Philosophy and information studies

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Introduction

There are several scholarly activities and practices that coalesce at the intersection of, on the one hand, the interdisciplinary field that is sometimes known as information studies, and on the other, the discipline of philosophy. The aim of this chapter is to distinguish among some of these practices, to identify and review some of the most interesting products of those practices, and to point to ways of assessing the significance of those products—for information studies, for philosophy, and for our general understanding of the world.

In the first section following this introduction, an attempt is made to characterize, in a few paragraphs, the subject matter, methods, and goals of philosophy. Suffice to say, any such attempt runs the risk of gross oversimplification as well as of inappropriate prioritization. That such an attempt be made is nevertheless a necessary adjunct to the short statement of scope that concludes this introduction. In succeeding sections, a distinction is drawn between philosophical questions asked *about* information studies and philosophical questions asked *in* information studies (cf. Floridi, 2002c, pp. 136-137), and the goals and subject matter of *philosophy of information studies* and *philosophy of information* are respectively described. This distinction is made in the spirit of conceptual clarity, rather than to reflect a division that is rigorously respected in actual scholarly practice: people interested in philosophy (or, indeed, in information studies) are likely to be interested in questions of both of these kinds. A concluding section poses questions about the reciprocal impact of each field.

Notwithstanding the publication in recent *ARIST* volumes of reviews of specific areas of philosophical interest (see, e.g., M. M. Smith, 1997, on information ethics; Cornelius, 2002, and Capurro & Hjørland, 2003, on conceptions of information; Blair, 2003, on information retrieval and the philosophy of language; Day, 2005, on poststructuralism and information studies; and Fallis, 2006, on social epistemology and information science), the present chapter is the first general review of its kind to appear in these pages. Consequently, its scope is not deliberately limited to a review of the work done in any particular time period; but an emphasis is nevertheless placed on contributions to the literature of the twenty-first century. No attempt has been made to be comprehensive in coverage: the bibliography is rather a selective one that represents the author's personal judgments as to which are some of the more interesting, illuminating, or insightful contributions. The bias is towards work that is informed by what is often characterized as the "analytic" tradition in western philosophy—with the caveat that it has become increasingly difficult, and (some would say) in any case misguided and unhelpful, to distinguish between "analytic" and "continental" philosophy as currently practiced (cf. Moran, 2008b, pp. 13-16). Otherwise, some additional care has been taken to avoid covering too much of the same ground as the recent *ARIST* chapters by David Blair and Don Fallis. A shorter, earlier version of some of this chapter's material appears as the entry on "Philosophy and the information sciences" in the *Encyclopedia of library and information sciences* (Furner, in press).

Philosophy

The question "What is philosophy?" is a meta-question about philosophy that arises in philosophy of philosophy (a.k.a. *metaphilosophy*; see, e.g., Williamson, 2007). Answers of many different kinds have been proposed since the original identification of philosophy as a discrete field in the ancient era. These proposals may be categorized on the basis of the kinds of criteria on which each proposal distinguishes philosophy from other fields. For example, one proposal might be to distinguish philosophy from other fields by pointing to differences between the kinds of *phenomena* that form the subject matter of philosophy and those of other fields; another might point to differences in the kinds of *questions* that are asked in philosophy and in the other fields; another might point to differences in the kinds of *methods* that are used to answer the questions that arise in philosophy and in the other fields; while yet another might point to differences in the kinds of *goals* or purposes that motivate people to engage in philosophy and in the other fields.

Different kinds of proposals have attracted varying levels of consensus at different times and in different places. It is important, yet difficult, to avoid misleading overgeneralization when characterizing the state of philosophy, even when the scope of the exercise is deliberately restricted to whatever is called "philosophy" by those who claim to practice it in a particular culture, such as the academy in the "western" world of the early twenty-first century. A simple caricature of the nature of philosophy at this point in its history might emphasize its concern with the most basic, fundamental, or foundational of phenomena (such as action, beauty, belief, being, causation, consciousness, evidence, existence, experience, goodness, identity, intentionality, justice, knowledge, meaning, necessity, rationality, reality, representation, responsibility, rightness, thought, time, truth, value, and virtue); its concern to ask the most basic of questions (such as "What is *x*?," "How do we know that *p*?," and "Why ought we do *a*?"); its promotion of, and reliance upon, the most basic of methods in answering such questions (such as analysis of the very concepts that are used in expressing the questions, analysis of the logical form of arguments, and analysis of the mental processes by which we interpret our worlds); and its pursuit of the most basic of goals (such as truth, happiness, justice, peace, authenticity, consistency, power, and an understanding of the meaning of life).

Such a caricature would fail to represent several significant respects in which metaphilosophy inspires ongoing debate: (i) the ways in which contemporary "western" philosophy is similar to and different from philosophy as practiced in "other" contemporary cultures, and from philosophy as practiced in earlier eras; (ii) the ways in which philosophy as traditionally practiced may be infected with systemic biases deriving from its domination by old, white, middle-class, heterosexual males; (iii) the ways in which twentieth-century "analytic" philosophy (also known, somewhat misleadingly, as Anglo-American philosophy) is similar to and different from twentieth-century "continental" philosophy (also known, again somewhat misleadingly, as European philosophy); (iv) the ways in which several historically-specific "turns" or transdisciplinary shifts in emphasis (such as "the cognitive turn," "the linguistic turn," "the pragmatic turn," "the cultural turn," "the naturalistic turn," and even—cf. Adams, 2003—"the informational turn") have affected different groups' understanding of the nature of inquiry in general and the proper purpose of philosophy in particular; (v) the extent to which philosophy is conceived as having a normative or prescriptive rather than merely descriptive purpose, on account of which conclusions are drawn about how the world *ought* to be, as well as or instead of about how the world *is*; (vi) the extent to which philosophy is conceived as having an "applied" as well as a "pure" function, in which real-world decision-making is informed by insights

derived from philosophical analysis; (vii) the ways in which different communities of philosophical practice emphasize different criteria for evaluating the results of philosophical analysis: e.g., truth, correspondence with external reality, internal coherence, power, utility for producing testable theory, utility for controlling future events, richness of coverage, simplicity, elegance; (viii) the ways in which the methods and goals of philosophy are similar to and different from those of the empirical or natural sciences, and the ways in which, historically, the pendulum of dominant opinion has swung between *rationalism* (very roughly, the view that a priori knowledge is possible) and *empiricism* (which denies the possibility of any kind of justification for knowledge other than experience); and (ix) the ways in which philosophy may be divided into discrete branches or subfields.

At the most general level, it has become conventional to distinguish between, on the one hand, a small number of long-standing subfields such as *metaphysics* (which focuses on questions to do with being and existence), *epistemology* (knowledge and belief), *ethics* (goodness), *aesthetics* (beauty), *phenomenology* (experience), and *philosophical logic* (truth), and on the other, a much larger number of subfields with (in most cases) shorter histories, whose names typically take the form "philosophy of *x*." There are branches of philosophy that are concerned with the fundamental ways in which human beings relate to their selves, to one another, and to their environments: *philosophy of mind*, *philosophy of language*, *philosophy of action*. And there are branches of philosophy that are concerned with particular intellectual, creative, spiritual, social, and physical pursuits: *philosophy of education*, *philosophy of art*, *philosophy of technology*, *philosophy of religion*, *political philosophy*, *philosophy of sport*. There are branches of philosophy that are concerned with particular disciplines, fields, professions, and practices: *philosophy of science* (including philosophy of physics, of mathematics, of psychology, of the social sciences, of information studies, etc.), *philosophy of history*, *philosophy of law*. And there are branches of philosophy concerned with particular phenomena: *philosophy of time*, *philosophy of race*, *philosophy of information*. Of course, the boundaries of these branches of philosophy are themselves social constructs that are historically and culturally specific (see, e.g., R. Collins, 1998). Such boundaries are entirely arbitrary and far from definite. Insights derived from work that is characterized as contributing to any one branch are regularly applied in (or, just as regularly, contradicted by) work done in another.

In philosophy, the standard encyclopedic sources are the ten-volume *Routledge encyclopedia of philosophy* (Craig, 1998), and the continuously updated, online *Stanford encyclopedia of philosophy* (Zalta, 1997–). The standard bibliographic database is *The philosopher's index* (Philosopher's, 1967–). Leading publishers include Blackwell, Cambridge University Press, Oxford University Press, Routledge, and Springer. Useful series of collections of introductory essays to various branches of philosophy include the Blackwell Philosophy Guides, the Oxford Handbooks in Philosophy, and the Routledge Philosophy Companions. A recent volume in the third of these series, *The Routledge companion to twentieth century philosophy* (Moran, 2008a), is particularly useful for those wishing to get rapidly oriented to a wide range of branches of the field. *The Blackwell guide to the philosophy of computing and information* (Floridi, 2003a) is the standard introduction to philosophy of computing; Luciano Floridi's earlier monograph, *Philosophy and computing* (Floridi, 1999b) covers similar ground. *The handbook of information and computer ethics* (Himma & Tavani, 2008) is a comprehensive introduction to information ethics. There is no single text that provides a comprehensive overview of philosophical concerns in information studies, but monographs by Blair (2006), Budd (2001), Cornelius (1996), Day (2001), Dick (2002), Frohmann (2004), Hjørland (1997),

Svenonius (2000), and Wilson (1968) serve as philosophically sophisticated introductions to their respective areas, as do the *ARIST* chapters by Blair (2003), Capurro and Hjørland (2003), Cornelius (2002), Day (2005), and Fallis (2006) mentioned earlier. *The epistemological lifeboat* (Hjørland & Nicolaisen, 2005–) is a valuable web-based resource. Special issues of information-studies journals devoted to philosophical themes include ones guest-edited by Ken Herold on "The philosophy of information" (*Library Trends*, *52* (3), 2004) and by Birger Hjørland on "Library and information science and the philosophy of science" (*Journal of Documentation*, *61* (1), 2005). Another important source is the special issue on "Social epistemology and information science" of *Social Epistemology*, *16* (1), 2002, guest-edited by Don Fallis.

The leading general journals in philosophy include *Analysis*, *Journal of Philosophy*, *Mind*, *Noûs*, *Philosophical Quarterly*, *Philosophical Review*, and *Philosophical Studies*. Other highly-ranked philosophy journals that have published information-related papers include *Erkenntnis*, *Metaphilosophy*, *Minds and Machines*, and *Synthese*. There is no journal that is devoted exclusively to philosophy and information, but several titles cover areas of specialist interest: *Episteme* and *Social Epistemology* in epistemology; *Applied Ontology* and *Axiomathes* in ontology; *Ethics and Information Technology*, *International Review of Information Ethics*, *Journal of Information, Communication and Ethics in Society* and *Journal of Information Ethics* in ethics; etc. Journals in information studies that carry philosophically informed articles on more than a very occasional basis include *Archival Science*, *Archivaria*, *Journal of the American Society for Information Science and Technology*, *Journal of Documentation*, *Library Quarterly*, and *Library Trends*. The Special Interest Group on the History and Foundations of Information Science (SIG/HFIS) of the American Society for Information Science and Technology (ASIS&T) regularly sponsors sessions of philosophical interest at annual meetings of ASIS&T, and the CoLIS (Conceptions of Library and Information Science) conference series is similarly receptive to philosophically themed papers.

Philosophy of information studies

We may distinguish questions that are raised *by* or *in* a discipline, field of inquiry, or group of fields—for example, philosophical questions raised in information studies—from questions that are *about* that field or group of fields—for example, philosophical questions raised about information studies (cf. Floridi, 2002c, pp. 136-137). Questions of the second kind might include questions about the subject matter of the field, its scope, its purposes and/or goals, its methods, its relationships to other fields and to other activities, and its usefulness, worth, or value. These are meta-questions about the field *as a field*: i.e., questions that are raised by studies *of* the field, rather than by studies *in* the field.

Sometimes it is considered that it is worth keeping the second-order questions that relate to a given field separate from their first-order cousins, and treating the second-order questions collectively as a discrete "meta-field." Sometimes such meta-questions are identified as being philosophical questions simply in virtue of their second-order status, and the aggregate of such questions is what is construed as the philosophy of field *x*—even though it might be unclear as to what is strictly *philosophical* about any given meta-question. More commonly, however, the history, sociology, and politics of any given field *x* are identified as meta-fields that are distinguishable from the philosophy of field *x*. Meta-questions about the who, what, where, when, and why of information studies are the kinds of questions that are asked by sociologists, historians, and political theorists: What is the subject matter of information studies as it has been

practiced at different points in history, and in different social contexts? What are the characteristics of the social groups whose members work on information studies? What motivations have people had for devoting time and other resources to the study of information and related phenomena? Why ought people to be interested in information?

Philosophy of information studies may then be distinguished from the history, sociology, and politics of information studies as the meta-field in which distinctively *philosophical* questions are posed (and philosophical answers attempted) *about* information studies *as a field*. We might ask, for example, What is the nature of information studies? What kinds of metatheoretical assumptions serve to orient and ground research in information studies (see, e.g., Hjørland, 1998; Bates, 2005a)? What kinds of methods are used in the pursuit of knowledge in information studies? In what essential respects does information studies differ from other areas of inquiry? The goals of philosophy of information studies may be stated as follows: (i) to locate and illuminate the position of information studies as an interdisciplinary field in the universe of inquiry: i.e., to understand its role in interpreting and changing the world, its internal structure, and its relationships with other fields; (ii) to provide justifications for any decision to engage in research in information studies; and (iii) to provide orientations towards and directions for scholarly practice in information studies by identifying the kinds of problems that are most significant, the kinds of questions that are most relevant, the kinds of research methods that are most reliable, and the kinds of answers that are most acceptable.

The nature of information studies

On this basis, it might be argued that the making of any attempt to define a field—perhaps by specifying the necessary and sufficient conditions which must be satisfied before identifying any given work as a contribution to that field—would itself be to engage in philosophy. Maybe if we briefly indulge in an attempt to define information studies, it will become partially clear, through example, what philosophy of information studies is.

The goals of people engaged in any field of inquiry typically include not just fame, fortune, and happiness, but also the production of knowledge about (or, perhaps, the shedding of light on, or the making sense of) a particular part or aspect of the world, through the construction of theories and explanations and the interpretation of meanings and understandings, and the application of that knowledge in a way that changes the world for the better in some respect. What is the particular part or aspect of the world with which information studies, especially, is concerned? What is its subject matter? What is it *about*?

The simplest answer, of course, would be that information studies is about information. Perhaps this answer could be extended relatively uncontroversially to include, as the subject matter of information studies, certain phenomena that are thought to be closely related to information, and the ways in which people interact with information and with information-related phenomena. Even taking this short step, however, would likely dismay some who would prefer to treat an emphasis on people's interactions with information as merely one example of a range of approaches that may possibly be taken to the study of information, each of which is associated with a number of presuppositions about the nature of information and its role in the world. In any case, such a barely extended answer would require augmentation in several respects before it could provide real insight into the nature of information studies. Helpful additions would include: (i) a definition of "information"; (ii) enumeration and description of information-related phenomena, and indication of the respects in which and strengths with which

they are related; and (iii) enumeration and description of ways in which people interact with information and with information-related phenomena.

Some possible approaches to the task of defining "information" are reviewed in the section below on "Conceptions of information." Meanwhile, it should be clear that the aggregate scope of the group of fields collectively labeled "information studies" is very broad, and that any precise delineation of that scope will depend partly on the sense in which "information" is understood. Different authors, working with different conceptions of information, continue to define the scope of information studies and/or the information sciences—and the relationships between that broad category and its various overlapping subfields and related professions, such as library and information science, archival studies, social informatics, information retrieval, knowledge organization, information management, documentation, librarianship, bibliography, etc.—in very different ways (see, e.g., Bates, 1999; 2007; Case, 2007; Cronin, 2008; Hjørland, 2000; Raber, 2003; Rayward, 1983; Vakkari & Cronin 1992; Warner, 2001; and, applying a distinctive method, White & McCain, 1998).

Different kinds of phenomena may be considered to be "related" to information (howsoever information is defined) in different ways. Authors, indexers, and searchers are related to information in respect of their being agents that are involved in the creation, representation, and seeking of information resources; libraries, archives, and museums are related to information in respect of their being institutions that are involved in the preservation and provision of access to collections of information resources; aboutness (see, e.g., Wilson, 1968, pp. 69-92), relevance (see, e.g., Wilson, 1968, pp. 41-54), and work-instantiation (see, e.g., Wilson, 1968, pp. 6-19) are related to information in respect of their being relations that structure networks of information resources; and so on. Lists of information-related phenomena are necessarily endless, and of limited utility: what is potentially more interesting from a philosophical perspective is the structure of fundamental categories of phenomena (e.g., objects, properties, relations, agents) developed by the listmaker. Similarly, no list of the kinds of things that we might imagine people wanting to do to, with, or through information could be exhaustive, no matter what definition of information is accepted. But taxonomists of information-related actions or events commonly adopt a framework that is loosely based on the notion of an information life-cycle, whereby information resources or *documents* (if not the meanings attributed to those resources) are assumed to have a concrete existence in space-time, and to be subject to change and to processes of cause and effect (cf. Buckland, 1991; 1996). Within such a framework, distinctions are often made between the following categories of actions or events: production, creation, and generation; reproduction; preservation and storage; representation, description, cataloging, registration, and documentation; organization, arrangement, and classification; transfer, communication, retrieval, and provision of access; search, discovery, and seeking; evaluation and appraisal; use and application; and destruction.

There thus appears to be a reasonably stable consensus about the identity of those areas of concern that collectively form the central core of the field of information studies, in contrast to other areas that are typically recognized as more peripheral. One formulation of the goals of projects associated with this core might run as follows: (i) understanding the nature of information, of information-related phenomena, and of human–information interaction; (ii) understanding the identities, purposes, motivations, intentions, needs, desires, and actions of people engaged in interaction with information; (iii) designing and building systems, services, and structures that help people to meet their goals when interacting with information; and (iv)

developing and administering policies and institutions that enable and/or constrain people's interactions with information.

Within this framework, it is possible also to distinguish between a conception of information studies (or of some of its components) as itself essentially *descriptive*, devoted to the construction of theories that explain how information-related events actually do occur in the real world and why real people actually do act and think in the ways that they do, and a conception of the field as essentially prescriptive or *normative*, devoted to the specification of the ways in which things should happen and the ways in which people should act.

In pursuing projects of these kinds, scholars in information studies draw on theories and practices developed in many overlapping fields of inquiry, not least of which is philosophy and its various branches. Understandings of the nature of information and of information-related phenomena are constructed in the light of developments in metaphysics, epistemology, ethics, and logic, as well as in the humanistic fields of art theory, literary theory, semiotics, linguistics, and history. Understandings of the activities of information users build on the behavioral and cognitive models developed in the life sciences: biology, psychology, cognitive science. Information systems design is informed by work done in engineering, technology, and design fields, including computer science; while information policy development and institutional management rely on insights generated by the social sciences and related applied fields: sociology, anthropology, political science, economics, public policy, business administration, and law. Notwithstanding one's readiness to accept the particular formulation of the core of information studies presented above, the general extent to which the content of information studies overlaps with that of "other" fields (if not the particular geography of any individual case of overlap) should be clear.

Approaches to philosophy of information studies

Just as we may distinguish approaches of two general kinds—descriptive and normative—taken by information-studies scholars, we may correspondingly distinguish two general approaches to philosophy of information studies. One is more descriptive, passive, and socio-historical: the emphasis is on giving an explanatory account of what scholars of information studies actually do, and what they have actually done, to locate themselves in the academic universe, justify their decisions, and orient their practices. Another flavor of philosophy of information studies is more prescriptive, active, normative, and (it might be argued) genuinely philosophical: the assumption is that philosophy of information studies should determine what information studies *should* be about, now and in the future.

Some of the questions asked in philosophy of information studies are questions about the *metaphysics* of information studies. For example: Does information studies propose a distinctive ontology, or a distinctive view of the kinds of things that exist in the world? The short answer here appears to be "No." Different theories in information studies, constructed by scholars working in different subfields, have different ontological commitments. (An ontological commitment is any acceptance, explicit or implicit, of a proposition that a given category of things exists.) Often, however, the precise nature of a theory's ontological commitments will not be made clear at the time of the theory's presentation, even though it may well be recognized that any evaluation of the theory will depend partly on an evaluation of those commitments.

Many of the philosophical questions that are asked about information studies are questions about the *epistemology* of information studies, in that they are motivated by a concern

to understand the various kinds of knowledge that are produced, and the various processes by which knowledge is producible, by research in information studies. Even more specifically, such questions are normative, methodological questions about the ways in which research in information studies ought to be carried out—about the ways in which hypotheses should be tested, results interpreted, and theories constructed. Again, we might ask: Does information studies have a distinctive methodology, or a distinctive view of how knowledge-claims might be generated and defended? And again the answer appears to be "No."

One common way of distinguishing among fields of inquiry or communities of inquirers is to locate the fields or communities somewhere between two opposite poles according to their methodological assumptions. Thomas Kuhn (1962), for instance, distinguishes between those academic communities whose members generally find themselves in agreement about the kinds of question that they ought to be asking (and about the kinds of method that they ought to be using to arrive at answers), and those preparadigmatic communities that presently lack such consensus (but that continue to strive towards it). Tony Becher (1994, pp. 35-36) develops a two-dimensional model that distinguishes between the "hard pure" (natural sciences and mathematics), "hard applied" (science-based professions, such as engineering), "soft applied" (social professions, such as education and law), and "soft pure" (social sciences and humanities). In Becher's model and others like it, the hard–soft dimension roughly corresponds to a scientific–humanistic distinction. "Hard" fields are restricted in scope, studying a clearly-delineated range of physical phenomena with a limited range of tried-and-tested methods, with the positivist goal of establishing general, deterministic laws of cause and effect that can each be used to explain the occurrence of large numbers of discrete events. Members of "hard" communities tend to make objectivist assumptions about the nature of reality, of truth, and of knowledge: scientists typically proceed, for example, on the basis that it is possible to acquire knowledge of "the" truth about "the" real world. "Soft" fields, in contrast, are more open to the study of complex, messy, lumpy problems, using a wide range of exploratory methods to come to interpretative understandings, both of the unique constellations of factors that produce particular events, and of the meanings those events have for individuals and for groups. Members of "soft" communities typically allow that our knowledge of the world (if not the world itself) is both socially constructed, in the sense that our beliefs are shaped not only by the ways in which we interpret others' beliefs about the world, and perspectival or relative, in the sense that the "truth" (or goodness) of our beliefs may be evaluated differently depending on the evaluator's present point of view.

Several communities of inquirers who have self-identified with a focus on information and information-related phenomena have a long tradition of soul-searching when it comes to locating themselves among the four quadrants of the Becherian model. Many commentators have drawn attention, in more or less exasperated tones, to the positivist nature of much of the research in the information sciences (see, e.g., Ellis, 1984; Harris, 1986), and such observations have usually been accompanied by impassioned calls for a "softening" (in the Becherian sense) of information research. These days, we are more likely to read about information studies' hospitality to a plurality of approaches, the implication being that each of its different subfields can be comfortably located in different quadrants, or even that each of its topics or problem sets can be explored using multiple methods originating in different quadrants. Marcia Bates (2005a), for instance, distinguishes nomothetic (hard, scientific, universal) from idiographic (soft, humanistic, particular) approaches, and describes thirteen separate approaches to library and information science that can be located along the nomothetic–idiographic spectrum.

Humanistically-oriented scholars are more likely to emphasize questions about the relations between information and the following (among other phenomena): conscious experience and the human condition; interpretation and sensemaking; meaning, language, and discourse; ideology, race, class, and gender; identity and diversity; preservation and cultural heritage; remembering and forgetting; narratives and stories; and aesthetic and moral value. Several attempts have been made to develop complete epistemological frameworks for such research, based variously on phenomenology (Budd, 2005), hermeneutics (Budd, 1995; Cornelius, 1996; Hansson, 2005), critical theory (Day, 2001; 2005; Benoît, 2002), feminist and standpoint epistemology (Olson, 1997; Trosow, 2001), and discourse analysis (Radford, 2003; Frohmann, 2004; Buschman, 2007). An understanding of philosophy of representation, itself a diffuse area, would appear to be a quality shared by proponents of the emergent view that information studies is properly about the relation between people and (not technology, nor even information, but) *reality* (see, e.g., Borgmann, 1999).

Comparative evaluation of the propriety of rival approaches to information studies is a difficult task. We could choose to ignore that the issue exists, or at least to deny that it is important (other than perhaps from a socio-historical perspective), given that the bundling up of questions and methods to form more-or-less distinct fields is essentially arbitrary and varies historically and culturally according to how phenomena are perceived rather than according to how the phenomena change in themselves. A more productive approach might be to focus on establishing the *values* or criteria (truth, power, utility, etc.) upon which different approaches may be evaluated, and the methods by which an approach's "performance" against such criteria may be measured.

Floridi's PI

Luciano Floridi is currently the most prolific and most widely celebrated scholar working on problems of philosophy and information. In his contribution to a 2002 special issue of the journal *Metaphilosophy* on "Cyberphilosophy: The intersection of philosophy and computing," Floridi (2002c) provides a systematic description of the origins and characteristics of the field that he names "*philosophy of information* (PI)" (Floridi, 2002c, pp. 123-124) summarizing work that he began for a lecture series on "Epistemology and information technology" in 1996-97 (Floridi, 2002c, pp. 142, note 13). In a companion piece (Floridi, 2004b), he enumerates and categorizes eighteen "open problems" in PI (Floridi, 2004b, p. 559), in the manner of David Hilbert's review in 1900 of twenty-three open problems in mathematics. Floridi expressly characterizes PI as a branch of philosophy that "combin[es] phenomenological and metatheoretical interests" (Floridi, 2002c, p. 136), and in that sense it should be regarded as encompassing *both* philosophy of information *and* philosophy of information studies as defined above.

At first blush, Floridi's emphasis in the 2002 paper seems to be squarely on the intersection of philosophy and computing. The prehistory of PI is discussed with reference to its "earlier appearance" as philosophy of artificial intelligence (Floridi, 2002c, p. 126); and Floridi dates the emergence of PI as an "area of research" to the mid-1980s, when committees, conferences, and special issues of journals began to appear on "philosophy and computers," "computing and philosophy," and "computers and ethics" (Floridi, 2002c, p. 128). The "topics investigated by PI" at that time included "[c]oncepts or process like algorithm, automatic control, complexity, computation, distributed network, dynamic system, implementation, information,

feedback, and symbolic representation; phenomena like HCI (human-computer interaction), CMC (computer-mediated communication), computer crimes, electronic communities, and digital art; disciplines like AI and Information Theory; issues like the nature of artificial agents, the definition of personal identity in a disembodied environment, and the nature of virtual realities; models like those provided by Turing machines, artificial neural networks, and artificial life systems ..." (Floridi, 2002c, p. 128). Floridi highlights the importance of "computational and information-theoretic research" in philosophy (Floridi, 2002c, p. 123), of the application of "information-theoretic and computational methodologies" to philosophical problems (Floridi, 2002c, p. 137), and of so-called "computational/informational" turns and shifts in philosophical paradigms (Floridi, 2002c, p. 125), citing Bynum and Moor's 1998 edited collection (on the new philosophical paradigm provided by computing; Bynum & Moor, 1998) as evidence of "the emergence of PI as a new force" (Floridi, 2002c, p. 129). The relevance (actual or potential) of branches of information studies such as library and information science is not examined in detail here.

A perceived lack of engagement with prior work of philosophical significance in information studies, in contrast to a deep engagement with relevant work in computer science; a tendency to emphasize those potential applications of PI that relate to computation; and a choice of publication venues (notably *Metaphilosophy* and *Minds and Machines*) that are not especially well-read by information studies scholars ... These may be factors contributing to the relative infrequency with which Floridi's work has been cited in the LIS literature. It would be a gross error, however, to conclude that Floridi's version of philosophy of information is somehow tangential to the primary concerns of information studies. Such a conclusion could be drawn only from a surface reading of the relevant works. Reasons (if any should yet be needed) for promoting awareness and appreciation of Floridi's PI within information studies include the following:

1. *PI's broadness of scope*. Floridi's conception of PI is such that it is concerned both with phenomenological examinations of "specific classes of first-order phenomena," such as information, and with metatheoretical analysis of "specific classes of second-order theoretical statements," such as the methodologies and theories developed in what Floridi calls "ICS" (i.e., the "information and computational sciences"; Floridi, 2002c, pp. 136-137). Floridi defines PI precisely yet inclusively as "the philosophical field concerned with (a) the critical investigation of the conceptual nature and basic principles of information, including its dynamics, utilisation, and sciences, and (b) the elaboration and application of information-theoretic and computational methodologies to philosophical problems" (Floridi, 2002c, p. 137). By the "dynamics" of information, Floridi means to refer to "(i) *the constitution and modelling of information environments* ...; (ii) *information life cycles*, that is, the series of various stages in form and functional activity through which information can pass ...; and (iii) *computation*, both in the Turing-machine sense of *algorithmic processing* and in the wider sense of *information processing*" (Floridi, 2002c, p. 138, all emphases in original). Floridi notes that topics in the third of these categories have "attracted much philosophical attention in recent years," but points out that PI explicitly privileges information over computation as "the pivotal topic" of the new field: "PI treats computation as only one ... of the processes in which information can be involved. Thus, the field should be interpreted as a philosophy of information rather than just of computation, in the same sense in which epistemology is the philosophy of knowledge, not just of perception" (Floridi, 2002c, p. 138).

Moreover, Floridi recognizes that PI is characterized not just by a unique subject matter (which in itself would be sufficient to mark PI out as an autonomous field), but additionally by an innovative methodology that can be applied in many philosophical areas that amount to branches or subfields of PI. The methodology that Floridi has in mind is that comprising "information-theoretic and computational methods, concepts, tools, and techniques" (Floridi, 2002c, p. 139), and some of the branches he lists as beneficiaries are information-theoretic semantics, information-theoretic epistemology, information-flow logic, situation logic, artificial life, cybernetics, game theory, formal ontology, virtual reality, computer and information ethics, and research on "psychological, anthropological, and social phenomena characterising the information society and human behavior in digital environments" (Floridi, 2002c, p. 139). It is this last group of areas of application that will be of most interest to library and information scientists. That Floridi casts the net much wider than this last group should not be taken to indicate a lack of relevance for information studies.

2. *PI's embeddedness in social theory*. Floridi sees PI as a timely response to the emergence of the information society—which he characterizes both as a stage in the development of society in which information resources and computer technologies are of "culturally defining" importance (Floridi, 2002c, p. 127), and a stage in a broader process of "semanticization" by which the mental world, i.e., the "conceptual environment designed ... by the mind," becomes "*the* environment in which more and more people tend to live" (p. 131, emphasis in original). In this environment—the *infosphere*—ideas, values, emotions, and personal identities are reified as information objects that "quietly acquir[e] an ontological status comparable to that of ordinary things like clothes, cars, and buildings" (p. 131). Floridi's conception of the infosphere is itself an original contribution to our understanding of the development of the information society; meanwhile, his realist view of information objects is a distinctive metaphysical position that has ramifications well beyond the traditional confines of metaphysics.

3. *PI's utility for ethical analysis*. Floridi is optimistic about the potential for PI to provide nothing less than the conceptual framework and roadmap that are required for making sense of contemporary society. He envisages PI being used to "guide the *purposeful* construction of our intellectual environment," thus enabling us "to make sense of the world and construct it *responsibly*" (both emphases added), ushering in a "new stage" in the ongoing process of semanticization (Floridi, 2002c, p. 141). The ethical concerns indicated here are echoed in Floridi's characterization of PI as a field that "is *prescriptive* about, and legislates on, what may count as information, and how information *should* be adequately created, processed, managed, and used" (Floridi, 2002c, p. 138, emphases added). In fact, Floridi has developed a sophisticated framework for applying the methods of PI to the analysis of problems in information ethics (see, e.g., Floridi, 1999a; 2002b; 2008a; 2008b).

4. *PI's foundational position at the heart of contemporary philosophy*. For Floridi, the concept of information is as fundamental and important as the concepts of being, knowledge, truth, meaning, goodness, and even life itself (Floridi, 2002c, p. 141). He traces the development of philosophers' interests in the modern period at first from metaphysics to epistemology (i.e., "from the nature of the knowable object to the epistemic relation between it and the knowing subject"), then from epistemology to philosophy of language and logic (i.e., to "the instruments whereby the infosphere is managed"), and finally to philosophy of information (i.e., the infosphere's "very fabric and essence"). In this way, PI should thus be recognized as the

"*philosophia prima*"—or, at the very least, "one of the most exciting and fruitful areas of philosophical research"—of our time (Floridi, 2002c, p. 141).

With regard to the second of the three categories of topics relating to information dynamics that he enumerates in his definition of PI, Floridi catalogs the phases that make up a "typical" information life cycle in a footnote (Floridi, 2002c, p. 138, note 11): "occurring (discovering, designing, authoring, etc.), processing and managing (collecting, validating, modifying, organising, indexing, classifying, filtering, updating, sorting, storing, networking, distributing, accessing, retrieving, transmitting, etc.), and using (monitoring, modelling, analysing, explaining, planning, forecasting, decision making, instructing, educating, learning, etc.)." The broad scope of this list closely matches that of descriptions of the concerns of information scientists and information management professionals. Floridi emphasizes the "natural relation" between PI and library and information science (LIS) in a pair of papers that attracted attention as much for their downgrading of the special relationship that, thanks to Jesse Shera's advocacy, LIS has enjoyed for so long with social epistemology, as they did for their promotion of PI as the most productive conceptual foundation for LIS (Floridi, 2002a; 2004a). It is to be hoped that projects in which PI is applied to topics in Floridi's broad category of information dynamics continue to attract willing volunteers. There is much to be done.

Philosophy of information

Some of the questions asked *in* information studies are philosophical questions, and it is in this sense that philosophy and information studies most clearly overlap. Encountering information studies for the first time, we might wonder, for example, What is this thing they call "information"? In what way does it exist? Of what fundamental category of things is it an instance? What are its properties? What are the necessary and the sufficient conditions some thing must satisfy for it to be counted as information?

The questions just listed are questions about a phenomenon that is clearly a core component of the subject matter of information studies, and they are questions that are commonly addressed both in introductory texts (e.g., Case, 2007) and in more advanced treatises (e.g., Bates, 2006) in information studies. Their philosophical nature (of which more will be said below) and their focus on the phenomenon of information are individually necessary and jointly sufficient conditions of their also being considered part of the branch of philosophy known as *philosophy of information*, and they are questions that are commonly addressed both in introductory texts (e.g., Floridi, 2003b) and in more advanced treatises (e.g., Floridi, 2005a) in that field, too. The simple form of questions of this sort belies the difficulty of providing answers that survive all challenges. Similar kinds of questions may be asked about various information-related phenomena, and about various kinds of human–information interaction.

Conceptions of information

Different conceptions of information have attracted consensus to different degrees in different communities, and there seem to be almost as many surveys and histories of those different conceptions—and of the relationship of conceptions of information to conceptions of data, knowledge, content, meaning, and wisdom—as there are interested parties (see, e.g., Machlup, 1983; Mingers, 1995; Cornelius, 2002; Capurro & Hjørland, 2003; Furner, 2004c; Floridi, 2005b; A. Collins, 2007; Rowley, 2007). The multiplicity of current conceptions partly

reflects the lack of agreement among communities on a prioritization of the desiderata that a conception should satisfy. In particular, the outlook for those who would hold out for a "one size fits all," transdisciplinary definition of information is not promising (cf. Floridi, 2003b, pp. 40-42). It is possible, nevertheless, to identify a number of general categories or families of conceptions of information that have proven useful in relatively broad ranges of contexts.

1. A *semiotic* family. In conceptions in this group, distinctions are typically made on the one hand between (a) real-world states, facts, or situations, (b) mental representations of those situations, and (c) linguistic expressions of those representations, and on the other between (i) tokens, and (ii) types, of situations, representations, and expressions—forming a model (of the relationships between reality, thought, and language) of the kind roughly depicted in Fig. 1 (Furner, 2004c). Each distinct conception of information in this family equates information with the content of a different cell in the model. For many, the crucial decision will be to choose between a conception of information-as-signal (Michael Buckland's "information-as-thing"; Buckland, 1991), and one of information-as-message (Buckland's "information-as-knowledge"), but conceptions of information as the very stuff of which real-world states are actually composed are not rare (cf. Floridi, 2003b, p. 44; Bates, 2005b; 2006; Bawden, 2007). *Objectivist* versions of the popular view of information-as-message assert that information resources (texts, sentences, words, characters, bits) "contain" information, that information resources "have" meanings, that "the" meaning of an information resource is discoverable by all, and that whether a given information resource has a given meaning is an objective matter. *Subjectivist* versions recognize, in contrast, that information resources do not "have" meanings, but that different meanings are assigned to the same resource by different people at different times, and that "the" conventional meaning of a given resource is a matter of intersubjective consensus (Hjørland, 1992; 2007).

2. A *socio-cognitive* family. In conceptions in this group (see, e.g., Boulding, 1956; Shera, 1970; Pratt, 1977; Brookes, 1980; Belkin, 1990), the emphasis is on action and process, and especially on processes by which people become informed or inform others. Information is conceived either as the act that causes a change in a person's mental state, internal "knowledge structure," or "image" of the world, or as the event in which such change takes place. Different theorists have different views about the respective strengths of different kinds of influence on the effects of the informing act (Talja et al., 2005). Adherents to a *physical*, systems-oriented paradigm that is based on a literal reading of Claude Shannon's mathematical theory of communication (Shannon, 1948) ascribe no role to the intentions of the individual person, whereas proponents of the *cognitive*, user-oriented viewpoint allow that the nature of the change wrought on an individual's mental model or image of the world by a given informative act depends at least partly on the prior state of that individual's model. The main theme of the *sociological*, community-oriented paradigm is that individuals' images of the world are shaped at least partly by those individuals' understandings of others' views, while the *cultural*, discourse-oriented paradigm derives from a recognition that the world itself is socially constructed in a strong sense, i.e., as a direct result of people talking about it.

3. An *epistemic* family. Conceptions of information in this group are developed with the aim of providing an account of the properties that an information resource must have if the beliefs that are generated upon interpreting the content of that resource are seen to be justified. These are conceptions of information-as-*evidence* (see also Furner, 2004b). On the relatively few occasions on which information is taken seriously in the philosophical literature as a category to be distinguished carefully from knowledge, it is typical for "information" to be equated roughly

with "evidence," and for the primary question about information to be understood as the question about what the evidence must be like to justify a given belief-that-*p*, and thus to qualify that belief (if it is one that is true) as knowledge. Theories of *informational semantics* (cf. Floridi, 2003b, pp. 53-56) have been developed that propose probabilistic methods of evaluating the informativeness of evidence as the degree to which it provides warrant or grounds for believing-that-*p*. Such methods typically involve calculating the unexpectedness of the observed evidence given the probabilities of occurrence of all the possible alternatives. In this sense, they derive from Shannon's mathematical theory of communication (Shannon, 1948), and form the core of the branch of philosophy of knowledge known as *information-theoretic epistemology* (Dretske, 1981; Harms, 1998).

The information-theoretic tradition

The *mathematical theory of communication* (MTC), popularized by Shannon's development of the work of Hartley and others (Hartley, 1928; see also Cherry, 1951), is sometimes known as *information theory*. It has become a commonplace to remark that the use of this alternate name is unfortunate, given the lack of concern of MTC with information in any ordinary sense of the word. The problem that the architects of MTC hoped to solve is an *engineering* problem: how to design communication systems that allow data to be transferred with maximal efficiency across channels of finite capacity. MTC emerged as an outcome of the application of probability theory in this domain, providing a method of calculating the average *informativeness* (or "amount of information") of messages sent and received across a particular channel. The informativeness of a message is the extent to which other possible messages are eliminated (i.e., the extent to which "uncertainty is reduced") in the process of message selection, and is measured in binary units (i.e., bits): the larger the number n of messages in the population s from which individual selections are made, the larger the average value of informativeness $I(s) = \log_2 n$ of those selections (cf. Dretske, 1981, pp. 3-26; Floridi, 2003b, pp. 46-51).

MTC in its classical form has nothing to say about the nature of messages or about the nature of the data that make them up, let alone about the nature of information. It identifies and accounts for no properties of data or of information, beyond that of informativeness in one distinctively quantifiable sense. Since the publication of Shannon's original presentation of MTC in 1948, many attempts have been made to build theories that provide authentic analyses of *information* on the foundations he supplied. In some cases (e.g., Dretske, 1981), the probabilistic approach distinctive to MTC is preserved, to a greater or lesser degree; in others (e.g., Israel & Perry, 1990), alternative frameworks derived from philosophical logic have been applied. Following the lead of Bar-Hillel and Carnap (1953), these are sometimes known as theories of *semantic information*, in virtue of the nature of the distinction that their advocates commonly draw between, on the one hand, containers, carriers, or vehicles of meaning, and on the other, the meaning(s) borne. When considered in isolation, the vehicles of meaning—e.g., sequences of sounds, strings of characters, patterns of differences—are merely *data*; it is only when such signals are considered as phenomena that have meaning for their creators and/or for their audiences that they are considered as information.

As a rhetorical device in his book *Knowledge and the flow of information* (Dretske, 1981; summarized with peer commentary, 1983), Fred Dretske initially adopts the conceptual framework of MTC, complete with its talk of signals, channels, noise, and entropy. Dretske and others have pointed towards a plausible merger of such a framework with that of philosophy of

language, where the focus is on such things as utterances, sentences, propositions, and meaning. It remains to be seen precisely how such a combined framework may be reconciled with the traditional concern of document-oriented information studies with works, texts, editions, and copies (see, e.g., Wilson, 1968, pp. 6-19; Svenonius, 2000, pp. 31-51).

Imagine it's June 1984, and the Boston Celtics have just beaten the Los Angeles Lakers in Game 7 of the NBA Finals. Bob missed the game, and wants to know which team won. Andy says to Bob "The Celtics are champions." The Celtics' winning the championship is a real-world event that is both datable (in time) and locatable (in space), as is Andy's utterance of the sentence "The Celtics are champions." Many philosophers of logic and language find it useful to treat utterances not only as tokens of sentences but also as tokens of propositions (or, at least, to distinguish between an utterance's syntactic form and its semantic content). Andy's utterance, in this particular context, of the sentence *s* "The Celtics are champions" is also an expression of the proposition *p* that the Celtics are champions. Proposition *p* is a proposition about what is actually the case—about the state of affairs that actually obtains—in the real world. Does proposition *p* itself also exist in the real world? Not all philosophers are realists about abstract objects like propositions, but those who do are wont to assert that propositions (rather than, e.g., sentences) are the things that have truth value. According to one theory of truth, a proposition is true if it corresponds to reality. If it is actually the case that the Celtics are champions, then proposition *p*, that the Celtics are champions, is true.

Is semantic or propositional content the same kind of thing as meaning, and/or indeed the same kind of thing as information? Given that any particular sentence can be uttered at any particular time by any particular speaker with any of a variety of different propositional intentions, many theorists of meaning follow Grice (1968) in distinguishing between the occasion meaning (a.k.a. speaker meaning) of an individual utterance, and the timeless meaning (a.k.a. conventional meaning) of a sentence or utterance-type. Dretske's position is to equate semantic content with occasion meaning, but to distinguish between meaning and information. For Dretske, information is content of a certain kind—viz. that content which is true. Suppose that Andy hasn't watched the game, has misheard the result, and, instead of telling Bob that the Celtics have won, says "The Lakers are champions." Andy believes that the proposition he intends to express is true, but in fact it is false. In Dretske's view, Andy fails to inform Bob that the Lakers are champions, even if Bob takes Andy's at his word, simply because it is not the case that the Lakers are champions. For Dretske, the proposition *q*, that the Lakers are champions, is not information.

The theoretical ramifications of Dretske's development of this distinctive conception of information are wide-ranging, substantial, and complex, and his project is a major contribution to several of the classical branches of philosophy, including philosophy of mind and epistemology, in particular the analysis of knowledge. In one traditional account, knowledge is analyzed as justified true belief: *S* knows that *p* if and only if (i) *p* is true, (ii) *S* believes that *p*, and (iii) *S* is justified in believing that *p* (see, e.g., Steup, 2006). The challenges faced by this conventional analysis include certain problematic scenarios in which the three conditions of truth, belief, and justification appear to be insufficient (Gettier, 1963). Dretske's response to such challenges is an instance of an alternative approach to the analysis of knowledge known as *reliabilism*. In the reliabilist's view, true beliefs are counted as knowledge if and only if they are produced by a reliable cognitive process (i.e., by a cognitive process—sense experience, say—that has consistently produced knowledge in the past). Dretske's reliabilism is encapsulated in his

analysis of knowledge as information-caused belief: *S* knows that *p* if and only if *S*'s belief that *p* is caused by the information that *p* (Dretske, 1981, p. 86).

Notwithstanding the considerable influence of Dretske's information-theoretic analysis of knowledge on epistemology, we may wish to ask: In what ways are Dretske's conception of information, and information-theoretic analyses of knowledge in general, useful for information studies? For example, if such a conception or analysis were accepted, could our understanding be improved of the ways in which information services might satisfy the desires of their users (cf. Fallis, 2006, pp. 493-494)? Pending further examination, it should be noted that Dretskean conceptions of information are decidedly not the norm in information studies.

Floridi (2003b, pp. 42-46) clarifies this by developing a hierarchy of categories of phenomena that includes (i) data; (ii) (semantic) information, a.k.a. (semantic) content—i.e., *meaningful*, well-formed data; and (iii) factual information, a.k.a. "epistemically-oriented" semantic information—i.e., *truthful*, meaningful, well-formed data. Floridi's "general" definition of information (GDI) specifies three conditions (data-ness, well-formedness, and meaningfulness) that must be satisfied for an *x* to qualify as an instance of information, while his "specific" definition of information (SDI) adds a fourth (truthfulness). Floridi (2003b, p. 45) cites Dretske (1981, p. 45) and Grice (1989, p. 371) as authoritative advocates of the "specific" definition and of the concomitant view that what is called "false [i.e., nonfactual] information" is in fact not information (in the same way in which a rubber duck is not a duck). He notes that the general sense in which information is understood simply as semantic content is "trivial" (Floridi, 2003b, p. 46), and that, in the context of communication, "the most important type of semantic information is *factual information*" (Floridi, 2003, p. 45, emphasis in original). Floridi (2003b, p. 42) asserts that the general definition has nonetheless become the "operational standard" in fields such as information science.

Why should this be so? For what reasons have scholars working in information studies come to adopt the general definition rather than the specific definition? Floridi points in the direction of a possible answer with his identification, among a set of "very important" concepts of information that he elects not to consider further, of "*pragmatic information* ... [which] includes *useful information*, a key concept in ... information management theory, ... where characteristics such as relevance, timeliness, updatedness, cost, significance, and so forth are crucial" (Floridi, 2003b, p. 57). This list of values—alternatives, in a way, to truth—serves to remind us that, even though advocates within information science of the conception of information characterized by Floridi as the GDI are prone to making statements that appear to be versions of the Dretske-esque slogan "Information is what is informative [i.e., what yields or causes knowledge]" (see, e.g., Capurro & Hjørland, 2003, p. 350; cf. Dretske, 1981, p. 44), their conceptions of informativeness and knowledge itself are quite different from those traditionally acceptable to epistemologists. Information scientists in the socio-cognitive tradition tend to be interested in changes in personal cognitive structures or "images" of the world, in how such changes are produced, and in how personal needs and desires are thus met, rather than in matters of "truth."

Bates's evolutionary model of information

One of the most controversial of recent contributions to the literature on conceptions of information is Marcia Bates's development of an "evolutionary" framework for the analysis of information and related concepts (Bates, 2005b; 2006). This framework is based on Bates's

interpretations of work done in the field of evolutionary psychology, which provides "an understanding of evolution and its impact on the cognitive, linguistic and social structures of human beings" (Bates, 2005b, "Objectives of this essay"), and of Susantha Goonatilake's model of "lineages" of information flow (Goonatilake, 1991; Bates, 2006).

Bates's framework includes a complex taxonomy of different "forms" (i.e., kinds) of information, in which she distinguishes (i) between "represented" information -- which is generated by (or at least "associated with") living organisms, and which exists either in "encoded" form as sequences of symbols or in "embodied" form as the physical manifestation of such sequences -- and other kinds of information existing in the natural world; (ii) between "genetic" information, "neural-cultural" information that is generated by humans and animals, and "exosomatic" information that is stored outside people's bodies; (iii) within the class of embodied, neural-cultural information, between "experienced," "enacted," and "expressed" information; and (iv) within the class of exosomatic information, between "embedded" and "recorded" information (Bates, 2006, pp. 1035-1036). Some of the things that Bates calls information are: every individual person's internal experience and memory of their life, their thoughts, and their activities (experienced information); every person's actions in the external world (enacted information); every person's acts of communication with others (expressed information, "technically a subset of enacted information"; Bates, 2006, p. 1039); all physical evidence of the actions of people in the world, such as footprints and vases (embedded information); and all durable results of people's acts of communication, such as pictures and writings (recorded information).

Bates (2005b, "Is the definition too inclusive?") admits that, in the early stages of the peer-review process, her model drew criticism partly for its all-encompassing ambitions. Reviewers found it difficult to see the value of a model that seems to include so much of the universe in a category called "information," and may additionally have been distracted by Bates's accompanying presentation of a separate framework for distinguishing between information, data, meaning, and knowledge. Bates distinguishes between what she calls "Information 1," "Information 2," "Knowledge," "Data 1," and "Data 2," providing definitions of each as follows: Information 1: "the pattern of organization of matter and energy"; Information 2: "some pattern of organization of matter and energy given meaning by a living being"; Knowledge: "information given meaning and integrated with other contents of understanding" (Bates, 2006, p. 1042); Data 1: "that portion of the entire information environment available to a sensing organism that is taken in, or processed, by that organism"; and Data 2: "information selected or generated by human beings for social purposes" (Bates, 2005b, "Finally, what are data?"). Bates's intention seems to be that Information 2 is a subset of Information 1; that Knowledge is a subset of Information 2; that Data 1 is another subset of Information 1, overlapping with Information 1; and that Data 2 is another subset of Information 2, overlapping with Knowledge. One thing that is clear is that any instance of any one of the latter four categories should simultaneously be understood as an instance of Information 1. All information is Information 1; some Information is Knowledge, some is Data 1, etc.

Bates's definition of Information 1 is derived from Edwin Parker (1974, p. 10): "Information is the pattern of organization of matter and energy." She takes several opportunities to point out that this definition should *not* be taken to imply that instances of information are composed of matter or of energy, but rather that they are made up of something else. She claims that information "resides in" physical reality, but that "to say this ... is not to say that information is *identical* with the physical materials or waves that make up the pattern of organization. *The*

information is the pattern of organization of the material, not the material itself." (Bates, 2005b, emphases in original). For Bates, instances of information are instances of "pattern of organization," which is a *property* of matter and of energy: "Information ... is the pattern of organization *to be found in* any matter or energy." (Bates, 2005b, emphasis added). She cites Wiener (1961, p. 132) as an authority: "Information is information, not matter or energy."

In lieu of a formal definition of "pattern of organization," Bates uses a number of semi-synonymic and related terms to build a picture of what she is referring to: differentiation, configuration, arrangement, regularity, bunching, clustering, etc. She also gives numerous examples of instances of this property, including the following: the particular pattern exhibited by the set of ice crystals that have settled on a particular window pane; the particular pattern exhibited by the series of actions taken by a particular teenager; the particular pattern exhibited by the set of atoms that make up a particular chair; and the particular pattern exhibited by the set of objects that a particular person calls "chairs," i.e., that we identify as instances of the class "chair." Here Bates is recognizing that the universe is not a uniform, undifferentiated, indivisible monad. In any slice of space-time, there are "differences, distinctions, differentiations" (Bates, 2005b, "*Whose* pattern of organization?"). It is possible to differentiate, to distinguish between, any one member of any set of objects or events (e.g., the set of ice crystals on window pane *x*, the set of teenager *y*'s actions, the set of chair *z*'s atoms, the set of things that person *a* calls chairs), and the background context (i.e., the rest of the universe). Differences of this kind are what constitute the particular "pattern of organization" of any set of entities. And it is the ability of people (and animals) to recognize the existence of these differences in their environment, to recognize the patterns formed by these differences, and to recognize the meta-patterns formed by similarities and differences among patterns, that allows people (and animals) to form concepts—i.e., to individuate, or identify as discrete individuals, particular sets of objects and events (such as the set of atoms making up chair *z*), and to categorize objects and events as instances of classes (such as the class "chair").

It is clear that Bates is a realist about instances of Information 1. That is, she believes that the existence of instances of Information 1 is not dependent on the mental activity of any person, that any proposition of the form "Phenomenon *x* is an instance of Information 1" has the truth value that it has (i.e, is true or false) as a matter of objective fact, and that (given an appropriate means of obtaining knowledge about matters of objective fact) it is logically possible to obtain an answer to any question of the form "Is phenomenon *x* an instance of Information 1?" by accessing the facts of the matter. It is almost as clear that Bates is a realist about instances of Information 2, in the same senses as outlined above. Whether or not an instance of Information 1 has been "given meaning by a living being" is also, for Bates, a matter of objective fact. This is not to say, however, that any proposition of the form "Instance-of-Information-2 *x* has particular meaning *y*" is true or false as a matter of objective fact, or that there any "facts" to access when attempting to answer any question of the form "Does instance-of-Information-2 *x* have particular meaning *y*?" This is because the attribution of meaning to instances of Information 1 is a mental act undertaken by individual persons. The existence of a relationship between any given instance of Information 1 and any given meaning is dependent on the mental activity of a given person, and we can know about it only by asking that person. The existence of instances of Information 2 is not in question; what is at issue here is whether or not a given instance of information 2 has a given property (or, to put it another way, whether or not it is a member of a given class). Since the semantic properties of instances of Information 2 (or the semantic classes to which they are perceived to belong) are matters of subjective belief rather than of objective fact, one rough-and-

ready way of capturing the distinction between the metaphysical status of Information 1 and that of Information 2 is to refer to Information 1 as "objective" and Information 2 as "subjective." Hjørland (2007) takes Bates to task for, as he sees it, her failure to clarify this distinction; in her rejoinder, Bates (2008) heads off any further misinterpretation of her views.

The central distinction that Bates makes between her "Information 1" and "Information 2" is what one is left with, once one strips away the layers of the taxonomy of "forms" of information. At this foundational level, one is struck by the concordance between Bates's fundamental understanding of information and the idea encapsulated in Floridi's specification of the "general" definition of information (GDI) that he sees as characteristic of the information sciences. Given Bates's idiosyncratic usage of "Information 1" and "Information 2," however, there is a possibility that the similarity may be obscured by discrepancies in terminology. We may recall Floridi's general definition of information as meaningful, well-formed data. Floridi's conception of a datum—a "lack of uniformity" or a difference (Floridi, 2003b, p. 43)—corresponds roughly to Bates's conception of Information 1, and his conception of information ("data + meaning"; Floridi 2003b, p. 42) corresponds roughly to Bates's Information 2. In this sense, Bates's model seems not to break new ground.

What is more compelling is the creativity with which Bates grounds a theory of living organisms' responses to the environment in information-scientific terms. Bates's model amounts to a theory of concept formation, and ideally should be evaluated from the perspective of cognitive psychology (or, given Bates's further claims about the evolutionary development of concept-forming abilities, from the perspective of evolutionary psychology). One element of the model that, if widely accepted, could substantially raise the profile of information studies among the cognitive sciences is the claim that access to instances of information—i.e., to the ways in which particular sets of entities are different from their contexts—is an essential prerequisite to any individual concept-forming act.

Metaphysics, philosophy of logic, and information

As we have seen, the scope of information studies is wide, and correspondingly there are fundamental "What-is-*x*?"-type questions to ask about information-related phenomena and activities of many different kinds. In addition to the basic question about the nature of information itself, we may ask: What are information sources, information services, information structures? What are collections, libraries, archives, museums? What are documents, data, records, metadata? How do documents correspond to inscriptions, sentences, propositions? What do documents do? How do they "mean"? How do they inform? What are works, texts, editions, versions, copies? What is the nature of the relationship between a document and the work that it instantiates? What is the nature of the relationships between a document and the classes of similar documents of which it is a member? What are representations, reproductions, images? What is aboutness? What kinds of things are subjects? How do we determine what a document is about? How do documents serve as evidence? How does the informational value of a document relate to its evidential value? What is authorship? What are authors, indexers, searchers? What are people doing when they are generating, looking for, or using information? How do we evaluate these interactions? What is the nature of people's conscious experience of interacting with documents, with information, with information services? What is the difference between information, education, and entertainment? What kinds of motivation do people have for choosing to engage with information, education, and entertainment services? What is relevance?

How does relevance relate to other epistemic values? How do we determine how relevant a document is? What is effectiveness? How do we determine how effective information services are? What is access? How does access relate to other socially important objectives, such as preservation? In what ways are information services socially valuable? How should access to information resources be distributed among members of a given social group? How should resources be represented and organized so that access is optimized? How can the power relations among information institutions and groups of information producers and users be changed?

In search of answers to questions of these kinds, branches of philosophy upon which work in information studies has touched more than momentarily include philosophies of action, art, communication, education, history, language, law, logic, mathematics, mind, representation, science, and technology, as well as epistemology, ethics, critical theory, hermeneutics, and phenomenology (cf. Herold, 2001). Questions that are specifically about the mode of existence and the basic nature of different kinds of things are questions of the sort that are asked in the branch of philosophy known as *metaphysics*, i.e., philosophy of being. Many of the philosophical questions asked in philosophy of information are metaphysical questions, in that they are motivated by a desire to understand the essential nature of information-related phenomena, and the roles or positions of those phenomena within the totality of phenomena. The basic motivation for attending to questions of these kinds is the prediction that our answers—developed by carrying out careful analysis of the concepts or categories that we construct and use to think about real-world substances and properties—will help us to clarify our thoughts, strengthen our arguments, and improve the quality of the decisions and actions taken on the basis of the conclusions of those arguments.

In turn, many metaphysical questions can be construed as *ontological* questions. Ontology is the branch of metaphysics that is concerned to identify and understand the fundamental categories or kinds of things that exist in the world. For any information-related phenomenon, we may ask, What kind of thing is it? A concrete thing (existing in space-time as a datable, locatable object or event that is capable of undergoing change and/or of causing effects), or an abstract thing? A universal (that is instantiable or exemplifiable), or a particular? A substance (that is characterizable), or a property? An object or an event? A set or an element? One of the tasks of ontology is to identify, characterize, and relate these different categories in a coherent framework (see, e.g., Lowe, 2006). It may sometimes be helpful to distinguish between "pure" ontology in that sense, and the "applied" ontology that is being done when information-related phenomena are being fitted into any predefined categorical structure (see, e.g., B. Smith, 2003). Another sense of applied ontology is that which is used to encompass work on modeling the kinds of entities and relationships about which information is to be stored in databases (see, e.g., IFLA Study Group, 1998; Le Boeuf, 2005; Delsey, 2005; Furner, 2006b; Renear & Dubin, 2007). In virtue of its focus on human-created artifacts that are the objects of human interpretation, ontology of information is closely related both to ontology of art (including ontology of literature) and to projects with metaphysical ramifications in philosophy of language and representation and in semiotics (see, e.g., Thomasson, 2003; Furner, 2006a).

Different thinkers have different views on the existence (i.e., the reality) or otherwise of entities in various categories—in other words, they have different ontological commitments, and may be regarded as realists or anti-realists with respect to the entities in any given category. In the philosophical literature, authors typically make their ontological assumptions well known, especially if those assumptions form the foundations on which are built understandings of the concepts under analysis. In information studies, on the other hand, such views are not frequently

made explicit, notwithstanding their equal importance for the development of cohesive and powerful conceptual frameworks. One consequence of the tendency for metaphysical assumptions to be left unstated is a general perception that contributions to the literature of metaphysics are of limited relevance to debates in information studies. Any review of philosophical contributions to information studies whose coverage were restricted to works that include explicit discussion of philosophical topics would not be well equipped to alter that perception.

As we have seen, one of the tasks of philosophy of information is to carry out the "proper" (i.e., epistemically valuable) analysis of concepts that are central to information studies. One such concept is that of *aboutness* (see, e.g., Wilson, 1968, pp. 69-92; Maron, 1977; Hjørland, 1992); others are *relevance* (see, e.g., Wilson, 1968, pp. 41-54; 1973; Harter, 1992; Borlund, 2003; Floridi, 2008c) and *work-instantiation* (see, e.g., Wilson, 1968, pp. 6-19; Svenonius, 2000, pp. 31-51; Smiraglia, 2001). In each of these three cases, a substantial and relevant body of literature exists in mainstream philosophy, resulting from the efforts to understand these concepts made by philosophers of logic, language, and being. And in each of these cases, the extent to which the philosophical literature has received attention in the literature of information studies is small, despite the importance of these concepts, and the corresponding extent to which they have been the object of analysis in information studies.

Taking aboutness as an example, the primary question about that concept that has attracted the attention of analytic philosophers since the early part of the twentieth century may be paraphrased as follows: What do we really mean when we say that a given sentence, statement, or proposition *s* is *about* a given thing *z*? In other words, what do we really mean when we say that a given sentence *s* has a given *subject* or topic *z*? Consider the simple *sentence*, or sequence of words, *s*: "Lubetzky is wise." By speaking or writing down these words, it seems that we're saying something *about* Lubetzky (viz. that he is wise). Indeed, we might express our judgment on that matter—in response, say, to a question like "What is sentence *s* about?" or "What is the (semantic) subject (i.e., the topic) of sentence *s*?"—with a sentence like *t*: "'Lubetzky is wise' is about Lubetzky" or "The topic of 'Lubetzky is wise' is Lubetzky." In determining how we might make sense of sentences like *t*, a number of subsidiary philosophical questions, both ontological and *logical*, arise.

For example: Would it be appropriate or useful to conclude that the pair made up of (i) the sentence "Lubetzky is wise," and (ii) the person Lubetzky, is an instance of a *relation* called "aboutness"? At the same time, would it be appropriate or useful to conclude, independently of any answer that we might give to the previous question, that sentence *s*'s being about Lubetzky is an instance of a *property* called "aboutness"? Are sentences really the kinds of things that can be about other things? Are there any other kinds of things (e.g., propositions, documents, works) that can be about things? Must every instance of any of these kinds of things always be about something? Are people really the kinds of things that other things can be about? Are there any other kinds of things (e.g., classes, concepts, works) that things can be about? Must things *exist* in order to be capable of entering into an aboutness relation, or can things that no longer exist (e.g., Lubetzky) or things that have never existed (e.g., Harry Potter) be topics? Must topics be *concreta* (i.e., things that exist in time-space), or can they be *abstracta*? Must topics be *particulars* (i.e., things that are not instantiable), or can they be *universals*? Are the elements of an aboutness instance (e.g., "Lubetzky is wise," and Lubetzky) related *necessarily*, or *contingently*? In other words, is it impossible that the pairing could ever be different, or not? Are statements of aboutness instances (e.g., statements such as "The topic of 'Lubetzky is wise' is

Lubetzky") *analytic*, or *synthetic*? In other words, are such statements true by definition or by logical form (and therefore analytic), or not? Is our knowledge of the topics of sentences *a priori*, or *empirical*? In other words, is such knowledge justifiable without appealing to experience, or not? Are sentences like "*s* is about *z*" true or false *objectively*, i.e., independently of any of our beliefs about their truth? And is there a way of determining their truth value objectively, i.e., independently of any examination of people's beliefs about their truth? Is the relation of aboutness most appropriately conceived as a two-place relation, or are more than two places involved? For example, does aboutness vary in accordance with (i) the identity of the agents who speak the sentences that express the aboutness instances, and/or (ii) the dates on which such sentences are spoken? Is Lubetzky the only thing that "Lubetzky is wise" is about? Or is it possible that sentence *s* is simultaneously about wisdom, or wise things in general? Could it be about the class of non-wise things as well as about Lubetzky (since "Lubetzky is wise" is logically equivalent to "Non-wise things are non-Lubetzkies")? Or about the class of non-Lubetzkies as well as about the class of non-wise things? Is it equally about librarians, and catalogers, and professors in general (given the truth of the additional proposition that Lubetzky is an instance of each of those classes of things)? Is it also about these things, but about them to some lesser extent than it is about Lubetzky? Is it about the class of non-librarians (given the logical equivalence of "Lubetzky is a librarian" and "Non-librarians are non-Lubetzkies")? Would that mean that sentence *s*, like every sentence, is about everything? Or is it only about Lubetzky's being wise and nothing else, not Lubetzky, nor even "Lubetzky"? In general: What is the *logical* nature of the relationship between a sentence *s* and the thing *z* that *s* is said to be about? Finally, what method of or procedure for identifying instances of aboutness (i.e., for determining the topics of, e.g., sentences) is most reliable or most useful?

Questions of these kinds have been addressed in several contributions to philosophy of logic since the 1930s, and different philosophers have answered such questions in different ways (see, e.g., Ryle, 1933; Putnam, 1958; Goodman, 1961). These answers involve several technical concepts that have historically received much additional attention in philosophy of logic, philosophy of language, and ontology. One prerequisite for understanding and evaluating candidate answers is an appreciation of a number of distinctions that are commonly made in philosophical discourse—distinctions, for example, between linguistic things and non-linguistic things; among linguistic things, between utterances and sentences, and between sentences and expressions; among expressions, between subject-terms and predicate-terms; among non-linguistic things, between mental and material things; among mental things, between concepts and propositions; among material things, between objects and situations; between substances and properties, properties and relations, objects and concepts, classes and instances, sets and members, types and tokens, abstracta and concreta, universals and particulars ... The list is long. Other distinctions that are commonly made in the presentation and development of theoretical frameworks in logic, metaphysics, and epistemology include those between analytic and synthetic propositions, between necessary and contingent truths, between a priori and empirical knowledge, and so on. Different philosophers have different ideas about the reality and importance of, and relations among, such distinctions. Much of the history of twentieth- (and now twenty-first-) century philosophy of logic and language is the history of debates about the nature of the relations between words, concepts, and objects (see, e.g., Stanley, 2008).

Given a conventional understanding of documents as sequences or aggregates of sentences, or of works as sequences or aggregates of propositions, it requires little imagination to see these questions as having direct analogs in information studies. Instead of asking them about

sentences like "Lubetzky is wise," we might ask them about documents like Svenonius and McGarry's "Introduction" (pp. xi-xxiii) to *Seymour Lubetzky: Writings on the classical art of cataloging* (Englewood, CO: Libraries Unlimited, 2001). Of course, it is possible that answers to questions of the kind "What is document *d* (or work *w*) about?" may be different in form from those to "What is sentence *s* (or proposition *p*) about?" or indeed that such answers may be arrived at only if approaches of correspondingly different kinds are taken. It might be considered surprising, nevertheless, that the topic of document-aboutness or work-aboutness (as distinct from sentence-aboutness or proposition-aboutness) does not seem to have captured the imagination of many working in philosophy of logic or indeed in philosophy of literature. For scholars working in information studies, of course, document-aboutness is of far more immediate concern; but few have taken a philosophical approach, noted the analogy between document- and sentence-aboutness, or cited the philosophical literature on the latter.

The author in information studies who has engaged most productively with philosophical analyses of aboutness is Patrick Wilson, in Chapter V, "Subjects and the sense of position," of his *Two kinds of power* (1968, pp. 69-92). Wilson's general conclusion is that "[t]he notion of the subject of a writing is indeterminate" (Wilson, 1968, p. 89). Wilson contrasts works (which he calls here "writings") with physical objects that are "determinate in every respect," and that "must have some definite shape and size and so on, at any moment," whether or not we are able to discover what the values of those variables are (Wilson, 1968, p. 90). For Wilson, works are not like physical objects, and the subjects of works are not like the shapes or sizes of physical objects. Not only is it the case that different methods of determining the subjects of a work produce different results: there is no way in principle of deciding which of two equally specific or equally exhaustive subject statements is the "correct" statement, because (for Wilson) works do not "have" subjects in the same way that physical objects have shapes. Wilson claims that "being on a given subject" contains a "quasi-technical term which is nowhere explained" in libraries or in the literature of librarianship (Wilson, 1968, p. 92). The claim is that, "to the librarian, 'being on a given subject' means [nothing more nor less than] 'being the sort of writing which our methods of assigning single locations assign to the positions with such and such a name'" (Wilson, 1968, p. 92).

Wilson's position exemplifies a family of views of the nature of document/work-aboutness and semantic subjecthood that may be placed at one of the two ends of a spectrum of such kinds of view. At this pole—which might conveniently be called *nominalist* or (following Hjørland, 1992) "idealist"—we may locate views that comprise some or all of the following component claims: aboutness can not sensibly be conceived as a property of works, but rather as a relation between sets of works, subjects, agents, and dates; what we call subjects are merely linguistic expressions that serve as labels or names for sets of works or for positions within a sequence or hierarchical structure; subjects do not exist independently of the thoughts and actions of humans; the sets of documents designated by subject labels are nominal kinds, not natural kinds: it is not possible to specify an intensional definition of such a set; it makes no sense to speak of documents "having" subjects, of subjects "inhering in" documents, or of "the" subject of a document (unless the intention is to designate the expression that happens to be attributed to the document by a particular agent on a particular date); and it is not possible to determine the truth of the sentence "Document *d* is about subject *z*" objectively (i.e., without reference to the thoughts or actions of humans), either on an a priori basis or empirically: it is not possible to specify any regular procedure by which document *d* may be analyzed in order to discover or generate "the" subject of *d*.

Conversely, at the opposite pole—which (again following Hjørland, 1992), we might call *realist*—lie views made up of some or all of the following elements: aboutness is a property class whose instances are predicated of classes of works; what we call subjects are the things designated by the linguistic expressions that comprise subject statements: such things may be concrete (existing in space-time) or abstract, and they may be particulars (not instantiable) or universals; subjects exist independently of the thoughts and actions of humans; the classes of works of which aboutness instances are predicated are natural kinds that may be defined intensionally; we may speak sensibly of works "having" subjects, and of "the" subject(s) of any given work; and it is possible to determine the truth of the proposition that work *w* is about subject *z* objectively, by specifying a regular procedure by which work *w* may be analyzed in order to discover its subject.

The fact that, at this point in the history of theory in information studies, the nature of aboutness continues to be the subject of such debate in the field is a result not primarily of the inability of proponents of views at the two poles to persuade their opponents of the merits of those views, but rather of the largely unacknowledged influence of the realist view on the activity of designers and users of knowledge organization systems. It is difficult to find well-reasoned defenses of the realist view in the literature, yet most of us who are actively engaged in the tasks of designing bibliographic classification schemes, indexing documents in accordance with such schemes, and using those schemes as tools for finding documents of the kinds that we want, continue to *act* as if we accept the realist view as the correct one.

Establishing the *ontological* nature of the thing *z* that a given sentence *s* or sentence-aggregate *d* (or proposition *p* or proposition-aggregate *w*) is said to be about is not only of purely academic interest, but has a bearing on very practical matters such as the design of library catalogs. Any sentence *t* of the form "Work *w* is about subject *z*" is an example of a kind of statement—a subject statement—that is found in millions of catalog records around the world. One of the aims of the designers of data models like the one presented in the *Final report* of the International Federation of Library Associations and Institutions's Working Group on Functional Requirements for Bibliographic Records (FRBR; IFLA Study Group, 1998, p. 12) is to identify the fundamental categories or classes of entities that are of interest to users of bibliographic data, including not only "the products of intellectual or artistic endeavour that are named or described in bibliographic records" (such as works), but also those entities that are capable of serving as "the subjects" of works.

The original FRBR model allows for the following classes of entities to serve as subjects: Concept (each of whose instances is "an abstract notion or idea"), Object ("a material thing"), Event ("an action or occurrence"), and Place ("a location"), as well as Work, Manifestation, Expression, Item, Person, and Corporate body (IFLA Study Group, 1998, p. 16). In this sense, the FRBR model amounts to an ontology of subjects: the claim that is being made is that anything that is an instance of one of these entity classes can sensibly be treated as the subject *z* of a given work *w*. Tom Delsey (2005, p. 50) identifies three "broad objectives" to be met by re-examination of the ways in which the FRBR model analyzes data relevant to subject access, the first of which is "to ensure that the scope of the entities [i.e., the entity classes] ... is sufficient to cover everything that a user of a library catalogue might view as a 'subject'." He goes on (p. 50) to pose two "key questions" that arise in the context of this first objective: "The first [of the key questions] is whether the entities are defined in sufficiently broad terms to cover fully what we might characterize as the 'subject' universe. The second is whether the categorizations represented by the entities defined in the models are appropriate and meaningful for the purposes

of clarifying the bibliographic conventions through which that 'subject' universe is reflected." In other words: (i) Are the entity classes collectively exhaustive? Does the model cover the whole universe of subject-related entity classes? (ii) Are the entity classes individually appropriate? Does the model carve up the universe of subject-related entity classes in the "right" way?

Furner (2006a) notes that the entities that are listed in the FRBR *Final report* as examples of instances of Object, Event, and Place, are similar in that they are all individual named things—they are concrete particulars that exist in space-time (i.e., they are "datable and locatable"), and that are not themselves instantiable but that instantiate universals. Meanwhile, the examples given of instances of Concept do not include kinds of objects, events, and places, but the implication is that such universals (i.e., kinds of concrete particulars) are to be considered as concepts, along with "abstract notions or ideas" such as "Economics," whose status as universal or particular, or indeed as abstract or concrete, is as ambiguous in the FRBR context as is the ontological status of any instance of Work.

Epistemology and information

Some of the philosophical questions that are asked in information studies are *epistemological* questions, in that they are motivated by a desire to understand the ways in which information and other information-related phenomena are involved in the processes by which belief can become knowledge (see, e.g., Steup, 2005).

In information studies, just as there is no standard conception of information, there is no standard conception of knowledge. The two main rival views are those of knowledge as true information (or information about the facts, i.e., information about the way the world really is), and knowledge as internalized information (i.e., the content of individuals' mental images or representations of the world). These both differ from the theory of knowledge that is traditionally provided by epistemology, which is that knowledge is justified true belief. In other words, for any one of our beliefs to count as knowledge, it must be both (i) one that is true, and (ii) one for which justification can be provided. Different forms of the traditional theory give different accounts of what it means for a belief to be evaluated as true, how the truth-value of a belief may be determined, how justifications of different kinds may be supplied, what degree of certainty is required of a justification, and so on.

For the scholar of information studies, there is a dual motivation for studying and contributing to epistemology. In the first place, we may learn about some of the epistemological assumptions underlying the scholarly practice of information studies (see, e.g., Hjørland, 2005), and about potentially productive methods of generating knowledge in information studies. In the second place, if we accept the idea that there is some sort of conceptual relationship between information and knowledge, we are only a short step away from accepting that what we say about the nature of knowledge and about how it is acquired will influence what we say both about the nature of information and about how we collect, organize, and provide access to the content of information sources, i.e., recorded knowledge (Budd, 2001). An understanding of epistemology thus helps us to determine what our information structures, systems, services, policies, and institutions ought to be like, and what they ought to do, if the processes by which we interact with information are to result in the satisfaction of our "epistemic objectives"—e.g., the rapid, cheap, and easy acquisition of all and only those beliefs that are justified, true, and relevant (Fallis, 2006).

Historically, there have been two main points of intersection between epistemology and information studies. Firstly, and as already mentioned above, some accounts of justification and/or knowledge rely on a particular conception of *information as evidence* (e.g., Dretske, 1981). Secondly, librarians and information scientists were among the first to express and address the idea that the processes by which knowledge is acquired are significantly *social* in several respects. Margaret Egan and Jesse Shera were the first authors to use the term "social epistemology" in print, and focused on demonstrating how an understanding of the ways in which social groups (as well as individuals) acquire knowledge can be applied in the design of information services to those groups (Egan & Shera, 1952; Budd, 2002; Furner, 2002b; Furner, 2004c). More recently, epistemologists such as Alvin Goldman have been concerned to give an account of the conditions under which social processes such as the provision and receipt of testimony can result in the acquisition of knowledge, and a number of conceptual analyses have been undertaken of trust, reputation, authority, reliability, credibility, and other criteria for evaluating the likelihood that information sources of various kinds will be productive of epistemically valuable beliefs (Goldman, 1999; 2006; cf. Rieh & Danielson, 2007; see also Wilson, 1983).

In a series of papers, Don Fallis (2006; 2007b; 2008; Fallis & Whitcomb, in press) demonstrates the ways in which the methods and results of epistemology may be applied in attempts to improve the quality of decision-making in information management, information policy, and information use. Some of the areas of activity that may benefit from applied epistemological analysis of this kind are knowledge organization (where decisions must be made about how to organize documents in such a way that knowledge acquisition is maximized; see, e.g., Andersen, 2002), reference service and information retrieval (which involve decisions about which documents to recommend; Furner, 2002a), collection development (which involves decisions about which documents to collect; Fallis & Whitcomb, in press), resource discovery and evaluation (which involves decisions about which sources to trust; Fallis, 2008), and information policymaking and legislation (which involve decisions about which rights to respect; Fallis, 2007b).

Fallis and Whitcomb (in press) outline a general method of identifying the kinds of goals, values, or criteria, and the kinds of relationships among those criteria, that should be considered when choosing among alternative courses of action such as the acquisition of, provision of access to, or use of document *x* rather than document *y*. Fallis and Whitcomb recognize that, in any given context, such values may include financial criteria, legal criteria, ethical criteria, aesthetic criteria, and so on; but, they argue, we create, provide access to, and seek information primarily because we believe that information is what allows us to *acquire knowledge*: "Our typical reason for seeking information is to acquire knowledge, or at least beliefs with knowledge-making properties like truth and justification." (Fallis & Whitcomb, in press, "Focusing on epistemic values"; cf. Dretske's conception of information as that which yields knowledge; Dretske, 1981, p. 86). In other words, we do not value information as an end in itself but rather for its instrumental quality as a means to the ends of knowledge acquisition. Fallis and Whitcomb consequently focus on *epistemic* goals such as the maximization of knowledge acquisition, and draw on epistemology to identify ways of breaking down such general objectives into more-specific components (e.g., maximization of acquisition of *true* belief, and maximization of acquisition of *justified* belief), and ways of identifying, categorizing, and weighting the relationships and trade-offs among those components.

If the objective of an information-management decision is to promote the acquisition of knowledge in the form of certain kinds of "good" or epistemically valuable beliefs (at the same time as obstructing the acquisition of certain kinds of "bad" beliefs), how might "goodness" be interpreted in this context? Contributions to the ongoing debate in epistemology about the conditions for knowledge can help us sift among candidate values such as truth and justification. But in many contexts (as Fallis and Whitcomb note), the ulterior motivation for engaging in a search for information is not so much the prospect simply of acquiring knowledge, but the prospect of putting acquired knowledge to some practical *use*, in the course (for example) of carrying out a task (see, e.g., Byström & Hansen, 2005), solving a problem, understanding an explanation, becoming wise, achieving happiness, or living purposefully (cf. Floridi's conception of pragmatic information; Floridi, 2003b, p. 57).

In order to understand and improve decision-making in contexts of those kinds, ideally we would consider the non-epistemic criteria on which beliefs may be valued highly—criteria such as the *relevance* of beliefs to a given ulterior goal, or the *utility* of beliefs for achieving that goal. There are connections waiting to be made between the work being done by applied epistemologists like Fallis and an existing body of work in information studies on criteria for evaluating library and information services in general (see, e.g., Saracevic & Kantor 1997, cited in Fallis & Whitcomb, in press) and resource discovery systems in particular (see, e.g., Harter & Hert, 1998). In this latter tradition, an analytical distinction is commonly made between (i) criteria for evaluating the average success with which a system fulfils its dual function of finding resources that are relevant (useful, interesting) and avoiding resources that are irrelevant (useless, uninteresting) to a searcher *s* at time *t*, and (ii) criteria for judging the actual relevance (usefulness, interest level) to a searcher *s* at time *t* of individual resources (Borlund, 2003; see also Floridi, 2008c). In this literature, some care is usually applied in taking into account the subjective (i.e., mind-dependent) and contextual nature of the relationship (between resource and searcher) of *relevance*, which contrasts with the objective (i.e., mind-independent) nature of the relationship (between belief and reality) of *truth*. Whether or not, or to what degree, a proposition *p* believed by a searcher *s* at time *t* is true or justified is something that can, in principle, be determined independently of any input from the searcher. In contrast, whether or not, or to what degree, a document *d* is actually relevant to a searcher *s* at time *t* is something that can be determined only (if ever) by asking the searcher. It will be interesting to see how future applications of epistemic value theory can be extended to similarly take into account the pragmatic nature of much decision-making in information-management contexts.

Ethics and information

One sense of "philosophy" that has not been covered in this chapter is the one that people mean when they talk about their (or their institution's) personal or professional "philosophy" of information work, scholarship or research. It is in this sense that people sometimes talk about *having* a philosophy, which is different from the sense in which philosophers *do* philosophy. Talk about the philosophy that one has, in this sense, is typically equivalent to a state of one's long-term or fundamental goals or mission, or a statement of one's basic or most strongly-held values. Having a knowledge of professional ethics is not a necessary prerequisite for making statements of goals or values. Nevertheless, study of professional ethics can provide suggestions of values to hold that are in line with others', and can provide knowledge of ethical principles that can aid choice among values (see, e.g., Callahan, 1988). *Information ethics* is commonly

construed as a branch of philosophy of information, but mere statements of values (which may or may not result from the study of information ethics) are not usually conceived as contributions to philosophy—at least, not in the strict sense of "philosophy" used by most philosophers.

Several branches of philosophy deal with questions of value or goodness, and with claims about the kinds of things that ought to be done in given situations. Social and political philosophy, for example, are concerned with the evaluation of public policy, and governmental activity, and group interaction, and with the analysis of socially valuable states such as justice and freedom. Aesthetics is concerned to establish criteria upon which works of art may be evaluated. Ethics is concerned with the rightness of actions in general. Within ethics, some fairly fuzzy boundaries may be drawn between ethical theory, meta-ethics, and applied ethics. Ethical theories propose criteria for distinguishing between right and wrong actions; meta-ethics categorizes ethical theories (e.g., as consequence-based, duty-based, rights-based, or virtue-based; Spinello, 1995, pp. 14-42; Fallis, 2007a) and analyzes the concepts and assumptions on which they are based; and projects in applied ethics demonstrate the consequences of applying particular ethical theories as guides to action in particular situations.

As we approach the end of the first decade of the twenty-first century, information ethics (see, e.g., Himma, 2007) is the most visible of subfields of philosophy of information. This is a field that already has its own international association, its own journals, and its own handbooks and readers (see, e.g., Moore, 2005; Himma & Tavani, 2008). "Information ethics" is typically understood to include "computer ethics" (Bynum, 2008), and to emphasize questions about the ethical implementation and use of information technologies, but rarely to the exclusion of more-general questions about the ethical provision and use of information services (online or offline; computerized or not; see, e.g., Hauptman, 2002). For the information policymaker, systems developer, or service provider, the fundamental ethical question is "Who should have [what level of] access to what information?" (Fallis, 2007a, p. 24). The issues that tend to arise in the evaluation of rival answers to this question include equity of access to information; intellectual freedom; information privacy and confidentiality; and intellectual property. The literature on each of these issues is large and straddles the boundaries between ethical theory, meta-ethics, and applied ethics, paying close attention to the problems that arise when criteria or principles for ethical action conflict. Kay Mathiesen and Don Fallis (Mathiesen & Fallis, 2008), for example, discuss the ethical dilemmas facing librarians that arise from challenges to intellectual freedom; Mathiesen (2008) reviews concepts of censorship and justifications for limiting access to information; Adam Moore (2007; 2008a) and Herman Tavani (2008) review concepts of privacy and justifications of information privacy rights; Moore (2008b) and Kenneth Einar Himma (2008) analyze justifications for the legal protection of intellectual property rights; while Rafael Capurro (2008) assesses the significance of intercultural information ethics. Hope Olson (2002) uncovers the causes and effects of bias in the construction of bibliographic classification and subject indexing schemes, and Clare Beghtol (2002; 2005) explores strategies for creating and maintaining knowledge organization systems that are ethically acceptable. Jonathan Furner (2007; in press-a) draws on critical theories of race, social justice, and social identity to develop a conception of the just knowledge organization system.

Kay Mathiesen (2004) proposes a theory of information ethics that distinguishes between the subjective (contextual) and objective (intrinsic) value of the information access states in which particular people find themselves with respect to particular information resources. Luciano Floridi (see, e.g., Floridi, 2008a) develops an interpretation of an information macroethics that is intended to encompass and supersede information-as-resource approaches such as Mathiesen's

(which focus on the values of availability, accessibility, and accuracy), information-as-product approaches (focusing on issues of, for example, plagiarism, libel, and propaganda), and information-as-target approaches (focusing on intellectual freedom, intellectual property, privacy, confidentiality, and security, etc.). Further research on meta-ethical categories and concepts can only raise the profile of information ethics within mainstream philosophy circles even higher. Early contributions to this subfield were covered in an *ARIST* chapter by Martha Montague Smith in 1997 (M. M. Smith, 1997), and Leah Lievrouw and Sharon Farb (Lievrouw & Farb, 2003) deal with ethical issues in their discussion of inequities of access to information. A true successor to Smith's chapter that comprehensively covers work in information ethics published in the interim is well overdue.

Conclusion

Just as there are meta-questions (philosophical, historical, sociological, and political) to be asked about information studies, there are meta-questions that may be asked both about philosophy of information studies and about philosophy of information. These include questions about when, where, and how philosophy of these kinds has been done, who it has been done by, and what motivations people have had for doing it. Such questions are asked by historians and sociologists of philosophy (see, e.g., R. Collins, 1998).

It is relatively easy to trace the histories of a few well-defined branches of philosophy of information: information ethics, information-theoretic epistemology, and social epistemology come to mind. But, taken as wholes, both philosophy of information and philosophy of information studies are diffuse, unbounded fields that lack scholarly associations, journals, textbooks, and reputations. The high-quality work that exists remains scattered, infrequently cited, and (one sometimes suspects) unread. The appearance in the early 2000s of several special issues of journals devoted to topics in philosophy of information demonstrates that the field is gradually attaining some degree of respectability within information studies; but, given the field's lack of a clearly expressed identity, it is probably too early to expect any significant contributions to an understanding of its historical development. When that history is written, it will assuredly be of great interest to scholars wishing to see how the kinds of philosophical questions asked in information studies, and the kinds of answers offered, have changed over the years, which long-standing assumptions and beliefs (if any) have been challenged by the various paradigm shifts that have been identified in the broader academy, and how social factors have played a role in those developments.

Much of the intent of this review has been to examine the influence of philosophy on information studies. As part of any general quest to understand the interdisciplinary nature of information studies (see, e.g., L. C. Smith, 1992), we may well wish to look in the opposite direction and ask, To what extent does information studies contribute to "mainstream" philosophy? The short answer here is "Hardly at all." The "trade deficit" produced by the imbalance between intellectual imports (from philosophy to information studies) and exports (to philosophy from information studies) could doubtless be demonstrated bibliometrically (see, e.g., Cronin & Meho, 2008, for a description of the kinds of methods that could be used). Certainly, the frequency with which contributions to the literature of information studies are cited in the literature of philosophy is vanishingly low. Moreover, the status within the general philosophical community of philosophy of information studies sometimes seem to be roughly on a par with that of the philosophy of pasta. Things may change in the future as increasing numbers of

philosophers first find inspiration in information-related phenomena and subsequently become aware of the existence of an entire field that, for one reason and another, has often struggled to attract the academic respect for which it has yearned.

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Fig. 1. A semiotic model of the relationships between reality, thought, and language.

	Real-world situations:	Mental representations:	Linguistic expressions:
	Information as reality	Information as message, meaning, knowledge, image	Information as signal, vehicle, data, document, thing
Tokens / Particulars	States of affairs	Thoughts	Utterances
Types / Universals		Propositions	Sentences