census Home Page](#)
- What data are collected? [Sample Short Form from 2000 Census](#), [Sample Long Form from 2000 Census](#) --- "*information*"
- The data collected by the US Census are objective and provide an accurate representation of reality!?

- Census data are valuable to planning professionals, who employ a variety of tools to justify planning-related actions
- In lab exercises 2-5, you'll work with Census data that seek to describe the population, race, gender, income, of education Central Square residents

IV. Geographic Information Systems or Science (GIs)?

- What is GIs? An acronym that stands for "geographic(al) information system(s) or science"
- What is a GIs? *An organized collection of computer hardware, software, geographic data, and personnel designed to capture, store, update, manipulate, analyze, and display all forms of geographically referenced information*
- GIs are a dynamic and growing discipline; a multibillion-dollar industry
- Growth is due, in part, to recent improvements in the capabilities and affordability of personal computers; the information age represents an emphasis on (spatial) data

Personal Computer	1984	2002
Speed	4 MHz	1.8 GHz
Memory	64 KB of RAM	512 MB RAM
Storage	10 MB Hard Drive	30 GB Hard Drive

V. The Challenges of Transforming Data to Action (In Practice)

- What should planners keep in mind while collecting income-related data? *(Is it an accurate representation of reality?)*
- Analyzing income-related data? *(Does data manipulation, such as aggregation, alter the results?)*
- Presenting income-related data? *(How does the tool impact the message?)*
- Let's look at an example using 1997 Census data to examine income distribution in **downtown** Philadelphia, PA *(You will look at Cambridge, MA)*

TABLES

Sorted by Block Group Number

Sorted by MHI

Block Group	MHI	Block Group	MHI
1383	\$22,556	1392	\$46,250
1388	\$37,679	1395	\$43,750
1392	\$46,250	1470	\$38,552

1395	\$43,750	1388	\$37,679
1397	\$9,959	1462	\$37,431
1404	\$5,000	1435	\$36,635
1410	\$13,140	1465	\$30,951
1414	\$24,983	1447	\$27,817
1423	\$0	1414	\$24,983
1430	\$11,563	1383	\$22,556
1433	\$0	1410	\$13,140
1435	\$36,635	1430	\$11,563
1447	\$27,817	1459	\$11,522
1453	\$0	1397	\$9,959
1459	\$11,522	1404	\$5,000
1462	\$37,431	1453	\$0
1465	\$30,951	1433	\$0
1470	\$38,552	1423	\$0

- **Let's examine the tables above...**
- Difficult to visualize and interpret findings
- Cannot perceive spatial relationships
- Appears to be a data collection or other issue with at least three block groups (*MHI = \$0*)

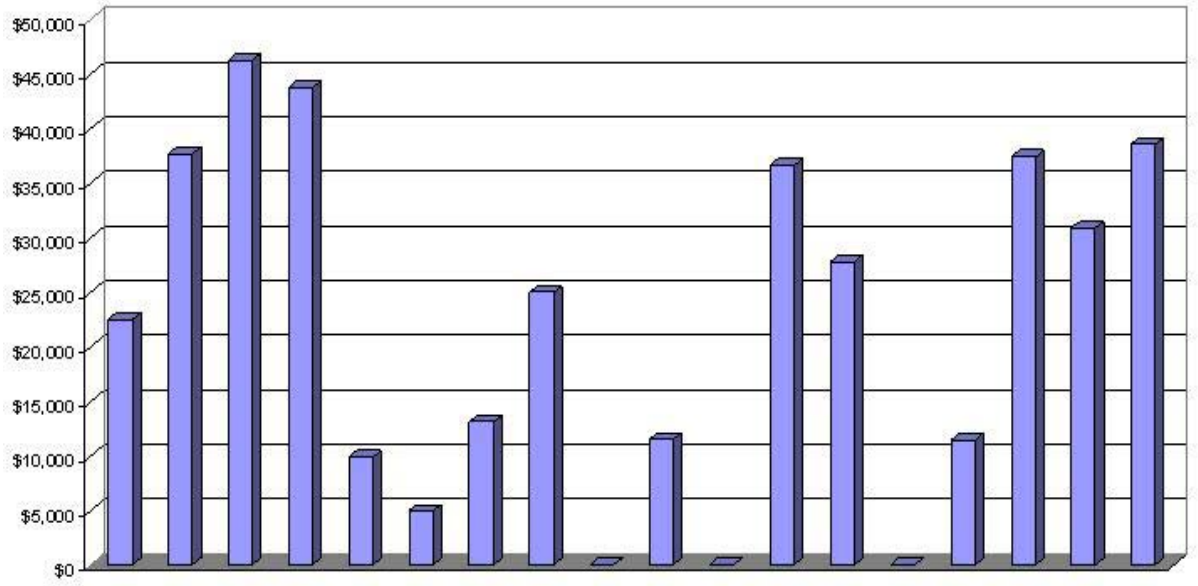
Further, let's examine the underlying assumptions...

- The block (block group/census tract) is the most useful unit of data aggregation;
- The use of 'median' values, emphasis on 'household' income, and 'earnings' as a measure of wealth;
- Count reflects **residential** population, people present at that moment in time, and those inclined to respond

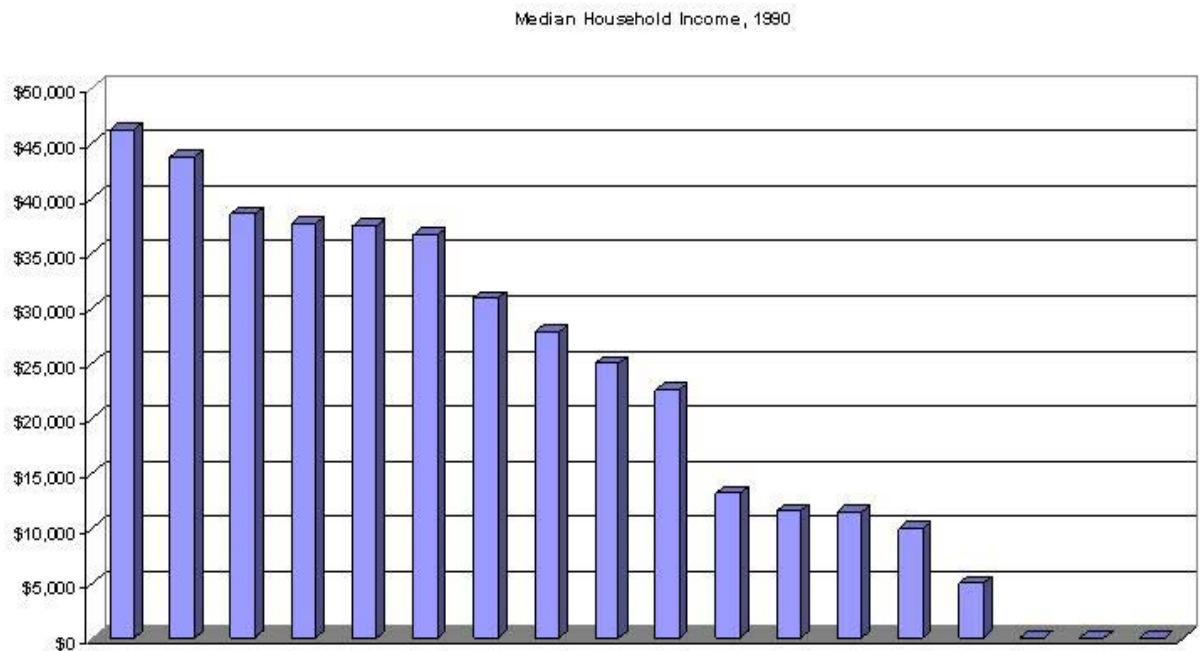
CHARTS

Sorted by Block Group Number

Median Household Income, 1990



Sorted by MHI



Let's examine the charts above...

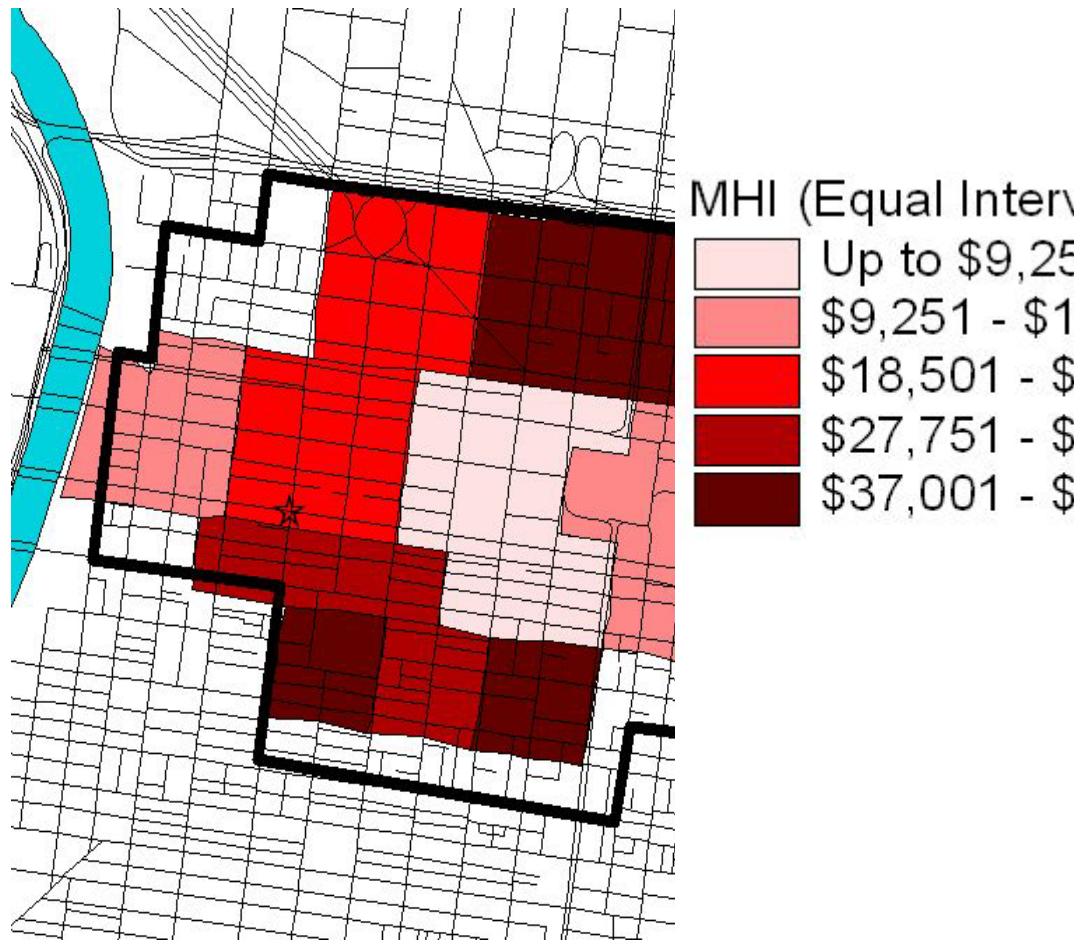
- Can perceive relative relationships easily (*average*)
- Cannot perceive spatial relationships

MAPS

Equal Interval.....Natural Breaks.....Quantile (*Classification Methods*)

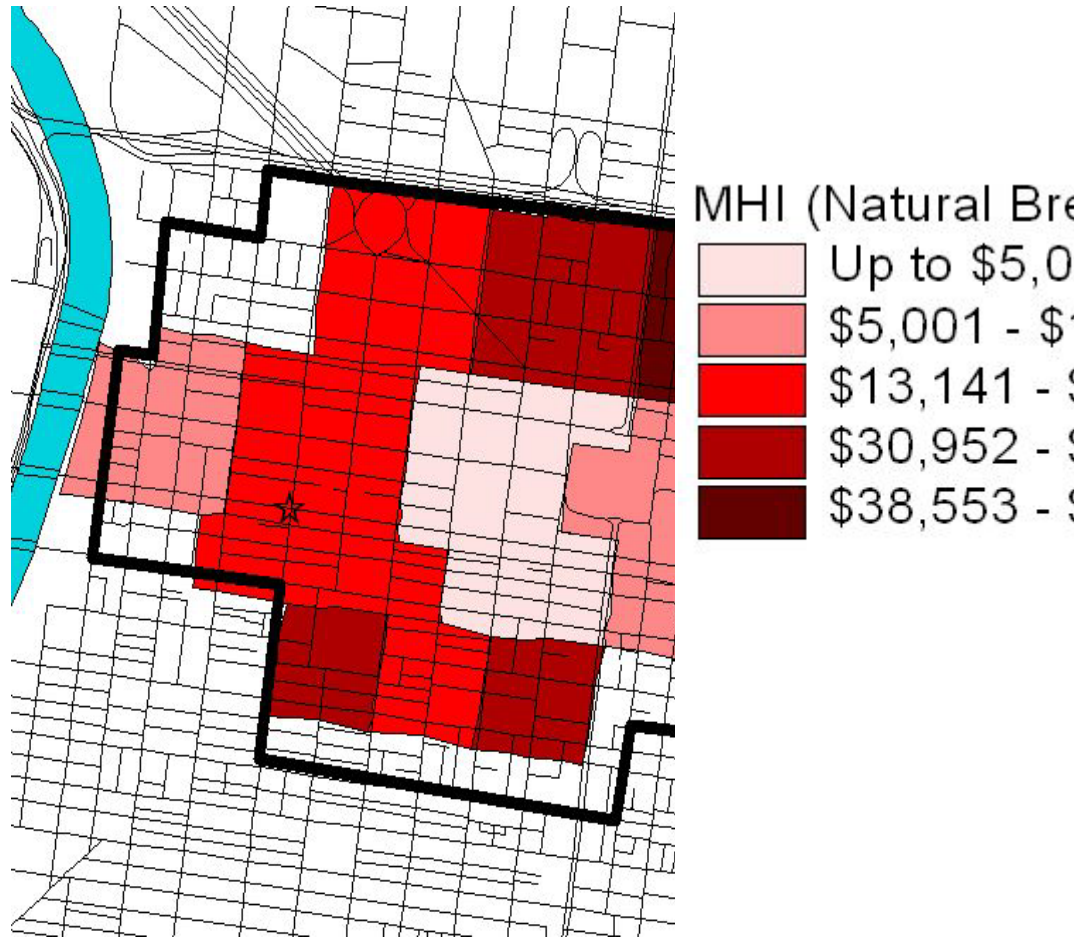
This method divides the range of values into equal sized sub-ranges. Then the features are classified based on those sub-ranges.

Map 1



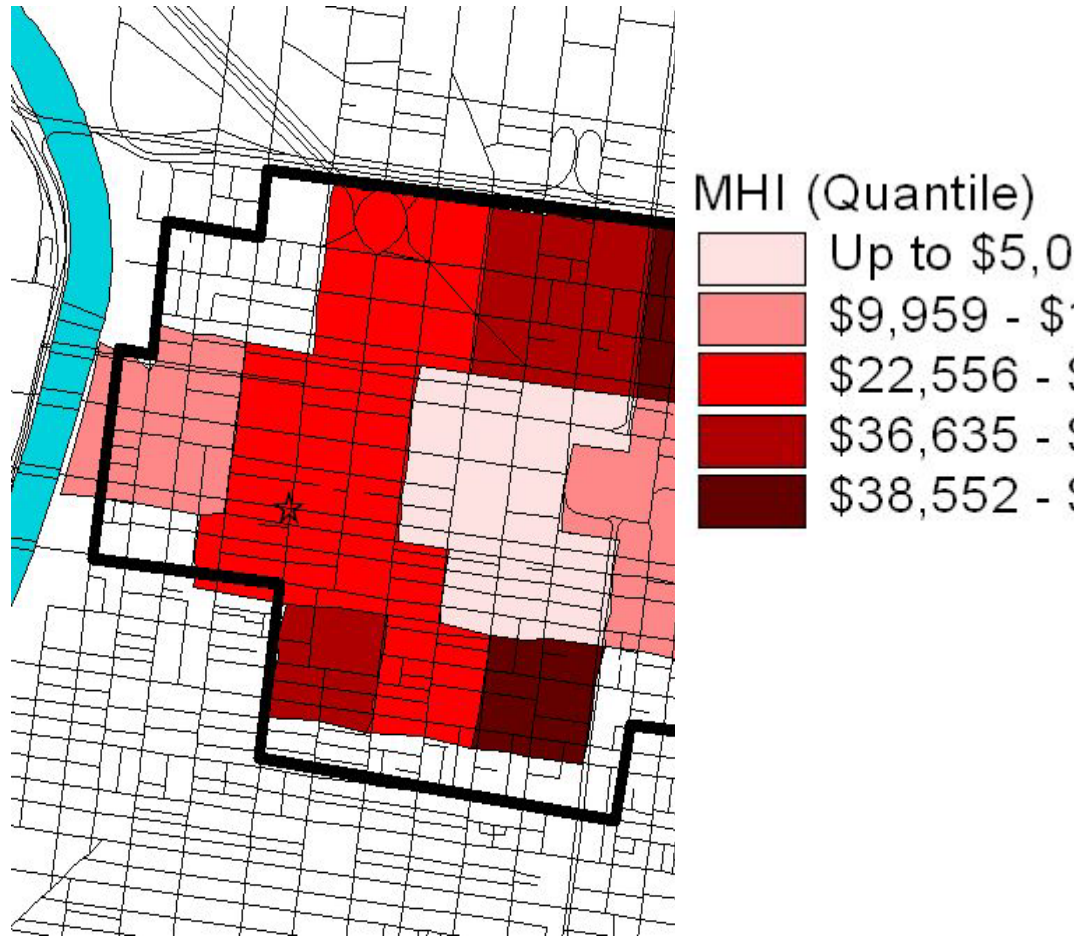
This method identifies breakpoints between classes using a statistical formula (Jenks optimization); it finds groupings and patterns inherent in your data.

Map 2



In the quantile classification method, each class contains the same number of features.

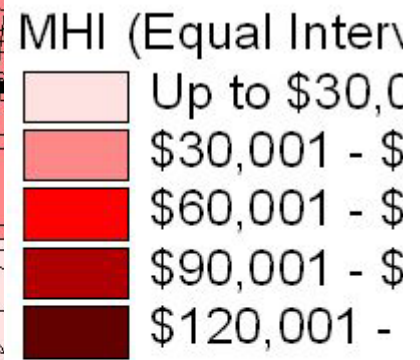
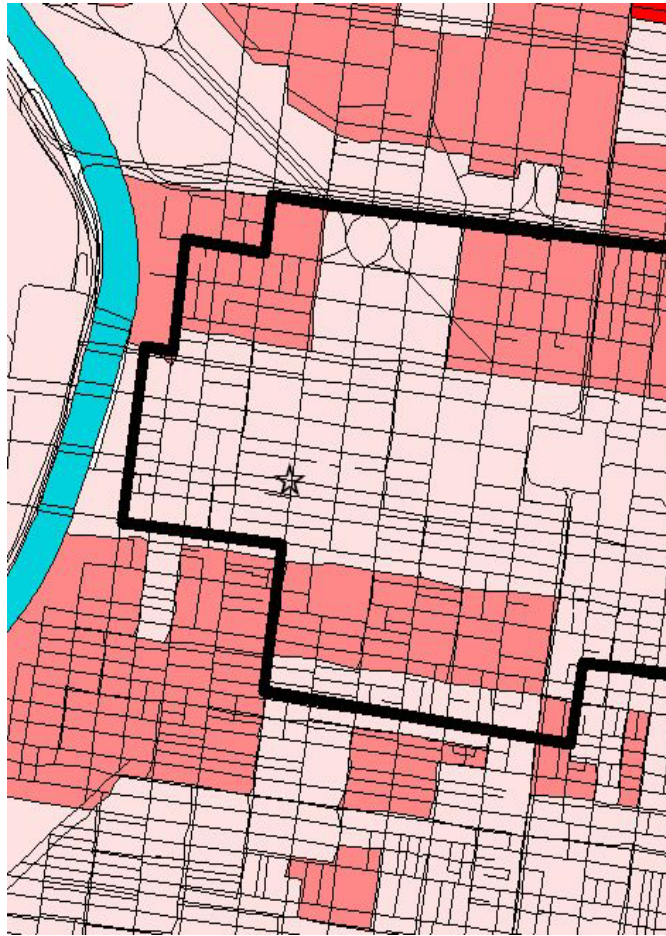
Map 3



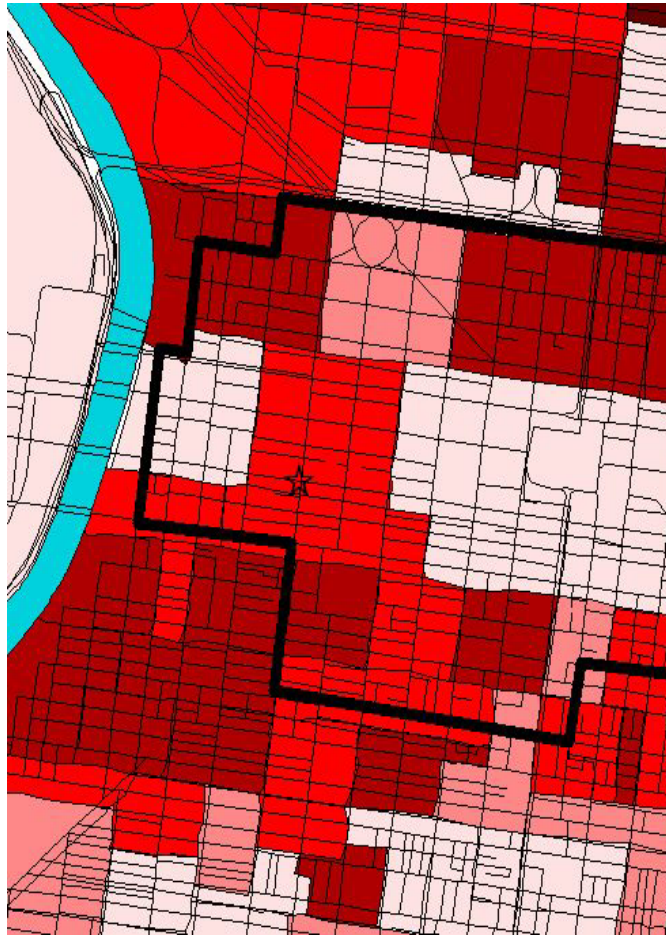
Which map is best?

Should we isolate Center City or compare it to the entire city?

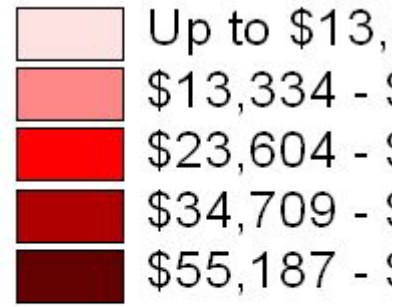
Map 1



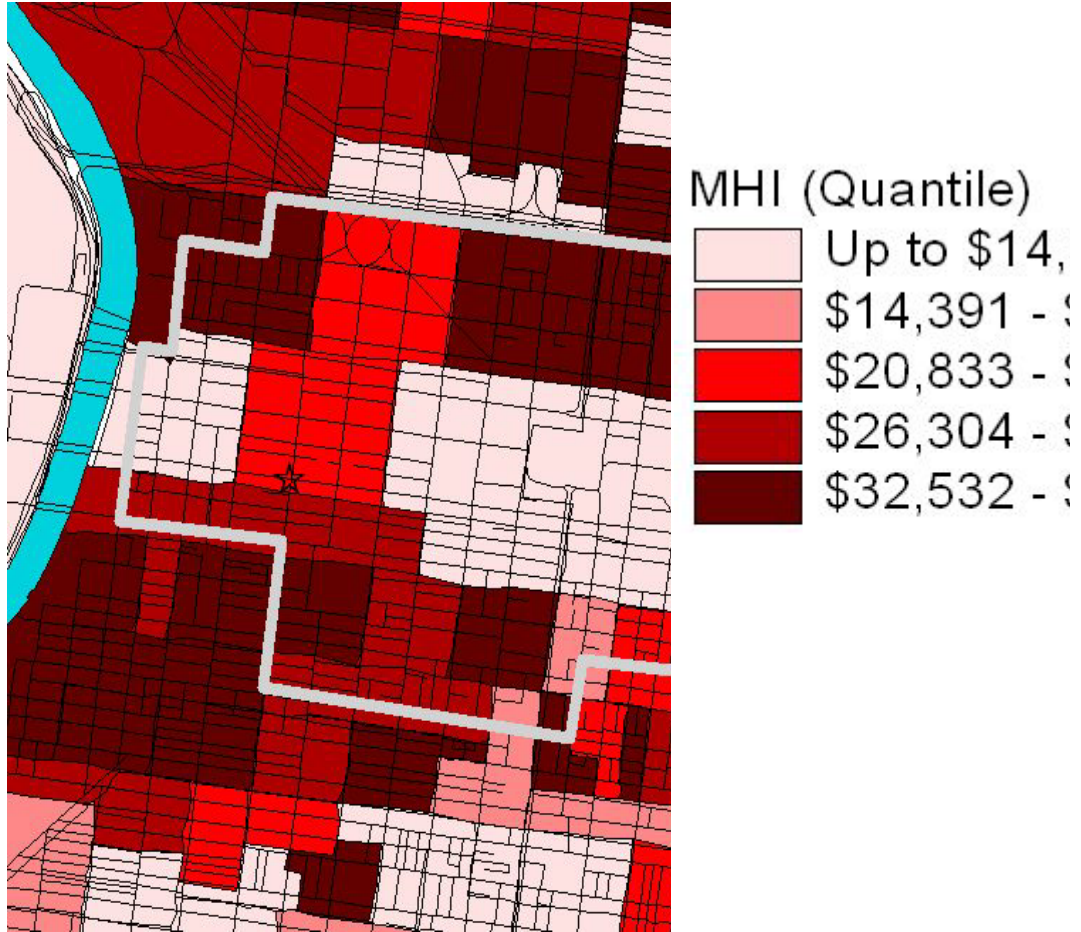
Map 2



MHI (Natural Bre



Map 3



In short, remember...data are not objective, there are ethical and value choices inherent in the process of capturing and manipulating data, and these decisions inform the results and decision-making processes.

Created October 2002 by Lorlene Hoyt.