University Transportation Research Center - Region 2

Final Report

The Role of Social Media in Improving the Safety and Efficiency of Traffic Operations during Non-Routine Events such as Incidents and Planned Special Events

Performing Organization: Rensselaer Polytechnic Institute

September 2015

Sponsor:
University Transportation Research Center - Region 2

University Transportation Research Center - Region 2

The Region 2 University Transportation Research Center (UTRC) is one of ten original University Transportation Centers established in 1987 by the U.S. Congress. These Centers were established with the recognition that transportation plays a key role in the nation's economy and the quality of life of its citizens. University faculty members provide a critical link in resolving our national and regional transportation problems while training the professionals who address our transportation systems and their customers on a daily basis.

The UTRC was established in order to support research, education and the transfer of technology in the field of transportation. The theme of the Center is "Planning and Managing Regional Transportation Systems in a Changing World." Presently, under the direction of Dr. Camille Kamga, the UTRC represents USDOT Region II, including New York, New Jersey, Puerto Rico and the U.S. Virgin Islands. Functioning as a consortium of twelve major Universities throughout the region, UTRC is located at the CUNY Institute for Transportation Systems at The City College of New York, the lead institution of the consortium. The Center, through its consortium, an Agency-Industry Council and its Director and Staff, supports research, education, and technology transfer under its theme. UTRC's three main goals are:

Research

The research program objectives are (1) to develop a theme based transportation research program that is responsive to the needs of regional transportation organizations and stakeholders, and (2) to conduct that program in cooperation with the partners. The program includes both studies that are identified with research partners of projects targeted to the theme, and targeted, short-term projects. The program develops competitive proposals, which are evaluated to insure the mostresponsive UTRC team conducts the work. The research program is responsive to the UTRC theme: "Planning and Managing Regional Transportation Systems in a Changing World." The complex transportation system of transit and infrastructure, and the rapidly changing environment impacts the nation's largest city and metropolitan area. The New York/New Jersey Metropolitan has over 19 million people, 600,000 businesses and 9 million workers. The Region's intermodal and multimodal systems must serve all customers and stakeholders within the region and globally.Under the current grant, the new research projects and the ongoing research projects concentrate the program efforts on the categories of Transportation Systems Performance and Information Infrastructure to provide needed services to the New Jersey Department of Transportation, New York City Department of Transportation, New York Metropolitan Transportation Council , New York State Department of Transportation, and the New York State Energy and Research Development Authorityand others, all while enhancing the center's theme.

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The modern professional must combine the technical skills of engineering and planning with knowledge of economics, environmental science, management, finance, and law as well as negotiation skills, psychology and sociology. And, she/he must be computer literate, wired to the web, and knowledgeable about advances in information technology. UTRC's education and training efforts provide a multidisciplinary program of course work and experiential learning to train students and provide advanced training or retraining of practitioners to plan and manage regional transportation systems. UTRC must meet the need to educate the undergraduate and graduate student with a foundation of transportation fundamentals that allows for solving complex problems in a world much more dynamic than even a decade ago. Simultaneously, the demand for continuing education is growing – either because of professional license requirements or because the workplace demands it – and provides the opportunity to combine State of Practice education with tailored ways of delivering content.

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16. Abstract

Social media has become an integral part of modern communication. There is however no clear consensus among transportation managers on how social media could or should be used to collect or disseminate actionable information. To provide guidance on the potential use of social media in transportation, a better understanding is needed of the message content as well as the path taken from the sender to the potential user of actionable information during crises and other non-routine events in the transportation system. This report assesses how social media is used to support traffic management operations during planned special events such as concerts and sporting events, and unplanned disruptive events, such as accidents and weather events. This report also examines best practices for traffic operations among various agencies, and presents practices used to disseminate real-time, actionable information to motorists in a useful and engaging format via social media.

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EXECUTIVE SUMMARY

This research project entitled, "The Role of Social Media in Improving the Safety and Efficiency of Traffic Operations during Non-Routine Events such as Incidents and Planned Special Events" has been conducted for the University Transportation Research Center by Rensselaer Polytechnic Institute. The objective is to present an assessment of how social media is used to support the management of traffic operations during non-routine events. To accomplish this, the authors have reviewed social media literature related to social media use for transportation, and for disasters and crises. Further, the team reviewed social media sites and data provided by various transportation agencies, in particular the messages related to traffic and non-routine events. Based on the key findings, recommendations for transportation agencies are made to help transportation agencies better use social media for non-routine traffic events.

This research project was comprised of seven tasks, including:

Task 1: State of the Practice in Social Media
Task 2: NYSDOT's use of Social Media
Task 3: Data Collection
Task 4: Data Analysis
Task 5: Determining User Behavior
Task 6: Guidance on using Social Media for Traffic Operations
Task 7: Final Report

Social media has become a significant medium of human interaction, capable of delivering real-time information to a vast number of people. People use social media to communicate with each other, targeted groups, or the general public. At present, social media is not universally used as a governmental channel of communication with the public. There is no clear consensus among transportation managers on how social media could or should be utilized to collect and disseminate actionable information. To provide guidance on social media use in transportation, this paper looks at the content, as well as social media approaches taken by agencies in delivering actionable transportation information during crises and other non-routine events.

Generally, transportation agencies have been using social media for more than five years, yet there is no clear guidance or consensus on social media best practices for disseminating critical information. The evolution of social media occurred so rapidly that many transportation agencies were not able to plan how these systems would be used to support traffic operations generally, and particularly for non-routine events. In most cases, social media was used by transportation agencies on an ad-hoc basis. This problem is compounded by the existing budgetary constraints these agencies face; they often don't have the staff to make these systems fully and consistently operational.

Even before the emergence of social media, transportation agencies have been trying to enhance their communications with their major "customers," the driving public. This communication is typically in the form of disseminating traveler information such as accidents or other delays along certain routes. Traditionally, this outreach was done via television or radio, but in the Internet age this outreach has grown, and with the advent of social media it has grown rapidly. The way in which transportation agencies use social media is still evolving. Social media has become a dynamic and adaptive force across the globe, used to inform countries, communities, and individuals about crises and disasters, and has substantially aided in relief efforts worldwide. The use and full value of these tools to disseminate actionable information to motorists is still evolving, and will likely continue to evolve as transportation agencies realize its benefits.

The extent to which social media is used to support traffic management during events (i.e. such planned special events as concerts and sporting events, and such unplanned disruptive events as natural disasters and weather) varies a great deal among agencies. Agencies large and small have demonstrated success, but they have also experienced difficulty in creating and leveraging social networks. Based on the research conducted for this project, some guidelines and conclusions for using social media for traffic operations were identified that significantly impact the usefulness of an agency's social media program, including:

- Develop (or update) the social media policy
- Provide timely information
- Use visuals when possible
- Engage the users
- Make the public aware of the system
- Work with other agencies

In theory, social media provides the ability to serve as a two-way communication tool. However, for transportation agencies it is often difficult to fully utilize incoming messages. Often the agency has to focus on sending information. Some agencies are able to use Facebook to have a dialog with their customers, and in some cases customers may post a picture of a traffic event or a damaged roadway. Depending on the situation, the transportation agency can decide if additional action is necessary, such as sending a field crew to validate the damaged roadway. If the agencies have a group of trusted sources, such as community groups or other traffic groups, they may be able to redistribute these messages, or at least make links to these groups available to motorists.

Based on the data collection and data analysis conducted as part of this project it has been determined that using social media data as a traffic sensor is not cost-effective or reliable. Although it is possible to scrape tweets in real-time based on keywords, the number of possible word combinations that people can use is almost endless. People do not use a common language when talking about traffic, and people's perception of traffic congestion varies. This could change in the future if people used certain hashtags that could be correlated to specific

geographic areas; however, it would require training people on how they can provide useful traffic information. Even so, the usefulness of this is still questionable since it is illegal for drivers to use mobile devices while driving, and drivers would have to make these types of posts when they stop or their trip concludes. Thus, the information would not be timely and other more traditional traffic sensors would detect this information much sooner. Another alternative would be for the agencies to create a 'trusted user' program. This might be similar to the 'weather watcher' programs that local news stations have. This group of people could report conditions for a certain set of roads on a daily basis and the DOT could monitor the data from this group of people. For roads without any instrumentation this might serve as an alternative.

It is important to reiterate that motorists should not use mobile devices while driving. They should either preplan their trips, or have a passenger use the device while the vehicle is operational. If the driver insists on receiving updates while driving, they should use a service that would provide text to speech, allowing for hands-free operation. These services continue to emerge, and will make the use of social media for traffic operations a more viable option for motorists, especially while driving.

This research has demonstrated that transportation agencies, primarily in the United States, have been actively engaged in enhancing their communication networks through social media. This state-of-the-practice assessment makes clear that transportation agencies have challenges in deploying such a system, but that, with the proper steps, social media can provide great benefits to motorists, however, the question remains as to whether the benefits will outweigh the costs.

1. INTRODUCTION AND BACKGROUND

Social media has become a significant medium of human interaction, capable of delivering real-time information to a vast number of people. People use social media to communicate with each other, targeted groups, or the general public. At present, social media is not universally used as a governmental channel of communication with the public. There is no clear consensus among transportation managers on how social media could or should be utilized to collect and disseminate actionable information. To provide guidance on social media use in transportation, this paper looks at the content, as well as social media approaches taken by agencies in delivering actionable transportation information during crises and other non-routine events.

The first decade of the 21st Century has witnessed an explosion of wireless communications and applications using high-speed Internet. Social media platforms such as Facebook, Twitter, and Pinterest are examples of new communication forms. Major technological advances can transform the way people behave and interact with each other. Such social transformations, however, may take a long time to evolve; technology enables humans to adapt and adopt new responses to it, and to each other, sometimes instigating dramatic behavioral or even philosophical changes. The transportation network could be transformed by the proper use of social media, especially during a non-routine incident. This technology provides new, more immediate forms of two-way communication between the operator and the user.

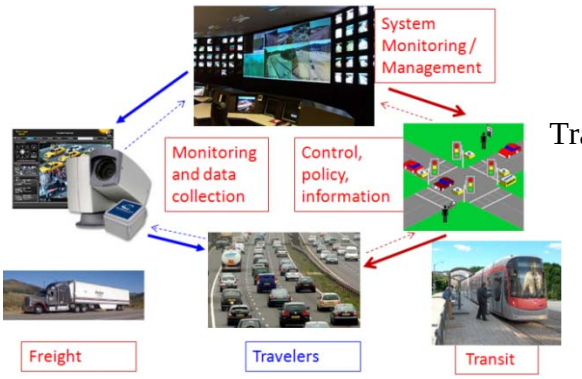
To appreciate how widespread Internet use is among Americans, it is helpful to understand current underlying trends. According to a 2014 Pew Research Center report, more than 70% of American adults 18 years and older use Facebook on a routine basis [1]. Other social media platforms, such as Twitter, LinkedIn, Pinterest and Instagram have usage rates of between 20 and 30%. Facebook functions as a kind of gateway medium for branching into other social media sites. The study also cites that at least 52% of adults use at least two different social networking sites. These data need to be considered by government and transportation agencies, to determine how they might use this medium to engage with the public.

Overall, the use of social media is on the rise, with population percentage increases every year since 2012. Since public-sector outreach to the community should continue to grow as well, clearly social media should play a part. It is important, however, to ensure that public-sector agencies engage their customers in a meaningful way. During the last several years the channels through which information is sought and exchanged have changed dramatically. Social media provides new mechanisms for real-time information exchange, participating in events and activities, and receiving emergency alerts and warnings [2-6]. The research team has a working knowledge of the use of social media data for emergency situations [7, 8], including the creation of models to understand user behavior. Classic warning models suggest that when people receive warnings, they process the content of the warning, evaluate the credibility of the source, personalize the warning, seek confirmation of its content, and then take action [9, 10]. With the advent of social media, this information exchange-participation pattern may have changed,

especially with regard to traffic operations during non-routine events such as incidents and planned special events.

Generally, transportation agencies have been using social media for more than five years, yet there is no clear guidance or consensus on social media best practices for disseminating critical information. The evolution of social media occurred so rapidly that many transportation agencies were not able to plan how these systems would be used to support traffic operations generally, and particularly for non-routine events. In most cases, social media was used by transportation agencies on an ad-hoc basis. This problem is compounded by the existing budgetary constraints these agencies face; they often don't have the staff to make these systems fully and consistently operational.

Currently, most surface transportation systems are monitored and managed passively, as shown in Figure 1(a). Feedback from users to the system is minimal (shown using dashed lines primarily for data flow). In essence, users are considered separate individuals, and their social connections are considered to a minimal extent (e.g., travel demand modeling usually focuses on a household, recognizing that drivers have social connections, but only at the household level) or not at all (e.g., when collecting traffic data).



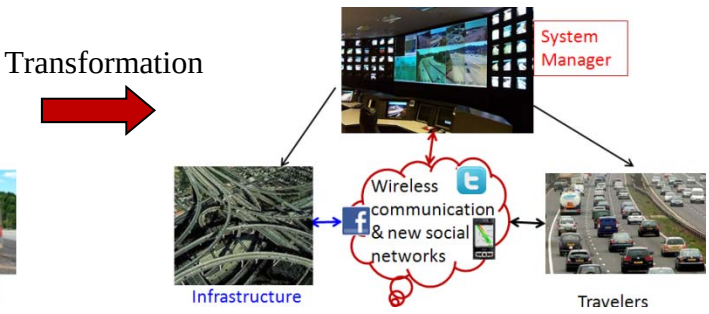


Figure 1(a) Current Transportation System **Figure 1(b) Next Generation Transportation System**

Very different from the traditional view in Figure 1(a), Figure 1(b) depicts the next-generation transportation system. In such a system, users play a more important role in almost every aspect, from data collection to solving congestion, safety, and environmental problems. The addition of wireless communication and social media will transform the way people (users) interact with the transportation system. In the new system, the vital, dynamic social relations among users can be reflected and integrated, as shown in Figure 1(b). The system infrastructure, system manager (such as transportation management agencies), and users are connected more closely. By exploring such connections in innovative ways, new opportunities are provided for solving critical transportation problems. However, since transformational change requires behavioral changes in the users (drivers) of the transportation system, one cannot expect it to happen overnight.

This research project entitled, “The Role of Social Media in Improving the Safety and Efficiency of Traffic Operations during Non-Routine Events such as Incidents and Planned Special Events” has been conducted for the University Transportation Research Center by Rensselaer Polytechnic Institute. The objective is to present an assessment of how social media is used to support the management of traffic operations during non-routine events. To accomplish this, the authors have reviewed social media literature related to social media use for transportation, and for disasters and crises. Further, the team reviewed social media sites and data provided by various transportation agencies, in particular the messages related to traffic and non-routine events. Based on the key findings, recommendations for transportation agencies are made to help transportation agencies better use social media for non-routine traffic events.

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Task 7: Final Report

This report serves as the Final Report (Task 7) and includes the relevant findings from each of the tasks listed above. The report is organized as follows: Section 1 serves as the introduction and background; Section 2 provides the state of the practice for using social media for traffic operations (Tasks 1 and 2); Section 3 discusses the data collection and analysis that was completed as part of this project (Tasks 3 and 4); Section 4 discusses the findings related to driver behavior (Task 5); and Section 5 presents guidance on using social media for traffic operations, key findings and conclusions (Task 6).

2. STATE-OF-THE-PRACTICE ASSESSMENT OF SOCIAL MEDIA IN TRANSPORTATION

This section provides a summary of the current state of the practice in transportation regarding the use of social media to disseminate critical information about non-routine events on the highway network. A brief summary of social media use for non-transportation events such as crises and disasters is provided, but the majority of the focus is on the transportation field. A more detailed summary of how several state Departments of Transportation (DOTs) are using social media is also provided. It is important to recognize that the research focuses on social media, not mobile applications (apps).

Transportation agencies across the country have been exploring the use of social media for a variety of topics including general press releases, employee and other recognitions, construction projects, and other outreach items. For instance, the Transportation Research Board (TRB) National Cooperative Highway Research Program (NCFRP) released NCHRP 25-25 Task 80 in 2013 [11]; this report found that "transportation agencies are utilizing social media and web-based tools during the National Environmental Policy Act (NEPA) process, specifically in regard to public involvement. The research included an online survey and case study interviews to inform recommendations for implementing social media during the NEPA process. Although transportation agencies agree that social media has potential use for public outreach during the NEPA process, the survey revealed that agencies are waiting for proof of effectiveness and demonstration of utility to the NEPA process." [11] Although this is not specific to traffic management, it demonstrates that many DOTs are encouraging the use of social media for many of their activities.

To keep motorists and taxpayers informed, many DOTs now create 'project' social media pages to disseminate information. This information may not be provided in real-time, but it keeps the public engaged and informed on the progress of the project. This is often done for lengthy or disruptive projects that are visible to the public.

Social media has proved an effective means of communication for transit agencies. Transit systems are obviously different from highway systems, and they are different as well in their use of social media. In a transit system there are fixed routes and schedules whereas in a highway network a road can be referred to by many different names; in a transit system it is easier to classify delays or problems by saying the problem is on a specific line between two locations whereas there is much more ambiguity and variability in the highway network; and lastly, in the transit system users are more likely to have access to a mobile device while waiting and riding whereas in an automobile it is necessary for the person to preplan their trip or have use of the mobile device while driving. Transit agencies use social media to provide timely updates on their service, public information, citizen engagement, employee recognition and entertainment. The Transit Cooperative Research Program (TCRP) published the "Uses of Social Media in Public Transportation" and reported on how social media is used by transit agencies [12]. The

report identified some barriers to using social media. The top five barriers identified are: (1) staff not available to manage activities, (2) the concern that people will use social media to criticize agency, (3) posting updates takes too much time, (4) riders do not have access to technology, and (5) people with disabilities cannot access social media. However, each challenge is being addressed, and overall, transit agencies have begun to incorporate social media into their everyday operations.

It should be noted that the National Highway Institute has offered a webinar dealing with the use of social media during weather events [13]. This webinar offered insight into how the Federal Highway Administration and some state DOTs employ social media. In the United Kingdom, the Transport Research Laboratory recently released "The Role of Social Networking Sites in Changing Travel Behaviors" [14]. This report examined the impact of social media on traveler behavior in the UK.

Social Media Usage by Departments of Transportation

In the United States, there is no uniform guidance for DOTs to follow when issuing messages via social media. At the beginning of the social media age, many states found themselves creating ad-hoc messages just to meet the need of the emerging technology. The evolution of social media occurred so rapidly that many agencies were unable to plan how to use these systems to support traffic operations in general, much less for non-routine events. Currently, agencies are evolving to meet this need, but there is still no clear guidance for transportation operators on the best use of social media to disseminate critical information. Budgetary constraints often limit the amount of resources agencies can spend on social media; they often have limited staff available to make systems operational, despite how a properly functioning system can provide actionable information that could reduce delays and enhance safety.

The American Association of State Highway and Transportation Officials (AASHTO) has been conducting annual surveys to state DOTs concerning their use of social media since 2009. AASHTO reported that between 2012 and 2014 social media usage on a state-by-state basis experienced a dramatic increase. In 2012, 83% of the state DOTs reported using Twitter, and 98% in 2014; similarly Facebook usage increased from 69% to 89% in the same period [15, 16]. The concerns regarding future use of social media among state transportation agencies remained largely the same, such as concerns of sustainability over time, privacy and policy concerns, duty to the public during crises, and staffing availability for such a rapidly changing field of technology. The 2014 report suggests that many more DOTs are beginning to use social media for custom crafted messages, as opposed to the computer-automated messages sent in recent years. The report cites that many DOTs are using social media much more for public relations than for such non-routine emergency events as major accident and inclement weather conditions. The DOTs are also trending upwards with the adoption of a formal social media policy, 76% in 2014 versus 66% in 2012. Lastly, AASHTO reports that 80% of the DOTs have a mobile

version of their sites, and 55% have reported having a stand-alone app for traveler information [15, 16].

In her research, Kaufman (2012) reported on current social media practices within New York City; however mainly related to transit rather than road-related usage [17]. The report stressed that the goal of social media outreach to the public was to inform, motivate, and engage the public in a timely fashion, allowing users to make decisions about their transportation plans within minutes. The report elaborated that to accomplish these goals, social media needed to be: (1) accessible, easily discovered through various channels and information campaigns; (2) informative, pushing greater amounts of information during times of stress, and allowing for longer and more elaborate feedback on media like blogs; (3) engaging, responding to customers and engaging, marketing new services, and building ties in the community; and (4) responsive, soliciting feedback from users and self-evaluating in a continuous cycle.

The report used Twitter as an example, and reported that few transportation agencies are able to maximize the use of Twitter's tools, such as using hashtags appropriately, interactive functions, and other dynamic content. Hashtags are an especially important tool to use effectively, as they help sort messages into more specific categories for third-party users. Additionally, the overall tone used by transportation agencies while on Twitter tends toward the negative. This kind of tone and attitude is an important consideration for agencies with such a wide impact on the public. Washington State DOT has exemplified the importance of tone in their social media usage; being positive and "can do" garnered largely positive feedback from the public. Negative responses evoke a similarly negative trend response from members of the public [17].

In a Forbes news story, Mark Fidelman discusses social media use at the Missouri DOT. Due to lack of funding for rebuilding several major highways, MODOT provided social media mapping technology for mobile users, and allowed them to find alternate routes around the highways after they had been closed. Other innovative practices the MODOT uses are construction and traffic clearance updates, using traffic cameras in different areas [18].

In March 2012, the United States Government Accountability Office (GAO) issued a report about how state DOTs could use social media to improve traffic functions. The publication also discusses the national 511 system, which provides traffic information. Currently, there is no uniform platform for presenting the 511 system, and at the time of the report, 14 states lacked coverage of a 511 system at all. This is unlikely to change or improve very much, as the publication included a survey by the National Surface Transportation Infrastructure Financing Commission, which anticipates that under current policies, there will be little budget available for DOTs to cover social media costs [19]. Other issues noted in the publication were obstacles that Information Technology departments faced when tasked with creating or maintaining a social media presence. Lack of staff training is a problem in many offices, as well as the effort it takes to maintain social media services. Strategies recommended to aid these efforts include: developing a long-term strategy and goal, identifying primary users and the target audience

especially in presentation of traffic projects, and carefully monitoring the public's reactions to the services being presented [12].

Survey of State DOTs Social Media Use

As part of this research, a survey was distributed to all state DOTs as well as several in Canada in December 2014. After accounting for incomplete and duplicate surveys a total of 34 surveys were completed (33 from the United States and one from Canada). The purpose of the survey was to assess the current state of the practice for DOTs in using social media for traffic operations. Figure 2 shows the length of time the agencies have been using Twitter and Facebook within their departments, 54.5% of the respondents indicated they have been using Twitter and Facebook since before 2010. 61% of all the respondents indicated they have never had a marketing plan to make people aware of their social media presence.

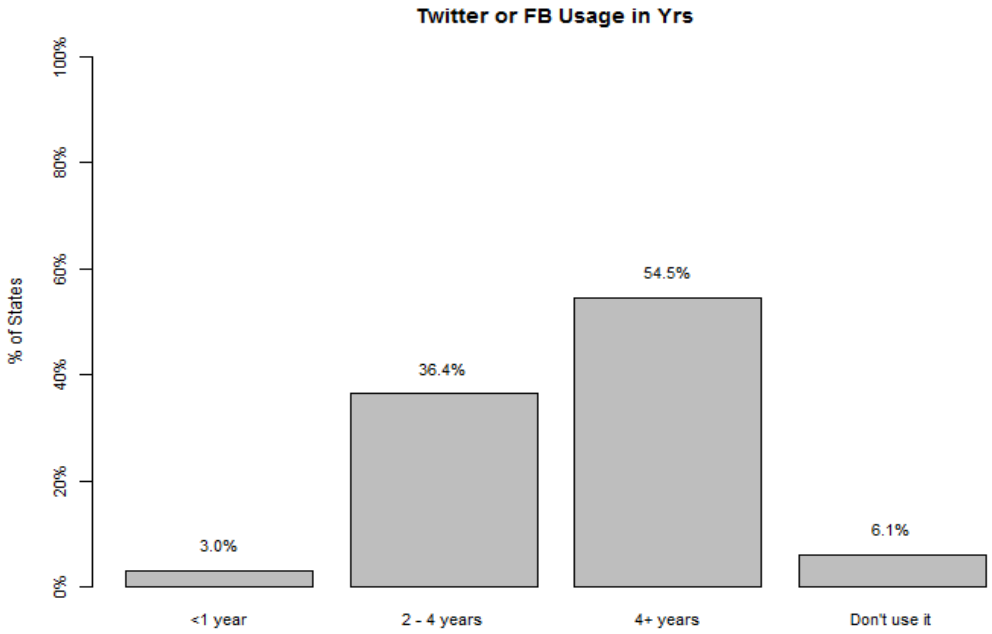

Figure 2 Length of social media use (in years)

When asked about their social media staff it was found that only 12% of the sample had full-time staff entirely responsible for social media, 45.5% had staff dedicated to social media during certain times of the day such as the peaks, and nearly 42% had no dedicated social media staff, rather existing staff responded to social media issues when they had time as shown in Figure 3. Many of the DOTs provided comments indicating that their social media staff is usually on during normal business hours and that they have no staff available to respond in the evenings or on weekends and holidays. In some cases the survey respondents indicated that some of their staff will monitor the social media feeds remotely during the off-hours. The survey asked about

the background of their social media staff; 79% responded that they have at least one person with a communications background, while only 15% had a transportation operations background.

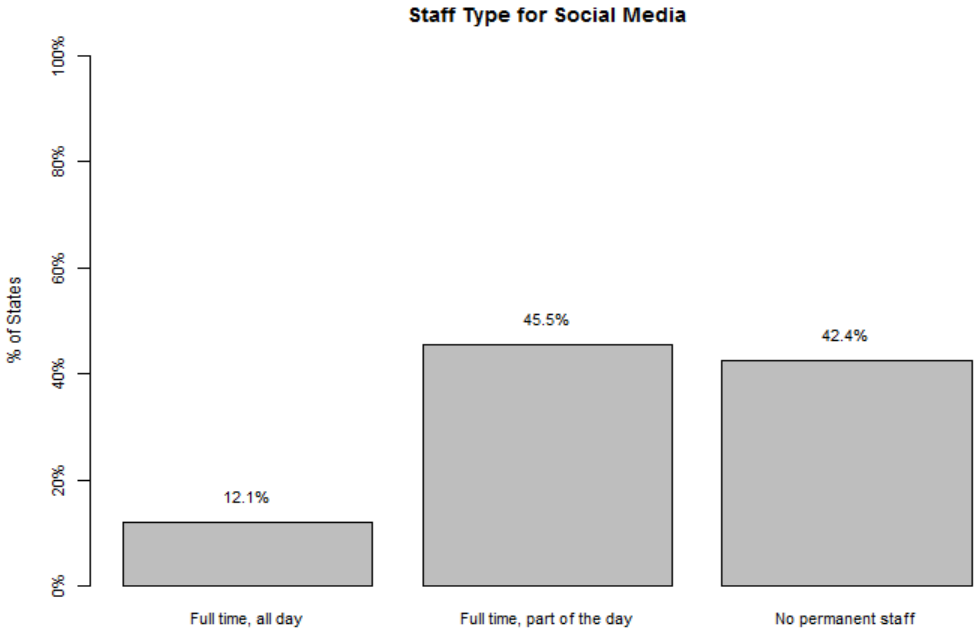

Figure 3 Level of social media staffing

Based on the results of the survey, the majority of state DOTs only have one statewide Twitter and Facebook account, 54.5% and 63.6% respectively. State DOTs reporting no Twitter or Facebook accounts was found to be 3% and 9% respectively; two other DOTs declined the survey because they had no social media presence. The survey also asked if the agencies maintained multiple 'regional' social media accounts. It was found that most agencies do not maintain multiple Facebook accounts, with 78.8% of the respondents indicating they do not have additional accounts, this is compared to 45.5% for Twitter. The number of 'regional' accounts varied greatly between the states but California and North Carolina DOTs respectively reported 12 and 15 separate regional or special Twitter accounts across the state.

It was also found that only 57.6% of the agencies provide formal training to their social media staff. In the cases where there is training provided this training is typically done on a periodic basis with all relevant staff. The survey respondent from Missouri DOT indicated "one of the constant obstacles with social media is making sure that your message is seen by your customers. Keeping up with posting trends and best practices can help but it is a struggle to be seen at times on social media." As a result, the Missouri DOT meets quarterly with their social media staff. At these meetings best practices, strategies for creating and sharing posts are discussed as well as refreshing general rules.

When asked if they disseminate computer generated messages, custom messages or a combination of the two, the split was 12.1%, 51.5% and 36.4% respectively. It should be noted

however, that many respondents indicated that traffic information messages were automated from a 511 system, while custom messages were generally used for non-traffic events or to provide additional details after the initial automated message was disseminated. Other agencies said that they have staff that issue custom messages between certain hours such as during peak periods, whereas at other times of the day, the messages are automated. 69.7% of the respondents said that they try to use a common language within their organization, abbreviating words such as northbound, route, and interstate. The DOTs of some states, for example, Vermont, New Hampshire and Maine, are working together to develop a common language and message scheme.

The way in which content is provided in social media messages is important. Besides plain text there are other alternatives for providing users with information via social media. The types of content and the percentage at which they are used by the survey respondents is shown in Figure 4. Almost all DOTs (84.8%) indicated they disseminate pictures when possible to inform motorists of traffic related incidents. Unfortunately, most messages actually don't have pictures because it is necessary for the incident to occur at a location where a remote picture can be taken or someone is in the field to take the picture. Some states, such as Washington, are fortunate to have a high penetration of video cameras, especially near accident-prone locations. 69.7% of the respondents indicated that they occasionally use hashtags within their messages, while only 18.2% use memes. Illinois DOT, for example uses #ILtraffic in all of their traffic related tweets, however, the public does not seem to post traffic related messages with this hashtag. The DOTs using memes are generally staffed with full-time social media employees.

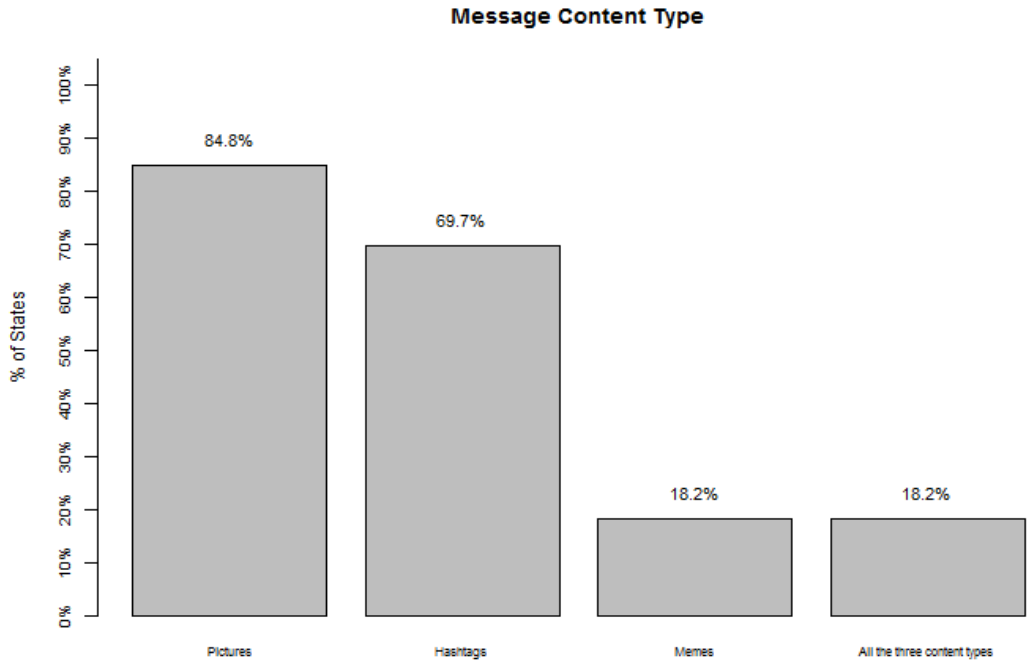

Figure 4 Message content used by DOTs

Figure 5 shows a plot of how the agencies evaluate their social media performance. 97% of the agencies use the number of followers as an evaluation metric, 81.8% using the number of retweets or likes and 66.7% using user input. Only one agency indicated that they use a decreased incident clearance time as an evaluation metric, this is likely due to the fact that it is difficult to correlate an incident clearance time with the use of social media since every incident is different.

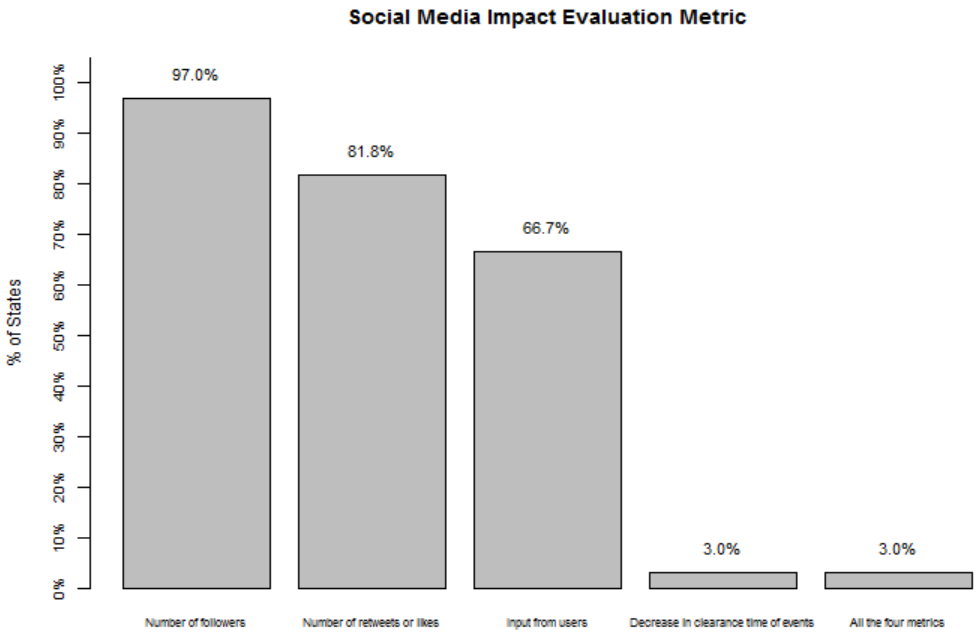

Figure 5

Figure 5 Metrics to evaluate impact of social media

The survey asked what obstacles they have faced related to using social media for traffic operations. The recurring answers tended to deal with staffing. Users of social media expect responses immediately and if the agency is not staffed in the evening or on a weekend it discourages the public from communicating with the agency. Other issues that were presented include getting buy-in and support from the agency leadership in terms of technology and staffing, lack of access to social media websites from their workplace and providing training to social media staff. Lastly, all of the agencies do not want drivers using mobile devices while driving so they have to be careful not to promote texting and driving. Below are a few quotes from various DOTs on the topic of safety.

- **Utah DOT**: "We do not want people to use their mobile devices while driving and traffic operations messages may promote this. To counter this, we try to include safety messages as well."

- **Oregon DOT:** (commenting about challenges) "Managing customer expectations. Not wanting to encourage social media use behind the wheel."

- **New Jersey DOT**: "Public safety and distracted driving. We do not use social media except for Pulaski Skyway Project. Period."
- **Washington State DOT**: "We want to ensure people are using social media responsibly and not tweeting and driving."

The following subsections discuss in more detail the social media practices for Washington State DOT, New York State DOT, and West Virginia DOT. Additionally there is a subsection that talks about some private companies who provide services related to social media.

Washington State Department of Transportation

The research team selected Washington State DOT (WSDOT) as a premier example of DOT best practices for their use of social media, based on the criteria of equipped personnel, richness of posted content, and continuous successful interaction with the public. The WSDOT personnel responsible for compiling and distributing social media information have an educational and professional background in communication, and understand best practices of public outreach. Additionally, the richness of the posted social media content, which includes videos and pictures of traffic-related matters, encourages a broader understanding among the public. Finally, the WSDOT was found to be interactive and personable with members of the public by directly responding to their concerns, questions, and complaints, as well as including humor and self-deprecation in communications about the office's abilities and limitations.

WSDOT was one of the first state DOTs to have a social media presence, dating back to 2008. They have one primary Facebook account (https://www.facebook.com/WSDOT) and numerous Twitter accounts, including a statewide account (@WSDOT), a traffic-specific account for the Seattle area (@wsdot_traffic), and several regional Twitter accounts for traffic and projects. WSDOT has received praise as well as awards for its innovative use of the technology, including the AASHTO Francis B. Francois Award for Innovation for "Communications in the Public Sector through Social Networking," the NTPAW "Best Use of Social Media," and the Excellence in Communication Award from GovDelivery [20]. The WSDOT staff indicated that they do not want to spread their 'brand' too thin. As a result, they have one main account and one account for each region with major metropolitan areas. They also have several 'mega project' accounts for major projects within Washington but normal size projects and announcements are distributed through their main WSDOT account. Their regional accounts primarily focus on traffic within their specified areas, however they have noticed that the accounts with a personal touch get a much larger following.

The authoritative and inclusive presence of WSDOT on social media platforms has served as a source of recognizable, reliable information to members of the public, and helped to limit uncertainty in high stress, crisis, and disaster situations. Due to WSDOT's leading role with social media for transportation operations, the research team toured their facility and interviewed their staff.

The WSDOT social media sites are primarily staffed with people who have a communications background as opposed to a traffic background. However, in most cases this staff is located in a traffic management center (TMC) and can easily interact with traffic engineers. Additionally, only trained staff are allowed to interact via their social media accounts unless in emergency situations. In these situations if there is untrained staff they must introduce themselves and state they are 'untrained' and they will do their best to help the users.

The WSDOT released a communications manual for its employees, with a comprehensive presentation of the WSDOT's goals and ideologies [21]. The WSDOT communications team has approached their community outreach program in a manner similar to a private company communicating with its customers, by referring to their social media program as a "brand." The communications manual cites that the goal of their brand is to promote quality of life as concerned with transportation. Specific qualities of their brand, as they define it, include accountability, project delivery and benefits, and communication [21]. During a tour of their facility the team asked what makes their use of social media so successful; their response was that they try to beat the mass media at their own job. They want to communicate directly with users to ensure that they get correct information as soon as possible, as opposed to letting the media provide a story that may or may not be correct. For example, if WSDOT is able to provide a message about emergency roadwork and the potential traffic implications, they want to let the users know directly what they feel is the importance of this actionable information.

WSDOT has incorporated several attitudes into their 'brand,' including: (1) a "can do" attitude; (2) a caring, customer-oriented, approach, seeking interactivity with the public; (3) 'full disclosure,' in taking the initiative to share information about DOT's activities; (4) managing expectations, by presenting the DOT in a realistic manner; and encouraging public understanding that incidence resolution and construction take time and require patience; (5) strategic and conscientious communications, by providing a consistent message throughout the DOT workplace; and (6) real communications that recognize that every interaction is an opportunity to build public trust and create capital among users [21].

WSDOT has shown substantial initiative in contacting members of the public to solicit feedback about their program. In 2009, the WSDOT conducted a survey about their communication and public information outreach practices through GovDelivery listserv, and received 5,600 responses in return. For the following question, "What is your overall impression of the Washington State Department of Transportation?" respondents returned a 34.5% rating of strongly favorable, and 49% somewhat favorable, totaling 84% in positive answers. For the question of "How do you rate WSDOT's performance in general?" the survey returned a 74% positive rating, combining answers that ranked it good or excellent. WSDOT also collected data about user access, asking where respondents got their news; 78.8% responded from the Internet, 69% from newspapers, and 67% from TV. The survey provided feedback from users, and validation for their outreach program [22].

Figure 6 shows two examples of WSDOT tweets and social media interaction with the public [23, 24]. One discusses planned lane closures and the other provides motorists with traffic delay information. Both messages are fairly standard, but the figure shows the dialog WSDOT has with their users. For the post on the left, the user was unsure if the lane closure was going to affect her weekend trip, so she asked. For the post on the right, the user was upset by the delay and inquired about the reason. In both cases, shortly after the questions were asked, WSDOT gave responses. In one case, WSDOT provided alternative route information, and in the other case they provided a link to a project website so the motorist could learn more about the project and potential impacts.

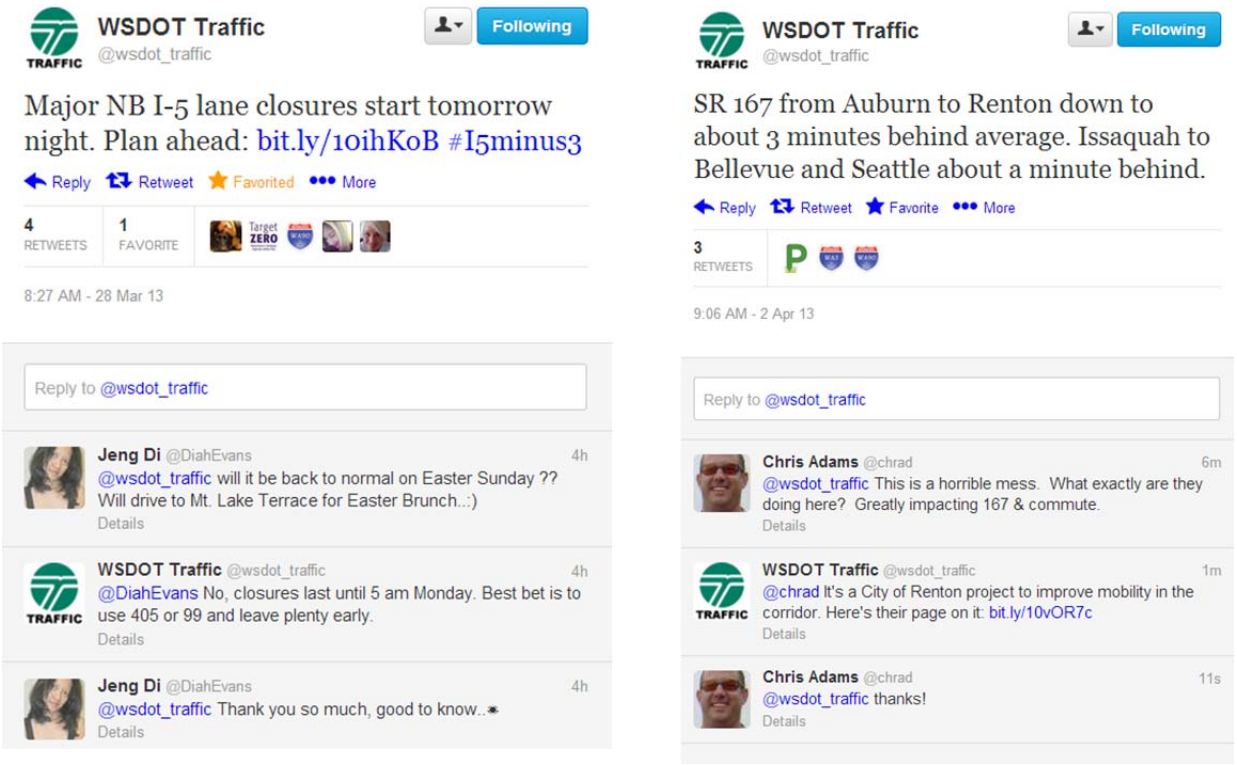

Figure 6 Examples of WSDOT tweets showing two-way communication and providing additional information [23, 24]

Specifically, the WSDOT determined that elements such as clear writing and storytelling, effective graphical presentation of data, and rigorous data analysis and quality were key for following the precepts of performance journalism. They identified seven principles to inform their practice: (1) good stories combined with good graphics, (2) good writing, (3) good data, (4) good format, (5) good graphics and presentation, (6) good quality control, and (7) good timing. During the tour of their facility the WSDOT staff reaffirmed these principles, and also reported to the research team that they encourage their staff to push the envelope with humor and wit as long as they are not offensive.

As an example of personalized social media engagement, WSDOT's handling of the events of October 20, 2014, including multiple crashed vehicles and an aircraft on the highway, is presented. It is important to note that there were no serious injuries or casualties during any of these events; if there were any it would not be recommended to make a joke out of the events. The first event-related tweets were simply informative. Then, in order to inject levity into the situation and lessen frustration with the problems mounting on I-5, the social media staff resorted to humorous comments on the problems. A full record of the tweets is archived at http://imgur.com/a/CzsVe and Figure 7 shows the series of tweets issued by WSDOT [25].

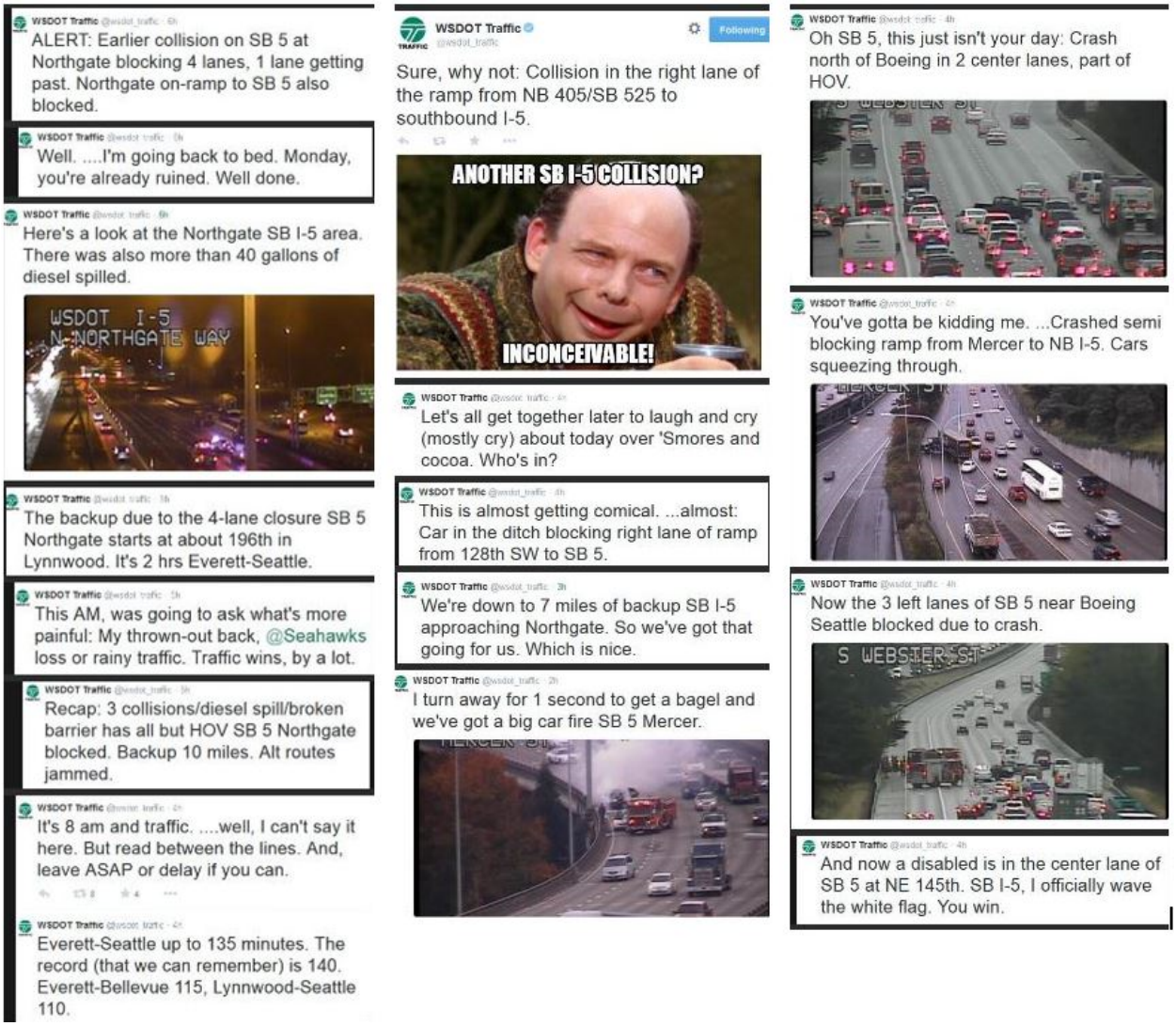

Figure 7 WSDOT tweets from I-5 traffic accident on October 20, 2014 [25]

Another notable attribute of WSDOT's use of Twitter is the positioning of the tweets within the socio-cultural perspective of the State of Washington. For example, one of the tweets compared the traffic problems to the loss of the Seattle Seahawks sports team to engage users with the information. Similarly, the feed recalled fairly popular Internet behavior, invoking memes even

in a professional setting, in order to alleviate frustration on both the receipt and production of information. Finally, as the traffic problems progress, the social media presence on Twitter becomes almost a singular human voice, expressing empathetic disbelief, and commiserating with the plight of travelers, even while advising caution and giving information about route times.

These pathways to communicating with an invested public are important, especially as research shows that information processing and cognitive functioning during high stress events tends to be compromised, often relying on processing shortcuts to digest information without diverting attention away from the crisis. Karl Weick [26] situates attention and understanding during crises as a kind of coordinated event, where cognition of the event is always a step behind actions dealing with the event, and being able to provide a sense-making narrative, as has been exampled in the WSDOT's tweets, is an enactment of social learning, perception of the situation, and understanding of methods of addressing the situation.

As Weick further points out, Twitter has enlarged the capability of WSDOT's workers to reach out to the public to offer advice, warnings, and to construct this sense-making narrative. The public's ability to access information is particularly important, because it enhances people's ability to cope with a crisis situation. WSDOT, through the methods outlined above, has enacted a sense-making narrative using humor, and easily recalled and accessed memetic information, to help people deal with difficult and crisis situations.

WSDOT has found that generally each case needs to be responded to individually, and it is almost impossible to draft standard messages. They have found that prescribed messages lack the personal touch and therefore do not provide personal engagement. Also, they have found that it is often easier to draft the proper message in the heat of the moment rather than trying to develop a playbook of possible 'what if' cases.

During the interview, the research team asked WSDOT staff about what attributes make an ideal social media professional at a DOT. The response was the following attributes:

- An ample communications background (an intern would not be sufficient)
- Thick skin (i.e. someone who does not take things personally)
- At least a basic understanding of the transportation system
- The ability to think and act quickly
- The ability to keep calm, even in emergency situations

New York State Department of Transportation

New York State is large and complex, with more than 110,000 miles of roadway. Managing all of these roadways is a massive undertaking. The New York State Department of Transportation (NYSDOT) has primary responsibility for most of the state, but New York City DOT is responsible for roads within the NYC area.

In 2006, a substantial storm took place resulting in major flooding and infrastructure damage to numerous roads throughout the state. During this event NYSDOT became aware that they did not have the capability to alert the public with the necessary information; a program needed to be implemented in order to instantly alert travelers.

NYSDOT first officially established their social media presence in June of 2009, under the 511NY Traveler Information System. The 511NY program was labeled a national traveler information number in 2000 by the Federal Communications Commission. It contributes to improving the movement of people as well as goods more efficiently by fulfilling multimodal needs of various customers. Users have the option to utilize efficient methods of travel provided by the 511NY system through real time highway information. The 511NY program offers a host of traveler information tools, including maps displaying traffic cameras, incidents, construction, restrictions and weather conditions.

The 511NY site provides a great deal of transit-related information for more than 60 operations as well as park-and-ride lot information, vanpool and rideshare referrals, and carpool and bicycling information. An objective of the system is to provide information on numerous modes of transportation for travelers to find the most suitable and effective method. The 511 system has taken one step further in using the evolution of social media to connect with motorists [27].

On the 511NY site, a variety of social media tools are available, such as Facebook, Twitter, YouTube, Pinterest, and Flickr. Facebook and Twitter are the primary social media tools used for providing real-time travel updates. The Facebook page (https://www.facebook.com/511NY), mainly serves as a portal to disseminate major events, including potential storms and accidents. Advisories are often posted on the site along with those from other reliable sources, such as the NYS Police.

As employees access the social media sites, NYSDOT issued a Use of Social Media Technology policy report as well as procedures in April of 2010 [28, 29]. These reports are defined to administer the appropriate use of social media to promote the objective while also protecting NYSDOT and its employees. The procedure report established a set of social media guidelines and regulations. The guidelines include various rules such as following the policy, having considerations when speaking on behalf of NYSDOT, use of best judgment and many more pertaining to the best interest of NYSDOT, the employee and the public [28, 29].

511NY has divided their Twitter accounts into different geographic areas of NYS (see

Figure 8) known as @NY511 [30]. This allows for motorists to access their information in the most efficient way rather than one general site for the entire state. The 511NY site also shows links to other non-NYS accounts, such as Connecticut and New Jersey, for those who may travel between multiple states.

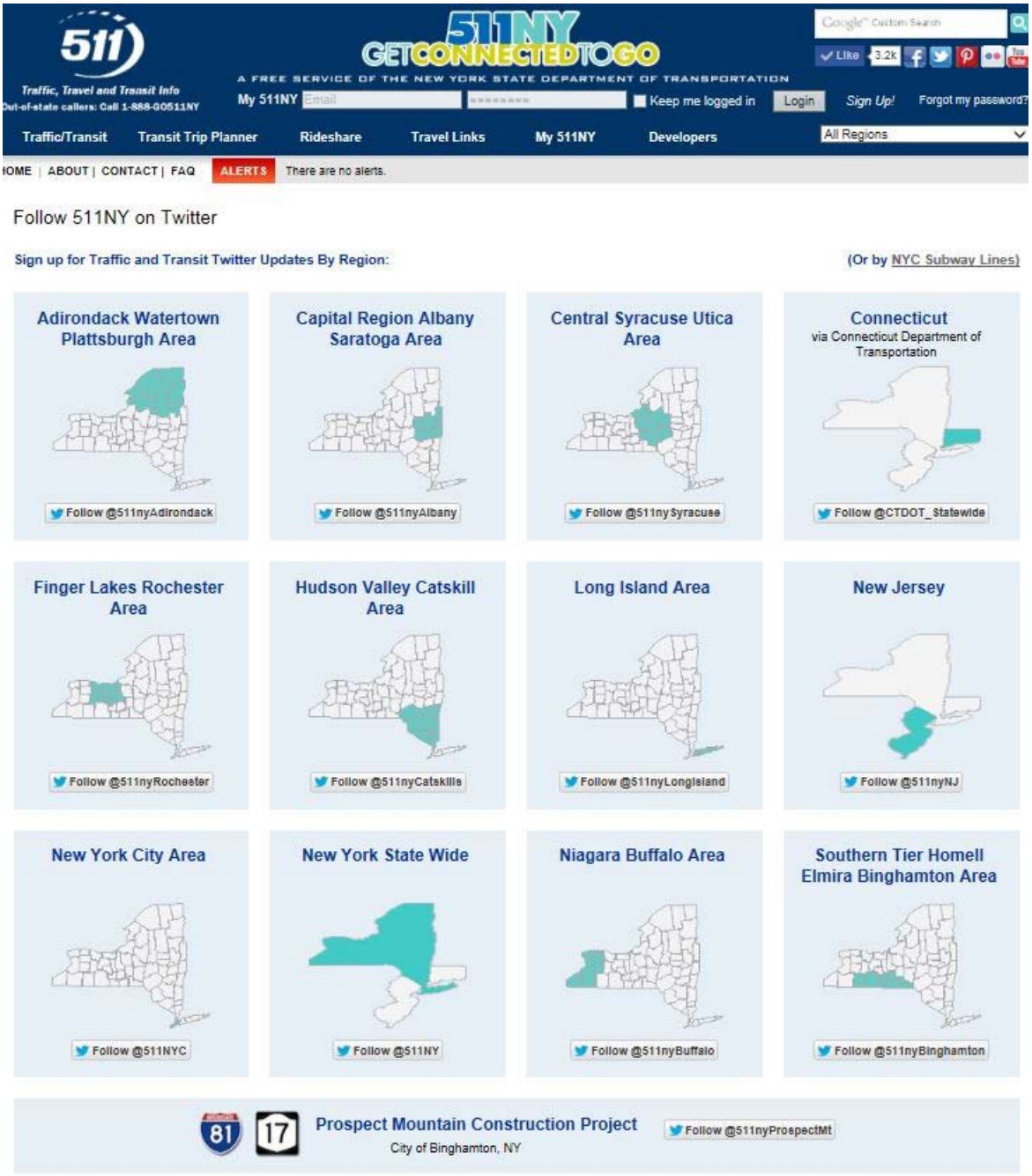

Figure 8 511NY Twitter accounts [30]

Each Twitter account uses computer-automated messages up to 140 characters known as tweets. These alerts are uploaded when events such as construction, accidents or delays are encountered in the 511NY system from the traffic management centers. These automated tweets include information about when the event was generated and when the event is cleared. An example of these messages is shown in Figure 9 [31].

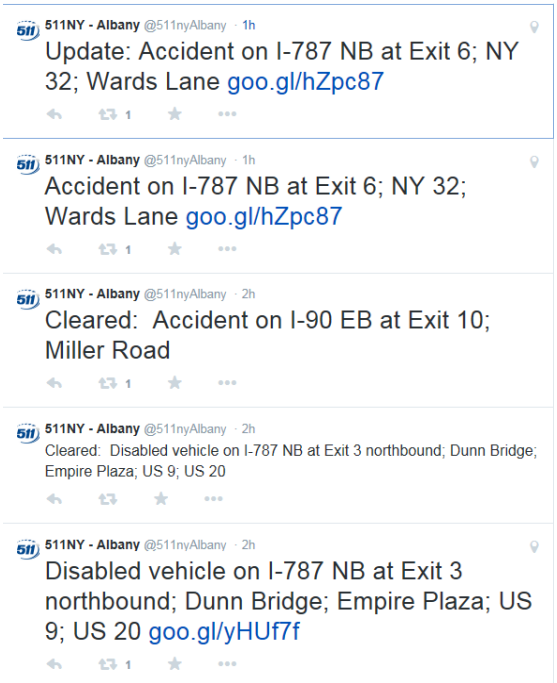

Figure 9 511NY automated tweets [31]

However, these tweets are not written by individuals, and therefore, there is no personal interaction. Unlike the posts from WSDOT, these posts are often not retweeted. It has been found that sometimes the local news media will retweet the stories, or use these tweets to generate their own individual tweet of the event.

Given the size of the NYS transportation system, at the current time, providing these automated tweets about traffic conditions may be the only reasonable solution. In an ideal situation, these tweets would be more personalized; however, it may not be possible to have a social media staff large enough to accurately monitor and maintain a fully interactive social media presence across the state.

The problem stands that if one region begins to offer a personal interaction, users in other regions will then expect a similar experience.

In recent years, NYSDOT has launched regional 'NYSDOT' Twitter accounts, one being @NYSDOTAlbany. The goal of these accounts is to fill the personal void created from the 511NY sites, and to offer other 'non-travel' related messages to the public. These accounts focus on major weather events and construction projects and do not address specific incidents or planned special events.

NYSDOT and the Acting Director for the Office of Traffic Safety and Mobility have received several awards for their social media program. NYSDOT won two awards from the Center for Digital Government, including The Most Innovative Use of Social Media, as well as Demonstrated Excellence in Project Management [32].

The use of social media during Hurricanes Irene in 2011 and Sandy in 2012 was also important for the transportation system. During Hurricane Irene, social media took on an unexpected role by providing information on damage to the civil infrastructures, such as power and transportation. The social media networks were more resilient than the power infrastructure, and state agencies relied on information provided by the public through social media sources about local storm developments and damage reports.

NYSDOT reported to the authors that during the storms they were able to learn of infrastructure failures via social media. Due to the magnitude of the event, it was not possible for DOT staff to evaluate every incident immediately, but people would post pictures of roads and bridges that were washed away due to flooding. Figure 10 shows an example of a Facebook post by 511NY following Hurricane Irene [33]. 511NY posted photos of the local road conditions, and responded to user questions about road closures and potential detour routes. Also, during Hurricane Irene and Lee (one week after Irene) 511NY saw a dramatic increase in Facebook and Twitter followers.

Figure 10 511NY Facebook posts after Hurricane Irene [33]

Lessons learned for future crises included: (1) recruiting and managing more technical volunteers and support; (2) getting agencies, groups, and individuals to work together, as separate groups independently sent the same information and created too much noise; (3) including more data openness and availability from organizations; (4) promoting better and more complete information sharing among agencies, groups, and organizations working in relief efforts, to better organize and strengthen their ability to aid the public [34].

In 2012, New York University held a panel that hosted a number of social media and emergency response workers who were on call during Hurricane Sandy. During the event, they said that their main focus in using social media was to push correct, timely information to the public about the current situation, rather than focusing on style or artistic quality. The panelists also stated that one of the biggest lessons they learned during this event was that including greater transparency of their efforts evoked more trust from the public [35].

The expanded use of social media has become a focus for improving NYSDOT outreach to the public in various aspects. It was highlighted by Governor Andrew M. Cuomo that NYS should distinguish motorists as a priority when undertaking roadwork, through the implementation of the 'Drivers First' initiative in 2012, stating that the NYSDOT "makes the convenience of motorists a priority and ensures that disruptions are as minimal as possible to drivers at highway and bridge projects across the state." [36] NYSDOT proposed a number of solutions that are to be used during the life of a highway project and implemented these in different phases in order to find the best approach to implement the changes successfully. The different phases include recommendations observed from current projects, use analysis to establish guidelines for future

projects and identify long-term solutions for collaboration. One of the approaches identified includes improving and expanding the use of direct communication with drivers. Two components of this involve the expansion of the use of 511NY and social media. These tools will be used to help notify motorists of any delays and alternative routes that can be used to avoid congestion. The use of the social media component allows NYSDOT to relay targeted information that directly impacts the motorist along a specific route, which will reduce congestion over time. The improvement of all travel information outlets can contribute to the highest quality effort in notifying the public of any congestion that can be avoided [36].

Over time the 511 system has evolved to accommodate what best suits the public in providing information on traffic and road conditions. The number one objective today is to ensure 511NY is the most "readily available option" while supplying the audience with what they are trying to find in the presentation they prefer. Therefore, a strategic plan for social media, including 511 has been implemented to provide people with real-time information in the most efficient way available, this plan is available in Appendix A.

In the 511 system strategic plans, short-term and long-term goals have been established to improve the 511NY social media presence. Some of the short-term goals include building the social media user base and analyzing the behavior of their followers. As part of the short-term goals, NYSDOT plans to add Instagram to their brand to allow users to more easily share pictures. NYSDOT has consolidated many of their Twitter feeds to reduce the amount of clutter and they also are using dedicated hashtags now instead of having so many separate Twitter accounts. Some of the hashtags that will be used routinely include #trafficalert, #511nytrafficalert, #NYCTRAFFIC, #NYTRAFFIC, #weatheradvisory, #construction and #accident. Long-term goals include promoting their social media program, measuring their successes, growing the program through the number of active users, and improving their brand analysis.

The Twitter feeds will be able to provide the correct content in order to increase the growth of the audience as well as engagement. Promoting the content will help to aid the growth in followers and the program. The plan is to eventually develop a 511NY blog and other social media sites to increase the 511NY presence. Within time and based on the success of other goals, as people visit the 511NY page they will begin to follow back rather than just visiting once [37].

Data was collected by the NYSDOT from June 1, 2015 to June 30, 2015 with the short-term goals already implemented; additional information related to this report is included as Appendix B of this report. Figure 11(a) demonstrates the engagement level issued by the @my511NY Twitter feed and Figure 11(b) presents the @511NYAlbany feed [38]. The goal of engagement that NYSDOT had set can be demonstrated within the data. A total of 36% conversation occurred during June with the personal @my511NY feed while 0% took place with the resource @511NYAlbany [38]. The plan is to increase engagement each month with the personal page

rather than just sending updates with the resource page. The long-term goal is to balance the two different feeds in order to create a known personality and voice for the system. The 511NY system is determined to remain the go-to resource for traffic and transit information.

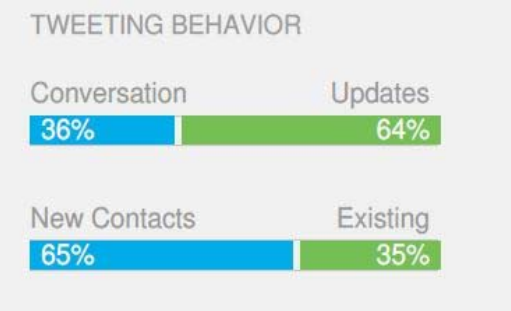

Figure 11(a) @my511NY data [38]

Figure 11(b) @511NYAlbany data [38]

West Virginia Department of Transportation

West Virginia is much smaller in size and population than Washington and New York. In West Virginia, there are approximately 35,000 miles of state and federal roads for which the state DOT (WVDOT) is responsible. The WVDOT travel information program has the tagline of "know before you go," promising relevant, timely information pertinent to users before they go out on their travels. Their 511 program can be found at http://www.wv511.org/. The WVDOT has its own web page, containing interactive maps that can filter relevant factors to the user, such as traffic incidents, weather alerts, and the ability to focus on discrete regions of the state. They also link to contact information for the department, as well as to the Twitter feed run by the WVDOT 511 program. WVDOT's Twitter page (https://Twitter.com/WV511) has produced nearly 35,000 tweets, and has more than 6,500 followers (as of mid-2015).

In examining the content and production of the Twitter feed, several things are clear. First, the content is structured around information related to traffic and travel, with a straightforward and clear tone. The tweets use simple, clear language with precise location information. Most of the tweets are generated from a pre-prepared pool of warnings, with little deviation in phrasing, such as "use caution when traveling through this area," and "be prepared to stop." Some example posts are shown in Figure 12 [39].

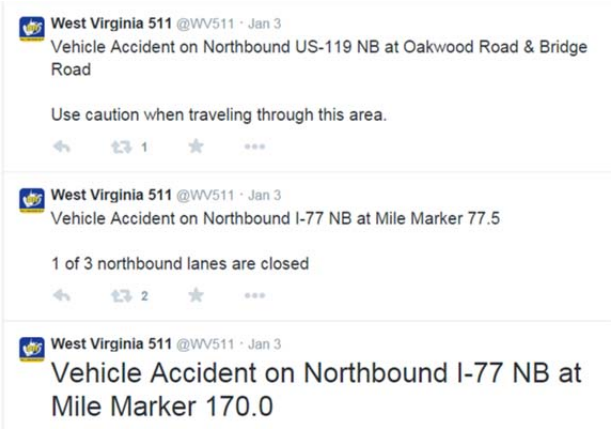

Figure 12 Sample WVDOT tweets for traffic accidents [39]

A noteworthy aspect of the Twitter feed is its regular, dedicated use, and its accuracy for incident occurrence. Updates are released approximately every hour, sometimes more frequently depending on weather events, reporting hazards to motorists, and the expected precautions that should be taken when traveling through

the area. While the tone of the content is not as animated or individualistic as other traffic feeds, the regular use of clear, simple language is accessible to users.

Similarly, the feed is only used for incident reports that could be dangerous to travelers. There are no public relations messages, or irrelevant or polarizing information that could present a problem during stressful times. This is an important feature of the Twitter feed that can sometimes be overlooked by personnel handling the account, who may discuss upcoming highway projects along with traffic incident reports.

Private Industry Transportation Monitoring

The Highway Monitor is a private-sector industry virtual organization that collates traffic-related information released by state DOTs on its website for travelers, highway merchants and government agencies. They have developed a Twitter feed that collates roughly 200 separate Twitter feeds of local and interstate traffic information. Their site was launched in May 2010, after severe flooding struck Tennessee, and was further updated to include more states after Hurricane Irene affected the east coast. The organization touts 30 years of experience in the transportation industry.

Typically the Highway Monitor has a separate Twitter account set up for each interstate highway in the United States, for example, in New York State I-87 runs north-south from New York City to the Canadian border; the Highway Monitor Twitter account for this highway is @NYI87. Their site includes an interactive map that allows users to search for alerts and accidents by state and county, which then sends the user to the state DOT-maintained traffic webpage. As many state DOTs are using interactive mapping to relay traffic information, the Highway Monitor brings all links to one interactive map. Also included on the website is a weather map provided by the National Weather Service and NOAA. Any information released by these services is included on the map.

The Use of Social Media for Disasters and Crises

In recent years the use of social media has also been transforming communications for crisis and disasters [2, 3], becoming a critical source of real-time information. The characteristics of social media have been studied during a number of extreme events, including:

- The 2010 Haiti earthquake [3, 40-44];
- The 2011 Japan tsunami [45];
- The 2011 Joplin tornados [46];
- Hurricane Irene in 2011 [34];
- The Horsethief Canyon Fires in 2012 [47]; and
- Hurricane Sandy in 2012 [46].

During the 2010 Haiti earthquake, the U.S. government was able to use social media for sharing knowledge [3]. Additionally, individual volunteers emerged during the event to use a predefined

tweet language to assist the efforts of the responders and the public, and to aid victims [42]. After the 2010 Haiti earthquake, many medical teams were sent out to aid the affected population. Researchers found that the efforts of the teams were uncoordinated and decentralized; however, there were small teams and non-government organizations that provided updated information on their relief efforts on social media. These efforts were found to be particularly useful for smaller organizations and teams providing aid to the affected populations under decentralized conditions [41]. Coordinated efforts organized by social media can already be seen through organizations such as Humanity Road [43] and Virtual Operations Support Team (VOST) [48]. During the 2011 Japan tsunami, the emergency management personnel in a small county in California, the Del Norte County, were able to successfully utilize social media by "by closing a feedback loop between first responders and the public, by monitoring information flow, and by providing regular updates to the public." [49] Additionally, people utilized Twitter as a source of information, a medium for information propagation, and a source of emotional support [45, 50-52]. For the 2011 Joplin tornados and 2012 Hurricane Sandy events, the researchers adopted various text-mining techniques to extract emergency relevant data [46]. Additionally, text mining was utilized to classify tweets into categories to extract relevant data, or to pinpoint those conversations that provide a view on users' coordination activities during 2011 Hurricane Irene [53]. Twitter has also been utilized to study community resilience through automatic extraction of resilience metrics from the tweets by classifying them into four categories: technical, organizational, economic, and social [54]. Moreover, social media has been a powerful tool aiding crisis mapping, which is a way to combine qualitative and quantitative approaches to display and analyze data during an extreme event [51, 55]. Kent and Capello studied the 2012 Horsethief Canyon fires to show that crisis mapping provides effective ways to synthesize and visualize event-specific data to "quickly and effectively assess efficacy of mining actionable data from social media." [47]

Social Media Use During Hurricanes Irene and Sandy

New York State was severely impacted by Hurricanes Irene in 2011 and Sandy in 2012. Social media was utilized during Hurricane Sandy to disseminate critical emergency relevant information, provide emotional support, and demonstrate individual response. In Tyshchuk et al. [56], researchers utilized Twitter data generated during 2012 Hurricane Sandy to evaluate individual as well as organizational responses. The research showed that individuals organized themselves into online communities, where all members demonstrated similar behaviors. These communities were led by celebrities, specialized organizations (e.g. various weather reporting agencies), and local, state, and federal emergency management organizations. These leaders served an important role as information sources. Additionally, the analysis demonstrated that government organizations were the ones providing unique and critical information on Twitter that was later disseminated by other users.

To evaluate the organizational response by emergency officials, New York State was selected for review. Twitter data was collected using an API search during Hurricane Sandy. This collection

method generates 1% of all available tweets. Once the data was collected, only the official sources and their corresponding tweets were selected for analysis. The goal of the study was to evaluate the interagency communication among official response organizations. The results suggest that official sources were primarily retweeting messages from other official sources, with 53 retweet messages and 8 mention messages. Out of these 61 messages, 16 messages contained critical actionable information, 1 message provided a confirmation, and 44 messages urged the public to take the prescribed action (i.e. evacuate). Such retweeting helped build awareness among Twitter users of available channels of information on Twitter. For example, as users followed @NYCMayorOffice, who retweeted @NYPDNews with relevant local information, users were more likely to turn to @NYPDNews for additional information.

From Figure 13, it is clear that there was a separation between state and local agencies in their communication with the public via Twitter, which mirrored the offline relationship between the agencies. The separation gap was, however, filled by federal government—the Federal Emergency Management Agency (FEMA). In fact, FEMA served as a bridge between state and local agencies. When evaluating structural communities (i.e. densely connected sets of nodes) in this graph, state and local agencies were separated into two distinct clusters. Additionally, the eigenvalue centrality measure (i.e. a measure of influence in a network) was used to demonstrate the importance of each agency in the interagency Twitter communication. This value is displayed in the form of the size of each node in Figure 13. This centrality measure highlighted the importance of @NYCMayorOffice, @FEMA, and @NYGovernorCuomo in the interagency Twitter communication.

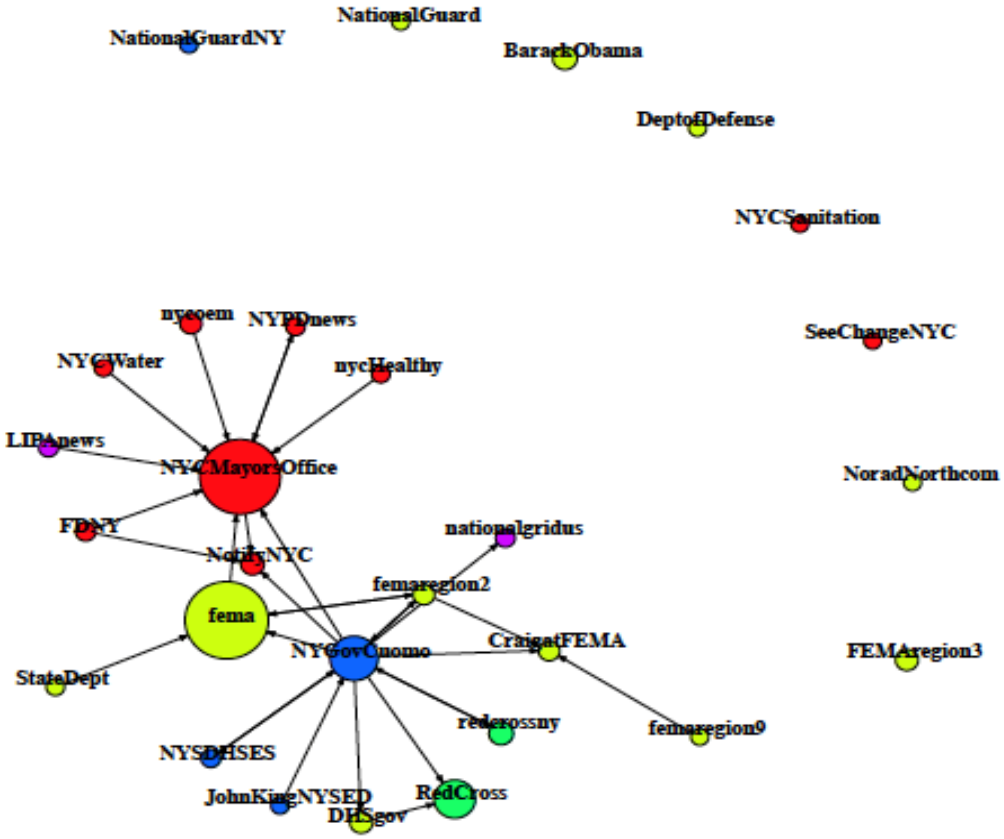

Figure 13 Official Response Twitter Communication Network - red: local (New York City), blue: state (New York State), yellow: federal, and green: non-profit organizations (e.g. Red Cross) (Size: Eigenvalue Attribute)

3. DATA COLLECTION AND ANALYSIS

The purpose of this chapter is to outline the data collection and analysis that was conducted as part of this research project as it relates to Tasks 3 and 4. As part of the data collection the team had used a 'scraping' technique to obtain tweets for certain events, the team also monitored certain events directly via social media and captured the data related to these events. The advantage of scraping data is that it is an automated process which allows the user to input the search criteria and it will automatically populate a database with messages fitting the search criteria. The biggest challenge is that the scraping software is only allowed to provide 1% of the tweets related to the search criteria. As a result the research team often followed Facebook and Twitter directly during events and took screenshots; this allowed the team to monitor the event with more complete coverage. It should be noted that at the time of the proposal for this research project there were online tools available to search Twitter; these tools were more like a typical Google search and yielded user friendly results and analytics. These free tools have since been discontinued.

Data Collection Process

In general, any user can search Twitter directly (using the search bar at the top of any Twitter page) for tweets and users that pertain to the search terms that they input. However, these searches do not result in the display of every single tweet and user that corresponds to the search criteria that the user put into the search bar. These results, when retrieved through a Twitter page directly, can be very limiting and may not give the user exactly what they are looking for. For instance, when searches are executed on a Twitter page, the most popular and recent tweets (whether they are directly related to the user's intended search or not) are typically the ones that are displayed to the user initially. If the user is looking for tweets that were created further back in time, it can become very difficult to access those tweets at all. However, other alternatives to searching Twitter directly (via Twitter's search bar) exist that can give the user a little more freedom through search filters that allow for the user to be very specific about the kinds of tweets they are looking for (with respect to time, content, etc.).

To collect data from Twitter in the form of tweets more efficiently and effectively, one can use programs and services that will allow for the user to "scrape" Twitter for tweets relating to a specific search. So, if the user creates a search for a specific word (or combination of words), tweets that contain the word in any sort of fashion (whether it be in the body of the text, in a hashtag that is denoted in a given tweet, or in a person's Twitter name) will be pooled and collected. Additionally, the user can even search for a specific username, which will then result in tweets being collected that were either sent to or from that specific username. When making these searches, it's important to note that 'general' kinds of searches may not always give the user the types of tweets that they are looking for. For instance, if the user were to search for the word 'traffic' with the intention of receiving tweets about highway traffic, they could instead pull tweets related to internet traffic, tweets related to the movie 'Traffic,' and usernames containing the word 'traffic' of users who may not tweet about highway traffic at all.

Additionally, when searching for a specific highway, road, or interstate (for instance), the general public may refer to these items differently. In New York State, for example, Interstate 87 can be referenced in several different ways via text (I-87, I 87, I87, "the Northway," etc.). So, if a user were to input the search "I-87" with the hopes of collecting tweets that reference Interstate 87, they would not collect the relevant tweets that may exist in the "Twitterverse" that refer to Interstate 87 as "the Northway." Our research team aimed to conduct searches specific enough to properly generate the desired results without excluding relevant tweets.

The different kinds of programs and services that exist which allow for a user to collect tweets based on a particular search mainly fall into two categories: "firehose-type" services that allow for the user to collect 100% of the tweets related to a specific search and programs that function with Twitter's Streaming API [57] that can collect approximately 1% of the tweets related to a specific search.

The "Twitter Firehose" refers to the stream that includes the entirety of tweets that are tweeted in any given period of time [58]. Access to this "firehose" would allow for a user to collect 100% of the tweets related to a specific search, which could definitely have a lot of value for a company who is looking to collect data from a major demographic of the public. However, in order to be able to receive access to this "firehose," companies and individuals must purchase it at specific pricing rates from companies such as DataSift and Gnip, which are Twitter's reseller partners [59-62]. For example, DataSift allows for users to gain access to the "firehose" through a payment plan of their choosing, which could either follow an "on demand" basis or a "paid subscription" basis. The pricing rates for both of these payment plan options are specified on the DataSift website, along with a guide for determining which payment plan would best suit the user. In general, however, each individual tweet accepted by the customer that gets collected by DataSift costs $0.0001. So, if a customer accepts 1,000 tweets, it would cost $0.10 (the website notes that this price is subject to change) [61, 62].

As of 2010, Twitter's Streaming API became available, allowing for users to collect approximately 1% of the total stream of tweets from the "Twitter Firehose" [58]. Although the use of Twitter's Streaming API does not incur any fees that the user would have to pay in order to scrape tweets from Twitter, it obviously does not provide the user with the total amount of tweets that exist in the "Twitterverse" for a given search. Additionally, rate limitations are imposed on those who are using Twitter's Streaming API. For instance, the only tweets that can be collected for a given search are tweets that have been tweeted no more than seven days prior to when a given search is activated.

There are multiple ways to access this smaller stream of global tweets via Twitter's Streaming API, but they all serve the same function in creating an HTTP connection to one of the endpoints of Twitter's Streaming API. When searches of keywords are composed by the user through this HTTP connection, tweets that include those keywords are pulled from the stream and made visible to the user in some sort of formatted display, which largely depends on the way in which

the tweets were accessed. Programming languages such as Python, PHP, and Java have been used to connect to Twitter's Streaming API [61] and some users have even made the programs that they've created (which serve this function) available to the public.

In addition to using hard code, another alternative way to access Twitter's Streaming API is to use the Twitter Archiving Google Spreadsheet (TAGS). TAGS was developed by Martin Hawksey. On his blog, Hawksey gives instructions on how to access Twitter's Streaming API via TAGS and frequently answers questions that users have about using the spreadsheet. Users are able to input searches into the spreadsheet and are even able to use operators such as "AND," "OR," "to:" and "from:" during searches. The TAGS script itself fetches 100 tweets per call and is barred to the rate limitation of 180 calls allowed every 15 minutes imposed by Twitter. So, a maximum of 18,000 tweets can be collected in a span of 15 minutes, and these tweets make up only 1% of the total number of tweets (tweeted in the past seven days) that exist for a given search [63].

When deciding between using the different methods that exist for scraping tweets, there are some tradeoffs between scraping tweets manually (for instance, using Hawksey's TAGS) and paying another company to scrape tweets. Relying on another company to collect tweets incurs financial costs. Although it can be expensive to have another company collect the tweets, one does not have to spend any time setting up the Twitter-scraping algorithms. Additionally, these companies can perform analyses for their clients, which may be useful. When one manually scrapes tweets, direct financial costs are not incurred. However, this manual Twitter-scraping process can take a fair amount of time, especially when considering the amount of time that it takes to set up the scraping algorithm, to check that it remains functional throughout the entire "scraping period," and to perform any post-scraping analyses on the tweets that are collected.

For the sake of our analysis for this research project, our research team decided that it would be best to scrape tweets manually using Hawksey's TAGS. As events were identified, the team set up and started collecting scrapes for different planned special events and traffic incidents. Many of the events were in the Summer of 2013 at the Saratoga Performing Arts Center, since a variety of concerts and events took place there that would be of interest to men and women of all ages and musical preferences. Additionally, scrapes were set up for the NYS Fair and for construction on Interstate 87 at the 'Twin Bridges' during a bridge replacement project which included major traffic disruptions during weekends. In doing so, we spent a fair amount of time setting up the spreadsheets that would be used to scrape tweets from Twitter (for some events, setting up these spreadsheets took approximately 45 minutes to one hour).

Secondly, it was necessary to check our spreadsheets often to make sure that our searches were generating relevant and useful tweets, with regard to both our spreadsheet functionality and our search results relevancy. Part of the process entailed determining which keywords users are more likely to use. As mentioned above, different Twitter users may refer to roadways by

different terms. For accidents, traffic, weather conditions and events, our research team paired together two keywords (e.g. location and event/condition) to find suitable tweets.

Lastly, once the tweets were collected, the team manually sifted through both relevant and irrelevant results. This careful sifting process took an incredible amount of time (in some cases where a significant number of tweets was collected, upwards of 10-12 hours per search), but obtaining any sort of useful analysis relied heavily and completely on a manual sifting process.

Data Analysis

The team collected a variety of social media data from various planned special events. For some events, the team set up the scraping techniques described earlier in this report and for other events the team conducted the data collection by monitoring Twitter and Facebook directly and saved the conversations that were made available. During the summer of 2013, the team collected and analyzed Twitter data for 12 different concerts at the Saratoga Performing Arts Center. In addition to these concerts, the team monitored and scraped tweets for the NYS Fair in 2013 and 2014 and collected data for emergency incidents such as accidents, weather events and a bridge collapse. The following subsections discuss in detail the findings from these events.

Concerts at the Saratoga Performing Arts Center

The 12 concerts monitored at the Saratoga Performing Arts Center were a mix of rock music, country music and a musical group geared toward teenagers. Additional information about the events that were monitored is included in Appendix C.

The typical searches for these events included the venue name and/or the artists' name and some keywords about traffic such as road names or even just the word traffic. It was found that during most of these events that some people would tweet about traffic conditions but it was rare and usually took place when they were talking about the parking lots. Depending on the expected crowd for the event or if an actual traffic incident took place there would be automated tweets from NYSDOT.

The New York State Fair in Syracuse, New York

The New York State Fair is a large-scale event, held for 12 days each August near Syracuse, NY. During the Fair, the average daily attendance is about 85,000 people, and can exceed 100,000 on a given day. This translates into potential problems for the surrounding transportation network. During normal conditions, it is necessary to ensure that the transportation system functions as seamlessly as possible. This is even more crucial in the event of a major incident or event.

Due to the scale of the Fair, there are many stakeholders responsible for interacting and providing support during the event. For the purposes of this case study, the main groups include the NYS Fair, NYSDOT, the news media and the public. During the 2014 Fair, each of these groups provided different levels of information about the Fair via social media.

The NYS Fair (Twitter: @NYSFair; Facebook: The Great New York State Fair) maintains their own presence on social media as the event host. Most of the tweets and Facebook posts by the NYS Fair were related to advertising the event, and providing scheduling details to fairgoers. No traffic or parking information was provided from the NYS Fair accounts.

The NYSDOT is responsible for the highway network connecting to the NYS Fairgrounds. NYSDOT has numerous Twitter accounts across the state; the one that covers the highways near the fairgrounds is the Central NY account (Twitter: @NYSDOTSyracuse; Facebook: New York State Department of Transportation). During the 2014 NYS Fair, the NYSDOT account for Central NY only posted one Fair-related message: a tweet warning of a reduction in the speed limit near the fairgrounds [64]. This was not a tweet dealing with traffic congestion or parking, but was the only post related to transportation.

The Central NY News (Twitter: @TWCNewsCNY; Facebook: TWC News Central/Northern NY) created an album on their Facebook page with 147 pictures from the Fair. Central NY News would occasionally tweet pictures and messages related to traffic congestion, as shown in Figure 14 [65].

The public also tweeted about State Fair traffic congestion. Based on various search terms like "NYS Fair", "NYSF" and others, some tweets show people tweeting at the Fair or hashtagging the State Fair about traffic congestion. Some tweets are more specific than others, stating the exact location on I-690 or the street name. Other tweets show the public's frustration due to traffic congestion. The public also used social media to report updates on the current traffic flow; an example of some tweets can be found in Figure 15 [66].

Figure 14 Traffic-related post from @TWCNewsCNY [65]

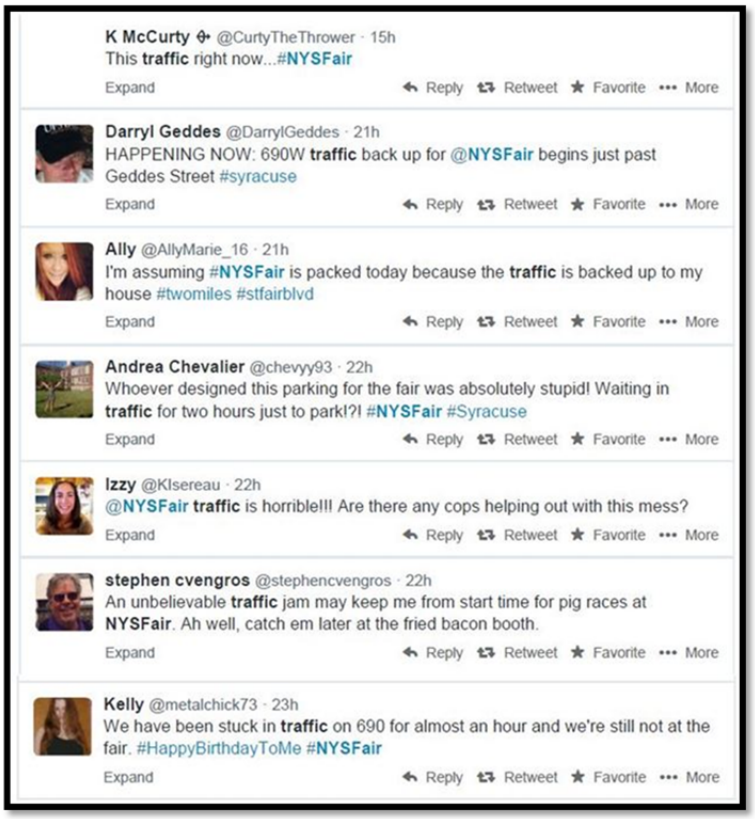

Figure 15 Public Twitter search results for 'NYSFair' 2014 [66]

Winter Weather Accident on Interstate 90 in Albany, New York

On January 3, 2015, there was an unexpected and quick moving snow storm in Albany, NY. The storm caused snow and ice accumulations on Interstate 90 (I-90), a major highway through the area. The majority of the social media posts were from a meteorologist-based site, Upstate NY Weather (Twitter @upstatenywx; Facebook: Upstate NY Weather). Figure 16 demonstrates how the Upstate NY Twitter and Facebook accounts were used to post information about a traffic accident on I-90, as well as an update of the location by using a picture [67, 68]. After the Facebook post was made by Upstate NY Weather, it was shared by 547 people, liked by 136 people, and 53 comments were made by the public.

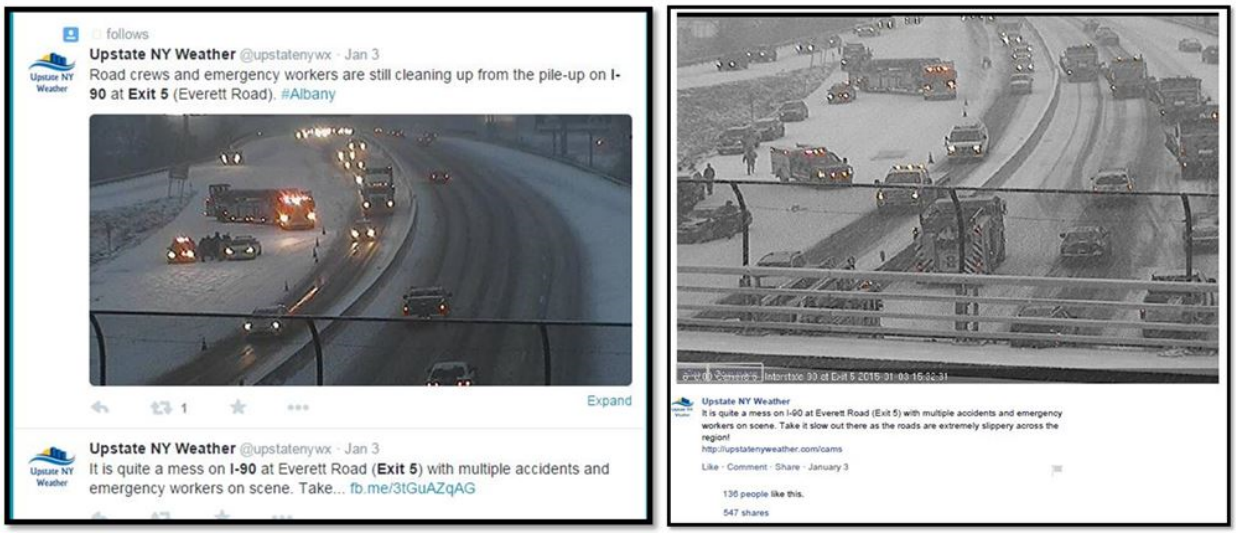

Figure 16 Upstate NY Weather Twitter and Facebook posts [67, 68]

Of the 547 comments on Facebook, many directly addressed traffic conditions; see Figure 17 [67]. Upstate NY Weather also responded to traffic-related questions during the event. Once the post started being shared by many users, it generated additional comments, which are not counted in the 547.

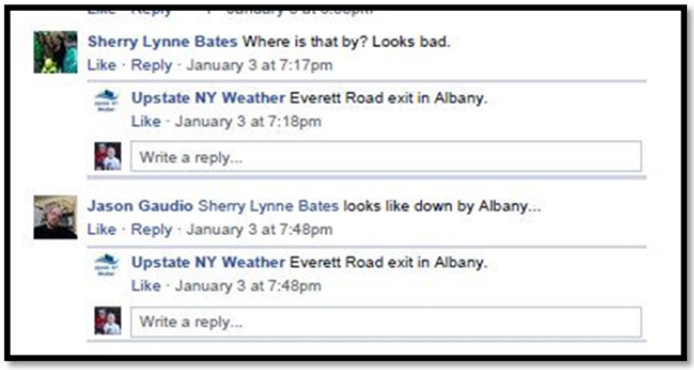

Figure 17 Upstate NY Weather Facebook comment [67]

During this event, NYSDOT Capital Region, (Twitter: @NYSDOTAlbany; Facebook: New York State Department of Transportation) did not post anything specific to the event. They did, however, retweet a message from the National Weather Service of Albany, as shown in Figure 18 [69]. However, details were not provided about what accidents had taken place, or any possible delays. Similarly, there were no posts on the NYSDOT Facebook account on January 3, when the I-90 accident occurred.

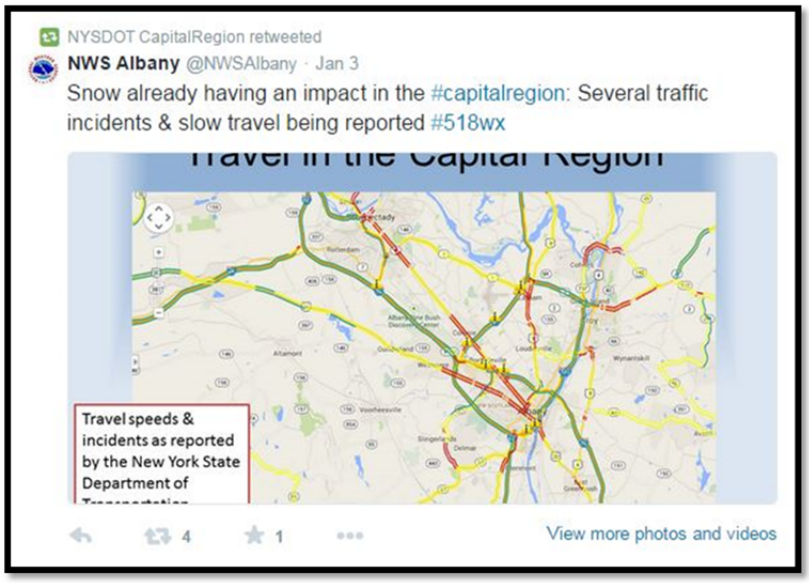

Figure 18 NYSDOT Capital Region Twitter @NYSDOTAlbany [69]

Similar to NYSDOT, the news media in the Albany area did not post anything related to this event. Based on the engagement of the Upstate NY Weather accounts, it shows that social media data for events such as weather do not have to come from a transportation agency, even when there are significant impacts on the highway.

Interstate 5 Skagit River Bridge collapse in Washington State

On May 23, 2013, the Interstate 5 bridge over the Skagit River, north of Seattle, WA, collapsed into the river. Shortly after the event, WSDOT was informing motorists of the collapse, and providing detour information via Twitter and Facebook. For this event, WSDOT provided the research team with summary data.

WSDOT provided a summary of their website and social media statistics for the days prior to, and after the Skagit River Bridge collapse. Figure 19 provides a plot by day, showing the page views to the WSDOT websites [70]. The blue line on top represents the main WSDOT webpage, the red line represents a page with traffic information to the Mt. Vernon/Stanwood area, which is near Skagit Bridge. The dashed line represents a page that was developed specifically for the Skagit River Bridge collapse, launched the day following the collapse [70].

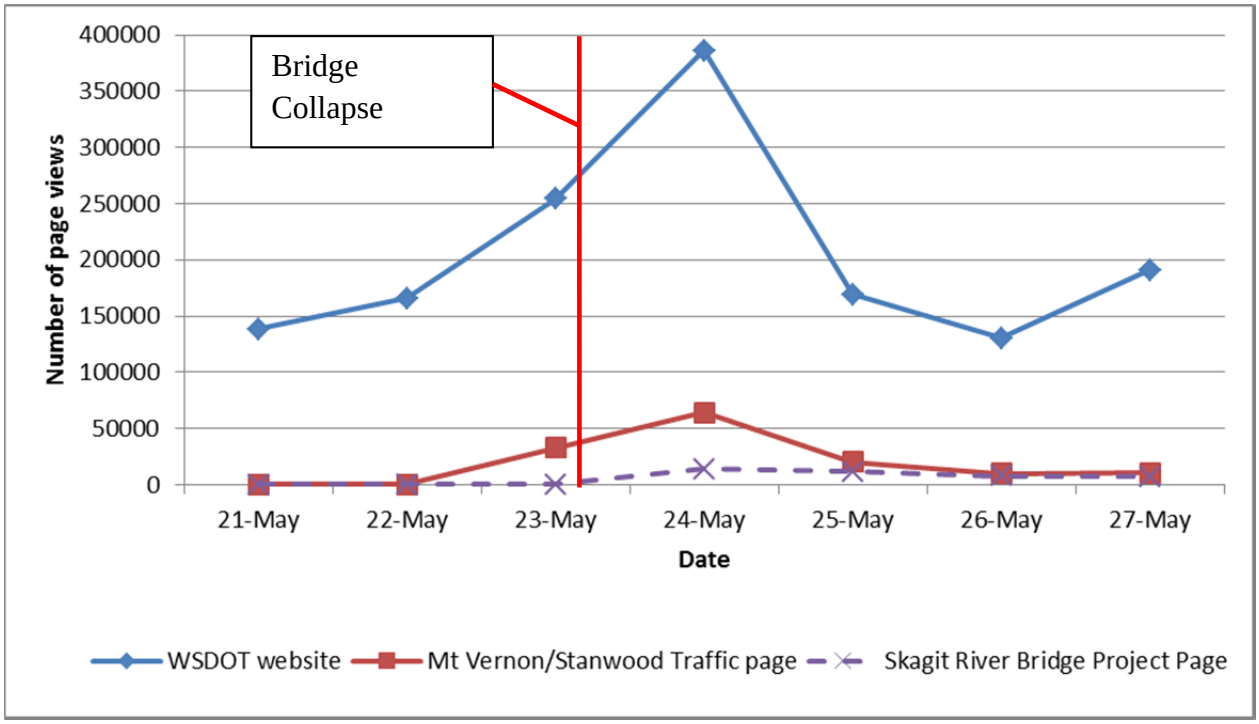

Figure 19 WSDOT social media page views [70]

The sharp spike shown in Figure 19 demonstrates how people look to the Internet for information when a major incident occurs. The day after the incident, the daily average number of page views to the main WSDOT website increased by more than 150%. The existing website for traffic for Mt. Vernon/Stanwood had a daily average number of page views of approximately 300 per day, which jumped to approximately 64,000 in the day following the collapse, a 21,214% increase. Also, in its first day of operation, the Skagit River Bridge Collapse page had nearly 34,000 page views. [70]

Social media was also actively used following the bridge collapse. On May 23, 2013 between 7PM and midnight there were more than 1,900 tweets mentioning the collapse; the following day there were nearly 1,200 tweets. Following the incident, @WSDOT had 1,249 new followers, and their Facebook account had 482 new 'likes.' [70]

In the days and weeks following the bridge collapse, WSDOT continued to successfully use social media to interact with many of their motorists, and provide them with updates. Fortunately, the WSDOT staff was prepared to respond to this event as it occurred, and they had built the trust of the motorists. If the social media network were not in place, then the results may have been different.

The authors have found that this phenomenon of steep spikes in followers to social media pages is common when extreme events take place. Therefore, it is important to have a system in place prior to a major event so that when an event occurs, people have a place to go for information.

Traffic Accident in Upstate New York

On the afternoon of September 6, 2013, a traffic accident involving a school bus occurred between the City of Troy and Latham, New York. The accident was on Alternate Route 7, westbound at I-787. As the event unfolded, there were NY-Alert messages issued for the accident including updates on which lanes were closed, and available detour routes.

Tweets were also made via the 511NY-Albany account, as this event unfolded. Figure 20 shows tweets from 511NY Albany concerning the traffic on the impacted roads [71, 72]. The tweets gave general updates on the traffic conditions, and provided an estimate for when traffic would resume to normal levels. These tweets were retweeted in some cases by the news media, and almost always by the private group Highway Monitor, the group that retweets messages related to major highways across the United States. In addition to the public-sector posts about this event, some of the local news outlets posted updates. Also, during this event many motorists were parked on the roads, and since they were not driving they had access to their mobile devices. An example post from a motorist is shown in Figure 21 [73]. This person was stuck in the traffic jam for more than one hour, and informed her social media followers, even including a photo of the situation.

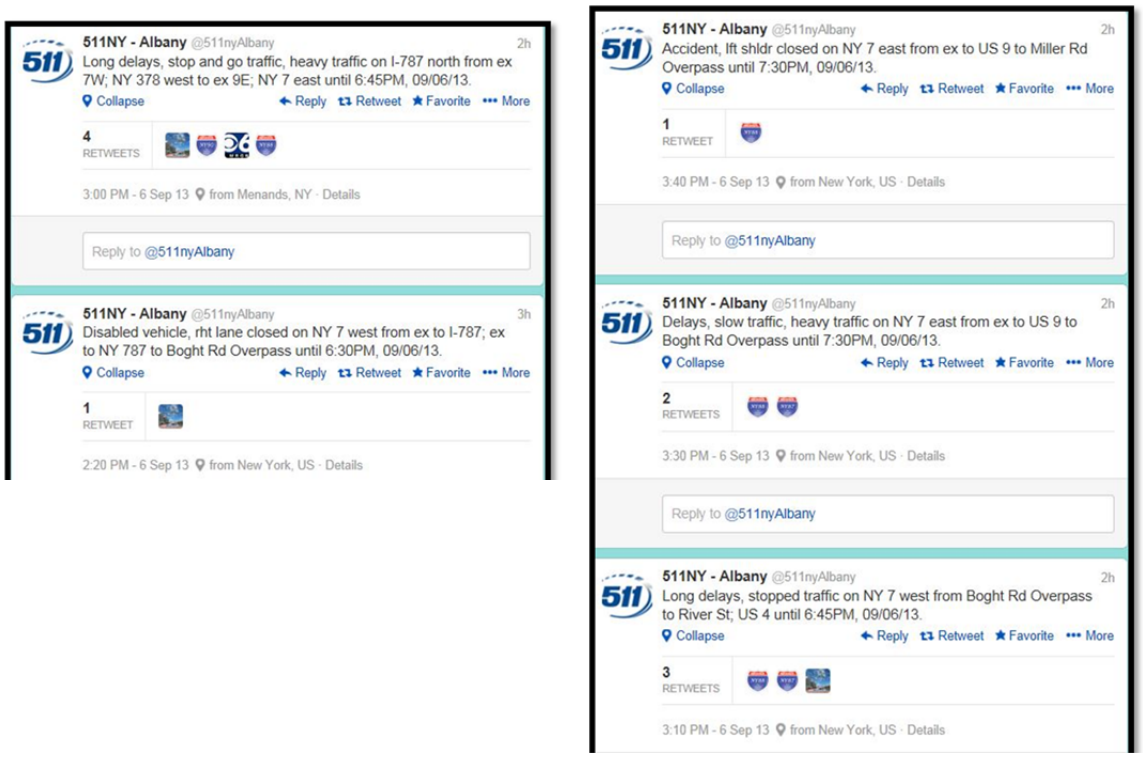

Figure 20 511NY-Albany Twitter [71, 72]

Figure 21 Example motorist tweet [73]

Findings from the Data

In our analysis, we found an interesting conclusion that can be drawn from the tweets that we generated through Twitter.com searches and through Twitter-scraping software. We found that for "non-emergency-type" events such as concerts, users seemed to be more open to creating their own tweets that gave their own perspective and insight on the occurrence at hand. On the other hand, for more "emergency-type" events, users tended to retweet messages created by local/national news media sources as opposed to creating their own tweets about the events that were occurring. This trend seems to hold true for a vast majority of the tweets that were collected (using both of the discussed methods) in our analysis, which seems to exhibit a general user inclination towards sharing opinions in one's own words and sharing facts (or, accurately-established details pertaining to a given event) in another's words (namely, those who are trusted or well-known in society).

A second conclusion that was found pertained to the Twitter-scraping software used to generate tweets. Although the method was successful in gathering tweets to draw conclusions, it was not efficient if the goal was to monitor traffic conditions in real-time. The time it takes in scraping this particular kind of data is very labor intensive. A majority of the time is spent searching through the tweets determining what is relevant and what is not. In terms of conducting these searches in real-time, using the Twitter scraping software may not be the best choice of resources. If specific hashtags were developed and utilized for certain incidents, then a large portion of the tweets could be found rather than having to use a variety of search words; however, not all users would know the correct hashtag for each event.

Based on this research, the use of social media, as a traffic sensor is not cost-effective or reliable. Although it is possible to scrape tweets in real-time based on keywords, the number of word combinations people can use is almost endless. People do not use a common language when talking about traffic, and people's perception of traffic congestion varies, therefore it is difficult for DOTs to use Twitter as a reliable traffic sensor.

4. USER PREFERENCES

Task 5 of this project was to determine the preferences of the users of social media for traffic information. As part of this task the team decided the best approach would be to distribute a survey to motorists to determine their preferences in learning about traffic related incidents. A survey was created using SurveyMonkey and was intentionally kept simple so it would not discourage the respondents from answering. The survey was only nine questions and was designed to take approximately three to five minutes to complete; the complete survey can be found in Appendix D. The questions included:

1) Zip code in which you live
2) What sources do you currently use to learn of traffic congestion?
3) In general, how often do you use social media on a mobile device?
4) Do you ever use social media for travel-related issues?
5) What social media platform do you prefer to use for updates on travel-related issues?
6) For what purpose(s) do you use social media tools for travel?
7) Which social media source do you use to regularly monitor your traffic information?
8) Would you be interested in getting messages that warn you of potential travel delays associated with non-routine events such as construction, concerts and sporting events?
9) Contact information if we can contact you in the future with any additional questions on this topic

This survey was disseminated to drivers in January 2015 to assess their preferences in obtaining traffic information and their preferences for using social media. The survey was distributed through several mailing lists and also several DOTs agreed to post this survey on their website and even distribute this through their social media networks. The states that helped distribute the survey included New York, Washington, Kansas and Georgia. In total 615 driver surveys were completed. The highest penetration of completed surveys was in New York and Washington, 68 and 101 responses respectively from each. Although the sample is not very large it provides useful insight into how drivers in the United States and in particular New York and Washington acquire traffic information. Survey analysis has been conducted for New York, Washington, the entire United States, and the United States excluding New York and Washington.

The survey respondents were asked to list all of the sources they currently use to learn of traffic congestion. Figure 22 shows a comparison between the four different groups. Based on the results, New York significantly favors more traditional mediums such as radio and television

compared to both Washington and the rest of the nation. Social media in New York is rated as the third most popular source at nearly 28%, however, social media is rated number one in Washington with nearly 72% of the respondents indicating they use social media to learn of traffic congestion. New York is even below the nation in their preference to use social media by approximately 10%. The use of the 511 system in New York is much higher than in Washington and the rest of the nation, 24% versus 6% and 14% respectively. The percentage of people in both states that indicated they don't use any medium to learn of congestion was nearly 10%. In New York 63.2% reported that they never or rarely use social media for traffic related issues, compared to 22.8% in Washington. In Washington 52.5% reported that they often or always use social media for traffic related issues, compared to 13.2% in New York.

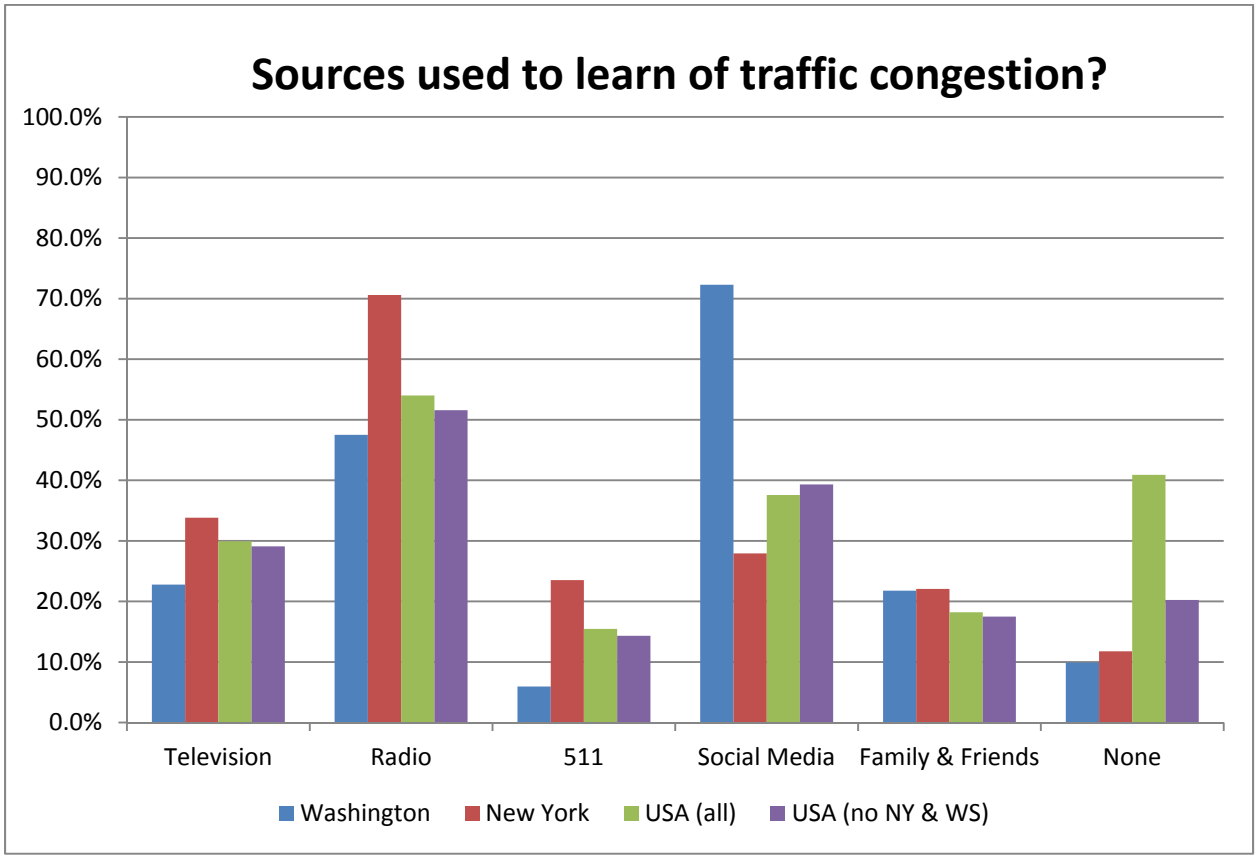

Figure 22 Sources used to learn of traffic congestion

The survey asked drivers to indicate the platforms they preferred for receiving traffic related information; the results are shown in Figure 24. In Washington, more than 41.6% of drivers choose Facebook and 45.5% choose Twitter, compared with 11.8% and 13.2% respectively in New York and 26% and 24% in the rest of the nation. The two dominant responses in New York were (1) via email, which was selected 38.2% of the time; and (2) 38.2% of the drivers indicated they do not need to receive any traffic information via social media, email or text. The rest of the nation indicated that SMS and text messages are the preferred platform, followed closely by Facebook and Twitter.

The survey asked the respondents their likelihood of using social media for travel related issues; Figure 23 shows these results. Approximately 23-24% of respondents indicated that they will sometimes use social media for travel related issues. New York led the responses of 'never' or 'rarely' using social media for travel related issues with over 60% and Washington had the lowest in this category at nearly 20%; for comparison the rest of the nation was at 50%. Over 50% of the responses from Washington indicated that they will 'often' or 'always' use social media for travel related issues and New York was just 13.2%.

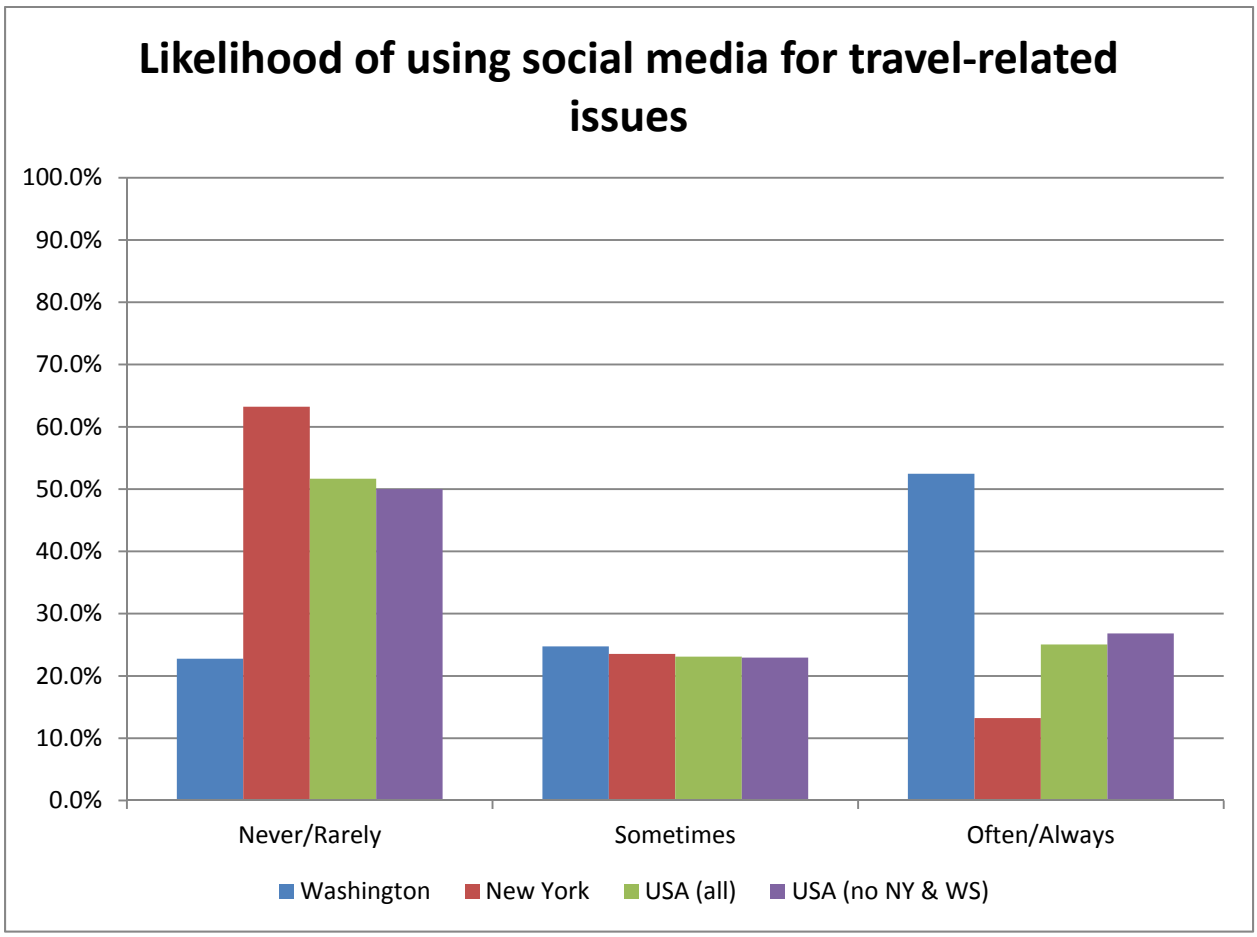

Figure 23 Likelihood of using social media for travel related issues

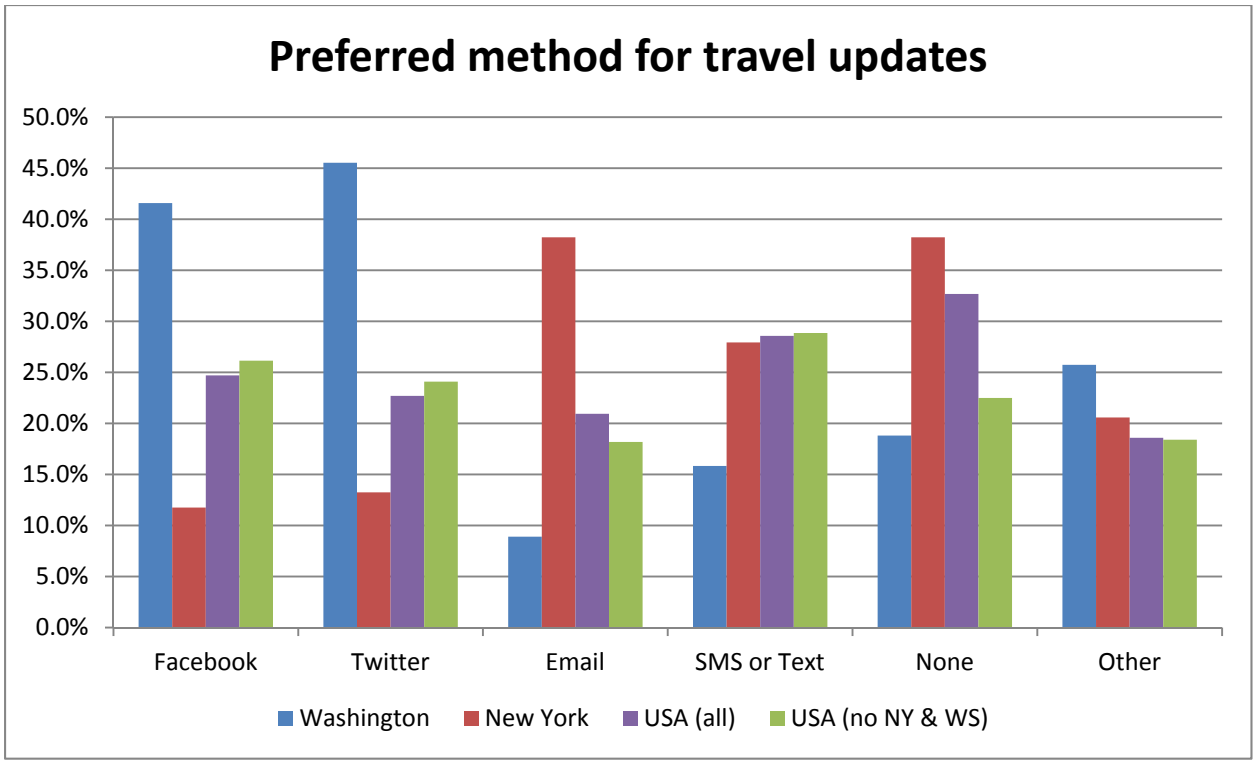

Figure 24 Preferred method for receiving travel related updates

The survey contained the question, "For what purpose(s) do you use social media tools for travel?" The results are shown in Figure 25. Depending on the type of trip, Washington drivers indicated they use social media 24–38% more than New York drivers; 38% of New York drivers said they don't use social media for travel compared to 4% in Washington. In both states the use of social media traffic conditions during trips with inclement weather was found to be a top use. For the respondents that indicated that they use some form of social media, the New York responses tend to be approximately 2-8% below the rest of the nation.

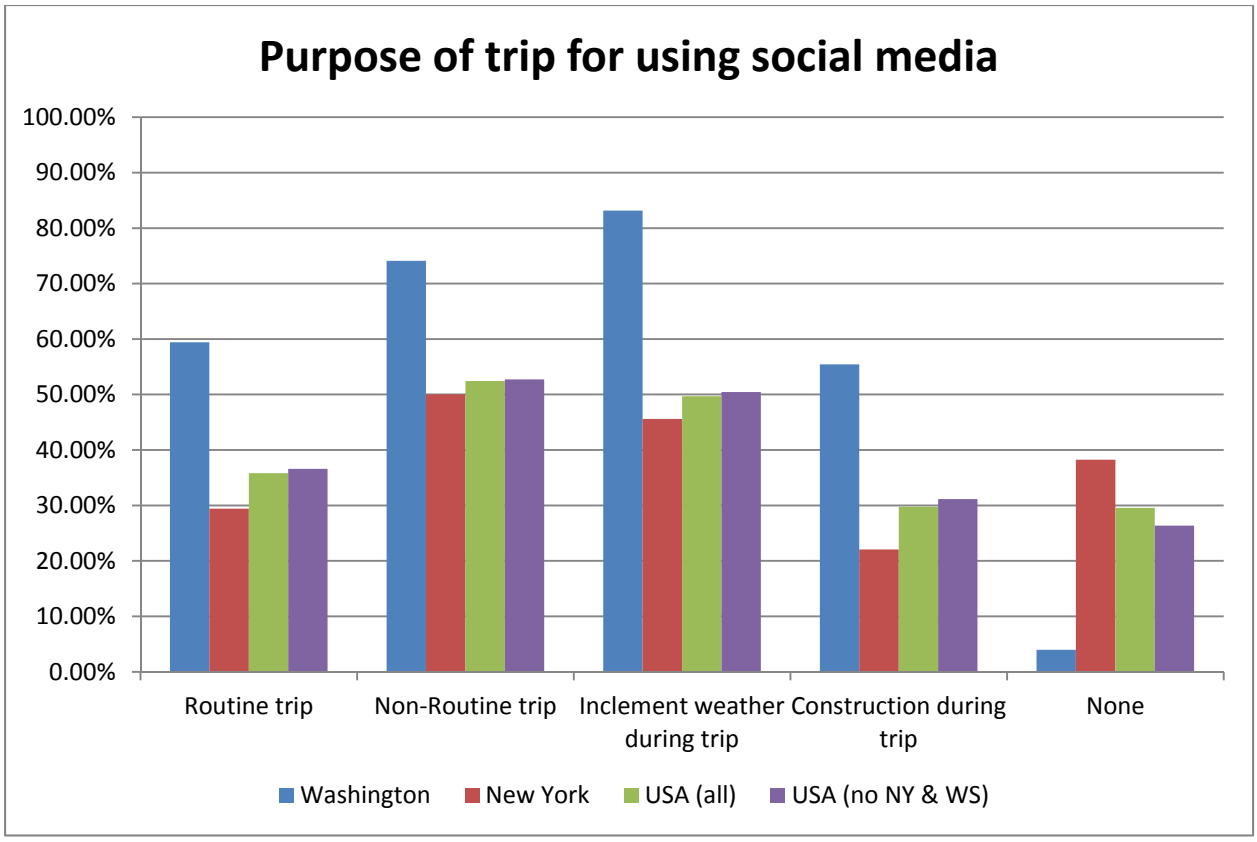

Figure 25 Social media usage by trip type

Lastly, the survey asked drivers to specify the types of accounts they preferred to monitor for traffic related information; Figure 26 presents the results for the four groups. In Washington the top response was 'DOT accounts' at 69%, compared to only 19% in New York. 'DOT accounts' was also the leading response for the rest of the nation but only at 33%, roughly half that of Washington. In New York, the top responses were 'none' at 29.4% and 'news media' at 27.9%. In Washington, the news media placed second but only at 8.9%.

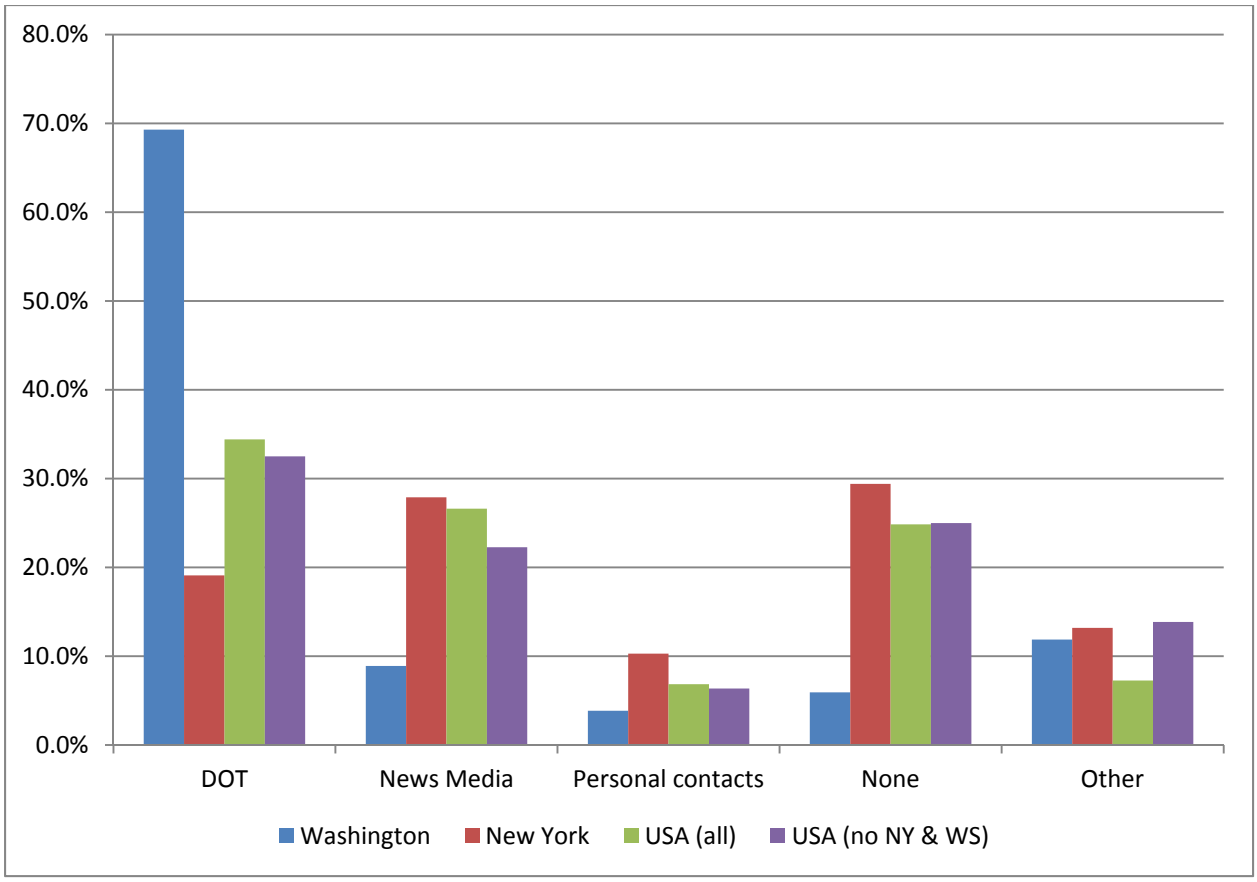

Figure 26 Primary types of social media accounts monitored for traffic information

Based on this survey it is apparent that people in different states prefer different methods of receiving traffic related information. In Washington, for example, drivers tend to favor using WSDOT social media accounts. This could be because WSDOT has an established social media presence and they engage their followers on a daily basis. In New York, most of the traffic messages are automated messages and drivers tend to receive most of their updates via the news media instead of the DOT.

Commercial Vehicle Operators

In addition to the driver survey that was conducted primarily for passenger vehicles the research team also investigated the importance of social media for drivers and operators of commercial vehicles. During an interview with the Director of Transportation at a large grocery store chain in upstate New York the role of social media for truck drivers was discussed. During the winter of 2015 there was a weather forecast for a historical snow/ice storm in the northeast. As a result several states including New York were closing major highways to trucks in advance of the storm. As it turns out the storm took another path and did not impact the region. The closing of the highways prior to the storm was detrimental to the trucking community because many of the trucks were delivering supplies to the region that would need them greatly if the storm actually hit. During this event (as well as others) the Director of Transportation at this grocery store

company said drivers were monitoring road conditions and closures via Twitter and Facebook. The drivers would monitor this information from either truck stops or when they were stopped at stores making deliveries. In some cases the drivers would monitor sites such as 511 sites or in some cases there are even 'truck driver' groups within Facebook and Twitter that have been established to allow the drivers to share information and experiences. From the fleet operations standpoint, they regularly monitor 511 and DOT pages for the regions they travel, but note that although following these extra sources may be burdensome, it can be worth the expense, especially when the driver can be notified in advance of traffic or an incident.

Additionally, during the site visit to WSDOT the social media staff indicated that fleet operations staff and truck drivers often monitor social media feeds to see if there is any traffic or incidents along their route that will impact their trip. For international truckers, they tend to also monitor the feeds related to the international border crossings so they can plan their trips accordingly. Lastly, the WSDOT staff indicated that many of the truck drivers provide good information back to the DOT such as congestion, accidents and other events occurring on the system.

5. GUIDANCE ON USING SOCIAL MEDIA FOR TRAFFIC OPERATIONS, KEY FINDINGS AND CONCLUSIONS

Even before the emergence of social media, transportation agencies have been trying to enhance their communications with their major "customers," the driving public. This communication is typically in the form of disseminating traveler information such as accidents or other delays along certain routes. Traditionally, this outreach was done via television or radio, but in the Internet age this outreach has grown, and with the advent of social media it has grown rapidly. The way in which transportation agencies use social media is still evolving. Social media has become a dynamic and adaptive force across the globe, used to inform countries, communities, and individuals about crises and disasters, and has substantially aided in relief efforts worldwide. The use and full value of these tools to disseminate actionable information to motorists is still evolving, and will likely continue to evolve as transportation agencies realize its benefits.

Transportation agencies' social media presence is evolving as their familiarity with it grows in the context of traffic. A growing number of transportation agencies are beginning to offer more non-routine, personalized messages, however the number of agencies that disseminate computer-automated messages is still in the majority. When it is possible to offer personalized messages and the users feel as though they are interacting with a human as opposed to a computer, this allows the users to realize that someone cares and is trying to help the situation. Posting automated messages about incidents or travel times is often easy once the system is set up but there is a greater deal of attention and risk associated with providing custom messages, however this can be worthwhile.

The extent to which social media is used to support the traffic management during events (i.e. such planned special events as concerts and sporting events, and such unplanned disruptive events as natural disasters and weather) varies a great deal among agencies. Agencies large and small have demonstrated success, but they have also experienced difficulty in creating and leveraging social networks. Based on the research conducted for this project, some guidelines and conclusions for using social media for traffic operations were identified that significantly impact the usefulness of an agency's social media program, including:

- **Develop (or update) the social media policy:** It is important for transportation agencies to create and keep up to date a social media policy. Within the policy it is important to define the goals and objectives of using social media for traffic operations and to identify how social media relates to the mission and policies of the agency. It is also important to identify the expectations of the staff and the public. In addition to building and maintaining a social media presence, agencies should approach their use of social media strategically. For instance, an agency should decide whether they want to lead or follow in the dissemination of data. If they lead, they should decide if they are strictly in the business of disseminating information to other groups, such as the news media, or if they

want to build individual relationships directly with users of their system. The latter would be ideal, but the appropriate resources may not be available. When the transportation agency takes a leadership role in disseminating information they have the opportunity to be the trusted, reliable and timely resource for motorists. It is important to note, though, that once people become accustomed to a certain level of service, it is often difficult to decrease that level. It is also important to offer the same level of service across an agency's entire operating area.

- **Level of service:** It is necessary for agencies providing information via social media to maintain the same level of service across time. If the agency is able to offer a great deal of information one day and not another day then the users will not be able to depend on this as a reliable source of information. If only limited staffing is available for social media activities then it is best to be conservative with the amount of information that can be provided. This idea is directed at routine events but when there is a large scale emergency or event, the public is more likely to appreciate more frequent social media updates even if it is not the norm for that particular agency.
- **Staffing:** Ultimately, the success of a transportation agency's use of social media depends on having the proper resources to implement, and sustain, a concerted program. A staff that is familiar with communications, and has a working knowledge of the transportation system, is critical. Equally important is having dedicated staff resources for social media work. While it may not be necessary to have personnel working full time with social media, having people dedicated to social media during non-routine events is critical. Many PSEs occur outside of normal business hours such as on weekends or at night and many DOTs do not have resources to have the proper social media staff during these times. This is often a challenge to many DOTs.
- **Structure of the message:** It is important to determine the best flow of the message, for example, should the highway name or the name of the location (such as the town or city) be listed first in the message, or should the message indicate the severity of the event or the event type such as 'road closure,' 'accident,' 'congestion,' or 'blocked lane' earlier in the message. In this way, the motorist can quickly ascertain whether or not the message is relevant. This guidance is primarily intended for automated messages because motorists are more likely to skip reading these types of messages.
- **Use of a standard language:** Many agencies use a standard language within their organization. However, it is important for social media to use a language that the public can understand. If the agency uses language that is not understood or informative to motorists, it is unlikely that the messages will be heeded. For example, motorists often refer to roads by names that differ from those used by the DOT. The DOT may refer to the road by the route number but the motorist may call it by a road name; it is necessary to ensure if information is posted about a certain route that it can be found by everyone. It is also necessary to develop a standard structure for abbreviations that the public can relate to. For example, will 'route' be abbreviated and if so will it be 'RT' or 'Rte' and

the same applies for direction, such as using 'NB' for northbound. Ideally, this structure would be the same from state to state so that when drivers cross state lines they do not need to learn new systems.

- **Timeliness:** In this day in age people expect to receive information as quickly as possible, therefore it is necessary to ensure that social media messages are timely. With this said, it is necessary to ensure that they are in fact verified events. Social media messages must be carefully crafted, but the agency cannot afford to wait too long to post these messages. The staff must be properly trained and there should be minimal levels of approval needed for these posts (it is expected that for some major events there may be the need to get higher approvals). If the agency does not post in a timely manner, then other unverified users will begin posting messages which may cause more confusion. It would even be beneficial if the agencies posted a message notifying users of the incident but post updates once they are known. For example, if a major event or accident forces the closure of a route the agency could post this information when it is known and verified and at a later time they could post detour information; this could give the motorists an awareness of the incident sooner.
- **Use of visuals:** The use of visuals in messages is important. It may not be possible to use photos in every message, but if available, photos provide a wealth of quick information about the current conditions, and how to proceed. For example, Figure 27 shows the impacts of a 'partially blocked lane.' If this message were only text, it would be more difficult to assess the situation [74].

Figure 27 Example use of picture by WSDOT [74]

- **Engage the users:** It is important to actively engage followers of a particular site. Rather than continually posting computer-generated messages, it is important to communicate that the DOT is aware of the current situation, and taking appropriate action. If the system uses only computer-generated messages, motorists may not know which messages are critical and which messages can be ignored. It may not even be clear which messages are "live" and which are permanent, or static. With personalized messages, followers tend to recognize critical messages as such, since someone is actually taking the time to post these messages.
- **Awareness:** Agencies can build and maintain excellent social media sites to disseminate information, but if the public is not aware of the sites, they will not perform as expected. It is important to understand who the users are, and to conduct outreach to increase public awareness of the available tools. It is also important to understand the expectations of the

users so that the system can meet their expectations. In order for the social media program to have an impact it is necessary to ensure that there is a critical mass of active users.

- **Work with other agencies:** During traffic events such as planned special events or incidents such as accidents and weather related events it can be advantageous to coordinate with others using social media. For instance, if the police post something related to an event it can be beneficial if the DOT redistributes this information via their social networks. This involves understanding the various agencies that may be posting information about events, such as local governments, police organizations, transit operators and even the venue operator.

In theory, social media provides the ability to serve as a two-way communication tool. However, for transportation agencies it is often difficult to fully utilize incoming messages. Often the agency has to focus on sending information. Some agencies are able to use Facebook to have a dialog with their customers, and in some cases customers may post a picture of a traffic event or a damaged roadway. Depending on the situation, the transportation agency can decide if additional action is necessary, such as sending a field crew to validate the damaged roadway. If the agencies have a group of trusted sources, such as community groups or other traffic groups, they may be able to redistribute these messages, or at least make links to these groups available to motorists.

Based on the data collection and data analysis conducted as part of this project it has been determined that using social media data as a traffic sensor is not cost-effective or reliable. Although it is possible to scrape tweets in real-time based on keywords, the number of possible word combinations that people can use is almost endless. People do not use a common language when talking about traffic, and people's perception of traffic congestion varies. This could change in the future if people used certain hashtags that could be correlated to specific geographic areas; however, it would require training people on how they can provide useful traffic information. Even so, the usefulness of this is still questionable since it is illegal for drivers to use mobile devices while driving, and drivers would have to make these types of posts when they stop or their trip concludes. Thus, the information would not be timely and other more traditional traffic sensors would detect this information much sooner. Another alternative would be for the agencies to create a 'trusted user' program. This might be similar to the 'weather watcher' programs that local news stations have. This group of people could report conditions for a certain set of roads on a daily basis and the DOT could monitor the data from this group of people. For roads without any instrumentation this might serve as an alternative.

It is important to reiterate that motorists should not use mobile devices while driving. They should either preplan their trips, or have a passenger use the device while the vehicle is operational. If the driver insists on receiving updates while driving, they should use a service that would provide text to speech, allowing for hands-free operation. These services continue to

emerge, and will make the use of social media for traffic operations a more viable option for motorists, especially while driving.

This research has demonstrated that transportation agencies, primarily in the United States, have been actively engaged in enhancing their communication networks through social media. This state-of-the-practice assessment makes clear that transportation agencies have challenges in deploying such a system, but that, with the proper steps, social media can provide great benefits to motorists, however, the question remains as to whether the benefits will outweigh the costs.

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74. Washington State Department of Transportation (wsdot_traffic), *"Car trouble has the right lane partially blocked on SB 5 at the Snohomish River Bridge."* April 2, 2013. Tweet.

Appendix A

Strategic Plan

511NY Social Media Strategic Plan

Prepared for New York State Department of Transportation
by IBI Group
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1 Introduction

This 511NY social media Strategic Plan is positioned to deliver on key objectives that will be outlined in the section “Goals”, but also to establish a solid foundation for 511NY to build from when and if those Goals change. The activities recommended are also designed to deliver actionable data, information that will help us better understand who the 511NY audience is, what they want, and why, when and how they want it.

A primary goal at the outset of this strategic plan is to clearly define who the 511NY audience is, and to confirm that we are providing the information they need, how they need it. The secondary goal is to consolidate the current 511NY feed into the overarching @511NY handle along with a hashtag strategy to differentiate regions and alert types, and create a more user-friendly, engaging social persona via @my511ny.

Overall, In addition to clearly defining the 511NY audience, our goal is to clearly communicate the 511NY value proposition, making it easy for people to know what 511NY can offer, and how they can get it.

Thanks to Google, most people (this is an assumption built on long experience, a deep understanding of user behavior, as well as data from the Google Keyword Planner) in the State of New York will open a browser and, reportedly, search for the following:

	Searches based on Road Conditions	**Searches based on Traffic**
1.	“how to find road conditions”	“traffic alerts app”
2.	“nyc road conditions current”	“real traffic time”
3.	“road conditions new york city”	“traffic road conditions”
4.	“road conditions information”	“current traffic lincoln tunnel”
5	“nyc road conditions”	“nyc current traffic”
6.	“find road conditions”	“traffic construction”
7.	“check road conditions for my trip”	“new york traffic alerts”
8.	“real time road conditions”	“nyc traffic closers”
9.	“trip road conditions”	“traffic closures nyc”
10.	“road conditions on”	“real time traffic conditions”

This leads us to believe that there is a demand for real-time traffic and transit information, but…

1. Is 511NY what people click on?
2. Is it what MOST people click on?
3. Who is the target audience?
4. Are they getting what they need, in the way they need it?

Regardless of how the average resident of the State of New York find their traffic and transit information (generally via Google Search), our strategy is to make sure that 511NY is the most readily available, highly visible option that comes to mind, and, when people are turning to 511NY for their traffic and transit information, we want to ensure that we are delivering what the audience is looking for, in the format they prefer. How do we do that?

1. By properly telling the 511NY story;

2. By clearly identifying what 511NY does;
3. By clearly identifying the different ways people can get the information they want and need; and
4. By delivering that information in a user-friendly, valuable way.

2 Foundation

Before we can start, we have to ensure that we are building from a solid foundation, and clearly defining the core tenets of this strategic plan: Brand definition, goals, setting, and 511NY competitors.

1. **Brand:** How is 511NY currently perceived? The brand is generally viewed as a firehose of information. An automated feed with no one on the other end who can respond or engage.
    - Task: Redefine the brand. Use our consolidated social media persona and hashtag strategy, as well as the personalized 511NY Twitter handle (@my511ny) to communicate value and engage with our audience
2. **Goals:** We have established some early/recommended goals to get started.
    - GOAL SETTING:
        - Short Term Goals: (1) Defined 511NY audience (2) Consolidated Twitter channel and hashtag strategy (3) User-friendly, engaging Twitter handle [@my511ny] (4) Grow social following
        - Long(er) Term Goals: (1) Content strategy (2) Creation of my511ny Blog (3) Creation of an Instagram feed [also @my511ny] (4) Amplify and promote content (5) Grow social following
3. **Setting:** The 511NY channel strategy - Other than search, Twitter and Facebook, there are a number of ways we can affect content opportunities and execution. We will evaluate the channels 511NY is using and the channels it should be using. This is also where we define the current audience and the target audience.
    - Short Term Task: Consolidated Twitter channel and hashtag strategy (everything under @511ny, with hashtags to define the jurisdiction and type of alert).
    - Short Term Task: New public-facing social persona - @my511ny
    - Short Term Task: Identify the Social Channels we can capitalize on the most
        - Pinterest is not the most effective channel for Traffic and Weather, and it is not currently adding value in any perceivable way.
            - It also isn't regularly updated as it is, so taking it out of the mix simplifies and streamlines the 511NY social offering.
            - This doesn't mean that we CAN'T use it in the long term, but we do not recommend it as a primary social channel.
        - YouTube and Flickr are also not regularly updated and therefore shouldn't be part of the primary offering. YouTube can remain as a channel, but we shouldn't promote it unless we are prepared to regularly create and curate content.

- Long Term Task: Create Instagram account (@my511ny). Instagram can be very effective for a brand like 511NY.
  - Traffic, travel and weather are very visual categories.
  - This would require us to regularly create and curate content for the Instagram channel, so it should only be considered a viable option if we have the resources to dedicate to it.
- Long Term Task: Create my511ny blog (Can be called My511NY or #NYTRAFFIC).

4. **Competitors:** Who is vying for the same audience?
   - Task: Regular competitive analysis and monitoring. Although we understand that NYSDOTs main goal is to ensure that the traveling public have the information they need no matter what the source, we feel that it is still important to ensure that the 511NY brand is recognized as one of the top sources for traveler information to the public.

Note: Because the strategy is built from here, we need to establish buy-in on these starting foundation assumptions early on to ensure we are going in the right direction and working towards the right goals and objectives.

2.1 Discovery

The discovery identifies “How we establish the Foundation”.

Note: Discovery is a core component of the 511NY Strategic Plan that can be initiated upon approval.

- **Personas.** This will be our definition of the target audience, where we outline their needs and what motivates them. It is ok if these don’t exist yet, because we can create some to ensure we are targeting the right people going forward.
- **Stakeholder interviews.** To fully understand and place a value on the goals and objectives, we will be undertaking Stakeholder Interviews. These interviews will get us on the same page and help establish the most effective processes for achieving our goals in a timely fashion.
- **Content inventory.** This is a quantitative assessment of the content you already have. Where does content live right now? How much is there? This is where we gather data on the URLs, metadata, links, author, date last updated, target keywords, etc. based on the current content inventory.
- **Content audit.** A qualitative assessment, evaluating everything you in the content inventory. Is the content good? Is it accessible and on-brand? Does it meet the needs of the audience? What gets the most (and least) traffic? How does the bounce rate and time on page look? Are the social shares strong or weak? If it's content that's meant to convert, is it converting? See what kinds of trends emerge about content that performs well and poorly.
- **Gap analysis.** Now look for where content is missing. Are there types of pages that should have content but don't? And are there topics that should be covered and aren't?
- **Competitive analysis.** We will apply the same exercise to the 511NY competitors.

2.2 Social Media Channels: Twitter, Facebook and Instagram

Twitter and Facebook are the two social pillars we want to build the @my511ny brand on and around.

The consolidation of the @511NY alerts with a corresponding hashtag strategy to define jurisdiction and type of alerts will ensure that the content 511NY is known for will continue to be available, but we will use the @my511ny handle to highlight and communicate the most important alerts and to contextualize and humanize the content.

We will continue to use YouTube as long as we can continue to upload content there, but we will not actively be developing a YouTube strategy.

We should remove Pinterest and Flickr from the social profile until we can determine value there. An @my511ny Instagram handle will resonate much more with our defined audience than either Pinterest or Flickr, and yet it will still accomplish much of the same objectives by providing a social channel to share #NYCTRAFFIC images. That said, even Instagram requires dedicated resources, so we should consider that channel as one of our longer-term goals when and if deemed necessary.

3 511NY Brand Proposition

511NY is the official, free USDOT Intelligent Transportation System for the State of New York, but it is also more than that:

511NY is currently positioned as a resource to a community of commuters and travellers. That said, its greatest strength could be its greatest weakness: To add value and to be as effective as possible, **511NY needs to be more than just a resource, it needs to be part of the community it serves.**

NOTE: “Real-time” information is important, but how it is delivered—along with how often it is delivered—and received determines how valuable and useful it is. Real-time does not imply “fire hose”. Or it shouldn’t. Real-time should represent availability: If you want it, we have it.

The goal: Simple, easy to navigate, easy to understand.

This is what people are looking for when they go online to find up-to-the-minute or real-time traffic and transit information.

4 Goals

The first goal of a social media and content strategy should be to add value. After that, we should be focused on making our tools easy to use, engaging our audience and growing our following. Section 4.1 outlines the short term goals that should be implemented immediately. Section 4.2 outlines the long term goals to ensure that our initial strategy is working.

4.1 Short Term Goals

The following list outlines the short term goals that we would like to achieve over a 3 month period as part of the 511NY Social Media Strategic Plan.

1. Creation of @my511NY;
2. Consolidate @511NY auto-feed and implement hashtag strategy;

3. Content Engagement - more retweets, shares and engagement over a 3 month period;
4. Growth - gain upwards of 500-1000 new followers over a 3-month period; and
5. Analyze follower behavior and determine whether or not the auto-feed is something we want more followers on, or if we would rather more followers on the consumer-facing feed (@my511NY).

4.1.1 Creation of @my511NY

The @my511NY handle should retweet and contextualize higher-level or highly-relevant alerts, as well as provide an easier-to-digest feed that is also positioned to promote other **value-add content, and engage with the community it serves**.

A Social Media Policy: We will build a so-called roadmap for users that is more accessible and easier to navigate than the current FAQs on the site. This includes:

1. Identifying the team behind 511NY content and activation: Give 511NY a face, a voice and a personality.
2. What users can expect from each channel: Auto-feed from 511NY, 2-10 tweets a day from the support/HQ feed, daily-to-weekly posts on Facebook, something on Instagram, Pinterest and YouTube, email alerts, etc.
3. Set expectations: We identify which channels are monitored, and what time frame users can expect a response (i.e. feeds are monitored 24/7, or between 8 am and 6 pm EST, and the support/HQ channel typically responds within 24 hours or less, as an example).
4. Other ways of contacting us.
5. What to do in an emergency.
6. What to do if you have information about traffic or alerts in the New York State area.

4.1.2 Consolidation & Hashtags

Instead of managing 19 Twitter feeds (with the possible addition of more), we recommend creating one auto-feed channel.

In lieu of the other @511NY Twitter handles, we need to implement the following **hashtag strategy** that uniquely identifies each jurisdiction, transit line and type of alert. The hashtags listed below need to be established and generated by the content management system.

Subways

1. #511NYSB1 (Subway line 1)
2. #511NYSB2
3. #511NYSB3
4. #511NYSB4
5. #511NYSB5
6. #511NYSB6
7. #511NYSB7
8. #511NYSBA
9. #511NYSBB

10. #511NYSBC
11. #511NYSBD
12. #511NYSBE

Regions

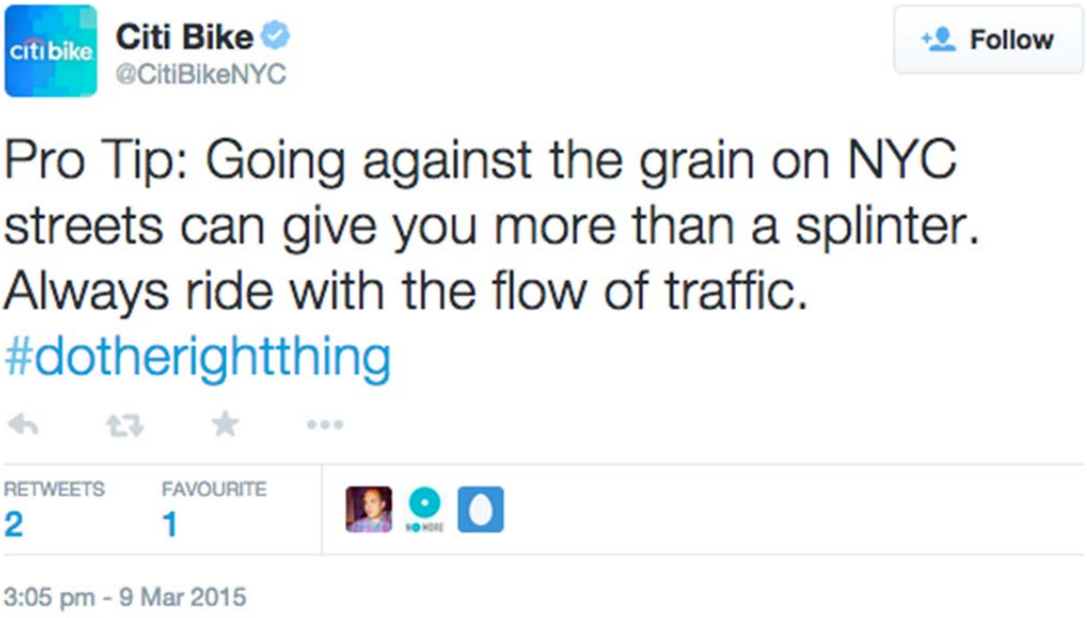
1. #511Albany
2. #511Adirondack
3. #511Binghamton
4. #511Buffalo
5. #511Catskills
6. #511LongIsland
7. #511NYC
8. #511Rochester
9. (Should also include highways, toll roads, etc.)

Alerts

1. #511nytrafficalert
2. #trafficalert
3. #NYCTRAFFIC and/or #NYTRAFFIC
4. #weatheradvisory
5. #construction
6. #accident

Not only does this give people the opportunity to pick and choose what they focus on, but it caters to a **search strategy**, honing in on what is trending and what your audience is looking for.

We can create new hashtags as well based on trending searches. For instance, if there is a 10% or greater increase in searches or mentions of #NYCTRAFFIC (a highly used hashtag) and/or “pro tip”, we can add these (#nyctraffic #protip, #nycstreets) to the @my511NY feed and/or retweet the following:



Data and Testing: While we are confident that a consolidated @511NY auto-feed, and a more personal @my511ny account will provide more value to the 511NY audience, we will be testing content, polling users and collecting data to confirm these assumptions.

We will run a Twitter "follow campaign," asking the targeted audience if they want access to real-time traffic and transit updates, clearly indicating that followers should expect a high volume of valuable traffic and transit information.

This will **grow the auto-feed handle** (more followers), and as we grow, we will **analyze and report upon the findings**. If the new followers drop off, then we will know that the feed isn't for them, and/or we will be able to glean other interesting information about how people receive and engage with that channel.

The auto-feed will always exist and be accessible, but it will be positioned as a resource rather than the sole voice of 511NY, one that people can navigate more effectively by following hashtags, rather than opting in to the whole stream 24/7. We will test how this works and if it engenders a greater follower rate, retweets, increased traffic and more time spent on the website, etc.

The support/HQ (@my511NY) channel will also be positioned for growth so that we can measure and test its directive: It will serve to **carve out the weightier traffic and transit alerts, contextualizing them, and responding to engagement opportunities**.

4.1.3 Content Engagement

Currently, 511NY is in push mode. Push out the information, and hope it is serving its purpose.

ACTION REQUIRED: More content and engagement.

We need to **push and pull, listen and engage** in order to add value and be a brand that a community will want to follow. We need to rework the 511NY channel strategy in order to better manage the setting we operate in. This will require the addition of other channels, such as a 511NY Blog and a clearer understanding of what our current channels provide. Once we establish that, we will clearly communicate that to the community at large.

4.1.4 Short Term Growth

As noted, we want the 511NY community to grow. We will grow the follower base with a Twitter strategy that incorporates content, that retweets relevant information and that engages with influential, as well as everyday users. We will give people reasons to go the website, and concurrently grow the amount of value-add content coming from all 511NY channels.

4.1.5 Analysis

We want to learn from our activities, and adapt accordingly. With more reporting and actionable information coming from our social channels, we can identify opportunities for engagement, areas we can improve, as well as where we are winning.

We are already running regular reports on our social channels as well as monitoring conversations and keywords across the Internet, however we will also need to configure and analyze our Google Analytics to ensure we are working towards the following goals:

Ratio of Returning vs. New Visitors to 511NY.org: Currently 57/43 over the past month.

Increase amount of time on site: Most only stay for 10 seconds or under.

Device preference: Desktop (80%) vs. Mobile (13%) vs. Tablet (7%).

People evidently go online and search for traffic and transit information. They go to 511NY.org, they visit the Twitter feed. But they don't follow, and we don't retain them. Our goal is to encourage visitors to follow us, to want to follow us, to think that it will make their commutes and their lives better for following us, and they will share that information, retweeting and quoting information spread by our channels, encouraging others to join the community.

4.2 Long Term Goals

The following list outlines the long term goals that we would like to achieve over a 3 month the next year for 511NY Social Media.

1. Content Plan;
2. Promotion;
3. Measurement;
4. Growth; and
5. Brand Analysis.

4.2.1 Content Plan

Daily, weekly and monthly content designed to increase our followers and communicate the 511NY brand proposition.

ACTION REQUIRED: A full content plan and calendar that identifies frequency and type of content required to grow and engage our audience.

We want to get you started on the right foot by giving you the information you need to develop brand guidelines and a voice and style guide. In addition, we'll be proposing a few steps to streamline your content workflow and develop a content lifecycle.

4.2.1.1 The 511NY Story

Once we all agree upon and understand the environment that our content strategy will be building on, it's time to start the story itself, comprised of the following:

1. **Core strategy.** Create a community that adds value. A community that listens to and engages with its members in order to know what it is doing well, and to learn what to do better. This includes an **Approval Process** to ensure messaging is appropriate and questions directed at the 511NY brand are properly addressed.
2. **Themes and messages.** We will further identify these during the deeper discovery phase, but for now the themes and messages should look back to our focus on community and our need to streamline and minimize our volume, while making it more relevant and engaging at the same time.
3. **Content plan**. TBD: This will be based on what we feel is workable with the current resources.

4.2.1.1.1 Core Strategy

Create a community that adds value – a community that listens to and engages with its members in order to know what it is doing well, and to learn what to do better.

ACTION REQUIRED:

Monitoring/Listening strategy – daily, weekly and monthly monitoring and analysis to develop a keen(er) understanding of what people are asking for, and to identify opportunities to engage with them.

Example:

NYPD NEWS ✔ @NYPDnews

In NYC this weekend? Plan ahead with the NYPD weekend traffic advisory: http://ow.ly/3xsRsG

06 Mar

This is something can could easily be retweeted and added on to…

my511NY ✔ @my511NY
Don't forget my511NY alerts http://511NY.org/my511NY RT @NYPDnews In NYC this weekend? Plan ahead with NYPD traffic advisory: http://ow.ly/3xsRsG
06 Mar

OR

Andrew Wiebe @andrew_wiebe
Grand plan to get home for 8:30 games via cab ruined by NYC traffic.
8:26 PM - 7 Mar 2015

Possible response…

my511NY @my511NY
Sorry to hear that Andrew. Maybe we can help next time! RT @andrew_wiebe Grand plan to get home for 8:30 games via cab ruined by NYC traffic.

These are simple engagement opportunities that let people know that:

a) You're listening;

b) You care; amf

c) You are part of the commuting community and have services and information they should be interested in/can take advantage of.

We will establish an approval process (see section 4.2.1.1.3) that will determine what should and shouldn't be responded to, and when.

Regardless of whether or not we go forward with unique, 511NY-owned content, the monitoring strategy will continually provide insights into who our audience is, and what they are looking for.

Engagement – To truly build a community, we have to engage with our audience, but we also want them to engage with us. Engagement is about encouraging our audience/511NY users to interact and share in the experiences/information we create for them. If we execute it properly, our engagement strategy will foster brand growth and loyalty.

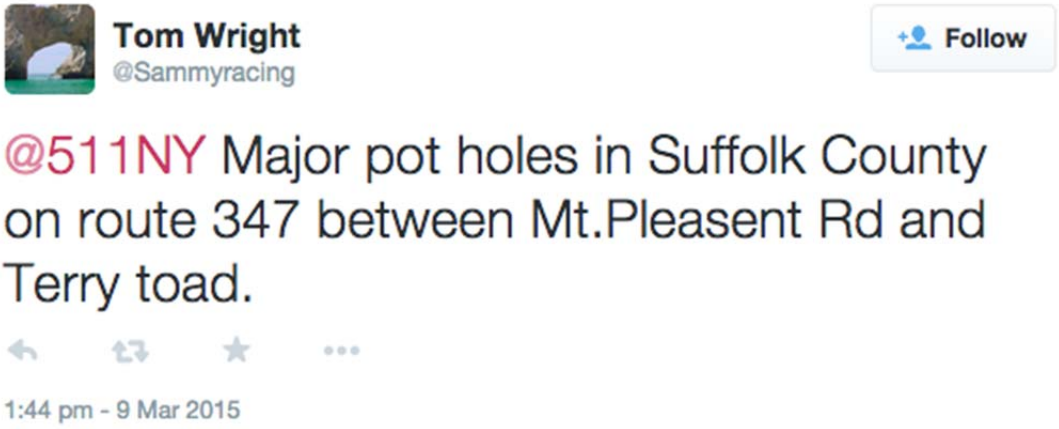
Some key things we need to do in order to engage with our audience:

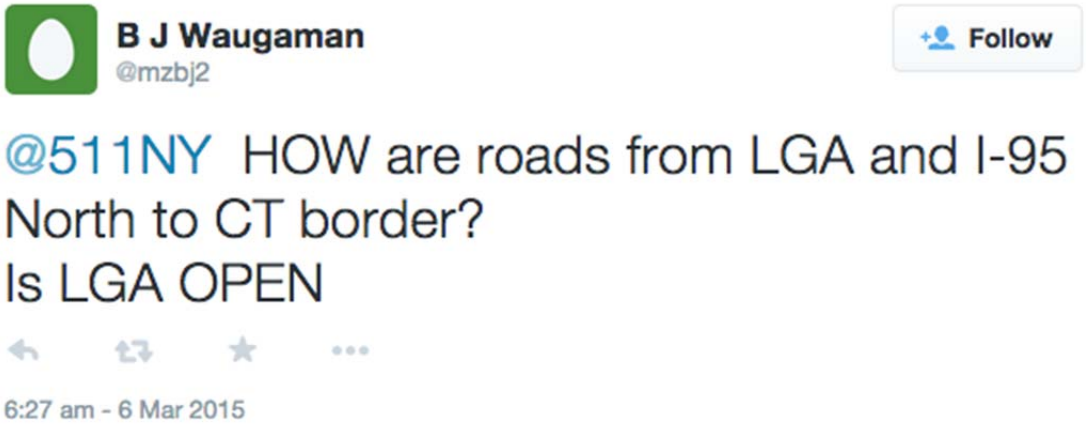
Humanize: Show our audience that we understand their needs, that we are one of them as well. Show that we are passionate and genuine about the information and services we provide.

Make people happy: This can be impossible, or incredibly easy. Sometimes the simplest act, like responding to a post that wasn't directed at us specifically, can make someone's day…

Someone driving in to work, stuck in traffic, complaining about it, may really appreciate a response like "We feel your pain. Here's a link to redeem a free coffee on us to make your day a little brighter!" <NOTE: We are not suggesting that we have to give anything away, but this is how some communities work>.

Or perhaps there was a message that WAS directed at us, but because people assume a certain amount of interaction on Twitter they will ultimately be disappointed that no one responded.





Responses would go a long way here… none of these people follow us, but they might if we responded and gave them a reason to.

The @my511NY feed should push out highly relevant traffic and transit information, as well as value-add content, infographics and other proactive material that will be of interest to our audience, something they want to share, and something that will engender more followers.

4.2.1.1.2 Themes

To reach our new audience and continue to serve our existing one, 511NY should concentrate on the following recommended themes:

New service updates:

1. New functions of the site (responsive web);
2. New alert functions;
3. Addition of @my511NY community feed;
4. Retweets/Sharing;
5. Sharing highly-relevant alerts from the auto-feed;
6. Contextualizing alerts or issues; and
7. Other influential posts/tweets.

Added value content:

1. Travel data (i.e. http://data-waze.com/2015/02/03/data-viz-schools-out-for-winter/)
2. Every-day-life alerts: Daylight Savings!
3. Tips and tricks
4. Commuting playlists

Not all content will cover all themes—in fact it shouldn't, because sometimes you need to specialize in order to make the best possible work.

A note about content and risk: Ian Lurie of Portent, Inc. often refers to something called the 70/20/10 rule. This is the ratio of your content that you want to be safe, moderately risky, and very risky. You need the 70% content—your FAQs and pricing page are examples—because your customers need that information. The 20%—e.g. articles about creativity—is content that visitors might want to share. It's riskier and sometimes reaches beyond your business model, but it should always be related to your core strategy. The 10%—like the slot machine interactive—should be risky enough that it scares you a little. It might fail, but if it succeeds, the payoff is worth all the effort.

4.2.1.1.3 Approval Process

Response and engagement for the @my511ny feed requires an established approval and vetting process to ensure the right message is being communicated. This will be established once we have determined all the players involved, resources available and what kind of expectations we want to establish for the 511NY audience.

We also need to establish a separate process for negative engagement or complaints. Please see “Social Media Response Assessment” in Appendix A.

4.2.2 Promotion

Promotion and amplification are longer-term goals that will ensure continuous, scalable growth.

Without proper promotion, content fails. There are lots of content assets you won't promote (much of your onsite content falls into this category), but anything that falls into the brand awareness part of the funnel needs a promotion plan behind it. Here are some other tactics to employ depending on the value of the asset (e.g. 10% content should get more promotion than 70% content):

1. **Social media.** We need to promote and publicize our content more than once, because social media (especially Twitter) has a very short shelf life.
2. **Paid social.** To achieve the best reach in social, you'll need to leverage ads. This is neither a social nor a PPC strategy, so if you're going to set aside a large budget for ads, you might want to consult a professional. For now, suffice it to say that you should put the biggest ad investment behind the assets you estimate will be most valuable.
3. **Outreach.** Likewise, if the content is something an influencer might share (and your 20% and 10% content should be), reach out to that influencer to let them know it exists.
4. **Syndication.** Explore opportunities to take some of your blog posts and re-post them on worthy sites with a broader or different audience.

Outreach, syndication, and PR are all tactics that require more forethought. So as your team is ideating, think about which pieces might be worthy of that kind of investment and do an extra layer of investigation into who might share the content (and what their specific interests are) before putting pen to paper.

4.2.3 Measurement

Measuring the success of content is one of the biggest challenges marketers face. With online marketing you have the benefit of analytics, but determining what metrics are useful, and what success looks like is something we have to establish.

1. Do we want MORE people to the site, or do we want more people returning the site? A balance of both?
2. Do we want them on the site longer?
3. Do we want them visiting more pages?
4. Do we want them visiting specific pages?
5. Is there a goal or action we need or want them to complete (my511NY, sign up for email newsletter, follow us on Twitter, etc.)?

As you assess these measures of content performance, keep in mind that sometimes it's good just to invest in something for its own sake because you never know what good could come from it (serendipitous marketing). This is especially true for your 10% content.

4.2.4 Long Term Growth

The 511NY Strategic plan recommends the following Long Term Growth goals.

Channel Growth: We recommend a **511NY blog**, as well as opening up to other social channels (i.e. Instagram). The blog provides an opportunity to highlight the expertise and influence 511NY possesses. It provides a face and a voice for the organization that can only help engender a loyal following.

We will deliver a comprehensive Social Blueprint outlining what each channel is positioned to achieve, and communicate to the public accordingly.

NOTE: 511NY owned and created content will make channel growth and engagement more effective and easier to obtain, but it is **not a requirement out of the gate**. We will make the case for content and other creative assets after the formal content strategy and overall proposal has been agreed upon.

Listen and Engage: A community isn't really one in practice if it doesn't listen to and engage with its community members. **Our tools and tactics will enable the 511NY team to know what people are saying, when they are saying it, and empower them to respond with the information they are looking for**.

Reporting and Data: We want to learn from our activities, and adapt accordingly. With more reporting and actionable information coming from our social channels, we can identify opportunities for engagement, areas we can improve, as well as where we are winning.

We are already running regular reports on our social channels as well as monitoring conversations and keywords across the Internet; however we will also need to configure and analyze our Google Analytics to ensure we are working towards the following goals:

Ratio of Returning vs. New Visitors to 511NY.org: Currently 57/43 over the past month.

Increase amount of time on site: Most only stay for 10 seconds or under.

Device preference: Desktop (80%) vs. Mobile (13%) vs. Tablet (7%).

Brand Awareness and Influence: People evidently go online and search for traffic and transit information. They go to 511NY.org, they visit the Twitter feed. But they don't follow, and we don't retain them. Our goal is to encourage visitors to follow us, to want to follow us, to think that it will make their commutes and their lives better for following us, and they will share that information, retweeting and quoting information spread by our channels, encouraging others to join the community.

4.2.5 Competitive/Complimentary Brand Analysis

At first glance, the competitors in this space are the community members themselves. Socially active users engage on platforms and communities like Waze/Google Maps to stay informed, but the real information, the real actionable data comes from 511NY.

Additionally, it also appears like the Federal USDOT generates and advocates a significant amount of content, engendering a large following on its social channels. We need to pay attention to what others are doing in this space and learn from them.

ACTION REQUIRED: A full **competitive analysis**, as well as an analysis of like-minded, complementary brands.

5 Conclusion

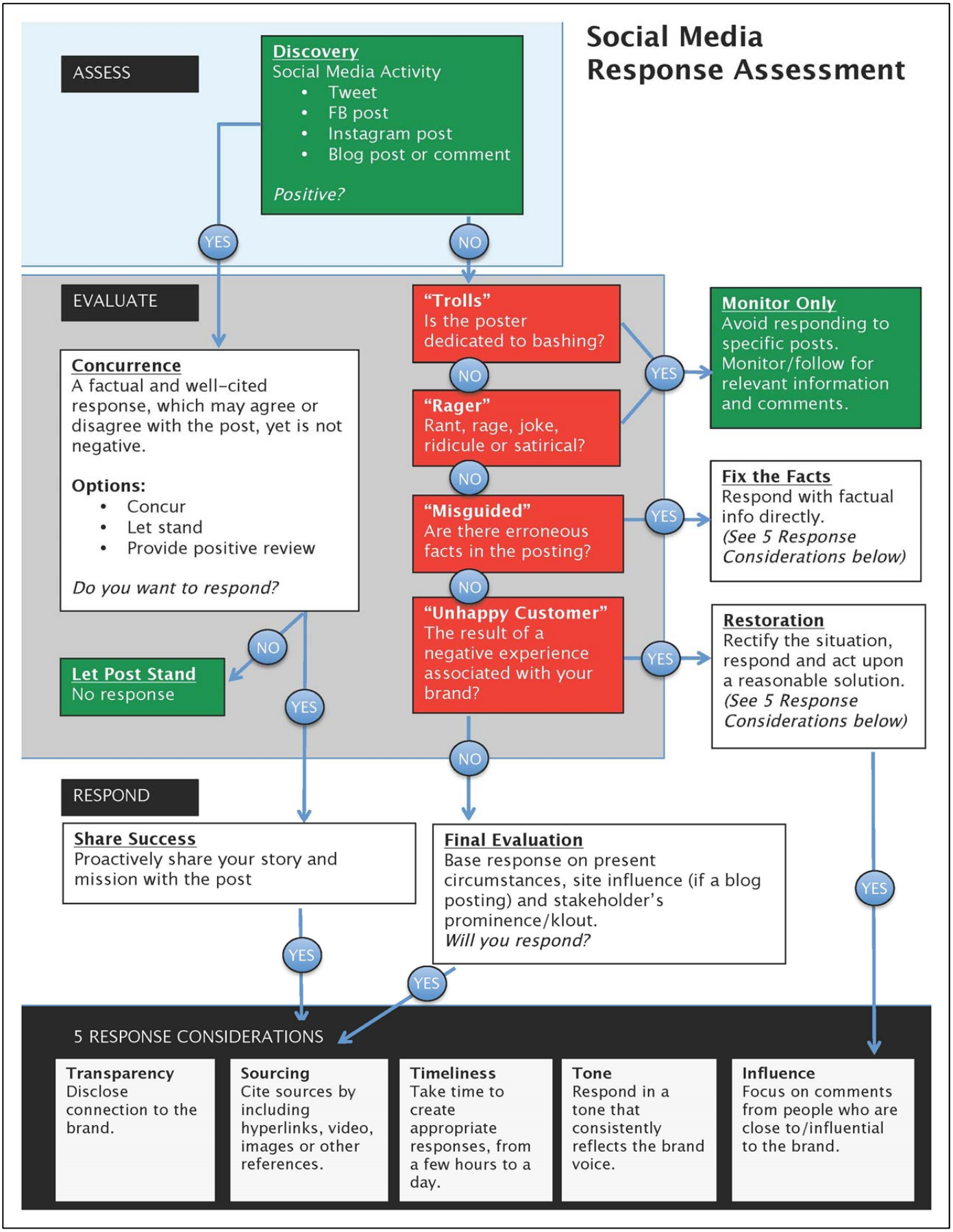
This strategic plan is positioned to establish a foundation so that we can enter into discovery and planning with all the same assumptions, goals and objectives in mind.

The key actions and deliverables of the plan are:

- Consolidate the @511NY auto-feed;
- Implement a hashtag strategy;
- Create a user-friendly, public-facing persona: @my511ny (Twitter and Instagram);
- Grow the 511NY follower base;
- Engage our audience; and
- Implement Long Term Goals.

By streamlining and simplifying the 511NY user experience, by creating and sharing content, by listening to what our audience is saying, and facilitating a process through which we can respond and engage in conversation with them, we will exponentially grow the 511NY social community, increase engagement with the brand, and, ultimately, make 511NY the go-to traffic and transit information and support resource for New York State residents.

Appendix A – 511NY Social Assessment


Social Media Response Assessment
ASSESS
Discovery
Social Media Activity
• Tweet
• FB post
• Instagram post
• Blog post or comment
Positive?
YES
NO
EVALUATE
Concurrence
A factual and well-cited response, which may agree or disagree with the post, yet is not negative.
Options:
• Concur
• Let stand
• Provide positive review
Do you want to respond?
NO
YES
Let Post Stand
No response
"Trolls"
Is the poster dedicated to bashing?
YES
Monitor Only
Avoid responding to specific posts. Monitor/follow for relevant information and comments.
NO
"Rager"
Rant, rage, joke, ridicule or satirical?
YES
NO
"Misguided"
Are there erroneous facts in the posting?
YES
Fix the Facts
Respond with factual info directly.
(See 5 Response Considerations below)
NO
"Unhappy Customer"
The result of a negative experience associated with your brand?
YES
Restoration
Rectify the situation, respond and act upon a reasonable solution.
(See 5 Response Considerations below)
NO
RESPOND
Share Success
Proactively share your story and mission with the post
Final Evaluation
Base response on present circumstances, site influence (if a blog posting) and stakeholder's prominence/klout.
Will you respond?
YES
YES
YES
5 RESPONSE CONSIDERATIONS
Transparency
Disclose connection to the brand.
Sourcing
Cite sources by including hyperlinks, video, images or other references.
Timeliness
Take time to create appropriate responses, from a few hours to a day.
Tone
Respond in a tone that consistently reflects the brand voice.
Influence
Focus on comments from people who are close to/influential to the brand.

Appendix B

GROUP REPORT from June 1, 2015 - June 30, 2015

- @511nyLS
- @511ny_NQRW
- @511nyAlbany
- @511ny456
- @511nyBuffalo
- @511nySyracuse
- @511nyRochester
- @511nyACE
- @511nyBinghamton
- @511ny123
- @511nyLongIsland
- @511NY
- @511ny7
- @my511NY
- @511nyBDFV
- @511nyG
- @511nyAdirondack
- @511nyJMZ
- @511nyCatskills
- 511NY
- All Web Site Data

GROUP STATS across all Twitter and Facebook accounts

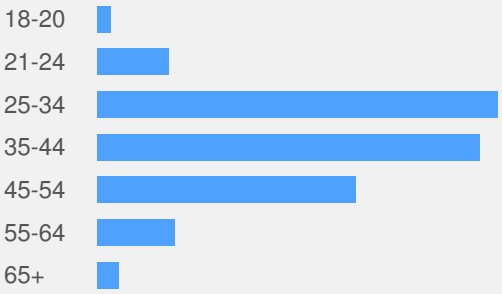
Incoming Messages	166
Sent Messages	76,081
New Twitter Followers	322
New Facebook Fans	30

16,979 INTERACTIONS
BY 148 UNIQUE USERS
66,979,849 IMPRESSIONS

TWITTER STATS across all Twitter accounts

FOLLOWER DEMOGRAPHICS

61% MALE FOLLOWERS
39% FEMALE FOLLOWERS



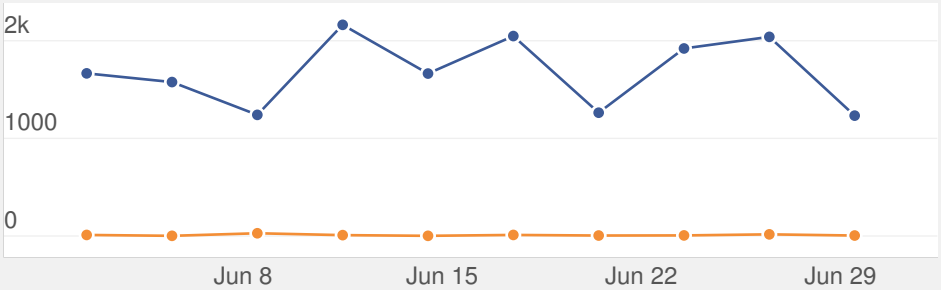
TWITTER STATS

322 New Twitter Followers in this time period

1,843 Link Clicks
96 Mentions
16,816 Retweets

DAILY INTERACTIONS

@MENTIONS 96 RETWEETS 16,816



OUTBOUND TWEET CONTENT

76,032 Plain Text
31 Links to Pages
13 Photo Links

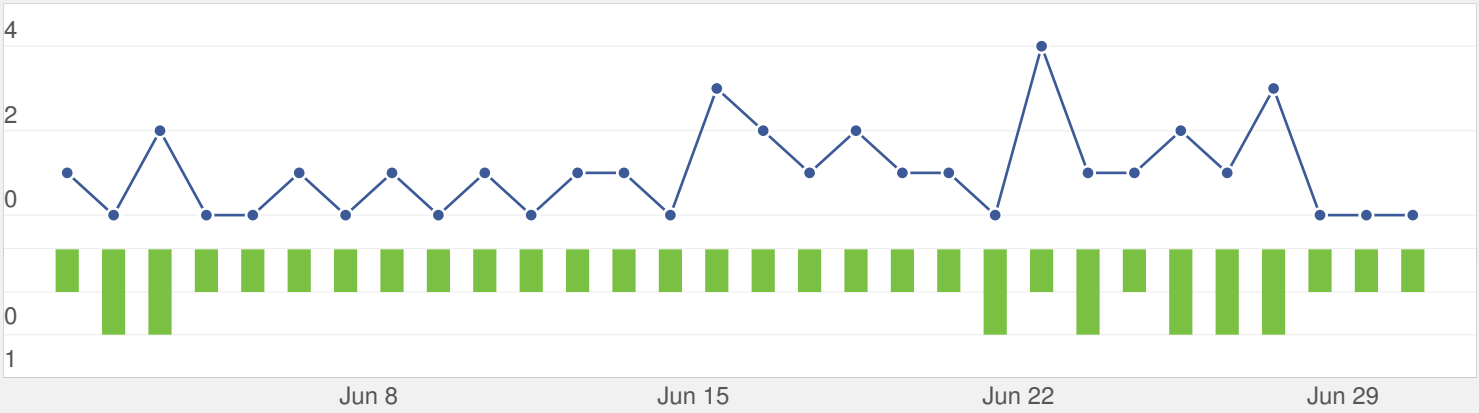
FACEBOOK STATS across all Facebook pages

My Facebook Pages

3.43k Total Likes, and 17 people talking about this

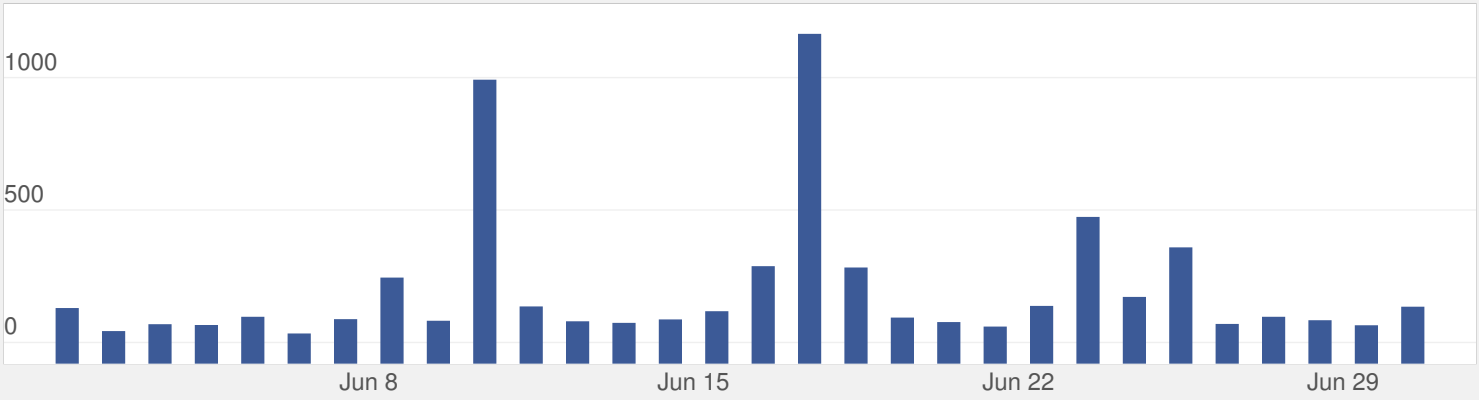
FAN GROWTH

New Fans 30 Unliked your Page 7

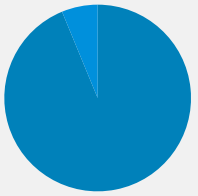


PAGE IMPRESSIONS

Impressions 5,902 by 2,421 users



IMPRESSIONS



- Page Post 2.6k
- Fan 170
- Coupon 0
- Checkin 0
- Question 0
- User Post 0
- Mention 0
- Other 0
- Event 0

- Paid 0
- Organic 3.1k
- Viral 2.7k

BY DAY OF WEEK	AVG	TOTAL
Sun	79.8	319
Mon	139.2	696
Tue	204.4	1.0k
Wed	599.5	2.4k
Thu	211	844
Fri	85.3	341
Sat	70.5	282

IMPRESSION DEMOGRAPHICS

Here's a quick breakdown of people engaging with your Facebook Page

AGE & GENDER

13-17	7 /
18-24	106 / 54
25-34	324 / 159
35-44	265 / 200
45-54	192 / 243
55+	187 / 269

54% Male

46% Female

TOP COUNTRIES

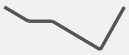
United States	1.9k
Canada	27
Iraq	14
Pakistan	5
Philippines	4

TOP CITIES

Albany, NY	91
New York, NY	66
Binghamton, NY	25
Syracuse, NY	23
Schenectady, NY	22

GOOGLE ANALYTICS

Stats across your web properties

Web Traffic	40,957	
Social Traffic	315	
Twitter Posts	38,193	
Web Mentions	17	

Leading Social Traffic Source

Twitter 189 views

TOP SOCIAL REFERRERS

#1 Construction on #NJ139Upper BOTHDIR from Kennedy Boulevard to Hoboken Av/Coles St http://t.co/pcpTmBY3Ny JRAracena JRAracena

JRAracena 107,974 followers · http://511ny.org

#2 Construction on #NJ139Upper BOTHDIR from Kennedy Boulevard to Hoboken Av/Coles St http://t.co/pcpTmBY3Ny JRAracena

JRAracena 107,974 followers · http://511ny.org

#3 RT @my511NY: Are there closures on your #nycommute? Find out with #MY511NY's live traffic reports: http://t.co/JOxg1dpGHa

trying2getit 5,198 followers · http://511ny.org

sproutsocial
www.sproutsocial.com

FACEBOOK PAGE REPORT

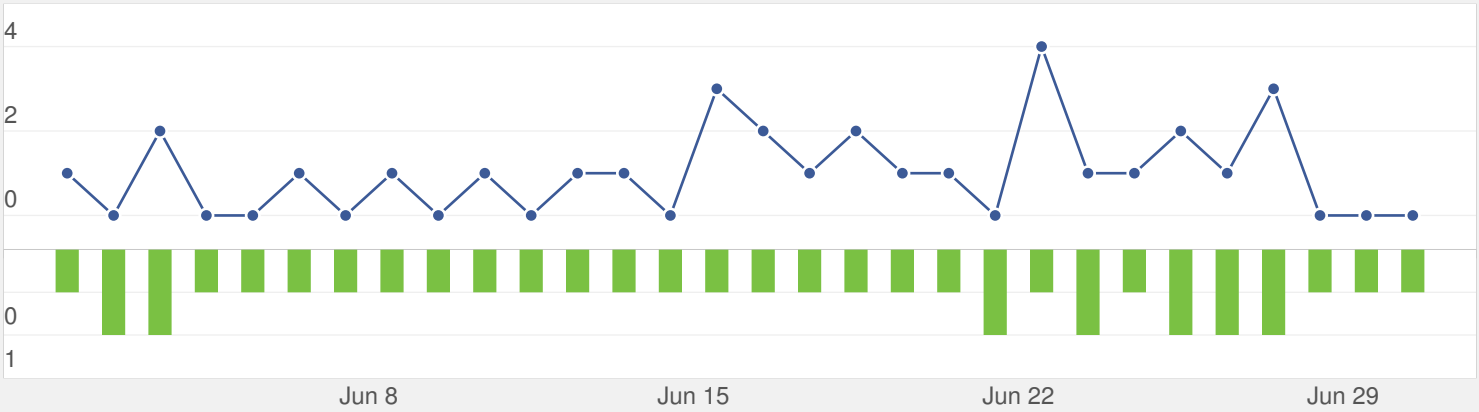
from June 1, 2015 - June 30, 2015

511NY

FAN GROWTH

3.43k Total Likes, and 17 people talking about this

New Fans 30 Unliked your Page 7



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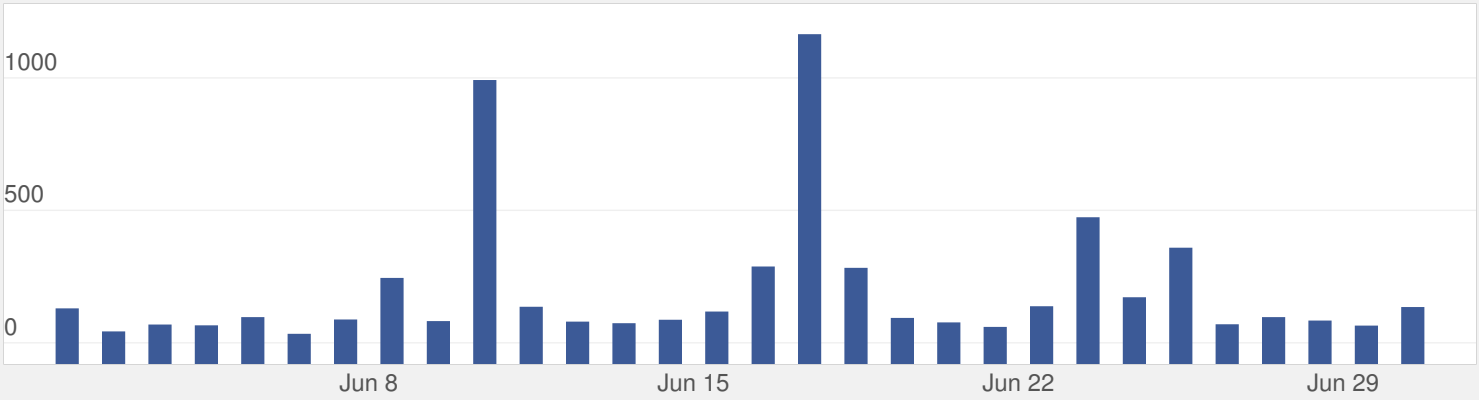
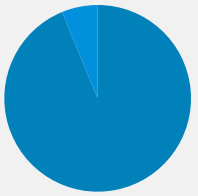


IMPRESSIONS



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46% Female

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Canada	27
Iraq	14
Pakistan	5
Philippines	4

TOP CITIES

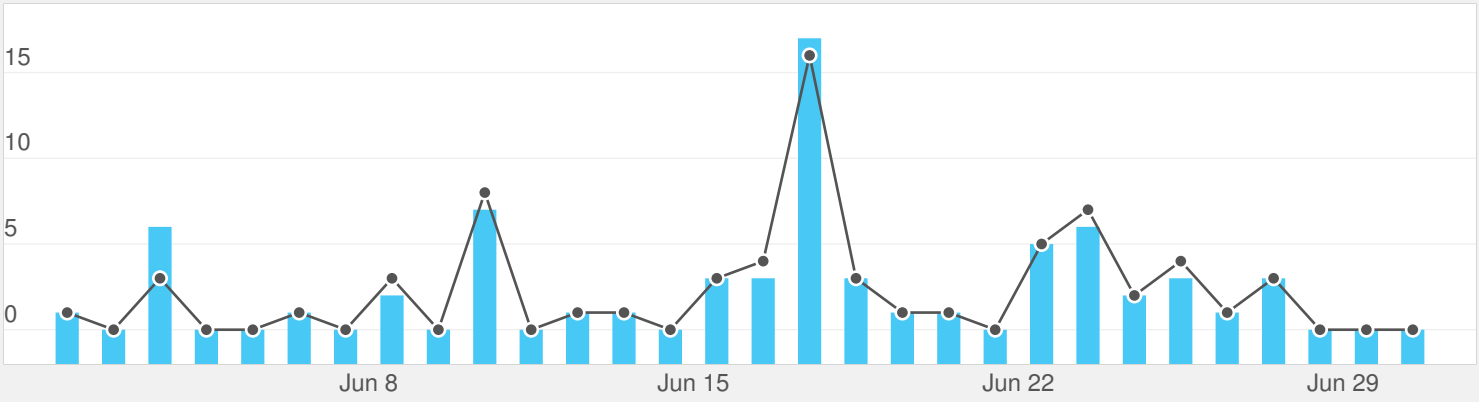
Albany, NY	91
New York, NY	66
Binghamton, NY	25
Syracuse, NY	23
Schenectady, NY	22

SHARING

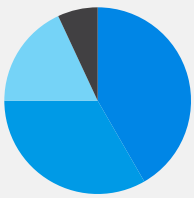
how people are sharing your content

STORIES

Stories Created 67 by 68 users



SHARE TYPE



- Fan 30
- Other 24
- Page Post 13
- User Post 5
- Coupon 0
- Checkin 0
- Question 0
- Mention 0
- Event 0

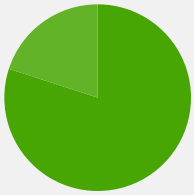
BY DAY OF WEEK

	AVG	TOTAL
Sun	0	0
Mon	2.2	11
Tue	1.8	9
Wed	8	32
Thu	1.5	6
Fri	0.8	3
Sat	1.5	6

YOUR CONTENT

a breakdown of the content you post

BY STORY TYPE



	AVG	TOTAL
Reach	463.2	2.32k
People Talking About This	4.6	23
Engagement	3.75%	4.66%

CONTENT BREAKDOWN

A breakdown of how your individual posts performed

DATE	POST	REACH	ENGAGED	TALKING	LIKES	COMMENTS	SHARES	ENGAGEMENT
06/25/15	Traffic impacts in Albany this weeken...	165	5	0	--	--	--	3.03%
06/23/15	Wondering how traffic is moving along...	287	14	5	4	--	1	4.88%
06/16/15	Routes 34&96 between Piper Road and B...	940	74	14	10	2	5	7.87%
06/10/15	Are you on Twitter? Follow our new @m...	767	13	4	4	--	1	1.69%
06/08/15	Interesting read about Governor Cuomo...	157	2	0	--	--	--	1.27%

TWITTER GENERAL STATS

from June 1, 2015 - June 30, 2015

@my511NY
my511NY

165
total followers

280 connections
made in this time period

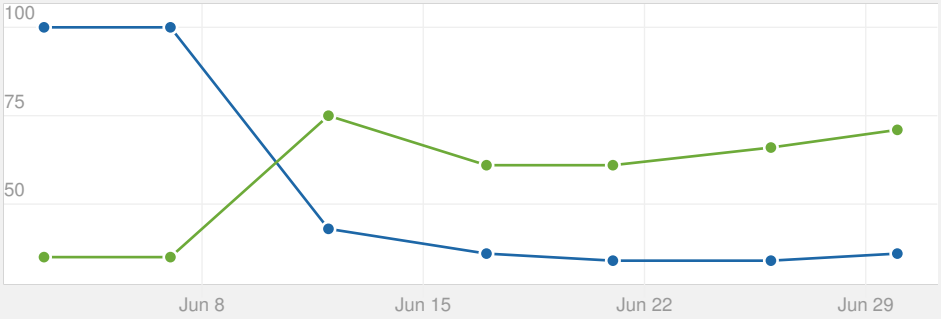
New Followers	151	
You Followed	118	

@ Mentions	37	
Messages Sent	100	
Messages Received	40	
Clicks	1,843	
Retweets	23	

KEY INDICATORS

Measure how you're conversing with your audience

MY SOCIAL SCORES — INFLUENCE 71 — ENGAGEMENT 36



TWEETING BEHAVIOR

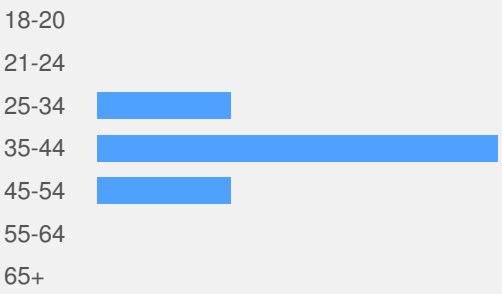
Conversation	Updates
36%	64%

New Contacts	Existing
65%	35%

FOLLOWER DEMOGRAPHICS

Learn more about your audience to shape your messaging & campaigns

BY AGE RANGE



BY GENDER

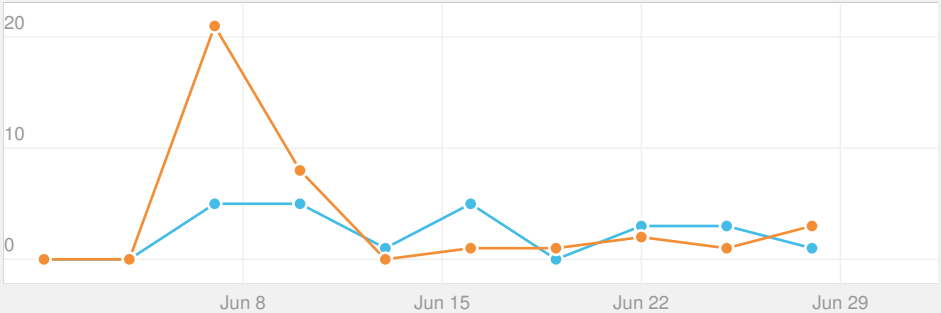
72%
MALE FOLLOWERS

28%
FEMALE FOLLOWERS

PUBLISHING

Measure performance on your outbound tweets

DAILY INTERACTIONS — @MENTIONS 37 — RETWEETS 23



OUTBOUND TWEET CONTENT

56	Plain Text
31	Links to Pages
13	Photo Links

TWITTER GENERAL STATS

from June 1, 2015 - June 30, 2015

@511nyAlbany
511NY - Albany

2,226
total followers

21 connections
made in this time period

New Followers	39
You Followed	0

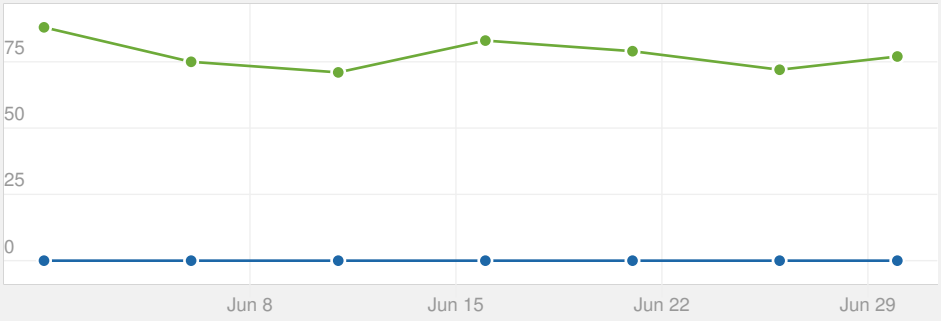
@ Mentions	7
Messages Sent	4,256
Messages Received	7
Clicks	0
Retweets	3,080

KEY INDICATORS

Measure how you're conversing with your audience

MY SOCIAL SCORES

INFLUENCE 77 ENGAGEMENT 0



TWEETING BEHAVIOR

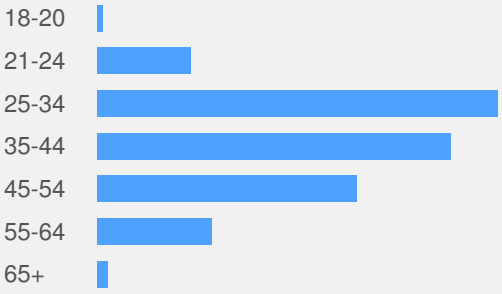
Conversation 0% | Updates 100%

New Contacts 100% | Existing 0%

FOLLOWER DEMOGRAPHICS

Learn more about your audience to shape your messaging & campaigns

BY AGE RANGE



BY GENDER

52% MALE FOLLOWERS

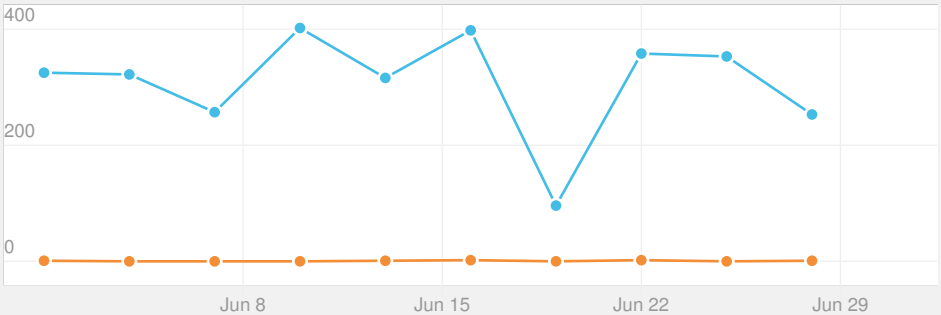
48% FEMALE FOLLOWERS

PUBLISHING

Measure performance on your outbound tweets

DAILY INTERACTIONS

@MENTIONS 7 RETWEETS 3,080



OUTBOUND TWEET CONTENT

4,256 Plain Text

0 Links to Pages

0 Photo Links

TWITTER GENERAL STATS

from June 1, 2015 - June 30, 2015

@511NY
511 New York

865
total followers

9 connections
made in this time period

New Followers	42	
You Followed	0	

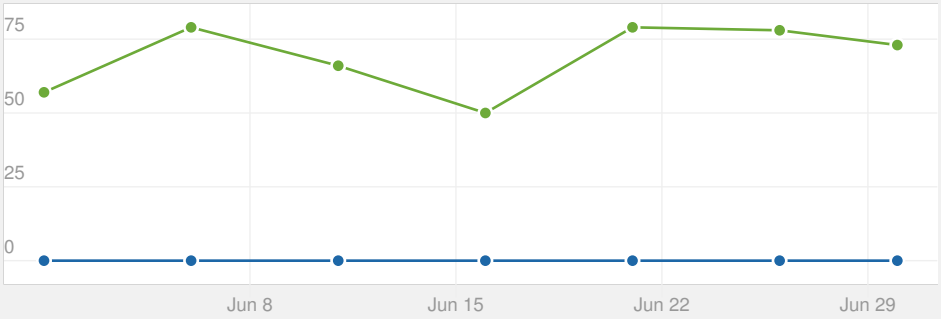
@ Mentions	22	
Messages Sent	48,390	
Messages Received	22	
Clicks	0	
Retweets	15	

KEY INDICATORS

Measure how you're conversing with your audience

MY SOCIAL SCORES

INFLUENCE 73 ENGAGEMENT 0



TWEETING BEHAVIOR

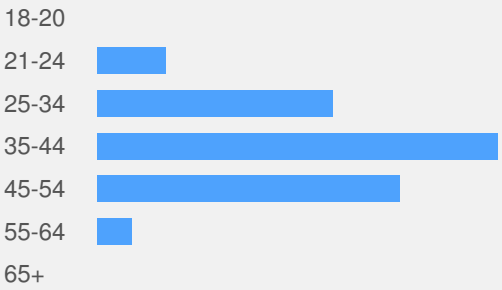
Conversation 0% | Updates 100%

New Contacts 100% | Existing 0%

FOLLOWER DEMOGRAPHICS

Learn more about your audience to shape your messaging & campaigns

BY AGE RANGE



BY GENDER

56%
MALE FOLLOWERS

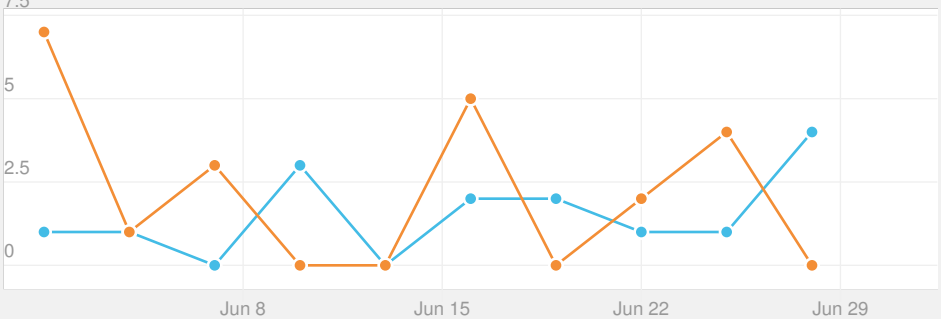
44%
FEMALE FOLLOWERS

PUBLISHING

Measure performance on your outbound tweets

DAILY INTERACTIONS

@MENTIONS 22 RETWEETS 15



OUTBOUND TWEET CONTENT

48,390 Plain Text

0 Links to Pages

0 Photo Links

Trends Report for **@my511NY**

Jun 01, 2015 - Jun 30, 2015

The Trends Report gives you insight into what's being said to your brand on Twitter—and who's saying it. The report automatically analyzes all of your @mentions for the selected Twitter profile and surfaces the top topics, hashtags and influencers for the selected date range.

sproutsocial

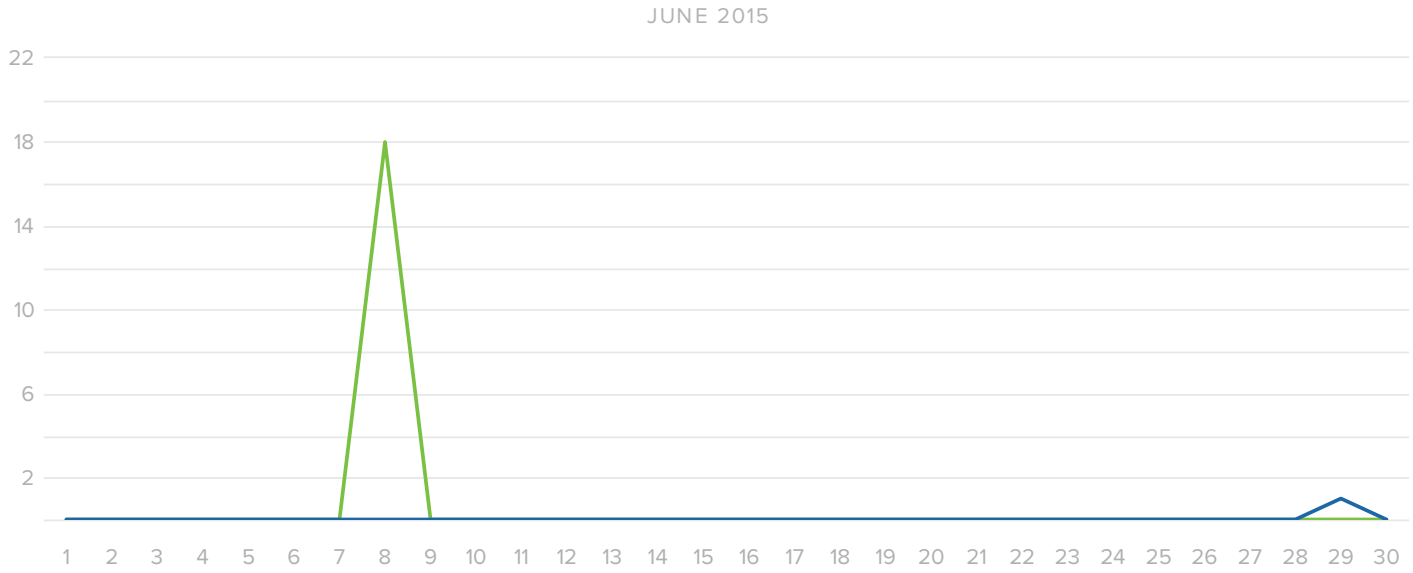
TOPICS FREQUENTLY MENTIONED
with @my511NY

friday	monitored updated visit live	18
9-5 est	monitored updated visit live	18
monday	monitored updated visit live	18
non-automated account	monitored updated visit live	18
map	get back figured clicking specifically see want click..	2
cam	figured back get means seems specifically getting ...	2
twitter feed	new follow get want improve	2
helpful tips	follow operated provide forget feed	2
info	new improve follow want get	1
search	clear know want	1

HASHTAGS FREQUENTLY MENTIONED
with @my511NY

#traincommute	profile monitored forget year works 9a-5p et mond.	1
#i87	search better option clear know want search route...	1
#i81	search better option clear know want search route-...	1

TOPICS & HASHTAGS FREQUENTLY MENTIONED *with @my511NY*, BY DAY



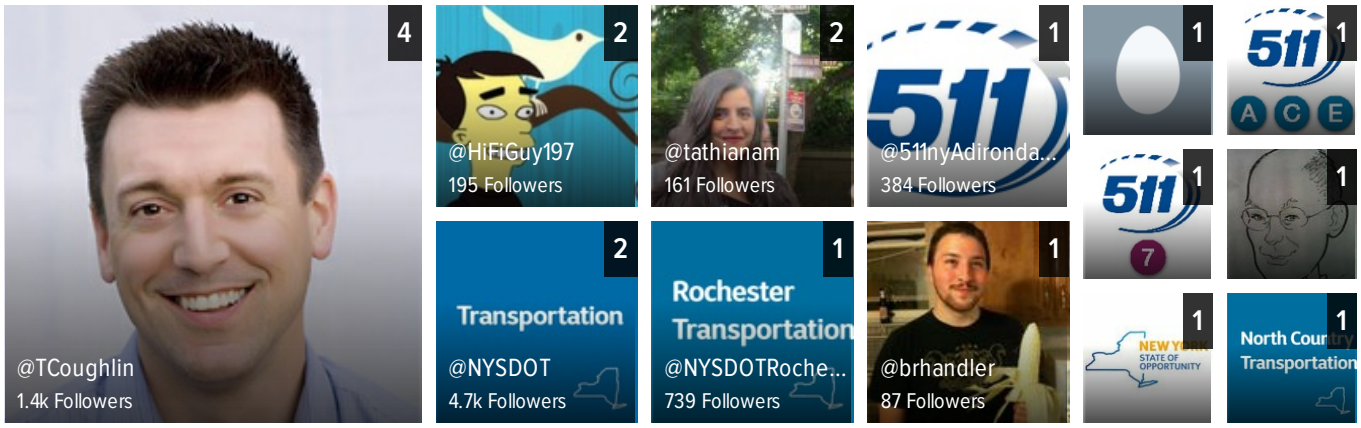
TOPICS

- friday
- 9-5 est
- monday
- non-automated ac...
- map
- cam

HASHTAGS

- #traincommute
- #i87
- #i81

PEOPLE *and* BRANDS FREQUENTLY TALKING ABOUT *@my511NY*



PEOPLE *and* BRANDS FREQUENTLY MENTIONED WITH *@my511NY*

Trends Report

Sprout automatically analyzes all of your @mentions for the selected Twitter profile and surfaces popular topics and hashtags for the selected date range.

GENERAL INFORMATION

- The Trends Report is generated using the timezone settings you have configured. Please visit Personal Settings to change your timezone.
- Data is updated daily and current through yesterday.
- You will only see monthly reports for months when you received @mentions.

TOPICS FREQUENTLY MENTIONED

Terms and phrases frequently used in your inbound @mentions for the selected Twitter profile. Under each term, you'll find an additional set of popular terms that were found. Click any of your top topics to reveal the Tweets behind the result.

HASHTAGS FREQUENTLY MENTIONED

Hashtags that were frequently used in your inbound @mentions for the selected Twitter profile. Under each hashtag you'll find an additional set of popular terms that were found. Click any of your top hashtags to reveal the Tweets behind the result.

TOPICS & HASHTAGS FREQUENTLY MENTIONED, BY DAY

A daily breakdown of your top six topics and hashtags. Click on topics or hashtags below the chart to quickly identify relationships between them over time. **Note: This section of the report will only be displayed if you have sufficient data to render the chart.**

PEOPLE AND BRANDS FREQUENTLY TALKING ABOUT

Watch for superfans, passionate customers and others that frequently mention the selected Twitter account. Click any Twitter profile to view their contact page and learn more about all of your previous interactions.

PEOPLE AND BRANDS FREQUENTLY MENTIONED WITH

Watch for peers, competitors and others that are frequently mentioned *with* you. Click any Twitter profile to view their contact page and learn more about all of your previous interactions.

Trends Report for **@511NY**

Jun 01, 2015 - Jun 28, 2015

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sproutsocial

TOPICS FREQUENTLY MENTIONED
with @511NY

app — 3
feed forget welcome print live know want onlin...

project — 2
used initiated get submits please back will can ...

cheapest broadway tickets — 2
click

application — 2
referring send

link — 2
sound profitable useful whether agreed discussed s...

2-10 posts/day — 2
follow expect find

automated traffic/transit updates — 2
follow expect find

access — 1
maybe going notify block

wolf road — 1
one online right printed told

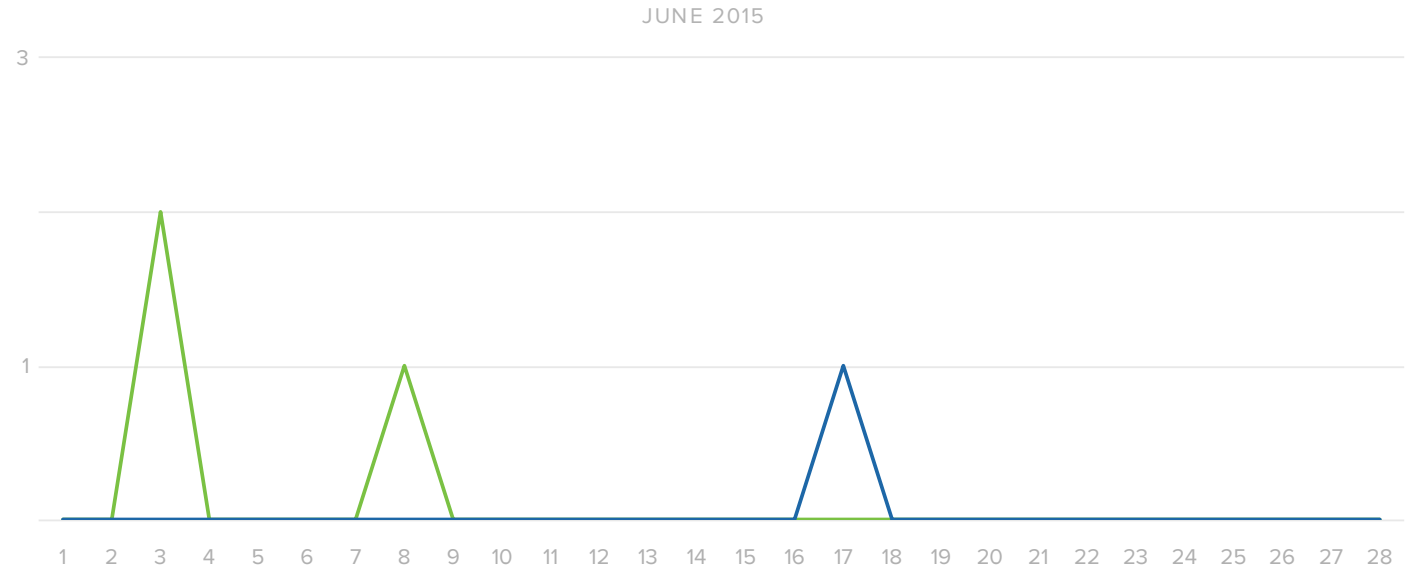
wolf road address — 1
correct

HASHTAGS FREQUENTLY MENTIONED
with @511NY

#my511nyrules — 1
follow automated traffic/transit updates 2-10 posts/day ...

#511nyapp — 1
now drive mode nys app real-time traffic featuring ...

TOPICS & HASHTAGS FREQUENTLY MENTIONED *with @511NY*, BY DAY



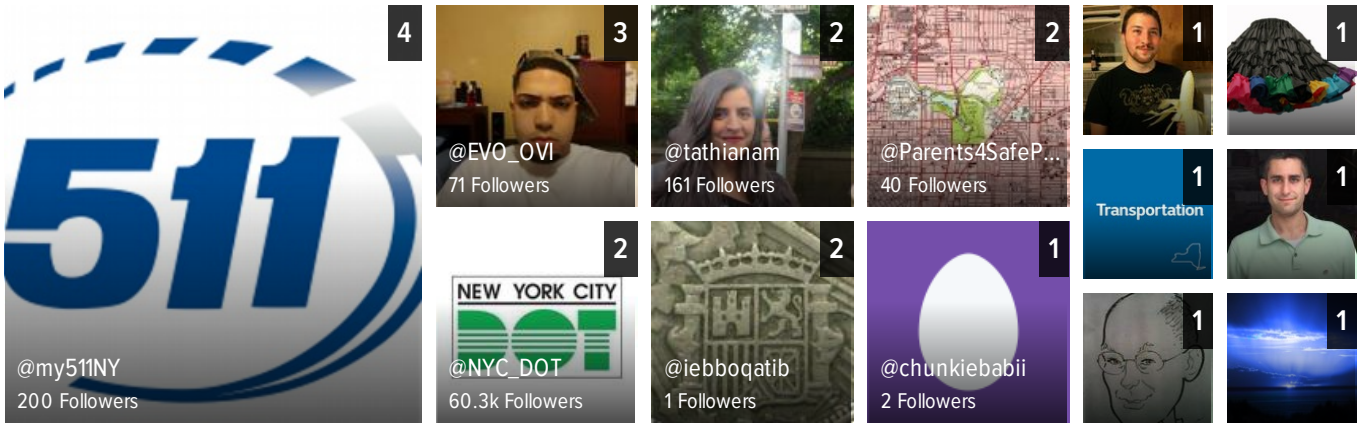
TOPICS

- app
- project
- cheapest broadw...
- application
- link
- 2-10 posts/day

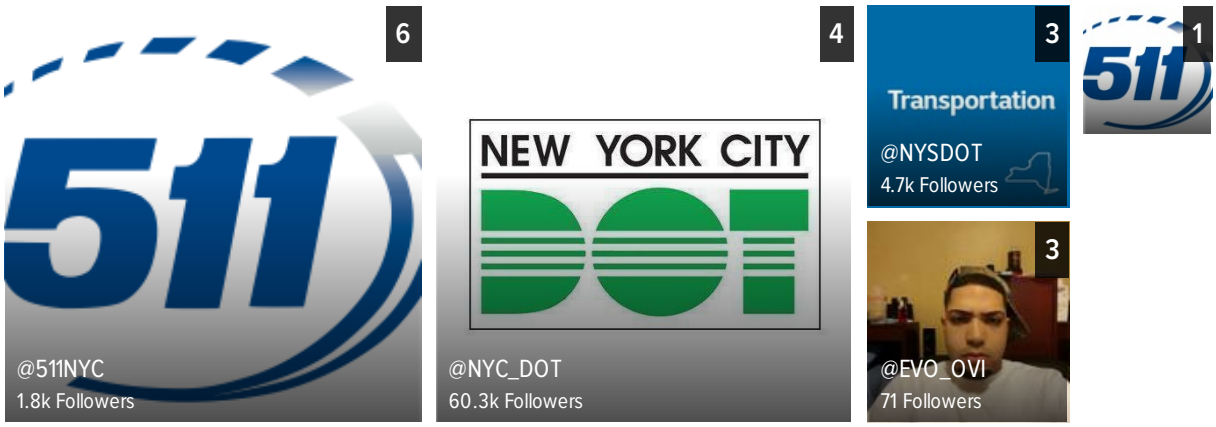
HASHTAGS

- #my511nyrules
- #511nyapp

PEOPLE *and* BRANDS FREQUENTLY TALKING ABOUT *@511NY*



PEOPLE *and* BRANDS FREQUENTLY MENTIONED WITH *@511NY*



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Terms and phrases frequently used in your inbound @mentions for the selected Twitter profile. Under each term, you'll find an additional set of popular terms that were found. Click any of your top topics to reveal the Tweets behind the result.

HASHTAGS FREQUENTLY MENTIONED

Hashtags that were frequently used in your inbound @mentions for the selected Twitter profile. Under each hashtag you'll find an additional set of popular terms that were found. Click any of your top hashtags to reveal the Tweets behind the result.

TOPICS & HASHTAGS FREQUENTLY MENTIONED, BY DAY

A daily breakdown of your top six topics and hashtags. Click on topics or hashtags below the chart to quickly identify relationships between them over time. **Note: This section of the report will only be displayed if you have sufficient data to render the chart.**

PEOPLE AND BRANDS FREQUENTLY TALKING ABOUT

Watch for superfans, passionate customers and others that frequently mention the selected Twitter account. Click any Twitter profile to view their contact page and learn more about all of your previous interactions.

PEOPLE AND BRANDS FREQUENTLY MENTIONED WITH

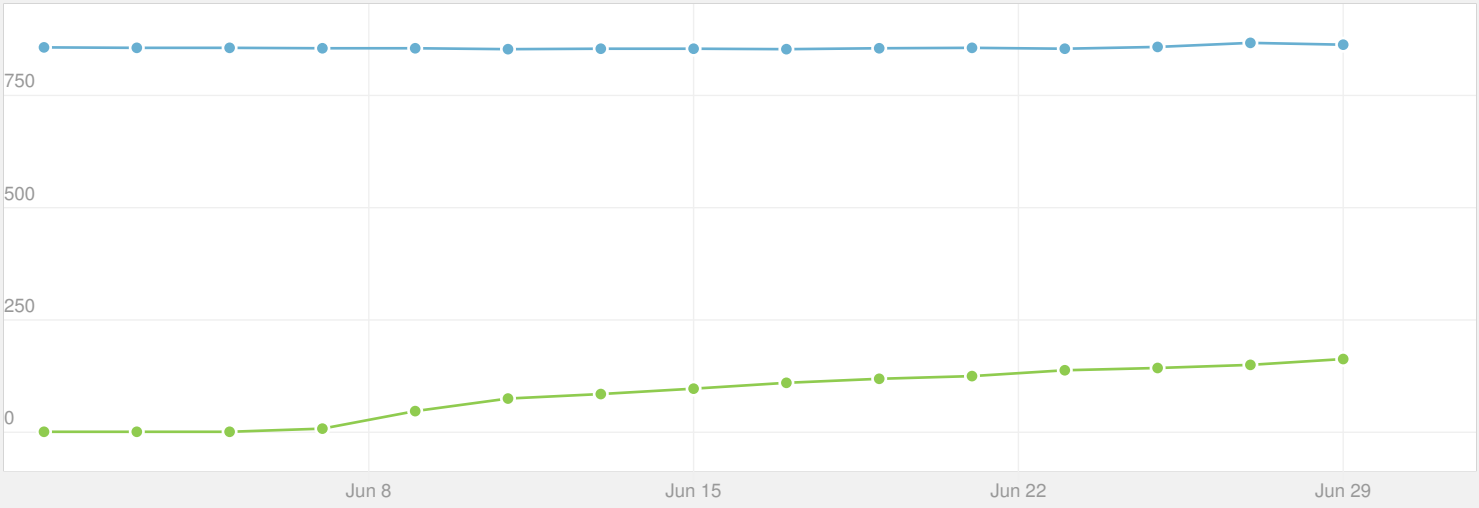
Watch for peers, competitors and others that are frequently mentioned *with* you. Click any Twitter profile to view their contact page and learn more about all of your previous interactions.

COMPARISON REPORT

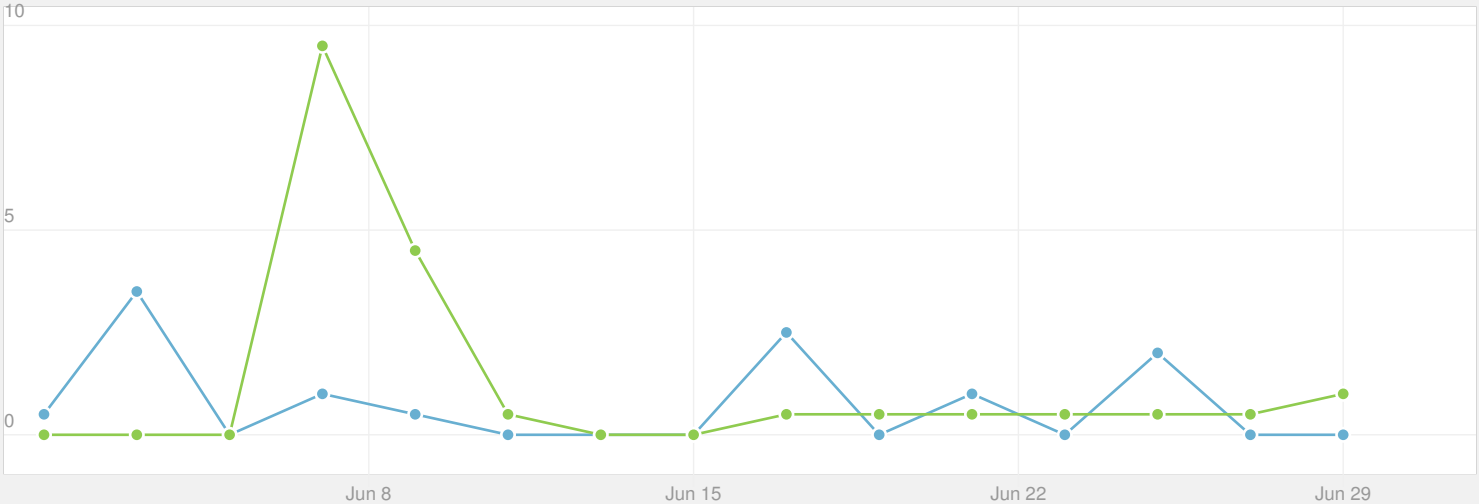
from June 1, 2015 - June 30, 2015

511 New York @511NY		my511NY @my511NY
ENGAGEMENT 0%		ENGAGEMENT 36%
INFLUENCE 73%		INFLUENCE 71%
Followers Gained 9		Followers Gained 164
Messages Sent 48,390		Messages Sent 100
Clicks 0		Clicks 1,843
Retweets 15		Retweets 23

511 New York 865 — TWITTER FOLLOWERS — my511NY 165

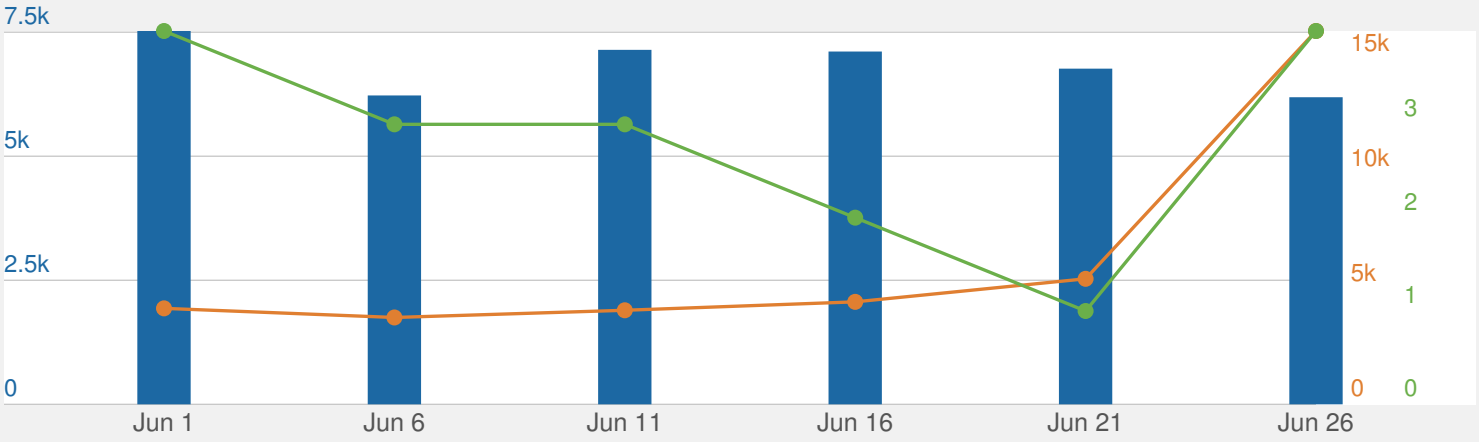


511 New York 22 — TWITTER MENTIONS — my511NY 37



WEBSITE vs. SOCIAL REPORT

from June 1, 2015 - June 30, 2015



WEBSITE TRAFFIC 40,957

TWITTER MENTIONS 38,193

ARTICLES & BLOG POSTS 17

RESULTS

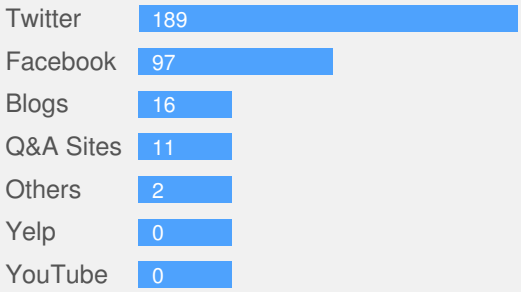
Construction on #NJ139Upper BOTHDIR from Kennedy Boulevard to Hoboken Av/Coles St http://t.co/pcpTmBY3Ny JRAracena JRAracena
JRAracena Follower Count: 107898

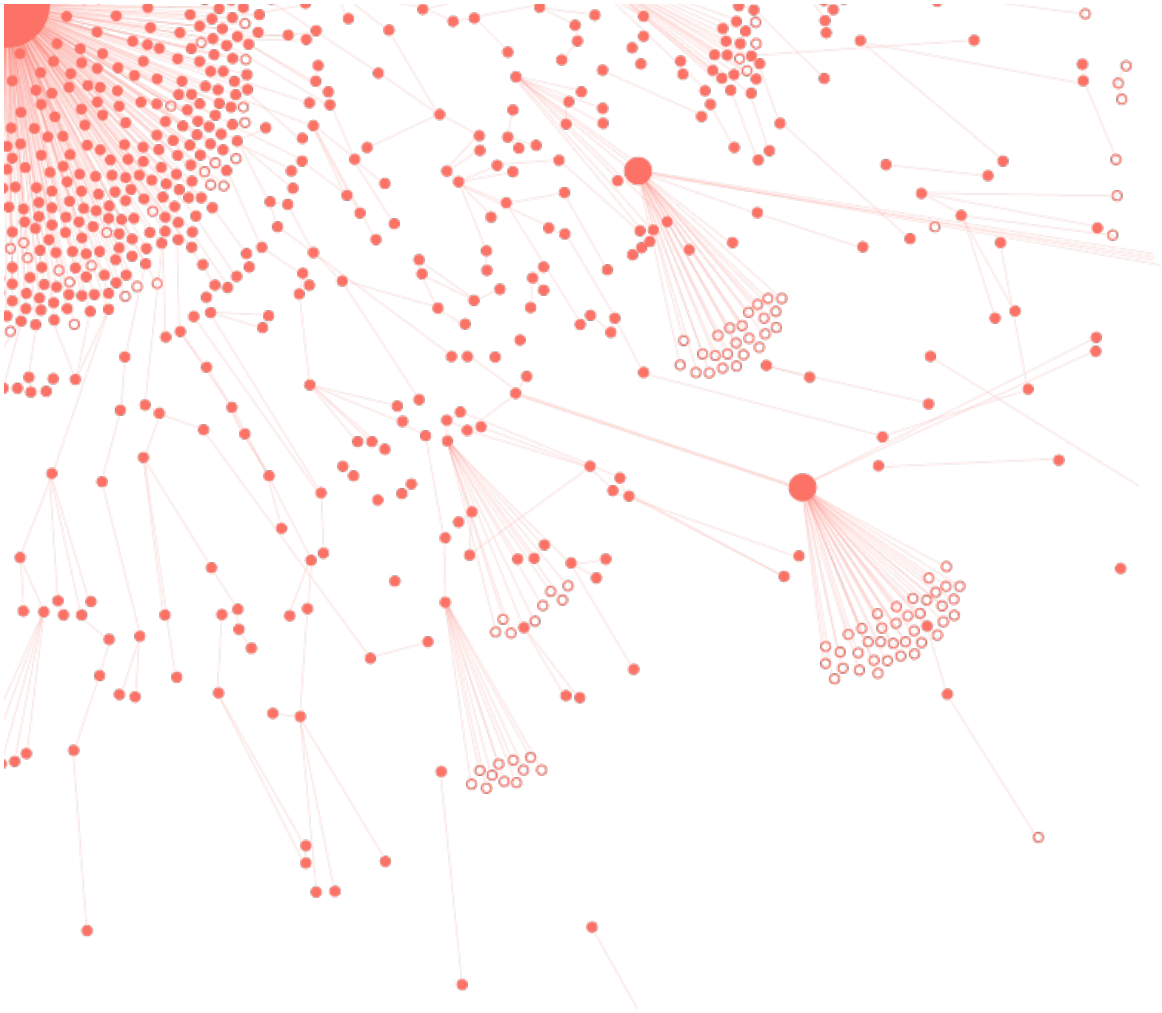
Construction on #NJ139Upper BOTHDIR from Kennedy Boulevard to Hoboken Av/Coles St http://t.co/pcpTmBY3Ny JRAracena
JRAracena Follower Count: 107898

RT @my511NY: Are there closures on your #nycommute? Find out with #MY511NY's live traffic reports: http://t.co/JOxg1dpGHa
trying2getit Follower Count: 5251

RT @my511NY: Plans for the weekend? Check out our Trip Planner before you head out on your #nycommute! http://t.co/3XvJOiRhLr
NYSDOT Follower Count: 4677

TRAFFIC SOURCES





511NY Social Landscape

June 1, 2015 at 12am - June 30, 2015 at 11pm

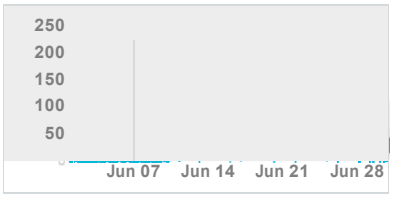
At a Glance

This report analyzes 27,855 social mentions including the keywords traffic nyc, traffic weather nyc, nyc traffic alerts, traffic conditions nyc, traffic weather ny, ny traffic report, ny traffic news, ny traffic conditions, ny traffic alerts, traffic updates ny, ny weather advisory, 511ny, ny area traffic, traffic map ny, ny real time traffic, ny traffic maps, brooklyn traffic report, news 12 long island traffic weather, NYC DOT, nysdot, NYS dot, new york weather, new york traffic, central new york traffic, new york city weather, new york city traffic, new york alerts, albany traffic and albany weather between June 1st at 12am (Eastern Daylight Time) and June 30th at 11pm (Eastern Daylight Time).

The peak of conversation happened on June 19th at 3pm, which included the keywords wide x 16, tall x 31, somehow we, rack and large wood. Positive conversations included the emotions cleared, want, recommend, join and interested. Negative conversations included the emotions accident, property damage, stuck, killed and shoulder blocked.

The most influential profile during the selected time period was @nytimes, who has 17,378,066 followers. @nytimes's mentions were shared 109 times.

Volume:

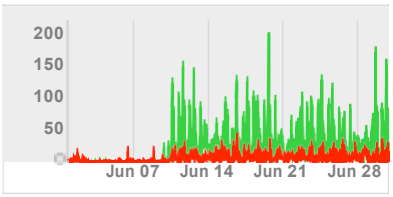


There were 27,855 mentions between June 1st at 12am and June 30th at 11pm.

The peak of conversation (233 mentions) occurred on June 19th at 3pm..

The most frequently used keywords during that peak were wide x 16, tall x 31, somehow we, rack and large wood.

Sentiment:



56% Positive

Peak: 199 mentions on June 19th at 3pm.

13% Negative

Peak: 41 mentions on June 16th at 4pm.

Most shared Positive mention:

> #Jeopardy! loves Central New York. Hey @uticacollege! http://twitter.com/AndrewDonovan/status/...

Andrew Donovan
Influence: 45 Followers: 1,935
Reporter at WSYR @NewsChannel9 in Syracuse | Formerly at @WKTV in Utica, @NBCNews in NY | Alum of @HWSColleges | Links and retweets aren't endorsements.

Influencers:

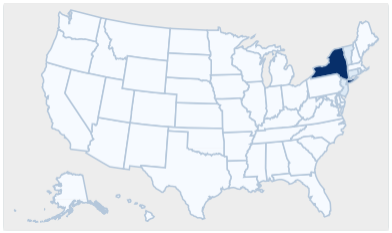
The New York Times — Score: 99
Where the conversation begins. Follow for breaking news, special reports, RTs of...

Adweek — Score: 94
The leading source for news, insight and community for marketers, media and...

Business Insider — Score: 94
What you need to know.

The Top 10 Influencers are interested in new york, news and new york city.

Location:



The highest number of mentions originated from New York, New Jersey and Connecticut.

New York, New Jersey and Vermont had the most mentions per capita.

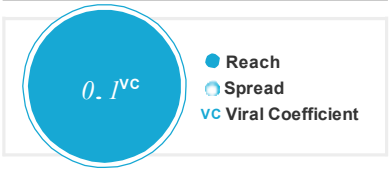
Conversations:

23.6%
6,805 mentions shared "construction"

8.0%
2,298 mentions shared "accident"

6.5%
1,887 mentions shared "delays"

Viral Coefficient:



Original mentions had a potential of reaching 7,537,413 people between June 1st and June 30th.

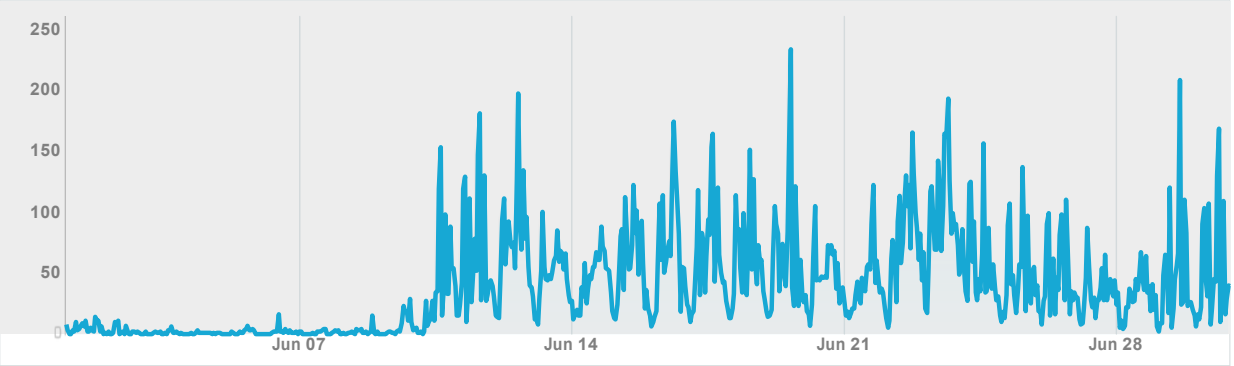
In the same timeframe, those mentions spread to 499,051 additional people via Re-Tweets and Shares.

Viral Coefficient
Mentions during this time period were not very viral.

Volume

Between June 1st at 12am and June 30th at 11pm there were **27,855** mentions. 26,335 of these were original mentions reaching a potential audience of 7,537,413. In addition, 140 unique profiles made a total of 1,520 reshares spreading the mentions to an additional 499,051 people.

Mentions Timeline



27,855

Total Mentions

On Friday the 19th of June at 3pm, there was a spike of 233 mentions.

The most frequently used keywords during that time were wide x 16, tall x 31, somehow we, rack and large wood

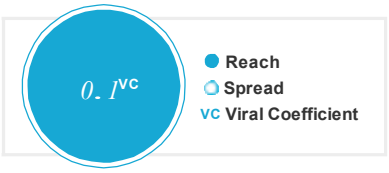
Content Source Breakdown

Twitter
98.23% (27,362 mentions)

Instagram
1.65% (460 mentions)

Facebook
0.11% (30 mentions)

News Sources
0.01% (3 mentions)



Original mentions had a potential of reaching 7,537,413 people between June 1st and June 30th.

In the same timeframe, those mentions spread to 499,051 additional people via Re-Tweets and Shares.

Viral Coefficient
Mentions during this time period were not very viral.

Most Reach

@nytimes, who posted on June 18th at 2:36pm, has the most followers (17,378,066).

> Large parts of NYC's Central Park and Prospect Park will be closed to car traffic on weekdays http://www.nytimes.com/2015/06/19/nyregi...

The New York Times
Influence: 99 Followers: 17,378,066
Where the conversation begins. Follow for breaking news, special reports, RTs of our journalists and more from http://NYTimes.com

Most Spread

On June 11th at 8:52am @FoxMariaMolina, who has 48,513 followers, posted a mention that spread to 432,420 additional people.

> Severe weather is possible today anywhere from Colorado to New York. #wind, #hail & isolated #tornado @foxandfriends ht...

Maria Molina
Influence: 60 Followers: 48,513
All about weather, space, science and photography @FoxNews @ColumbiaCS @floridastate

Most Popular

The most popular mention appeared on June 18th at 6:45pm, posted by @nytimes, and as of July 6th at 9:58am, was retweeted 109 times.

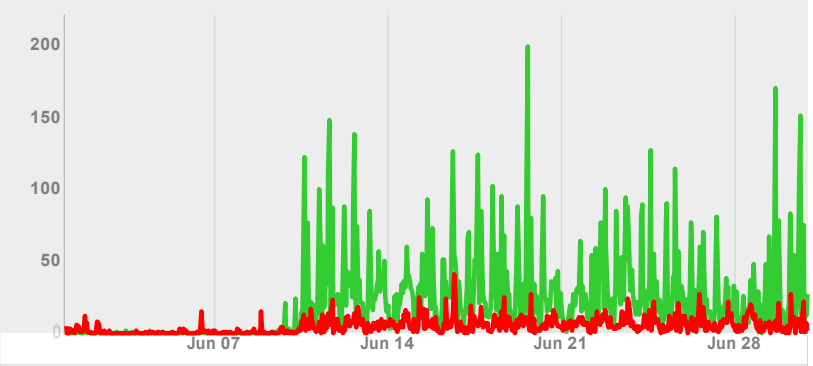
> Large parts of NYC's Central Park and Prospect Park will be closed to car traffic on weekdays http://www.nytimes.com/2015/06/19/nyregi...

The New York Times
Influence: 99 Followers: 17,378,066
Where the conversation begins. Follow for breaking news, special reports, RTs of our journalists and more from http://NYTimes.com

Sentiment

Of 27,855 mentions analyzed between June 1st at 12am and June 30th at 11pm, approximately 15,620 mentions (56%) were positive, and 3,616 mentions (13%) were negative. 8,619 mentions (31%) were classified as neutral, or not very emotional in either direction. The most frequently used positive emotions were cleared, want, recommend, join and interested. The most frequently used negative emotions were accident, property damage, stuck, killed and shoulder blocked.

Sentiment Timeline



56% Positive Mentions

13% Negative Mentions

31% Neutral Mentions

The biggest sentiment gap occurred on June 19th at 3:00pm when the positive sentiment reached 85% (199 mentions), and the negative was 3% (8 mentions).

On Friday the 19th of June at 3pm, there was a spike of 199 positive mentions.

Most shared Positive mention:

#Jeopardy! loves Central New York. Hey @uticacollege! http://twitter.com/AndrewDonovan/status/...

Andrew Donovan
Influence: 45 Followers: 1,935
Reporter at WSYR @NewsChannel9 in Syracuse | Formerly at @WKTV in Utica, @NBCNews in NY | Alum of @HWSColleges | Links and retweets aren't endorsements.

Negative sentiment peaked with 41 mentions (31% of the volume) on June 16th at 4:00pm.

Most shared Negative mention:

Today we're memorializing seven people killed by NYC traffic 1. Ida Rosenblatt 3-26-2014 #VisionZero @NYC_SafeStreets http://twitter.com/RightOfWayNYC/status/...

Right of Way
Influence: 49 Followers: 1,647
Direct Action Street Justice #walknyc #bikenyc #visionzero now

The lists to the right show the people who are using positive keywords and negative keywords in posts about your brand, along with the number of people that follow them, and the number of mentions they shared between June 1st and June 30th.

Sharing Positive Sentiment

User	Mentions
511 New York 865 Followers	12,697
Albany Jobs 227 Followers	112
Jobs in Albany 187 Followers	80
Elmira Local 660 Followers	63
Diane Auresto 553 Followers	61

Sharing Negative Sentiment

User	Mentions
511 New York 865 Followers	2,425
Diane Auresto 553 Followers	80
John Gabriel 239 Followers	42
TTN Albany 332 Followers	40
MoCo Incidents Page 864 Followers	36

Influencers

The top Influencer, **The New York Times** with 17,378,066 followers and and influencer Score of 99, posted twice between June 1st at 12am and June 30th at 11pm. The most active author, **511 New York**, who has 865 followers and an Influencer Score of 39, posted 17614 times during the same period.

Name	Bio	Followers	Score
The New York Times @nytimes	Where the conversation begins. Follow for breaking news, special reports, RTs of our journalists and more from http://NYTimes.com	17,378,066	99
June 18th at 6:45pm	Large parts of NYC's Central Park and Prospect Park will be closed to car traffic on weekdays http://www.nytimes.com/2015/06/19/nyregi...		
Adweek @Adweek	The leading source for news, insight and community for marketers, media and agencies. Join #AdweekChat each Wednesday at 2 p.m. ET.	407,113	94
June 16th at 9:55pm	Traffic cop shockingly lifts NYC taxi, but it's the ad up top that's the giveaway. http://www.adweek.com/adfreak/traffic-co...		
Business Insider @businessinsider	What you need to know.	1,119,859	94
June 17th at 12:49pm	A 'Ring of Fire' weather pattern could bring tropical floods to New York. http://www.businessinsider.com/ring-of-f...		
Bloomberg Business @business	The first word in business news.	2,316,123	93
June 19th at 4:30am	In historic move, NYC will close most of Central Park and Prospect Park to traffic http://www.bloomberg.com/news/articles/2...		
NY1 News @NY1	Updates from Time Warner Cable's 24-hour news channel in NYC	185,441	86
June 17th at 12:18pm	Last Day of #Albany Legislative Session: http://www.ny1.com/nyc/all-boroughs/news...		
Wendy Williams @WendyWilliams	Watch Wendy Weekdays for the latest #HotTopics, Celebrity Guests, Music Performances, #AskWendy & more! #WendyWilliams ...	1,371,308	83
June 3rd at 7:42am	There's heavy traffic in Jersey, but I'm coming....my @TonyDovolani & cooking with @LidiaBastianich! Live @ 10am NYC!		
NBC New York @NBCNewYork	New York's #1 TV source for news on @Twitter. Breaking news, I-Team investigations, & Storm Team 4 weather. News tip or question?...	205,426	82
June 15th at 4:57pm	RT @andrewsiff4NY: City hall says 18% uptick in calls to 311 about tenant issues like #rent with looming deadline in #Albany. #NBC4NY		
WNYC @WNYC	News, culture, and music from New York Public Radio. 93.9 FM | AM 820 http://www.instagram.com/wnycradio http://www.wnyc.tumblr.com/	104,036	82
June 24th at 7:40am	As traffic speeds slow, NYC wants to curb car service growth. via @TransportNation http://www.wnyc.org/story/traffic-speeds...		

Conversations

From the **27,855** total mentions between June 1st at 12am and June 30th at 11pm) there were 96 major categories of conversation, with "construction" occupying 23.6% or 6,805 mentions.

Word Burst

23.6% 6,805 mentions shared "construction"

8.0% 2,298 mentions shared "accident"

6.5% 1,887 mentions shared "delays"

5.4% 1,560 mentions shared "incident"

2.4% 690 mentions shared "#albany"

1.9% 538 mentions shared "north"

Trending Hashtags

Hashtag	Occurrences
#job	2,213
#hiring	1,378
#jobs	1,296
#tweetmyjobs	681
#i90nysthruway	613
#i87nysthruway	600
#i278	383
#weather	382
#gardenstateparkway	263

Trending Keywords

Keyword	Occurrences
construction	5,548
bothdir	2,980
accident	1,782
delays	1,321
incident	1,093
vehicle	887
north	770
new york	766
road maintenance operations	740

Trending URLs

URL	Occurrences
http://localbuzznetwork.com/elmira-ne...	213
http://twitter.com/DierksBentley/status...	45
http://www.sigalert.com/Map.asp?reg...	34
http://www.albanymuseumofpoliticalco...	32
https://www.thumbtack.com/	26
http://www.rssweather.com/zipcode/1...	24
http://localbuzznetwork.com/new-yor...	24
http://twitter.com/RightOfWayNYC/sta...	22
http://www.rssweather.com/zipcode/1...	19

Appendix C

Twitter Scraping/Data Collection: Event Analysis

The Twitter scarping technique was used to collect tweets relevant to search words entered into the program. Twitter scraping documents were set up for events at the Saratoga Performing Arts Center (SPAC) as well as emergency incidents in order to gather tweets made by the public pertaining to the event or traffic. Data was collected for various events at SPAC such as country shows, rock shows and shows for younger audiences. Emergency incidents that occurred involved a bridge collapse, bridge closing and flooding.

Data was also collected on social media by manually searching on Facebook and Twitter tweets pertaining to specific incidents to supplement any of the data scraping.

2.1 Twitter Scraping

Country Shows @ SPAC:

- Brad Paisley (06.02.13)
- Jason Aldean (08.11.13)
- Rascal Flatts (06.16.13)

The traffic-related tweets that were pulled from the Country Concerts that were held at SPAC were generally created by teenagers and young adults who were attending the concert. Most of these traffic-related tweets were tweeted from the road and mainly consisted of personal accounts of being held up in traffic on the highway (I-87) that leads to SPAC. However, the number of relevant tweets that were collected during these Country Concerts were not as numerous as they were for some of the Rock Concerts that were held at SPAC (Dave Matthews and PHISH, especially).

Rock Shows @ SPAC:

- Dave Matthews (05.25.13 – 05.26.13)
- Matchbox Twenty & Goo Goo Dolls (06.26.13)
- O.A.R. & Andrew McMahon (07.28.13)
- PHISH (07.05.13 – 07.07.13)
- RUSH (06.25.13)
- Tom Petty (06.23.13)

The traffic-related tweets that were pulled for the Rock Concerts that were held at SPAC were not really specific to one "age category." For shows like Dave Matthews and PHISH (which took place over the course of multiple days as opposed to one single night), traffic-related tweets came both from those who were attending the concert(s) (and were sitting in traffic, looking for parking, etc.) and from those who were not necessarily attending the concert(s) but were affected by the traffic anyway (those who were traveling on I-87 especially).

Shows for Younger Audiences @ SPAC:

- BTR & Victoria Justice (07.27.13)

The traffic-related tweets that were pulled for the Big Time Rush / Victoria Justice Concert at SPAC were not very abundant at all. Because the audience for this show consisted primarily of families with younger children, non-computer-generated tweets related to the concert were pretty scarce when compared to the amount of tweets that are tweeted during other concerts at SPAC (especially with regard to tweets that were related to traffic). This would make sense, as young children and parents do not typically have Twitter accounts (for parents who do have Twitter accounts, they are not likely to tweet while they are driving with their children).

Appendix D

The purpose of this survey is to understand how drivers use social media for travel planning. The survey should take about 3 minutes to complete.

* 1. In what ZIP code do you live? (International responses please just type the name of your country)

* 2. What sources do you currently use to learn of traffic congestion? (select all that apply)

- [ ] Television
- [ ] Radio
- [ ] 511
- [ ] Social media
- [ ] Family & Friends
- [ ] none

Other (please specify)

* 3. In general, how often do you use social media on a mobile device?

- ◯ Never/Don't have a mobile device
- ◯ 1-3 times a week
- ◯ 1 time per day
- ◯ 2-4 times per day
- ◯ 5 or more times per day

* 4. Do you ever use social media for travel-related issues?

- ◯ Never
- ◯ Rarely
- ◯ Sometimes
- ◯ Often
- ◯ Always

* 5. What social media platform do you prefer to use for updates on travel-related issues?

- [ ] Facebook
- [ ] Twitter
- [ ] Email
- [ ] SMS or text
- [ ] none

Other (please specify)

* 6. For what purpose(s) do you use social media tools for travel? (select all that apply)

- [ ] To get travel information for a routine trip (i.e. work, school, etc.)
- [ ] To get travel information for a non-routine trip (i.e. vacation, shopping, special event, etc.)
- [ ] For any trip if there is inclement weather
- [ ] For any trip if there is construction
- [ ] none

Other (please specify)

* 7. Which social media source do you use to regularly monitor your traffic information? (select only one)

- ( ) Department of Transportation accounts
- ( ) News Media
- ( ) Personal contacts, like family and friends
- ( ) None

Other (please specify)

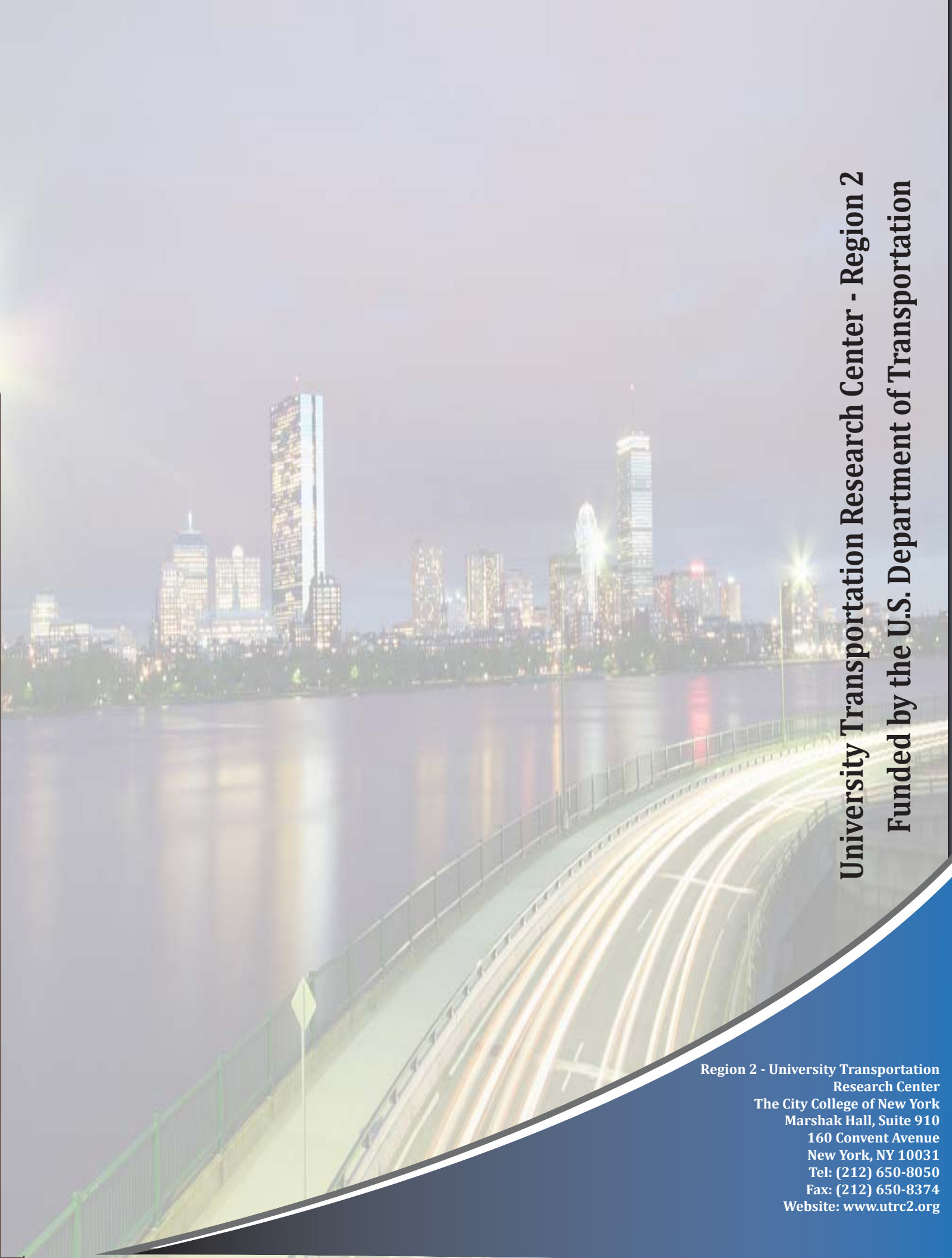
* 8. Would you be interested in getting messages that warn you of potential travel delays associated with non-routine events such as construction, concerts and sporting events?

- ( ) Yes
- ( ) No

9. Please add your contact information if we can contact you in the future with any additional questions on this topic?

Name:

Email Address:



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