COMPUTER TECHNOLOGY - ITS SOCIAL IMPACT

By:

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Abstract:

It is not difficult to get computer professionals to agree that computers have a significant impact on society. It is rather more difficult to get them to agree on *why* computers impact as they do. It discusses several characteristics of computer technology that may be at the center of the effects. It is intended that this list become a focal point around which the design of new technology can revolve in order to anticipate the social consequences of a new product and mitigate any potential negative effects it may have on society.

Traditionally, courses that deal with computers and society issues focus primarily on enumerating the various ways in which computers impact society. This is done by listing categories of topics such as privacy,

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computers in medicine, military uses of computers, etc. Classic cases of computer abuse or errant systems are typically described in detail. These examples are meant to serve as warnings to future professionals in the hope that they will practice their profession with greater care.

What are the characteristics that are at the root of this impact? Are there fundamental differences between this technology and others that have transformed our world in the past?

The intent of developing a list of these characteristics is that it could lead to a better understanding of the nature of the social impact of computers. In this way, it might be possible to examine a new computer project at the time of its *design* (not, as is the usual case, a long time after the project has been implemented and disseminated) to determine its potential impacts as a social change agent.

The characteristics given below are not necessarily unique to computer technology. However, in many instances computers have created situations that were previously impossible to accomplish (such as space flight), were essentially inconceivable until the technology was applied, or at least were very difficult to achieve without the aid of computer technology. Furthermore, even though other technologies may have had impacts similar to computers in many ways, computer technology has greatly amplified their effects to the point of entirely overshadowing any previous technology's impact.

Finally, the term *computer technology* is meant to be inclusive of any device that is essentially controlled by a basic computer (CPU, program, etc.). This would include, therefore, modern telephones, VCRs, microwave ovens, CAT scanners, supermarket scanners, and the like.

The following are in no particular order. Also, some devices or examples are likely to fit into more than one of the categories below:

(1) Ubiquity

It is perhaps stating the obvious that computers appear to be everywhere today. Even when we don't encounter them directly in their various forms of modern convenience devices, such as digital watches, microwave ovens, VCRs, and the like, we generate transactions that are processed via computers without actively doing anything: the utility companies are recording our usage, the phone company records incoming calls, our answering machine might be recording a message while we are doing something else, someone is performing a credit check on us, etc.

(2) Magnification

Computers tend toward magnification in several different ways. First, the explosion of the availability of information is due in large part to the computer's ability to generate, collect, and store an ever increasing amount of raw data. Since the ability to create and

collect data is growing exponentially, so too is the generation of information that can be synthesized from this data. Second, the types of negative impacts a single error can have has grown enormously with computer technology. Finally, the number of people directly affected by a system error has also grown enormously, to where a single software system literally can affect millions directly.

(3) Accessibility

Access to information continues to increase at hard to believe speeds. To begin with, the vast quantities of information available on-line (through, for instance, the Internet) appears to be growing exponentially. In addition, we now have unprecedented accessibility to information and communications from nearly anywhere we happen to be. Next, information is available to an unprecendented number of people. Finally, the promises of the "information superhighway" to open up new lanes of access, including text, voice, graphics, and video increases the types of information to which we have access to include all media.

(4) Reproducibility and Distributability

The major concern of the recording industry regarding the introduction of digital audio tape (DAT) systems was the ability to make exact duplicates of digital material, indistinguishable from the original. The concern, of course, has been that DAT technology

would cause unprecedented bootlegging of recordings, to the obvious detriment of the recording industry, composers, and performers. Clearly, any digital file can just as easily be duplicated. Many information resources are available only in digital form, via, for instance, the Internet. As more information is converted to digital form (e.g. voice and video), the ability to duplicate and distribute such information increases enormously. Indeed, there are some forms of publishing that can exist only within the context of a computer system. The concept of hypertext and hypermedia (including audio and video), the ability to create non-linear accessibility to information, was conceived out of the ability to randomly access information via computers. Its increasing success easily shows how important information in a digital form has become already. [1]

(5) Lack of Accountability

It has become a popular complaint that it is getting more and more difficult to locate a human being who is willing to accept responsibility for an error made by a computerized system. While it is tempting to blame such problems on incompetent employees, in truth the problem may be a poor user interface, lack of training, or an error in the software, none of which can be solved by those providing the front-line service. Another difficulty is finding someone who will, indeed,

fix an error in an account. It is often the case that service representatives are reluctant to accept the responsibility for making a necessary change. In addition, it can often be difficult to even find a human being to deal with a problem. Getting lost in a voice-mail system has become a modern urban legend. [2]

(6) Temporality

Computers have several effects on time and the timeliness of information. It seems that computer technology is to blame in large part for the "speed up" of modern society - everything has to get done faster, be there sooner, be available immediately. Another form of temporality in computer systems is that information can be retained over long periods of time, even when they appear to have been destroyed (consider the classic case of Col. Oliver North). There is little reason that information should be entirely lost any more, even due to accident. And it is reasonable to suspect that every scrap of information generated today will be available virtually forever. Another temporal shift for which computers have been responsible is that people who work together do not necessarily have to do so at the same time. Finally, services and information are more frequently available on a 24-hour basis. This allows people to request a

service or seek information when it fits their schedule, rather than when it fits the service provider's schedule.

(7) Spatiality

Computers have done more to shorten distances than any previous technology, even the supersonic jet. It is possible to send large amounts of data, messages, video, etc. virtually anywhere in the world via networks such as Internet. Long distance learning, using information databases or video feeds of courses via satellite, is a reality for a growing portion of our modern society. We can now even be on the move when we talk with someone on the phone, or receive a fax.

(8) Surveillability

Is there any doubt that computers have made surveillance easier than at any time in history? In addition to the usual surveillance equipment such as cameras and microphones, transactional data is increasingly being collected for virtually all types of transactions, even cash purchases and the acquisition of services. There has even been discussion by the government of using a universal health card, which is seen by many as the first step toward finalizing the move (begun with the co-opting of the social security

number) in the US toward a national identification card.

(9)Shifting of Relationships/Changes in Intercommunication Protocols

One of the more difficult characteristics to track is how computer technology has changed communication between people and groups of people. In particular, the use of email has been shown to eliminate a lot of the usual visual and verbal cues we often use in communicating with one another (whch can be viewed as both an advantage and as a disadvantage). In addition to removing such cues, computer-mediated communications mask attributes such as race, gender, age, or physical disability, in addition, perhaps, to the person's social or management status within an organization.[3, 4]

(10) Illusion of Precision

It is not difficult to make many (perhaps even most) people who are not in the computer field believe that any numeric result generated by a computer is correct. Those not well versed in the hardware of computers have little understanding of the fact that numbers must be converted back and forth between decimal and binary forms, or that there is a limitation

on the accuracy of numbers due to memory constraints. As a result, they willingly accept values generated by a computer as infinitely accurate.[5]

Conclusion:

The characteristics described above are factors in the social impact of computer technology. For most there is at least anecdotal evidence of their existence (with seemingly countless examples). For some, there is also experimental evidence. It has finally become widely accepted that technology is not value neutral, as originally thought. By examining this list and using it as a set of landmarks for evaluating new systems, it may be possible to better anticipate the social impact of new systems, prior to their dissemination. Perhaps this will help achieve the development of what some have called a Social Impact Statement, which is intended to be analagous to the Environmental Impact Statements[6,7] required by the Environmental Protection Agency prior to most building projects.

References

1- Oz, E. (1994). Ethics for the Computer Age. New York: Wm. C. Brown Communications.

2-Nissenbaum, J. (1994). Computing and Accountability. Communications of the ACM. 37(1):72-80.

3- Grudin, J. (1994). Groupware and Social Dynamics: Either Challenges for Developers. Communications of the ACM. 37(1):92-105.

4- Perrole, J. (1987). Computer and Social Change. Belmont, CA: Wadsworth Publishing.

5- Liffick, B. (1985). Software Developer's Sourcebook. Reading, MA: Addison-Wesley.

6- Schneiderman, B. (1990). Human Values and the Future of Technology: A Declaration of Empowerment. Computers and Society, 20(3), 1-6. ÿ

7- Huff, C. & T. Finholt (1994). Social Issues in Computing. New York: McGraw-Hill.