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Information and design: book symposium on Luciano Floridi's *The Logic of Information*

Tim Gorichanaz
College of Computing & Informatics,
Drexel University, Philadelphia, Pennsylvania, USA

Jonathan Furner
Graduate School of Education and Information Studies,
University of California Los Angeles, Los Angeles, California, USA

Lai Ma
School of Information and Communication Studies,
University College Dublin, Dublin, Ireland

David Bawden, Lyn Robinson and Dominic Dixon
Centre for Information Science, City, University of London, London, UK

Ken Herold
Swirbul Library, Adelphi University, Garden City, New York, USA

Sille Obelitz Søe
Royal School of Library and Information Science,
Kobenhavns Universitet Det Humanistiske Fakultet, Copenhagen, Denmark

Betsy Van der Veer Martens
School of Library & Information Studies,
University of Oklahoma, Tulsa, Oklahoma, USA, and

Luciano Floridi
Oxford Internet Institute, Oxford, UK and
The Alan Turing Institute, London, UK

Abstract

Purpose – The purpose of this paper is to review and discuss Luciano Floridi's 2019 book *The Logic of Information: A Theory of Philosophy as Conceptual Design*, the latest instalment in his philosophy of information (PI) tetralogy, particularly with respect to its implications for library and information studies (LIS).

Design/methodology/approach – Nine scholars with research interests in philosophy and LIS read and responded to the book, raising critical and heuristic questions in the spirit of scholarly dialogue. Floridi responded to these questions.

Findings – Floridi's PI, including this latest publication, is of interest to LIS scholars, and much insight can be gained by exploring this connection. It seems also that LIS has the potential to contribute to PI's further development in some respects.

Research limitations/implications – Floridi's PI work is technical philosophy for which many LIS scholars do not have the training or patience to engage with, yet doing so is rewarding. This suggests a role for translational work between philosophy and LIS.
Originality/value – The book symposium format, not yet seen in LIS, provides forum for sustained, multifaceted and generative dialogue around ideas.
Keywords Design, Philosophy
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Editor's introduction (David Bawden)

The *Journal of Documentation* has always placed a strong emphasis on theories, concepts and philosophies related to documents and recorded knowledge. It is in my view unquestionable that the most important such development in recent years has been Luciano Floridi's *Philosophy of Information*, and its potential applicability to questions of library and information science, and of documentation. This has been debated for over 15 years, and the publication of Floridi's latest monograph, *The Logic of Information*, contributes to those debates, with much relevance for the information disciplines.

Having a "book symposium" to discuss this new work developed from a panel session – "Curators of the Infosphere? What's the good of PI for LIS (and vice versa)?" – at the iConference in Sheffield in 2018, following Floridi's keynote talk, and all of the participants in those discussions have contributed here. The idea for this book symposium is due to Tim Gorichanaz; and as editor of the *Journal of Documentation*, I am grateful to him, to those who have provided commentaries on *The Logic of Information*, and to Luciano Floridi for his response.

Introduction (Tim Gorichanaz)

The question of whether library and information studies (LIS) needs a grounding philosophy crops up perennially. (Of course, this is already a philosophical question.) Related is the question of what sort of philosophy ought to do the job.

Over the past two decades or so, we have borne witness to the emergence of a new philosophical system that responds to the exigencies of the digital revolution, Luciano Floridi's philosophy of information (PI). In designing this philosophical system, Professor Floridi has written hundreds of articles which are coalescing in a four-book series (i.e. a tetralogy) presenting the foundations of PI, what Floridi calls his *Principia Philosophiae Informationis* – hearkening back to Newton's era-defining *Principia Mathematica*.

Given the co-occurrence of "information" in the names of both LIS and PI, it may be unsurprising that there has been much discussion in the LIS literature of whether and how PI is relevant to LIS, and specifically whether it might be a suitable grounding philosophy for LIS. And indeed, just as Floridi locates the seed of PI in the insights of Alan Turing and others in the first part of the twentieth century, LIS (specifically the "I" part) was emerging at the same time. To be sure, PI connects to a line of past philosophers, reaching back to Plato, just as LIS has roots in bibliography and librarianship. But both PI and today's LIS were shaped by a great realization of the twentieth century: the technological leaps that are possible through codification. And so arises the question of what these two fields might have to say to each other.

To continue and bring forward these discussions, we convened this book symposium on *The Logic of Information* (Floridi, 2019). Nine scholars, the authors of this paper, each first independently read the book and wrote response essays. Each author was instructed to raise a question and/or probe some aspect of the book, linking it to their own work or the broader interests of LIS. Then, Professor Floridi was invited to read our comments and respond. This project resulted in the present document, a compendium of short essays.

The essays, whose authors are indicated in each section title, raise questions that spring from reading this book or considering PI more broadly. Jonathan Furner's contribution appears first, offering a succinct overview of the book, including a short encapsulation of the thrust of each chapter. In particular, Furner considers a number of questions that the book poses for those interested in the intersection of epistemology and LIS. Next, Lai Ma puts the book into the historical context from which LIS emerged, considering how Floridi's work may fit in. David Bawden and Lyn Robinson focus on the book's preface, reflecting on how PI performs a reversal on four major misconceptions from the history of philosophy: where to place the focus in epistemology (Floridi would have it on the maker, not consumer), ethics (on the patient, not the agent), metaphysics (on dynamic relations, not entities) and logic (as design, not analysis). After this, Dominic Dixon digs into Floridi's conceptualization of open questions – a foundational theoretical discussion in the book – for its implications regarding the relationship between PI and LIS. In particular, Dixon reconsiders the question of whether LIS is fruitfully understood as an applied PI. Ken Herold also seeks to connect ideas in the book to our concerns in LIS, considering questions of big data and distributed knowledge. Herold in particular emphasizes the care and methodical approach needed to work with PI's ideas. In my contribution, I consider the implications of PI's claim that philosophy is design in light of recent discussions that LIS, also, is a field of design. Next, Sille Obelitz Søe questions the meaning of "philosophy of information", putting Floridi's approach to PI into conversation with other philosophies of information. And finally, Betsy Van der Veer Martens probes the concept of "maker's knowledge", so central to the book, showing many avenues for its application in LIS. Following these, Luciano Floridi offers responses to each contribution, focusing in each case on a generative quotation.

What results of all this is a kaleidoscopic discussion of this latest instalment in what I expect will come to be seen as an era-defining philosophical opus: a *Principia* for our time. It seems clear to me that PI has great relevance for LIS, though Floridi's original writings may be too specialized for LIS scholars to engage with directly, hence the importance of translational work – which, hopefully, this book symposium contributes to.

"A philosophy of our time for our time": a review of Luciano Floridi's *The Logic of Information* (Jonathan Furner)

Notwithstanding what is perhaps a slightly misleading title, this third volume in a projected set of four is a work of epistemology, in a pragmatist tradition traced to Peirce (Floridi, L., 2019, p. xiii). It is presented as "contributing to the development of a philosophy of our time for our time" (p. xii), i.e., a complete philosophy, ultimately consisting of ontological, ethical, epistemological and political components, built up from the central assumptions that reality consists of data and that semantic information is data that are well-formed, meaningful and truthful.

Floridi says that the book is "a *constructionist* study in the *conceptual logic* of *semantic information* both as a *model* (*mimesis*) and as a *blueprint* (*poiesis*)" (p. xi, emphases in the original). At the core of his argument are the twin concepts of construction and design.

Floridi is at once a realist about the external world and a constructionist about our knowledge of it: "Epistemic agents know something when they are able to build (reproduce, simulate, model, *construct*, etc.) that something [...] [A]n agent qualifies as an epistemic agent not when she is a passive user of some information, but when she is a critical producer of it" (p. 27, emphasis added) – i.e., when she has "the *poietic*, *interactive*, and *practical* knowledge *of* something being the case", rather than "the *mimetic*, *passive* and *declarative* knowledge *that* something is the case" (p. 28, emphases in the original). The transformation of the data provided by reality into semantic information, by people working as "semantic engines", is a process more like cooking than like photography: "Models are not representations understood as pictures, but interpretations understood as data elaborations,

of systems" (p. xi). Sometimes this process results in a blueprint of what could (or should) be, not a mere model of what there is.

A constructionist approach to knowledge is common in disciplines like architecture, computer science, economics, engineering and jurisprudence (p. 205 – library and information science, LIS, might also have been mentioned, but is not), which "tend not only to study but also to build" their subjects (p. 51). Floridi characterizes the poietic process of knowledge construction as one of conceptual design and argues that "philosophy is the ultimate form" (p. xi) of conceptual design, just as it is of conceptual analysis. More specifically, the part of philosophy that is about the "abstract [structural] properties, principles, mechanisms, or dynamics characterizing or underpinning systems" (p. ix) is to be known as "conceptual logic". Floridi is careful to note that, strictly speaking, the conceptual logic of semantic information is not a conceptual logic of a system *per se*, but a conceptual logic of the design of a model of a system – since semantic information is itself always about (i.e. a description of some properties of) a system.

The book is divided into two parts of unequal length. The shorter Part I is a "metatheoretical" section, consisting of three chapters in which Floridi successively presents: his interpretation of the nature of philosophical questions, as "*open to informed, rational, and honest disagreement*" (p. 3, emphasis in original); a defence of constructionism as an approach to answering philosophical questions; and a characterization of constructionism as non-naturalistic as well as non-relativistic.

The longer Part II has seven chapters and an afterword. In Chapter 4, Floridi restates from *The Philosophy of Information* his definition of knowledge as semantic information that has been correctly accounted for (i.e. justified, explained, warranted), and newly shows how this definition can be applied to perceptual knowledge and knowledge by testimony, by understanding perception and testimony as data sources rather than as instances of knowledge in themselves. Chapter 6 is a densely-argued, Peircean defense of our knowledge of the world against "the sceptical challenge", namely "how do we know that the world really is as our informational constructs tell us it is?" (p. 113). Chapter 7 similarly defends the "principle of information closure" – the principle that, if S holds the information that p, and S holds the information that p entails q, then S holds the information that q – against another sceptical challenge. Chapter 8 argues that two well-known fallacies in formal logic – those of "denying the antecedent" and "affirming the consequent" – can, under certain conditions, be interpreted as logically valid, as "informational shortcuts". Chapter 9 is a discussion of "maker's knowledge" – i.e., where the holder of some information holds it because "she designed the system that way" (p. 193). Here, Floridi argues in favour of adding a fourth important distinction – informative vs uninformative – to three classic properties of truths – necessary vs contingent, analytic vs synthetic and *a priori* vs *a posteriori*.

Chapter 5 is the one that will probably hold most interest for the LIS audience. One of the briefer chapters at 12 pages, it is about information quality. "Which data may be useful and relevant, and so worth collecting, curating, and *querying*, in order to exploit their valuable (small) patterns?" (p. 101, emphasis in original). Floridi distinguishes first between kinds of purposes: those for which information is produced, and those for which information is consumed – and second among several dimensions of information quality, including accuracy, completeness, consistency and timeliness. He calls this a "bi-categorical" approach, which "lends itself to simple visualizations" (p. 101) such as the radar chart depicted on p. 112. A short section on previous work on information quality (pp. 106-107) contains citations to a few representative works from the 1990s onwards, focusing on data quality, but the absence of reference to, and consequent lack of accounting for, a whole tradition of work on relevance criteria in the context of information retrieval system evaluation stretching back to the Cranfield tests in the 1960s is bewildering and disappointing, especially since the distinctions Floridi makes will not be new for LIS readers.

Chapter 10 identifies two existing conceptual logics of information – Kant's transcendental logic of "conditions of possibility" of a system and Hegel's dialectical logic of "conditions of in/stability" of a system – and outlines a third – Floridi's logic of design, about the "conditions of feasibility" of a system (p. 188). Such a logic is what we need to make sense of the shift from a representationalist (mimetic) to a constructionist (poietic) understanding of knowledge. Floridi acknowledges a debt to Herbert Simon's (1969) *Sciences of the Artificial*, but seeks to distinguish between Simon's logic of design as one that "would help to identify the right answers" and his own as one that "would help to design the right questions" (p. 189). This kind of logic – a "logic of requirements" – is needed to "make the most of […] increased opportunities" (p. 204) presented by the digital, to understand a world in which "knowledge […] is increasingly constructionist" (p. 205), and "to devise new answers to the open questions posed by the information revolution" (p. 205).

The book in which this logic is developed is intended to provide some "tools […] to understand and design the human project we may want to pursue in the twenty-first century" (p. 207). The "actual navigation" through the "uncharted territory" of the "problems with which we […] shall be dealing in the infosphere" (p. 207) is left to the next volume, *The Politics of Information*, to which many readers in LIS will be looking forward.

You do not have to buy wholly into Floridi's particular worldview to accept that various of the questions with which he deals are important ones – they are considered as such by many epistemologists working in different traditions – nor that their answers are relevant to designers of information services and systems, and to others working in librarianship and in information science. In particular, questions about how to measure the quality of information derived from various sources and about how to establish criteria for judging the quality of information on various dimensions are central to information system design, and the chapters that touch on these kinds of questions (primarily Chapter 5) might work as required reading for advanced classes in this area. Others will be harder going for those without degrees in philosophy. As Floridi points out, the book is "not a textbook on […] the sort of topics discussed in undergraduate courses entitled 'introduction to (library and) information science'" (p. xv).

Questions concerning Floridi's theory of philosophy as conceptual design as a human project (Lai Ma)

Many have attributed the beginning of information science to Vannevar Bush (1945), with his article "As we may think", published in *The Atlantic*, in which he conjectured a device, the "memex" where an "individual stores all his books, records, and communication, and which is mechanized so that it may be consulted with exceeding speed and flexibility". In the same year, Claude Shannon was working on code-breaking in Bell Labs. He completed a report, "A mathematical theory of cryptography", where he noted a secrecy system is "almost identical with a noisy communication system" (Gleick, 2011). In 1948, Shannon published an article, "A mathematical theory of communication", a groundbreaking theory that greatly improved the capacity of communication channels and the speed of information transmission. The development of information science in the USA in the postwar period was considered as an effort in advancing science and technology by investing in information infrastructure and was partly funded and supported by the newly established National Science Foundation (Hahn and Barlow, 2012).

The development of the British school of information science, however, was less tied to the postwar effort. Robinson and Bawden (2013) have identified the European documentation movement as one of the driving forces, including the establishment of the Universal Bibliographic Repertory by Paul Otlet and Henry La Fontaine in the late nineteenth century (Rayward, 1991). The terms "information science" and "information scientists" were first used by Jason Farradane, who was instrumental in the establishment

of the Institute of Information Scientists in the mid-1950s, although it has been argued that information science as a discipline should be traced back to the launch of the *Journal of Documentation* and *Aslib Proceedings* in the mid-1940s (Robinson and Bawden, 2013).

Nevertheless, Alan Turing's work has not been discussed in relation to the foundations of information science, albeit our experience in the digital world today is much mediated by artificial intelligence, broadly construed. Floridi's new book, *The Logic of Information*, brings our attention to a notion of philosophy as conceptual design, which he attributed Turing as the representative in "the process of dislocation and reassessment of humanity's fundamental nature and role in the universe". *The Logic of Information* sheds new lights on our conceptions of information, inasmuch as our responsibilities to engage with and to design the infosphere.

A main argument of this book is that humans are natural-born data hackers as a way to rethink philosophical questions in what Floridi calls "the fourth revolution". This argument positions epistemic agents in relation to the "system". The basic construct reminded me of Gregory Bateson's notion of information, "a difference which makes a difference" proposed at the Korzybski Memorial Lecture for the Institute of General Semantics on 9 January 1970. In this lecture, Bateson attempted to answer questions concerning the mind as shaped by cybernetic epistemology, system theory and information theory (Bateson, 2000, p. 467). The unit of mind, for Bateson, is "the computer in the human head" (p. 464). It evolves "memory and data banks" (p. 465) and is concerned with "mental and communication process" (p. 458). Bateson envisions a Mind, like Floridi's multi-agent system, that is composed of individual minds that belongs to a cybernetic system characterized by trial-and-error processes.

In *The Logic of Information*, Floridi moves towards the more creative, unpredictable ways epistemic agents make use and repurpose information. He maintains that a PI would enable humanity "to semanticize the world and construct it responsibly", yet the interactions between epistemic agents and the system remain somewhat opaque. Does this conception of information in relation to humanity go beyond Bateson's conception of the Mind and allow for different forms of interactions in the infosphere, and whether the infosphere is a closed system? And, what do big data add to the need for a PI, for the challenge of "too much to know" has persisted since centuries ago (Blair, 2010)?

Another difficulty occurs when Floridi makes the case that "computers have joined us in the infosphere". It is unclear as to whether computers, artificial intelligence and humans are all epistemic agents in this system. For human beings can rely on, in Floridi's words, "perception" and "testimony" to repurpose data and information, whereas artificial intelligence's senses/perception and its reaction are still mediated by testimony. Consider, for example, a self-driving car. Are its senses and perception natural or non-natural? What are the responsibilities of human agents if computers are considered as epistemic agents with a theory of philosophy as conceptual design?

Like Bateson's conception of the Mind, as well as most models concerning data, information, and knowledge in information science and knowledge management, there seems to be a gap in philosophizing information that is emotive and affective. While the logic of information is important for clarifying the conditions for constructionism, in the sense of the maker's knowledge tradition in this volume, much information we encounter every day is charged with emotions. Can we use the logic of information to analyse and philosophize disinformation, misinformation, trolls and memes? How do we account for curiosity and imagination, for love and hate? Would a theory of philosophy as conceptual design would guide us away from or back towards the information-processing models of mind? And how might Alan Turing's work benefit the thinking of information, for he possibly did not imagine artificial intelligence's dependence on big data today? These are all interesting questions worth exploring.

As the conclusion of Floridi's book came to the discussion of the human project, I could not help but think of Paul Otlet's Mundaneum (Rayward, 1991), Norbert Wiener's (1954) *The Human Use of Human Beings*, and H.G. Wells' (1938) World Brain. These different visions have led us to have different assumptions and interactions between human, information and technology. The history of information science, despite its different origins in the UK and the USA, is converging into a universal and global one. *The Logic of Information* calls for philosophical questions concerning big data, artificial intelligence, and most importantly, the role of human agents in designing information systems, philosophically and responsibly.

"A thin red line against the vandalism of time": PI and LIS in *The Logic of Information* (David Bawden and Lyn Robinson)

"Among our mundane and technical concepts, information is currently one of the most important, widely used, yet least understood. It is the Cinderella of the history of philosophy", Luciano Floridi writes in this new book (Floridi, 2019, p. 211); "information has arisen as a concept as fundamental and important as Being, knowledge, life, intelligence, meaning, or good and evil" (p. 213). The concept is, of course, of equal importance in LIS. Floridi (2002a, 2004) has argued that LIS may be seen as applied PI, while Bawden and Robinson (2018) have suggested that PI may be regarded as a foundation for LIS. The two are not exactly the same (a point taken up in Dominic Dixon's contribution) but they both suggest a close relation, and interaction, between PI and LIS. PI should certainly inform LIS, in some manner, and it may be that LIS may be of importance to PI "in terms of deepening our mutual understanding of information ontologies, the dynamics of informational domains, and the variety of evolving relationships among information organisms and information objects" (Van der Veer Martens, 2015, p. 348).

It is a tribute to the richness of the book that the preface alone raises several topics relevant to the PI–LIS relation.

Floridi (p. xii) tells us that this book provides a bridge between the epistemological analysis of his *The Philosophy of Information* (2011) and the normative prescriptions of *The Ethics of Information* (2013). He explains that the account of PI set out in the three volumes is a move towards a reversal of four fundamental philosophical misconceptions. It is interesting to consider whether the four philosophical reversals have any analogy in, or lesson for, LIS.

Floridi's four reversals are grounded in the application of Shannon's sender–message–receiver–channel communication model to the philosophical domains of epistemology, ethics, metaphysics and logic. The book as a whole, of course, does not deal with information in Shannon's probabilistic sense, but with semantic information: well-formed, meaningful and truthful.

The first suggests that epistemology should be focused on the producer/sender of knowledge, rather than the mere consumer/recipient. This strikes a chord, since within LIS numerous information behaviour models have been developed over the decades (Case and Given, 2016), but virtually all were focused on the "user", i.e. the consumer/recipient; producers and senders were represented by passive "sources" and "resources". Ironically, elsewhere in the academic world, the discipline of communication studies was doing rather the opposite; focusing on the nature of the producer and sender of messages, with the recipient being an undefined end-point. It is only relatively recently that models have been derived to try to encompass both parts of the information communication process (Robson and Robinson, 2013). Similarly, the many models and frameworks for information literacy initially focused on the information user as a rather passive recipient, ideally of good quality information; it is only relatively recently that such models have expanded to include the idea of the user as an active creator and sharer of information (see, for instance, Mackey and Jacobson, 2014).

We may therefore say, at the risk of stretching the analogy too far, that Floridi's philosophical reversal parallels LIS's more pragmatic reversal, and may lend support to it.

The second, by contrast, argues that ethics should focus more on those on the receiving end, rather than on the motives and actions of the active agent. LIS has always had a concern for the ethics of information within its sphere of agency, and this has become a more pressing issue with concerns of digital ethics. A criticism of LIS's approach to ethics may be that is has been rather piecemeal and overly pragmatic; for that reason, it has been suggested by several authors that Floridi's information ethics may be a valuable framework for the development of ethical perspectives within LIS; see, *inter alia*, Ess (2008), Furner (2010) and Bawden and Robinson (2018). However, limited though the LIS approach to ethics may have been, it has generally been firmly centred on the concerns of the recipient. This reversal seems to be moving the philosophical approach more in the direction of LIS's existing pragmatic approach and may therefore be an area where LIS may contribute to the development of PI.

The third reversal implies that metaphysics should be more concerned with dynamic structural relations between entities, rather than simply with the entities themselves. Here, we may see an analogy with some of the newer approaches in the study of information behaviour, which move beyond consideration of rather static "users" and "sources", to a more dynamic and constructionist approach to information seeking and knowledge sharing; a good example is the "information grounds" approach. Indeed, again at the risk of stretching the analogy, we might see a parallel between the philosophical constructionist principles which are a major theme of this book, with newer developments in LIS, an early statement of which is given by Talja *et al.* (2005).

The fourth sees logic moving from using information and communication to justify conclusions to extracting reliable information from a variety of sources, focusing on relations and leading to one of the book's themes, the importance of developing a logic of conceptual design, based on PI. There seems be a clear relation here between this development in philosophical analysis and the pragmatic approach to "extracting reliable information from a variety of sources" which many would see as the *raison d'être* of LIS. This is particularly so as LIS's information is based on testimony, a form of evidence which is another major feature of the book. It is not hard to see that this is another aspect in which LIS may receive theoretical support for PI and may in turn contribute to PI's development.

This superficial analysis serves to show the clear significance of the ideas in the book for LIS, and the ways in which PI and LIS may, hopefully, interact fruitfully. Many other such potential links are present throughout the book. A few examples may suffice: the discussion of open and closed questions, to which Chapter 1 is largely devoted, reminiscent of the research/reference dichotomy in LIS; the issues of information quality addressed in Chapter 5; and the links between information, knowledge, and understanding, and the particular role of testimony (*inter alia*, p. 52 and much of Chapter 4).

To take one example in more detail, Floridi reminds us, in a footnote on page 95, of the influence of Popper's idea of World 3 of objective knowledge in the development of PI. Popper's ideas were, nearly 40 years ago, famously declared by Bertie Brookes (1980) to be the foundation of information science. This idea has rather fallen by the wayside, though it has been revived from time to time (see, for instance, Bawden, 2002; Gnoli, 2018). It is interesting, and rather pleasing, to think that it may now, in the much more fully developed form of PI, be restored to its place.

It is also worth noting the emphasis on design throughout the book, with the note that many academic disciplines, from engineering to jurisprudence, do not merely study the systems of interest to them, but build and modify them (Floridi, 2019, p. 205). The same must surely be true of LIS.

Floridi tells us that this "is not a textbook […] on the sort of topics discussed in undergraduate courses entitled 'introduction to (library and) information science'". While much of the book is certainly at too advanced a philosophical level for this purpose, it can be argued that, as the examples above illustrate, many of its topics should be discussed on such courses. It will certainly be added to the recommended reading for the graduate LIS courses at City, University of London; partly because it is good for students to appreciate the analytical rigour which can be applied to topics of interest to both PI and LIS, and partly because of the inspiration the book offers to all who believe in the value of the right handling of information in our society. When Floridi writes (pp. 99-100) of self-conscious information structuring nodes, such as ourselves, as "Nature's beautiful glitches […] stewards of Being", with an "unclear destiny [in their] moral struggle against entropy […] a thin red line against the vandalism of time", it is hard to see this as other than a sublime expression of the values which LIS upholds. And when he writes that "[…] the philosophy of information can be presented as the study of the informational activities that make possible the construction, conceptualization, and finally the moral stewardship of reality" (p. 213), again it is hard to deny that there are indeed close links between PI and LIS, and that these merit further detailed study and development.

Philosophical questions as open questions: implications for defining library and information science as applied philosophy of information (Dominic Dixon)

In this, the third volume of Floridi's "tetralogy" project, the overall question being addressed is, "What is the conceptual logic of information-modelling (i.e. generating a description of some structural properties of) a system?" (Floridi, L., 2019, p. ix). Floridi is careful to note that the way in which he uses the words "logic" and "information" differs to what might one might typically expect. By conceptual logic, he is focusing on structural studies, or "the study of structural properties of systems […] and their dynamics" (Floridi, F., 2019; Floridi, L., 2019, p. ix), studies which he notes are already common in philosophy despite not being typically referred to as logic. By information, he is not referring to it in the mathematical or "Shannon" sense but rather to semantic information, which he has previously defined as "well-formed, meaningful and truthful data" (Floridi, 2005).

It is clear from the outset that much of the content within this volume is highly relevant to LIS, particularly if it is to adopt PI as its conceptual foundation. The chapter on logical fallacies as Bayesian information shortcuts, in particular, may have implications for LIS pedagogy in relation to information literacy – this is something I intend to explore in future research. Here, however, I restrict myself to focusing on just one area: the analysis of philosophical questions as open questions as set out in Chapter 1, which I will argue has important implications for the relationship between PI and LIS.

In his paper "On defining library and information science as applied philosophy of information", Floridi (2002a) sets out an argument for PI as the conceptual foundation for LIS and argued further that LIS can in fact be defined as applied PI. The analysis of philosophical questions in Chapter 1 serves to provide further clarification as to what a PI approach to LIS would look like by making it clearer how Floridi conceives of philosophical questions and of philosophy more broadly. A major upshot of this is that, using Floridi's analysis, we are able to better demonstrate the importance of philosophy to science and consequently to LIS. However, this analysis also reveals a tension in Floridi's aforementioned claim that LIS can be defined as applied PI.

As a starting point, Floridi, L. (2019, p. 8) states that philosophical questions are in principle open while empirical questions are closed. By this, Floridi is careful to note, he is not suggesting that there is widespread agreement on how to answer empirical questions or that the relevant information to answer the questions is always available, but rather that once the necessary and sufficient resources are available and the correct answer has

been formulated, disagreement would be futile. In contrast, philosophical questions are questions "not answerable empirically or mathematically, with experiments or calculations" (Floridi, L., 2019, p. 9). They are such that even after answers have been formulated, using the necessary resources, there is always room for debate and disagreement; thus, it follows that the set of philosophical questions remains permanently open.

To elucidate this idea, Floridi draws on the mathematical concept of closure, whereby it is said that a set is closed under a given operation if the carrying out of this operation on members of the set always returns another member of the set. Floridi illustrates this concept with the set of positive integers, noting that under addition the set is closed while under subtraction it is open. This is because if you add any two positive integers you always obtain another positive integer, while under subtraction the set is open as if you take any positive integer and subtract a larger one from it a negative integer is returned, and you then move outside the initial set into the set of negative integers (p. 13). In other words, whether a set is open or closed depends upon the operation being carried out on the set.

After considering a number of objections to the initial conception of philosophical questions as open questions, Floridi gradually refines the definition and arrives at the following:

> […] philosophical questions are in principle open, ultimate but not absolute questions, closed under further questioning, possibly constrained by empirical and logico-mathematical resources, which require noetic resources to be answered. (Floridi, L., 2019, p. 23)

To continue the mathematical analogy, what this means is that under the operation "under further questioning" philosophical questions, despite being in principle open, are closed, meaning if you keep questioning you always stay within the set of philosophical questions. Likewise, empirical questions, despite being in principle closed, are open under the operation "under further questioning" – that is, if you keep questioning the questions you escape the set of empirical questions and enter the set of philosophical ones. As Floridi notes, "Questioning is a stepping-up process that sooner or later ends up trespassing on philosophy" (Floridi, L., 2019, p. 12).

I will now turn to the implications of this for LIS. Floridi (2002a) argued that LIS should be defined as applied PI. Prima facie, by its very definition, this would then seem to remove the science in LIS and restrict it to dealing with open questions. This follows from the fact that under Floridi's definition, empirical questions – or questions requiring empirical resources to be answered – are not within the remit of philosophy. However, in Floridi's (2002a) definition of LIS as applied PI, he states that it "conducts empirical research for practical service-oriented purposes (e.g. conservation, valorization, education, research, communication and co-operation), thus contributing to the development of basic research in PI" (p. 46). This suggests that Floridi sees no issue with conceiving of LIS as both a science and an applied philosophy. This point is further backed up by looking at Floridi (2004, p. 659), where he states that "LIS amounts to, what one learns, with different degrees of complexity, through the university curriculum that educates a librarian or an information specialist". It is uncontroversial to suggest that this would include carrying out empirical research. It is, therefore, difficult to conceive of how empirical questions would not be part of the set of questions included within LIS as applied PI.

The problem with this is that putting empirical research within the scope of LIS as an applied philosophy appears to be in tension with the distinction Floridi has proposed in this chapter, which states that philosophical, or open questions require noetic resources, while closed, or scientific questions require empirical or logico-mathematical resources. As an applied philosophy then, the set of empirical questions within LIS would appear to be rendered empty – given philosophy's focus on open questions, which do not draw on empirical resources to be answered.

It might be argued that applied philosophy is a special case, in that it can include closed questions. For example, some such as Bufacchi (2004) have argued for a more empirical approach to applied philosophy and Lippert-Rasmussen (2016) has put forward a conception of applied philosophy as "significantly informed by empirical evidence" (p. 12). However, there is a difference between a question being informed by empirical evidence and requiring empirical evidence to be answered – the latter seems to be more what Floridi has in mind when speaking of empirical questions as closed questions. Furthermore, under Floridi's conception of the distinction between philosophical and empirical questions outlined above and his definition of LIS as applied PI, the end result seems to be an applied philosophy that ends up looking more like a form of applied science. Thus, it is reasonable to ask: where is the work being carried out to answer the non-applied empirical, or closed questions that are of concern to LIS?

While it is certainly empowering to LIS that, with PI as a conceptual foundation, it can contribute to "basic" research in PI and thus to its own foundation, it is not clear that it needs to be redefined as applied PI in order to do so – the methods of PI can be applied to questions within LIS without changing its status as a discipline. It is notable that in arguing for defining LIS as applied PI, Floridi initially followed Herold (2001) who claimed, "To the extent that librarianship is an applied philosophy of information, it seeks to discover the roots of phases of information dynamics in the course of our traditional work" (p. 6). It is perhaps evident, given the use of the phrase "to the extent that", that Herold is not making a strict identity statement but rather is recognizing that with PI as a foundation LIS can benefit from the methodology of PI to build a stronger conceptual foundation. This would not exclude it from carrying out empirical research, perhaps with the purpose of answering "closed" questions outsourced from PI, which would require empirical resources to be answered. Perhaps this less strict definition is what Floridi also has in mind, but, in lieu of clarification from Floridi, it remains an open question whether the set of LIS questions is open or closed.

It is my contention that it would be better to conceive of LIS and PI as engaged in what Floridi refers to in the conclusion of Chapter 1 as a "two-way trade between open and closed questions" (p. 23). This saves the set of (closed) LIS questions from the threat of emptiness. Following Cornelius (2004), we can then conceive of LIS, more broadly, as encompassing LIS as an academic discipline (or science) and librarianship as an area of professional practice (or an applied science) alongside other practical areas of LIS such as information, knowledge and records management, with PI as its conceptual foundation. This means both philosophical (open) and empirical (closed) questions can be within the broad set of LIS questions, and the methodology of PI can be applied to the answers to the latter set of questions to gain further insights – and generate more open, or philosophical questions – which can in turn be dealt with at the foundational level as part of PI.

Depth of study indicates long-term investigation (Ken Herold)

Those of us toiling in the information fields have long enjoyed the company and advice of our philosophy colleagues. The ancient twinning of yore between star catalogers and records, cities and libraries, has never ceased in practice to this day. In the so-called historical record, our legendary object of curation, accelerating growth and inconceivable variation necessitated theories and strategies as much as technologies and tools. The best of philosophical study involves a depth of coverage which indicates productive long-term investigation of a subject matter. Such is the case with Floridi's present volume on logic within the PI. Others have summarized the experience of researchers in LIS as to issues in philosophy more recently (Fallis, 2007a, b; Furner, 2017, 2010). Of note are works within the new century explicitly addressing the PI (Dodig-Crnković and Burgin, 2019; Floridi, 2002a, 2003; Herold, 2004, 2015). In the present volume 3 of his tetralogy, Luciano Floridi warns LIS

undergraduates this is not their central subject matter, and he is quite right. In musical terms, the four-part structure of *Principia Informationis* resembles the sonata in which the third movement involves a most careful stepwise exposition, in this case dynamic epistemic logic of the informational kind. We shall have learned by now that data, information and knowledge are strictly terms of art within the context of semantic logic. It is equally fruitful and wise to hold back on otherwise hasty observations or criticisms of the present volume pending our fuller education in Floridi's purposes. This contribution seeks to indicate the care which I see necessary to make fruitful connections out from the logic of information to our purposes in LIS, such as how it deploys the terms for database, distributed knowledge and public announcement, for instance, but not with our common understanding.

"Time is ripe". So state the authors announcing an appeal to address the integration challenge facing researchers and scholars in all data-computational fields (Allen *et al.*, 2019). It is the dawning of the hyper-historical record for our expanded curatorial concern in LIS (Floridi, 2015). Massive global databases comprising DNA sequences, digitized natural history collections, geospatial locations of species, along with real-time sensor network data require just as massive integration and linking through computational analysis. This is the time of *x*-informatics, what Gray (Hey *et al.*, 2009) termed e-science, in crafting tools and systems for shared epistemic communities, where *x* is nearly any field of study. Van Benthem praises informatics as "a seismic force which can redraw academic territories" capable of "cutting through old boundaries between the humanities, social, and natural sciences" (Floridi, 2008). He does this explicitly in the context of Floridi's project on the study of computing and information, seeing informatics as having the "right mix of a fundamental scientific study of information". Dynamic epistemic logics, according to van Benthem, should consider knowledge and the actions producing and transforming it on the same level. So "representations and processes must be studied together". I suppose that for Floridi the action-oriented nature of poiesis supplants the static notion of representation. We might see this mirrored in LIS in our own information lifecycle concept of design, short of employing modal logic *per se*. Van Benthem summarizes his view of the history of informatics and its cultural role beyond logic, a fascinating perspective where "fundamental research happens simultaneously with technological innovation". In contrast with the logic of information, an LIS curation of hyper-historical documentation operates on a meta-level.

If knowledge is design and philosophy is conceptual design, then the conceptual logic of semantic information in Floridi's realist constructionist view moves away from representing to interpreting in the interplay of the epistemological and the normative. Does LIS similarly act to synthesize answer towards the clarification of others' questions? Hjørland (2004) has an in-depth look at our realism, but is information science closed or open as Floridi sees it? Do we study "noetic resources" and "semantic artifacts" in the process by which our curation practices deliver service innovations which enhance curation, and so on, not so much as applied PI but a productive outsourcing of open philosophical investigations? Perhaps online and open textbooks are a kind of constructionist education and our role in information resource design and discovery is maker oriented. LIS is cultural, non-natural and increasingly artefactual. We make (assign) categories and have been supposed experts in information transfer, but we really had not considered libraries to be volumes of data, or as the collected testimony of data providers until the digital era. It seems that LIS is meta-epistemic in the sense that the awareness-logical distinctions among common knowledge, mutual knowledge and distributed knowledge do not match our understandings of agents, processes and communications (Pettit, 2014). To us the social has not necessarily been the multi-agent, though we can appreciate the perspective where "different agents may have different kinds of access to the same truth". Should we consider a less passive epistemology, more active, even holistic? And what might be the *ab anteriori,* the historical interpretation of

recorded knowledge in hyper-history? Is there a maker's account (Floridi, 2018b) of memory and thereafter a more formal theory for shared, collective memory within LIS?

Floridi (2012) assessed the philosophical state of the massive growth of data on our collective abilities to solve problems through the serious game of asking and answering in the hunt for utility and relevance in and among sets of properly collected and curated data:

> Big data are here to grow. The only way of tackling them is to know what you are or may be looking for. At the moment, such epistemological skills are taught and applied by a black art called *analytics*. Not exactly your standard degree at the university. Yet, so much of our well-being depends on it that it might be time to develop a philosophical investigation of its methods.

Analytics (emphasis in original) is of course the systematic computational analysis of data, while arguably studies in the field of LIS involve a weaker or paradoxically an increasingly overt degree of epistemological thought. The solving of problems in information transfer in LIS is not the redundancy of ontic or factual changes, or the clarity of fully accessible transfer states among LoAs. We should not neglect the rules Floridi elucidates in his distinction from their performance in logics to the extent that we in LIS apply an inter-subjective scientific method through tools, such as entity-relation diagrams. If for Floridi "[…] a pure logic of information cannot be used to distinguish between knowledge acquired by observation" directly and already witnessed and that by testimony, the former is a message from the system (only as a modelled source) while the latter is our intuitive sense of communication. I trust that further meta-level common ground for Floridi and LIS will obtain with publication of his final volume on the human project. Our frameworks for the design of LIS information–communication and data-computational systems require openness, ethics, logic and the fullest identification possible with education and learning at their roots. To meet the challenges of the digital requires an informational design architecture fusing the modes Floridi promotes: to need, to see, to shape, to make and to test. One looks ahead to a melding of sorts in his finale.

LIS, design and philosophy (Tim Gorichanaz)
LIS has traditionally been considered among the social sciences. I am convinced, however, that it is not a social science, but rather a design field. Rachel Ivy Clarke (2018) makes a convincing case for this, showing how the problems of librarians and other information professionals are design problems. For example, librarians are concerned with improving and increasing information access and literacy, issues whose solutions admit of disagreement among reasonable and well-informed people. There is an old saying: "three Jesuits, four opinions" – and it is much the same for librarians.

Whereas the sciences focus on describing the world as it is, design emphasizes creation and change. With these different goals come different epistemologies: science is steeped in notions of generalizability, validity and reliability, and its theories are meant to describe, explain and predict the world. The epistemology of design, on the other hand, is much less understood. In *The Logic of Information*, Floridi, L. (2019) seeks to remedy this, articulating the logic of design – and along the way arguing that philosophy is a matter of conceptual design. Floridi's work lends precision to what is often presented only vaguely. To show how, I will briefly discuss a contribution of the book to each of the two key stages of design: finding the right problem, and then finding the right solution.

Finding the right problem
First, a designer must figure out what problem to solve. This is rarely self-evident. Suppose Alice wants a hole drilled in a wall. Though solving this problem seems straightforward

enough, hole-drilling may not actually be the best problem to solve. A questioning designer may look instead for different ways to hang a shelf, or different ways to store her books, or even different formats for her books to take (Norman, 2013). Finding the right problem involves considering multiple perspectives, implementing constraints and finding a "way in" (Clarke, 2018, p. 45; see also Harfield, 2007).

Some say that design problems are inherently ill-defined (e.g. Archer, 1965; Cross, 1984). These been called "wicked problems" (Rittel and Webber, 1973), described as being "unique, constantly changing problems that have no single correct solution. Wicked problems lack definability, true-or-false solutions, conclusive endings, scientific tests for solutions, and lists of acceptable moves" (Clarke, 2018, p. 44). And "if a solution can be seen to arise automatically and inevitably from the interaction of the data, then the problem is not a design problem" (Clarke, 2018, p. 44).

That discussion, in light of Floridi's work, could use some revision. A question may admit of multiple solutions while still being well-defined. As Floridi shows, design problems can – or even should – be well-defined. Such definition requires specifying a level of abstraction and recognizing or imposing empirical and logical constraints. Next, design problems do not necessitate any single answer; one can test solutions and bring the design process to a conclusive ending, even though a "conclusive" ending need not have been the only one possible.

Finding the right solution

Once a problem has been defined and solutions have been proffered, a designer must evaluate the solutions. How is this done? Clarke (2018), like most design scholars, writes that design thinking relies upon abductive reasoning, or inference to the best explanation (see also Kroll and Koskela, 2015). That is, when several solutions are proposed, a designer selects the one with the fewest drawbacks. Abduction is usually presented as one of three choices, the others being deduction (deciding a case based on general laws) and induction (developing a general law from cases). But logicians recognize other structures of reasoning; and as Floridi, L. (2019) argues, the reasoning used by designers is not abduction but rather conduction.

Conduction is a matter of accumulating independent, relevant reasons to support a conclusion. There is no reference to a general law, and these reasons are not decisive, but when presented as a group they offer a preponderance of evidence for accepting a conclusion – or, in this case, a design solution. Originally proposed by Carl Wellman (1971) to discuss justification in moral arguments, the concept of conduction has since been developed and applied more broadly (Govier, 2018). Articulating the logic of design as one of conduction, and Floridi, L. (2019) writes that a set of requirements sufficientizes (makes sufficient) a particular system – without necessitating that particular system.

Floridi, L. (2019) locates this inference at solution-evaluation stage of design, but it raises the question whether (and how) conduction is also at play in other stages. For that matter, to what extent do defining one's level of abstraction, requirements, constraints, etc., also constitute design problems? Do they also rely on a logic of conduction? These seem to be important questions, as iteration (both of problem and solution) is inherent to design. Designers go between defining the problem and constructing solutions, back and forth.

So far as I can tell, conduction has not yet been discussed in the LIS literature. If Floridi, L. (2019) is correct, then perhaps LIS ought to investigate conduction more closely. Indeed, LIS may even be able to further epistemologists' understanding of conduction: as Trudy Govier (2018, p. 101) writes, conduction "depends crucially on the concept of relevance", and relevance is a concept that has been much developed in LIS.

Conclusion
If LIS and philosophy are both fields of design, then there may be more confluences than we previously imagined. All this suggests many paths forward for LIS research, practice and education. To that end, in addition to my comments above, I had also like to shine a light on the issue of noetic resources (Floridi, L., 2019, pp. 18-19). These are one's beliefs, memories, culture, practices, etc., and these are required for solving design problems, whereas non-design problems may be satisfied simply with empirical and/or logical resources.

In the global information economy, all of us are designers. Indeed, as Floridi writes, being human simply is designing. If LIS is to fully serve humanity today, then, we must learn to serve designers. This is not just about provisioning facts, but also catalyzing noetic resources – ingredients for imagination. We should work to better understand how documents can contribute to one's noetic resources. Put differently: what is the role of information-as-thing in design? More broadly, if humans are beings for whom "understanding is constructing" (Floridi, L., 2019, p. 194, see also p. 69), then what is the role of documents in that understanding?

Philosophy of information (Sille Obelitz Søe)
Floridi, L. (2019) states that, "The philosophy of information […] promises to be one of the most exciting and beneficial areas of philosophical research of our time" (p. 213). I both agree and disagree with this statement. I do so because it is not entirely false although not entirely true either. The explanation is twofold and has to do with meaning and context: it concerns what one mean by "philosophy of information". While I agree that PI "promises to be one of the most exciting and beneficial areas of philosophical research of our time", I disagree with the framework of PI promoted by Luciano Floridi (2019), latest in *The Logic of Information*. Let me explain why.

At the core of PI lies the notion of information itself. Thus far, I agree with Floridi. In Floridi's (2002b) interpretation of PI, information is a foundational concept, more foundational than belief, mind and knowledge – even more foundational than life itself. From this conception of information follows that information cannot be reduced to other concepts such as meaning, belief or knowledge. Instead, meaning, belief and knowledge can be explained in informational terms. Thus, PI is a full package – an interdisciplinary field complete with an ontology, an epistemology, an ethics and an information-theoretic philosophical method (Floridi, 2002b, 2011; Floridi, L., 2019). Floridi's PI framework comes with four important concepts: the information revolution; the infosphere; inforgs; and the "onlife". Further, the framework has its own theory of knowledge (a constructionist view including maker's knowledge), its own theory of meaning (so-called Action-based Semantics) and its own theory of truth (the correctness theory of truth). Moreover, Floridi's (2011) PI is a foundational philosophy due to its main objective – the question "what is information?" (Floridi, 2011). However, Floridi's PI comes with a specific definition of information, namely as well-formed, meaningful and truthful data. This definition of information lies at the core of the correctness theory of truth, the contructionist view of knowledge, the logic of information, the newly developed treatment of informational skepticism and so on. In fact, "Information—in the factual, semantic sense of well-formed, meaningful, and truthful data about some topic, [is the sense] adopted in this book" (Floridi, L., 2019, p. 115).

This is the catch. I subscribe to a fundamentally different conception of semantic information. And, I fundamentally disagree that a scholarly field of inquiry should come with a single built-in definition of its object of study. For instance, philosophy of language does not come with only one definition of meaning and epistemology does not come with only one definition of knowledge. According to Floridi, L. (2019), the "most basic quality of information, [is] its truthfulness" (p. 113). However, as I have argued elsewhere (cf. Søe, 2016, 2017, 2018, 2019)

when misinformation and disinformation are considered and treated on a par with information (paying close attention to the interconnections between the three notions) truth loses its force as a defining feature of information. Truth in itself is not a safeguard against the misleadingness of misinformation and disinformation. Misinformation and disinformation can be literally true, yet misleading and information can be literally false, yet non-misleading (think about irony and satire). Therefore, I argue in favour of a notion of information based on Grice's (1957/1989/1991) concept of nonnatural meaning where intentions (and intentionality) play a central role. It is misleadingness/non-misleadingness as pragmatic features of meaning together with intention and intentionality which are the defining features of information, misinformation and disinformation, respectively (cf. Søe, 2016, 2018). Thus, I do not subscribe to Floridi's PI framework, because I reject the basic premise of the project – the definition of information as inherently truthful.

However, as Adams and de Moraes (2016) point out, it is legitimate to accept and defend the idea of PI as an interdisciplinary and autonomous field without accepting "[t]he ideological aspect of Floridi's proposal [which] is an ontological one: a replacement of a human-centric and conscious mind-centric world-view with an information-centric view, in which 'information' acquires the central role" (p. 161). Instead of an all-encompassing world-view developed to describe and deal with the universe (and everything in it) in informational terms, PI is, in my understanding, an interdisciplinary field comprised of various contributing disciplines – e.g. computer science, cognitive science, artificial intelligence, (analytic) philosophy and information studies (Søe, 2016). The shared goal of the field is philosophical, conceptual and critical investigations of "information" and related concepts. The "intersection" approach (as I call it) does not entail any specific ontological commitments or any single methodology – and it does not entail a specific conception of information. Thus, the intersection approach has the advantage that it enables contributions from within each of the disciplines, which comprise PI – exploring different ontologies, epistemologies and methodologies. In this way contributions from information studies, cognitive science, computer science, artificial intelligence, (analytic) philosophy, etc., can all be instances of PI as long as they share the goal of philosophical and critical investigations of "information" from their specific point of view. The intersection approach has the further advantage that it actually enables philosophical, conceptual, systematic analyses and investigations of information thereby engaging with the question "what is information?" – which in all approaches and interpretations is claimed to be the main objective of PI.

My own area of PI is the intersection between information studies and analytic philosophy – especially epistemology and philosophy of language. Analytic philosophy is characterized by a focus on logic, language and conceptual analysis as the means to solve philosophical problems and it is these means which are most commonly used by scholars and philosophers who work in the intersection between information studies and analytic philosophy (cf. Fallis, 2009, 2014; Furner, 2004; Fox, 1983; Mai, 2013, 2016; Søe, 2016, 2018). Hence, PI – in the intersection between information studies and analytic philosophy – engages in questions ordinarily found in information studies such as: what information is; how it is or can be used; its relation to knowledge, data, communication and learning; questions about privacy and information ethics; and what it means to live in the information age with information technology, algorithms, internet and social media. The questions are asked in a similar way to questions asked about the nature of knowledge and its possibility in epistemology as well as questions asked about the nature of meaning and language in philosophy of language. The questions themselves are not that different from the questions Floridi asks in *The Philosophy of Information* (2011), *The Ethics of Information* (2013) and *The Logic of Information* (2019), but they are freed from the ontological, epistemological and ethical commitments put forth by Floridi. In other words, they are asked within different contexts thus enabling different answers.

In this connection, a further advantage of the intersection approach to PI is that it enables contributions from both sides of the intersection to be genuine contributions to the field. Such an approach has potential in the current situation, which, as Furner (2010) points out, is that it is mostly information studies that are influenced by philosophy – especially by epistemology and philosophy of language – whereas work from information studies is hardly present within philosophy[1]. Interestingly, it can be noted that the few philosophical accounts of misinformation and disinformation, respectively, which have been developed, have been put forth in PI by information studies scholars (e.g. Fallis, 2009, 2014, 2015; Fox, 1983).

As already mentioned, my work is Gricean[2] in nature and centred on the notions of information, misinformation and disinformation. As is implied by the emphasis on "Gricean" my work is pragmatic deriving insights from the ordinary language philosophy and employing Grice's (1957/1989/1991) distinction between natural and nonnatural meaning to make sense of the world along with his concept of implicature (Grice, 1967/1989/1991) to make sense of misleadingness. It is neither information-theoretic nor an exercise in formal logic – although it does engage with approaches of these kinds. However, it is a philosophical approach to the concept of information and therefore very much an instance of PI – albeit PI in a broader interpretation than the one offered by Floridi.

This is not to say that Floridi's project is not PI, it is just a different interpretation of what constitutes the field. The two interpretations need not be mutually exclusive. It is clear that my approach would be excluded by Floridi's PI as I do not require the "application of information-theoretic and computational methodologies to philosophical problems" (Floridi, in The Π Research Network, 2013, p. 32, slightly rephrased from Floridi, 2002b, p. 137). Nor do I require the method of LoAs which is closely connected to Floridi's constructionist view of knowledge and information as well as his correctness theory of truth. And I do not require the definition of semantic information as inherently truthful that is at the core of Floridi's work. However, I see no problem in having Floridi's project as one among others within a broader field of PI employing a variety of different methods with different ontological, epistemological and ethical commitments. I do after all argue that PI is comprised of all the various fields that investigate "information" and related concepts from philosophical, conceptual and critical perspectives – and Floridi's project is as welcome as any other.

A footnote for Professor Floridi (Betsy Van der Veer Martens)
Luciano Floridi suggests in his preface to *The Logic of Information* (LI) that the book is not intended as a text for students of LIS, referring any such potential readers to a footnote stating that he has discussed these matters elsewhere (p. xv). Although Professor Floridi clearly possesses "maker's knowledge" of the contents of his own work (which he declares here should be considered as "roots not leaves"), there are questions of interest for those of us in LIS, which he has previously termed the "applied side" of the PI (Floridi, 2004), in this most recent work in his tetralogy in progress. Thus, the following is intended as a footnote to his footnote, not only leaving it to be understood that I am perhaps unduly "privileging a naïve ontology of sufficiently permanent things and qualities" (Floridi, L., 2019, p. 94) but also acknowledging that all this must be rooted in Floridi's more purely philosophical work.

Roots
Floridi continues a constructionist approach to his PI project in this new volume, emphasizing conceptual engineering as a productive, interactive and practical method complementary to the conceptual analytic approach to philosophy. He maintains that the essence of philosophy is design rather than logic, as better suited to the modelling of key philosophical questions, which consist of ultimate but not absolute questions, not answerable empirically or mathematically, but always open to answers that permit

informed and rational disagreement. LI also offers a constructionist approach to knowledge by exploring the ways in which a constructive intervention on a system may help to define the truth within the model of that system.

LI focuses on the conceptual logic of systems, specifically semantic information systems, emphasizing the need for a logic of design to supplement those existing conceptual logics represented by Kant's transcendental logic of the conditions of possibility and Hegel's dialectical logic of the conditions of in/stability of systems. Floridi notes that while Kant's logic is past-oriented and Hegel's logic is present-oriented, LI's logic of design is future-oriented, involving recursive processes of developing a set of novel requirements (understood as scope, features or functionality) and designing a model of a system that will more or less sufficiently implement them. Conceptual engineering studies the abstract properties, principles, mechanisms or dynamics pertaining to semantic information systems independent of their particular implementations by formalizing a model or blueprint, often by using the so-called LoAs, of such systems. As always in PI, information is defined as well-formed, meaningful and truthful.

One of the focal points of LI is the philosophical value of "maker's knowledge", which refers to our continuous creation of such systems as geometry and politics, as compared to that of our "user's knowledge" of astronomy and physics, since we as humans are makers of the first kind of systems but not of the second. Although in modern times "user's knowledge" has overshadowed "maker's knowledge", both epistemologically and pragmatically, due to technological advances in experimentation and observation during the evolution of scientific disciplines, Floridi argues that developments in computer science, artificial intelligence and related areas have reached the point at which our ability to make and model systems equals our ability to observe them, prompting a revival of interest in "maker's knowledge", which has been largely neglected since Vico's seminal work of centuries ago.

Floridi's view of "maker's knowledge" is, of course, very different than that of Vico, whose holistic view of human knowledge, *contra* the reductive approach of his contemporary Descartes, combined historicism, philology and rhetoric to express what are now termed his verum-factum and verum-certum principles (Daniel, 1995). Floridi's modern treatment of "maker's knowledge", however, is future oriented, philosophical rather than philological and analytical rather than rhetorical; he distinguishes among the types of experiential knowledge available to makers and non-makers of a particular system, shows how to identify the responsible agents both inside and outside this system in the making, and proposes an interactive form of knowledge (*ab anteriori*) to join the classic forms of *a prior* and *posteriori* knowledge in order to delineate the "somewhat weak *a priori* knowledge that *p* enjoyed by an agent whose actions are responsible for bringing about the truth of *p*". He further argues that "epistemic agents know something when they are able to build (reproduce, simulate, model, construct etc.) that something and plug the obtained information in the correct network of relations that account for it" (Floridi, L., 2019, p. 27).

Stems

In Van der Veer Martens (2015), I sketched some ways in which PI and LIS might better inform each other. With LI, certain connections become clearer. For example, Floridi's "Alice" must have developed much of her maker abilities and corresponding experiential knowledge long before she began to play chess. "Making" is innate, dating from our earliest hominid ancestry, as well as learned, dating from our earliest human infancy. Although the physical aspects of making are easiest to observe as infants first begin to use their hands to make messes, the cognitive aspects are equally significant, since categorization is a form of making that lets them communicate semantically with their carers, first by staring or pointing, and later with babble or words that allow these children to create and share

concepts as they acquire semantic capabilities and experiences with data (Gopnik, 2009). Today, these "natural-born data hackers" (Floridi, L., 2019, p. 71) find themselves in a world, the infosphere, in which they also interact with other agents that are not "natural-born".

Chess, however briefly mentioned in LI, is seldom a casual choice for Floridi, who has often employed it in his work, for instance in his description of a chess pawn as an informational object (2013, p. 105), in his description of the chess board itself as a level of abstraction (2011, p. 51) and in his description of Alan Prost invention of the first chess programme as the beginning of artificial intelligence (2012, p. 132). Chess can represent a mode of play, a model of reality or a modality of human–computer interactions (Ensmenger, 2012; Prost, 2012). As a domain, it enjoys a storied past (Cazaux and Knowlton, 2017), an engaging present (Fine, 2015) and a fascinating future (Roudavski, 2016). Philosophers have used chess to explore a variety of metaphysical and metatheoretical issues (Hale, 2008) and chess, as Siitonen (1998) observes, even provides a metaphor for philosophical argument itself. Floridi's illustration in LI involving Alice, Bob and Carol as two players and a third observer is worth some further exploration to better understand how this classic model of strategic action, formed over centuries from a multicultural fusion of military, political, and social influences, offers insights into informational issues as well.

If we focus on Alice, for instance, a model in which she makes her first move might well formalize the extent to which someone is cognitively equipped to play winning chess rather than merely moving a piece at random or making artful designs out of the white pieces. Floridi asserts that as a "maker" Alice has a uniquely *ab anteriori* knowledge of her move while making it but does not specify whether her "truthful" knowledge is merely of the physical repositioning of the piece or *a priori* includes an extensive knowledge of the repertoire of opening chess moves of which hers may or may not form a part. Until Alice makes her initial move with the white King's pawn, even the nature of the game being played is speculative and may well be one of several chess variants using a standard board and pieces. The system being modelled, therefore, may be that of a beginner's first game or of one anywhere on the World Chess Federation rankings.

We may assume, given that she is capable of adding a teaspoon of sugar to Bob's cup of coffee, that Alice is not "AlphaZero", the current AI chess champion. Despite the existence of AlphaZero and other attempts at the strong AI considered essential for a non-human chess grand master, chess is still considered a computationally unsolved though finite problem, so an "Alice" model of a chess system presents intriguing individual questions, ranging from whether playing against oneself can qualify as "playing chess", which by definition involves predictions about opposing moves in order to counter and defeat these, to larger questions such as the extent to which any individual player, human or non-human, "makes" chess as a system, especially as techniques and technologies advance and become acceptable and accessible. As Floridi, L. (2019, p. 180) comments, "Most of classic epistemology has focused on a single agent. This is fine, but too restrictive in a world that needs to understand how knowledge and information work within multiagent systems".

So, as we shift our focus to Bob, his move in response to Alice's initial move shows another facet of Floridi's illustration. Chess play is a two-sided competition, so the "Bob" model shows a system in which two agents respond to one another through their "conversation" on the board. Here, both Alice and Bob perform as makers and both are apparently "within" the game model as they make their individual chess moves. Further, if for whatever reason, his observation of her move is inaccurate, the "truthfulness" of his knowledge of his own next move is in jeopardy as well. As the game is one of complete information, its success relies on the accurate knowledge of and ongoing annotation of all moves by both players; once that accuracy fails, the activity no longer qualifies as a chess game (though some variants such as "dark chess" do involve incomplete information). Thus, the philosophical issues underlying a "Bob" model touch on questions of intersubjectivity

and the interpretation of information in the making process, albeit in the relatively structured environment that a chess game provides.

And, finally, if we focus on Carol, the remote observer whose knowledge of the chess game in progress is gained from verbal updates ("testimony") from Bob, our attention is drawn outside the model being made by the others and brings the realization that, without observables if not observers, any model of any system is unlikely to outlast its makers. Carol's knowledge of chess notation, allowing her to follow the game in progress (and to record it) is a reminder that the longevity of both these models and systems after their initial creation is contingent upon some form of instantiation as well as participation.

The earliest origins of ancient games of strategy remain unknown, but there must have been semantic artefacts, both physical and verbal, that allowed these to be made and remade over time, resulting in the contemporary versions of chess, Go, and other strategic games; thus, Carol's documentation of this particular game may be important for chess's future. As Floridi, L. (2019) comments, "testimony as information transmission, not yet generation, and as a by-product of perception, which allows further semantic hacking, plays a final and crucial role" (p. 92). This also touches on the temporal elements of LI: although our example focuses on the game's present, a future-oriented model of such a system must permit recursive learning from each game played, and data and documentation of some kind are essential to prevent memory failure or loss within the system. Carol's role in documenting testimony about the game may be considered that of "a semantic hacker" when the model is extended over space and time.

Leaves

This aspect of Floridi's illustration leaves us well within in the purview of LIS. While the discussion of chess is surprisingly uncommon in LIS discourse, perhaps the more perplexing because chess is a domain of expertise that possesses its own archival traditions and arguably more literature than all other games combined (Lipking, 2003), it is clear that if, as LI asserts, our knowledge is by design, such a system for a chess player would also include all recorded chess data and documents, whether or not any individual player draws on these. Further, the example of chess as "made" by its players easily translates into other semantic information-rich systems, such as ballet and law, with their own forms of notation and citation.

These various forms of testimony form, in Floridi, L.'s (2019) words:

> […] a mechanism through which agents learn and share a language as well as information and hence can constitute a multiagent system ([or] a community of speakers) […] For testimony is what enables the development of language as the main cognitive tool to hack natural meanings, thus allowing the Lamarckian evolution of hacked data through generations. (p. 92)

This "testimony" is the "semantic artefact" that epistemic agents both employ and deploy in the making of their informational projects over time. The difference between LI's view of "testimony" and that of the traditional view of "user's knowledge" is that the "agent qualifies as an epistemic agent not when she is a passive user of some information, but when she is a critical producer of it. Her epistemic expertise increases in relation to the scope and depth of the questions that she is able to ask and answer on a particular topic" (Floridi, L., 2019, p. 27). Where Alice a ballerina or a lawyer as well as a chess player, her critical contributions to these systems might well be through her interpretation of a ballet role or through her argument in a legal case. Clearly epistemic agents may participate in multiple systems over time.

Moreover, as "the maker's knowledge is knowledge of the ontology of the semantic artefact" (Floridi, L., 2019, p. 27), it also applies to LIS itself, since semantic artefacts of all kinds are the building blocks of the bibliographic universe, the archival multiverse, various

intertextual and paratextual spaces, and all other creative sectors of the infosphere. As Floridi (2004) has previously noted, "LIS deals with contents understood as meaningful data [and] connected with the activity of stewardship of a semantic environment" (p. 662). Here again, this active "stewardship" of the semantic environment entails our realization that we are "making" it as well.

But the development of "maker's knowledge" has been rarely discussed within LIS, with its focus on organizing and disseminating collected knowledge, rather than on creating knowledge or reflecting upon it or upon the processes used in creating it, famously first noted by Butler (1933) and later brilliantly expressed through Wilson's work on "second-hand knowledge" (1993). Floridi's (2004) view is that LIS's proper concern is not knowledge itself, but the information sources that make it possible, even if only indirectly (p. 41). Nevertheless, since these information sources themselves are semantic artifacts, knowledge of their ontology should be a prerequisite for the ongoing process of modelling LIS's systems as well. Many current LIS practices, particularly those involving discovery tools, are similar to those he described as the provision of existing information for various new purposes through the design of "[an interface] supported by […] quantitative metrics, which can (let users) associate values to dimensions depending on the categories in question, by relying on solutions previously identified: metadata, tagging, crowd sourcing, peer-review, expert interventions, reputation networks, automatic refinement, and so forth" (Floridi, L., 2019, p. 112).

It is also true that the relationship between LIS and its technologies (and technology in general) is complicated. There is no generally accepted "philosophy of technology" within LIS and surprisingly little technological innovation outside the largest academic and metropolitan libraries. Although variants of "systems thinking" (Churchman, 1972), "computational thinking" (Kules, 2016) and "design thinking" (Clarke, 2018) have been introduced into LIS education as preferred, pragmatic approaches to technology, there has been little connection made to central LIS concerns beyond considerations of the specific projects involved. Even as data science and digital humanities turn to the construction and deconstruction of texts and tools in libraries, many traditional library sources and services are being eliminated or replaced by various externally developed technologies.

Indeed, the term "making" in LIS has been associated primarily with the introduction of 3D printers and other technologies for patron use (Barniskis, 2016). More broadly, since its evolution from an earlier exclusive focus on the library collection and its values, the professional ethos of LIS has focused on users, user needs, and, importantly, the epistemic value of "user's knowledge" to such an extent that any relevance of "maker's knowledge" to LIS itself is almost unknown.

It may be time to consider remaking the professional ethos of LIS. While LIS continues to face the external challenges posed by the prevalence of agnatology (Greyson, 2019), anti-epistemology (Tiffert, 2019) and apathy (Buschman, 2019), there have been recent internal challenges as well, especially to the primacy of LIS's espoused professional values of accessibility, diversity, efficiency, and neutrality in information organization, collection, description and dissemination processes. Critics maintain that these values may be not only unattainable but undesirable, and that more activist, inclusive, thoughtful and transparent approaches are necessary for LIS's future (e.g. Mai, 2019; Punzalan and Caswell, 2016; Roy, 2015).

Floridi (2004, p. 659) has suggested that a PI approach to the foundations of LIS may be expected to work on the ontology of its (i.e. LIS's) "objects", on a substantial theory of information dynamics, and on an ethical approach to the domain of information. LI's maker's knowledge combined with PI's information ethics may provide a sustaining vision for remaking our understanding of LIS agency in how "knowledge becomes a collaborative enterprise of growth and refinements in a multi-agent system (humanity) across generations" (Floridi, L., 2019, p. 36) through the stewardship of semantic content.

As the infosphere expands, and as the role of LIS accordingly expands in focus from local to global, from managing collections of information objects for users to caring for and creating connections among information objects as well as for their users, a reontologization of LIS thinking could fundamentally transform the nature of the field. As shown in other contributions to this symposium and elsewhere, potential perspectives on this future already exist, as some of LIS's own "makers" are becoming more fully aware of their expertise as epistemic agents in creating specific interfaces as well as becoming more active in their participation within the very systems they create. A "maker's knowledge" approach that might help in designing (or at least to help in asking) the right questions about this rather than searching through "user's knowledge" for the right answers may well serve to "reboot" LIS philosophically as well.

Replies (Luciano Floridi)

Writing a book is a pleasure, publishing it is a relief, being read is a privilege. I am more grateful than I can express here to Tim Gorichanaz and David Bawden, the designers (if I may say so) and curators of this project, and all the colleagues who spent time and mental energy to study and comment on *The Logic of Information: A Theory of Philosophy as Conceptual Design* (Floridi, L., 2019, henceforth LI). I know LI is not an easy book, and I can only hope their investment was worthwhile. I am not being nice, and this is not a *captatio benevolentiae*. Their feedback is insightful and constructive, without any exception. I learnt a lot from this symposium, as I hope to show below. Maybe because we are among information experts and understand its dynamics, all the comments show an unusual finesse and delicacy in capturing important nuances and subtle implications in LI. The authors "play gently with ideas" (a quote from Oscar Wilde I used more than once to describe the art of philosophising). I find this reassuring and energizing. Because this book symposium shows that it is perfectly possible to dialogue, discuss, agree, and disagree in urbane and civilized ways, making progress in sharing, refining and improving one's own views. It is a reminder that real communication is never semantic vandalism, no matter what we read on Facebook and Twitter. If only our politicians could have similar symposia on matters that are less complicated than the ones we discuss here, and yet influence the lives of millions of people.

I very much welcomed the invitation to share some brief comments about the comments. It may seem an endless process, but dialogues should never stop, just end for lack of time. So, allow me to prolong this a bit longer, for it is too enjoyable. For the sake of brevity and clarity, I shall discuss each author's comments by referring to one quotation.

To Jonathan Furner

> A constructionist approach to knowledge is common in disciplines like architecture, computer science, economics, engineering, and jurisprudence (p. 205—library and information science, LIS, might also have been mentioned, but isn't), which "tend not only to study but also to build" their subjects. (p. 51)

This is correct. I do not know how I missed mentioning LIS among the "poietic" sciences. Furner is right and, easy to say this now that he mentioned it, obviously so. He is also right in identifying Peirce and a pragmatist approach as one of the foundational, underlining influences of my whole philosophy, LI included. Did he know that I wrote my PhD on Peirce? If not, his intuition is even more striking. Among the great masters, Plato, Descartes, Kant, Peirce and Wittgenstein are those who have exercised the most lasting influence on how I think philosophically. I tried to learn from them how to play, so to speak (see my comment about chess below, in response to Betsy Van der Veer Martens). And Furner is also right (I am really sorry to admit this) that I should have referred to, and engaged with, relevance

criteria in the context of information retrieval system evaluation stretching back to the Cranfield tests in the 1960s. By way of apology, I may mention the fact that sometimes, while rushing to reach a place, one fails to notice who else went there, and what good advice they may have. But urgency is not justification for lack of scholarship.

To Lai Ma

> A main argument of this book is that humans are natural-born data hackers as a way to rethink philosophical questions in what Floridi calls "the fourth revolution". This argument positions epistemic agents in relation to the "system". […] Like Bateson's conception of the Mind, as well as most models concerning data, information, and knowledge in information science and knowledge management, there seems to be a gap in philosophizing information that is emotive and affective. While the logic of information is important for clarifying the conditions for constructionism, in the sense of the maker's knowledge tradition in this volume, much information we encounter every day is charged with emotions.

The gap is there, undeniably. It is also significant, and unjustified. What I can say is that I hope someone will fill it properly. I find some philosophising about emotions and feelings sloppy or cheesy, and that is an inclusive "or". It is sometimes a philosophy that seeks to aggrandize itself by talking about things we care so much: love, death, friendship, happiness and sadness, joy or fear, regret and guilt, envy, revenge, etc. Some philosophers seem to forget that the importance of a topic does not automatically translate into the quality of its treatment. The opposite is probably true. And some philosophers (often the same) seem to think that the problem, in treating such delicate topics, is what Juliet's father calls "chop-logic" and that a better, sharper scalpel is all that is needed, when in fact it is not a matter of cutting at all, but of gentle handling of fragile and immensely significant aspects of our affective life. I am fond of describing ourselves as a beautiful glitch in the universe. We are also a delicate one, more like a crystal than a diamond. I grew up as an analytic philosopher and a logic chopper. But I still remember some of my favourite authors when I was young: Nietzsche, Kierkegaard, Jaspers and so on, I know about the coarseness of my tools and the inadequacy of my philosophy. In this, studying Sextus Empiricus has helped a lot. Intellectual humbleness is underestimated in philosophy (I know by experience). So, almost in a Wittgensteinian sense, the things about which I am more afraid to philosophise are some of the things I find more important: our emotional and spiritual life, religion included. I hope to mature enough one day to dare more, and tackle these issues. Time is running out. But my current silence is mostly a matter of respectful awareness of my conceptual inadequacy.

To David Bawden and Lyn Robinson

> Floridi reminds us, in a footnote on page 95, of the influence of Popper's idea of World 3 of objective knowledge in the development of PI. Popper's ideas were, nearly 40 years ago, famously declared by Bertie Brookes (1980) to be the foundation of information science. This idea has rather fallen by the wayside, though it has been revived from time to time (see, for instance, Bawden, 2002; Gnoli, 2018). It is interesting, and rather pleasing, to think that it may now, in the much more fully developed form of PI, be restored to its place. It is also worth noting the emphasis on design throughout the book, with the note that many academic disciplines, from engineering to jurisprudence, do not merely study the systems of interest to them, but build and modify them (Floridi, L., 2019, p. 205). The same must surely be true of LIS.

What a subtle point to highlight, so well-chosen and so important. Popper, with whom I had a brief correspondence about my PhD thesis when I was a graduate (he disagreed about my criticism of his solution of Fries' trilemma, of course I still think I was right), did play a significant role in my development of the PI, which I initially conceived, in Popperian terms,

as an epistemology without the knowing subject (to quote one of Popper's essay). The fact that LIS may have some common Popperian roots is reassuring in terms of coherent convergence. It shows to me that, as in chess (more on this later), there are many conceptual moves one can make, but only some are good and even fewer are excellent and successful. In philosophy too, if one thinks well and long enough, similar solutions are identified for similar problems, even if the sequence of the moves may not be identical. Design deals with open problems, but when constrains and requirements start piling up, the room for good solutions starts shrinking. A quick visit to Oxford's anthropological museum, the Pitt River, shows that anywhere in the world humans have developed similar solutions to similar problems often independently: stools, chairs, tables, candles, blades, arches and arrows, drilling tools, etc., in the long run, the logic of design is a safe guide, if one follows it carefully.

To Dominic Dixon

> This suggests that Floridi sees no issue with conceiving of LIS as both a science and applied philosophy. […] It is my contention that it would be better to conceive of LIS and PI as engaged in what Floridi refers to in the conclusion of Chapter 1 as a 'two-way trade between open and closed questions. (p. 23).

I agree with Dixon. Sometimes distinctions, as the one between open and closed problems, are meant to help one understand complex cases in which the distinguished components are mixed. We should not confuse the stage at which we speak about the ingredients, before the cooking, with the stage at which we speak of the dish, after the cooking. Likewise, disciplines and sciences of all kind, LIS included, rely on a mix of open and closed questions. This is not a dualist tension, but a gradual spectrum of options. If they deal more and more with open questions, then they become increasingly philosophical. This is where their foundations lie. If they deal with increasingly empirico-mathematical questions, then they can become more and more scientific, formal, applied, experimental, practical and so forth, but not philosophical. So, the trade-off is there. The important thing is to understand what the trade-off is between, how it is reached, and what follows from it. This is what I tried to do in LI.

To Ken Herold

> If knowledge is design and philosophy is conceptual design, then the conceptual logic of semantic information in Floridi's realist constructionist view moves away from representing to interpreting in the interplay of the epistemological and the normative.

I choose this quote by Herold because it seems to me to provide an elegant synthesis of a fundamental idea in LI. As I have repeatedly stressed in many occasions, design is a crucial, epistemological process, hugely undertheorised, and which we need to understand much better, not only for its own sake, but also to make the most of it. It combines epistemic, logical, normative and practical aspects. It is a major form of innovation, and in our time probably the main one, when compared to the other two, discovery and invention. We design laws, institutions, environments, the products and services we use or consume. We increasingly design biochemical entities and new materials. Digital technologies make all this very easy. Our age really is the age of design, it should be the age of good design.

To Tim Gorichanaz

> I'd also like to shine a light on the issue of noetic resources (Floridi, L., 2019, pp. 18–19). These are one's beliefs, memories, culture, practices, etc., and these are required for solving design problems, whereas non-design problems may be satisfied simply with empirical and/or logical

resources. In the global information economy, all of us are designers. Indeed, as Floridi writes, being human simply is designing. If LIS is to fully serve humanity today, then, we must learn to serve designers. This is not just about provisioning facts, but also catalyzing noetic resources—ingredients for imagination. We should work to better understand how documents can contribute to one's noetic resources.

Gorichanaz makes many important comments about design, and about the logic of design as "conduction" (which is not deduction, induction or abduction), using the terminology introduced in LI. I hope to come back to them in the future. Here, I wish to highlight what he writes about noetic resources. I published LI before developing another piece of research[3] on something I have called "semantic capital" (for an initial account see Floridi, 2018a). It is a topic I am still investigating, but if I could edit LI (perhaps in a new edition) I would use this concept instead of "noetic resources". I understand "semantic capital" not in economic terms (so nothing to do with Bourdieu and the various social, cultural, human, etc., capitals that are economically transformable), but as any content (i.e. well-formed and meaningful data) that can enhance someone's power to semanticise something, that is, give meaning to different elements and make sense of them overall (Floridi, 2018a) (note the absence of any reference to truth; astrology can be as much part of Alice's semantic capital as astrophysics). Only recently, while studying to write these replies, I understood something obvious (again, the glasses were on the nose): that the power to semanticise translates into the twofold ability (mind, not two abilities) to interpret and design realities. It is Alice's semantic capital that enables her to see a broom as a horse as well as to prepare a special corner in her room where the broom-horse can rest when tired. Like any good idea one has not had before, the welding of these two lines of research – design and semantic capital – seems evident now, but it had not occurred to me before this symposium and the feedback offered by Gorichanaz. Philosophy as conceptual design and LIS (to name the two main disciplines we are discussing here, but they are not the only ones) in the end depend on, but also curate, enrich and foster our semantic capital.

To Sille Obelitz Søe

[…] it is legitimate to accept and defend the idea of philosophy of information as an interdisciplinary and autonomous field without accepting "[t]he ideological aspect of Floridi's proposal [which] is an ontological one: a replacement of a human-centric and conscious mind-centric world-view with an information-centric view, in which 'information' acquires the central role" (Adams and de Moraes, 2016, p. 161). Instead of an all-encompassing world-view developed to describe and deal with the universe (and everything in it) in informational terms, philosophy of information is, in my understanding, an interdisciplinary field comprised of various contributing disciplines—e.g. computer science, cognitive science, artificial intelligence, (analytic) philosophy, and information studies (Søe, 2016). […] This is not to say that Floridi's project is not philosophy of information, it is just a different interpretation of what constitutes the field. The two interpretations need not be mutually exclusive.

I fully agree with this quotation. I have often drawn a distinction between the PI as a discipline, and my own way of developing it. When one seeks to establish a new field, as I have been trying to do for some time with the PI, one must inevitably double-task by creating the game, so to speak and then playing it as well as one can. Other people may like the game a lot, and yet totally disagree on the style, tactics and strategies of the person who designed it in the first place. The example I have in mind (indeed the ideal inspiration, since my early days as an undergraduate student in Rome) is Saussure. When Saussure worked on what came to be known as Linguistics, essentially the discipline did not exist as such. Thanks to his foundational investigations, later researchers were able to call themselves linguists, establish a whole scholarly tradition, and of course disagree on whether

Linguistics should be Saussurean at all. This may seem arrogant on my side, but it is about wishes, not presumptions. My great hope is that, in a distant future, people may still remember my work for having established a new branch of philosophy. My greatest ambition is that they may like the way I develop it. I am not underplaying disagreements. I think that, for example, any philosophical analysis that fails to acknowledge the importance of a clear grasp of the level of abstraction at which any investigation is being developed risks to be messy. I am convinced that denying that semantic information, the real thing, must be the truthful kind, is a confusion, most likely due to a lack of a proper use of the level of abstraction required to be clear and precise. But this is my way of playing the "philosophy of information" game, and I fully agree that nobody needs to agree with it to like the game itself, and play it differently. This is not relativism, because it is a matter of confronting an increasing number of philosophical problems and see how well different conceptual strategies perform in the long run.

To Betsy Van der Veer Martens

Chess, however briefly mentioned in LI, is seldom a casual choice for Floridi, as he has often employed it in his writing, for instance in his description of a chess pawn as an informational object (2013, p. 105) in his description of the chess board itself as a level of abstraction (2011, p. 51), and, importantly, in his description of Alan Turing's invention of the first chess program as the beginning of artificial intelligence (1999, p. 132). Floridi's illustration, involving Alice, Bob, and Carol as two players and a third observer is obviously worth some further exploration to better understand how this classic model of strategic action, formed over centuries from a multicultural fusion of military, political, and social influences, might provide insights into various informational concerns.

It may seem a bit unfair to select this quotation by Van der Veer Martens because her text contains a wealth of insights and suggestions that may seem worthier of comment. However, the note struck me for being paradigmatically perceptive. I have a small, magnetic, chess board in my office in Oxford, permanently set up, next to the window. It is a present from my father, who is a Chess Master. He loves philosophy, for which he has the highest admiration, but he often jokes that I could have used my time more fruitfully to become a professional chess player. I am not sure at all. But Van der Veer Martens is absolutely right that chess books (and theology and philosophy books) have been the ones I grew up with as a child. Recently, I helped my father edit a sort of *memoire* of his best tips and teachings about chess openings and the strategic use of computer programs (Floridi, F., 2019). So, yes, the choice of chess examples is never casual. At home, we often describe and interpret aspects of life in chess terms, which is really the native, hermeneutical language I learnt as soon as I could use my hand to move a piece on a board. Life has an opening, a middle game and an endgame. All moves have consequences, the earlier ones more than the later ones. Some can be undone (one can divorce) and others can be rectified (apologies are for this) but most are permanent, including the moves one never made and it is too late to make the opportunity costs. Sometimes there are great opportunities, some other times moves are forced. Long chains of inferential thinking are paramount, in anything one does. Drawing, when playing with the black, is a success, like doing your best in adverse circumstances. There is a first-mover advantage. Short-term, tactical choices – the typical donut today – are hardly ever preferable to long-term, well-studied strategies – the two donuts tomorrow – if one can think hard, put the right pieces in the right places, and be patient. There is courage in attack, ingenuity in defence and elegance in knowing when to abandon. Some players are timid. Some classic openings are audacious. Some combinations are so brilliant to be classic masterpieces. A good move today can repay much later, like a bishop well positioned many moves ahead. There is no execution without good preparation.

I could keep going. Van der Veer Martens is correct, my philosophy is future oriented and analytical, like a chess game. In chess, one enjoys perfect information, impeccable logic and zero memory, but I also have a passion for history. This is due not to playing the game itself, there is no relevant past in a chess game, but to studying it. Millions of people have played before, for centuries great minds have won and lost amazing games of extraordinary beauty. Learning to play chess is a matter of a few minutes, the rules are quite simple. But being good at it is a matter of study and commitment, of maturity and practice, of knowing what others have learnt before, very much like philosophy itself.

Notes

1. One exception is Floridi's (2002a) paper in the journal *Social Epistemology* in which he acknowledges a relation between philosophy and information studies – or library and information science – and thus suggests that work with relevance to philosophy of information is carried out within information studies.

2. I am aware that Grice (1989/1991) in strand six of his Retrospective Epilogue states, "False information is not an inferior kind of information; it just is not information" (p. 371). However, as Grice does not engage further with the notion of information (e.g. how to define it), I do not consider the statement enough to counter the idea of a concept of information based on nonnatural meaning.

3. The opportunity to work on the nature and scope of semantic capital was offered by the kind invitation to give the inaugural keynote of a new series of "Digital Lectures", organized by The National Archives in the UK in 2018.

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Corresponding author
Tim Gorichanaz can be contacted at: gorichanaz@drexel.edu