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This is a preprint version of the introduction to “The Ethics of Information Technologies”,
a volume I co-edited with Keith Miller

Ethics and Information Technologies: History and Themes of a Research Field

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1. Introduction

The International Telecommunication Union, the United Nations agency that deals with information and communication technologies (ICTs), estimated the 2014 number of worldwide Internet users was almost 40% of the worldwide population. The 2014 report of the World Economic Forum predicts that the value of the Internet-based economy of the G-20 nations will reach \$4.2 trillion (or more than 5% of the countries' GDP) by 2016.

Clearly, we live in data-driven, IT-based societies: societies that depend crucially on information. This may not sound new to the reader. Media, academic articles, and everyday discussions increasingly focus on the informational, technology-driven turn that characterizes this historical moment, in which widely disseminated and radical changes simultaneously affect both individuals and societies. Such changes generate new opportunities, but also new questions and problems ranging from individual well-being and the management of societies, to the regulation of design and deployment of technological artefacts, as well as the definition of ‘good’ and ‘evil’ and our understanding and perception of reality itself. These very same changes make the information revolution, the ubiquitous and capillary dissemination of information technologies, more than just a technological upheaval; for it has helped redefine individuals' daily practises and changed societies' social and political priorities.

Computer Ethics is a research field entirely devoted to address the ethical challenges brought about by the information revolution. Although some trace the start much earlier, many scholars cite James Moor's 1985 paper (Moor, 1985) as the beginning of computer ethics as a sub-discipline of applied ethics. In that paper, Moor described the changes that the information revolution (a term not popular in 1985, but helpful to our overview) was prompting and the need for conceptual analyses as a preliminary step to address them properly. In his words: "*although a problem ... may seem clear initially, a little reflection reveals a conceptual muddle. What is needed in such cases is an analysis which provides a coherent conceptual framework within which to formulate a policy for action*", (Moor, 1985: 266). Almost three decades later, with contemporary societies turning into information societies, policy vacuums and conceptual muddles surrounding information have become pressing issues. Understanding and regulating privacy, anonymity, and security in the information age were some of the most compelling problems in 1985, problems that have persisted during the past thirty years, along with new issues that have surfaced concerning crucial concepts such as identity (Ess, 2012); harm and evil (Floridi & Sanders, 2001) agency (Johnson & Miller, 2008); warfare and state power (Floridi & Taddeo, 2014) and (Taddeo, 2014). These issues are being played out as we construct a fundamentally new way in which we perceive ourselves and reality (Floridi, 2014). We are convinced that any attempts to fill the many policy vacuums concerning the design and use of ICTs are unlikely to be effective unless they are anchored in a fundamental rethinking of information and its importance to society.

The scholarly interest in these and other problems has grown since 1985, and has attracted experts from many different research fields, including philosophy, computers science, psychology, and social science. This interdisciplinary work continues to shape a new and broad research field: Information and Computer Ethics (ICE). Journals including *Ethics and Information Technology* (Springer), *Philosophy & Technology* (Springer), and the *Journal of Information, and Communication and Ethics in Society* (Emerald) have been launched during the past few decades and have fostered important and on-going debates. At the same time, academic and professional organisations have grown – including the Association for Computing Machinery's (ACM) Special Interest Group on Computers and Society, and the IEEE's Society on Social Implications of Technology (SSIT), the International Society for Ethics and Information Technology (INSEIT), the conference series on Computer Ethics Philosophical Enquiries (CEPE), and the one on Ethics In Communication (ETHICOM) – all of them supporting and coordinating scholars working in ICE.

This volume collects some of the most influential papers that have animated the debate in ICE over the past three decades. These articles have set the tone of the discussion on issues like

privacy, online trust, anonymity, values sensitive design, machine ethics, professional conduct and moral responsibility of software developers. Nonetheless, this collection of articles cannot be exhaustive; there are far too many important papers in the area for any collection of this kind to be comprehensive. Instead, we offer a sampling of important voices that have influenced, and continue to influence, the direction of scholarship in ICE.

This collection is also not meant to imply that a single, consensus approach to ICE has been established; it has not, and we do not expect that it ever will be. The main goal of this volume is rather to provide the reader with a set of valuable papers that have shaped the debate on key topics, papers we think should be considered when developing future research in this field. At the same time, the volume also aims to offer an overview of the main trends of research that have been developed in ICE over the past three decades. For this reason, we arranged the contributions into six sections, each devoted to a specific topic of analysis and focusing on research themes such as: the history and theoretical foundations of ICE; ethics and computer artefacts; computer ethics, privacy, and anonymity; well-being and the ethics of technology design; education and professional ethics; and social interactions and computer games.

2. Six sections, six research themes

The categorisation proposed in this volume will help to identify prominent trends in this field and offer conceptual coordinates to the reader less acquainted with ICE. Those who may be more familiar with ICE may consider our taxonomy partial or too rigid; we too are sceptical of any organizational scheme for ICE. Ethical problems related to the use of ICTs, like many other ethical or conceptual issues, are usually interwoven. For example, any insightful analysis of privacy will have also to take into account the relevance of social networks and the need to ensure a secure cyber space in contemporary societies. Likewise, a quality analysis of information warfare must include consideration of the moral status of autonomous artificial agents.

We are well aware of the complex conceptual network underpinning these, and other, issues. However, we found that this categorization gave us a useful conceptual order. So rather than looking at the organization as a restriction, we hope that readers will find the structure of the volume as a helpful stepping stone, using the categories as a map to begin or continue their discoveries in ICT. The organization, we think, will fade into the background as these excellent articles grab the readers' attention.

The reader will find that papers are arranged in a chronological order within each section. This allowed us to present the evolving debate surrounding each theme, so that the reader can have a clear idea of a starting point as well as more contemporary ideas on these important issues.

In the remainder of this introduction we will offer a more in-depth description of the content of this volume.

2.1 History and Theoretical Foundation of Information and Computer Ethics

Issues now important to ICE were explored in the 1940s and 1950s in the work of Wiener, who introduced the term “cybernetics” (Wiener, 1965) to refer to an interdisciplinary research field dedicated to the study of information feedback both in natural and artificial systems. He was also the first prominent technologist to highlight the potential impact of ICTs on humankind and society. Famously he stressed: “*long before Nagasaki and the public awareness of the atomic bomb, it had occurred to me that we were here in the presence of another social potentiality of unheard-of importance for good and for evil*”, (Wiener, 1965: 27–28). The ethical concern raised by Wiener remained marginal and largely ignored for more than a decade, before it was brought to the fore again between the 1960s and the 1970s when ICE emerged as a new field of study, mainly focused on establishing ethical principles to guide computer scientists in their daily practises.

Starting with the 1980s, ICE began to attract scholars mainly interested in the ethical implications of the use and dissemination of information technologies. The discussion at the time focused on what Herman Tavani (Tavani, 2002) later named the ‘uniqueness debate’, a scholarly discussion about the novelty and uniqueness of the problems with which ICE was, and still is, concerned. The debate addressed foundational issues related to whether ICE could be considered a coherent research field rather than a simple collection of ICT-related ethical problems and relative analyses.

The answers to these questions varied depending on one’s view of the problems under consideration. Some have regarded ICTs problems as “*new versions of standard moral problems and moral dilemmas, exacerbating the old problems, and forcing us to apply ordinary moral norms in uncharted realm*” (Johnson, 1999). Scholars such as Deborah Johnson and Keith Miller (Johnson & Miller, 2008) for example, do not deem radical, or totally novel, the changes brought about by the information revolution and consider ICE to be a research field focusing on specific issues related to the management of information. For those agreeing with this position, ICE endorses a decision-oriented approach and is devoted to offering applicable solutions on a case-by-case basis. Others (Moor, 1985) (Floridi, 2002) maintain that the problems posed by the information

revolution are radically new and call for a redefinition of traditional concepts, such as good and evil, to ensure an adequate understanding of the issues at stake.

This section encompasses five papers that have shaped this debate by James Moor, Herman Tavani, Luciano Floridi, Terry Bynum and Simon Rogerson. The section ends by offering a detailed critical historical analysis of the growth of ICE, provided by Terry Bynum's contribution (Bynum, 2008).

2.2. Ethics and Computer Artefacts

This section collects articles describing different positions in the debate on machine ethics. The area of research focusing on issues concerning the morality of artificial agents, a topic which spans from the very possibility of building moral machines, to whether building such a machine would be an ethical choice.¹ This debate was particularly heated at the beginning of the XXI century, and provided some crucial contributions to the discussion and research on the design and deployment of artificial autonomous agents, which nowadays concerns several areas of society from war-waging, health-care, and companion to the deployment of autonomous cars, as described in Koscher's paper (Koscher et al., 2010). The reader interested in this topic may also consult the volume of this series on *Machine Ethics & Robot Ethics* (edited by Asaro & Wallach).

The debate on the moral status of artificial agents begins with considering which requirement an artificial agent should meet to qualify as an autonomous agent. The literature on this specific topic is vast and interdisciplinary [see for example: (Floridi & Sanders, 2004) and (Wooldridge, 2009)]; in this section we include Deborah Johnson's article. That article provides five criteria that an agent which enjoys the status of moral agent needs to meet and concludes that as artificial agents only meet four of the five criteria they should not be considered moral agents. In her words: "*failure to recognize the intentionality of computer systems and their connection to human intentionality and action hides the moral character of computer systems. Computer systems are components in human moral action*". The stress on the intentionality of the designer and of the user remains one of the key aspects of this paper, for it points to the role, and moral responsibility, that human beings have in designing and deploying these artefacts

The issue of the moral responsibility of designers is at the core of Frances Grodzinsky, Keith Miller, and Marty Wolf's paper (Grodzinsky et al. 2008), which builds upon the distinction among autonomy, moral accountability, and responsibility offered by Luciano Floridi and Jeff Sanders (2004) and seeks to define the extent of moral responsibility of a designer, once the

¹ The reader interested in the legal debate surrounding this issue may find useful (Pagallo, 2011).

created artefact shows some autonomy as defined by Luciano Floridi and Jeff Sanders. In Grodzinsky's and colleagues words: "*Can an artificial agent that changes its own programming become so autonomous that the original designer is no longer responsible for the behavior of the artificial agent?*".

The remaining three articles focus on machine ethics as a research field. Colin Allen, Wendell Wallach, and Ida Smith paper's (Allen et al. 2006) as well as Michael and Susan Anderson's papers (Anderson & Anderson, 2007) both offer seminal contributions in delineating the scope of the field and its relevance both within and outside academia. As Anderson and Anderson stress in their papers, "*machine ethics is concerned with ensuring that the behavior of machines toward human users, and perhaps other machines as well, is ethically acceptable*".

The section ends with *The Moral Responsibility for Computing Artifacts: The Rules*, also known as "The Rules". This is a set of rules defined, and subsequently refined, by an *ad hoc* committee, chaired by Keith Miller, that collaborates online to address the ethical problems concerning the design and deployment of autonomous machines. "The Rules" are different from a code of ethics, since they are not specific to any profession or organization; they are also relatively easy to change and to update as society and technology evolve. They aim at offering a set of guidelines that engineers and software developers as well as ethicists may consider in designing, developing, and deploying ICTs.

2.2 Computer Ethics, Privacy, and Anonymity

Over the past decades, privacy and anonymity have increasingly had a bearing on policy- and law-makers. They have also attracted public attention in a way many other ICE issues have not. Consider for example, the widespread public interest devoted to the 2014 European Court of Justice decision concerning the right to be forgotten. It was clear since the very beginning that the computational power and the malleability of data manipulated by informational artefacts could put at risk individual liberties. The 2013 U.S. National Security Agency (NSA) scandal offers a tangible example of how technological and state power can put such rights under sharp devaluating pressure.

Informational privacy (as distinct from bodily privacy) is broadly defined as the right to control personal information, and is deeply interwoven with the development and dissemination of communication technologies. As noted by Mireille Hildebrandt (Hildebrandt, 2013), the definition of the right to privacy has undergone a series of continuous refinements over the XX and the XXI century, which have happened in parallel with the evolution of information technologies. Briefly sketching this process, Hildebrandt starts with the famous definition of

privacy as the ‘right to be left alone’ (Warren and Brandeis 1890). A definition which was proposed in response to the publication of private pictures of movies stars, and aims at protecting the extent to which one's thoughts, sentiments, and emotions could be shared with others. Such an understanding of privacy rests on the principle of “inviolate personality” which is part of a general right of immunity of the person, “the right to one's personality”. It does not seem a coincidence that the concern for privacy emerged when cameras started to become popular and newspaper began to circulate to a wider extent than before.

During the XX century, the definition of privacy went from ‘the right to be left alone’ to the right of self-determining the conditions for sharing personal information (Westin, 1970). Also in this case, the refinement of the definition does not appear to be accidental; for this definition was formulate in the same decade in which databases started to become a common tool to collect, mine, and transfer data. The next notable step in the definition of privacy arrives with Philip Agre and Marc Rotenberg, who defined privacy as the freedom from ‘unreasonable constraints to the construction of one’s own identity’ (Agre & Rotenberg 1997). This definition set two important differences from the ones provided before, it shows that (i) privacy is not an absolute right, some constraints are indeed possible and need to be accepted insofar as they are *reasonable*, and (ii) it links privacy to individual’s identity stressing the dynamic nature of the latter.²

However, the understanding and the definition of privacy and anonymity does not only depend on technological upheaval; it is also shaped by one’s cultural heritage. For this reason in this section we included papers from scholars belonging to both Western and the Eastern cultures. Papers such as Lu Yao-Huai’s (Yao-Huai, 2005) and Kiyoshi Murata and Orito Yohko (Murata & Orito, 2008). The papers cannot represent of the totality of non-western perspectives on privacy and anonymity; nonetheless, they offer a glimpse into alternative perspectives on these important issues.

Helen Nissenbaum’s (Nissenbaum, 1998) article focuses on key problems related to possible breaches of privacy. In the author’s words: “*information and communications technology, by facilitating surveillance, by vastly enhancing the collection, storage, and analysis of information, by enabling profiling, data mining and aggregation, has significantly altered the meaning of public information. As a result, a satisfactory legal and philosophical understanding of a right to privacy, capable of protecting the important values at stake in*

² The reader interested on the analysis developed on personal identity and privacy in the age of the information revolution may want to refer to (Ess, 2012).

protecting privacy, must incorporate, in addition to traditional aspects of privacy, a degree of protection for privacy in public”.

Jeroen Van den Hoven and Pieter Vermaas’s article shifts the focus to threats to privacy that come from the dissemination of nano-technologies, arguing that while the menaces to privacy are usually conceived within the framework of a generalised and centralised form of surveillance, nano-technologies will allow for a new, horizontal, breaches to privacy. “[One related to] constant observation at decentralized levels. [...] privacy concerns may not exclusively be about constraining information flows but also about designing of materials and nano-artifacts such as chips and tags”.

Risks to privacy are further analysed in Herman Tavani and Fran Grodzinsky’s paper (Tavani & Grodzinsky, 2002) and Michael Zimmer’s paper (Zimmer, 2010). The former focuses on the risk posed to privacy by cyber stalking and stresses the need to consider the moral responsibility of Internet Service Providers in allowing access to personal information as well as the responsibility of internet users in managing information online. The latter uses a case study to reflect upon the ethical problems encountered by the research focusing on social networks.

Phillip Serracino-Inglott’s paper (Serracino-Inglott, 2013) concludes this section. The paper offers an original and innovative analysis of anonymity online, with a focus on digital vigilantism and *hactivism*. The article seeks to answer the following question: “Do Anonymous’s activities qualify as vigilante activity, and if so, can they be justified?” This paper also gave us chance to remember Philip, who was a bright, generous, and passionate young scholar who passed away in 2013 at the age of 37.

2.3 Well-Being and the Ethics of Technology Design

The papers included in this section focus on the embedding of ethical values in the process of designing technological artefacts. The discussion concerns both which values should be included during the design process, and which methodology should be used to make sure that such values are properly considered while designing new artefacts. Value sensitive design is the research field devoted to the analysis of these topics.

The discussion springs from the idea that design is not a value-neutral process, and that it is affected by social practises, moral and cultural values, and commercial interests. Furthermore, design also affects individuals’ practises and habits. One of the famous examples often cited to illustrate this point is the design process of the bicycle that occurred in the XIX century. At the time, bicycles were originally thought as a tool for sports; as such the main goal was speed. Safety was not a primary concern. This led to the design of bicycles with the rear wheel much bigger

than the front one. Later on, a new market opened up: women and elderly people could use bicycles to move around. Speed became at this point a secondary aspect to be balanced with comfort and safety. A new model of bicycle, the one that we know today, was then conceived. This new model allowed for a wider use of bicycles, which eventually changed many people's habits.

Following up this example, value sensitive design aims at ensuring that all technological artefacts, not just informational or computational artefacts, endorse and respect human values. The list of the proposed value to be followed is quite general and comprehensive, the reader interested in this topic will find Batya Friedman, Peter Kahn and Alan Borings's paper (Friedman et al., 2006) insightful. The paper also offers the starting point for an in-depth reflection on the methodology to be endorsed so to ensure that human values are respected throughout the design process and fostered when a given artefact is deployed.

Jeroen van der Hoven and Noemi Manders-Huits' article deepens the analysis of the challenges posed by the design of information technologies and the need to ensure that computational artefacts would respect and support human values, given their pervasive dissemination and the radical changes that this is prompting to human interactions and habits.

A conceptual tool, called the *Control Closure of an operation*, is proposed in Matteo Turilli's paper (Turilli, 2007) to ensure the embedding of moral value in the design of computational artefacts. The Control Closure allows for translating ethical principles into ethical requirements and protocols that need to be satisfied and respected by the artefact.

Carson Reynolds and Rosalind Picard's paper (Reynolds & Picard, 2004) offers an innovative interpretation of value sensitive design. The authors describe sensors and algorithms that can sense and interpret information related to emotional states. Focusing on values such as calmness, autonomy, and informed consent, the article describes how adaptive technologies act on these values and how such adaptation will impact the development of affecting computers. This paper also offers us a chance to remember another brilliant colleague, Carson Reynolds, who passed away in 2013 at the age of 37.

2.4 Professional Ethics and Education

ICE issues affect all of society, but computing professionals have a distinct and significant perspective on these issues. These professionals design, develop and deploy the artefacts that define the information revolution. Already in 1948, Wiener (Wiener, 1948) recognized that the people who design machines and algorithms had special responsibilities, and others have

discussed these issues since. But starting in the 1990's, important scholarly contributions about professional computing ethics appeared, papers that apply classical ethical theories to situations that computing professionals face in their work lives.

Donald Gotterbarn (Gotterbarn, 1991) has been a leading voice in that literature. His paper about the "use and abuse of computer ethics" appeared in the *Journal of Systems and Software*; the fact that this is a computer science, software systems journal (and not a philosophy journal) illustrates the importance of interdisciplinary scholarship and an interdisciplinary readership when working in the field of professional computer ethics.

In addition to interdisciplinary scholars, professional organizations in computing have become engaged in computer ethics, often by way of codes of ethics. The ACM showcased several important papers about applied computer ethics; our next three papers come from their flagship publication, *Communications of the ACM*. An often-cited 1993 paper by Ronald Anderson, Deborah Johnson, Don Gotterbarn, and Judith Perrolle introduced a code of ethics from the ACM to its membership by giving short cases, and applying the recently revised code to those cases.

A common theme in professional ethics in general, and in professional *computer* ethics in particular, is accountability for work accomplished. Words like "responsibility," "duty", and "pride of workmanship" appear often as part of this theme. A 1994 paper by Helen Nissenbaum, "Computing and Accountability," (Nissenbaum, 1994) explores how distinctive characteristics of computing (including, among others, the problem of many hands, and the frequency of bugs) complicate issues of accountability.

In that same year, a related paper by W. R. Collins, Keith Miller, Bethany Spielman, and Philip Wherry (Collins et al. 1994) explored how to act professionally despite difficulties measuring and attaining high quality in software. The phrase "How good is good enough?..." was in the title of this paper, and the term "good enough software" was subsequently used frequently in software engineering literature, although not always with the same emphasis as this paper.

Scholarly work, ethics codes, and case studies focused on professional ethics, and all three of these resources were brought to bear on educating potential computing professionals about their ethical responsibilities. An early influential paper about such education is from Dianne Martin and Elaine Wertz (Martin & Wertz, 1999), a paper that encouraged curricula that included ethical awareness, but also ethical action.

Issues of gender, both in computing professions and in computer science education, have also been an on-going concern. Underrepresentation of women in professional computing has been a chronic issue for many individuals, professional organizations, and governments. We finish this section with a 2002 paper by Eileen Trauth entitled “Odd girl out: an individual differences perspective on women in the IT profession.” (Trauth, 2002)

2.5 Social interactions and Computer Games

The papers proposed in this section analyze the impact of ICTs on social interactions and on related ethical problems. The focus on such problems has expanded over the years to include problems pertaining to virtual realities, such as Second Life and computer games, to issues concerning social networks and the behaviours fostered by the social dynamics occurring in such networks, e.g. Facebook and Twitter.

In an attempt to reproduce the evolution of the discussion on these topics, this section includes Charles Ess and Fay Sudweeks’ (Ess & Sudweeks, 2005) contribution, which provides the reader with an introduction to Computer Mediated Communications, a research field that has a specific focus on the impact of ICTs on social interaction. In particular, the paper addresses two issues, which are also at the core of a special issue of *Journal of Computer and Mediated Communication*, which this paper opened. The two questions are, “*To what extent are the now widely used—but also seriously criticized—frameworks for cultural analysis provided by Hall and Hofstede fruitful for crosscultural and intercultural communication in CMC environments?*” and “*How have CMC scholars and researchers developed, modified, and/or created alternative frameworks for analyzing cultural dimensions of online communication?*”.

Philip Brey’s paper (Brey, 1999) starts off with an analysis of immoral behaviours occurring in virtual realities and uses such an analysis to offer an insight of the ethical aspects of misrepresentation and biased representation, which are often peculiar of virtual realities. The analysis of unethical behaviors is also at the core of Miguel Sicart’s (Sicart, 2005) article on the ethics of computer games. The paper rests on the consideration that as computer games become increasingly popular, occupying an increasing share of the entertainment industry, questions have arisen as to whether involving users in simulations that require and encourage violent and aggressive behaviours may prompt the emergence of unethical behaviours: “*apparently, computer games turn their users into blood thirsty zombies with a computer game learnt ability of aiming with deadly precision*”.

The second part of the section focuses on the impact of ICTs on society at large, issues pertaining information overload, research ethics, and cyber warfare are addressed in this case.³ Shannon Vallor's paper (Vallor, 2010) proposes to consider virtue ethics as a suitable framework to discuss the ethical impact of information technologies, in general, and the impact of social networks in particular. Ken Himma's article (Himma, 2007) explores the implications of the so-called information overload for contemporary information society. Finally, Mariarosaria Taddeo's contribution (Taddeo, 2012) addresses the ethical problems posed by the dissemination of information warfare, and more in particular of *cyber* warfare. The paper argues that the novelty of the phenomenon generates a policy gap that can be only filled once a clear understanding of the nature of the phenomenon will be grasped. It also advocates for a conceptual analysis of information warfare as a necessary preliminary step to any attempt to regulate this new phenomenon.

Conclusion

We have enjoyed surveying the rich and growing collection of scholarly writing about ICT ethics. Although we regret not including more of that writing, we hope that this small sample will whet the reader's appetite, and encourage you to explore both the rich history of scholarship in this area, as well as the exciting new ideas in more recent work. As computing becomes an increasingly important part of our lives and of our world, we are convinced that ICE will have increasing significance, and that the ideas in these papers have helped, and are helping, to shape those ethics.

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³ Due to the space available we could not add any paper concerned with trust online and e-trust, the interested reader may find useful the two special issues (Taddeo & Floridi, 2011) and (Taddeo, 2010) dedicated to these topics.

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