COMPUTER ETHICS AND COMPUTER PROFESSIONALS

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Tech workers now want to know: what are we building this for?

Conger K., Metz C., 2018

INTRODUCTION

This paper investigates the intersection among the two domains: *computer ethics* (as an academic research field) and *computer professionals* (the professionals that work in real life organizations). The paper focuses around the main question: is the long history of *computer ethics* finally starting to "make a difference" in the real world of information and communication technologies (ICT) where computer professionals work?

COMPUTER ETHICS: A FIELD WITH A LONG HISTORY OF STUDY

Computer ethics as a research field has the same age of ICT: in the 1950s the "*social and ethical implications of computing*" were very clear to Norbert Wiener, one of the pioneers of the computer age (Wiener, 1950). Following Wiener, it is worth mentioning Joseph Weizenbaum, who in the 1970s, distinguished the problems that can be analysed and delegated to algorithms from the situations that cannot be "solved" by computational thinking, but require *judgment*, the "capacity to choose", a trait that makes people human (Weizenbaum, 1976). These recommendations appear visionary at a time when "artificial intelligence" applications are spreading and misused in many areas of society.

In the 1980s the term computer ethics was introduced by Maner: "... a new field that studies ethical problems aggravated, transformed or created by computer technology" (Maner, 1980). The critical absent from this definition are the computer professionals: ICT are just machines designed by humans that executes software code developed by humans. This limit in the initial approaches to computer ethics was still present in its formal definition proposed by Moor: "there is a policy vacuum about how computer technology should be used" (Moor, 1985). In this definition, technology in itself is not questioned, it is still considered as "neutral" and, again, computer professionals are in the shadow, even if they are the main agents as designers of complex ICT systems. Thanks to Deborah Johnson this connection became evident when she proposed to use the term "socio-technical systems" instead of "computer systems": according to her, technology is not neutral since technology and society co-shape each other: "We have to keep stressing that engineering is a social activity" (Johnson, 1985). Other contributions to the theoretical foundations of the academic field of computer ethics come from Bynum, who describes it as an applied ethics that relates to the: "... identification and analysis of the impacts of information technology on such social and human values like health,..." (Bynum, 1999), and Floridi who proposes an analogy between 'suffering in the biosphere' and 'entropy in the infosphere' and introduces the term information ethics: "... what is good for an information entity and the infosphere in general? This is the ethical question asked by information ethics" (Floridi, 1999).

This field has now produced a vast amount of research and is a well-established field with conferences and publications, but the main actors of this scenario, *computer professionals*, are still in the background.

COMPUTER ETHICS AND COMPUTER PROFESSIONALS

When *computer professionals* started to come to the foreground in the *computer ethics* debate? Probably the first researcher that focused on them was Donn Parker in the 1960s with its remarkable attention to people working with computers in real life and their relationship with ethics. He wrote: "*It seemed that when people entered the computer center they left their ethics at the door*" (Parker, 1968).

In the 1980s at *Xerox Palo Alto Research Center* (PARC) a discussion group, initiated by Severo Ornstein and Laura Gould, was formed by computer professionals concerned over the increasing role of digital technologies in war scenarios. This was the seed for the establishment of the *Computer Professionals for Social Responsibility* (CPSR), an organization dedicated to raising awareness among the profession and the public about the dangers of using computers in critical systems (Bruemmer, 1994). Unfortunately, CPSR as a membership organization dissolved in 2013 (Schuler, 2013).

In the 1990s, Donald Gotterbarn focused on "professionalism" and on the importance of: "... the values that guide the day-to-day activities of computing professionals" (Gotterbarn, 1991). He provided a fundamental contribution to the definition of a *Code of Ethics and Professional Conduct*, an important reference on "professional norms", released on July 2018 by the ACM (*Association for Computing Machinery*) (ACM, 2018).

In Europe this effort for "making a difference" in the real world of computer professional is becoming evident in the works of Simon Rogerson. He wrote: "*computer and information ethics are defined as integrating ICT and human values in such a way that ICT advances and protects human values*" (Rogerson, 2011). Ethics and ICT have to be strongly related and, by establishing in 1995 the *Centre for Computing and Social Responsibility* (CCSR) at De Montfort University, he gave a main contribution to the historical debate about the impact of strategic, managerial, and ethical issues of ICT inside real organizations.

Despite all these important efforts, recent events raise the question about the real impact of the *computer ethics* debate in the *computer professionals'* domain and inside business organizations.

EXAMPLES OF 'WORST PRACTICES'

One well known example of a "worst practice" is the *Volkswagen* "dieselgate". In September 2015 the EPA (*US Environmental Protection Agency*) communicated that the car manufacturer *Volkswagen* had installed a software for manipulating the data about car emissions with potentially dangerous consequences on human health. This kind of actions are strongly related to the attitude of *computer professionals*, and, according to Rogerson, put at risk their entire community's reputation. The importance of ethics in real contexts become evident: *computer professionals* must be aware about the risks of unethical practices (Rogerson, 2018).

Another well known example of software developers involved in a very controversial story is the "*Cambridge Analytica*": in March 2018 media around the world disclosed that the infamous *Facebook* app "*This is Your Digital Life*" distributed on the smartphones of 270,000 users of the social network was able to collect personal data of about 87 million of people by using the users' friends network. The

majority of these users were not aware about this data collection and the app developer gave all those data to *Cambridge Analytica* who used it for playing very controversial role in several political elections (Rosenberg et al., 2018). Without the skills of computer professionals all this data trick would not have been possible.

On October 2018 and on March 2019 two airplane crashes killed 346 people. Investigations discovered that the two airplanes, both Boeing 747 MAX, suffered a failure in the MCAS (*Maneuvering Characteristics Augmentation System*), a software for automated flight control activated by an erroneous indication from a sensor on the exterior of the airplane. Unfortunately, it was impossible for the pilots to regain the control (Laris, 2019). In this case, maybe the software plays just a minor role, nevertheless the entire system failed by keeping humans out of the loop.

In all these examples the question is: what is the role of *computer professionals* involved, even in very different roles, in these disasters? Were they aware of the consequences of the deployment of technologies coming from their work? A more general question arises: why people fail to adopt behaviours that demonstrate awareness about social and ethical issues in the ICT world?

HOW CAN WE RESTORE ETHICS IN ICT INDUSTRY?

The term 'pneumatophores' (inspired by botanical properties of some trees) is used for people who act as spirit bearers, who inspire others. Luckily in the ICT world, there are many 'pneumatophores', people who can be seen as exemplary by computer professionals. A study of moral exemplars in the computing profession showed that there are many dimensions involved in the moral excellence (Huff and Barnard, 2009). This paper is taking as a starting point just the words of Severo Ornstein, one of the leading computer scientists who worked at MIT's Lincoln Laboratory in 1955, Internet pioneer at Bolt Beranek & Newman in 1969, and founder of CPSR in 1983. In his words, from one side he is taking a strong position against the use of his knowledge and skills for military applications, when he says: "I refused to work on classified projects" (Bruemmer, 1994, p.4). He was a computer professional with a deep awareness about the context. From the other side, while looking around to his colleagues, he says: "I also had for a long time been concerned that the whole profession seemed nerdish in the sense that it had its head down narrowly in what it was doing and playing games with it ... was not paying, seemingly, very much attention to what the social consequences of what it was doing ... people who seemed to be paying attention only to the thing itself and not very much to the context, and the context was clearly going to be the real world" (Bruemmer, 1994, p.5). Sadly, in his words, he majority of computer professionals look without an awareness of the context.

Inspired by the 'pneumatophore' Ornstein, this paper proposes two main paths for restoring ethics in the ICT industry: one for people who are aware, and one for people who are not aware of the context.

COMPUTER PROFESSIONALS WHO ARE AWARE OF THE CONTEXT

In ICT industry, there are many people that feels being in conflict, while applying their competence and skills for developing morally controversial applications. At the same time, these *computer professionals*, across the technology industry ask questions that go beyond the technical details and functionalities. They are asking questions about purposes demanding greater insight into how their companies are deploying the results of their work (Conger and Metz, 2018). This often generates conflicts: more recently, Dr. Timnit Gebru, researcher in the Ethical Artificial Intelligence Team of Google, was fired by the company in December 2020. She was raising ethical concerns about the use of AI in language processing applications (Criddle, 2020). A dramatic conflict between ethical concerns and real businesses. Here one could open a deep debate about the *business ethics* of many companies, but this would go beyond the scope of the paper.

Let's stay on the *computer professionals'* 'side'. It looks like there is an awareness about the social and ethical consequences of their work, but there are difficulties in "making a difference" in the real world. Maybe sometimes they feel alone or feel it is risky to act *personally*? Of course, especially for engineers working in large organizations, there is the well known approach called 'whistle-blowing'. When a person feels uncomfortable in collaborating with a project or when the employee recognizes unacceptable behaviours inside a company, then in some situations, the only possibility is 'to go outside' and let the public know about it. In particular when: the consequences for the public (or for the environment) are serious, all the warnings raised through the channels inside the organizations failed, there are impartial observers outside able to recognize the situation, and there is evidence that making the situation public will prevent the risks of serious consequences (De George, 1981). One of the best examples of 'whistle-blowing' in ICT world and engineering ethics is the 'Snowden case' in 2013 (Johnson, 2020).

In some situations, the single person feels being in real difficulties, feels alone, or the risk of losing the job is too high for the employee. So, what can a *computer professional* do in these cases? In many ICT companies, there are signs of *computer professionals* that start to organize their actions *collectively*. One example is the protest organized by Google workers in 2019 when they discovered that the company was collaborating in a military project (Hollister, 2019).

So, when *computer professionals* are aware about the context and feel being in conflict with their employers they can act *personally* or *collectively*. Here the role of international organizations like CPSR with its working groups like 'computers in the workplace' and 'technology and ethics' is fundamental. Nowadays, there is the ACM, with its Code of Ethics and related materials like 'The ACM Integrity Project: Promoting Ethics in the Profession', 'Ask an Ethicist", or 'Case studies' that can provide useful support (ACM, 2018).

COMPUTER PROFESSIONALS WHO ARE NOT AWARE OF THE CONTEXT

The question about the levelof awareness about the social and ethical implications of technology in the community of *computer professionals* of course requires further study and more systematic social research. This paper takes a simplified approach just to identify possible directions for addressing the issue. Back to the words of Ornstein ("*people … paying attention only to the thing itself and not very much to the context*"), indeed in ICT world, there are a large number of computer professionals that like to concentrate just on the technical side.

Unfortunately, the view of technology as 'neutral' was present even in the approach on one of 'founders' of technology, John Von Neumann: "*I would prefer not to join the Board (of Bulletin of Atomic Scientists), since I have ... avoided all participation in public activities, which are not of a purely technical nature*" (Von Neumann, 1946). Indeed "*The Bulletin of the Atomic Scientists*", was established in 1945 to raise awareness about the risks for humanity related to technological advances (Boyer, 1985). On the other side, another 'founder', Norbert Wiener wrote: "*I do not expect to publish any future work of mine which may do damage in the hands of irresponsible militarists...*" (Wiener, 1947). A first suggestion for *computer professionals* could be: to read, for example, the letters of these two giants of the computer history (Heims, 1980).

Many ICT technical people are so much involved in their projects that could look a little 'naive', even if one can consider them as 'good guys'. This is the main reason for introducing *computer ethics* courses

even to undergraduate students in computer science: to raise awareness among 'good technicians' of the risks of underestimating the role of the context in ICT complex systems (Gotterbarn, 2015).

There are many approaches to teaching *computer ethics* in computer science courses, some of them are *concentrated* in one course, some are *distributed* among all the curriculum, but all of them try to enlarge the landscape of the stakeholders involved with ICT and reflect on their relationships (Patrignani, 2020; Karoff, 2019). All these efforts try to improve the *ethical competence* of future *computer professionals*.

Despite all these efforts at university level, there are issues about the general culture in ICT that need to be addressed: from one side the culture of 'innovation' and the other the culture of 'coding'.

About 'innovation' at any cost, often the mantra of ICT, indeed computer professionals need a kind of 'antidote' to the 'motto' of the high-tech industry "*disrupt first, ask questions later*". Later could be *too late*, and the capability to 'anticipate' is becoming a requirement in the engineering field (Pasquale, 2020).

About 'coding', this 'buzzword' is becoming popular in the schools at any age. Indeed, it is true that we need to educate children, even at elementary schools providing them with a good level of 'digital literacy' in order to avoid the risk of becoming just 'digital consumers'. But for the future generations, we need also to introduce a 'wise use of technology' even at primary level schools.

According to Rogerson, it is time to go beyond *computer ethics* just for computer scientists, a renewed *digital ethics* is needed for everyone since childhood: "... In the digital age it is people ... who make *digital technology... digital ethics education in the post millennial era is best started from early childhood*" (Rogerson, 2021).

If we want to prepare future generations for a true 'digital citizenship', then introducing scientific method, problem solving, computational thinking, and coding is necessary, but not enough. We need to introduce also digital identity management skills, a good balance between online and offline time, a knowledge about the use of technology for the public interest (like 'ethical hackers'), and a Slow Tech approach: a good (socially desirable), clean (environmentally sustainable) and fair (ethically acceptable) ICT (Patrignani, 2020). There are several interesting experiments in this direction, starting from 'teaching the teachers' of elementary schools like the project "*From coding to digital wisdom*" (Loccioni, 2021). Maybe the time has come for *computer ethics* or *digital ethics* for all ages?

CONCLUSIONS AND NEXT FUTURE

The role of ICT in this century is becoming pervasive, with seven out of the ten greatest companies in the world that are the "titans of the Web". ICT has a critical impact on society and the environment. They are now the main challenges of the Anthropocene.

Computer professionals represent the core node of the ICT stakeholders' network, they are at the centre of fundamental design choices, but usually operate inside large organization: how can their "ethical competence" be balanced with the power of business companies, how can they cope with the power of the organizations in which they operate? Can they act just individually? Maybe it is time to re-establish organizations like *Computer Professionals for Social Responsibility*? How can they develop their "moral autonomy" in social situations where both *thinking* and *action* are involved? How can we educate *computer professionals* to acquire the necessary ethical skills? (Kavathatzopoulos, 1988, 2003; Patrignani, 2020). Maybe it is time to introduce mandatory *computer ethics* courses for undergraduate students? For *all* education levels?

KEYWORDS: Computer Ethics, Computer Professionals, Volkswagen, Snowden.

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