Welcome

Michael Pack, Director, CATT Laboratory, University of Maryland, and Visualization Conference Planning Committee Chair

Public Sector Keynote Address

Diana Furchgott-Roth, Deputy Assistant Secretary for Research and Technology, U.S. Department of Transportation

Private Sector Keynote Address

Eddie Moreno, Senior Civil Designer, Walt Disney Imagineering, Design, and Planning Studio

Presentation:

The Mouse and the Think Tank
Author: Eddie Moreno, Walt Disney Imangineering

Visual and Augmented Reality Technology and Infrastructure – Part 1

Description: Gaming techniques, real-time applications, immersive rendering tools and innovative new display technologies have made virtual and augmented reality tools (VR/AR) more accessible and much more cost effective for transportation projects. These tools provide immersive, participatory experiences and allow users to better assess their surroundings and make informed decisions about the simulated environment. These sessions will cover several approaches to representing projects with immersive virtual and augmented reality tools.

Moderator: Kevin Gilson, WSP, Kevin.Gilson@wsp.com

Presentations:

1. **Augmented Reality for asset visualization and content management**
   Author: Felipe Jung, Atkins North America

1. **Immersive Work Zone Inspection Training using Virtual Reality**
   Author: Praveen Edara, University of Missouri-Columbia

2. **Using Virtual Reality for Enhanced Decision Support: A Case Study on the North Tarrant Express Project in Texas**
   Author: Cameron Schmeits, Center for Transportation Research, UT Austin

3. **StationView – Metro's New Interactive Toolset with Google Street View Virtual Tour inside Metro Stations**
   Author: Minhua Wang, Washington Metropolitan Area Transit Authority

Visualization and Climate Change – Part 1

Description: How can visualization help us better understand the challenges we face as our climate changes? This session will explore how Power BI has impacted air quality visualization, a new paradigm for evaluating mobility options within an urban area and if visualization helps real people understand sea level rise.

Moderator: Frank Broen, Teach America, fbroen@teachamerica.com

Presentations:

1. **Visualizing Sea Level Rise Impacts in Transportation** Planning
   Author: Serena Hoermann, Florida Atlantic University

2. **Identifying and Mapping Flood-Prone Roadways in Philadelphia, PA**
   Author: Seri Park, Villanova University

3. **Interactive Data Visualization in Air Quality Research**
   Author: Reza Farzaneh, Texas A&M Transportation Institute

4. **Visualizing the Quality of Mobility in your City using the Mobility Energy Productivity metric**
   Author: Stanley Young, National Renewable Energy Laboratory

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Systems Performance Measure & Analytics

Description: Visualization techniques can be incredibly powerful when used performance measures and analytics applications. A skillful data visualization can highlight patterns and trends in complex data sets. When combined with performance targets, visualizations can identify which operational programs are meeting performance expectations. Visualizations can also serve as decision-support tools when improvement is necessary. This session will provide examples of how visualization is used in the context of MAP-21 PM3 performance measures, travel time reliability, and informed decision guidance.

Moderator: Barbara Ostrom, Wood Environment & Infrastructure Solutions, Inc., barbara.ostrom@woodplc.com

Presentations:

1. **Reliability Performance Measure**
   Author: Katie McCann, Virginia DOT

2. **Transportation Systems Analysis and Visualization: A Multiscale and Multivariate Approach to Shopping Districts**
   Author: Anne Berres, Oak Ridge National Laboratory

3. **Bottleneck Ranking Metrics for Informed Decision Guidance**
   Author: Mark Franz, UMD CATT Laboratory

4. **MAP-21 PM3 Deep-Dive Visual Analytics**
   Author: Greg Jordan, UMD CATT Laboratory

U.S. Department of Transportation's Solving for Safety Visualization Challenge

Description: The U.S. Department of Transportation's Solving for Safety Visualization Challenge (the Challenge) seeks to develop innovative analytical visualization tools to gain insights and inform decisions to help reduce serious crashes on the U.S. road and rail system. Three of the semi-finalists will present their tools.

Presentations:

Overview of the Challenge
Jordan Riddle. Fellow. Bureau of Transportation Statistics, U.S. Department of Transportation

Real-Time Crash Risk Visualization Tools for Traffic Safety Management
Mohamed Abdel-Aty. PhD, PE, F.ASCE, Trustee Chair, Pegasus Professor & Dept. Chair. Department of Civil, Env. & Construction Engineering, University of Central Florida

RoadCode
Bo Wang. Mobility Analytics Supervisor. Ford Motor Company

My Street
Kim Eccles, PE, Safety Practice Leader. VHB

Moderator: Patricia Hu, Bureau of Transportation Statistics, Patricia.Hu@dot.gov

Visualization of Transportation Operations and Performance

Description: This session will examine the role visualization can play in effectively communicating transportation operations and performance. Presenters will example system performance from both operational and planning perspectives, showing how visualization tools can generate new insights.

Moderator: Charles Lattimer, Atkins North America, charles.lattimer@atkinsglobal.com

Presentations:

1. **Visualizing Real-time Traffic Operations in MD, DC, and VA—a regional perspective**
   Author: Taran Hutchinson, MATOC

2. **Visually Communicating Holiday Travel Forecasts**
   Author: Matthew Glasser, GDOT

3. **Visualizing Operations Performance Measures and Public Response to Public Information**
   Author: Subrat Mahapatra, MD SHA/CHART

4. **Measuring and Presenting ODOT's response and ability to clear incidents**
   Stephanie Marek, ODOT

5. **A Unique Perspective on TMC Operations Video Walls—they aren't for CCTV!**
   Daniel Smith, FDOT

Using Visualization to Improve Transportation Safety

Description: Visual analytics tools have the potential to transform our understanding of safety-related issues on our roads. This session explores pedestrian fatality data visualization, crash-risk visualizations, how GIS tools can enhance safety analytics, and naturalistic driver behavior visualizations.

Moderator: Patricia Hu, Bureau of Transportation Statistics, Patricia.Hu@dot.gov

Presentations:

Explore Driver Behavior at Rural High-Speed All-Way Stop Control Intersections by Visualizing Naturalistic Driving Data
Author: Chenhui Liu, National Research Council

Interactive Pedestrian Fatality Web Application
Author: Kyle Titlow, Bureau of Transportation Statistics

Predicting Crashes by Applying Machine Learning on New Sources of Driver Behaviour Data
Author: Gareth Robins, EROAD

Utilizing GIS for Traffic Safety
Author: Sean Lynn, Washington College GIS Program

Immersive VR/AR Tools for Infrastructure Visualization - Session 1 of 2

Description: Gaming techniques, real-time applications, immersive rendering tools and innovative new display technologies have made virtual and augmented reality tools (VR/AR) more accessible and much more cost effective for transportation projects. These tools provide immersive, participatory experiences and allow users to better assess their surroundings and make informed decisions about the simulated environment. This session and the next will cover several approaches to representing projects with immersive virtual and augmented reality tools.

Moderator: Kevin Gilson, WSP, Kevin.Gilson@wsp.com

Presentations:

1. **360-degree Images for Public Communication on the North Tarrant Express 35W Project**
   Author: Cameron Schmeits, Center for Transportation Research, UT Austin

2. **PaveDC: Empowering Paving Decisions with Data Visualization**
   Author: Ting Ma, District of Columbia Department of Transportation (DDOT)

3. **Improving Quality Management of Pavement Condition Data**
   Author: Bahareh Bazargani, Iowa State University

4. **The Future of 3D Visualization--Interactivity, Smart Traffic, and More**
   Author: Sam Lytle, Civil FX

Analyzing Both People and Freight Movements with Waypoint and Trips Data - Part 1

Description: Trip data is no longer collected by surveys alone. Massive amounts of real-time people and freight movement data is being collected by the private sector via smart phones, connected vehicles, telematics, and other in-vehicle tracking devices. This session covers several of the unique visualization tools and technologies that are being developed to sit on top of these massive data sets, along with the many insights that can be gleaned from these data and tools.

Moderator: Patricia Hu, Bureau of Transportation Statistics, Patricia.Hu@dot.gov

Presentations:

1. **Visualizing Spatio-Temporal Activity-Travel Patterns**
   Author: Avital Vainberg, Massachusetts Institute of Technology

2. **Visualization of Origin-Destination Traffic Flows Using Vehicle Trajectory Data**
   Author: Simona Babiceanu, University of Virginia

3. **Vehicle Trajectories for Improved Planning and Operations**
   Author: Michael Schade, UMD CATT Laboratory

4. **Web Based Visualization and Analysis Tools to Support Transportation Planning**
   Author: Jon Walker, ICF

Visualizing Transit Schedules and Performance: Industry Examples

Description: Operators of transit systems face unique challenges with understanding the performance of their systems and how they interact with systems owned and operated by others. This session covers some of the business intelligence tools and dashboards being implemented by transportation agencies around the country--including how they address some of the demands of transit operators.

Moderator: Matt Haubrich, Iowa Department of Transportation, matthew.haubrich@iowadot.us

Presentations:

1. **Introducing Business Intelligence Monitoring Principles to Commuter Rail Operations**
   Author: Daniel Mihalov, Metra Commuter Rail

2. **LA Metro Transit Market Share Dashboard**
   Author: Anurag Komanduri, Cambridge Systematics

3. **Visualizing Scheduled Transit Frequency with TransitFlow**
   Author: Willlliam Geary, CitySwifter

4. **Visualizing Transit Network Performance by Leveraging Big Data**
   Author: Nikhil Menon, Center for Urban Transportation Research

Immersive Interactive 3D Tools for Infrastructure

Description: Technologies, tasks, and tools are rapidly changing the way transportation projects are planned, designed, constructed, maintained, operated and managed. This session focuses on recent trends and emerging tools, including uses of UAVs, LiDAR, augmented reality, and interactive visualization.

Moderator: Kerry Himes, **Atkins**

Presentations:

1. **Big Data LiDAR Collection and Visualization**
   Author: Mark Day, Greenman-Pedersen, Inc. (GPI)

2. **Using 3D Visualization in Court**
   Author: Steven Rhyne, Kittelson & Associates, Inc.

3. **Practical Uses of Augmented Reality for Transportation**
   Author: Chris Leone, WSP

Immersive VR/AR Tools for Infrastructure Visualization - Session 2 of 2

Description: Gaming techniques, real-time applications, immersive rendering tools and innovative new display technologies have made virtual and augmented reality tools (VR/AR) more accessible and much more cost effective for transportation projects. These tools provide immersive, participatory experiences and allow users to better assess their surroundings and make informed decisions about the simulated environment. This session and the previous will cover several approaches to representing projects with immersive virtual and augmented reality tools.

Moderator: Kevin Gilson, WSP, Kevin.Gilson@wsp.com

Presentations:

1. **Virtual Testing of In-Vehicle Data-Visualization for a CAV**
   Author: Isaac Gordillo, PTV Group

2. **Using 3D complete streets rule-based modeling in a geospatial framework to interactively evaluate street design scenarios**
   Author: Ilir Bejleri, University of Florida

3. **Leveraging Augmented Reality for Highway Construction**
   Author: Hoda Azari, FHWA

4. **Effectively Communicating the Value of Geotechnical Site Characterization for Transportation Projects Through Augmented Reality Visualization**
   Author: Derrick Dasenbrock, Minnesota DOT

Visualization Techniques for Providing System Performance Measures

Description: Visualization techniques can be incredibly powerful when used performance measures and analytics applications. A skillful data visualization can highlight patterns and trends in complex data sets. They can also be useful for data exploration and guiding thoughtful discussion of potential causes and effects. This session will provide some examples of how visualization can be used in an exploratory sense to identify trends and understand the causes of congestion.

Moderator: Justin Clarke, Bureau of Transportation Statistics, justin.clarke@dot.gov

Presentations:

1. **VDOT's New Dashboard**
   Author: Jay Styles, Virginia DOT

2. **Florida DOT Multimodal Mobility Measures and Trends**
   Author: Jessica VanDenBogaert, FDOT

3. **High Dimensional Visualizations of Transportation Demand and Supply Conditions**
   Author: Michalis Xyntarakis, Cambridge Systematics

4. **Understanding Causes of Congestion**
   Author: Katie McCann, Virginia DOT

Visualization and Unmanned Aerial Systems

Description: Often referred to as drones or UAVs, Unmanned Aerial systems are being adopted by transportation agencies for real-time incident management, situational awareness, surveillance, accident reconstruction, bridge inspection, and other data collection activities. In this session, we will learn how these systems, and the data collected by them, are being used to collect new data, how this data can be leveraged by different transportation disciplines, and the challenges associated with working with unmanned systems and their data.

Moderator: Michael Pack, CATT Laboratory, PackML@umd.edu

Presentations:

1. **Using Drones for Various Types of Traffic and Driver Behavior Studies**
   Author: Wei Zhang, USDOT/FHWA

2. **Damage Assessment of Transportation Infrastructure (e.g. Bridges, Roads, etc.) Post Disaster such as a Hurricane via Drone Enabled Field Data Collection and Visualization**
   Author: Janak Kalaria, ICF

3. **UAVs for Real Time Traffic Visualization using Cameras and V2X Communication**
   Author: Garrett Dowd, The Ohio State University

4. Using Drone Imagery in Project Planning
   Author: Mark Day, Greenman-Pedersen, Inc. (GPI)

5. Collection, Analysis, and Interpretation of Data Obtained from Unmanned Aerial Systems (UAS) for Bridges
   Author: - Hoda Azari,

Reception, Technology Demonstrations, and Interactive Poster Session

Description: The presenters below will have their interactive research on display with their laptops, tablets, and large-screen monitors. Attendees are encouraged to interact with the presenters, explore their research, software, and systems, and engage in discussions with other symposium attendees.

1. Mitre MAP/Brenda Hogan
2. Visualizing Safety Data in Iowa/Skylar Knickerbocker
3. Using 3D complete streets rule-based modeling in geospatial…./Ilir Bejleri
4. Traj Analytics: A Web-Based Visual…./Ye Zhao
5. Visualization in Decision Support:/Ryan Noyes
6. Transportation Visualization at a National Scale:/Kelsey Taylor

9th International Visualization in Transportation Symposium

Visualization in Action

Wednesday, November 6, 2019

Using Visualization to Improve Society and Inform Decisions

Description: Visualization is more than just a tool and an output. The way in which we approach the concept of visualization can change the way we perform our jobs, make or influence decisions, conduct research, communicate with the public, and understand our impacts on society. This session will explore several philosophical aspects of visualization, discuss approaches to solving problems with visualization, and explore how the process of visualization and help improve transportation operations and safety.

Moderator: Michael Pack, CATT Laboratory, PackML@umd.edu

Presentations:

1. **Visualizing Inequality in Mobility Using National Household Travel Survey Data in New York** State
   Author: Chieh (Ross) Wang, Oak Ridge National Laboratory

2. **WWHRD? (What Would Hans Rosling Do?)**
   Author: Kirk Zeringue, Louisiana DOTD and the Louisiana Transportation Research Center (LTRC)

3. **How visualization improves decision making**
   Author: Frank Broen, Teach America

4. **Visual After Action Review of the Woodrow Wilson Bridge Snooper Truck Incident**
   Author: Taran Hutchinson, MATOC

Transit Performance Dashboards and Visual Potpuri

Description: Transit data - including information on vehicle locations, maintenance issues, ridership, fare collection, and more, are beginning to become more readily available to both transit operators and the public. This session explores various transit analytics dashboards and visualization procedures that are leveraging these data to improve bus and rail performance.

Presentations:

1. **Transportation Visualization at a National Scale: Developing "Transportation Geography of the United States: 2019/2020"**
   Author: Kelsey Taylor, Oak Ridge Institute of Science and Education/U.S. Department of Transportation

2. **Comparing Route Alternatives by Travel Mode with Wayfinder3D**
   Author: William Geary, CitySwifter

3. **Visualization Dashboard for Bus Network Sketch Planning: Examining Route Performance through Origin, Destination, and Interchange Inference Based Metrics.**
   Author: Rucha (Ru) Mehendale, Massachusetts Institute of Technology

4. **Estimating Traffic Volumes for Signalized Intersections Using Connected Vehicle Data**
   Author: Kaviin Sethu, University College

Color Fundamentals for Visualization Creation and Exploration

Description: This workshop an overview of the fundamentals of color theory and approaches to color selection for visualization and exploration. Our tutorial is intended for a broad audience of individuals interested in understanding the mysteries of color as applied to visualization. Our journey includes the introduction to the concepts of color models and harmony, a review of color vision principles, the defining of color gamut, spaces and systems, and demonstrating online and mobile apps for performing color analyses of digital media. Freely available commercial and research tools for your continued use in color selection and color deficiency assessments are highlighted. The tutorial includes concepts from art and design such as extending the fundamentals of the Bauhaus into digital media as well as overviews of color perception and appearance principals from vision and visualization researchers and practitioners. Newly emerging trends in automated color selection and deep learning colorization are also highlighted.

Moderator: Theresa-Marie Rhyne

Presentations:

1. **Color Theory Workshop - Part 1**
   Author: Theresa-Marie Rhyne, Consultant

Interactive Poster Session (BIM)

Description: The presenters below will have their interactive research on display with their laptops, tablets, and large-screen monitors. Attendees are encouraged to interact with the presenters, explore their research, software, and systems, and engage in discussions with other symposium attendees.

1. **Interactive Data Visualization in Air Quality/Reza Farzaneh**
2. **Interactive Pedestrian Fatality Web App/Paul Teicher**
3. **Visualizing Sea Level Rise Impacts in Trans Planning/Serena Hoermann**
4. **Damage assessment of transportation infrastructure…./Janak Kalaria**
5. **LA Metro Transit Market Share Dashboard/A. Komanduri**
6. **Introducing Business Intelligence Monitoring Principles to Commuter Rail/Daniel Mihalov**

Signals & Arterial Performance Measures

Description: The performance of signalized arterials has traditionally been more challenging to analyze than that of freeways. Interruptions in flow caused by traffic signals, along with the porosity of traffic from side streets and midblock destinations, increases the complexity of traffic analysis. With the introduction of higher density data sets, like trajectory data and high-resolution traffic controller data, transportation engineers are able to visualize arterial operations with greater clarity and insight. This session will feature presentations on how automated traffic signal performance measures, trajectory analysis, probe data, and connected vehicle data are transforming the way we view arterial performance measures.

Moderator: Skylar Nickerbocker, Institute for Transportation, Iowa State University, sknick@iastate.edu

1. **Intersection Data Visualization Tool for V2X Application Development**
   Author: Sukru Yaren Gelbal, The Ohio State University

2. **Using Automated Traffic Signal Performance Measures Visualizations to Improve Traffic Signal Operations**
   Author: Charles Lattimer, Atkins North America

3. **Probe Vehicle Data for Arterial Performance Monitoring**
   Author: Michael Pack, UMD CATT Lab

4. **Mid-Block Travel Time and Turning Movement Analysis with Trajectory Data**
   Author: Greg Jordan, UMD CATT Laboratory

Visualizing Freight Flows and Safety

Description: Reducing crashes, injuries, and fatalities involving commercial trucks and buses is a key component of the safety mission of USDOT. This session looks out how freight-related data--including hours of service, crash reports, and freight flow data, is being leveraged to make better informed decisions at the federal, state, and local levels

Moderator: Ed Strocko, Bureau of Transportation Statistics, Ed.Strocko@dot.gov

1. **Visualizing and Predicting Hours of Service Violations**
   Author: Stephen Eick, VisTracks, Inc.

2. **Visualizing Urban Freight Movement by Leveraging Mobility Data Portals**
   Author: Eren Yuksel, University of South Florida / Center for Urban Transportation Research

3. **Visualizing Safety Data in Iowa**
   Author: Skylar Knickerbocker, Iowa State University - InTrans

4. **Using Tableau to Visualize Disaggregated Freight Flow Data in North Carolina**
   Author: Scott Boone, Cambridge Systematics

Visualization and Climate Change – Part 2

Description: How can visualization help us better understand the challenges we face as our climate changes? Can a heat map help us change from gas to electric vehicles? How does travel related energy flow across a city. And how is Honda beginning to consider Mobility As a Service (MaaS)? IN addition can a weighted Voronoi diagram help us to estimate petroleum consumption?

Moderator: Frank Broen, Teach America, fbroen@teachamerica.com

Presentations:

1. **Estimating Petroleum Product Consumption at Terminals using Satellite Images and Weighted Voronoi Diagram**
   Author: Hyeonsup Lim, Oak Ridge National Laboratory

2. **Honda Abstract**
   Author: Matthew Moniot, National Renewable Energy Laboratory

3. **Application of a Web-based Planning Tool for LA Metro for Siting EV Charging Infrastructure: Heatmaps showing EV Siting Scores**
   Author: Jon Walker, ICF

4. **Visualization of Traffic Energy Flow Geographic Information Systems**
   Author: Jeff Cappellucci, National Renewable Energy Laboratory

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Implementation of BIM for Infrastructure Processes

Description: BIM for Infrastructure, or 3D-Engineered Model processes (also referred to as Civil Integrated Management or CIM), are being adopted and implemented by DOT's and the FHWA at a rapid pace. The FHWA is promoting CIM and 3D Engineered Models through the Every Day Counts (EDC) initiatives and workshops. These tools and processes include challenges and opportunities from both a technological and a cultural/ process perspective. Presenters in these sessions will cover some of these challenges and opportunities from the perspective of State and Federal Agencies.

Moderator: Chuck Hixon, chixon@edge-gts.com

Presentations:

1. **A Roadmap for Deploying a Roadway and Bridge BIM/Visualization Program**
   Author: Jamison Wahl, Stanley Consultants
2. **BIM in Practice; The Challenges & Benefits of 3D Technology**
   Author: David Loughery, Allplan, Inc.

3. **BIM vs. the Digital Twin**
   Author: Jennifer Steen, WSP

4. **Measuring the Effects and Performance of BIM in Transportation**
   Author: Phil Bell, ARA

Where Are You Going and How Did you Get There? People Movement Visualizations

Description: This session covers several new visual analytics tools and methodologies for analyzing trajectory and paths data obtained from connected vehicles and devices as they move throughout a transportation network.

Moderator: Michael Schade, CATT Lab

Presentations:

1. **Computer-Vision Based Visualization of Pedestrian and Vehicle Paths on a Map View using Sparse Camera Networks**
   Author: Ilan Goodman, Numina

2. **Developing a Chart Selection Matrix for Visualizing National Household Travel Survey Data**
   Author: Chieh (Ross) Wang, Oak Ridge National Laboratory

3. **MITRE Map: A Flexible Tool for Interactive Display of Spatiotemporal and Attribute Data**
   Author: Brendan Hogan, The MITRE Corporation

4. **TrajAnalytics: A Web-Based Visual Analytics Software of Urban Trajectory Data**
   Author: Ye Zhao, Kent State University

Visualization Tools for Infrastructure Project Management

Description: Innovations in tools are changing the way transportation projects are designed, constructed, maintained, and managed. This session focuses on recent trends and emerging tools, including uses of UAVs, LiDAR, augmented reality, and interactive visualization.

Presentations:

1. Visualization in Decision Support: VHB Brings Design Options to Life
   Author: Ryan Noyes, VHB

2. Identify Physical and Mobile DMV Site Locations in North Carolina
   Author: Dr. Majed Al-Ghandour, NCDOT

3. NDE Data Fusion, Analysis, and Visualization for a Quantitative Asset Management
   Author: Hoda Azari, FHWA