



TRANSPORTATION RESEARCH BOARD

OF THE NATIONAL ACADEMIES

5th INTERNATIONAL VISUALIZATION IN TRANSPORTATION SYMPOSIUM AND WORKSHOP

October 23 – 26, 2006

Hyatt Denver Tech Center, Colorado

FINAL PROGRAM
web version

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IMAGE CREDITS:

On The Cover: Rocky Mountain National Park, CO – courtesy M. Manore, 2003

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TRB SPONSORING COMMITTEE

Visualization in Transportation Committee

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Committee on Construction of Bridges and Structures (**AFH40**)
Committee on Fabrication and Inspection of Metal Structures (**AFH70**)
Committee on User Information Systems (**A3B08**)
Committee on Highway Geometric Design (**AFB10**)
Operational Effects of Geometrics Committee (**AHB65**)

CONFERENCE ORGANIZING COMMITTEE

Michael Manore, P.E., Chair
R. Wade Allen, Systems Technology, Inc.
Dr. Ronald Hughes, ITRE-NCSU
Charles Hixon, III – Bergmann Associates
Tom Greaves – SPARPOINT Research, LLC
Frank Broen, Teach America
Teresa-Marie Rhyne, Center for Visualization and Analytics, NCSU

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- *Federal Lands Division*
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- *Office of Planning*
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ORGANIZATIONAL CO-SPONSORS

American Association of State Highway Transportation Officials
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National Association of Development Organizations
Human Factors and Ergonomics Society – Transportation Technical Group
Transportation and Development Institute of ASCE

HOST

Colorado Department of Transportation

GOAL of the 5th INTERNATIONAL VISUALIZATION in TRANSPORTATION SYMPOSIUM:

TRB has supported awareness and research regarding visualization since the early 1990's...both at its annual meetings, and through an ongoing series of symposia. The last TRB symposium on visualization was held in 2002 in Salt Lake City just following the Winter Olympics.

More than four years have gone by, and visualization technologies have continued to evolve at a considerable pace, yet the highway transportation industry is still years behind its counterparts in aerospace, architecture, plant facilities, automotive, shipping, and others, when it comes to fully embracing visualization tools and the corresponding mindsets.

Times, however, are changing. Recent technologies like *Google Earth®*, *3D PDF®*, *Terrestrial & Airborne LIDAR*, *Driving Simulators*, *Construction Machine Control*, and *Steel Bridge Fabrication* (to name a few) are gaining the awareness and interest of transportation organizations.

As fascinating as these advancements are, it is still not clear how visualization directly assists in addressing our transportation needs. Additionally, the understanding of *digital infrastructure, training, organizational and implementation requirements* is knowledge yet unearthed for most transportation organizations and professionals.

The goal of this event, therefore, is: To develop an awareness of visualization in the context of our transportation needs, and promote ideas for action that evolves our ability to address those needs.

OBJECTIVES:

To achieve this goal, the Symposium encompasses four primary objectives:

- Continue to promote the education and awareness of the benefits (realized and potential) of visualization technologies and practice as applied to the transportation industry;
- For the first time, provide a program that brings together the diversity of expertise needed to deliver effective transportation programs in the context of visualization technologies and practice;
- Provide a balance of traditional presentations and audience-engaging panel sessions on research, demonstration & practice;
- Gather and document the knowledge exchanged and ideas generated in order to drive innovation in practice, targeted research, and technology development *to evolve the use of visualization in transportation.*

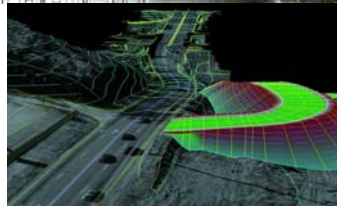
SPECIAL EXECUTIVE SESSION:

On Monday, October 23, 2006, as part of its 5th International Symposium on Visualization, TRB will host a special half-day working session exclusively for upper and executive management professionals in the highway transportation industry.

There are three primary objectives of this session:

1. To provide an executive overview of the technology and state of practice regarding visualization;
2. To facilitate an interactive discussion regarding current and evolving issues in delivering our transportation programs;
3. Explore the potential of visualization to assist in delivering those programs.

This session is open to leaders in federal, state, and local agencies, as well as those in consulting, construction, and academic organizations.



DEMONSTRATIONS

This year's symposium will not host an official Exhibit Hall. However, technology providers, researchers, and consultants will be provided casual table set-ups to allow you to do personal, ad hoc presentations for interested parties as part of the evening receptions on:

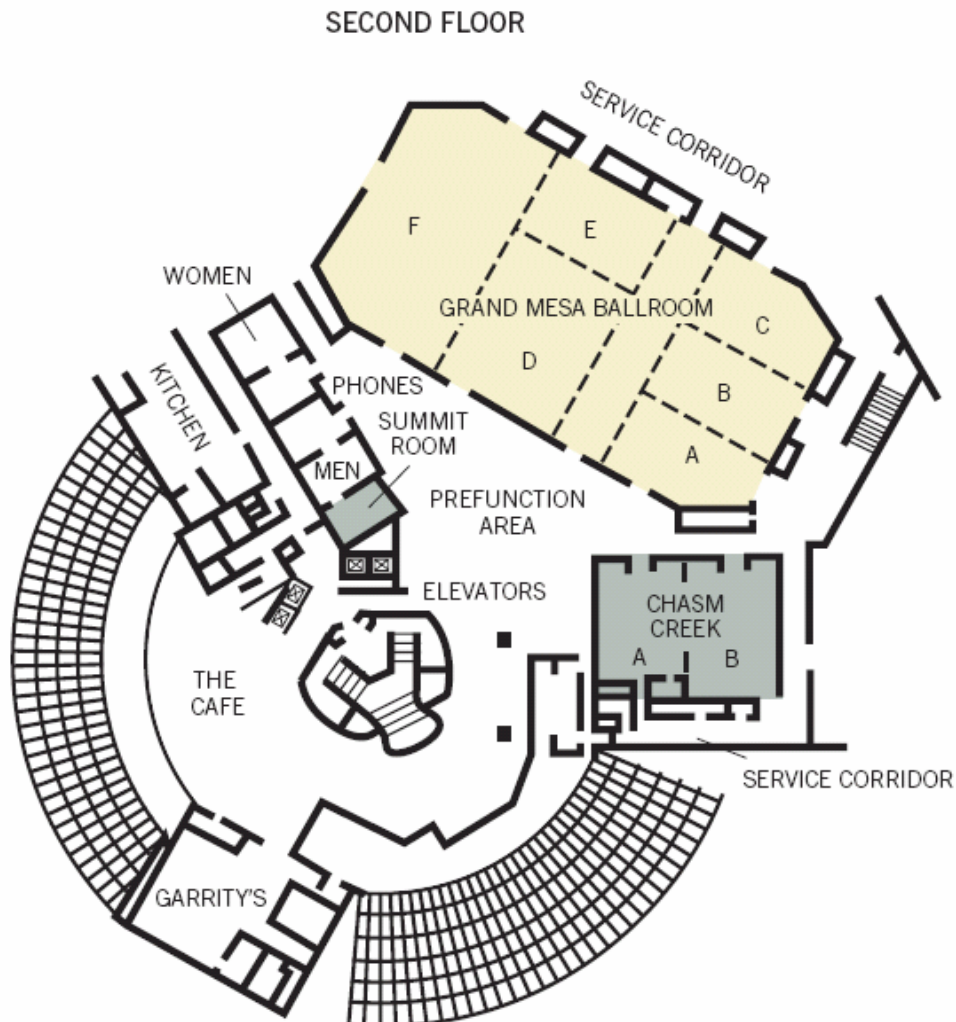
- [MONDAY OCT 23 @ 5:00 PM – 7:00 PM](#)
- [TUESDAY OCT 24 @ 5:00 PM – 7:00PM](#)

Demonstrators are encouraged to bring their own desktop displays. Also, a large screen projector and DVD player will be provided for those who wish to run un-narrated displays of their work.

REGISTRATION DESK LOCATION & SCHEDULE

The Registration Desk for this event is located on the Second Floor in front of the Pre-Function Area. The Registration Desk Schedule will be as follows:

- [SUNDAY OCT 22](#) [NOON – 6:30PM](#)
- [MONDAY OCT 23](#) [7:00AM – 6:00PM](#)
- [TUESDAY OCT 24](#) [7:00AM – 6:00PM](#)
- [WEDNESDAY OCT 25](#) [7:00AM – NOON](#)



SPEAKER AND VISUAL AID REQUIREMENTS

The Presenter & Panelist guideline and release form can be downloaded at the Symposium website:
<http://www.trb.org/Conferences/Visualization/Presenters.asp>

FINAL PROGRAM

MONDAY OCTOBER 23, 2006

7:00AM – 8:15AM EXECUTIVE BREAKFAST

8:15AM – 11:30AM EXECUTIVE SESSION

- **Opening & Introductions**
Michael Manore – Chair, TRB Visualization Committee
- **Welcome & Objectives Overview**
Tom Norton & Cynthia Burbank
- **Overview of Visualization Technologies & NCHRP 36-04 Findings “Visualization in Project Development”**
Charles Hixon, III, Synthesis Consultant, Bergmann Associates, Inc.
- **Facilitated Discussion on Issues and Needs for Decision-makers**
Barbara Harder – Principal, B.T. Harder, Inc.

11:30PM – 1:30PM EXECUTIVE LUNCH

1:30PM – 3:15PM OPENING SESSION

- **Symposium Opening Welcome**
Dr. Richard Pain – Transportation Research Board
- **Overview and Intent of the Symposium**
Mr. Michael Manore, P.E. – Chair, TRB Visualization Committee
- **Colorado Welcome and Opening Perspectives**
Mr. Tom Norton, P.E. – Executive Director, Colorado Department of Transportation
- **Update on SAFETEA-LU Requirements & Perspectives on Visualization for Planning**
Ms. Cynthia Burbank – Associate Administrator, Federal Highway Administration Office of Planning, Environment, and Realty
- **Decision-Making and Public Engagement from a Multi-Modal Planning Perspective**
Charles Goodman, Director of Systems Planning, FTA Office Planning & Environment
- **Regional Council Perspectives on Visualization -**
Tom Boone – Denver Regional Council of Government (**INVITED**)

3:15PM – 3:45PM BREAK

3:45PM – 5:00PM OPENING SESSION (cont.)

- **Progress & Directions in Visualization Technology**
Teresa-Marie Rhyne – Director, Visual Analytics Institute, NCSU
- **The Ultimate Purpose of Visualization**
Jeff Coleman – Manager, Bob Singerman – Business Development Manager - URS Corporation

5:00PM – 7:00PM RECEPTION

TUESDAY OCTOBER 24, 2006

7:00AM – 8:00AM

BREAKFAST

8:00AM – 9:30AM

CONCURRENT PAPER SESSIONS

- Planning Track

Moderator: Tim Case, Parsons Brinkerhoff

- 1 **Scenario Planning for Idaho’s 30-Year Transportation Vision**
Mr. Dave Biggs, Co-founder, Envision Sustainability Tools - MetroQuest
- 2 **Visualizing Metra: An Interactive Visualization Tool**
Ms. Laxmi Ramasubramanian, Hunter College
Co-Author - Ms. Sue McNeil, University of Delaware
- 3 **Multimedia Use in Visualization of transportation Projects: From Project Pursuits to Client Reviews and Public Information**
Mr. Jesse Miguel, HNTB Corporation

- Engineering Track

Moderator: Jeff Coleman, URS Corporation

- 1 **Value of Visualization within an Engineering Consulting Firm**
Mr. Paul Brown, Parsons Brinkerhoff, Cardiff, UK
- 2 **3D Visualization and Micro-Simulation Applied to the Identification and Evaluation of Geometric and Operational ‘Solutions’ for Improving Visually Impaired Pedestrian Access to Roundabouts and Channelized Turn Lanes**
Dr. Ron Hughes, ITRE-NCSU
- 3 **A Tandem Effort: Balancing Architectural Desires with Structural Needs**
Mr. Michael Mundy, HNTB Corporation

9:30AM – 10:00AM

BREAK

10:00AM – 11:30AM

CONCURRENT PAPER SESSIONS

- Planning Track

Moderator: Wade Allen, Systems Technologies, Inc.

- 1 **A Visualization Experience of the Northern Illinois Planning Commission**
Yukun Dong, University of Delaware
- 2 **Towards an Advanced Spatial-Temporal Visualization System for the Metropolitan Washington D.C.**
Dr. Chang-Tien Lu, Virginia Polytechnic Institute and State University
- 3 **Various Uses of Color in 3D Visualizations to Demonstrate Traffic Operations to Decision-makers and the Public**
Mr. Mark Yedlin, KLD Associates, Inc.

- Engineering Track

Moderator: Rich McDaniel, Federal Highway Administration

- 1 **Using Visualization for the Design Process of Rural Roads**
Dr. Wolfgang Kuhn, University of Leipzig, Germany
- 2 **Rapid 3-D Modeling and Simulation of Underground Transportation Structures** – James Kainz, Applied Research Associates
- 3 **3D/4D/nD Modeling Real-time Visualization in Transportation**
Mr. Doug Eberhard, Parsons Brinkerhoff

11:30AM – 1:00PM

LUNCH

1:00PM – 2:30PM

CONCURRENT PAPER SESSIONS

- Planning Track

Moderator: Mark Yedlin, KLD Associates, Inc.

- 1 **Atlanta Regional Commission Uses Oblique Imagery to Help New Orleans Recovery Effort**
Mr. Art Kalinski, Atlanta Regional Commission
- 2 **Visualization Data Standards for Planning & Design**
Mr. Cyrus McCall, McCormick Taylor, Inc.
- 3 **Delivering the NY Transit System Advertising System to NYC**
Ms. Erin May, URS Corporation

- Engineering Track

Moderator: Dr. Ron Hughes, ITRE-NCSU

- 1 **Use of Visualization Technology for Right-of-Way Acquisition and Eminent Domain** – Mr. David Walterscheid, Federal Highway Administration
- 2 **A Four-D, Real-Time, Transportation Visualization System**
Mr. Michael Pack, Center for Advanced Transportation Technology
- 3 **Leveraging of Civil Data Models During Construction**
Mr. Paul DiGiacobbe, Nave Newell, Inc.

2:30PM – 3:00PM

BREAK

3:00PM – 5:00PM

CONCURRENT PAPER & PANEL SESSIONS

- Planning Track

- **Visualization and Practices for Regional Planning**
Moderator: Jody McCullough, Federal Highway Administration

Description: SAFETEA-LU requires that we use visualization to describe plans as part of the Public Participation Plan requirement in Metropolitan and Statewide Transportation Planning. This session will highlight two visualization techniques that have helped regions describe their transportation visions and goals.

Interactive planning support tools facilitate the creation of sustainable visions, and support the implementation of transportation plans. MetroQuest is a proven approach for urban and regional planning that can turn stakeholders into constructive partners. MetroQuest is one of the leading software tools that can be used to visualize regional growth issues. Through workshops, participants balance dozens of priorities in areas such as transportation, housing development and environmental stewardship. Envision Utah used visualization throughout the process to involve key decision-makers and the community to gain support at the ground level. Building grass roots support for your transportation plan will ensure its successful implementation. Envision Utah provided critical technical information to help analyze the impacts of growth on transportation, air quality, land use, water supply/demand, and infrastructure costs. Through the involvement of the public, local and state elected officials, the business, civic, and religious communities, and other key stakeholders, Envision Utah gathered information about what Greater Wasatch Area residents value and how they think growth should be accommodated.

Panelists:

- **Dave Biggs** – Co-Founder, MetroQuest.
- **Donald McAuslan** – Transportation Planner II, Metropolitan Washington COG
- **Darren Smith** – Transportation Planner I, Metropolitan Washington COG
- **Ted Knowlton** – Planning Director, Envision Utah

- **Engineering Track I**

Moderator: Michael Manore, P.E., Bentley Systems, Inc.

- 1 **An Efficient Means for Prototyping and Reviewing Roadway Designs Through Visualization**
R. Wade Allen, Systems Technologies, Inc.
Mr. Michael Pack, Center for Advanced Transportation Technology
- 2 **3D Modeling for Lighting Visualization for Enhanced Safety**
Paul Lutkevich & Christopher Leone, Parsons Brinkerhoff
- 3 **The Use of Simulation Visualization as an Aid to Roadway Design**
Tom Granda, Ph.D., Turner-Fairbank Highway Research Center

- **Engineering Track II**

Moderator: Bruce Jenkins, Managing Partner, Spar Point Research, LLC

- 1 **Evaluating Rock Faces by Ground-based laser Scanning Techniques**
John Kemeny, University of Arizona
Co-Author - Dr. A. Keith Turner, Colorado School of Mines
- 2 **Using Ground Based Rotating LIDAR for 3D Viewing and Measuring**
Laurence Rohter, Illinois Institute of Technology
- 3 **FHWA's Digital Highway Measurement and Ground Penetrating Radar Technologies** Michael Trentacoste, Turner Fairbank HRC

5:00PM – 7:00PM

RECEPTION

WEDNESDAY OCTOBER 25, 2006

6:30AM – 7:30AM

BREAKFAST

7:30AM – 9:30AM

CONCURRENT PANEL SESSIONS

- Planning Track

- **Visualization and Practices for Corridor Planning**

- Moderator** – Ben Williams, Federal Highway Administration

- Description:** Visualization tools can be used in planning transportation corridors. Carter & Burgess employed techniques during the design-build of the Transportation Expansion (known as T-Rex) Project in Denver. Visualization provided a highly accurate method of examining alternatives at the design stage, when options are most open. The T-REX project includes the reconstruction of 16.5 miles of two interstate highways and the design and construction of 19 miles of light rail transit. Design Visualization created engaging, believable imagery, providing a window into the future so the public could actually picture, and help others picture, how this project would unfold.

- Donley & Associates uses real time visualization in roadway planning to evaluate road alignments, lane configurations and potential traffic study demands/loads. The analysis results can inform the design process and citizen involvement. Skilled users can produce simple, but useful visualizations in just a few minutes as Donley & Associates describes. Off the shelf software packages include Google Earth, CommunityViz's SiteBuilder3D, and ESRI's ArcScene/ArcGlobe.

- Each system differs in GIS compatibility, visual quality and ease of use. The sample project depicts a proposed road alignment located southeast of Durango. The road connects the proposed 3 Springs development with Ewing Mesa and it provides an alternate route for traffic on US 160 and US 550.

- Panelists:**

- **Chuck Donley** – Donley & Associates, Inc.
 - **Wendy Wallach** – Carter Burgess
 - **Dony Dawson** – Carter Burgess
 - **North Carolina DOT (INVITED)**

- Engineering Track

- **Advancements in Surveying & Remote Sensing**

- Moderator** – Bruce Jenkins, Managing Partner, Spar Point Research, LLC

- Description:** This session will review how laser scanning, airborne LIDAR, GPS and traditional survey integrated with CAD and GIS impacts project safety, schedule, quality and cost for the design, construction and operation of transportation infrastructure assets.

Panelists:

- **James V. Flint** – Vice President, Laser Geomatics - Bohannon Huston, Inc.
- **Paul Mrstik** – Vice President, Engineering, Terrapoint Canada, Inc.
- **John Kemeny, Ph.D.** – Associate Professor, Dept. of Mining and Geological Engineering, University of Arizona

9:30AM – 10:00AM

BREAK

10:00AM – NOON

CONCURRENT PANEL SESSIONS

- Planning Track I
 - **Modeling Traffic for Planning & Design Decision-making**
Moderator – **Dr. Tom Furlani**, University at Buffalo, Center for Computational Research

Description: This session will overview developments relating to traffic modeling and visualization in order to provide a context for open discussion. Panelists and Moderator will draw on prior experience and will discuss future trends and where they believe the technology is headed. After the presentations, the panel will engage the audience in discussing some of the challenges and interests associated with modeling and visualizing traffic along with the utility this capability provides for the planning, design, and approval process.

Panelists:

- **Frank L. Dolan, P.E., PTOE** – Bergmann Associates
- **Matthew Martimo** – Citilabs
- **Mark Yedlin** – KLD Associates, Inc.

- Planning Track II
 - **Visualization and Practices for Neighborhoods, Projects , & Places**
Moderator – **Charles Goodman**, Federal Transit Administration

Description: Probably no where else does the use of Visualization techniques affect planning more closely than at the Neighborhood, Project Level. However, transportation planning is seldom thought of as a visual process. Often, transportation decisions are made on the basis of engineering plans or diagrams, with the focus primarily on traffic or alignment considerations. At the same time, these designs have a big impact on the livability of the street and the community. We seek public input when making transportation decisions, but there is typically little ability for understanding and visualizing what the choices really are. Through the use of visualization techniques like GIS-based analysis, 3D visualization tools, and Google Earth, communities are provided with new exciting tools that allow them to envision land use alternatives, understand their potential impacts, explore options, and share possibilities. The ability to truly show how transportation relates to its surroundings is vital to reaching consensus, overcoming objections and in accelerating the review process with town councils and the public. This session will present a number of examples of how various affordable visualization tools can lead to better decision-making, especially when coupled with design charrettes and

other public engagement venues. A panel of experts from CommunityViz, Winston Associates, and the Pikes Peak Council of Governments will highlight these tools and how they are used in transportation planning and project decision-making.

Panelists:

- **Doug Walker** – President, Placeways - CommunityViz
- **Chase Mullins** – 3D Visualization Specialist, Winston Associates
- **Craig Casper** – Director, Transportation Program - Pikes Peak COG

- **Engineering Track**

- **Progress in Context Sensitive Solutions and Visualization**

- **Moderator** – **Chuck Hixon, III**, Business Development Manager, Bergmann Associates

- **Description:** This Panel Discussion will focus on the higher level applications of visualization within the Context Sensitive Solutions (CSS) process. Issues such as; How is Visualization used within the CSS process, What is the process to introduce visualization and obtain approvals for its use, What is the funding process, How can Visualization be monitored and measured within the CSS process, and what team members are needed to utilize Visualization within the CSS process will be addressed (*along with others*) during this panel discussion.

- **Panelists:**

- - **Lisa Olszak** – President, Olszak Management Consultants, Inc.
 - **Angelo Papastamos** – CSS Director, Utah Department of Transportation
 - **Jon Nepstad** – Principal, AICP, Fehr & Peers

NOON – 1:00PM

LUNCH

1:00PM – 3:00PM

CONCURRENT PANEL SESSIONS

- **Organizational Track**

- **Opportunities and Challenges in Transportation Data Visualization**

- **Moderator** - **Harvey J. Miller**, University of Utah

- **Description:** Transportation research and application are moving from a data-poor to a data rich environment. New technologies such as intelligent transportation systems, location aware technologies (e.g., the global positioning system), video cameras, satellite and airborne remote sensing, automated toll systems, and so forth, are greatly increasing the volume and scope of transportation data. The cost of storing and sharing these data is decreasing due to increasing capabilities for data warehousing and data infrastructures. The continuing geometric growth of computing power and is also improving the means for transportation data processing.

- Despite these growing potentials, there is still a widespread feeling among transportation researchers and practitioners that we are “drowning in data” rather than exploiting it to its fullest extent. Many of the traditional analytical tools used in research and practice were developed in an era of scarce data and weak computing: they can only scratch the surface

of the vast information space implied by these data. These unrealized capabilities are apparent at the same time when there is a critical need for new thinking about the major challenges facing transportation over the next decade, such as congestion, safety, security, infrastructure renewal and the environment.

Data visualization and improved interoperability offers potential for making sense of the large volume of data being collected about transportation systems. The insights gained through deeper and more holistic exploration of transportation data can generate new ways of thinking about and analyzing transportation systems and their challenges. This panel will bring together leading experts in transportation data visualization to discuss its opportunities and challenges in basic research and application.

Panelists:

- **Tim Case** – Parsons Brinkerhoff
- **Thomas R. Furlani** – University at Buffalo

- **Engineering Track I**

- **Using Simulator Technologies to Improve Safety in Designs and Work Zones**

- **Moderator** – R. Wade Allen – Systems Technologies, Inc.

- **Description:** Driving simulation (immersive and desktop) promote a higher level of safety assessment and review of roadway projects. This panel session will summarize past, current and potential applications. Open discussion with the audience will be encouraged regarding utility of this approach, how to achieve this capability in various agencies, and the potential for wider adoption of these techniques.

- **Panelists:**

- - **Tom Granda** – Federal Highway Administration
 - **Michael Kelly** – Western Transportation Institute
 - **Yiannis Papelis** – Center for Advanced Transportation Systems Simulation

- **Engineering Track II (Bridge)**

- **Visualization for Bridge Design, Fabrication, and Construction**

- **Moderator** – **Tom Seiwert**, Deputy Chief-Materials Reliability Division, National Institute of Standards and Technology

- **Description:** This session will look to present and discuss advancements, opportunities, and issues relating to the extension of 3D data into bridge fabrication and construction practices.

- **Panelists:**

- - **Krishna Verma**– Principal Bridge Engineer, Federal Highway Administration
 - **Asif Habibullah** – Director, CSRI
 - **Michael Mundy** – Bridge Architect, HNTB
 - **Jeff Coleman** – Manager, Creative Imaging, URS Corporation
 - **Pingsha Dong** – Technical Director, Battelle
 - **Luke Faulkner** – Director of Technology Initiatives, AISC

3:00PM – 3:30PM

BREAK

3:30PM – 5:30PM

- Organizational Track

- **Employing Visualization Organizationally**

- Moderator - Rich McDaniel**, Federal Highway Administration/EFLHD

Description: This session will discuss visualization in the context of the organizational considerations. More specifically: How is Visualization employed within the organization? What is the process to introduce visualization and obtain approvals for its use? How can Visualization be monitored and measured? What team members are needed to utilize Visualization?

Panelists:

- **Chuck Hixon, III** – Bergmann Associates
- **Doug Walker** – Placeways, LLC
- **Kevin Gilson** – Parsons Brinkerhoff
- **Steve Braun** – Florida Department of Transportation

- Engineering Track

- **Visualization in Design/Build and Design/Bid/Build Project Environments**

- Moderator - Mark Taylor**, Federal Highway Administration, Central Federal Lands

Description: The goal of the session is to present and discuss how 3D data and visualization (wire-frame data or rendered models) can and are being used to expedite, facilitate and support transportation construction activities. Panelists will present some the latest developments and issues on this subject followed by facilitated discussion with the audience. This session is intended to generate ideas and opportunities for action on where the highway design and construction industry should go in terms of research, development and technology (RD&T) to better support and leverage applications of the emerging 3D and visualization to expedite construction of transportation projects.

Panelists:

- **Jim Bodi**– Kiewit Western Co.
- **Paul DiGiacobbe** – Nave Newell, Inc.
- **Helen Peiker** – Colorado Department of Transportation

5:30PM – 7:00PM **EVENING WORKSHOP & RECEPTION**

3D Innovations for Transportation: Google Earth, Real-time, and Supermodels
Hosted by Parsons-Brinkerhoff

This fun and interactive workshop will cover the possibilities as well as the nuts-and-bolts of 3D modeling and visualization tools that are rapidly maturing in our industry. Techniques for many modes of transportation will be previewed. A lively discussion of lessons learned, challenges ahead, and good old fashioned storytelling will be woven into the workshop presentation. The evening will be a perfect way to wind down after a long day and have a chance to talk with colleagues in an open casual setting.

Presenters:

- Tim Case
- Kevin Gilson
- Glen Loyd

Registered Conference Attendees are welcome and a drink ticket with hors d'erves are available.

THURSDAY OCTOBER 26, 2006

7:00AM – 8:00AM

BREAKFAST

8:00AM – 9:30AM

PLENARY SESSION

- **Linking Transportation, Land Use, and Conservation Planning Through Decision Support Tools**
Patrick Crist, Manager of Conservation Planning Services, NatureServe
- **Visualizing the World via Google Earth, Google SketchUp, and 3D Warehouse**
Mike Springer, Lead Software Engineer - Google

3D is increasingly becoming a standard - and expected - language for visualization. Google Earth, Google SketchUp and the Google 3D Warehouse are tools for both the professional and the consumer that help make 3D easier to create, visualize and share. Mike will share with us some of the phenomenon surrounding Google Earth and Sketchup in the world of 3D, and explore the opportunities for the future through new advancements such as 3D Warehouse.

9:30AM – 10:00AM

BREAK

10:00AM – NOON

PLENARY SESSION

- **Title Pending**
Doug Eberhard, Chief Technology Officer, Parsons Brinkerhoff
- **Research Agenda of the TRB Visualization Committee**
Dr. Ron G. Hughes, ITRE-NCSU
- **Special Announcements & Closing Remarks**
Michael Manore, P.E. – Chair, TRB Visualization Committee

NOON

SYMPOSIUM CONCLUDES
