Computer Ethics

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This is a preprint version of the following article:

Computer ethics is a new field of applied ethics that addresses ethical issues in the use, design and management of information technology and in the formulation of ethical policies for its regulation in society. For contemporary overviews of the field, see Tavani (2007), Weckert (2007), Spinello and Tavani (2004) and Himma and Tavani (2007). Computer ethics, which has also been called *cyberethics*, emerged in the 1980s, together with the rise of the personal computer. Early work in the field, however, already started in the 1940s, soon after the invention of the computer. The birth of computer ethics as a field is often fixed at 1985, a year that saw the appearance of seminal publications by Jim Moor (1985) and Deborah Johnson (1985). The field is sometimes also defined to be a part of a more general field of *information ethics*, which includes computer ethics, media ethics, library ethics, and bioinformation ethics.

Why would there be a need for computer ethics, while there is no need for a separate field of ethics for many other technologies, like automobiles and appliances? Jim Moor (1985) has argued that the computer has had an impact like no other recent technology. The computer seems to impact every sector of society, and seems to require us to rethink many of our policies, laws and behaviors. According to Moor, this great impact is due to the fact that computers have *logical malleability*, meaning that their structure allows them to perform any activity that can be specified as a logical relation beween inputs and outputs. Many activities can be specified in this way, and the computer therefore turns out to be an extremely powerful and versatile machine that can perform an incredible amount of functions, from word processor to communication device to gaming platform to financial manager.

The versatility of computers is an important reason for the occurrence of a computer revolution, or information revolution, that is now transforming many human activities and social institutions. Many important things that humans do, including many that raise moral questions like stealing from someone, defaming someone, or invading someone's privacy now also exist in electronic form. In addition, the computer also makes substantially new types of activities possible that are morally controversial, such as the creation of virtual child pornography for which no real children were abused. Because many of the actions made possible by computers are different and new, we often lack policies and laws to guide them. They generate what Moor has called *policy vacuums*, being the lack of clear policies or rules of conduct. The task of computer ethics, then, is to propose and develop new ethical policies, ranging from explicit laws to informal guidelines, to guide new types of actions that involve computers.

Computer ethics has taken off since its birth in the mid-80s, and has established itself as a mature field with its own scientific journals, conferences and organizations. The field initially attracted most of its interests from computer scientists and philosophers, with many computer science curricula nowadays requiring a course or module on computer ethics. However, given the wide implications for human action sketched by Moor, computer ethics is also of interest to other fields that focus on human behavior and social institutions, such as law, communication studies, education, political science and management. Moreover, computer ethics is also an important topic of debate in the public arena, and computer ethicists regularly contribute to public discussions regarding the use and regulating of computer technology.

Approaches in computer ethics

Computer ethics is sometimes defined as a branch of *professional ethics* similar to other branches like engineering ethics and journalism ethics. On this view, the aim of computer ethics is to define and analyze the moral and professional responsibilities of computer professionals. *Computer professionals* are individuals employed in the information technology branch, for example as hardware or software engineer, web designer, network or database administrator, computer science instructor or computer-repair technician. Computer ethics, on this view,

should focus on the various moral issues that computer professional encounter in their work, for instance in the design, development and maintenance of computer hardware and software.

Within this approach to computer ethics, most attention goes to the discussion of ethical dilemmas that various sorts of computer professionals may face in their work and possible ways of approaching them. Such dilemmas may include, for example, the question how one should act as a web designer when one's employer asks one to install spyware into a site built for a client, or the question to what extent software engineers should be held accountable for harm incurred by software malfunction. Next to the discussion of specific ethical dilemma's, there is also general discussion of the responsibilities of computer professionals towards various other parties, such as clients, employers, colleagues, and the general public, and of the nature and importance of ethical codes in the profession. A recent topic of interest has been the development of methods for *value-sensitive design*, which is the design of software and systems in such a way that they conform to a desired set of (moral) values (Friedman, Kahn and Borning, 2006)

While the professional ethics view of computer ethics is important, many in the field employ a broader conception that places the focus on general ethical issues in the use and regulation of information technology. This approach may be called the *philosophical ethics* approach to computer ethics. This conception holds, following Moor (1985), that computer ethics studies moral issues that are of broad societal importance, and develops ethical policies to address them. Such policies may regulate the conduct of organizations, groups and individuals and the workings of institutions. The philosophical approach focuses on larger social issues like information privacy and security, computer crime, issues of access and equity, and the regulation of commerce and speech on the Internet. It asks what ethical principles should guide our thinking about these issues, and what specific policies (laws, social and corporate policies, social norms) should regulate conduct with respect to them.

Although most ethical commentary in the philosophical approach is directed to the *use* of computers by individuals and organizations, attention has also started to be paid to systems and software *themselves*, as it has been recognized these are not morally neutral but contain values and biases in their

design that must also be analyzed. Approaches that emphasize this angle include *values in design* approaches (Nissenbaum, 1998) and *disclosive computer ethics* (Brey, 2000). Another development in the field that is of more recent origin is the emergence of *intercultural information ethics* (Capurro, 2007), which attempts to compare and come to grips with the vastly different moral attitudes and behaviors that exist towards information and information technology in different cultures.

Topics in computer ethics

Privacy

Privacy is a topic that has received much attention in computer ethics from early on. Information technology is often used to record, store and transmit personal information., and it may happen that this information is accessed or used by third parties without the consent of the corresponding persons, thus violating their privacy. Privacy is the right of persons to control access to their personal affairs, such as their body, thoughts, private places, private conduct, and personal information about themselves. The most attention in computer ethics has gone to *information privacy*, which is the right to control the disclosure of personal data. Information technology can easily be used to violate this right.

Privacy issues play, amongst others, on the Internet, where cookies, spyware, browser tracking and access to the records of internet providers may be used to study the Internet behavior of individuals or to get access to their PCs. Privacy issues also play in the construction of databases with personal information by corporations and government organizations, and the merging of such databases to create complex records about persons or to find matches across databases. Other topics of major concern include the privacy implications of video surveillance and biometric technologies, and the ethics of medical privacy and privacy at work. It has also been studied whether people have a legitimate expectation to privacy in public areas or whether they can be freely recorded, screened and tracked whenever they appear in public.

Security and crime

Security has become a major issue in computer ethics, because of rampant computer crime and fraud, the spread of computer viruses, malware and spam, and national security concerns about the status of computer networks as breeding grounds for terrorist activity and as vulnerable targets for terrorist attacks. Computer security is the protection of computer systems against the unauthorized disclosure, manipulation, or deletion of information and against denial of service. Breaches of computer security may cause harms and rights violations, including economic losses, personal injury and death, which may occur in so-called safety-critical systems, and violations of privacy and intellectual property rights.

Much attention goes to the moral and social evaluation of computer crime and other forms of disruptive behavior, including *hacking* (non-malicious break-ins into systems and networks), *cracking* (malicious break-ins), *cybervandalism* (disrupting the operations of computer networks or corrupting data), *software piracy* (the illegal reproduction or dissemination of proprietary software), and *computer fraud* (the deception for personal gain in online business transactions by assuming a false online identity or by altering or misrepresenting data). Another recently important security-related issue is how state interests in monitoring and controlling information infrastructures to better protect against terrorist attacks should be balanced against the right to privacy and other civil rights (Nissenbaum, 2005).

Free expression and content control

The Internet has become a very important medium for the expression of information and ideas. This has raised questions about whether there should be content control or censorship of Internet information, for example by governments or service providers. Censorship could thwart the right to free expression, which is held to be a basic right in many nations. Free expression includes both freedom of speech (the freedom to express oneself through publication and dissemination) and freedom of access to information.

Several types of speech have been proposed as candidates for censorship. These include pornography and other obscene forms of speech, hate speech such as websites of fascist and racist organizations, speech that can cause harm or undermine the state, such as information as to how to build bombs, speech that violates privacy or confidentiality, and libelous and defamatory speech. Studies in computer ethics focus on the permissibility of these types of speech, and on the ethical aspects of different censorship methods, such as legal prohibitions and software filters.

Equity and access

The information revolution has been claimed to exacerbate inequalities in society, such as racial, class and gender inequalities, and to create a new, digital divide, in which those that have the skills and opportunities to use information technology effectively reap the benefits while others are left behind. In computer ethics, it is studied how both the design of information technologies and their embedding in society could increase inequalities, and how ethical policies may be developed that result in a fairer and more just distribution of their benefits and disadvantages. This research includes ethical analyses of the accessibility of computer systems and services for various social groups, studies of social biases in software and systems design, normative studies of education in the use of computers, and ethical studies of the digital gap between industrialized and developing countries.

Intellectual property

Intellectual property is the name for information, ideas, works of art and other creations of the mind for which the creator has an established proprietary right of use. Intellectual property laws exist to protect creative works by ensuring that only the creators benefit from marketing them or making them available, be they individuals or corporations. Intellectual property rights for software and digital information have generated much controversy. There are those who want ensure strict control of creators over their digital products, whereas others emphasize the importance of maintaining a strong public domain in cyberspace,

and argue for unrestricted access to electronic information and for the permissibility of copying proprietary software. In computer ethics, the ethical and philosophical aspects of these disputes are analyzed, and policy proposals are made for the regulation of digital intellectual property in its different forms.

Moral Responsibility

Society strongly relies on computers. It relies on them for correct information, for collaboration and social interaction, for aid in decision-making, and for the monitoring and execution of tasks. When computer systems malfunction or make mistakes, harm can be done, in terms of loss of time, money, property, opportunities, or even life and limb. Who is responsible for such harms? Computer professionals, end-users, employers, policy makers and others could all be held responsible for particular harms. It has even been argued that intelligent computer systems can bear moral responsibility themselves. In computer ethics, it is studied how the moral responsibility of different actors can be defined, and what kinds of decisions should be delegated to computers to begin with. It is studied how a proper assignment of responsibility can minimize harm and allows for attributions of accountability and liability.

Other Topics

There are many other social and ethical issues that are studied in computer ethics next to these central ones. Some of these include the implications of IT for community, identity, the quality of work, and the quality of life, the relation between information technology and democracy, the ethics of Internet governance and electronic commerce, the ethics of trust online, and metaethical and foundational issues in computer ethics. The constant addition of new products and services in information technology and the coming into being of new uses and new social and cultural impacts ensures that the field keeps meeting new challenges.

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