

IMIA Americas Conference Educational Program

Visual Analytics: Exploring Geographic and Temporal Data beyond Maps

This presentation will provide an overview of several unique, interactive visual analytics tools that are helping researchers understand trends in traffic congestion, crash patterns, agency budgets, and other issues affecting safety and mobility. Live demos will showcase tools and techniques that leverage maps linked with other interactive graphics to display, filter and search through trillions of temporal, spatial and categorical data from a wide range of government agencies and private sector data providers. These information visualization tools lead users to insights that would usually be difficult, if not impossible, to discover through traditional data analysis techniques by increasing a user's ability to:

- Remember information and thus enhance productivity
- Search rapidly, and deliver meaningful reports to decision makers
- Identify patterns or clusters within data
- Identify relationships between variables
- Monitor and comprehend larger numbers of events or data sources
- Analyze data that has spatial components, and give the user the ability to manipulate the data interactively

Michael L. Pack

Director

**University of Maryland Center for Advanced Transportation
Technology Laboratory (CATT Lab)**



Michael L. Pack has formal training in information visualization, as a Systems Engineer, a Computer Scientist, an Instrumentation and Measurement Engineer, an artist, a human computer interface designer, Machine Vision (a.k.a. image processing), database management systems, GIS, and significant experience in transportation operations, incident and emergency management, and other fields related to operations and serious gaming.

Pack currently serves as the Chair of the Visualization Committee of the National Academies of Sciences

Transportation Research Board. He has written editorial articles for the IEEE Journal of Computer Graphics & Applications and Transportation Research Part C, where he also serves as a guest editor.

Pack was honored at the White House in 2013 as a “Champion of Change” for his exemplary leadership in developing or implementing transportation technology solutions to enhance performance, reduce congestion, improve safety, and facilitate communications across the emergency management and transportation industries at the local, state, and national level. He is the 2007 winner of the Charley V. Wootan Award for outstanding paper in the field of policy and organization presented at the annual meeting of the Transportation Research Board. He is also the winner of the 2009 and 2013 Greg Herrington Award for Excellence in Visualization Research. Pack has been featured on the History Channel’s “Modern Marvels” television program, CNN, NPR, the Washington Post, CBS, and other national and international television, radio, web, and print media.

Pack is well known internationally for his work in systems integration, operational data sharing, information visualization, transportation operations, and GUI design, and has provided research and consulting services to companies and agencies in Japan, Dubai, the Netherlands, Germany, Russia, Argentina, Canada, the United Kingdom, Brazil, and South Korea. He works closely with ITS America and other agencies on educating Congress and the Senate on pressing transportation issues and advancements. He routinely gives lectures on transportation data visualization at colleges and universities throughout the country. Pack teaches transportation Performance Measurement at the I-95

Corridor Coalition's Operations Academy, and he has formerly taught courses on database management systems, GIS, computer vision, and data acquisition / sensor systems design.

He has previously worked at the Center for Transportation Analysis at the Oak Ridge National Laboratory under Patricia Hu, the University of Virginia's Smart Travel Laboratory under Brian L. Smith, and most recently as the Director of the University of Maryland Center for Advanced Transportation Technology Laboratory (CATT Lab), and is a member of the multi-disciplinary Human Computer Interaction Laboratory — a partnership of the Institute for Advanced Computer Studies in the College of Computer, Mathematical and Natural Sciences and the College of Information Studies. Pack also advises the Leadership of the I-95 Corridor Coalition, a 15-state alliance of transportation agencies, toll authorities, and public safety agencies from Maine to Florida including affiliate members in Canada.

3D Mapping in the National Parks: Virtual Views versus Air Photos

Oblique 3D map views provide an effective means to portray a natural or historic landscape to a general audience. International Mapping has worked with Mount Rushmore, Weir Farm and other U.S. national parks to create virtual bird's eye views that alter reality to present a clearer picture of a park's features and points of interest. This presentation will look at the 3D modeling and rendering process and how trimming and removing trees, moving buildings, sculpting terrain, and other manipulations can help a reader see the park more clearly than in an air photo.

Alex Tait
Vice President
International Mapping



Alex Tait is Vice President at International Mapping, a custom mapping services company located in Ellicott City, Maryland. Tait graduated from Dartmouth College with a BA in Geography and from the University of Wisconsin with an MS in Geography. He has created 3D maps for the National Park Service, National Geographic Society, Smithsonian Institution, and many other clients.

Earth Reshaped: Designing Three New World Map Projections

Tom Patterson, US National Park Service, will discuss the making of the Natural Earth, Natural Earth II and Patterson projections in collaboration with Bernhard Jenny and Bojan Savric at Oregon State University. The effort began with the development of Flex Projector, a free, cross-platform application for designing new world map projections via graphical controls. With this software, he set out to improve the venerable Robinson projection. The resulting Natural Earth projection, also a compromise pseudo-cylindrical projection, has better distortion properties, a taller height-to-width aspect ratio, and slightly rounded corners, where the pole lines and lateral meridians meet. The Natural Earth II is a follow up projection with a highly rounded shape that took its design inspiration from the Mollweide. The third projection, the Patterson, is a cylindrical derived from the Miller, but with significantly less polar distortion. All three new map projections are intended for general-purpose mapmaking.

Tom Patterson
Senior Cartographer
US National Park Service



Tom Patterson is the Senior Cartographer at the US National Park Service, Harpers Ferry Center. He has an MA in Geography from the University of Hawaii at Mānoa and previously worked as Cartographic Laboratory Manager

at the University of Utah. Cartographic relief presentation is his passion. Patterson maintains the ShadedRelief.com website and is the co-developer of the Natural Earth cartographic dataset. He is a former president of the North American Cartographic Information Society and is active in the International Cartographic Association, Commission on Mountain Cartography.

Real-Time Multi-Resolution Labeling in 3D GIS

Fast and meaningful real-time labeling has become a critical component of the digital mapping landscape. Traditional 2D labeling principles used in static and electronic maps have well been documented. However research into responsive multi-resolution 3D labeling is largely unexplored by comparison. 3D GIS maps and scenes introduce a surprisingly large number of new problems that have only recently started being explored by cartographers. In this presentation Damien Saunder will address some of the unique aspects of labeling in 3D GIS both from an aesthetic and technology point of view. He also questions if the importance of 3D labeling is equal to that in 2D maps and scenes.

Damien Saunder
Geospatial Product Engineer
Esri, Inc.



Damien Saunder specializes in designing and building interactive web maps and analyzing high performance sports data using GIS. He is on the editorial board of the British Cartographic Journal and serves on the board of directors for IMIA Americas. He is also co-chair on the Commission of Map Design for the International Cartographic Association (ICA).

In recent years Saunder held the position of Chief Cartographer for the limited edition Earth Blue Edition atlas, and has won numerous awards for his cartographic work. He now works at Esri, where he is currently a Geospatial Product Engineer in sunny Redlands, California. Saunders holds a degree in Cartography from RMIT University.

TomTom Geospatial: Real-Time Maps, Traffic and Innovation

Map and traffic information have a daily impact on society. Using up-to-date and accurate map data to get to your desired destination quickly and efficiently is paramount. Leveraging traffic information to adjust your route based on current congestion conditions can make or break a deal. Applications that combine map and traffic content to maximize the navigation experience lead to such societal benefits as reduced stress, lower fuel emissions and time savings.

The presentation will provide insights into innovations being made in the geospatial industry to detect, validate and implement map changes and to realize real-time travel conditions. These innovations are making map and traffic content more closely mimic the actual road network, providing business value and societal benefits.

Kenneth Clay
Marketing Manager
TomTom



Kenneth Clay is a Marketing Manager with TomTom. His background spans a variety of roles including; sales, marketing, product management, customer support, and engineering. Clay has 13 years of experience in the geospatial industry. At TomTom he manages all aspects of marketing for the North American geospatial team. Most recently he was an account manager focused on real-time and historical traffic data sales into government accounts. Prior to that, Clay managed a major

partner portfolio including one of the largest revenue generating accounts in TomTom Geospatial.

Clay holds a Bachelor's Degree in Electronic Engineering Technology from the University of New Hampshire and an Associate's Degree in Electronic Engineering Technology from the New Hampshire Technical Institute.

Five Principles

The National Geographic Magazine has been publishing maps within its pages since the first issue of the journal of the National Geographic Society was published in 1888. This year we celebrate the centenary of our map division, this provides us with a good opportunity to look back and examine what makes our maps special. Martin Gamache will discuss five principles that distinguish the maps currently being created for publication in the National Geographic Magazine.

Martin Gamache
Senior Editor, Cartography
National Geographic Magazine



Martin Gamache is the Senior Editor for maps at National Geographic. Prior to National Geographic he held positions at the Alpine Mapping Guild and the Boston Redevelopment Authority. He studied Geography at the University of Ottawa and Remote Sensing at Boston University. Gamache has strong interests in relief depiction, cartographic journalism and topographic mapping.

Mapping for Humanitarian Disaster Response at the U.S. Department of State

The U.S. Department of State's Humanitarian Information Unit (HIU) is at the forefront of U.S. Government geospatial initiatives, helping to collect, analyze and disseminate information critical to decision makers and partners for response to humanitarian emergencies and disaster relief.

Efforts focus on three key components: producing insightful analytic maps and graphics for high level policymakers with little time for interactive exploration, utilizing open source data and the volunteer mapping community to inform policy and planning for disaster response, and sharing data within the U.S. government and broader community to guide relief work during humanitarian crises / disaster response.

Christine Fellenz
Lead Cartographer, Humanitarian Information Unit
Office of the Geographer and Global Issues
Bureau of Intelligence and Research (INR/GGI/HIU), U.S. Department of State



As the Lead Cartographer in the U.S. Department of State's Humanitarian Information Unit (HIU) in the Office of the Geographer and Global Issues, Christine Fellenz has spent four years mapping humanitarian-themed topics around the world.

Prior to joining the HIU, she researched and produced maps at National Geographic and then spent five years at the Baltimore Sun helping visually tell a more complete story with data. Fellenz has developed a clean mapping style that ensures that you can follow a disaster, but that it does not follow you.

Using Open Source and Open Data to Solve the Big Problems or Just the Right Data at Just the Right Time

Technology change has created an inflection point for data. Mobile devices, social media, retail transactions, and more generate a tremendous amount of data. The volume, variety and velocity of data is ever increasing. Exchanging the right data, with the right people, at the right time, in an effective manner, to solve big problems, is extremely hard. What do we do about it?

New technologies are being developed to handle the huge amounts of data. The problem is more complex than simply having a big relational database or any single vendor's solutions. Andrew Ross will present an overview of commercially friendly open source geospatial technologies, which enable big data on the server, little data on devices and other clients, and version controlling it to make it useful with the right context at the right time. More than technology for technology's sake, this enables people to use it to do something meaningful.

Andrew Ross
Director
LocationTech



Andrew Ross is Director of LocationTech, a collaborative working group driven by industry, academia and government. LocationTech is hosted by the Eclipse Foundation, which is a vendor neutral not-for-profit that nurtures open source software and open data based research and development collaborations. The Foundation is currently supported by more than 230 member organizations and 1100 software engineers.

Ross's career spans more than 20 years as an award winning software architect and technology leader. He has specialized in developing innovative industry solutions based on open technologies including for Telecom, Healthcare, IT, Government, Not-for-profits, and more.

S-100 – The International Hydrographic Organizations Universal Data Model for Maritime Applications

The development of S-100 – the IHO Universal Hydrographic Data Model represents a major step forward in the standardization of products for use in maritime applications. Based on the ISO 19000 set of standards for Geographic Information Systems, S-100 provides a framework for organizations to build different products that can be used by a wide variety of users from the commercial mariner to coastal zone managers. Current S-100 based products that are under development are S-101 for Electronic Navigational Charts, which will become the eventual replacement to S-57 ENC's, ocean forecast information, marine protected areas, and surface currents, among other things. Julia Powell will discuss how S-100 can be leveraged for emerging navigational products.

Julia Powell
Technical Director for ENC Development
Marine Chart Division
NOAA



Julia Powell is the Electronic Navigational Chart Technical Director for NOAA's Office of Coast Survey, and represents the United States on various standards committee's in the development of the ENC product specification. The ENC product specification is the international standard for countries to build electronic charts in a specific format to be used on board ship's navigation systems. She is chair of the IHO's S-100 working group and the work item leader for the development of S-101.

Powell has been with NOAA since 1997 and has a Bachelor's degree in Geological Sciences from Cornell University and a Master's Degree in Computer Systems Management from the University of Maryland.

eCommerce for Map Businesses and Changing Internet Space

eCommerce is not new and for years map publishers and retailers are running their online stores. During the past few years, the Internet has transformed immensely and continues to do so. Mobile and social Internet has brought a new dimension to the way websites are accessed by users. The whole web eco-system of design, development and marketing has changed to adapt to this new - fit to small screen-all screen Internet world.

In past few years NextByte Technologies has worked with map publishers and retailers in North America, Europe and Australia helping them move their existing online presence to newer platforms and design. This presentation will share insights and strategies to upgrade and move an eCommerce business to this changing web space including a case study of transforming an eCommerce website for a leading global map publishing company.

Mani Singh
CEO
NextByte Technologies



Mani Singh is CEO of New Delhi based NextByte Technologies. He has worked in the software and Internet industry for 23 years successfully building and running various Internet and mapping businesses. Singh has worked in marketing and project management of software products, ERP solutions, online advertising, ecommerce businesses, and mobile apps. He also serves as a Director on the Asia Pacific Board of the International Map Industry Association (IMIA). When not at his desk, Singh can be found hiking in the mountains with his camera.

An Inside Look at the United States Board on Geographic Names (BGN)

It is difficult to imagine a world without geographic names, yet they are a continual challenge for map makers. While there are geographic naming authorities for everything from streets to exoplanets, geographic names remain ambiguous, contested, changing, and complex.

The United States Board on Geographic Names (BGN) was established in 1890 to resolve naming conflicts among Federal Departments and eliminate duplication of effort. Its powers were expanded in 1906 to more broadly address naming issue and the BGN was reestablished in its current by Congress in 1947. In this presentation, we will briefly examine the history, structure, operations, and resources of the BGN.

Douglas Caldwell
Data Signature Analysis Branch, Geospatial Research Laboratory
U.S. Army Corps of Engineers' Engineer Research and Development Center



Douglas Caldwell is the current Chair of the United States Board on Geographic Names (BGN) and the Department of Defense Member. A researcher at the U.S. Army Corps of Engineers' Engineer Research and Development Center in Alexandria, Virginia, Caldwell is a Certified GIS Professional (GISP) with more

than 35 years of experience working with geographic names, cartographic visualization and geospatial data analysis.

Government Forum

The forum will feature a keynote presentation by Jerry Johnston, Geospatial Information Officer for the U.S. Department of Interior. His keynote will focus on the evolution of government map products and services to support the recreation market, government interaction with the private sector and opportunities associated with crowd sourcing.

This year's forum will be moderated by the U.S. Geological Survey, Director of the National Geospatial Technical Operations Center, Ms. Kari Craun. Government invitees will include the U.S. Forest Service; Bureau of Land Management; National Park Service; Census Bureau; National Oceanic and Atmospheric Administration; National Geospatial-Intelligence Agency, Department of Natural Resources and Mines, Queensland, Australia and UK Ordnance Survey.

Dr. Jerry Johnston Geospatial Information Officer US Department of the Interior



Dr. Jerry Johnston is Geospatial Information Officer at the US Department of the Interior. In this role, Dr. Johnston leads DOI's efforts to coordinate and implement geospatial technology across the Department to meet a wide range of mission goals. This includes providing a vision for geospatial interoperability throughout the enterprise, as well as guidance and perspective on opportunities for adopting place-based approaches more broadly across Departmental lines of business.

Dr. Johnston joined DOI in 2012. Prior to that, Dr. Johnston was with the Environmental Protection Agency, most recently serving as the Agency's Geospatial Information Officer. Prior to his work at EPA, he served as the Director of Midwest Technical Operations for Image Matters LLC of Leesburg, VA, a small business focused on the development of geospatial semantics and interoperability solutions for a diverse set of customers.

Dr. Johnston was previously Executive Vice President of Pangaea Information Technologies of Chicago, IL, a provider of geospatial information management products and services to both public and private sector clients. Dr. Johnston holds a B.S. in Environmental Science from Michigan State University as well as M.S. and Ph.D. degrees in Environmental Science from Indiana University, Bloomington, and is the past Vice Chair of the National Geospatial Advisory Committee (NGAC).

Kari J. Craun Director of the U.S. Geological Survey National Geospatial Technical Operations Center (NGTOC)



Kari J. Craun is the Director of the U.S. Geological Survey, National Geospatial Technical Operations Center (NGTOC). This Center performs a wide range of functions in support of maintaining a seamless, current, nationally consistent coverage of base geospatial data for the United States, including development of digital and graphic products such as U.S. Geological Survey topographic maps. In addition, the Center manages several broadly-scoped contract mechanisms for acquisition of geospatial products and services through the commercial sector.

Craun is a Past-President of the American Society for Photogrammetry and Remote Sensing (ASPRS) and the Cartography and Geographic Information Society. She received a B.S. degree in Geology from the University of Missouri-Kansas City in 1984, an M.S. degree in Photogrammetry from Purdue University in 1987, and a Master of Science degree in Geospatial Information Science through Northwest Missouri State University in 2014.