

# Yesterday's Technology is Today's Social Problem: Compelling Need to Incorporate Ethical Theories in Information System

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**Abstract-**The premise of this paper is that information technology is currently moving beyond the familiar main frame, pc, laptop and networked paradigms and that these new development require ethical reflection. We are now witnessing an arena of the mobile and wireless revolution, the ubiquitous computing revolution as well as revolutionary new uses of IT in biomedicine, crime and terrorism, entertainment and other arena. We are anticipating a nanotechnology revolution as well as convergence between IT, biotechnology and nanotechnology together as “converging technologies”. These new developments require ethical reflection, even before their consequences become visible [1]. This digital convergence and globalization in the emerging knowledge society has raised complex ethical, legal and societal issues. We are faced with complex and difficult questions regarding the freedom of expression, access to information, the right to privacy, intellectual property rights and cultural diversity. So we believe, whenever a new technology is created or a new invention in IT is forked, there must be an “IMPACT ANALYSIS” of this technological object on society, environment, culture and various walks of life.

If one wants a direct development in information system, it would be a good point of departure to look at the system development process, which eventually will lead to the creation of system with proper knowledge of its probable impact on society. We suggest a new phase “IMPACT ANALYSIS” to be incorporated in SDLC (software development life cycle).

The proposed SDLC (with ethical analysis of impact) is called as ISDLC (Impactful SDLC).

**Keywords-**Ethics, computer information system (CIS), ISDLC, Consequentialism, Deontology, Information Technology.

## 1. BACKGROUND

We are compelled to write this paper because; Computer Science and IT does not only involve technological aspects but also epistemology (theory of knowledge). Since, its main component is information, IT assists and extends the ability of mankind to capture, store, process, understand, use, create and disseminate information at a speed and scale which had never been thought possible before. Sometimes the impact and changes are obvious, but many are subtle. Benefits and cost need to be studied closely for a nation to progress and improve the quality of life for its citizens. Issues that have arisen from adoption of IT, such as

adoption of ATM, can be summarized as follows [2]:

### 1.1 Unemployment

The automation of work has caused creative destruction by eliminating some vocations and creating new ones. Employment/Unemployment of the work force of nation is affected.

### 1.2 Loss of Privacy

Transactions are transmitted and recorded in databases at banks, hospitals, shopping complex and various organizations in public or private sector. The contents of electronic communication and databases can provide important and private information to unauthorized individuals and organizations if they are not securely guarded.

### 1.3 Intellectual Property

Millions of rupee of software is illegally copied each year all over the world, which has a negative impact on the software industry and ethical progress of technology.

### 1.4 Freedom of Speech and Press

How do the constitutional rights of individuals in terms of freedom of speech and press apply to electronic media? How seriously do the problem of pornography, harassment, libel and censorship on the internet affect individuals and society?

### 1.5 Digital Divide

IT affects local community life to a great extent. The increasing use of computers at one side brought the entire world to our doorstep but on the other side has increased the separation of rich and poor, creating a digital divide between the information “haves” and “have-nots”.

### 1.6 Crime

Stolen and counterfeit ATM cards, terrorist activities, threats, cybercrime are some areas which need to curb upon. Not only is this but there are more factors which compels us to incorporate ethics into our IT structure.

## 2. INTRODUCTION

The intention of this chapter is to open a window to the areas of ethics, ethics in context of computer technology, and system development. It should also give the reader an understanding why the subject presented is of importance. Technological impact will be examined first, followed by the meaning of ethics, and finally ISDLC with its phases will be addressed. Fundamental to the work, the question

“Is ethics important in the use of computer technology” must be examined.

Technological impact is of broadly two types [3]

- Product impact
- Service impact

### 2.1 Product Impact

Products change our world in many ways. In the literature of technology, two main types of product are recognised: Boenink et al. (2010) distinguish between hard and soft impacts of technological artefacts [4]. Hard impacts, according to the authors, are the effects of technology on health, environment, safety etc. In such effects, human behaviour plays only a minor role, and if it plays a role, it is unintentional human error that causes harm, not intentional actions. Therefore, the designer can be held responsible for negative consequences that are entailed by their designs. For example manufacturers will call their products back for maintenance if they discover safety problems with, say the brakes.

Soft impacts, by contrast, denote “the way technology influences, for example the distribution of social rules and responsibility, moral norms and values”. Boenink et al. give two reasons why soft impacts are not easily accepted by designers as a part of their responsibilities, because firstly, there is less of a consensus on what desirable consequences are in domain. People may strive for different values, and it may be impossible to find universal norms on what impact needs to be achieved. Secondly as the impact is mediated by the human behaviour, responsibility could be said to lie with the users of the products. For example explosive manufacturer may state that their products can be used for both good and bad purposes and therefore reject responsibility for changing their products to prevent undesirable usage.

### 2.2 Service Impact

We would like to highlight on two classes of properties of information services here. The first is the direct interaction between provider and consumer, related to notion of inseparability, as well as to the lack of transfer of ownership.

The second is intangibility related not so much to service impact, but rather to informational nature. Both represents different from the things that have been primary target of post phenomenology thus far.

In the context of information services such as Facebook, assumption of separation of design and use no longer hold. There is no such thing as an identical good being delivered to multiple consumers. This leads to different relations, which do not involve only person, the technology and the world but also an active service provider as well as active co-users of the information service which require real time actions of both provider and consumer. For example if the use of Facebook would cause privacy problems, users could be instructed not to post any sensitive information. There is no “thing” that can be inspected for impact on the environment.

Thus after realizing the differences between product and service impact we must focus to concept of technological mediation keeping in mind the ethical consequences.

## 3. WHAT IS ETHICS?

“Ethics and faith are beacons for all personal, professional, informational and societal relationships and help steer us away from crashing on the rocks of chaos, anarchy and destruction patterns that rage against productive timing”.

Ethics has its roots in the Greek word Ethos, “the character and sentiment of the community”. It is a branch of philosophy that is concerned with human conduct. It determines individual’s thoughts and actions. It is not to suggest that the relation between two is that of cause and effect, but yes, it provides a platform where thoughts are converted into actions.

Ethics deal with questions that cannot simply be answered with “yes” or “no” for example, Is it right to be dishonest for a good cause? Is it right to steal food when starving? Is it right to make decisions that will benefit many at all price of sacrificing few?

Oz asks, “what is right and what is wrong... the answer depend on the society and the time in which we live” [5].

What is considered right for one person, organization or community does not necessarily need to be considered right and wrong by others. Often there is no right and wrong, but different and opposite viewpoints that are considered right by their arguers.

In discussion of incorporating ethics into computer information system it must be clearly known “**what ethics is not**”.

### 3.1 Ethics and Feelings

Many people tend to equate ethics with their feelings. But being ethical is clearly not a matter of following one’s own feelings.

Any person following his/her feelings may recoil from doing what is right. In fact feelings frequently deviate from what is ethical.

### 3.2 Ethics and Morality

Morality can be individual set of commitments even when they are rejected by others. But one can’t be ethical alone.

Ethics bring other people for the realization of self. Morality does not demand acquiescence from others the way ethics does. It is possible to be moral alone. If two countries are at the verge of war a moralist can say I do not believe in war, so what if everyone else does.

### 3.3 Ethics and law

Being ethical is also not same as following the law. A good system of law often incorporates ethical standards to which most citizens subscribe. But laws can deviate from what is ethical? Pre-civil war slavery law of America and the old apartheid laws of past day South Africa are obvious examples of laws that deviate from what is ethical.

### 3.4 Ethics and Social norms

Finally, being ethical is not same as doing “what society accepts”. In any society, most people accept standards that are in fact, ethical. But standards of behaviour in society can deviate from what is ethical. An entire society can be ethically corrupt. Nazi Germany is a good example of a

morally corrupt society.

Thus, we can say ethics is an attempt to guide human conduct and it is also an attempt to help man in leading good life by applying moral principles. Ethics refer to well based standards of rights and wrong that prescribe what humans ought to do usually in terms of rights, obligations, fairness, or specific virtues. Ethics when applied to information systems must make sure that technological impact benefits to society with issues of propriety, rightness and wrongness. It is a matter of practical concern. Ethics determine choices regarding right and wrong, good and evil. Ethics is to consider the practice of doing right actions or what we can call the „ART OF LIVING THE GOOD LIFE“.

#### 4. ETHICAL THORIES

In order to work on new phase of impact analysis some major ethical theories must be focused upon.

##### 4.1 Consequentialism

The consequences of our behaviour, rather than the behaviour itself, are important for ethical judgement. What is important is amount of common good an act produces.

What is good? One might ask. A sub-branch of consequentialism, utilitarianism, views good as any behaviour that improves happiness [5].

Consequentialist can be separated in two groups

- ACT\_UTILITARIANIST- who only considers the amount of goodness an act produces.
- RULE\_UTILITARIANIST-who evaluate whether an act is right or wrong by looking upon whether it is based on good rule or principle [8].

According to utilitarian, happiness is the ultimate good and what everyone strives for. This striving is a part of our human nature (Johnson, 1994). Utility is defined as the overall balance of good and bad consequences when committing an act. High utility will mean much good and little bad as possible [8]. Ethics in utilitarianism is therefore based upon outcome of an act and to check whether it leads to promotion of happiness or not. All of good and bad produced by an act must be considered. By a mathematical system, the ethical and unethical are summed for stakeholder affected by a decision. All measures values can be treated as vectors. They are then summed. The act is ethical if sum is positive, if sum has negative value, it is unethical. What is emphasized is net good of society not for the individual.

##### 4.2 Deontologism

In deontologism, an act is considered morally good because of some of the characteristics of the action itself not because the result of the action is good. Oz illustrates the difference between consequentialism and deontologism by example from field of computer information system [6].

Consider an issue of copying of proprietary, software, piracy. A consequentialist would say that piracy is wrong, since if many people copy a program without permission, the authors will go out of business, leaving their customers no choice at all to buy their product or they will find new ways to earn money to stay in business, for instance increasing the price of the product, which will hurt their

regular paying customers. i.e. “Do not copy software as it hurts people”.

Whereas deontologist will say “Do not copy since it is unethical and wrong, regardless of the consequences.” It will not focus on possible effects of piracy rather it will check the intrinsic nature of piracy to decide whether it is right or wrong. Deontologist focuses on rights and duties.

#### DUTIES

German philosopher Immanuel Kant (1724-1804) focussed on duties divorced from one’s will to obtain happiness or pleasure. Duty ethics emphasizes that one ought to perform certain duties even when these duties do not necessarily produce the most good [5]. For an act to be considered good, not just the act but its motive must be considered ethical. For example, a software company creates a robust software which prevents piracy and distributes it for free (incurring bearable losses rather than selling and earning profit), just in order to achieve fame and to produce good market will, rather than true intention of curbing piracy, is considered unethical.

Kantianism is based on individual’s duties. Spinello in 1995 states that Kantianism is not based on knowledge of human nature, but instead in common idea of duty. Kant put the emphasis on the intension to do ones duty: “the honest and conscientious efforts to fulfil duties.” [7].

#### RIGHTS

British philosopher John Locke’s (1632-1704) argued that to be a person means that one has rights (for instance rights to property, liberty and life). Rights can be divided into positive and negative rights. Johnson (1994) identified negative rights as rights that require restraints from others, and positive rights as the duty of others to do something for the holder of the right. Negative rights are the rights that have to be protected from outside intervention in certain activities, such as freedom of speech, liberty and privacy [8]. Positive rights are the rights to pursue one’s interests, such as right to health care or education.

Locke’s ethics can be categorized as contractarianism. This type of ethics emphasizes the co-operation between an individual and the society. The individual recognizes the rights of other groups and individuals in the society such as every individual’s right to freedom, life and property, whereas the society recognizes the same rights for each individual of the society.

Contractarianism focuses on the need to respect each individual “legal, moral and contractual rights as the basis of justice and fairness [7]”.

The strong emphasis on the rights of the individual in contractarianism would not make it possible for a contractarianist to accept the utilitarian view about maximising good for all. For example, confiscating goods or property for the good of all would be a violation of individuals’ rights.

Johnson (1994) separates rights into two groups: legal and moral, legal rights are created by law, whereas moral rights are not necessarily law. Moral rights are independence of law [8].

## 5. ISDLC

After studying major ethical theories, we will be applying them to various phases of SDLC. The new form of SDLC (that we are proposing) has a new phase IMPACT ANALYSIS which incorporates various other impacts as shown in following Fig. 1. We call it as ISDLC.

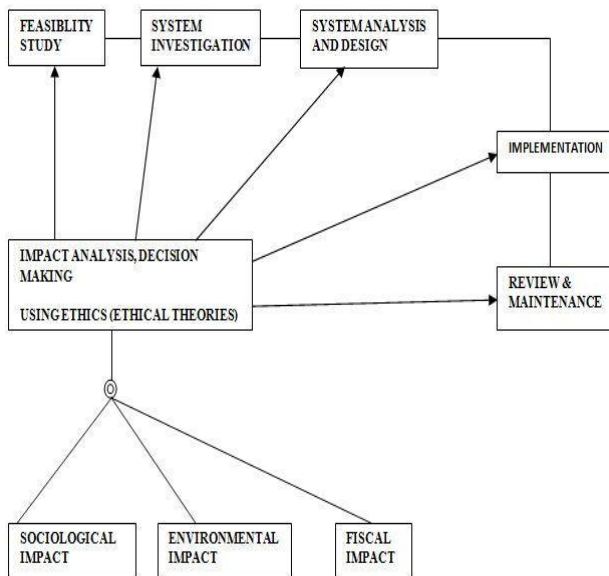


Fig. 1. ISDLC (Various phases of ISDLC are shown with special emphasis on Impact Analysis Phase. This phase includes analysis of sociological, environmental and fiscal impact altogether. Since Impact Analysis has to be done in every other phase of ISDLC, it is shown independently in the proposed model. All other phases are inter-transitory hence; they are connected with unidirectional lines, which also emphasize that there is a free flow in between any two adjacent phases of ISDLC).

### 5.1 Feasibility Study

The aim of the initial study is to ensure that the system developed is the one most fit in a competing environment. What is considered a competing environment is based on economic factors, by weighing possible expenses versus income.

If these economic factors were supplemented with all factors affecting the stakeholders SDLC would be a UTILITARIAN VIEW. It is obvious to add ethics as a cost where the measurability of beneficial factors is in focus.

### 5.2 System Investigation

Potential ethical problems that have been identified in phase one should now be analysed in detail, underlying causes of ethical dilemmas that the system faces must be looked upon. This should be carried out to ensure that these problems are not transferred to the new system, but instead are solved in the design of new one. With decision makers rest the profit responsibility, and the way they assign the economic resources to the development process and the new system to be build, they largely influence how ethical theories and considerations will be treated and put into

practice. Hence it becomes important for decision makers to have an in depth knowledge of ethical issues and ethical theories. CIS can be expected to have an impact outside the system boundaries, thus this impact must be included in the analysis and investigation. Not doing so would make ethical reasoning pointless. For example suppose a software consulting company design a medical database containing patient records for hospital. Decision makers of the software company suggest that security might be violated in the current system design and later decision makers of the hospital chooses to settle for a minimum security solution to minimize the cost for the new system. In implementation phase, it is shown that hacker could easily access the system. Now two options are left, either accept the new system, but this would neglect the patient rights to security and integrity. Other option is to re-design the system probably from an early development phase, with increased cost compared to expenses for a system with right security level from the beginning.

Here duty ethics can be followed that companies have certain rules that should be followed, if ethical considerations are not met, Software Company rejects the project.

### 5.3 System Analysis and Design

This phase focuses on that, ethical system objectives should have firm definition. A firm definition means specific and measurable here specificity is likely to be easier to estimate as compared to measurability of ethical objectives. Ethics deals with human and social factors, which are difficult to measure and quantized as compared to hard ones (such as technical and economical aspects) considering the different observations might judge the same situation in different ways. The designers of the new system must have the character of ethical analysis in mind.

### 5.4 Implementation

In this phase, system will be implemented. ISDLC emphasizes that work should be undertaken to ensure that transition from old system to new system works flawlessly. When it comes to implementing ethical objectives, the design group could benefit by the knowledge obtained from experiences with the present system. This knowledge could be reused, to minimize the risk of transferring old problems to the new system.

If enough time and resources have been devoted in resolving the ethical issues and possible dilemmas faced in the earlier phases, ethical dilemmas should not prevent the implementation.

### 5.5 System Maintenance and Review

The system must be reviewed, in order to ensure that the objectives are implemented according to specifications. Efficiency and job satisfaction are critically important for the intra environment of company which is using newly made computer information system. Also review is necessary with respect to its social and environmental impact. If the actual impact is not in accordance with the previous assumed impact review in ethical theories has to be done. In spite of utilitarianism, deontology could be

tested or vice versa.

A strong distinction must be made in weakly and strongly stated objectives to show how the system to be designed as per these ethical objectives like: weakly stated objectives.

In government agencies information system policy “the system should respect the rights the rights of people to privacy.” This could be stated as strongly stated ethical objective as “to obtain the aim of providing a sufficient level of privacy, the database containing personal records should restrict access to personal records, by password protection, logging of access and encryption of data and communication.”

By converting all the weak objectives to strong objectives, any SDLC approach can be used in designing and implementation. Ethics could be calculated in same way as monetary costs to get an idea of the fitness of the system chosen for development. Johnson states that, an important advantage of utilitarian view is that it puts the requirement on system analyst, to consider in a neutral way the interest of all parties affected by an action, in this case the system design [7].

Decision makers must not approve project just on monetary grounds, but also on social, environmental and ethical grounds. For this a dedicated team of sociologist, environmentalist, ethics expert must be formed which in collaboration with development team will create a computer information system which will eventually lead to sustainable development.

Decision making will be a cumbersome task in a situation like, “if automating a part of corporation information system would decrease the need for a group of loyal long term employee that, until recently, were considered as an important asset, how should decision makers act?”. In tackling such situation ethics play a vital role.

## 6. CONCLUSION

If ethical theories are to be integrated in the SDLC, systems development will have to take on a system approach. Analysing various ethical theories that can be applied to SDLC, we found that a broad perspective regarding different factors that influence design will have to be taken in account. Considering CIS, as a mean of generating revenue and economic profit only, will deviate IT industry from sustainable development. Today, it is the responsibility of decision makers to establish an ethical standard for CIS being developed (i.e. to incorporate ethical analysis phase in SDLC). Tomorrow, ethical theories might characterize methodologies used to develop CIS. Until then, responsibility rests on shoulders of decision makers when it comes to ethical issues in system development.

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