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Tweeting Transit: An examination of social media strategies for transport information management during a large event

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ABSTRACT

Social media platforms are seeing increasing adoption by public transport agencies, as they provide a cost-effective, reliable, and timely mechanism for sharing information with passengers and other travellers. In this paper, we use a case study of the @GamesTravel2014 Twitter account to evaluate how this social media platform was used over the course of the 2014 Commonwealth Games in Glasgow, Scotland to provide and share transport-related information and respond to information requests. The case study provides an exemplar for the public co-ordination of information from multiple partners in a complex environment during a time of transport disruption. We evaluate both the structure and intent of the @GamesTravel2014 social media strategy via interviews with involved parties and an analysis of Tweets related to the account. Findings indicate the potential for future applications of social media by transport operators and authorities in producing a more effective network of communication with passengers.

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1. Introduction

The nature and form of communication between public transport service providers and their customers has changed dramatically with the advent of GPS, smartphones, and digital social networking. Far from the days of reliance upon static timetable information posted at stops and paper-based maps, providers have widely embraced real-time updates, internet-based journey planners, and a variety of other digital methods to communicate relevant and timely information to their customers (Tang and Thakuriah, 2012). In perhaps no area is this transition more evident than in the increasing use of the microblogging site Twitter for purposes of communication with customers. The Twitter brand has become widespread in the public transport field (Camacho et al., 2013), as it provides a cost-effective and reliable method of sharing information that may be time-sensitive or impact upon large sections of the transport network.

Twitter's status as a public forum, however, has created a need for public transport operators to re-evaluate and modify their operating procedures regarding communication. For example, customer complaints that previously would have been

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addressed privately in a one-to-one manner between the customer and operator are now posted publicly on Twitter, heightening the need for the operator to carefully monitor and evaluate the tone and content of customer interactions. Equally critical is the need to ensure the accuracy and reliability of posted information, as the mechanics of Twitter increase the likelihood that Tweets will be shared and spread far beyond the original forum (Ye and Wu, 2010). Further, previous work has been conducted by passenger advocates to understand how Twitter can be used as a communication channel during disruption (Passenger Focus and Abellio, 2012).

In this paper, we examine the use of Twitter in the context of a large event, specifically considering how Twitter was used to manage relevant information and broadcast a co-ordinated message regarding transport and travel disruption. The 2014 Commonwealth Games (hosted by Glasgow, Scotland) are used as a case study to:

- Assess how a social media strategy was developed for purposes of transport information sharing during a large, disruptive event.
- Examine how background administrative processes (particularly regarding information co-ordination between multiple service and information providers) contributed to the dissemination of a consistent, reliable message.
- Evaluate the content of disseminated messages, and the public response to these on the Twitter platform.

Through these activities, we hope to contribute to a better understanding of the role a platform such as Twitter may play in facilitating public access to reliable, co-ordinated messages regarding the state of the transport network, particularly during times of disruption. The research was carried out using a combination of interviews with involved parties and analysis of Tweets in order to evaluate best practices for using Twitter from a travel authority or operator perspective as a mechanism for providing relevant, timely, accurate and co-ordinated public transport information in the context of a large transport-disruptive event.

2. Background

In 2014, the Pew Research Center found that 71% of American Internet users aged 18+ were using Facebook (Duggan et al., 2014). While this number had remained largely unchanged from 2013, other social media sites (including Pinterest, Instagram, and Twitter) were seeing continued rise, with 52% of online adults reporting use of two or more social media sites (Duggan et al., 2014). Though reporting specifically on US-based internet users, the trends indicated here are more broadly reflective of internet users worldwide, with social media seeing generally increasing use by consumers and companies alike. Kietzmann et al. (2011) have reported that this use can be viewed as consisting of seven functional 'building blocks', including: identity, conversations, sharing, presence, relationships, reputation, and groups, with different social media sites focusing on various permutations of these activities. How different sites are used by different agents will depend on the intent of their use, and how well these intents are fulfilled will be largely dependent upon the strategies engaged by users.

Since its launch in July 2006, Twitter, a microblogging site that allows users to upload short (140 characters or less) updates on any topic and share them with a network of friends and followers (Twitter.com, 2015), has amassed a user network of 302 million monthly active users sending nearly 500 million Tweets per day (Twitter.com, 2015). A 2009 study conducted by Pear Analytics, a search engine marketing firm located in Texas (USA), suggests that Twitter is used for numerous purposes, including conversations (37%), news (4%), self-promotion (6%), pass along value (9%), spam (4%) and pointless babble (40%) (Kelly, 2009). Notwithstanding the case for "pointless babble", Twitter has grown to become a widely used platform for communication between friends, colleagues, retailers, service providers, customers, and others. As a primarily public, directed network in which users may follow one another without reciprocation, Twitter has proven a rich source of data for social network analysts, amongst others. For example, Twitter network and content data have been used to explore such issues as trust (Mendoza et al., 2010; Suh et al., 2010); reliability (Acar and Muraki, 2011; Kim et al., 2015); and information dissemination (Lovejoy et al., 2012). Analysis of usage of social media by British public transport operators appears to indicate a preference for Twitter rather than Facebook as the latter is often considered too personal and social (Passenger Focus and Abellio, 2012).

The relative ease of access to Twitter data and the variety of tools available for analysis provide the potential to look, not only at the Tweets themselves, but also at how individuals and organisations structure Tweet content, the purposes for which Tweets are used, the spread of information through networks, indications of perceived trust and reliability in Tweeters, and sentiments expressed at various locations (Yeboah et al., 2015; Collins et al., 2013). Though acknowledging that Twitter demonstrates a non-representative sample of the general population (Sloan et al., 2015), it does provide a useful vantage point from which to observe interactions between participating parties – a feature we will use in more detail over the course of the paper.

Differing strategies are clearly seen in the rapid uptake of social media by transport agencies. In a 2012 report from the Transit Cooperative Research Program (TCRP), five overarching categories of social media use for public transportation were identified, including:

- Timely updates—Agencies may use social media to enable them to share real-time service information and advisories with riders.

- Public information—Use of social media to provide the public with information about services, project planning, and fares.
- Citizen engagement—Leveraging the interactive ability of social media to connect with passengers.
- Employee recognition—Use of social media to recognise current workers and recruit new employees.
- Entertainment—Agencies may use social media to entertain their passengers through informal means, such as songs, videos, and contests (Bregman, 2012).

Building on these categories, additional studies have been conducted to assess the potential uses of Twitter and other social media platforms for purposes such as transport planning (Evans-Cowley and Griffin, 2012), collection of data related to transport incidents (Mai and Hranac, 2013), and enhancing the user experience on public transport (Foth et al., 2013).

While such studies have generally demonstrated the potential strengths of social media as a means for communication between public transport operators and their customers, a number of concerns have also been raised, including: resource requirements, managing employee access, responding to online criticism, accessibility, security, archiving and records retention, user privacy, and the changing social media landscape (Bregman, 2012). These concerns reflect the tacit acknowledgement that social media is still an evolving mechanism, with uncertainties regarding its effective use in the public domain. The management of these concerns is a key consideration in the public transport arena, as agencies work to balance the on-going needs of service provision with increased expectations from consumers regarding the timely, accurate and personalised provision of information (Papangelis et al., 2016). The difficulty that emerges, however, is that the learning process of agencies is evolving as discussions are taking place in the public realm. As evidenced by recent events (such as an exchange between the San Francisco Bay Area Rapid Transit (BART) and its followers on Twitter (Williams, 2016)), how social media platforms are used is fluid, with differing approaches to tone, proactive or reactive information being shared, and degree of interaction with the broader network. These issues may also reflect a diversity of personnel behind the scenes, as social media feeds are often managed by a network of people with differing personas and approaches; as evidenced by a study of social media use amongst a number of British bus operators (Gault et al., 2014). In the case presented here, we will focus on how these issues are addressed using the Twitter platform.

3. Study context: 2014 Commonwealth Games, Glasgow

An estimated 600,000 individual visitors, more than the total number of Glasgow residents (around 595,000), attended the 2014 Glasgow Games and Festival events (Glasgow City Council and Games Partners, 2014). Given the increased load on the transport network, considerations regarding transport played heavily into both preparations for and actions during the Games. Changes to the travel network implemented for the duration of the Games included parking restrictions, implementation of Games travel lanes, and increased public transport services (North Lanarkshire Council, 2014). These changes, in combination with visitors' unfamiliarity with the city, required enhanced communication between transport operators and the travelling public. A key mechanism for this enhancement was the @GamesTravel2014 Twitter account, "The official Glasgow 2014 Twitter feed providing travel advice and information to help you plan in advance and make your journeys easier during the Games" (GamesTravel2014, 2014). The account, which was run by the official Games consortium, drew upon both official event branding and collaboration with local transport operators and information providers (the Travel Demand Management (TDM) team), including First Glasgow (the area's largest bus operator), Strathclyde Partnership for Transport (SPT, the Regional Transport Partnership which operates the Glasgow subway system, supports various bus operations and is responsible for planning and co-ordinating local and regional public transport services), Traveline Scotland (which functions as a public transport information aggregator and journey planner provider), Traffic Scotland (providing real-time trunk road traffic information) and ScotRail (the privately owned national rail operator for Scotland).

The @GamesTravel2014 Twitter account was designed, in large part, to assist with the alleviation of stress points on the transport network by providing pre-emptive warnings about planned transport disruption, informing the public of current disruptions, and otherwise providing general travel advice in the context of the Games. The internal structure of the TDM team consisted of four people with complementary skill-sets related to transport operations, customer service and online marketing. Team members were delegated various tasks, including monitoring social media, providing planned marketing messaging, co-ordinating with transport operators and managing the overall process of communication in a consistent way. This process was designed to generally demonstrate a 'best-case scenario' for co-ordination of activities around a Twitter presence during a high profile large event, given a high volume of disparate activity and real-time information to co-ordinate.

4. Methodology

The study presented here was designed to assess how organisations use Twitter for purposes of sharing transport-related information with their customers (and other interested parties) during times in which both planned and unplanned disruptions are expected to occur. Addressing this objective required obtaining information that reflected both the structure of the social media approach taken during the Games (including the overall representation of the social media team and the way in which they interacted), as well as the public manifestation of this approach – i.e. the content of the Twitter feed and the ways in which others interacted with it. In order to allow for these issues to be reviewed in the context of the overall project, we

used a mixed-methods approach to data collection, utilising both semi-structured interviews of persons involved in the GamesTravel2014 consortium and data collected from Twitter related to transport during the Games.

4.1. Part one: semi-structured interviews and qualitative analysis

Four semi-structured interviews were conducted with key persons involved in the provision of travel information during the games, including:

- A marketing manager within a local bus operator who co-ordinated the Twitter messaging for the operator before and during Games time.
- The team leader of the GamesTravel2014 account who structured and managed the process for working with the Games organisers and other transport organisations.
- The spectator and workforce transport manager for the Games who was responsible for the overall delivery of free public transport for spectators, workforce and Games partners.
- A representative from Transport for London (TfL) who had previously used Twitter to support travel demand management during the London 2012 Olympics (known as the first social media games (Burnap et al., 2012)), which greatly informed the Commonwealth Games strategy.

These interviews provided an overall picture of the strategy that was developed for using Twitter as a source of travel information in the context of the Games – in particular, how the underlying structure of the social media team involved with the @GamesTravel2014 account was reflected in the public message sent forth in communications by involved parties.

The GamesTravel2014 Twitter account was created separately from the larger Commonwealth Games account so it could be used specifically for targeting travel information related to the Games. This social media presence was established only six weeks before the Games were held, so significant effort was needed to grow the number of followers from a very low starting point in order to maximise the potential for information dissemination across the network. The account profile was branded with appropriate graphics in order to match other travel-related marketing material based around the Games (see Fig. 1). The initial strategy was to grow the number of followers via collaboration with partners included in the Virtual Communications Group (VCG – described below) such as Traffic Scotland and ScotRail. The TDM team also paid for some of their Tweets and the account itself to be promoted; for example, advertising on the Twitter timelines of people who were not already following the account to help gain new users. The number of accounts following @GamesTravel2014 peaked at 13,289 during Games time, though the Glasgow 2014 XX Commonwealth Games Highlights report indicated that, "The @GamesTravel2014 Twitter account generated a maximum reach of almost 3 million people (Legacy 2014, 2014)", indicating a breadth of reach beyond followers only. While figures related to target follower numbers are not available, it is notable that this figure is comparable to general Twitter follower metrics of other Glasgow-based transport service providers (for example, @FirstinGlasgow and @GLASubwayTravel (with 20.6 K and 4.8 K followers, respectively, as of December 2016)).



Fig. 1. Branding for @GamesTravel2014 Twitter account (accessed 14 May 2015).

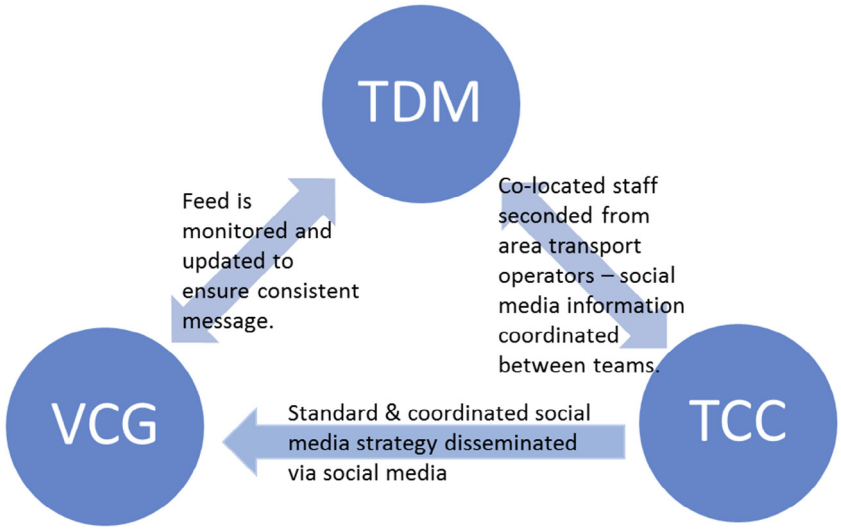


Fig. 2. Overview of @GamesTravel2014 data/person flow.

4.1.1. Communication within travel demand management team and with transport operators

The TDM team was comprised of a dedicated team of people responsible for: answering questions directed to the @GamesTravel2014 Twitter account, dissemination of planned messages to the travelling public regarding travel during the Games, management of communications between the TDM team and the Transport Coordination Centre (TCC - described in more detail below), and reporting back to the Games organisers on any identified issues.

The TDM team formed one of three distinct groups working together to provide consistent and accurate information through the @GamesTravel2014 account (see Fig. 2), alongside the VCG (comprising the social media accounts for the various transport operators and information providers), and the TCC (comprising staff seconded from the transport operators and co-located with the Games organisers). Such a practice only commonly occurs during a large-scale event such as the Games, and is done to allow for activities and information to be sufficiently co-ordinated.

The TDM team sought to make the @GamesTravel2014 account the primary trusted source of information that would filter out to the rest of the network through the VCG. This task was facilitated by a predefined protocol to verify and confirm any reports of disruption received at the TCC via Twitter before any further information was disseminated across the network. This was an important innovation with an interviewee stating that traditionally, transport operators will provide passengers with information on the current status of travel but will not provide specific advice in order to avoid detrimental impacts upon another operator. The TDM team therefore became a catalyst and the 'sender of truth' around what information and advice would need to be provided during the time when the Games were taking place. The co-ordinated involvement of multiple operators helped with the provision of information during Games time as there were more channels for distribution. While the operators retained their remit to provide information, they were able to defer to the @GamesTravel2014 account for further advice when necessary.

4.1.2. Cycling case studies: external communication to the public

The consistent and reliable messaging communicated to the travelling public through the GamesTravel2014 account helped to establish a reputation of trust (Morris et al., 2012). Two particular instances, however, both revolving around cycling, revealed significant issues that tested this reputation.

The cycling road race instigated a large amount of planned disruption as it required many street closures before and during the event. When the race concluded, there was an expectation from the public that the roads would reopen immediately; however, road re-openings were timed only to happen once it was safe to do so. The @GamesTravel2014 account was able to communicate re-openings to the public on a street-by-street basis, a process facilitated by continual updates from the TCC to the TDM who were then able to disseminate this information publicly. A drip feed of information provided a more gradual recovery from the disruption, a process considered an improvement over an abrupt, blanket announcement that all impacted roads were open. This approach showed the public progress being made with the re-opening of the roads with the aim of helping to diminish potential feelings of frustration.

A more negative example, where the co-ordination of information did not accurately reflect service provision on the ground, related to cycling facilities for people attending Games events. The TDM programme encouraged active travel (i.e. walking and cycling) to events as a means to help alleviate high demands on public transport. However, a key cycle route along the River Clyde was closed during the Games on security grounds. This led to a very vocal minority of cyclists complaining about the path closure through the @GamesTravel2014 account. This issue created a conflict between the advice

being given through the Twitter account and the situation on the ground as the push towards active travel by the TDM team did not match up with the service provision. Many of the Tweets containing such complaints were sent as replies to original messages where cycling had been encouraged. The complaints were not acknowledged through the public Twitter timeline, in order to minimise conflict on the public face of the account; however, @GamesTravel2014 did provide an alternative suggested route in one instance although this was not clearly defined for those on the ground.

4.2. Part two: Tweet analysis

In order to better understand the dynamics of the co-ordinated approach to information dissemination via Twitter adopted by the GamesTravel2014 consortium of transport providers during the Commonwealth Games, we evaluated data sub-sets that reflected various characteristics of information sharing. The data evaluated were collected using a bespoke tool (the Twitter Monitoring Infrastructure – or TMI[1]) developed by researchers at the University of Aberdeen. The TMI consists of a set of tools developed to monitor Twitter and store and export Tweets in accordance with Twitter's data collection and retention policies. The TMI registers with the Twitter Streaming API[2] using the Twiter4J Java API[3] to be notified of Tweets containing certain keywords (including hashtags) or that are authored by certain accounts. The TMI also recorded conversations: for example, if the meta-data associated with a Tweet specified that it was 'in reply to' another Tweet, then that Tweet is also stored; this process is repeated until a Tweet with no value for 'in reply to' is found.

The TMI stores the content of each Tweet and a subset of the associated meta-data provided by the Twitter API.[4] This information is then stored in a Postgres database. The archived data includes the Tweet's content (i.e. message), author identifier and account name, identifier of the Tweet being replied to and that Tweet's author details, the original Tweet identifier (if it's a ReTweet), geolocation (if available), the time the Tweet was created, and the time that the Tweet was received. The TMI also provides an interface that allows users to browse the stored data, and export Tweets to CSV files. The export function provides several filters to restrict the exported data, such as by author, featured keywords, or creation time.

Over the course of the Games, from 23rd June to 3rd August 2014, roughly 9 million Tweets were collected by the TMI using a combination of transport-related keywords, hashtags, and account holders. To begin the analysis, we identified a set of Twitter accounts of interest based in part on those organisations or agencies that took an active role in the GamesTravel2014 consortium, including:

- @FirstinGlasgow (First Bus, greater Glasgow)
- @GamesTravel2014 (official Twitter feed for travel advice and information related to the 2014 Glasgow Commonwealth Games)
- @GlasgowSubway (official Twitter feed for the Glasgow Subway network)
- @GLASubwayTravel (Customer travel information and updates for the Glasgow Subway by Strathclyde Partnership for Transport)
- @NRE_ScotRail (Official account of National Rail Enquiries)
- @ScotRail (official ScotRail feed)
- @Trafficscotland (Scottish trunk road traffic)
- @TravelineScot (public transport information for Scotland)

These Twitter accounts form the core set of users of interest in the following analysis.

The first set of data evaluated consisted of Tweets that were "retweeted" by the above accounts between 21st July 2014 and 5th August 2014 (the duration of the Games plus two days on either side to allow for a buffer period of preparation and winding-down exercises), yielding 1736 Tweets.[5] These Tweets were then analysed to identify both the type of account being retweeted, and the type of information contained in the Tweet. Tables 1 and 2 provide information regarding the categories used for this analysis, which were developed by reviewing the Tweets in the context of literature discussed above and with reference to themes emerging over the course of the Games. The categorisation process used a modified version of the approach described in Naaman et al. (2010). Here, one member of the team assigned initial codes to a subset of Tweets. Two additional members of the project team then used this set of codes to perform their own categorisation, resulting in overall moderate agreement. Following discussion and evaluation, categories were re-defined and reduced and participants completed a second round of coding. In the recoding exercise, the level of agreement reached, as computed using Fleiss Kappa implementation in the R software package (Gamer et al., 2012), was substantial agreement (i.e. 0.61–0.80) with a z-value of 39.4, p-value of 0 and a kappa value of 0.65 (for more information, see Cottrill et al. (2015)).

[1] Information on the TMI is available at https://github.com/SocialJourneys/TMI.
[2] https://dev.twitter.com/streaming/reference/post/statuses/filter.
[3] http://twitter4j.org.
[4] https://dev.twitter.com/rest/reference/get/statuses/show/\%3Aid.
[5] Retweets may be used as proxy indicators of trust and reliability, as they may impact upon the reputation of the account holder who retweets. As indicated by Metaxas et al. (2014), "Our findings show that retweeting indicates, not only interest in a message, but also trust in the message and the originator, and agreement with the message contents." This is further supported by work from Lee (2014), which found that "Social trust has a positive effect on the intention to retweet.".

Table 1
Categorisation of original Tweet author.

Type of account being retweeted (i.e. the account of the original author of the Tweet)	
Agency	Defined generally as a government-associated organisation; for purposes of this analysis, transport-related agencies have been identified in a separate category
Celebrity	Athlete or other well-known, public individual, not including media personalities
Charity	Non-profit organisations
Company	For-profit organisations
Games	Twitter accounts officially associated with the 2014 Commonwealth Games
Games Transport	Separate category for GamesTravel2014 account
Individual	Twitter accounts of individual users
Media	Twitter accounts associated with identified media outlets and/or personnel
Sport Association	Non-profit organisation associated with a specific sport
Transport	Account associated with an Agency or organisation primarily associated with the provision of transport services or information
University	Account associated with a University

Table 2
Categorisation of Tweet content (based in part on Cottrill et al. (2015)).

Code	Primary category	Description
AT	Alternative Transport Options (especially walking and cycling)	The Tweet's key characteristic is the suggestion of a mode of travel other than driving or taking the train
EI	Event Information	A Tweet whose primary function is to share information directly related to the Commonwealth Games (aside from transport information)
GI	General Information	The lowest category in the hierarchy of Tweets; to be used if the Tweet fits in no other category
IS	Information Seeking	A Tweet requesting information or interaction (e.g. "Tell us…", "Please retweet")
NC	Negative Comment	A Tweet primarily characterised by the sharing of a negative emotion
PC	Positive Comment	A Tweet primarily characterised by the sharing of a positive emotion
PR	Promotion	The Tweet is encouraging readers to participate in events, download an app, or otherwise engage in an activity promoted by the Tweet author
TD	Transport Disruption	Any Tweet that indicates a specific disruption or time of disruption
TI	Travel Information	A general category for Tweets related to the sharing of non-disruption-specific travel information, such as where to find information on travel routes and journey planning
UC	Unclassified	Generally reserved for those Tweets consisting primarily of photos that are not accessible to the general public

Tables 3 and 4 below provide information on the overall breakdown of Tweet categorization by the type of account retweeted, along with the type of Tweets retweeted by specific Tweet authors over the same period.

For purposes of statistical analysis, it was necessary to reduce and recode some of the data set. Due to the small number of retweets recorded, the accounts for NRE_Scotrail and GLASubwayTravel have been removed for purposes of further analysis. Additionally, some categories of original Tweet author have been collapsed, including combining the Celebrity and Media categories and the Charity, Sport Association and University categories. Finally, the Tweet categories of "Unclassified", "Information Provision", and "Negative Comment" were removed due to limited numbers. Removing and combining these categories left a total of 1697 Tweets (98%) for analysis.

Data were analysed using cross-tabulation statistics in SPSS after being re-coded as nominal variables. The first questions of interest were whether the original Tweet author and the content category of the Tweet being retweeted were independent of the retweeting account. Though the number of cells with counts less than 5 was somewhat high in both cases, it was felt that the sample set was sufficiently large to overcome this barrier. Based on the reduced data, Chi-Square tests revealed that in both cases, the two variables are not independent of one another (at a significance level of 0.000); rather, the account retweeting information is associated both with the type of account initially Tweeting information and with the type of information retweeted. Though significant, however, the association is not necessarily strong in both cases. For the former, association between the account retweeting and the type of Tweet retweeted is quite low ($\lambda = 0.059$), and only slightly higher for association with the type of account retweeted ($\lambda = 0.258$).

Findings here are largely supported by Tables 3 and 4 above, which reflect that for the majority of cases Tweets retweeted by the authors of interest are related to Transport disruption or travel information, and originally Tweeted by transport-related accounts (including GamesTravel2014). The main exception to this is GlasgowSubway, which primarily retweeted 'positive comment' Tweets from individuals. This pattern may be reflective of the general tone taken by the different accounts, or by factors such as their geographic coverage (for example, @GlasgowSubway has 14.9k followers compared to @TrafficScotland's 85.9k, reflecting the discrepancies in numbers of interested parties, though both accounts follow a similar number of accounts (545 and 657, respectively)[6]). Patterns revealed here are reflective of general transport communication

[6] All figures as of 23 May 2015.

Table 3
Category of original author as retweeted by transport agency or organisation.

Category of original Tweet author	Retweet author								
	FirstinGlasgow	GamesTravel2014	GlasgowSubway	GLASubwayTravel	NRE_ScotRail	ScotRail	Trafficscotland	TravelineScot	Total
Agency	7	15	6			4	97	8	137
Celebrity	1					2			3
Charity	1		1			1	4	1	8
Company	5	4	8			2	4	2	25
Games	7	10	22			2	51	9	101
Games Transport	11		15	11	1	131	325	36	530
Individual	3	26	60		2	30	7	4	132
Media	2	13	3			2	6	4	30
Sport Association						1	1		2
Transport	54	317	15	3		61	192	125	767
University			1						1
Total	91	385	131	14	3	236	687	189	1736

Table 4
Tweet category by Tweet author (n = 1736).

Tweet author	Tweet category										
	AT	EI	GI	IS	NC	PC	PR	TD	TI	UC	Total
FirstinGlasgow		0.3%		0.1%		0.7%	0.1%	2.8%	1.3%	0.1%	5.2%
GamesTravel2014		0.4%	0.3%	0.1%		1.4%	0.8%	13.3%	5.9%	0.1%	22.2%
GlasgowSubway	0.1%	1.0%	0.1%	0.1%		4.0%	0.8%	0.9%	0.6%	0.1%	7.5%
GLASubwayTravel	0.1%						0.1%	0.4%	0.2%		0.8%
NRE_ScotRail							0.1%	0.1%	0.1%		0.2%
ScotRail	1.0%	0.7%	0.2%	0.2%	0.1%	1.9%	0.5%	4.5%	4.6%		13.6%
Trafficscotland	3.0%	3.6%	0.4%	0.4%	0.1%	0.7%	2.2%	15.6%	13.5%	0.1%	39.6%
TravelineScot	0.3%	0.6%	0.1%			0.4%	0.9%	4.7%	3.9%		10.9%
Total	4.4%	6.6%	1.0%	0.7%	0.1%	9.1%	5.4%	42.2%	30.1%	0.3%	100%

co-ordination efforts indicated in interviews. The focus of the retweets by involved and associated parties reflects the desire to present a co-ordinated, controlled message regarding transport across the network during the Games.

Next, we focus more directly on Tweets involving the @GamesTravel2014 account. Here, we look at a temporally constrained sub-set of Tweets that were associated with @GamesTravel2014. In this analysis, we will focus on two days in particular: 24th July (the first full day of the Games) and 2nd August (the last full day before the day of the closing ceremony). We are interested in assessing how the interaction and co-ordination of the Twitter message evolved over the course of the Games, and how the public interaction of accounts was used. Here, we once again use the categories of Tweet identified above, but we also evaluate the function of the Tweet – i.e. whether it was a comment made to or mentioning, a retweet of, or an original Tweet from @GamesTravel2014. Tables 5 and 6 below indicate the relationships between the Tweet function and Tweet content on the two days in question.

It is evident, as indicated above, that there were a large number of retweets by both @GamesTravel2014 and others of transport disruption and transport information Tweets over both days. Of greater interest, perhaps, are both the growth in the number of Tweets (from 182 to 296) and the growth in the number of Tweets that function as "Direct Comments", i.e. those sent directly between @GamesTravel2014 and another user. Information seeking (IS) Tweets (such as, "@GamesTravel2014 Any parking recommendations for the road race tomorrow?") grew from 7 to 15 over the time in question, with 4 of 7 on the 24th July and 14 of the 15 requests sent on 2nd August being direct questions to @GamesTravel2014, while "Direct Comment" Tweets overall grew from 11 to 52 over the time period in question. While a limited set of data for evaluation, this indicates that during the duration of the Games, recognition of the @GamesTravel2014 was growing, and it was becoming a recognised provider of transport-related information. It may also reflect that the social media team were becoming increasingly confident in the use of this medium for the sharing of information with consumers. (Of note is that @GamesTravel2014 sent 85 Tweets on 23rd July and 90 on 2nd August, indicating that the growth was not purely related to the amount of Tweets sent.)

Regarding the interaction of the transport consortium members, @GamesTravel2014 was retweeted by other consortium members 49 times on 24th July and 62 times on 2nd August.[7] Most retweets, as expected, related to transport disruption or transport information; however, on both dates consortium members also recommended that their followers should follow @GamesTravel2014 (for example, "Info on @Glasgow2014 sports, venues & where/when we expect trains2be busy today http://t.co/NGCeEPBtam Worth following @GamesTravel2014 too!") or cited @GamesTravel2014 as an information source (for example, "Hotspot Map for August 3rd - @GamesTravel2014 Day 11 Commonwealth Games - check busy areas here:).". In both cases, it is evident that the public Twitter feeds of consortium members reflect the background co-ordination taking place. While the overall Twitter feeds of consortium members reflected standard operating procedures (such as responding to general requests for information and providing status and information updates on their usual services), it was evident that consortium members were committed to using and promoting the @GamesTravel2014 account to communicate Games-related travel information. This pattern reflects both the degree of success the co-ordination efforts described above engendered, as well as the work to minimise disruption for "usual" travellers who relied upon the consortium members' standard feeds for travel information.

The latter point is a critical one, as it highlights the delicate balance faced by transport service providers during times of lengthy planned disruption that impact upon portions of the service area. As Twitter becomes a standard platform for the communication of service information, it is necessary to reflect upon the manner in which it is used to convey information about both standard services for the regular traveller and targeted services for travellers attending and/or impacted by event activities. In addition, the mix of transport modes and service providers available in the impacted area may increase the complexity of communicating necessary information (for example, a customer's train-to-bus transfer may be impacted upon by service changes, which would typically be communicated only by one or the other provider). Here, by establishing an account specifically targeted to travel and transport issues associated with the Commonwealth Games separate from the standing Twitter feeds of area transport operators, the continuation of regular communication by other consortium members

[7] These figures are not explicitly broken out in the tables above, but are provided as indicative measures of interaction between consortium members.

Table 5
@GamesTravel2104-related Tweets sent on 24th July.

24-Jul	Category									
Tweet function	AT	GI	IS	NC	PC	PR	TD	TI	Total	
Direct Comment	1		5	1	1			3	11	6%
Original Tweet	7		1		3	13	8	23	55	30%
Retweet	11	1	1		4	10	42	47	116	64%
Total	19	1	7	1	8	23	50	73	182	100%
	10%	1%	4%	1%	4%	13%	27%	40%	100%	

Table 6
@GamesTravel2014-related Tweets sent on 2nd August.

02-Aug	Category									
Tweet function	AT	GI	IS	NC	PC	PR	TD	TI	Total	
Direct Comment		1	14	6	14			15	52	18%
Original Tweet	2	2			3	3	15	23	48	16%
Retweet	1	12	1	1	1	28	80	74	198	67%
Total	3	15	15	7	18	31	95	112	296	100%
	1%	5%	5%	2%	6%	10%	32%	38%	100%	

was enabled, while providing a trusted source of communication to report upon transport information relevant to all services. This demonstrated the potential for a social networking application such as Twitter to be beneficial to both service providers and customers.

5. Findings and summary

In this paper, we have focused on the mechanics of using Twitter in a co-ordinated manner, drawing on interviews with participants about their roles regarding Twitter during the Commonwealth Games. Findings include both positive aspects of the experience, particularly regarding positive effects of enabling competing transport operators, who would normally work in separate organisations, to come together for a shared goal under pressured circumstances; as well as challenges associated with co-ordinating the social media message, the on-ground situation, and user responses in a public forum. The social media model used for transport information dissemination during the Games demonstrates what can be achieved when separate entities co-ordinate themselves more efficiently, and also provides indications of areas where additional planning and evaluation are needed. While such a process may not always be necessary outside such a large-scale event, it demonstrates the role a technology solution such as Twitter may play in helping to facilitate a dialogue between the public, transport operators and other information providers. The background effort that was necessary to ensure a consistent, targeted message regarding travel during the disruption of the Games was largely invisible to the public; however, the @GamesTravel2014 account, and the interactions between it and other transport providers in the Glasgow area, were highly visible as they played out over the public Twitter network. Actions taken, such as the co-location of social media team members from the various involved parties, the bi-directional following of and interaction with social media feeds of consortium members, and managed efforts towards the co-ordination of message content and timing, were critical for the overall success of @GamesTravel2014 and, more broadly, the travel experience of those impacted upon by the Games.

Findings from the analysis of the collected Twitter data support the information provided by consortium members in the need to co-ordinate a consistent message across the information being shared on social media. While it was evident that not all communication was infallible, the degree to which the @GamesTravel2014 feed was regarded as a trusted source of transport information surrounding the Games was demonstrated in the information communication and dissemination patterns seen over the course of the Games. As shown above, the increased amount of discourse between @GamesTravel2014 and customers, along with ongoing support from consortium members, revealed the extent to which the co-ordinated efforts of the involved parties were reflected in the public face of the Twitter feed.

This paper has explored the co-ordination of activities around a Twitter presence for the dissemination of transport information during a high profile large event. For the study, we have conducted parallel exploration of the behind-the-scenes activity from a travel authority and operator perspective alongside an analysis of the publicly available Twitter data. The analysis has shown an increased level of managed discourse with the public over the duration of the Games, which helps to indicate the successful strategy for co-ordinating internal information sources. By using a structured, co-ordinated social media approach in the background, the public face of @GamesTravel2014 was able to provide a reliable, consolidated source for transport information and updates necessary for a smooth travel experience during the Commonwealth Games. While the co-ordinated approach has not continued since the completion of the Games, it does provide an indication of the potential for such a collaborative approach in presenting a consistent social media message where appropriate conditions have been put in place.

Findings from this study demonstrate the increasing relevance of social media as a platform for sharing trusted, accurate information and the benefits that may be seen by both operators and the public from effective management of this medium. As transport operators increasingly look to social media for publicly-facing communication with customers, it has been demonstrated that utilisation of a strategic, managed approach that goes beyond the bounds of current isolated management practices and draws upon a mixture of information sources and interdependent actors represents an effective model of social media communication. While we have looked at this strategy in the context of a large event, it also demonstrates the potential for future applications of social media usage in producing a more effective network of communication with passengers. In conducting this parallel exploration, the research provides needed evidence for transport operators incorporating social media into their communications strategies, and addresses the call for research to, "investigate the main aspects involved in integrating social media into on-going transport planning, management and operational activities, while addressing the socio-technical factors that play a role in this challenging and promising field" (Gal-Tzur et al., 2014).

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Tweeting Transit: An examination of social media strategies for transport information management during a large event

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