Forest Research

Social Media and Forestry:

A Scoping Report

Photo by adam (THEO) on Flickr

Amy Stewart, Bianca Ambrose-Oji and Jake Morris

The Research Agency of the
Forestry Commission

Contents

Acknowledgements

This scoping study was funded by the Forestry Commission (FC). We are grateful for the feedback, guidance and information various individuals have provided us with from within the FC to help inform this piece of work. In particular, thanks go to the FC social policy teams in all three countries (in particular Helen Towsend, Mark Durk, James Ogilvie and Barbara Anglezarke), FC and FR Communications professionals (in particular Steve Penny, Allan Tanner, Mark Funnell, Louisa Aveyard and Colin Morton).

1. Executive summary

Social media can be defined as a collection of internet-based applications that facilitate social interaction via the creation and exchange of user-generated content (Wikipedia, 2012a). They are characterised by two- or many-way communications as opposed to traditional one-way corporate communications. The growth in uptake and use of social media, and the different media channels now available (and the fact that they are constantly evolving) has significant implications for the way in which the Forestry Commission (FC) communicates with stakeholders and the wider public. The FC is beginning to think more strategically about the value of social media to the organisation, how it can be more effectively utilised and what objectives and policy goals it can be used to help achieve.

This scoping report is therefore intended to help inform thinking around these issues and provide a basis for identifying specific future research needs to support the FC's ongoing implementation of, and engagement with social media. Specific objectives are to:

1. Describe some of the current major social media channels of relevance to this study;
2. Review the literature for evidence on the potential application of social media to support the three themes of the study – information gathering, empowerment and democratisation, and behaviour change;
3. Highlight the challenges associated with the use of social media and the implementation of corporate social media strategies;
4. Identify potential future research topics and questions.

This section provides a brief overview of the findings of this study (although it does not provide a synopsis of objective 1 (section three of the report), since this information is not usefully abbreviated).

1.1 Literature review

1.1.1 Gathering information

- Social media have great potential for improving planning and spatial decision-making processes through helping to facilitate Public Participation GIS processes and teledemocracy.
- GPS-enabled devices also provide a valuable means of gathering data from the public through Volunteered Geographic Information.
- Examples of public policy-related data mining using social media are largely limited to the health field and around disease outbreaks.

- Social media are increasingly being used to harness public engagement with key scientific questions and to enable the public to work alongside professional scientists to make valuable contributions to the gathering and analysis of scientific data.
- A key application of technology-mediated citizen science relates to public involvement in monitoring natural phenomena and uploading data relating to observations of the natural environment.
- Crowd-sourcing can be defined as the outsourcing of an activity or activities to a network of external people.
- Social media have been used in crowd-sourcing initiatives in the health and heritage fields, as well as in software development.

1.1.2 Empowerment and democratisation

- Questions are being posed in the academic literature around the degree to which social media: are changing the relationships between public servants and communities or individuals; can widen participation and increase citizen engagement across social gradients, diversity and equality, and help overcome the “digital divide”; impact upon individual behaviours and encourage active citizenship rather than just “clictivism”.
- Much of the evidence concerning the development of e-democracy and participation comes from the United States and there is little evidence related to the environmental, land-based or forestry sector available.
- The forms of engagement/empowerment and democratic civic action that government agencies have involved themselves with through the use of social media include: decision-making, co-production, information provision, mobilisation, and civic transactions.
- Overall, empirical evidence suggests that so far empowerment and e-democracy show poor results in the interaction between the public and public service agencies.
- Using social media for information provision is more successful, and there is a low but growing level of transactional behaviour where the public is better able to focus complaints or access necessary services.
- Evidence suggests that only around 30-40% of the population can be reached by e-democracy means and these are the segments of society that already actively socialise and/or campaign online.
- Socio-demographic factors of age, ethnicity, income and political or civic attitudes have been shown to make a difference to social media usage but as predictors of participation, they do not mirror off-line participation patterns.
- Different empowerment objectives may (and more importantly should) influence choice of social media channel.
- Little work has been undertaken to understand the kinds of social media interactions that people want to have with government bodies.

1.1.3 Behaviour change

- The evidence base on the behaviour change potential of social media is weak and currently only in its infancy. That which exists is mostly concentrated in the health and environmental spheres.
- Social media campaigns can definitely increase reach but, as yet, robust evidence does not exist to prove that they can significantly and sustainably affect behaviour change.
- Although few interventions are taking advantage of it currently, social media could be particularly useful with respect to behaviour change because of its capacity to facilitate the profiling of target users and their information preferences.
- It has also been theorized that social media could be useful for behaviour change because it allows for free-choice learning, social learning, and collective identity formation.
- However, questions remain as to whether social media is likely to have the most significant impact on those already seeking to change their behaviour; whether online activity will change behaviour offline; and whether technology is the best way to engage people in environmentally responsible behaviour.

1.2 Challenges to using social media

Section five of this report highlights that while there is great potential for government bodies to utilise social media to help them more effectively deliver their objectives, there are also numerous challenges to effective implementation. These include:

1. Quality and security of, and control over content and data
2. Bureaucratic processes, procedures and institutional norms
3. Access, representation and digital literacy
4. Understanding and meeting the needs of audiences and external users
5. Resourcing and managing relationships and risk over time.

1.3 Potential future research questions

RQ1. How far and under what circumstances can social media increase access to FC key stakeholder groups and enable more active and legitimate relationships with citizens and partners? Are there stakeholders or protected characteristics that are better served or disadvantaged by the FC's use of social media? How important is this?

RQ2. What are the risks (i.e. system security, reputational, financial, political and legislative) associated with different forms of social media used (or which could be used) by the FC?

RQ3. What types of social media best suit the specific operational and delivery needs associated with different projects, site-based objectives and strategic policy issues?

RQ4. What types of public feedback and input do (could) the FC value as land managers or in the development of forest governance, and what kinds of social media best capture these interactions? How far can these public inputs be used as legitimate or representative opinion?

RQ5. What do the public want in terms of the social media provided by FC? What are the demand side issues for key stakeholder groups?

RQ6. How can the FC's use of different social media types and channels be evaluated and how can we ensure that evaluation informs the effective use of social media going forwards? What has the FC and the wider forestry sector learnt about best practice around the use of social media, and how can this learning be shared?

2. Introduction

2.1 What is social media?

The focus of this study is largely around social media which can be defined as a collection of internet-based applications that facilitate social interaction via the creation and exchange of user-generated content (Wikipedia, 2012a). The use of social media has been facilitated by the introduction of Web 2.0 in 2004, which can be described "as the version of the web that is open to ordinary users and where they can add their own content" (Brown, 2009: 1). When the web was first introduced in the 1990s it was largely controlled or utilised by computer programmers and graphic designers. In 2004, nothing fundamentally changed in terms of the technology, but what started to change were people's attitudes and perceptions of the web around how they could use it (Brown, 2009: 2). As a result, ordinary internet users began to create their own Web 2.0 sites and social media were borne.

Alongside social media, this report also incorporates a focus on other recent technological developments such as mobile internet technology (i.e. smartphones and tablet computers) which allow for the use of social media almost anywhere and at any time, and facilitate innovative new forms of communication between organisations and the general public through software applications and the use of features such as Global Positioning System (GPS) tools.

2.2 Background

The growth in uptake and use of social media, and the different media channels now available (and the fact that they are constantly evolving) has significant implications for the way in which the Forestry Commission (FC) communicates with stakeholders and the wider public. In order to maintain current levels of engagement and communications, and ensure that corporate communications remain relevant and do not become outdated and ineffective, the FC has to keep up-to-date with the latest developments in this field and the way in which people are using social media in their daily lives.

Furthermore, social media offer exciting opportunities to change and improve the way the FC communicates externally and engages with the public. Social media are defined by their interactive functional capacity and are therefore characterised by two- or many-way communications, rather than more traditional one-way corporate style communications. For government organisations, interactive conversations with the public can be useful for numerous reasons, not least in terms of finding out public perceptions on certain issues, activities and policies, and how operations and service delivery could

be improved. At the end of the day, even if the FC does not engage with social media, conversations about it, and about topics relevant to its objectives will take place on social media platforms regardless. As Brown (2009: 18) maintains, “Ultimately, the choice for organizations is a simple one: they either take part in these conversations or they don’t. What they have to realize though is that if they don’t participate in these conversations they won’t simply go away. The dialogue will go on without them.”

The Forestry Commission is currently engaged in the process of drafting a social media strategy at the GB level and individual countries are also thinking about the best ways in which to use social media. For example, Forestry Commission Scotland are currently producing guidance for staff on how to decide whether social media is right for promoting their own work, and which tools are best for what purpose. In essence, the FC is beginning to think more strategically about the value of social media to the organisation, how it can be more effectively utilised and what objectives and policy goals it can be used to help achieve. Although social media has potential applicability to a range of FC policy objectives and business functions, such as for recruitment of personnel, or to help staff do their own jobs better, this study concentrates on three main themes (which have been identified by FC social policy advisors as of interest) or potential applications, namely to:

- Gather information and evidence in order to help better inform and shape research, policy and practice;
- Empower individuals and communities and improve public engagement, participation and active citizenship;
- Foster behaviour change, such as pro-environmental behaviour or behaviour contributing to individual health and well-being.

This scoping report is therefore intended to help inform thinking around these issues and provide a basis for identifying specific future research needs to support the FC’s ongoing implementation of, and engagement with social media. The main intended audiences for this report are the FC social policy advisors across GB and their colleagues working in the communications field. However, it may also be of interest to wider audiences both within the FC and the not-for-profit/public environmental sector who would find use from a reference guide to the different types of social media available, and the potential these have for different public, private and civil society organisations. In particular, section three could be useful for anyone engaged in external or internal communications. This research also has close links with other studies being undertaken by the Social and Economic Research Group in Forest Research on behaviour change, monitoring and evaluation, community engagement and citizen science.

2.3 Objectives

Specific objectives are to:

- Describe some of the current major social media channels of relevance to this study;
- Review the literature for evidence on the potential application of social media to support the three themes of the study (information gathering, empowerment and democratisation, and behaviour change);
- Highlight the challenges associated with the use of social media and the implementation of corporate social media strategies;
- Identify potential future research topics and questions.

2.4 Methods

The methods employed for this study focused on a literature review using four document search tools, Science Direct, Scirus, Web of Science and Google Scholar. Searches were focused around combinations of the following terms

Social media	Engagement	Public policy	Environment/al	Success factors
Social network/s/ing	Participation	Delivery	Tree	Challenges
Internet	Behaviour change	Operations	Wood	Barriers
Online	Empowerment	Planning	Forest	Effectiveness
Mobile phone application	Active citizenship	Research	Green space	
Web application	Influence		Countryside	
New media	Awareness-raising		Landscape	
	Knowledge exchange/transfer		Natural settings	
	Feedback		Recreation	
	Evidence (gathering)			
	Data gathering/capture			
	Monitoring			
	Evaluation			
	Citizen science			
	Representation/representative			
	Interest groups			

Searches were limited to documents published in 2006 or later and only the first 100 returns from each search were reviewed.

Identified documents were uploaded to a shared library in the reference manager tool, Mendeley. Included were also documents and websites found via internet searches and through the authors' own personal expertise and knowledge, as well as through following up on citations found in identified documents. This resulted in a reference library of 175 citations.

Following this, documents were "tagged" or coded into the three themes, gathering information, empowerment and democratisation, and behaviour change. In addition, a tag for more general social media related material or that which dealt with organisational responses to the implementation of social media was used. Each document was then briefly reviewed for relevance and given a rating of A1 for highly relevant, A2 for moderately relevant and A3 for not relevant.

Only documents with an A1 or A2 rating were then more thoroughly reviewed. The screening process resulted in 41 citations for the theme gathering information (A1, n=12; A2 n=29), 74 for empowerment and democratisation (A1, n=32; A2, n=42), 19 for behaviour change (A1, n=5; A2, n=14), and 17 for general/organisational responses (A1, n=8; A2, n=9), (which were supplemented by two books on social media marketing and communications).

2.5 Report structure

This report is divided into six sections. The next section (three) briefly explores the different social media channels available, providing a description of what they are and do, as well as suggesting some tools which can be employed to monitor what is being said on them. Section four reviews the literature around three themes associated with how social media could potentially have (greater) application for the Forestry Commission, namely, information gathering, empowerment and democratisation, and behaviour change. Section five addresses challenges associated with implementing social media strategies and using social media communications within government bodies. Finally, section six concludes by suggesting some potential avenues for future research on social media.

3. Overview of social media channels and monitoring tools

The Monopoly graphic (by *Flowtown.com*) on this page is a reminder of the vast number of social media tools and sites available, and it provides an insight into their relative popularity at a given time (Nov 2010) in the USA.

Graphic by: Flowtown.com

However, the popularity of any given site should not be the only determining criteria when selecting media channels for use. The starting point for any social media strategy should be business or organisational objectives. The goal of social media use should be clearly defined at the outset, which will help determine what channels of communication to use, and also how to use them. At the end of the day, there are no right or wrong channels to use, choice of channels should be driven by business objectives. As Brown (2009) maintains "It's the content not the channel" that matters most.

This section gives an overview of some of the media channels available. This report does not intend to endorse any particular products, nor is intended to provide a comprehensive or exhaustive list of media channels or applications. Instead it offers an overview of some of the most influential channels and tools available at present, as well as other media types which could be of interest to the FC and could potentially be utilised more within the forestry sector.

The section ends with a very brief outline of some of the tools and sites that can be used to monitor social media channels to find out what people are saying about certain topics or organisations.

3.1 Social networks and forums

As Brown (2009: 50) outlines, social networks are revolutionizing the way people communicate and share information. They are used by millions of people worldwide on a daily basis and are essentially online communities based around things like friendship or common interests. They incorporate a number of ways of interacting, including instant messaging, e-mail style messaging, file sharing and blogging, often allowing integration with other media channels and platforms. For businesses and other organisations "they present a number of opportunities for interacting with customers [or the general public], including via plug-in applications, groups and fan pages. Each social network presents its own possibilities and challenges. Users of individual sites have different expectations of commercial behaviour" (Zarrella, 2009: 53). *Facebook* is the most popular social network in the UK and is the second most visited website of any type after *Google UK* (Hitwise, 2012). Other social networking sites include *Twitter* (although this can also be classed as a micro-blogging site – see below), *LinkedIn*, *Google+*, *Bebo* and *MySpace*. The FC currently has a number of active *Facebook* pages, including national pages, project pages and visitor site pages.

Forums are probably the oldest type of social media online and focus on discussion around a certain topic or interest; users post their views or contribute information on to the forum site and others can respond and comment on this (Zarrella, 2009: 147). Unlike with other social media channels which have just a handful of prevalent sites, there are thousands of popular forums in use on the web (Zarrella, 2009: 146).

3.2 Blogs, micro-blogs and vlogs

A blog is a form of content management that allows users to publish short pieces of text called "posts". Blogs are similar to websites in many respects but they can be defined by having a title, and a date (generally), and also for allowing for comments to be posted. They are usually maintained regularly by a single individual although some organisations have a jointly maintained blog. Often a blog focuses on one topic, or in many cases they act more like an online diary (Brown, 2009: 27). The tone of a blog should be conversational rather than "corporate-speak" and for organisations, "Blogs make great hubs for…other social media marketing efforts, as they can be integrated with nearly every other tool and platform" (Zarella, 2009: 9). The most widely-known and well-used blogging platform is *WordPress* (W^3Techs, 2012). Other popular platforms include *Joomla*, *Drupal*, *Blogger* and *Movable Type*.

Micro-blogging, as the name suggests, is a mode of blogging where only very short text entries are made and these have a character limit for each post (usually 140 characters) (Brown, 2009: 36-7; Zarella, 2009: 31). “This limitation has spawned a set of features, protocols, and behaviour that are entirely unique to the medium” (Zarella, 2009: 31). This style of blogging allows entries to be uploaded from anywhere, at any time and allows for more frequent, immediate updates than traditional blogging. The most popular micro-blogging site is generally accepted to be *Twitter* although this does not take into account the *Facebook* “Status” update facility, which can also be considered to be a micro-blogging tool (Hitwise, 2012; Brown, 2009: 37). There are a number of FC *Twitter* accounts, including at national and team level, as well as some focused on specific topics such as tree pest news. Another tool which is growing in popularity is *Tumblr*. *Tumblr* bridges the divide between micro-blogging and traditional blogging, allowing users to post short or full-length posts and share links and media.

Vlogs (video blogs), as the name suggests, utilise the medium of video for blogging. They and are a form of Web Television and are a popular category on *YouTube* (Wikipedia, 2012b).

3.3 Wikis

Wikis are webpages which enable anyone with access to the site to add or modify existing content, without the need to understand complex web markup language (i.e. HTML) (Brown, 2009: 39). Wikis are useful for enabling collaborative working and facilitating interaction, and can operate as open or closed systems with restricted user access (Mergel, 2011). The most popular and well known wiki is *Wikipedia*, a collaborative encyclopaedia which is currently the eleventh most popular website in the UK (Hitwise, 2012). Mergel (2011: 9) reports that a 2005 study published in *Nature* (Giles, 2005) found that science entries in *Wikipedia* are nearly as accurate as those in *Encyclopaedia Britannica*. She also notes that Wikis can be used by governments for a variety of purposes (see Mergel, 2011 for case study examples):

- **Open information creation environments,** such as *Wikipedia*, in which everyone can freely create collaborative content
- **Specific purposes,** in which authorship rights might be limited to specific authorized users to co-create and share professional knowledge…
- **Personal note taking or full-fledged knowledge management systems** on the corporate intranet

3.4 RSS

RSS stand for Really Simple Syndication. An RSS is a web feed format or aggregator which makes it possible for a user to keep up to date with web content like blogs,

podcasts and news headlines from multiple sources in one place, without having to check individual websites (Brown, 2009: 42). *Internet Explorer*, *Firefox*, *Yahoo*, *Google*, *Microsoft Outlook* and *Safari* (to name but a few) all handle RSS content. A user subscribes to an RSS feed by adding a link to their RSS reader or by clicking on an RSS icon. The RSS reader then regularly downloads any new material from the original sources.

3.5 Media-sharing

Media-sharing websites allow users to upload their own multimedia content (often referred to as user-generated content). Media-sharing sites include those allowing uploads of videos, such as *YouTube*; photos, such as *Flickr* and *Photobucket*; and presentations, such as *SlideShare*. Although most of these sites integrate some social networking features, the majority of users tend not to be members, but are rather just viewers of the site's content (Zarella, 2009: 77). Like other forms of social media, the popularity of media-sharing sites is growing. For example, in 2011, 48 hours of video were uploaded to *YouTube* every minute and this has now risen to at least 60 hours of video per minute (Grossman, 2012).

3.6 Podcasts and vodcasts

Podcasts or audiostreams are basically internet radio programmes and are usually downloaded rather than broadcast in a traditional sense (Brown, 2009). They can either be downloaded directly from their publisher/broadcaster or via an RSS feed such as *iTunes* where the user subscribes to a series of podcasts and every time a new episode is added, the programme is sent to the user's RSS feed. They can then either listen to it directly on their computer, smartphone or other Internet-enabled device, or have it automatically downloaded to their MP3 player (when it is connected to their computer). Brown (2009: 6) notes that "Podcasts are incredibly cheap and easy to produce and simple to make available. The key, however, is content…It is an easy mistake to assume that because it is a low-technology environment anyone can do it". Vodcasts are essentially podcasts using video instead of audio and web television series are often distributed in this way.

3.7 Social news and bookmarking

Social news sites allow users to submit and vote on news stories from across the web, and in this way rank their popularity and highlight the most interesting items. "Marketers have found these sites to be very useful for generating buzz and traffic around specific campaigns or articles, but direct marketing on social news sites is typically frowned

upon" (Zarella, 2009: 103). Some of the most popular social news sites include *Digg* and *Reddit*.

Similarly social bookmarking sites allow interesting links to be identified. Much like the way favourite websites and pages can be stored in a web browser, social bookmarking allows favourite links to be collected and stored. The difference is that social bookmarking allows users to share these, either with everyone, or with specified groups or individuals (Brown, 2009: 48-9). Social bookmarking sites count the number of times a piece of content has been stored, interpreting this as votes (Zarella, 2009: 103). Bookmarks can be imported and exported allowing access on any computer or other Internet-enabled device, and they can also be rated by other users and "tagged" (Brown, 2009: 49). Here users create tags for websites and thereby create a taxonomy of the internet. This allows web content to be searched and organized in new ways: "In practice, people discover and bookmark web pages that have not yet been discovered or indexed by search engines" (Brown, 2009: 49). Social bookmarking sites include *StumbleUpon*, *Delicious* and *Furl*.

3.8 Smartphones and tablet computers

Smartphones are phones which are built on a mobile computing platform and combine numerous functions (such as digital cameras, media players and video cameras), internet connectivity, and have advanced operating systems which support the development and use of mobile software applications or "mobile apps", which can also be used on tablet computers. The use of these technologies is growing and Boulos et al. (2011: 16) estimate that between approximately 20 and 30% of the UK population now owns a smartphone, and within 10 years this figure could be as much as 80 or 90%.

Smartphones and tablets enable the use of social media channels almost anywhere, and at any time. Indeed Boulos et al. (2011: 11), quoting Curtis, 2005, assert that "the mobile phone has enabled us to become 'distributed beings', due to the fact that mobile communication has unfettered us from our geographical boundedness". Importantly for organisations, "Knowing where our audience physically are at any one moment will have a dramatic influence on what we want to say to them" (Brown, 2009: 6).

Because of their mobility, multimedia capability and connectivity to the internet, smartphones and tablets can also facilitate data gathering or data sharing, and are particularly useful in gathering information that is place specific via location aware applications utilising global positioning systems (GPS), mobile phone infrastructure or wireless access points. User generated content such as text and other media (e.g. photos) can thus be linked to a specific location and application content, information, and resources can be tailored based on the user's location.

3.9 Mobile apps and QR codes

A recent study in the US by *Mobile Future*, found that downloading of mobile applications to smartphones and tablets has dramatically increased in the last two years, "with figures going up from 300 million apps downloaded in 2009 to five billion in 2010" (Boulos et al., 2011: 11).

The FC in England has already developed a mobile application called *ForestXplorer.* Initially it was only available for *iPhone* users but it was recently also released for use on devices with an android operating system. The application lets users locate their nearest FC woodland, find out site information and what activities are available there, download trail maps, learn more about trees with a tree identification module, search for events nearby, and plan camping and log cabin breaks with *Forest Holidays* (Forestry Commission, 2012). A similar application has also recently been released in Wales, *Cymru ForestXplorer*.

The use of Quick response codes, or as they are more commonly known, QR codes is also growing. They are a type of barcode, consisting of a square containing black modules on a white background. With the use of a QR decoder application on an internet-enabled mobile device with a camera, a user can scan a QR code which will then link them to information or resources such as text, a web page or a wireless network. QR codes can be used to store organisational, personal or product information and may appear almost anywhere where a user may require information. If permission is granted by the user, location aware applications can also link where QR codes have been scanned to a specific place, or alternatively, the URL encoded within the QR code itself can be associated to the specific location in which it was found.

3.10 Reviews and ratings

According to a 2009 poll, covering 25,000 internet consumers from 50 countries, 90% of people have some degree of trust in recommendations from people they know (such as through social networking sites) and 70% of people trust in consumer opinions posted online, compared with 61% who trust newspaper ads, 55% who trust radio ads, 54% who trust emails they signed up for, and 41% who trust search engine results (Nielson, 2009). In 2010, an online survey of 752 UK adults found that 65% of people visited customer review websites; significant minorities visited such sites monthly (27%) or at least weekly (12%); and 43% felt that online customer reviews are influential (for younger respondents this figure was higher). The survey suggests that "Consensus is a powerful force" (Guardian, 2010) and these figures have probably grown in the last two years as the popularity of such sites has increased, both in terms of the amount of people posting ratings and commenting on blogs regularly, and in terms of the amount of people who view these sites.

Zarrella (2009: 131) advises businesses that, “Users are already talking about your products, services, and brand online whether you’re involved in the conversation or not, so you might as well join in the discussion. Burying your head in the sand and ignoring rating sites will do you no good”. High profile review sites include *TripAdvisor*, *Yelp*, and *Google Places/Maps* reviews. *Google* have also introduced a +1 button which now appears on many web pages. By clicking this button, users essentially give the content their seal of approval, and can comment on it and share it with their social network on *Google+*. This is similar to *Facebook’s* “like” facility (whereby users can “like” postings, status updates or *Facebook* pages), but the big difference is it is external to the social network itself and can encompass any website that is signed up. *Twitter* is also a powerful review tool.

Forestry Commission England and Forestry Commission Scotland have both embraced this concept and now allow users to comment on their visit to a particular forest site and rate it. Similarly, the Woodland Trust *VisitWoods* project encourages users to upload photos, videos, comments, stories and blogs relating to woodland visits, and also rate them (Woodland Trust, 2012). Other users can then comment on this content.

3.11 Monitoring tools

As has been previously noted, regardless of whether an organisation chooses to engage with social media, the likelihood is that people will be talking about it on these channels anyway and talking about issues of importance to it. Therefore, monitoring of social media channels on an ongoing basis is important if an organisation wants to ensure that it knows what is being said about it and is aware when action is needed to address the topics of these communications. Zarella (2009) recommends that multiple systems are used to help ensure that nothing important is missed. Likewise, Brown (2009) cautions that there is no single tool or dashboard that can do everything.

Most sites generate basic analytics themselves for evaluation and assessment and allow key word searches for free. Key terms to monitor might include organisation name, key employees’ names, as well other topics of interest, and in the FC’s case, things like forest names or project names. These can be monitored using an RSS feed (such as *Google reader*) which will incorporate results from all the feeds signed up to, such as *Technorati Search, Ice Rocket Blog Search*, *Google News Search*, *Twitter Search*, *Google Video Search*, *Digg Search*, *BoardReader*, *BoardTracker*, and *Reddit Search*. The FC is currently using the tool *SocialMention.com*.

There are also other sites which don’t offer keyword feeds but which are still very useful monitoring tools such as *Delicious*, *StumbleUpon*, *Netvibes* and *LinkedIn Answers*. *Google Alerts*, *Tweet Beep* and *Social Mention Alerts* can also be used and will send

email alerts whenever a new result appears relating to your keywords and topics. Another powerful tool is *Google Trends* which allows you to monitor web searches on *Google*.

Paid-for monitoring tools are also available, such as *Ubervu*, *Radian6*, *Scout Lab* and *Trackur*. Such tools “can make your life much easier if your brand is talked about frequently, as the free versions can get overwhelming and provide little organisation” (Zarella, 2009: 191).

4. Review of the use of social media for different objectives

4.1 Gathering information

In our literature search, 44 documents were identified as relating to gathering information. Of these 12 were rated highly relevant (A1), 29 were rated as of medium relevance (A2), and 3 were rated as of low relevance (A3).

As stated in the introduction, the second evolution phase of the internet, broadly referred to as Web 2.0, and sometimes the "participatory" and "social" web (Stanoevska-Slabeva, 2011), revolutionised use of the internet by creating possibilities for users to interact, get involved, and participate in the creation of online content. The potential for using Web 2.0 technologies to harness human capital for the gathering, analysis and interpretation of information and data is currently being exploited by a huge number of individuals and organisations. Shirky (2010) refers to Web 2.0 harnessing humanity's "cognitive surplus" and argues that free-time, which was once spent on passive activities (notably watching television) can now be used in a profoundly different ways, for new kinds of creativity and problem-solving: "the wiring of humanity lets us treat free time as a shared global resource, and lets us design new kinds of participation and sharing that can take advantage of that resource."

In this section we review some of the key applications of social media technology which are being used to gather, analyse and interpret information. These applications fall into four categories, namely spatial and planning tools, data mining, participatory monitoring and citizen science, and crowd sourcing.

4.1.1 Spatial and planning tools

An important application of Web 2.0 and other forms of social media technology is the recording, creation, uploading, sharing and collective analysis of geographic information. There are two broad and related subcategories – applications which enable users to collaborate in the use of spatial data, and those with a specific focus on planning and other forms of spatial decision-making. While these applications are of course related to gathering information, there are also strong links with the theme of democratisation and empowerment discussed in section 3.2 since such applications can open up decision-

making processes to a wider group of stakeholders, or at the very least, allow the input of their data into such processes.

A number of authors have documented the development of Geographic Information Systems (GIS) and, most notably, the emergence of Public Participation GIS (PPGIS) (Obermeyer, 1998; Brown & Reed, 2009; Bugs et al., 2010). PPGIS is mostly used within the context of planning and spatial decision-making and is used to describe a variety of approaches to making GIS and other spatial decision-making tools available and accessible to all those with a stake in official decisions (Obermeyer, 1998). Bugs et al. (2010) report how PPGIS has been used as a feed into urban planning and decision-making in Brazil, while Brown and Reed (2009) document the use of PPGIS in National Forest planning in the US. They describe how PPGIS has been used to capture public landscape values and special places data for input into a national forest planning decision support system. They argue that, in addition to the core output of publicly informed planning decisions, key positive outcomes are to be found in the democratisation of the forestry agency's public participation process which has helped to restore public trust in the forest planning process and has increased acceptance and support for forest management decisions.

Also under the category of spatial analysis are the tools and applications that have been developed in response to the emergence of an enormously wide range of GPS-enabled hand-held devices, such as smartphones. Lane et al. (2010) examine the potential applications and implications for research of multiple sensors (accelerometer, digital compass, gyroscope, GPS, microphone, and camera) within modern smartphones. GPS-enabled devices allow users to record and upload data, which can be spatially cross-referenced with the device's geographical position and are causing a paradigmatic shift in the content and characteristics of geographic information and in how it is created and shared.

Elwood (2011) refers to this information genre as Volunteered Geographic Information (VGI), and describes how citizens are now using handheld devices to collect geographic information, using web-based mapping interfaces to mark and annotate geographic features, or adding geographic location to photographs, text, and other media shared online. Barbeau et al. (2008) track developments in travel behaviour monitoring using GPS-enabled devices. They present the design, implementation, and testing of "TRAC-IT" software architecture for GPS-enabled mobile phones which enables both passive and active travel behaviour data collection while also supporting real-time location-based services that benefit the end-user. George Mackerron and Susana Mourato of the London School of Economics have developed the *Mappiness* app for the *Apple iPhone* (www.mappiness.org.uk) to explore the relationship between subjective well-being (how happy people feel) and their physical environment. Users are prompted between one and five times a day to upload information about who they're with, where they are, and what

they're doing. Using the GPS capability of the *iPhone*, these data can then be cross-referenced with location-specific data relating to the physical environment, for example, habitat type, pollution levels, and proximity to greenspace.

Kangas and Store (2003) report on the application of social media technologies to spatial planning. They use the term “teledemocracy” to refer to the way in which advances in online, and particularly Web 2.0 facilities have increased the capacity for citizens to participate in decision making. Teledemocracy has great potential application in spatial decision-making and planning, particularly in more remote, rural areas, where it can help to solve problems resulting from geographical insularity and long distances. They therefore argue that there is considerable potential for the application of teledemocracy in participatory forest planning. An example of this is provided by Eyvindson et al. (2011), who describe the use of “Mesta” - an online Multi Criteria Decision Support application used for comparing and evaluating holding-level forest plan alternatives to enable private woodland owners to interact in collaborative forest planning processes.

4.1.2 Data-mining

Corley et al. (2010) and Morris (2011) report on work to monitor and analyse activity online and through various forms of social media relating to outbreaks of influenza and other infectious diseases and public perceptions around these health issues. Both studies show the potentially valuable contribution of these data to the task of monitoring the spread of dangerous and infectious diseases and to informing the responses made by governments and health authorities. Corley et al. (2010) demonstrate how data-mining of this sort can provide a valuable disease surveillance resource and can help to identify online communities for targeted and tailored public health communication. Similarly, Morris (2011) observes that identifying misinformation which is being posted on social media sites is useful in determining communication priorities.

Tools are being developed for automated content analysis of blogs, social network sites and news aggregators to identify trends in online discussions and content around disease and illness. “These techniques are relatively inexpensive, and unlike traditional telephone polling, they can provide continuous *in situ* monitoring and help delineate diverse segments of the population” (Schein et al., 2011: 15). Similarly, tools have been developed such as *HealthMap* which acquires data from news, medical/health sites, blogs, microblogs, and social networking sites to allow free, automated monitoring, organization and visualization of global disease outbreaks (Schein et al., 2011: 17).

4.1.3 Participatory monitoring and citizen science

Social media are increasingly being used to harness public engagement with key scientific questions and to enable the public to work alongside professional scientists to make valuable contributions to the gathering and analysis of scientific data

(Shneiderman, 2011). Sometimes referred to as technology-mediated citizen science, there is a wide and expanding range of projects which use social media to facilitate public involvement in scientific research. Newman et al. (2011) provide a summary of relevant applications, from active forms of involvement whereby the public collect data and help to develop policy responses to the related scientific findings, through to more passive forms whereby people volunteer the use of their personal computers to help in the analysis of complex and large datasets (e.g. data relating to seismic activity, or celestial bodies).

A key application of technology-mediated citizen science relates to public involvement in monitoring natural phenomena and uploading data relating to observations of the natural environment. There are large-scale projects, such as those co-ordinated by the Cornell Lab of Ornithology (e.g. *Project FeederWatch*, *PigeonWatch*, *NestWatch*, *NestCams*, *Great Backyard Bird Count*, *eBird*, *Celebrate Urban Birds*, *CamClickr*, *BirdSleuth*, and *Birds in Forested Landscapes* – see: http://www.birds.cornell.edu). However, Newman et al. (2011) also highlight the vast array of smaller projects, with some 115+ programmes listed in the Citizen Science Central registry and 272+ listed at SciStarter.com. Karatzas (2011) reports on a project to develop Participatory Environmental Sensing as a method for monitoring the effects of environmental quality on quality of life. Brigham and Graham (2009) report on work for the National Park Service in the US using smartphones and citizen scientists to map invasive species and track spread over time. In this project, users (citizens and staff) photograph target invasive species and have these photographs and GPS locations up-loaded and displayed as a map on a public webpage (www.whatsinvasive.com). The Scottish Government's *Scotland's environment* webpage (www.environment.scotland.gov.uk) also provides links to a variety of citizen science projects.

4.1.4 Crowd sourcing

Howe (2006) provided an early definition of crowd sourcing as "the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form of an open call". Crowd sourcing is distinct from citizen sourcing, which refers to processes of policy-related innovation and problem solving and is discussed below (section 4.2).

For example, Marsh et al. (2010) reports on the Collective Health Intelligence Initiative, which makes use of social media applications and enables both uncertified and certified data provided by the public to enhance the social pool of existing health knowledge available to public health agencies. According to the author, this initiative represents a potential complement to national health programmes by quantifying epidemiological affects of health policy thereby providing a useful tool for policy evaluation. Ooman and Aroyo (2011) report on the growing use of crowd sourcing by heritage institutions (galleries, libraries, archives and museums). So-called "GLAMs" are creating shared

information spaces to enable their users to assist in the selection, cataloguing, contextualisation, and curation of collections. Stanoevska-Slabeva (2011) discuss the phenomenon of internet-based collaborative innovation, particularly within the field of software innovation. This is referred to as "enabled innovation" and defined as innovative processes that take place online where the users or customers are the main innovators. Online innovation has blurred the boundaries between producers and consumers and the author coins the term "prosumers" to capture the notion of consumer involvement in processes of product conception and development.

4.2 Empowerment and democratisation

In our literature search, 81 documents were identified as relating to empowerment and democratisation. Of these 32 were rated highly relevant (A1), 42 were rated as of medium relevance (A2) and 7 were ranked as of low relevance (A3) and not reviewed in depth. In addition, a total of 8 references cited in these texts were also reviewed.

4.2.1. Defining terms

As George Osborne (quoted in Brown, 2009: 20), the UK Chancellor of the Exchequer noted recently:

> *With all these profound changes – the Googleization of the world's information, the creation of online social networks bigger than whole populations, the ability of new technology to harness the wisdom of crowds and the rise of user-generated content – we are seeing the democratization of the means of production, distribution and exchange…People are no longer prepared to sit and be spoon-fed.*

However, it is important to clarify the terms empowerment and democracy before considering in greater detail the types of social media that have been, and could be used for different purposes. The literature reviewed is careful to make distinctions between more passive forms of e-government which are related to information provision and automated service delivery, compared with e-democracy which are internet-based activities and subsequent behaviours that have the power to influence public decision making and bring about changes to governance. Central to the definitions of democracy and empowerment presented in the literature are the different degrees of political engagement and potential to bring about change. The key terms used are as follows:

> ***Civic engagement*** (Ehrlich, 2000, quoted in Obar et al., 2011: 4). "*civic engagement means working to make a difference in the civic life of our communities and developing the combination of knowledge, skills, values and motivation to make that difference….through both political and non-political processes*".

Collective action (Obar et al., 2011: 5). "The *pursuit of a single goal by more than one individual ….[it] …. can take many forms, brief or sustained, institutionalise or disruptive, or temporary, humdrum or dramatic"* but has political mobilisation as a central feature.

Political participation defined by Schlozman et al. (2010), relates to influencing government action, policy making or policy implementation.

Citizen sourcing are processes in which citizens generate innovation and problem solving ideas relevant to the development and delivery of policy (Muniz and Schau, 2011; Nam, 2012a). It differs from crowd sourcing (see section 4.1.4) by being more about creative co-production and the two way exchange of ideas, rather than passive data collection exchange from larger numbers of less engaged people that crowd sourcing implies.

e-democracy *or* ***e-participation*** are explained by Ferro and Molinari (2010) as the engagement of people in political decisions and actions in a way which involves citizens, politicians and public sector organisations. This is contrasted strongly with e-administration which is concerned with improving internal functioning, and e-government which is about the delivery of information and services by public agencies.

4.2.2. Theoretical approaches

Research dealing with the use of the internet and new media to change governance is beginning to be theorised. A good deal of discussion relates to the general move from face-to-face type relationships to those which rely on remote systems, and how this heralds a move from street-level to "system-level bureaucracies" (Reddick, 2005). This transition involves a change in the level of interaction between public servants and communities and the degree of discretion that public servants have in mediating their responses. It is characterised by new interactions which are IT-based and may rely on automated decision making with much less responsive flexibility. For other researchers the debate is about the degree to which social media can widen participation and increase citizen engagement across social gradients, social diversity and equality. In other words does social media increase inclusion and influence the "digital divide", and are non-traditional accessers encouraged by social media or are divisions deepened leading to a "reinforcement of the information elite" (Verdegem, 2011)?

Critics wonder if social change and individual behaviours are actually affected through interaction with social media. There is a school of opinion that claims social media may seem to increase participation but only in a limited and qualitatively different way to the active participation and community involvement traditionally experienced in physical spaces (Hampton et al., 2011). This phenomena is described as "net delusion"

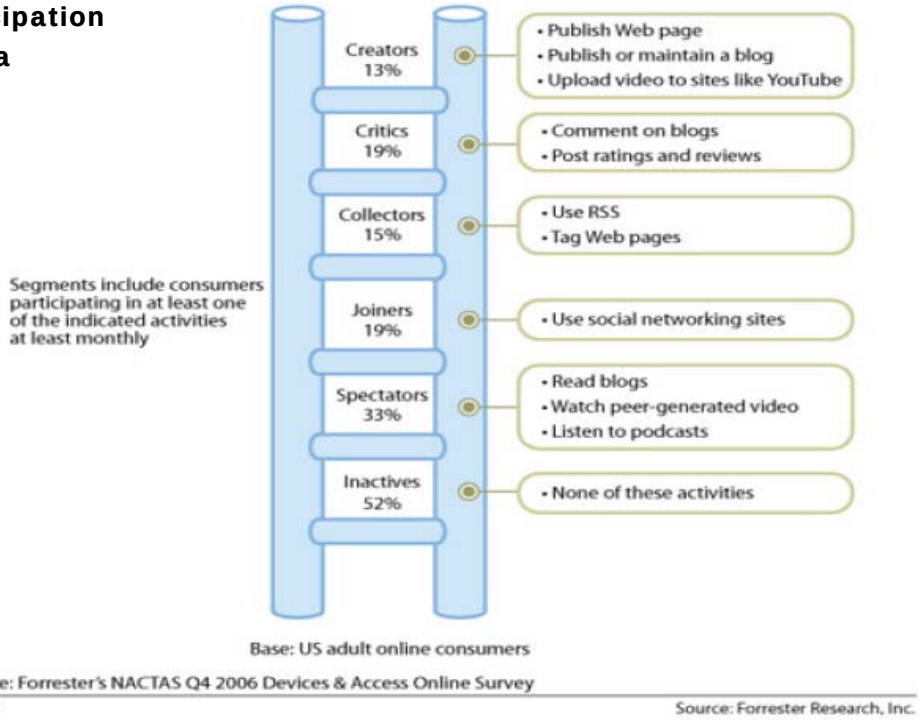
"clicktivism" or "slacktivism" (Morozov, 2011), and refers to situations in which individuals 'participate' in collective action by simply clicking a predetermined tab, or 'sharing' or 'liking' a site. Some researchers believe that such actions rarely leverage wider influence, and neither increase participants knowledge of particular issues, nor change their political or other citizen behaviours. These concerns are relevant to section 4.3 on behaviour change and are also discussed in section five.

4.2.3. Empirical evidence

Much of the evidence concerning the development of e-democracy and participation comes from the United States. Due in part to the evidence needs, the federal Office of E-Government and Information Technology was charged with increasing the efficiency of government. Established under G.W. Bush, it was extended under Obama to look for democratic engagement using three key principles: transparency, participation and collaboration. The eEurope Action Plan 2005 and the i2010 strategy (European Commission, 2005a, 2005b), pushed for more evidence around the increased use of internet-based media and government action to reduce the digital divide perceived to be a barrier to greater citizen engagement.

Bertot et al. (2010b) show a variety of ways in which government has engaged in the use of internet-based and social media and show a concentration of methods which provide information to the public. Ferro and Molinari (2010) extend this outlook by mapping the types of engagement onto an updated version of Arnstein's ladder of participation using empirical data from an American online access survey (see Figure 1). They go on to identify different consumer 'segments' depending on the degree of engagement and the types of social media activity undertaken.

Figure 1. Ladder of participation in relation to social media



Ferro and Molinari (2010) refine their analysis and divide the public into four broad groups depending on their ability to access and how they use the internet. They estimate that "activists" who involve themselves in campaigning through the internet and use government e-democracy sites, experiments and tools make up to 19% of the US population. Another important group are the "socialisers" described as the "Y and Z generations" deeply embedded in social media, but less likely to be politically active, also accounting for up to 19% of the US population. For the last two groups, the "connected" may be able to use internet-based media but are not inclined to e-democracy activities, and the "unplugged" who are neither skilled nor easily able to access internet, make up about 40% on average of the US and also EU population. What they conclude from this is that between 30-40% of population can be reached by e-democracy means (i.e. the activists and socialisers), and that the forms of social and new media employed within e-participation must be tailored to the perspectives and use profiles of the segments identified. For some groups such as the "unplugged", mobile forms of social media delivered either through mobile phones or through travelling 'roadshows' bringing IT to communities, termed m-governance, is suggested.

Different sectors of the political and social economy will be interested in achieving distinct empowerment objectives that will in turn affect the choice and task effectiveness of the social and new media tool employed. Advocacy groups such as *38 degrees*[1] in the UK, with political mobilisation and influence objectives, are more likely to use social media such as *Facebook* and *Twitter* which link individuals through friendship and shared values, "because of the ease and speed at which a large group can be mobilised" and collective action prosecuted (Shirky, 2008). Social enterprises and charities may be looking to build brand and increase presence and awareness so may concentrate on using apps, QR codes, emails, bookmarking and tools (see for example the *Care 2 rainforest saver* tool[2], raising the profile for the US Nature Conservancy). To date the role of the public sector in terms of e-government and e-participation has been focused on government specific objectives and tasks such as the delivery of public service and policy information provision, with political parties being more driven towards empowerment and inclusion as part of their own strategies for increasing membership, political participation and influencing policy development. It has not been a traditional role of government to look to cultivate close personal relationships with organisations and thus much of the personalisation and relationship building possible through new media sites has been viewed with a lack of trust. Instead, to pursue political participation, collective action and e-democracy goals, government has often relied on relationships and partnerships with intermediary organisations from the business, civil society or community sectors to act as an interface and conduit for citizen sourcing.

[1] www.38degrees.org.uk the save the UK forests campaign mobilised 40,000 people to fight against government proposals to change the governance of the public forest estate in England.
[2] www.care2.com/click-to-donate/rainforest/

Empirical evidence of who uses what kind of new media for which kind of purpose is slowly being collected and analysed, although data directly related to the governance of the environmental, land-based or forestry sector is scarce. Mossberger et al. (2008) and Hampton et al. (2011) show that e-participation is popular amongst those people already motivated to engage and already taking part in collective or political action. Key socio-demographic factors of age, ethnicity, income and political or civic attitudes have been shown to make a difference to the use of on-line and other new media formats (Obar et al., 2011; Bertot et al., 2012; Reddick, 2005; Nam, 2012b).

Whilst a seemingly unsurprising finding, these factors work in different ways as predictors of off-line empowerment and democratic engagement. For example, while ethnicity predicts off-line political activity, with Caucasians more likely to engage, ethnicity is not a factor predicting on-line participation; in terms of age, younger people tend to participate more on-line than older people (i.e. > 55); civic attitudes affect off-line participation but not on-line engagement (Nam 2012b). Nam (2012b) suggests therefore that whilst some social trends might be reinforced, interaction with new and social media can foster engagement with e-democracy as a leveller, for example, bridging the gap between engagement by ethnicity. Smith (2011) tested different approaches to citizen engagement and demonstrated that traditional face-to-face deliberative tools (e.g. public hearings, public meetings, workshops) were shown to be more effective than ICT-based methods because they were seen as more trustworthy, coherent and properly interactive. Kangas and Store's (2003) study of forest design planning through teledemocracy (as discussed in section 4.1) also showed that it is often those people one would expect to engage with forestry issues that choose to engage in traditional and new media forms of decision making. Both the internet-based mapping tools and public meetings and workshops seemed to attract the same participants. Bortree and Seltzer (2009) undertook an analysis of the *Facebook* profiles of environmental advocacy groups, and showed that they were not using the full potential of the sites, thinking that simply creating a site was enough to bring about engagement (dialogue and negotiated content or action).

Whilst research concentrates on uptake and use of social media being provided by government and others, there is far less work on the demand side of social media provision. This is an important question, because, if it is unclear what kinds of opportunities and services the public want from government versus other organisations and institutions, it is unlikely that government will find the most effective methods of engagement. The evidence suggests that many of the ways in which the public wish to engage through campaigns and advocacy working to shape policy and political decision making is best served by other organisations with greater perceived legitimacy and trust. This makes partnership working and the action of intermediary organisations an important consideration if government wants to consider how best to present and market new media tools and applications. Otherwise the risk is for "electronically

amplified public opposition" (Kobrin, 1998) rather than more positive democratic interventions.

The key issue limiting the use of social media as an empowerment tool is the variation in which citizens use what kind of social media tool, which makes it difficult to design a platform that can engage citizens effectively in e-empowerment. This poor institutional design of digital platforms "leads to poor results in terms of the quantity and quality of e-participation." (Shkabatur, 2011: 41).

In summary, the forms of engagement/empowerment and democratic or civic action that government agencies have involved themselves with through the use of social media include:

- Decision making
- Co-production
- Information provision
- Mobilisation (this includes campaigning)
- Civic transactions (e.g. of the www.fixmystreet.com type or accessing services e.g. buying DVLA tax discs)

The evidence (as provided by the literature reviewed for this study) about who takes part in these different forms of engagement, using which tools is summarised in Table 1 on the following page.

The empirical evidence suggests that overall empowerment and e-democracy show poor results in the interaction between the public and public service agencies. Using social media for information provision is more successful, and there is a low but growing level of transactional behaviour where the public is better able to focus complaints or accessing necessary services. There are clearly sections of the population who respond better to the use of particular social media tools linked to specific empowerment and democracy objectives.

Table 1. Synthesis of available evidence about use of social media in e-democracy and engagement

Empowerment /democracy objectives	Sector	Social (and other online) media used (Effectiveness*)	Who uses?	Evidence source
	Public (government)			
Decision making	Service provider and policy development	Facebook***	Those already engaged and with strong sense of 'civicness'	(Bertot et al., 2010a; Nam, 2012a, 2011b)
Co-production	Service provider	Facebook***		(Nam, 2012b)
Information provision	Regulator, Service provider, policy implementation	On-line interactive and static webpages**	< 55 years old, with on-line experience, trust government and want to change policy	(Reddick, 2005)
Civic transaction	Service provider	Webpage[3]***	White, combined income >£75k, with on-line experience	(Reddick, 2005)
	Regulator	Webpage*** Email*	As above	(Reddick, 2005)
Mobilisation	Policy implementation and advocacy	YouTube*		(Obar et al., 2011)
	Political parties	Twitter*** Facebook*** Blogs* YouTube*	Those already engaged	(Nam, 2012b; Hampton et al., 2011 Cole, 2009)
	Civil society			
Information provision	Advocacy and membership organisations	Email** Webpages** Facebook*		(Obar et al., 2011; Reddick, 2005; Bortree and Seltzer, 2009)
Mobilisation	Advocacy and membership organisations	Twitter*** Facebook*** Blogs* YouTube*		(Obar et al., 2011; Reddick, 2005)

Effectiveness rating * = low, **= medium, *** = high ratings taken from research studies

[3] Even though webpages of themselves are not considered to be social media, the webpages referred to here involve transactions e.g input of data, information or opinions from participants.

4.3 Behaviour change

A fundamental question that should be asked by anyone establishing a social media strategy or implementing social media communications is, what action do you want your audience to carry out following your communication? In many cases the answer will involve behaviour change. At present, research on the behaviour change potential of social media is in its infancy. It is an emerging research field with only a small number of studies in existence (even fewer are peer reviewed), and of these, many concentrate on what might be possible, rather than on proven impact, or on testing the utility of social media for specific outcomes. In our literature search, 24 documents were identified as relating to behaviour change. Of these 5 were rated highly relevant (A1), 14 were rated as of medium relevance (A2) and 5 were ranked as of low relevance (A3) and not reviewed in depth. The focus of the documents reviewed was either with regards to changing behaviours around health (n=14) or the natural environment (n=5).

4.3.1 Health

Taken as a whole, as Schein et al. (2011: 23) argue, while there is strong evidence that social media health campaigns increase reach, there is currently relatively little robust evidence that connects social media platforms with behavioural changes. This is not to say that they cannot be used for such purposes, but more that such evidence takes a long time to compile and this process is only just beginning.

However, a number of studies have investigated the relationship between the internet and changing behaviours related to health and well-being and found that internet interventions can be used to positive effect, and are improved when social media functions are incorporated. For example, Schubart et al. (2011) found that online interventions which target participants with pressing health concerns and which are able to adapt to individual needs, offer personally tailored advice and feedback, and include functionality for social networking and support from peers or clinicians, are usually the most effective in terms of engaging users.

Korda and Itani (2011: 5) looked more specifically at social media and similarly found that communicative functions and personal or tailored contact via email, online or text message were found to help to support behaviour change through promoting interaction with the intervention, providing motivation and personalised advice, and reminding people of the need for action. They (Korda and Itani, 2011) also found that interventions which were built around behaviour change theory and which incorporated more behaviour change techniques, generally had more impact than those that were not based on theory and which incorporated fewer techniques.

There is also some evidence that the social and interactive nature of social media platforms could enhance motivation for behaviour change through competition and encouragement amongst peers, at least in the short term (Foster et al., 2010).

Alongside the promotion of healthy behaviours, social media has also been used to provide the public with health information and raise awareness about certain issues, such as disease prevention and control. Morris (2011) provides examples of where this has already been done and reports that social media (mainly *Twitter*) is being used by 40% of health organisations aimed at preventing infectious diseases in the UK. At the moment this is usually a one-way, expert led style communications, despite the social media format, but there is a gradual shift to two-way communications in some areas.

One case study reported on by Morris (2011) focused on the development of a mobile app on Lyme disease in the Netherlands, aimed at holiday makers, green space users, those working in the outdoors, and public sector agencies. The application is to be developed by a team at the University of Twente, working with stakeholders.

Social media can facilitate the profiling of target demographics and can help to unpick target audience information preferences, which should prove useful in behaviour change interventions. Indeed, Schein et al. (2011: 13-14) argue that social media platforms offer significant advantages over traditional communication channels “because they can provide fine-grained demographic information and continuous statistics on intervention-engagement, platform usage, sharing and feedback behaviours.”

However, few health interventions are currently utilising usage analytics to help tailor their messages (Schien et al., 2011: 14). Furthermore, evaluating the impact of social media health interventions is difficult because social media is often used as one of many health promotion tools and more research is needed to understand “target audiences and their information preferences” as well as to define “process and outcome measures to assess intervention impacts, intermediate outcomes, and health status outcomes”.

Beyond challenges to evaluation of behaviour change interventions, there are also other significant barriers to the effective application of social media for the achievement of health-related behaviour change. Boulous et al. (2011) noted that thus far, the evidence of successful behaviour change achieved via internet interventions focuses largely on people that have previously decided that they want to change their behaviour. These interventions also usually have high attrition rates, and it is likely that users who drop out of the intervention have also given up on changing their behaviour (Boulos et al., 2011: 17). The authors (Boulos et al., 2011: 16) suggest that smartphone technology could help to decrease attrition rates though their location awareness and mobility, although there are also drawbacks to smartphone interventions (see section five).

Abroms and Maibach (2008) highlight a further challenge to health promotion via social media. In their view, population health should be considered through an ecological model, taking into account not only individuals but also wider social, community and place-based factors and structures. Accordingly, they argue, interventions designed to promote behaviour change will fail to deliver if they only concentrate on changing individual behaviour and do not take account of other barriers.

4.3.2 Environment

The documents reviewed for this study relating to environmental behaviour change included some insights into behaviour change theory. Some authors have theorised that behaviour change can be promoted through social media because it allows for 'free-choice learning' (i.e. "the learning that individuals engage in throughout their lives when they have the opportunity to choose *what, where, when,* and *with whom* to learn" (Falk et al., quoted in Robelia et al., 2011: 555)), as well as 'social learning' (i.e. learning is located within certain contexts and relationships, or communities of practice, and individuals and groups actively shape and are shaped by their environments), and takes into account the powerful effect of social norms (Robelia et al., 2011).

Hungerford (cited in Robelia et al., 2011) maintained that the development of environmental citizenship behaviour is based on variables at three levels:

> "(1) *entry level*, including environmental sensitivity, understanding of the ecological issue, and attitudes; (2) *ownership*, including in-depth knowledge of issues, personal investment, knowledge of the consequences of behaviour, and a personal commitment to issue resolution; and (3) *empowerment*, including knowledge of and skill in using environmental action strategies, locus of control, and intention to act".

Social networking, could therefore, "offer a unique platform for this complex mix of information, community norms, and personal feelings that interact to influence behaviour" (Robelia et al., 2011: 557).

Similarly, Dourish (2008) argued that sustainability should be thought about as a process of political mobilization, and a critical first step in political mobilization comes through a process of alignment, where one starts to "find one's own interests as being congruent with those of others". He maintained that social networking applications such as *Facebook* may offer a platform for this and that we can view "social networking sites as technologies of affiliation, alignment, and identification, sites at which forms of collective identity are forged and enacted".

While there is some evidence of the positive effect of social media on environmental behaviours (Robelia et al., 2011), broadly speaking there is even more limited robust

evidence available in relation to environmental behaviour change through social media than there is for health behaviour change. Using social media in this way is relatively new, and evaluations of its practice are scarce.

One study that was highlighted in the literature which could be of interest to the Forestry Commission was concerned with influencing people's movement patterns within the national park around Vienna, Austria (Schechtner and Schrom-Feiertag, 2008). The motivation behind this was the need to both provide recreational opportunities for as many people as possible and, at the same time protect the environment and ensure people respected restricted areas. The project therefore aimed to influence the distribution of visitors within the national park by providing users with information not only on infrastructure within the national park but also on the spatiotemporal behaviour of other users. The spatiotemporal behaviour information was collected using a variety of sensors, including GPS enabled personal digital assistants, which also functioned as national park guides for users.

At the time of writing the article, the authors reported that the project had only reached the stage of modelling movement patterns and had not yet reached the stage of testing people's willingness to follow the routes suggested, this they suggest will be dependent on "the willingness of the visitors to balance their individual benefit against the benefit of the society" (Schnecter and Schrom-Feiertag, 2008).

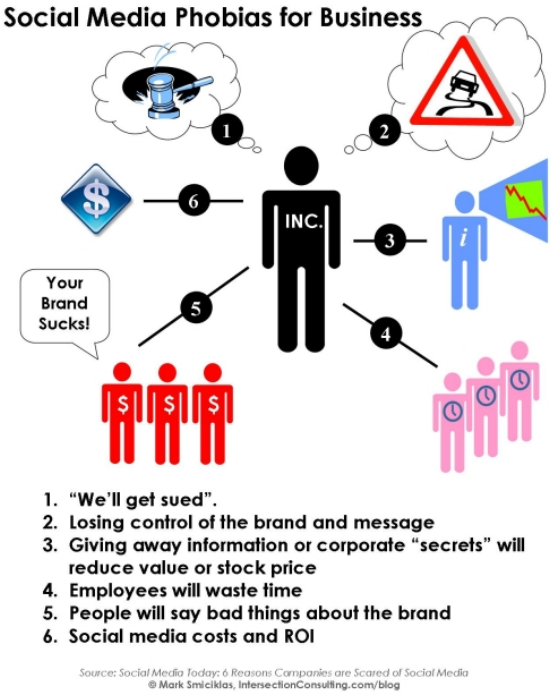
Identified challenges and limitations to the successful use of social media to effect environmental behaviour change were similar to those listed in the health section above, such as: interventions being based on, or attracting only those who were already predisposed to changing their behaviour (Robelia et al., 2011; Davis, 2008); an acknowledgement that while "learning that occurs in one kind of activity system [e.g. online] can influence what one does in a different kind of system [e.g. offline]", there are no guarantees this will occur (Greeno, 2006 quoted in Robelia et al., 2011: 555); and that "technology may not [always] be the most effective way to engage people in environmentally responsible behaviour" and "first-hand experience" or "direct experiences in nature" are also important in terms of building understanding of and appreciation for the natural world (Robelia et al., 2011: 570).

5. Challenges to using social media

The graphic on this page neatly depicts some of the reasons that companies can be wary of social media. Such concerns are also common across the public sector and although the use of social media heralds great potential for government bodies in many areas, there are also numerous challenges to its effective implementation.

These include:

1. Quality and security of, and control over content and data
2. Bureaucratic processes, procedures and institutional norms
3. Access, representation and digital literacy
4. Understanding and meeting the needs of audiences and external users
5. Resourcing and managing relationships and risk over time



5.1 Quality and security of, and control over content and data

A number of commentators raise issues to do with the quality and reliability of information and data gathered through social media. Discussing crowd sourcing by heritage institutions, Ooman and Aroyo (2011), for example, highlight the risks to the reputations and scientific authority of GLAMs, built up over the years by preserving the quality and truthfulness of the information they offer, and maintained by having full control over the acquisition, organisation and the annotation of their collections. For these organisations, allowing end-users to actively participate, for instance by adding descriptive metadata to catalogues, could erode the qualitative distinction between users and organisation staff. In his book "The Cult of the Amateur", Andrew Keen (2007) offers a critique of peer production and user generated content, pointing to the inherent dangers of eroding established conventions of expert-based filtering, reviewing and quality assurance.

Concerns also exist around security of, and control over content, and ensuring the integrity of information uploaded via social media. Content integrity and security is particularly a concern related to wikis (Mergel, 2011) but can also apply to any use of social media which allows postings and public interaction. As Brown (2009, 157) notes, "There is nothing we can do to free ourselves entirely from risk" (although there are approaches which can be taken to mitigate against risk, such as careful monitoring of social media sites to allow timely responses to unwelcome coverage) when engaging with social media. Indeed, governments are generally risk-averse and slow to change, meaning that by the time they have agreed processes and got to the stage of implementing a social media strategy, citizens social media behaviours have changed and allegiances have been shifted to new platforms (Schein et al., 2011).

Another significant challenge to the use of social media for e-democracy and empowerment are privacy issues, data security and archiving, especially given Freedom of Information (FoI) legislation. Participants in social media forums and those taking part in campaigns and advocacy are reticent to provide their details to government agencies that they perceive themselves to be fighting against, not least because the very public declaration of personal values is integral to social media, and the rules governing the storage and use of participant information and words posted are poorly understood. Social media transactions are also subject to the same rules of data management as any other form of information: FoI requests around decision making based on social media interactions is another poorly tested area of legislation. In short, the "rapid evolution of e-government have far outpaced the ability of information policy to adapt to these changes" (Jaeger and Bertot, 2010). With the decreasing and low levels of trust in government[4] (Edelman, 2010), the need to maintain privacy and trust between public agencies and citizens is crucial.

5.2 Bureaucratic processes, procedures and institutional norms

This relates to challenges to social media usage imposed by governmental processes and institutional norms. For example, as Mergel (2011) pointed out with regards to using wikis: "Moving to an open collaboration format will be challenging no matter the context" but particularly in environments where knowledge tends to exist within a hierarchical reporting structure or is embedded in clear standard operating procedures.

[4] See for example: http://www.forbes.com/sites/susanadams/2012/01/23/trust-in-ceos-plummets-but-still-beats-trust-in-government/
http://www.guardian.co.uk/news/datablog/2012/jan/24/trust-in-government-country-edelman

Schein et al. (2011, citing Hudson) also noted a range of other barriers to government implementation of social media strategies, namely that: bureaucratic policies and processes which govern information flows within government can impede rapid responses to the information needs of the public or to public mood; poor technical infrastructure can impair some agencies' ability to interact with bandwidth-intensive sites; internally imposed security measures such as firewalls and permission processes may restrict access to certain sites and delay experimentation with social media; and, finally, the necessity of government agencies to consider inclusion issues around linguistic minorities.

Another important area which limits the use of social media either as a research tool or as part of an empowerment project, is concerned with how feedback gathered from social media is used, its level of influence on governance and decision making processes, and whether or not there is a will within government to actually act on information and opinions garnered. As Bertot et al. (2012: 6) pointed out:

> "*It is too early to understand how agencies and governments are incorporating social media technology-driven participation in to the act of governing. It is one thing to solicit participation and feedback and another to actually incorporate such public participation into government regulations, legislation and services.*"

Ultimately, social media is interactive and if it is to be viewed as a worthwhile means of communication, government bodies must be seen to be responsive in some way to views expressed by the public using it, although this inevitably raises questions about the representativeness of this data. In many cases, it may be best to use social media as an indicator of *possible* public mood, rather than accept the comments or posting of one person or a group of people as representing a more general view. This can then be explored in more depth using other means or through further investigation of the issue utilising social media to establish how widely held a view it is or how widespread a problem.

5.3 Access, representation and digital literacy

Indeed, concerns around inclusion are raised frequently in the literature, as previously mentioned in section 4.2. It is usually accepted that age is the biggest "digital divide" when it comes to use of social media, with young people much more likely to engage and use such technology than senior citizens (Boulous et al., 2011; Chou et al., 2009; Schein et al., 2011: 22). This is clearly as issue which needs to be taken account of in any communication strategy. However, it must also be remembered that if government bodies fail to use social media then there may be segments of the population that they

fail to reach since for some young people, social media and mobile technology is at the heart of the way they communicate with each other and the rest of the world (Schein et al., 2011). Moreover, it should be noted that the "senior citizens of tomorrow will include the young and middle aged of today, who are more familiar with, and reliant on computers, smartphones and the internet than previous generations, and are increasingly well-versed in using these technologies on a daily basis for study, work and leisure" (Boulos et al., 2011: 19). Kietzmann et al. (2011) also suggest that adults aged 55 and over are the fastest growing demographic on *Facebook*, so there are signs that things are changing.

There are other groups in society which may also be less well represented on-line, such as those with disabilities, chronic diseases or serious mental health problems (Nicholson and Rotundi, 2010), or people belonging to specific ethnic groups (Chou et al., 2009). However, there are also some positive messages about the potential of social media to overcome geographical or social barriers which exist around the use of more traditional media for some populations (Schein et al., 2011). Furthermore, some findings suggest that the accessibility and anonymity of social media can support their use by those with stigmatizing health problems. For example, Seeman et al. (2008, cited in Schein et al., 2011) reported that men with depression were more likely to participate in online support groups than in face-to-face meetings.

In relation to the use of social media for the gathering, analysis and interpretation of information, some commentators argue that access to the devices, services and social media applications necessary to participate in collaborative projects is by no means universally or equally distributed across society. This raises questions around the representativeness of the data that is being analysed, and of the decisions based on that analysis. Eyvindson et al. (2011), for example, argue that data networks cannot be used as the only method for carrying out collaborative forest planning, due to the diversity among private forest owners with their varying levels of ability and willingness to get involved. They also highlight that forest owners are characterised by significant differences in levels and types of needs for information and decision support, and argue that these differences should be taken into account by tailoring specific planning interfaces for segmented target groups. Obermeyer (1998) notes that a result of the development and application of PPGIS is that many groups are poorly represented in today's GIS, and highlight the danger that the performance of spatial analysis and the preparation of visually attractive maps can lend an aura of persuasiveness to reports that may mask unsound underlying ideas, and poor representation of stakeholders' ideas and opinions.

It should also be remembered that issues around digital literacy are not confined to the general public and also exist within an organisation's employees. A social media strategy that does not take into account the capacity, aptitude and interest of staff in these forms

of communication may very well fail, or at the very least will encounter some significant hurdles to implementation and uptake. As far as encouraging employees to engage in outward-facing social media efforts is concerned, this may very well involve and require behaviour change techniques and theory to be employed to ensure successful uptake. As has also been observed, people who are used to interacting using social media platforms understand the social norms that govern these spaces and, as such, can more effectively communicate on behalf of organisations because they will appear more authentic and trustworthy (Schein et al., 2011: 21).

5.4 Understanding and meeting the needs of audiences and external users

Another common problem discussed in the literature is around the promotion of participation in social media communication efforts. With regards to social media use designed to engage with the public, there are numerous examples of efforts which have failed to capture as wide or as active an audience as originally hoped for, and this is true of some of the social media communications currently being employed by Forestry Commission staff. Key issues that many of these failed communications have neglected to consider at the outset are whether there is an audience (and who that audience is) for the material being communicated, whether social media channels are the most appropriate way of communicating, whether interaction will be sustained and users will be responded to, and ultimately what use the social media communication will have for the user. In other words “what’s in it for them”? How will the communication provide them with something they value? It is only when users find that the social media communication offers them something of consequence that they will participate.

Retaining participation and securing return visits is an even more challenging feat, especially as the number of sites and channels increases. As Korda and Itani (2011: 5) argue, “Sites that succeed tend to be highly dynamic and flexible and change content and approach often in order to stay entertaining and engaging. Developing active user communities is one way to keep content fresh and interaction alive”.

Newman et al. (2011) argue that information gathering through social media should not be conceived as a simple form of data transaction. They show that successful citizen science projects, for example, are able to accommodate a wide range of data management and communication needs, from species observations to auxiliary environmental data, participant information, volunteer hours, land manager contact information, training event schedules, species attributes, site characteristics, and user preferences for alerts related to new observations. They recommend that citizen science programmes develop features that support communication, teach field skills online, store

field data collected by citizens, and offer analysis and reporting capabilities to distributed users.

Related to this, other commentators have stressed the need to look beyond data and information content within online collaborations and to pay attention to the processes of recruiting, motivating and retaining participants. Nov et al. (2011), for example, surveyed volunteers at Stardust@home, a digital citizen science project, in which volunteers classify online images from NASA's Stardust spacecraft. They focused their analysis on the motivational factors that encourage and maintain participation amongst enthusiasts, and found that collective (e.g. “advancing the goals of Stardust@home is important to me.”) and intrinsic (e.g. “Participating in Stardust@home is fun.”) motivations are the most salient motivational factors, whereas reward and status motives (e.g. “Gaining reputation in the Stardust@home community is important to me.”) seem to be less relevant.

5.5 Resourcing and managing relationships and risk over time

Finally, another important challenge to consider is costs and resourcing. Hanna et al. (2011: 272) argue that, compared with traditional media, social media is relatively inexpensive, and if budgets are tight then organisations can at least take advantage of freely available tools rather than having to pay for traditional media coverage or invest in new tools or software: “Social media is about users and being connected to other users; it is not about significant investments in expensive production and media”. Furthermore, as Schein et al. (2011) argue, even the cost of establishing surveillance and monitoring systems can be done for free.

Nonetheless, in small organisations, or those facing resource shortages, there is a concern about the time and staff implications of maintaining social media communications and ongoing interactive public engagement (Schein et al., 2011). As a respondent in one study focusing on a charity said, “If you’re going to go to the effort to have social media, you need to make sure someone is updating that information” (Briones et al., 2011: 40). In other words, if you are going to use social media, resource its usage properly so that communications are effective, otherwise you may as well not bother, indeed it may be better not to bother rather than to create communication channels but then seemingly ignore the responses you get from the public using them.

6. Conclusion: potential future research directions

This review of research evidence has illustrated that understanding more about the effective use of social media, and how they might be used to enhance the delivery of different policy objectives, as well as goods and services, by private and public sector organisations, is a rapidly growing, broad and complex subject area. Ongoing research can improve understanding, and defining the most appropriate research questions likely to be of greatest value to the FC is an important next step. Different areas of the business will have different priorities and varying operational and strategic areas of enquiry. Without coming to some consensus regarding the prioritisation of well defined specific and focused research questions, the risk is that outputs will not be targeted enough to answer specific research needs or may be too broad to be of practical use.

A set of potential research questions is outlined below. These have emerged through:

- consultation with FC policy advisors, communications and business marketing personnel
- reference to the draft FC – GB social media strategy
- a consideration of the issues emerging from the evidence review set out in this report.

This list of research questions stands as a starting point for discussion with our research customers and other stakeholders. It is not anticipated or intended that FR will address all of these questions in the future. Instead the intention is that the list operates as a device to help our customers and stakeholders identify their research priorities. The questions set out here are clearly generic and should be used, through further discussion, to identify the key areas of policy / operational delivery that will be considered with reference to specific examples and potential case studies.

RQ1. How far and under what circumstances can social media increase access to FC key stakeholder groups and enable more active and legitimate relationships with citizens and partners? Are there stakeholders or protected characteristics that are better served or disadvantaged by the FC's use of social media? How important is this?

RQ2. What are the risks (i.e. system security, reputational, financial, political and legislative) associated with different forms of social media used (or which could be used) by the FC?

RQ3. What types of social media best suit the specific operational and delivery needs associated with different projects, site-based objectives and strategic policy issues?

RQ4. What types of public feedback and input do (could) the FC value as land managers or in the development of forest governance, and what kinds of social media best capture these interactions? How far can these public inputs be used as legitimate or representative opinion?

RQ5. What do the public want in terms of the social media provided by FC? What are the demand side issues for key stakeholder groups?

RQ6. How can the FC's use of different social media types and channels be evaluated and how can we ensure that evaluation informs the effective use of social media going forwards? What has the FC and the wider forestry sector learnt about best practice around the use of social media, and how can this learning be shared?

References

Abroms, L.C. and Maibacj, E.W. 2008. The effectiveness of mass communication to change public behaviour. Annual Review of Public Health 29: 219-234

Barbeau, S.J., Labrador, M.A., Georggi, N.L. Winters, P.L. and Perez, R.A. 2008. TRAC-IT – A software architecture supporting simultaneous travel behaviour data collection & real-time location-based services for GPS-enabled mobile phones. *Proceedings of the National Academy of Sciences' Transportation Research Board 88th Annual Meeting*, paper #09-3175, January 2009

Bertot, J.C., Jaeger, P.T. and Grimes, J.M. 2010a. Using ICTs to create a culture of transparency: E-government and social media as openness and anti-corruption tools for societies. *Government Information Quarterly* 27 (2010): 264-271

Bertot, J.C., Jeager, P.T., Munson, S and Glaisyer, T. 2010b. Engaging the Public in Open Government: Social Media Technology and Policy for Government Transparency. *Report from the US National Science Foundation sponsored workshops: Technology mediated social participation.* http://www.tmsp.umd.edu/TMSPreports.html

Bertot, J.C, Jeager, P.T and Hansen, D. 2012. The impact of polices on government social media usage: Issues, challenges, and recommendations. *Government Information Quarterly* 29 (2012): 30-40

Bortree and Seltzer . 2009. Dialogic strategies and outcomes: An analysis of environmental advocacy groups' Facebook profiles. *Public relations review*, 35(3), 317-319

Boulos, M.N.K., Wheeler, S., Tavares, C. and Jones, R. 2011. How smartphones are changing the face of mobile and participatory healthcare: an overview, with example from eCAALYX. BioMedical Engineering OnLine. http://www.biomedical-engineering-online.com/content/10/1/24

Briones, R.L., Kuch, B., Liu, B.F. and Jin, Y. 2011. Keeping up with the digital age: How the American Red Cross uses social media to build relationships. Public Relations Review 37: 37-43

Brown, R. 2009. Public Relations and the Social Web: How to use social media and web 2.0 in communications. Kogan Page Limited, London, Philadelphia, New Delhi

Brown, G.G. and Reed, P. 2009. Public participation GIS: A new method for use in national forest planning. *Forest Science* 55 (2): 166-182

Bugs, G., Granell, C., Fonts, O., Huerta, J. and Painho, M. 2010. An assessment of public participation GIS and Web 2.0 technologies in urban planning practices in Canela, Brazil. *Cities* 27 (3): 172-181

Chou, S.W., Hunt, Y.M.Beckjord, E.B., Moser, R.P. and Hesse, B.W. 2009. Social media use in the United States: Implications for Health Communication. Journal of Medical Internet Research 11 (4)

COI (Central Office of Information). 2009. Engaging through social media: A guide for civil servants. London, COI

Corley, C.D., Cook, D.J., Mikler, A.R. and Singh, K.P. 2010. Text and structural data mining of influenza mentions in web and social media. *International Journal of Environmental Research and Public Health* 7 (2): 596-615

Cole, R. (2009). Social media:What does it mean for public managers? Public Management, 91 (9): cover story

Davis, J. 2008. Towards Participatory Design of Ambient Persuasive Technology. In M. Foth, C. Satchell, E. Paulos, T. Igoe and C. Ratti Eds. Workshop on Pervasive Technology and Environmental Sustainability. http://www.paulos.net/papers/2008/Pervasive2008SustainabilityWorkshopPapers.pdf accessed 28th February, 2012

Dillahunt, T., Becker, G., Mankoff, J. and Kraut, R. 2008. Motivating Environmentally Sustainable Behaviour Chnages with a Virtual Polar Bear. In M. Foth, C. Satchell, E. Paulos, T. Igoe and C. Ratti Eds. Workshop on Pervasive Technology and Environmental Sustainability. http://www.paulos.net/papers/2008/Pervasive2008SustainabilityWorkshopPapers.pdf accessed 28th February, 2012

Dourish, P. 2008. Points of Persuasion: Strategic Essentialism and Environmental Sustainability. In M. Foth, C. Satchell, E. Paulos, T. Igoe and C. Ratti Eds. Workshop on Pervasive Technology and Environmental Sustainability. http://www.paulos.net/papers/2008/Pervasive2008SustainabilityWorkshopPapers.pdf accessed 28th February, 2012

Elwood, S. 2011. Researching volunteered geographic information: Spatial data, geographic research, and new social practice. *Annals of the Association of American Geographers* 102 (3): 571-590

Ehrlich, T. (2000) (ed.). Civic responsibility and higher education. Westport, CT: Oryx Press

European Commission. 2005a. eEurope 2005 Action Plan. http://ec.europa.eu/information_society/eeurope/2005/all_about/action_plan/index_en.htm accessed 6th July, 2012

European Commission. 2005b. i2010 A European information society for growth and employment. http://ec.europa.eu/information_society/eeurope/i2010/index_en.htm accessed 6th July, 2012

Eyvindson, K., Kurttila, M., Hujala, T. and Salminen, O. 2011. An Internet-supported planning approach for joint ownership of forest holdings. *Small-scale Forestry* 10 (1): 1-17

Forestry Commission. 2012. http://www.forestry.gov.uk/mobileapp accessed 16th February, 2012

Ferro, E. and Molinari, F. 2010. Framing Web 2 .0 in the process of public sector innovation: Going down the participation ladder. *European Journal of ePractice,* 9 (March): 1-15

Foster, D., Linehan, C. and Lawson, S. 2010. Motivating physical activity at work: using persuasive social media extensions for simple mobile devices. In: Workshop on Nudge & Influence Through Mobile Devices, Mobile HCI 2010, September 7-10, Lisbon, Portugal

Giles, J. 2005. Special report Internet encyclopaedias go head to head. Nature 438: 900-901

Grossman, L. 2012. The beast with a billion eyes. Time, April 2nd, 2012

Guardian. 2010. Trust in the digital age: survey analysis. http://www.guardian.co.uk/digital-trust/trust-in-the-digital-age-survey-analysis accessed 16th February, 2012

Hampton, K.N, Lee, C-J., Ja Her, J.. 2011. How new media affords network diversity: Direct and mediated access to social capital through participation in local social settings. *New Media and Society* Online 16th February 2011

Hanna, R., Rohm, A. and Crittenden, V.L. 2011. We're all connected: The power of the social media ecosystem. Business Horizons 54: 265-273

Hearn, G.N., Foth, M. and Gray, H.L. 2009. Applications and implementations of new media in corporate communications: An action research approach. Corporate Communications 14 (1): 49-61

Hitwise. 2012. Data Center – Top Sites and Engines. http://www.hitwise.com/uk/datacentre/main/dashboard-7323.html accessed 16th February, 2012

Howe, J. 2006. The rise of crowdsourcing. *Wired magazine* 14th June, 2006

Jaeger, P.T and Bertot, J. C. 2010. Designing, Implementing and evaluating user-centred and citizen-centred e-government. *International Journal of Electronic Government Research* 6(2):1-17

Kangas, J and Store, R. 2003. Internet and teledemocracy in participatory planning of natural resources management. *Landscape and Urban Planning* 62(2):89-101

Karatzas, K.D. 2011. Participatory environmental sensing for quality of life information services. *Environmental Science and Engineering* 3(1): 123-133

Keen, A. 2007. *The cult of the amateur: how today's Internet is killing our culture and assaulting our economy*. Nicholas Brealey Publishing, London, Boston

Kietzmann, J.H., Hermkens, K., McCarthy, I.P. and Silvestre, B.S. 2011. Social media? Get serious! Understanding the functional building blocks of social media. Business Horizons 54: 241-251

Kobrin, S.J. 1998. The MAI and the clash of globalizations. *Foreign policy*, 112, 97- 109

Korda, H. and Itani, Z. 2011. Harnessing social media or health promotion and behaviour change. Health Promotion Practice, online version. http://hpp.sagepub.com/content/early/2011/05/10/1524839911405850

Lane, N.D., Miluzzo, E., Lu, H., Peebles, D. Choudhury, T. and Campbell, A.T. 2010. A survey of mobile phone sensing. *IEEE Communications Magazine* September 2010: 140-150

Marsh, A., Carroll, D. and Foggie, R. 2010. Using collective intelligence to fine-tune public health policy. *Studies in Health Technology and Informatics* 156: 13-18

Mergel, I. 2011. Using Wikis in Government: A guide for public managers. IBM Center for The Business of Government, Washington

Mergel, I. 2010. Government 2.0 revisited – Social Media Strategies in the Public Sector. PA Times 33 (3): 7 and 10

Morris, K. 2011. Tweet, post, share – a new school of health communication. www.thelancet.com/infection Vol 11, July 2011, pp500-501

Morozov. 2011. The net delusion: The dark side of Internet freedom. Philadelphia: Perseus Books Groups.

Mossberger, K., Tolbert, C. J., & McNeal, R. S. 2008. Digital citizenship: The internet, society, and participation. Cambridge, MA: The MIT Press

Muniz, A. and Schau, H. 2011. How to inspire value-laden collaborative consumer-generated content. *Business Horizons* 54 (3): 209-17

Nam, T. 2012a. Suggesting frameworks of citizen-sourcing via Government 2.0. *Government Information Quarterly* 29 (1): 12-20

Nam, T. 2012b. Dual effects of the internet on political activism: Reinforcing and mobilizing. *Government Information Quarterly* 29 (Supplement 1): S90-S97

Newman, G., Graham, J., Crall, A., Laituri, M. 2011. The art and science of multi-scale citizen science support. *Ecological informatics* 6 (3-4): 217-227

Nicholson, J. and Rotondi, A.J. 2010. The internet, health promotion, and community participation. Psychiatric Services 61 (1): 96-97

Nielson. 2009. Nielsonwire – Global Advertising: Cosumers Trust Real Friends and Virtual Strangers the Most. http://blog.nielsen.com/nielsenwire/consumer/global-advertising-consumers-trust-real-friends-and-virtual-strangers-the-most/ accessed 16th February, 2012

Nov, O., Arazy, O. and Anderson, D. 2011. Dusting for science: motivation and participation of digital citizen science volunteers. *Proceedings of the 2011 iConference,* Seattle, February 8-11

Obar, A.C, Zube, P. and Lampe, C. 2011. Advocacy 2.0: An analysis of how advocacy groups in the United States perceive and use social media as tools for facilitating civic engagement and collective action (November 8, 2011). Available at SSRN: http://ssrn.com/abstract=1956352 or http://dx.doi.org/10.2139/ssrn.1956352

Obermeyer, N.J. 1998. PPGIS: The evolution of public participation GIS. *Cartography and Geographic Information System* 25 (2): 65-66

Ooman, J. and Aroyo, L. 2011.Crowdsourcing in the cultural heritage domain: Opportunities and challenges. *Proceedings of the 5th International Conference on Communities and Technology – C&T 2011,* 29 June – 2 July 2011, Brisbane, Australia

Robelia, B.A., Greenhow, C. and Burton, L. 2011. Environmental learning in online social networks: adopting environmentally responsible behaviours. Environmental Education Research 17 (4): 553-575

Reddick, C.G. 2005. Citizen interaction with e-government : From the streets to servers? *Most* 2005 (22):38-57

Schechtner, K. and Schrom-Feiertag, H. 2008. Understanding and influencing spatio-temporal visitor movement in national parks based on static and dynamic sensor data. In M. Foth, C. Satchell, E. Paulos, T. Igoe and C. Ratti Eds. Workshop on Pervasive Technology and Environmental Sustainability. http://www.paulos.net/papers/2008/Pervasive2008SustainabilityWorkshopPapers.pdf accessed 28th February, 2012

Schein, R., Wilson, K. and Keelan, J. 2011. Literature review on effectiveness of the use of social media: A report for Peel Public Health. http://www.peelregion.ca/health/resources/pdf/socialmedia.pdf accessed 29th February, 2012

Schubart, J.R., Stuckey, H., Ganeshamoorthy, A. and Sciamanna, C.N. 2011. Chrinic Health conditions and Internet behavioural interventions: A review of factors to enhance user engagement. *Computers, Informatics, Nursing* 29 (2): 81-92

Shirky, C. 2010. The political power of social media. *Foreign Affairs* January/February 2011

Shirky, C. 2008. Here comes everybody: The power of organizing without organizations. New York: Penguin

Shkabatur, J. 2011. Cities @ crossroads: Digital technology and local democracy in America. Brooklyn Law Review, 76(4)

Shneiderman, B. 2011. Technology-mediated social participation: The next 25 years of HCI challenges. *Proceedings of Human-Computer Interaction, Design and Development*

Approaches – 14th International Conference, HCI International 2011, Orlando, USA, July 9-14, 2011

Smith, G. John, P. Sturgis, P. Nomura, H. 2009. Deliberation and internet engagement: initial findings from a randomised controlled trial evaluating the impact of facilitated internet forums.

Smith, C. 2011. Mediating change and changes in mediation: Adapting ICTs for just environmental governance. Dissertation submitted in partial satisfaction of the requirements for the degree of Doctor of Philosophy at the University of California, Irvine

Stanoevska-Slabeva, K. 2011. Enabled Innovation: Instruments and methods on Internet-based collaborative innovation. Draft paper prepared for the 1st Berlin Symposium in Internet and Society, October 25-27, 2011

Schlozman, K.L. Verba, S. and Brady, H.E. 2010 Weapon of the Strong? Participatory Inequality and the Internet. *Perspectives on Politics*. 8(2): 487-509

Verdegem, P. 2011. Social Media for Digital and Social Inclusion: Challenges for Information Society 2 . 0 Research & Policies. *Society* 9 (11): 28-38

W3Techs. 2012. Usage of content management systems for websites. http://w3techs.com/technologies/overview/content_management/all accessed 6th July, 2012

Wikipedia. 2012a. Social media. http://en.wikipedia.org/wiki/Social_media accessed 16th February, 2012

Wikipedia. 2012b. Video blogging. http://en.wikipedia.org/wiki/Video_blogging accessed 6th July, 2012

Woodland Trust. 2012. VisitWoods. http://visitwoods.org.uk/en/visit-woods/Pages/get-involved.aspx accessed 16th February, 2012

Zarrella, D. 2009. The social media markeing book. O'Reilly, Sebastopol