

■ PART I

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# FOUNDATIONAL ISSUES AND METHODOLOGICAL FRAMEWORKS

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# Foundations of Information Ethics

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## 1.1 INTRODUCTION

We call our society “the information society” because of the pivotal role played by intellectual, intangible assets (knowledge-based economy), information-intensive services (business and property services, communications, finance, and insurance), and public sectors (education, public administration, health care). As a social organization and way of life, the information society has been made possible by a cluster of information and communication technologies (ICTs) infrastructures. And as a full expression of *techne*, the information society has already posed fundamental ethical problems, whose complexity and global dimensions are rapidly growing and evolving. Nowadays, a pressing task is to formulate an information ethics that can treat the world of data, information, and knowledge,<sup>1</sup> with their relevant life cycles (including creation, elaboration, distribution, communication, storage, protection, usage, and possible destruction), as a new environment, the *infosphere*,<sup>2</sup> in which humanity is and will be flourishing. An information ethics should be able to address and solve the ethical challenges arising in the infosphere.

The last statement is more problematic than it might seem at first sight. As we shall see in some detail in the following sections, in recent years, “Information Ethics” (IE) has come to mean different things to different researchers working in a variety of disciplines, including computer ethics, business ethics, medical ethics, computer

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<sup>1</sup>For this distinction, see Floridi (1999b).

<sup>2</sup>*Infosphere* is a neologism I coined years ago (see, e.g., Floridi (1999b) or Wikipedia) based on “biosphere,” a term referring to that limited region on our planet that supports life. It denotes the whole informational environment constituted by all informational entities (thus including informational agents as well), their properties, interactions, processes, and mutual relations. It is an environment comparable to, but different from, cyberspace (which is only one of its subregions, as it were), since it also includes offline and analogue spaces of information.

science, the philosophy of information, social epistemology ICT studies, and library and information science. This is not surprising. Given the novelty of the field, the urgency of the problems it poses, and the multifarious nature of the concept of information itself and of its related phenomena, perhaps a Babel of interpretations was always going to be inevitable.<sup>3</sup> It is, however, unfortunate, for it has generated some confusion about the specific *nature*, *scope*, and *goals* of IE. Fortunately, the problem is not irredeemable, for a unified approach can help to explain and relate the main senses in which IE has been discussed in the literature. This approach will be introduced in the rest of this section. Once it is outlined, I shall rely on it in order to reconstruct three different approaches to IE, in Sections 1.2–1.4. These will then be critically assessed in Section 1.5. In Section 1.6, I will show how the approaches can be overcome by a fourth approach, which will be qualified as macroethical. In Section 1.7 two main criticisms, often used against IE as a macroethical theory, are discussed. Section 1.8 concludes this chapter with some brief, general considerations.

The approach mentioned above is best introduced schematically and by focusing our attention on a moral agent A. ICTs affect an agent's moral life in many ways. Recently (Floridi, forthcoming), I suggested that these may be schematically organized along three lines (see Fig. 1.1).

Suppose our moral agent A is interested in pursuing whatever she considers her best course of action, given her predicament. We shall assume that A's evaluations and interactions have some moral value, but no specific value needs to be introduced at this stage. Intuitively, A can avail herself of some information (information as a *resource*) to generate some other information (information as a *product*) and, in so doing, affect her informational environment (information as *target*). This simple model, summarized in Fig. 1.1, may help one to get some initial orientation in the multiplicity of issues belonging to Information Ethics. I shall refer to it as the RPT model.

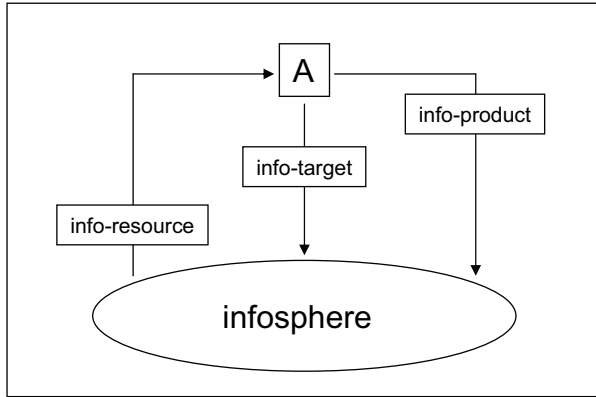
The RPT model is useful to explain, among other things, why any technology that radically modifies the "life of information" is bound to have profound moral implications for any moral agent. Moral life is a highly information-intensive activity, and ICTs, by radically transforming the informational context in which moral issues arise, not only add interesting new dimensions to old problems, but may lead us to rethink, methodologically, the very grounds on which our ethical positions are based.<sup>4</sup>

At the same time, the model rectifies an excessive emphasis occasionally placed on specific technologies (this happens most notably in *computer ethics*), by calling our attention to the more fundamental phenomenon of information in all its varieties and long tradition. This was also Wiener's position,<sup>5</sup> and it might be argued that the various difficulties encountered in the conceptual foundations of information and computer ethics are arguably connected to the fact that the latter has not yet been recognized as primarily an environmental ethics, whose main concern is (or should be) the ecological

<sup>3</sup>On the various senses in which "information" may be understood see Floridi (2005a).

<sup>4</sup>For a similar position in computer ethics see Maner (1996) on the so-called "uniqueness debate" see Floridi and Sanders (2002a) and Tavani (2002).

<sup>5</sup>The classic reference here is to Wiener (1954). Bynum (2001) has convincingly argued that Wiener may be considered as one of the founding fathers of information ethics.



**FIGURE 1.1** The “External” R(esource) P(rodut) T(arget) model

management and well-being of the infosphere (see Floridi and Sanders (2002b) for a defense of this position).

Since the appearance of the first works in the eighties,<sup>6</sup> Information Ethics has been claimed to be the study of moral issues arising from one or another of the three distinct “information arrows” in the RPT model. We are now ready to map the different approaches to IE by following each arrow.

## 1.2 THE FIRST STAGE: IE AS AN ETHICS OF INFORMATIONAL RESOURCES

According to Froehlich (2004),<sup>7</sup> the expression “information ethics” was introduced in the 1980s by Koenig et al. (1981) and Hauptman (1988), who then went on to establish the *Journal of Information Ethics* in 1992. It was used as a general label to discuss issues regarding information (or data) confidentiality, reliability, quality, and usage. Not surprisingly, the disciplines involved were initially library and information science and business and management studies. They were only later joined by information technologies studies.

It is easy to see that this initial interest in information ethics was driven by concern about information as a resource that should be managed efficiently, effectively, and fairly. Using the RPT model, this meant paying attention to the crucial role played by information as something extremely valuable for A’s evaluations and actions, especially in moral contexts. Moral evaluations and actions have an epistemic component, as A may be expected to proceed “to the best of her information,” that is, A may be expected to avail herself of whatever information she can muster, in order to reach (better) conclusions about what can and ought to be done in some given

<sup>6</sup>An early review is provided by Smith (1996).

<sup>7</sup>For a reconstruction of the origins of IE see also Capurro (2006).

circumstances. Socrates already argued that a moral agent is naturally interested in gaining as much valuable information as the circumstances require, and that a well-informed agent is more likely to do the right thing. The ensuing “ethical intellectualism” analyzes evil and morally wrong behavior as the outcome of deficient information. Conversely, A’s moral *responsibility* tends to be directly proportional to A’s degree of information: any decrease in the latter usually corresponds to a decrease in the former. This is the sense in which information occurs in the guise of judicial evidence. It is also the sense in which one speaks of A’s informed decision, informed consent, or well-informed participation. In Christian ethics, even the worst sins can be forgiven in the light of the sinner’s insufficient information, as a counterfactual evaluation is possible: had A been properly informed, A would have acted differently and hence would not have sinned (Luke 23:44). In a secular context, Oedipus and Macbeth remind us how the mismanagement of informational resources may have tragic consequences.<sup>8</sup>

From a “resource” perspective, it seems that the moral machine needs information, and quite a lot of it, to function properly. However, even within the limited scope adopted by an analysis based solely on information as a resource, care should be exercised lest all ethical discourse is reduced to the nuances of higher quantity, quality, and intelligibility of informational resources. The more the better is not the only, nor always the best, rule of thumb, for the (sometimes explicit and conscious) withdrawal of information can often make a significant difference. A may need to lack (or preclude herself from accessing) some information in order to achieve morally desirable goals, such as protecting anonymity, enhancing fair treatment, or implementing unbiased evaluation. Famously, Rawls’ “veil of ignorance” exploits precisely this aspect of information-as-a-resource, in order to develop an impartial approach to justice (Rawls, 1999). Being informed is not always a blessing and might even be morally wrong or dangerous.

Whether the (quantitative and qualitative) presence or the (total) absence of information-as-a-resource is in question, it is obvious that there is a perfectly reasonable sense in which Information Ethics may be described as the study of the moral issues arising from “the triple A”: *availability*, *accessibility*, and *accuracy* of informational resources, independently of their format, kind, and physical support. Rawls’ position has been already mentioned. Since the 1980s, other important issues have been unveiled and addressed by IE understood as an Information-as-Resource Ethics: the so-called *digital divide*, the problem of *infoglut*, and the analysis of the *reliability* and *trustworthiness* of information sources (Froehlich, 1997; Smith, 1997). Courses on IE, taught as part of Information Sciences degree programs, tend to share this approach as researchers in library and information sciences are particularly sensitive to such issues, also from a professional perspective (Alfino and Pierce, 1997; Mintz, 1990; Stichler and Hauptman, 1998).

One may recognize in this original approach to Information Ethics a position broadly defended by Van Den Hoven (1995) and more recently by Mathiesen (2004),

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<sup>8</sup>For an analysis of the so-called IT-heodicean problem and of the tragedy of the good will, see Floridi (2006 b).

who criticizes Floridi and Sanders (1999) and is in turn criticized by Mather (2005). Whereas Van den Hoven purports to present this approach to IE as an enriching perspective contributing to the wider debate on a more broadly constructed conception of IE, Mathiesen appears to present her view, restricted to the informational needs and states of the individual moral agent, as the only correct interpretation of IE. Her position seems thus undermined by the problems affecting any univocal interpretation of IE, as Mather correctly argues.

### 1.3 THE SECOND STAGE: IE AS AN ETHICS OF INFORMATIONAL PRODUCTS

It seems that IE began to merge with computer ethics only in the 1990s, when the ICT revolution became so widespread as to give rise to new issues not only in the management of information-as-a-resource by professional figures (librarians, journalists, scholars, scientists, IT specialists, and so forth) but also in the distributed and pervasive creation, consumption, sharing, and control of information, by a very large and quickly increasing population of people online, commonly used to dealing with digital tools of all sorts (games, mobiles, emails, CD players, DVD players, etc.). In other words, the Internet highlighted how IE could also be understood in a second but closely related sense, in which information plays an important role as a *product* of A's moral evaluations and actions (Cavalier, 2005). To understand this transformation, let us consider the RPT model again.

It is easy to see that our agent A is not only an information consumer but also an information producer, who may be subject to constraints while being able to take advantage of opportunities in the course of her activities. Both constraints and opportunities may call for an ethical analysis. Thus, IE, understood as Information-as-a-Product Ethics, will cover moral issues arising, for example, in the context of *accountability, liability, libel legislation, testimony, plagiarism, advertising, propaganda, misinformation*, and more generally of *pragmatic rules of communication* à la Grice. The recent debate on P2P software provides a good example, but, once again, this way of looking at Information Ethics is far from being a total novelty. Kant's classic analysis of the immorality of *lying* is one of the best known case studies in the philosophical literature concerning this kind of Information Ethics. Cassandra and Laocoön, pointlessly warning the Trojans against the Greeks' wooden horse, remind us how the ineffective management of informational products may have tragic consequences. Whoever works in mass media studies will have encountered this sort of ethical issues.

It is hard to identify researchers who uniquely support this specific interpretation of IE, as works on Information-as-Product Ethics tend to be inclusive, that is, they tend to build on the first understanding of IE as an ethics of informational resources and add to it a new layer of concerns for informational products as well (see, e.g., Moore, 2005). However, the shift from the first to the second sense of IE (from resource to product) can be noted in some successful anthologies and textbooks, which were carefully revised when undergoing new editions. For example, Spinello (2003) explicitly

emphasizes much more the ethical issues arising in the networked society, compared to the first edition (Spinello, 1997), and hence a sort of IE that is closer to the sense clarified in this section rather than that in the previous section. And Severson (1997), after the typical introduction to ethical ideas, dedicates a long chapter to respect for intellectual property. Finally, it would be fair to say that the new perspective can be more often found shared, perhaps implicitly, by studies that are socio-legally oriented and in which IT-professional issues appear more prominently.

#### 1.4 THE THIRD STAGE: IE AS AN ETHICS OF THE INFORMATIONAL ENVIRONMENT

The emergence of the information society has further expanded the scope of IE. The more people have become accustomed to living and working immersed within digital environments, the easier it has become to unveil new ethical issues involving informational realities. Returning to our initial model, independently of A's information input (info-resource) and output (info-product), in the 1990s there appeared works highlighting a third sense in which information may be subject to ethical analysis, namely, when A's moral evaluations and actions affect the informational environment. Think, for example, of A's respect for, or breach of, someone's information *privacy* or *confidentiality*.<sup>9</sup> *Hacking*, understood as the unauthorized access to a (usually computerized) information system, is another good example because it shows quite clearly the change in perspective. In the 1980s it was not uncommon to mistake hacking for a problem to be discussed within the conceptual frame of an ethics of informational resources. This misclassification allowed the hacker to defend his position by arguing that no use (let alone misuse) of the accessed information had been made. Yet hacking, properly understood, is a form of breach of privacy. What is in question is not what A does with the information, which has been accessed without authorization, but what it means for an informational environment to be accessed by A without authorization. So the analysis of hacking belongs to what in this section has been defined as an Information-as-Target Ethics. Other issues here include *security* (including issues related to digital warfare and terrorism), *vandalism* (from the burning of libraries and books to the dissemination of viruses), *piracy*, *intellectual property*, *open source*, *freedom of expression*, *censorship*, *filtering*, and *contents control*. Mill's analysis "Of the Liberty of Thought and Discussion" is a classic of IE interpreted as Information-as-Target Ethics. Juliet, simulating her death, and Hamlet, reenacting his father's homicide, show how the risky management of one's informational environment may have tragic consequences.

Works in this third trend in IE are characterized by environmental and global concerns. They also continue the merging process of Information and Computer Ethics begun in the 1990s (Woodbury, 2003), moving toward what Charles Ess has labeled ICE (Weckert and Adeney, 1997). Perhaps one of the first works to look at IE as an ethics of "things" that, as patients, are affected by an agent's behavior is Floridi (1999a) (but see

<sup>9</sup>For further details see Floridi (2005c).



also Floridi, 2003). On the globalization of IE, Bynum and Rogerson (1996) is among the important references (but see also Buchanan, 1999; Ess, 2006), together with the regular publication of the *International Review of Information Ethics*, edited by Rafael Capurro at the International Centre for Information Ethics (<http://icie.zkm.de/>).

## 1.5 THE LIMITS OF ANY MICROETHICAL APPROACH TO INFORMATION ETHICS

So far we have seen that the RPT model may help one to get some initial orientation in the multiplicity of issues belonging to different interpretations of Information Ethics. Despite its advantages, however, the model can still be criticized for being inadequate, for at least two reasons.

First, the model is too simplistic. Arguably, several important issues belong mainly but not only to the analysis of just one “informational arrow.” The reader may have already thought of several examples that illustrate the problem: someone’s testimony is someone’s else trustworthy information; A’s responsibility may be determined by the information A holds, but it may also concern the information A issues; censorship affects A both as a user and as a producer of information; misinformation (i.e., the deliberate production and distribution of misleading information) is an ethical problem that concerns all three “informational arrows”; freedom of speech also affects the availability of offensive content (e.g., child pornography, violent content, and socially, politically, or religiously disrespectful statements) that might be morally questionable and should not circulate. Historically, all this means that some simplifications, associating decades to specific approaches to IE, are just that, simplifications that should be taken with a lot of caution. The “arrows” are normally much more entwined.

Second, the model is insufficiently inclusive. There are many important issues that cannot easily be placed on the map at all, for they really emerge from, or supervene on, the interactions among the “informational arrows.” Two significant examples may suffice: “big brother,” that is, the problem of *monitoring and controlling* anything that might concern A; and the debate about information *ownership* (including copyright and patent legislation) and *fair use*, which affects both users and producers while shaping their informational environment.

Both criticisms are justified: the RPT model is indeed inadequate. Yet why it is inadequate is a different matter. The tripartite analysis just provided helps to structure both chronologically and analytically the development of IE and its interpretations. But it is unsatisfactory, despite its initial usefulness, precisely because any interpretation of Information Ethics based on only one of the “informational arrows” is bound to be too reductive. As the examples mentioned above emphasize, supporters of narrowly constructed interpretations of Information Ethics as a *microethics* (i.e., a one-arrow-only ethics, to use our model) are faced with the problem of being unable to cope with a large variety of relevant issues, which remain either uncovered or inexplicable. In other words, the model shows that idiosyncratic versions of IE, which privilege only some limited aspects of the *information cycle*, are unsatisfactory. We should not use the model to attempt to pigeonhole problems neatly, which is

impossible. We should rather exploit it as a useful first approximation to be superseded, in view of a more encompassing approach to IE as a *macroethics*, that is, a theoretical, field-independent, applicable ethics. Philosophers will recognize here a Wittgensteinian ladder that can be used to reach a new starting point, but then can be discharged.

In order to climb up on, and then throw away, any narrowly constructed conception of Information Ethics, a more encompassing approach to IE needs to

- (i) Bring together the three “informational arrows”;
- (ii) Consider the whole information cycle; and
- (iii) Analyze informationally all entities involved (including the moral agent A) and their changes, actions, and interactions, by treating them not apart from, but as part of, the informational environment, or *infosphere*, to which they belong as informational systems themselves.

As steps (i) and (ii) do not pose particular problems, and may be shared by any of the three approaches already seen, step (iii) is crucial but involves an “update” in the ontological conception of “information” at stake. Instead of limiting the analysis to (veridical) semantic contents—as any narrower interpretation of IE as a microethics inevitably does—an ecological approach to Information Ethics also looks at information from an object-oriented perspective, and treats it as entity as well. In other words, one moves from a (broadly constructed) epistemological conception of Information Ethics—in which information is roughly equivalent to news or semantic content—to one which is typically ontological, and treats information as equivalent to patterns or entities in the world. Thus, in the revised RPT model, represented in Fig. 1.2, the agent is embodied and embedded, as an informational agent, in an equally informational environment.

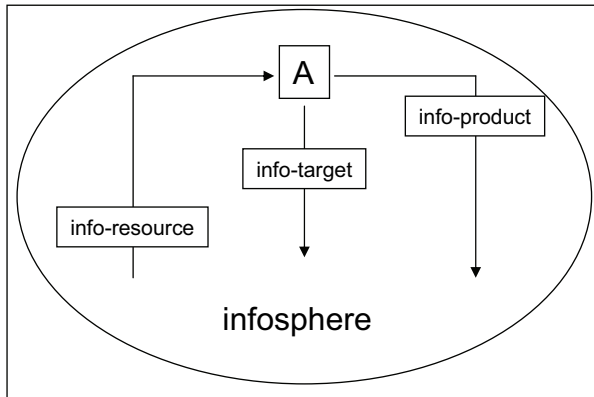
A simple analogy may help to introduce this new perspective.<sup>10</sup> Imagine looking at the whole universe from a chemical perspective.<sup>11</sup> Every entity and process will satisfy a certain chemical description. To simplify, a human being, for example, will be 90% water and 10% something else. Now consider an informational perspective. The same entities will be described as clusters of data, that is, as informational objects. More precisely, our agent A (like any other entity) will be a discrete, self-contained, encapsulated package containing:

- (i) The appropriate data structures, which constitute the nature of the entity in question, that is, the state of the object, its unique identity and its attributes; and

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<sup>10</sup>For a detailed analysis and defense of an object-oriented modeling of informational entities see Floridi and Sanders (1999), Floridi (2003, 2004).

<sup>11</sup>“Perspective” here really means level of abstraction; however, for the sake of simplicity the analysis of levels of abstractions has been omitted from this chapter. The interested reader may wish to consult Floridi and Sanders (2004a).



**FIGURE 1.2** “Internal” R(ESource) P(ROduct) T(ARGET) model: the Agent A is correctly embedded within the infosphere.

- (ii) A collection of operations, functions, or procedures, which are activated by various interactions or stimuli (i.e., messages received from other objects or changes within itself) and correspondingly define how the object behaves or reacts to them.

At this level of analysis, informational systems as such, rather than just living systems in general, are raised to the role of agents and patients (senders and receivers) of any action, with environmental processes, changes and interactions equally described informationally.

Understanding the *nature* of IE ontologically, rather than epistemologically, modifies the interpretation of the *scope* and *goals* of IE. Not only can an ecological IE gain a global view of the whole life cycle of information, thus overcoming the limits of other microethical approaches, but it can also claim a role as a macroethics, that is, as an ethics that concerns the whole realm of reality. This is what we shall see in the next section.

## 1.6 THE FOURTH STAGE: INFORMATION ETHICS AS A MACROETHICS

The fourth interpretation of IE, as a macroethics, may be quickly summarized thus: IE is a *patient-oriented, ontocentric, ecological* macroethics (Floridi and Sanders, 1999). These are technical expressions that can be intuitively explained by comparing IE to other environmental approaches.<sup>12</sup>

<sup>12</sup>For an initial development of Information Ethics and a more technical treatment of some of the themes discussed in this paper see the following papers, available from <http://www.philosophyofinformation.net/papers.htm>: Floridi (1995, 1999a, 2002, 2003, 2005d, 2005c, 2006a, 2006b, forthcoming), Floridi and Sanders (1999, 2001, 2002b, 2004a, 2004b, 2005).

Biocentric ethics usually grounds its analysis of the moral standing of bioentities and ecosystems on the intrinsic worthiness of *life* and the intrinsically negative value of *suffering*. It seeks to develop a patient-oriented ethics in which the “patient” may be not only a human being, but also any form of life. Indeed, Land Ethics extends the concept of patient to any component of the environment, thus coming close to the approach defended by Information Ethics. Any form of life is deemed to enjoy some essential proprieties or moral interests that deserve and demand to be respected, at least minimally and relatively, that is, in a possibly overridable sense, when contrasted to other interests. So biocentric ethics argues that the nature and well-being of the patient of any action constitute (at least partly) its moral standing and that the latter makes important claims on the interacting agent, claims that in principle ought to contribute to the guidance of the agent’s ethical decisions and the constraint of the agent’s moral behavior. The “receiver” of the action, the patient, is placed at the core of the ethical discourse, as a center of moral concern, while the “transmitter” of any moral action, the agent, is moved to its periphery.

Now substitute “life” with “existence” and it should become clear what IE amounts to. IE is an ecological ethics that replaces *biocentrism* with *ontocentrism*. It suggests that there is something even more elemental than life, namely *being*—that is, the existence and flourishing of all entities and their global environment—and something more fundamental than suffering, namely *entropy*. The latter is most emphatically *not* the physicists’ concept of thermodynamic entropy. Entropy here refers to any kind of *destruction, corruption, pollution, and depletion* of informational objects (mind, not of information), that is, any form of impoverishment of *being*. It is comparable to the metaphysical concept of *nothingness*. IE then provides a common vocabulary to understand the whole reality informationally. IE holds that *being/information* has an intrinsic worthiness. It substantiates this position by recognizing that any informational entity has a *Spinozian* right to persist in its own status, and a *Constructionist* right to flourish, that is, to improve and enrich its existence and essence. As a consequence of such “rights,” IE evaluates the duty of any moral agent in terms of contribution to the growth of the *infosphere* and any process, action, or event that negatively affects the whole infosphere—not just an informational entity—as an increase in its level of nothingness (or entropy) and hence an instance of evil (Floridi, 2003; Floridi and Sanders, 1999, 2001).

In IE, the ethical discourse concerns any entity, understood informationally, that is, not only all persons, their cultivation, well-being, and social interactions, not only animals, plants, and their proper natural life, but also anything that exists, from paintings and books to stars and stones; anything that may or will exist, like future generations; and anything that was but is no more, like our ancestors or old civilizations. IE is impartial and universal because it brings to ultimate completion the process of enlargement of the concept of what may count as a center of a (no matter how minimal) moral claim, which now includes every instance of *being* understood informationally, no matter whether physically implemented or not. In this respect, IE holds that every entity, as an expression of *being*, has a dignity, constituted by its mode of existence and essence (the collection of all the elementary proprieties that constitute it for what it is), which deserves to be respected (at least in a minimal and

overridable sense) and hence places moral claims on the interacting agent and ought to contribute to the constraint and guidance of his ethical decisions and behavior. This *ontological equality principle* means that any form of reality (any instance of information/*being*), simply for the fact of *being* what it is, enjoys a minimal, initial, overridable, equal right to exist and develop in a way that is appropriate to its nature. The conscious recognition of the ontological equality principle presupposes a disinterested judgment of the moral situation from an objective perspective, that is, a perspective that is as nonanthropocentric as possible. Moral behavior is less likely without this epistemic virtue. The application of the ontological equality principle is achieved whenever actions are impartial, universal, and “caring.”

The crucial importance of the radical change in ontological perspective cannot be overestimated. Bioethics and Environmental Ethics fail to achieve a level of complete impartiality, because they are still biased against what is inanimate, lifeless, intangible, or abstract (e.g., even Land Ethics is biased against technology and artifacts). From their perspective, only what is intuitively alive deserves to be considered as a proper center of moral claims, no matter how minimal, so a whole universe escapes their attention. Now, this is precisely the fundamental limit overcome by IE, which further lowers the minimal condition that needs to be satisfied, in order to qualify as a center of moral concern, to the common factor shared by any entity, namely its informational state. And as any form of *being* is, in any case, also a coherent body of information, to say that IE is infocentric is tantamount to interpreting it, correctly, as an ontocentric theory.

The result is that all entities, *qua* informational objects, have an intrinsic moral value, although possibly quite minimal and overridable, and hence they can count as moral patients, subject to some equally minimal degree of moral respect understood as *a disinterested, appreciative, and careful attention* (Hepburn, 1984). As Naess (1973) has maintained, “all things in the biosphere have an equal right to live and blossom.” There seems to be no good reason not to adopt a higher and more inclusive, ontocentric perspective. Not only inanimate but also ideal, intangible, or intellectual objects can have a minimal degree of moral value, no matter how humble, and so be entitled to some moral respect.

Deep Ecologists have already argued that inanimate things too can have some intrinsic value. And in a famous article, White (1967) asked “Do people have ethical obligations toward rocks?” and answered that “To almost all Americans, still saturated with ideas historically dominant in Christianity. . . the question makes no sense at all. If the time comes when to any considerable group of us such a question is no longer ridiculous, we may be on the verge of a change of value structures that will make possible measures to cope with the growing ecologic crisis. One hopes that there is enough time left.” According to IE, this is the right ecological perspective and it makes perfect sense for any religious tradition (including the Judeo-Christian one) for which the whole universe is God’s creation, is inhabited by the divine, and is a gift to humanity, of which the latter needs to take care. IE translates all this into informational terms. If something can be a moral patient, then its nature can be taken into consideration by a moral agent A, and contribute to shaping A’s action, no matter how minimally. In more metaphysical terms, IE argues that all aspects and instances of *being* are worth some initial, perhaps minimal, and overridable, form of moral respect.

Enlarging the conception of what can count as a center of moral respect has the advantage of enabling one to make sense of the innovative and epochal nature of ICTs, as providing a new and powerful conceptual frame. It also enables one to deal more satisfactorily with the original character of some of its moral issues, by approaching them from a theoretically strong perspective. Through time, ethics has steadily moved from a narrow to a more inclusive concept of what can count as a center of moral worth, from the citizen to the biosphere (Nash, 1989). The emergence of the infosphere, as a new environment in which human beings spend much of their lives, explains the need to enlarge further the conception of what can qualify as a moral patient. IE represents the most recent development in this ecumenical trend, a Platonist and ecological approach without a biocentric bias, a move from the biosphere to the infosphere. More than 50 years ago, Leopold defined Land Ethics as something that “changes the role of *Homo sapiens* from conqueror of the land community to plain member and citizen of it. It implies respect for his fellow members, and also respect for the community as such. The land ethic simply enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively: the land” (Leopold, 1949, p. 403). IE translates environmental ethics into terms of infosphere and informational objects, for the land we inhabit is not just the earth.

### 1.6.1 Moral Agents

We have seen that the whole infosphere counts as a patient of moral action, according to IE. But what sort of moral agents inhabit the infosphere? The short answer is that IE defines as a moral agent any *interactive, autonomous, and adaptable transition system* that can perform *morally qualifiable actions* (Floridi, 2004). As usual, the rest of this section is devoted to explaining and discussing this definition.

A transition system is *interactive* when the system and its environment (can) act upon each other. Typical examples include input or output of a value, or simultaneous engagement of an action by both agent and patient—for example, gravitational force between bodies.

A transition system is *autonomous* when the system is able to change state without direct response to interaction, that is, it can perform internal transitions to change its state. So an agent must have at least two states. This property imbues an agent with a certain degree of complexity and independence from its environment.

Finally, a transition system is *adaptable* when the system’s interactions (can) change the transition rules by which it changes state. This property ensures that an agent might be viewed as learning its own mode of operation in a way that depends critically on its experience.

All we need to understand now is the meaning of “morally qualifiable action.” Very simply, an action qualifies as moral if it can cause moral good or evil. Note that this interpretation is neither consequentialist nor intentionalist in nature. We are neither affirming nor denying that the specific evaluation of the morality of the agent might depend on the specific outcome of the agent’s actions or on the agent’s original intentions or principles.

With all the definitions in place, it becomes possible to understand why, according to IE, *artificial agents* (not just digital agents but also social agents, such as companies, parties, or hybrid systems formed by humans and machines, or technologically augmented humans) count as moral agents that are morally *accountable* for their actions.

The enlargement of the class of moral agents by IE brings several advantages. Normally, an entity is considered a moral agent only if (i) it is an *individual* agent and (ii) it is *human based*, in the sense that it is either human or at least reducible to an identifiable aggregation of human beings, who remain the only morally responsible sources of action, like ghosts in the legal machine. Limiting the ethical discourse to *individual agents* hinders the development of a satisfactory investigation of *distributed morality*, a macroscopic and growing phenomenon of global moral actions and collective responsibilities, resulting from the “invisible hand” of systemic interactions among several agents at a local level. Insisting on the necessarily *human-based nature* of the agent means undermining the possibility of understanding another major transformation in the ethical field, the appearance of artificial agents that are sufficiently informed, “smart,” autonomous, and able to perform morally relevant actions independently of the humans who created them, causing “artificial good” and “artificial evil” (Floridi and Sanders, 1999, 2001).

We have seen that morality is usually predicated upon responsibility. By distinguishing between moral responsibility, which requires intentions, consciousness, and other mental attitudes, and moral accountability, we can now avoid anthropocentric and anthropomorphic attitudes toward agenthood. Instead, we can rely on an ethical outlook based not only on punishment and reward (responsibility-oriented ethics) but also on moral agenthood, accountability, and censure. We are less likely to assign responsibility at any cost, forced by the necessity to identify individual, human agent (s). We can stop the regress of looking for the *responsible* individual when something evil happens, since we are now ready to acknowledge that sometimes the moral source of evil or good can be different from an individual or group of humans (note that this was a reasonable view in Greek philosophy). As a result, we are able to escape the dichotomy:

- (i) [(responsibility implies moral agency) implies prescriptive action], versus
- (ii) [(no responsibility implies no moral agency) implies no prescriptive action].

There can be moral agency in the absence of moral responsibility. Promoting normative action is perfectly reasonable even when there is no responsibility but only moral accountability and the capacity for moral action.

Being able to treat nonhuman agents as moral agents facilitates the discussion of the morality of agents not only in cyberspace but also in the biosphere—where animals can be considered moral agents without their having to display free will, emotions, or mental states—and in contexts of “distributed morality,” where social and legal agents can now qualify as moral agents. The great advantage is a better grasp of the moral discourse in nonhuman contexts.

All this does not mean that the concept of “responsibility” is redundant. On the contrary, the previous analysis makes clear the need for further analysis of the concept of responsibility itself, especially when the latter refers to the ontological commitments of creators of new agents and environments. The only “cost” of a “mind-less morality” approach is the extension of the class of agents and moral agents to embrace artificial agents. It is a cost that is increasingly worth paying the more we move toward an advanced information society.

### 1.6.2 The Responsibilities of Human Agents

Humans are special moral agents. Like demiurges, we have “ecopoietic” responsibilities toward the whole infosphere. So Information Ethics is an ethics addressed not just to “users” of the world but also to producers, who are “divinely” responsible for its creation and well-being. It is an ethics of *creative stewardship* (Floridi, 2002, 2003; Floridi and Sanders, 2005).

The term “ecopoiesis” refers to the morally informed construction of the environment, based on an ecologically oriented perspective. In terms of a philosophical anthropology, the ecopoietic approach, supported by IE, is embodied by what I have termed *homo poieticus* (Floridi, 1999b). *Homo poieticus* is to be distinguished from *homo faber*, user and “exploitator” of natural resources, from *homo oeconomicus*, producer, distributor, and consumer of wealth, and from *homo ludens* (Huizinga, 1970), who embodies a leisurely playfulness, devoid of the ethical care and responsibility characterizing the constructionist attitude. *Homo poieticus* is a demiurge who takes care of reality to protect it and make it flourish. This reality has been defined above as the infosphere.

The ontic powers of *homo poieticus* have been steadily increasing. Today, *homo poieticus* can variously exercise them (in terms of control, creation, or modeling) over himself (e.g., genetically, physiologically, neurologically, and narratively), over his society (e.g., culturally, politically, socially, and economically), and over his natural or artificial environments (e.g., physically and computationally). The more powerful *homo poieticus* becomes as an agent, the greater his duties and responsibilities become, as a *moral agent*, to oversee not only the development of his own character and habits but also the well-being and flourishing of each of his ever-expanding spheres of influence, to include the whole infosphere. To move from individual virtues to global values, an *ecopoietic* approach is needed that recognizes our *responsibilities* toward the environment (including present and future inhabitants) as its enlightened creators, stewards or supervisors, not just as its virtuous users and consumers.

### 1.6.3 Four Moral Principles

What sort of principles may guide the actions of *homo poieticus*? IE determines what is morally right or wrong, what ought to be done, what the duties, the “oughts,” and the “ought nots” of a moral agent are, by means of four basic moral laws. They are formulated here in an informational vocabulary and in a patient-oriented version, but



an agent-oriented one is easily achievable in more metaphysical terms of “dos” and “don’ts”:

- (1) Entropy ought not to be caused in the infosphere (null law);
- (2) Entropy ought to be prevented in the infosphere;
- (3) Entropy ought to be removed from the infosphere;
- (4) The flourishing of informational entities as well as of the whole infosphere ought to be promoted by preserving, cultivating, and enriching their properties.

The basic moral question asked by IE is: what is good for informational entities and for the infosphere in general? We have seen that the answer is provided by a minimalist theory: any informational entity is recognized to be the center of some basic ethical claims, which deserve recognition and should help to regulate the implementation of any informational process involving it. It follows that approval or disapproval of A’s decisions and actions should also be based on how the latter affects the well-being of the infosphere, that is, on how successful or unsuccessful they are in respecting the ethical claims attributable to the informational entities involved, and hence in improving or impoverishing the infosphere. The duty of any moral agent should be evaluated in terms of contribution to the sustainable blooming of the infosphere, and any process, action, or event that negatively affects the whole infosphere—not just an informational object—should be seen as an increase in its level of entropy and hence an instance of evil.

The four laws are listed in order of increasing moral value. Their strict resemblance to similar principles in medical ethics is not accidental, since both approaches share an ethics of care. They clarify, in very broad terms, what it means to live as a responsible and caring agent in the infosphere.

On the one hand, a process that satisfies only the null law—the level of entropy in the infosphere remains unchanged after its occurrence—either has no moral value, that is, it is morally irrelevant or insignificant, or it is equally depreciable and commendable, though in different respects. Likewise, a process is increasingly depreciable, and its agent source is increasingly blameworthy, the lower is the number-index of the specific law that it fails to satisfy. Moral mistakes may occur and entropy may increase if one wrongly evaluates the impact of one’s actions because projects conflict or compete, even if those projects aim to satisfy IE moral laws. This is especially the case when “local goodness,” that is, the improvement of a region of the infosphere, is favored to the overall disadvantage of the whole environment. More simply, entropy may increase because of the wicked nature of the agent (this possibility is granted by IE’s negative anthropology).

On the other hand, a process is already commendable, and its agent-source praiseworthy, if it satisfies the *conjunction* of the null law with at least one other law, not the *sum* of the resulting effects. Note that, according to this definition, an action is unconditionally commendable only if it never generates any entropy in the course of its implementation; and the best moral action is the action that succeeds in satisfying all four laws at the same time.

Most of the actions that we judge morally good do not satisfy such strict criteria, for they achieve only a balanced positive moral value, that is, although their performance causes a certain quantity of entropy, we acknowledge that the infosphere is in a better state after their occurrence.

## 1.7 TWO RECURRENT OBJECTIONS AGAINST IE

Since the nineties,<sup>13</sup> when IE was first introduced as an environmental macroethics and a foundationalist approach to computer ethics, some standard objections have been made that seem to be based on a few basic misunderstandings. The point of this final section is not that of convincing the reader that no reasonable disagreement is possible about the value of IE in general and on IE as a macroethics in particular. On the contrary, several of the theses seen in the previous pages are interesting precisely because they are also open to discussion. Rather, the goal here is to remove some ambiguities and possible confusions that might prevent the correct evaluation of IE in its various interpretations, so that disagreement can become more constructive.

### 1.7.1 Does it Make Sense to Talk of Informational Entities and Agents?

By defending the intrinsic moral worth of informational entities and the importance of considering artificial agents as moral agents IE does not refer to the moral value of any other piece of well-formed and meaningful data such as an e-mail, the *Britannica*, or Newton's *Principia* (Himma, 2004, Mathiesen, 2004) or some science fiction robot such as *Star Wars'* C3PO and R2D2. What IE suggests is that one adopt an informational approach (technically, a level of abstraction) to the analysis of *being* in terms of a minimal common ontology, whereby human beings as well as animals, plants, artifacts, institutions, and so forth are interpreted as informational entities. IE is not an ethics of the BBC news or some artificial agent à la Asimov. Of course, it remains open to debate whether an informational level of abstraction adopted is correct. For example, the choice and hence its implications have been recently criticized by Johnson (2006) and Capurro (2006) has argued against the ontological options adopted by IE.

### 1.7.2 Is IE Inapplicable?

Given its ontological nature and wide scope, one of the objections that is sometimes made against IE is that of being too abstract or theoretical (too philosophical in the worst sense of the word) to be of much use when human agents are confronted by very

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<sup>13</sup>Fourth International Conference on Ethical Issues of Information Technology (Department of Philosophy, Erasmus University, The Netherlands, March 25–27, 1998); this was published as Floridi and Sanders (1999).

concrete and applied challenges (Mathiesen, 2004; Siponen, 2004). IE would work at a level of metaphysical abstraction too philosophical to make it of any direct utility for immediate needs and applications. Yet, this is the inevitable price to be paid for any foundationalist project. One must polarize theory and practice to strengthen both. IE is not immediately useful to solve specific ethical problems (including computer ethics problems), but it provides the conceptual grounds that then guide problem-solving procedures. Imagine someone who, being presented with the declaration of human rights, were to complain that it is too general and inapplicable to solve the ethical problems she is facing in a specific situation, say in dealing with a particular case of cyberstalking in the company that employs her. This would be rather out of place. The suspicion is that some impatience with conceptual explorations may betray a lack of understanding of how profound the revolution we are undergoing is, and hence how radical the rethinking of our ethical approaches and principles may need to be in order to cope with it. IE is certainly not the declaration of human rights, but it seeks to obtain a level of generality purporting to provide a foundation for more applied and case-oriented analyses. So the question is not whether IE is too abstract—good foundations for the structure one may wish to see being built inevitably lie well below the surface—but whether it will succeed in providing the robust framework within which practical issues of moral concern may be more easily identified, clarified, and solved. It is in its actual applications that IE, as an ethics for our information society, will or will not qualify as a useful approach; yet building on the foundation provided by IE is a serious challenge, it cannot be an objection. It is encouraging that IE has already been fruitfully applied to deal with the “tragedy of the digital commons” (Greco and Floridi, 2004), the digital divide (Floridi, 2002), the problem of telepresence (Floridi, 2005d), game cheating (Sicart, 2005), the problem of privacy (Floridi, 2005b), environmental issues (York, 2005) and software protocols design (Turilli, 2007).

## 1.8 CONCLUSION

In one of Einstein’s letters there is a passage that well summarizes the perspective advocated by IE understood as a macroethics: “A human being is part of the whole, called by us ‘universe,’ a part limited in time and space. He experiences himself, his thoughts and feelings, as something separated from the rest, a kind of optical delusion of his consciousness. This delusion is a kind of prison for us, restricting us to our personal desires and to affection for a few persons close to us. Our task must be to free ourselves from our prison by widening our circle of compassion to embrace all humanity and the whole of nature in its beauty. Nobody is capable of achieving this completely, but the striving for such achievement is in itself a part of the liberation and a foundation for inner security” (Einstein, 1954). Does looking at reality through the highly philosophical lens of an informational analysis improve our ethical understanding, or is it an ethically pointless (when not misleading) exercise? IE argues that the agent-related *behavior* and the patient-related *status* of informational objects *qua* informational objects can be morally significant, over and above the instrumental function that may be attributed to them by other ethical approaches, and hence that they

can contribute to determining, normatively, ethical duties and legally enforceable rights. IE's position, like that of any other macroethics, is not devoid of problems. But it can interact with other macroethical theories and contribute an important new perspective: a process or action may be morally good or bad irrespective of its consequences, motives, universality, or virtuous nature, but depending on how it affects the infosphere. An ontocentric ethics provides an insightful perspective. Without IE's contribution, our understanding of moral facts in general, not just of ICT-related problems in particular, would be less complete and our struggle to escape from our anthropocentric condition, being this Plato's cave or Einstein's cage, less successful.<sup>14</sup>

## REFERENCES

- Alfino, M. and Pierce, L. (1997). *Information Ethics for Librarians*. McFarland & Co., Jefferson, NC.
- Buchanan, E.A. (1999). An overview of information ethics issues in a world-wide context. *Ethics and Information Technology*, 1(3), 193–201.
- Bynum, T. (2001). Computer ethics: basic concepts and historical overview. In: Edward, N.Z. (Ed.), *The Stanford Encyclopedia of Philosophy*. <http://plato.stanford.edu/entries/ethics-computer>.
- Bynum, T.W.E. and Rogerson, S.E. (Eds.). (1996). *Global Information Ethics*. Opragen Publications. (A special issue of the journal *Science and Engineering Ethics*, April 1996.)
- Capurro, R. (2006). Toward an ontological foundation of information ethics. *Ethics and Information Technology*, 8(4), 175–186.
- Cavalier, R.J. (2005). *The Impact of the Internet on Our Moral Lives*. State University of New York Press, Albany, NY.
- Einstein, A. (1954). *Ideas and Opinions*. Crown Publishers, New York.
- Ess, C. (2006). Ethical pluralism and global information ethics. *Ethics and Information Technology*, 8(4), 215–226.
- Floridi, L. (1995). Internet: which future for organized knowledge, Frankenstein or Pygmalion? *International Journal of Human-Computer Studies*, 43, 261–274.
- Floridi, L. (1999a). Information ethics: on the philosophical foundations of computer ethics. *Ethics and Information Technology*, 1(1), 37–56. Reprinted, with some modifications, in *The Ethicomp Journal*, 1(1), 2004. [http://www.ccsr.cse.dmu.ac.uk/journal/articles/floridi\\_l\\_philosophical.pdf](http://www.ccsr.cse.dmu.ac.uk/journal/articles/floridi_l_philosophical.pdf). Abridged French translation in *L'Agora*, 5.4 (July–August 1998), pp. 19–20. Polish translation in *Ethos*, the journal of the John Paul II Institute at the Catholic University of Lublin (August–September 2005).
- Floridi, L. (1999b). *Philosophy and Computing: An Introduction*. Routledge, London, New York.

<sup>14</sup>This chapter is based on Floridi (1999a, 2003, 2005c), Floridi and Sanders (2001, 2004b, 2005), and Floridi (forthcoming). I am in debt to all the colleagues and friends who shared their comments on those papers. Their full list can be found in those publications. Here I wish to acknowledge that several improvements are because of their feedback, and the editorial suggestions by Kenneth Himma and Herman Tavani.

- Floridi, L. (2002). Information ethics: an environmental approach to the digital divide. *Philosophy in the Contemporary World*, 9(1), 39–45.
- Floridi, L. (2003). On the intrinsic value of information objects and the infosphere. *Ethics and Information Technology*, 4(4), 287–304.
- Floridi, L. (Ed.). (2004). *The Blackwell Guide to the Philosophy of Computing and Information*. Blackwell, Oxford, New York, 40–61.
- Floridi, L. (2005a). Information, semantic conceptions of. In: Edward, N.Z. (Ed.), *Stanford Encyclopedia of Philosophy*. <http://plato.stanford.edu/entries/information-semantic/>.
- Floridi, L. (2005b). An interpretation of informational privacy and of its moral value. *Proceedings of CEPE 2005—6th Computer Ethics: Philosophical Enquiries Conference, Ethics of New Information Technologies*, University of Twente, Enschede, The Netherlands.
- Floridi, L. (2005c). The ontological interpretation of informational privacy. *Ethics and Information Technology*, 7(4), 185–200.
- Floridi, L. (2005d). The philosophy of presence: from epistemic failure to successful observability. *Presence: Teleoperators and Virtual Environments*, 14(6), 656–667.
- Floridi, L. (2006a). Four challenges for a theory of informational privacy. *Ethics and Information Technology*, 8(3), 109–119.
- Floridi, L. (forthcoming). Information ethics: its nature and scope. In: van den Hoven, J. and Weckert, J. (Eds.), *Moral Philosophy and Information Technology*. Cambridge University Press, Cambridge.
- Floridi, L. (2006b). Information technologies and the tragedy of the good will. *Ethics and Information Technology*, 8(4), 253–262.
- Floridi, L. and Sanders, J.W. (1999). Entropy as evil in information ethics. *Etica & Politica, Special Issue on Computer Ethics*, 1(2).
- Floridi, L. and Sanders, J.W. (2001). Artificial evil and the foundation of computer ethics. *Ethics and Information Technology*, 3(1), 55–66.
- Floridi, L. and Sanders, J. (2002a). Mapping the foundationalist debate in computer ethics. *Ethics and Information Technology*, 4(1), 1–9.
- Floridi, L. and Sanders, J.W. (2002b). Computer ethics: mapping the foundationalist debate. *Ethics and Information Technology*, 4(1), 1–9. Revised version published in the 2nd edition. In: Spinello, R. and Tavani, H. (Eds.), *Readings in Cyberethics*. Jones and Bartlett, Boston, pp. 81–95.
- Floridi, L. and Sanders, J.W. (2004a). The method of abstraction. In: Negrotti, M. (Ed.), *Yearbook of the Artificial-Nature, Culture, and Technology, Models in Contemporary Sciences*. Peter Lang, Bern, pp. 177–220.
- Floridi, L. and Sanders, J.W. (2004b). On the morality of artificial agents. *Minds and Machines*, 14(3), 349–379.
- Floridi, L. and Sanders, J.W. (2005). Internet ethics: the constructionist values of *Homo Poieticus*. In: Cavalier, R. (Ed.), *The Impact of the Internet on Our Moral Lives*. SUNY, New York.
- Froehlich, T.J. (1997). *Survey and Analysis of Legal and Ethical Issues for Library and Information Services*, G.K. Saur, Munich. UNESCO Report (Contract no. 401.723.4), for the International Federation of Library Associations. IFLA Professional Series.
- Froehlich, T.J. (2004). A brief history of information ethics. *Textos universitaris de bibliotecnologia i documentacio*, <http://www.ub.es/bid/13froel2.htm>

- Greco, G.M. and Floridi, L. (2004). The tragedy of the digital commons. *Ethics and Information Technology*, 6(2), 73–82.
- Hauptman, R. (1988). *Ethical Challenges in Librarianship*. Oryx Press, Phoenix.
- Hepburn, R. (1984). *Wonder and Other Essays*. Edinburgh University Press, Edinburgh.
- Himma, K.E. (2004). There's something about Mary: the moral value of things *qua* information objects. *Ethics and Information Technology*, 6(3), 145–159.
- Huizinga, J. (1970). *Homo ludens: a study of the play element in culture*. Paladin, first published 1938 London.
- Johnson, D.G. (2006). Computer systems: moral entities but not moral agents. *Ethics and Information Technology*, 8(4), 195–204.
- Koenig, M.E.D., Kostrewski, B.J., and Oppenheim, C. (1981). Ethics in information science. *Journal of Information Science*, 3, 45–47.
- Leopold, A. (1949). *The Sand County Almanac*. Oxford University Press, New York.
- Maner, W. (1996). Unique ethical problems in information technology. *Science and Engineering Ethics*, 2(2), 137–154.
- Mather, K. (2005). Object oriented goodness: a response to Mathiesen's 'what is information ethics?' *Computers and Society*, 34(4), [http://www.computersandsociety.org/sigcas\\_ofthefuture2/sigcas/subpage/sub\\_page.cfm?article=919&page\\_number\\_nb=911](http://www.computersandsociety.org/sigcas_ofthefuture2/sigcas/subpage/sub_page.cfm?article=919&page_number_nb=911)
- Mathiesen, K. (2004). What is information ethics? *Computers and Society*, 32(8), [http://www.computersandsociety.org/sigcas\\_ofthefuture2/sigcas/subpage/sub\\_page.cfm?article=909&page\\_number\\_nb=901](http://www.computersandsociety.org/sigcas_ofthefuture2/sigcas/subpage/sub_page.cfm?article=909&page_number_nb=901)
- Mintz, A.P. (Ed.). (1990). *Information Ethics: Concerns for Librarianship and the Information Industry: Proceedings of the Twenty-Seventh Annual Symposium of the Graduate Alumni and Faculty of the Rutgers School of Communication, Information and Library Studies*, April 14, 1989. Jefferson, NC, McFarland, London.
- Moore, A.D. (Ed.). (2005). *Information Ethics: Privacy, Property, and Power*. University of Washington Press, London, Seattle, Washington.
- Naess, A. (1973). The shallow and the deep, long-range ecology movement. *Inquiry*, 16, 95–100.
- Nash, R.F. (1989). *The Rights of Nature*. The University of Wisconsin Press, Madison, Wisconsin.
- Rawls, J. (1999). *A Theory of Justice*, revised edition. Oxford University Press, Oxford.
- Severson, R.J. (1997). *The Principles of Information Ethics*. M.E. Sharpe, Armonk, NY.
- Sicart, M. (2005). On the foundations of evil in computer game cheating. *Proceedings of the Digital Games Research Association's 2nd International Conference—Changing Views: Worlds in Play*, June 16–20, Vancouver, British Columbia, Canada.
- Siponen, M. (2004). A pragmatic evaluation of the theory of information ethics. *Ethics and Information Technology*, 6(4), 279–290.
- Smith, M.M. (1996). *Information Ethics: An Hermeneutical Analysis of an Emerging Area in Applied Ethics*, Ph.D. Thesis. The University of North Carolina at Chapel Hill, Chapel Hill, NC.
- Smith, M.M. (1997). Information ethics. *Annual Review of Information Science and Technology*, 32, 339–366.
- Spinello, R.A. (1997). *Case Studies in Information and Computer Ethics*. Prentice Hall, Upper Saddle River, NJ.

- Spinello, R.A. (2003). *Case Studies in Information Technology Ethics and Policy*, 2nd edition. Prentice Hall, Upper Saddle River, NJ.
- Stichler, R.N. and Hauptman, R. (Eds.). (1998). *Ethics, Information, and Technology: Readings*. Jefferson, NC, McFarland, London.
- Tavani, H.T. (2002). The uniqueness debate in computer ethics: what exactly is at issue, and why does it matter? *Ethics and Information Technology*, 4(1), 37–54.
- Turilli, M. (2007). Ethical protocols design. *Ethics and Information Technology*, 9(1), 49–62.
- Van Den Hoven, J. (1995). Equal access and social justice: information as a primary good. *ETHICOMP95: An International Conference on the Ethical Issues of Using Information Technology*. De Montfort University, Leicester, UK.
- Weckert, J. and Adeney, D. (1997). *Computer and Information Ethics*. Greenwood Press, Westport, Connecticut.
- White, L.J. (1967). The historical roots of our ecological crisis. *Science*, 155, 1203–1207.
- Wiener, N. (1954). *The Human Use of Human Beings: Cybernetics and Society*. Revised Edition. Houghton Mifflin, Boston.
- Woodbury, M.C. (2003). *Computer and Information Ethics*. Stipes, Champaign, Ill.
- York, P.F. (2005). Respect for the world: universal ethics and the morality of terraforming. Ph.D. Thesis. The University of Queensland.

