Ethics Assessment in Different Fields

Information Technologies

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Annex 2.b.1
Ethical Assessment of Research and Innovation: A Comparative Analysis of Practices and Institutions in the EU and selected other countries
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Contents

1   BASIC DESCRIPTION OF THE FIELD[1]

Information technology (IT) is the application of computers and telecommunications equipment to store, retrieve, transmit and manipulate data. The term is commonly used as a synonym for computers and computer networks, but it also encompasses other information distribution technologies, such as smartphones, robotics and Artificial Intelligence (AI). Furthermore, IT is often used to designate practices that are made possible by computers and telecommunications, such as social media, e-commerce and computer games. Several industries are associated with information technology, broadly categorisable as computer hardware, software, electronics, semiconductors, internet, telecom equipment, e-commerce and computer services.

Because of the close interaction between hardware and software and the so-called "logical malleability" of IT, it is generally difficult to make hard distinctions. This is especially the case since the advent of the Internet, as more and more forms of IT are now connected to computer networks. Indeed, there is a steady increase in the number of sectors that may fall under the rubric of IT as more and more types of data is digitised hence can be processed by computers. To take but one example, programming can itself be said to be an IT discipline, but programming is then a major ingredient of most, if not all, other IT disciplines – both hardware and software. Furthermore, most companies in the IT sector typically operate across several sub-disciplines, employing programmers, graphics designers, database administrators, security experts, and so forth. To complicate matters further, several companies produce both hardware and software seamlessly. This is especially the case for all the major actors in the field, such as Microsoft, Google and Oracle. All of this complicates any effort to standardise protocols and frameworks in the field.

2   VALUES AND PRINCIPLES

There is a long-standing tradition of ethical assessment for IT, the terms for which are more or less synonymous: ethics of information technology, computer ethics, cyberethics, information ethics, Internet ethics. It has long been recognised that IT has had an impact like no other recent technology and seems to impact every sector of society. An important reason for this is the fact that computers are "logically malleable", meaning that their structure allows them to perform any activity that can be specified as a logical relation between inputs and outputs. As a result, computers can perform an incredible number of functions, from word processor to communication device to gaming platform to financial manager. This versatility of computers is an important reason for the occurrence of a computer revolution, or information revolution, which 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 policy

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[1] Some of this overview is based on Brey, Philip, and Johnny Hartz Søraker, "Philosophy of Computing and Information Technology", in A. Meijers (ed.), *Philosophy of Technology and Engineering Sciences*, Vol IX in D. Gabbay, P. Thagard and J. Woods (eds.), *Handbook of the Philosophy of Science*, Elsevier, Amsterdam, 2009, pp. 1341-1408.

vacuums, being the lack of clear policies or rules of conduct with which we can compare activities made possible by IT. 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.

The most common term seems to be computer ethics, first introduced in the mid-1970s by Walter Maner, who also promoted the idea of teaching computer ethics in computer science curricula.[2] It can be defined as a 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. Early work in computer ethics started in the 1940s, soon after the invention of the computer, but became widely acknowledged following the work of Jim Moor[3] and Deborah Johnson[4] in 1985, both of whom helped define the field. Since then, it has become a recognised field of applied ethics, and has established itself as a mature field with its own scientific journals, conferences and organisations. The field initially attracted most of its interests from computer scientists and philosophers, but intersects and benefits from contributions by other fields that focus on human behaviour 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.

Computer ethics is sometimes defined as a branch of professional ethics similar to other branches such as engineering ethics and journalism ethics. On this view, the aim of computer ethics is to define and analyse the moral and professional responsibilities of computer professionals, 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. In addition to the discussion of specific ethical dilemmas, 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.

While the professional ethics view of computer ethics is influential, 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 and studies moral issues that are of broad societal importance, such as information privacy and security, computer crime, issues of access and equity, and the regulation of commerce and speech on the Internet, and develops ethical policies to address them. It asks what ethical principles should guide our thinking about these issues, and what

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[2] Cf. Bynum, Terrell, "A very short history of computer ethics." *APA Newsletters on Philosophy and Computers* 99, 2000.

[3] Moor, James H., "What is Computer Ethics?", *Metaphilosophy,* 16, 1985, pp. 266-275.

[4] Johnson, Deborah, *Computer Ethics,* 1st ed., Prentice Hall, 1985.

specific policies (laws, social and corporate policies, social norms) should regulate conduct with respect to them. Within this approach, some researchers focus on the development of ethical guidelines for users of computer technology. Others place more emphasis on policy issues, and try to formulate ethical policies for organisations, government agencies or lawmakers. Still others focus on computer technologies themselves, and try to identify and evaluate morally relevant features in their design. Some also focus on theoretical and meta-ethical issues.

3 ETHICAL ISSUES

Introductions to computer ethics show considerable agreement on what the central issues for computer ethics are. They include ethical issues of privacy, security, computer crime, intellectual property, free expression, and equity and access, and issues of responsibility and professional ethics. The question of whether IT poses unique ethical challenges is itself a point of debate within the field, often referred to as the *uniqueness debate.* It has been argued that unique features of IT, such as logical malleability, superhuman complexity and the ability to make exact copies, raise unique ethical issues to which no non-IT analogues exist. Others remain unconvinced that any computer ethics issue is genuinely unique, and that they involve traditional ethical concepts and principles such as privacy, responsibility, harm and ownership.

3.1 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.

Privacy issues come into play on the Internet, where cookies, spyware, browser tracking and access to the records of internet providers may be used to study the Internet behaviour of individuals or to get access to their PCs. They also come into play in the construction of databases with personal information by corporations and government organisations, and the merging of such databases to create complex records about persons or to find matches across databases. This becomes particularly problematic when the purpose is to use such private information for commercial purposes. Other topics of major concern include the privacy implications of video surveillance and biometric technologies, and the ethics of medical privacy and privacy in the workplace. It has also been studied whether people have a legitimate expectation to privacy in public areas, whether they can be freely recorded, screened and tracked whenever they appear in public and how the notion of "public" itself has changed in light of information technology. The questions discussed typically differ depending on whether the domain in question is of a commercial or governmental nature. The first tends to focus on issues such as consumer exploitation, behavior-steering and what many defend as a right to go about one's daily life without having to share private information in exchange for commercial benefits. The second area focuses more on governmental surveillance, and has received a tremendous amount of attention since the so-called Snowden revelations.

3.2   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 unauthorised disclosure, manipulation, or deletion of information and against denial of service attacks. 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. It is also a field that connects closely with many of the other ethical issues, such as violations of privacy and intellectual property rights. For instance, with regard to privacy, this is not only an issue of exchanging personal information with another party, but also whether that party has the ability to properly safeguard that information. This recently became a point of much attention in the recent "Heartbleed" controversy, where a security bug allowing theft of server's private keys and users' session cookies and passwords affected many of the biggest Internet actors, including Google, Dropbox, Facebook and YouTube.

Furthermore, issues related to security include 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), *cyber vandalism* (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 to what degree state interests in monitoring and controlling information infrastructures to better protect against terrorist attacks needs to be balanced against the right to privacy and other civil rights. This also means that information technology is playing an increasingly important role in cyberwarfare, whether for the purpose of spying on potential enemies, spreading propaganda, or attacking critical infrastructure. A recent point of controversy in this regard is the extent to which traditional principles of just war apply to cyberwarfare, especially regarding issues of proportionality and the distinction between combatants and non-combatants.

3.3   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 organisations, 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. The field of computer ethics focuses on the permissibility of these types of speech, and on the ethical aspects of different censorship methods, such as legal prohibitions and software filters.

3.4 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, one studies 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 industrialised and developing countries. There seems to be a consensus that the more important the service, the more important equity becomes. Hence, basic services such as ATMs, online banking, health services and so forth are designed with various disabilities in mind.

3.5 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 to ensure strict control of creators over their digital products, whereas others emphasise 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 analysed, and policy proposals are made for the regulation of digital intellectual property in its different forms.

3.6 IT AND 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. Due to the logical malleability, modularity and digital nature of IT, the difficulty of assigning blame to any one party becomes particularly challenging to the field – a problem often referred to as 'the problem of many hands'.

It has even been debated whether intelligent computer systems can bear moral responsibility themselves, whether we act less responsibly when placing too much trust in the IT system, and what kinds of decisions should be delegated to computers to begin with.[5] In such

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[5] See e.g. Bechtel, William, "Attributing responsibility to computer systems", *Metaphilosophy*, 16, 1985, pp. 296-306.

situations, we need to study how a proper assignment of responsibility can minimise harm and allow for attributions of accountability and liability.

3.7 AUTONOMY, SOCIALITY, AND AUTHENTICITY

A common characterisation of IT users is that they often lack the social skills necessary to be successful in the physical world, and seek for social media and virtual worlds instead where this handicap is easier to overcome. Several researchers argue that there are certain virtues inherent in embodied, face-to-face communication that cannot be replicated in social media and virtual worlds. Closely related, it has been argued that we can neither learn nor exercise several important virtues (e.g., patience or empathy) with these technologies, nor a sense of context, commitment or shared risk-taking. A central point of discussion in recent years has concerned virtual friendships, where several authors argue that virtual friendships are inferior to actual friendships because they do not allow for non-voluntary self-disclosure. Internet addiction has also been a central ethical concern. This is clearly related to loss of social skills, but goes further by reducing other basic needs and capabilities that could be important to one's well-being, including the loss of job or education, health problems and mental disorders. This is often discussed in the context of IT dramatically altering our behavioural dispositions – especially violent video games supposedly fostering aggressive and anti-social behaviour in children and adolescents.

Experts have also argued that different types of IT have contributed towards scattered attention and lack of concentration, as well as a reduced understanding of the consequences of our actions.[6] Anyone familiar with virtual worlds and social media will have encountered "flaming" and "trolling", i.e. deliberate verbal attacks on someone or outrageous claims, often worded to cause as much offense as possible. Undoubtedly, part of the reason for the prevalence of such statements is the anonymity and corresponding lack of consequences offered by the Internet. The lack of consequences in virtual worlds is related to the fact that virtual events do not enter into mechanico-causal relations with physical events and usually cannot elicit the same chemical and biological reactions as physical entities can.

3.8 AI AND ROBOTICS

The source of many ethical problems in AI and robotics stems from the fact that these systems tend to be opaque. That is, they make *choices* and *decisions* according to criteria of which the users have little or no understanding. These operations can even be opaque to the designers themselves, especially when build upon a connectionist or evolutionary architecture. With the complexity required for a machine to act intelligently, it could even be argued that it is impossible to safeguard against their malfunction and that the creation of war robots and other AI systems capable of massive destruction is inherently unethical. This is particularly challenging because robots must be able to make nuanced and reliable distinctions between moral and non-moral patients as well as understand the consequences of its actions – of particular importance in military applications. Indeed, this line of reasoning famously led David Parnas to take a public stand against the so-called Star Wars program during the cold war, arguing that it would be impossible to create artificial intelligence that can reliably be trusted to prevent nuclear attacks.[7]

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[6] See e.g. Carr, Nicholas, *The Shallows: What the Internet Is Doing to Our Brains*, W. W. Norton, 2011.

[7] Parnas, David L., Software aspects of strategic defense systems. *Commun. ACM*, 28, 1985, pp. 1326-1335.

If computers become reliable to such a degree that we willingly leave our deliberations and decisions to the computer, does this entail that *our* autonomy is reduced – and what are the implications for those whose jobs are taken over by IT. Closely related, and a topic of much discussion in recent years, is whether it ethically desirable to use robots in healthcare (e.g., telemonitoring) and the ageing population?[8]

3.9   EMBEDDED VALUES

It has come to be recognised that the systems themselves are not morally neutral but contain values and biases in their design, often referred to as 'embedded values' and discussed within the context of *values in design* approaches. The central discussion is whether IT can be morally evaluated partially or wholly independently of actual uses of them; whether they can be said to embody values in the sense that they have a tendency to promote or sustain particular values when used.

This can happen in three ways. Pre-existing bias emerges from the practices and attitudes of designers and the social institutions in which they function. Technical bias arises from technical constraints. Emergent bias arises after the design of the system, when a context of use emerges that is different from the one anticipated.

3.10 OTHER TOPICS

There are many other social and ethical issues that are studied in computer ethics in addition 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, and the ethics of trust online. Recently, much attention has been devoted to ethical aspects of social networking sites such as Facebook, MySpace and YouTube, to ubiquitous computing and ambient intelligence, and to robotics and artificial agents. The constant addition of new products and services in information technology and the emergence of new uses and correlated social and cultural consequences ensures that the field keeps meeting new challenges.

4   ORGANISATIONS

There are two main associations for IT professionals.

First, the Institute of Electrical and Electronics Engineers Computer Society (IEEE-CS), the purpose of which is "to advance the theory, practice, and application of computer and information processing science and technology" and the "professional standing of its members". As a subgroup of IEEE, it contains an Ethics and Member Conduct Committee[9] and a Society on Social Implications of Technology (SSIT)[10], which focuses on environmental, economics, health, and safety implications of technology.

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[8] See e.g. van Wynsberghe, Aimee, "Designing Robots for Care: Care Centered Value-Sensitive Design", *Science and Engineering Ethics*, 19(2), 2013, pp. 407-433.
[9] http://www.ieee.org/about/ethics.html
[10] http://www.ieeessit.org/

The other major association is the Association for Computer Machinery[11] (ACM), the world's largest educational and scientific computing society uniting the world's computing educators, researchers and professionals. The ACM has the ACM SIGCAS, Special Interest Group on Computers and Society.[12]

As mentioned above, IT forms a subgroup of engineering, hence takes part in many associations shared by other engineers. As such, another major association is the generic World Federation of Engineering Organizations[13], which has its own Committee on Information and Communication (CIC)[14] seeking to "push forward the Information and Communication Technology (ICT) to be widely applied globally, particularly in developing countries, for narrowing the gaps between the developing and developed countries" – recognizing that "Information engineers have a particular responsibility for the implementation of a sustainable Information Society global-wide and minimisation of the digital gap between developed and developing countries".

Likewise, the International Association of Engineers (IAENG), a professional organisation for engineers that also considers issues of professional ethics, has most of its societies related to IT, including:
- IAENG Society of Artificial Intelligence[15]
- IAENG Society of Bioinformatics[16]
- IAENG Society of Computer Science[17]
- IAENG Society of Data Mining[18]
- IAENG Society of Imaging Engineering[19]
- IAENG Society of Information System Engineering[20]
- IAENG Society of Internet Computing and Web Services[21]
- IAENG Society of Scientific Computing[22]
- IAENG Society of Software Engineering[23]
- IAENG Society of Wireless Networks[24]

Furthermore, the Council of European Professional Informatics Societies (CEPIS)[25] is a non-profit organisation seeking to improve and promote a high standard among informatics professionals in recognition of the impact that Informatics has on employment, business and society. It represents 35 Member Societies in 32 countries across greater Europe.

Other important organisations:

[11] http://www.acm.org/
[12] http://www.acm.org/sigcas/
[13] http://www.wfeo.net/
[14] http://www.wfeo.net/stc_information_and_communication/
[15] http://www.iaeng.org/ISAI.html
[16] http://www.iaeng.org/ISB.html
[17] http://www.iaeng.org/ISCS.html
[18] http://www.iaeng.org/ISDM.html
[19] http://www.iaeng.org/ISIME.html
[20] http://www.iaeng.org/ISISE.html
[21] http://www.iaeng.org/ISICWS.html
[22] http://www.iaeng.org/ISSC.html
[23] http://www.iaeng.org/ISSE.html
[24] http://www.iaeng.org/ISWN.html
[25] http://www.cepis.org/

- 3TU centre for ethics and technology[26]
- National Institute for Engineering Ethics[27]
- Ethics and Compliance Officer Association[28]
- Chamber of Computer Engineers of Turkey[29]
- BCS — The Chartered Institute for IT (formerly the British Computer Society)[30]
- Computer Ethics Institute[31]
- Centre for Computing and Social Responsibility, De Montfort University, UK[32]
- Electronic Privacy Information Center[33]
- Research Center on Computing & Society, Southern Connecticut State University[34]
- Software Engineering Ethics Research Institute, East Tennessee State University)[35]
- Computer Society of the Institute for Electrical and Electronic Engineers (IEEE-CS)[36]
- Association for Information Systems[37]

Select associations worldwide:

- ANIE: African Network for Information Ethics[38]
- ACM/SIGCAS: Association for Computing, Special Interest Group on Computers and Society[39]
- CPSR: Computer Professionals for Social Responsibility[40]
- GI: Gesellschaft für Informatik[41]
- IACAP: International Association for Computing and Philosophy[42]
- INSEIT: International Society for Ethics and Information Technology[43]
- Institute for Ethics & Emergent Technologies[44]
- IBR: Internet Bill of Rights[45]
- Technology and Society[46]
- The Korea Society of Internet Ethics (KSIE)[47]
- LiSS: Living in Surveillance Societies (COST Action IS0807)[48]

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[26] http://www.ethicsandtechnology.eu/
[27] http://www.niee.org/
[28] http://www.theecoa.org/
[29] http://bmo.org.tr/2012/06/02/bilgisayar-muhendisleri-odasinin-kurulusu-onaylandi/
[30] http://www.bcs.org/
[31] http://www.computerethicsinstitute.com/
[32] http://www.ccsr.cse.dmu.ac.uk/
[33] http://www.epic.org/
[34] http://www.computerethics.org/
[35] http://seeri.etsu.edu/
[36] https://www.computer.org/portal/web/guest/home
[37] http://www.acm.org/
[38] http://www.africainfoethics.org/
[39] http://www.sigcas.org/
[40] http://www.cpsr.org/
[41] http://www.gi-ev.de/
[42] http://iacap.org/
[43] http://www4.uwm.edu/cipr/collaborations/inseit/
[44] http://ieet.org/index.php/IEET/
[45] http://ibr-beta.cpsr.org/
[46] http://technologyandsociety.org/
[47] http://www.ksie.kr/

- RELEI: Red Latinoamericana de Etica de la Información[49]
- Red Universitaria de Etica en el Ciberespacio[50]
- UNESCO Information for All Programme (IFAP)[51]
- UNESCO Observatory on the Information Society[52]
- UNESCO: Communication and Information[53]
- WSIS: Official Website of the World Summit on the Information Society[54]
- AoIR: Association of Internet Researchers[55]
- ASIST: American Society for Information Science and Technology[56]
- CIPR: Center for Information Policy Research, School of Information Studies, University of Wisconsin-Milwaukee, USA[57]
- CEI: Computer Ethics Institute, The Brookings Institution, Washington D.C., USA[58]
- EFF: Electronic Frontier Foundation[59]
- ICRAC: International Committee for Robot Arms Control[60]
- IFIP: International Federation for Information Processing[61]
- Institute of Network Cultures[62]
- SPT: Society for Philosophy and Technology[63]
- Stanford Law School Center for Internet and Society [64]
- WIPO: World Intellectual Property Organization[65]
- W3C-Consortium[66]
- New Zealand Institute of IT Professionals (IITP)[67]

See also 'International Frameworks and Protocols' for an overview of ISO subcommittees relevant to IT.

5 INSTITUTIONALISATION

Ethics assessment in IT is in some ways institutionalised, primarily through professional ethical codes for engineers, sometimes also reflected in various ISO certifications. Beyond

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[48] http://www.liss-cost.eu/

[49] http://redeticainformacion.ning.com/

[50] http://www.redciberetica.org/

[51] http://www.unesco.org/new/en/communication-and-information/intergovernmental-programmes/information-for-all-programme-ifap/priorities/information-ethics/

[52] http://portal.unesco.org/ci/en/ev.php-URL_ID=7277&URL_DO=DO_TOPIC&URL_SECTION=201.html

[53] http://portal.unesco.org/ci/en/ev.php-URL_ID=1657&URL_DO=DO_TOPIC&URL_SECTION=201.html

[54] http://www.itu.int/wsis/

[55] http://www.aoir.org/

[56] http://www.asis.org/

[57] http://www.uwm.edu/Dept/SOIS/cipr/index.html

[58] http://www.brook.edu/its/cei/cei_hp.htm

[59] http://www.eff.org/

[60] http://www.icrac.co.cc/

[61] http://www.info.fundp.ac.be/~jbl/IFIP/home.html

[62] http://www.networkcultures.org/

[63] http://www.spt.org/

[64] http://cyberlaw.stanford.edu/

[65] http://www.wipo.int/

[66] http://www.w3.org/

[67] http://www.iitp.org.nz/

professional ethical codes, text books, and university courses, however, there is not a lot of institutionalisation of IT. There are several other disciplines in which there are working groups and research centres *about* IT, from the perspective of law, ethics or sociology, but there appears to be few professional associations hosted by the IT professionals themselves that are dedicated to ethics assessment.

In Europe, the European Group on Ethics in Science and New Technologies (EGE) is an independent, pluralist and multidisciplinary body advising the European Commission on ethics in science and new technologies in connection with Community legislation or policies. Several of its "opinions" are concerned with IT, including the comprehensive *Opinion of the European group on ethics in science and new technologies to the European commission – Ethics of information and communication Technologies*.[68]

The legal aspects of IT are notoriously overwhelming. Indeed, one of the most pressing challenges for IT is to standardise laws across jurisdictions, as well as to clarify the extent to which existing laws can be applied to IT practices. The biggest challenges in this regard relate to intellectual property, data protection, and professional responsibility (see above).

6   INTERNATIONAL FRAMEWORKS AND PROTOCOLS

The combined codes of ethics from IEEE-CS and ACM have become the standard in the field (in particular for *software* engineering) also internationally[69]. In some cases there are also national codes of ethics being used. For instance, some Dutch computer scientists follow the professional ethics code from *Nederlandse Vereniging voor Registerinformatici*.[70] The Information Technology sector also often makes use of frameworks and protocols common to engineers in general (cf. survey of 'engineering').

There are several associations in the field that provide code of ethics:

- Australian Computer Society[71]
- Canadian Information Processing Society[72]
- Computer Society of India[73]
- Hong Kong Computer Society[74]
- Association of Information Technology Professionals[75]
- System Administrators Guild[76]
- National Society of Professional Engineer[77]s
- Association for Computing Machinery[78]
- New Zealand Computer Society[79]

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[68] http://ec.europa.eu/bepa/european-group-ethics/docs/publications/ict_final_22_february-adopted.pdf

[69] http://www.acm.org/about/se-code

[70] http://www.vri.nl/wp-content/uploads/2012/09/Gedragscode-VRI-17092012.doc

[71] http://www.acs.org.au/national/pospaper/acs131.htm

[72] http://www.cips.ca/?q=system/files/CIPS_COE_final_2007.pdf

[73] http://courses.cs.vt.edu/~cs3604/lib/WorldCodes/India.Code.html

[74] http://www.hkcs.org.hk/ethics.htm

[75] http://www.aitp.org/organization/about/ethics/ethics.jsp

[76] http://www.sage.org/ethics.mm

[77] http://www.nspe.org/ethics/eh1-code.asp

[78] http://www.acm.org/constitution/code.html

[79] http://www.nzcs.org.nz/SITE_Default/about_NZCS/Code_of_ethics.asp

- Better Business Bureau[80]
- American Society for Information Science and Technology Professional Guidelines[81]

The International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) also has a joint committee (ISO/IEC JTC 1) dedicated to develop, maintain, promote, and facilitate standards in the fields of IT. They have a total of 18 sub-committees, each with a large set of standards. Although most of these relate to technical standards and protocols none of these are related specifically to ethics, many of them establish standards in areas such as IT security and privacy (e.g. ISO/IEC 15408-1:2009[82], providing evaluation criteria for IT security), IT education (e.g. ISO/IEC 29187-1:2013[83], identifying privacy protection requirements pertaining to learning, education and training) and IT governance (e.g. ISO/IEC TR 38502:2014[84], which provides a framework for governance of IT). Below is a list of these subcommittees with links to standards that fall under their respective responsibility:

- ISO/IEC JTC 1/SC 2: Coded character sets[85]
- ISO/IEC JTC 1/SC 6: Telecommunications and information exchange between systems[86]
- ISO/IEC JTC 1/SC 7: Software and systems engineering[87]
- ISO/IEC JTC 1/SC 17: Cards and personal identification[88]
- ISO/IEC JTC 1/SC 22: Programming languages, their environments and system software interfaces[89]
- ISO/IEC JTC 1/SC 23: Digitally Recorded Media for Information Interchange and Storage[90]
- ISO/IEC JTC 1/SC 24: Computer graphics, image processing and environmental data representation[91]
- ISO/IEC JTC 1/SC 25: Interconnection of information technology equipment[92]
- ISO/IEC JTC 1/SC 27: IT Security techniques[93]
- ISO/IEC JTC 1/SC 28: Office equipment[94]
- ISO/IEC JTC 1/SC 29: Coding of audio, picture, multimedia and hypermedia information[95]
- ISO/IEC JTC 1/SC 31: Automatic identification and data capture techniques[96]
- ISO/IEC JTC 1/SC 32: Data management and interchange[97]

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[80] http://www.bbbonline.org/reliability/code/CodeEnglish.pdf
[81] http://www.asis.org/AboutASIS/professional-guidelines.html
[82] http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=50341
[83] http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=45266
[84] http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=50962
[85] http://www.iso.org/iso/home/store/catalogue_tc/catalogue_tc_browse.htm?commid=45050
[86] http://www.iso.org/iso/home/store/catalogue_tc/catalogue_tc_browse.htm?commid=45072
[87] http://www.iso.org/iso/home/store/catalogue_tc/catalogue_tc_browse.htm?commid=45086
[88] http://www.iso.org/iso/home/store/catalogue_tc/catalogue_tc_browse.htm?commid=45144
[89] http://www.iso.org/iso/home/store/catalogue_tc/catalogue_tc_browse.htm?commid=45202
[90] http://www.iso.org/iso/home/store/catalogue_tc/catalogue_tc_browse.htm?commid=45240
[91] http://www.iso.org/iso/home/store/catalogue_tc/catalogue_tc_browse.htm?commid=45252
[92] http://www.iso.org/iso/home/store/catalogue_tc/catalogue_tc_browse.htm?commid=45270
[93] http://www.iso.org/iso/home/store/catalogue_tc/catalogue_tc_browse.htm?commid=45306
[94] http://www.iso.org/iso/home/store/catalogue_tc/catalogue_tc_browse.htm?commid=45314
[95] http://www.iso.org/iso/home/store/catalogue_tc/catalogue_tc_browse.htm?commid=45316
[96] http://www.iso.org/iso/home/store/catalogue_tc/catalogue_tc_browse.htm?commid=45332

- ISO/IEC JTC 1/SC 34: Document description and processing languages[98]
- ISO/IEC JTC 1/SC 35: User interfaces[99]
- ISO/IEC JTC 1/SC 36: Information technology for learning, education and training[100]
- ISO/IEC JTC 1/SC 37: Biometrics[101]
- ISO/IEC JTC 1/SC 38: Distributed application platforms and services (DAPS)[102]
- ISO/IEC JTC 1/SC 39: Sustainability for and by Information Technology[103]
- ISO/IEC JTC 1/SC 40: IT Service Management and IT Governance[104]

7   OTHER ISSUES

It is generally problematic to confine ethical issues in IT to a single discipline, since IT intersects with most other engineering disciplines, and often share principles, tools and frameworks with other engineering disciplines. Furthermore, computer component are present in most forms of contemporary technology.

8   JOURNAL AND CONFERENCE SERIES

There are several journals and conferences dedicated to IT and ethical assessment. Most of these are targeted at academics who are not themselves IT professionals. Ethicomp is an important exception as it explicitly aims to include IT professionals to a larger degree than other relevant conferences.

8.1   JOURNALS

- *Computers and Society*[105]
- *Ethics and Information Technology*[106]
- *Journal of information, communication and ethics in society*[107]
- *Studies in Ethics, Law, and Technology*[108]
- *International Journal of Information Ethics*[109]
- *Journal of Information, Communication and Ethics in Society (ICES)*[110]
- *APA Newsletter on Philosophy and Computers*[111]
- *Philosophy & Technology*[112]
- *Information*[113]

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[97] http://www.iso.org/iso/home/store/catalogue_tc/catalogue_tc_browse.htm?commid=45342
[98] http://www.iso.org/iso/home/store/catalogue_tc/catalogue_tc_browse.htm?commid=45374
[99] http://www.iso.org/iso/home/store/catalogue_tc/catalogue_tc_browse.htm?commid=45382
[100] http://www.iso.org/iso/home/store/catalogue_tc/catalogue_tc_browse.htm?commid=45392
[101] http://www.iso.org/iso/home/store/catalogue_tc/catalogue_tc_browse.htm?commid=313770
[102] http://www.iso.org/iso/home/store/catalogue_tc/catalogue_tc_browse.htm?commid=601355
[103] http://www.iso.org/iso/home/store/catalogue_tc/catalogue_tc_browse.htm?commid=654019
[104] http://www.iso.org/iso/home/store/catalogue_tc/catalogue_tc_browse.htm?commid=5013818
[105] http://www.researchgate.net/journal/0095-2737_ACM_SIGCAS_Computers_and_Society
[106] http://www.springer.com/computer/swe/journal/10676
[107] http://www.emeraldgrouppublishing.com/products/journals/journals.htm?id=JICES
[108] http://www.degruyter.com/view/j/selt
[109] http://www.ijie.org/
[110] http://www.deepdyve.com/browse/journals/journal-of-information-communication-and-ethics-in-society
[111] http://www.apaonline.org/?computers_newsletter
[112] http://www.springer.com/philosophy/epistemology+and+philosophy+of+science/journal/13347

- *International Review of Information Ethics (IRIE)*[114]
- *International Journal of Internet Research Ethics (IJIRE)*[115]
- *International Journal of Technology and Human Interaction*[116]
- *Journal of Computer Mediated Communication (JCMC)*[117]
- *Journal of Information Ethics*[118]
- *AI & Society*[119]
- *Computers and Society : The quarterly publication of ACM SIGCAS (Assoc. of Computing, Special Interest Group on Computers and Society)*[120]
- *Cybernetics & Human Knowing*[121]
- *EJISDC*[122]
- *International Journal of Cyber Ethics in Education (IJCEE)*[123]
- *I/S: A Journal of Law and Policy for the Information Society*[124]
- *Journal of Community Informatics*[125]
- *Journal of Information, Law & Technology*[126]
- *New media & society*[127]
- *Surveillance & Society*[128]
- *Techné: Research in Philosophy and Technology*[129]
- *The Information Society*[130]
- *tripleC - Open Access Journal for a Global Sustainable Information Society*[131]
- *Journal of Information, Communication & Ethics in Society*[132]
- *The ETHICOMP Journal*[133]

8.2 CONFERENCE SERIES

- Association of Internet Researchers[134]
- Computer Ethics: Philosophical Enquiry (CEPE)[135]

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[113] http://www.mdpi.com/journal/information/
[114] http://www.i-r-i-e.net/
[115] http://ijire.net/
[116] http://www.idea-group.com/ijthi
[117] http://jcmc.indiana.edu/
[118] http://icie.zkm.de/publications/journals/ie
[119] http://link.springer.de/link/service/journals/00146/
[120] http://www.computersandsociety.org/sigcas_ofthefuture2/sigcas/index.cfm
[121] http://www.imprint-academic.com/C&HK
[122] http://www.ejisdc.org/
[123] http://www.igi-global.com/journals/details.asp?ID=35218
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[130] http://www.slis.indiana.edu/TIS/index.html
[131] http://www.triple-c.at/index.php/tripleC
[132] http://www.emeraldinsight.com/info/journals/jices/jices.jsp
[133] http://www.ccsr.cse.dmu.ac.uk/journal/
[134] http://aoir.org/conferences/
[135] http://inseit.net/

- IADIS International Conferences[136]
- ETHICOMP[137]
- International Association for Computing and Philosophy (IACAP)[138]
- Cultural Attitudes towards Technology and Communication (CATaC)[139]
- Australian Institute of Computer Ethics (AiCE) research conferences[140]
- Society for Philosophy and Technology Biennial Conference[141]

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[136] http://www.elearning-conf.org/
[137] http://cerna-ethics-allistene.org/ETHICOMP-2014/
[138] http://www.iacap.org/
[139] http://www.catacconference.org/
[140] http://auscomputerethics.com/
[141] http://www.spt.org/

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