Policy Paper

A Network Model of Broadband Adoption: Using Twitter to Document Detroit Future

Preliminary Analysis by the Open Technology Institute

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A banner with the Detroit Future logo promotes the #detroitfuture hashtag. Photo credit: Preston Rhea

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About New America & OTI

New America is a nonprofit, nonpartisan public policy institute that invests in new thinkers and new ideas to address the next generation of challenges facing the United States.

The Open Technology Institute formulates policy and regulatory reforms to support open architectures and open source innovations and facilitates the development and implementation of open technologies and communications networks. OTI promotes affordable, universal, and ubiquitous communications networks through partnerships with communities, researchers, industry, and public interest groups and is committed to maximizing the potentials of innovative open technologies by studying their social and economic impacts — particularly for poor, rural, and other underserved constituencies. OTI provides in-depth, objective research, analysis, and findings for policy decision-makers and the general public.

From 2010 to 2012, the Detroit Digital Justice Coalition (DDJC) conducted a federally-funded training program in digital media that they called "Detroit Future." The purpose of the program was to use broadband adoption as a means of strengthening economic development and community organizing in Detroit. To that end, the DDJC developed a "networked" model of broadband adoption as part of its implementation of the program. The coalition documented the program with the Twitter hashtag #detroitfuture.

The key feature of the networked model is that relationships are both an input (a core group of trainees are meant to transfer their skills and share their digital media with the people they know) and an outcome (participants use their newly-acquired digital skills to maintain relationships and collaborate with other program participants). The underlying theory of the networked model is that these relationships, increased in number and solidified through the programs and enhanced by digital technologies such as broadband and Twitter, multiply the value of participants' new skills and provide a platform for future collective action.

The networked model contrasts with traditional digital training programs where the focus is on individuals' skill adoption, and in which the primary lasting relationship is imagined as being between the participant and the training organization. In the case of Detroit Future, people form relationships with each other. For those coming online or using digital tools for the first time have a community to welcome them to the Internet and a pathway for bringing even more people into that online community. The program participants all develop digital skills to use on their own projects documenting work in their neighborhoods or on their chosen local issue. At the same time, they are a network connecting these issues and neighborhoods and collaborating on a shared online narrative about Detroit Future and their city.

The DDJC's use of Twitter is an innovation in program documentation. While the DDJC also used traditional methods of program documentation like activity reports, monthly reports and quarterly reports, participants documented their own work in a public forum on a daily basis using Twitter. The widespread use of the #detroitfuture hashtag described in this report connects to a number of the organizing coalition's intended outcomes, including participants' increased digital literacy, more relevant content on the Internet, and stronger relationships among those working to improve the city. An individual's use of Twitter was a baseline achievement for digital literacy and the total number of users of the #detroitfuture hashtag was one way of counting the reach of the program.

The Detroit Digital Justice Coalition (DDJC) used #detroitfuture to create a welcoming space on the Internet for new participants and a public forum for conversation about Detroit Future. The coalition allowed program participants and the public to participate in, question, re-direct, and initiate crucial conversations about what was happening with the federal grant the DDJC had received. Over time, the growing network of relationships and shared use of the #detroitfuture hashtag on Twitter became a platform for a sustained discussion of the city's future with over a thousand participants. The #detroitfuture discussion spread out from the Detroit Future program and the topic of digital justice to a broader array of community issues.

The use of Twitter as a participatory means of documentation also served to map the social network of the program, which was vital to evaluating the success of the networked model. This social network was both expansive and participatory. Vastly more people — approximately six and a half times more — contributed to the #detroitfuture discussion on Twitter than participated in the primary training programs. And many of the most prominent participants were program trainees or part-time employees, alongside the official accounts of the lead organizations.

Detroit Future and the #detroitfuture hashtag provide a rich case study for understanding how an emerging digital network grows and evolves, and potentially to see how it may mirror, support, or add to offline networks. In this report, we analyze the use of social media to augment and document outcomes of Detroit Future. In particular, we examine the use of the Twitter hashtag #detroitfuture by a group of program organizers and participants, and by a larger community they connected with both offline and online. We propose future research questions to further examine the way that use of the hashtag evolved and how it impacted the program and its effects. Finally, we include recommendations for modifications to programs like Detroit Future which may wish to use social media to achieve program goals along the lines of the #detroitfuture model.

1

Background

In 2009, a coalition of organizations with varied missions, institutional backgrounds, and histories came together to consider how they could use media and technology to enhance work already underway to build a better future for Detroit. The coalition came together under the banner of "digital justice," with the intention of building a general foundation of media and digital literacy among Detroit's network of organizers and their constituents. The coalition formulated a set of digital justice principles under four broad categories of access, participation, common ownership and healthy communities.

The Detroit Digital Justice Coalition (DDJC) was responding both to low levels of broadband utilization for community organizing and economic development efforts, as well as to the misrepresentations of Detroit in the media. They saw that this virtual representation of Detroit repelled potential broadband users, demoralized local organizing efforts and challenged efforts at economic development.

> Online, the most prevalent stories about Detroit from 2008 to 2010 either portrayed a corrupt and violent wasteland or a paradise of opportunity ripe for gentrification. Offline, we saw vibrant communities of people who call Detroit home transforming the city from the ground up ... Our goal was to use digital technologies to strengthen these efforts, interconnect them, and make them more visible. This would shift the online narrative of the city while propelling communities to re-write their offline reality – growing businesses, community programs, and community infrastructure through media-based organizing skills. (Allied Media Projects, "The Detroit Future Media Guide to Digital Literacy." Forthcoming.)

To address these needs, the DDJC partnered with Michigan State University to win federal stimulus grants for broadband adoption trainings and public computer centers (the Broadband Technology Opportunities Program, "BTOP"). The resulting DDJC programs, operating collectively as "Detroit Future," pioneered innovative organizing methods devoted to the vision of a healthy future for

Detroit and to training people of all ages how to use technology on their own terms.

At the time of the formation of the DDJC and the launch of the Detroit Future programs, the city was facing unprecedented challenges across a number of spheres. The convergence of social, political, and economic crises in Detroit required that communities rethink systems of education, infrastructure, and economic development. DDJC member organizations took on the task of designing their programs in this context, often reaching beyond their established mission focus to develop new answers and approaches that were out of the reach of traditional institutions of governance.

The DDJC delegated implementation, management and documentation of the BTOP funds to three coalition members: East Michigan Environmental Action Council (EMEAC), Allied Media Projects (AMP), and the Open Technology Institute (OTI). The Detroit Future programs included three main components: Detroit Future Media (DFM) and Detroit Future Schools (DFS), operated by AMP, and Detroit Future Youth (DFY), run by EMEAC. OTI coordinated the documentation, reporting and evaluation of these programs. EMEAC, AMP and OTI formed a leadership team with six members to coordinate the grant-funded activities; they employed a coordinator for each program, additional part time trainers, a part-time evaluation contractor and a communications coordinator.

In the two-year course of the federal grant, from January 2011 - December 2012, program organizers conducted two iterations of a set of the intensive, months-long Detroit Future Media trainings for approximately 45 people, including some repeat participants from the first to the second iteration (a total of approximately 80 trainees). DFY focused on building capacity and collaboration among a group of 12 youth organizations, bringing staff and members of these organizations together on a monthly basis for trainings and discussion, and directly providing digitally-based leadership training to 75 Detroit area youth. DFS had 6-8 artists working with 22 teachers to provide digital arts education in approximately 12 classrooms across the city, eventually working with approximately 1680 students. Overall, a core group of approximately 155

Detroiters received direct intensive training through the programs; an exponentially larger population was drawn into participation in Detroit Future through work or contact with the core group of trainees.

The lead organizations implemented multiple reporting instruments to properly document and report on the federally funded program activities. Michigan State University required quarterly reports with details on all training activities. The Detroit Future leadership team of EMEAC, AMP and OTI collected monthly reports on the programs and separate reports for each activity. They also promulgated the use of the #detroitfuture hashtag on Twitter to capture qualitative details and informal interactions from the program.

Table 1: Detroit Future Program Documentation Methods

This chart shows how the use of the #detroitfuture hashtag fit into a larger documentation and reporting schema, providing an opportunity for any participant to engage as writer or reader.

Reporting Instrument	Frequency	Completed By	Submitted to
BTOP Quarterly Report	Quarterly	Michigan State University	NTIA
Quarterly Report	Quartlerly	Detroit Future Leadership Teaam	MSU
Monthly Report	Monthly	Program Coordinators	Leadership Team
Activity Report	Once per training (multiple per week)	Program Coordinators and Lead Instructors	Program Coordinators and Leaderhip Team
#detroitfuture tweets	Multiple times per day	Most Detroit Future participants, self-selected	Personal network and most DF participants

The program's lead organizing groups (AMP and EMEAC) designed each of the Detroit Future components to intersect with the others. For example, DFM trained people who worked for organizations that were part of DFY, and trained artists who worked with schoolteachers as part of DFS. They intended the programs to build strong relationships among participants, incorporating professional development retreats, monthly capacity building trainings, classroom cohorts and peer learning. This program design meant that Detroit Future had an impact far beyond the skills development of its core participants. The ethos of networked co-learning made social media a good fit to keep track of and connect across all of the far-reaching program activities.

2 The Use of Twitter for Program Documentation

Woven throughout the Detroit Future programs – which taught skills ranging from graphic design to web development along with entrepreneurship and community organizing – was the practice of using Twitter to document and discuss activities, events, and trainings with the Twitter hashtag #detroitfuture. This innovative practice added a digital dimension to the network of people and organizations running the program and created a data footprint of the program's activities.

At the outset, organizers and evaluators surveyed staff to consider options for aggregating online conversations about Detroit Future. Ultimately, the leadership chose to use Twitter over Facebook (the other major option selected in the surveys); Facebook allows users to post status updates, longer notes, photos, videos, pages, "likes," and more, and unlike Twitter has many layers of access to data. With Twitter, statutory reporting requirements could be streamlined through use of a data-collection instrument requiring concise entries (140 characters or less) deliverable via web, smartphone app, or SMS, and accounts were simply either private or public. In general, it is more difficult to access, export and share or archive material posted on Facebook.

Since training in digital skills including the use of digital tools was an intended outcome of BTOP, participants' use of #detroitfuture on Twitter constituted a demonstration that the program was fostering adoption. It also created a place of intersection across the programs, rather than documenting activities solely by using standard reporting mechanisms that flowed up an evaluation hierarchy. Finally, the use of social media also gave program participants a voice in program documentation as well as in discussions about the program overall and about Detroit in general.

More importantly, the DDJC approached the BTOP goal of "broadband adoption" less as an attempt to bridge the digital divide and more as a path toward building a healthy digital ecology in which multiple voices and narratives co-exist. Twitter allowed individuals to express their opinions; aggregation of these data allowed for collaborative construction of a collective identity and the discussion of the development of shared principles.

Including thoughts from participants and stakeholders in program documentation via Twitter provided important challenges both to prevailing, negative media narratives about Detroit and to accepted notions about digital "inclusion." Detroit is home to a powerful and dedicated network of organizers, leaders, and community groups rarely featured in the mainstream media, who – especially prior to the Detroit Future programs – had only a minimal presence on the Internet. By incorporating this network into the program and inviting participation in the documentation process via a popular digital platform, organizers hoped that the resulting record itself could make broadband more useful and meaningful for stakeholders. This approach fit with the DDJC's goal to "design tech to fit the shapes of our relationships, rather than try to fit [our relationships] into the shapes of existing tech."

Finally, DDJC formulated principles at its founding, including that truly sustainable adoption implies a transformative process "through which people can investigate community problems, generate solutions, create media and organize together." They meant for Detroit Future program participants to move from being media consumers (or trainees) to being media producers (and peer educators). Twitter, like other social media platforms, provided a set of readily accessible tools to aid in this process, as they were user-friendly and by their nature also produced data artifacts for analysis.

Twitter use aligned with a set of core beliefs that inform the work of Detroit Future; these include the understanding that Detroit's brighter future will not arrive with a banner headline in the local newspaper, but in small moments throughout the city. The program publicized the #detroitfuture hashtag (first used for a March 13, 2011, SXSW panel of organizers of the Allied Media Conference speaking about the role of media in the future of Detroit's economy) in trainings and by word of mouth, so that each #detroitfuture tweet would become a pin marking the time and place where people were discussing, debating

and sharing their own visions for Detroit's future and the Detroit Future programs.

All participants in Detroit Future, including staff and supporters, were able to use the #detroitfuture hashtag in social media to note or discuss evidence of the project, combining with other hashtags for commentary or greater specificity. They could also note links to documentation on the web – for example, photos of an event or a video produced for a class. Participants "live-tweeted" many Detroit Future events. The program's official communications coordinator tweeted using the handle @dcommunicates, frequently tweeting and re-tweeting program-relevant information. Organizers used trainings and social events, which they called a "Twitter Tea," to show participants how and why to participate. Many of these Twitter trainings were specifically for the general public. At other community events, OTI displayed visualizations of the resulting data and otherwise explained why these Tweets were useful data beyond the immediate social aspects.

#detroitfuture tweets on a screen in the Allied Media classroom. Photo credit: Imad Hassan

3 Methods and Limitations

This preliminary analysis focuses on the broad characteristics of the entire dataset created by use of the #detroitfuture hashtag as described above. Our study is intended to provide a foundation for further investigation into this program and iteration on the use of Twitter for program documentation. This report does not incorporate the insights of many of the practitioners from the Detroit Future program and in general only skims the surface of possible analyses of these data.

Use of the hashtag is ongoing; this report includes data from the period October 2011 – July 2013. This time period does not precisely correspond with the entire period of the Detroit BTOP grant, which was announced in September 2010 but provided public programming between February 2011 - December 2012.

To archive these tweets, we used a combination of free and open source tools. Because the use of Twitter evolved organically with Detroit Future, we did not begin archiving tweets until September 29, 2011, and we adjusted our data collection methods over the course of the program, so there is some variability in the type and quality of data collected over time. Initially, we employed a system using the web-based service If This Then That (http://ifttt.com), which integrates applications and services together by setting up automatic triggers. IFTTT triggers created a post on a Wordpress blog whenever someone used the #detroitfuture hashtag on Twitter. All posts on a Wordpress blog are stored in an exportable database. This setup collected all tweets marked with the hashtag, and also allowed us to search and filter the database to look for patterns.

Starting in April 2012, Twitter made changes to their application programming interface (API), which discontinued the IFTTT/Wordpress integration. As a result, we had to change our collection method to a Javascript based solution using an open source library -- the Immortal Twitter library (https://github.com/horixon/immortal-ntwitter) and NodeJS (http://nodejs.org) to listen on the Twitter API for the #detroitfuture hashtag and store that data in a database powered by CouchDB (http://couchdb.apache.org/). The javascript tools provided cleaner and richer data collection, enabling additional analysis.

Collecting the data via the API also allowed us to include data fields about the users, as well as metadata about each tweet.

Neither archiving method guaranteed that the dataset would be complete, as the Twitter API does not provide a comprehensive dataset. In at least one instance, we identified a #detroitfuture user, @pipercarter, who was prominent in the data only because of mentions in others' tweets. None of the user's original content is in the archive, which results in a major undercount of what would probably be one of the leading users. There may be other instances like this at all levels of use.

In addition to the limitations of the API, the Twitter data collection tools used in this study only collected tweets that used the #detroitfuture hashtag, and therefore missed tweets that were related to the Detroit Future programs but did not use the exact #detroitfuture hashtag. This is a limitation of social media based research, as there is no way to enforce strict use of the hashtag, nor is there a perfect algorithm for gathering all potential variations that users might create related to the hashtag. For more comprehensive Twitter collection related to the BTOP programs, data collection tools should also search for variations of the #detroitfuture hashtag (i.e., #detfuture, #futureofdetroit), and other related hashtag combinations (i.e., #vision, #detroit, #digital, etc). The collection methods also did not capture tweets with the #detroitfuture hashtag from accounts that were private.

Another limitation of using Twitter as a program documentation tool was that participants had to have sufficient skill, equipment, and interest to create an account to share their opinions about the program, so some program participants may have opted out. However, a short, free form entry may be perceived as less burdensome than a structured survey, and users have a level of agency regarding how they use the tool in perpetuity. If they were motivated to use Twitter to discuss the program or the larger issues of Detroit's future, program participants could do so with whatever feature phone, smartphone, laptop or computer they had, or make use of the computers in the DDJC's public computer centers.

Although we cannot say from this analysis how

representative the responses are of overall program participation and impact, the volume of #detroitfuture tweets from users connected to the program with both strong and weak ties is promising. In that sense, this data collection is like other types of research in which participation in data collection is optional and voluntary; however, since adoption of online tools like Twitter was a program outcome itself, the dataset de facto excludes people who gained no skills or had no interest in participating in the digital network.

The data was exported from the collection database and then analyzed using Social Network Analysis and data analysis software to look at Twitter usage over time as well as users' #detroitfuture tweet behaviors. In order to perform preliminary analysis of the Twitter data, we used pivot tables to understand the patterns and frequency of the data, drawing out descriptive statistics that identify a core group of users and provide a sense of the volume of people who participated in the conversation by virtue of their connection to the core group of trainees and organizers.

Mentioning another Twitter user is a common practice to attribute a quote, acknowledge someone's presence at an event, address another person directly ("direct message"), or echo what a user has tweeted ("retweet"). Users are able to mention as many other users as can fit in the 140 character tweet along with the content of the tweet. Direct Messages are private and are not available in the dataset. For the purpose of this analysis, all of the other types of mentions are counted equally.

We used the free and open-source tool Gephi (http://gephi.org) to analyze the network of the #detroitfuture dataset. Gephi is an "interactive visualization and exploration platform for all kinds of networks and complex systems, dynamic and hierarchical graphs," which includes tools for Social Network Analysis (SNA). Utilizing the Fruchterman-Reingold algorithm for Social Network Analysis, we were able to assess the weight and value of the connections between users. In the network visualizations included in this report, the participants are "nodes" arranged based on their centrality within the network, as well as their connections with other users in the network as determined by the algorithm. When the dataset is loaded into Gephi, each Twitter

username becomes a node with a force value based on the frequency with which they appear in the dataset. The more one mentions another user or is mentioned by another user, the more gravity that node exerts on the other nodes in shaping the graph. Gephi uses the sum of these force vectors to determine which direction a node should be positioned relative to the other nodes in the network, eventually finding an equilibrium in the form of the network layout presented here. In this case, prominence in the network is determined visually by the person viewing the data based on the size, centrality or other distinguishing trait of the node.

Each "mention" in a tweet becomes an "edge" in the network, creating a link between one participant and another. Using the SNA methods in Gephi, we were able to analyze the connection patterns of the #detroitfuture community, e.g. the degrees of connection among program participants and their respective networks ("connection score"), identifying who were the central participants and micro communities within the network ("connected components"), and understanding how information flows within the network. We used the "Connected Components" SNA test to determine communities within the network.

To promote additional interactive analysis by participants and researchers, we used a javascript library — Data Driven Documents (D3. js) — to create an exploratory tool. D3.js allows exploration of the social network of tweets dynamically over time.

Overall, while program analysis via social media artifacts created limitations as discussed here, the type and volume of data is promising when compared to other types of information generated for program documentation and network analysis. (As an example for comparison, OTI and program partners used a short survey that popped up on computer workstations to gather data from participants in a BTOP program in Philadelphia. That method resulted in more structured data that we could tie more easily to specific program activities and objectives, but we only received 3148 responses over 12 months, even though the Philadelphia program was approximately ten times as large as the Detroit program in terms of federal funding.)

Findings

Summary

The following statistical and social network analyses of Twitter data show some key points about how the DDJC and its constituents utilized social media and the #detroitfuture hashtag to augment the model of networked digital adoption, as described above. Our data describe a dense but sizeable and fairly well interconnected core in the Detroit Future programs, with connections out to many people beyond that network. These results are consistent with what one would expect from a program designed on the network model to foster relationships among participants and train a corps of organizers and educators to reach disparate communities. Although some questions cannot be answered given limitations in the data and the methodology, there are several key findings that clearly point to the robust adoption of social media within the Detroit Future programs and the expansion of program impacts to a wider digital network by virtue of this adoption:

Adoption of the hashtag followed a "long tail" curve. There is high frequency of use of the hashtag by a small group of users, a middle group of periodic users, and a great majority of less frequent users.

The #detroitfuture hashtag had a core group of 55 users, as characterized by a high volume of tweets (21 or more) and high frequency of tweets (on a monthly basis or more frequently).

Within this core group is a single superuser ("dcommunicates") who was the communications coordinator for the program, and two intensive users ("allied_media" and "emeac") who represented the official accounts of the two main coordinating organizations. Together these three users' output represented 38% of all "#detroitfuture" tweets during the study period.

Beyond this core group were many additional tiers of participation, extending to a group of approximately two-thirds of all users (63%) who used the #detroitfuture hashtag once.

Participants could rise to a prominent position in the discussion from different points of entry.

In addition to the main organizations and full-time staff, some partner organizations, program trainees, and part-time staff were in the core group of #detroitfuture users.

There are some participants who are not among the top 10 users in terms of volume of their own tweets, but are prominent in the network for their connections and conversations with others.

Approximately half of those who used the hashtag more than once did so less than once a day but at least once a month. In other words, for those who saw #detroitfuture as an ongoing conversation, it was something they participated in a few times a month or maybe a few times a week. Even if some people tweeted about it every day, most were fine contributing at their own pace.

The more frequent users of #detroitfuture were connected to each other and linked to extended constituencies or micro-communities, connecting a larger group of participants through the hashtag.

The core users of the hashtag also tended to be consistent and regular with their use, sustaining the conversation about #detroitfuture and keeping their personal networks informed.

Over time, events related to various aspects of Detroit's future drove spikes in the use of the #detroitfuture hashtag, in addition to the program activities themselves and discussions of digital justice for Detroit.

The #detroitfuture discussion continued to attract new users beyond the end of the grant period.

Patterns of Overall Use of #detroitfuture

During the entire study period (October 2011 - July 2013), we archived a total of 10,883 tweets from 1059 users. The total number of users (1059) is approximately six and a half times the number of people who received direct, intensive training in the Detroit Future program (155). Even just the number of people who used the hashtag at least three times (248) exceeded the core group of training participants by half (Table 2). This finding reinforces our understanding that the networked model of participation in the Detroit Future programs led to widely dispersed outcomes, with many users beyond the core group of trainees receiving benefits and contributing back to the program.

Examining the number of #detroitfuture tweets by each user shows a "long tail" model of adoption of the hashtag (Figure 1). There is high volume of use of the hashtag by a small group of users, a middle group of periodic users, and a great majority of minimal users. Just over three-quarters (811 people, or 76.6%) of all users only used the hashtag once or twice, whereas a much smaller group (55 people, or 5.2%) tweeted more than 20 times each.

Figure 1: Distribution of #detroitfuture Tweets by Unique Participants
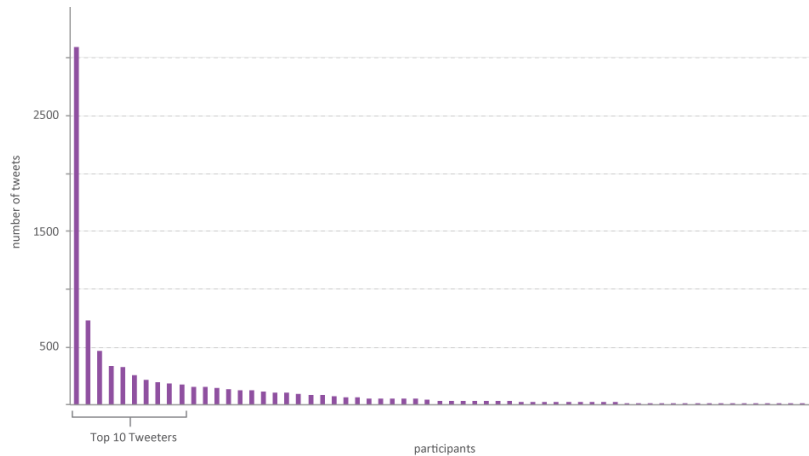

Table 2: #detroitfuture Users Groups by Number of Tweets

Number of Tweets	Number of Users	Percentage of All Users
1	667	63.0%
2	144	13.6%
3-8	145	13.7%
9-20	48	4.5%
21 or more	55	5.2%

Table 3: Top Ten Users of #detroitfuture by Number of Tweets

| Twitter Handle	Account Description	Number of Tweets
@dcommunicates	Communications coordinator for the Detroit Future programs	3092
@emeac	DDJC member organization and implementer of the Detroit Future Programs	723
@bikejobdet	Detroit Future Media graduate and Detroit Future Schools teaching artist	468
@allied_media	DDJC member organization and implementer of the Detroit Future Programs	330
@divinespeech	EMEAC employee and member of the Detroit Future leadership team	322
@sublimelightdet	EMEAC employee	255
@husseinmullen	Detroit Future Media graduate and Detroit Future Schools teaching artist	211
@jeffdebruyn	Detroit Future Media graduate	190
@D_FY	Detroit Future Youth	184
@insidesouthwest	Detroit Future Youth member organization	177

Table 3 (above) identifies the Twitter handles of the ten users who tweeted #detroitfuture the most. The most frequent user of #detroitfuture in the study period was the communications coordinator for the program, @dcommunicates, who frequently made announcements on Twitter, retweeted other messages, and engaged new users in direct exchange on Twitter. The number of tweets from @dcommunicates was 3092, or 28.4% of the total volume. The next nine most frequent users accounted for 2860 tweets, or 26.3%.

When we look at the composition of the top ten #detroitfuture users, we see that the group includes representatives or organizers of the Detroit Future program (@dcommunicates, @emeac, @allied_media, @divinespeech, @D_FY). Yet other core users were trainees (@bikejobdet, @husseinmullen or @jeffdebruyn), another employee (@sublimelightdet), or a partner organization (@insidesouthwest), not official coordinators or representatives of the program, and were unpaid or only partially paid through the federal BTOP funding. This record confirms that participants could rise to a prominent position in the discussion from different points of entry.

Figure 2 (right) is a network graph that shows the relative positions of the ten most active users of the #detroitfuture hashtag. @dcommunicates and @emeac are almost on top of each other, with @divinespeech, @sublimelightdet and @insidesouthwest nearby. @D_FY is a distinct hub for a handful of prominent users. On the other side of the @dcommunicates center of gravity is @allied_media. @bikejobdet, @husseinmullen and @jeffdebruyn, all part of DFM and the first two also part of DFS, are lined up going away from the center of the graph. The extent to which this pattern reflects the existing social dynamics is a question for further research.

Figure 2: #detroitfuture Network with Top Ten Users Highlighted
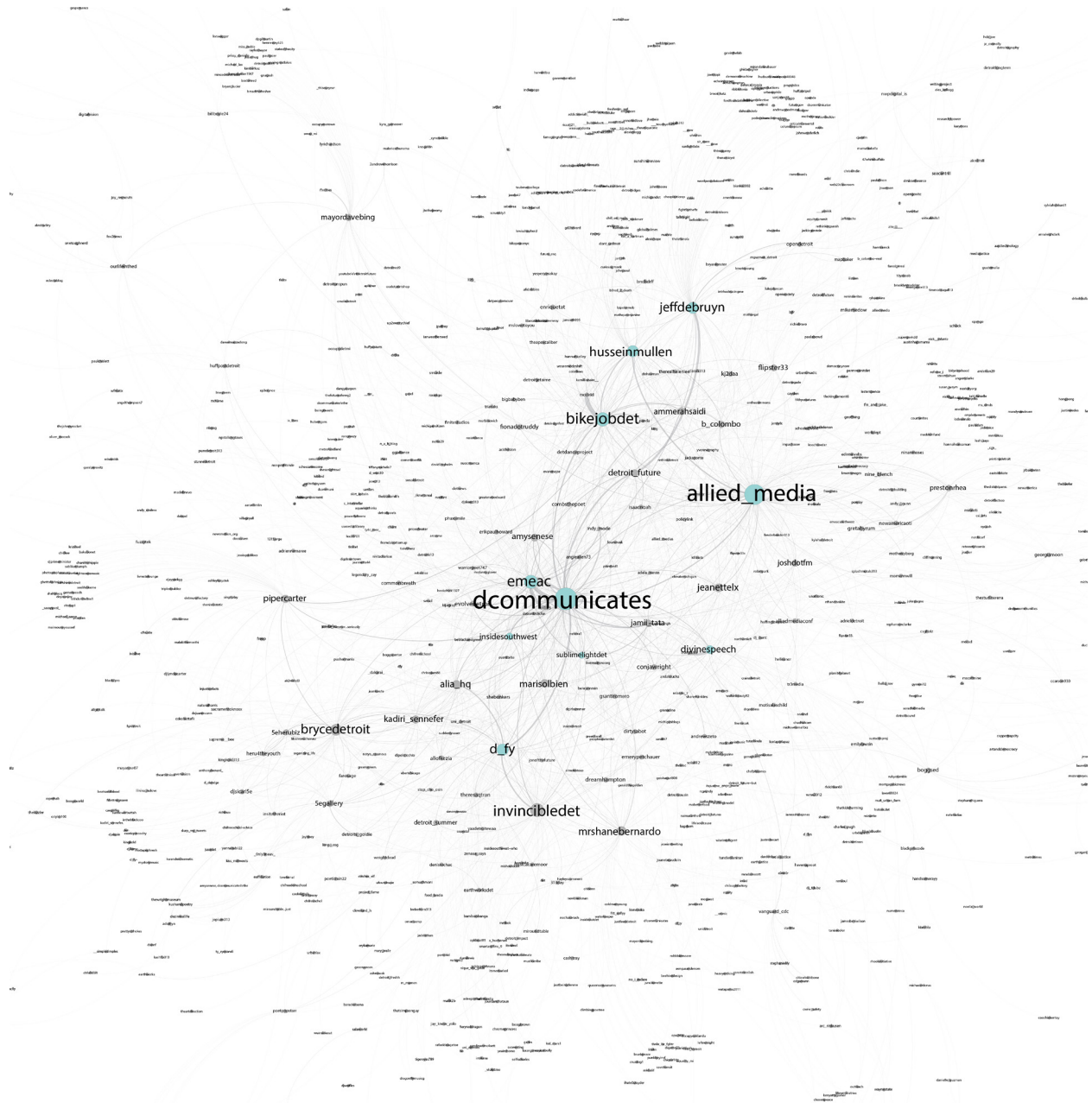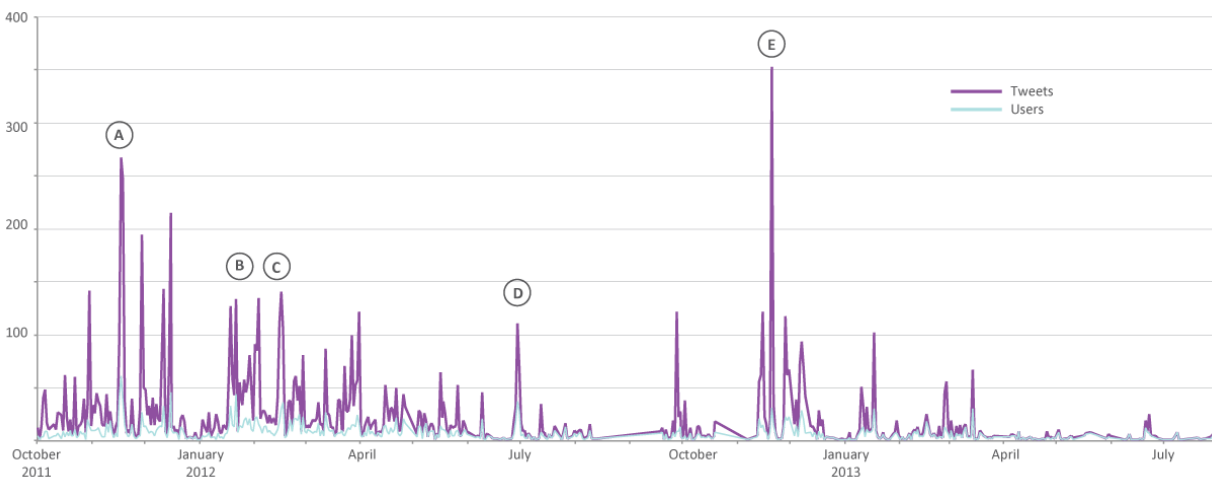
Use of #detroitfuture Over Time

When we examine when users of the #detroitfuture hashtag first appear in our dataset, we see that most first used the #detroitfuture hashtag in November or December 2011. However, even after the grant period officially ended in December 2012 there were still a significant number of users tweeting with the #detroitfuture hashtag for the first time. This shows the self-sustaining adoption of the hashtag beyond the core group of trainees.

The timeline in Figure 3 shows the daily number of tweets (in purple) and the unique Twitter users per day (in blue). In addition, this graph shows peaks in activity with the hashtag around specific events; for example, training for the DFM program and a tweet by Mayor Dave Bing in which he solicited use of the #detroitfuture hashtag (not in coordination with the Detroit Future program) coincided in November 2011 (Letter A). Training participants and organizers commented on and discussed the Mayor's vision, exchanging messages with many new users of #detroitfuture. In the graph above, major usage also spiked around orientation for DFM (Letter B) and the Allied Media Conference (Letter D), both organized by Allied Media Projects, and around community hearings in southwest Detroit (Letter C) where @insidesouthwest is active, and the sale of municipal land to Hantz Farms (E), which was a major issue for @emeac. This shows that #detroitfuture spread out from the topic of digital justice to a broader array of community issues.

Figure 3: Total #detroitfuture tweets (in purple) and unique users (in blue) by day, October 2011 - July 2013

Frequency of Use of #detroitfuture

There were 101 users (9.5% of the total group) who were active with the hashtag, but only for one day – most likely having participated in a training, event, or brief exchange, but not persistently active members of the #detroitfuture community. Among those who used the hashtag over more than one day, the data show that some users tweeted multiple times a day whereas some tweeted much less frequently. Among the group of more intermittent users – 291 accounts (27.5% of the total group) that used the hashtag over two or more days – the average length of time between tweets was about one month, or 30 days.

Of those who tweeted over more than one day, there is a concentration of users participating at a moderate pace of around one tweet every 1-3 weeks. 101 people, or a third (33.2%) of this subset tweeted every 1-3 weeks. This approximates the pace of DFM and DFS, which met multiple times a week, and DFY, which convened monthly. Overall, of the #detroitfuture participants who tweeted more than once, half (50.5%) participated somewhere between once a day and once a month on average. For many if not most participants, the Twitter forum for the discussion of #detroitfuture was something they participated in a few times a month or maybe a few times a week, even if some other participants tweeted about it everyday.

Table 4: Average Frequency of Use of #detroitfuture

Average frequency of #detroitfuture use	Number of Users	Percentage of All Multi-day Users
More than once a day	32	11%
Daily	9	3.1%
every day to a week	49	16.8%
every week - 2 weeks	52	17.9%
every 2 - 3 weeks	29	10%
every 3 - 4 weeks	27	9.3%
every 4 - 5 weeks	14	4.8%
every 5 - 6 weeks	14	5.2%
every 6 - 7 weeks	13	4.1%
every 7 - 8 weeks	5	1.7%
More than 8 weeks	47	16.2%

When analyzed by number of tweets per user, we can see that the Twitter users who used the #detroitfuture hashtag 21 or more times (55 Twitter accounts, 5.2% of the total sample) tended to tweet at least every 2 weeks. This shows us that the core users of the hashtag also tended to be consistent and regular with their use, sustaining the conversation about #detroitfuture keeping their personal networks informed.

Our data describe a dense but sizeable and fairly well interconnected core in the Detroit Future programs, with connections out to many people beyond that network. These results are consistent with what one would expect from a program designed on the network model to foster relationships among participants and train a corps of organizers and educators to reach disparate communities.

Figure 4: Number of Users by Frequency of Use and Volume of Tweets
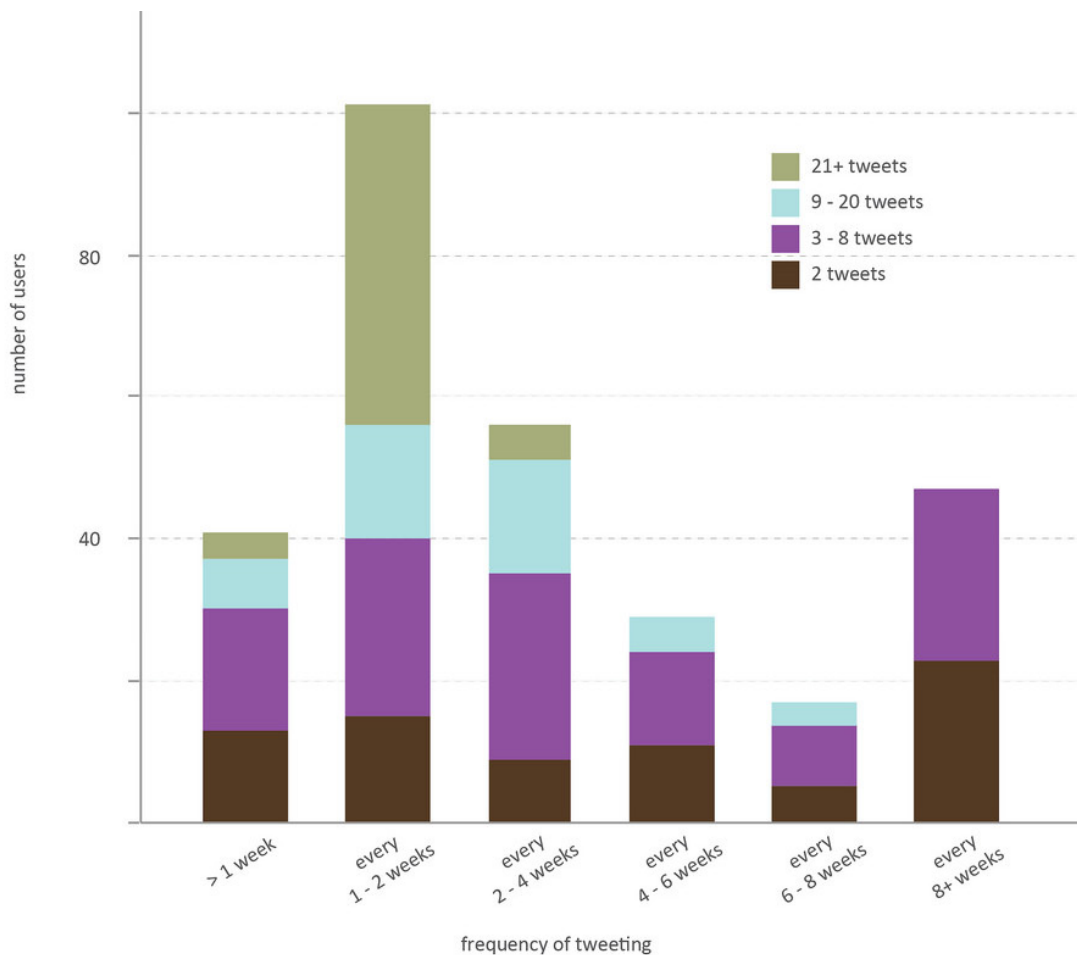
Connections Among Users

Of the 10,883 tweets, 5,833 or 53.5% mention at least one other user. We did not examine the percentage of users that mentioned or were mentioned by another user. The top ten users based on connections to other users – mention of or being mentioned by other users – are shown in Table 5 as a "connection score." The list is similar, but not identical to the list of most frequent users of the hashtag. Note that the score does not differentiate between incoming and outgoing, so if someone retweeted someone else or was retweeted by someone else, it counts the same.

 The major difference in the list of the ten most connected users (Table 5) compared to the list of top ten users overall (Table 3) is the disparity between the first and second entries on the list is much smaller here. @dcommunicates

recorded only a fraction more mentions than @allied_media, while tweeting more than four times as often as the next most frequent tweeter, @emeac. This suggests that a large portion of @dcommunicates tweets may have been announcements, sharing links to Detroit Future events or content, or live-tweeting events. The number of @allied_media mentions is fairly close to its total count; likewise, @D_FY. This may have been because these users might have focused on retweeting messages from their networks, or that their followers regularly retweeted their messages.

We have included the date of the top users' first tweets in Table 5 as an initial look at participants' ability to rise in prominence over time. Though @jeffdebruyn and @ mrshanebernardo made the list started

Table 5: The Ten Most Connected Users from the #detroitfuture Network

Twitter Handle	Account Description	Number of Tweets	Date of First Tweet
@dcommunicates	Communications coordinator for the Detroit Future programs	258	10/1/11
@allied_media	DDJC member organization and implementer of the Detroit Future Programs	231	10/20/11
@bikejobdet	Detroit Future Media graduate and Detroit Future Schools teaching artist	143	10/4/11
@invincibledet	DFY program coordinator	140	10/10/11
@emeac	DDJC member organization and implementer of the Detroit Future Programs	140	10/22/11
@D_FY	Detroit Future Youth	116	10/27/11
@husseinmullen	Detroit Future Media graduate and Detroit Future Schools teaching artist	113	10/1/11
@brycedetroit	Coordinator of Detroit Future Youth member organization (5E/Heru) and Detroit Future Media graduate	112	10/4/11
@jeffdebruyn	Detroit Future Media graduate	112	11/18/11
@mrshanebernardo	Coordinator of Detroit Future Youth member organization (DAY Project) and Detroit Future Media graduate	85	1/21/12

Figure 5: #detroitfuture Network with Ten Most Connected Users Highlighted
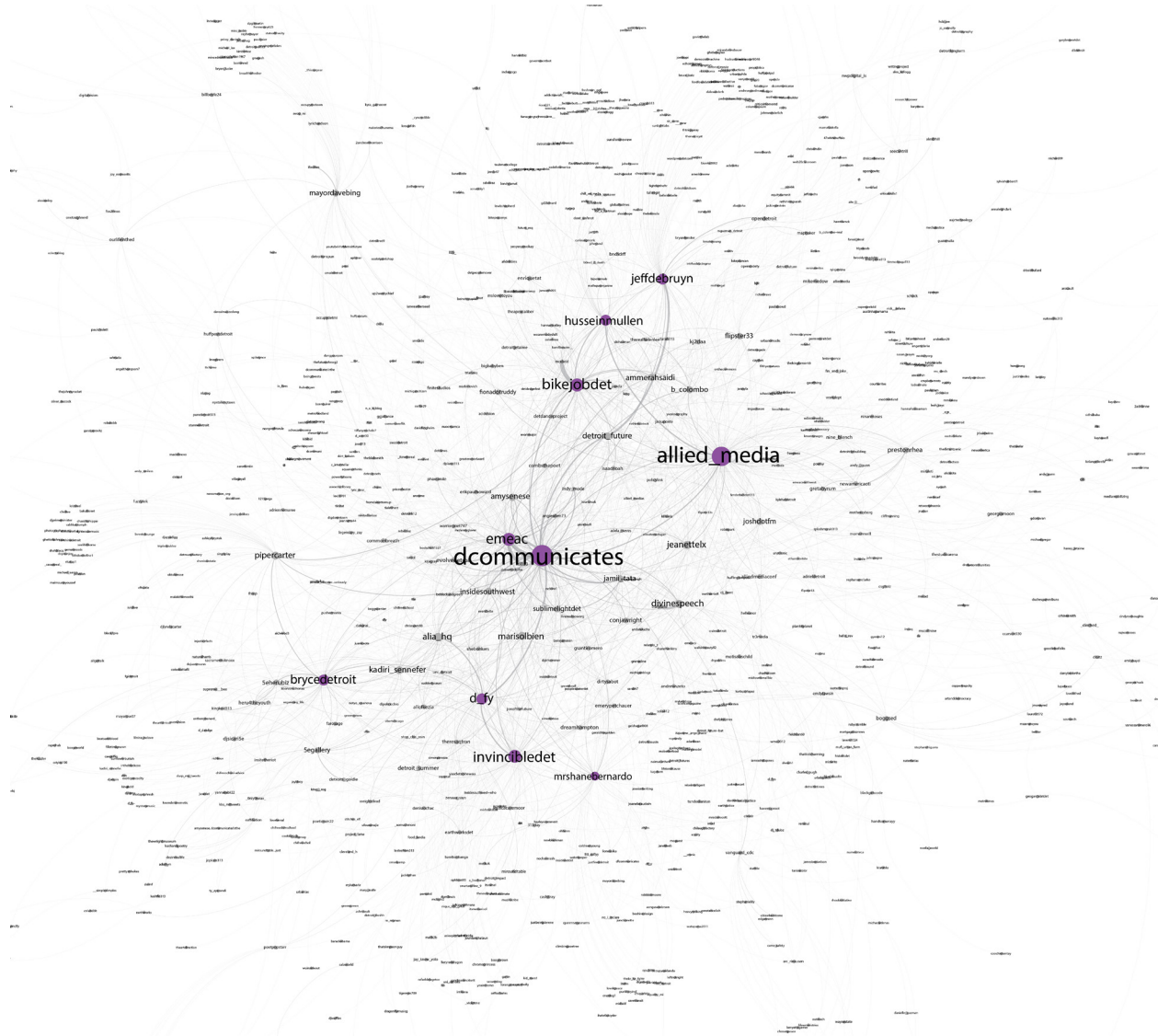
about 1.5 and 3.5 months after the start of the study period, this data is inconclusive. We prepared an interactive timeline (http://files.opentechinstitute.org/~georgia/detroit/dfnetwork.html) of all #detroitfuture tweets that offers a richer way of looking at the question. You can select date ranges in which to examine the network and see the roles of particular users change over time. Future research could associate configurations of the network over particular periods with specific events or pivotal shifts in the program or city.

Figure 5 (left) shows who each user connected with. The top ten most connected users are marked in purple. The arrangement of the names and dots are also based on the connections: the more a user has mentioned or been mentioned by another, the closer they are on the graph, so this shows relationships in addition to numbers. Less connected users tend to the edges, which points to how some users are maintaining the core while others are bringing in new people to the network.

Figure 6: #detroitfuture Network with Positions of the Ten Most Connected Users and Ten Most Frequent Users Highlighted, Side-by-side Comparison

Participants who tweet frequently also tend to mention and retweet other users from the network frequently. From these results, we see there are some participants who are strongly connected within the network, but do not appear in the top ten users list above (Table 3). As described above in the case of @jeffdebruyn, these users may tweet less frequently, but in conversation with others, making them prominent links in the #detroitfuture community. Sometimes users like this are primary links to a distinct "microcommunity" within #detroitfuture that carries on conversations, such as a training cohort.

@Bikejobdet appears in both lists, suggesting he connects with both a broad spectrum of other #detroitfuture users and a particular microcommunity or microcommunities in the network. As described above, this user was not a coordinator or official paid representative of the program, but was a trainee and part time employee. In contrast, @allied_media and @dcommunicates are closely linked to each other and central to the overall network, which makes sense given that both of these accounts were used by the program coordinators throughout the grant period.

Figure 7: #detroitfuture Network with Prominent Connectors Circled
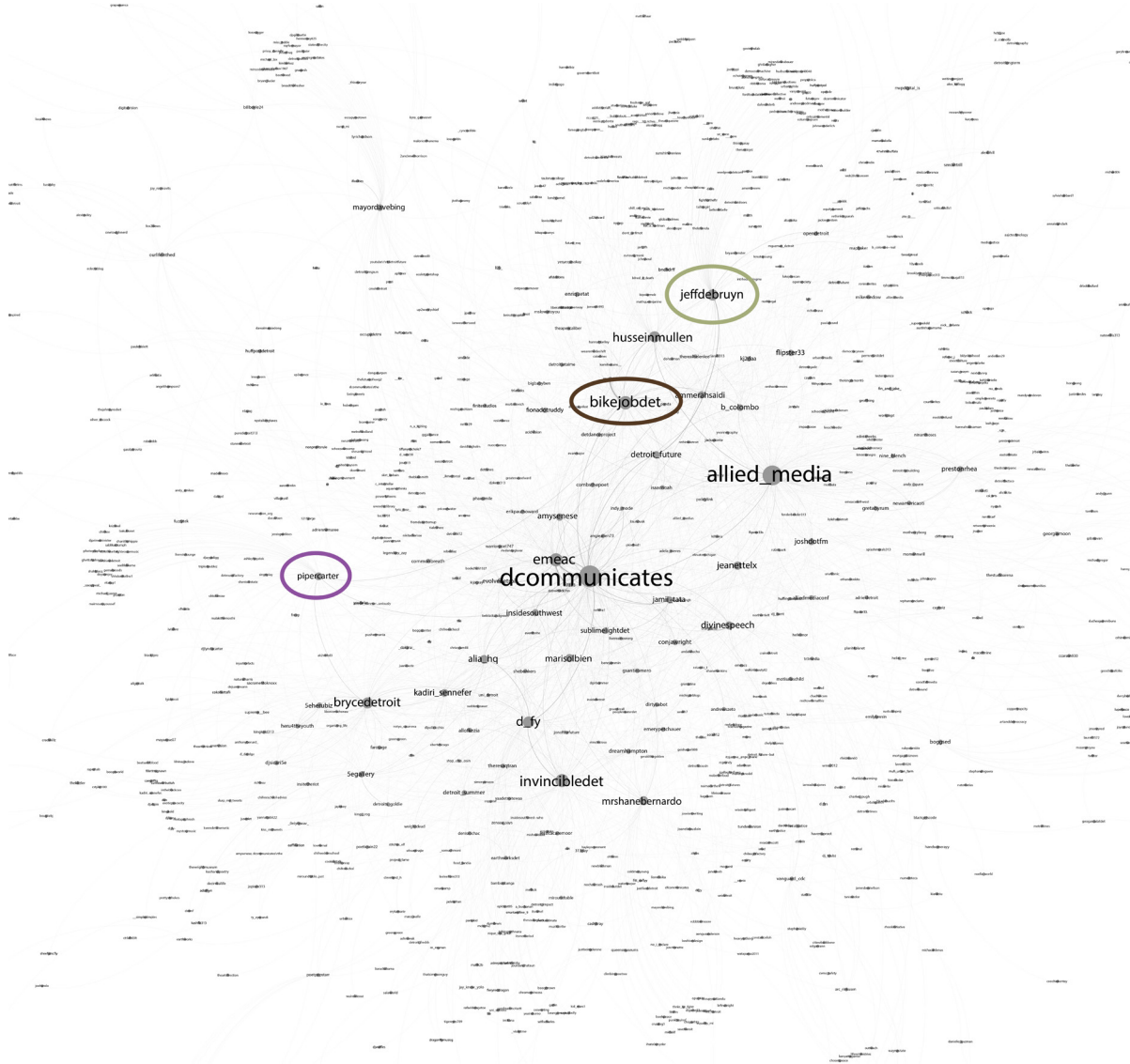
In Figure 6, we can see clearly the hub of core users, anchored by @dcommunicates and @allied_media, as well as their connections to other groups or networks. Additionally, the role that users such as @jeffdbruyn (green highlight) and @pipercarter (purple highlight) play in the network become clearer, as we can see that they are points of connection to communities that are otherwise not connected to the core users. (In the case of @pipercarter, this visualization is due to inconsistencies in the functioning of the API, as mentioned in the methods section.) @jeffdebruyn did not tweet as much as the most frequent users, but @jeffdebruyn received frequent mention (retweets or direct responses) by users who were not directly connected to the central hub of the Detroit Future network. This is a clear demonstration of how the use of Twitter allowed for the program to reach beyond the direct trainees participating in the grant.

Discussion and Conclusions

5

The Detroit Digital Justice Coalition was successful in using Twitter to document the scale and nature of the Detroit Future network, and to engage a broad community in a discussion of both the training programs and the future of Detroit. The #detroitfuture Twitter network appears to be of commensurate size and reach to the program itself, though we cannot say at this point precisely how representative it is of the complete on- and offline Detroit Future network. Participation in this forum also appears to be independent of the federal funding, with top-tier participation by some unpaid or partially-paid participants, and with use of the hashtag continuing past the end of the grant period.

More broadly, our preliminary analysis of the #detroitfuture hashtag suggests the "network model" of the Detroit Future programs led to widely dispersed outcomes, with many users beyond the core group of trainees receiving benefits and contributing back to the program. The originating people and institutions remained in a central position while new people emerged to play similarly prominent roles. They not only participated actively; they provided an important community-building function by connecting additional communities into the network with the skills and relationships they developed through the training programs.

Patterns in the Twitter data suggest a dynamic and layered network of a core group with highly engaged participants who talk with each other and, in turn, engage disparate groups. This is similar to the design of the Detroit Future programs, which focus on teachers, artists and organizers as key connectors in the community. The data suggest that they found those connectors and got them engaged, and that they then reached out to broader networks of their own.

Based on this evidence, we can conclude that the DDJC effectively achieved a form of network-based broadband adoption and successfully documented that achievement through the use of Twitter. The key feature of this model is that relationships are both a documentation input and an outcome, by design, since use of the social media platform

itself constituted a proof of digital adoption. Social media also allowed for the engagement of a broad group of participants based on their existing relationships, including those who were followers of the participants on Twitter.

This network model of adoption contrasts with traditional individual-based training programs where the focus is solely on individuals' skill adoption, and in which the primary lasting relationship is meant to be the one between the participant and the training organization. The network model presumes that a large and dense social network – built through the shared experience and peer learning of the programs and enhanced by digital technologies such as broadband and Twitter – multiplies the value of participants' new skills.

This approach was attuned to the conditions in Detroit at the time, where a lot of the city's thriving institutions and visionary communities were underrepresented on the Internet and negative portrayals of the city were common. These conditions limited the city's social and economic potential. The Detroit Future program gave a targeted group of residents the skills to bring small businesses, community organizations and important stories onto the Internet; it also made the broader narrative of Detroit's future its own digital media project, open to discussion and collaboration. In this way, the Internet becomes a tool to imagine and build a future Detroit.

The Detroit Future innovation was to merge the crafting of a shared online narrative with a network of people teaching digital literacy skills. This aimed to disrupt a pattern of broadband adoption that teaches one group of people – usually poor people and people of color – basic skills, while more experienced broadband users – generally younger and with more formal education, with an overrepresentation of white men compared to the general population – dominate the forum for public discussion. While more research is needed to measure the precise efficacy in this instance, this model holds the potential to address some of the structural disparities that perpetuate the digital divide even as overall rates of broadband adoption and digital literacy rise.

6 Recommendations

Recommendations for Future Practice

The Detroit Digital Justice Coalition's goals for the #detroitfuture discussion on Twitter evolved over the course of the program, and the current, ongoing system for archiving and analyzing the tweets was not in place until after the close of the grant period. Therefore, it was difficult for an analysis of these data to have a formative impact on the conduct of the program while it was in progress, even though the tweets themselves were in constant circulation. Similar efforts in the future could modify the approach to achieve even stronger outcomes. Some potential modifications:

Instead of or in addition to a single point of contact for new users of the hashtag (such as the communications wing of the Detroit Future programs, "dcommunicates"), form a welcoming committee to decentralize the inner core of superusers.

Put in place measures to move one-time users up to the next tier of participation, perhaps by reaching out after a month to people who tweeted one time and then stopped.

At the onset of the program, draw the shape of the network you would like to achieve or establish other target metrics, then review the data on a periodic basis to assess performance and make operational adjustments.

Track secondary hashtags used in combination with the central hashtag (#detroitfuture) in order to be able to analyze branching conversations that include many of the same participants.

Recommendations for Future Research

The bounty of data in this Twitter archive certainly merits further analysis. There remain some important points for a comprehensive meta-analysis, but the content of the tweets themselves are probably the richest source of insight into the programs, the participants and the city in this period. There is also an opportunity to correlate the analysis from this dataset with others, including the program record as captured through other means and potentially from new sources. Specific investigations should include

Determine the number of connections among different tiers of #detroitfuture users.

Identify the edge networks impacted by the core Detroit Future hub.

Distinguish sections of the network related to different components of the program.

Determine the extent to which the clusters of connections in the Twitter data reflect the existing social dynamics in Detroit or within the program.

Analyze the content of the tweets to assess perceptions of Detroit and of the Detroit Future programs.

Analyze the content of the tweets to identify key points of discussion or catalyzing events.

Associate configurations of the network over particular periods with specific events or pivotal shifts in the program or city.

Examine official program reports to more clearly identify the interplay between program activities, including training in the use of Twitter, and the use of the #detroitfuture hashtag.

Match the Twitter handles to actual identities (when possible) to compare the online network with the on the ground network of organizations and individuals of the DDJC network.

Interview the organizers and trainers to gather their insights from implementing Twitter as a program documentation and network adoption tool.

Develop a method for users with private accounts or who were excluded from the archive by peculairities in the Twitter API to or bolster the #detroitfuture archive with exports of their personal accounts.

Identify the furthest a message reached beyond the bounds of the program, how it did do so and how often it did so.

These intriguing investigations notwithstanding, in the spirit of the Detroit Future programs, we would expect the most valuable insights into this trove of tweets to come from the participants themselves. We hope this preliminary analysis provides sufficient context and motivation for this group, as well as for other researchers, to dive into the #detroitfuture record. And we hope this report can strengthen future practice, especially in the use of a networked model of service delivery for effective and transformative outcomes.

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