Coming Across Academic Social Media Content Serendipitously

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ABSTRACT
We wanted to find out whether students come across academic social media content serendipitously and, if so, to gain a detailed understanding of their experiences. To achieve this aim, we conducted semi-structured Critical Incident interviews with 15 postgraduate students from various disciplines. We found that the students did indeed come across academic social media content serendipitously – often when undertaking unfocused browsing during a break from other academic work. Time investment was identified as an important over-arching theme: investing time in creating and sharing social media content led to the creation of opportunities for serendipity for both the person creating/sharing the content and others. The interviews also highlighted a time investment trade-off – where more time spent using social media was perceived to provide greater opportunity for serendipity but, as serendipity can never be guaranteed, it was also perceived to increase the chance that none of the information encountered would contribute to the interviewees’ academic research (and therefore would be ‘wasted’ time). We make a number of suggestions for the design of social media tools that create opportunities for serendipity based on our findings.

Keywords
Serendipity, Social Media, Information Encountering, Information Discovery.

INTRODUCTION
Serendipitous experiences are a relatively rare but important part of our lives. They are when unexpected circumstances and an insightful ‘aha’ connection result in a valuable outcome (Makri and Blandford, 2012). People come across information serendipitously both in everyday life and as part of their academic research. Consider, for example, unexpectedly coming across the perfect gift for a loved one whilst browsing the Web for something else entirely or coming across a useful paper or Website for one academic project whilst searching for information on another. The use of social media tools and sites has become commonplace. We use them not only to socialise, but also for academic purposes – such as keeping abreast of the research currently being conducted by academics we have previously met or collaborated with. But do social media tools and sites facilitate the serendipitous discovery of academic content? The goal of our research was to find out whether students come across academic social media content serendipitously and, if they do, to gain a rich understanding of their experiences.

We begin by reviewing background literature on the nature of serendipity and academics’ experiences of the phenomenon. Next we discuss the main decisions we made surrounding data collection and analysis. This is followed by our findings on the interviewees’ experiences of serendipity and their use of social media. We also discuss findings related to the over-arching theme we identified of time investment. We then discuss the relation of our findings to existing literature and, finally, make suggestions for the design of social media tools based on our findings.

BACKGROUND
McBirnie (2008) asserts that “although increasingly a documented aspect of human information behaviour, serendipity in information seeking has not been the subject of extensive empirical research” (p. 609). Indeed, we are unaware of existing work that has focused on academics’ experiences of coming across academic social media content serendipitously. However, there are existing studies that have examined peoples’ experiences of serendipity in an academic context. In this section, we review several of these studies. But first, we discuss the nature of serendipity in the context of information discovery.

The Nature of Serendipity
The term ‘serendipity’ was coined by Horace Walpole after a fairy tale – ‘The Three Princes of Serendip,’ in which the princes were “always making discoveries by accidents and
sagacity, of things they were not in quest of...” (Merton and Barber, 2004, pp. 1-2). Erdelez (1995) asserts that “the meaning of serendipity has gradually changed from Walpole’s original conception” (p. 44) and suggests that the modern day usage “primarily means accidental discovery” (p. 44). We suggest that modern usage ignores an important component of Walpole’s original definition – the notion of sagacity. Therefore in the context of information discovery, we suggest that serendipity not only involves coming across valuable information unintentionally, unexpectedly or accidentally. But it also involves some insight in noticing that the encountered information might be potentially valuable.

Experiences of Serendipity in Academia

Although there have not been many empirical studies of coming across information serendipitously, many of the studies that do exist have focused on researchers’ and students’ experiences of the phenomenon. In this section, we review many of these studies. It has been found that serendipity is difficult to replicate in a controlled setting (see Erdelez, 2004; Toms & McCay-Peet, 2009). Therefore most of these studies are qualitative in nature – with semi-structured interviews the most commonly-adopted method.

Foster and Ford (2003) conducted unstructured interviews with 45 inter-disciplinary researchers to model their information-seeking behaviour and noticed a number of serendipity-related findings. They found serendipity was widely experienced in research and classified the examples of coming across information serendipitously provided by the researchers as either unexpectedly finding information where the information was of unexpected value or where the existence and/or location (rather than the value of the information) was unexpected (p. 332). The researchers found unexpectedly valuable information either by looking in “likely sources” or “by chance” (p. 332). The encountered information either strengthened the researcher’s existing problem conception or solution or took them in a new direction “in which the problem conception or solution is re-configured in some way” (p. 330).

Erdelez (1999) conducted surveys and follow-up interviews with students and staff and proposed an empirically-grounded model of “information encountering.” Information encountering can be considered a specific type of coming across information serendipitously - “an instance of accidental discovery during an active search for some other information” (Erdelez, 2005, p. 180). Erdelez’s model (see Erdelez, 2004) assumes that a user is actively looking for information related to a particular foreground problem and encounters information related to a background problem. The user notices information particularly relevant to the background problem, stops the existing search, examines the encountered information, captures any useful information and returns to the search related to the foreground problem. Makri and Warwick (2010) found that Architecture and Urban Design students generally followed this model when encountering information during Web searches. However, they tended to refocus or reformulate their original searches after encountering information, rather than continue to look through the results which had led them to unexpectedly find the new information.

Instead of focusing directly on information encountering, Erdelez and Rioux (2000a; 2000b) examined how academics shared encountered information with others. They conducted a qualitative survey and follow-up interviews with students from various disciplines and found the students frequently encountered information for others - usually on the Web, in physical (print) environments and through personal contact. After systematically reviewing Web sharing tools available at the time, Erdelez and Rioux (2000b) highlighted the importance of designing sharing tools “that make Web-based sharing experiences easier, more satisfying, and more enjoyable, and perhaps even habitual for both novice and experienced users” (p. 226).

Watson (2008) conducted semi-structured interviews with Library Science academics and public librarians in order to better understand how experienced searchers came across academic information serendipitously and whether they had strategies for doing so. Watson found the interviewees considered their experiences to be unexpected or unplanned and the information encountered was considered to be useful or valuable. The interviewees noted that serendipity included an amount of luck, but also the need to “make one’s own luck” by actively searching or browsing for information.

McBirnie (2008) interviewed academics (mostly music lecturers) and jazz improvisers to find out how they experienced serendipity. She found that serendipity was widely experienced in both domains and asserted that it “incorporates both passive and active elements and results from a combination of factors, including context, process” (p. 610). McBirnie’s interviewees mentioned they experienced serendipity by being “open” to the experience. The interviewees stated that this could be achieved by remaining flexible when actively seeking information and ready to explore tangentially-related information. McBirnie concluded that “while seeking serendipity seems improbable, paradoxically, some degree of control may be possible” (McBirnie 2008, p. 601).

Sun et al. (2011) conducted a mobile diary study and follow-up interviews with 11 PhD students. They asked the students to use a mobile diary application to capture experiences during the course of their research that they considered to be serendipitous. This application allowed them to take photos or video of their experiences, or to describe them textually. Sun et al. then asked the students to discuss and reflect on their experiences in an interview. They found that the encountered information was either related or unrelated to the activity they were performing when they came across it, it was either unexpectedly valuable, or not (i.e. either the information was not
valuable, or the value was expected) and it either came from an unexpected source or a likely source (one that the student was aware of or had frequently used). Sun et al. propose that these three dimensions can be used to classify serendipitous experiences.

In order to gain a rich understanding of serendipity as a phenomenon, Makri and Blandford (2012) conducted semi-structured interviews with 28 inter-disciplinary academic researchers, asking them to provide memorable examples of coming across information serendipitously. They found that the researchers’ experiences all involved 3 ‘ingredients’: unexpected circumstances, an insightful ‘aha’ moment and a valuable outcome (such as enhancing their knowledge or saving them time). Makri and Blandford suggest that unexpectedness, insight and value are therefore important dimensions of serendipity and that these dimensions can be used to (subjectively) determine whether or not an experience is considered to be serendipitous and, if so, how serendipitous.

Makri and Blandford (2012) also present a model of the process of serendipity. In this model, a new connection is made that has the potential to lead to a valuable outcome, projections are made on the potential value of the outcome and actions are taken to exploit the connection. This leads to an (unanticipated) valuable outcome. An example from Makri and Blandford’s interviews of coming across academic information serendipitously when using social media can be used to illustrate this process; an employee at a journalism lab noticed the interviewee’s enthusiastic Journalism-related Tweets on Twitter, made a connection between the interviewee and their need for enthusiastic interns, projected that he might make a good intern, exploited the connection by contacting the interviewee and suggesting he apply for an internship at the lab, then interviewing him. This resulted in an internship that was valuable for both the interviewee and the journalism lab.

Whilst a couple of existing studies have identified social media as a source of coming across academic information serendipitously (Watson, 2008; Makri & Blandford, 2012), we are unaware of any previous work that has shared our focus of understanding experiences of coming across academic social media content serendipitously.

METHODOLOGY

Data Collection

We conducted semi-structured Critical Incident interviews (see Flanagan, 1954) with 15 postgraduate research students who were working on either a Masters or PhD dissertation. All had already written a literature review and were in the process of conducting research to support the writing of other dissertation chapters. Ten students were writing their dissertations in the field of Human-Computer Interaction. We recruited these students based on ease of access. The remaining five students were writing dissertations in the fields of Architecture, City Planning, Environment Design, Modern History and Event Management. We recruited these students from a range of disciplines as we thought the nature of using social media to support research might differ across disciplines and this might have an impact on the interviewees’ related experiences of serendipity.

At the beginning of the interviews, we asked ice-breaker questions about the topic of the interviewees’ dissertations. We then asked interviewees whether they had found useful information for their dissertation without intention, whether they had found useful social media content for their dissertation (with or without intention) and whether they had found useful social media content for their dissertation without intention. We used this ‘layered questioning’ approach so we could get as rich as possible an understanding of the relationship between serendipity and social media in the context of academic research. Whilst interviewees often gave examples of encountering non-social-media-related information and intentionally using social media for their dissertations, we only probed examples in detail that combined serendipity and social media – i.e. examples of unintentionally coming across social media content that was useful for their dissertation.

Towards the end of the interview, we asked questions about interviewees’ attitudes towards serendipity and social media. For example, we asked whether they thought serendipity was valuable for academic research, whether they thought using social media had increased the amount of serendipity in their lives and whether there was anything they could do to increase the possibility of experiencing serendipity. These questions were useful for encouraging interviewees to reflect on the nature of serendipity and its perceived value for their academic work. The final question was useful for encouraging interviewees to reflect on the role of insight or sagacity in coming across information serendipitously. This was particularly important because we decided not to mention insight or sagacity in our earlier questions (on finding information without intention) so as to keep our definition of serendipity simple and in line with modern day usage of the term. Therefore this question allowed us to probe this important aspect of serendipity without confusing the interviewees.

The interviewees were informed that the interviews would be audio recorded, the transcripts would be anonymised and that they could withdraw from the study at any time. They were also told that they could request to have parts of their interview transcript edited or removed at any time. The informed consent form also explained that the interviews had been approved by the relevant UCL departmental ethics committee and that the data would be stored and shared in accordance with the UK Data Protection Act 1998.

Data Analysis

We analysed the interview data by conducting an inductive grounded analysis. We followed an inductive as opposed to deductive coding process, allowing themes to emerge from the data rather than seeking to test a particular hypothesis.
We continually compared findings from new interviewees to previous interviews (known as ‘constant comparison’ – see Corbin and Strauss, 2008). We also periodically stepped back and asked questions of the data in order to help us define our coding scheme, to ensure that there were clear distinctions between codes and to ensure that we had chosen the most appropriate label for each code. Although we followed many of the principles of Grounded Theory (see Corbin and Strauss, 2008), we describe our methodology as a grounded analysis because, due to the pragmatics of interviewee availability, we could not take an evolving theoretical sample (which, according to Strauss and Corbin, is an ‘essential feature’ of Grounded Theory – see Strauss and Corbin, 1998, p. 46).

FINDINGS
The interviewees discussed 27 memorable examples of coming across information serendipitously. When prompted to provide an example of unintentionally coming across social media content that was useful for their dissertation work, most of the interviewees were able to provide an example. We begin our findings section by discussing the interviewees’ experiences of serendipity and use of social media in general. We then discuss findings relating to the core focus of our study: interviewees’ experiences of serendipity when unintentionally coming across useful social media content for their dissertations. We highlight the importance of investing time in social media in order to yield benefits in the form of serendipitous experiences for self or others. We also highlight a trade-off between investing time in social media and ensuring that the time spent results in a useful academic output; as serendipity cannot be directly controlled or induced, more time invested in social media was perceived to increase the potential for experiencing serendipity but also the potential for coming away with nothing of value.

Interviewees’ Experiences of Serendipity
Most of the interviewees’ experiences of serendipity occurred when they were exploring information on a particular subject – whether they were actively trying to extend their knowledge on the subject or more passively browsing information on the Web during a break from work. Indeed, almost half the examples of coming across information serendipitously occurred during a period of relaxation. Very few of the examples of serendipity occurred when actively conducting focused searches for information. However, some interviewees did provide examples of coming across information on a particular topic serendipitously whilst conducting a search on an unrelated or loosely-related topic. For example, interviewee P12 explained that he often experienced serendipity when conducting unfocused ‘random searches’ on Google. He explained that he often kept a few topics he wanted to follow up on in the ‘back of his mind’ and occasionally would come across documents on the Web that were related to those topics.

“There are 3 or 4 things that I’m always interested in. In my random searches, I spend more than 1 hour in Google Search. So when I come across search results that remind me of these 3 things, this is the kind of information I would call serendipity. Because they are not completely random things. They are things that are interesting, but you just forgot about” – P12.

The interviewees generally associated serendipity with positive feelings. Several interviewees regarded serendipity as a pleasurable experience that resulted in a valuable outcome (such as extending their knowledge). However, serendipity was also associated with negative feelings. There was a widespread perception that serendipity “kills time” (P5), or can “take people away from path they were supposed to follow, and contributes to losing focus” (P12). Others expressed negative feelings of being frustrated that serendipity could not be controlled because this meant that it could not be relied on as an outcome of academic research. P6 suggested that trying to adopt strategies to control serendipity was unlikely to work:

“If you have a strategy then the serendipity is gone” – P6.

As a result of coming across academic information serendipitously, interviewees often shifted the aim of their research or searched for additional information related to the information they encountered. For example interviewee P1 was looking on an Internet forum for information on software that could record the screen for a pilot study she was running and came across information on voice recorders. As she was already aware of a trial version of a screen recorder that she could use for her studies, she shifted the aim of her research towards a voice recorder she could buy for her pilot studies that used its own rechargeable battery rather than disposable ones. The practice of conducting more specific follow-up searches as a result of coming across information serendipitously was common. Interviewee P13, for example, conducted a follow-up search to determine how useful the information found would ultimately be:

“I went to look for proof of what others people were posting, to compare it with my previous thoughts” – P13.

Interviewees also discussed the importance of capturing their serendipitous experiences when they happened in order to keep a record of their chain of thought when serendipity occurred. They often took screenshots or photographs to keep a record of the information they had come across serendipitously. Some captured the information using social bookmarking tools such as Delicious and Digg.

Interviewees’ use of Social Media
All of the interviewees reported that they used social media sites on a daily basis and over half reported coming across social media content serendipitously. This included unintentionally encountering social media content whilst conducting Internet searches. For example, interviewee P12
reported finding social media content on Citeulike whilst conducting Google Scholar searches for academic papers:

“There are some papers that are rare, so when I search for them in Google, the first result is always the citation from Citeulike. Instead of the source of paper itself it takes me to this social site instead” – P12.

Facebook was the most commonly used social media site, but was used mainly in a social context - to keep in contact with friends and peers, rather than for academic purposes. Several sites with social media functions were, however, used to support the interviewees’ academic research. These included Zotero, Mendeley, Wikipedia, various blogs and Citeulike (mentioned in the quote above).

Seven of the fifteen interviewees reported spending 30-60 minutes per day using social media, often when taking a break from work. As explained by P5, this was done not only to stay informed, but also as a form of relaxation:

“In my area, in Computer Science, there is something happening all the time, so I do it for relaxing and getting information. At least 30 minutes to 1 hour per day. Without intention, without goals, just exploring” – P5.

This undirected exploration often resulted in interviewees coming across information serendipitously. For example, P14 described how she found interesting photographs on Flickr whilst checking to see whether people had commented on her own photographs:

“I was browsing on Flickr and I saw pictures of a photographer that is a scientist [...] I randomly met him on Flickr because I was interested in his pictures and I contacted him via email. I told him about my project and he gave me some ideas for my project, so it was completely without intention. I was just exploring content on Flickr, checking my pictures to see if there were comments to my pictures, and on the home page” – P14.

Aside from undirected browsing, some interviewees also used social media in more purposeful ways to support their learning. For example, some used forums to find answers to academic questions, whilst others used Facebook status updates to ask study-related questions to peers:

“I had a question that I couldn’t answer, and I posted on Facebook, and some people answered this question [...] So you can get people to explain stuff in this way” – P4.

Other interviewees purposefully used social media to support their academic research by ‘following’ relevant people and organisations. For example, P5 became a follower of a particular organisation on Twitter. He reported to have experienced serendipity when he noticed that the company were looking for an intern and was successful in his application. He explained that he followed the organisation on Twitter because he wanted to stay updated on developments within the firm:

“I know this organisation is good, so there is an impulse to go there. I follow them on Twitter for this reason, to have an immediate update of what they are doing” – P5.

This example highlights that there is actually a degree of intentionality when coming across information serendipitously using social media tools, as it is not only possible to take actions to exploit the value of potentially serendipitous experiences but also to take deliberate actions (such as ‘following’ a person or organisation) to increase the chance of experiencing serendipity in the first place. Whilst serendipity can never be guaranteed, the interviews suggested that deliberate actions could be taken to indirectly influence the possibility of it occurring.

A degree of intentionality was also described by P10, who used social media sites throughout her research project to recruit participants for an online survey and to disseminate early results:

“It was good for creating a reaction from people on certain topics, and I used social media to spread my survey. When the results were ready, I tweeted about it [...] I didn’t expect I could reach so many people with social media” – P10.

The Importance of Investment
We identified investment as an important over-arching theme that emerged from our interviews. Specifically, the interviews suggested the importance of investing time when using social media for academic purposes in order to create opportunities for serendipity. In particular, the interviews suggested the importance of investing time in the creation and consumption of social media and in making numerous and high-quality people connections. The interviews also highlighted a time investment trade-off when using social media for academic purposes. In this section, we discuss the concept of time investment, and the related trade-off by making reference to quotations from our interviewees.

Investing in the Creation and Consumption of Social Media
The interviews suggested that investing time in using social media sites and creating social content could result in the creation of opportunities for serendipity for both themselves and others. We identified two important roles from the interview data; those of creator and consumer of social media content. The creator produces, saves and shares information, thereby creating potential opportunities for serendipity. These opportunities can be created for one’s self. For example, when interviewee P14 was asked what others might do to experience serendipity, she advised that they should “record what you think and feel, and share it online, so you create more opportunity for yourself” (P14). The same interviewee also suggested that creating social media content and, in particular, sharing that content could also result in serendipitous experiences for others:
"When people start to share information, lots of thoughts, like in blogs, it may be useful for other people and give ideas to others" – P14.

Creators not only invested time in creating new social media content when providing opportunities for serendipity for others, but they also invested time in tagging and making online comments on existing content. Some interviewees mentioned that the choice of social tags used to classify content had an impact on whether or not other people were likely to come across the content through routine active searches, or more serendipitously. For example, P8 mentioned that he might not have come across a particular academic paper if it had not been tagged with keywords that differed from the content of the paper itself:

"I can’t remember the paper but I got interested because of his vocabulary. The wording was absolutely different from mine, so I wouldn’t have found this paper otherwise. His vocabulary helped me to find this paper. The tagging had the same vocabulary I used" – P8.

The consumer makes use of the vast pool of social media content created or shared by others, as explained by P2:

“Everybody has so much knowledge and everybody is open to share. The technology is giving a platform to share and there are so many people, so many brains, so many ideas. Everyone wants to come and show, and people like me want to sit back and look” – P2.

Our interviewees highlighted that social media is often explored or browsed with little or no prior intention. Therefore consuming social media content provides opportunity for people to experience serendipity (particularly where they subjectively consider the content to be unexpectedly valuable). P3 explains that as a result of consuming social media content, "you end up getting new ideas that would not have occurred to you otherwise" (P3).

Investing in People Connections

Although interviewees were aware that serendipity could not be directly controlled or induced, they perceived that it was possible to take positive actions to increase their chances of experiencing serendipity. These actions not only included investing time in creating and sharing content, but also investing time in using social media to stay in contact with the right people and a large quantity of people. P8, for example, mentioned that being connected to people with similar interests could lead to him coming across academic social media content serendipitously:

"On Facebook, you have a stream of friends and we share the same area of study, so there is high chance that whatever they post, I’m interested as well" – P8.

Other interviewees noted the importance of being connected to ‘high quality’ people who had particular influence in their academic lives (such as their dissertation supervisors). For example, P14 reported coming across useful information (about robots that are controlled by bacteria) for his Masters project on ‘self-growing’ architecture by following a link posted by his supervisor on Facebook. He explained that his supervisor posted interesting links on Facebook as a result of being well-connected to other researchers in the area:

"My tutor uses Facebook and she knows a lot of scientists that are doing this work. So she posts interesting links on her profile. She is really busy, but with Facebook she can be in contact with everyone" – P14.

Similarly interviewees also mentioned that the quantity of people they were connected to in social networks could affect the likelihood that they experienced serendipity. P5, for example, suggested that being ‘highly connected’ in social media could lead to a greater chance of experiencing serendipity:

"In terms of social media, the more friends you have the more you can experience serendipity. The more you have contact with others, the more information you get" – P5.

The interviews highlighted an awareness that investing time, whether in the creation and sharing of social media content or in connecting with other people, could not only result in serendipitous experiences for one’s self, but also for other people. Although several interviewees mentioned that they themselves benefited from this investment, it was also evident that they primarily created and shared social media content for the benefit of others and without expecting recognition or reciprocation. Therefore time investment in social media can be considered an unselfish community-focused act even though it may benefit the creator as well as consumers of social media.

The Investment Trade-off

Related to the theme of investment discussed above, the interviews also highlighted an important time investment trade-off. This was a trade-off where interviewees perceived that spending more time using social media for academic purposes could provide greater opportunity for serendipity but, as serendipity can never be guaranteed, it was also perceived to increase the chance that none of the information encountered would directly contribute to the interviewees’ academic work (and therefore would be regarded as ‘wasted’ time).

As noted above, most of the interviewees spent part of the day browsing the Web in an unfocused manner. This often involved encountering social media content whilst surfing the Web or browsing particular social media sites such as Facebook and Twitter. Several of the interviewees mentioned that they experienced serendipity as a result of unfocused browsing. For example, P1 describes going ‘outside of the box’ by consuming encountered information:

"I start my day by briefly searching and doing this and that, and sometimes it could be that I'm reading one thing and I look at something and then something comes up and
I just want to click on that and carry on reading, so sometimes I go outside of the box” – P1.

Interviewees were, however, acutely aware that spending time undertaking unfocused browsing activities prevented them from conducting more focused academic research. Interviewee P5, for example, described this practice as ‘dangerous’ because it has the potential to ‘kill time’:

“If you have work to do, but you go somewhere because it is interesting, there is no limit. This is dangerous, because it kills your time instead of you doing work” – P5.

Interviewees not only held the opinion that unfocused exploration of the Web and social media content could result in wasted time, but regarded it more as a leisure activity than a work-related one. This was despite the fact that it sometimes resulted in them encountering useful academic information. This represents an important trade-off, where interviewees were aware that investing time in unfocused browsing, as well as in creating and sharing social media content, could increase the odds of them experiencing serendipity. However, the interviewees were also aware that serendipity cannot be directly controlled or induced and therefore there was no guarantee that the time they invested would result in a valuable outcome. Interviewee P3 demonstrated an awareness of this trade-off by highlighting the need to strike a balance “between injecting more unpredictability in your life and creating noise” (P3). He was aware that investing time in social media could yield benefits in the form of serendipitous experiences, ‘but in a time-wasting, noisy kind of way’:

“I think it’s worth making a conscious effort to get serendipity and having social media in your life. But a lot of the time, social media has introduced serendipity but in a time-wasting, noisy kind of way” – P3.

Interviewee P3 stated that there was no easy way of optimising the time investment trade-off other than to remain alert about time being ‘wasted’ (i.e. to note when significant time is being invested without any valuable outcome). Indeed, this was a trade-off where interviewees had to decide, often on a case-by-case basis, when to invest more time undertaking unfocused browsing activities and creating and sharing social media content and when to ‘cut their losses’ and switched to other more directed information-seeking activities or other academic work that would result in a guaranteed tangible outcome.

DISCUSSION

We now discuss our findings in relation to existing work on serendipity. First we discuss them in relation to the existing serendipity models and frameworks that we introduced in the ‘background’ section. Then we discuss issues related to the roles of the creator and consumer of social media content. This incorporates a discussion on information sharing. Finally we discuss issues related to the key theme of time investment and the trade-off that we identified.

Relation of Findings to Existing Models/Frameworks

Relating our findings to Sun et al.’s (2011) classification of serendipitous experiences, most of the experiences reported by our interviewees were related to their broad dissertation topic (this is unsurprising given that we probed them for examples of when they had unintentionally come across useful social media content for their project). However, as most interviewees were undertaking unfocused browsing when they came across this information, they were not performing any structured ‘activity’ for the information to be related/unrelated to. All of the examples involved coming across information that was unexpectedly valuable and most but not all the information came from likely sources (mostly social media sites that the interviewee used on a daily basis).

Makri and Blandford (2012) found that researchers’ experiences of coming across information serendipitously as part of their research and in everyday life all involved unexpected circumstances, an insightful ‘aha’ moment and a valuable outcome. The same was true of our interviewees. For example, as discussed above, interviewee P5 followed the PARC innovation centre on Twitter and became aware of an internship that started in the coming October where the interviewee would have just finished his Masters course and had no other work or study commitments (unexpected circumstances). The interviewee realised that the internship might be good for his career (insightful ‘aha’ moment) and applied for it (potentially valuable outcome).

In Erdelze’s (2004) model of Information Encountering, people notice information related to something that was already in the back of their minds whilst searching for information related to something else entirely and then stop to examine the encountered information, capture the useful aspects of the information for later use and then return to the original information task. In our interviews, and was also the case in the interviews by Foster and Ford (2003) and Makri and Warwick (2010), the direction of the research often changed as a result of coming across information serendipitously. Therefore interviewees did not always return to the original information task. Although we did not explicitly probe why interviewees did not return to the original information task, we suggest that this may be because the original task was no longer deemed to be as important as pursing new goals related to the encountered information. Alternatively, interviewees may not have returned to the original information task simply because they became side-tracked by the encountered information.

The Roles of Creator and Consumer

Our interviewees took on the roles of either ‘creator’ or ‘consumer’ of social media content – with the creation and sharing of this content sometimes leading to serendipitous experiences for themselves or others. These two roles somewhat resemble those of the domain expert and the consumer, as identified by Blandford and Attfield (2010). Blandford and Attfield, however, describe the relationship between domain expert and consumer in terms of power
imbalance (the domain expert has more knowledge than the consumer). In our study, there was no such disparity of knowledge: creators and consumers of social media content had an equal and symbiotic relationship – where creating and sharing content had the potential to lead to useful feedback from others, whilst consuming content had the potential to lead to interesting and/or serendipitous discoveries. The role of the creator is also partly related to the role of the ‘super-encounterer’ as identified by Erdelez (1999), particularly with regard to sharing information. Super-encounterers often come across information that they recognise may be relevant or useful to others and share this information with them (see Erdelez, 1999). Cooksey (2004) defines the action of someone sharing information that they have come across serendipitously with someone else who they think it might interest as ‘altruistic serendipity.’

The concept of information sharing has been widely documented (e.g. see Davenport, 2001; Erdelez and Rion, 2000; Talja, 2002). However, previous work has downplayed the importance of sharing information with an unknown public audience (i.e. to people who are not personally known to the sharer). In our study, whilst interviewees reported sharing information with specific individuals that they thought it might interest, they also reported sharing information with the world at large simply because they found the information interesting. This shares a conceptual similarity with the ‘preventive grace’ approach to serendipity discussed by Liestam (1992). This approach suggests that opportunities for serendipity can be created through the prior organisation of information. Liestam asserts that the preventive grace approach “is aided by people, processes and systems external to the researcher which seek to make information readily accessible to the user” (p. 526). Preventive grace is a particularly interesting concept if considered alongside information sharing. If social media content is shared directly with a particular friend or colleague, the very fact that someone hand-picked the information for them might make the consumer think that coming across the information was not particularly serendipitous. However, if content is shared with the world at large rather than with a particular individual, we hypothesise that it might be considered as more serendipitous. This highlights that peoples’ experiences of serendipity are highly subjective. What may be perceived to be serendipitous by one person may not be by another.

The Importance of Investment
The importance of investing time in social media in order to increase the chance of experiencing serendipity was a key theme from our interviews. Whilst Foster and Ford (2003) found that perceptions related to the extent to which serendipity could be influenced or controlled varied, most of our interviewees did not believe that they could employ any particular strategy to create opportunities for serendipity – other than to be receptive to new information (which one of Watson’s (2008) interviewees described as “making yourself available to luck,” p. 28). Our findings are supported by McBirnie (2008), who found limited evidence of strategic decisions playing an important role in serendipitous experiences. McBirnie (2008) asserts that “chance and unpredictability are fundamental aspects of human existence. Although we may forever attempt to control these attributes and their effects, we can never be completely successful in our attempts” (p. 601).

Regarding the time investment trade-off, some of our interviewees perceived undirected browsing of social media content as a task that could potentially result in serendipity, but could also potentially result in wasted time. Both the positive and negative aspects of this trade-off have been noted in previous work; Toms (2000) compared the behaviour of a group of people searching purposefully for information with another group browsing with no clear purpose and found that unfocused browsing led to more serendipitous discoveries in terms of the number of information encounters and novel topics identified. Whereas Toms and McCay-Peet (2009) argue that “introducing the potential for serendipitous discovery [...] brings also the possibility for diverting attention away from the task, leading to unproductiveness.” (p. 192).

**Design Suggestions**
We now present a number of suggestions for the design of social media tools based on our findings. These include supporting users in: creating and sharing social media content, sharing information that they have come across serendipitously and making valuable people contacts.

The main focus of our design suggestions is on helping to create opportunities for the serendipitous discovery of both academic and non-academic information when using social media. It can be argued, however, that it is not desirable to try to ‘design serendipity into’ interactive systems. Indeed, we believe that ‘engineering’ serendipity is an oxymoron because once users are aware that a system has aided a particular discovery, they may no longer perceive the discovery to be serendipitous. This is because the system may have removed some or all of the unexpectedness involved in the circumstances surrounding the discovery and some or all of the insight involved in making the discovery. Rather than attempting to offer ‘serendipity on a plate’ by designing it explicitly into systems, we suggest that designers should focus on designing interactive environments that create opportunities for users to make discoveries that they perceive to be serendipitous.

**Supporting Users in Creating and Consuming**
Although social media tools already support the creation of content, there is a scope for them to support content creation in new ways that might improve serendipitous opportunities for both the creator and the consumer. For example, social media tools might provide users with suggestions of Web content (news articles, academic papers, Web pages, other social media content) which is strongly or not so strongly related to the content they are creating. A user who is writing a blog post about Sustainability in Architecture
might be provided links to academic papers on the subject. Or a user who mentions the name of a particular academic in a Tweet or Facebook status update might be provided with links to papers authored by the academic or to the homepages of people who have co-authored with the academic. The provision of these links might directly inform the content the user is creating or simply provide them with useful information related to the content they are creating that they might not have found otherwise.

The consumption of social media content might be supported by social media tools allowing users to specify their research or leisure interests and the tools tailoring feeds so as to prioritise content related to these interests. As with consumption, this tailoring need not only prioritise content that is strongly related to users’ interests, but also content that is more loosely related (content that may well be perceived as serendipitous by users if it is both unexpected and valuable).

As many of our interviewees experienced serendipity when using social media to take a break from other work, this tailoring might be particularly useful for supporting users in utilising their break time effectively; social content might be presented separately from academic content, allowing users to decide whether they want to spend their break time looking at social content, academic content or a mixture. There are also many other ways in which content consumption might be supported, possibly leading to serendipity as a by-product. For example, users might be shown social media content that has been socially tagged with keywords that are also present in papers that they have authored or academic searches they have conducted. Or users might be shown academic content that their colleagues or people they have co-authored with have created or consumed (e.g. ‘academic papers your colleagues are currently reading’). This is similar to functionality provided by Facebook, which suggests news articles that friends have read recently.

**Supporting Users in Capturing and Sharing**

Interviewees highlighted the importance of capturing and sharing both social media content in general and content that they have come across serendipitously. Social media tools already provide some support for capturing and sharing social media content. For example, it is often possible to automatically create a Facebook post or Tweet from a blog entry. Similarly, some smartphones and digital cameras allow users to automatically upload photos/videos to social media sites such as Facebook and YouTube. Similarly Delicious allows both capturing and sharing to be achieved simultaneously: when users save a link in public share mode, the link is automatically shown to other users.

However, there is still scope to further support users in capturing and sharing social media content — including content they have come across serendipitously. Desktop tools might be developed to allow users to ‘clip’ content from the Web and store it either on the user’s computer or in the cloud. This content could be date and time stamped and users could be given the opportunity to add social tags to allow them to re-find content they deem to be useful. The same tools might allow users to share this information across a range of social media platforms. The social tags used to describe the content might therefore also be used to help other users encounter the content.

**Supporting Users in Making Useful Contacts**

Social media tools currently support users in adding new contacts by allowing them to search for people and import contacts from their e-mail accounts, and by suggesting people they might want to connect with based on common connections. However, these tools tend not to provide much support for allowing users to make valuable connections. Facebook allows users to search by organisation name as well as by an individual’s name. But there is scope for supporting users in making useful contacts in other ways. For example, in an academic context, social media tools might scan the papers that a user has saved on their computer and suggest that they connect with authors who currently use the same tool. Similarly, these tools might scan the papers that the user has authored and suggest that he or she connects with people they have co-authored with or cited. They might also suggest that users connect with others who have published work on topics that are strongly or loosely related to those discussed in the scanned papers (or, indeed, somewhere in between).

Whilst users may experience serendipity by consuming social media content from useful contacts, social media tools might also create opportunities for them to discover those contacts serendipitously. The tool should suggest contacts that the user might not have otherwise thought of contacting but where the user may benefit from consuming the content that they produce.

**CONCLUSION AND FUTURE WORK**

We have found that investing time in social media not only has the potential to yield positive benefits for the individual investing the time, but also for consumers of the social media content that the individual creates or shares. However, there is also a trade-off associated with investing time in social media; spending time creating, sharing and consuming social media content was perceived to create opportunities for serendipity. However, as serendipity cannot be directly induced or controlled, interviewees were also aware of the strong possibility that nothing beneficial would result from the time spent using social media.

Although serendipity cannot be ‘engineered’ into interactive systems, social media tools and sites can be designed to create opportunities for serendipity. We encourage developers of these tools and sites to design with serendipity in mind so that users can not only be informed and entertained by social media content, but delighted by the information they come across when using social media.
We hope that an increased awareness of serendipity in social media (particularly where coming across academic information is concerned) will serve two important purposes. Firstly, it should combat the existing negative stigma of serendipity in academia (see Liestman, 1992), where coming across information serendipitously is regarded as less legitimate for research than actively seeking information. Serendipity should also gain a positive stigma – as a potential driver for novel research and valuable collaborations. Secondy, we hope that coming across academic social media content serendipitously will highlight the importance of social media in academia. Whilst using social media can eat up valuable time from the working day, it can also keep people abreast of new research developments and directions, newly published work and new opportunities for jobs and funding. We therefore believe that both social media and serendipity are valuable parts of academic life and should be embraced.

Future work might examine the time investment trade-off in more detail and in other settings, such as during loosely-focused Internet searching. This would help determine whether (and potentially how) interactive systems can support users in optimising the use of their break time from work. Future work might also examine academics' motivations for sharing information they have discovered.

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REFERENCES


