

On the Ethics of Democratic Access to Web Information

(some reflections on recent work by Luciano Floridi)

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Abstract

Floridi's work, although diverse and multifaceted, portrays a solid coherence across his different lines of work. Among his wealth of interests and results, we highlight his recent work on information logics, on the ethics of information technology, and his rigorous (and vigorous) philosophical analysis of recent technological trends and developments in information technology. In the present article we illustrate, by means of some connecting arguments, the diversity and coherence of Floridi's work. We also show how his work, although fundamentally philosophical in nature, can be used to build solid foundations for scientific and entrepreneurial endeavours of higher quality. More specifically, we discuss how the combination of results from the three lines of work referred to above can be used as ground for the organisation of higher quality programmes to augment the capabilities and effectiveness of governmental systems through information and communications technology, a trend that has been explored in many nations and that has been coined Electronic Government. Electronic Government programmes that improve the capabilities of citizens to interact with each other and with governments, as well as the capabilities of governments to listen to the needs and aspirations of citizens, have the potential to become more democratic. Electronic Government systems that rely on ready made models to prescribe to citizens how best they should interact with each other and with the public administration are, by construction, non-democratic. Hence, it can be a moral and ethical matter for governments to choose which line of technological development they take.

1 Introduction

Among the many positive predicates that can be applied to the work of Luciano Floridi, we highlight its diversity, which nevertheless is accompanied by a rigorous coherence among all his multifaceted lines of work.

In the present article we explore and illustrate this diversity and coherence, by analysing the results of three articles recently published by Floridi, devoted to:

1. The formalisation of the notion of *being informed*, based on the introduction of a novel class of multimodal logics,
2. The characterisation of a notion of *information ethics*, and
3. An analysis of present trends in the development of the World Wide Web, in which, based on an initial comparison between the Semantic Web and the Web 2.0 trends, he builds a wider scenario which encompasses a myriad of possibilities for future development of the Web.

We identify some connections between these works, which depict how they are consistent with each other, and illustrate how the joint consideration of these lines of work, characterised by the connections we have chosen to bring to fore, can shed light on relevant foundational issues for the development of information systems. More specifically, we show how these three pieces of work by Luciano Floridi can be used to build appropriate guidelines for the development of successful programmes for Electronic Government.

In section 2 we briefly review Floridi's *information logic*, which is a multimodal logical system to account for the notion of being informed. We avoid, in this presentation, specific technicalities related to multimodal logics, and focus on how the information logic improves our ability to analyse and discuss with rigour issues related to the acquisition and distribution of information by agents, and how the acquired information can transform the agents.

In section 3 we briefly review Floridi's characterisation of *information ethics*, with emphasis to his notion of *macroethics* based on the concept of *levels of abstraction*, and show how some aspects related to information ethics can be described and clarified when expressed in terms of the information logic.

In section 4 we review Floridi's views about the development trends for the World Wide Web.

As a concrete domain in which these notions can be productively applied, we introduce the notion of Electronic Government. In a nutshell, it is about employing digital information technology to improve the quality of governmental systems, to strengthen democracy and to make citizens more powerful and influential, by ensuring that multiplexed information channels are built connecting citizens, organisations in general and the public administration. We explore, incrementally, how the notions featured in the previous sections can be used to build proper foundations to ensure the development of high-quality Electronic Government systems.

Finally, in section 5 we present some final discussion and conclusions.

2 Information Logic

Floridi has revised and reconstructed the required notions to build an information logic [5], based on the notions of multimodal logics. Essentially, he based his work on previous logics for the formal characterisations of the notions of knowledge and belief, discussed how and why the notion of being informed differs from the notions of knowledge and belief, and showed how these differences could be depicted formally.

In Floridi’s logic, we have two modal operators, indexed by agents to which they refer:

1. $\Box_a\varphi$.
2. $\Diamond_a\varphi$.
in which φ is a classical propositional formula, a identifies the agent to which the sentences refer and \Box and \Diamond have the usual semantics.

Using Floridi’s notation, these modal operators are denoted as:

1. $I_a\varphi$.
2. $U_a\varphi$.

Intuitively, $I_a\varphi$ stands for *agent a is informed about φ* , and $U_a\varphi$ stands for *agent a is uninformed (but can be informed) about φ* .

Multimodal logics have been extensively used for formal characterisations of the notions of knowledge and belief (see e.g. [8]). Several semantic properties have been analysed, together with the appropriate axiom systems that enforce them, to capture subtly different notions of knowledge and belief that have shown to suit better different settings in which these notions could be used, ranging from the metaphorical utilisation of these notions to specify and analyse the behaviour of distributed computational systems to the economical analysis of markets based on game theory to the philosophical rendition of these notions and their impact in humans and societies.

An interesting aspect of these logics is what occurs when we have nested modalities, especially when these modalities are indexed by a collection of different agents. Indeed, notions of group, shared and common knowledge have been analysed, in which modal operators can be indexed by sets of agents, instead of solely by single agents.

Another interesting possibility that has been analysed is the hybridisation of logics, in which agents are classified in many sorts, in such way that different notions of knowledge and belief – and hence different semantic notions, tied to the appropriate different axiom schemata – are linked to different groups of agents. Imagine, for example, a heterogeneous multiagent system comprised by human as well as artificial agents, who have to interact with each other in a distance learning scenario.

Yet a third stream of investigation has been on reasoning about truth values, instead of reasoning directly about propositions [1]. This line of investigation

can be (and has been) extended to the whole area of uncertain reasoning [2], and has been founded on the notion that, although we can reason about uncertainty, or about truth and falsity, uncertain propositions (as well as false propositions) can always be reified as objects of reasoning, whose truth must be assessed by reasoning procedures. In other words, we can organise our reasoning systems in a layered fashion, in such way that uncertainties and false propositions are treated in the lower layers, and the outermost layer always looks for the identification of true statements, even if they refer to false statements, as in “*it is **true** that φ is **false***”.

This last observation resonates well with Floridi’s notion of semantic information, which is required to be always true (otherwise, as Floridi has stated emphatically in his publications, it is not information at all). We can be informed about the falsity of a proposition, and this of course shall qualify as information, as long as it is true.

In Floridi’s work we find initial – although formally precise – sketches of a logic of information. Much work remains to be done, for example in lines of research similar to the three ones depicted above for logics of knowledge and belief. Floridi has managed to characterise, nevertheless, the notion of being informed as different from the notions of knowledge and belief that have been explored by other authors. From a conceptual point of view, these notions are different, as knowledge and belief refer to internal cognitive states of agents, which are updated by themselves, even if as a result of interaction with other agents and with the environment, whereas being informed refers to interactions between agents and external sources of information. Situatedness creates the opportunities for information flow, which justify the construction of a formal model such as the information logic for their analysis and understanding.

Floridi has portrayed this difference by showing that the semantic schemata that are most appropriate for the information logic are different from those that have been used for logics of knowledge and belief. A fourth interesting line of research that remains to be further developed is the relationship between these three notions – knowledge, belief and being informed – which can result on interesting hybrid logics that can capture and improve the understanding of how information can influence the update of knowledge and belief in agents of various sorts.

The notions unveiled by Floridi’s information logic bring to fore that, for an agent to move from the state of *uninformed* to the state of *informed* about a proposition φ , this information must be acquired by the agent through some communication channel, and must be provided by some source. If the bearer of such information refuses to communicate this piece of information, or if the agent refuses to receive the information, the state will not change.

Hence, the update on information states of agents depends on the will to change that can be found in both the bearer and the recipient of information. This will to change can be subject to ethical analysis and valuation, thus leading to the consideration of an *information ethics*.

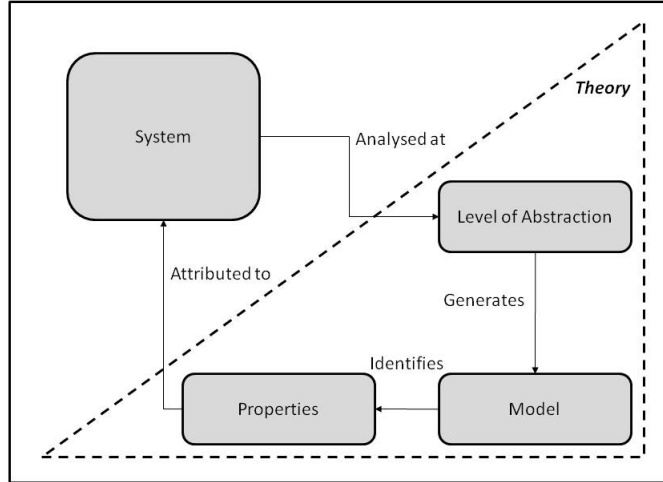


Figure 1: The constituents of a theory [6]

3 Information Ethics

In [6] Floridi presents his theory of *information ethics*. It is a rich and sophisticated theory, from which we only highlight here a few relevant points for our own argumentation.

The theory is founded on the notion of *levels of abstraction*, which assumes an objective external reality to be out there, named a *System*, which is analysed at a certain *Level of Abstraction*, which then generates a *Model* through which certain *Properties* can be identified, which are then attributed back to the *System*. Level of Abstraction, Model and Properties comprise a *Theory* (Figure 1).

In [3] we find a conceptual model to understand information flow, whose unfoldings and unveilings are used throughout that book to explain a variety of concepts related to agent purposeful interaction. Even though this model has been developed independently of the model of levels of abstraction proposed by Floridi and colleagues, their resemblance is striking (Figure 2). The similarities between both models can be better appreciated if we map the corresponding terminologies as follows:

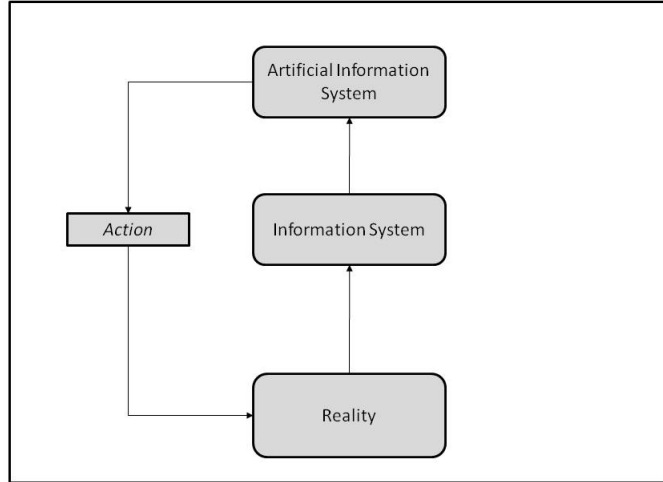


Figure 2: A model for information flow (adapted from [3])

Floridi's levels of abstraction	Correa da Silva and Agusti's information flow
System	Reality
Level of Abstraction	Information System
Model	Artificial Information System
Properties	Action

For the development of information ethics, the appropriate level of abstraction is precisely that of information systems: an external system (the “reality” according to Correa da Silva and Agusti) is considered from the point of view of the information it bears.

Two important notions in Floridi's information ethics are *informational entities* and *moral agents*. An informational entity is any identifiable entity through which information can flow. A human individual, of course is an informational entity, as well as organisations, software agents, toasters, chess boards, trees or any object through which information can flow or to which information can be ascribed.

A moral agent is a special type of informational entity. Being an agent, it is capable of autonomous actions. It is a *moral agent* if to those actions can be ascribed moral values. It is important to notice that a moral agent is not necessarily a morally *responsible* agent. A trained dog can participate in search and rescue operations, performing actions of indisputable moral value, and therefore is a moral agent, even though it is not responsible for its own

actions.

Following more precisely Floridi's characterisation, a moral agent is an interactive, autonomous and adaptable transition system. An interactive system is a system (*aka* an informational entity) capable of exchanging information with external systems (other informational entities, including that generic informational entity coined *the environment*). A transition system is a system comprised by states, that can change between states depending on the results of internal processes (e.g. depending on interactions that occur involving external entities). An autonomous system is a system capable of autonomous actions, i.e. actions that can influence external entities or update its internal states whose source comes from itself. Finally, an adaptable system is a system whose state transition rules themselves can be updated as result of interactions with external entities.

One way to depict the states of a transition system is precisely based on its status of information, knowledge and belief. Hence, a formal account of any transition system can be built based on an appropriate combination of logics of information, knowledge and belief, such as those referred to in the previous section of this article.

Any agent is granted full right to manage its own transitions. As a consequence, any moral agent has the moral duty to contribute to any other agent to ensure this right.

Morally responsible agents are deemed responsible for ensuring this full benevolence to any agent's decisions to perform state transitions – including themselves. Moral agents which are not morally responsible agents are *accountable* for their support to those decisions.

Moral responsibility imposes constraints on the behaviour of morally responsible agents, which must align their actions with their responsibilities. Accountability, in turn, does not impose such constraints. Yet, morally accountable actions identify the source of actions which, according to their consequences, shall be deemed ethical or anti-ethical.

Departing a little from Floridi's original work, we identify a second special case of moral agents which can be of interest, which we coin *public moral agents*. A public moral agent is a moral agent whose actions are, by definition and construction, fully accountable by third party.

To give an example, a dog participating in a search and rescue operation is a moral agent, as referred to above, but clearly not a morally responsible agent, *nor* a public moral agent. The same applies to an autonomous mobile robot working on the same operation, whose internal design and control software belong to a private corporation. A robot whose design and software are open source, however, is a public moral agent – even though it continues not to be a morally responsible agent.

Public moral agents constitute an interesting class of moral agents because, even though they are not required to be responsible, they can still be required to *commit* to morally valuable actions.

As may have become clear from the characterisation above based on an example of public moral agent, this class of agents can only contain artificial agents,

whose specification, design and implementation is open to public scrutiny (hence the name *public* moral agents). It seems reasonable to assume that the designers and builders of public moral agents are indeed morally responsible agents, and hence it is their responsibility to ensure that public moral agents are committed to morally valuable actions.

We have had a specific motivation to characterise this class of moral agents, which is the fact that an interesting type of organisation belongs to this class. Namely, organisations related to the public administration are public moral agents, since they are – or at least should be – by definition and construction, public in the way they receive, process and produce information, and they are clearly moral agents, in the sense depicted above.

Hence, public administration and governmental organisations are moral agents, whose internal functioning is public, thus making them fully accountable, and such that their designers, builders and operators are morally responsible agents whose duty is to ensure the right to any agent to manage its own transitions and control the update of its information, knowledge and belief.

In recent years, we have observed the development, in many nations, of *Electronic Government* programmes, which are technological programmes furthered by the public administration that make appropriate use of information technology – in most cases, of digital information technology – to improve the quality of governmental systems, to strengthen democratic values and to empower citizens and organisations in general.

Adopting the terminology popularised by Engelbart [4], Electronic Government aims at the *augmentation* of the capabilities and effectiveness of public administration through information and communications technology. In order to ensure that public administration, which is comprised by public moral agents, behaves in accordance with the tenets of Floridi’s information ethics, appropriate policies and planning to develop an Electronic Government programme must be adopted. Since Electronic Government is closely related to the available information and communications technology, it is reasonable to assume that the best policies and planning for an Electronic Government programme shall follow the evolution of the existing technology. Hence, an analysis of the trends for development of ICT is relevant to ensure the ethical value of the behaviour of public moral agents.

4 Development Trends for the World Wide Web

In a recent publication [7], Floridi discusses the development trends for the World Wide Web, which in turn may well identify the development trends for the use of digital information and communications technology in general.

In the following lines, we shall review briefly Floridi’s account for the future of the World Wide Web, and align it with the discussions presented in the previous sections and with the applicability of the future trends of the Web in Electronic Government programmes.

The departing point is the so called *Web 1.0*, aka *Static Web*, in which

static information went online. It constitutes of static web pages, featuring information of all sort to be consumed by readers through their web browsers.

In the Web 1.0, we had the two separate roles of producers and consumers of information, in which a select (and relatively small) group of agents concentrated the power to produce information, based on specialised technological skills and capabilities, and a larger group of agents passively consumed that information.

Considering the arguments developed in the previous sections, we see that the Web 1.0 did not abide fully by the tenets of information ethics. Indeed, by creating a large group of passive consumers of information, it alienates this group from the possibility of behaving in accordance with higher ethical values, since this group of consumers is not equipped to contribute to information, knowledge and belief state transitions of other agents through the web.

In the Web 1.0 we have one-way communication. It does not support transparency of the producers of information. Hence, it is not hospitable to the participation of public moral agents. Electronic Government programmes based on the Web 1.0 shall be, by design, limited in scope and reach.

The *Web 2.0* is the *Participatory Web*. It breaks the barriers between producers and consumers and information. In the Web 2.0, all participants can be both producers and consumers, and hence have the opportunity to contribute to the transformations (*aka* state transitions) in every informational entity that accepts the Web as a means for communication.

The Web 2.0 is, therefore, a friendly environment for the nurturing of public moral agents, as well as of morally responsible agents. For this reason, the Web 2.0 can be a fertile ground for the development of Electronic Government programmes. It provides appropriate conditions for the development of such programmes, although its utilisation is not sufficient to ensure that appropriate Electronic Government programmes will be built.

The Web 3.0, as well pointed out by Floridi [7], can be approached by two viewpoints. The first one embodies a "Sci-Fi" vision of the technological development of the Web. It has some slightly authoritarian nuances in between lines, as it assumes that all Web users shall one day abide by common vocabularies and interpretations of the world in order to communicate effectively, and suggests that these vocabularies and interpretations should be determined by coordinating authorities in top-down fashion. It is unlikely to succeed, given the multitude of interests, goals, cultural backgrounds, beliefs etc. of Web users – be them human users or artificial entities programmed by human developers. Hence, we should not worry much about it.

The second approach to the Web 3.0 is more practical and to the ground. According to this view, the Web becomes the *MetaSyntactic Web*, in which interoperability between distributed resources and software agents is ensured by coordinated development of such resources and agents. One possible strategy for this coordination is through the alignment with standards, which can be encoded in many sophisticated ways, e.g. by means of computational ontologies.

The MetaSyntactic Web, therefore, extends the virtues of the Web 2.0 to encompass interactions between different sorts of agents, beyond human consumers and producers of information. It is technological development put at

service of the augmentation of informational entities that interact through the Web. Recent successful examples of the MetaSyntactic Web range from the interconnection of databases from flight operators to provide cross-company air flight itineraries to the development of e-Science, in which large repositories of experimental data are encoded according to universal standards and then open for public consultation and utilisation for the advancement of science.

For the Electronic Government, the MetaSyntactic Web expands the possibilities of interactions between the public administration and external entities, facilitating the construction of automated services by public agencies as well as by any citizen or organisation.

The *Web 4.0* is the *Bridging Web*, in which all features referred to above are expanded to embrace larger portions of the population. In practice, it has been materialised by means of the expansion of the Web to wireless and portable devices, such as smartphones and kiosks for access to the Web. In the Web 4.0, consumers of information are empowered by ubiquitous access.

The *Web 5.0* is the *Cloud Based Web*. In some sense, it is dual to the Web 4.0, as it empowers the *producers* of information with the benefits of ubiquity.

Finally, as proposed by Floridi, the *Web 6.0* is the *Web "Onlife"*, in which all previous features and resources are integrated for the full benefit of the informational entities which make use of them.

Floridi's views are clearly optimistic, and we concur with them. Distopic views can, of course, be built, in which informational agents refuse to align with the moral values of information based interactions, in which asymmetries in the access to the necessary resources either to produce or to consume information are maintained purposefully by those agents, in which moral agents refuse to go public, and so on.

We prefer to believe and to hope that presently observed trends continue to work, in which the availability of technological support for effective interactions among informational entities puts pressure on the improvement of those interactions towards better alignment with the moral values proposed by information ethics.

5 Final Remarks

Floridi's work is clearly and evidently the work of a philosopher. To our view, there cannot be such thing as "applied philosophy".

One can, however, employ the techniques, results and conclusions of philosophical inquiry as foundation for scientific and entrepreneurial endeavours. Indeed, by doing so, it is more likely that those endeavours have their quality enhanced by the careful scrutiny of their motivations and methods, which shall naturally result from the proper use of good quality philosophical analysis.

In the present article, we have ventured on sketches of how such use of philosophical resources can be used, for example, to build appropriate foundations for Electronic Government programmes. By grounding the organisation and development of Electronic Government programmes on solid roots related

to the formalisation of information based interactions between agents, to the characterisation and analysis of actions based on information ethics, and on the observation of the development of supporting technology for information based interactions, one can build programmes with higher probability of full commitment to the improvement of public administration in a variety of senses, to the strengthening of democratic values and to the empowerment of all informational entities involved in the relevant interactions.

This has been precisely the methodology that has been employed in a variety of projects that have been developed at the Interoperability Lab, University of Sao Paulo, which is tied to the **LIDET** – Laboratory of Interactivity and Digital Entertainment Technology. Some results connected to the research initiatives under these laboratories can be found at <http://lidet.wordpress.com>.

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