2022

HOW POLICY INNOVATION LABS COMMUNICATE USING TWITTER

Kei Schmidt
Michigan Technological University, kaschmi2@mtu.edu

HOW POLICY INNOVATION LABS COMMUNICATE USING TWITTER

By
Kei Schmidt

A REPORT
Submitted in partial fulfillment of the requirements for the degree of
MASTER OF SCIENCE
In Environmental and Energy Policy

MICHIGAN TECHNOLOGICAL UNIVERSITY
2022

This report has been approved in partial fulfillment of the requirements for the Degree of MASTER OF SCIENCE in Environmental and Energy Policy.

Department of Social Sciences

Report Co-Advisor:	*Dr. Adam Wellstead*
Report Co-Advisor:	*Dr. Angie Carter*
Committee Member:	*Dr. Anat Gofen*
Department Chair:	*Dr. Don Lafreniere*

Dedicated to my cat, warm tea, sunny windows, and the process of learning a new skill.

Table of Contents

List of Figures

List of Tables

Author Contribution Statement

This report consists of research that was performed on data which was collected for a larger research project lead by Dr. Adam Wellstead, Dr. Angie Carter, and Dr. Anat Gofen on Policy Innovation Labs which is funded by the National Science Foundation, Science of Science and Innovation Policy (SciSIP) Program (Award # 1811077), and the US-Israel Binational Science Foundation. While I did not initially collect the data from Twitter, I did upload the data to NVivo, design the analysis, and conduct the analysis myself.

Acknowledgements

Thank you to Shan Zhou for being an exemplary role model for your students.

Thank you to Adam Wellstead for pushing me to get things done, helping me learn new things, getting me involved in research, and always knowing what to do next.

Thank you to Angie Carter for being my co-advisor, being thoughtful and saying what needs to be said, and for pushing me in the right direction when I get off course.

Thank you to Anat Gofen from the Federman School of Public Policy, Hebrew University of Jerusalem for being on my committee and asking fascinating questions.

Thank you to Patty Cobin, John Jaszczak, Nate Bezotte, Katie Sullivan, and Joan Chadde for getting me through my first year of graduate school with odd jobs and helpful advice.

Thank you to the other Fall 2020 EEP students for your support and our collaborative perseverance though graduate school in the time of covid-19.

Thank you to Liss Ladd for reminding me to never give up on school and to find wonder in the world when things get difficult.

Definitions

Mentions – message that contains another user's username.

Mentions in retweet - message that contains another user's username while retweeting one of their messages.

Reply to – message in response to another user's tweet.

Retweet – message where one user shares another user's tweet on their profile.

Tweet – message containing up to 280 characters that a user posts to their own profile.

List of Abbreviations

PIL: Policy Innovation Lab
also known as:

- public sector innovation lab
- public innovation lab
- government innovation lab
- organizational innovation lab
- social innovation lab
- innovation labs/ i-lab
- public policy lab
- system change lab
- living lab
- design lab
- policy lab

(Hinrichs-Krapels et al., 2020, p. 2)

Abstract

This report consists of an analysis of the interactions and information shared between Policy Innovation Labs (PILs) and their stakeholders over the social media platform Twitter during the summer of 2020. The focus is on how the PILs use Twitter as a tool for stakeholder engagement and the information that is being shared in these interactions. To accomplish this, Twitter data for 42 US based PILs was downloaded using NodeXL and coded using NVivo according to both method of message delivery and message content. The results show that there is two-way communication that occurred during the collection period, though PILs employed several different methods of engagement to create this communication. The information discussed consists of topics that both relate to the PILs' work and the current events of the collection period either as separate or related topics. These findings suggest that Twitter can be used as a method for successful stakeholder engagement by PILs.

1 Introduction

Policy Innovation Labs (PILs) are organizations and spaces with a highly collaborative foundation that can take many different forms. One of the key aspects that tie all PILs together regardless of the focus area, structure, or funding source is that they provide opportunities for stakeholders to engage in co-production/co-creation of information (Wellstead et al., 2021, p. 195). In today's highly virtual environment, Twitter can be used as a supplement to encourage this engagement between PILs and their stakeholders. Twitter is a social media platform where users can share short messages and other users within their networks can interact with the messages through a variety of methods.

While there has been research done on what a PIL is and how they do work, there has been significantly less on the impact of the work that PILs do (McGann, 2018, p. 265). Analyzing the Twitter profiles of PILs not only gives insights into the work that PILs do but also the impact that they have in this virtual environment. To evaluate the frequency and ways PILs in the US use Twitter, data was collected for this study from their Twitter profiles during the summer of 2020. This data shows what work PILs were doing during the early months of the pandemic and how their stakeholders engaged with them on a variety of topics.

Using NVivo, I analyzed over 67,000 tweets from 42 PIL Twitter profiles over an 11-week timeframe from June 1 to August 13. This data contained content originating both from the PIL itself and also other Twitter users who interacted with that PIL's profile. The analysis organized this data by message origins, interaction method, and message content to look for trends in stakeholder engagement and discussion topics. Findings suggest that PILs are indeed initiating communication on Twitter which engages their stakeholders, specifically around topics relating to current events and the PIL's work. Being able to engage stakeholders through Twitter allows PILs to continue contributing their research to their policy fields even while they may not be able to collaborate in person.

2 What is a Policy Innovation Lab?

Policy Innovation Labs (PILs) are a varied group of organizations that have been called by many names and engage in many fields of work at different levels of government, in universities, and in the private sector. What ties PILs together as a unit is that they actively use innovation and co-production methods to address complex policy problems which current government structures find challenging (Lewis, 2020, p. 1). PILs are seen as "arenas for experimentation" which can be added to an organization or function independently (Criado et al., 2020, p. 1). They often "break down hierarchy and engender divergent and creative thinking" in order to use these collaborative methods to create user-centered designs and solutions to public problems (Bellefontaine, 2012, p. 1).

PILs are not necessarily a new approach to public problems (McGann, 2018, p. 250). There have been similar structures put in place by governments and private companies in the past. PILs draw from the New Public Management movement to reinvent government through networked governance by externalizing problem-solving and encouraging private sector involvement (McGann, 2018, p. 251). This approach aims to encourage citizen engagement with the goal of improving public outcomes (Criado et al., 2020, p. 4). The growing popularity of PILs "can be seen as one of the elements in the ongoing public-sector innovation discourse and related reform attempts" as governments are facing new challenges in the current era (Tõnurist et al., 2017, p. 1456). There are now hundreds of PILs across the globe, indicating the popularity of this new approach.

The key features that distinguish PILs as a unique group from other types of organizations include the fields of organizational structure, focus area, methods, and collaboration (Lindquist & Buttazzoni, 2021, p. 214). These four features work together to form a loose idea of what a PIL is or should be. PILs are, however, a diverse set of organizations that exist in many different forms.

PILs have two main concerns within organizational structure: ongoing effort and organizational autonomy. That the PIL is an ongoing effort is a mandatory feature. While the PIL can consist of multiple projects which have set deadlines, the lab as a whole should be an ongoing organized effort (Puttick, 2014, p. 4). If it is instead an event or a project with a set deadline, that is not considered a PIL. The second point is organizational autonomy. While "the legal status of policy labs substantially varies" with labs operating at different levels of government, in the public sector, as non-government organizations, and as inter-organizational partnerships (Olejniczak et al., 2020, p. 98), the PILs should be "structurally set apart from the rest of the public sector and operate with a large degree of autonomy in setting their targets and working methods" (Tõnurist, 2017, p. 1472). The reason the PILs have such autonomy is that it allows them to be "more open and agile than large bureaucracies" (Lewis, 2020, p. 2).

The focus area of the PIL should fall within the two categories of policy and social issues and may encompass both. Olejniczak et al. (2020) identified "three main specialization patterns: serving the government…serving the community…[and] serving both" (p. 99). While there are PILs in many different fields (such as the environment, urban development, data management, etc.), the first area that their work could focus on is public issues and policy. Regardless of their specific field, PILs should "aim to promote government effectiveness and cultural shifts" (Olejniczak et al., 2020, p. 99). The second area is social and public issues where PILs create "user-driven service production logic in the public sector" (Tõnurist et al., 2017, p. 1462). No matter what specific issue a PIL works on fostering innovation to address public services and policy should be their main function (Tõnurist et al., 2017, p. 1456).

In general, PILs "employ quite different methodological approaches" and a wide range of innovative methods are utilized by PILs (McGann, 2018, p. 253). The methods that PILs use should include at least one of the following independently or in conjunction: user-centered solutions, experimental methods, a design approach, or a workshop process. These can be seen in practice as "engag[ing] in a workshop process to understand

complex problems and design new approaches and solutions" (Bellefontaine, 2012, p. 1), "explor[ing], design[ing], and test[ing] user-centered solutions for potential use" (Bellefontaine, 2012, p. 1), "user-centered design, new analytical techniques in data science, randomized assignment experiments, and behavioral insights" (McGann, 2018, p. 253), "user-driven service production logic in the public sector" (Tõnurist et al., 2017, p. 1462), and "explor[ing] ideas, solv[ing] problems, train[ing] leaders, and deliver[ing] tools to improve public services through innovation." (Olejniczak et al, 2020, p. 99).

The last category requires that PILs collaborate, or co-create, with their stakeholders (Bellefontaine, 2012, p. 1). While related to user-centered methods in the above category, collaboration is a more involved process where stakeholders have input rather than just being a consideration. These stakeholders can include members from the key groups of practitioners, community, and researchers (Schwoerer et al., 2017, p.7) which can look like "local and regional authorities, public administration institutions, and private stakeholders, who actively contribute to projects" (Olejniczak et al, 2020, p. 98). PILs should be engaging "a more diverse range of voices and inputs into the policy process that resonates with principles of network governance" in order to get an accurate representation of citizens and their opinions (McGann, 2018, p. 252). "To enable cross-disciplinary and citizen-driven approaches" can even be seen as one of the main reasons that PILs are created in the first place (Tõnurist et al, 2017, p. 1466).

3 Data and Methods

3.1 Twitter

This report looks at Twitter as a method PILs use for stakeholder engagement. Twitter is a micro-blogging platform where users can interact with short messages. Not only do individuals have profiles and send messages, but so do organizations such as companies, government officials, academic departments, and PILs. Twitter was chosen for this study due to the increased relevance of virtual engagement during the COVID-19 pandemic. This highly transmissible virus decreased the amount of in-person stakeholder engagement for PILs, especially early in the pandemic during the collection period.

On Twitter, a user can tweet a message of up to 280 characters which will be seen by anyone who looks at that user's profile. Other users can interact with that tweet by replying to the message as a public comment or retweeting the message onto their own profile. Other users can also interact with a specific user through mentioning, where the user's profile name on Twitter is included within a Tweet (Twitter, n.d.).

While Twitter users in the US are generally representative of the US population, there are important ways in which they vary demographically which could impact the content that is present on the platform. The Pew Research Center in 2019 found that about 22% of American adults use Twitter, or 56 million people (Wojcik & Hughes, 2019, p. 2). Compared to the general public, these users tend to be overrepresented in ages younger than 50, especially in the 30-49 age range, and underrepresented in ages over 50, with a sharp drop off after age 65 (Wojcik & Hughes, 2019, p. 5). There is also an over-representation of people with a college degree, higher income, and who identify as Democrats (Wojcik & Hughes, 2019, p. 5-6). These demographic trends mean that the content these users produce and interact with will lean to either favor or engage the users who are present on the platform.

Organizations use social media in general for "cost reductions, improvements in customer relations, and enhanced accessibility of information" (Tajudeen et al. 2018, 310). The concepts of engagement and information are specifically relevant to PILs and the nature of their work. Social media provides the opportunity for dialogue, or two-way communication, on any topic between organizations and their stakeholders. This open communication motivates both types of users to actively engage on the platform (Tajudeen et al. 2018, 314). This dialogue creates "intense and meaningful interactions" with stakeholders which gives organizations the opportunity to further engage them in their work (Saxton & Guo, 2014, p. 286). This is especially relevant to PILs whose work includes collaboration with and engagement of their stakeholders. PILs utilizing Twitter during the COVID-19 shutdowns were able to enjoy some of these additional benefits of social media. In addition, PILs continued to perform collaboration and user-centered design through stakeholder engagement on their social media.

3.2 Data Collection

The PILs examined in this report were derived from a catalogue of US-based PILs developed by Wellstead and Nguyen (2020), which identified 116 PILs. Of these, 52 had no Twitter account or their Twitter activity was inactive at the time of the data collection. The remaining 64 were initially considered for analysis of which 22 PILs were removed due to their infrequent Twitter activity, leaving 42 PILs.

During the eleven consecutive weeks from June 1st, 2020 to August 13th, 2020, the Twitter data from these 42 PILs was collected by Adam Wellstead using NodeXL. NodeXL is a network analysis and visualization software package for Microsoft Excel that supports the exploration of social media with import features that extract network data from a range of data sources, including Twitter. The NodeXL Twitter Search network data collector starts by performing a query against the Twitter Search service at http://search.twitter.com. Searches can be performed for any string of characters, including the use of Boolean operators such as "OR". For the data I used in this study, the Twitter user handle for the 42 PILs was searched during the collection period. This

service returns up to 18,000 tweets that contain a requested search string with an age limit of 7-10 days for the data Twitter will return. Tweets are processed by NodeXL where data is assembled from the results of many queries to Twitter about the connections among the authors in the data set. The results are displayed in a NodeXL worksheet labeled “edges”. Each “edge” represents a connection event between two people who tweeted within the data sample period. Edges can represent the various types of relationships that can be created through Twitter. NodeXL constructs four different Twitter edges from the data it collects: follows, replies, mentions, and tweet. This data included the weekly tweets and responses on the PILs’ profiles, regardless of if the tweet originated from the PIL or other Twitter users, and the retweets of PIL content and mentions of the PIL made by other users. If there was no activity on a PIL’s profile for a specific week, then that PIL’s data was not collected for that week.

3.3 Data Processing

Next, I uploaded the Twitter data, collected by Adam Wellstead, into NVivo. Each PIL had a unique file for each week of data collection. In NVivo, I coded the individual messages into two different categories based on their attributes and content: Tweet Types and Codes. In some cases, PILs engaged with Twitter users who spoke languages other than English. In this case, I used Google Translate to translate the message to English and used the provided translation.

Tweet Types

The Tweet Type distinguishes how the Twitter message was sent. There are two main categories of tweet types: Lab Tweets and Others Tweet. Lab Tweets are messages that a PIL created on Twitter and Others Tweet are messages that other, non-PIL, users created that interacted with the PIL’s Twitter profile. Under these two categories there are the different methods of sending the message on Twitter as shown in Figure 3.1: tweet, retweet, mentions, mentions in retweet, and reply to. Others Tweet does not have a tweet option because just a tweet by anyone other than the PIL would not interact with the PIL’s Twitter profile unless they used one of the other methods of sending the message.

Tweet Types	Lab Tweets	Others Tweet
Tweet	✓	
Retweet	✓	✓
Mentions	✓	✓
Mentions in Retweet	✓	✓
Reply to	✓	✓

Figure 3.1: Origins of Tweet Types

Codes

Codes were used to distinguish the content of the message rather than the method used to send it. I utilized three major categories of codes based on Lovejoy & Saxton's (2012) three functions of Twitter messages: Action, Community, and Information (p. 341). Each message received at least one code from one to three of these categories. Some messages had multiple codes from one to three of the categories. The number of codes each message received depended on the content of the message. Each individual message was only coded once per week. In order to analyze the engagement of users with the messages, not just the content of the messages themselves, under certain conditions, messages were coded more than once. If there were repetitions of the same message, which often happened due to multiple Twitter users retweeting the same message, then the first occurrence of the message was coded. If there was a duplicate message in more than one collection week, it did get coded again in all weeks it was present. Examples provided below are taken from the collection week of the PIL specified but did not necessarily originate from the PIL itself.

Action Codes

The purpose of the action category is to identify messages that originate from a PIL with the purpose to engage other Twitter users; "the heart of this function are messages that aim to get followers to 'do something'" (Lovejoy & Saxton, 2012, p. 345). Lovejoy & Saxton (2012) identify seven specific ways in which the PIL can achieve this: promote an event, call for volunteers and employees, lobbying and advocacy, donation appeal, selling a product, learn how to help, and join another site or vote for organization (p. 345-347). In the context of this study, not all seven categories were necessary and so I narrowed these down to four, adding two categories that expanded the Lovejoy & Saxton categories

specifically for this study. The categorization of action codes, and illustrative examples from my analysis, are listed below in Table 3.1.

Table 3.1: Action code categories

Category #	Category Names	Category Example
Category A.1	Lovejoy & Saxton name: Promote an event Name in this study: Lab holds/participates in an event	August 13: Results4America "Which states are leading the nation using #evidence and #data for COVID response? Find out tomorrow at 1PM ET with @Results4America launch event for the 2020 #StateStandard of Excellence."
Category A.2	Lovejoy & Saxton name: Call for volunteers and employees Name in this study: Job posting/sharing	August 5: ImmigrationLab "Want to join us in advancing immigration policy worldwide? IPL is looking for an executive director for our branch at ETH Zurich."
Category A.3	Lovejoy & Saxton names: Lobbying and advocacy Donation appeal Selling a product Join another site or vote for organization Name in this study: Lab reaches out/requests	June 16: NRPA_news "Within the next few days, the U.S. Senate is expected to consider the Great American Outdoors Act, which would fully fund the Land and Water Conservation Fund. Tell your Senator to vote YES on S.3422 and #FundLWCF"
Category A.4	Lovejoy & Saxton name: Learn how to help	June 16: GlobalDevLab "The increased use of #digital technology during #COVID19 is

	Name in this study: Lab work/research sharing	posing risks to women and girls. In this new post, @GlobalDevLab shares key considerations and several resources for applying a gender lens to digital development."
Category A.5	Lovejoy & Saxton name: N/A Name in this study: Other shared information	July 21: TheLab_DC "Good thread on the Georgia map of Covid-19 cases by former @TheLab_DC colleague."

The following describes my recategorization of Lovejoy and Saxton's (2012) action code categories and the function they served in this study:

Category A.1 specifies messages that the PIL uses to engage other Twitter users in an event that the PIL is holding or participating in. This took the form of sharing details about the event time and location, soliciting engagement around the topic of the event, and sharing details of where to find recordings of the event after it was finished. As the data was collected during the first summer of the pandemic, many of these events took the form of virtual meetings or webinars.

Category A.2 includes open job postings and volunteer opportunities which the PIL shared with its followers. Both tweets about opportunities for the PIL and retweets of opportunities at other organizations were included.

Category A.3 included messages where the PIL actively engaged their followers to take an action. This took the form of making requests for their followers to be active politically or engage in the work that the lab was performing. This was the most common way the PILs made requests of their followers rather than donate or buy a product, as other types of organizations might reach out to their followers.

Category A.4 was created specifically for this study but also includes one of the Lovejoy & Saxton categories which was used infrequently by the PILs. This category includes messages that discuss PIL work. These could have originated from the PIL itself or other users. The messages included the promotion of active projects, a push to engage with PIL content, published papers, and reminders of work that had been done previously which was relevant to a specific situation.

Category A.5 was created specifically for this study to provide an added distinction between two broad topics of information: the PIL and others. While messages about the PIL are placed in the above category, messages which engage followers in other information not already designated in a different action code are included here. This most often took the form of tweets or retweets from the PILs which were about a different PIL or organization's work.

Community Codes

What is included in the community code category are the tweets that interact with the community that engages with the PIL's Twitter profile by creating "dialogue and community-building" (Lovejoy & Saxton, 2012, p. 343). Lovejoy & Saxton (2012) identify four different ways that Twitter users accomplish this task: giving recognition and thanks, acknowledgement of current and local events, responses to public reply messages, and response solicitation (p. 344-345). I used three of these categories and created a fourth one for this study. For the response solicitation category, I included messages with corresponding contents under action – lab reaches out/requests. The categorization of community codes, and illustrative examples from my analysis, are listed below in Table 3.2.

Table 3.2: Community code categories

Category #	Category Names	Category Example
Category C.1	Lovejoy & Saxton name:	June 30: UChiUrbanLabs

	Giving recognition and thanks Name in this study: Awards/Props/Thanks	"Choose2Change provides trauma therapy and mentorship, proven to deter youth involvement with crime and the justice system. Thank you to @chicagosmayor for the ongoing support of this important initiative."
Category C.2	Lovejoy & Saxton name: Acknowledgement of current & local events Name in this study: Lab says a statement	July 28: NRPA_news "Parks and public spaces must remake themselves as sanctuaries for all and become places where black people and all people can celebrate, heal, and breathe."
Category C.3	Lovejoy & Saxton name: Responses to public reply messages Name in this study: Responses/conversations	Helpful Example: Aug 5: CIERP_Fletcher "Agreed. To further your call for real climate action, I'm highlighting proforestation. Check it out and please spread the word!" Not Helpful Example: August 13: Results4America "We live here and we have seen firsthand how terrible your handling of this crisis has been. From having an incompetent staff, to not taking decisive action on measure to curtail the spread, to leaving our school restart in chaos. You should be ashamed of yourself."
Category C.4	Lovejoy & Saxton name: N/A	June 30: NRPA_news

	Name in this study: Others call on lab	"Any movement on opening water fountains?"

The following describes my recategorization of Lovejoy and Saxton's (2012) community code categories and the function they served in this study:

Category C.1 included all messages which provided recognition. This came in many forms such as saying thank you, giving out awards, or giving a shout-out to volunteers. Many of the PILs engaged in this behavior, thanking event participants, congratulating new employees, and even giving out awards via Twitter for a program they run. Often if a specific person was being recognized they would be mentioned in the tweet using their Twitter profile name.

Category C.2 included tweets the PIL sent which informed their follower rather than engaging with them. Often, this related to either current events or the work the PIL was currently engaged in. This took the form of happy holiday messages, statements about diversity at their organization, and recognition of subjects in the news.

Category C.3 included direct communications between the PIL and other Twitter users. This can be split into two subcategories of conversations: helpful and not helpful. The helpful conversations occurred when users asked questions and supplied answers either amongst themselves or in conversation with the PIL in a productive and engaging manner. The not helpful conversations would occur when many users would tweet insults and be generally rude to someone/an organization. Often the PIL would not interact with the not helpful conversations.

Category C.4 includes a conversation where a Twitter user directly contacts the PIL. Once the PIL replies to the user, the conversation moves to the category above (responses/conversations), but the initial contact falls under this category. This took the

form of asking a question, mentioning that the PIL should be involved in a topic/event, or calling out an action that the user thinks the PIL should not have engaged in.

Information Codes

The information code category shows what topic was being discussed in the message or what information it was conveying (Lovejoy & Saxton, 2012, p. 343). While Lovejoy & Saxton only had one general category of 'Information', this study looks at the variety of topics that are present within this category as well. As shown in Table 3.3, there were 18 general topics that occurred with recurring frequency for these PILs during the time period data was collected, some of which can also be broken down into more specific topics.

Table 3.3: Visual representation of codes

Action	Community	Information	
Job posting/sharing	Awards/Props/Thanks	**COVID**	Businesses/activities
Lab holds/participates in event	Lab says a statement		Cases/testing
Lab reaches out/requests	Others call on lab		Data/science/information
Lab work/research sharing	Responses/conversations		Masks/social distancing
Other shared information			Medical aspects
			Regulations/policy
			Societal issues/recovery
		Development	
		Education	Education
			Covid school (in person)
			Extracurriculars
			Remote learning
			Reopening schools
		Envir	Environment
			Clean energy
			Climate change
		Food insecurity	
		Government	
		Health/hospitals	
		Housing	
		Immigration	
		Jobs	
		Museums	
		Outside	
		Parks	
		Police	Police
			Crimes/prison
			Defund the police
			Gun violence
			Police violence
		Race	Race
			Black Lives Matter
			Equity actions
		Research	
		Tech	Tech
			Data
			Internet
		Transportation	
		Voting/elections	

Appendix Table A.1 shows the distribution of messages that are present in the Action, Community, and Information codes. The files represent each individual collection week for a specific PIL. For example, there were a total of 82 job posting messages which occurred throughout the entire study and were present in 54 files of PIL collection weeks.

3.4 Data Analysis

Once all of the messages had both a Tweet Type and a Code, I ran four different queries. In NVivo, queries are used to compare different attributes of the data set, allowing multiple analyses to be run on the same data set with different configurations.

Query 1: Tweet Types per PIL

This query shows the distribution of tweet types for each individual message on a PIL's Twitter page for each week the PIL's data was collected. This shows the different types of activity that are taking place on the PIL's Twitter profile each week. It is split between Lab Tweets and Others Tweets. Depending on the PIL, some weeks have more or fewer messages which come from each tweet type. This query produces a table that includes the weekly tweet type breakdown for a specific PIL.

Query 2: Weekly Tweet Types all PILs

This query compares the distribution of tweet types for each PIL present in a specific collection week. This shows how tweet type distribution varies between different PILs within a specific week. For some PILs, the PIL might put out more messages on their Twitter and minimal other people will interact with those posts, while for other PILs, the majority of the activity is by other Twitter users who are retweeting or mentioning the PIL while the PIL might not post anything on their Twitter profile that week. This query produces a table that includes tweet type distribution for all PILs in a specific week.

Query 3: Weekly Codes all PILs

This query shows the distribution of codes for each PIL present in a specific week. This shows how the code distribution varies between different labs within a specific week.

There might be trends with the usage of similar codes among the PILs if it is a holiday or a major event occurred. The PILs also tweet about their work and activities they are perusing alongside any major events, which will produce a distribution of codes across the information spectrum rather than a focus on one area as a major event might produce. This query produces a table that includes code distribution for all PILs in a specific week.

Query 4: Codes by Tweet Type

This query shows the distribution of codes in each tweet type for a specific week. This shows what sources are talking about what information. The drawback of this query is that duplicate messages are coded only once per week per PIL. This means that a message can be coded as one tweet type, but also be present as another tweet type. A common example of this was a PIL's tweet was coded but then other users retweeted that initial tweet but only the original was coded. This makes this query incomplete with regard to the entirety of the tweet type data on the PIL's Twitter page. While this query has drawbacks, it also allows the two ways of coding the tweets to be seen together, albeit in a limited fashion.

4 Results

4.1 Summer 2020 Context

The information portion of the analyzed tweets was strongly influenced by both the work of the individual PIL and current events. While the PIL's individual work topics vary greatly, the current events are easy to identify by looking back at news sources. There were four major trends of current events that happened from January to August of 2020 which were often discussed or mentioned in the data collected: the escalating COVID-19 pandemic, Black Lives Matter protests, climate change, and US politics.

COVID-19 started to spread at the end of 2019 and became an issue of concern in the US early in 2020. In mid-March, the WHO declared COVID-19 a pandemic and the reality of the deadly virus was causing schools and businesses to shut down in-person operations. By April the US had 6.6 million people who had filed for unemployment in 2020 alone (2020 Events, 2020). Daily life had changed dramatically by June when data collection started. This included high levels of unemployment, shifts from the physical office to virtual work environments, K-12 and college students attending school virtually, and the wearing of masks and other personal protective equipment in public (What a year, 2020). This all prompted much discussion on Twitter around the issue of COVID-19 as a public health concern, data collection and modeling, the policies to address the situation, and community-level solutions to issues caused or influenced by COVID-19.

In the context of a nation reacting to COVID-19, the disproportionate deaths of Black Americans in the US, especially at the hands of police officers, started to gather widespread attention in February 2020 with the killing of Ahmaud Arbery. This was followed by Breonna Taylor and Daniel Prude being killed by the police in March, leading up to George Floyd being killed by the police at the end of May (What a year, 2020). The death of George Floyd, and the widely spread video account of the incident, sparked protests against police brutality and for Black lives. The protests started in Minneapolis and spread nationally and internationally through May and June. While

these protests were mainly peaceful, about 5% turned violent, 21 states had the National Guard deployed, and the protests became a national discussion (Kishi & Jones, 2020). In July federal law enforcement was sent to the Portland protests where the situation turned violent. The national attention to the issues of policing in the US and structural racism brought about discussions on how to fund police departments and changes in how the confederate flag is utilized by US states and the military (Taylor, 2021). This prompted discussion on Twitter around structural racism, policing, and allyship and also the responses of corporations, businesses, and schools to the expressed public sentiments regarding police behaviors and discussions on race.

With regard to climate change, 2020 was the hottest year on record at the time which started off with the continuation of the bush fires which burned millions of acres in Australia (NASA, 2021). While COVID-19 global shutdowns caused a notable decrease in anthropogenic emissions, there were not any long-term effects of this change (Blunden & Boyer, 2021, S4). In addition, there were above-average occurrences of tropical storms and more intense droughts and monsoons throughout the globe (Blunden & Boyer, 2021, S4). At the end of the collection period, August marked the beginning of the West Coast fires in the US, which had fire emissions "almost three times higher than the 2003-10 mean" and Death Valley marked the highest recorded temperature on Earth (Blunden & Boyer, 2021, Siii). On Twitter, the continuation of these record-breaking events prompted discussions around climate change itself and the work that PILs and other organizations to understand and work against its causes and impacts.

2020 was also a presidential election year in the US, with the first Democratic primary debate occurring in January. Events on the topic of the presidential election continued throughout the year until November, when the election was held, and after (2020 Events, 2020). In addition, then-president Trump was impeached for the first time in February and also began publicly spreading disinformation about COVID-19. In May, Twitter labeled one of his tweets as misleading for the first time, though he was allowed to remain on the platform until 2021 (What a year, 2020). This all prompted political

discussions on Twitter which at times were centered on fake news and disinformation in addition to the political campaign messages and updates about government actions.

4.2 Findings

Cumulative Tweet Origins for Individual PILs

The results of the Tweet Types per PIL query have been simplified cumulatively into the two categories of message origins, Lab Tweets and Others Tweets, for the 11-week collection period in Figure 4.1. The data broken down by PIL can be seen in Appendix Table A.2. During the data collection period, there were 6 PILs that did not create any Lab Tweets but did have a presence of Others Tweets on their Twitter profile. There was an overall average of 104.88 Lab Tweets and 1,426.60 Others Tweets per PIL. This has a ratio of 7% Lab Tweets to 93% Others Tweets on a PIL's Twitter profile. As shown in Figure 4.1, there is a general trend where the more messages a PIL outputs onto their Twitter profile, the more other users will interact with their messages and profile.

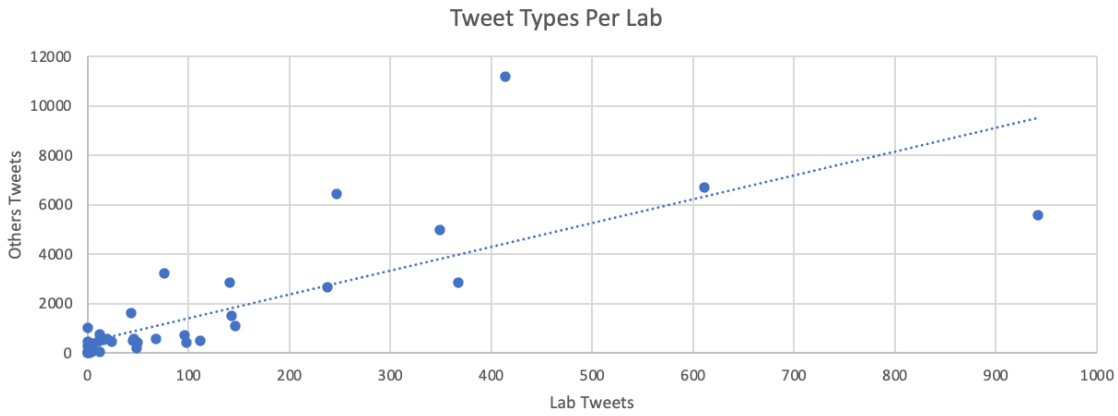

Figure 4.1: Lab Tweets vs Others Tweets

Weekly Tweet Types for Cumulative PILs

Derived from the Weekly Tweet Types all PILs query these results show the cumulative number of each tweet type that was present on each PIL's Twitter profile for each collection week. The data broken down by week and Tweet Type can be seen in Appendix Table A.3. Tracking the activity across the duration of the collection period, message numbers peaked in the first week of July as shown in Figure 4.2. Overall, the

message numbers remained steadily between 4,000-8,000 messages per week throughout the collection period. As shown in Figures 4.3 & 4.4, the most used Tweet Types are mentions and mentions in retweets for both Lab Tweets and Others Tweets. Due to the higher presence of Others Tweets in the collected data, Figure 4.4 can be seen to follow the trend of the overall data in Figure 4.2. While the Lab Tweets tend to use the different Tweet Types more equally, as seen in Figure 4.3, the Others Tweets tend to rely heavily on mentions and mentions in retweets, with around a 1,000 message difference to the usage of retweets, as seen in Figure #3. While both Figures 4.3 & 4.4 show that the Tweet Type replies to has low usage, it is balanced between the two message sources.

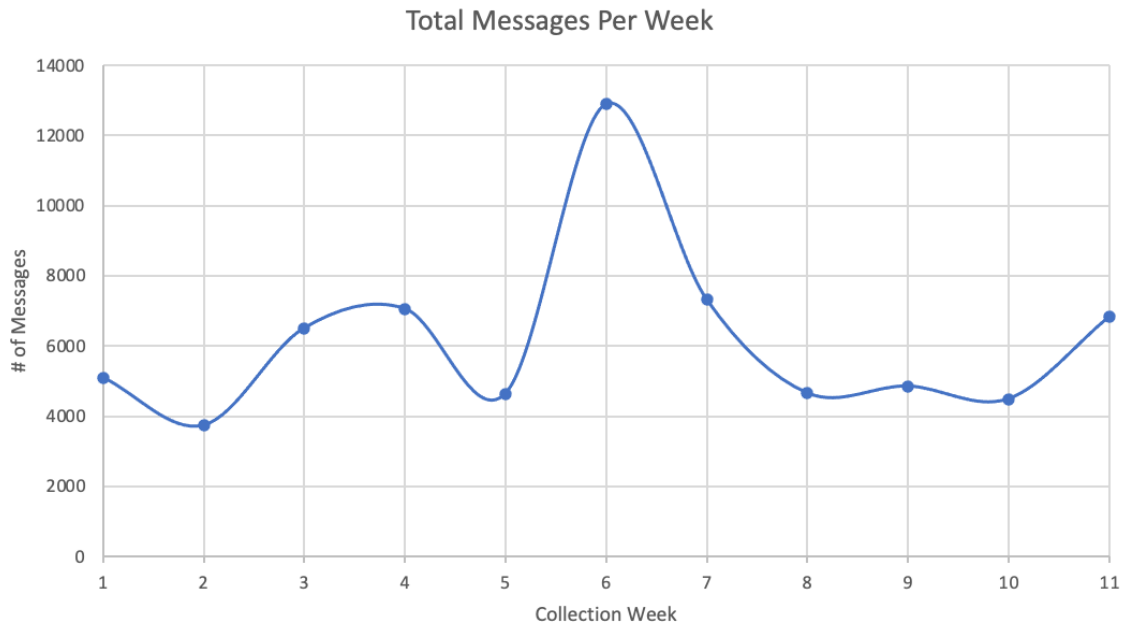

Figure 4.2: Total Tweets per week

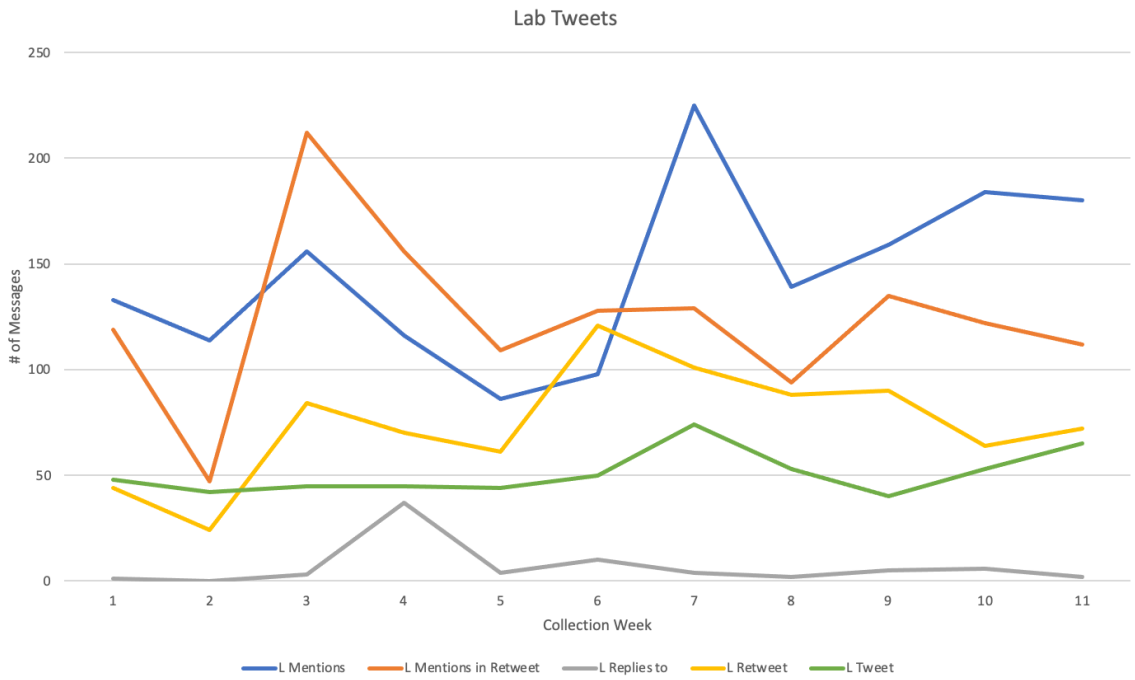

Figure 4.3: Total Lab Tweets per Tweet Type per week

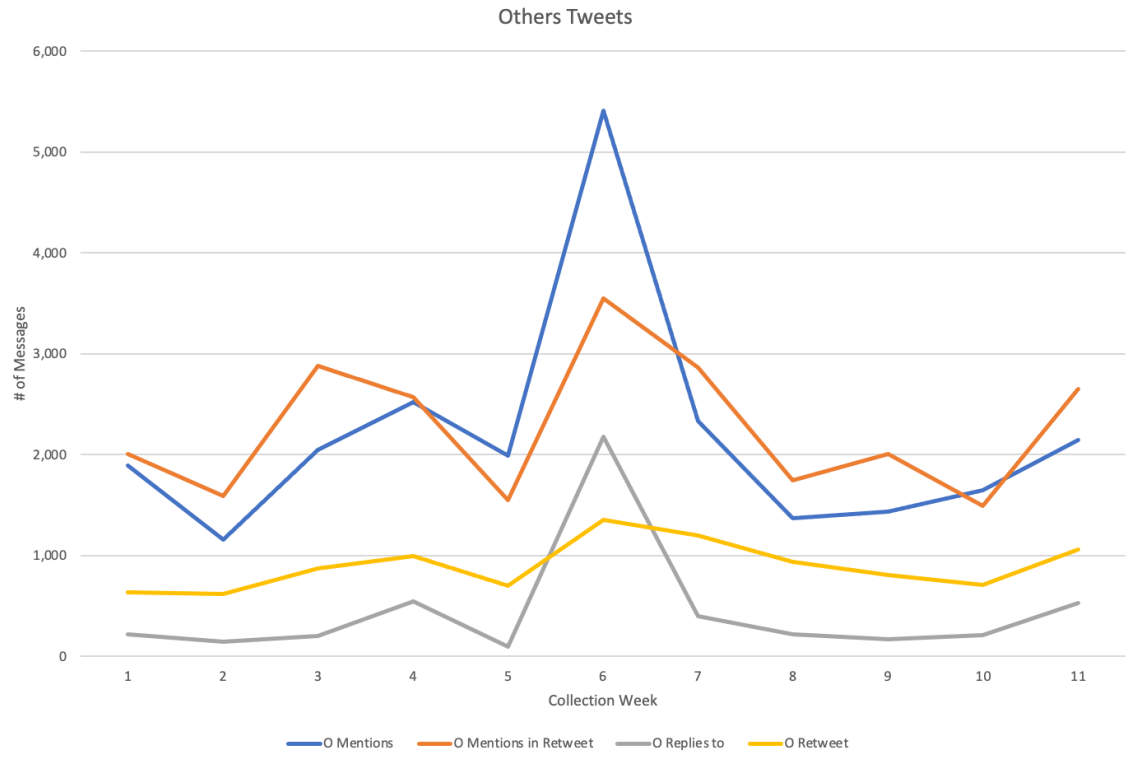

Figure 4.4: Total Others Tweets per Tweet Type per week

Weekly Codes for Cumulative PILs

From the Weekly Codes all PILs query these results show the number of times each code was present in an individual week. The data for each individual code can be seen in Appendix Table A.4. For Action codes, Figure 4.5 shows the most commonly used codes were lab work/research sharing and other shared information. For Community codes, Figure 4.6 shows the most commonly used codes were awards/props/thanks and responses/conversations. The nearly 1,000 message peak in responses/conversations occurred when one particular lab was repeatedly mentioned in a conversation surrounding a political event. Overall, Figure 4.7 shows that the most discussed information topics were COVID-19 and technology, followed by health and government. Most of these discussions lasted the entire length of the collection period but race and police were focused at the end of June, though they did continue with less popularity through July and August.

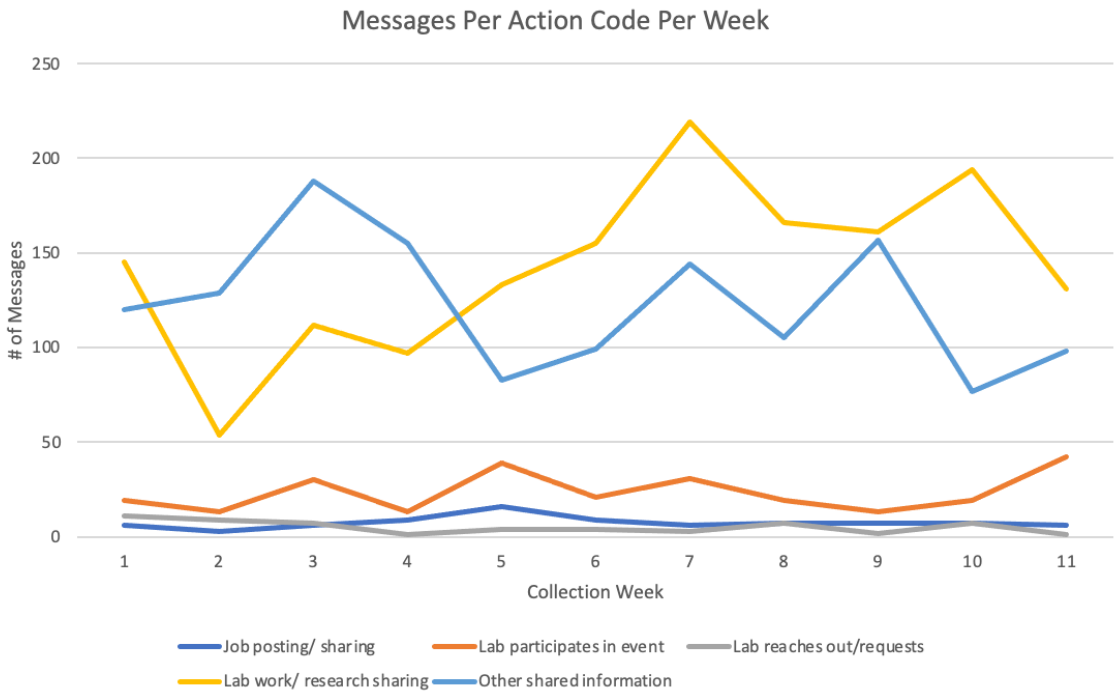

Figure 4.5: Messages per Action Code per week

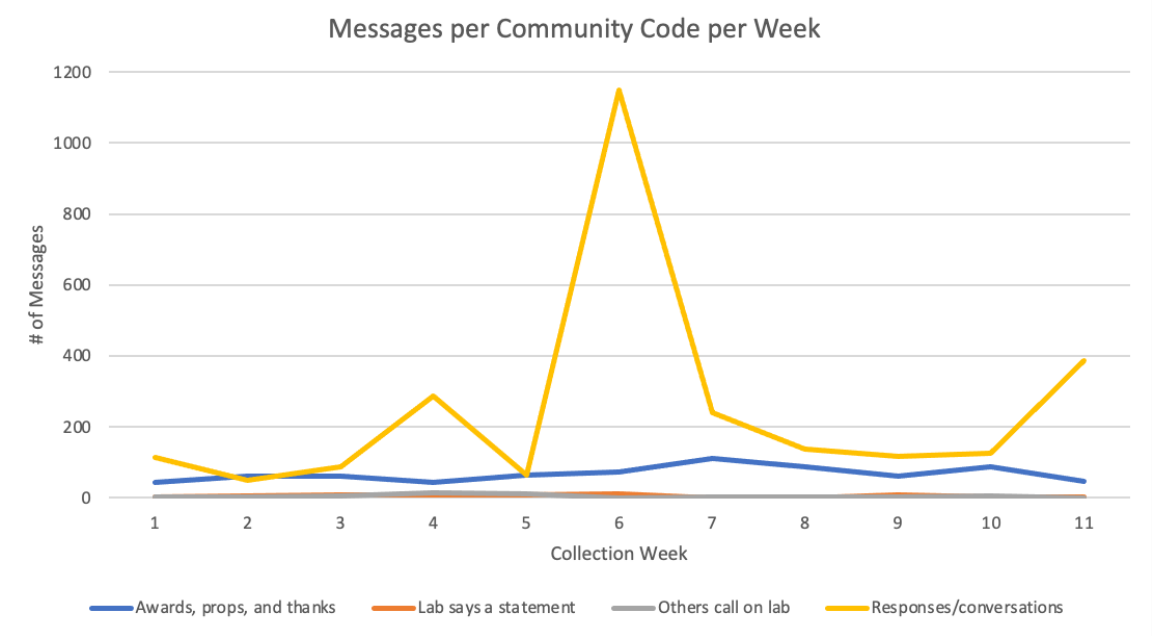

Figure 4.6: Messages per Community Code per week

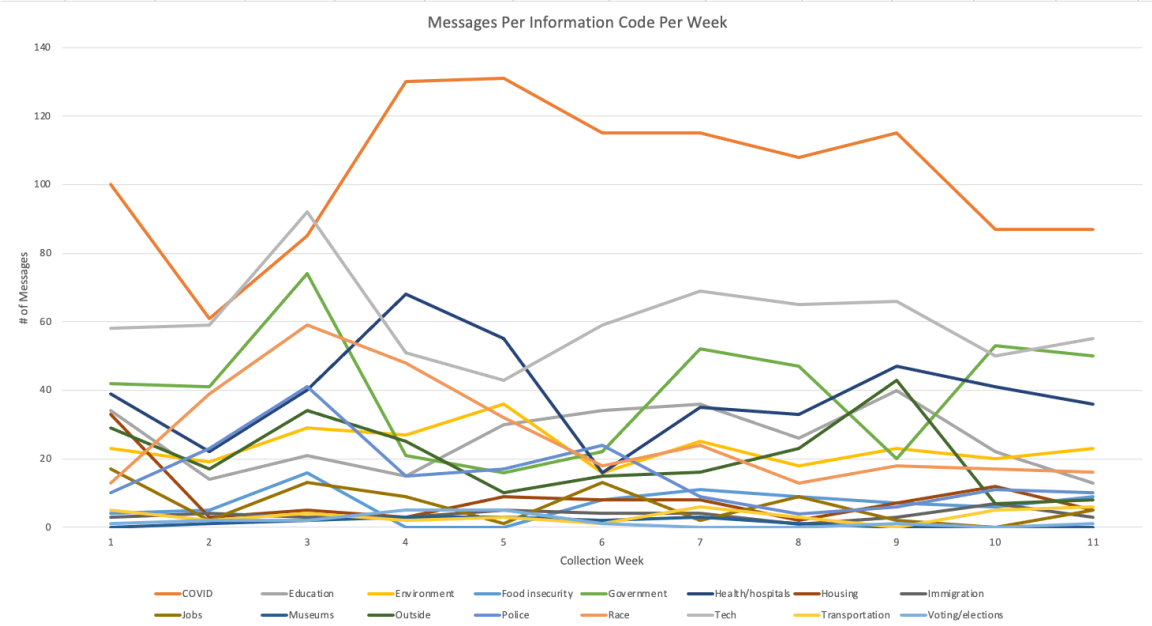

Figure 4.7: Messages per Information Code per week

Cumulative Tweet Types for Codes

The Codes by Tweet Type query identified the Tweet Types of coded messages. The data for each individual code can be seen in Appendix Table A.5. For Action codes, Figure 4.8 shows the percentage breakdown of each Tweet Type in the messages assigned to a

specific Action code. As with all codes, the majority of the messages are from other users, but for Action codes, there is about a 10% Lab Tweets presence. For Community codes, Figure 4.9 shows an overall lower percentage of Lab Tweets except in the Lab Says a Statement code, which shows a variety of Tweet Types. The reason that this code is not entirely Lab Tweets is likely due to the nature of how this study was coded, with the first message being the only one coded for that week. If the first message was a retweet of the original message then the message would be coded for Others Tweets rather than Lab Tweets. For Information Codes, Figure 4.10 shows Lab Tweets in the 10-20% range overall.

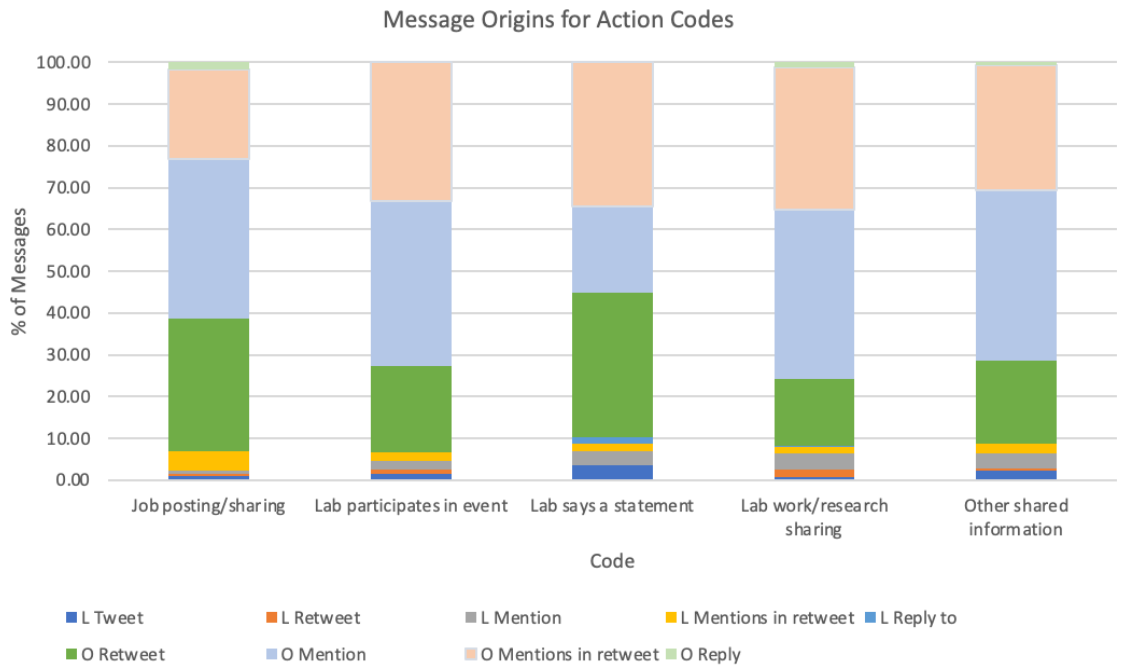

Figure 4.8: Message origins for Action Codes

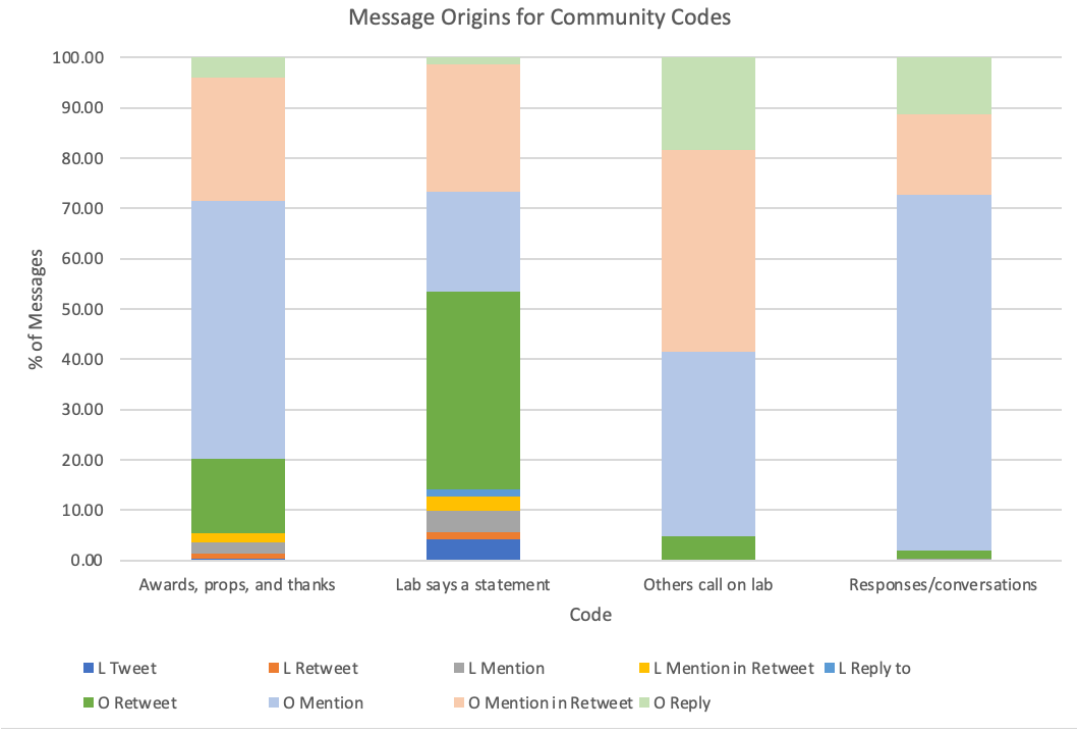

Figure 4.9: Message origins for Community Codes

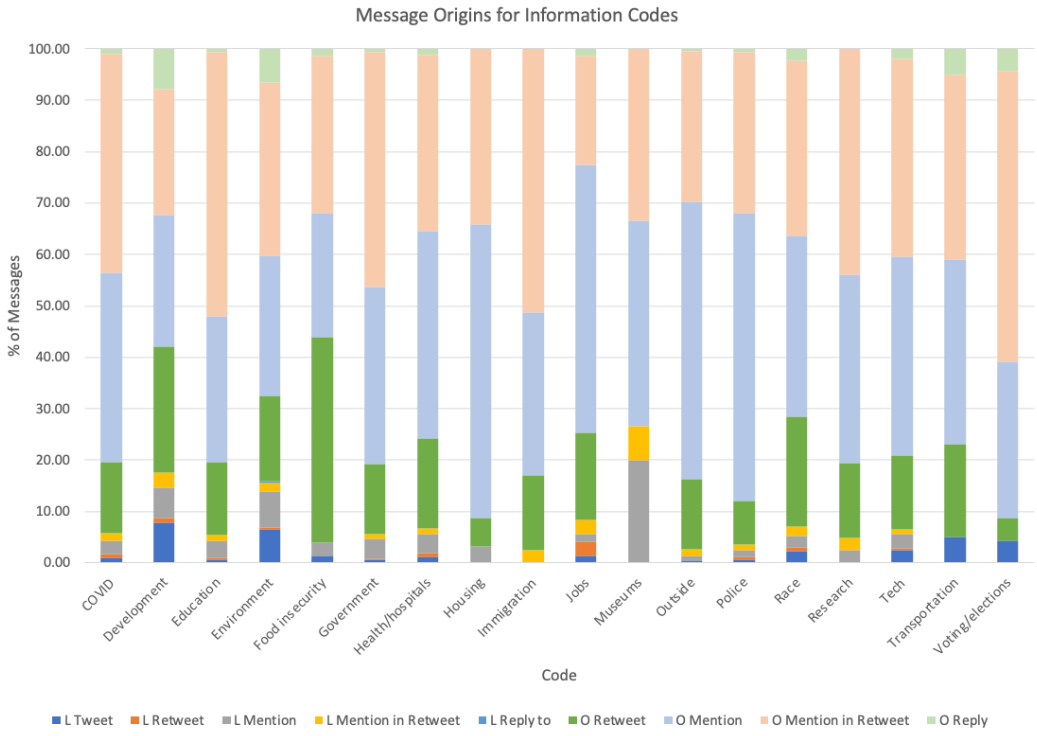

Figure 4.10: Message origins for Information Codes

5 Discussion

The analysis of these results will center on two major points for both the PILs and the stakeholders in order to gauge the impact of PILs on Twitter: engagement and content. Engagement with stakeholders is a key feature of PILs' method of collaboration and is seen on Twitter through the activity of other users around the messages PILs produce on their profiles. Content relates to the information that is in both the messages of the PILs and their stakeholders. PILs addressed many topics through Twitter and their stakeholders engaged with them on these topics in different manners.

The first step towards engagement is communication. Both PILs and their stakeholders initiated communication which lead to engagement on Twitter. Of the 116 PILs identified in the US, the 42 in this study were identified as operating an active Twitter account. Of these 42, 6 did not create any messages during the collection period. This leaves 36 PILs that actively used Twitter to communicate with their stakeholders. And this paid off, as shown in Figure 4.1, there is a general trend where the more messages a PIL outputs onto their Twitter profile, the more other users will interact with their messages and profile. Stakeholders also communicated with PILs. Not only did they respond to messages the PILs created, but on occasion stakeholders also initiated discourse. They did this by asking direct questions to the PIL through Twitter or using a mention to include the PIL in a conversation that was happening on a different profile.

The audience of the PILs' communication can be generally categorized as their stakeholders. Due to the public nature of Twitter, however, an exact audience is difficult to specify since any user on Twitter can access a PIL's profile, and thus their messages. When PILs did actively target an audience in their messages it tended to be around the discussion of a specific topic, directed at potential participants for an event, or in response to a direct prompt from another user. Stakeholders, however, had more defined roles in these engagements and thus more defined audiences. Their audience was either the PIL directly as a response to content the PIL or user had produced or other stakeholders on a statement that they had shared publicly.

Overall, the labs created very few of the total number of messages that were present on their profiles. Most content was the response of stakeholders reacting and replying to messages the PIL created. That being said, PILs did have to create some level of content in order to have the other users engage around it. As shown in Figure 4.3, PILs created a mix of tweets, retweets, mentions, and mentions in retweets on a weekly basis. If they were not tweeting their own messages, then PILs were amplifying the messages of other organizations through retweets or mentions. This can be seen collectively in Appendix Table A.3. Stakeholders, as the ones responsible for the majority of the content on the PILs' Twitter profiles, created mostly reactionary content. They would retweet and respond to content that was originally the PIL's. Much less frequently would stakeholders actively engage the PIL without PIL content as a starting point, but this did occur, as can be seen in the 'others call on lab' code in Appendix Table A.4.

Another, less helpful, way that stakeholders engaged with the PIL was through repeated mentioning in a response thread. While the initial post and content were relevant to the PIL, the content in the responses tended to be less relevant. For example, a tweet about an award that WhatWorksCities gave to the city of Portland developed a response thread where users complained about the city and its officials. These responses had nothing to do with the PIL, but the users continued to mention the PIL in their responses. This type of behavior drove up the number of messages for PILs and stakeholders engaging while in reality there was no engagement occurring.

With regard to content, the PILs discussed a variety of topics which both spanned the Action, Community, and Information codes while including both their own work and current events. As shown in Figure 4.8 - 4.10 and Appendix Table A.5, the PILs in aggregate put out more action codes than community codes, as well as a wide variety of information codes. The information codes that PILs and stakeholders engaged in included COVID-19, the government, and technology. These topics all maintained a strong presence through the collection period while race and police peaked between June and July and education, especially with regard to COVID-19, peaked in July.

Overall, there was often a balance between the PILs sharing their own work and acknowledging current events. PILs discussed their own work, hence the general topics of ‘education’, ‘environment’, and ‘police’ where the topic was not directly tied to COVID-19 or social movements, but just a continuation of the discussions PILs had previously on these topics of their work. There was also an effort from the PILs to tailor their work to current events, as the current events during the collection period exemplify the types of policy issues that PILs address in their work. The PILs made a conscious effort to produce work that their stakeholders could use such as maps of COVID-19 cases, resources for accessing low-cost internet, and methods for better work from home environments.

6 Conclusion

Even though PILs' work was interrupted by COVID-19 in early 2020, they still had the option to continue engaging in their highly collaborative work through Twitter. For an organizational structure which puts a high emphasis on stakeholder engagement and interaction, this had the opportunity to be an effective solution. Through analysis of the messages and interactions on the Twitter profiles of PILs, the solution was tested for effectiveness. It was clear through the study that the PILs were engaging with their stakeholders and that the stakeholders were also engaging with the PILs. This engagement consisted not only of discussion on the work of the PIL but also on the current events which occurred during the collection period.

While this was an effective solution, not all PILs engaged in equal amounts. The PILs that produced more original content tended to have more engagement from other Twitter users as compared to PILs which produced less original content. Additionally, these were only the 42 PILs who have Twitter profiles and use them out of the 116 PILs which were identified in the US, or 36% of US PILs. As this has been shown to be effective in engaging stakeholders, the PILs who have an active Twitter profile should use it purposefully in the ways which increase stakeholder engagement, and the PILs that do not should at least consider Twitter as a method they could utilize.

References

Bellefontaine, T. (2012). Innovation Labs: Bridging Think Tanks and Do Tanks. *Policy Horizons Canada*, 1-4. https://publications.gc.ca/site/eng/432058/publication.html

Blunden, J., & T. Boyer, Eds. (2020). State of the Climate in 2020. *Bulletin of the American Meteorological Society, 102*(8), Si–S475. https://doi.org/10.1175/2021BAMSStateoftheClimate.1

Criado, J.,I., Dias, T.F., Sano, H., RojasMartín, F., Silvan, A., & Filho, A.I. (2020). Public Innovation and Living Labs in Action: A Comparative Analysis in post-New Public Management Contexts. *International Journal of Public Administration, 44*(6), 451-464. https://doi.org/10.1080/01900692.2020.1729181

Hinrichs-Krapels, S., Bailey, J., Boulding, H., Duffy, B., Hesketh, R., Kinloch, E., Pollitt, A., Rawlings, S., van Rij, A., Wilkinson, B., Pow, R., & Grant, J. (2020). Using Policy Labs as a process to bring evidence closer to public policymaking: A guide to one approach. *Palgrave Communications*, 6(101). https://doi.org/10.1057/s41599-020-0453-0

Kishi, R., & Jones, S. (2020, September). *Demonstrations & political violence in America: New data for summer 2020.* ACLED. https://acleddata.com/2020/09/03/demonstrations-political-violence-in-america-new-data-for-summer-2020/

Lewis, J.M. (2020). The limits of policy labs: characteristics, opportunities and constraints. *Policy Design and Practice, 4*(2), 242-251. https://doi.org/10.1080/25741292.2020.1859077

Lindquist, E.A., & Buttazzoni, M. (2021). The ecology of open innovation units: adhocracy and competing values in public service systems. *Policy Design and Practice, 4*(2), 212-227. https://doi.org/10.1080/25741292.2021.1941569

Lovejoy, K., & Saxton, G.D. (2012). Information, Community, and Action: How Nonprofit Organizations Use Social Media. *Journal of Computer-Mediated Communication*, *17*(3), 337-353. https://doi.org/10.1111/j.1083-6101.2012.01576.x

Lovejoy, K., Waters, R., & Saxton, G. (2012). Engaging stakeholders through Twitter: How nonprofit organizations are getting more out of 140 characters or less. *Public Relations Review, 38*(2), 313-318. https://doi.org/10.1016/j.pubrev.2012.01.005

McGann, M., Blomkamp, E., & Lewis, J.M. (2018). The rise of public sector innovation labs: experiments in design thinking for policy. *Policy Science, 51*, 249-267. https://doi.org/10.1007/s11077-018-9315-7

NASA (2021, January 14). *2020 Tied for Warmest Year on Record, NASA Analysis Shows.* NASA Global Climate Change. https://climate.nasa.gov/news/3061/2020-tied-for-warmest-year-on-record-nasa-analysis-shows/

Olejniczak, K., Borkowska-Waszak, S., & Domaradzka-Widta, A. (2020). Policy labs: the next frontier of policy design and evaluation? *Policy & Politics*, *48*(1), 89-110. https://doi.org/10.1332/030557319X15579230420108

Puttick, R. (2014). *Innovation teams and labs: A practice guide.* Nesta https://www.nesta.org.uk/toolkit/innovation-teams-and-labs-a-practice-guide/

Saxton, G.D., & Guo, C. (2014). Online stakeholder targeting and the acquisition of social media capital. *International Journal of Nonprofit and Voluntary Sector Marketing, 19(*4), 286-300. https://doi.org/10.1002/nvsm.1504

Schwoerer, K., Keppeler, F., Mussagulova, A., & Puello, S. (2021). CO-DESIGN-ing a more context-based, pluralistic, and participatory future for public administration. *Public Administration, 100*(1), 72-97. https://doi.org/10.1111/padm.12828

Tajudeen, F.P., Jaafar, N.I., & Ainin, S. (2018). Understanding the impact of social media usage among organizations. *Information & Management, 55*(3), 308-321. https://doi.org/10.1016/j.im.2017.08.004

Taylor, D.B. (2021, November 5). George Floyd Protests: A Timeline. *The New York Times.* https://www.nytimes.com/article/george-floyd-protests-timeline.html

Tõnurist, P., Kattel, R., & Lember, V. (2017). Innovation labs in the public sector: what they are and what they do? *Public Management Review*, *19*(10), 1455-1479. https://doi.org/10.1080/14719037.2017.1287939

2020 Events (2020, December 17). HISTORY. Received March 21, 2022, from https://www.history.com/topics/21st-century/2020-events

Twitter. (n.d.). *New User FAQ* https://help.twitter.com/en/resources/new-user-faq

Wellstead, A.M., Gofen, A., & Carter, A., (2021). Policy innovation lab scholarship: past, present, and the future – Introduction to the special issue on policy innovation labs. *Policy Design and Practice, 4*(2), 193-211. https://doi.org/10.1080/25741292.2021.1940700

Wellstead, A., & Nguyen, S. (2020). The Rise of Policy Innovation Labs: A Catalog of Policy Innovation in the United States (1st Edition). *SSRN Electronic Journal*. http://dx.doi.org/10.2139/ssrn.3513548

What a year it was: A 2020 timeline (2020, December 18). *Los Angeles Times*

https://www.latimes.com/california/story/2020-12-18/what-a-year-it-was-a-2020-timeline

Wojcik, S., & Hughes, A. (2019, April 24). *Sizing Up Twitter Users*. Pew Research Center. https://www.pewresearch.org/internet/2019/04/24/sizing-up-twitter-users/

Appendix A: Expanded Data

Table A.1: Total numbers of tweets

Lab	1-Jun	9-Jun	16-Jun	23-Jun	30-Jun	7-Jul	14-Jul	21-Jul	28-Jul	5-Aug	13-Aug	Lab total
Beta NYC	28	286	1204	293	407	263	122	36	68	65	109	2,881
CA Policy Lab	79	22	139	36	15	46	88	101				526
CIERP Fletcher	57	57	40	9	7	7	210	51	45	100	44	627
CITRIS Policy Lab	5		38	25	53	36	67	116	6	42	74	462
Civic Impact jhu	13	69	9	13	89	119	469					781
CO Health Inst	30	49	74	52	54							259
Duke CPIGH	24	101	143	80	95	155	71	131	251	154	25	1,230
Global Dev Lab	88	225	217	272	444	185	379	249	335	279	798	3,471
Gov Lab PH	48											48
Green Harvard	12	19	50	8	12	9	67	125	196	62	19	579
HHSCTO office	130	57	123	245	183	14	95	182	206	196	228	1,659
Immigration Lab	147	8	48	76	3	36		2	6	20	182	528
Innovate RI	237	58	111	54	74	80						614
LA Innovates	2			4								6
Lab OPM	5							2	9	8		24
MIT CoLab	95	9	50	102	130	91	345			18		840
Nebraska OCIO			110	45	11	31	39	16				252
NRPA news	378	303	1236	290	375	631	1052	897	959	429	239	6,789
NYC CTO	337	305	284	1251	1146	1554	577	80	565	116	122	6,337
NYC Opportuity	121	15	125	81	36	43	107					528
Policy Lab CHOP	338	101		1983			469	790	663	731	254	5,329
Policy Sciences							121					121
Public Policy Lab	13	2	36		36	159	124	12	12			394
Research LSU	25							5				30
Results 4 America	168	126	582	319	212	684	981	419	412	456	2543	6,902
Rutgers EOAS	25	79	102	33	25	60	63	72	72	16	47	594
SACOG	48	4	20	1	17	36	6	14	19	53	5	223
SF Human Services	865	226	86	169	57	288	216	187	183	606	109	2,992
SF MOCI			13	5								18
SILC at CU	168	163	41	2	71	20						465
Sun Foundation	128	188	119	217	17	12	116	127	84	49	609	1,666
sustain ILLINOIS	16	39	63	81	107	21	11	2	1	140	74	555
sustainable pdx	8			7								15
Tech Policy Lab	56	4	8	1	7	2	10	10	3	86	271	458
the gov lab	1087	876	965	1	545	459	415	569	542	469	585	6,513
The Lab DC	9	15	4	1				3	13	74	2	121
Tigers Go Green	34	25										59
Uchi Urban Labs	32	83	136	43	162	111	89	103	78	61	116	1,014
UMN Sustain			6	1				11	21	16	42	97
What Works Cities	128	222	330	341	349	7749	1023	426	112	603	333	11,616
Youth Policy Lab	116		17									133
Week total	5,100	3,736	6,529	6,141	4,739	12,901	7,332	4,738	4,861	4,849	6,830	67,756

Table A.2: Code files and total uses

Code	Files	Messages
Action		
Job posting/sharing	54	82
Lab holds/participates in event	98	262
Lab reaches out/requests	33	56
Lab work/research sharing	219	1595
Other shared information	234	1388
Community		
Awards/Props/Thanks	158	746
Lab says a statement	37	63
Others call on lab	36	54
Responses/conversations	183	2770
Information		
COVID		
Businesses/activities	39	92
Cases/testing	32	152
Data/science/information	64	241
Masks/social distancing	48	118
Medical aspects	30	51
Regulations/policy	37	66
Societal issues/recovery	98	315
Development	17	105
Education		
Education	52	108
Covid school (in person)	18	94
Extracurriculars	7	20
Remote learning	16	25
Reopening schools	18	39
Environment		
Environment	71	176
Clean energy	15	18
Climate change	39	56
Food insecurity	27	75
Government	109	450
Health/hospitals	98	433
Housing	37	95
Immigration	24	43
Jobs	31	73
Museums	9	15
Outside	9	46
Parks	14	181
Police		
Police	32	77
Crimes/prison	18	32

Defund the police	18	32
Gun violence	8	10
Police violence	13	20
Race		
Race	39	54
Black Lives Matter	30	55
Equity actions	57	159
Research	33	43
Tech		
Tech	78	262
Data	70	412
Internet	19	35
Transportation	23	37
Voting/elections	12	23

Table A.3: Tweet Type distribution by lab

Lab Name	Weeks Recorded	Lab Tweets Total	Others Tweets Total
18F	1	5	111
BetaNYC	11	238	2,643
CAPolicyLab	8	98	428
CIERP_Fletcher	11	68	559
CITRISPolicyLab	10	50	412
CivicImpact_jhu	7	12	769
COHealthInst	5	49	210
DukeCPIGH	11	146	1,084
GlobalDevLab	11	367	2,842
GovLabPHL	1	4	44
GreenHarvard	11	19	560
HHSCTOoffice	11	143	1,510
ImmigrationLab	10	16	512
InnovateRI	6	46	566
LabOPM	4	0	25
LAInnovates	2	1	5
MITCoLab	7	96	718
Nebraska_OCIO	6	0	252
NRPA_news	11	247	6,445
NYCOpportunity	7	24	472
NCY_CTO	11	76	3,230
PolicyLabCHOP	8	349	4,980
PolicyScience	1	3	118
PublicPolicyLab	8	5	390
Research_LSU	2	0	30
Results4America	11	942	5,594
RutgersEOAS	11	112	481
SACOG	11	2	221
SFHumanServices	11	141	2851
SFMOCI	2	0	18
SILCatCU	6	10	455
SunFoundation	11	43	1,623
sustainablepdx	2	0	15
sustainILLINOIS	11	45	510
TechPolicyLab	11	0	458
thegovlab	11	611	6,711
TheLab_DC	8	3	118
TigersGoGreen	2	12	47
UChiUrbanLabs	11	0	1,013
UMNSustain	6	6	91
WhatWorksCities	11	414	11,201
YouthPolicyLab	1	2	15

Table A.4: Tweet Types for each collection week

Tweet Type	6.1	6.9	6.16	6.23	6.30	7.7
Lab Tweets	345	227	500	424	304	407
Mentions	133	114	156	116	86	98
Mentions in Retweet	119	47	212	156	109	128
Replies to	1	0	3	37	4	10
Retweet	44	24	84	70	61	121
Tweet	48	42	45	45	44	50
Others Tweet	4,755	3,507	6,008	6,641	4,331	12,494
Mentions	1,889	1,158	2,051	2,525	1,987	5,406
Mentions in Retweet	2,010	1,587	2,881	2,574	1,552	3,550
Replies to	220	144	200	544	94	2,181
Retweet	636	618	876	998	698	1,357

Tweet Type	7.14	7.21	7.28	8.5	8.13
Lab Tweets	533	376	429	429	431
Mentions	225	139	159	184	180
Mentions in Retweet	129	94	135	122	112
Replies to	4	2	5	6	2
Retweet	101	88	90	64	72
Tweet	74	53	40	53	65
Others Tweet	6,799	4,281	4,423	4,060	6,399
Mentions	2,336	1,371	1,438	1,650	2,148
Mentions in Retweet	2,864	1,749	2,005	1,490	2,654
Replies to	398	222	170	210	534
Retweet	1,201	939	810	710	1,063

Table A.5: Codes in individual collection weeks

Action Codes

	6.1	6.9	6.16	6.23	6.30	7.7	7.14	7.21	7.28	8.5	8.13
Job posting/ sharing	6	3	6	9	16	9	6	7	7	7	6
Lab participates in event	19	13	30	13	39	21	31	19	13	19	42
Lab reaches out/requests	11	9	7	1	4	4	3	7	2	7	1
Lab work/ research sharing	145	54	112	97	133	155	219	166	161	194	131
Other shared information	120	129	188	155	83	99	144	105	157	77	98

Community Codes

	6.1	6.9	6.16	6.23	6.30	7.7	7.14	7.21	7.28	8.5	8.13
Awards, props, and thanks	43	62	60	43	65	73	112	89	60	88	46
Lab says a statement	3	6	8	8	10	13	1	1	8	2	3
Others call on lab	4	3	7	14	11	1	2	3	2	5	1
Responses/conversations	114	51	89	286	65	1149	240	138	117	125	386

Information Codes

	6.1	6.9	6.16	6.23	6.30	7.7	7.14	7.21	7.28	8.5	8.13
COVID											
Businesses/activities	4	8	14	9	21	12	7	5	4	6	2
Cases/testing	7	5	4	24	1	16	20	29	21	12	13
Data/science/information	28	9	11	14	36	31	15	15	25	15	37
Masks/social distancing	20	11	6	17	10	9	9	8	14	9	5
Medical aspects	4	4	4	16	2	0	4	1	4	9	3
Regulations/policy	6	3	4	3	9	8	12	5	7	6	3
Societal issues/recovery	31	14	34	35	39	35	35	32	28	20	11

Development										
	0	7	8	12	13	4	13	13	12	10	13
Education											
Education											
	18	7	17	11	9	7	12	6	7	7	7
Covid school (in person)											
	1	0	1	0	11	22	16	10	20	9	4
Extracurriculars											
	1	0	0	2	0	0	1	5	9	1	1
Remote learning											
	7	3	2	1	5	3	2	0	0	1	0
Reopening schools											
	7	4	1	1	5	2	5	5	4	4	1
Environment											
Environment											
	16	11	20	12	27	12	16	11	15	16	19
Clean energy											
	1	1	1	13	4	0	3	2	1	1	1
Climate change											
	6	7	8	2	5	4	6	5	7	3	3
Food insecurity											
	4	5	16	0	0	8	11	9	7	6	9
Government											
	42	41	74	21	16	22	52	47	20	53	50
Health/hospitals											
	39	22	40	68	55	16	35	33	47	41	36
Housing											
	33	3	5	3	9	8	8	2	7	12	5
Immigration											
	3	4	3	3	5	4	4	1	3	7	3
Jobs											
	17	2	13	9	1	13	2	9	2	0	5
Museums											
	0	1	2	3	3	2	3	1	0	0	0
Outside											
	2	7	8	11	8	0	0	2	8	0	0
Parks											
	27	10	26	14	2	15	16	21	35	7	8
Police											
Police											
	8	13	29	12	1	3	2	0	1	3	5
Crimes/prison											
	1	2	3	0	6	5	7	4	2	1	1
Defund the police											
	0	3	5	3	6	12	0	0	0	2	1

Gun violence											
	1	1	2	0	2	0	0	0	0	2	2
Police violence											
	0	4	2	0	2	4	0	0	3	3	1
Race											
Race											
	2	8	8	18	6	2	3	1	0	3	3
Black Lives Matter											
	3	10	19	8	3	7	2	1	0	1	1
Equity actions											
	6	21	25	19	9	8	11	9	16	9	12
Research											
	2	0	7	3	14	1	8	2	2	4	0
Tech											
Tech											
	31	27	33	20	16	18	29	20	26	23	11
Data											
	20	30	57	31	24	36	33	42	39	25	41
Internet											
	7	2	2	0	3	5	7	3	1	2	3
Transportation											
	5	2	4	2	3	1	6	3	0	5	6
Voting/elections											
	1	2	2	5	5	1	0	0	1	0	1

Table A.6: Tweet Types vs codes

Action Code	Lab					Others			
	Tweet	Retweet	Mention	Mention in Retweet	Reply to	Retweet	Mention	Mention in Retweet	Reply
Job posting/sharing	2	1	2	10	0	68	82	46	4
Lab participates in event	8	7	12	12	0	119	227	192	0
Lab says a statement	2	0	2	1	1	20	12	20	0
Lab work/research sharing	18	43	90	38	4	386	969	815	28
Other shared information	41	10	68	42	0	362	750	545	15

Community Code	Lab					Others			
	Tweet	Retweet	Mention	Mention in Retweet	Reply to	Retweet	Mention	Mention in Retweet	Reply
Awards, props, and thanks	4	11	28	20	1	172	596	286	47
Lab says a statement	3	1	3	2	1	28	14	18	1
Others call on lab	0	0	0	0	0	4	30	33	15
Responses/conversations	1	1	6	2	1	44	2076	468	330

Information Code	Lab					Others			
	Tweet	Retweet	Mention	Mention in Retweet	Reply to	Retweet	Mention	Mention in Retweet	Reply
COVID									
Businesses/activities	0	2	3	0	0	5	44	38	0
Cases/testing	3	0	3	0	0	19	52	66	3
Data/science/information	1	1	7	7	0	38	77	108	1
Masks/social distancing	1	0	4	0	0	15	51	42	1
Medical aspects	1	1	0	0	0	6	16	26	1
Regulations/policy	2	1	2	0	0	12	26	33	2
Societal issues/recovery	3	2	8	9	0	48	115	128	3
Development	8	1	6	3	0	25	26	25	8
Education									
Education	1	1	3	2	0	21	28	48	1
Covid school (in person)	0	0	3	0	0	6	23	60	0
Extracurriculars	0	0	2	0	0	3	5	10	0

Remote learning	0	0	1	1	0	2	12	8	0
Reopening schools	1	0	0	0	0	8	12	18	1
Environment									
Environment	11	1	11	2	1	26	58	59	11
Clean energy	2	0	2	1	0	3	4	6	2
Climate change	4	0	5	1	0	14	8	22	4
Food insecurity	1	0	2	0	0	30	18	23	1
Government	3	1	17	4	0	60	153	202	3
Health/hospitals	5	3	16	5	0	75	173	147	5
Housing	0	0	3	0	0	5	52	31	0
Immigration	0	0	0	1	0	6	13	21	0
Jobs	1	2	1	2	0	12	37	15	1
Museums	0	0	3	1	0	0	6	5	0
Outside	0	0	0	2	0	1	23	20	0
Parks	1	0	2	1	0	30	99	46	1
Police									
Police	0	0	0	0	0	8	39	28	0
Crimes/prison	0	0	2	0	0	0	19	10	0
Defund the police	0	0	0	2	0	3	19	7	0
Gun violence	0	1	0	0	0	1	5	2	0
Police violence	1	0	0	0	0	2	11	5	1
Race									
Race	1	0	2	0	0	14	14	21	1
Black Lives Matter	0	0	1	1	0	9	23	18	0
Equity actions	5	2	3	4	0	34	57	52	5
Research	0	0	1	1	0	6	15	18	0
Tech									
Tech	8	0	9	2	0	31	97	107	8
Data	10	2	10	4	0	70	162	149	6
Internet	0	0	0	1	0	1	14	16	0
Transportation	2	0	0	0	0	7	14	14	2
Voting/elections	1	0	0	0	0	1	7	13	1