

Chapter 1

Introduction

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Abstract

This chapter sets the scene for the book, explaining why it is needed and what it aims to achieve.

The crucial role of information in society

Information is everything, and everything is information
(Beckett, 1971, p.103).

We live in a world suffused with information. From our bank records to our lists of friends, from our music collections to the genetic sequence of our bodies – many things which were perceived as physical objects are now widely understood through their information content.

Consider music as a straightforward example. There was a time before recording when music couldn't be separated from people, whether singing or playing an instrument, it was a person or persons doing it. Musical scores provided instructions, but the music required people. Technology broke that tie and music was available from an object, whether it was a musical box, pianola, a gramophone, tape or a CD. The fact that the encoding on a CD was digital was a significant departure from analogue records and tapes, but it wasn't one that necessarily had an impact on the user. The music was tied to a physical object even if it was a digital CD instead of an analogue record. Today, however, music floats free. You can download a file and use it wherever you want, transferring between laptop and mp3 player, TV and mobile phone. Or you don't even bother downloading the file, you just listen online whenever you want on your computer at the desk or via your smartphone.

Music on a phone draws attention to a consequence of digitization that has been developing since the telephone network started to use digital technology in the 1980s, and which is often referred to as *convergence*. Originally it was about the convergence of telecommunications and computing (telephone exchanges became giant computers, and computer data was sent over telephone links) but now all sorts of things converge because they all use digital technology. Taking telephone calls is only a small part of what a mobile phone does now. As well as playing music it takes photographs, gets you the train timetables and allows you to pay for your parking. There's little point in enumerating everything you can do because there will be lots more that can be done with it in only a matter of months, and anyway sooner or later it will probably be some different gadget doing all these things – the concept of a 'mobile phone' may itself soon be out of date. The message, though, is that more and more of these things are information, and the physical technology that gets them to us is incidental, or at least is a conceptually separate from the information.

Talk of what can be done with a mobile phone puts the emphasis on the individual, especially as a consumer. That is not the only area in which the focus on information is increasing though. Governments documents are replaced by online information, passports are supplemented by biometric data, movements are tracked by CCTV (for good or ill). Many have argued that the Internet will reshape democratic debate, and some evidence can be seen that this is already happening (as discussed by Castells, 2009). Frequently-quoted examples include the bottom-up nature of the Obama presidential campaign in the United States in 2008 and the organising of the

opposition in Iran via Twitter in 2009, although the popular story of transformation through technology in both of these cases has been questioned.

It is examples such as these that lead many to describe our current period as the information age and the information society. While there is a need to be careful how we interpret these sentiments and the conclusions that we draw from them, at the very least we need to explore what is behind them. In particular, it is important to decipher what people are talking about when they refer to ‘information’, since it is far from obvious. In the words of Dretske (1981), quoted by Holwell in Chapter 6 of this book:

It is much easier to talk about information than it is to say what it is you are talking about ... A surprising number of books, and this includes textbooks, have the word information in their title without bothering to include it in their index. It has come to be an all-purpose word, one with suggestive power to fulfil a variety of descriptive tasks.

By exploring information from a variety of perspectives, this book aims to contribute to the understanding of information.

Information through many academic lenses

An awareness of the need to understand information has arisen in many academic disciplines.

Pre-eminently, perhaps, it is engineering and technology, specifically computer and communications technology, that has led the way, since it is these technological developments that have, if not created the information age, at least been the main enabler. It may be that many working on developments in ICTs have done so with little reflection on the significance of their output, but others certainly have been fully aware of it, with many of them as enthusiastic evangelists for the possibilities opened-up by the new technologies (e.g. Shirky, 2008). The rise of the Internet and Web, and the significant changes upon society that have arisen through their development, have led to much hyperbole, especially about the dominant role of information, but it has also led to a richer and more considered debate about the history and the future of the Web (see, for example, Naughton, 2000; Berners-Lee et al., 2006). Yet as some technologists argue, the Web is not just changing the *role* of information but also the *nature* of information, or at least our relationship to it – as Weinberger (2007, p.7) vividly writes, “As we invent new principles of organization that make sense in a world of knowledge freed from physical constraints, information doesn’t just want to be free. It wants to be *miscellaneous*”.

Within social sciences, the concept of the Information Society figures highly as a topic of investigation – understandably given that ‘society’ is the central area of study of sociology, and given the primacy of information. The term ‘information society’ is in widespread use in popular writing and in government circles (the European Commission has long had a Director General for the Information Society). It has been analysed by a generation of social scientists, starting with the work of the economist Fritz Machlup (1962) who first wrote of the “knowledge industries” and continuing through later writers such as Daniel Bell (1973) with his work on post-industrial society, and Manuel Castells (1996) with his work on theories of the network society. For some writers, the information society is equated with globalization; for others, with postmodernism. The concept has been problematised by a number of writers in the social sciences – as Webster (2002, p.8) observes, “what strikes one in reading the literature on the information society is that so many writers operate with undeveloped definitions of their subject”. Nonetheless, the concept is one that continues to be of some relevance and debate within the social sciences.

The nature and role of information in business and management has inevitably received a lot of attention. Because of the economic nature of the discourse around the information society, much of the work in that area has had a strong influence upon business and management, albeit in a more populist vein – it was Peter Drucker (1968), working within the field of management, who coined the term ‘knowledge worker’. As with other fields, but especially so given the nature of the popular business literature, one strand of writing has been strongly utopian and determinist, exemplified by works such as Frances Cairncross’s *The Death of Distance* (Cairncross, 1997) and *We-Think* (Leadbeater, 2008).

The field of information systems, which sits between technology and management, takes information as its primary concept, and thus the nature of information is highly significant to the field. Most information systems textbooks have a section labelled ‘what is information’. Nonetheless, as Checkland and Holwell (1998) observe, information is poorly analysed within the field, partly due to an implicit assumption that information is something tangible, the equivalent of a physical object that can be stored and processed within an information system. In many ways, information systems is still coming to terms with understanding its fundamental concept.

The humanities too have been exploring the possibilities opened up by information technologies, and the consequences of new ways of working – the term ‘digital humanities’ is much in vogue within a range of disciplines. The typical research method of a historian or literary critic, painstakingly working through archives or texts, has been transformed by the ubiquity of digital texts. Even more obvious have been the changes to library science, and more generally the change in the understanding of books (as discussed later in this book, in Chapter 8 by Foster-Jones).

A book that perhaps more than any other has brought popular attention to the impact of the changing understanding of information, as opposed to the impact of information technologies, is von Baeyer’s *Information: The new language of science* (2003). While it is by no means universal in science, there is increasing awareness, especially in physics and biology, that the language of information provides a new tool for a scientific understanding of the world. Within biology there is both the growth of bioinformatics, with things like the human genome project from which we now have what might be thought of as a complete specification of a human being stored as a digital code, and biosemiotics which explores the meaning of signs in the biological world.

As people in all these different disciplines explore the nature and impact of information, others have been seeking a unified theory of information. This endeavour has been largely the work of philosophers, such as Luciano Floridi (2010) and Wolfgang Hofkirchner (2010). With information being discussed in so many different disciplines, seeking a unified theory is fraught with difficulties. There is no *a priori* reason to suppose that the word means the same thing when used in the different contexts, so a single definition of the word might be impossible. Floridi’s approach has been to come up with a categorisation which encompasses a range of different types of information (Floridi 2010).

Approach of this book

Rather than seeking a unified theory of information, this book is taking its cue from Von Baeyer’s insight that information is a new *language* of science. We, however, argue that it is a language of much more than science, and this book has contributors from a range of disciplines. All have written about information, or about the new impacts of information, in their own fields of interest, and they have written in a deliberately accessible style aimed at presenting insights from their field to workers in other disciplines. In this way the book is to be considered a contribution to an interdisciplinary *conversation* about information. By exposing readers to the language of information as spoken in a range of disciplines, we aim to help them contribute both to the ongoing interdisciplinary exploration

into the nature of information, and to enriching their own disciplines through the insights that information offers.

We start in Chapter 2 with a historical perspective, specifically the birth of the current conception of information within the field of cybernetics. Magnus Ramage discusses the birth of cybernetics in the late 1940s, and contrasts two competing models of information that arose around the same time within cybernetics and which he argues are still pervasive. These models are: a 'hard' view, which treats information as an object in its own right; and a 'soft' view, which regards the context and meaning of information as crucial.

Chris Bissell continues the historical perspective in Chapter 3, but in a somewhat different way. He argues that the popular concept of 'the information revolution' is highly misleading, in several respects. In particular, he looks at the long history of information and communication technologies, and the ways in which they have previously both shaped, and been shaped by, the societies in which they arose. Bissell's writing is a particularly valuable counter to some of the utopian and deterministic writing about information that we referred to earlier.

Both Ramage and Bissell talk of the importance of the work of Claude Shannon, who is often described as "the father of information theory". In Chapter 4, David Chapman describes Shannon's work in more detail, and looks at the contentious question of whether Shannon's concept of information has any relevance to semantic information. Chapman draws on metaphors of layering, as used by engineers for layered models of communication systems, together with insights from semiotics, to suggest a way of thinking that links the two.

Semiotics is the main field that John Monk draws on in Chapter 5. He describes the functions of signs and how they are used by institutions. He suggests that 'information' is a word that comes into the vocabulary to talk about the sign games of institutions.

Both Sue Holwell in Chapter 6 and Paul Lefrere in Chapter 7 are interested in how information can inform purposeful action. Holwell comes from a background in Information Systems and explores what constitutes meaningful information in a social or organisational context. She introduces a hierarchy of concepts: data, *capta*, information and knowledge.

Lefrere describes the concept of 'exformation', the knowledge needed to make sense of a message but which is not sent because it is already known to both the sender and the recipient. He describes how messages sent between group members will be unintelligible to outsiders because they do not share the exformation.

Juanita Foster-Jones in Chapter 8 describes the changing nature of libraries, and the changing role of librarians, with the impact of web 2.0. It can be seen as a 'case study' of the consequences of information being freed from a material object, as books cease to need a body of paper and card.

Chapter 9 by Paul Piwek explores information in the context of human dialogue. Drawing on the insights of linguists, logicians, computer scientists and philosophers Piwek equates information flow with context change, and finds that effective information flow is a cooperative endeavour, and one that is dependent on the existing context.

Chapter 10 is the only chapter in this book which looks specifically at information in science. In it, Tony Nixon writes about information in quantum physics. He presents a simple explanation – as simple as anything can be in quantum physics – of how quantum information differs from classical information, and he talks about the concept of the quantum bit, the qubit. He briefly explains how quantum cryptography works, discusses some aspects of quantum computers and touches on the problems of real-world interpretations of quantum theory.

The changing nature of information means that the ways of dealing with it have to change too. In Chapter 8, in which Foster-Jones looks at libraries, we see one example of the response to that change. In Chapter 11 by Ray Corrigan we see some of the problems that a failure to cope with changes can generate. Corrigan looks at the development of public policy on information, and, based around a case study of the UK's Digital Economy Act, explores the lobbying and interest groups that are involved, and the generally unsatisfactory outcomes.

The final chapter, the Conclusion in Chapter 12, extracts some common themes from the book and suggests some initial insights that emerge from the conversation in this collection.

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