

Preprint

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Information Ethics, its Nature and Scope

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“The world of the future will be an ever more demanding struggle
against the limitations of our intelligence,
not a comfortable hammock in which we can lie down
to be waited upon by our robot slaves”
Wiener [1964], p. 69.

1. A Unified Approach to Information Ethics

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 science, the philosophy of information, social epistemology and library and information science. Perhaps this Babel was always going to be inevitable, given the novelty of the field and the multifarious nature of the concept of information itself.¹ It is certainly unfortunate, for it has generated some confusion about the specific *nature* and *scope* of IE. The problem, however, is not irremediable, for a unified approach can help to explain and relate the main senses in which IE has been discussed in the literature. The approach is best introduced schematically and by focusing our attention on a moral agent *A*.

Suppose *A* is interested in pursuing whatever she considers her best course of action, given her predicament. We shall assume that *A*'s evaluations and actions have *some* moral value, but no specific value needs to be introduced. Intuitively, *A* can use 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*). Now, since the appearance of the first works in the eighties,² Information Ethics has been claimed to be the study of moral issues arising from one or another of these three distinct “information arrows” (see Figure 1). This, in turn, has paved the way to a fruitless compartmentalization and false dilemmas, with researchers either ignoring the wider scope of IE, or arguing as if only one “arrow” and its corresponding microethics (that is a practical, field-dependent, applied and professional ethics) provided *the* right approach to IE. The limits of such narrowly constructed interpretations of IE become evident once we look at each “informational arrow” more closely.

¹ On the various senses in which “information” may be understood see Floridi [2004].

² An early review is provided by Smith [1996].

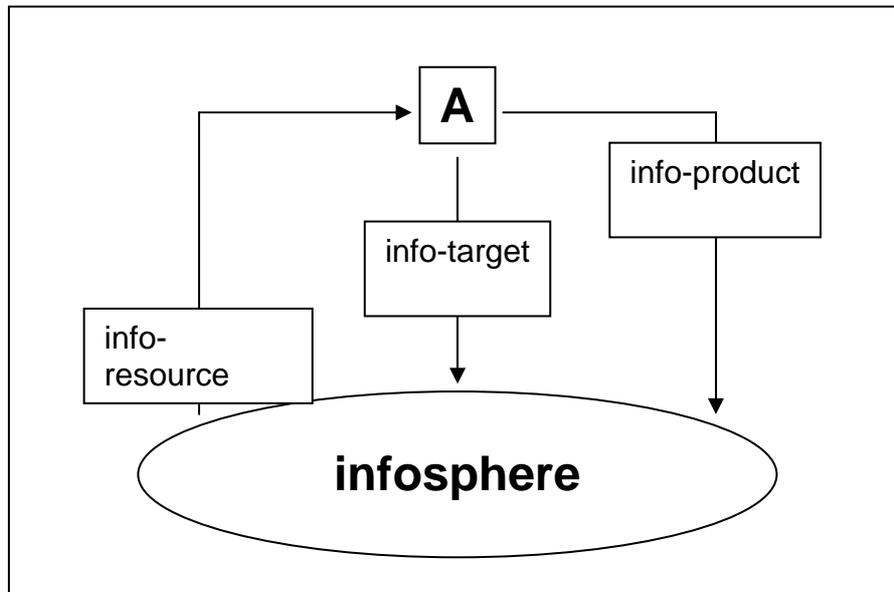


Figure 1 The “External” R(esource) P(roduct) T(arget) Model

1.1. Information-as-a-resource Ethics

Consider first the crucial role played by information as a *resource* for *A*’s moral evaluations and actions. Moral evaluations and actions have an epistemic component, since *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 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” analyses evil and morally wrong behaviour 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 (inadvertent) mismanagement of informational resources may have tragic consequences.

From a “resource” perspective, it seems that the machine of moral thinking and behaviour 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 intentionally 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 sense³ 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. Other examples of issues in IE, understood as an Information-as-resource Ethics, are the so-called *digital divide*, the problem of *infoglut*, and the analysis of the *reliability* and *trustworthiness* of information sources (Floridi [1995]).

1.2. Information-as-a-product Ethics

A second but closely related sense in which information plays an important moral role is as a *product* of *A*’s moral evaluations and actions. *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. Both constraints and opportunities call for an ethical analysis. Thus, IE, understood as Information-as-a-product Ethics, may cover moral issues arising, for example, in the context of *accountability*, *liability*, *libel legislation*, *testimony*, *plagiarism*, *advertising*, *propaganda*, *misinformation*, and more

³ One may recognise in this approach to Information Ethics a position broadly defended by Van Den Hoven [1995] and more recently by Mathiesen [2004], who criticises Floridi [1999a] and is in turn criticised by Mather [2005]. Whereas Van Den Hoven purports to present his approach to IE as an enriching perspective contributing to the debate, Mathiesen means to present her view, restricted to the informational needs and states of the moral agent, as the only correct interpretation of IE. Her position is thus undermined by the problems affecting any microethical interpretation of IE, as Mather well argues.

generally of *pragmatic rules of communication* à la Grice. Kant's analysis of the immorality of *lying* is one of the best known case-studies in the philosophical literature concerning this kind of Information Ethics. The boy crying wolf, Iago misleading Othello, or Cassandra and Laocoon, pointlessly warning the Trojans against the Greeks' wooden horse, remind us how the ineffective management of informational products may have tragic consequences.

1.3. Information-as-a-target Ethics

Independently of *A*'s information input (info-resource) and output (info-product), there is 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*. *Hacking*, understood as the unauthorised access to a (usually computerised) information system, is another good example. It is not uncommon to mistake it for a problem to be discussed within the conceptual frame of an ethics of informational resources. This misclassification allows the hacker to defend his position by arguing that no use (let alone misuse) of the accessed information has 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 authorisation, but what it means for an informational environment to be accessed by *A* without authorization. So the analysis of hacking belongs to an Info-target Ethics. Other issues here include *security*, *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, re-enacting his father's homicide, show how the risky management of one's informational environment may have tragic consequences.

1.4. The limits of any microethical approach to Information Ethics

At the end of this overview, it seems that the RPT model, summarised in Figure 1, may help one to get some initial orientation in the multiplicity of issues belonging to different interpretations of Information Ethics. The model is also useful to explain why any technology, which radically modifies the "life of information", is going to have

profound implications for any moral agent. ICT (information and communication technologies), by transforming in a profound way the informational context in which moral issues arise, not only add interesting new dimensions to old problems, but lead us to rethink, methodologically, the very grounds on which our ethical positions are based.

At the same time, the model rectifies the excessive emphasis placed on specific technologies (this happens most notably in *computer ethics*), by concentrating on the more fundamental phenomenon of information in all its variety and long tradition. This was Wiener's position⁴ and I have argued (Floridi [1999a], Floridi and Sanders [2002]) that the various difficulties encountered in the philosophical foundations of computer ethics are connected to the fact that the latter has not yet been recognised as primarily an environmental ethics whose main concern is (or should be) the ecological management and well-being of the *infosphere*.

Despite these advantages, however, the model can still be criticised for being inadequate, in two respects.

On the one hand, the model is still too simplistic. Arguably, several important issues belong *mainly but not only* to the analysis of just one "informational arrow". A few examples well illustrate the problem: someone's testimony (e.g. Iago's) is someone's else trustworthy information (i.e. Othello's); *A*'s responsibility may be determined by the information *A* holds ("apostle" means "messenger" in Greek), but it may also concern the information *A* issues (e.g. Judas' kiss); 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.

On the other hand, 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: the "panopticon" or "big brother", that is, the problem of *monitoring and controlling* anything that might concern *A*; and the debate about

⁴ The classic reference here is to Wiener [1950] and Wiener [1954]. Bynum [2001] has convincingly argued that Wiener should be considered the "father" of information ethics.

information *ownership* (including copyright and patents legislation), which affects both users and producers while shaping their informational environment.

So the criticism is fair. The RPT model is indeed inadequate. Yet *why* it is inadequate is a different matter. The tripartite analysis just provided is unsatisfactory, despite its partial 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* are faced by the problem of being unable to cope with a wide 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 scheme 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 recognise here a Wittgensteinian ladder.

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 (including creation, elaboration, distribution, storage, protection, usage and possible destruction); and
- iii) analyse 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 (see Figure 2).

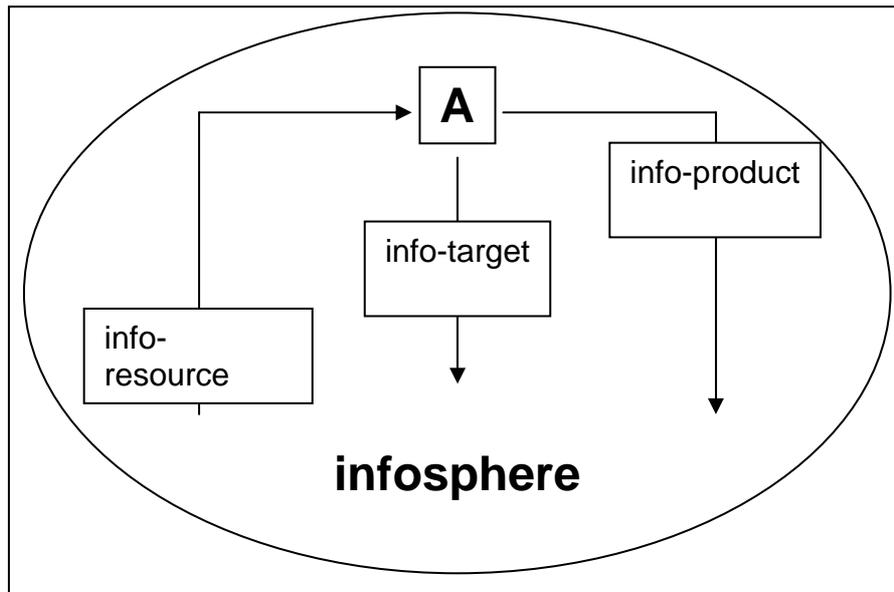


Figure 2 The “Internal” R(esource) P(roduct) T(arget) Model

Whereas steps (i) and (ii) do not pose particular problems and may be shared by other approaches to IE, step (iii) is crucial but involves a shift in the 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 looks at information from an object-oriented perspective and treats it as entity. In other words, we move from a (broadly constructed) epistemological conception of Information Ethics to one which is typically ontological.

A simple analogy may help to introduce this new perspective.⁵ Imagine looking at the whole universe from a chemical *level of abstraction* (I shall return to this in the next section). Every entity and process will satisfy a certain chemical description. An agent *A*, for example, will be 70% water and 30% something else. Now consider an informational level of abstraction. The same entities will be described as clusters of data, that is, as informational objects. More precisely, *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
- ii) a collection of operations, functions, or procedures, which are activated by various interactions or stimuli (that is, messages received from other objects or changes within itself) and correspondingly define how the object behaves or reacts to them.

⁵ For a detailed analysis and defence of an object-oriented modelling of informational entities see Floridi [1999a], Floridi [2003] and Floridi and Sanders [2004b].

At this level of abstraction, informational systems as such, rather than just living systems in general, are raised to the role of agents and patients 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* 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.

2. Information Ethics as a Macroethics

This section provides a quick and accessible overview of Information Ethics understood as a macroethics (henceforth simply Information Ethics). For reasons of space, no attempt will be made to summarise the specific arguments, relevant evidence and detailed analyses required to flesh out the ecological approach to IE. Nor will its many philosophical implications be unfolded. The goal is rather to provide a general flavour of the theory. The hope is that the reader interested in knowing more about IE might be enticed to read more about it by following the references.

The section is divided into two parts. The first consists of six questions and answers that introduce IE. The second consists of six objections and replies that, it is to be hoped, will dispel some common misunderstandings concerning IE.

2.1. What is IE?

IE is an *ontocentric, patient-oriented, ecological* macroethics (Floridi [1999a]). An intuitive way to unpack this answer is by comparing IE to other environmental approaches.

Biocentric ethics usually grounds its analysis of the moral standing of bio-entities and eco-systems 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.⁶ Any form of life is deemed to enjoy some

⁶ Rowlands [2000], for example, has recently proposed an interesting approach to environmental ethics in terms of naturalization of *semantic* information. According to him, “There is value in the environment.

essential proprieties or moral interests that deserve and demand to be respected, at least minimally if not absolutely, 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 behaviour. The "receiver" of the action is placed at the core of the ethical discourse, as a centre of moral concern, while the "transmitter" of any moral action is moved to its periphery.

Substitute now "life" with "existence" and it should become clear what IE amounts to. IE is an ecological ethics that replaces *biocentrism* with *ontocentrism*. IE 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* or *corruption* of informational objects (mind, not of information), that is, any form of impoverishment of *being*, including *nothingness*, to phrase it more metaphysically.⁷

IE then provides a common vocabulary to understand the whole realm of *being* through an informational *level of abstraction* (see section 2.2). IE holds that *being/information* has an intrinsic worthiness. It substantiates this position by recognising that any informational entity has a *Spinozian* right to persist in its own status, and a *Constructionist* right to flourish, i.e. 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* (see section 2.5 and 2.6) and any process, action or event that negatively affects the whole infosphere – not just

This value consists in a certain sort of information, information that exists in the relation between affordances of the environment and their indices. This information exists independently of [...] sentient creatures. [...] The information is *there*. It is in the world. What makes this information value, however, is the fact that it is valued by valuing creatures [because of evolutionary reasons], or that it would be valued by valuing creatures if there were any around.' (p. 153).

⁷ *Destruction* is to be understood as the complete annihilation of the object in question, which ceases to exist; compare this to the process of "erasing" an entity irrevocably. *Corruption* is to be understood as a form of pollution or depletion of some of the properties of the object, which ceases to exist as that object and begins to exist as a different object minus the properties that have been corrupted or eliminated. This may be compared to a process degrading the integrity of the object in question.

an informational entity – as an increase in its level of entropy and hence an instance of evil (Floridi and Sanders [1999], Floridi and Sanders [2001], Floridi [2003]).

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. Indeed, according to IE, even ideal, intangible or intellectual objects can have a minimal degree of moral value, no matter how humble, and so be entitled to some respect. UNESCO, for example, recognises this in its protection of ‘masterpieces of the oral and intangible heritage of humanity’ (<http://www.unesco.org/culture/heritage/intangible/>) by attributing them an intrinsic worth.

IE is impartial and universal because it brings to ultimate completion the process of enlargement of the concept of what may count as a centre of a (no matter how minimal) moral claim, which now includes every instance of *being* understood informationally (see section 2.4), 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 deserve to be respected (at least in a minimal and overridable sense) and hence place moral claims on the interacting agent and ought to contribute to the constraint and guidance of his ethical decisions and behaviour. 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 which is appropriate to its nature. In the history of philosophy, this is a view can already been found advocated by Stoic and Neoplatonic philosophers.

The conscious recognition of the ontological equality principle presupposes a disinterested judgement of the moral situation from an objective perspective, i.e. a perspective which is as non-anthropocentric as possible. Moral behaviour 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 (even Land Ethics is biased against technology and artefacts, for example). From their perspective, only what is intuitively alive deserves to be considered as a proper centre 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 centre of moral concern, to the common factor shared by any entity, namely its informational state. And since 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.

2.2. What is a Level of Abstraction?

The *Method of Abstraction* has been formalised in Floridi and Sanders [2004a] and Floridi and Sanders [forthcoming]. The terminology has been influenced by an area of Computer Science, called *Formal Methods*, in which discrete mathematics is used to specify and analyse the behaviour of information systems. Despite that heritage, the idea is not at all technical and for the purposes of this paper no mathematics is required, for only the basic idea will be outlined.

Let us begin with an everyday example. Suppose we join Anne (A), Ben (B) and Carole (C) in the middle of a conversation. Anne is a collector and potential buyer; Ben tinkers in his spare time; and Carole is an economist. We do not know the object of their conversation, but we are able to hear this much:

- A. Anne observes that it (whatever “it” is) has an anti-theft device installed, is kept garaged when not in use and has had only a single owner;
- B. Ben observes that its engine is not the original one, that its body has been recently re-painted but that all leather parts are very worn;
- C. Carole observes that the old engine consumed too much, that it has a stable market value but that its spare parts are expensive.

The participants view the object under discussion according to their own interests, which constitute their conceptual interfaces or, more precisely, their own *levels of abstraction* (LoA). They may be talking about a car, or a motorcycle or even a plane, since any of these three systems would satisfy the descriptions provided by A, B and C above. Whatever the reference is, it provides the source of information and is called the *system*. Each LoA (imagine a computer interface) makes possible an analysis of the system, the result of which is called a *model* of the system (see Fig. 3). For example,

one might say that Anne's LoA matches that of an owner, Ben's that of a mechanic and Carole's that of an insurer. Evidently a system may be described at a range of LoAs and so can have a range of models.

A LoA can now be defined as a finite but non-empty set of *observables*, which are expected to be the building blocks in a theory characterised by their very choice. Since the systems investigated may be entirely abstract or fictional, the term "observable" should not be confused here with "empirically perceivable". An *observable* is just an *interpreted typed variable*, that is, a typed variable together with a statement of what feature of the system under consideration it stands for. An interface (called a *gradient of abstractions*) consists of a collection of LoAs. An interface is used in analysing some system from varying points of view or at varying LoAs. In the example, Anne's LoA might consist of *observables* for security, method of storage and owner history; Ben's might consist of observables for engine condition, external body condition and internal condition; and Carole's might consist of observables for running cost, market value and maintenance cost. The *gradient of abstraction* might consist, for the purposes of the discussion, of the set of all three LoAs.

The Method of Abstraction allows the analysis of systems by means of models developed at specific gradients of abstractions. In the example, the LoAs happen to be disjoint but in general they need not be. A particularly important case is that in which one LoA includes another. Suppose, for example, that Delia (D) joins the discussion and analyses the system using a LoA that includes those of Anne and Carole plus some other observables. Let's say that Delia's LoA matches that of a buyer. Then Delia's LoA is said to be more concrete, or finely grained or lower, than Anne's and Carole's, which are said to be more abstract, or more coarsely grained or higher; for Anne's or Carole's LoA abstract some observables which are still "visible" at Delia's LoA. Basically, not only has Delia all the information about the system that Anne and Carole might have, she also has a certain amount of information that is unavailable to either of them.

It is important to stress that LoAs can be nested, disjointed or overlapping and need not be hierarchically related, or ordered in some scale of priority, or support some syntactic compositionality (the molecular is made by more atomic components).

We can now use the method of abstraction and the concept of LoA to make explicit the ontological commitment of a theory, in the following way.

A theory comprises at least a LoA and a model. The LoA allows the theory to analyse the system under analysis and to elaborate a model that identifies some properties of the system at the given LoA (see Figure 3).

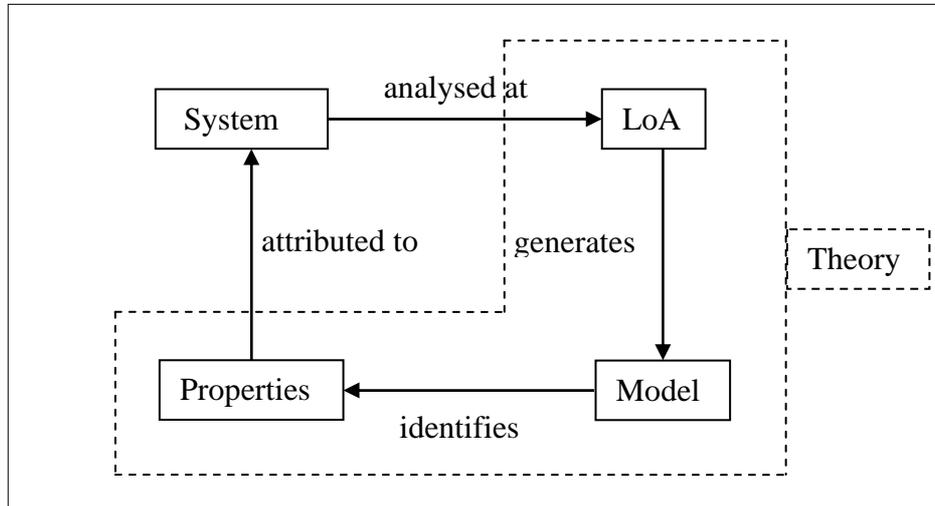


Figure 3 The scheme of a theory

The ontological commitment of a theory can be clearly understood by distinguishing between a *committing* and a *committed* component, within the scheme.

A theory commits itself ontologically by opting for a specific LoA. Compare this to the case in which one has chosen a specific kind of car (say a Volkswagen Polo) but has not bought one yet. On the other hand, a theory is ontologically committed in full by its model, which is therefore the bearer of the specific commitment. The analogy here is with the specific car one has actually bought (that red, four-wheeled, etc. specific object in the car park that one owns). To summarise, by adopting a LoA a theory commits itself to the existence of certain types of objects, the types constituting the LoA (by deciding to buy a Polo Volkswagen one shows one's commitment to the existence of that kind of car), while by adopting the ensuing models the theory commits itself to the corresponding tokens (by buying that particular vehicle, which is a physical token of the type Polo Volkswagen, one commits oneself to that token, e.g. one has to insure it). Figure 4 summarises this distinction.

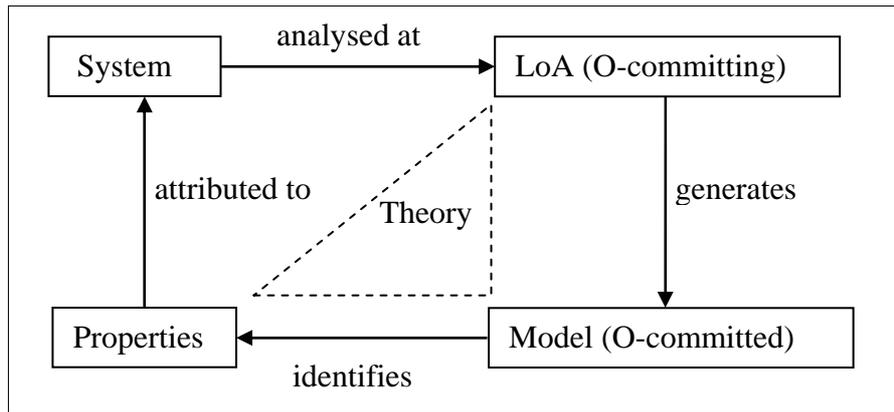


Figure 4 The SLMS scheme with ontological commitment

By making explicit the ontological commitment of a theory, it is clear that the method of abstraction plays an absolutely crucial role in ethics. For example, different theories may adopt androcentric, anthropocentric, biocentric or ontocentric LoAs, even if this is often left implicit. IE is committed to a LoA that interprets reality – that is, any system – informationally. The resulting model consists of informational objects and processes.

In the previous section, we have seen that an informational LoA has many advantages over a biological one, adopted by other forms of Environmental Ethics. Here it can be stressed that, when any other level of analysis becomes irrelevant, IE’s higher LoA can still provide the agent with some minimal normative guidance. That is, when even e.g. Land Ethics fails to take into account the moral value of “what there is”, IE still has the conceptual resources to assess the moral situation and indicate a course of action.

A further advantage of an informational-ontic LoA is that it allows the adoption of a unified model for the analysis of the three arrows and their environment in the RPT model. In particular, this means gaining a more precise and accurate understanding of what can count as a moral agent and as a moral patient, as we shall see in the following two sections.

2.3. What counts as a moral agent, according to IE?

A moral agent is an *interactive, autonomous and adaptable transition system* that can perform *morally qualifiable actions* (Floridi and Sanders [2004b]) As usual, the definition requires some explanations.

First, we need to understand what a *transition system* is. Let us agree that a system is characterised, at a given LoA, by the properties it satisfies at that LoA. We are

interested in systems that change, which means that some of those properties change value. A changing system has its evolution captured, at a given LoA and any instant, by the values of its attributes. Thus, an entity can be thought of as having states, determined by the value of the properties that hold at any instant of its evolution. For then any change in the entity corresponds to a state change and vice versa. This conceptual approach allows us to view any entity as having states. The lower the LoA, the more detailed the observed changes and the greater the number of state components required to capture the change. Each change corresponds to a transition from one state to another. Note that a transition may be non-deterministic. Indeed, it will typically be the case that the LoA under consideration abstracts the observables required to make the transition deterministic. As a result, the transition might lead from a given initial state to one of several possible subsequent states. According to this view, the entity becomes a transition system. For example, the system being discussed by Anne in the previous section might be imbued with state components for location, whether in-use, whether turned-on, whether the anti-theft device is engaged, history of owners and energy output. The operation of garaging the object might take as input a driver, and have the effect of placing the object in the garage with the engine off and the anti-theft device engaged, leaving the history of owners unchanged, and outputting a certain amount of energy. The “in-use” state component could non-deterministically take either value, depending on the particular instantiation of the transition (perhaps the object is not in use, being garaged for the night; or perhaps the driver is listening to the cricket on its radio in the solitude of the garage). The precise definition depends on the LoA. With the explicit assumption that the system under consideration forms a transition system, we are now ready to apply the Method of Abstraction to the analysis of agenthood.

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, at the given LoA, as learning its own mode of operation in a way which 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 (more on the distinction between responsibility and accountability presently).

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) 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.

Regarding (i), 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.

And as far as (ii) is concerned, 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], Floridi and Sanders [2001]).

Of course, accepting that artificial agents may be moral agents is not devoid of problems. In section one, we have seen that morality is usually predicated upon *responsibility*. So it is often argued that artificial agents cannot be considered moral agents because they are not morally responsible for their actions, since holding them

responsible would be a conceptual mistake (see Floridi and Sanders [2004b] for a more detailed discussion of the following arguments). The point raised by the objection is that agents are moral agents only if they are *responsible* in the sense of being prescriptively assessable in principle. An agent x is a moral agent only if x can in principle be put on trial.

The immediate impression is that the “lack of responsibility” objection is merely confusing the *identification* of x as a moral agent with the *evaluation* of x as a morally responsible agent. Surely, the counter-argument goes, there is a difference between being able to say who or what is the moral source or cause of (and hence it is accountable for) the moral action in question, and being able to evaluate, prescriptively, whether and how far the moral source so identified is also morally responsible for that action, and hence deserves to be praised or blamed, and in case rewarded or punished accordingly.

Well, that immediate impression is indeed wrong. There is no confusion. Equating identification and evaluation is actually a shortcut. The objection is saying that identity (as a moral agent) without responsibility (as a moral agent) is empty, so we may as well save ourselves the bother of all these distinctions and speak only of morally responsible agents and moral agents as co-referential descriptions. But here lies the real mistake. For we can now see that the objection has finally shown its fundamental presupposition, viz., that we should reduce all prescriptive discourse to responsibility analysis. But this is an unacceptable assumption, a juridical fallacy. There is plenty of room for prescriptive discourse that is independent of responsibility-assignment and hence requires a clear identification of moral agents.

Consider the following example. There is nothing wrong with identifying a dog as the source of a morally good action, hence as an agent playing a crucial role in a moral situation, and therefore as a moral agent. Search-and-rescue dogs are trained to track missing people. They often help save lives, for which they receive much praise and rewards from both their owners and the people they have located. Yet this is not yet the point. Emotionally, people may be very grateful to the animals, but for the dogs it is a game and they cannot be considered morally *responsible* for their actions. The point is that the dogs are involved in a moral game as main players and hence that we can rightly identify them as moral agents *accountable* for the good or evil they can cause.

All this should ring a bell. Trying to equate identification and evaluation is really just another way of shifting the ethical analysis from considering x as the moral

agent/source of a first-order moral action y to considering x as a possible moral patient of a second-order moral action z , which is the moral evaluation of x as being morally responsible for y . This is a typical Kantian move, with roots in Christiana theology. However, there is clearly more to moral evaluation than just responsibility because x is capable of moral action even if x cannot be (or is not yet) a morally responsible agent.

By distinguishing between *moral responsibility*, which requires intentions, consciousness and other mental attitudes, and *moral accountability*, we can now avoid anthropocentric and anthropomorphic attitudes towards agenthood. Instead, we can rely on an ethical outlook not necessarily based on punishment and reward (responsibility-oriented ethics) but 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 \rightarrow moral agency) \rightarrow prescriptive action], versus

ii) [(no responsibility \rightarrow no moral agency) \rightarrow 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 non-human 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 non-human 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. This point is further discussed in section 2.5. 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 towards an advanced information society.

2.4. What counts as a moral patient, according to IE?

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]).

Deflationist theories of intrinsic worth have tried to identify, in various ways, the minimal conditions of possibility of the lowest possible degree of intrinsic worth, without which an entity becomes intrinsically worthless, and hence deserves no moral respect. Investigations have led researchers to move from more restricted to more inclusive, anthropocentric conditions and then further on towards biocentric conditions. As the most recent stage in this dialectical development, IE maintains that even biocentric analyses are still biased and too restricted in scope.

If ordinary human beings are not the only entities enjoying some form of moral respect, what else qualifies? Only sentient beings? Only biological systems? What justifies including some entities and excluding others? Suppose we replace an anthropocentric approach with a biocentric one. Why biocentrism and not ontocentrism? Why can biological *life* and its *preservation* be considered morally relevant phenomena in themselves, independently of human interests, but not *being* and its *flourishing*? In many contexts, it is perfectly reasonable to exercise moral respect towards inanimate entities *per se*, independently of any human interest; could it not be just a matter of ethical sensibility, indeed of an ethical sensibility that we might have had (at least in some Greek philosophy such as the Stoics' and the Neoplatonists') but have then lost? It seems that any attempt to exclude non-living entities is based on some specific, low LoA and its corresponding observables, but that this is an arbitrary choice. In the scale of beings, there may be no good reasons to stop anywhere but at the bottom. 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 LoA. 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 respect.

Deep Ecologists have already argued that inanimate things too can have some intrinsic value. 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, but not only, 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 (see section 3.6). 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. According to IE, the minimal criterion for qualifying as an object that, as a moral patient, may rightly claim some degree of respect, is more general than any biocentric reference to the object’s attributes as a biological or living entity; it is informational. This means that the informational nature of an entity that may, in principle, act as a patient of a moral action, is the lowest threshold that constitutes its minimal intrinsic worth, which in turn may deserve to be respected by the agent. Alternatively, and to put it more concisely, being an informational object *qua* informational object is the minimal condition of possibility of moral worth and hence of normative respect. 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 centre of moral respect has the advantage of enabling one to make sense of the innovative nature of ICT, 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 centre of moral worth, from the citizen to the biosphere (Nash [1989]). The emergence of cyberspace, 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, as it were.

IE is ontologically committed to an informational modelling of *being* as the whole infosphere. The result is that no aspect of reality is extraneous to IE and the whole environment is taken into consideration. For whatever is in the infosphere is

informational (better: is accessed and modelled informationally) and whatever is not in the infosphere is something that cannot be.

More than fifty 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.

2.5. What are our responsibilities as moral agents, according to IE?

Like demiurges, we have “ecopoietic” responsibilities towards the whole infosphere. 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], Floridi [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 characterising the constructionist attitude. *Homo poieticus* is a demiurge who takes care of reality to protect it and make it flourish.

The ontic powers of *homo poieticus* have been steadily increasing. Today, *homo poieticus* can variously exercise them (in terms of control, creation or modelling) 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 informationally). 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 recognises our *responsibilities* towards the environment (including present and future inhabitants) as its enlightened creators, stewards or supervisors, not just as its virtuous users and consumers.

2.6. What are the fundamental principles of IE?

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” (compare this list to the similar ones available in medical ethics, where “pain” replaces “entropy”):

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

What is good for informational entities and for the infosphere in general? This is the basic moral question asked by IE. We have seen that the answer is provided by a minimalist theory: any informational entity is recognised to be the centre 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, i.e. 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 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 is increasingly deprecable, 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", i.e. the improvement of a region of the infosphere, is favoured 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,

- a) an action is unconditionally commendable only if it never generates any entropy in the course of its implementation; and
- b) 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 on the whole after their occurrence (compare this to the utilitarianist appreciation of an action that causes more benefits than damages for the overall welfare of the agents and patients). Finally, 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 deprecable and commendable, though in different respects.

3. Six recurrent misunderstandings

Since the early nineties,⁸ when IE was first introduced as an environmental macroethics and a foundationalist approach to computer ethics, some standard objections have circulated that seem to be based on a few basic misunderstandings.⁹ The point of this final section is not that of convincing the reader that no reasonable disagreement is possible about the value of IE. Rather, the goal here is to remove some ambiguities and

⁸ Fourth International Conference on Ethical Issues of Information Technology (Department of Philosophy, Erasmus University, The Netherlands, 25-27 March, 1998), this was published as Floridi [1999a].

⁹ For a good example of the sort of confusions that may arise concerning Information Ethics see Himma [2005].

possible confusions that might prevent the correct evaluation of IE, so that disagreement can become more constructive.

3.1. Informational objects, not news

By defending the intrinsic moral worth of *informational objects*, IE does not refer to the moral value of any other piece of well-formed and meaningful data such as an email, the *Britannica*, or Newton's *Principia*. What IE suggests is that we adopt an informational LoA to approach the analysis of *being* in terms of a minimal common ontology, whereby human beings as well as animals, plants, artefacts and so forth are interpreted as informational entities. IE is not an ethics of the BBC news.

3.2. Minimalism not reductionism

IE does not reduce people to mere numbers, nor does it treat human beings as if they were no more important than animals, trees, stones or files. The minimalism advocated by IE is methodological. It means to support the view that entities can be analysed by focusing on their lowest common denominator, represented by an informational ontology. Other level of abstraction can then be evoked in order to deal with other, more human-centred values.

3.3. Applicable not applied

Given its ontological nature and wide scope, one may object that IE works 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 polarise 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. Thus, 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 [forthcoming]), game cheating (Sicart [2005]), the problem of privacy (Floridi [2005]) and environmental issues (York [2005]).

3.4. Implementable not inapplicable

A related objection is that IE, by promoting the moral value of any entity, is inapplicable because too demanding or superogatory. In this case, it is important to stress that IE supports a *minimal* and *overridable* sense of ontic moral value. Environmental ethics accepts culling as a moral practice and does not indicate as one's duty the provision of a vegetarian diet to wild carnivores. IE is equally reasonable: fighting the decaying of *being* (information entropy) is the general approach to be followed, not an impossible and ridiculous struggle against thermodynamics, or the ultimate benchmark for any moral evaluation, as if human beings had to be treated as mere numbers. "Respect and take care of all entities for their own sake, if you can", this is the injunction. We need to adopt an ethics of stewardship towards the infosphere; is this really too demanding or unwise? Perhaps we should think twice: is it actually easier to accept the idea that all non-biological entities have no intrinsic value whatsoever? Perhaps, we should consider that the ethical game may be more opaque, subtle and difficult to play than humanity has so far wished to acknowledge. Perhaps, we could be less pessimistic: human sensitivity has already improved quite radically in the past, and may improve further. Perhaps, we should just be cautious: given how fallible we are, it may be better to be too inclusive than discriminative. In each of these answers, one needs to remember that IE is meant to be a macroethics for creators not just users of their surrounding "nature", and this new situation brings with it demiurgic responsibilities that may require a special theoretical effort.

3.5. Preservation and cultivation not conservation

IE does not support a morally conservationist or "laissez faire" attitude, according to which *homo poieticus* would be required not to modify, improve or interfere in any way with the natural course of things. On the contrary, IE is fundamentally proactive, in a way similar to *restorationist* or *interventionist ecology*. The unavoidable challenge lays precisely in understanding how reality can be better shaped. A gardener transforms the environment for the better, that's why he needs to be very knowledgeable. IE may be, but has no bias in principle, against abortion, eugenics, GM food, human cloning, animal experiments and other highly controversial, yet technically and scientifically possible ways of transforming or "enhancing" reality. But it is definitely opposed to any associated ignorance of the consequences of such radical transformations.

3.6. A secular, not a spiritual or religious approach

IE is compatible with, and may be associated with religious beliefs, including a Buddhist (Herold [2005]) or a Judeo-Christian view of the world. In the latter case, the reference to *Genesis 2.15* readily comes to one's mind. *Homo poieticus* is supposed "to tend (*'abad*) and exercise care and protection over (*shamar*)" God's creation. Stewardship is a much better way of rendering this stance towards reality than dominion. Nevertheless, IE is based on a secular philosophy. *Homo poieticus* has a vocation for responsible stewardship in the world. Unless some other form of intelligence is discovered in the universe, he cannot presume to share this burden with any other being. *Homo poieticus* should certainly not entrust his responsibility for the flourishing of *being* to some transcendent power. As the enlightenment has taught us, the religion of reason can be immanent. If the full responsabilization of humanity is then consistent with a religious view, this can only be a welcome conclusion, not a premise.

4. Conclusion

There is a famous passage in one of Einstein's letters that well summarise the perspective advocated by IE. "Some five years prior to his death, Albert Einstein received a letter from a nineteen-year-old girl grieving over the loss of her younger sister. The young woman wished to know what the famous scientist might say to comfort her. On March 4, 1950, Einstein wrote to this young person: '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 the informational LoA of IE provide an additional perspective that can further expand the ethical discourse, so as to include the world of morally significant phenomena involving informational objects? Or does it represent a threshold beyond which nothing of moral significance really happens? 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 *behaviour* 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.

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