1. Introduction

Cybernetics, developed by Norman Wiener in the 1950s, can be regarded as the foundational discipline for Computer Ethics. (Floridi, 2015, p. 91) His new discipline covered many of the same topics that we would today regard as central to Computer Ethics. These include access to computers for people with disabilities, computer security, professionalism in computing, unemployment due to computing, automation and many more. (Bynum, 2016)

The term we use today, “Computer Ethics”, has its origins with Walter Maner (Maner, 1980; Bynum, 2016)

Today Computer ethics covers a broad range of topics including: security, privacy, copyright as in computer “piracy”, access to computing for the disabled, environmental impact and sustainability of computing system and research ethics etc. Of these, privacy, is currently the most discussed topic in the field. (Stahl *et al.*, 2016, p. 3,28)

Researchers can now use the principles of Responsible Research and Innovation (RRI) to manage the ethical considerations of how their research impact on society.(Eden, Jirotka and Stahl, 2013, p. 1)

1. Definition of Ethical Computing

According to the Cambridge Dictionary of Philosophy, ethics is “the philosophical study of morality” (Audi, 1999). Therefore, Ethical Computing relates to the study of morality as it relates to Computing. In simple terms, morality can be thought of as the study of what is right and what is wrong.

People have an innate sense of right and wrong. What is right or wrong can differ between nationalities, groups or people. These ideas need to be openly discussed and reasoned about. But there needs to be agreement on what is right and what is wrong. That is why we need ethical theory (Stahl, 2012, pp. 638–640).

There are a few competing ethical theories used in Computer Ethics.

Firstly, we can classify ethical theories into a couple of categories. Consequentialism, Deontology and Virtue ethics. All of which are Normative ethical theories. In Consequentialism, whether an action is good or bad, i.e. ethical, depends on the consequences of the action. The most prominent consequentialist theory is utilitarianism. Which can be describes as doing the most amount of good to the largest amount of people. Deontology on the other hand hold that the intention of agent doing the action determines whether it is ethical or not (Stahl *et al.*, 2016, p. 4). Where in virtue ethics it depends on the individual character (Stahl, Eden and Jirotka, 2013, p. 812).

Another prominent theory is Luciano Floridi’s Information ethics (Stahl *et al.*, 2014, p. 812). Floridi’s theory is an ontology of information. Everything can be fundamentally seen as information with an emphasis on the relationship between information agents. (Ess, 2008, pp. 160–161) As Floridi puts it “moral actions are the result of complex interactions among distributed systems integrated on a scale larger than the single human being” (Floridi, 2008, p. 198).

1. Importance of Ethical Computing

In our society we are constantly inundated with ethical dilemmas in the Information and Communication Technology sector. From issues about privacy and consent (Carter, Laurie and Dixon-Woods, 2015; de Bruin and Floridi, 2017) to copyright infringement (Chiou, Wan and Wan, 2012, p. 108).

Most prominent are issues relating to privacy. Examples are the 2010 cyber-attack on Gmail and the NSA spying scandal of 2013 (de Bruin and Floridi, 2017, p. 22).

James H, Moor defines Computer ethics as “… the analysis of the nature and social impact of computer technology and the corresponding formulation and justification of policies for the ethical use of such technology” (Moor, 1985, p. 266). According to Moor it is policy vacuums that create computer ethics problems.

Responsible Research and Innovation (RRI) can be used to develop policies for how researchers are to respond to the consequences of their ICT research and innovation. (Eden, Jirotka and Stahl, 2013, p. 1) This approach has become prominent in Europe where it will underpin Horizon 2020, the European research framework (Stahl, 2013, p. 1).

Privacy

Piracy

Equal access

Check (Carter, Laurie and Dixon-Woods, 2015; Floridi and Taddeo, 2016)

Also see (Mittelstadt and Floridi, 2016)

Moor describes that a policy vacuum creates issues in computer ethics.

Policy vacuum is to be filled with the help of RRI(Eden, Jirotka and Stahl, 2013)

RRI (Von Schomberg, 2013)

1. Some guidelines on being ethical within the computing environment
2. Conclusion
3. References

Audi, R. (1999) ‘The Cambridge Dictionary of Phiosophy, Second Edition’.

de Bruin, B. and Floridi, L. (2017) ‘The Ethics of Cloud Computing’, *Science and Engineering Ethics*, 23(1), pp. 21–39. doi: 10.1007/s11948-016-9759-0.

Bynum, T. (2016) *Computer and Information Ethics*. Winter 201. Edited by Edward N. Zalta. Metaphysics Research Lab, Stanford University. Available at: https://plato.stanford.edu/entries/ethics-computer/ (Accessed: 25 March 2018).

Carter, P., Laurie, G. T. and Dixon-Woods, M. (2015) ‘The social licence for research: why care.data ran into trouble’, *J Med Ethics*, 41, pp. 404–409. doi: 10.1136/medethics-2014-102374.

Chiou, W.-B., Wan, P.-H. and Wan, C.-S. (2012) ‘A new look at software piracy: Soft lifting primes an inauthentic sense of self, prompting further unethical behavior’, *Int. J. Human-Computer Studies*, 70, pp. 107–115. doi: 10.1016/j.ijhcs.2011.09.001.

Eden, G., Jirotka, M. and Stahl, B. (2013) ‘Responsible research and innovation: Critical reflection into the potential social consequences of ICT’, in *Proceedings - International Conference on Research Challenges in Information Science*. doi: 10.1109/RCIS.2013.6577706.

Ess, C. (2008) ‘Luciano Floridi’s philosophy of information and information ethics: Critical reflections and the state of the art’, *Ethics and Information Technology*, 10(2–3), pp. 89–96. doi: 10.1007/s10676-008-9172-8.

Floridi, L. (2008) ‘Information ethics: A Reappraisal’, *Ethics and Information Technology*, 10(2–3), pp. 189–204. doi: 10.1007/s10676-008-9176-4.

Floridi, L. (2015) *The onlife manifesto*. Springer. doi: 10.1007/978-3-319-04093-6.

Floridi, L. and Taddeo, M. (2016) ‘What is data ethics?’, *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, 374(2083), p. 20160360. doi: 10.1098/rsta.2016.0360.

Maner, W. (1980) ‘Starter kit in computer ethics’, *Hyde Park, NY: Helvetia Press and the National Information and Resource Center for Teaching Philosophy*.

Mittelstadt, B. D. and Floridi, L. (2016) ‘The Ethics of Big Data: Current and Foreseeable Issues in Biomedical Contexts’, *Science and Engineering Ethics*, pp. 303–341. doi: 10.1007/s11948-015-9652-2.

Moor, J. H. (1985) ‘What is Computer Ethics?’, pp. 67–69. Available at: https://pdfs.semanticscholar.org/2b26/2968529c25ebc2647f58cbb50a46fffcce17.pdf (Accessed: 25 March 2018).

Von Schomberg, R. (2013) ‘A Vision of Responsible Research and Innovation’, *Responsible Innovation: Managing the Responsible Emergence of Science and Innovation in Society*, pp. 51–74. doi: 10.1002/9781118551424.ch3.

Stahl, B. C. (2012) ‘Morality, Ethics, and Reflection: A Categorization of Normative IS Research’, *Journal of the Association for Information Systems*, 13(8), pp. 636–656. Available at: http://search.proquest.com.ezproxylocal.library.nova.edu/docview/1039704452?accountid=6579.

Stahl, B. C. (2013) ‘Responsible research and innovation: The role of privacy in an emerging framework’, *Science and Public Policy*, 40(6), pp. 708–716. doi: 10.1093/scipol/sct067.

Stahl, B. C. *et al.* (2014) ‘From computer ethics to responsible research and innovation in ICT: The transition of reference discourses informing ethics-related research in information systems’, *Information & Management*, 51, pp. 810–818. doi: 10.1016/j.im.2014.01.001.

Stahl, B. C. *et al.* (2016) ‘The Ethics of Computing: A Survey of the Computing-Oriented Literature’, *ACM Computing Surveys*, 48(4), pp. 1–38. doi: 10.1145/2871196.

Stahl, B. C., Eden, G. and Jirotka, M. (2013) ‘Responsible Research and Innovation in Information and Communication Technology: Identifying and Engaging with the Ethical Implications of ICTs’, in *Responsible Innovation*. Wiley-Blackwell, pp. 199–218. doi: 10.1002/9781118551424.ch11.