



City Research Online

City St George's, University of London

Citation: Robinson, L. (2015). Multisensory, Pervasive, Immersive: Towards a new generation of documents. *Journal of the American Society for Information Science and Technology*, 66(8), pp. 1734-1737. doi: 10.1002/asi.23328

This is the accepted version of the paper.

This version of the publication may differ from the final published version. To cite this item please consult the publisher's version.

Permanent repository link: <https://openaccess.city.ac.uk/id/eprint/6864/>

Link to published version: <https://doi.org/10.1002/asi.23328>

Copyright and Reuse: Copyright and Moral Rights remain with the author(s) and/or copyright holders. Copies of full items can be used for personal research or study, educational, or not-for-profit purposes without prior permission or charge, unless otherwise indicated, provided that the authors, title and full bibliographic details are credited, a hyperlink and/or URL is given for the original metadata page and the content is not changed in any way. For full details of reuse please refer to [City Research Online policy](#).

Multi-sensory, Pervasive, Immersive: towards a new generation of documents

Lyn Robinson April 2014

Centre for Information Science
City University London
Northampton Square
London
EC1V 0HB
United Kingdom

e: lyn@soi.city.ac.uk
t: +44 (0)20 7040 8390
f: +44 (0)20 7040 8845

Multi-sensory, Pervasive, Immersive: towards a new generation of documents

Abstract

The emergence of immersive documents, which allow the 'reader' to perceive unreality as real, is foreseen. This new type of document will evolve from the combination of contemporary participatory, transmedia storytelling with pervasive computing technologies and multisensory interfaces. It is argued that a research programme within the information sciences is needed, to investigate new information behaviours associated with such documents, the new digital literacies needed to make effective use of them, and their place in the information communication chain.

Introduction

This opinion piece suggests that a combination of technologies, particularly pervasive, networked information, and multi-sensory interaction, will lead to widespread adoption of new forms of immersive documents. This will have significant implications for the library/information disciplines.

Information science is focused on the communication chain of recorded information, instantiated in documents; its academic study and its promotion and improvement in practice (Bawden and Robinson, 2012; Davis and Shaw, 2011; Robinson, 2009). There has been considerable debate on the nature of documents, a central concept within the information sciences (see, for example, Buckland, 1997; Buckland, 1998; Frohmann, 2009). The concept of document has expanded to include religious icons (Walsh (2012)), museum objects (Latham 2012), and landforms (Grenersen 2012).

Now, new technical, and to an extent social, developments are leading towards entirely new forms of document. Although these have not yet received much recognition, still less serious study, within the information sciences, they have the potential to bring about great changes in the information environment, and concomitant challenges and opportunities for the information disciplines.

Three developments are of significance: pervasive information, using new technologies to by-pass the need for conventional 'information devices'; multi-sensory technology, allowing communication of information by senses other than sight and hearing; and participatory, transmedia stories (fictional or fact-based), which invite the active participation of the 'reader' across a range of devices and formats. The blending of these technologies, which may be achieved in various ways, leads to the new forms of documents discussed here.

The three enabling developments are not synonymous. Pervasive information devices may convey conventional documents; multi-sensory technology will be used mainly for purposes other than conveying recorded information; and interactive, participatory experiences do not have to be recorded in any formal documentary sense (e.g. theatre performance).

Nonetheless, it is the conjunction of the three that is likely to bring about the most far-reaching changes. Developments in pervasive and multi-sensory computer technologies are leading towards a future in which 'reading a good book' may deliver an entirely realistic experience, where the 'reader' participates in a simulated version of a story, and may be able to influence the final outcome.

We will now briefly consider each of these three developments in turn.

Pervasive information

One of the main trends over the past decades has been the 'diffusion' of information provision from specific 'information spaces' into the wider environment. The advent of the portable radio, in general use from the 1960s, may be seen as the first stage. But up to 1990, it was taken for granted that one went to an 'information place' –

library, record centre, bookstore, computer room – to interact with any significant amount of information, beyond that which would be carried in the form of a small number of printed documents. The mobile ‘information device’, initially for telephone communication, but later allowing email, web access and storage of extensive digital files, altered the picture greatly. As great an alteration is likely to be seen with the widespread adoption of ‘wearable tech’, currently personified by Google Glass and the long-awaited ‘smart watch’: for historical development and general issues see Randell (2005), for latest developments see Wearable Computing Review (2014) and for a perspective on their influence on publishing see Salkowitz (2014).

The effect of genuinely pervasive information, requiring neither an information place nor a specific information device, will be to increase the feeling of connectivity, and of being ‘immersed in the information conveyed’. This will contribute to, and be magnified by the other two developments.

Multi-sensory technology

Information systems communicate with their users almost exclusively through sight and sound. Even these are used in a limited way, as witness the plastic glasses necessary for viewing 3D films. So-called ‘augmented reality’ systems aim to overcome these limitations, but are still generally restricted to a limited range of sensory inputs and outputs (Craig 2013). Some applications, actual and potential, of these limited systems in library/information and settings have been reported: see, for example Pence (2011), Berryman (2012), Hahn (2012) and Cocciolo and Rabina (2013).

Truly multi-sensory technology aims to use sight and hearing more fully, and to enroll the other senses of touch, smell and taste in a more convincing sensory communication. Although this has been seen as a desirable objective for decades (see, for example, Bawden, 1985), it is only recently that it has approached reality. Multi-sensory technology, by combining sensory inputs and outputs with network technology, aims to allow users to sense everything in the way as in reality; see, for example, Flinders (2013) and Bowdler (2014).

Although these issues have been touched on over the years in the information science and technology literature, science fiction has arguably given better indications of what is to come, as it has for a variety of information innovations (Bawden and Robinson, 2012). The 1970s British children’s TV series *TimeSlip* included a scene in a ‘fantasy room’, in which a tubular device could be placed upon a user’s forehead to allow their dreams to be experienced as reality (P.A.S.T., nd). Wim Wender’s 1991 film *Until the End of the World* featured a more modern-looking headset device, which again allowed the user to experience dreams as a reality (Rotten Tomatoes, nd). Best known perhaps is the ‘holosuite’, or ‘holodeck’, from the Star Trek universe (MemoryAlpha, nd; Gresh, 2001), a space within which participants engage in a computer generated unreality which is indistinguishable from reality. These science fiction prophecies raise queries about the nature of unreality, which may become pressing if the kind of documents under consideration

here become commonplace: if (unreal) wine is drunk in the holosuite, do the participants become drunk; and if a participant falls in love with an 'unreal' character, is what they feel 'real'?

At present, the technologies available to deliver these sort of experiences exist only as relatively heavy and clumsy physical devices, and go only a limited way to evoking a sense of reality, for example Oculus Rift and Scentee (see <http://www.oculusvr.com> and <http://www.scentee.com/>), but we may expect this situation to change rapidly. Multi-sensory information communication will then contribute to the new form of immersive document.

Participatory culture; transmedia stories

A participatory story or experience, (fiction or fact-based), is one in which the 'reader' moves beyond a passive experience of the text and becomes an active participant. Transmedia implies that the story may be 'read' or 'engaged' with, across a variety of media platforms (See Jenkins, 2007 and TransmediaNext nd). Transmedia stories do not have to be participatory, nor do participatory texts require transmedia, but increasingly the two techniques are used together and conveyed in digital document forms. These approaches invite and facilitate the reader's perception of unreality as an increasingly plausible reality. They promote an immersive experience.

The idea of participatory texts or stories long predates digital networked media. Several decades ago, the BBC broadcast a children's radio serial, which left the heroes with a dilemma at the end of each episode; listeners could steer the story by voting (by postcard) on what action the heroes should take. More recently, we have had participatory plays, for example *The Drowned Man* (Punchdrunk, 2013) and installations, for example *Tomorrow* (Victoria and Albert, Museum 2013) both in physical spaces, while participatory printed novels allow the reader to construct their own path through pre-set story elements (see, for example, McElhatton, 2010). Role-playing games, now largely though not entirely digital in nature, also evoke an immersive (unreality as reality), participatory experience.

The rise of 'fandom', particularly for cult TV shows, books and films, promoted by social media, has also led to various immersive and participatory activities, particularly 'cosplay', dressing up to 'become' the characters; as examples, see Brehm-Heeger, Conway and Vale (2007), Booth (2013), Drushel (2013) and Ue and Cranfield (2014).

Thus far, these developments have had little impact on the information disciplines, although Broussard (2013) describes how a college library's annual Harry Potter night uses games and simulations to create an "emotionally immersive [and] multisensory experience".

Fuelled by the progress in networks and mobile computing platforms, electronic texts are now emerging, combining aspects of the traditional printed book with televisual experiences, and taking the form of 'transmedia': playing out across a

variety of information devices (Salkowitz, 2014). These documents reach beyond what most of us understand by the term e-book, in that the story follows the reader into the real world. Boundaries between reality and unreality become blurred. In this new type of document, exemplified by *The Craftsman* (Portal Entertainment, 2103), events unfold in real time, and engage their readers as part of the fiction. In transmedia style, readers receive texts, emails, calendar updates and phone messages from other characters within the plot, and may stop and resume the interaction as convenient.

Naturally these kinds of texts require an innovative writing technique, and support for this is beginning to emerge: see, for example, the Immersive Writing Lab (2013).

The central aspect of all the examples mentioned above is participation. The 'reader' is invited to enter the unreality, and live as a part of the fiction. It is in this sense that such documents portray 'unreality' as 'reality'. This, however, requires a considerable suspension of disbelief: in spite of the popularity of engaging with the highly elaborate fantasies demonstrated by cult fandom, transmedia specialists, theatres and museums, there is much room for improvement in delivering experiences which cannot be readily be distinguished from reality.

Whilst the concept of immersive 'stories' implies documents which provide entertainment and relaxation, immersive documents could be used to deliver training, education or development. Today, limited simulators for training drivers and pilots are best known, but technological improvements may lead to innovative more realistic, simulations in domains such as healthcare where sensory inputs and cues are of great value (Levine, DeMaria, Schwartz and Sim, 2014).

The promise of pervasive and multi-sensory technology is that such improvement is likely to be rapid and substantial, greatly extending the scope and acceptability of immersive documents. This change can be seen as a part of what Luciano Floridi has termed the Fourth Revolution, and of what Katherine Hayles notes as the changes in thinking brought about by new media: in both cases, advances in information technology shape how we understand and think about the world, and how we interact with it, and each other (Floridi, 2014; Hayles, 2012).

Significance for LIS

If such texts - pervasive, multi-sensory and immersive – are indeed to provide the next generation of documents, and a significant part of the total world of documents in the near future, then it behoves the information disciplines to consider how they fit into the processes of the information communication chain. It is entirely possible that we may see radical changes in information behaviour, as documents become more immersive. It is surely not too soon to begin to consider possible implications for information provision.

In his book *Beyond the Library of the Future*, Bruce Schuman (1997) speculated on what would become of libraries some decades into the future. One scenario had the public libraries of 2022 curating 'experiences', rather than just physical works. The

experiences were envisaged as computer programs which allowed a 'reader' to engage with a recording of a real experience – the memory of another person – so that they perceived it as real for themselves. There is, of course, no reason why such experiences could not be fictional, an extension of the immersive texts such as 'The Craftsman', or indeed entirely imaginary, and hence 'unreal'.

The kinds of documents produced may span the spectrum from factual to fantastical; the Star Trek holosuite was envisaged as being used for personal and collective fictional experiences, but also for training and simulations, which were recorded for future reference. While the lure of fantasy will always be strong, and may form the grounds for many immersive documents, allowing the participants to experience what could never be encountered in real-life, they will also have application in more real-life situations. They could support, in a far more realistic and holistic manner than is possible with present technology, training and development in a variety of areas from emergency response and surgery, through piloting aircraft and operating complex machinery, to dealing with difficult customers.

So it will be necessary to understand the changes in information behaviour which may be brought about by this radically new form of document. Studies of engagement with various forms of technology, invoking aesthetic, sensory, sensual, social and emotional factors, offer a valuable starting point - see, for example, O'Brien and Toms (2008) and Schonau-Fog and Bjorner (2012) - but any study method or underlying conceptual model will need to be considerably extended to encompass this new form of document.

There is also a question of how immersive documents may be stored, indexed and retrieved; this question is both technical and conceptual. Such documents may be both intensely personal – particularly if memories, personal fantasies or even dreams are to be stored – but may equally be collaborative and social. There should be an important role for library/information practitioners for assisting in their organization. In the individual case, this would put a radically new gloss on personal information management, recently recognized by an ASIS&T panel as one of the priority areas for information research (Gainor, 2013). It may also be seen as an extension of the idea of 'lifelogging', the recording of all real-life personal experiences (Marks, 2014), by the inclusion of 'unreal' experiences. While this may be of most relevance to public libraries, or perhaps to a new breed of personal experience consultants, immersive documents will be of relevance to all sectors. Healthcare information providers, for example, will need to handle immersive training simulations, educational libraries will deal with a wide variety of such materials, while for heritage collections they will offer a new dimension. This suggests a need for a broad research programme across all application areas, and type of use, of immersive documents, and on the new forms of digital literacy needed to make best use of them. Such a programme should focus on the use of such documents, and the new forms of information behaviour which they are likely to evoke, on the means of organization and retrieval of such material, on the significant issues of ethics and privacy which they are likely to raise, and on the ways in which they will complement, and perhaps replace, conventional documents.

Conclusions

Immersive documents, deriving from the influence of pervasive and multi-sensory technologies on participatory, transmedia texts, are likely to gain importance in the near future. It is essential that the information professions and disciplines are prepared for this; a programme of research into these issues is needed.

References

- Bawden, D. (1985). Computer output devices: a tutorial review. *Journal of Information Science*, 11(1), 1-8.
- Bawden, D. and Robinson, L. (2012). *Introduction to Information Science*. London: Facet.
- Berryman, D.R. (2012). Augmented reality: a review. *Medical Library Reference Services Quarterly*, 31(2), 212-218.
- Booth, P. (2013). *Fan Phenomena: Dr Who*. Bristol: Intellect.
- Bowdler, N. (2014), Prototype lets users read the web in augmented reality, [online]. Retrieved February 22, 2014, from <http://www.bbc.co.uk/news/technology-25870181>.
- Brehm-Heeger, P., Conway, A. and Vale, C. (2007). Cosplay, gaming and conventions: the amazing and unexpected places an Anime Club can lead unsuspecting librarians. *Young Adult Library Services*, 5(2), 14-16.
- Broussard, M.J.S. (2013). No muggles in the library tonight! Harry Potter night at an academic library. *Library Trends*, 61(4), 814-824.
- Buckland, M.K. (1997). What is a "document"? *Journal of the American Society for Information Science*, 48(9), 804-809.
- Buckland, M.K. (1998). What is a "digital document"? *Document Numérique*, 2(2), 221-230, [online]. Retrieved February 21, 2014, from <http://people.ischool.berkeley.edu/~buckland/digdoc.html>.
- Cocciolo, A. and Rabina, D. (2013). Does place affect user engagement and understanding? Mobile learner perceptions on the streets of New York. *Journal of Documentation*, 69(1), 98-120.
- Craig, A.B. (2013). *Understanding augmented reality: concepts and applications*. Waltham MA: Morgan Kaufmann.
- Davis, C.H. and Shaw, D. (Eds.) (2011). *Introduction to information science and technology*. Medford NJ: Information Today.

Drushel, B.E. (2013). *Fan Phenomena: Star Trek*. Bristol: Intellect.

Flinders, K. (2013), City University London explores multi-sensory human communication via mobile. *Computer Weekly*, 22 October 2013, [online]. Retrieved February 22, 2014, from <http://www.computerweekly.com/news/2240207633/Financial-traders-could-soon-use-multi-sensory-human-communication>.

Floridi, L. (2014). *The fourth revolution: how the infosphere is changing human reality*. Oxford: Oxford University Press.

Frohmann, B. (2009). Revisiting "what is a document?". *Journal of Documentation*, 65(2), 291-303.

Gainor, R. (2013). Selected ASIS&T board members discuss research trends in information science: a summary. *Bulletin of the Association for Information Science and Technology*, 40(1), 13-16.

Grenersen, G. (2012). What is a document institution? A case study from the South Sámi community. *Journal of Documentation*, 68(1), 127-133.

Gresh, L.H. (2001). *The computers of Star Trek* (2nd edn.). New York NY: Basic Books.

Hahn, J. (2012). Mobile augmented reality applications for library services. *New Library World*, 113(9/10), 429-438.

Hayles, N.K. (2012). *How we think: digital media and contemporary technogenesis*. Chicago IL: University of Chicago Press.

Immersive Writing Lab (2013), *How to create a storyworld*, [online]. Retrieved February 10, 2014, from <http://the.writingplatform.com/2013/02/immersive-writing-lab-series-how-to-create-a-storyworld>.

Jenkins, H. (2007). *Transmedia Storytelling 101*. Retrieved April 21, 2014, from http://henryjenkins.org/2007/03/transmedia_storytelling_101.html.

Kalnikaite, V. and Whittaker, S. (2012). Synergetic recollection: how to design lifelogging tools that help locate the right information. In M. Zacarias and J.V. deOliveira, (Eds.), *Human-Computer Interaction: the agency perspective*, *Studies in Computational Intelligence* series volume 396 (pp329-348). Berlin: Springer.

Kelly, K. (2007). *Lifelogging: an inevitability*. The Technium blog. 21 February 2007. Retrieved February 22, 2014, from http://kk.org/thetechnium/archives/2007/02/lifelogging_an.php.

Latham, K.F. (2012). Museum object as document: using Buckland's information concepts to understand museum experiences. *Journal of Documentation*, 68(1), 45-71.

Levine, A.I., DeMaria, S., Schwartz, A.D. and Sim, A.J. (2014). *The comprehensive textbook of healthcare simulation*. New York NY: Springer.

Marks, P. (2014), Lifelogging: take a stroll down a virtual memory lane. *New Scientist*, 221(2951), 20. Retrieved February 10, 2014, from <http://www.newscientist.com/article/mg22129514.500-stroll-down-a-virtual-memory-lane-to-revisit-your-past.html>.

McElhatton, H. (2010). *Million little mistakes*. London: Headline.

MemoryAlpha (nd), Holosuite, [online]. Retrieved February 11, 2014, from <http://en.memory-alpha.org/wiki/Holosuite>.

O'Brien, H.L. and Toms, E.G. (2008). What is user engagement? A conceptual framework for defining user engagement with technology. *Journal of the American Society for Information Science and Technology*, 59(6), 938-955.

P.A.S.T. (nd). *TimeSlip*, Series 1, episode 7, part 2, P.A.S.T. Projects, [online]. Retrieved February 10, 2014, from <http://www.timeslip.org.uk>.

Pence, H.E. (2011). Smartphones, smart objects and augmented reality. *Reference Librarian*, 52(1/2), 136-145.

Portal Entertainment (2013), *The Craftsman*, [online]. Retrieved February 10, 2014, from <http://www.portalentertainment.co.uk/production/craftsman>.

Punchdrunk (2013), *The drowned man*, [online]. Retrieved February 10, 2014, from <http://punchdrunk.com/current-shows>.

Randell, C. (2005), *Wearable computing: a review*. Technical report CSTR-06-004. Bristol: University of Bristol. Retrieved February 22, 2014, from <http://www.cs.bris.ac.uk/Publications/Papers/2000487.pdf>.

Robinson, L. (2009). Information science: communication chain and domain analysis. *Journal of Documentation*, 65(4), 578-591.

Rotten Tomatoes (nd), *Until the end of the world*, [online]. Retrieved February 22, 2014, from http://www.rottentomatoes.com/m/until_the_end_of_the_world.

Salkowitz, R. (2014). The future of reading: 10 trends for 2014 and beyond. *Publishers Weekly*, 261(3), 24-25.

Schonau-Fog, H. and Bjorner, T. (2012). "Sure, I would like to continue": a method for mapping the experience of engagement in video games. *Bulletin of Science, Technology and Society*, 32(5), 405-412.

Shuman, B.A. (1997). *Beyond the Library of the Future: more alternative futures for the public library*. Englewood CO: Libraries Unlimited.

TransmediaNext.com (nd). What is transmedia? Retrieved April 21, 2014, from <http://transmedianext.com/abouttransmedia>.

Ue, T. and Cranfield, J. (eds.) (2014). *Fan Phenomena: Sherlock Holmes*. Bristol: Intellect.

Victoria and Albert Museum (2013). *Tomorrow* [online]. Retrieved February 22, 2014, from <http://www.vam.ac.uk/content/exhibitions/tomorrow-elmgreen-dragset>.

Walsh, J.A. (2012). "Images of God and friends of God": the holy icon as document, *Journal of the American Society for Information Science and Technology*. 63(1), 185-194.

Wearable Computing Review (2014), *Wearable Computing Review blog*. Retrieved February 22, 2014, from <http://wearablecomputingreview.com>.