Immersive information behaviour; using the documents of the future

Abstract

Purpose
Immersive documents, where unreality is perceived as reality, arise from a combination of rapidly developing technologies and applications: pervasive, networked information; multi-sensory interaction; and the creation of participatory texts. This paper presents the case for studies of information behaviour in the use of such documents.

Methods
A critical and selective analysis of relevant literature is presented.

Findings
Immersive documents are likely to have a significant effect on library/information service provision, as it is to expected that novel information behaviours will emerge as these documents become widely used. Studies of immersive information behaviour and practices will be valuable in planning for how library/information services can best provide access to such documents, and may also guide the development of such documents. They may also contribute to the development of information behaviour research generally, and to better interaction between research and practice.

Research limitations
Since such documents are not yet in wide use, the conclusions are necessarily speculative.

Originality
This is the first paper to discuss information behaviour in respect of immersive documents.

Keywords
Immersive documents; Information behaviour

Paper type
Research paper

Immersive information behaviour; using the documents of the future

Introduction

A new form of 'immersive' document is being developed, driven by the confluence of several technological developments. It seems likely that the availability of such documents will have a transformative effect on some aspects of information provision, and on library / information science (LIS) as a discipline. This paper argues the need to study the changing information behaviours of those who use such immersive materials.

Immersive documents

The prospect of immersive documents arises from a combination of rapidly developing technologies, particularly pervasive, networked information, and multi-sensory interaction, when combined with participatory texts. The nature and development of this new form of document have been reviewed and exemplified (Robinson, 2014A), so only the main points will be mentioned here.

They emerge from the overlap of three general technological trends:

1 Mobile becomes pervasive

Pervasive networked information, diffusing away from 'information places' and avoiding the need for specific 'information devices', is foreshadowed by 'wearable tech', such as Google Glass and smart watches. Its widespread adoption could have at least as significant an impact as that of mobile devices such as tablets and smart phones.

2 Multi-media becomes multi-sensory

Multi-sensory technology goes beyond the currently available augmented, or virtual, reality, by involving all the senses to create a more convincing reality. As yet, such devices provide only a limited sense of reality; for examples of current library/information applications, see Fernandez (2014), Berryman (2012) and Hahn (2012). However, we may expect their sophistication to increase rapidly.

3 Interactive becomes participative

Participatory texts, with active participants, directing the flow of the text, rather than passive readers following a fixed text, are by no means new, and have been instantiated in a variety of printed and digital books, in plays and exhibitions, and in role-playing games, both physical and digital. When they are expressed in the newer format of 'transmedia', with a single text expressed across a variety of information devices, they provide a richer form of immersion. An example is *The Craftsman* (Portal Entertainment, 2013), in which events unfold in real time, engage the reader as part of the fiction, with texts, emails, calendar updates and phone messages from other characters within the plot enhancing the main text. For further examples, see Robinson (2014B).

As these three trends develop and overlap, the feeling of being enveloped in information which is provided by a pervasive information environment, involving

multi-sensory input, delivering a participative text, provides what may reasonably be described an immersive experience. The record of such experiences is an immersive document. Both the 'raw' text, and each experience of it, may be considered as a document, posing interesting issues for the organization and management of such documents.

Significance for library and information science

For the theory and practice of the library/information sciences, these developments provide a new form of document to handle, of potentially wide scope and significance. It would be wise to begin to consider these issues now, so that our discipline can be well-prepared to deal with them, rather than struggling to catch up later, as has sometimes seemed to be the case with new digital formats. Hahn (2012, p. 429) writes that "Mobile augmented reality (AR) applications represent a profound opportunity for increased access to print and digital library collections. AR applications can deliver an engaging and interactive information experience." The same will surely be even more so for the further developed immersive documents, and it would be well for the library/information professions to be as well placed as possible to take advantage, and to steer developments. As will be noted below, one crucial aspect of this is study of the ways in which new forms of documents will be used, and new information behaviours and practices which they may inspire.

If we understand the library and information sciences to be concerned with the whole communication chain of recorded information, from creation to use (Duff, 1997; Robinson, 2009; Bawden and Robinson, 2012), then it is clear that the emergence of immersive documents affects all parts of the chain.

The most dramatic effects are to be seen in the use of such documents, active participation in an immersive reality being qualitatively different from passive reading of a conventional information resource. Such effects are not always self-evident and not always positive. It has been shown that comprehension of information, and confidence in information sources, can be increased by even a modest degree of interactivity, but that this interactivity may pose problems for less capable users of digital environments (see, for example, Lustria, 2007), so that we may expect much greater effects from fully immersive documents. This points up the need for studies of the use of such documents at an early stage, so that the best design principles can be identified, and unintended consequences overcome.

At the other end of the chain, the creation of immersive texts can be analysed both from a theoretical perspective (see, for example, Hayles, 2012 and Ryan, 2001) and from the perspective of practical advice for creators of such texts (see, for example, Immersive Writing Lab, 2013). However, aspects of interest for LIS can be found throughout the communication chain, with three aspects being of particular importance.

First, there is the question of how to organize and retrieve such documents. For the master documents, the issues will be similar to those faced in dealing with interactive media, such as video games; see, for example, Lee, Tennis, Clarke and

Carpenter (2013), and the contributions in the volume edited by Delve and Anderson (2014). These principles will have to be extended to the more complex environment of immersive documents. The articles by Vukadin (2014) on the problems of bibliographic modeling of transmedia documents according to the principles of FRBR, and by Abbott (2014) on the preservation of interaction, are good illustrations of the approaches that will be needed.

Second, there is the question of how, and by whom, such documents will be stored and managed. This amounts to a kind of personal information management, with very specific issues of ethics and privacy (Robinson 2014). The prospect puts one in mind of speculations that libraries might in the future have collections of experiences, allowing users to engage with memories and other digital recording of events (Schuman 1997).

Third, and most important for this paper, is the need to understand the information behaviours and practices associated with these new forms of document; to understand immersive information behaviour.

Understanding immersive information behaviour

No full research programme to understand the behaviour and practices of people dealing with immersive documents is as yet possible, as no documents of this nature are widely available. However, we may still envisage what such a programme would comprise, and begin by considering such documents as are now available; for example, participatory texts which are not fully immersive, or haptic multi-sensory interfaces which are not associated with any text. Greifeneder (2014) has identified studies of wearable technology and ubiquitous access as an important issue for current and future information behaviour research. We may also begin to gain understanding of the issues by an attempt to predict future prospects, through interviews, focus groups and Delphi studies with developers and potential users of such documents.

It would be important to study three related aspects of immersive information behaviour.

First, at a 'micro level', detailed studies could be made of the ways in which people made use of different aspects of immersive documents. This would be an extension of previous and current studies of interactive systems with less than immersive participation, such as the web log analyses which showed the detail of interaction with web-based interactive systems (Nicholas, Huntingdon, Lievesley and Withey, 1999; Jansen, 2006).

Other examples of studies with systems which offer some of the features of immersive documents are those of Schønau-Fog and Bjorner (2012), who used the card-sorting usability testing tool to categorise the nature of engagement with video games as sensory, social, narrative, etc., of Makri, Blandford and Cox (2010), who used think-aloud records of engagement with variety of interactive information

systems, and of O'Brien and Toms (2008), who used semi-structured interviews to investigate engagement in a variety of interactive systems. Such methods may perhaps be applicable to immersive documents, or at least to certain aspects of their use; however, as noted later, it is likely that a more holistic, mixed-methods approach would be needed, to do justice to the complexity of immersive materials.

Second, at a broader level, there could be studies of where such systems fit into the range of resources used by various groups of users; an extension of the well-worked 'information sources for..' type of study (Case, 2012). Some examples may already be envisaged: immersive training, in medical and technical contexts; immersive educational products at a variety of levels of education; immersive access to heritage material; and immersive games and stories. This latter reminds us of one particularly disruptive effect of such documents; the blurring of the boundaries between leisure and information provision, an extension of the 'gamification' of information provision and learning, whose benefits for library/information contexts have been noted (Prince, 2013; McMunn-Tetangco, 2013). It has been recognized for many years that the distinction between information and entertainment is artificial, and that there is in fact a continuum (Cermak, 1996; Case, 2012). In this respect, as in others, the advent of immersive documents has the effect of intensifying and making plainer trends already recognized. One impact on information behaviour research of this blurring of the boundaries of what amounts to 'information access' is that it may be increasingly unhelpful to segregate usage into the groupings by education, employment and task that have been commonly used (Case, 2012). Assessments of these issues might be helpful even at this early stage in the development of immersive systems. A particularly suitable approach would be the Delphi method, which has been used to good effect in information research (Pickard, 2013A; and see, as examples, Eldredge, Ascher, Holmes and Harris, 2012; Saunders, 2009; Maceviciute and Wilson, 2009), and which could be used here to harness the views of experts as to the future of this new form of document.

Third, and perhaps most interesting, would be studies of the kinds of overall information behaviours and practices shown by people dealing with immersive documents, with particular focus on any novel behaviours. It may be expected that the latter will be seen, as that has been the experience with less innovative forms of interactive system; for example, the unexpected behaviours identified by web log analysis (Nicholas, Huntington, Williams and Dobrowolski, 2004). It may not be unreasonable to suggest that we may see radical changes in information, as information access becomes increasingly more pervasive, multi-sensory and, in particular, participative. It is therefore important to use research methods which are sufficiently open so as to allow new forms of information behaviour to be identified.

An issue of particular importance with respect to immersive documents is the interplay between the information behaviour of individuals and that of social groups, a topic of relevance to all information behaviour studies (Bawden and Robinson 2013). Given that immersive documents, by their very nature, lend themselves to individual participation and experience, an approach focusing on the individual is clearly worthwhile. It seems likely that behaviour with respect to immersive

documents is likely to be related to personality and other individual differences, and this would be a fruitful line of enquiry (Vilar and Žumer 2008; Bawden and Robinson 2011; Heinström, Sormunen and Kaunisto-Laine, 2014)

On the other hand, it is also likely that interesting social and group practices might manifest themselves in the context of use of immersive documents. This is particularly so in view of the enthusiasm with which participatory media have been taken up by groups with common interests, most notably fan fiction communities, with the groups acting as both users and creators of such materials (Robinson 2014). This phenomenon is likely to be enhanced by the increased participatory and multi-sensory attributes of immersive documents. There is a need to study creation of, and participation in, as well as consumption, of immersive and participatory documents; an aspect of the general need for more studies of information use identified by Case (2014) and by Griefeneder (2014).

Finally, we might note that adoption of immersive documents on any large scale within libraries and information centres could have significant implications for the nature of their services. There have been very few examples so far: one which gives some indication of the possibilities is a college library, whose annual Harry Potter night uses games and simulations to create an "emotionally immersive [and] multisensory experience" (Broussard, 2013, p. 814). This is in general in line with the trend for libraries – public libraries in particular – to offer more participatory experiences, as noted by several of the contributors to the volume edited by Janes (2013). As they develop, such participatory offerings will have to be evaluated, as another aspect of the evaluation of service impact (Markless and Streatfield 2013). New forms of digital literacy will be needed to make effective use of such environments, and these too will need to be assessed. This may perhaps best be done using qualitative approaches along the lines of the phenomenographic approach used by Boon, Johnson and Webber (2011) for investigating simpler ideas of information literacy.

Investigating immersive information behaviour

As noted above, a full programme of research into this topic will not be feasible until a substantial number of fully immersive documents become available. In the meantime, studies can focus on the analysis of future prospects, and on the study of the use of 'partially immersive' documents; those which exhibit some but not all of the traits of pervasive, multi-sensory participation. We may compare this with other proposals for research agendas to deal with new issues: for example, the sustainability of digital information (Chowdhury, 2013), the future of the school library in light of participatory web services (Dresang and Koh, 2009) and the under-researched topic of oral documents (Turner 2012). The difference in the research programme proposed here is that it may begin at the time when the topic of study, genuinely immersive documents, are first becoming available.

The first of these, essentially a futurological study, must be approached by methods suitable for gaining realistic opinions on a topic which is may be quite difficult for the

participants in such a study to imagine, and where there may be widely differing views and elements of controversy. The value of the Delphi method has been noted above, and a particularly suitable variant for this context would be the 'Slow Delphi' technique, which is designed to elicit qualitative understanding of complex conceptual topics, where there are a variety of perspectives and positions to be considered (Poirier and Robinson, 2014).

The second, the study of the use of partially, and later wholly, immersive documents is likely to need broad mixed-methods approaches, building on methods used for the analysis of use of simpler interactive systems (Kelly, 2009), as in the examples given above of card-sorting, semi-structured interviews, and think-aloud recording. These qualitative methods offer the chance to gain the rich and detailed insight necessary to begin to understand behaviour in the immersive information environment. While there is certainly a place for more limited studies of specific aspects of the use of these documents – for example, the ways in which participation occurs, or the value of different sensory inputs – in general, more holistic methods will be needed in assessing the very different information environment created by such documents. Both quantitative and qualitative methods will be of value, but is likely that qualitative will – at least initially – prove more valuable, in accounting for the qualitative behaviour changes that are likely to be seen. This can be seen, in terms of general LIS research methodology, as a strengthening of what Case (2014) and Greifeneder (2014) have identified as an intensifying move towards qualitative methods in LIS research generally.

Because of the intensely personal nature of immersive experiences, it is likely that methods based on phenomenology and phenomenography will prove particularly valuable. These are intended to allow the researcher to appreciate information behaviour from the perspective of the user/participant's life context (Budd, 2005; Limberg, 2000); a particularly appropriate stance for this research area. As noted above, the value of these approaches for evaluating individual conceptions of information literacies has been demonstrated (Boon, Johnson and Webber, 2007). To capture the social aspects of the use of such documents, ethnographic approaches are likely to be valuable; these again seek to understand information behaviour from the perspective of the participants (Williamson, 2006; Pickard, 2013B; Carlsson, Hanell and Lindh, 2013)).

Finally, we may note that the investigation of immersive information behaviour may be a particularly appropriate topic for joint research between researchers and LIS practitioners. "The twenty-first century library", writes Hahn (2012, 0. 437), "is a laboratory of experimentation and prototyping". Creation and use of participative and immersive documents would seem to fit well within this concept, and the investigation of immersive information behaviour as much the concern of LIS practitioners as of academic researchers. This may be a good context in which to try to overcome the much-lamented gap between research and practice in the library/information world (Bawden 2014).

Conclusions

Immersive documents are likely to have a significant influence on library/information provision. An understanding of the information behaviours and practices associated with the use of such documents will be essential in optimizing provision. Starting research on this topic, at this early stage in the development of such documents is worthwhile, and not merely because it enables library/information services to plan for the best forms of provision. A knowledge of the user behaviour with respect to such documents, particularly novel and unexpected behaviours, will enable influence to be brought on the development of this striking new form of document.

From the point of view of information research, studies of immersive information behaviour will reinforce the value of qualitative research, within a mixed methods paradigm, and will also reinforce a focus on use, creation and participation. It also offers the possibility of strengthening links between research and practice.

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