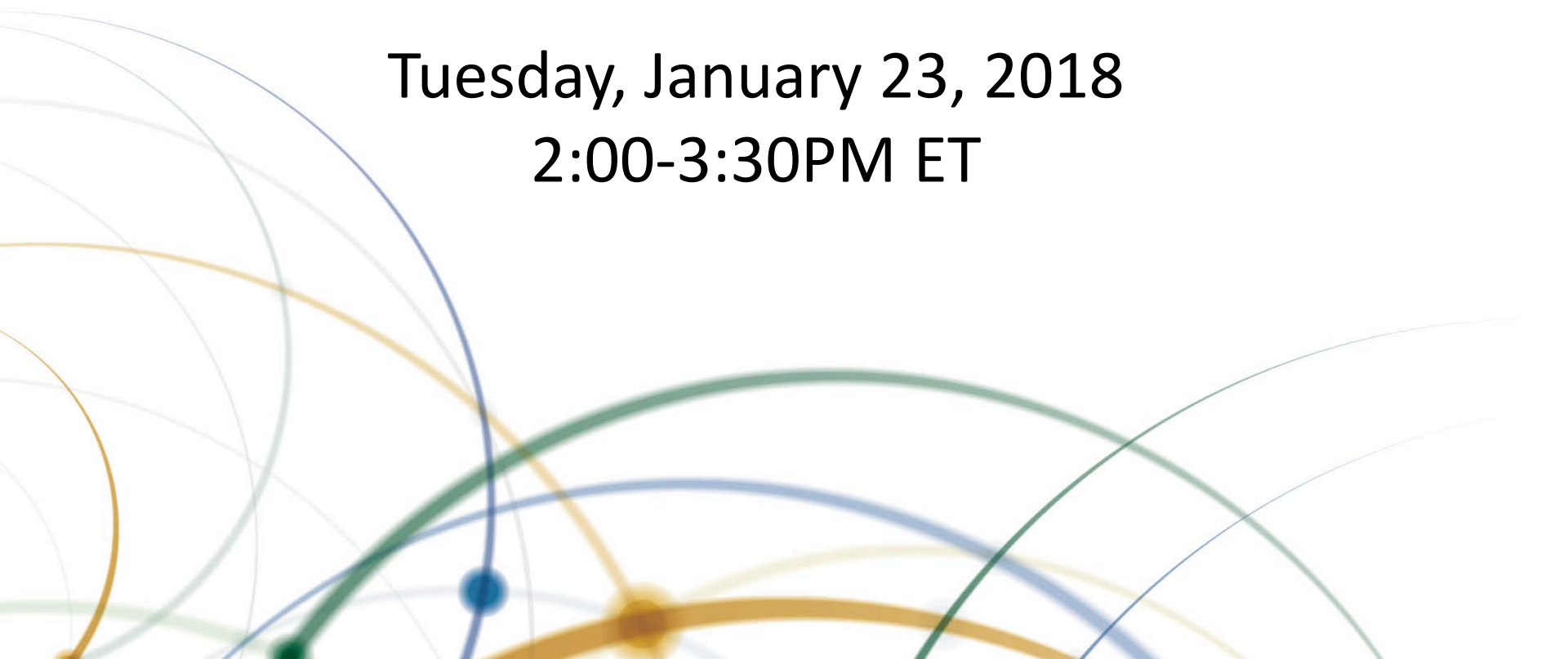


*The National Academies of*  
SCIENCES • ENGINEERING • MEDICINE

TRANSPORTATION RESEARCH BOARD

# Vizguide: Data Visualization for Transportation Agencies

Tuesday, January 23, 2018  
2:00-3:30PM ET



***The Transportation Research Board has met the standards and requirements of the Registered Continuing Education Providers Program. Credit earned on completion of this program will be reported to RCEP. A certificate of completion will be issued to participants that have registered and attended the entire session. As such, it does not include content that may be deemed or construed to be an approval or endorsement by RCEP.***



**REGISTERED CONTINUING EDUCATION PROGRAM**



# Purpose

Discuss NCHRP Web Only Document 226.

## Learning Objectives

At the end of this webinar, you will be able to:

- Explain the visualization process
- Describe visualization charts
- Describe visualization style
- List visualization tools



# **NCHRP Web Only Document 226: Data Visualization Methods for Transportation Agencies**

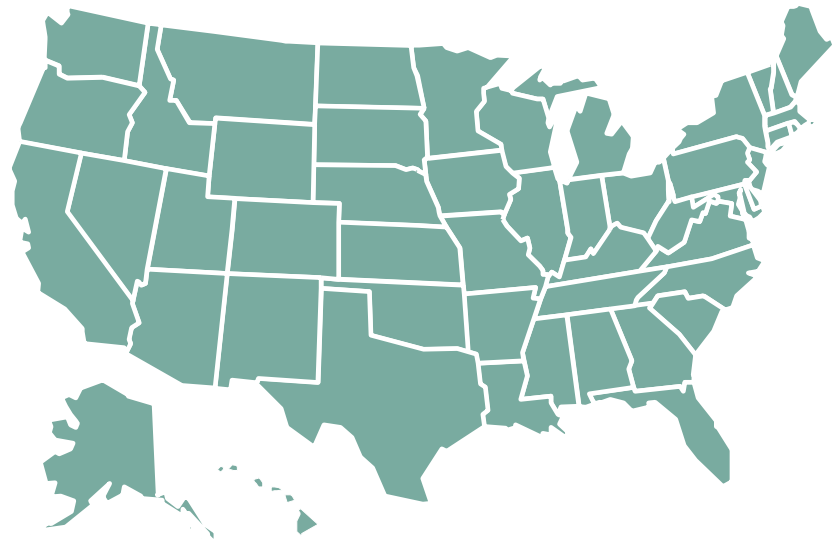
**NCHRP Project 08-36/Task  
128**



# NCHRP is a State-Driven Program

- Sponsored by individual state DOTs who

- Suggest research of national interest
- Serve on oversight panels that guide the research.

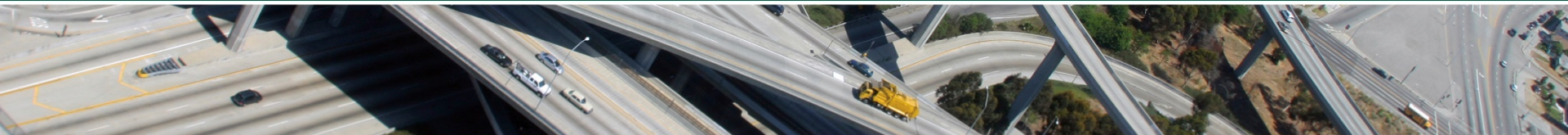
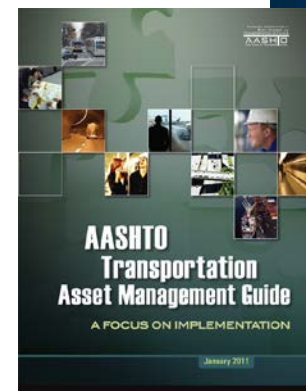
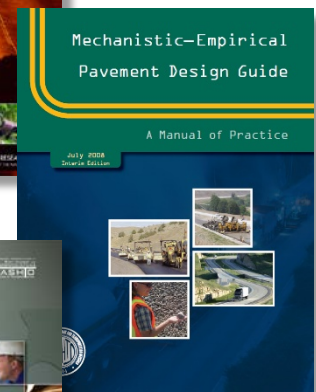
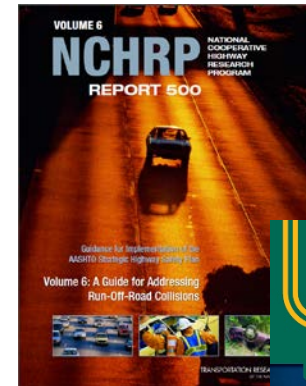


- Administered by TRB in cooperation with the Federal Highway Administration.



# Practical, ready-to-use results

- Applied research aimed at state DOT practitioners
- Often become AASHTO standards, specifications, guides, syntheses
- Can be applied in planning, design, construction, operations, maintenance, safety, environment



# Today's Speakers

- Joe Zissman, Cambridge Systematics
- Nate Higgins, Cambridge Systematics





DATA VISUALIZATION METHODS  
*for TRANSPORTATION AGENCIES*

# TRB Webinar

Presented By: Nathan Higgins

Joe Zissman

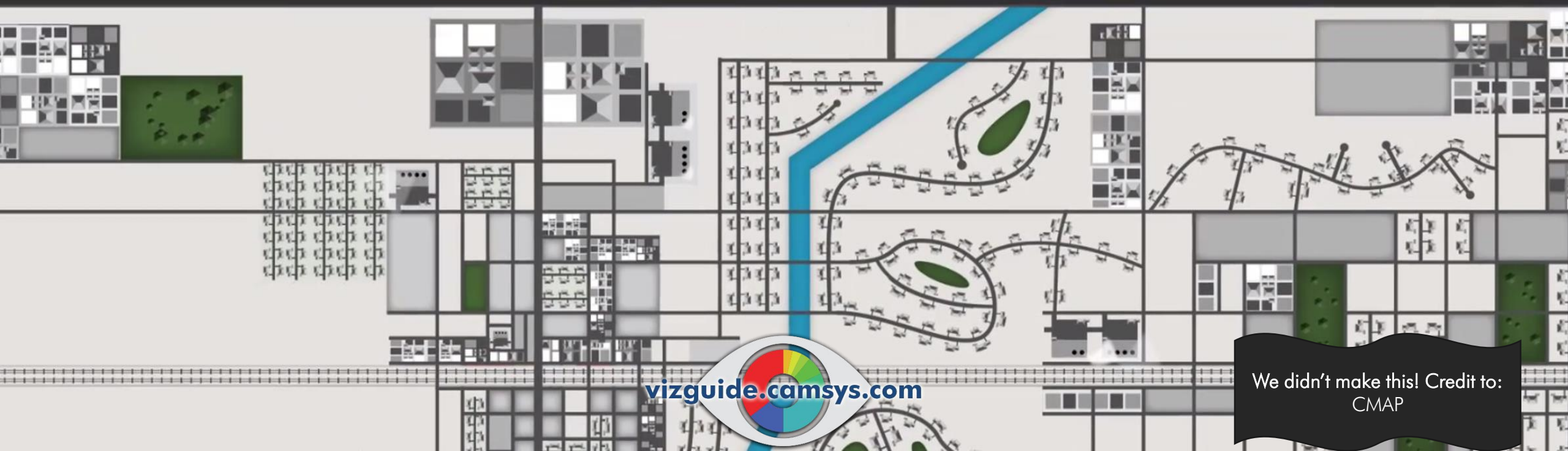
# What is a visualization?




We didn't make this! Credit to:  
NATS

# Visualizations make complicated things simple

TOMORROW



We didn't make this! Credit to:  
CMAP

Philmont Station - West Trenton Line   
Lower Moreland Township, Montgomery County  
RideScore for this station is : 2.4

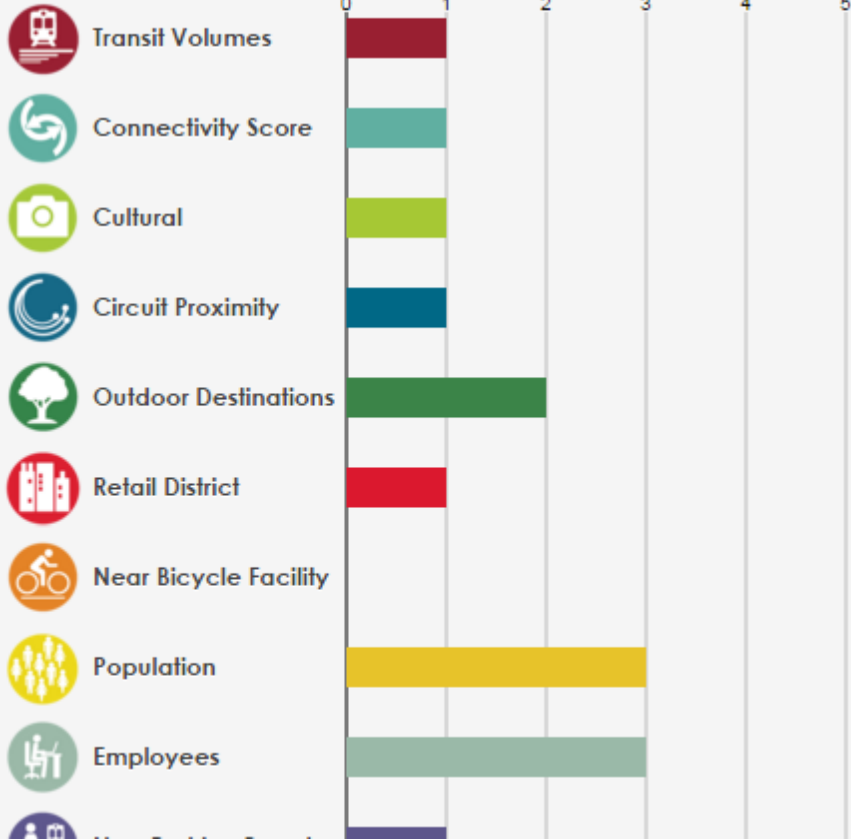


RideScore is the sum of values for each station characteristic

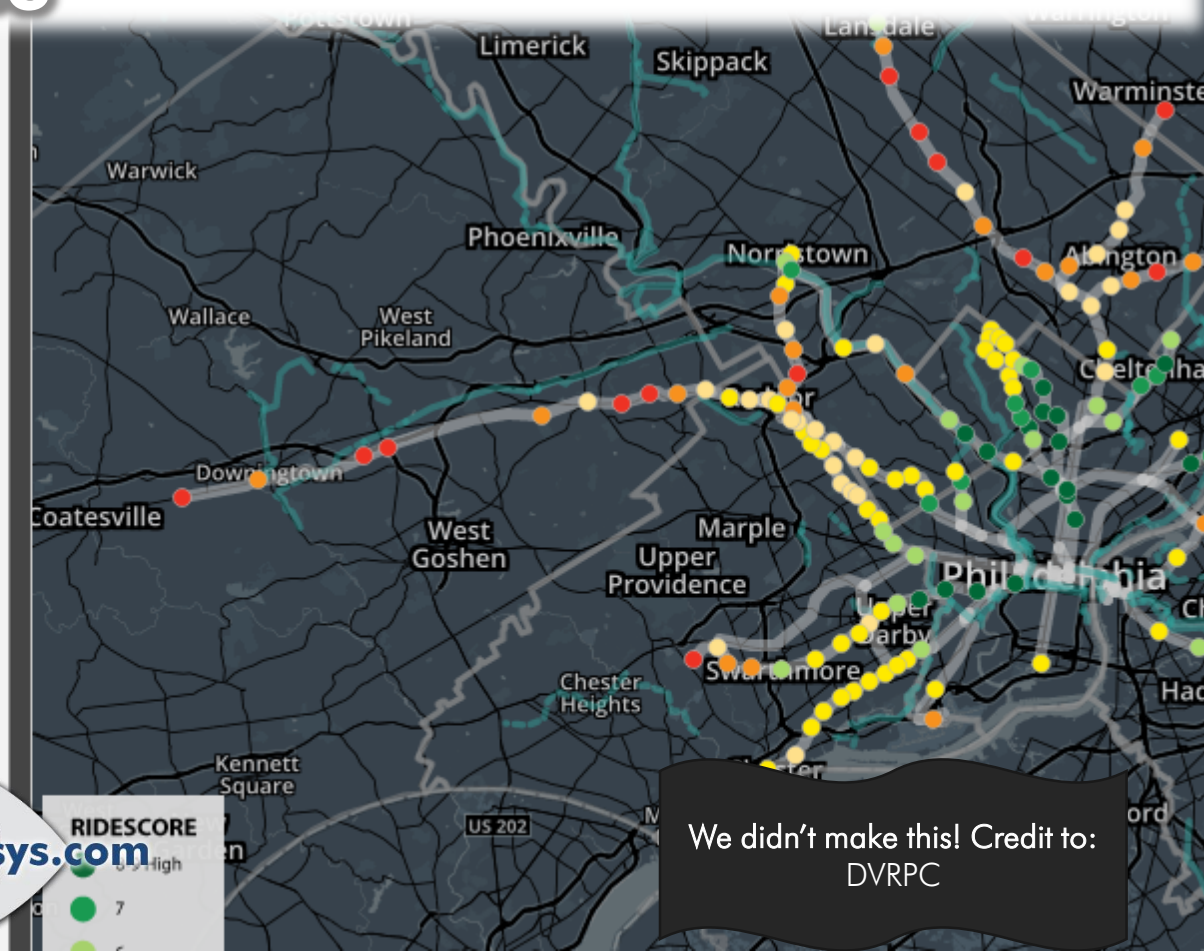
Category Scoring

Data

(click icon for category description)



# Visualizations let people see how impressive your work really is



We didn't make this! Credit to: DVRPC

# Visualizations make comparisons easier

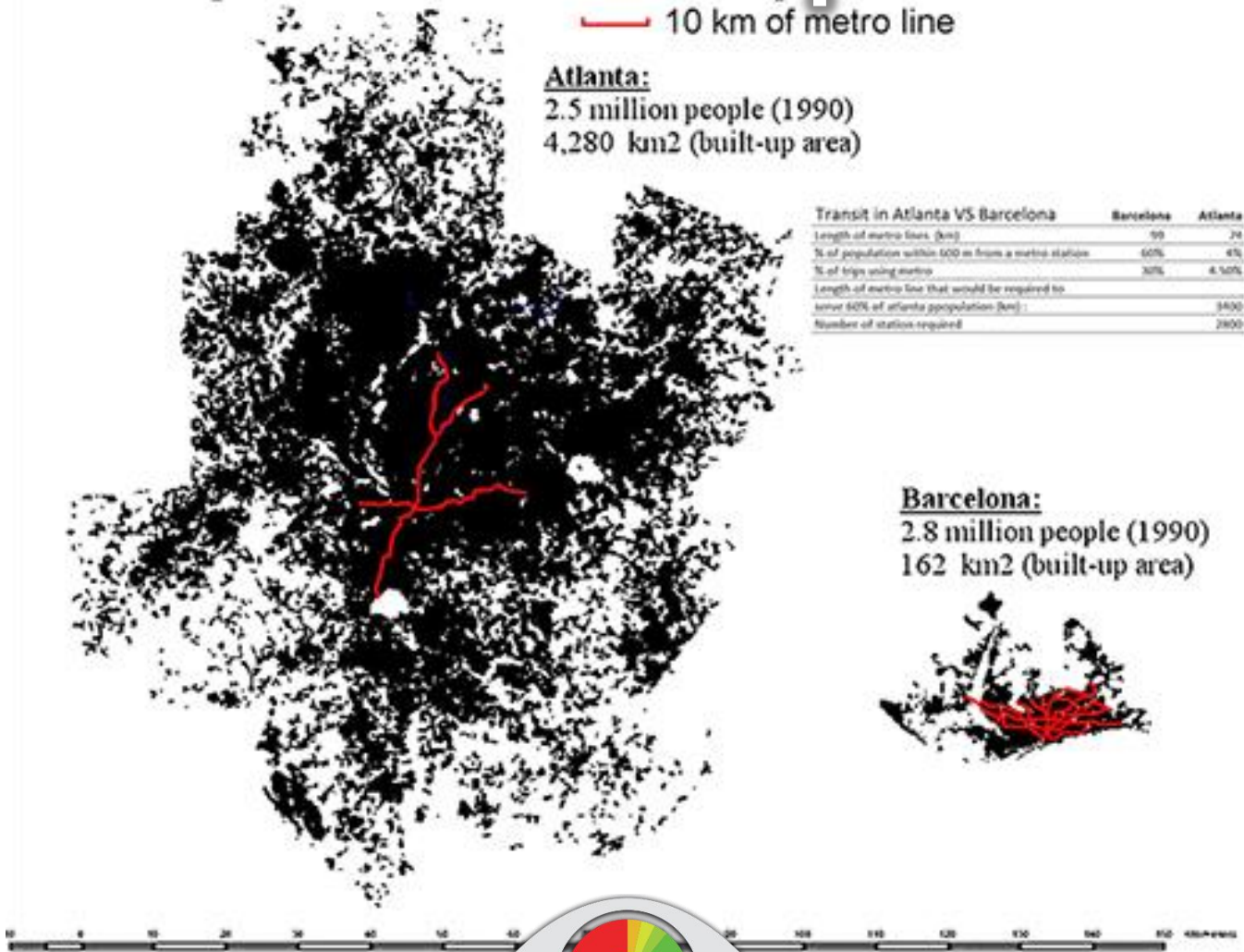
The Built-up Area of Atlanta and Barcelona Represented at the Same Scale

— 10 km of metro line

**Atlanta:**  
2.5 million people (1990)  
4,280 km<sup>2</sup> (built-up area)

Transit in Atlanta VS Barcelona	Barcelona	Atlanta
Length of metro lines (km)	99	74
% of population within 500 m from a metro station	50%	4%
% of trips using metro	30%	4.50%
Length of metro line that would be required to serve 50% of atlanta population (km):		5400
Number of stations required		2800

**Barcelona:**  
2.8 million people (1990)  
162 km<sup>2</sup> (built-up area)



We didn't make this! Credit to:  
Alain Bertaud

\$ = Cost\* (millions)  
 ⌚ = Closure Time\* (days)  
 ▲ = Maximum Grade  
\*Both cost and closure time are estimated ranges.

**Alternative 3**  
 Complete Superstructure Replacement  
 3-Lane Main Span & Approaches  
 Steel Plate Girder Design

**Alternatives 1 and 2**  
 Rehabilitation of Existing Structure  
 2-Lane Main Span  
 Alternative 1: 9'-10" Lanes, Sidewalk Between Trusses  
 Alternative 2: 10' Lanes, Sidewalk Outside Truss

**Alternative 4**  
 Complete Superstructure Replacement  
 3-Lane Main Span & Approaches  
 Steel Through Truss Design

\$ 25-28  
 ⌚ 320-460  
 ▲ 7.6%

\$ 32-35  
 ⌚ 540-680  
 ▲ 7.3%

**Alternative 5**  
 Complete Superstructure Replacement  
 3-Lane Main Span & Approaches  
 Cable Stayed Design

\$ 32-35  
 ⌚ 460-600  
 ▲ 7.5%

**Alternative 6**  
 Complete Superstructure Replacement  
 3-Lane Main Span & Approaches  
 Extradosed Design

**Where will the bridge cross the river?**  
 All alternatives being considered will cross the river at the existing location. In fact, all alternatives will make use of the existing piers. The bridges are depicted alongside each other here for a visual comparison of the replacement alternatives.

Kanawha River

# What can visualization do for transportation?

Sidewalk  
 5ft-wide for each replacement alternative

6ft-wide for each replacement alternative

12ft-wide for each replacement alternative



We didn't make this! Credit to:  
 West Virginia DOT

© 2014 West Virginia Department of Transportation. All rights reserved. This visualization is not a final design and is subject to change without notice.

# It can give residents a view of the future



We didn't make this! Credit to:  
Alabama DOT

# It can let stakeholders see their concerns come to life



## Sustainable Choices 2040



LONG RANGE TRANSPORTATION PLAN ♦ Youth Forum

NOVEMBER 2, 2013

[vizguide.camsys.com](http://vizguide.camsys.com)

# It can actually show you the color of your money

Fees and Sales:

State Road Toll: \$180M

Other DOT Revenue: \$60M

Federal Aid: \$100M

Tolls: \$125M

Bonds: \$75M

Highway Fund

Turnpike Fund

vizguide.camsys.com

Highway O&M: \$5M

Highway Project Development: \$40M

Highway Administration: \$40M

Highway Betterment: \$20M

Highway Municipal Aid: \$60M

Department of Safety: \$80M

Highway Construction: \$140M

Debt Service: \$50M

Turnpike O&M: \$60M

Turnpike Administration: \$40M

Turnpike Construction: \$40M

O&M: \$225M

Municipal Aid: \$60M

Administration: \$50M

Pass-Through: \$130M

Construction: \$100M

HIGHWAY



PERFORMANCE

Congestion Free Travel on Interstates Daily Updates



SAFETY

Highway Deaths Since the Beginning of the Year



CONDITION

Quality of Road Surface



FINANCE

YTD Planned vs. Actual Expenditures (Variance)

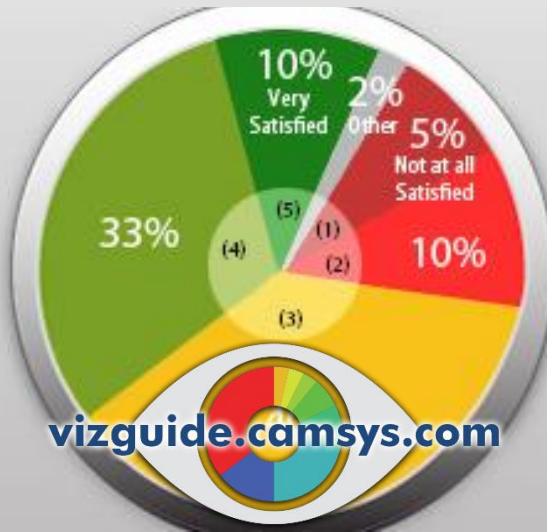
...and what that money buys

VDOT PERFORMANCE



VDOT MANAGEMENT

Management Performance Areas



vizguide.camsys.com



PROJECT

We didn't make this! Credit to: Virginia DOT

One picture may be all that people remember...

So make it count!



# Data Visualization Methods

## for Transportation Agencies

Welcome to Vizguide! This website is intended as a resource for transportation professionals who want to use illustrations and visualizations to communicate their ideas to an audience. You might associate visualization with complicated things like interactive animated websites and 3D models of major projects - and you're right, you can learn how to build those things - but visualizations also include things like bar charts, maps, and even specially formatted text or numbers. Used well, they can make a strong impression. Click on one of the areas below to get started!

# The Project

### Examples

Need some inspiration? We've organized some high-quality and effective visualizations for some of your common tasks, with suggestions on how you can replicate them.

### Process

When you're making visualizations, do you feel lost? Click on one of the steps below for tips. You can work through the process from beginning-to-end, or you can jump in wherever you are.

### Charts

The most effective visualizations for communicating your message are the ones with which people are familiar. Each of the chart types below include examples, variations, and tips for use.

### Style

Your style may be largely out of your control as you obey your agencies or clients. We've curated some tips that apply no matter what, including how to comply with Federal guidelines.

### Tools

A great visualization shouldn't stay in your head. Here are some of the most common and well-liked visualization tools, including [vizguide.camsys.com](http://vizguide.camsys.com)

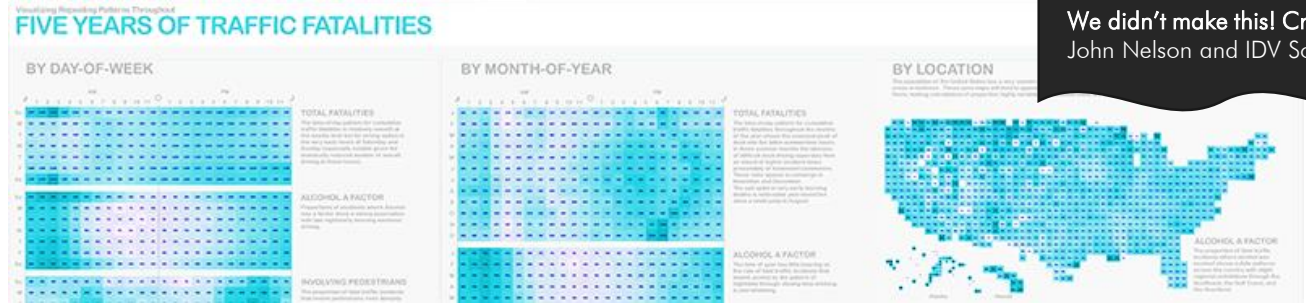
### Resources

Still curious about how to proceed with visualizing your story? We've accumulated resources for you as you design, build, and implement your vision, in-print or online.

# Our Goals

To envision information ... is to work at the intersection of image, word, number, art.

Edward Tufte



## Evaluate data visualization methods

- ...through the lens of transportation
- ...to provide guidance to practitioners

## Produce a guide in two forms

- A written report, and
- A website open to the public

# Our Team

The moment something just becomes fun to play with, almost like a video game, you hit some level of engagement and it becomes really interesting.

Martin Wattenberg



**Nathan Higgins, AICP**

Principal Investigator



**Ron Basile**

Graphic Artist | Web Designer



**Joe Zissman**

Analyst | Report Author



**Sam Van Hecke**

Subject Matter Expert



**Scott Gilkeson**

Human-Computer Interaction Expert



# Our Audience

To me, the best reporting philosophy is to craft reporting that can be presented to, and understood by, all audiences simply and completely, with little effort on their part.

John Allen



## Survey of Practitioners

- 30 respondents (12/2015 – 3/2016)
- Focused on 2 best-practice examples

## Our typical respondent...

- Manager or specialist at a DOT, MPO
- Makes bar/column charts, maps, stacked-area, and pictograms for a lay audience
- Uses ArcGIS, MS Office, Adobe, Javascript
- Uses common public datasets

# Our Report

## Outline

- Visualization in transportation
- Audience for the guide
- How to illustrate data
- How to develop effective visuals
- Style guide

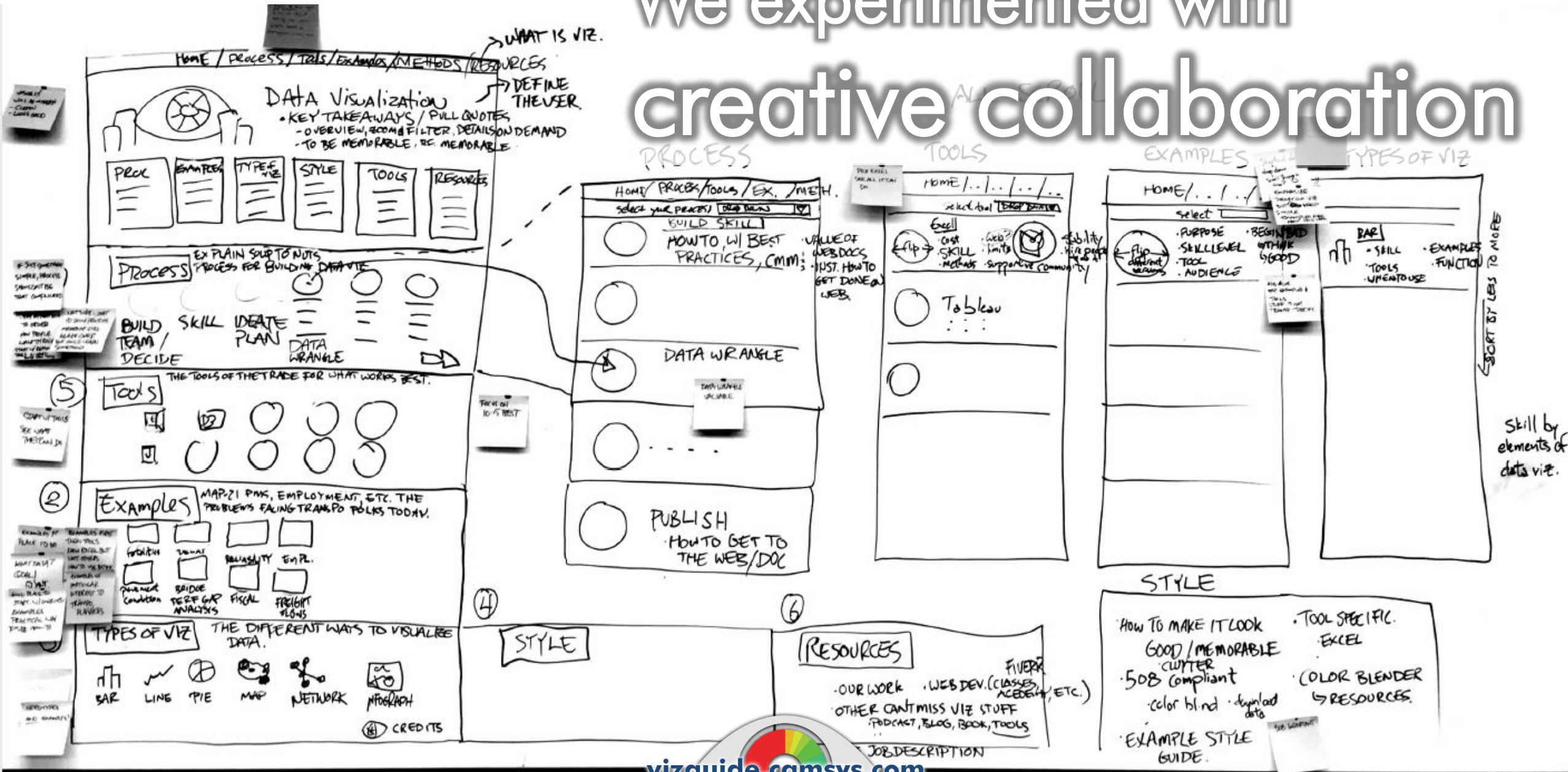


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NCHRP Web-Only Document 226  
Data Visualization Methods for Transportation Agencies  
*Visualizing Transportation Data*

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# We experimented with creative collaboration



# Our Website

- Guidance for each step of the visualization process
- Even more examples from our survey and from the web
- Chart types, software tools, and recommendations for use
- Data and style resources



# Today's Participants

- Nate Higgins, *Cambridge Systematics*,  
[nhiggins@camsys.com](mailto:nhiggins@camsys.com)
- Joe Zissman, *Cambridge Systematics*,  
[jzissman@camsys.com](mailto:jzissman@camsys.com)

# Get Involved with TRB

- Getting involved is free!
- Join a Standing Committee (<http://bit.ly/2jYRrF6>)
- Become a Friend of a Committee (<http://bit.ly/TRBcommittees>)
  - Networking opportunities
  - May provide a path to become a Standing Committee member
- For more information: [www.mytrb.org](http://www.mytrb.org)
  - Create your account
  - Update your profile

# Get involved with NCHRP

- Suggest NCHRP research topics
- Volunteer to serve on NCHRP panels
- Lead pilot projects and other implementation efforts at your agency
- For more information:  
<http://www.trb.org/nchrp/nchrp.aspx>

# Receiving PDH credits

- Must register as an individual to receive credits (no group credits)
- Credits will be reported two to three business days after the webinar
- You will be able to retrieve your certificate from RCEP within one week of the webinar