

SALUIT: A Local Planning Tool from a Regional Agency

Doug Walker, Placeways & Bob Diogo, North Jersey Transportation Planning Authority

Imagine you are a county planner in northern New Jersey. A proposal has come forward for a small area land use project—a transit-oriented development (TOD), for example, or a neighborhood revitalization project. As a planner, you would like to know the project's potential impacts on both transportation-related factors such as roadway system impacts and mode share, and on broader topics such as economics, environment, and housing. But commissioning studies on all those elements would be too time consuming and expensive, especially at this early, preliminary stage.

Luckily, your region's MPO, the North Jersey Transportation Planning Authority (NJTPA), has a solution. NJTPA's Small Area Land Use Impact Tool—SALUIT—is a desktop-based analysis tool for local projects that sources data and models from the cloud. You input the proposed project (by sketching land uses on a map or importing digital plans), push a button, and sit back while a comprehensive analysis is performed. The results are packaged up in detailed reports and in a visual, presentation-friendly format that steps through a series of thematically organized maps and charts. The

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2016 APA National Conference | Phoenix | Technology Division Activities

Smart Cities, Geodesign, and Big Data Session | Saturday, April 2nd, 2:30–3:45pm, S436

This facilitated panel discussion is being sponsored by the Technology Division and will include an overview of how to effectively use geodesign and big data applications to achieve outcomes consistent with smart city principles.

Business Meeting | Sunday, April 3rd, 7:00am

All members are welcome. Location will be at conference hotel. See conference program for room assignment.

#AppsforPlanning: Innovative Mobile Planning Apps Challenge | Sunday, April 3rd 2:30–3:45 Room 129A

Watch students and emerging professionals pitch great web-based and mobile applications that will help the planning profession and the communities we serve.

Reception | Sunday, April 3rd, 7:30–9:30pm | Desoto Central Market, 915 N Central Ave., Phoenix, AZ

The Technology Division is partnering with the International Division, Sustainability Division, Urban Design and Preservation Division, and New Urbanism Division on a joint reception. This is a ticketed event. The cost is \$5 and includes drink tickets and food. Space is limited so purchase tickets now at the web site: <https://conference.planning.org/search/?tags=RECEPTIONS§ion=RECEPTIONS&scope=program>.

For detailed descriptions of technology and smart city related conference sessions, see pages 6–7.

The Next Frontier of Digital Engagement: Designing for User Experience

Emily Crespin, Urban Interactive Studio

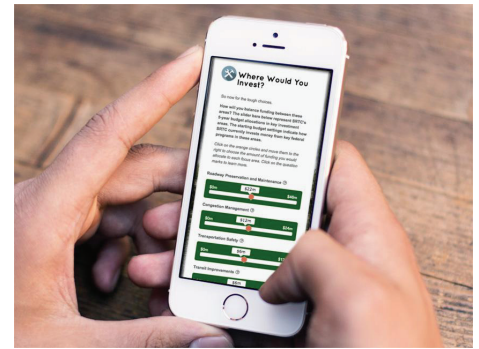
When digital engagement first piqued the interest of civic agencies in the late 2000s, it was an aspirational but somewhat impractical notion. As technology capacity has skyrocketed over the last half-decade, online participation has become more feasible, but there is a danger of development for technology's sake rather than for user benefit. While the possibilities may seem limitless, it is the end user experience that is the true measure of success for digital engagement. Citizen experience is enhanced through the use of intuitive imagery and design, integrated content and feedback, and by creating opportunities during every project phase.



Meaningful participation involves educating the community about relevant issues and opportunities to create context for their feedback. Planners must distill inherent complexities and help people understand how participation now could impact their quality of life in the long term. Visual elements like icons, infographics, and imagery draw users into the engagement experience and improve comprehension of technical details, decreasing the knowledge barrier required for meaningful participation and broadening the potential audience.

Advancements in technology now make it simple to ask for input beyond open ended questions like *how can we make the city better?* Consider, instead, an activity that consolidates complex information and presents alternatives in a clear, appealing format alongside targeted questions about the alternatives. The user is empowered to offer specific, actionable insights, transforming a potentially frustrating experience into one focused on problem-solving and bottom-up engagement.

It is easy to envision an early stage, digital engagement tool that asks big picture questions and places the responsibility



for ongoing participation on the user. As projects progress to later stages involving alternative scenarios, design concepts, and trade-offs, feedback tools must modify engagement activities to reflect this increased complexity. Interactivity becomes paramount, helping users understand the impacts of their preferences through trial and error.

Digital participation tools hold immense potential for reaching and engaging broad audiences, but attention must be paid to the public experience of those tools to ensure constructive, meaningful interactions with government. By focusing on visual context, integrated content and feedback opportunities, and consistent calls to action throughout the project, digital engagement tools have the power to elevate user experience and improve the quality of civic interactions.

Urban Interactive Studio provides digital engagement tools that expand traditional high-touch outreach and participation programs, maximizing inclusion by offering intuitive ways to participate in public process online. Learn more at urbaninteractivestudio.com.

International Journal of E-Planning Research (IJEPR)

The International Journal of E-Planning Research (IJEPR) is a peer-reviewed international quarterly journal that publishes original theoretical and innovative empirical research on the many aspects of the emerging interdisciplinary area of Urban e-Planning. The journal is mainly focused on e-planning theory, history, methods, ethics, best practices, e-planning pedagogy, future developments, and on the software technology associated with Urban e-Planning.

The mission of the International Journal of E-Planning Research (IJEPR) is to provide scholars, researchers, students and urban and regional planning practitioners with analytical and theoretically informed empirical research on e-planning, as well as evidence on best-practices of e-planning, in both urban and regional planning fields. The journal aims to establish itself as a reference for information on e-planning issues. The International Journal of E-Planning Research is committed to provide a forum for an international exchange of ideas on e-planning research and practice.

Information on submission procedures and manuscript formatting:
<http://www.igi-global.com/journal/international-journal-planning-research-ijepr/44994>.

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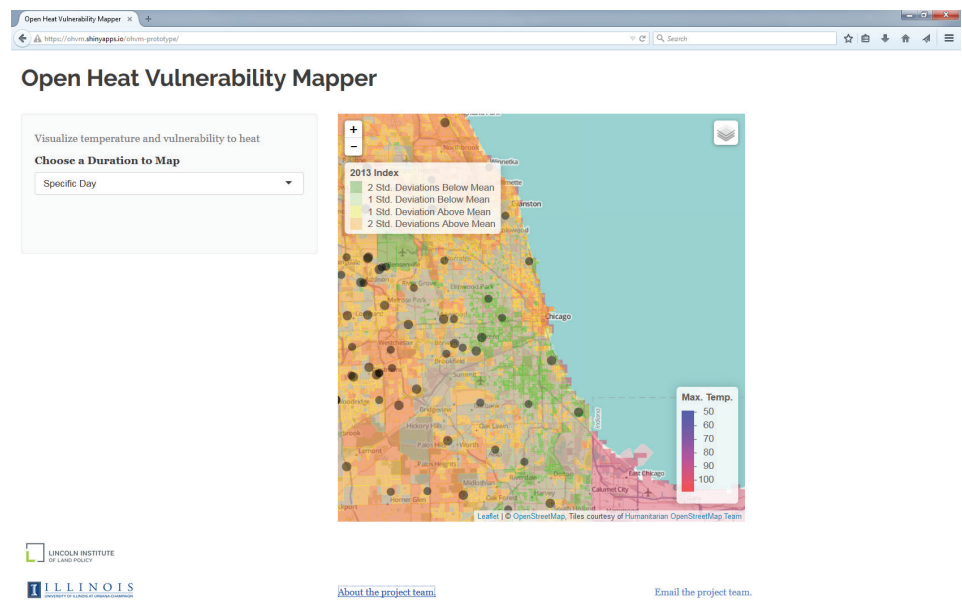
Advancing Vulnerability Planning with Open Data & Scenario Analysis

Bev Wilson, Arnab Chakraborty, & Elizabeth Bastian, University of Illinois at Urbana Champaign

Last fall we received a competitive grant from the Lincoln Institute of Land Policy to develop a tool with advanced scenario analysis capabilities. Our goals were to create a novel planning application built on open data and with open source software. The Open Heat Vulnerability Mapper prototype (<http://ohvm.shinyapps.io/ohvm-prototype/>) currently focused on Chicago is a first outcome of our work. Created in R using the leaflet and shiny packages, the tool allows users to visualize vulnerability of population to heat related illnesses and mortality by census block groups, and variations in surface temperature, especially during extreme heat events. Because both climate and vulnerability vary in space and change over time, a key contribution of this work is to visualize its intersection and to support monitoring and long-term risk reduction through planning.

The tool allows a variety of interactive exploration, including identifying areas that are hottest and most vulnerable, as well as the distribution of heat-related risks vis-à-vis locations of cooling centers. In future, it will have capabilities that allow users to adjust the key parameters of vulnerability and visualize the cumulative impact of such changes by factoring in downscaled versions of future climate scenarios. We are also developing an associated toolkit to help identify how specific planning actions, such as development regulation and new green-spaces, can mitigate the risks. A web-form where beta testers in the Chicago region and beyond can provide us feedback is accessible from: <http://goo.gl/forms/4JkbpmcJnl>.

Our efforts to build this tool have been primarily in three areas. We measure vulnerability of population to extreme heat by building on Cutter et al.'s (2003) foundation work on social vulnerability. We model an index of vulnerability to extreme heat based on the approach outlined by Johnson et al. (2012) that is—in turn—based on Cutter's social vulnerability index (SoVI). Using



Open Heat Vulnerability Mapper interface

American Community Survey data, we apply principal components factor analysis to derive the key factors such as percentage of older population, minority residents, and those with lower income and education. We then calculate the index for each block group in the Chicago metropolitan area.

For surface temperature information, we use Daymet, a dataset that provides daily minimum and maximum temperature at one square kilometer level, from the Oak Ridge National Laboratory. From that, we isolate areas of elevated temperature using historical data from Global Historical Climatology Network and from weather stations in Chicago.

Finally, we create the OHVM prototype in R using the leaflet and shiny packages, which are essentially wrappers for established JavaScript code and libraries designed to support mapping and data analysis on the web. The tool uses OpenStreetMap base layer, location of cooling centers, vulnerability index, and temperature information. The prototype is currently hosted on shinyapps.io, a paid cloud computing service, while some of the data used in the prototype are stored

and distributed using GeoServer, an open source server designed specifically for sharing geospatial data over the internet. The next version of the tool will allow users to visualize scaled down climate scenarios and changes in patterns of vulnerability using data from previous years collected by the Census Bureau. We will also actively engage urban planning, emergency management, and public health practitioners in this phase of tool development. This, we hope, will assist planners better respond to extreme heat events and reduce vulnerability in the long term through investments in green infrastructure.

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Works Cited

- Cutter, S.L., Boruff, B.J., & Shirley, W.L. (2003). Social vulnerability to environmental hazards. *Social Science Quarterly*, 84 (2), 242-261.
- Johnson, D. P., Stanforth, A., Lulla, V., & Luber, G. (2012). Developing an applied extreme heat vulnerability index utilizing socioeconomic and environmental data. *Applied Geography*, 35(1), 23-31.

Urban Network Analysis toolbox for Rhinoceros3D

Andres Sevtsuk & Raul Kalvo, Harvard University and City Form Lab

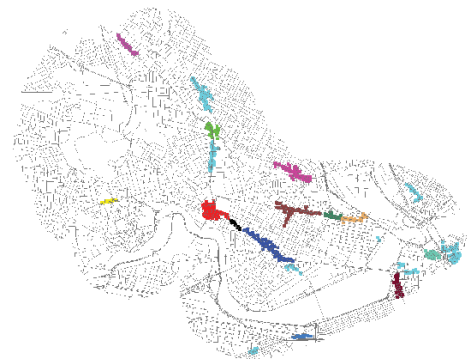
The Urban Network Analysis (UNA) toolbox is a software plugin for measuring relationships between spatial activities and pedestrian activity along urban circulation networks. Available as an ArcGIS plugin since 2011, a new version of the toolbox with enhanced functionality was released for Rhinoceros 3D in 2015.

As the use of Rhinoceros drawing and modeling software has rapidly expanded from architects to urban designers and physical planners, it becomes important to make analytic decision support tools available to planners who work directly on drawing files. The Rhino UNA toolbox integrates powerful network analyses into hands-on design processes on a digital drawing canvas. This shortens the lengthy feedback cycle between design and analysis, where drawings from one software are exported to GIS or other platforms for

evaluation, and results eventually returned to design software. Having UNA metrics in Rhino allows a planner to evaluate a specific plan or development proposal within seconds, incorporating analytics into a fast and iterative design process, where designs can be altered, evaluated and redesigned in seamless cycles to rapidly improve the outcome.

Rhino UNA toolbox requires two types of inputs from the user. First, a spatial network is needed to describe circulation paths along which travel can occur. Spatial network commonly utilize centerlines of streets and sidewalks, though they can also be extended to include two- and three-dimensional indoor networks. In dense urban settings, public space can flow seamlessly from sidewalks to building lobbies or multistory retail and service environments. Since Rhino is foremost design software, creating and editing networks is intuitive and highly flexible. Data exchange with ArcGIS and Excel is also enabled, making it possible to bring in shapefiles and to use Excel to graph and manipulate feature attributes.

The second input involves origins and destinations for modeling movement along networks. Origin points—buildings, businesses, transit stations, schools or parks—designate where movement starts. Origin points can be weighted by attributes describing their real-world properties—a weight called “jobs” in commercial buildings can describe the

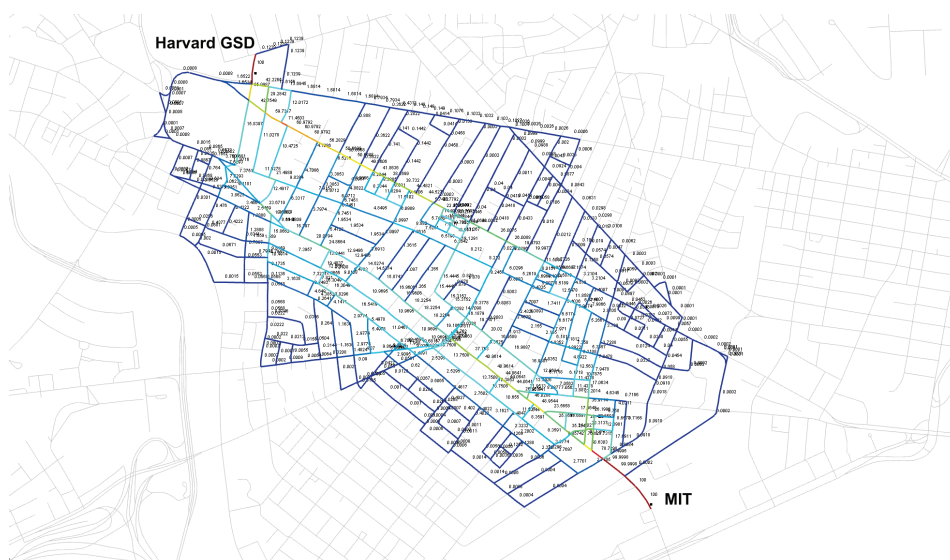


Spatial clusters of retail and food service establishments in Cambridge, MA. Clusters are detected as groupings that contain at least 25 establishments and where each establishment in a cluster is no further than 75 yards from the nearest neighboring member in the same cluster.

number of employees in each building. Weights can either be imported from shapefiles or directly created in Rhino. Destination points describe the terminal locations that movement flows to. Using office building entrances as origins and Metro stations as destinations allows one to estimate how employees are likely to distribute over a street network while going from jobs to transit stations.

Given these inputs by the user, the following describes a few example functions of the toolbox. Accessibility tools offer different indices for measuring how readily origins on spatial networks can access a set of destinations. The Reach metric quantifies how many destinations each origin can reach within a give walk radius. It can be used to describe how many households or jobs are available within a five-minute walk around each bus stop or retail business, for instance. The Gravity metric models accessibility as a ratio between destination weights and transportation cost for reaching them. Accessibility to a park can be specified as a ratio between the number of beneficiaries that are found within a given walkshed, divided by each beneficiary’s walking distance to the park.

Betweenness tool can be used to estimate pedestrian flow at particular locations. Since pedestrians do not always choose shortest routes, movement between each origin and destination can not only be modeled along shortest paths, but users can also input an allowable “detour ratio” to include longer routes. If homes are taken as origins and retailers

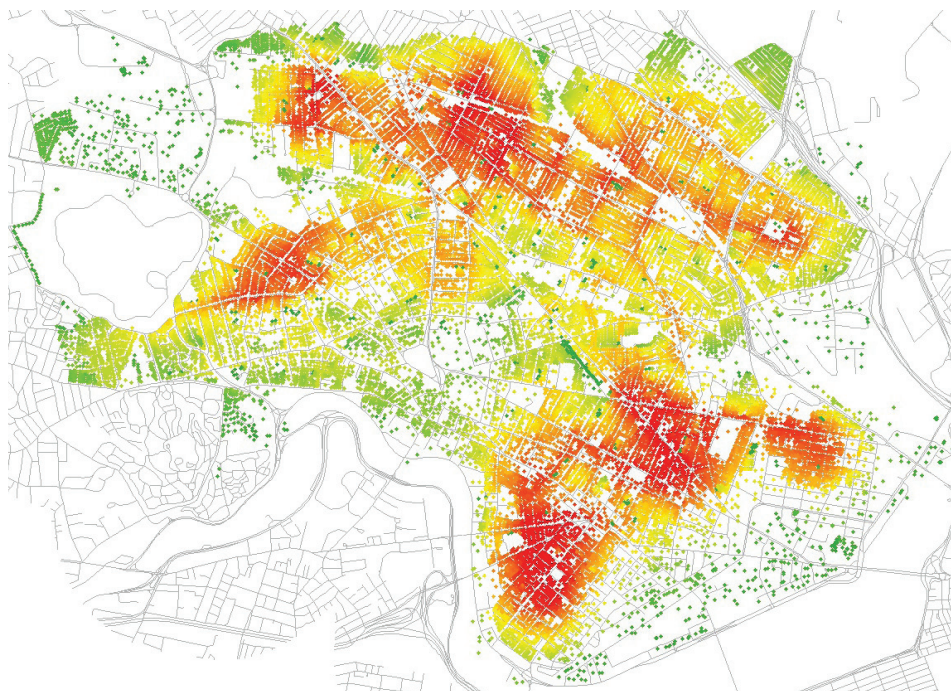


Probability distribution of walking routes from MIT to Harvard GSD. Warmer colors denote path segments that are more likely to be used, cooler segments routes that are less likely to be used. Routes that are not highlighted in colors are more than 20% longer than the shortest available walk.

as destinations, then the number of residents starting from each home location is distributed over all paths within the allowable detour, giving each route that is found an equal probability. The analysis keeps track which route segments receive most overall users, indicating their total estimated pedestrian flow.

Facility patronage tools can be used to estimate the patronage of spatial facilities—e.g shops, public spaces, transit stops—in a network. A discrete choice model is used to allocate a proportion of demand from all origin points to all destination facilities such that a higher allocation is given to facilities that are closer to the user or have higher weights. The results can be used to examine how many people or what share of the total demand is likely to patronize each facility. Testing different planning scenarios iteratively can improve facility patronage for individual destinations or all destinations collectively.

The toolbox includes a number of additional functions that cannot be elaborated here for brevity. A



Reach to residents from each building in a 10-minute walkshed in Cambridge, MA. Red colors indicate buildings that can reach more residents, green colors less residents in a 650-yard network radius.

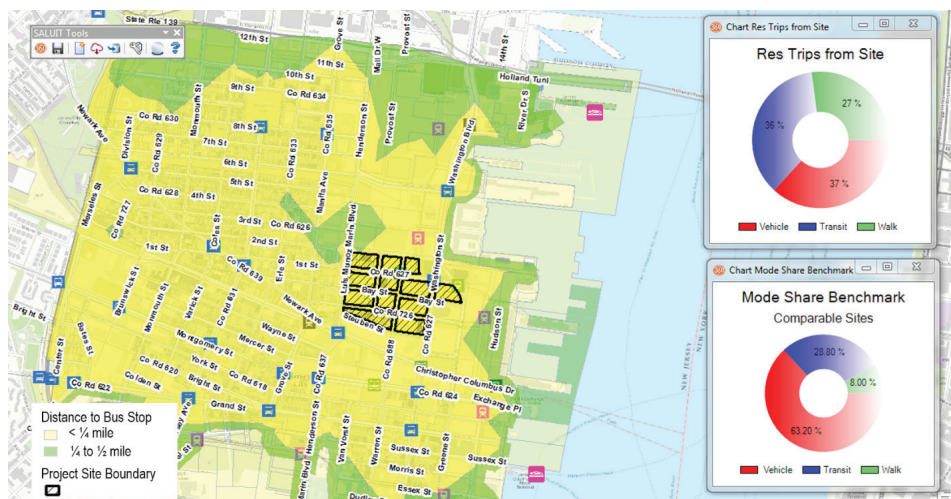
comprehensive help file is available along with tutorial videos for getting started. The UNA toolbox can be downloaded from the

Harvard GSD City Form Lab website; it is distributed free of charge as a plugin for Rhinoceros 5.0.

(cont. from page 1) results tell you and your constituents all about the potential impacts of the proposal. Want to experiment with changes that might improve the project? You can do that, too.

This is no generic analysis. It is using local GIS data and modeling parameters for estimating the results for specific locations, and it also lets you supplement the results with your own information. It uses the latest available data on where people in your area live and work, what the transportation infrastructure is and how it performs, and even how comparable projects in similar place types perform.

Here's how it works: the necessary GIS data comes from NJTPA's cloud-based regional data repositories. Impact models and the locally-calibrated parameters were researched and developed when SALUIT was first created, and they are reviewed and updated periodically. Many calculations happen in real-time using local spatial relationships and the specifics of your proposal. The desktop platform is a free, custom add-in to ArcGIS and CommunityViz planning software.



A screenshot of NJTPA's Small Area Land Use Impact Tool (SALUIT). The planning analysis application provides a pre-packaged, comprehensive impact analysis of small area project proposals that covers transportation, housing, environment and other topics. (Image: Placeways LLC)

Starting to wish you were in NJTPA's region? So far, no other MPO has quite the same system, but now that it has been built once, the application would be easier to build again in other locations. Some of SALUIT's reusability features are already finding their way into the next version of CommunityViz, and Placeways and

NJTPA staff would be pleased to share their knowledge and experiences with other groups who may be interested.

The SALUIT website: <http://njtpa.org/data-maps/modeling/land-use-impact-model>.

2016 APA National Conference: Smart City & Technology Sessions

Tech Zone: A SimSandbox. Virtual reality headsets. A driving simulator. A hackathon. See the coolest new tools around when Autodesk and WSP | Parsons Brinckerhoff return with the 2016 TechZone.

Modern Trends in GIS for Planners—Harnessing the Value of Citizen Engagement (W320): In this hands-on workshop, we will examine how easy-to-use apps, on a number of different devices from laptops to smart phones, can lead to genuine, productive interaction with citizens. We will also show how to make the most of crowd sourced feedback and present it to administrators in a clear and concise manner in order to generate a feasible plan of action.

Consider the Future With Scenario Tools (W302 & W326): How do you help a community think about its desired future—and the plans, policies, programs, and projects that realize the vision? Examine the theoretical and practical underpinnings of the way planners pose future choices.

Modern Trends in GIS for Planners—Leverage 3D in Your Next Comprehensive Plan (W321): This hands-on workshop utilizes the latest 3D web-based GIS technology to support long range planning with examples from around the world. You will learn how to effectively introduce 3D into your planning workflows and how to easily share major elements of your strategic plan and ongoing development projects with the public for comment. Leveraging 3D improves communication with constituents and promotes better decision making.

Buildings and Cities Beyond This Century (S805): Led by the Department of Energy, more than 150 experts from various fields came together to envision the building of the future. This session will share the results and explore a paradigm

shift to more resilient and connected buildings and cities.

Broadband Planning for a Sustainable Community (S431): Broadband access is essential for most Americans—at home, at school, at work, and even at the corner coffee shop. Join leaders from the U.S. Department of Commerce's BroadbandUSA initiative as they discuss how to harness broadband's benefits for your community.

Smart Cities, GeoDesign and Big Data (S436): This facilitated panel discussion is being sponsored by the Technology Division and will include an overview of how to effectively use geodesign and big data applications to achieve outcomes consistent with smart city principles.

Modern Trends in GIS—Publishing Story Maps (W323 & W327): Maps have always been a way to tell a story about data. In this hands-on workshop, we'll show how to take that story to the next level. With no programming and no GIS knowledge, we'll show how ready-made templates can be used to tell a story about the assets of your community on the web, so that your map conveys the story that you want.

The DNA of Innovation Districts (S450): The evolution of University-Related Business Parks into diverse Knowledge Communities

Modern Trends in GIS—Location Analytics to Build Resilient Communities (W324): While many communities across America struggle to develop their local economies while enhancing their quality of life, they are starting to question the rationale of big business recruitment through financial incentives. Instead, many are focusing on supporting small local businesses ripe for growth. This workshop will show how

a web-based GIS solution can analyze demographic, income, expenditure, education and many other variable in order to effectively develop and retain a diversity of local businesses.

Modern Trends in GIS—Bringing Geography to Design and Planning Work Flows (W325): In this hands-on workshop, we'll utilize GeoPlanner to design, analyze, and report on planning alternatives and scenarios. This combines web-based analytics, sketching tools, and dashboards to help you visualize design impacts in real time. This entry-level workshop presents a geodesign-based workflow that includes assessing data, defining key performance indicators, and comparing multiple scenarios in an economical and easy-to-use environment.

Innovative Planning Apps Challenge (S817): The Technology Division will issue a call for proposal for students and emerging professionals to develop web-based and mobile applications to aid the planning profession. Planners who respond will be selected to present their proposals and compete for an award.

Build a Better Haystack—Use Data (S486): Great cities are built by great decision makers. But, turning great information into actionable insights requires resources that aren't always available. Through research, case studies and experience, learn how to use your data to make better, impactful decisions.

Transforming Tech—Geography of Innovation (S500): Explore the ongoing maturation of the technology industry as pertains to planning and real estate development, the rapidly evolving geography of advanced industry clusters, the expanding ecology of innovation, and the transformative opportunities these trends hold for the American urban core and suburb.

#AppsforPlanning: Innovative Mobile Planning Apps Challenge

Sunday, April 3rd 2:30–3:45 Room 129A

Join us for the Innovative Mobile Planning Apps Challenge at this year's national Conference! Watch students and emerging professionals pitch great web-based and mobile applications that will help the planning profession and the communities we serve. A panel of judges at the Tech Division's session 2016 APA National Conference will pick their top selection to determine who takes home the grand prize for their app.

Special thanks to our sponsors:

- WSP | Parsons Brinckerhoff
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- PlaceSpeak
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Planning for Integrated Energy System Integration (S513): Achieving deep carbon reductions requires fundamental transformation of our energy systems, with significant impact and benefit to urban communities. Discover how members of the Carbon Neutral Cities Alliance are working to envision that transformation and equip local governments for the changes ahead.

Filling in Transportation Gaps with Technology (S519): Technology and mobile applications have enhanced transportation access and mobility on an unprecedented level. This session will focus on recent efforts made by public agencies and private businesses to reshape transportation systems, rethink public policies, and embrace shared mobility.

Envisioning and Engaging With Geodesign (S549): Discover how geodesign, a new design approach, is allowing planning and design professionals to anticipate future trends and propose planning solutions. Learn how it also is helping communities and decision makers make the wisest, most well-informed choices possible.

Using Big Data in Bike Planning (W317): Learn how “big data,” including cell phone and other large-scale, geo-referenced datasets, can be used to improve our understanding of bicycling rates and routes. Discover how big data could revolutionize decision making about where bicycle infrastructure should be constructed.

Community Engagement and Technology (S571): A new era of innovative, community engagement has taken advantage of mobile technology, big data and increasing citizen involvement. Discover which cities are at the forefront of this trend and how other jurisdictions can catalyze the critical components necessary for meaningful, contemporary civic engagement to flourish.

Geodesign—Comprehensive Planning for Sustainable Communities (S591): Geodesign and GIS-based decision support tools provide a problem-solving framework and platform for engaging communities and building consensus. Discover how these tools offer solutions to pressing problems.

2016 APA National Conference: Smart City & Technology Posters

Measuring bicycle facilities with road data: This poster maps San Diego County's bicycle network, color-coding bicycle facilities by their traffic stress levels. It combines various road features into one score. An origin/destination matrix illustrates the mobility of each traffic stress level in the County.

Sustainable Urbanism: Integrating Behavior, Neighborhoods, Technology: Sustainable urbanism is a rapidly changing topic in urban and environmental planning. This poster will highlight Farr Associates' latest research findings and case studies of sustainable urbanism in practice.

Meter Overstay Analytics using Big Data: Transportation agencies have data

that can be utilized for decision-making purposes. Learn how technological and analytic improvements have helped Departments of Transportation to leverage big data to inform policy and operational changes.

Advanced Scenario Analysis Using WaterSim: In this poster, concepts of exploratory scenario planning are discussed using case study of Phoenix regional water supply and demand model. Methods of scenario analysis including factor sensitivity, key trigger a will present to planners.

Rural Iowa Fiber-Optic Internet Access Optimization: Rural northeast Iowa hosts the MetroNet fiber-optic telecommunications network, a

collaborative public-private partnership providing reliable, high-speed internet in Decorah. A financial, organizational, and legal assessment of expansion scenarios provides best fit recommendations to foster regional connectivity.

Framing the Plan: Integrating Geodesign into Planning: This poster represents the synthesis of multiple, competing interest groups in ongoing land use and geographic design issues within Chatham County, Georgia. The groups participated in a Geodesign engagement process that utilized a digital framework provided by Geodesignhub.com.

The Technology Division is charting the use of new technologies for the American Planning Association. Planners everywhere need to understand the use and planning implications of new systems: computer simulation, GIS, telecommunications, and computer-based information resources.

Planning & Technology Today is the Division's newsletter, bringing you current information that is useful for making decisions on how to use the new technologies. If you are presently a member of APA, it costs only \$25 to join the Division; students \$10; non-members \$40.

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