



GIS Open Data

Case Studies of Select Transportation Agencies

June 2019

Prepared for:

**Office of Planning
Federal Highway Administration
U.S. Department of Transportation**



**U.S. Department
of Transportation
Federal Highway
Administration**



**U.S. Department of Transportation
Volpe Center**

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REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.				
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE June 2019		3. REPORT TYPE AND DATES COVERED Final Report
4. TITLE AND SUBTITLE GIS Open Data Case Studies of Select Transportation Agencies				5a. FUNDING NUMBERS HW2LA5 SF025
6. AUTHOR(S) Noah Augustine, Benjamin Bressette				5b. CONTRACT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Department of Transportation John A. Volpe National Transportation Systems Center 55 Broadway Cambridge, MA 02142-1093				8. PERFORMING ORGANIZATION REPORT NUMBER DOT-VNTSC-FHWA-19-13
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Department of Transportation Federal Highway Administration 1200 New Jersey Avenue, SE Washington, DC 20590				10. SPONSORING/MONITORING AGENCY REPORT NUMBER FHWA-HEP-20-004
11. SUPPLEMENTARY NOTES				
12a. DISTRIBUTION/AVAILABILITY STATEMENT This document is available to the public on the FHWA website at https://www.gis.fhwa.dot.gov/ .				12b. DISTRIBUTION CODE
13. ABSTRACT (Maximum 200 words) In supporting State Departments of Transportation (DOTs) and metropolitan planning organizations (MPOs) in using geographic information systems, the Federal Highway Administration (FHWA) is publishing this case study report focusing on the creation and use of open data applications by transportation agencies. To gather information for this report, the U.S. DOT Volpe National Transportation Systems Center interviewed two State DOTs and two MPOs, and developed a case study focusing on their experiences. The purpose of this document is for State DOTs and MPOs to consider the approach that these agencies have used in employing open data to enhance public access to transportation information and learn best practices from peer agencies.				
14. SUBJECT TERMS Geographic information systems (GIS), Open Data, Open Data Portals, Public Data, Data Transparency, Data Integrity				15. NUMBER OF PAGES 19
				16. PRICE CODE
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT Unlimited	

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std.
Z39-18
298-102

Acknowledgments

The Federal Highway Administration and the U.S. Department of Transportation Volpe National Transportation Systems Center would like to thank the participating agencies and interviewees that made this case study report possible. The participating agencies are listed below and the particular individuals who took the time to be interviewed for this report are listed in Appendix A: Case Study Participants.

- Mississippi Department of Transportation.
- New York State Department of Transportation.
- Wilmington Urban Area Metropolitan Planning Organization.
- North Jersey Transportation Planning Authority.

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List of Abbreviations

Abbreviation	Term
AASHTO	American Association of State Highway and Transportation Officials
AMPO	Association of Metropolitan Planning Organizations
FHWA	Federal Highway Administration
GIS	Geographic Information Systems
GIS-T	Geographic Information Systems for Transportation
LPA	Local Public Agency
MAP-21	Moving Ahead for Progress in the 21 st Century Act
MDOT	Mississippi Department of Transportation
MPO	Metropolitan Planning Organization
NJTPA	North Jersey Transportation Planning Authority
NJTransit	New Jersey Transit
NYSDOT	New York State Department of Transportation
PATH	Public Accountability in Transportation Hub
QGIS	Quantum GIS
TIA	Traffic Impact Analysis
USDOT	United States Department of Transportation
WMPO	Wilmington Metropolitan Planning Organization

I. Introduction

The amount of data available publicly about the national transportation system has expanded rapidly in the past decade. This proliferation of publicly accessible transportation data is partially a result of a movement toward using performance measurement and performance management throughout public agencies. Performance management rulemakings from the Moving Ahead for Progress in the 21st Century Act (MAP-21) required agencies to set performance measures and regularly collect the data to evaluate their performance, encouraging data-driven decision making across State DOTs, MPOs, and transit agencies. Additionally, an increasing focus on openness and transparency in government has driven some agencies to make more data available to the public and their transportation partners.

The continuing evolution of geographic information systems (GIS) technology has also played a role in the expansion of public datasets and the ways agencies make transportation systems data public. Collecting and maintaining large volumes of data on assets and business processes resulted in disjointed datasets, often housed in multiple databases and inaccessible within or outside the agency. Linking asset data to geographic data enables more direct and accessible use of the data, particularly for operational functions and maintenance. Likewise, linking and integrating multiple data sources makes possible new methods of analysis and planning. Open data portals or websites where public agencies can make their data available for download or use have become key tools in information dissemination.

I.1 Background

In 2018, the United States Department of Transportation (USDOT) published a Strategic Plan.¹ The goals of the plan are four-fold: safety, infrastructure, innovation, and accountability. The Federal Highway Administration (FHWA)'s GIS in Transportation program incorporates these goals into resources created for State Departments of Transportation and metropolitan planning organizations (MPOs). GIS applications can be used to influence and support each of these goal areas, particularly when used in communication with the public.

Open data portals directly contribute to innovation and accountability goals by allowing more researchers, students, and members of the public to access and analyze State or MPO-collected data. The

FHWA Strategic Plan Goals and Objectives

- **Safety**—Reduce transportation-related fatalities and serious injuries across the transportation system.
- **Infrastructure**—Invest in infrastructure to ensure mobility and accessibility and to stimulate economic growth, productivity, and competitiveness for American workers and businesses.
- **Innovation**—Lead in the development and deployment of innovative practices and technologies to improve the safety and performance of the Nation's transportation system.

¹ <https://www.transportation.gov/sites/dot.gov/files/docs/mission/administrations/office-policy/304866/dot-strategic-planfy2018-2022508.pdf>

provision of open data can also be used to support safety and infrastructure initiatives through avenues like crowdsourcing data on damaged or blocked roads for more rapid emergency response (see FHWA GIS in Transportation [August 2018 newsletter](#)). With robust open data portals, the public has direct access to much of the information that impacts the transportation network, enabling stakeholders to hold agencies and municipalities accountable for conditions and ongoing work. Innovations using public data advance transportation, and can directly benefit transportation agencies.

I.2 Purpose and Methodology

This report is part of the GIS in Transportation case study series. FHWA designed the series to highlight GIS examples across State DOTs and MPOs. These case studies allow similar agencies to stay apprised of current practices in the field, learn about best practices for particular GIS implementations, and become familiar with which groups are leading the field and in which ways. Through each case study, colleagues at other agencies will know whom they can contact when they need assistance developing and implementing a related program or resolving a related issue.

The GIS in Transportation program identified the topic of open data as an area of growing interest and implementation among State DOTs and MPOs through the results of the GIS for Transportation (GIS-T) 2018 Survey administered by American Association of State Highway and Transportation Officials (AASHTO), and a survey conducted by the Association of Metropolitan Planning Organizations (AMPO). Further, these survey results revealed enough transportation agencies interested in learning more on the topic as well as enough potential interviewees to provide sufficient information for a robust case study report.

Through the same AASHTO and AMPO surveys, the GIS in Transportation Program team identified those State agencies and MPOs that have demonstrated experience in the field of leveraging open data use in GIS applications. The team conducted further research into the list of transportation agencies identified, and selected organizations that had significant experience with open data, and those with the ability to participate in this case study report. Those agencies are:

- New York State Department of Transportation (NYS).
- North Jersey Transportation Planning Authority (NJTPA).
- Mississippi Department of Transportation (MDOT).
- Wilmington Urban Area Metropolitan Planning Organization (WMPO).

Staff from each of the identified organizations were generous enough to provide one hour of their time with the research team for a phone interview. Agency representatives were the most knowledgeable staff on how open data applications were developed and implemented within their organization. The research team developed a standardized interview guide, which can be found in Appendix B, to use for the interviews. This allowed the research team to guide each interview consistently among agencies and produce consistent information that can be compared among respondents. Additional follow up questions were also asked dependent on information provided.

I.3 What Is Open Data?

Open data is a concept and ideology more than a tangible product. At its core, open data is just that: data that is freely available to all individuals to use at their discretion. There are no copyrights or restrictions, outside of basic citations. Private individuals can download, manipulate, and analyze this data at their discretion, to support whatever their research agenda or goal may be.

This case study did not use a predefined idea of open data; rather, it identified agencies based on how they defined open data through project applications. Interviews were structured around these specific projects, learning how they were shaped by the agency's definition of open data. The agencies used the concept of open data flexibly to respond to their internal and external stakeholders and provide information widely.

2. Agency and Project Profiles

Interviews with New York State DOT, Mississippi DOT, Wilmington MPO, and the North Jersey Transit Planning Authority explored the ways these agencies use open data portals, maps, and other data-sharing methods. Each of these agencies uses GIS tools to engage with and communicate information to internal and external stakeholders in multiple ways. Some agencies used open data GIS tools primarily for information gathering, while others used open data GIS tools primarily for information dissemination. The unique stakeholders and goals of each interviewee shaped their approach to GIS open data.

These profiles identify key components of each agency's approach to open data, including basic information on their projects, agency structures, and the challenges they faced in making data public.

2.1 North Jersey Transportation Planning Authority (NJTPA)

The North Jersey Transportation Planning Authority (NJTPA) is the federally authorized MPO for 6.7 million people and 13 counties in northern New Jersey. NJTPA's data needs are unique in the sense that it brings together data from 13 member organizations: Newark, Jersey City, New Jersey Department of Transportation (NJDOT), Port Authority of New York and New Jersey (PANYNJ), NJ TRANSIT, New Jersey Department of Environmental Protection (NJDEP), and all of New Jersey's Transportation Management Associations (TMAs). In order to allow efficient access to these many datasets, the NJTPA created the [Open Data Portal](#), which normalizes and integrates data from these multiple stakeholders to make it more accessible and meaningful. The Open Data Portal includes data submitted by all stakeholders, including datasets related to demographics, transit ridership, roads, asset management, freight, and many other topics.

While the Open Data Portal holds all of NJTPA's stakeholders' submitted datasets, it has also incorporated the data into a number of topic-specific tools that its members can use on a day-to-day basis. These applications were developed in house or by consultant efforts, and provide valuable information on county demographic profiles, regional freight activity, and scenario planning for the region. These specialized tools allow stakeholders to access NJTPA's robust data repository in a more user-friendly and directed approach, as opposed to analyzing raw data (though that option is available as well).

This large, ongoing data collaboration effort was achieved through forming a group of GIS technical contacts, including points of contact for each stakeholder. An initial survey identified stakeholders to participate, and this group instituted an informal agreement asking for quarterly data updates and relevant additions to the data in the Open Data Portal. Internally, NJTPA staff incorporate this data into planning efforts and project work, and host annual workshops for staff to collaborate on needs and wants for future data collection and management.

NJTPA Open Data Portal

Project Description

NJTPA undertook a project to create an open data portal that would serve member organizations in providing a diverse array of data. Their goal was to standardize data across members to create a repository of useful information about the region.

Key Stakeholders and Goals

NJTPA developed their repository through collaboration of 13 member counties, two cities, a port authority, and a transit agency. The repository allows stakeholders to access and utilize data collected by each other.

Data Sources, Integration, and Platforms

Data for NJTPA's Open Data Portal was taken from all 17 members and standardized by NJTPA. The data is updated every quarter with relevant information and is accessible to the general public with featured tools and applications created by NJTPA.

Champions and Working Structures

NJTPA created a GIS Technical Contact Group that combines GIS staff from all members into one collaborative working group. Internally, an annual workshop identifies future data wants and needs for the authority.

Successes

- NJTPA effectively crafted an informal agreement with 17 independent organizations to collaborate on data management.
- This success is complemented by an internal staff that is dedicated to advancing GIS practices and data integration into planning.

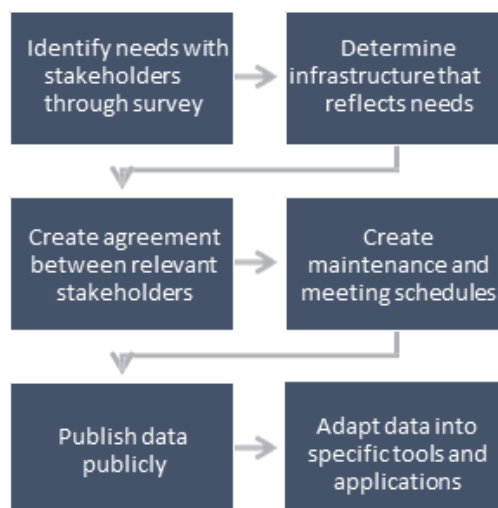
Challenges

- When collaborating with such a diverse group of stakeholders, data wants and needs can extend beyond NJTPA's capacity.
- The authority also deals with issues of requests being project specific, with limited utility in sharing publicly.

Lesson Learned

- One key lesson NJTPA would pass on is the importance of establishing a stakeholder group in the beginning.

Project Processes



2.2 Wilmington Urban Area Metropolitan Planning Organization (WMPO)

The Wilmington Urban Area Metropolitan Planning Organization (WMPO) covers roughly 280,000 residents of the greater Wilmington, North Carolina metropolitan area, including three counties and seven municipalities. WMPO's use of open data applications is relatively new, and only in recent years has it incorporated GIS into project work and planning decision making. WMPO began integrating these business practices when developing the most recent version of its long-range transportation plan. During the planning process, WMPO created an [open data public input map](#) through which residents were able to input data areas of transportation concern. The data gathered through this interactive mapping process was analyzed in the Cape Fear [Moving Forward 2045 Metropolitan Transportation Plan](#).

The open data mapping effort was successful in a number of ways, the most important of which was through providing a way for the public to interact with and input data into a GIS platform. This publicly created map was available on WMPO's website, which allowed the public access to the additional open data resources that WMPO provides, including traffic counts and traffic impact analyses (TIAs). Providing a broad array of open data can inform the public's knowledge about what WMPO's role is in the area, as well as upcoming transportation investments.

WMPO engaged in robust public engagement to gather feedback from various community members. WMPO had received feedback in the past that certain communities felt excluded from the planning process, and wanted to increase participation in the planning process. In an effort to reach members of the community who were not typically included in planning efforts, WMPO advertised its long-range transportation plan and public input effort at retirement fairs, community events for Spanish-speaking residents, and churches in minority communities. WMPO also reached out to people via social media to engage a younger demographic. Using an online feedback-gathering tool rooted in GIS can allow for a much wider data collection process than an in-person campaign limited by staff time and availability (see Figure 1).

The compilation of WMPO's data resources is now housed in their GIS Open Data Portal. Launched in spring 2019, the portal incorporates all of WMPO's public applications and maps, along with their publicly available databases that are available to download. WMPO designed the portal to be simple and easily navigable.

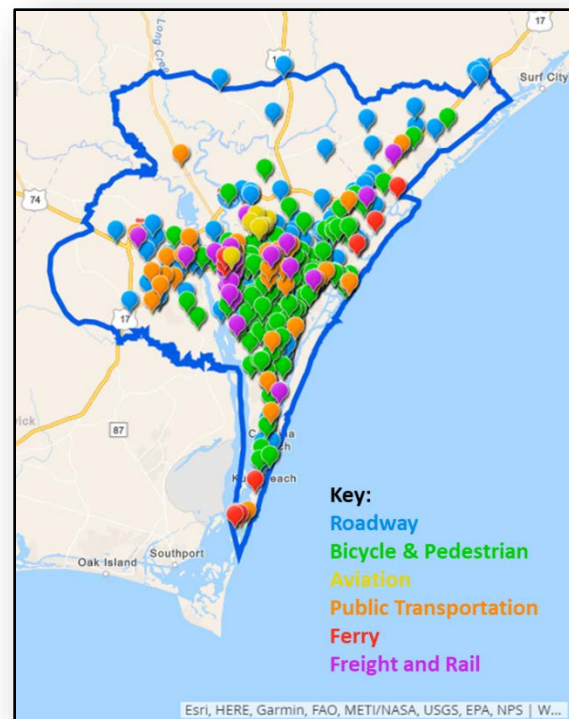


Figure 1. Illustration. Screenshot of WMPO's Open Data Interactive Mapping Tool, with comments from the public. Source: WMPO.

Wilmington MPO Open Data Maps

Project Description

WMPO began its use of open data with a public input map, which was part of its long-range plan. The input map allowed the public to submit projects that were of concern to them, using a web map. The success of this project allowed WMPO to develop additional open data applications.

Key Stakeholders and Goals

When creating its public input map, WMPO engaged with a number of stakeholders through a comprehensive public input process. While there were barriers for communities without internet, WMPO made attempts to overcome these barriers, such as bringing iPads to community events.

Data Sources, Integration, and Platforms

The main input for the public input map was user-entered geographically identifiable data. The data were then cleaned, standardized, and matched to internal data to make it more accessible to the public.

Champions and Working Structures

Development of the open data portal required a team effort, with each team member contributing ideas that went into the final product. All publishable materials must be approved by the executive director and the board of directors.

Successes

- WMPO effectively engaged multiple groups within the community, using non-traditional mediums of feedback. In a small organization with only 3 planners, this was no small feat and only made their product more valuable.

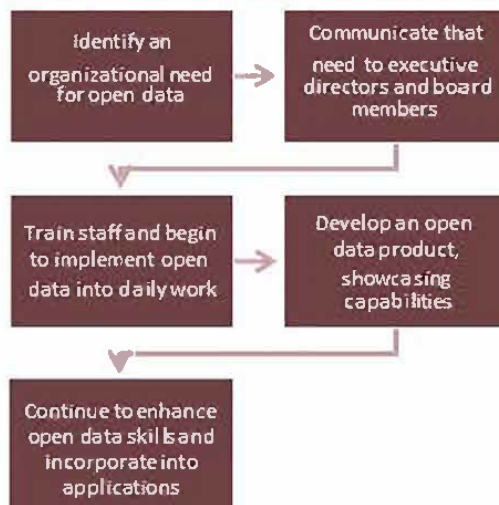
Challenges

- WMPO is relatively new at developing GIS applications. It took some time to engage and convince the organization of the benefits of open data and GIS. This posed challenges with being able to effectively execute and implement this project, making it a priority for the organization.

Lesson Learned

- One key lesson WMPO would pass on is to engage with the community, and continue to develop new methods of stakeholder engagement.

Project Processes



2.3 Mississippi Department of Transportation (MDOT)

The Mississippi Department of Transportation maintains a statewide transportation system, including over 5,800 bridges and 29,000 lane miles.² The MDOT GIS division has been operating for around 15 years, and had developed many systems to house geospatial and other data. MDOT recently began a series of projects related to open data with the intent of giving more people access to their data both internally and externally. A series of requests through the Mississippi legislature to increase transparency and accountability was one impetus for MDOT to develop open data resources and publish more transportation-related data online. These requests were also an important factor in prioritizing which datasets were made available first, and how MDOT approached their open data project. MDOT also created these open data resources in response to internal requests for data across the agency.

The MDOT open data development process began with a fact-finding mission to investigate current GIS data usage across the agency, and determine what employees of MDOT would find most helpful in a data resource. Ensuring buy-in from other divisions early in the project made the process of developing tools easier, and ultimately more successful. Feedback from across the organization indicated that employees would like to have access to a set of mapping tools similar to Google Maps in appearance and simplicity, to access the existing MDOT data. MDOT's GIS division began a process of investigating possible platforms, software packages, and methods of creating open data sets.

One of the notable practices MDOT pursued was their use of free or open source software. As they grew over the years, the GIS division noted that software packages were often not interoperable, and were sometimes discontinued, as well as being an expensive item to procure. Their commitment to ensuring access to their data across the agency led to key decisions on how they created a central repository, and to using Quantum GIS (QGIS) software/leaflet so that an unlimited number of licenses could be obtained. This strategy will ensure that data access within the organization is open, inexpensive, and adaptable to future software needs.

MDOT has published [bridge](#) and [pavement](#) data on their public facing website, the MDOT Public Accountability in Transportation Hub (PATH) site (see Figure 2). MDOT will be continuing an incremental approach to publishing new datasets as they are completed. The next module to be added to the PATH site will be data on current and planned projects across the State.



Figure 2. Illustration. Posted and/or closed bridges interactive map. Source: MDOT.

² <https://path.mdot.ms.gov/>

Mississippi DOT Open Data Maps

Project Description

Mississippi DOT (MDOT) undertook a project to display more maps of their data to internal and external stakeholders. Their project produced online interactive maps displaying data publicly for the first time in its history (property lines, bridge data, etc.).

Key Stakeholders and Goals

MDOT's key stakeholders included employees across the agency, external partners (MPOs, LPAs, etc.), and even the Mississippi Legislature (who requested more access to open datasets). Project goals included creating a low-cost, robust system for accessing data, and providing easily digestible maps on the State DOT website in a familiar format for users.

Data Sources, Integration, and Platforms

MDOT gathered data from many sources within the agency and attempted to build a warehousing solution that did not restrict their options for accessing the data. Most of the work done was internal. The agency currently uses free, open source GIS software for accessing data internally.

Champions and Working Structures

The planning, bridge, research, maintenance, and IT divisions worked together on this project. MDOT's unique structure of a single chief engineer supervising these departments made it easy to secure executive support and broad buy-in across the agency.

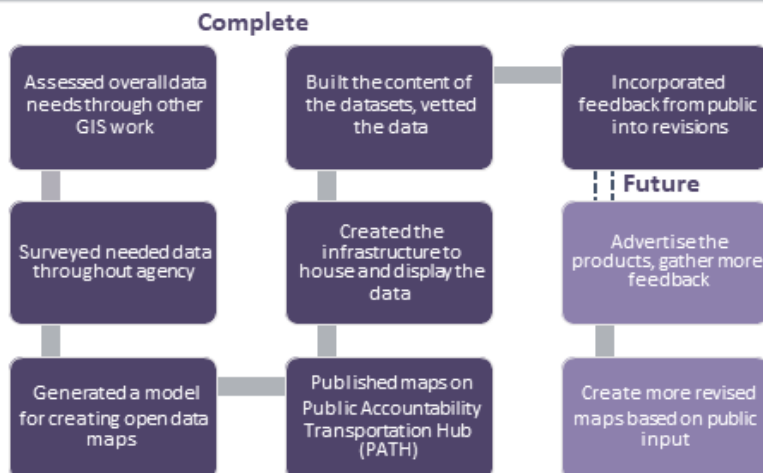
Successes

- After the initial maps became available online, MDOT received more requests for maps.
- Creation of these maps helped spur GIS use throughout MDOT.
- Process partly spurred creation of a data governance plan.

Challenges

- Programmers are not GIS experts, which created the need for increased collaboration between departments.
- Plotting data revealed discrepancies and the opportunity to improve overall data quality and raise awareness of the need for precision in data collection and storage.

Project Processes



Lessons Learned

- MDOT described needing a champion but also a visionary who creates needed innovations.
- One of the next datasets planned for external display includes all ongoing construction projects, with start and completion dates and location.

2.4 New York State Department of Transportation (NYSDOT)

New York State's Department of Transportation manages a vast statewide transportation system, including over 17,400 bridges and more than 113,000 highway miles.³ NYSDOT began a process of enhancing their publicly available datasets over three years ago. Their primary drive for better data access was internal, to serve employees trying to access the vast datasets compiled in various systems. NYSDOT took a comprehensive, rather than incremental, approach to understanding the open data needs within and outside their organization, including a thorough interview process to uncover pain points related to data access throughout the organization. Their findings indicated that while many very valuable data assets existed, access to the data required an expert level of database or GIS knowledge, and was not available widely.

NYSDOT's next step was to work toward data integration within an enterprise data warehouse, ensuring that the data repository would serve all the identified needs and accommodate their disparate datasets. While gathering this data, the core project team ensured that everyone who asked for an application or modification to the system contributed their own data—ensuring buy-in to the final product through a reciprocal exchange. This process took over a year and a half, after which NYSDOT began working on individual open data products. Their approach to making data available involves creating lightweight mobile apps, each focused on a particular dataset or operational need. Almost 50 mobile apps were identified, and the first six have been put into use internally.

With priority on building tools needed internally, NYSDOT has also begun to work within the context of New York State's larger [Open Data framework](#). This innovative and statewide platform allows all New York State agencies (and other partners) to upload datasets to a centralized data portal, expanding well beyond transportation to encompass many other categories of data. Although this portal creates an ideal landing place for the datasets NYSDOT is creating, the platform also requires a level of review and data quality assurance that will prolong the process of making data publicly available and necessitate outside review for formatting and consistency.

NYSDOT's initial app development and future steps to make these internal sources available publicly emphasize the need for careful planning, and the benefits of a tightly integrated team working cross departments.

³ <https://www.dot.ny.gov/about-nysdot/history/past-present>

New York State DOT Open Data Apps

Project Description

New York State DOT (NYSDOT) undertook a project to create a set of open data applications that would serve internal stakeholders in accessing information across divisions, and would eventually be made public. Their process was comprehensive and involved building significant new data infrastructure.

Key Stakeholders and Goals

NYSDOT's largest stakeholders were internal partners unable to access (or were unaware of) the extensive data NYS DOT owned. Goals included making data accessible, transparent, and GIS enabled.

Data Sources, Integration, and Platforms

This project integrated many data sources through creating an integrated data warehouse. The majority of work thus far has involved gathering, cleaning and integrating data, as well as creating the first round of viewers and apps to display this data internally.

Champions and Working Structures

A small partnership between Asset Management, GIS and IT departments created the steering committee for this project. This group secured executive level buy in, which was key in getting resources in place, as well as reciprocal data sharing agreements with other departments, generating more buy-in to the products.

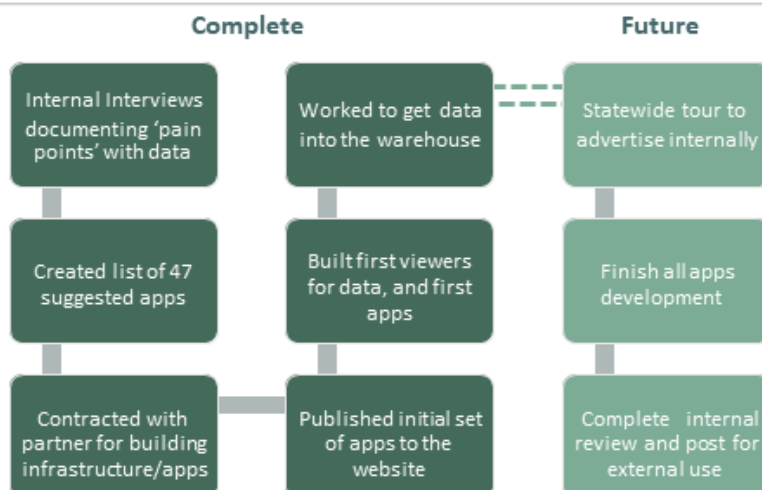
Successes

- Generating buy-in & momentum through personal relationships across departments
- Using a 'Lego' approach to create a nimble, alterable structure
- Using a comprehensive approach and identifying all needs up front.

Challenges

- Building the extensive infrastructure needed to integrate and house data
- Creating access to unstructured datasets
- Raising awareness of the new tools internally
- The NYS review process for any external facing websites or datasets

Project Processes



Lessons Learned

- NYSDOT found that the process was a 'mirror' for discovering data issues
- NYSDOT credits a comprehensive approach with the project success
- The project has already generated enthusiasm, and is recognized as providing a good ROI.

3. Lessons Learned

Agencies may create and use open datasets and data portals to fulfill multiple objectives. Open data is publicly available, and can be oriented to a variety of users, stakeholders, and applications. While traditional web-based open data portals are a common method of providing access to data, there are many ways to make data available, including maps and mobile applications. These techniques will vary depending on agency circumstances, including legislative priority, available resources, and the overarching style of presenting public data throughout the agency.

This section of the report will focus on how agencies explore, use, and disseminate open datasets using GIS, as well as the implications of these findings for other agencies.

3.1 Differences between MPOs and State DOTs

Across the four participants in this case study, the most striking difference in purpose for open data projects was the stakeholders for each agency. WMPO and NJTPA had more external stakeholders driving, shaping, and using their open data projects, while MDOT and NYSDOT developed products through a process that was mainly internal. The differences between a metropolitan planning organization and a State DOT explain some of this difference; NYSDOT noted, for example, that the main purpose of the applications they were building was to enable operations goals, such as prioritizing maintenance on roads. Tools developed by WMPO and NJTPA were much more influenced by and designed for public consumption. In WMPO's case, some of its tools were specifically designed to gather input from the public.

With these functional differences, there were similarities among all four agencies. Some of the common themes included working structures and the need for project champions, the need for data integrity in creating open datasets, and the importance of coordination between many stakeholders.

3.2 Open Data Project Characteristics

3.2.1 Approaches and Motivations

As discussed briefly above, the major drivers of open data differ by agency type, with State DOTs working more to provide internal tools throughout the agency to aid in work processes, and WMPO and NJTPA pursuing data sharing across other agencies and directly with the public.

Both NYSDOT and MDOT used an 'internal first' approach to do a quality check on their data. Deploying a tool internally first allows these agencies more time to review the datasets and discover any discrepancies before publicly providing that data. Both agencies described a somewhat more complex process for making data publicly available, and a common need to ensure data integrity before disseminating information.

In NJTPA's case, the creation of an open data portal not only made agency data public, but also greatly

enhanced the data available to NJTPA. Sharing of data through open data portals between agencies could be a useful best practice for State DOTs and MPOs, who often collect overlapping information, or identical data that does not connect past the State borders. Using a single data repository might eliminate unnecessary duplication of efforts, and ease reporting burdens for both State DOTs and MPOs.

WMPO's use of an open data input map served a different purpose than the other three case study participants, in that their approach involved public data solicitation as well as dissemination. As part of their long-range planning efforts, the creation of an input map simplified data collection, allowed for correlation of comments and feedback to internal datasets, and helped to present the findings of their work in an accessible way to their community. Using GIS-based systems to collect feedback has become more common in the last few years, and multiple commercial platforms support this type of data collection at the local level.

3.2.2 Stakeholders

Much like the goals of each agency, the stakeholders for each open data project were quite different. The table below briefly summarizes some of the stakeholders identified by each agency, but is not an exhaustive list.

	General Public	Internal Employees	Legislature	Other State Agencies	Other Local Agencies
NJTPA	X	X			x
WMPO	X	X			X
MDOT	X	X	X		X
NYSDOT	X	X	X	X	X

Although the agencies each have stakeholders in common, the role of stakeholders varies considerably between agencies. For example, the role of the public is integral to the creation of data in WMPO's case, while the role of the public for State DOTs involves giving feedback on open data tools and potential other data needs. Likewise, the State DOTs were not soliciting data for incorporation into the portals from local agencies, while WMPO and NJTPA did request input.

3.2.3 Scope and Structures of Projects

Each project highlighted for this case study met a slightly different need, and entailed different scopes of effort. The MDOT, NYSDOT, and NJTPA projects required the creation of centralized data repositories, extensive data cleaning, and revisions to business practices to ensure data collection met parameters for

inclusion in integrated datasets or was cleaned and standardized. Some projects were externally influenced, such as the requirements NYSDOT must meet before their data is eligible for inclusion on the New York Open Data webpage. Although NYSDOT's overarching requirements for using this portal are unique, and were not mentioned by other case study participants, more public agencies are integrating open data sources across departments or agencies, and State DOTs looking to distribute open data may face similar requirements. Knowing the requirements data must meet during the scoping phase of the project will help mitigate the impact of these requirements on project timelines.

The scope of open data projects may expand during project implementation. As NYSDOT noted, their process to create a central data repository was much more intensive and longer than estimated at the outset. Working with multiple databases and different data formats, as well as multiple software packages that must be integrated can easily expand a project's scope. MDOT's focus on establishing a lean, flexible architecture for their data was one method of eliminating these issues.

The scale of projects also differed based on the desired outcomes, with NYSDOT's 47 proposed lightweight mobile applications perhaps being the largest. The scale of these efforts necessitates a phased implementation approach, which for NYSDOT included a phase 1 and phase 2 of product development. While the scope of work was significantly smaller for WMPO in creating an interactive map, it was a significant undertaking given their staff capacity and having never done something like this before. Understanding the benefits that will be realized from a project can help to generate enthusiasm and buy-in from decision makers and stakeholders, who may need to divert resources from other projects to ensure the success of an open data initiative.

3.3 Benefits and Challenges of Open Data

The agencies interviewed reported highly positive reception for open data products both internally and externally, including positive assessments of the return of investment in these projects. Providing tools that are easily usable across departments within a State DOT creates value by reducing staff time spent generating repetitive reporting, allowing greater information flow between divisions, and ensuring consistency in data being used across the organization. In addition to these internal benefits, State DOTs build trust with the public through providing open datasets, and can also spur innovation and the use of this data for research and private sector work. The New York State open data portal provides many examples of datasets, which may be useful beyond governmental purposes.

There are also distinct benefits to using GIS-based tools for data dissemination and data collection. Data displayed geographically can be easier to interpret for the public, particularly when giving suggestions for improvements. Presenting stakeholders with a map for data entry can gather more detailed information and eliminate processing steps, as in WMPO's project.

Using GIS to display agency data can also allow practitioners to more easily connect new datasets to existing geographic data, and to ensure that existing datasets are accurate. When mapping two distinct sources of data, discrepancies are easier to identify, as MDOT described in their process of cleaning and integrating data across the agency.

Challenges to creating open data products include both internal and external considerations. Many of the internal challenges involved are similar to those for any other large project, including securing funding, buy-in from executives, and planning for the many steps involved in reorganizing and presenting data.

Multiple agencies discussed the particular need for a strong champion who is able to ensure progress is made on the project across departments. NYSDOT also spoke of the need for a ‘visionary’ in addition to a champion—someone who can think outside the box and create new, innovative solutions to challenges. Gathering a team of experts from across the organization with experience in GIS, data analysis, IT architecture, project management, and the business processes of an agency is the first step toward effective open data development.

Finding the correct software configuration for combining multiple systems of data can be another large barrier to effective open data management. States described the difficulty of bridging the gap between IT and the GIS department when needing to work on geographic data architecture, and the difficulty of selecting the correct configuration for a central data repository. Selecting a set of GIS, warehouse, and data platforms for use in the future can be a significant and ongoing commitment of funds. Carefully thinking through future needs led agencies in this study to choose more robust, interoperable, and in some cases less-expensive tools which would serve the foreseeable future needs of the agency well.

External challenges to creating open data products can include strict review processes for publishing data, creating and maintaining a website capable of hosting the data, and integrating this external facing system with the data repository on hand. Additionally, using open data information gathering tools presents challenges to equitable access for those without computers or internet access, which WMPO discussed as a particular challenge during their outreach process. Working with a set of external stakeholders can also increase the scope of the project beyond what is possible for the organization to execute, such as NJTPAs experience with partner agencies asking for more datasets to be included in the open data portal.

4. Conclusion

Open data resources are becoming increasingly common in the public sphere as technology continues to evolve and the public actively watches and engages with the operations and actions of public agencies. Within transportation agencies, open data are becoming increasingly valuable given new requirements for performance measurement and management in decision-making processes. Given these factors, open data portals are becoming a key part of the way transportation agencies interact with the public.

State DOTs and MPOs are using open data tools to provide information, build trust, increase transparency, gather input, and spur innovation. The open data tools developed may be targeted toward internal or external audiences, and may represent either agency-created data or a compilation of data from many sources. The process of actualizing an open data portal is not linear, and will often require staff to make tough, and sometimes compromising decisions that ensure the finished product is publicly accessible to a variety of users. The lessons learned by one agency are useful in this budding area of transportation policy and program development, but one agency's experiences cannot be extrapolated to multiple agencies. Similarly, the successes or failures of one open data project within an agency serve only as lessons learned, and should not be assumed to hold true in future open data projects.

This case study intended to highlight examples from a variety of agencies, representing projects of varying scope. MDOT, NYSDOT, NJTPA, and WPMO have also recently begun to embrace open data as a business practice in recent years, and their experiences are valuable in understanding how other agencies might begin or improve their processes. Open data portals and open datasets represent a new wave of transparency and data availability in the transportation industry, and will continue to be a topic of interest for agencies developing new tools.

Appendix A: Case Study Participants

Agency	Department Type	Name	Title	Email
MDOT	Technical Department	Mike Cresap	Transportation Information Director	MCresap@mdot.ms.gov
WMPO	Transportation Planning	Michael Madsen	GIS Analyst	Michael.Madsen@wilmingtonnc.gov
NJTPA	Analytical and Planning Tools	Gabrielle Fausel	Principal Planner	GFausel@njtpa.org
NYSDOT	Technical Department	Kevin Hunt	GIS Manager	Kevin.Hunt@its.ny.gov
		Steve Wilcox	GIS	Steve.Wilcox@dot.ny.gov
		Michael Rossi	GIS Branch Manager	Michael.Rossi@dot.ny.gov

Appendix B: Interview Guide

Introduction

Thank you for taking the time today to discuss the topic of Open Data within your GIS division. Working closely with FHWA, the Volpe Center is interviewing a handful of State DOTs and MPOs to discuss the different challenges, best practices, and potential lessons learned regarding how mobile applications are leveraged at different agencies. Our objective is to create a Case Study Report that will highlight the range of approaches and practices regarding open data applications that can then serve as a guide to other State DOTs, MPOs, and FHWA.

Background

We're going to start this interview with some general background and descriptive information about your office and how you leverage GIS technologies generally, at a high level. We'll get to mobile application use later.

- What type of work has your agency done with open data portals? Have you programmed future projects that will incorporate open data?

Purpose

- What led you to produce an open dataset or data portal?
- Was the drive for this display of information internal or external, and how did the stakeholders involved influence its development?

Process

- How did you begin the process of creating an open data project?
- Did you face obstacles related to releasing the data itself?
- How did data integrity factor into your decision making on what to release and what to keep internal?
- What platforms did you use for the data portal/open data dissemination?

People

- Who were the main players in this project? Did the project require work across departments, and did it have a champion?

Reactions

- What have been the reactions of internal and external stakeholders to your open data product?
- Have you learned new things about your dataset?
- Have you learned lessons you would apply to this type of project in the future, or which would be useful for another agency contemplating a similar project?

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DOT-VNTSC-FHWA-19-13
FHWA-HEP-20-004