Effective Data Visualization in Evaluation

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What’s the Point?

What's the Point of this Presentation?

- Definitions, MWS
- Data Visualization (DV) in Evaluation and the CDC Framework for Evaluation
- Research on DV in Evaluation
- Tools for DV in Evaluation
- Final Thoughts
- Questions??

A Definition: Effective

ef·fec·tive əˈfektiv/

1. adequate to accomplish a purpose; producing the intended or expected result
2. actually in operation or in force; functioning
3. producing a deep or vivid impression; striking

http://www.dictionary.com

A Definition: Data

da·ta ˈdādə/

1. a plural of datum
2. (used with a plural verb) individual facts, statistics, or items of information
3. (used with a singular verb) a body of facts; information

http://www.dictionary.com

A Definition: Visualization

vis·u·al·i·za·tion ˌviZH(o͞o)ələˈzāSH(ə)n,

1. the act or an instance of visualizing
2. a technique involving focusing on positive mental images in order to achieve a particular goal

http://www.dictionary.com

Merit, Worth, & Significance

- Data visualization in evaluation not necessarily concerned with merit, worth, or significance
- Rather, data visualization in evaluation can buttress merit, worth, or significance claims

CDC Framework (Koplan, Milstein, & Wetterhall, 1999)

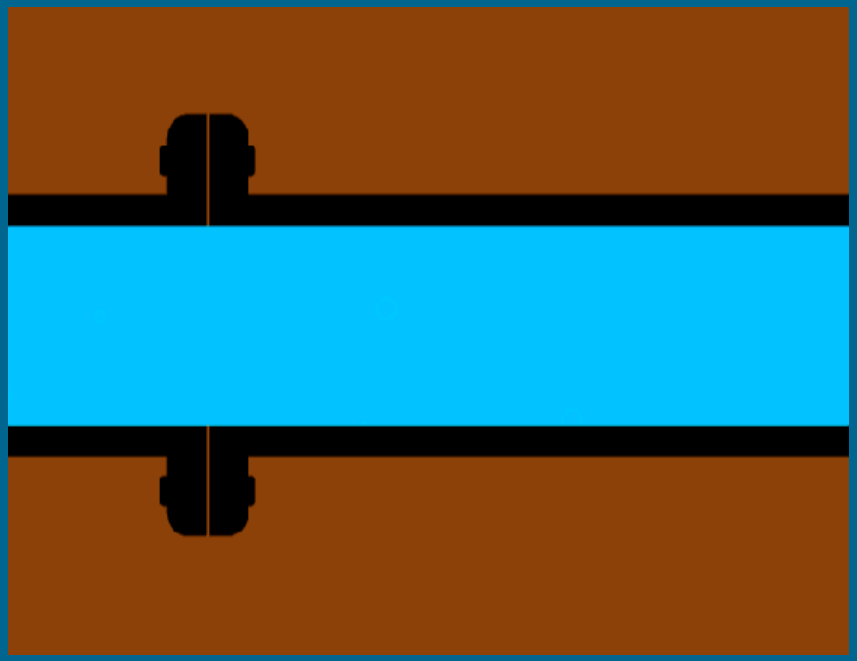
Exercise

- Visualization within the CDC framework
- Demonstrate first 3 steps
- Last 3 steps on website

Engage Stakeholders: WTP?

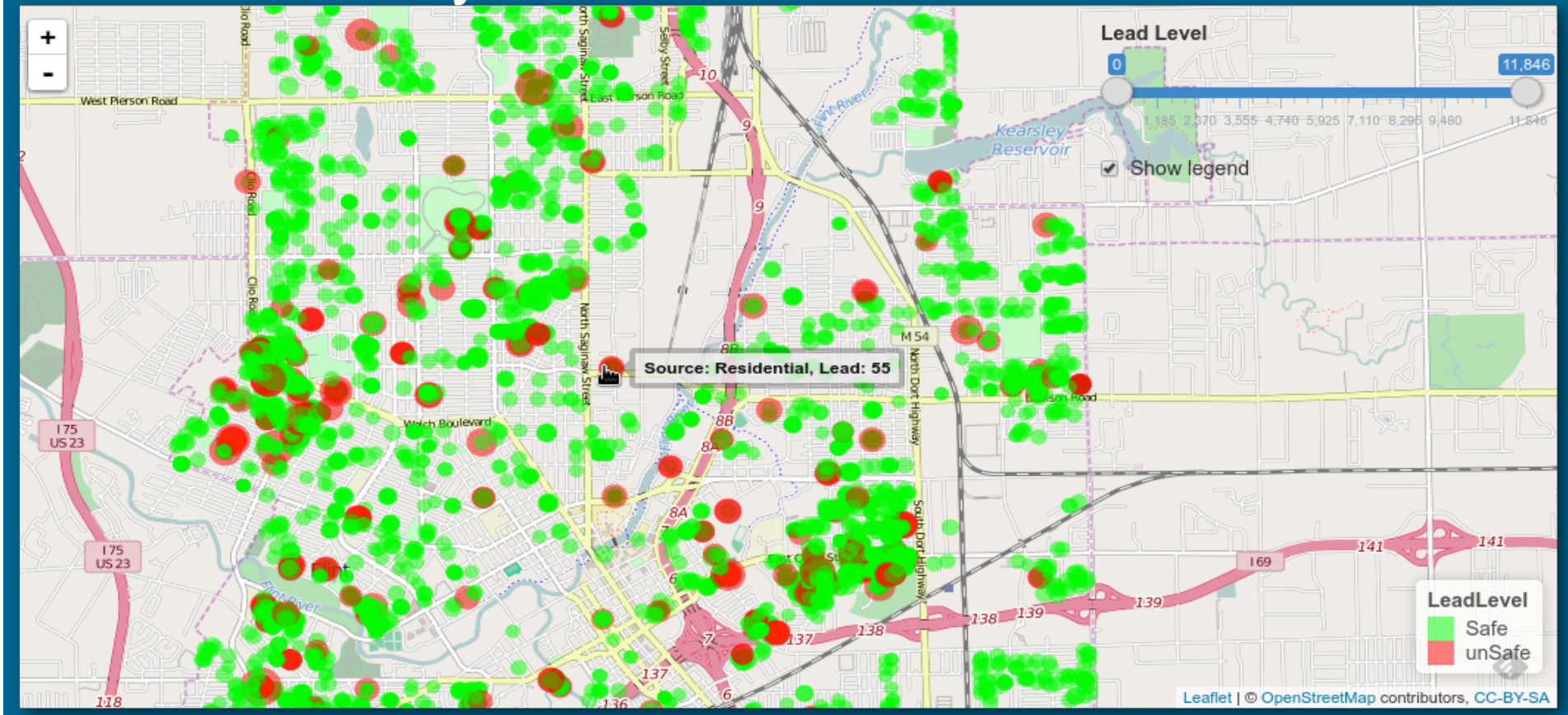
- The point: involve stakeholders in the evaluation
- How does data visualization help accomplish this goal?
  - Engaging visualization of data can highlight the issue, problem effectively/impactful
  - Statistics aren’t always as important as a good cat story!

Visualize a problem or motivating issue (e.g. Flint Water Crisis)

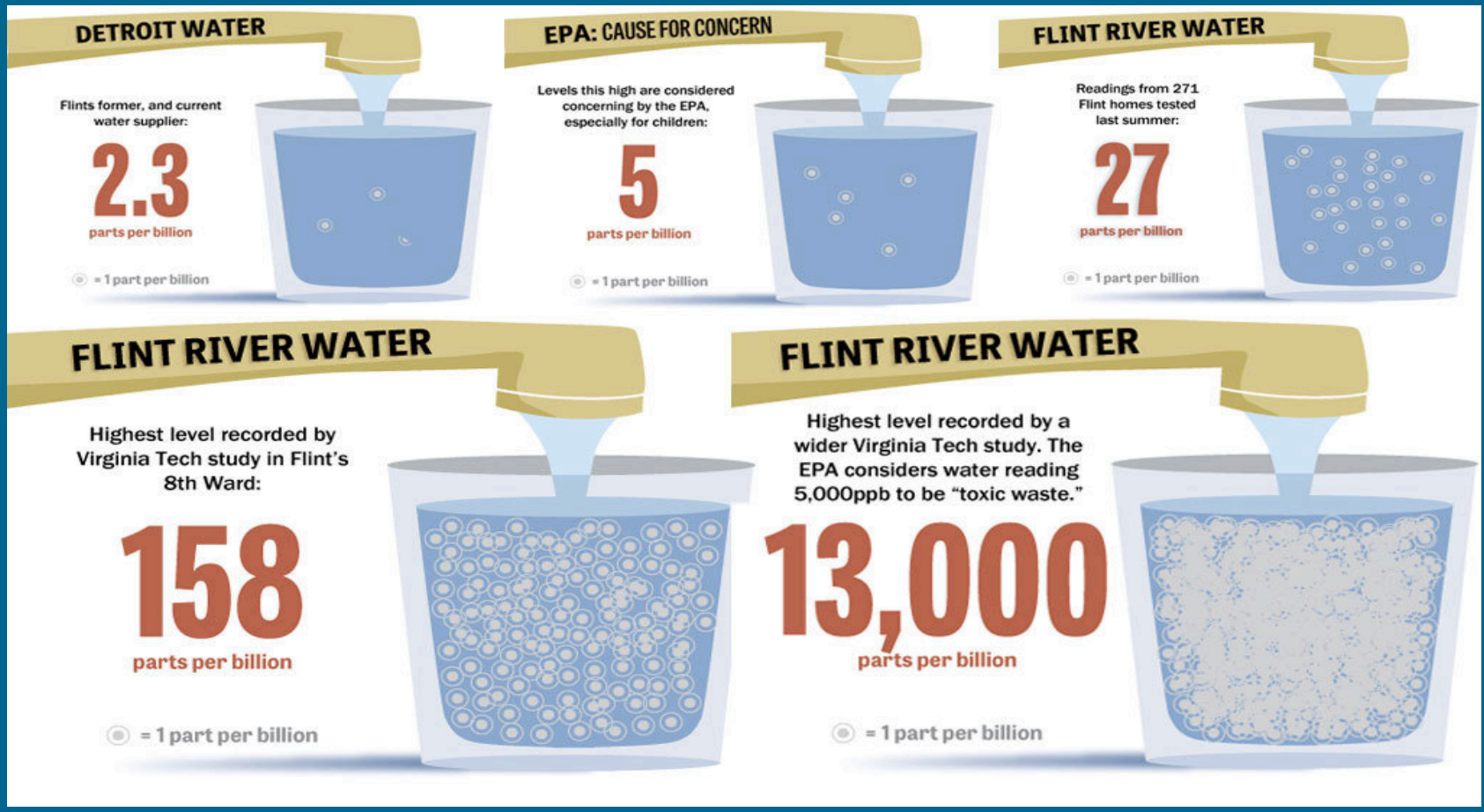


Sanburn (2016)

Lead levels by location



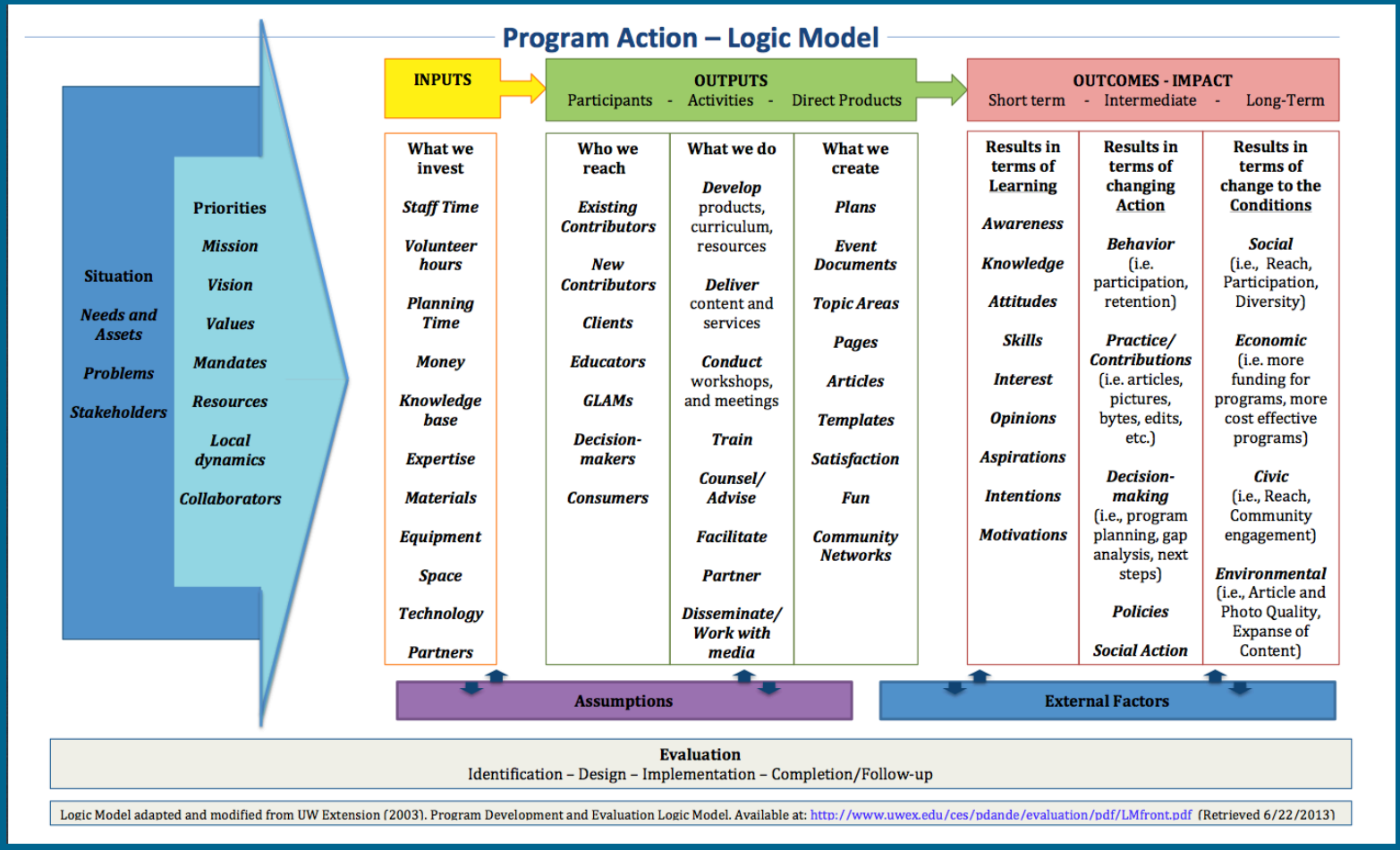
https://github.com/seantma/Flint_Shiny



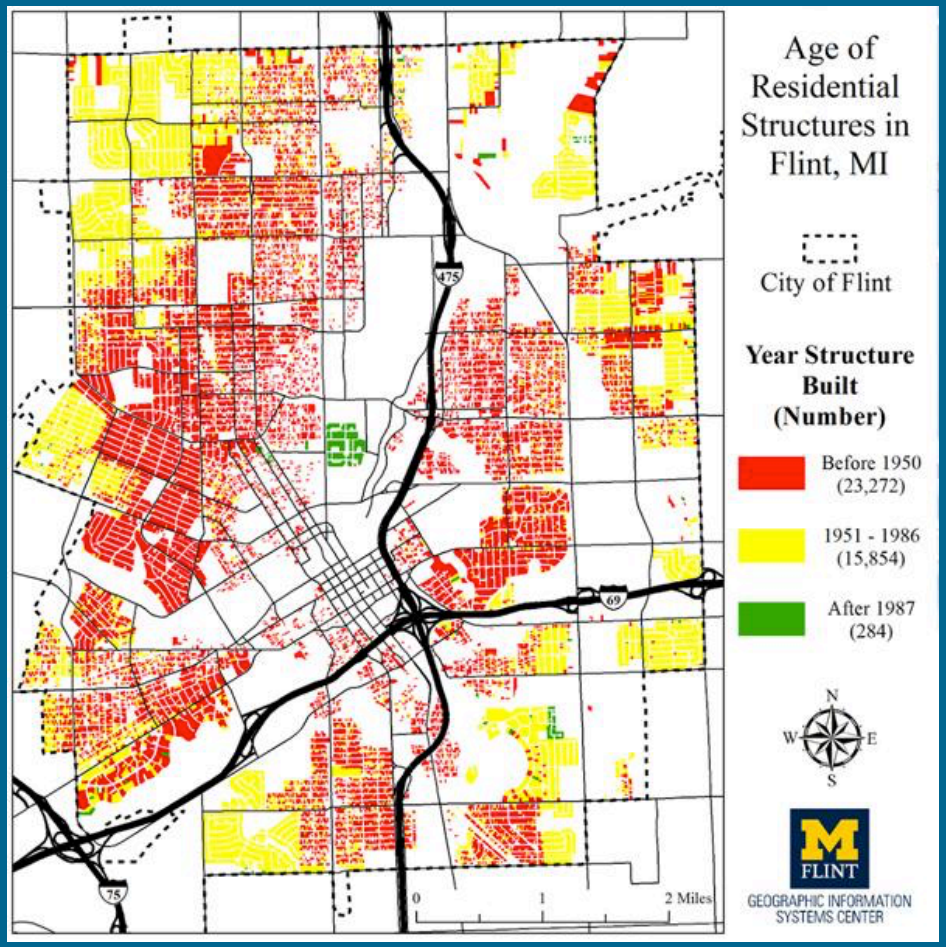
Graphic by Milt Klingensmith | MLive.com

Describe the Program: WTP?

- The point: clearly describe the program (e.g. inputs, outputs, and outcomes)
- Create logic models!
- How does data visualization help accomplish this goal?
- What about visualizing:
  - expected effects,
  - inputs & resources, and
  - context & outputs


Program Action – Logic Model
Situation
Needs and Assets
Problems
Stakeholders
Priorities
Mission
Vision
Values
Mandates
Resources
Local dynamics
Collaborators
INPUTS
OUTPUTS
Participants - Activities - Direct Products
OUTCOMES - IMPACT
Short term - Intermediate - Long-Term
What we invest
Staff Time
Volunteer hours
Planning Time
Money
Knowledge base
Expertise
Materials
Equipment
Space
Technology
Partners
Who we reach
Existing Contributors
New Contributors
Clients
Educators
GLAMs
Decision-makers
Consumers
What we do
Develop products, curriculum, resources
Deliver content and services
Conduct workshops, and meetings
Train
Counsel/ Advise
Facilitate
Partner
Disseminate/ Work with media
What we create
Plans
Event Documents
Topic Areas
Pages
Articles
Templates
Satisfaction
Fun
Community Networks
Results in terms of Learning
Awareness
Knowledge
Attitudes
Skills
Interest
Opinions
Aspirations
Intentions
Motivations
Results in terms of changing Action
Behavior (i.e. participation, retention)
Practice/ Contributions (i.e. articles, pictures, bytes, edits, etc.)
Decision-making (i.e., program planning, gap analysis, next steps)
Policies
Social Action
Results in terms of change to the Conditions
Social (i.e., Reach, Participation, Diversity)
Economic (i.e. more funding for programs, more cost effective programs)
Civic (i.e., Reach, Community engagement)
Environmental (i.e., Article and Photo Quality, Expanse of Content)
Assumptions
External Factors
Evaluation
Identification – Design – Implementation – Completion/Follow-up
Logic Model adapted and modified from UW Extension (2003). Program Development and Evaluation Logic Model. Available at: http://www.uwex.edu/ces/pdande/evaluation/pdf/LMfront.pdf (Retrieved 6/22/2013)

Wikipedia



Marty Kaufman & Troy Rosencrants / University of Michigan – Flint Geographic Information Systems Center

Community Health Data Viewer

Will County, Illinois

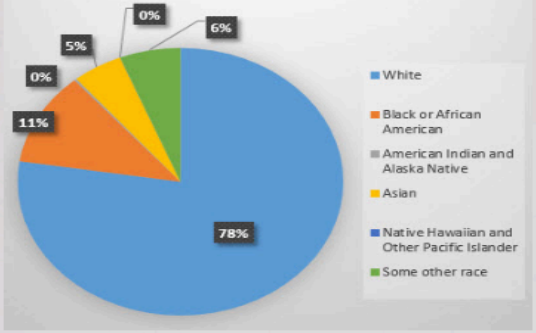
Demographic | Low-income Population | Health Center Patients | Health Insurance Status

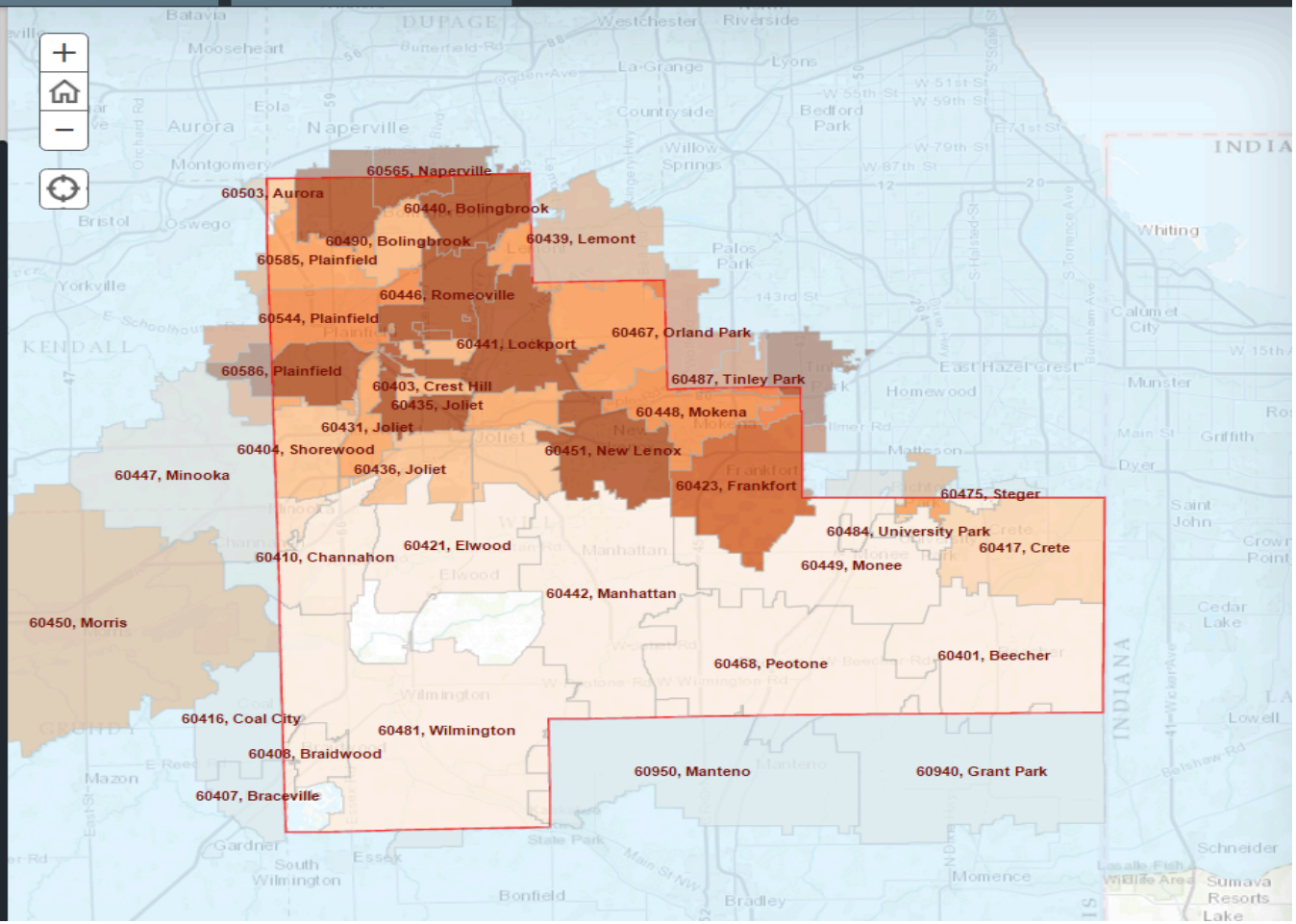
the American Community Survey (ACS) 2010-2014 five-year estimates.

*ZIP code in ZCTA are not exact geographic match to ZIP Code. ZCTAs may be comprised of one or more ZIP Codes.

- **Total Populations** - 682,108 (100%)
- **Population below the Poverty Level** - 55,932 (8.2%)
- The **median age** for Will County is 36.2.
- **Sex**
  - Male: 338,598
  - Female: 343,510

Population by Race





Focus the Evaluation Design: WTP?

- The point: define evaluation purpose, users, uses, questions, methods
- A focused evaluation can help address concerns and be efficient with resources
- Requires *compromise* and *agreements* among stakeholders
- Visualization is helpful in focusing the evaluation design, or reaching compromise, through:
    - Methods such as dot voting
    - Depicting of qualitative input about evaluation design among numerous stakeholders

Concept Mapping (Trochim, 1989)

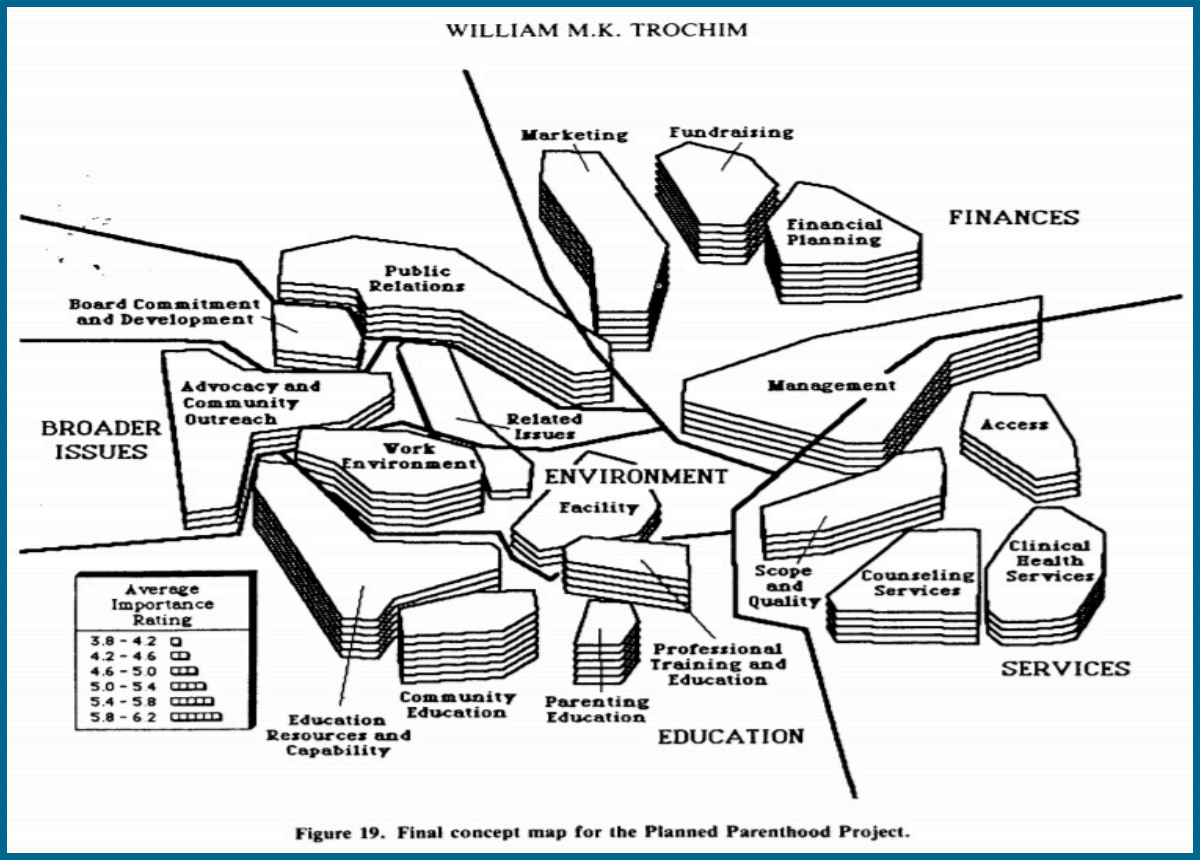
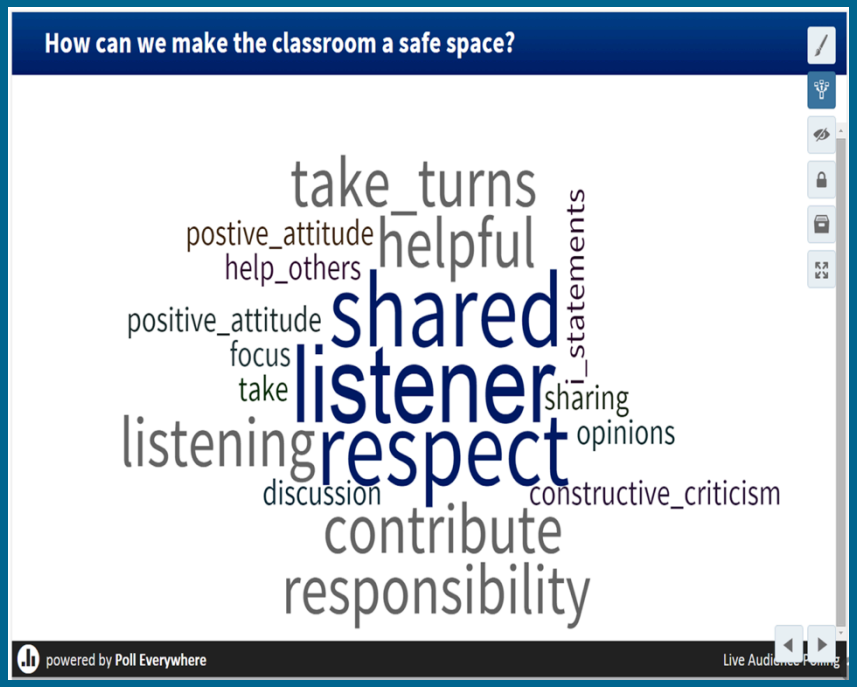
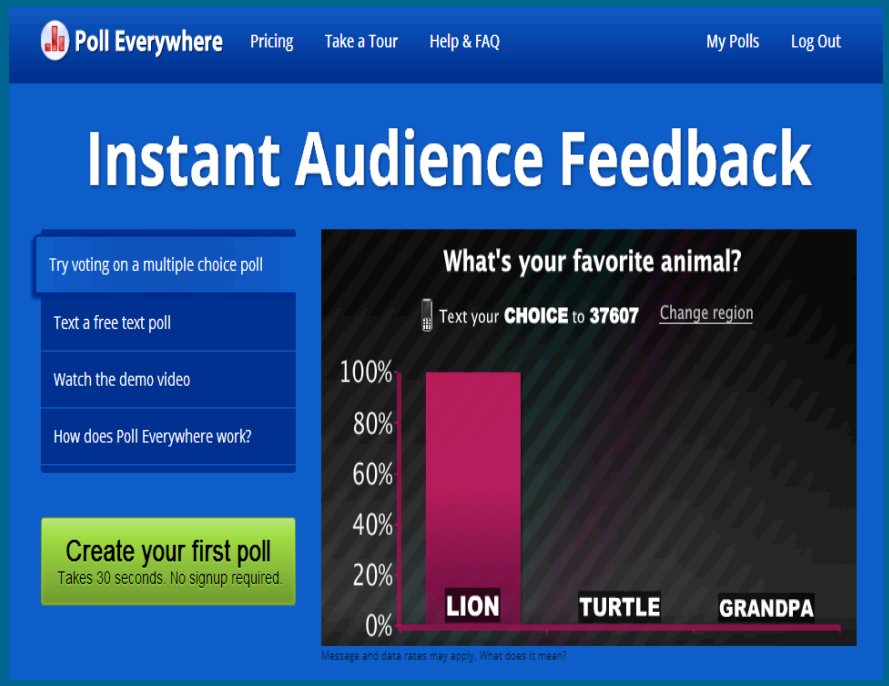


Figure 19. Final concept map for the Planned Parenthood Project.

Visualization for Decision Making





RoE in Data Visualization

Human factors in Visualization Research (Tory et al.,2004)

- Visualization is extremely helpful for data analysis and decision making
- Depends on people's **perception** and **interaction** with the visualization tool
- Directly affects understanding of data or usefulness of the tool.
- Associated mainly with Perception Based Design

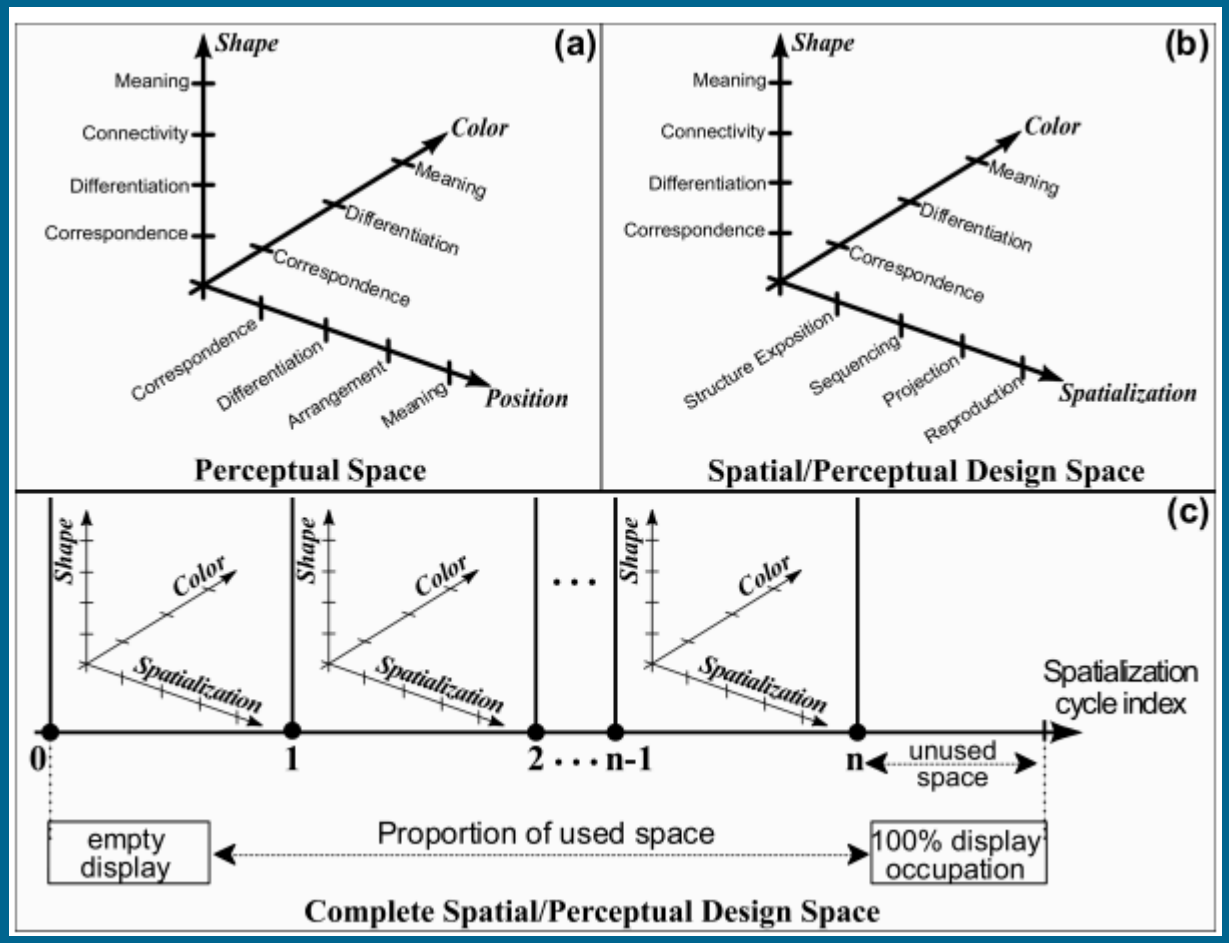
RoE in Data Visualization

Spatial-Perceptual Design Space (Rodrigues Jr. et al, 2007)

Developed a model to identify processes through which Visualizations become effective or more expressive

Visual Expression process has three components-- Observation of visual stimuli, visual perceptions and reasoning

Spatialization- how they're positioned in space, **Shape**, **Color**


(a)
Shape
Meaning
Connectivity
Differentiation
Correspondence
Color
Meaning
Differentiation
Correspondence
Correspondence
Differentiation
Arrangement
Meaning
Position
Perceptual Space
(b)
Shape
Meaning
Connectivity
Differentiation
Correspondence
Color
Meaning
Differentiation
Correspondence
Structure Exposition
Sequencing
Projection
Reproduction
Spatialization
Spatial/Perceptual Design Space
(c)
Shape
Color
Spatialization
Shape
Color
Spatialization
Shape
Color
Spatialization
Spatialization cycle index
0
1
2 • • • n-1
n
unused space
empty display
Proportion of used space
100% display occupation
Complete Spatial/Perceptual Design Space

RoE in Data Visualization

Visualizing Qualitative Data in Evaluation Research (Henderson et al., 2013)

- Qualitative techniques can be useful in most stages of Evaluation- early planning and design, data analysis or reporting
- Works well with various approaches- summative, developmental, utilization focussed, participatory and Mixed-methods
- Examples: Word/tag clouds, word tree, Themes

Tools for DV in Evaluation

- Tools for DV in Evaluation
  - R, Rstudio, statistics software
  - Rmarkdown, Slidly
  - http://www.graphicaldescriptives.org/#
  - Polling Application
    - Poll Everywhere
    - Tricider

Qualitative Tools

★Word Clouds- Displays frequency of each word

- Wordle
- TagCrowd

★Themes- displays broader ideas/theories about the general pattern of data

Package- CAQDAS

★Most free online available softwares (like Many Eyes) **do not allow data privacy or security** which is a BIG ISSUE for Stakeholders and Evaluators!!

Quantitative Tools

- ★Tableau
- ★Google Fusion Tables
- ★Google Chart Tools
- ★Power Pivot

Final Thoughts

- What's the point?!?!
- Resources
  - AEA Topical Interest Group for Data Visualization & Reporting
    - Homepage
  - AEA365 Blog on Data Visualization and Reporting
    - 192 entries, as of 3/28/17
    - Homepage
  - Website with Resources on Data Visualization for Evaluators

Questions?

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