
Super-Science, Fundamental Dimension, Way of Being: Library and Information Science in an Age of Messages

David Bawden and Lyn Robinson

Abstract

This paper examines some conceptual issues for library and information science (LIS), with a focus on how they have been treated in the scholarship of Rafael Capurro, based on a selective literature analysis. Three topics are examined. First, the concept of information is considered, with particular reference on the value of theoretical approaches for LIS, and with emphasis on a comparison of Capurro's approach with those of Popper and of Floridi. Second, the nature of the information-centric disciplines is considered, with particular reference to Capurro's conception of a conjoined LIS discipline, rooted in the humanities. Third, Capurro's ideas of digital ontology and digital hermeneutics are outlined, with emphasis on their value in providing a theoretical background for studying the new generation of immersive multisensory documents. It is concluded that the kind of rigorous study of foundational issues which characterises Capurro's work will be of even greater importance for the LIS discipline in the future.

Rafael Capurro's body of writings encompass a wide and diverse set of issues of importance to information science, but within them one may identify a number of recurring themes. In this paper we identify and discuss three of these themes, basing our analysis of some of Capurro's own writings and on a highly selective review of recent literature. We first, and at most length, consider the nature of information itself, following Capurro's insistence on the importance of a clear understanding of this foundational concept, and focusing on epistemological aspects. We then examine the nature of the disciplines which have this concept as their focus, and examine Capurro's advocacy of a conjoined discipline of library and information science (LIS). Finally, we look briefly at the way in which this discipline may develop in the future, again following Capurro's imaginative and forward-looking ideas. It has to be said that Capurro's ideas are not always easy to come to grips with; but as Luciano Floridi, with whom Capurro has had a somewhat combative relationship, has pointed out (Floridi, 2008), there is much of value to be found there, even for the less-philosophically inclined LIS scholar or student.

The Nature of Information

A constant theme running through Capurro's writings has been that of the value of a clear understanding of the idea of information, as he sets out to "undertake the task of exploring the past, present and future of the concept of information" (Capurro, 2009, p. 126). This recurs in a number of his publications, but is particularly focused in an influential review, *The Concept of Information*, which had been cited over 100 times by mid-2015 (Capurro & Hjørland, 2003) and in an article derived from it (Capurro, 2009).

The concept of information is widely, and increasingly, used in a variety of disciplines, many far removed from LIS. Capurro and Hjørland (2003) argue that it is important for LIS to consider the way the concept is used in different disciplines, not least because many of the theoretical approaches in LIS have their origins in other subjects.

Capurro is in company with a number of other authors in noting the ways in which the word "information" has been used over time; see, for example, Schrader (1983, 1986), Bawden (2001), Díaz Nafria (2010) and Furner (2013). A detailed analysis of the linguistic roots of the term, and of the usage of the concept since classical times, shows a change in its meaning, and in particular of a continuing duality between an objective and subjective implication of the term (Capurro & Hjørland 2003; Capurro 2009). This complexity in meaning has led to what has been termed "Capurro's Trilemma," with three options for understanding the idea of information (Capurro, Fleissner & Hofkirchner, 1999):

- univocity: the concept of information has the same meaning in all contexts
- analogy: the concept of information has an original meaning in a specific context, and is applied as an analogy in other domains
- equivocity: the concept of information has different, but equally valid, meanings in different contexts

The implication of this is that a truly unified theory of information is impossible, since, whichever of these options is adopted, no satisfactory theory can result (Treude, 2015). The first option loses all sensible distinction, so that biochemical processes and the composition of an email are "the same"; the second relies for unity on loose and perhaps anthropomorphic analogy, such that we may say that molecules "talk to each other" in a manner analogous to that which people do; and the third abandons from the start any intent at unification.

In assessing the trilemma, almost twenty years on from its first formulation, it still appears to capture much of the difficulties of understanding the concept of information. The first option appears so reductive as to be of no value, and yet it is, presumably, the one which would have to be pursued in setting any single theory of information for all domains, at least in any scientific sense of "theory." We must agree with Furner (2010) that the prospects for any such "one size fits all" theory of information are not good. The second is undeniably true: there are original and clear meanings of information in specific contexts—the Shannon measure most obviously—and such meanings are indeed applied analogously or metaphorically. But analogy and metaphor, though they may aid understanding, are

hardly components of any theory worth the name. The third, while defensible, necessarily ignores valuable insights into similarities between differing concepts of information, and results—at best—in a multiplicity of theories of information, all resolutely separate, and without hope of any cross-fertilisation.

One solution could be to declare one concept of information to be primary, and require all others to relate to it; essentially option two, but with the relations being more than analogies. Capurro rejects this idea, and prefers to accept, in option three, the existence, on equal terms, of different concepts of information in different domains, and then to establish their relationships through a Wittgensteinian language game approach, seeking family resemblances (Treude, 2015). More specifically, he recommends a concept of information that “connects, without leveling [sic] differences, human and non-human angeletic phenomena” (Capurro, 2009, p. 137), “angeletic” implying some form of message. He notes that this has some commonality with, without being the same as, Brier’s “cybersemiotic” approach to a unified theory of information, which also emphasises communication and meaning (Brier, 2008, 2013).

This approach, while attractive in many respects, is limited to finding relations through use of language, and is therefore far from establishing any objective relations. The focus on messages is also not self-evidently appropriate in all contexts. While Capurro (2009) shows convincingly that objective measures of information, such as that of Shannon, may be understood in terms of messages, his suggested extension to thermodynamics, via the ideas of Weizsäcker, do not seem fully convincing, other than as analogies. There is a good deal to be said about the relation between information and entropy, complexity and similar physical concepts (Bawden & Robinson, 2015a, 2015b), but it is not yet evident that this is best expressed in terms of messages and messengers.

A rather more general approach has been outlined by Robinson and Bawden (2013). This involves accepting, as in option three, the distinct information concepts in different domains, and then seeking to find relations—to bridge the gaps between concepts—by more than simply linguistic means. There are, it seems, two kinds of gaps: those between the concepts; and those between scholars who think it worthwhile to try to bridge such gaps and those who do not.

Two examples can be given of such “gap bridging” attempts. Stonier, taking a general view of information as an abstract force promoting organisation in systems of all kinds, proposed evolutionary links between information in the physical and biological domains, and then between information in the biological and social realms (Stonier, 1990, 1992, 1997). Bates, again claiming an evolutionary perspective, related five information-like entities in the physical, biological and social domains (Bates, 2005, 2006). She categorised these as:

- Information 1—the pattern of organisation of matter and energy
- Information 2—some pattern of organisation of matter and energy given meaning by a living being
- Data 1—that portion of the entire information environment available to a sensing organism that is taken in, or processed, by that organism

- Data 2—information selected or generated by human beings for social purposes
- Knowledge—information given meaning and integrated with other contents of understanding

While it is fair to say that neither of the approaches of Stonier or of Bates has met with general acceptance, they are an early indication of the kind of gap bridging that may be possible.

A gap bridging exercise of a rather different nature is Floridi's Philosophy of Information. Starting with Shannon's theory as a basis, this develops, by philosophical analysis, a general theory for biological, environmental and semantic information (Floridi, 2010, 2011). Floridi's ideas will be mentioned later, as the only current general model of information directly applicable to the concerns of LIS.

Despite his interest in other disciplines' use of the information concept, Capurro invariably returns to a focus on how LIS should view the idea. This has involved a restriction on the scope of the information concept:

one thing seems to be clear: the notion of information in our field is explicitly referred and restricted to the human sphere. This means a(n) (implicit) rejection of information science in the sense of a super-science whose object is information at all levels of reality. (Capurro, 1991, p. 83)

The most important concept within information science is not information itself, but the human being: information is a "fundamental dimension of human existence", and its use to share knowledge is a "way of being" (Capurro, 1991, p. 83). Information is what is informative for a given person, and the most important perspective for LIS is to view information as a constitutive force in human society (Capurro & Hjørland, 2003). This is very much in line with the ideas of Hjørland, who argues forcefully against the relevance of objective conceptions of information for LIS, and hence against gap bridging models which incorporate such conceptions (Hjørland, 2007, 2008).

Capurro has been generally critical of all the conceptions of information commonly used within LIS; this tendency to challenge common assumptions and models is one of the more intellectually pleasing aspects of his scholarship. Ma (2012), for example, identifies three leading foundational theories of information of relevance to LIS: the quantitative information theory developed by Nyquist, Hartley and Shannon; Popper's Three Worlds epistemology; and the data-information-knowledge-wisdom hierarchy. Capurro has found reason to criticise all of these at some time.

Capurro and Hjørland (2003) noted, seemingly approvingly, the overall tendency to regard the mathematical theory of information as a blind alley for LIS; and indeed Shannon's objective conception of information sits ill with Capurro's focus on human information, although he does, as noted above, include Shannon theory within his message-centric approach to information (Capurro, 2009).

As regards the well-known data-information-knowledge-wisdom hierarchy (Rowley, 2007), Capurro regards it as problematic, since it is unclear how each level emerges from the one below (Treude, 2015). Similar criticisms have been made by others, such as Frické

(2009), and Randles, Blades and Fadlalla (2012), who regard it nonetheless as a valuable metaphor.

The third foundational theory, Karl Popper's Three Worlds ontology, stems from his ideas of "objective epistemology" and "knowledge without a knowing subject" (Popper, 1979). This holds that all information-related entities, and for that matter everything else in the world, falls into three categories, which Popper terms "Worlds":

- World 1 is the physical world, of people, books, computers, buildings, etc.
- World 2 is the internal, subjective mental state of an individual, including their personal knowledge
- World 3 is the world of objective knowledge, which may be communicated between people by means of information stored in documents.

This framework was adopted enthusiastically by Brookes, who announced it as the most appropriate philosophical foundation for the information sciences (Brookes, 1980). The task of the information sciences was to understand World 3 of objective knowledge, as instantiated in World 1 objects—documents of all kinds—and its interactions with the cognition of the user, Popper's World 2. Popper's views were criticised, in philosophy generally and in their LIS application specifically, as an unnecessary "mystification," introducing spurious and unnecessary complexity: see, for example, Neill (1982) and Rudd (1983).

Capurro (1991) and Capurro and Hjørland (2003) support Rudd (1983) in arguing that Popper's World 3 is not needed to explain information processes. They note an overall tendency in information science to prefer Peirce's semiotic viewpoint to Popper's meta-physical pluralism; informative objects are signs (World 1 phenomena in Popper's terms which trigger responses in other World 1 objects).

However, attitudes seem to be changing: as Nutturno (2000, p. 139 and 145) says "most contemporary philosophers regard World 3 as an unfortunate product of Popper's old age: as incoherent, irrelevant and perhaps, if the truth be told, a bit ridiculous ... [but] .. most philosophers who reject Popper's theory of World 3 simply do not understand it." Popper's ideas have been shown to have value for LIS purposes (Bawden, 2002, 2007; Abbott 2004), and are cited as foundational for LIS in recent textbooks and reviews (Davis & Shaw, 2011; Ma, 2012; Bawden & Robinson, 2012). There is also a considerable similarity with the influential framework of Buckland (1991), which distinguished three aspects of information:

- information-as-thing, where the information is associated with a document
- information-as-process, where the information is that which changes a person's knowledge state
- information-as-knowledge, where the information is equated with the knowledge which it imparts.

These have evident similarity with Popper's Worlds 1, 2 and 3 respectively (Robinson, 2015a). It therefore seems that Capurro, with other commentators, may have underestimated the value of Popper's ontology as a natural conceptual framework for LIS.

Capurro (2008a, p. 170) also criticises Floridi's idea of the "infosphere" in much the same way, describing it as "a kind of Popperian 'immaterial world.'" While Floridi tells us that Popper's objective epistemology was an initial inspiration for this philosophy of information (Warburton, 2015), the two are hardly the same. And it should be noted that Floridi himself dissents from much of Capurro's commentary on Floridi's information ethics, and on his philosophy of information generally (Floridi, 2008, pp. 199-201). However, it is worth noting that Capurro is able to fit Floridi's "informational objects" within his message-centred idea of information (Capurro, 2009).

Floridi himself claimed a close relation between his philosophy and LIS, which he described at one point as "applied philosophy of information" (Floridi, 2002). Although this idea met with some resistance, various authors have suggested that Floridi's philosophy may indeed provide a valuable theoretical underpinning for LIS: see, for example, Robinson and Bawden (2013), Furner (2013), Compton (2015) and Dineen and Brauner (2015). Van der Veer Martens (2015) makes similar points, and further suggests that LIS may have contributions to make in developing the philosophy of information; a pleasing prospect for those who feel that LIS should be as much a lending discipline as it is a borrowing one.

In short, Capurro has provided analyses of the information concept, especially as it applies to LIS, which offer different perspectives and insights from anything else available. It would be particularly valuable if some clearer reconciliation between his viewpoint and those of Popper and Floridi could be obtained, as this could provide a valuable theoretical impetus for the LIS discipline.

The LIS Discipline

The nature of the information disciplines, and LIS in particular, has been another recurring theme in Capurro's writings, often closely linked to his thoughts about the concept of information.

He has, as noted above, argued that the central concept of LIS should not be information, but the human being. He does not suggest that a concept of information may not be essential for LIS, if we have adequate concepts of data, meaning, relevance, collection, access etc., as does Furner (2004, 2015). However, he does suggest that the concept of information for LIS cannot be considered in isolation, but must be related to other important concepts, such as documents and media (Capurro & Hjørland, 2003). This viewpoint may be seen as linked with another of Capurro's concerns: that LIS should have a strong awareness of its historical roots, and embrace a historical continuity of development (Capurro & Hjørland, 2003). He equates information science, library and information science, and documentation as disciplines which all grew from the application of the computer to bibliography, and particularly scientific bibliography, especially in the Anglo-Saxon world (Capurro,

2009). This might be seen as an endorsement of a focus on documents and documentation as a central concern within LIS, although Capurro does not seem to have made this link explicitly. Capurro and Hjørland (2003) note that information science, or documentation, was originally based more on specific subject knowledge whereas special librarianship relied more on education and training in schools of librarianship. They identify chemistry as having played an especially important role in the development of information science; this is undoubtedly true, and one might add also the pharmaceutical sector (Bawden & Robinson, 2010). Nonetheless, Capurro has never sought to privilege the information science approach, but rather to argue for a conjoined LIS discipline. Information science should increase its awareness of social questions, and free itself from what Capurro sees as a one-sided focus on information retrieval technology. Joining with the tradition of library science, it should investigate the social phenomena associated with the communication of recorded information (Treude, 2015).

As to the nature of this conjoined discipline, Capurro and Hjørland (2003) note that LIS is only one of a number of disciplines which are related to technology, systems and processes in the communication of information, and that further clarification and strengthening of the specific identity and goals of LIS is desirable. More than ten years on from publication of this view, the need for such clarification seems equally apposite; see, for example, Dillon (2007), Buckland (2012), Lugya (2013). Capurro has consistently sought to attain clarity by arguing that information science should be a hermeneutic-rhetorical discipline, centred on human beings rather than on technology or on an objective conception of information, and focused on the communication and interpretation of meaningful knowledge (Capurro, 1991).

The focus of this discipline should be the production, collection, organisation, analysis, interpretation, storage, retrieval, dissemination, transmission, transformation and use of information (Capurro & Hjørland, 2003; Truede 2015). This has been described, though not by Capurro specifically, as the information communication chain, presented over a long period, and expressed in various ways, as the central focus of the LIS discipline and profession: see, for example, Borko (1968), Duff (1997), Robinson (2009), Bawden and Robinson (2016).

It is, of course, clear that LIS is by no means the only subject with an academic and professional interest in the components of the chain: computer science and information systems, publishing and journalism, communication and media studies, and digital humanities are only some of these. Capurro and Hjørland (2003) argue that LIS's distinctive contribution is provided by a social and epistemological approach to the information chain. The computational aspects of all the components are primarily the concern of computer science, although clearly there are overlaps.

Also interested in most if not all of the components of the chain are domain experts: doctors, for example, will be experts in the interpretation of health information, while chemists will have a particular insight into retrieval of chemical information. Capurro and Hjørland (2003) express the distinction here as one of LIS professionals, even subject experts, working in top-down mode from a knowledge of information sources in general, while domain experts must work in a bottom-up mode, from a specific knowledge to a

more general understanding. This is helpful in clarifying matters, as more disciplines and professions become evidence-based and information-intensive, and take on a different relation to the LIS profession.

Capurro's analysis of the nature of the LIS discipline is convincing, in particular his emphasis on the conjoining of the information science and library science perspectives, on the value of the historical perspective, and on the need for a continuing re-evaluation of what is needed for the discipline to have a distinctive stance and value. His disentangling of the LIS/computer science relation by avoiding a focus on what each discipline is "interested in"—very much the same things, in many cases—but by considering their respective perspectives, is also helpful.

However, his insistence on a hermeneutic-rhetorical basis for the discipline with a central focus on the human, and hence a firm location of LIS within the humanities sector, seems less helpful. This location for the discipline is probably the most common one, and can be seen as placed most appropriately within cultural studies (Furner, 2015). However, Capurro's categorisation seems somewhat restrictive, inasmuch as it precludes some seemingly valuable approaches. It may perhaps be better to regard a conjoined LIS as a field of study focusing on recorded information and knowledge, an approach more open to the variety of techniques, perspectives and forms of knowledge needed to deal with the complexities of its subject (Bawden 2007; Bawden & Robinson 2012, 2016). Compton (2015) makes a similar point, suggesting that LIS will best survey changing times by maintaining its interdisciplinary character. If this means that LIS finds it difficult to establish a fixed position within the academic structure, as evidence shows to be the case already (Bawden & Robinson 2016), then so be it.

The Future of the Library/Information Sciences

A theme which Capurro has developed more recently is the need for a theory of digital ontology and digital hermeneutics, to facilitate understanding of the nature and consequences of the move to a digital world; a theme which has implications for the future of LIS, among much else. This overlaps considerably with Floridi's "philosophy of information" and "infosphere" concept, and has led to robust debate (Capurro, 2008a; Floridi, 2008). Another notable similarity between the approaches of these two scholars is that both see ethical and moral issues as emerging as a natural and important consequence of their philosophies of information; see, for example, Capurro (1985, 2008b) and Floridi (1999, 2013).

Compton (2015) has analysed the differing ontologies of Capurro and Floridi. He characterises Capurro's as continental, Heidegger-influenced, and oriented towards phenomenology and hermeneutics, and Floridi's as analytical and formally logical, and concludes sensibly enough, that both perspectives are helpful. Floridi, who identifies his philosophy of information as spanning the analytic/continental divide (Søraker, 2012), explicitly notes how Capurro brings the tools of continental philosophy to bear on information concepts, and how these are potentially enriching for the field (Floridi, 2008). This has been, until

recently, an approach largely ignored within the information sciences (Cronin & Meho, 2009; McKechnie, Serantes & Hoffman, 2012), and it may be that calling attention to the value of this approach, over a long period, may come to be seen as one of Capurro's longest-lasting contributions. Its significance was noted at a relatively early stage by Day (2005). The intention of the chapter authors is not to join in a technical philosophical debate, which they are ill-equipped to do, but rather to draw attention to the importance of these theoretical issues for the future of LIS.

Capurro emphasises 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). And, at a relatively early stage, Capurro (1999) was recognising that these changes required a careful analysis of what is real, and what "real" actually means.

While these considerations may seem entirely theoretical, perhaps even "academic" in the worst sense of the word, we suggest that they will impinge on some very practical concerns for LIS in the near future. An example of immediate impact is the issue of information literacy (or digital literacy), which currently assumes considerable importance in the practice of LIS. Capurro reminds us that it is not sufficient to think of this simply as a matter of imparting a set of information skills; there is a need to base the development of information literacy on a rigorous examination of the nature of information and its role in, and effect on, the lives of people (Treude, 2015).

More fundamentally, as the digital environment develops, and as ubiquitous media systems become commonplace, this combination of pervasive information technologies, fully multimedia and multisensory interfaces, and increasingly interactive systems will lead to the development of immersive environments. These will offer their users, or rather participants, individual immersive and interactive experiences, whether for recreation, training, aesthetics, or purposes so far unimagined. If recorded and stored, such environments will be a new form of immersive document, potentially generating new forms of immersive behaviour (Robinson, 2015a, 2015b, 2015c). These will become the concern of LIS, as has each new form of document in its turn. To deal with these effectively will require a sound theoretical understanding, and this in turn will mean that we address exactly the questions which Capurro posed: what is real, and what does real mean? Capurro, and also Floridi (2014), remind us that this new, and fully digital, environment, brings new questions: practical, conceptual and ethical. There are as yet no definitive answers, but it seems likely that these philosophical arguments will have real practical value in dealing with these questions.

Conclusions

"Ghostly technology is dreaming us ... reality is vanishing" wrote Rafael Capurro some years ago (Capurro, 1999, p. 8). Dramatic, and even far-fetched, though this may sound, it may come to be seen as a realistic description of a new information age, characterised by immersive documents of an entirely new kind.

If so, the kind of rigorous and imaginative conceptual analysis which has been a characteristic of Capurro's scholarship will be of great value in helping LIS cope with this new environment, without, as Capurro reminds us, losing sight of who we are and where we came from. This stands, regardless of the ultimate place of hermeneutics and angeletics in the conceptual bases of LIS. If the LIS discipline is to retain its unique values and perspectives in the future, it will have to draw theoretical strength from the contributions of scholars like Capurro, while remaining open to those who, like Floridi, advise us from outside.

"Maybe" wrote Capurro (2009, p.137), "we are in the process of leaving the age of the book by going through the information age towards the age of messages and messengers." If so, his concept of information, and the information communication chain, expressed in message terms, may be his most lasting contribution.

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