2

Information technology and ethics

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Abstract

Information technology (IT) exerts a strong influence on people either as individuals, workers or members of society. In this paper, the ethical issues raised by computerization are discussed. IT development is first put into the broader context of technological development in general. Next, ethical issues arising from IT are identified and categorized. Issues which are already the subject of discussion include artificial intelligence and expert systems, work, privacy, social power, computer crime, and intellectual property rights. To this can be added issues which have been recognized but not so much discussed yet, such as artificial and virtual reality technology and its consequences. The paper does not give any simple solutions or answers on how to handle possible ethical issues but rather aims to make the reader aware of them and to stimulate discussion by raising questions. Asking questions is the first step in formulating a solution.

INTRODUCTION

The ethical, legal, and social considerations raised by computerization concern areas such as privacy, crime, health, working conditions, individuality, and employment (O'Brien, 1994, p. 459). Computer monitoring occurs in workplaces. Private information is available through different databases. Well-known examples of computer crimes are the theft of money, services, and information. The computerization of production processes may eliminate jobs. However, while eliminating jobs computerization might also improve the working conditions and job satisfaction of the employees that remain, and make possible the production of higher-quality products at a lower cost to customers.

An Ethical Global Information Society J. Berleur & D. Whitehouse (Eds.)

The following question arises: Do we need to rethink our ethical principles as a consequence of the technical changes or are the new situations which we face reinterpretable based on old and well-established principles – if we have any? The summary of the IFIP WG9.2 position paper (Berleur, this volume) seems to consider a rethink necessary:

> *New deals require new regulation.* People may be upset with present politics, new market trends in the hands of a "happy few". Culture remains the way to find new political and economic regulations, according to the genius of nations and particular people. (Italics added.)

The above point of view finds a resonance in the opinion of Oz in his recent book (1994):

> Information technology revolutionized the way in which we conduct many aspects of our lives. The tremendous technological advancement in the area of computers and related devices created unforeseen situations that necessitate new ethical considerations. Important issues like piracy, free speech, and protection of intellectual property have new meanings in the information age. The ease with which commercial values are transferred from one party to another with the help of computers and computer networks created new crimes. *Ethics have to be modified to accommodate the vast changes brought upon us by the new technology.* (Italics added.)

There is an expressed need in the IT community to develop new ethical codes of conduct (Eriksson, 1996), to identify general ethical attitudes, and to seriously consider users' requirements of information systems. There are particular features of IT which give rise to special ethical problems. Computers often make work abstract. Abstraction makes ethical issues appear neutral. Communication takes place via rather anonymous media. It is easy to monitor employees' work habits, including their use of electronic mail. Such aspects indicate that general and IT ethics cannot be the same, although the basic principles might be.

This situation is not new or unique; technical changes have always caused new problems or accentuated old ones and this is what is happening with the introduction of IT. The new problems just need to be recognized and controlled. Here the IT community's interest in ethics comes in; to be in control of the situation through agreed codes.

But what are the general ethics which should be broadened or reinterpreted to make them contain and explain IT related problems? Teleological and deontological principles represent almost opposing ethical views here. Teleological principles emphasize goals and ends, the good over the right; utilitarianism is one of the well-known theories within this category. Deontological principles on the other hand are based on duty, emphasizing the right over the good. In this category we can find theories such as universalism and Kant's categorical imperative. There are also Christian values and specific Orthodox values. What principles should be considered and to what extent?

Harakas (1983) defines three categories of ethical judgement. Besides good/evil and right/wrong, he also takes in fitting/unfitting or appropriate/inappropriate (p.17). According to Clement and Wagner, what can be considered as 'good' or 'right' is shaped by the context and conditions that characterize a certain social setting (Clement and Wagner, 1996; Piller, 1993). In other words, there are good reasons to assume that people's ideas of 'good' and 'right' differ among social and

political cultures. In all likelihood, neither the meaning nor the priorities of ethical concepts are the same in different cultures. Considering the dichotomies fitting/unfitting or appropriate/inappropriate, these pairs of concepts by definition must be culturally defined. Thus, ethics could be considered to be a part of the values, culture, and history in which they have been developed, both on an individual and on a social level. However, computerization and especially the development of communication technology may become a threat to cultural diversity, the result being a monoculture. Defining a common basis for ethics might then be possible - but is it desirable to eliminate this diversity?

TECHNOLOGICAL DEVELOPMENT

One of the issues raised for the conference to consider was understanding technological development. Understanding change can be quite hard but summarizing what has happened, and how and why, is at least one step in that direction, and might give a hint as to where we are heading. In the following sub-section the position of science and technology is discussed in a historical perspective and then the development of information technology is summarized.

Science and Technology

In the classical period, philosophy included all scientific knowledge. Knowledge was a holistic concept. Later specialization split science into different disciplines, the consequence being the fragmentation of knowledge. This splitting-up or specialization continues to this day, e.g., in the field of biology. 'Science' has become to mean natural sciences only.

Nor was technology a separate field of knowledge from the beginning, although the Greek distinguished between three types of knowledge; scientific knowledge in its original and holistic sense (*episteme*), skills (*techne*) and practical wisdom or knowing how to behave correctly in a moral way (*phronesis*). Skills included craftmanship and understanding the nature of the material to be worked upon. Despite the name 'techne' for skills, I presume that technology does not belong there but should be considered part of episteme instead. Technology only gained a more distinct role of its own when mechanics, electromagnetics and, later, electronics became central to the development of products and production methods.

Christianity taught that man was master over his environment and emphasized human superiority over the rest of creation. According to Harakas (1982, p. 161), that led man to study nature (science) and then to control it (technology). Thus, man's dominance over nature permits and requires his knowledge of science as well as his control over technology. Destruction of nature or ecological mismanagement is not acceptable, instead man is expected to assume responsibility and save nature for future generations (Harakas, 1982, p. 162). Several Christian fathers emphasize that ownership amounts to no more than borrowing.

Information Technology

Information technology is a fast-developing field with indisputable influence on our lives. The ways in which we perform our work tasks, make decisions, and communicate have changed. Many of us have become very dependent on computers both in our working and in our private lives.

Computers do not only affect our lives and work but also our behaviour and the way we think of many fundamental concepts. As an example, consider the somewhat unexpected lack of messaging or network etiquette, even among IT professionals, which became evident as a result of general access to email. Human online behaviour seems to be different from face-to-face behaviour.

We can identify three phases or 'paradigm shifts' in IT development from the 1950s to the 1990s (Friedman and Cornford, 1993). The phases go from a focus on the benefits and constraints of computers and system software, to types of applications, and on to the broadening of user categories. This shift of attention is reflected in the characteristics considered most important.

During the first phase, cost-effectiveness was the central characteristic. Computers were used for process control and to automate clerical tasks in offices, and they were certainly effective in this respect. It was rather easy to develop such information systems and make them run fast and effectively, especially since the cost/performance ratio of computers improved remarkably, and seemingly continues to do so.

Computers were fast and cost-effective. This brought requests from users for new information systems, but there were not enough IT professionals to respond to the needs and opportunities available. The so-called software crisis became a reality. During the second phase, this crisis was to be overcome by improved information systems development techniques and tools. Productivity was the major issue. During this phase also, new fields opened up to computerization such as decision support and artificial intelligence applications, offering yet new challenges.

In the 1980s and 1990s, the quality of information systems proved to be the major issue. There were more users than ever and they were from all hierarchical levels in organizations, many of them with no previous training in using computers. They began to understand that they had the right to ask for useful and flexible tools to perform their work tasks. So, new helpful systems were needed.

A further step in this development is represented by the present situation emphasizing information and communication technology (ICT). Easy communication and the availability via the Internet of a huge amount of data and information from around the world present unforeseeable opportunities - and risks. This can lead to democratization as well as to polarization within and between nations. It also has an influence on individuals when they perform their work, utilize the services offered by society, and exercise their political power. The direction in which we are heading depends both on decisions influenced by economic considerations, and on ethics and moral values.

ETHICAL ISSUES RAISED BY INFORMATION TECHNOLOGY

Discussions on ethics are certainly not new - the ancient Greeks specialized in it. For some time, there has also been discussion of what the consequences of the introduction of new technology are on individuals and work, on organizations and their structure, and on society. Even the consequences of introducing information technology have been debated and studied. However, the concept in these discussions has not been 'ethics' but rather 'social issues'. It is pertinent to question why there is now so much debate on 'ethics'. Is there a new awareness that something has been neglected in previous discussions? Does IT pose a major threat which has only been recognized recently? Or is the ethical stage of our society in a crisis of some kind which warrants such an emphasis? Or are there indeed new issues to be taken into account?

The previous sections have stressed the need to consider ethical issues from new perspectives. In the following section, issues which are considered to be ethical are identified, classified, and discussed.

Recognizing the issues

First, the ethical issues raised by information technology have to be recognized, and the variety of topics that can be considered ethical makes some classification necessary. One way to do this is to browse through all literature where the topic is discussed or to use existing bibliographies on the topic. Another way might be to look at empirical studies applying available ethical models as the frame of reference. All approaches have their pros and cons, and I will briefly mention some ideas that appear relevant to me although I have chosen to use the bibliography approach for my study.

Information systems (IS) developed to support work tasks are intended to facilitate work performance, but there are systems which instead control the work, and force users to adapt their way of working to the computer system's way. According to Clement and Wagner (1996), many causes can be identified for such a deficiency, but they can all be traced in some degree to an ethical shortcoming. However, the failure of individuals and organizations to consider the likely effects on people's welfare and to take responsibility for adequate remedial action are key here. Systems development is the activity where the quality of the system to be produced is determined. Clement and Wagner state that this activity represents the obvious stage at which ethical concerns can be brought to bear. However, most attention to ethical issues has focused on IT use, but earlier intervention could help to develop better systems. Research into ethics in information systems development is therefore endorsed. The essential point is the emphasis on prevention instead of adaptation and correction after IS have been implemented.

In a thought-provoking essay, Mason (1986) expressed his concern over people's vulnerability to IT. He studied in what ways users can come to harm either through misuse of IT or by being hindered from exercising their legal rights. For the purpose of analysis, he constructed a framework consisting of four ethical issues: privacy, accuracy, property, and accessibility. This ethical construct, called PAPA, can be applied to identify and to structure ethical problems. For example, the misuse of personal information or use of incorrect data can cause a person harm

and violate her privacy. Personal property is protected by law but, for software and data, the concept of property has not been clearly defined. Lately, there have been several legal cases which will form precedents for the future. Not only the protection of, but also access to, a person's property, including intangible property, should be guaranteed. In Mason's study, as in many other studies, ethics and legal rights are mixed. One major merit of Mason's essay is that it initiated discussion on the ethical issues raised by IT.

In my analysis, I have adapted a more pragmatic way of identifying central ethical issues in information systems. Herman Tavani (1995) and his students have put together 'A Computer Ethics Bibliography' made up of over 1,200 entries on the topics of computer ethics and computer and society. This bibliography was published in *Computers and Society*, June-December 1995. The bibliography covers the following major fields: material for teaching computer ethics courses, professional ethics and issues of responsibility for computer professionals, and a section dealing with applied ethics and computing. I have earlier written an article on professional ethics (Eriksson, 1996). In the present article, applied ethics and computing will be discussed. In Tavani's classification these issues cover: artificial intelligence and expert systems, work, privacy, social power, computer crime, and intellectual property rights. They could be categorized as issues primarily dealing with democratic versus cultural aspects, although these categories would not be quite exclusive, which a good categorization should be, but partly overlapping. In the following, however, I will follow such a structure. Another categorization, and maybe a more interesting one, which I apply, is issues under discussion and issues not yet discussed.

Tavani and his students deserve to be acknowledged for the major effort in putting together the bibliography which they are also continuously updating. The latest update was published in *Computers and Society* in September 1996. Of course, it can be questioned whether this classification is the right one, whether it covers all aspects of ethics, whether there are issues which do not necessarily belong to the ethics field but are primarily legal issues, for example - and, no doubt, there is an American bias since most American journals and books are covered but not the European ones. I do not, however, consider these points to be critical. Each researcher using Tavani's bibliography can make his own judgements and utilize the results as best fits his purpose. The American bias, on the other hand, could be balanced by sending Tavani information on European articles discussing the topic which would then certainly be included in the bibliography.

Issues under discussion

Tavani's bibliography includes references to articles and book chapters dealing with ethical issues. Consequently, these are the issues generally under discussion, but there is great variation in the frequency with which a certain topic occurs. Most references are to North American journals and books, and discuss issues which are considered major topics there. It might be that other issues would be more important in Europe or Asia. A similar study of these cultural regions would be interesting.

In the United States, the most important issue is privacy and individuality. Issues not yet so much discussed are artificial and virtual realities. In the following, a brief overview of relevant ethical issues categorized either as democratic or cultural is presented.

Ethical issues with democratic challenges

Computers and work

Computers and work is one of the themes, but I have discussed it earlier in another article (Eriksson, 1994), so I will be very brief here. The discussion concerns the impact of computers on contemporary workplaces and work. There are now less dangerous and monotonous jobs but also a higher rate of unemployment. New jobs require new skills and not all people are able or willing to invest their time and energy in continuous learning. On the other hand, computerization is blamed for deskilling people's proficiency, something the use of expert systems might maintain. The organization of work is also changing, e.g., telework is a rather new concept with varying impact on individuals.

The quality of working life is the other major issue. There are health hazards and medical injuries associated with the workplace, including the electronic office. Stress due to computer monitoring is a reality, although monitoring could also be interpreted as a form of support, all depending on how the information is used.

Communication technology, networks and groupware have an influence on the division of work, also at the global level. There is the opportunity and the risk of an unfair distribution of work to areas where the workforce is cheapest, thus creating and maintaining economic inequality in the world.

All these issues deal with ethics - the rights and responsibilities of employer and employee, work and the family. Hitherto, these have been discussed under the concept of 'social consequences'; but now they can even have global dimensions, and thus we are talking of not only democratic but also of cultural effects.

Computers and privacy

Computers and privacy is the most eagerly discussed topic. There is the 'big brother' issue, the fear of government's attempts at social control. Employers can not only monitor their employees' working but also read their email and monitor their telephone conversations. The use of databases in the commercial sector and the selling of personal information for unintended use has been criticized. The accuracy of data in databases and access to these are also relevant issues in this context.

The security of medical records, public and protected databases as well as electronic fund-transfer and point-of-sale systems, or more generally, security in networks represent issues for both individuals and organizations, also in the ethical dimension. The expanding use of the Internet for both private and business use accentuates the significance of security and the need for protection.

There are the assumptions of individual and personal privacy as aspects of human dignity, and the protection of economic interests which have to be considered. The economic aspects concern both individuals and business. Here an overlap between economic, i.e., legal, aspects and ethics is obvious.

Privacy is a hot topic, especially in the United States, with its accompanying reference to democratic rights. However, as far as I know, there are no such rights

enshrined in any legislation. There are other countries where the issue is the reverse, and the government wants to protect itself from the insight of its citizens. There are also countries which do not consider privacy an issue at all. In other words, the democratic issue is certainly culturally flavoured.

Computers and the distribution of social power

Ethical issues under this sub-heading concern computers and equity, computers and gender, computers and education, and computers in the political sector. Three of the issues mentioned above are closely related. It is a fact that there are inequities in opportunities to access computer resources and thus in computer literacy - and computer literacy soon becomes a necessity when competing for places at work. This is both an economic and an attitudinal issue. For example, women are not expected to be interested in technology in general nor in computers, and yet it is mostly women who use computers but for simpler tasks. In an interesting contradiction of this widely-held notion, in 1996, a new course in multimedia at the vocational education level in the Aland Islands (Finland), a region considered rather conservative in many respects, attracted the majority of its applicants from women over the age of 30!

In Finland, the government is making a major investment in computers and teacher training in public schools. This is expected to guarantee students equal opportunities in computer literacy. The Internet provides an opportunity to bring global resources into classrooms -- given the basic resources are available. Computer aided instruction programs (CAI, CAL, etc.) are also becoming more common and widely available and offer new ways of broadening the educational supply.

A major problem in the quest for equality is represented by all those people already in the workforce who have missed out on computerization. They might be passed over if vocational retraining is not organized. If computer literacy becomes a must, in the same way as literacy is, for a person to function and use his social power in the society of tomorrow, then this is one of the critical political and moral issues our society has to solve.

The third world represents a global problem, also in respect of equity for computer resources. Where computers and computer-related knowledge are available together with a cheap labour force for programming, for example, this can be utilized by enterprises in developed countries. The question is whether this will be enough to give developing countries a real chance to improve their own conditions in the future.

From the political point of view, centralization versus decentralization of power is an interesting question and either choice is easily made possible by IT. There are discussions on 'teledemocracy' or 'digital democracy' bringing computer aided voting and political decision-making to the home. The problem of the security and reliability of systems and networks has yet to be solved. The risk of misuse is obvious. And, of course, the infrastructure in society and the resources in the home are needed!

If the distribution of social power is to be considered an ethical issue, then we certainly have many new ethical issues to find solutions for and to study.

Computer crime and abuse
Computers make new ways of committing old crimes possible and that is why one of the topics which has been discussed a lot is computer crime and abuse. Viruses are one of the first issues which come to mind, although this it is not the major problem, albeit an annoying one. Economic crimes are the most central and these are often committed by employees and not by hackers. Industrial espionage is another important issue and the risk of wiretapping, for example, is why some big organizations do not dare to use open networks. Before the security problems of the Internet are solved, electronic commerce with all its potential will probably remain no more than that - potential. Software piracy as well as the illegal copying of software are also central problems to be solved. They concern profits and economic justice, but here different attitudes to intellectual property in different cultures represent a problem.

From the ethical point of view computers do not create very many new types of crimes but mainly legal issues. Computers just make committing some crimes easier and open to new groups of people. Somehow they also make the borderlines between acceptable and non-acceptable behaviour fuzzy.

Intellectual property rights and information ownership
Intellectual property rights and how to extend them to the ownership of electronic information is a crucial point. There is the issue of protecting creativity and ideas, for example a piece of electronic music. According to 'normal copyrights', a piece of electronic music would be the property of its creator, but how can such rights be enforced in an electronic environment? A very special case is the availability of the source code to all home pages on the Internet. Normally, printed material is protected by copyright laws but for 'printed home pages' there is no way, and maybe no point, in insisting on any copyrights. The realization is available to whoever wants to reuse it.

We also have the issue of the ownership of information in electronic form. Who owns it? Is it the person whose data have been collected or the instance that collected it? And, if it has been sold on, can the new owner decide how to use it? What is a fair price for information and who decides it? Answering these questions concerns not only ownership but also privacy, and the Internet will make manifold the problem since collecting data on who visits which web sites is so easy.

With these property issues, we can observe changed practices and changed values. If this reflects changed morals, we probably need new ethical rules or a reinterpretation of old ones to solve the problems experienced.

Ethical issues with cultural challenges
In the previous sub-section, ethical issues primarily related to democratic challenges were discussed, although many of them represent cultural challenges as well. Only one class in Tavani's classification, artificial intelligence and expert systems, fits better under cultural challenges and is discussed below.

Artificial Intelligence and Expert Systems
Artificial intelligence (AI) and expert systems (ES) aim to assist in decision-making. From the outset, the goal was to replace expert knowledge where no experts were available - or to replace expensive expertise by a cheaper labour force.

Such use met with a lot of criticism. Johannessen (1987), among others, pointed out that it might be possible to tap the expert's factual knowledge and include his/her decision rules into a computer program, but it is never possible to tap the expert's judgement based on experience and intuition. Heuristics do not help here either.

The locus of moral responsibility in decisions made with the aid of ES has been questioned, as has the question of whether the goals of AI are proper and ethical. For example, the latest way to make point in a courtroom in the United States is computer animation. Knowing the power of pictures over words and the American habit of watching television, and being aware of the opportunities to build up the situation in a favourable way in a computer animation, would make me at least question the objectivity of the presentation, the protection of justice, and the rights of the people concerned. Clinical judgement and diagnosis is another problematic issue. Correctly used by experts, it can certainly be helpful, but trying to replace non-existing knowledge and trusting suggested solutions too much can be dangerous and risky - an issue of moral responsibility and liability, as I see it.

To this field also belong efforts to try to make computers more humanlike. There are attempts to encourage computers to learn to interpret facial expressions in terms of signalled human emotions. The issue of simulated sex is not far off - and is being discussed. Do we want it?

The major issue about the challenges that AI and ES offer is to what extent the solutions are acceptable. Do they fit our cultural and moral context? And, if not, what should be changed: the ethics, the local culture, or the opportunities the new technological solutions offer? Here I see the need for serious discussion.

Not many of Tavani's categories fitted properly under the sub-title of cultural challenges. Partly, this is due to the fact that the categories are not strictly distinct. The most likely explanation for the small number of topics purely dealing with cultural challenges is, as I see it, that these are the issues that are not yet discussed.

Issues not yet discussed

One topic in Tavani's bibliography which has not yet been widely debated but which is important from the ethical point of view is the use of artificial or virtual reality technology. For many young people in particular this is becoming a reality where they spend a lot of their time. It might be just fun, but it may also be 'addictive' and isolate users from real life. The American film industry has made a comedy about young professional people unable to communicate except via their computers, something which does not seem very likely but is not entirely impossible either (*Denise Calls Up* by Sony Pictures Entertainment) - and, in that case, I would not call it a comedy.

Besides the isolation of people, there is also the ethical issue, as I see it, of what is created or manmade versus our duties, an issue which has been discussed since Aristotle. Now, the borderline between manmade and created just seems to have become quite diffuse.

Manmade versus natural and our moral duties has been considered an ontological issue since Plato and Aristotle, and was a concern of Christian values

as well up to the mediaeval period. The thinking, however, changed in 1,500-1,600 when new science evolved (Tyørinoja, 1995).

Aristotle's distinction, in Physics II[1], between natural things and artifacts was that natural things had the principles of movement and change and their own strivings which artifacts lacked. Mediaeval thinkers often based their ideas on Aristotle but they, as theologians, had to address the issues of 'made' or 'created' as well.

Thomas of Aquino (circa 1,225-1,274) wanted to make Aristotle's philosophy the basis for theology and thus make theology a theoretical science, the highest of all sciences, because of its objects of study. The simple principle concerning made versus created was: God created living things, while man made artifacts.

Ockham (circa 1,285-1,347/9) represents later Franciscan theology and new nominalistic thinking which reinterpreted ontological issues into epistemological and logical-semantic issues. Thus, the distinction of natural versus artifact became context-dependent causality.

Ockham's theology gave rise to the question of possible worlds (already discussed by Aristotle) and also to natural philosophy, which had been discussed in England already in the twelfth century. Science, in that respect, was thus established in England by Roger Bacon (circa 1,214-1,292/4), and others.

Renaissance Platonism was followed by neo-Aristotelian philosophy with its discussions about mechanism and its nature, whether it is a theoretical or practical science. This gave rise to the development of technology, I suppose. At this time the discussion about artifacts concerned whether a manmade product could be better than a natural one. Artifacts were considered to be of two types, those which followed their nature and those which were freely designable.

In the sixteenth century, Francis Bacon (1561-1626) no longer accepted any essential difference between natural and manmade things. Descartes (1596-1650) agreed. Descartes had a mechanistic interpretation of all living things; they existed just for the moment without any ultimate purpose; God recreated the world constantly.

In the eighteenth century, Julien Offray de La Mettrie tried to show that human beings are machines, all biological processes are mechanic.

Now, we come to the discussion of virtual and artificial reality - which is so real. Do we have and, in that case what, moral responsibilities to manmade things? Who owns what we create? Who owns what we say in cyberspace? What is play and what is cheating? It is probably time to think of the ethical consequences of living in cyberspace as well as the interpretations. This is a new ethical issue which has not yet been seriously addressed and requires attention.

DISCUSSION

The purpose of the Corfu conference, according to the call for papers (see also Berleur, this volume), is to develop 'a statement about the future of culture and democracy in a global information society' and to present its outcome 'in the form of recommendations targeting decision-makers, computer scientists and professionals, consumers and users' associations, ...'. My approach in contributing to this major task is to try to establish what the issues are, especially from the

ethical point of view, which of these are being discussed by IT and management information systems researchers and professionals as well as by researchers in other fields, and which are not. The justification for my approach is that the first step to change is to recognize the need for it, and that means being aware of what the issues are. I think there is hope for a reappraisal, where necessary, of the topics under discussion. Topics which have not yet been discussed represent a more problematic and threatening domain.

Seven broad questions are stated in the beginning of the call for papers. The first question concerns the sustainability of a society whose cultural, social, political, economic, and technological developments we did not understand. Our society is probably much more complex or at least we are better aware of its complexity than ever before. The solution is hardly to be found in IT, but I would not regard IT as being the problem either. It is what makes the global information society possible. We have it and we need it. How to cope with it certainly is an issue and an important one, but I cannot see any other way around the 'problem' than education and individual confidence in oneself. The issues at least are being discussed.

The second question concerns changes in jobs and work-related skills. Computer literacy is a topic where research has been and continues to be done. The threat of AI and ES and their effects on deskilling people has been discussed but perhaps has not been studied very much yet, so here is a field for research.

The third question concerns the monocultural view of information. Western culture seems to dominate today. However, the global society is really opening up through ICT, and many Asian countries at least are taking up the challenge, so monocultural might become multicultural in the near future.

The fourth question also deals with cultural issues, the right to one's own culture in a global society. This topic has been discussed in articles and the issue is thus recognized.

In the fifth question, I think I can recognize the old discussion on technocracy and technological determinism from years back. What is new here now?

The sixth question deals with issues where economic and political interests are in conflict. However, this is not a new issue although it will probably be accentuated when electronic commerce takes off. Such markets will be very hard to regulate since many legal issues are all new. This will certainly be one central field of both research and political action.

The last question concerns the threats to civil rights from IT and especially from IT integration. Democratic rights is a typical topic for American society so the issue is being discussed, and will certainly continue to be, at least in the United States.

To summarize, there are problems, some of them caused by computerization, but computers are essential to our society today. They are necessary for business, government, and individuals. ICT in particular can be considered a threat but an opportunity at the same time.

It is my belief that, by recognizing an issue and starting to discuss it, we are on our way to solving it. The major problem is that in our 'global village', western culture is dominant. I would like to see studies like Tavani's performed in Europe, Asia (the Pacific Rim), and other continents as well. What are the political

and cultural, i.e., ethical, issues there? Recognizing these is the first step to making our world a global and democratic information society.

Many of the issues discussed above are a mix of IT and ethical considerations. The fundamental question that arises is what kind of basis for moral judgement is applicable and relevant to IT. The title of my paper might suggest solutions according to different ethical and moral theories. However, I do not think that it is really possible to start analyzing global IT issues before recognizing them - in a global perspective. Next, we have to accept that there are different cultural settings and we should not enforce any general solution as the whole truth. The solutions might have to be context-dependent, even in a global world, if we want to promote variety instead of a monocultural view.

In this article, I asked the question whether it is necessary to rethink ethical issues because of IT, and my answer to this is, yes. There are new issues to consider, old issues have to be seen in a new context, and there are the local-global aspects to consider. Whether we need new ethics or new moral theory is another issue. It may be that the old principles still hold, if only we could agree what the principles are.

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[1] All the following references on philosophy are indirectly taken from Tyørinoja's work (1995). Unfortunately, I do not understand the original languages.