Serialisation and the use of Twitter:
Keeping the conversation alive in public policy scenario projects

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1

Abstract

Scenario planning projects have been used in a variety of organisational settings to explore future uncertainty. The scenario process is often a participative one involving heterogeneous stakeholder groups from multiple organisations, particularly when exploring issues of wider public concern. Facilitated workshops are a common setting for scenario projects, typically requiring people to be physically present in order to participate and engage with others for the duration of the project. During workshops, participants progress through the stages of the process, generating content relevant to each stage and ultimately the scenarios themselves. However, the periods between workshops and other episodes of activity (e.g. interviewing stakeholders) are rarely mentioned in such accounts. Thus we know very little about what activities take place between such activities, when they occur and who is involved. This is a particular issue for larger scale scenario projects that run over a period of weeks or months and involve multiple workshops; in such cases organisers and facilitators have to consider how to maintain the interest and levels of engagement of participants throughout the duration of the project. A variety of social media exist which allow people to interact with each other virtually, both in real time and asynchronously. We reflect on the use of social media within a project to develop scenarios for the future of the food system around Birmingham, UK, in the year 2050. We explore how a particular social media, namely Twitter, can be used effectively as part of a scenario planning project, for example to engage participants and encourage contributions to the project. We suggest that Twitter can support the serialisation of strategic conversations between the face-to-face workshops. The paper considers the implications of these reflections for both the scenario process and scenario projects more generally.

Keywords: scenario development, social media, Twitter, workshops, serialisation

1. Introduction

Scenario planning projects have been used in a variety of organisational settings to explore future uncertainty; a number of case studies exist describing its application in private [1-3] and public policy settings [4-6]. The scenario process is often a participative one involving heterogeneous stakeholder groups from multiple organisations, particularly when exploring issues of wider public concern. Facilitated workshops are a common setting for participation in scenario projects, typically requiring people to be physically present in order to participate and engage with others for the duration of the project. Bowman [7] conceptualises the scenario process as consisting of "discursive and episodic practices" such as a series of workshops.

During workshops, participants progress through the stages of the process, often in a facilitated setting, and generate content related to each stage in the process, and ultimately the scenarios themselves. Much of the scenario literature documents a series of prescriptive process steps relating to the development of scenarios, along with case studies that illustrate the content produced [3]. However, the periods between workshops and other episodes of activity (e.g. interviewing stakeholders) are rarely mentioned in such accounts. Thus we know very little about what activities take place between workshops, when they occur and who is involved. This is particularly an issue for large scale scenario projects that run over a period of weeks or months and involve multiple workshops; in such cases organisers and facilitators have to consider how to maintain the interest and levels of engagement of participants throughout the duration of the project.

This paper reflects on a year-long project that prepared the ground for the development of scenarios describing food futures for the year 2050 for the geographical region surrounding the UK city of Birmingham. The project was led by the New Optimists, a not-for-profit organisation, who describe themselves as a "community interest company" that creates "…platforms for scientists to promote and disseminate their work, and for their scientific endeavour to enable better informed decision-making" [8]. The project was promoted through the New Optimists Forum and was documented via their webpage, which also acts as a repository for documents relating to the project (http://newoptimists.com/the-forum/) [9]. A key goal for this project was to inform and influence local policy makers. A novel feature of the Birmingham 2050 project was the use made of social media, and in particular Twitter, to facilitate live reporting of workshops as they happened and to provide a vehicle for communication between workshops. The authors were involved in the project in the role of advising on the scenario process, supporting the facilitation of some of the workshops, and following events via social media.

Our research question concerns *the serialisation of the strategic conversation, both during and between face-to-face workshops, with a* specific *focus on the early stages of a scenario planning process.* Thus, our approach differs from many of the extant accounts of scenario projects, in that we explore the overarching project process rather than focusing on the detailed steps required to generate scenarios. More specifically, our research questions are as follows:

- *Is there an ongoing strategic conversation taking place between and/or during workshops as evidenced by Twitter data?*
- *What is the nature of the conversation taking place, e.g. is it focused on a single topic or does it have multiple strands?*
- *Who is involved in the conversation?*
- *Does the conversation contribute to the development of scenarios within the project? If so, how?*
- *What can be learnt about the current or potential future use of Twitter, or other social media, to support a scenario project?*

This paper is organised as follows. The next section reviews the literature on scenario processes, the workshop setting and the increasing interest in the use of technology to support scenario processes, including the use of social media to support engagement in activities. The following section introduces the case study and analytical setting. An analysis of Twitter data used to support the Birmingham 2050 scenario project is then presented, followed by a discussion of the potential contribution of such social media to scenario projects, particularly those within the public arena or involving multiple stakeholder groups.. The paper ends with a discussion of future research directions.

2. Theoretical context

2.1 Scenarios within the public arena

Applications of scenario planning can be found across a wide spectrum of organisational settings. Perhaps the most well-known case history of scenario planning is that of the Royal Dutch Shell Company within the private sector. In the public arena, Ringland [5] differentiates between scenarios developed within the public sector and those developed to influence public attitudes. Both types of projects may be intended to influence public policy; the difference between them is in the level of participation involved in the process and the intended audiences for the process outputs.

Volkery and Ribeiro [10] describe a continuum of functions of scenario planning according to its impact on decision-making. 'Indirect' forms of scenario-based decision support are intended to stimulate wider debate about possible futures and encourage stakeholder buy-in. In contrast, 'direct' forms are targeted at generating options for future action and appraising the robustness of such options. They argue that 'indirect' forms of scenario-based decision support relate to the early phases of policy development which involve issue identification, issue framing and agenda setting. Additionally, they suggest that such forms provide "an opportunity for broader participation of societal stakeholders and open-minded discussions" (p. 1200). Ringland's 12 step process for developing scenarios to influence public attitudes explicitly involves publicising the scenarios, a stage she likens to a marketing campaign, where one of the questions to be addressed is which channels to use to reach the intended audiences [5].

A number of case studies can be found in the literature that describe the development of scenarios intended for debate within the public arena. For example:
- The Mont Fleur scenarios created to explore future developments in South Africa [11].
- The Hemingford. scenarios created to explore the future of health and healthcare in the UK [4]
- Scenarios for Rotterdam, exploring the future development of the city [5].
- E-Government scenarios exploring the impact of information and communication technologies on local government in the UK [12]
- The Icram scenarios, exploring the future of academic medicine [13]
- The PRELUDE scenarios exploring land use development in Europe [14]
- Climate change scenarios developed to explore the potential development of the port of Hastings, Australia [6]
- Scenarios for the future of Scotland and the UK [15]

A comparison across the cases reveals the following characteristics of such projects:
- Projects typically had an identifiable client or sponsor who was often involved or represented in the process.
- The issues addressed in the each of the projects span the interests of multiple stakeholder groups. Thus a key purpose of each project is to open up debate, and engage people in thinking about the issues and range of possible futures. Some of

the projects were specifically designed to engage the public in debate about the future.

- The descriptions of the cases typically focus on the steps of the process and the detail of the scenarios; little, if anything is reported about intervening periods between workshops and other activity.
- The early phases of many of the projects involved interviews with relevant stakeholder groups and individuals, including relevant experts. The material collected through these interviews was subsequently used in the development of the scenarios.
- Workshops involving multiple stakeholder representation typically took place in face-to-face settings; given the scale of some projects, series of workshops were employed, scheduled over a period of weeks or months.
- Where written reports were produced documenting the early phase of the projects, these were typically circulated to those involved in the project.
- A variety of settings and media were employed to publicise the interim and final outputs of the project, including reports, presentations, videos, dramatizations and exhibitions, as well as coverage by the press.

2.2 Key elements in scenario-based exercises

The literature describes a variety of different scenario processes which can be grouped into three generic phases [3]:
- A preparatory phase where the purpose and focus of the exercise is agreed and the driving forces are identified and explored,
- A development phase involving the creation of the scenarios,
- A use phase when the scenarios are used for their intended purpose.

This study focuses on the first phase and, in particular, on the exploration of issues and potential driving forces which underpin scenario development. Schwartz [17] notes that the scenario process involves significant research, with the identification of driving forces being perhaps the most research-intensive stage as it involves exploring a broad spectrum of different forces relevant to the issues under consideration in the project.

Van der Heijden et al. [18] suggest that the starting point for a scenario exercise should aim to "open up the conversation, enabling the widest possible exploration of the issues" (p. 195). They also distinguish between short, sharp scenarios that may be developed quickly and scenario projects lasting many weeks; the benefit of the latter, they note, is that they allow "…group members to critically reflect on the content, to undertake further research on the issues raised and to engage in formal and informal discussions, with one another and with other interested parties" (p. 194-5).

Interviews and facilitated workshops, both of which involve decision-makers and other stakeholders, often form the vehicle through which this preparatory phase is conducted. There is abundant advice in the literature about how to conduct this phase. For example, a

set of questions known as the 'Oracle questions' can be used to help explore potential issues when thinking about the focus of the exercise [3]. Equally, prescriptive advice about the steps to follow and supporting materials to use at workshops exists [19], as do case histories documenting the scenarios produced [20, 21].

Whilst the existing literature provides some detail of typical activities during this preparatory phase, it is largely silent on what happens outside of the 'formal' environment of the workshop. For example, do participants carry on the conversation in between face-to-face workshops, and if so, what do they talk about? The literature suggests that such "serialisation" of the strategic conversation might prove to be beneficial. For example, it has been noted that an effective strategic conversation requires a common language, an alignment of ideas, a willingness to engage in rational argumentation and an evolution of ideas [22, 23]. It can be argued that all of these aspects, and in particular an evolution of ideas, are more likely to develop over time as part of an ongoing conversation which may have pauses and multiple phases to it.

2.3 Use of social media

According to Kaplan and Haenlein [24], the term "social media" refers to a group of internet-based applications that build on the foundations of Web 2.0, and that allow the creation and exchange of user-generated content (see also [25], [26]). In particular, Twitter is a free social networking and micro-blogging service that enables its users to send and read messages known as tweets [27, 28]. In terms of the analysis of social media data, the existing literature has begun to report analyses of the content of tweets, for example to explore the relationship between Twitter use and engagement. Smitko [29] undertakes a discourse analysis of tweet content, whilst Lovejoy et al. [30] and Waters and Jamal [31] both chose to use content analysis. Burnap et al. [32] and Lipizzi et al. [33] each adopted a conversation analytic approach, while Chae [34] combines descriptive analytics, content analytics and network analytics. In addition, a number of studies have explored how social media is used to support marketing activities within organisations (e.g. [35], [36]).

While the emerging literature on social media discusses its use in a range of contexts, an analysis of its use in scenario planning projects is sparse (e.g. [37], [38]). Raford [39] explores the impact that 'methodological innovations' may have on the scenario method and practice. Examining both face-to-face and online case studies of scenario planning, he found that online approaches have the potential to increase participation, reduce time to generate data, and share basic analytic tasks. He also calls for further research into "how to encourage greater interactive socialization, both in face-to-face and online settings" (p75), i.e. a 'blended' approach to scenario planning.

The existing literature also discusses the use of electronic media by groups of participants that need to work together across geographic distances and time zones. As electronic media become central to organisational life, individuals may use asynchronous media in various ways to "help them coordinate across geographical distance and across multiple temporal structures" ([40], p. 697) – and this raises questions around how such temporal coordination is achieved. Im, Yates and Orlikowski [41] also observe that the temporally and geographically dispersed communication environments of virtual teams pose significant challenges to the

coordination of team activities. We therefore suggest that there is a need to understand the potential use of social media such as Twitter to address these challenges, in the context of exercises such as scenario planning projects.

2.4 Current issues with the scenario process: participation and removal

Some form of strategy workshop, to allow face-to-face participation in the scenario process, is a common feature of such projects. The existing literature on strategy workshops suggests that they are typically conducted within single organisations and predominantly in the private sector. A number of studies have explored the impact of strategy workshops, many using strategy tools such as scenario planning, on organisations and participants (e.g. [42]). Some have suggested that strategy workshops can leave little lasting impression (e.g. [43], [44]) – and hence the management literature has taken an interest in how this situation might be improved (e.g. [45], [42]). A common roadblock to strategic change is denial (e.g. [17]). Van der Heijden et al. [18] argue that it is impossible to change behaviours and actions without first understanding the underlying reasons for current behaviour and action. Ringland [3] suggests that pilot workshops should be run, to experiment with different facilitation techniques. Healey et al. [43] stress that such workshops should be evaluated in terms of a range of outcomes; their findings indicate that workshops organized as part of a series of events will be associated with both organisational and cognitive outcomes that are perceived more positively relative to workshops held as one-off events.

We suggest that there are currently a number of important issues concerning scenario exercises that require further research and exploration. In order to address the problem of inertia in strategic decision-making, and to avoid negative coping strategies (such as procrastination and buck passing) in response to environmental challenges [18], improvements in various aspects of the scenario process should be considered. These include: getting the right participation in a scenario-based exercise; and avoiding the downsides of the sense of 'removal' that participants can experience when attending strategy workshops that take them away from their day-to-day work. On the first of these issues, a number of authors (e.g. [46-48]) have discussed the benefits of inclusiveness in the strategy process. Healey et al. [43] show that the greater the range of stakeholder groups involved in the workshops, the more positive the perceived interpersonal outcomes. While other scholars advocate wide participation in exercises such as scenario planning [49-51], the best way to achieve this goal in practice is not entirely clear. Hence we suggest that the role of social media in widening participating in strategy workshops, such as those where scenario planning is deployed, should be more fully explored.

Turning to the second of the issues raised, i.e. the disadvantages of a sense of 'removal', Healey et al. [43] observed a negative association between removal and organisational outcomes, and hence they point to a clear need to identify "means of integrating valuable workshop outcomes into the wider organization" (p. 523). They suggest that repeating analytical activities and revisiting debates enhances the amount of time and energy focused on strategic issues, which increases the likelihood of learning and builds momentum towards chosen courses of action [52, 53]. Work by Hendry and Seidl [54] also suggests that strategic episodes that are more frequent acquire their own structures and legitimacy, thus becoming a recognized means of 'getting strategy work done'. We therefore suggest that the

serialisation of strategy workshops, i.e. returning to ideas and commitments over a series of episodes, can be supported by social media, and that this has the potential to address difficult issues around both participation and removal.

Having considered the extant literature that brings together an identification of important elements of scenario exercises with an exploration of some of the outstanding issues around the effectiveness of such activities, alongside the potential use of social media, in the next section we introduce our case study setting and our approach to data analysis.

3. Analytical approach and case study setting

Our case study setting is a year-long scenario-based project run by the New Optimists to consider food futures for Birmingham in 2050. A report on the project can be found online [9], where the project founder argues that "scientists have a vitally important, informed contribution to make in 'seeing' how we can build a sustainable future". One of the authors conducted an in-depth interview with the project founder; when asked about her motivation in undertaking the project and her rationale in choosing a scenario-based approach, she argued:

> "Well, I wanted to influence local decision-makers and I wanted a reasonably robust process by which to do it. And to do it directly, just getting scientists talking about stuff, I reckoned would have zero impact…"

An early phase of the project focused on the exploration of driving forces affecting food futures; the data generated fed into a later phase of scenario development and writing. This early phase consisted of six events, involving local scientists and others with expertise in areas such as architecture, biochemistry, bio-energy, chemical engineering, computer science, entomology, food distribution, geography, horticulture, plant science, public health, and veterinary epidemiology. The events ranged from informal dinner gatherings to larger workshops, and were facilitated by a professional facilitator, with the authors assisting at two of the events. None of the facilitators tweeted during this stage of the project. In addition, each event was supported with live social media reporting managed by a specialist team. Reporting took the form of live Twitter postings which were intended to promote the events and facilitate engagement by non-attendees; the hashtag #TNOFOOD was used. Table 1 presents a summary of the events organised, and shows the number of people who tweeted, including participants, event organisers, social media reporters, and people not present.

Event	Topic and Setting	Number of Participants present at the event	Number of People (participants and others) who tweeted during events
1	Food Futures discussed in a forum style setting.	11	4
2	Food Poverty discussed over informal dinner	6	2

3	Food Futures discussed in a forum style setting	6	7
4	Factor selection discussed in a mini forum	3	2
5	Semantic Web discussed at a forum	8	6
6	Distributed energy systems discussed at a forum style setting	9	4

Table 1: Events, settings and number of participants

Our dataset consists of the tweets made over the duration of the six workshops by those involved in the project, including the project founder and participants, facilitators, members of the social media team, and other parties who came into contact with and became interested in the project. In collecting and analysing the Twitter data, the authors were mindful of ethical considerations. For example, the data used for analysis were limited to the username, time and date of tweet and the actual message. In order to illustrate the analyses undertaken, we have included tweet content anonymised both in terms of omitting usernames and any links to websites [55].

Tweets were manually coded according to their type (e.g. tweet, retweet, reply), and the nature of the content. The initial dataset consisted of 1718 tweets made by @newoptimists and some 22,500 tweets made by the others involved in the project; each observation consisted of a username, date and time, and the content of the tweet. Tweets not tweeted by newoptimists were subjected to a 'cleaning' process, using keywords derived from a frequency count of words appearing in the newoptimists tweets. Examples of the high frequency words chosen include #TNOFOOD, Birmingham, newoptimists, and food. The keywords were chosen in order to avoid terms that were overly narrow (e.g. birminghampost and astonuniversity) as well as terms that were too vague (e.g. forum, science, future) or lacked relevance to the project (e.g. http).

After cleaning this second set, 3776 tweets remained. These two collections of tweets were then inspected for relevance to the project, and any tweets falling outside the 13-month duration of the project were removed. This left 983 and 443 tweets by the newoptimists and others respectively, forming a final dataset of 1,426 tweets.

Given the exploratory nature of the study, the authors felt that an open coding approach was appropriate to the analysis of this data. Open coding involves identifying, naming and categorizing phenomena found in textual data [56]. Following an open coding analysis of the tweets, two categories were identified. The first category indicated the 'timing' of each tweet in relation to an event and used the following codes: before the event, during the event or after the event. Tweets were separated into 18 sets, either 'before', 'on the day of' or 'after' each of the six events. The splits were chosen where there were minor breaks in the volume of tweets, typically around mid-points between events. The second category assessed 'tweet content' and used the following codes which were used to undertake a qualitative analysis of the content of the tweets [56]:

- **Advertising** referred to direct event advertising, either posted from @newoptimists, or others, typically explaining an event.

- **Communication** covered any tweet that was involved in informal conversation, but not where tactical advertising had been intended.
- **Event content** covered all content that had been published from the events themselves, such as quotes and audio/video clips. This category is particularly interesting as many of the tweets were informative, yet also aiming to be prompts for discussion.
- **Wider marketing** (non-direct event advertising) encompassed a range of tweets such as those that were designed to provoke discussion (not directly event-related) or a commentary on the New Optimists movement beyond the six events.
- **Miscellaneous** –other tweets relevant to the New Optimists project that did not fit into any of the above categories.

The tweets were analysed as follows. First, a time-based frequency count was conducted to explore whether the pattern of tweeting coincided with the schedule of events. Second, a content analysis of the tweets was made based on the 'tweet content' and 'timing' codes identified above. The purpose of this analysis was to explore how different categories of tweets were used in relation to the timing of events. Next, a more detailed analysis of the tweets which had been coded as 'event content' was made to understand how they were being used. Finally, tweets associated with a selection of event themes were analysed to see whether the tweeting activity focused only on the event in question or whether the activity carried on over a period of time.

4. Findings

Figure 1 shows the daily pattern of tweeting over the 13-month project duration. Clear peaks in tweeting activity match the schedule of event dates, for example Event 1 took place on November 2nd. Other peaks were associated with indirectly related activities external to the project, e.g. Blog Action Day [57].
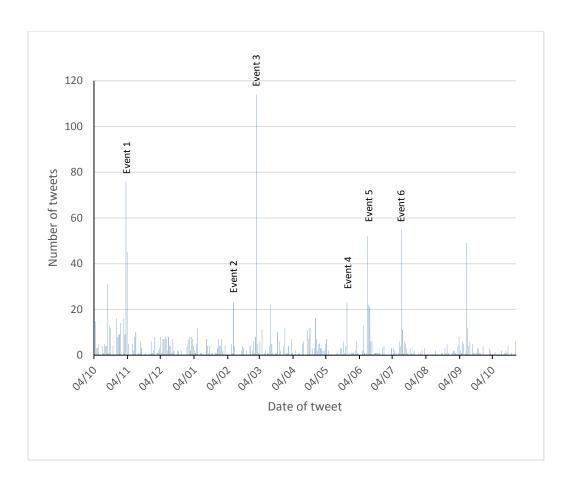
Figure 1: Daily pattern of tweeting by those involved with the project.

Figure 1 demonstrates that throughout the duration of the project, there was a continuous stream of tweeting activity from both the New Optimists and others involved in the project, and that tweeting was not an activity only occurring at discrete points in time, for example during workshops. Whilst Figure 1 shows the pattern of tweeting over time, it does not explore the content of what was tweeted. As described earlier, the authors coded tweets according to their timing in relation to an event and according to the nature of their content. Table 2 shows a sample of tweets and the codes allocated to them.

Tweeter and tweet	Timing code	Content code
"Faces to names: 10 scientists, an architect & the city strategist for Forum 2nd Nov Food futures #Brum 2050 http://webaddress #TNOfood	Before 1	Advertising
"@username Warwick scientists taking part mtg on Brum Food Futures 2050. 6-9pm tonight. Do join in via #TNOfood. http://webaddress"	Event 3	Advertising
"What will we be eating in 2050? Follow #TNOfood and @username: http://webaddress 6-9pm talking food poverty in #BirminghamUK."	Event 2	Advertising
"@username - yes will to join. I am interested in doing a doody thing in Climate Week March 2012"	Before 1	Communication

"@username Thanks for the compliment! Much appreciated."	Before 4	Communication
"forum now pondering why cities exist - asking with local energy systems will we still need a city? #brum #tnofood #2050 - many small cities?"	Event 6	Event content
"We're having intros from the scientists at the moment? we'll blog their thoughts asap but here's who's here http://webaddress #TNOfood"	Event 1	Event content
"http://webaddress @username shares his thought on semantic web #opendata and guerilla data"	Event 5	Event content
"Anyone know of other food growing projects? http://webaddress We'd like to add them to the list!"	Before 4	Marketing
"12 Signs That The World Is Running Out Of Food http://webaddress"	After 1	Marketing
"What does it mean to be a Brummie? « username http://webaddress "	After 6	Miscellaneous
"RT @ username: Can YOU launch a business in just 48 hours? Then register for Launch48 http://webaddress"	After 3	Miscellaneous

Table 2: Examples of tweets and their associated codes

Our analysis of the five tweet content categories in relation to event timing is summarised in Tables 3 and 4. Table 3 provides a summary of totals of the categories for the three time zones associated with the events i.e. before, during and after. Table 4 shows the breakdown of tweet content categories across the individual events.

Time in relation to event	Advertising	Communication	Event Content	Marketing	Miscellaneous	Total
Before	51	140	5	195	76	**467**
During	55	20	249	14	5	**343**
After	5	128	49	384	50	**616**
Total tweets	**111**	**288**	**303**	**593**	**131**	**1426**

Table 3: Overall summary of analysis of tweet content in relation to event timing

The overall summary presented in Table 3 gives an indication of the nature of the tweet traffic surrounding and during the series of events. As might be expected, tweets associated with Event Content are focused on the events themselves, but not exclusively; tweets relating to Event Content do occur both before and after events. Tweets associated with direct advertising typically take place prior to and on the day of events – such tweets are typically

reminding people that an event is happening and encouraging people to follow the event live on social media. Tweets associated with communication and marketing (indirect advertising) typically wrap around events. As a body of evidence, the tweets demonstrate the existence of a rich and varied collection of communications over time.

	Advertising	Communication	Event Content	Marketing	Miscellaneous	Totals	Total for each event
Before 1	30	33	0	81	42	186	
Event 1	8	3	60	5	0	76	465
After 1	0	40	23	113	27	203	
Before 2	4	36	2	42	13	97	
Event 2	4	4	13	2	0	23	133
After 2	0	5	0	5	3	13	
Before 3	5	5	0	10	3	23	
Event 3	20	1	89	4	0	114	250
After 3	0	19	11	76	7	113	
Before 4	2	59	3	44	16	124	
Event 4	6	0	16	1	0	23	160
After 4	4	1	0	7	1	13	
Before 5	8	2	0	6	1	17	
Event 5	8	6	36	0	2	52	137
After 5	1	13	11	40	3	68	
Before 6	2	5	0	12	1	20	
Event 6	9	6	35	2	3	55	281
After 6	0	50	4	143	9	206	
Total tweets	111	288	303	593	131	1426	

Table 4: Analysis of tweets content in relation to event timing

Table 4 allows us to focus on the nature of the tweets. It not only provides further evidence of the ongoing nature of the Twitter traffic that Figure 1 has already established, but also provides insight into its content. Table 4 shows that the majority of Twitter activity is associated with marketing and advertising activities. It also shows that a significant part of the Twitter traffic is associated with Event Content; this is explored in more detail below. The volume of tweets labelled 'communication' hint at exchanges taking place between interested parties, since they are typically directed at specific people and/or organisational accounts. Looking at the final column in Table 4, we see that the first event attracted the most Twitter activity – given that it was associated with the launch of the project, this is perhaps unsurprising.

Inspection of the tweets associated with Event Content led to a more detailed content analysis using the following four sub-categories:

1. Commentary – these are tweets that help explain the situation or what was happening at the event at that exact time, for example:
   o *"username is introducing the process to the room here at #TNOFood #21June2012 the slide show is available here: http://webaddress"*
   o *"Just posted scientists' final thoughts on what was interesting/important from last night's #TNOfood Forum event http://webaddress."*
2. Quotes – phrases participants had said that were deemed interesting or provocative enough to publish online, for example:
   o *"#TNOfood username: "Will we be rich enough in 2050 to afford the food we want to eat?" We're getting poorer and our debt is massive."*
   o *"We throw perfectly good things away because of sell by dates, common sense should play a part. #TNOfood"*
3. Questions – some tweets do not fall into the above categories but quite simply just ask their followers a question in order to gain responses and opinions, for example:
   o *"Could we use sea water / grey water for flushing toilets instead of expensive drinking quality water.#TNOfood"*
   o *"Should we give up on educating "the old" and concentrate on the younger ones to get the message through about food sustainability #TNOfood"*
4. Videos/Audio – these are links to video and audio clips of participants from the events, for example:
   o *"I uploaded a @YouTube video http://webaddress username on local energy"*
   o *"http:/ webaddress @ username shares his thought on semantic web #opendata and guerilla data"*

Table 5 provides an overall summary of the event content tweet analysis in relation to event timing and Table 6 shows the distribution of event content related tweets throughout the project.

	Commentary	Quote	Question	Video	Totals
Before	3	0	1	1	**5**
During	81	95	19	54	**249**
After	21	7	2	19	**49**
Total tweets	**105**	**102**	**22**	**74**	**303**

Table 5: Overall summary of analysis of Event Content tweets in relation to event timing

Table 5 provides an overview of the varied nature of the Event Content tweets. These tweets typically occur when events are scheduled, as might be expected. There is a balance between tweets reporting event commentary and quotes from participants, closely followed by tweets pointing to video clips of participant contributions. The smallest number of tweets is associated with questions which are typically used to prompt engagement by those following

the event on social media. Like the other tweet categories, question tweets most often occur during events.

Table 6 opens up the detail of how such tweets are distributed over the duration of the project. It shows that there are tweets of event content associated with each of the events; whilst most occur at events, some appear after events.

	Commentary	Quote	Question	Video	Totals
Before 1	0	0	0	0	0
Event 1	22	23	2	13	60
After 1	8	3	0	12	23
Before 2	1	0	0	1	2
Event 2	0	4	8	1	13
After 2	0	0	0	0	0
Before 3	0	0	0	0	0
Event 3	22	45	5	17	89
After 3	8	1	1	1	11
Before 4	2	0	1	0	3
Event 4	12	1	1	2	16
After 4	0	0	0	0	0
Before 5	0	0	0	0	0
Event 5	13	8	2	13	36
After 5	2	3	1	5	11
Before 6	0	0	0	0	0
Event 6	12	14	1	8	35
After 6	3	0	0	1	4
Total tweets	105	102	22	74	303

Table 6: Analysis of Event Content tweets by category and in relation to event timing

Analysis of three themes: food deserts, semantic web and energy

Our analysis proceeded with an exploration of three key themes that emerged from the discussions in the earlier workshops, namely 'food deserts', 'semantic web' and 'energy'. Table 7 shows an overview of the tweet counts associated with the three themes. First, we see that discussion of these themes is not restricted to the event at which they were surfaced. Our data shows that they have a 'life' before, during and after a particular event, and this demonstrates the journey of the tweets over time. Second, we find that the topic of tweets during the scenario project does not remain on the single focal issue (i.e. the future of food for the conurbation around Birmingham) but rather a series of sub-topics which surface and are discussed at different points over the duration of the project.

	Food desert	Semantic web	Energy	Focus of event
Before 1	2		1	
Event 1	3		2	Food futures
After 1	10			
Before 2	6		9	
Event 2	2			Food poverty
After 2			1	
Before 3				
Event 3		3	3	Food futures
After 3	5	6	5	
Before 4		5	1	
Event 4		4		Factor selection
After 4				
Before 5		11		
Event 5		21		Semantic web
After 5			6	
Before 6				
Event 6	1		27	Distributed energy systems
After 6		2	21	
Total tweets	**29**	**52**	**76**	

Table 7: Overview of Twitter activity associated with key themes

Tables A1-A6 in Appendix A show the timing of the tweets against the five main content categories introduced earlier. These tables illustrate that the collection of tweets consists of different contributions, as participants establish and later return to key themes. Some of the contributions focus on the content of the topic, and there may be a first tweet that is key to raising a new issue. This will typically be followed by further contributions that remind people of the content of the topic, promote the topic further, remind participants of its importance or when it will be discussed next, i.e. a range of contributions to raise interest and promote engagement.

We now explore the tweets associated with each key theme in some more detail, considering them in the order in which they emerged during the project.

The first notable theme emerged during the first workshop and concerned the controversial topic of *food deserts*, i.e. urban areas in which it is difficult to buy affordable or good-quality fresh food (see [4] for further commentary on food deserts in Birmingham). Our analysis summarised in Table 7 shows that that discussion continued between the first and second events, and it was revisited at the third event. Table A1 in Appendix A provides some additional insight into the patterns of Twitter activity, showing that tweets were evenly spread across event content and promotional categories. Table A2 gives some brief examples of relevant tweets; 'RT' indicates when a message has been retweeted.

The second key theme to emerge during the project concerned the topic of the *semantic web*. Table 7 shows that this issue was raised at the third event, in relation to its potential impact

on supply chains for food in the Birmingham area (again, further detail is available on the website [4]). Most tweets on this topic occurred during the workshop dedicated to the theme; however Table A3 shows that there was related Twitter activity occurring between Events 3 and 5, which was quite evenly split between promotional activity and other communication. Comments relating to the semantic web were still being shared after Event 6, showing that this theme was of ongoing interest to participants. Table A4 illustrates how the topic under discussion is spread through the use of re-tweeting (indicated by 'RT') – a number of the tweets are duplicates and near-duplicates of an original tweet but made by different people. This illustrates how postings about the topic can spread to a wider audience via the potentially different networks of the tweeters.

The third theme that we have chosen to highlight here is *energy*. Our analysis in Table 7 shows that this theme is an enduring one, running through all six events, and peaking in Event 6. Table A5 shows that the Twitter data in the earlier part of the project focused on promotional and communication activity, with some posting of event content. However, the peak of activity around Event 6, which was dedicated to this theme, was spread across both event content and promotional activity. Table A6 shows that for this theme, we have fewer retweets and more 'fresh' contributions as the six events progress.

Comparing across the three themes, our analyses illustrate that whilst the 'lifetime' of the sub-topics overlap each other, they have varying lifespans in terms of their tweeting patterns: the first sub-topic (food deserts) is focused on Events 1-3; the second sub-topic (semantic web) is focused on Events 3-5. In contrast, the final sub-topic (energy) ran across all events, peaking in the final, sixth, event. From this evidence, we suggest that the longer a topic is tweeted about, the more time there is for a 'blend' between face-to-face discussion and online exposure. In addition, the longer duration provides opportunities for the serialisation of the discussion and the evolution of ideas.

5. Discussion

In this section we reflect on each of our research questions in turn.

Is there an ongoing strategic conversation taking place between and/or within workshops, as evidenced by Twitter data?

Our dataset provides evidence of a continuous stream of tweets during the project; they are not confined to the duration of the workshops themselves, as might have been expected. It is our proposal that this collection of tweets, contributed from a group of individuals over a period of time, represents an ongoing conversation concerning the focal issue of the project. Our analysis demonstrates that a rich and varied conversation has taken place both during and between scheduled workshops and events. In the words of the project founder, the role of social media was to start conversations:

> *".. it's about trying to start conversations. It's not about pushing out, so it's not broadcast…. it's about, this is really interesting, then saying to somebody else who isn't*

there, look, notice this, what do you think about it? …so you're putting out ideas for conversations … Conversation starters, absolutely".

What is the nature of the conversation taking place, e.g. is it focused on a single topic or does it have multiple strands?

Our research explored the nature of the conversation taking place during the project and found that it included tweets that were aimed at advertising and marketing the project (often, but not solely, before the events); tweets sharing event content or asking questions related to the project topic (often, but not always, during the events themselves); and more general communication and discussion on relevant topics between interested parties. This evidence points to a varied conversation with multiple strands which can be classified in terms of their influence on the development of the scenarios. For example, indirect conversation strands relate to keeping the project as a whole alive in the minds of stakeholders, as well as promoting the project to potential newcomers; tweets aimed at advertising, marketing and general communication fall into this category. In contrast, direct conversation strands relate to content that potentially influences the development of the scenarios, such as tweets sharing event content or asking questions related to the project topic.

In an interview with one of the authors, the project founder commented on the emergent nature of the conversation taking place:

> *"…Anything that you put out to be broadcast will be lost, so it's actually conversation, and it's you noticing what other people do. So afterward I would notice what someone else has said and follow a train of thought, so I will find all sorts of stuff. Or two months later I will be invited to something because somebody had heard about it…interesting things will happen, you can't predict what they're going to be…I'm in the business of ideas generation…I think if you're in the business of ideas and ideas generation then social media is a very good way of doing it…"*

Who is involved in the strategic conversation?

The data suggests that on this project, Twitter was mostly used by existing 'activists', rather than by people new to the project; for instance, some participants did not tweet. There is some evidence of emerging engagement by new experts and interested parties; this data is worthy of further analysis in future to explore the extent of this. We looked for evidence that the use of Twitter encouraged wider participation in the project, and noted that there is little evidence of incoming Twitter activity fed live into forum events; it is possible that this could have been encouraged by more prompts from the project team to encourage engagement. We would also note that various definitions of 'engagement' are possible; for instance, our analysis has not allowed us to observe 'passive' participation, such as people who were reading the material generated but who chose not to interact. The project founder argued strongly for the benefits of wider engagement via social media:

> *"None of it could have happened without social media because what social media does … it's got the issues that we discussed in the scenarios into a much, much wider*

social domain so that people know about it. People talk about it. They may not be terribly aware that it's come from us, I don't think it matters very much…"

"… the interesting thing about this scenario is that it's, and the social media attached to it, is that it's got all sorts of people who wouldn't normally think in the same room as other people let alone the same kind of, it's not so much the same room because I invite them in but I have met a very large number of people and people approach me because they know about all of this lot because of vlogging, through video interviewing through Twitter… it has got different types of people involved so it's indirectly informed what we do and it means an awful lot of people know about what we're doing…"

Does the conversation contribute to the development of scenarios within the project? If so, how?

Within the project, we have traced the evolution of three themes that emerged during the ongoing conversation which ultimately were incorporated into the scenario project report and a number of other related publications. These themes had not been anticipated in advance of the project; in each instance the data shows that the theme was raised by an individual participant, and momentum was seen to build around discussion of the theme as it attracted the interest of other participants. The discussion of the theme was not confined to a single event; the conversation surrounded more than one event, and was not confined to the duration of the face-to-face events themselves – it also took place before and after them. We see participants choosing to re-tweet messages, as they decide to share more widely the contributions that they find to be of most interest. The sub-topics of the discussion changed over time, appearing to attract attention for a period of time before declining again.

Table B1 in Appendix B illustrates how the discussion of each of the three themes (food deserts, semantic web and energy) influenced the scenario process, and how the three themes made their way into a range of outputs and publications arising from the project (for the full repository of documents, see http://newoptimists.com/publications/). The project founder commented:

"… if you got to the New Optimists publications page, there's a list of all the publications there…so we've produced two documents that have gone into the Birmingham planning process, by law they've got to be considered. And we've also had an input into the 'FairBrum' thing which is about social inclusion. They are, all those things are unpredictable, but they wouldn't have come about without social media".

Some of these publications were directly linked to the project (e.g. the Narrativium project and the Birmingham 2050 Scenarios Project Report). Other publications aimed to contribute to ongoing external reviews and conversations, and drew on the work of the scenario project to do so; for example, the New Optimists response to a development plan for the city of Birmingham, and to the Elliott Review[1] into the security of food supply chains. Again, in an interview with one of the authors, the project founder argued strongly for the importance of the conversations within the scenario project in achieving impact on decision-makers:

"So that's a classic example of how the network this scenario planning project has led to us reporting back to the Elliott Review[1], it's led to … the Birmingham Food Council happening, it's led to 'Growing Birmingham' which is the information hub for people who grow their own food…now none of this would have happened without (the) scenarios project…"

What can be learnt about the current or potential future use of Twitter, or other social media, to support a scenario project?

Our analysis leads us to reflect on what might, in the future, constitute effective practice around the use of Twitter (and potentially other social media) during scenario development. We return to the classification of conversation strands suggested above, differentiating between strands that had a direct impact on the development of the scenarios and those with a more indirect impact. Table 8 below summarises the evidence found within the case study concerning the use of Twitter, along with additional suggestions for how it could be further used to support scenario projects.

With regard to indirect conversation strands, our research found strong evidence from the Twitter data of their existence throughout the duration of the project, and notably between scheduled workshops and events, through the use of tweets aimed at marketing, advertising and other communications. Thus we suggest that the use of Twitter offers opportunities to support the activities associated with running a scenario project, such as encouraging wider participation and engagement with the project; drawing people's attention to the project; and reminding participants of the project activities.

In terms of direct conversation strands, our research also found strong evidence of the use of Twitter to 'signpost' interested participants towards materials developed within workshops or events, such as video clips explaining key concepts. Regular tweeting and re-tweeting links to such materials additionally supports serialisation of strategizing activity, i.e. the re-visiting of ideas over a series of episodes. We found evidence of the use of Twitter in attempts to extend participation to those 'outside the room' through questions and prompts, inviting views and feedback on ideas and issues under discussion or content posted. We suggest that such use of Twitter may be most appropriate in the more 'divergent' stages of the scenario process where wide participation and idea generation are encouraged to support the successful outcome of the project. Examples would include the brainstorming of external factors that might drive the scenarios, the generation of themes behind possible scenarios, and the generation of strategic options for the focal organisation. In this instance, however, we failed to find strong evidence of wide scale engagement beyond the core of 'activists'. This leads us to question whether, in order to achieve wider participation, the project team would have required a clearer strategy for getting 'outsiders' interested in the project and creating a following; we did not find strong evidence of such a strategy on this occasion, e.g. a planned schedule for tweeting before, during and after the events.

	Evidence from the case	**Further suggestions**
Indirect support	Use of a project-related username (@newoptimists) as a contact point for the project.	Extensive and planned promotion of the identity of the project (and its contact details) via social media, prior to commencement of the scenario exercise.
	The ability to follow others and be followed – helps to set up and also to expand relevant networks.	Systematic identification of relevant networks prior to the commencement of the scenario exercise, and engagement with them via social media.
	Use of a hashtag as a point of reference or 'beacon' for the project (#TNOFOOD).	Extensive and planned promotion of the identity of the project (and its contact details) via social media, prior to commencement of the scenario exercise.
	Tweets and re-tweets: promotional activity in support of the project.	A systematic and well-resourced approach to social media strategy, e.g. the identification and distribution of promotional materials most likely to attract wider interest.
	Tweets and re-tweets: networking activity, e.g. expanding contacts through the use of re-tweeting.	A systematic and well-resourced approach to social media strategy, e.g. the identification and engagement of new contacts as the scenario project progressed.
Direct – within workshops/events	Tweets: posting materials, e.g. viewpoints of participants, weblinks to videos, audios, and relevant websites.	Tweets: Use of prompts or direct questions to invite and encourage input to specific activities, e.g. brainstorming factors, prioritisation of factors, and development of scenario themes. Given the constraints of Twitter (such as the limited number of characters), encourage supplementary use of alternative forms of communication such as other forums or email.
	Other online activity: evidence of project team posting to blogs, Facebook or other social media within the project, but little evidence of substantial incoming responses.	Inviting and supporting participation in other online media, e.g. forums

Direct – between workshops/events	Tweets and re-tweets: circulating workshop materials.	A systematic and well-resourced approach to social media strategy, e.g. the identification and distribution of materials most likely to attract wider interest.
	Tweets and re-tweets: signposting repositories, e.g. websites, forums and storage of workshop materials.	A systematic identification of contacts and networks with a potential interest in the materials, prior to the commencement of the scenario exercise, and engagement with them via social media to stimulate interest in project materials.
	Tweets: inviting feedback about issues under discussion or workshop materials.	A systematic identification of relevant contacts and networks prior to the commencement of the scenario exercise, and engagement with them via social media. Use of prompts and direct questions, to encourage a response.

Table 8: Summary of how Twitter can directly and indirectly support scenario projects.

There are phases of the scenario method where Twitter is not an appropriate support tool in isolation, for example the discursive phases which typically involve 'significant negotiation and debate amongst participants' ([58] p. 725). Each tweet is restricted to 140 characters, thus someone wanting to provide a complex or detailed explanation of their viewpoint would not be able to do so easily. Rather, using Twitter to point participants to a forum where a more detailed debate could take place would be an appropriate use.

6. Conclusions

This paper has considered the use of Twitter, with a particular focus on the early stages of a scenario project in a public policy setting. Our research analysed the tweets of participants in the project and found evidence of tweeting throughout the project. Tweets were categorised according to both their timing in relation to project events and their content. The analysis demonstrated that Twitter activity formed a wide distribution in relation to both of these categories. A further analysis of tweets relating specifically to 'Event content' was undertaken.

As a body of evidence, the collection of tweets demonstrates the potential for Twitter to support the ongoing strategic conversation beyond formal face-to-face events such as workshops. Returning to earlier comments around the criteria for good strategic conversations [22, 23], we suggest that the use of Twitter has the potential to support the serialisation of such conversation between workshops and other face-to-face events, hence allowing for the development of a common language, an alignment of ideas, a willingness to

engage in rational argumentation, and the evolution of strategic ideas. The data shows that the tweets do not represent a tightly focused conversation on a single topic; on the contrary, a number of unexpected sub-topics gained in popularity during the exercise (the three themes discussed earlier were food deserts, semantic web and energy). The project sponsor was also open and responsive to themes that emerged during the conversation, and this led to extended discussion around themes that were not pre-planned but were felt to be important – providing further evidence of the evolution of the participants' ideas.

We also differentiate between conversations relating directly and indirectly to the development of scenarios, having found evidence from Twitter data supporting both direct and indirect conversations. We suggest that more work is needed to explore effective approaches to 'blending' face-to-face and online input, with the aim of supporting good strategic conversation both during and between the face-to-face activities. Future research, with wider opportunities for data gathering during a number of phases of a scenario project, would allow for the contribution of Twitter to be more extensively evaluated, for instance to explore the potential benefits of social media usage in terms of widening project participation and/or increasing the efficiency or effectiveness of data gathering (such as the brainstorming of external factors). Both of these goals – the widening of both participation and data gathering – are likely to be particularly important and challenging for scenario projects taking place in a public policy setting and involving a wide array of stakeholders and multiple organisations. Birkinshaw [59], elaborating on the idea of Open Strategy [60], builds a framework that includes 'crowd-based input to decision-making' and 'collective buy-in and action'; we suggest that a 'blended' approach to scenarios, that embraces engagement from participants that are either physically or virtually engaged, is an important one in this context. As well as having theoretical implications for researchers, this research agenda around the 'blending' of face-to-face and online input has practical implications for those designing and running scenario projects, as it has the potential both to support a widening of participation in such exercises and to address the problems of 'removal' following workshops by encouraging serialisation of the conversation. We have identified some ways in which the use of Twitter in scenario projects might be improved in the future, and this could give further consideration to issues of both addressing wide participation and the problems of 'removal'; further research on these questions is likely to be beneficial.

Our perspective on the scenario process has been a holistic one, in that we have explored the periods of time between face-to-face events as well as during them. This is in contrast to much of the literature on scenarios, which focuses on the detail of the steps involved in generating the scenarios themselves. Connecting with existing work on serialisation (e.g. [43]), our data supports the idea that social media can be used to keep the strategizing activity going over time and in-between face-to-face workshops and events that might make up a scenario process, as there is clear evidence of tweeting by organisers and participants on a range of topics – and this occurs before, during and after each of the series of events. Hernes and Irgens [61] observe that managers need to hold a "Janusian" focus (p. 263), keeping a continuous eye on past, present and future as they seek to achieve learning under continuity, which they define as "mindfully engaging in opportunities while simultaneously keeping things on track" (p. 253). This focus is central to participation in effective scenario planning exercises, when managers are asked to reflect on where the organisation is coming from, where it is now, and where it might be in the future. To support this "Janusian" focus over a

series of face-to-face activities, we suggest that a 'blended' approach to scenario planning exercises, i.e. an approach that makes use of a mix of both face-to-face and online activities over the duration of the project, may be an effective one; further research could usefully explore the impact of different 'blends' of face-to-face and social media activity – which may of course include blogs and a wide range of e-technologies.

A possible limitation of the current study is the ability afforded by Twitter data to gain a full and rounded picture of the broad development of a strategic conversation. Our data provides evidence of a series of inputs or contributions to a conversation from a number of different participant sources. However, future research might seek to gain a more complete overview of the path of a strategic conversation. This might include a fuller exploration of a range of other social media alongside Twitter.

As a future research direction, there is scope to explore the contribution of social media to such projects in terms of both content and process. We note, for example, that Raford's [28] work focuses principally on the use of technological platforms to support the running of the scenario process, in terms of the generation and manipulation of content. We seek to develop a contribution at a broader level, around the process management of such projects as well as considering the content of the conversation itself. We are mindful of McLuhan and Fiore's [62] mantra, that "the medium is the message". They argue that the form of a medium embeds itself in the message, creating a symbiotic relationship by which the medium influences how the message is perceived. An exciting research question, going forward, concerns how the nature and process of the conversation (i.e. over social media, such as Twitter) affects the way that participants contribute to such an exercise, and absorb other people's contributions.

Appendix A

	Event content	Advertising	Marketing	Communication	Miscellaneous	Total
Before 1			2			2
Event 1	3					3
After 1	5		4	1		10
Before 2	1	2	2	1		6
Event 2	1	1				2
After 2						
Before 3						
Event 3						
After 3	3		2			5
Before 4						
Event 4						
After 4						
Before 5						
Event 5						
After 5						
Before 6						

Event 6	1					**1**
After 6						
Total tweets	**14**	**3**	**10**	**2**	**0**	**29**

Table A1: Tweets relating to Food Deserts –
Analysis of tweet content in relation to event timing

Event 1	Interview with *username* asking whether Birmingham's poorest live in 'food deserts'. Recorded at the first New... http:/ *webaddress*
Event 1	RT @username: Do Birmingham's poorest live in "food deserts" ? http://*webaddress* #tnofood #brum
After 1	Comments on Video Do Bham's poorest live in food deserts http://*webaddress* @ *username* @ *username* @ *username* l #tnofood
After 1	@ *username* RT @ *username*: RT @ *username*: Video: Do Bham's poorest live in "food deserts"? http:/ *webaddress* @ *username* #tnofood
Before 2	s.a. #opendata, food deserts & supermarkets http://*webaddress* @ *username*: *username*: A proposal to supermarkets http://*webaddress*
Before 2	@ *username* @ *username* @ *username* @ *username* @ *username* - looking forward tomorrow #fooddeserts discussion
Event 2	*username* is recapping to people what a Food Desert is - Do you know? http://*webaddress* #TNOfood
After 3	RT @ *username*: Bham 2050: Pathways to Famine, Pathways to Feast : Forum mtg on #food deserts http:/ *webaddress* #TNOfood @username ...
After 3	Bham 2050: Pathways to Famine, Pathways to Feast : Forum mtg on #food deserts http://*webaddress* #TNOfood @ *username* @ *username*
Event 6	@ *username* says researchers at *username* have mapped food deserts in Birmingham as a result of #tnofood work

Table A2: Examples of tweets relating to food deserts

	Event content	Advertising	Marketing	Communication	Miscellaneous	Total
Before 1						
Event 1						
After 1						
Before 2						
Event 2						
After 2						
Before 3						
Event 3	3					**3**
After 3	1		4	2		**6**

	Event content	Advertising	Marketing	Communication	Miscellaneous	Total
Before 4			3	2		**5**
Event 4	1			3		**4**
After 4						
Before 5		7	3	1		**11**
Event 5	14	7				**21**
After 5						
Before 6						
Event 6						
After 6			1	1		**2**
Total tweets	**19**	**14**	**11**	**9**	**0**	**52**

Table A3: Tweets relating to Semantic Web
– Analysis of tweet content in relation to event timing

Event 3	*username* on linked data the semantic web and local food production Birmingham http://*webaddress* #thnofood #opendata
After 3	Will the semantic web radically change our food supply system? http://*webaddress* #opendata #semanticweb #linkeddata #TNOfood @Bham_FOE
After 3	RT @ *username*: Will the semantic web radically change our food supply system? http://*webaddress* #opendata #semanticweb #linkeddata ...
After 3	RT @ *username* Will the semantic web radically change food supply system? http://*webaddress* #opendata #semanticweb #linkeddata #TNOfood
Before 4	RT @ *username*: RT @username Will semantic web radically change food supply? http://*webaddress* #semanticweb #linkeddata #opendata
Event 4	Showing video of @username talking #semanticweb and food supply system at previous #TNOfood Forum: http:/ *webaddress* ^GW
Event 5	http:/ *webaddress* @ *username* shares his thought on semantic web #opendata and guerilla data
Event 5	Enjoying @ *username* introduction to discussion of semantic web and food supply chains in #SmarterCities at #TNOfood http:/ *webaddress*
After 6	Was the #semanticweb mentioned at all? @ *username*; @ *username* #Ghana http://*webaddress* #smallholders #scalingup

Table A4: Examples of tweets relating to Semantic Web

	Event content	**Advertising**	**Marketing**	**Communication**	**Miscellaneous**	**Total**
Before 1					1	**1**
Event 1	2					**2**
After 1						

Before 2			7	2		**9**
Event 2						
After 2			1			**1**
Before 3						
Event 3	3					**3**
After 3			4		1	**5**
Before 4			1			**1**
Event 4						
After 4						
Before 5						
Event 5						
After 5		1	3	2		**6**
Before 6						
Event 6	19	8				**27**
After 6	3		16	2		**21**
Total tweets	**27**	**9**	**32**	**6**	**2**	**76**

Table A5: Tweets relating to Energy – Analysis of tweet content in relation to event timing

Event 1	#TNOfood Waste a lot of food in UK. Lots of food is energy rich which could be harnessed and recycled for other applications in society. ^GW
Event 1	@ *username* waste with high carbohydrate content, animal fats for eg, cd have energy extracted #TNOfood #EBRI
Before 2	@ *username*: @ *username* - yes bioenergy has to be part of solution
Before 2	Will the lights go out? Bioenergy for #Brum, nuclear energy for the UK? http://*webaddress*
Event 3	food waste to energy to food. | The New Optimists http://*webaddress* #tnofood #brum
Before 4	@ *username* briefing regional businesses on opportunities w bioenergy. 30th April 10:00 to 16:00 @ *username* http:/ *webaddress*
Before 4	Salad bags: 57 calories of energy for every 1 calorie of food. http:/ *webaddress* #statsWhichShameHumanity
After 5	Wind power is currently uneconomic - this will change when we have much higher energy costs
Event 6	hearing from @ *username* about how finding radical ways to cut #brums energy use are being sought in the council #tnofood

Event 6	distributed energy not just commerical - home generated and smart grids will change every building in #brum #2050 #tnofood: username
Event 6	Tonight's #TNOFood discussion of local energy systems is fascinating; wish I was there but will enjoy @ *username* social media reporting
After 6	Communities taking ownership of their own waste and energy ? and thereby making the world a greener place:... http://*webaddress*
After 6	RT @ *username*: @ *username* #TNOfood: Community-led, community-owned district energy systems: http://*webaddress* @ *username*

Table A6: Examples of Tweets relating to Energy

Appendix B

Table B1 - Publications that made reference to three of the key themes emerging during the scenario project

Title of Output	Source of Output (all accessed online on April 12th 2017)	Theme quoted in Output	Quotation linked to Theme
Narrativium Project (Richards, E. and Richards, K.)	http://aldsys.co.uk/newoptimists/wp-content/blogs.dir/22/files/2011/07/NarrativiumProject_One-family_Four-stories.pdf	*Food deserts*	"The most deprived households are increasingly concentrated in small areas of acute need. Food deserts exist in which cheap, nutritious food is virtually unobtainable…"
		Energy	"Energy Scenario 2050: Having failed to develop sufficient technologies to plug the energy gap, the UK now experiences rolling blackouts…"
Birmingham 2050 Scenarios Project Report	http://aldsys.co.uk/newoptimists/wp-content/blogs.dir/22/files/2013/06/The-Birmingham-2050-Scenarios-Report_June-2013.pdf	*Food deserts*	"In some wards in the city, there are …places where you can only buy high density high calorie foods stuffs …. it is impossible for some people in some wards to access a healthy diet…"
		Energy	"Could a high proportion of our energy really be supplied from within our boundaries by 2050, fuelled by the detritus of the million or so of us citizens?"
New Optimists Response to the draft 'Plan 2031' Birmingham Development Plan	http://aldsys.co.uk/newoptimists/wp-content/blogs.dir/22/files/2011/07/NewOptimists_Response_Plan-2031-BirminghamDevelopmentPlan.pdf	*Energy*	"The aim of this submission is to encourage and highlight the importance of waste management treatment and energy production at a local level …"
The New Optimists Forum Response to Places for the Future – Supplementary Planning Document	http://aldsys.co.uk/newoptimists/wp-content/blogs.dir/22/files/2011/07/NewOptimists_Response_Places4TheFuture_SPDDoc.pdf	*Semantic web*	"We identify, access and share data on local food supply chains to …enable Birmingham citizens to take advantage of any radical changes in food supply systems when emerging or nascent technologies, such as the semantic web, create new opportunities for growers, distributors and consumers".

		Energy	"The promise of this technology is a distributed carbon-negative energy generation system using biowaste to produce electricity and heat…"
Pathways to Feast (Richards, E.)	http://aldsys.co.uk/newoptimists/wp-content/blogs.dir/22/files/2012/03/Pathways-to-Feast.pdf	*Food deserts*	"…a topic that had arisen at the New Optimists Forum event on 2nd November, namely food deserts and poverty in Birmingham".
		Energy	"The government invests in transport infrastructure fuelled by alternative energy sources…"
Pathways to Famine (Richards, E.)	http://aldsys.co.uk/newoptimists/wp-content/blogs.dir/22/files/2012/03/Pathways-to-Famine.pdf	*Food deserts*	"Food deserts expand as access to, and distribution of nutritional foodstuffs becomes increasingly limited and erratic".
		Energy	"Failure by the government to invest in transport infrastructure and alternative energy sources."
Factor Analysis, and Summary factor analysis	http://aldsys.co.uk/newoptimists/wp-content/blogs.dir/22/files/2011/07/Summary-FactorAnalysis_23rdMay2012.pdf; http://aldsys.co.uk/newoptimists/wp-content/blogs.dir/22/files/2011/07/Factor_Analysis-May2012.pdf	*Semantic web*	"Factors about technologies: semantic web and other data system developments"
		Energy	"Factors about energy: UK Government policy on renewable energy"
Agroecology and Urban Farming	http://aldsys.co.uk/newoptimists/wp-content/blogs.dir/22/files/2011/07/Draft_Agroecology-urban-farming.pdf	*Food deserts*	"It was a meeting on the issue of food poverty/food deserts in Birmingham…"
		Semantic web	"The semantic web might well radically change, even destroy the current supply chain…"
		Energy	"Even if Birmingham does become largely energy self-sufficient, the impact of the national energy gap would be felt hard here too, really hard."

Footnote:

1. https://www.gov.uk/government/publications/elliott-review-into-the-integrity-and-assurance-of-food-supply-networks-final-report

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