Into the infosphere: theory, literacy and education for new forms of document

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Abstract
Coming changes in the information environment, particularly the infosphere and immersive documents are briefly reviewed, and their significance for library/information science considered, with a focus on topics addressed in the writings of Tatjana Aparac-Jelušić. Issues analysed include the nature of these new developments, new models of information behaviour and information literacy, consequences for education and professional training, and the relation between theory and practice.

Like many members of the library and information science community, we have known Tatjana particularly through the LIDA conferences, where her efficiency and kindness stands out, and also through her contributions to curriculum development in LIS Europe-wide. She is also a valued member of the editorial boards of the journals which we edit (*Journal of Documentation* and *Alexandria*).

Keywords
infosphere; immersive documents; library/information education; continuing professional development; theory and practice

1 Introduction

In this paper we will outline two new developments likely to have a strong effect on the discipline and practice of library and information science (LIS) over the next decade. These are the development of the 'infosphere', a radically new information environment grounded in pervasive digital information, and the introduction of a new generation of immersive documents. These changes will require both new theoretical approaches to analyse and comprehend them, new models of information behaviour and information literacy to enable good use to be made of them, and changes in LIS education and continuing professional development (CPD) to equip the profession to make use of them. These concerns reflect Tatjana Aparac-Jelušić 's contributions to theoretical and educational developments in information science, but also her concerns with links between theory and practice.

2 New developments

It is a truism to point out that great changes have occurred to the information environment over the past three decades, since the introduction of the personal computer and the origins of what would become the Internet. It is equally a truism to note that all commentators expect equally great changes to occur in the near- and medium-term future. These changes have provided both challenges and opportunities for the LIS disciplines and professions, and may be expected to continue to do so. Here we focus on two of these developments: the emergence of a new digital environment and the first indications of a new type of document within it.

2.1 The infosphere

The first conception of a totally new form of information environment, resulting from the spread of networked interactive computer systems, was *cyberspace*. The term was first used in fictional writings by William Gibson, and later gained widespread use to denote the influence of digital information, and the Internet in particular, on all aspects of life. Analysing this idea from an information science perspective, Rafael Capurro argues that cyberspace is not separated or independent from the physical world, but on the contrary, is present in all areas of life (Treude, 2015). It is part of the everyday life of millions of people and integrated into their bodily existence, bringing great changes in spatio-temporal social experience, and moving participants further and further away from their familiar ‘life-world’ (Capurro 2010).

This concept has been developed by the philosopher Luciano Floridi into the idea of the 'infosphere', an all-encompassing information environment in which people are seen as informationally embodied organisms, 'inforgs', mutually connected and embedded in the infosphere, which we share with both natural and artificial informational agents. In the infosphere, the boundaries between online and offline environments merge, so that we live in a manner termed ‘onlife’ (Floridi 2012, 2013, 2014; Martens 2015). “The infosphere”, writes Floridi (2013, p. 10), “will not be a virtual environment supported by a genuinely ‘material’ world behind; rather it will

be the world itself that will be increasingly interpreted and understood informationally, as part of the infosphere." Reality and unreality will blend.

Capurro and Floridi remind us that this new, and fully digital, environment, brings new questions: practical, conceptual and ethical. There is a need for good theoretical analysis here, in order to develop the conceptual foundations of the information sciences, so that they may make an effective contribution. Tatjana Aparac-Jelušić has drawn attention over a long period to the importance of the developing theory for LIS (see, for example, Aparac-Jelušić 1997), and the need for this clearly as great as ever.

2.2 Immersive documents

Both Capurro and Floridi remind us that, in an environment such as the infosphere, there is need for careful analysis of what is real, and what 'real' actually means. While these considerations may seem entirely theoretical, it is likely that they will impinge on some very practical concerns for LIS in the near future. On example of this is the consequences for LIS of the emergence of 'immersive documents'. As the digital environment develops towards the infosphere, and as ubiquitous media systems become commonplace, confluence of technologies becomes important. We will see a combination of: pervasive information technologies; fully multimedia and multisensory interfaces; and systems offering full participation rather than just interaction. 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, going well beyond current ideas of virtual reality. 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, retreival and management of such documents (Robinson 2015a, 2015b, 2015c).

These documents will become the concern of LIS, as has each new form of document from when writing began. They have been foreshadowed by futurologists such as Shuman (1989, 1997), with his scenarios of libraries as 'experience parlours' or 'ExperienCybraries', providing interactive experiences in the same way that today's libraries loan books or DVDs. One example which perhaps points to future possibilities is that of an American college library, whose annual 'Harry Potter night' uses games and simulations to create an "emotionally immersive [and] multisensory experience" (Broussard, 2013). Developments in LIS theory and practice will be needed to deal with them, as they have for digital documents over past decades (Aparac-Jelušić 1997), and we can see this a natural extension of the need for a "theory of information organization and retrieval in [the] digital environment as a base for future research", which Tatjana Aparac-Jelušić advocated in an ASIST panel session discussion (Aparac-Jelušić, Ibekwe-SanJuan, Huvila, Ma, Jimenez and Warner 2013).

3 Information behaviour and information literacy

As novel information environments and documents of this kind emerge, they are likely to generate new forms of information behaviour, which it turn will require new forms of information or digital literacy of people are to make effective and safe use of such developments. It is likely we may see radical changes in information behaviour, as information access becomes increasingly more pervasive, multi-sensory and, in particular, participative, in the same way that unexpected behaviours were identified in early uses of the World Wide Web (Nicholas, Huntington, Williams and Dobrowolski, 2004). Investigations of such new behaviour, at the earliest possible stage as the new immersive environments and documents develop, are highly desirable (Robinson 2015b).

Information literacy, and ways of effectively promoting it, have also been a topic on which Tatjana Aparac-Jelušić has contributed. New forms of behaviour with immersive documents will require new forms of information and digital literacy on the parts of their users, which we may term "immersive literacy". While this idea cannot yet be described in detail, we can already see some of its features.

There are previous examples of new information environments leading to new forms of information literacy. For example, Paul Gilster's original concept of *digital literacy* was devised in the 1990s, in response to the emergence of digital information in general, and of the internet in particular (Gilster, 1997). In the same way, *metaliteracy* was devised as a response to the social media environment (Mackey and Jacobsen 2014).

Some concepts have foreshadowed, in parts, the idea of immersive literacy. for example, the term *transliteracy* has been used to denote the knowledge and competences needed for effective reading, writing and interacting across a variety of media and formats (Lehmans and Cordier, 2015). Špiranec and Banek Zorica (2010) have remarked on the changes needed in information to cope with the hybrid and transient nature of information in a digital environment, while Karvalics (2015) has referred to the *hyperpeople literacies* required for the coming hyperconnected information world.
The idea of immersive literacy differs significantly from all prior information literacies, however, since it must include novel aspects such as multisensory transliteracy, the understanding of immersive narratives and digital storytelling, and the organising and accessing of immersive documents. An understanding of the information world is of great importance in the complex immersive environment, with its elements of unreality. This has been described as *information fluency*, an ability to cope with complexity and adapt to changing information technologies, environments, and contexts, and deal with all forms and formats information within those environments (Bawden, 2014).

An appreciation of the new information behaviours and literacies will be essential if LIS practitioners are to play a full part in the new information environment. This implies an increasing important role for CPD, as noted below, and as Tatjana Aparac-Jelušić has emphasised in other contexts (Petr and Aparac-Jelušić 2002; Aparac, Vrana, Badurina and Dragija 2001).

4 The information science discipline

Ever since the subject became established as an academic discipline in the mid-twentieth century, there have been continuing doubts and debates as to the nature of library and information science, and of its two constituent areas, library science and information science; see, for example, Vakkari (1994) and Dillon (2007). Most commentators have stressed it variety and diversity, seeing it as a broad field of study, a meta-discipline, an inter-discipline, etc.; see, for example, Bawden and Robinson (2012, chapter 1) and Ibekwe-SanJuan et al. (2014).

This in turn means that LIS has to adopt a wide variety of theoretical perspectives and empirical research methods, and indeed there have been a number of over-arching paradigms: the systems paradigm, focusing on quantitative assessment of the operation of library and information systems; the cognitive paradigm, focusing on the individual and his or her state of knowledge; the socio-cognitive paradigm, focusing on the shared information practices in social groups; and others. These have been accompanied by a plethora of research methods, quantitative and qualitative, positivist, realist, constructivist and interpretivist. (Bawden and Robinson 2012, chapters 3 and 4).

In some respects this plurality is a strength, but the criticism has been made that LIS does not have a strong theoretical base of its own, and is too reliant on borrowing techniques and perspectives from a variety of other disciplines. This viewpoint seems to be changing, as there is evidence that other disciplines, particularly in the social and cultural sciences, are adopting some of the methods, results and theoretical perspectives of LIS (Bawden and Robinson 2016). However this concern has led to suggestions that LIS needs to be more focused in its concerns and methods.

Tatjana Aparac-Jelušić has been among those arguing for the wider vision of LIS, suggesting that "interdisciplinarity is a desired strength", and that new frameworks of disciplinary theory are most likely to emerge from studies with the wider communication professions, in libraries, archives and museums (Aparac-Jelušić, Ibekwe-SanJuan, Huvila, Ma, Jimenez and Warner 2013). This fits well with the idea, expressed by several authors, that LIS should be seen as the discipline which studies the information communication chain: all aspects of the creation, organization, management, communication and use of recorded information, supporting the professional activities of the collection disciplines, including information management, librarianship, archiving and records management (Robinson 2009; Bawden and Robinson 2016). This leads to a broad conception of LIS, not tied to limited or traditional issues, but still with a clear focus, and hence well equipped to deal with the challenges of the new information environments.

5 LIS education and CPD

As with the nature of the discipline, a long-standing debate has been conducted about the appropriate preparation required for library/information professionals, and in particular about the balance to be struck between initial formal professional education and career-long CPD.

Tatjana Aparac-Jelušić's commitment to formal university-level education in LIS, and her success in establishing the academic environment in which it may flourish, is too well-known to require elaboration here, though her particular contributions to education for digital libraries (Casarosa, Tammaro, Aparac-Jelušić, Gradman, Saracevic and Larsen 2009) and for digital heritage (Manžuch, Huvila and Aparac-Jelušić 2005) may be noted. It is also worth mentioning her strong commitment to CPD, so that LIS professionals may be kept up-to-date with the knowledge and skills which they need to remain effective as the information environment changes (Petr and Aparac-Jelušić 2002; Aparac, Vrana, Badurina and Dragija 2001).

This seems to us to be in accordance with what is needed if LIS professionals are to deal with new technologies, new forms of document, and new information behaviours and literacies. An initial formal education, based around principles and concepts and illustrated with currently relevant examples and skills, must be supplemented by continuing CPD, to show how the principles are applied in new contexts. Both are essential if the LIS profession is to remain relevant in the new information environments.

6 Theory and practice

Another debate within the LIS discipline has been the relative importance of theory and practice, with the alleged gap between research and practice much lamented over many years (Bawden 2015). Views range from those who believe that it should be a primarily academic discipline with limited connections to its associated practical professions, to those who argue that it is primarily a vocational and skills-based discipline, with little room of theoretical analysis and research.

As will be clear from above, we regard the place of theory and research in LIS as centrally important, if the discipline is to thrive in the future. Equally however, we recognise that this should be rooted in, and contribute to, practice; there should be no mismatch, still less conflict between the two. This has certainly been the view of Tatjana Aparac-Jelušić, who has argued for the need for good theory in the LIS discipline (Aparac-Jelušić 1997), but who has also been involved in analysis and evaluation of issues of practice over a long period; see, for example, Aparac (1997)and Petr Balog, Aparac-Jelušić and Matošić (2015). A better integration of theory, research and practice is clearly an essential requirement if LIS is to play an effective part in designing and managing emerging information environments. This does not simply mean that researchers must pay attention to practice, but that practitioners should become more involved in research. And there are indications that immersive information environments may provide a good opportunity for them to do so; Hahn (2012), writing of augmented reality systems, a precursor of immersive documents, suggests that “The twenty-first century library is a laboratory

of experimentation and prototyping". This is certainly a positive and encouraging thought.

7 Conclusions

The vision which emerges from this short analysis of the LIS literature, informed by a focus on topics addressed by Tatljana Aparac-Jelušić, is one of an LIS discipline and profession facing, as it has done for some decades now, major changes in the kind of information environments and documents with which it will have to deal. This challenge can best be met by a broad discipline with a strong base of research and theory, interacting with practice, and with sound formal education supported by continuing CPD. With these conditions in pace, we believe that LIS has a bright future.

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