



# Data Visualization in Transportation NJDOT

**Presented By:** Nathan Higgins, AICP  
Cambridge Systematics, Inc.

# What is a visualization?



We didn't make this! Credit  
to:  
NATS




# Visualizations make complicated things simple

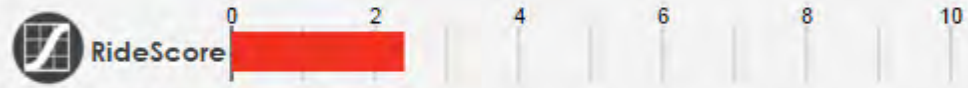
TOMORROW

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

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

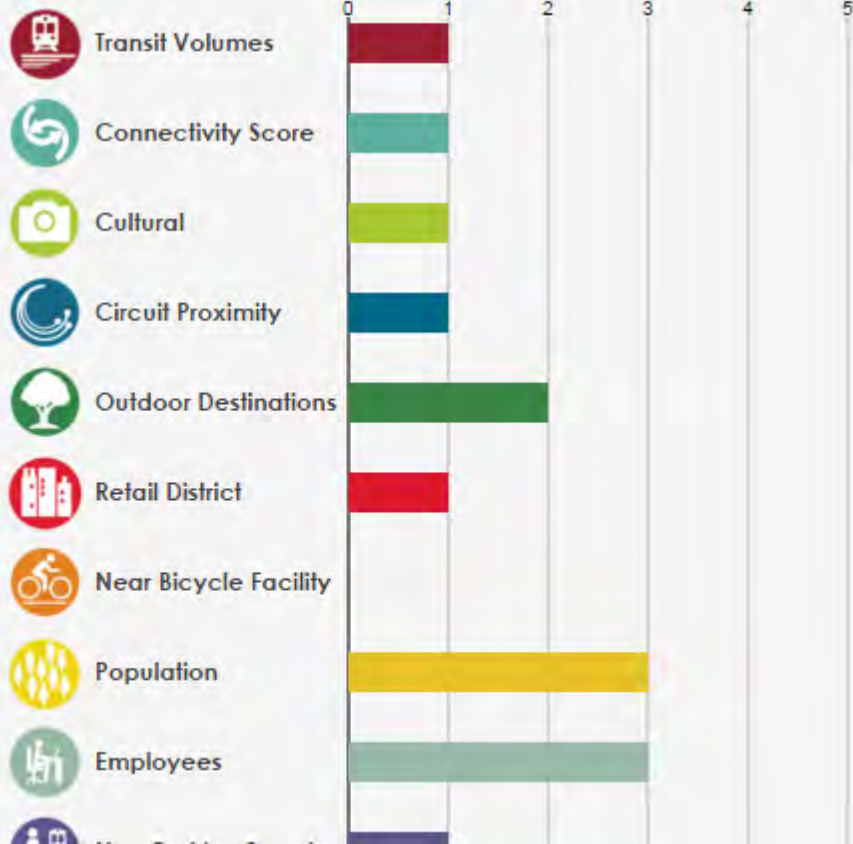


RideScore is the sum of values for each station characteristic

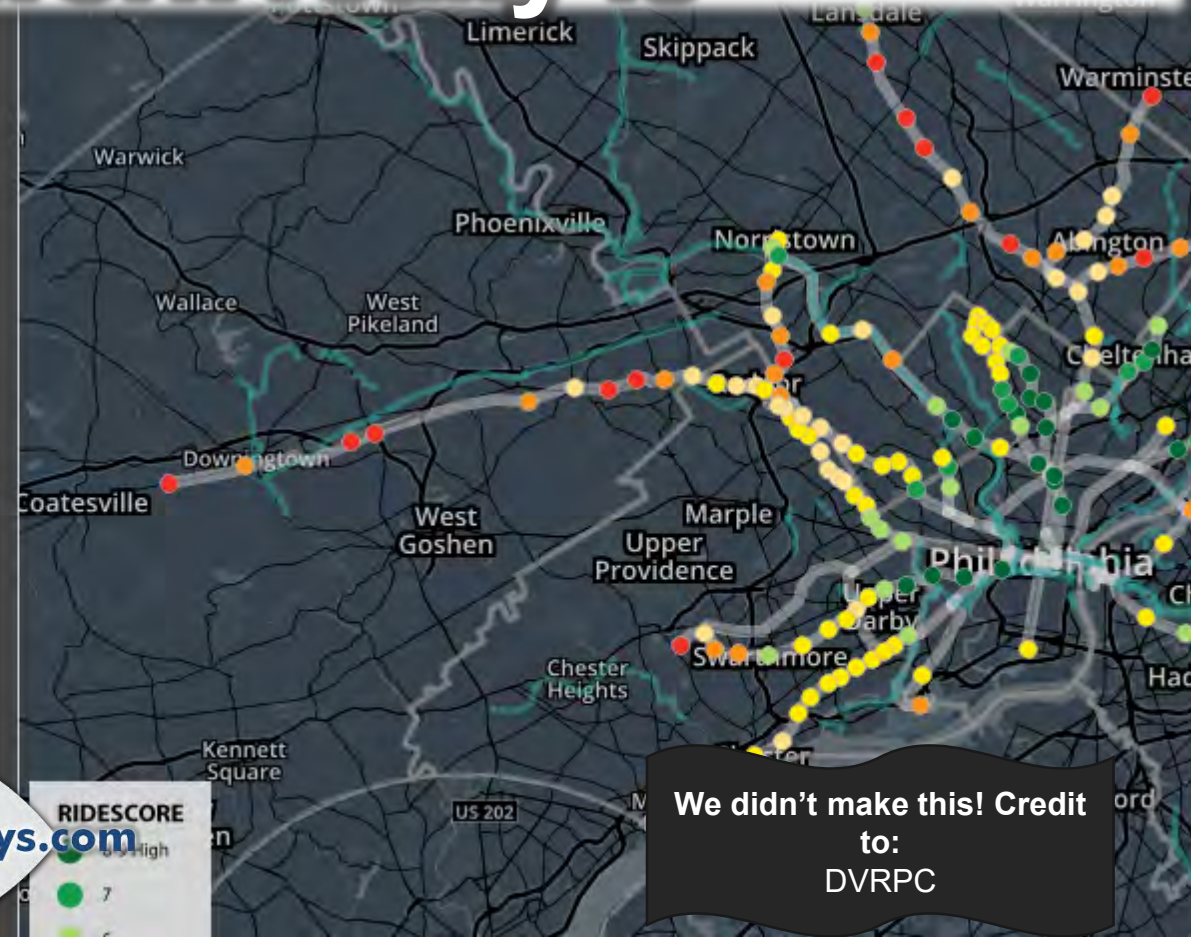
Category Scoring

Data

(click icon for category description)

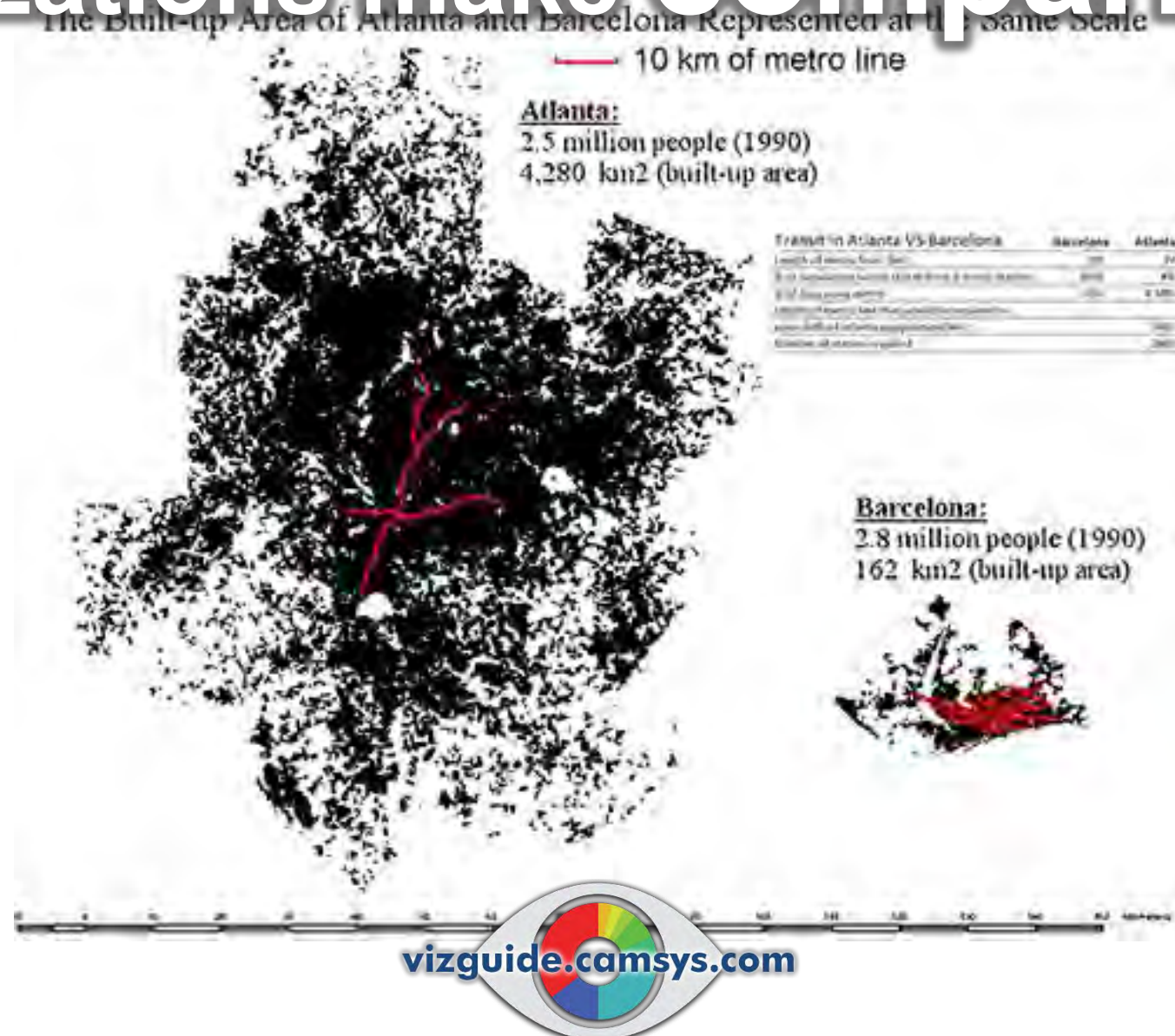


# Visualizations let people see how impressive your work really is



We didn't make this! Credit to: DVRPC

# Visualizations make comparisons easier



11/29/2018

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



\$ = Cost\* (millions)  
⌚ = Closure Time\* (days)  
▲ = Maximum Grade

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

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

\$ 27-32  
⌚ 360-570  
▲ 7.0%

\$ 25-28  
⌚ 320-460  
▲ 7.6%

\$ 26-29  
⌚ 380-520  
▲ 7.0%

\$ 32-35  
⌚ 540-680  
▲ 7.3%

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

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

\$ 32-35  
⌚ 460-600  
▲ 7.5%

**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



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



# 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

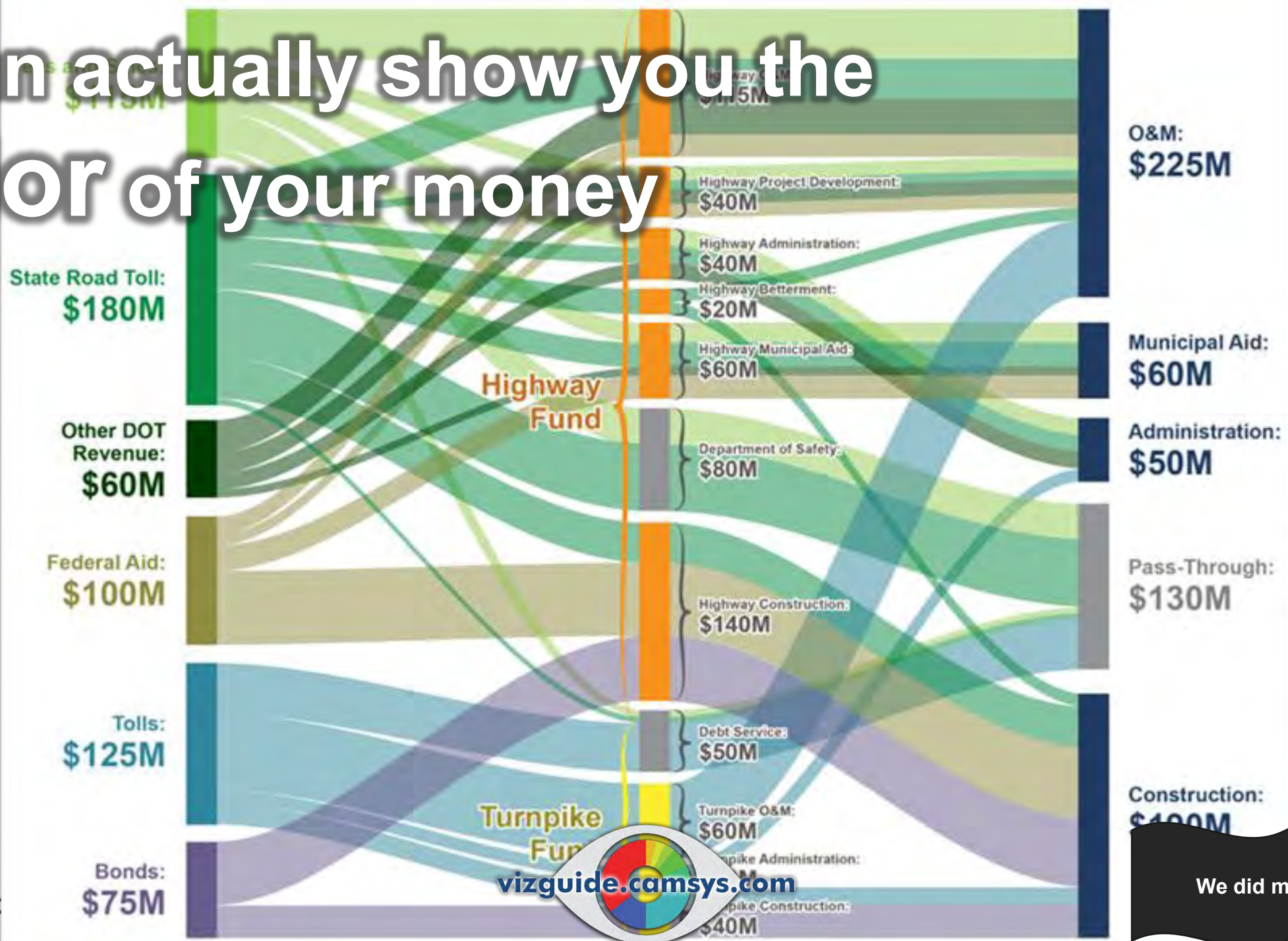
NOVEMBER 2, 2013

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

We didn't make this! Credit to:  
Champaign County RPC



# It can actually show you the color of your money



We did make this!



HIGHWAY



PERFORMANCE

Congestion Free Travel on Interstates  
Daily Updates



SAFETY

Highway Deaths Since  
the Beginning of the Year



CONDITION

Quality of Road Surface



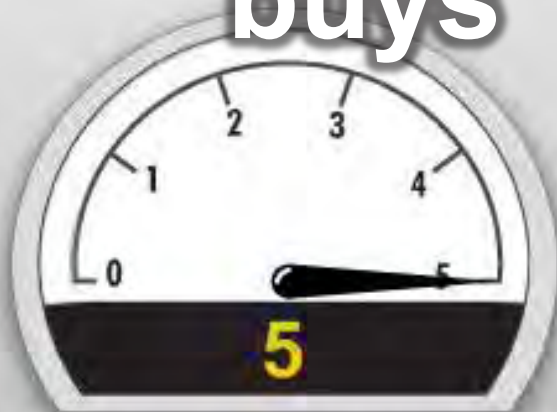
FINANCE

YTD Planned vs. Actual Expenditures  
(Variance)

...and what that money  
buys

VDOT

PERFORMANCE



VDOT MANAGEMENT

Management Performance Areas



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. You may not know how to build those things, but visualizations also include things like bar charts, maps, and even specially formatted text or numbers. Use this website to make a strong impression on your audience. One of the things 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 up-to-date information on the latest software.

## 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.

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





# Our Goals

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

Edward Tufte



We didn't make this! Credit to:  
John Nelson and IDV Solutions

## 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



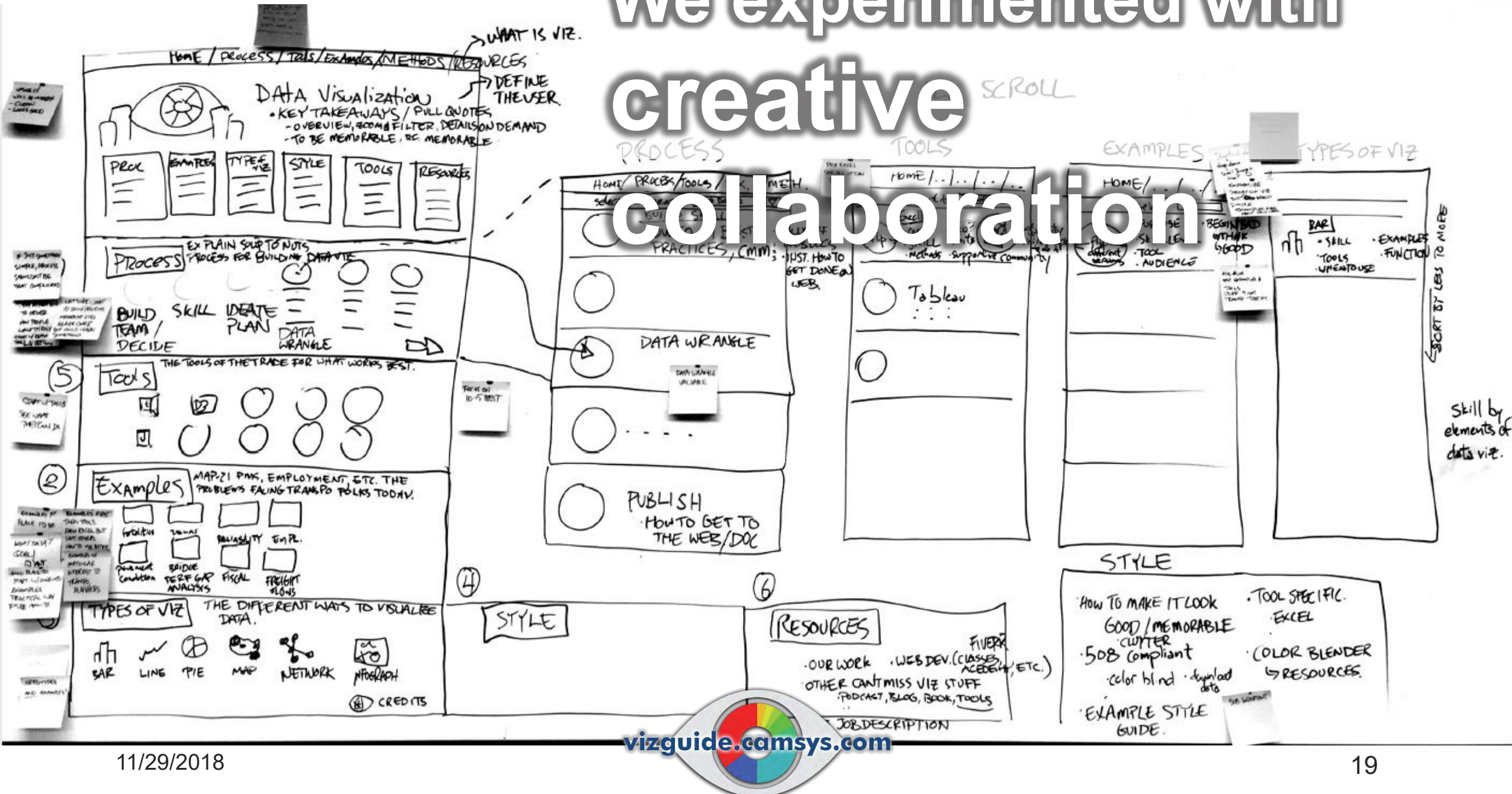
# Our Report

## Outline

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



# 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

