# Geospatial Approaches to Enhancing MPO Community Engagement

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**16. Abstract**

Metropolitan planning organizations are responsible for overseeing urban planning in every major urban region in the country. In recent years the importance of building engagement with constituents to create more equitable and inclusive urban planning models has become a heightened priority. This white paper explored the benefits and best practices that would be needed to incorporate Geographic Information System (GIS) data visualizations into MPO outreach plans to further this goal. Key considerations included legal outreach requirements, current outreach goals, and implementation of GIS-based outreach. The researchers found that GIS data visualizations contain many elements that support and promote outreach that meets legal standards of the California Brown Act as well as federal ADA and Civil Rights requirements. Furthermore, GIS data visualizations offer unique opportunities for MPOs and constituents to engage in collaborative dialogues where MPOs can both disseminate information and collect constituent opinions and data in both synchronous and asynchronous manners. Recommendations for the incorporation of GIS data visualizations in MPO outreach plans include building cross-departmental collaboration between GIS teams, project leads, and outreach teams; leveraging existing relationships with stakeholders and community organizations especially among hard-to-reach communities; and increasing and developing social media engagement with constituents.

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**Pacific Southwest Region UTC**
University Transportation Center

# Contents

## About the Pacific Southwest Region University Transportation Center

The Pacific Southwest Region University Transportation Center (UTC) is the Region 9 University Transportation Center funded under the US Department of Transportation's University Transportation Centers Program. Established in 2016, the Pacific Southwest Region UTC (PSR) is led by the University of Southern California and includes seven partners: Long Beach State University; University of California, Davis; University of California, Irvine; University of California, Los Angeles; University of Hawaii; Northern Arizona University; Pima Community College.

The Pacific Southwest Region UTC conducts an integrated, multidisciplinary program of research, education and technology transfer aimed at *improving the mobility of people and goods throughout the region.* Our program is organized around four themes:  1) technology to address transportation problems and improve mobility; 2) improving mobility for vulnerable populations; 3) Improving resilience and protecting the environment; and 4) managing mobility in high growth areas.

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## Disclosure

# Abstract

Metropolitan planning organizations are responsible for overseeing urban planning in every major urban region in the country. In recent years the importance of building engagement with constituents to create more equitable and inclusive urban planning models has become a heightened priority. This white paper explored the benefits and best practices that would be needed to incorporate Geographic Information System (GIS) data visualizations into MPO outreach plans to further this goal. Key considerations included legal outreach requirements, current outreach goals, and implementation of GIS-based outreach. The researchers found that GIS data visualizations contain many elements that support and promote outreach that meets legal standards of the California Brown Act as well as federal ADA and Civil Rights requirements. Furthermore, GIS data visualizations offer unique opportunities for MPOs and constituents to engage in collaborative dialogues where MPOs can both disseminate information and collect constituent opinions and data in both synchronous and asynchronous manners. Recommendations for the incorporation of GIS data visualizations in MPO outreach plans include building cross-departmental collaboration between GIS teams, project leads, and outreach teams; leveraging existing relationships with stakeholders and community organizations especially among hard-to-reach communities; and increasing and developing social media engagement with constituents.

# Geospatial Approaches to Enhancing MPO Community Engagement

## Executive Summary

Metropolitan Planning Organizations, or MPOS are the primary regulatory bodies of urban planning in the U.S. They are responsible for coordination of transit and goods movement across urban regions, and as such respond to many different moving parts and discrete interests such as port and freight movement, public transit, highway development, and interest groups impacted by these plans. In recent years MPOs have expanded from not only overseeing goods and people movement but also regulation that seeks to account for the environmental impact of trade and transportation. While historically MPOs have always been legally required to communicate their plans to the public, increasingly MPOs are seeking to increase their communication and collaboration with the public and community stakeholders in an effort to plan for services in a way that is working more directly with the individuals most directly impacted by MPO decision-making, creating more equitable and inclusive urban planning.

When seeking to increase and improve communication, incorporating new or existing technology as a tool can create new forms of engagement that have previously been difficult to achieve. Current events including the COVID-19 pandemic have heightened the need for virtual and web-based outreach plans. Currently, GIS data is frequently used by MPOs to plan for projects, and they also release data to stakeholders when requested. Yet GIS has not been heavily explored as a tool to increase outreach with the public. As a widely used piece of technology in the industry, the research team sought to understand better how GIS data visualizations can support MPO outreach goals and methods to integrate GIS into MPO outreach efforts. Key findings included:

- GIS visualization programs are well-equipped to handle diverse language needs and thus may expand the range of constituent feedback while remaining in compliance with the Civil Rights Act
- GIS visualizations are accessible to users with disabilities
- GIS visualizations are easy to disseminate in both synchronous (i.e. during a Zoom meeting) and asynchronous (i.e. as a link on a website or in an email) formats
- GIS visualizations offer opportunities for MPOS to gather public data and opinions through surveys, comments, and public data input
- GIS visualizations have been used successfully as a part of outreach efforts in smaller MPOs across the country

Based on the findings from the development on this white paper, the researchers make the following recommendations for integrating GIS data visualizations into outreach plans:

- Include current GIS teams in discussions and trainings on outreach projects. Some larger MPOs have existing robust GIS teams, but their level of engagement with outreach appears to be minimal. Regardless, existing GIS fluency will be integral for creating visually appealing and user-friendly GIS outreach products.
- Build cross-departmental teamwork between project leads, outreach teams, and GIS teams at MPOs.
- Leverage existing relationships with stakeholders and community-based organizations, which may help with dissemination and collaborative data gathering from hard-to-reach constituents.
- Increase and more strongly develop social media platforms for outreach with communities. Many MPOs have only minimal social media usage, with little engagement from constituents or stakeholders. Increasing online engagement will be integral for expanding asynchronous GIS engagement.

The findings and recommendations from this white paper will be used to guide the development of a GIS course for both GIS specialists and public sector professionals, along with a workshop designed for local transportation agency representatives and MPO staffers from across the Pacific Southwest Region (PSR) University Transportation Center focus area, which includes California, Arizona, Nevada, Hawaii, Guam and the U.S. Pacific Islands Region.

# Introduction

Policy and infrastructure impact individual lives in both big and small ways. Where we live, eat, play, and how we get there are all influenced by decisions made and plans developed by lawmakers, regulators, urban planners, and community leaders. Now more than ever, it is essential that constituent voices are heard and are part of decision-making processes to ensure that the unique needs of communities associated with every demographic are met in equitable and adaptable ways. With its ability to synthesize data and narrative together into a dynamic storytelling tool, geographic information systems (GIS) data visualizations such as StoryMaps, dashboards, and asset and enterprise planning applications are essential tools for leaders at municipal, regional, state, and national levels of government to open dialogues with the people most directly impacted by their decision making and planning. Integrating GIS visualizations into outreach methods by Metropolitan Planning Organizations (MPOs) will bring conversations about urban development into the geospatial paradigm and offer transformative opportunities for conversations and dialogue with constituents. This white paper will elucidate current best practices and make recommendations for incorporating GIS visualizations into MPO public sector outreach methods, which will guide development of a GIS course for both GIS specialists and public sector professionals, along with a workshop designed for local transportation agency representatives and MPO staffers from across the Pacific Southwest Region (PSR) University Transportation Center focus area, which includes California, Arizona, Nevada, Hawaii, Guam and the U.S. Pacific Islands Region.

# MPOs and Public Sector Outreach

## Background on MPOs

In an increasingly urbanized country and world, large-scale planning is often needed to provide cohesive and thoughtful infrastructure that benefits constituents and stakeholders. Since the 1960s, federally funded MPOs have been the mainstay of city planning in the U.S. MPOs play a key role in evaluating available modes of transportation in a region and developing transportation plans that seek to efficiently move goods and people in a way that improves quality of life for residents. Over time, there has been increasing recognition of the direct relationship between mobility and carbon emissions, and as such MPOs have become increasingly responsible for maintaining air quality in their regions (1).

Each region in California has its own MPO and is responsible for the transportation management in its region. The Southern California Association of Governments, or SCAG, is the LA region's MPO and describe MPOs as such:

> A Metropolitan Planning Organization is mandated by the federal government to develop plans for transportation, growth management, hazardous waste management and air quality. An MPO must have a "continuing, cooperative and comprehensive"

transportation planning process that results in plans and programs consistent with the comprehensively planned development of its corresponding urbanized area (2).

SCAG, as the largest MPO in the country, representing 6 counties (Imperial, Los Angeles, Orange, Riverside, San Bernardino, and Ventura), has an enormous responsibility in overseeing the transportation and mobility issues of such a large land area encompassing 191 cities. Regional transportation agencies such as the LA County Metropolitan Transit Authority (LA Metro) report their transit plans to SCAG, while advocacy groups such as the California Transit Association (CTA) communicate their own objectives with MPOs, allowing them to coordinate competing interests and routes to best serve the greatest number of residents accordingly. Given the large land area and number of residents being served daily in each region, the division of labor between transit organizations being responsible for daily operations and short-term planning, MPO coordination allows for better cooperation between the different layers of personal and goods transportation and long-term planning that occurs in such widely urban areas such as the LA Metro Area.

In recent years, MPOs in California have become increasingly involved in climate change and air-quality control (1). This has come about in large part because of bills such as AB 32 in 2006, which required greenhouse gas emissions to be returned to their pre-1990 levels by the year 2020 (3). For example, SCAG has recently begun developing a Regional Climate Adaptation Framework to better address how Southern Californian cities and communities prepare and cope with the inevitable impacts of climate change.

Given the large amount of responsibility and planning duties organized by MPOs and the direct impact that these policies have on residents' lives, open and ethical communication with constituents is of paramount importance. Transit, goods movement, and urban development affect people from all walks of life, and constituents have a right to be informed about decision making processes that governmental organizations are making, including how public money is being spent, and how city planning will impact their life. As such, MPOs have an ethical duty to conduct their business in an open manner that keeps the public informed of their activities and plans.

## Facilitating Representative Government Through GIS Data Visualization

Representative government is a core value at the foundation of American democracy. Beyond the ethical duty of governing bodies to communicate with constituents, laws like the Brown Act and other important federal and state legislation enshrine the legal duty of governing organizations to communicate effectively with constituents. Many of the laws governing open meetings were developed in response to growing concerns about secret meetings and back-door dealings in the 1950s and 1960s. As a consistent leader on the national stage, California was an early adopter of public open meeting and accountability laws, colloquially known as Sunshine Laws, which included the passage of the Brown Act in 1953 (4).

The Brown Act provides a set of standards for open meetings and public communication for government-funded organizations, including MPOs. Under the Brown Act, most MPO meetings are required to be made public, with a minimum of a 72-hour notice for the location and agenda for the meeting. While nearly every state has some kind of "sunshine law," California's are particularly robust. For example, California requires that constituents be permitted to publicly comment on agenda items during the meetings. While this is a *de facto* practice in many states, very few enshrine that right of public comment into law. The robust laws protecting the rights of citizens to be privy to governmental meetings is a demonstration of the dedication the State of California has to ethical communication and collaboration with citizens.

MPOs are not only subject to the Brown Act, however. In 1990, the Americans with Disabilities Act (ADA) was passed, which (among a number of other requirements) introduced requirements for accessibility and assistive measures for all organizations that receive public funding, to allow for individuals with disabilities to fully access public services (5). Practically speaking, this includes a wide variety of requirements for MPOs, including that meetings must be held in wheelchair accessible locations, translation into American Sign Language (ASL) or closed captioning for those with hearing loss must be made available, and reading materials must be made available for those with vision loss through means such as large print, braille, or audio recordings.

Beyond the Brown Act and ADA requirements, organizations that receive public funding are also subject to the Civil Rights Act of 1964 (6). In particular, MPOs are required to provide access to translation services for individuals with limited English proficiency (LEP) to allow for engagement and communication with governmental organizations regardless of national origin or language proficiency. As it stands, MPO websites typically have translation capabilities built into them, allowing visitors to view the webpages in the language they are most comfortable with. Individuals who would require live translation during meetings must request a translator at least 72 hours in advance to allow the organizations time to locate a translator for the target language.

With the multiple layers of legal requirements regarding open communication and accessibility for publicly funded organizations such as MPOs, there is a clear need for responsible and robust communication with constituents. As we move into the 21st century, technology-focused innovations are becoming increasingly relevant and even essential for a wide variety of communications. There is a pressing need for the future of public sector communication to increase technology-based outreach to engage with wider audiences and disseminate information more efficiently. The multilayered approach of GIS data visualizations such as StoryMaps, dashboards, and open-source software such as Openstreets, allow for users to incorporate mapping, seek out public opinion, and thread stories and narratives into dissemination, making them excellent tools for increased engagement that continue to meet accessibility and open-meeting legal standards.

## Accessibility Changes Due to COVID-19

Amid the disruption to a wide variety of public meetings and governmental actions due to the COVID-19 pandemic, approaches to public meetings have changed significantly. Due to the Brown Act and other laws governing open access to governmental organizations, governmental agencies are required to continue maintaining public access to these meetings even during the COVID-19 pandemic. However, on March 19th, 2020, Governor Gavin Newsom issued an executive order waiving all parts of the Brown Act requiring in-person participation (7). Despite the state fully re-opening in June of 2021, public meetings remain primarily virtual. Currently, SCAG is using Zoom conferencing for their meetings, posting a link to their meeting with the call-in number at the top of every meeting agenda. The call-in option is important, because it allows for individuals without computers to call in and listen to the meeting, even without the video portion available. There are clear challenges to promoting participatory governance with all participants connecting virtually. Yet GIS visualizations are ideal tools that help bridge some of the challenges of engagement and dissemination common to public policy makers. Furthermore, visualizations created with GIS software help policy makers (and constituents) to meta think and visualize data insights that could sometimes be lost in a spreadsheet. GIS data visualization tools have emerged as key policy and public information resources during the COVID-19 pandemic. Organizations such as John Hopkins University have taken advantage of GIS data systems to disseminate vital information about the spread of COVID-19 using resources such as their Coronavirus Dashboard (8). Data visualization such as this provides viewers with quick snapshots that pack a powerful punch of information in one easy-to-use image.

**Figure 1. Screen shot from John Hopkins University COVID-19 Dashboard**
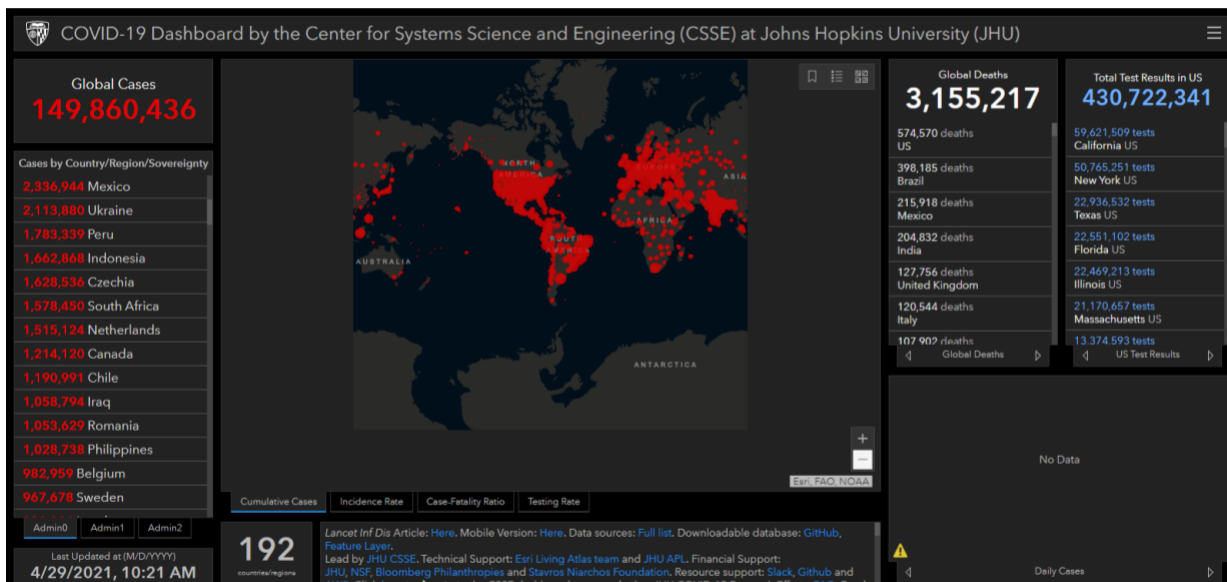
Even under the changes due to social distancing requirements, the public remains entitled to public comment, attendance, and accommodation for publicly held governmental meetings. Methods for commenting are made available at the beginning of every prepared slide for public meetings, which are posted a few days before the event. Currently, community members have the option of emailing ahead their comments, or "raising their hand" via the Zoom "raise hand" button, at which point they can share their comments live. Public comment has been severely constricted during the COVID-19 pandemic, which may put public meetings out of compliance with Brown Act (1). The lack of access to meetings and public comment has led to conflict and communication difficulties with community organizations with stakeholder interests (1). Incorporation of GIS presentations into public meetings and public sector outreach creates additional opportunities for public feedback and comments, by their ability to embed surveys and public comment boxes directly into the presentations. This allows MPOs to not only meet their duties of adherence to the Brown Act, but also collect data in real time that can better inform future public planning projects.

ADA and language compliance has become both easier and more difficult under the move to remote meetings. Zoom, the most commonly used platform for public meetings, has a translation services option for professional zoom accounts. Users who would like the meeting to be translated into their target language need only press the button, and they will receive the interpreter's audio instead of the main audio. This does require that interpreters be present live in the meeting, for real-time interpretation. This is the same as pre-pandemic conditions, where individuals would need to request translation services at least three days in advance to be able to ensure an interpreter in their target language would be available. In general, engagement is much lower with non-English speaking residents, as advertising and programming tends to be primarily focused on English, and non-English speaking residents may have less awareness of the programming and meetings that exist, or the level that these meetings may impact their neighborhoods and communities (9). In many ways ADA compliance may actually be easier under pandemic meeting conditions (1). Physical barriers to meeting have been eliminated, equalizing access to meetings for individuals with physical disabilities. Sign language interpreters are among the available interpreters one can request for those that need ASL accommodation, which fills an important gap in needed services. Like many top-of-the-line online programming these days, GIS software has a number of accessibility features built into it that promote accessibility, such as testing their fonts and colors to be color-blind and visual impairment friendly, as well as building their programs to be able to be navigated using keyboards instead of a mouse for individuals who struggle with using a mouse for navigation (10). StoryMaps also include the ability to toggle between different language translations (11). Consider the following StoryMap (figure 2) developed about a restoration project in Havana, Cuba. The StoryMap was developed in both Spanish and English and has a language button embedded into the title page, allowing viewers to easily toggle back and forth between the two languages (12). Programs like the ArcGIS online assistant (13) (support available for all Esri subscription holders) help StoryMap developers with technical details like placing translated

writing accurately into StoryMaps, and ensuring that all elements (titles, subheadings, body, etc.) are carried over effectively.

## Public Sector Outreach Today

While there are a number of legal requirements that apply to public meetings, constituent communication today has moved beyond fulfillment of legal requirements. MPOs are actively seeking ways to improve and increase communication with constituents, and engaging them in the planning and development process, especially amid global calls for increased accountability for diversity,

**Figure 2. Esri StoryMap featuring a translation toggle button**



equity, and inclusion. Many advocacy groups throughout the California region have been lobbying to have constituent representatives on committees and boards (1). The goals of this would be to increase accountability of these boards for representing the public interest. Constituent representatives could have the added benefit of increasing public participation and awareness of current projects being organized by MPOs and local Councils of Governments (COGs, regional planning organizations who report to local government), which could be harnessed by these organizations to increase and improve engagement with the public.

With the increased usage of online mediums for public meetings and communication, engagement still remains a perennial concern. MPOs are concerned with overseeing city planning and development; issues that directly impact city officials, business owners, developers, and residents. Despite the direct impact that MPO policies have on constituents, it can be difficult to create spaces for the public to engage directly with these topics, and a general lack of awareness of the ways one can engage and provide feedback for MPOs persists. While there is a legal precedent for public engagement with MPOs, increasing constituent engagement has become a top concern of many MPOs. In September of 2020, SCAG released their Public Participation Plan, detailing their commitment to increasing public engagement, and planned strategies to begin doing so (14). In this plan, SCAG outlines their commitment to increasing engagement particularly with underserved populations in meaningful dialogue

regarding decision making processes and gaining public input. The following guiding principles are from the SCAG Public Participation Plan:

> » Administer a transparent and clearly communicated process for public participation.
>
> » Ensure that opportunities for public involvement are accessible to all communities.
>
> » Provide information that is clear, concise, and current, making use of visualization and other techniques to enhance understanding.
>
> » Respect and consider all feedback received from members of the public, partners and stakeholders.
>
> » Adapt new communications strategies and technologies for public outreach.
>
> » Provide engagement opportunities that meet and exceed statutory requirements to ensure broad participation in SCAG's planning activities.

SCAG makes clear that they are looking to go above and beyond minimal requirements for public engagement, and instead are working to re-envision MPO engagement practices to create more equitable and accessible than ever. Use of GIS StoryMaps addresses a number of the stated objectives from SCAG. By introducing StoryMaps as a way to communicate with the public, MPOs are committing to using cutting edge technology to engage with and disseminate information. Furthermore, StoryMaps are an inherently visual medium. By taking data and producing it into maps and visual models, it increases the ease of understanding for lay audiences, allowing constituents to more directly engage with and better understand the workings and projects MPOs are pursuing. StoryMaps also have a number of ways for viewers to engage directly with MPO projects, such as the use of surveys and commenting.

## GIS Visualizations as a Tool for Engagement

What makes for a strong tool for public engagement? The information must be easily accessible, simple to navigate, and easy to understand. When we consider GIS, we are considering a form of mapping and geographic data. StoryMaps, dashboards, and other GIS visualization formats are dynamic and innovative tools that allows for complex, data-driven information to be disseminated to wide audiences in a user-friendly and interactive manner. The technology allows viewers to engage directly with the material presented and quickly understand what is being presented to them. More than that, it moves the information from being just data points on a page to becoming cohesive data storytelling. By introducing graphs, maps, and visualizations to an audience, they can begin to develop a greater understanding of a project or problem at hand.

## Uses and Qualities of GIS Visualizations

GIS visualizations, in particular StoryMaps, have been used to in a variety of fields to communicate concepts both granular and aggregate to general audiences. StoryMaps are intuitive to interact with and have been used in a number of creative ways. If one has ever looked up a restaurant to eat at in their city, they may have come across a StoryMap highlighting the best spots for a bite, such as the ones favored by Eater LA (15). The highly visual elements of StoryMaps allows for users to view and engage with diverse data sources in a fluid presentation, including personal stories and images, maps, graphs, visual projections of data, and more. Take the next example of a StoryMap developed by the National Oceanic and Atmospheric Administration National Ocean Service (NOAA/NOS), Old Dominion University, and Esri on Coastal flooding (16). In this StoryMap, the presentation incorporates imagery of historic buildings facing flooding, global maps showing where there have been changes in sea level in recent decades, graphs depicting changes in number of flood days over the years, and maps demonstrating where there will be anticipated increases in flooding issues at 20-, 40-, and 60-year projections. Effective presentations and persuasive arguments make fluent use of both data and personal stories to appeal to both logos and pathos in its attempts to win over an audience. This style of StoryMap development would be an especially effective method when working to increase public buy-in for planned projects.

StoryMaps can also be used to showcase locations, offer virtual tours, and even embed video. A StoryMap developed for the historic neighborhood of Georgetown in Washington, D.C. combines images, video, and written descriptions of some of the historic features of the town (17). Embedded into the StoryMap and accompanying each image or video is a map showing the location in Georgetown, allowing viewers to get an intimate feel for the neighborhood from the comfort of their homes.

StoryMaps are an excellent way to convey complex information to viewers that requires a multitude of layers, perspectives, and models. Consider the following StoryMap developed by Esri, *A World of Forests: Atlas* (18), which has multiple tabs with different maps explaining forest patterns across the globe. Each tab has a different layer, a legend explaining the measuring system, and a brief description of the map. The separate tabs tell different chapters of the story of forestry around the world, including where important forests are, where deforestation and re-forestation has occurred, and drivers of deforestation across the globe. The StoryMap also has a link to a second StoryMap (19) that is a multi-chaptered deep dive into forests around the world. The resource includes a combination of images of a variety of forests, visual data on the forestry industry, and more maps documenting global forest trends. These multi-layered and multimedia approaches allow the reader to gain rich detail and data in a user-friendly medium that is geared toward the average reader, allowing presenters to reach a wide audience.

## MPOs that have used GIS Visualizations for Public Engagement

GIS visualization tools are becoming an increasingly popular tool for dissemination of transportation planning and public communication in MPOs across the country. These MPOs have demonstrated fluent usage of tools such as StoryMaps for public engagement, and make use of embedded surveys, comment boxes, and language options.  For example, In Rapid City, South Dakota, their MPO hosted an online meeting in early 2020 using a story map to disseminate information to constituents about their Rapid Trip 2045 Metropolitan Transportation Plan (link available here). The StoryMap outlined the general plans for the future mobility planning for the city, including bike paths, roadways, and public transit. A key component was the use of mini surveys built into the StoryMap, to seek public opinion on the variety of upcoming mobility plans. See figure 3

**Figure 3. Sample survey from a StoryMap on public transit plans developed for Rapid City Area MPO**



below for an example of a mini survey that the organization used. The inclusion of mini surveys serves multiple purposes. First of all, it allows MPOs to gather information directly from their constituents, related to immediate concerns of the MPOs. This information is vital to MPOs, as it allows them to make mobility decisions with constituents' direct interests in mind. Second, surveys are an excellent tool to increase engagement, as they transform the content from one where the viewer is simply receiving information, to one where the viewer is in conversation with the information. As a tool of engagement, surveys pack a powerful punch. Another key element that the Rapid City Area StoryMap used was the inclusion of a contact page as their final slide. Constituents who were interested in staying up-to-date with the future plans for transportation in the city were invited to fill in a contact page with their name, phone number, email, and an option to receive future correspondence. Interested parties were also provided the opportunity of a final comment box to provide any additional feedback not covered under the surveys from earlier portions of the StoryMap. The fluidity of StoryMaps, as opposed to

traditional slides, allows users to collect a variety of information from their viewers that will allow for increased engagement and participation.

Language accessibility concerns have also been addressed through use of GIS visualizations. Consider the StoryMap used by the MPO of Grand Island, Nebraska in June of 2020 to disseminate their Long Range Transportation Plan to the public (20). It was developed in both Spanish and English to reach a wider portion of their constituency, increasing their ability to engage with non-english speaking residents. Like the one developed by the Rapid City Area MPO, this StoryMap included mini surveys and other interactive elements, creating opportunities for constituent feedback even in cases of language barriers.

**Figure 4. December 2018 Map of the Month from MTC, featuring rent increases in the Bay Area**
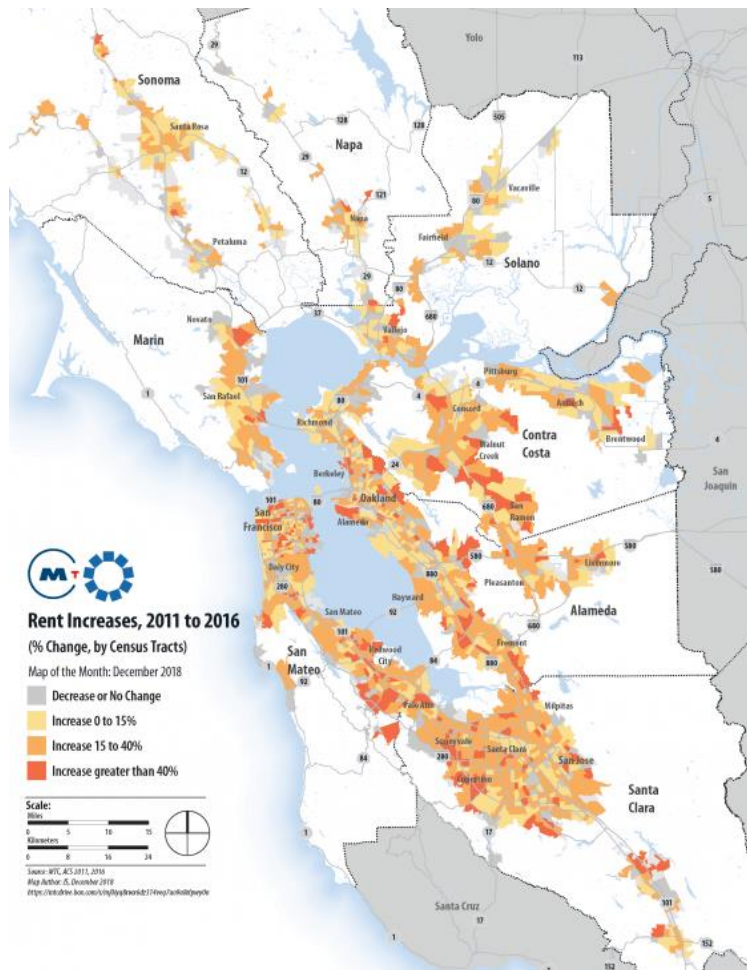


In California, the San Francisco Bay Area MPO, Metropolitan Transportation Commission (MTC), has already incorporated some GIS into public sector outreach. Until 2019, their website featured a GIS maps of the month developed (see figure 4) by the MTC Data and Visualization Team and contains information for constituents on issues pertinent to Bay Area residents such as housing, immigration, and census changes. The website also features an interactive mapping tool, One Bay Area: Maps, which allows current or future residents to select a mode of travel, their desired maximum travel time from two discrete points, their desired home value, and see where in the city they could live that would be within their price range and desired amount of travel time (21).

MPOs in California have dedicated GIS teams that make use of the mapping technology for a variety of research projects. MPOs such as SCAG, San Diego Association of Governments (SANDAG), Merced County Association of Governments (MCAG), Association of Monterey Bay Area Governments (AMBAG), and others also make GIS data directly available to stakeholders who wish to view GIS and census data themselves to conduct their own analysis. Depending on the

MPO, stakeholders or constituents may directly download data files themselves, or need simply email data coordinators for access to the files. Given the extensive use of mapping and data analysis in MPO work, the infrastructure for developing dynamic GIS visualization is well established among many of these MPOs and is a question more of directing resources towards public outreach, rather than to build up GIS facility.

# Applying GIS Visualization to Public Sector Outreach

## Building Engaging GIS Visualizations

While many MPOs in California currently offer GIS data to the public and stakeholders, GIS visualizations as of yet are in limited use among MPOs as a form of public outreach and engagement. GIS engagement such as the One Bay Area: Maps provides an important starting point for the myriad ways that GIS can be used as an effective engagement tool. But to build up effective outreach and engagement using GIS that fulfills and exceeds legal requirements for engagement and public access to information, MPOs will need to employ multi-pronged approaches that bring the public to the MPO websites. Namely, GIS visualization for outreach should focus on two main areas: MPO output and constituent input.

MPO output can manifest in a number of different ways. MPOs can develop StoryMaps to disseminate information to constituents and stakeholders on just about any relevant topic. Upcoming plans for road development, aviation changes, freight infrastructure and more can be fluently and expertly disseminated to the public through dynamic StoryMaps made available in both synchronous (i.e., open meetings) and asynchronous (i.e., linked on websites, posted on social media platforms, and distributed through listservs) manners. Consider the StoryMap developed for the MPO of Rapid City, South Dakota that explained to constituents the upcoming plans for fulfillment of their Rapid Trip 2045 Metropolitan Transportation Plan (link available here). Dashboards like the COVID-19 example at Johns Hopkins (figure 1) can also effectively keep constituents informed about current events, trends, and social issues affecting their communities.

Constituent input is the second area of focus. Increasing public engagement will help to develop a more symbiotic relationship between the public and MPOs, whereby MPOs are not only reaching out to and engaging with the public, but the public is also reaching out to and engaging with MPOs. GIS data visualizations offer unique opportunities to facilitate and expand communication between the public and MPOs and move beyond traditional meeting formats and public comment opportunities. Furthermore, an increasingly symbiotic relationship with the public will allow MPOs to better gather data, poll for public interest, and create more efficient research and recommendations to city planning that best meet constituent needs.

One example of a form of constituent input is through crowd-sourced data. Consider the myriad sustainability projects prioritized by MPOs. One area of growing interest is finding ways to increase active transportation methods such as walking, scooters, and bicycles. Despite growing interest in sustainable transportation, consistent usage of this remains lower than is

ideal, often due to a lack of safe pathways for active transportation users. The use of crowdsourced mapping data through programs such as Open Streetmaps, an open-access mapping program that allows users to track, edit, and input their own data, could provide MPOs with raw data on the frequency of use of routes throughout the city, popular destinations via bike or scooter, and allow that constituent data to inform future active transportation path development such as ones seen throughout bike-friendly cities such as Amsterdam. Crowd-sourced data can yield surprising results that can be difficult to capture through other more traditional methods of analysis.

## Plans for Engagement

Building dynamic GIS visualizations that speak to the public is only one portion of the equation. Responsible public outreach will go above and beyond the development of dynamic presentations and communication platforms but will actively work to increase engagement with these materials, to capture a wider swath of the public's opinion. Increased engagement on social media, including cross-referencing with related governmental organizations and key public officials will drive higher rates of engagement and accessibility for previously less engaged portions of the population. In California, outreach engagement by MPOs remains limited in scope and relies on traditional methods such as announcements of public meetings, and mandatory posting of meeting agendas and zoom links for online meetings. Increasing public engagement through GIS visualizations, surveys, and crowd-sourcing will require active planning for dissemination and engagement models to increase interaction. Of the 18 MPOs in California, only six have a presence on Twitter: Butte County Association of Governments, Fresno County Association of Governments, Metropolitan Transportation Commission, San Diego Association of Governments, SCAG, and Tulare County Association of Governments. Presence on Facebook is more significant, with 15 of the 18 MPOs in California having dedicated Facebook pages. Yet overall engagement on both Facebook and Twitter remains low. Effective outreach and communication with constituents through use of GIS visualization software will require concerted social media efforts across a variety of social media platforms where constituents and stakeholders can have increased access to links to social media, surveys, and other interactive models that will allow MPOs to increase conversational interactions with the public. Linking opportunities for engagement to social media platforms will allow constituents and stakeholders opportunities to engage even when they are not directly involved in open meetings, allowing for a greater breadth of data collection and engagement, and supporting MPOs' modern goals of actively engaging with constituents and seeking to eliminate barriers to communication.

Effective engagement plans will also leverage any existing relationships with community stakeholder organizations throughout their MPO region. Community organizations often have spent consistent time and energy developing community engagement and have direct interactions with community members who may be harder to reach for MPOs, such as LEP communities or constituents with less technology facility. Community organizations also have

the distinct advantage of being recognized within communities, and therefore have established trust and working relationships with constituents. Working together with stakeholder organizations will foster increased dialogue with constituents and facilitate positive relationships with the community at large.

## GIS Integration Workshops

In order to build best outcomes for integration of GIS into public sector outreach, intensive education and training on the technical aspects of GIS and the how and why of using it as an outreach tool is needed. At the Center for International Trade and Transportation (CITT), the workshop model is frequently used to disseminate information rapidly and with high competency. Workshops follow the ethos of learning by doing. By combining a variety of learning opportunities including visual presentations, Q and A, and active practice, participants can quickly become accustomed to a new skill and immediately practice integrating it into their own work. CITT has used the workshop model for a wide variety of courses that they have delivered, including a GIS day for high school students at Cabrillo High School, and a train-the-trainer workshop in partnership with Rio Hondo College focused on bringing GIS StoryMaps to K-12 educators.

One of the key benefits of the workshop model is the opportunity for practice and skill development within the lesson plan, where participants walk away with a skillset in hand and even a product or small presentation that they can deliver. The value produced in these settings can increase motivation and interest in the subject at hand, ease any potential anxiety about new tools or techniques, and jump-start the creative process for workers to build their skillsets. To deliver effective GIS education and integration into public sector outreach, workshops targeted at the needs of different workers and their backgrounds can create a user-friendly experience that breaks down any barriers to effective utilization of GIS in outreach efforts. GIS specialists employed by MPOs would not gain much from a primer on GIS but would benefit greatly from a workshop focused specifically on the uses of GIS as an outreach tool, and participating in brainstorming sessions that tackle real-life examples of issues that need greater outreach. Conversely, public relations workers and project managers may have no prior background in GIS and would benefit from more direct education on the how-to's of building GIS visualizations, but will likely very easily connect to how it may help increase engagement and may have many ideas on projects they would like to use GIS for. Given these differences in skillsets and backgrounds, GIS specialists may benefit more from a train-the-trainer workshop, while public relations workers and project managers would gain more from a direct workshop on building GIS visualizations.

In anticipation of these differences in needs and existing skillsets, CITT has developed is a tentative plan for a series of tiered GIS courses targeted at GIS specialists, public relations professionals, and project managers. We anticipate that completion of these workshops will build GIS skills in public relations workers and project managers, build outreach skills in GIS

specialists, and set the stage for increasing communication and collaboration between departments. GIS workshops may be especially important for smaller MPOs that do not have GIS specialists on staff, while larger MPOs such as SCAG may simply need assistance with increasing collaboration efforts between departments. Regardless of the size of the MPOS or their workers' experience level in GIS, we anticipate that these workshops will create ample opportunities for GIS visualization development, practice in planning and preparation for outreach, and increase collaborative efforts across departments.

### Train the Trainer Class

**Target Audience:** GIS professionals at MPOs across California
**Prior Knowledge:** GIS familiarity or expertise
**Objective:** building fluency in using GIS as a way to build conversations with the public
**Implementation:** Present examples of GIS StoryMaps, Dashboards, and other programs that have successfully been able to develop conversations with the public through use of GIS

*Train the Trainer Class*
**Introduction:** GIS as a tool for public sector outreach

- highlight where GIS is already being successfully used in California with stakeholders
- explore the gap between GIS use for stakeholders vs GIS use a public outreach
- examples of GIS use in public sector outreach

**Middle:** building blocks of successful use of GIS a public outreach tool

- the two sides of public outreach: dissemination and information gathering
- synchronous engagement (ex. Using StoryMaps to convey project plans) vs asynchronous (asking constituents to submit data on their vehicle usage)
- provide highlights of key elements to explore
- *Activity:* table discussions and brainstorming on other further ways GIS could be used to communicate with the public (both through synchronous/asynchronous, and dissemination/information gathering modalities)

**Culminating Project:** provide a sample project (maybe an old one from SCAG) and a prompt for the goals of public engagement

- divide members into groups and ask them to create a StoryMap that meets the guidelines of the prompt
- each group will present their StoryMap to the group
- final wrap up and take aways

### Pilot Classroom-Based Workshop

**Target audience:** project leads, Public relations, etc.

**Prior knowledge:** little to no experience with GIS, potentially experienced with public relations

**Objective:** Gain an understanding of GIS, learn about ways that it can be used to increase public sector outreach. Become familiar with common modalities of GIS and what they are best suited for.

**Implementation:** Present examples of GIS StoryMaps, Dashboards, and other programs that have successfully been able to develop conversations with the public through use of GIS. Provide examples of dissemination vs information gathering through GIS, and the different modalities that can be used to further those goals.

*Workshop*

**Presentation:** What is GIS? Increasing Public Engagement through GIS Visualization Tools

- provide a general overview of GIS
- how it is currently being used by MPOs in California
- common modalities for engagement (StoryMaps, Dashboards, OpenStreetmaps, etc.)
- GIS as a tool for increasing public engagement
- dissemination and information gathering
- synchronous and asynchronous usage
- accessibility and open meeting laws

**Project:**
- breakout groups where each group is assigned a prompt from a past MPO project from one of the major California MPOs (LA area, San Diego, or Bay Area)
- the group is tasked with developing an outreach plan using GIS tools (StoryMaps?)
- each group presents their plan to the group

**Virtual Workshop**

**Target audience:** project leads, Public relations, etc.

**Prior knowledge:** little to no experience with GIS, potentially experienced with public relations

**Objective:** Gain an understanding of GIS, learn about ways that it can be used to increase public sector outreach. Become familiar with common modalities of GIS and what they are best suited for.

**Implementation:** Present examples of GIS StoryMaps, Dashboards, and other programs that have successfully been able to develop conversations with the public through use of GIS. Provide examples of dissemination vs information gathering through GIS, and the different modalities that can be used to further those goals.

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# Conclusion

Public-sector outreach is an essential part of responsible public planning and development. Beyond legal requirements for public communication and engagement that complies with open meeting laws, anti-discrimination laws, and accessibility laws, MPOs in recent years are increasingly recognizing the importance of maintaining open dialogue with constituents for reasons beyond compliance. Constituents are the primary beneficiaries and recipients of the planning and programming developed by MPOs, and as such it is essential that their voices are heard, and constituents are given a seat at the table during all parts of the planning, development, and dissemination processes of MPO-backed projects and programs. GIS visualizations provide an innovative way of bringing data to life for constituents and stakeholders, while also creating opportunities for MPOs to gather key input from constituents, creating a true dialogue process between MPOs and the community.

Work environments have changed in a permanent way due to the COVID-19 pandemic. As a result, there have been shifts to the supply chain as well as massive shifts in constituent transportation habits. Without active communication and dialogue between constituents and MPOs, capturing the magnitude of transportation shifts and the subsequent changes that have resulted from those shifts (i.e., supply chain, housing, sustainability efforts) will present a barrier to creating effective transportation development across California and the greater PSR regions. Bringing in constituent experiences and using the public's perspectives will help to create more nuanced, targeted, and effective programming that is addressing the transportation and development needs of the community.

In MPOs across the country, GIS is already being used as a digital tool to enhance outreach efforts, research, analysis, and, increasingly, to cultivate online communities using a common visual platform. MPOs in California, such as SCAG, SANDAG, and MTC, have used GIS platforms

in innovative ways and are working to more aggressively incorporate GIS visualization into their outreach plans and more effectively engage with constituents across the region. One byproduct of the COVID-19 pandemic and quarantine is that U.S. citizens in communities across the nation are more open to online systems of collaboration and commerce. This new reality underscores the value of data-driven GIS online outreach tools and their continued relevance in any comprehensive outreach plan. The user-friendly elements of GIS visualizations that disseminates information in quick, easy-to-understand formats that are relevant to constituents make it a prime tool to communicate more effectively with a wide audience. Furthermore, the data collection abilities of GIS tools will allow MPOs to continue to benefit from the increased communication through gaining a more concrete understanding of community challenges, concerns, and desires for their regions.

Increasingly, MPOs are becoming vitally aware of the roles of diversity, equity, and inclusion in city planning. Prioritizing communication and constituent and stakeholder input into city planning is a key way to ensure that diverse voices and perspectives are considered and prioritized throughout the process. Among organizations with long histories of community outreach and collaboration such as the Peace Corps, GIS visualizations are becoming a mainstay of non-profit communication strategies and increasingly seen as a vital workplace skill (22). As MPOs seek to broaden their scope and push for greater diversity, equity, and inclusion in city planning and development, GIS visualizations will be a key tool to fully realize these goals.

# References

1. S. Lantz, Transportation Director for the South Bay City Council of Governments, personal communication

2. "Southern California Association of Governments – Frequently Asked Questions." Accessed August 24, 2020. http://www.scag.ca.gov/about/Pages/FrequentlyAskedQuestions.aspx.

3. "AB 32 Global Warming Solutions Act of 2006 | California Air Resources Board." Accessed January 22, 2021. https://ww2.arb.ca.gov/resources/fact-sheets/ab-32-global-warming-solutions-act-2006.

4. "Government in the Sunshine Act - Ballotpedia." Accessed August 27, 2020. https://ballotpedia.org/Government_in_the_Sunshine_Act.

5. Americans With Disabilities Act of 1990, Pub. L. No. 101-336, § 1, 104 Stat. 328 (1990).

6. Civil Rights Act of 1964, Title VI, 42 U.S.C. § 2000d

7. Lewis, Morgan, Bockius LLP-Thomas F. Gede, William D. Kissinger, and Monica A. Schwebs. "California Public Agency Open-Meeting Rules Relaxed Amid COVID-19 | Lexology." Accessed February 4, 2021. https://www.lexology.com/library/detail.aspx?g=36be8dc9-3881-43f9-8bde-4e1a3136bb76.

8. "Coronavirus COVID-19 (2019-NCoV)." Accessed June 30, 2021. https://gisanddata.maps.arcgis.com/apps/dashboards/bda7594740fd40299423467b48e9ecf6.

9. Metropolitan Transportation Commission. "Plan for Special Language Services for Limited English Proficient (LEP) Populations." Accessed June 1, 2021. https://mtc.ca.gov/sites/default/files/MTC_2019_Plan_for_Providing_Special_Language_Services_to_LEP_Population_-_Final.pdf

10. "Writing Accessible StoryMaps Content." Accessed June 30, 2021. https://www.esri.com/arcgis-blog/products/arcgis-storymaps/constituent-engagement/writing-accessible-story-map-content/.

11. Evans, Owen. "Producing a Story Map in Multiple Languages." *ArcGIS Blog* (blog), August 17, 2017. https://www.esri.com/arcgis-blog/products/story-maps/constituent-engagement/producing-a-story-map-in-multiple-languages/.

12. "Restoring Old Havana." Accessed June 30, 2021. https://storymaps.esri.com/stories/2017/havana-restoration/index.html.

13. "ArcGIS Online Assistant." Accessed July 8, 2021. https://ago-assistant.esri.com/.

14. Southern California Association of Governments. "Public Participation Plan." Accessed August 27th, 200. https://scag.ca.gov/sites/main/files/file-attachments/final2018ppp.pdf?1605729885

15. "38 Essential Restaurants in Los Angeles." Eater LA, October 3, 2017. https://la.eater.com/maps/best-los-angeles-restaurants-eater-38-essential.

16. "Coastal Flooding." ArcGIS StoryMaps, June 22, 2021.
    https://storymaps.arcgis.com/stories/4faf6d052c8f41b3b9b99c506642bca5.

17. Allen Carroll. "Touring Georgetown, D.C." ArcGIS StoryMaps, April 28, 2020.
    https://storymaps.arcgis.com/stories/dc4532a3234d450b80709ad36f3bd77a.

18. "A World of Forests: Atlas." Accessed July 8, 2021.
    https://storymaps.esri.com/stories/2019/anthropocene-atlas/3-forests.html.

19. ArcGIS StoryMaps. "A World of Forests," May 28, 2021.
    https://storymaps.arcgis.com/stories/f914a19bb499432eb74ae5feced5930c.

20. ArcGIS StoryMaps. "Plan de Transporte de Largo Alcance 2045." Accessed March 18,
    2021. https://storymaps.arcgis.com/stories/ede2393853914fecaa9fee79655db720.

21. "One Bay Area: Maps / Travel Time & Housing Prices." Accessed May 25, 2021.
    http://travel-housing.mtcanalytics.org/#origin=37.763900,-
    122.413000&mode=s3&time=AM&scenario=2010&xyz=9.00/37.7639/-
    122.4130&max_time=29.96&max_price=5300000&min_price=1500000.

22. National Peace Corps Association. "Introduction to Data Visualization as an Essential
    Skill in the Workplace." Accessed July 14, 2021.
    https://www.peacecorpsconnect.org:443/events/introduction-to-data-visualization-as-
    an-essential-skill-in-the-workplace.

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