Beyond information ethics - knowledge and care as new values in design

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Abstract
With computer and information technology (ICT) coming to play a greater and more pervasive role in the lives of people around the world, it becomes important to consider the ways in which values and ethical beliefs are embedded in the technology that we use. Software, in particular, with its ability to both act independent from its creation and be reproduced, shared, and transmitted almost infinitely, opens many new ethical questions both in the implications of its immediate use, as well as any future use and the new contexts that such future use can bring. While Floridi's Information Ethics presents a well developed, general means by which our interactions with ICT (from design to use) may be ethically guided, it provides no specific, proactive guidance for the creative process of design. When confronted with the need for a particular ICT system, or when faced with the opportunity for open-ended innovation, software and systems designers are left on their own to ask what kind of system should be built. Critiquing relevant ethical approaches, a knowledge-oriented ethics of care is presented that addresses the ethical questions of software design, while still allowing for the application of the variety of different ethical approaches necessary for dealing with the high level of complexity involved in building information communication networks. By acknowledging the complex networks of relationships that are engaged in the use and design of information communication technology, a substantial knowledge of the values and ethical positions embedded in technology proves to be necessary if one hopes to be able to properly practice a care-based ethics in the process of technology design.

Keywords: Information Ethics. Knowledge Systems. System Design.

Além da ética na informação – saberes e cuidados como novos valores no design

Resumo
Com as tecnologias da computação e da informação (TCI) desempenhando um papel cada vez maior e mais invasivo na vida das pessoas ao redor do mundo, torna-se importante considerar as formas como valores e crenças éticas são embutidas na tecnologia que usamos. Software, em particular, com sua habilidade ambígua de atuar de modo independente de sua criação e ser reproduzido, compartilhado e transmitido quase que infinitamente, apresenta muitas questões éticas tanto nas implicações de seu uso imediato, quanto em qualquer uso futuro, e os novos contextos que seu uso futuro pode trazer. Enquanto Informação e Ética, de Floridi, representa um meio bem desenvolvido e geral pelo qual nossas interações com TCI (desde o design ao uso) possam ser eticamente guiadas, não oferece nenhuma diretriz específica e proativa para o processo criativo de design. Quando confrontados com a necessidade de um sistema de TCI particular, ou quando encaram a oportunidade para inovação sem taxa de retorno, desenvolvedores de sistemas e software ficam abandonados à própria sorte para perguntar que tipo de sistema deve ser construído. Criticando abordagens éticas relevantes, apresenta-se uma ética de cuidados orientada ao conhecimento, que aborda as questões éticas de design de software, enquanto permite ainda a aplicação de uma variedade de abordagens éticas necessárias para lidar com o alto nível de complexidade envolvido na construção de redes de informação e conhecimento. Ao reconhecer as complexas redes de relacionamentos envolvidas no uso e design de tecnologias de comunicação da informação,

um conhecimento substancial de valores e posições éticas embutidas na tecnologia se mostra necessário, caso espera-se conseguir praticar corretamente ética baseada em cuidado durante o processo de design de tecnologia.

Palavras-chave: *Ética da informação. Sistemas de conhecimento. Design de sistemas.*

Más allá de la ética de la información – Saberes y cuidados como nuevos valores en diseño

Resumen
Con las tecnologías de la informática y la información (TII) desempeñando un papel cada vez más omnipresente en la vida de las personas de todo el mundo, es importante tener en cuenta la forma en que los valores y las creencias éticas están inmersos en la tecnología que utilizamos. Software, en particular, con su capacidad ambigua de actuar con independencia de su creación y ser reproducido, compartido y transmitido casi infinitamente, presenta cuestiones éticas, tanto en las implicaciones de su uso inmediato, así como cualquier uso futuro, y los nuevos contextos que el uso futuro puede traer. En cuanto Información y Ética, de Floridi, trae un medio bien desarrollado y general por el cual nuestras interacciones con TII (desde el diseño a utilizar) puede ser guiado éticamente, no ofrece orientación específica y proactiva para el proceso de diseño creativo. Cuando confrontados con la necesidad por un sistema TII en particular, o cuando enfrentan la posibilidad de innovación sin tasa de retorno, desarrolladores de sistemas y software están abandonados a su suerte a preguntar qué tipo de sistema debe ser construido. Criticando enfoques éticos relevantes, presentamos una ética de cuidados orientada a conocimiento, que se ocupa de cuestiones éticas de diseño de software, al tiempo que permite la aplicación de una variedad de diferentes enfoques éticos necesarios para hacer frente al alto nivel de complejidad que implica la construcción de redes de información y conocimiento. Reconociendo las complejas redes de relaciones que están involucradas en el uso y diseño de las tecnologías de información y comunicación, un conocimiento sustancial de los valores y posiciones éticas incrustado en la tecnología resulte necesario si se espera practicar adecuadamente la ética basada en cuidados durante el proceso de diseño de tecnología.

Palabras-clave: *Información de Ética. Los sistemas de conocimiento. Diseño de sistemas.*

INTRODUCTION

Recent years have seen an unprecedented rise in the use of information technology in almost all sectors around the world. From banking to education, entertainment to transportation, manufacturing to social relationships and more, there are few aspects of life in the developed world that have not been directly influenced by the rise of information technology, with few areas in less developed regions left untouched, at least indirectly, as well. As Information Communication Technology (ICT) has spread around the world in its various guises—computers, databases, cellular telephones, and perhaps most of all the Internet—it has been adapted and integrated into life in a myriad of surprising ways (BELL; DOURISH, 2006). Key to its pervasive reach has been its ability to fit into existing social practices, with technologies both shaping, and being shaped by, already-established modes of human interaction (KLING, 2000, 2007). It is in considering its pervasive reach and its deep social integration that ICT begins to take on significant ethical importance. While the ethical implications of ICT have recently made headlines (e.g. (HARDY, 2012)) with the rise of privacy concerns relating to the personal information being collected by both large and small companies, questions surrounding the ethical implications of ICT have been around for almost a century, with the ethics of technology being considered for much longer.

As far back as Aristotle's *Nicomachean Ethics* (ARISTOTLE, 1998, Book VI, 4), there was a consideration of the virtue of τέχνη, a virtue concerned with knowledge related to "contriving and considering how something may come into being which is capable of either being or not being,

and whose origin is in the maker and not in the thing made" (p.141). In this early sense of τέχνη—which came to be the root (techni) of our modern "technology"—there is already importance placed on the way in which such knowledge refers to both the object that is to be produced, as well as the relationship formed between the object and its intended mode of use (HEIDEGGER, 1997, p.29). That is, as a virtue, τέχνη is not simply concerned with the imagined production of something, but it is also cast as having an eye toward the function of the created thing once it is completed and has left the hands of the maker. Most importantly, τέχνη is concerned not with how things are, but how they could possibly be (Heidegger, 1997, p. 20) and how they may possibly continue to be following the act of making. While the implications of the ability of some made thing to outlast its moment of creation is an ancient idea, the implications of such a lasting are still pressing in the face of modern technology, if not more-so than ever[1].

Such concerns regarding the possible outcomes of the integration of technology with society were similarly and more stridently voiced in the 20th. century by Norbert Wiener. One of the founders of Cybernetics and actively involved in the technological and theoretical development of large scale computer networks, Wiener was influential in early ethical thinking surrounding the prospects that computation offered (BYNUM, 2008, 2010). Even in the 1950s, as the newly invented computational and network technologies were still largely confined to academic and government research, Wiener had concerns regarding the influence that they might have on systems of law, labor, and even human language (WIENER, 1954). For Wiener, the promise (and threat) of the development of technology lay not in knowledge concerning established forms of making as it did with Aristotle, but rather with the prospect of what may be achieved in future developments influenced by theories of mechanical communication: "society can only be understood through a study of the messages and the communication facilities which belong to it; and that *in the future development of these messages between man and machines, between machines and man, and between machine and machine, are destined to play an ever-increasing part*" (WIENER, 1954, p.16, italics added). While Aristotle thought only of the possible relations initiated through the knowledge of the process of making itself, Wiener began to see the potency in that which had been made (in addition to the possibilities seen by the makers themselves) as being a source of universal ethical concern[2].

Besides providing an accurate prediction of the current state of our involvement with ICT, Wiener highlighted two important aspects of the rise of computerized communication: First, he recognized the developing nature of such technology and the way in which it has been able, in the course of its development, to compound and build up to form ever-increasing systems of complexity interwoven with human society. That is, Wiener saw the possibilities offered by technology as in a mode of constant development, with technological ideas having an ethical dimension relating not only to things as they are now, but as they could possibly become. Second, Wiener began to conceive of "machines" as being almost equal partners in society, presaging current thinking regarding software agents as bits of code that, once developed, engage with users and the world as if completely autonomous. In this, he raised early ethical concerns regarding the responsibility of programmers who create systems which, while being set up by people, are able to act without specific human supervision.

[1] It is important to note here that while Aristotle's τέχνη deals with the future possibilities of use in the course of the making of an artifact, once "the product is finished, it escapes the dominion of τέχνη: it becomes the object of use proper to it" (HEIDEGGER, 1997, p. 29)

[2] Even in the title of Wiener's best known work on a proto-ethics of ICT, The Human Use of Human Beings, it is possible to hear echos of Kant's categorical imperative and the worry over the ways in which human-made technologies may have the ability (given Wiener's conception of the possibility of man-machine, machine-man interactions) to take human beings not as ends in themselves, but as means to other ends.

Equally as fundamental for considerations of the ethics surrounding the design and development of ICT as those concerns raised by Wiener regarding the always-changing nature of software agents is James Moor's founding of computer ethics on the malleability that computer systems present (MOOR, 1985). For Moor, what makes ICT ethically unique is its ability, as a form of a Universal Turing Machine, to emulate any type of computing machine. As Moor puts it, "computers are logically malleable in that they can be shaped and molded to do any activity that can be characterized in terms of inputs, outputs, and connecting logical operations" (MOOR, 1985, p.269). It is in part by this virtue that ICT has has been developed into the pervasive technology that it is today and why it has been so successful in inserting itself into such a variety of fields. For Jeroen van den Hoven, it is this aspect of computation that allows it to begin to colonize any domain to which it is applied. Such a movement can perhaps be best seen in the case of technology design itself, which is today dominated by the use of "technological" design tools (HOVEN, 2008).

Reviewing these few scattered historical aspects of the ethics of ICT, it is possible to recognize several key aspects of ICT that makes it a particularly important and difficult area for ethical investigation: First, ICT is built on human intention toward the world and projects a vision of how the world should, or could, be. Second, such intention is always seen as relational. In the process of making there is an externalization of intention that attempts to prescribe some purpose for the thing created. Third, ICT is constantly developing and building upon innovations. Fourth, in all it forms, to some degree, ICT can be understood as having the possibility of autonomous action. Even in the case of systems that are far from being considered in any way "intelligent," there exists, due to the quality of externalization of intention noted above, the possibility that any ICT may act, or simply *continue* to act, without direct human input. Finally, because of its status as a Universal Turing Machine, ICT is able to take the form of any type of automation, and is therefore able to come to constitute any field or domain to which it is applied to such a degree that previously non-technological practices can be modified in such a way that they become unimaginable without the aid of technology. This is particularly the case in technological design itself.

Taking these characteristics of ICT as a background and motivation for the tenor of the present ethical investigations, I will now turn to the question of the ethics of ICT design and the ways in which ethical valuations might be instantiated in ICT design. Following that, I will approach the question of complexity in ICT and will discuss one theoretical approach that has been developed to manage such ethical complexity. Finally, based on the critique of some of the existing systems of computer and information ethics available today, a knowledge-centered care-based ethics of design will be proposed.

DESIGN, ETHICS, AND THE KNOWLEDGE OF VALUES

While many of the challenges encountered when examining the ethical implications of ICT may be new, questions regarding the role of ethics in design (and vice-versa) in general are not. After all, even in The Republic, Plato offered a plan for the way in which a society should be "designed" in order to encourage a good life for its citizens. More recent ethics approaches, particularly those in the vein of the approach taken by John Rawls (RAWLS, 1999), offer a similar design-oriented ethics, but instead of offering a ready-made plan, provide a prescription for a way in which we may come together as a society in order to build a just way of living. In the case of Rawls, certain ethical values can be seen as being built into processes of deliberation and decision making. There, a particular ethical impetus can be seen as being "designed" into what are seen as just processes of deliberation (HOVEN, 2008).

The idea that our own ethical viewpoints may be built into the products of human creation can also be seen in Wiener's view of technology. Taking the position that "the structure of the machine or of the

organism is an index of the performance that may be expected from it" (WIENER, 1954, p.57), Wiener initiated early on the idea that technologies have innate to the way in which they are constructed some relation to their intended and *desired* function. That is, technologies, once developed, place constraints on individual actions, and through their use are able to change experiences and shape the ways in which people think (HOVEN, 2008).

The question of design bears heavily on the way in which ethics has been traditionally seen to approach problems. Customarily, ethical problems are posed on the basis of a given situation within which ethical determinations must be made. The ethicist makes their calculations and judgements based on the facts of a given situation, and attempts to reach a systematic ethical answer to the problem. In the case of ethical problems which are situated within a designed environment, such as those involving ICT, such a traditional approach is made more difficult in that the ethical decision maker must work to avoid what Hoven calls the "fallacy of the path-dependent dilemma" (HOVEN, 2008). That is, any ethical problem faced within a technological setting cannot be thought of purely as it exists in the immediate present, but also as containing countless past decisions. Beyond that, if an individual is confronted with an intractable ethical dilemma involving ICT, there remains the possibility that the technological system which initiated the problem could be re-engineered to avoid such difficulties, a possibility which pushes any ethics of technology back to the question of design. When faced with an ethical question involving technology, the question becomes not one of how we should act in the present situation, but rather, how would we like to be able to act in the future?

Thus, if in looking for an ethics to support the ways in which our relationships are mediated by technology, it comes to be that we need to look at the values that are embedded in the systems that we design, and what those values tell us about both how we should act in our use of such technologies and how we should conduct ourselves in the process of design and implementation. As Hoven puts it, "How can we design the systems, institutions, infrastructures, and IT applications in the context of users will be able to do what they ought to do and which will enable them to prevent what ought to be prevented" (HOVEN, 2008, p.59).

Philip Brey proposes a mode of disclosive ethics (BREY, 2000, 2010) as being necessary in order to even begin to approach ethical question regarding ICT. Given the way in which computer software and systems are often designed (with ordinary users rarely interacting with parts of a system other than the interface that has been specifically designed for use, the rest of the function and therefore the values embedded in a system obfuscated in unreadable source code), Brey advocates for such a disclosive ethics to work to make transparent those values that may be present, but only opaquely, in any system. With values in systems able to take a variety of forms—from those values innate to the code itself to those only raised once the software or system is put to use in a human and social setting—a disclosive ethics calls for a multi-disciplinary and multi-level approach in order to analyze the potential ethical impacts of any system (BREY, 2010).

For disclosive ethics, the aim is to be able to provide a source of information to users and designers which can aid in any ethical decision making process. By knowing what values may be embedded in a system, those interacting with systems are given the ability to adequately judge the ethics of their use and any future design that might be built upon existent systems. While Brey sets out specific values to be addressed in a disclosive ethics (such as justice, fairness, non-discrimination, freedom of speech, freedom of assembly, autonomy, privacy, and democracy (BREY, 2000)), others have countered that a disclosive ethics should not be concerned with any particular set of values, but rather should be concerned with any aspects of a system which may be promoting an ethical position (INTRONA, 2005).

While a mode of disclosive ethics is largely a retrospective ethical project—with a system examined in its fully-developed state in order to produce knowledge regrading a system's value orientation—other modes of investigation aim to address the question of values in design in the process of design itself. Value-sensitive design (VSD), in particular, provides one such method for incorporating a consideration of values into the process of design itself. For its originators, VSD "accounts for human values in a principled and comprehensive manner throughout the design process. It employs an integrative and iterative tripartite methodology, consisting of conceptual, empirical, and technical investigations" (FRIEDMAN; KAHN; BORNING, 2008, p.69). Like a disclosive ethics, VSD approaches the ethics and values that may be embedded in technological artifacts through a variety of methods, taking into consideration that "[a]n artifact or design emerges through iterations upon a process that is more than the sum of its parts" (FRIEDMAN et al., 2008, p.72).

Again, like a disclosive ethics, there is an emphasis in VSD on making the knowledge necessary for an ethical approach toward technology visible. For VSD, this involves taking account of the various stakeholders that may be affected by any design project, and taking into consideration the possible reach of any system. This need to account for all those who may possibly be affected by the implementation and use of system reveals a startling deficit in both VSD and disclosive approaches.

Given that ICT is itself often utilized in the development of new ICT systems (HOVEN, 2008), and given that a system may prove to be malleable and therefore be appropriated to other settings (MOOR, 1985), there enters into any calculation regarding the ethics of ICT design a measure of complexity that cannot be easily accounted for, even as ICT (by virtue of their status as consisting of material pathways of communication) may provide the ability to almost exactly track a system's network of effects. This ability to track such a complex of effects may indicate the viability of a quasi-utilitarian position when considering the ethical implications of the design of ICT, yet this ability to create a record of the effects of ICT turns back on itself, opening up the possibility for almost infinite calculations of utility, rendering a utilitarian perspective ultimately unusable.

COMPLEXITY, THE FUTURE, AND META-STRUCTURES OF ICT

It is in regard to issue of complexity that considering the ethics of designing ICT begins to approach an image established in the area of an ethics of sustainability (BECKER, 2012). While VSD brings to light the various and multifaceted relationships between a wide breadth of stakeholders and those engaged with the activity of design, such stakeholders are for the most part only considered to be contemporary human actors who may come into contact with the system. Such a position, however, neglects the wider perspective that is offered through sustainability ethics.

In the vision of sustainability ethics that Christian Becker lays out, the question of the various relationships of responsibility is given primacy when considering our ethical actions. What is interesting about Becker's approach to the question of how to act sustainably, is that he presents a consideration of our duty to not only ourselves, our contemporaries, and the natural world (as would any sort of ecological ethics, from which sustainability ethics is distinct), but also to our future selves and the future selves of others. While the implications for issues of sustainability for those in the future are quite apparent (the concern for conservation and maintenance in a world that must be available to those in the future), the implications for such future-oriented thinking may not be as clear when it comes to the design of ICT.

There are two main aspects of ICT that force the question of future generations into any discussion of the ethics of ICT. First, as we have already seen, any ICT carries with it a set of values and suppositions as part of the process of design. Such values are carried

forward into the future as the system or piece of software is used. Just as writing carries over memories from the past into the future in the form of material inscription, so are the values and intents embedded in software similarly inscribed and carried forward as well. The difference between writing and software, however, is that software not only carries forward those things (values, meanings) inscribed in the past, it also enacts them. In this, a variation on one of Wiener's concerns is made apparent: in our use of technology we engage in a process of communication with our machine creations, the future consequences of which are unknown in the present. Second, because of the need for compatibility and interoperability within ICT, any design decisions that are made today may influence, or even lock in, the possibilities for future designs. This is particularly true when designing software standards and frameworks within which others are meant to innovate. In this, a Kantian ethical concern for the avoidance of undue influence of the autonomy of others is thematically evident, even if it may not be the most effective approach.[3]

Besides highlighting the relationship that designers of ICT have with future generations, an ethics of sustainability also reveals the role meta-structures play in constraining and enabling ethical actions. As introduced by Becker, meta-structures are "complex compositions of ideas and institutions that mutually enforce each other" (BECKER, 2012, p.3) within which individuals, in their thoughts and actions, are located. For questions of sustainability, there are a myriad of meta-structures that influence actions, with the meta-structures of science, economics, and technology being some of the most important when considering the possibilities of acting in a sustainable manner (BECKER, 2012). The development of the concept of meta-structures makes explicit the complex field of human action in which modern activities take place, something crucial for the understanding of the ethical implications of ICT. In fact, meta-structures may even come to be more important for questions of ICT than for questions of sustainability. In the case of ICT design, decisions are not only enabled and constrained by various meta-structures, but such decisions also have a part in the constitution of meta-structures as well. In particular, ICT weighs heavily in the determination of economic and technological meta-structures, as can be seen in the discussion of interoperability and standards for innovation as discussed above and in the way in which ICT has come to be central to so many maturations of the modern global economy.

The awareness of relationships with people of the future and of our reliance on meta-structures that an ethics of sustainability provides is important when attempting to frame an ethics of ICT design; however, such an awareness does not go far enough in helping to manage the full range of complexity that ICT poses. In a way, insight into the nature of our relationships with others and the meta-structures which guide and constrain our actions only serve to further complicate the already complex field of ethical determinations posed by ICT without providing a fully-wrought solution.[4] In particular, conceiving of ICT as being dependent on various meta-structures—some of which ICT design interacts with in an auto-poetic fashion—forces the issue to take a wider and more radical approach which is able to not only account for complexity, but also innovation and a recursive interplay with meta-structures as well.

[3] Defaulting to the Kantian position of a categorical imperative given the role of innovation in ICT design, however, renders the question posed by the categorical imperative somewhat senseless: Would it really be possible for a designer to wish that anyone else would innovate in the manner in which the designer themself is innovating? Such a proposition would be senseless if the aim of innovation is truly to create something unique.

[4] While Becker ultimately frames an ethics of sustainability as being supported by an Aristotelian view on how to build virtues that help navigate the complexity posed by a myriad of relationships embedded within various meta-structures, Jeroen van den Hoven is dismissive of the possibilities of virtue ethics when it comes to the design of ICT. For him, virtue ethics "assumes that there is a relatively robust set of cases—the training set—that allow individuals to become expert judges . . .", however, "[w]hen new technology is involved and we are facing new problems every day, the acquisition of and buildup of dispositional properties may become problematic to the point that virtue ethics loses its attractiveness as a methodological approach to

AN ONTOLOGICAL ECOLOGY OF INFORMATION

One approach toward an ethics of ICT that attempts to account for the whole sphere of possible effect of any informational interaction is the Information Ethics put forward by Luciano Floridi. Working to define a firm basis for building an ethics of information (FLORIDI, 2008, 2010), Floridi looks to establishing an ecology of information which considers all aspects of informational interaction, ranging from information storage, use, and consumption, all the way to the design and creation of new informational products, be they simply informational records or dynamic systems. In this, Floridi does not shy away from the complexity and continuous development that ICT and an information society pose: ". . . as a full expression of techne, the information society has already posed fundamental ethical problems, whose complexity and global dimensions are rapidly growing and evolving" (FLORIDI, 2008, p.3). Floridi posits that managing this informational complexity is key in all aspects of a moral life, whether directly involved with ICT or not, and that anyone facing an ethical decision "may be expected to avail herself of whatever information she can muster, in order to reach (better) conclusions about what and ought to be done in some given circumstances" (FLORIDI, 2008, p.5). This sense of the impact of widespread information communication networks is critical for the way in which Floridi approaches the question of information ethics at large, particularly as he attempts to motivate a view of information itself—that which is managed by and constitutive of ICT—as the highest good in the way that it implicates and forms any other ethical determinations.[5]

This entanglement of information and moral action in all settings further highlights the impossibility of separating actions performed in a computation and explicitly informational setting (design, use, etc.) from those performed in more traditional, "real world" settings, an entanglement perhaps best seen in the Social Informatics research of Rob Kling (e.g. (KLING, 2000, 2007; KLING; MCKIM; KING, 2003; KLING; STAR, 1998)) and the research into embodied interactions conducted by Paul Dourish (DOURISH, 2001, 2004a, 2004b, 2010).

In motivating his viewpoint regarding the importance of information, Floridi develops the idea of the "infosphere," which he posits as being analogous to the biosphere, but rather than encompassing biological organisms, it instead is the field of action of informational objects (FLORIDI, 2008). Within the infosphere, Floridi theorizes that agents interact with three classes of information: resources, products, and targets. Here, resources are existing sources of information, products are those information resources which are created by agents through informational interactions, and targets are ancillary effects on the infosphere generated as an agent engages with resources in order to produce new products. To guide interactions within the infosphere, Floridi also proposes four ethical principles, all of which encourage agents

practical problems" (HOVEN, 2008, p. 64). As we will see, while a traditional mode of virtue ethics does indeed seem to be unsuitable for guiding an ethics of ICT for the reasons Hoven gives, a variation on the theme of virtue ethics—an ethics of care—is able to provide support for an ethics of ICT design. Indeed, in her discussion of care-based ethics, Virginia Held levels a similar critique against Virtue Ethics, complaining not, however, of its inability to approach questions of innovation, but rather that its reliance on traditional values are rooted in patriarchy (HELD, 2006, p. 19). The two critiques (Hoven's and Held's) are put on equal ground if both are considered under the larger rubric of the unsuitability of the traditional nature of virtue ethics, be it because of its patriarchal values, or its inability to adapt to new situations.

[5] Of course, Floridi presents the role of information in moral decision-making in a more nuanced fashion, accounting for the consideration of the quality of the information provided, as well as the possibility that in some situations, such as Rawls' "veil of ignorance," ethical decision making may actually be helped by less information. Nevertheless, Floridi still insists on the importance of the proper management of information as being key to ethical decision-making. For the argument toward an ethics of ICT design being presented here, such nuance only serves to highlight the importance of the design involved in the management of information, perhaps placing a value on such design above even the raw information itself, if the two could ever be completely disentangled.

to avoid the destruction of information within the infosphere (which Floridi terms "entropy"), while at the same time encouraging activities which enable informational structures to grow and flourish.

Crucial for Floridi's Information Ethics (which, perhaps due in equal measure to both the big tent approach that Floridi takes and his role as frequent editor and outspoken advocate for a philosophy of information, has become the default starting position for many ICT ethics) is the way in which he positions information not as something epistemological (equivalent just to news or semantic content), but as something ontological which is "equivalent to patterns or entities in the world" (FLORIDI, 2008, p. 10)[6]. This claim of Information Ethics shifts it from being an ethics suitable only for the consideration of those activities that take place within explicitly informational context (having only to do with computers, ICT, etc.) to a wider macro-ethics, large and powerful enough of a system such that it is able to encompass the full range of human and non-human activities in the world. Important for taking a broad-based information ethics as a fundamental ethical grounding is its non-anthropocentric orientation which is able to account for and regulate both the actions of humans as well as the actions of any created informational products[7].

As crucial as Floridi's Information Ethics appears to be in founding an ethical consideration of ICT that is able to sustain its contextual place within a wider (non-technological) world, it remains, in its ethical propositions, concerned only with a basic determination of the preservation and creation of information, without giving any guidance toward what type of information or information systems should be produced. In this, it lacks a central component for considering an ethics of design. While it enjoins any moral agent to contribute "to the sustainable blooming of the infosphere" (FLORIDI, 2008, p.17), it gives no proactive ethical recommendation, outside of an almost incalculable quasi-utilitarian position of maximizing information, for what types of informational products should be developed. That is, in Floridi's theory of Information Ethics, when confronted with two options, each with equal information-sustaining potential, a designer has no guidance for which route to follow.

Such a problem notwithstanding, Information Ethics does provide a basis for understanding the complexity that the design of ICT presents and a

[6] This setting of information as being a concern for ontological investigation rather than an epistemological one seems to present, unacknowledged (and, perhaps given comments elsewhere regarding the continental tradition in philosophy, unwanted) by Floridi, a close link between his Information Ethics and the phenomenological investigation of Being undertaken by Heidegger in *Being and Time.* Particularly, Floridi appears to set up information as being constitutive of a fundamental ontology for human action within the world in a way which is strikingly similar to (if terminologically distinct from) Heidegger's explanation of the phenomenological method in the introduction to *Being and Time*.

[7] (HEIDEGGER, 1996) This ontological approach happily aligns itself Becker's approach in sustainability ethics in that it accounts for a full range of entities in ethical considerations: "In IE [Information Ethics], 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; and thing that may or will exist, like future generations; and anything else that was but it no more, like our ancestors or old civilizations. IE is impartial and universal because it brings to ultimate completion the process of enlargement of the concept of what may count as the center of a (no mater how minimal) moral claim, which now includes every instance of being understood informationally, no matter whether physically implemented or not. in this respect, IE holds that every entity, as an expression of being, has a dignity, constituted by its mode of existence and essence (the collection of all the elementary properties that constitute it for what it is), which deserves to be respected (at least in a minimal and overridable sense) and hence places moral claims on the interacting agent and ought to contribute to the constraint and guidance of his ethical decisions and behavior. This ontological equity principle means that any form of reality (any instance of information/being), simply for the being what it is, enjoys a minimal, initial, overridable, equal right to exist and develop in a way that is appropriate to its nature. The conscious recognition of the ontological equality principle presupposes a disinterested judgement of the moral situation from an objective perspective, that is, a perspective that is as nonanthropocentric as possible. Moral behavior is less likely without this epistemic virtue. The application of the ontological equality principle is achieved whenever actions are impartial, universal, and 'caring'" (FLORIDI, 2008, p.12).

way to conceive of all the implications that ICT has for both human and non-human actors. Further, by conceiving of moral agents as themselves being part of an informational environment, there is an explicit recognition of the auto-poetic effects of information. That is, central to any ethics of ICT design needs to be the realization that in design, both through the process of design itself and through the products of that process of design, there are impacts on the agents engaging in the design activity. As such, any system of ethics that may hope to guide ICT design needs to account for the way in which activities reflect upon the moral agent as they are in the very process of ICT design.

INTERLUDE: RE-FRAMING THE QUESTION

Thus far, in tracing the course of the various modes available for an ethics of ICT design, a multi-layered approach can be seen. Moving from initial thinking about the nature of technical knowledge itself (in the form of Aristotelian τέχνη) to considering the ways in which technological artifacts may have values inputed in their construction, to an all encompassing vision of a universe of nothing but information (within which ICT is simply one type of informational entity—albeit perhaps a special one under such a schema), there appear to be multiple and sometimes contradictory approaches when it comes to reflecting on the complexity of the process of ICT design, entangled explicitly as it is with various meta-structures, relationships between agents that span temporal categories, and concern for both the development of new designs and of designers themselves. All this is made more difficult by the malleability and various possibilities for reconfiguration that software (and ICT more generally) is subject to.

Given this field of action, any moral agent hoping to engage in the design of ICT is faced with an ever-changing ethical landscape to navigate. While the multi-layered investigational techniques put forth by both disclosive ethics and VSD provide a methodology for understanding in what ways values may be instantiated in any technological design, and an information-as-ontology approach provides a baseline for ethical actions, there remains few viable systematic ethical procedures for understanding how to act in a moral fashion when faced with the question of innovative design. While highlighting the importance of the role of having adequate knowledge of the ways in which ICT systems carry out their functions, such diagnostic value-centered procedures often are only initiated once a set of values for any project are already in place (as put forth by the various stakeholders), or only initiated in a post-hoc fashion.

Such concern is particularly troubling in that as we begin to see technological structures as establishing, and in some some cases enacting, ethical attitudes and norms, greater ethical gravity is given to the process of design itself. The question remains, in what ways and by what ethical system should a project of ICT design be motivated? By what means can such multi-layered complexity of both immediate and future effect be managed? Is there a systematic ethics which is able to answer the basic question of ICT design: what kinds of systems should be designed and how should such systems be constructed?

KNOWLEDGE AND MEDIATED CARE

While Floridi's Information Ethics presents a well developed, general means by which our interactions with ICT (from design to use) may be ethically guided, it provides no specific, proactive guidance for the creative process of design. When confronted with the need for a particular ICT system, or when faced with the opportunity for open-ended innovation, software and systems designers are left on their own to ask what kind of system should be built. Fortunately, such a general Information Ethics offers the flexibility for developing other approaches within its borders. In this way, it is possible to take advantage of the wide ontological picture that Floridi presents, one which is able to conceptually account for the structures of complexity as introduced by an ethics of sustainability, while at the same time building out an ethics capable of addressing design and innovation.

Specifically focusing on the ethical needs of individual systems designers and the many dynamic relational and situational complexities they face, it becomes apparent that any ethics for design cannot be a simple deontological one, and that it needs to be one which is able to support both dynamic relations with others, as well as an understanding of the ethical agent being dynamic and non-singular as well. While certain tasks in design can easily appeal to a version of Habermasian discourse ethics (in the establishment of standards, modes of interoperation, etc.), the ethical kernel of the process of design seems to best appeal to an ethics of care, with a few necessary modifications.

In a care-based ethics (see, for example, Virginia Held's The Ethics of Care (HELD, 2006)), there is an emphasis placed on caring relationships, both as a means for enacting an ethics, as well as a means for developing a sense of what ethical behavior should be. Similar to the development of virtue in a virtue ethics, in an ethics of care the development of an understanding of how to enact caring relationships is achieve through the personal experience of caring relationships. Here, the example is that of a child's relationship with their mother. Almost all people, if they are to grow and develop from childhood to adulthood, have some experience of care and what it means to be cared for. A care-based ethics presents a proactive framing for ethics in which moral agents are seen to be able to internalize their own experience of caring relationships and then utilize such caring "virtues" as a way to guide their own actions as they enter into relationships with others.

Such an approach takes as a given that in every relationship what is necessary for care is different. That is, each different relationship—be it between a mother and child, between an employer and employees, or between a teacher and their pupils—calls for a unique means by which care is expressed. As such, what is necessary is to be able to develop an understanding of what a caring relationship looks like in general and how such relationships would be instantiated in each particular case. For those involved with the design of ICT, if we look back to the original Aristotelian definition of τέχνη as involving an aspect of "for whom," this means the development of an attitude of care toward those with whom, through the process of design, the designer is building a relationship. Such relationships (by virtue of design being an act of bringing something new into existence) are always different, and thus easily fit into the model of the particularity of caring relationships as defined by an ethics of care in which such relationships are always singular, each with their own unique needs.

This aspect of the newness which is ever-present in design, while often seen as being a roadblock to other, similarly-constituted ethical framings such as virtue ethics (Hoven, 2008), is easily accounted for in an ethics of care in that one simply learns a certain innovative care which is able to be applied to any new situation once the moral agent themselves has been on the receiving end of such caring innovation and had an opportunity to learn. Just as every child's sense of wonder for and exploration of the world is an important aspect of development, and yet is necessarily always different, parents are still able to develop an understanding of how to foster such experiences in the child. Similarly, for newness in design, individuals can learn over time what modes of innovation and newness adequately express care toward others and which don't. In this, for designers, engagement with the designs and modes of innovation of others (and a subsequent examination of the ethical values instantiated in each design) is a crucial part of the ethical process of ICT design.

However, if it is to provide the ethical kernel to ICT design, a traditional ethics of care needs to be reconfigured in one key way. In a traditional care-based ethics, there is an emphasis on the direct relationships involved. In this, care is conceived as being a particular practice and a particular value that is instantiated in the moment of the relationship between people. Such a possibility is complicated in the case of ICT design and doubly so. First, because of the eminent reproducibility of computer software, an individual designer is frequently unable to have a personal relationship

with each person who may come to use or be affected by the products of a design activity. This issue of the further complexity that is introduced into the line of ethical questioning by the possible reproducibility brings to light, among other issues[8], the way in which future relationships (as highlighted in an ethics of sustainability) are brought into play. Second is the fact that all relationships as established in the use of ICT are, by their nature, mediated. As such, even if a designer attempts to not simply engage in the act of design with consideration of an ethics of care but also attempts to build such an ethics into the system which they are designing (in a Rawlsian mode in which our ethical position is expressed through our designs), it is impossible to avoid the issue that the fact of mediation introduces into the situation.

Ultimately, while it may be possible to account for or mitigate the problem that mediation poses for applying an ethics of care through a philosophical re-fashioning of what mediation as a whole can be understood as[9], it is a more direct approach to simply see the ways in which mediation itself can be seen as an act of care. Just as a doctor may care for patients by using the tools of medicine, it is possible to understand direct caring relationships as taking place with the fact of mediation taken as a given. That is, while mediation may in some cases reduce the ability to instantiate an ethics of care (as in cases of a bureaucratic mediation), if the form and mechanics in such a mediation is itself taken into consideration as pertaining to the care provided, the difficulty of mediation can be subsumed into a traditional picture of a care-based ethics. Such a proposition is particularly (if not exclusively) suited for considering the design of ICT in that the mediation involved (both in the mediation between the designer and the user, as well as any mediation built into the product of the design process itself) is explicitly part of the activity of design in such a way as it may not be in other types of relationships.

Lastly, the role that knowledge needs to play in any consideration of an ethics of ICT design cannot be overstated. Given the complexity of values that may be instantiated within a piece of software or within an ICT system, and the myriad of effects that such values may have, it is necessary, even when already engaging in a caring practice of design, to have an accurate understanding of the conditions within which one is acting. This is particularly the case when the largely artificial landscape within which ICT design takes place in is considered. In spaces where innovation and complexity are the norm, it becomes increasingly important to know where one stands as an actor and to be able to properly orient oneself toward engaging in properly caring relationships. That said, the influence of a disclosive ethics need to be felt. In order to properly engage in care, there needs to be a conscious consideration of any values that may be instantiated in any design. As such, the approach proposed here goes directly against some traditional conceptions of the procedure of ethics that assert that "common knowledge" is the only knowledge necessary for proper ethical engagement.

To a large extent, this framing of ICT design ethics as a knowledge-based ethics of care begins to look like Hume's theory of moral action in which an innate moral sense is helped along by empirical determinations. In the present case, however, the moral sense is one which is developed by way of empirical experience as one interacts with and practices design, and not one that is innate in a spontaneous fashion, though to the degree that it is developed as the result of the necessary conditions for human physiological development it could very well be given the same originary status as that which would be innate. Ultimately, and in any event, such a distinction between the empirical and spontaneous is purely technical.

[8] For a discussion of the role of responsibility relating to the uses of ICT and the ways in which all aspects of responsibility are complicated by it, see (VEDDER, 2008).

[9] For a post-phenomenological look at how mediation may be mitigated by positing the primacy of such such mediation in all relationships, including that of the relationship of an individual to themself, see (DERRIDA, 2011).

In the end, in looking to define an ethics of ICT design, it is necessary to develop some form of both the virtues of care and of knowledge, with there being no possibility within such an ethics of dividing (as Aristotle does, separating phronesis and episteme). In looking for an ethical path within the dually artificial and natural landscape of ICT, it is necessary to have both a caring sense of what to do, and knowledge of how such a sense may be properly applied.

CONCLUSION

There are many aspects of ICT that pose strange and new challenges when considering how best to systematize an ethics of design. ICT's ability to instantiate values into a wide, complex field of human practices makes it necessary to think not only of the specific moment of design itself, but also to consider the way in which design may fit in among other informational concerns. Toward this end, by setting up the various relationships as developed by the concept of meta-structures within a wider, ontological perspective of information, it becomes possible to situate a knowledge-based ethics of care as a systematic means for guiding proactive practices such as ICT design. While any care-based ethics demands a close attention to the particulars of any relationships, this approach, with its emphasis on the role of a disclosure of knowledge as part of a process of ethics, does point to the viability of open-source models (with their principles of transparency and reviewability (GRODZINSKY; WOLF, 2008)) as being such a mode of ICT design that would be helpful for providing an initial springboard for the practice of a care-based ethics of design. Câmara and Fonseca (2006) show how open source software design can enhance the relationship between knowledge and care.

Even within the initial framework for a knowledge-based ethics of care that is presented here, there still remain further directions for inquiry. How it is possible to properly develop caring relationships with people of the future and the ethical implications of the possibility for the infinite re-use of ICT components toward the actualization of systems which are, in their aggregation, new are both questions which demand further reflection and systematization. These are certainly not the only questions yet to be addressed, and given the ever-changing nature of ICT, a constant re-evaluation of ethical approaches will surely be necessary.

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