

**THE NOTIONS OF *HOMO TECHNICUS*, *HOMO SIMPLEX*,
AND THE REAL DILEMMA OF SCIENCE AND TECHNOLOGY
IN BUSINESS AND SOCIETY**

ELIEZER GEISLER

Professor of Organizational Behavior and Associate Dean for Research
Stuart Graduate School of Business
Illinois Institute of Technology
565 W. Adams Street, Chicago, IL 60661 USA
Tel: (312) 906-6532 Fax: (312) 906-6549
email: geisler@stuart.iit.edu

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ABSTRACT

This paper describes the notions of *Homo Simplex* and *Homo Technicus* as representations of the gaps between technologically advanced and disadvantaged segments of society and the economy. The notion of *Homo Technicus* is a complex concept that includes the benefits accrued from science and technology, and a style of living in an environment that has become more complicated and sophisticated. The differences between the two notions are used to explain the ethical issues that arise from the applications and adoption of scientific and technological innovations in the economy and society.

The paper continues to examine such gaps and offers an analysis of what may be the “real dilemma” of ethical issues with science and technology (S&T). The paper advances and defends a set of arguments that S&T is by itself not conducive to ethical differentiation, and that under certain circumstances can even be “The Great Equalizer.” The paper also argues that the notion of “Paradox of Progress” is a misidentification of the phenomenon of S&T implementation by social and economic entities. The ethical issues that arise from such implementation are inherent in the phenomenon of *utilization* of S&T, and the commercialization aspects of the technology. The paper offers examples of both sides of the argument, and suggests that social and economic institutions that utilize S&T and its innovations have the ultimate choice in how well, how safely, and how responsibly S&T is going to be employed.

The paper concludes that the answers to the real dilemma lie somewhere between the extreme positions encountered in the literature. More S&T or no S&T is hardly the solutions to the problems that plague the economy and society. The paper examines the major conflicts in the literature and offers a middle-of-the-road way to address them.

INTRODUCTION

This paper discusses the gaps between technological advances and the perils from such advances to the disadvantaged segments of the economy and society. The paper advances the notions of *Homo Simplex* and *Homo Technicus* as representations of these gaps. The paper also anchors the analysis of these notions in the overall discussion on the ethical issues with science and technology (S&T).

In the past few decades S&T has generated massive changes in the fabric of society. There have been changes in the way we work, play, learn, and reproduce (Geisler, 2001; Tunzelman, 1997). There have also been radical changes in basic conventions of social intercourse, such as the role of women in society and the workforce, and the redefinition of the nuclear family (Chidambaran and Igurs, 2001; Winston and Edelbach, 1999). These changes may be attributed to advances in S&T, such as the progress in birth control methods, information and telecommunication technologies, and the restructuring of the economy from manufacturing to services.

These changes contributed to a redistribution of social power among social institutions. S&T now impacts social activities of human, religious, and ethical concern. Debates have arisen over genetic sciences and their actual and potential power to shape individual behavior and human lives (Fukuyama, 1999; Kaplan and McGee, 2000). The delicate balance between human rights and government prerogatives has been suddenly catapulted into a torrent of questions and fears. Government agencies are now in possession of powerful technologies that seem to threaten the invasion of citizens' most protected areas of life (Epstein, 1998).

This paper advances the argument that a basic change promoted by S&T in the social fabric has been the widening of the gap between those who can manipulate S&T and those who cannot. This gap is not only the "digital divide" which has been widely discussed in the popular and the scientific literature (Bolt and Crawford, 2000; Davenport, 2000), but a more complex phenomenon. The various impacts of S&T on society are shown in Figure 1. These changes have generated a profoundly

Figure 1 About Here

different social environment, in which these impacts helped to create two distinct social and economic groups.

THE S&T GAP: THE NEW SOCIAL AND ECONOMIC ENVIRONMENT

The rapid acceleration of S&T in the recent few decades has created the new social and economic environment we are experiencing today. Accumulation of S&T in our lives and the ubiquitous presence of technology in almost every aspect of the economy and society have exacerbated the cumulative impacts of this S&T revolution. Such cumulative effects are increasingly

visible and exert their power in widening the gap. The new environment will certainly become more entrenched in the years to come (Dorf, 2001; Kobin, 1998; Mokyr, 1992).

As social and economic institutions absorb the outputs from S&T, they create new procedures, new norms, and new structures. Economic, legal, and social standards change and the landscape of human intercourse becomes much more dependent on S&T and its manifestations in routine life.

Never before in human history has S&T played such a crucial role in the changing of the social and economic institutions. We have become “used” to technology, but most of us have little understanding of how it works, how to fix it, and how it pervades our existence.

The Rise of Technocracy

This phenomenon has already been observed and studied under the term “technocracy.” This term is generally defined as “government by technicians” or “management of society by technical experts” (Kalb, 1999; Loeb and Segal, 1996; McAvoy, 1999). Explorations of technocracy have been focused on the role that technical entrepreneurs and S&T advisors are increasingly playing in determining economic and social policies (Jasanoff, 1994; Stabile, 1984). One outcome of such trends may have been the replacement of the traditional middle-class (based on professions such as engineering, law, and medicine) with a new class whose power is derived from the new knowledge or information industries (Kellner and Heuberger, 1994).

From Technocracy to Technogarchy

The influence of the new technology-based power-brokers has perhaps exceeded that of advisors or even policy-makers. The change in the source of power (from strictly professional to a broader knowledge-based skills) is only one aspect of the radical transformation caused by S&T. Technocracy has given way to “technogarchy”: from power of technocrats to actual government and a pervasive influence throughout every aspect of human existence (Covin, Slevin, and Heeley, 2001; Joy, 2000; Segerstole, 2000).

Technogarchy may be loosely defined as the actual power exercised by the new class in the entire fabric of the economy and society. The difference between *technogarchy* and *technocracy* is

in the ubiquitous pervasiveness of S&T and its power-holders in the social and economic landscape (Scheer, 1995).

As technogarchy becomes more prevalent, a gap is created between those who possess the skills and ability to partake in this group of power-holders, and those who lack these skills and abilities. Moreover, in addition to the gap (or “divide”) between individuals and groups, there is also the emergence of a gap between what might be defined as two “cultures” or “states of mind” that characterize the different environments inhabited by the two categories of people (across the divide).

Thus, the divide is not only between categories of people in society and the economy, but also between different “ways of life” (*modus vivendi*). These differences are engendered by S&T and its hold on the social and economic fabric.

THE NOTION OF *HOMO TECHNICUS*

In order to operationalize the radical transformations engendered by S&T and to better explain the resulting gap or divide, the notion of *Homo Technicus* is introduced. This is a complex notion that encompasses the skills and capabilities a member of society possesses in the context of S&T and the increased sophistication of the environment. Figure 2 shows the characteristics of *Homo Technicus*.

Figure 2 About Here

The characteristics listed in Figure 2 extend well beyond skills and technical capabilities. They depict a way of life, a dependency on a continuous flow of S&T and innovations, and a set of attitudes and beliefs centered around the existence of S&T as a key element in the economy and in society (Andrews and Nelson, 2001; Tierney, 2000).

Homo Technicus is therefore a combination of the outcomes and benefits accrued from S&T, and the nature of the unique environment these outcomes have engendered. Those members of society who are able to cope and to adapt their skills and their way of life to this new environment fall under the rubric of *Homo Technicus*. Those who cannot do so fall under the notion of *Homo Simplex*.

THE NOTION OF *HOMO SIMPLEX*

Homo Simplex is a notion of a member of society who lacks not only the skills and capabilities to fully function in a technological environment, but also lacks other attributes needed for success and survival. Key among these attributes are the following: (1) understanding the role that S&T plays in the economy and society; (2) awareness of the trends of S&T and the necessity of participating in the environment they create; (3) utilizing S&T in all facets of life, including work, leisure, learning, and social intercourse; and (4) lacking the understanding of the adverse consequences of not participating in the S&T-driven economy and society.

It should be emphasized that *Homo Simplex* is lacking not only *access* to technology, but the array of attributes for functioning in a technological environment. In this sense, the “digital divide” applies only to a portion of the notion and explains only a limited aspect of the failure to succeed (Bolt and Crawford, 2000; Davenport, 2000; Korbin, 1998).

The differences between *Homo Technicus* and *Homo Simplex* are shown in Figure 3. These differences include, in addition to access, such attributes as awareness, use, benefits derived, and transfer to the next generation through personal example of parenting and targeted education.

Figure 3 About Here

THE GAP BETWEEN *HOMO TECHNICUS* AND *HOMO SIMPLEX*

There is a gap developing in the economy and society, operationalized by the differences between *Homo Technicus* and *Homo Simplex*. This is a gap that cannot be overcome by simply increasing access to technology. *Homo Technicus* becomes a member of society who is better housed, fed, clothed, and immunized against diseases. This member of society also enjoys better health care, higher life expectancy, better education, and a variety of social and economic advantages. A crucial aspect of this gap is the fact that this member of society who belongs to *Homo Technicus* also strives to improve the life of their offspring, thus contributing to widening the gap. If *Homo Simplex* does not improve, the gap will perpetuate to the next generation.

Homo Technicus survives and prospers due to S&T. But the same S&T helped to create the gap between the two groups. The gap exacerbates the growing lack of communication as well as common interests between the two groups. The more the gap widens, the harder it is for *Homo Simplex* to become *Homo Technicus*.

But S&T can also be a “great equalizer” by promoting social intercourse, improving communications between groups and countries, and by allowing a faster pace of economic activity. This phenomenon may channel S&T to *all* quarters of society and the economy—if the adoption and transfer processes are implemented adequately to ensure such benefits across groups and categories of people.

Geisler (2001) suggested that the gap described above and the phenomenon of equalization coexist. S&T allows different groups, professions, and countries to achieve economic and social improvements at a faster pace. S&T helps to develop economic and social opportunities that are open to all. S&T can be a powerful instrument whose implementation can assist in solving very complex social, economic, and ethical problems.

Because S&T generates a gap between groups *and* helps to equalize positions, it would be fair to assume that by itself S&T does not create problems nor does it solve them. All depends on how S&T is implemented and applied by individuals and their governments.

ETHICAL CONSIDERATIONS

S&T has created some negative consequences by misuse or overuse of resources. Some authors have referred to this phenomenon as the “Paradox of Progress,” namely, that the price paid by society for enjoying the benefits of S&T was far too high, perhaps even unbearable (Ashton and Laura, 1999). Such criticism of S&T is basically directed at the S&T phenomenon, without a clear distinction between the nature of S&T and its utilization.

Calls for cutting back on S&T and similar “Neo-Luddite” recommendations are misguided and misdirected. S&T in itself is not to blame for societal ills, however we are able to establish a causal link between societal degradation and S&T. The “Paradox of Progress,” if indeed it exists, derives from human ineffective application and adoption of S&T. A thorough examination of the costs and

benefits of S&T have not been attempted—except in selected cases, such as health care (Geisler, 2000; Lundberg, 2001; Thamer, Brennan, and Shemansky, 1998).

S&T is a tool, for usage in good as well as evil purposes. Geisler (2001) argued that “social and economic institutions that utilize S&T and its innovations have the ultimate choice in how well, how safely, and how responsibly they are going to put them to use and employ them in their activities. Business companies have a choice in how they pollute the environment, and government organizations have a choice in how many regulatory controls they are willing to exercise in order to check, reduce, or even eliminate any possibility of pollution. Society at large has a choice between economic imperatives and pollution prevention, namely, at what cost should zero pollution be feasible, and is society willing to take acceptable risks?” (P. 294).

The Ethical Dilemma of S&T

We exist in a world where society and the economy are driven by S&T. This has created an environment in which there are four levels of conflict between the consequences from S&T and society.

The first is the issue of the need for S&T and how much of it should be cultivated and even tolerated. The public debate on this topic helps to clarify issues, and to educate the public on the positive and negative aspects of S&T. An emerging problem is that those who belong to the *Homo Simplex* category are often excluded from the debate, whether because they lack the skills to participate in it, are unaware of its importance, or simply rely on the social, political, and economic institutions to engage in such a debate in their stead (Fukuyama, 1999; Andrews and Nelkin, 2001).

Another level of conflict involves the allocation of resources for S&T. Funding for certain areas of S&T—particularly from public sources—are routinely scrutinized. Conflicting interests involve their beliefs and convictions for or against such areas as stem-cell research, AIDS, exploration of space, and similar programs.

A third level is the public debate on the utilization of the outcomes from S&T. Overall issues are debated, such as the degradation of the world’s environment, while other, more specific examples are targeted in this conflict. Disasters such as Three-Mile-Island and Exxon Valdez become key

arguments for opponents of S&T and the unfettered use of the outcomes from S&T (Ashton and Laura, 199; Tierney, 2000).

The fourth level of conflict includes ethical concerns of S&T outcomes from specific areas of research and technology applications. Examples are pharmaceutical and biological S&T, cloning, and the increasingly avid manifestations of public concerns with technologically-driven invasions of privacy.

The ethical dilemma of S&T includes all four levels of conflict. Paradoxically, in order to promote growth and prosperity, there is a need for S&T and its outcomes. However, the more S&T is generated and applied, the more there are conflicts and resistance, and the more society wishes to control and restrict its generation, conduct, and implementation—thus leading to a very strange and uneasy partnership. The ultimate outcome from this unique situation is the gap between *Homo Technicus* and *Homo Simplex*. The first represents the need and desire to expand S&T, the latter represents the paucity of its effects and the desire to curtail it.

A MATTER OF CHOICE

The literature on the outcomes, conflicts, and ethical issues of S&T tends to emphasize extreme positions. Bill Joy, cofounder of Sun Microsystems, contended that cutting-edge technologies may be very difficult to control and humanity will thus irrevocably suffer the dire consequences from their application (Joy, 2000). Joy's description of such a Faustian horror scenario harbors the seed of a viable solution.

The problem and the solutions to technological nightmares are embedded in the *implementation* of S&T outcomes, not in the S&T itself. Many of society's ills can be cured by S&T, when it outcomes are utilized and implemented in an adequate manner.

Consider the case of agriculture and world hunger. Gonzalez (2001) described the drought in Central America in the summer of 2001. He quoted Francisco Rogue Castro, director of the Latin American section of the United Nations World Food Program, as Castro referred to the Central American farmers: "These people are subsistence farmers in a world that is not a subsistence world." In other words, *Homo Simplex* living in a world in which survival requires the capabilities and

culture of *Homo Technicus*. “These farmers,” continued Castro, “are confronting tomorrow’s challenges with yesterday’s tools. You cannot try to survive in this modern world when you only have corn and beans to cultivate or land that is marginal and subject to drought and floods...”. The problem of world hunger will not diminish in the coming years unless utilization and application of S&T are geared toward plausible solutions (Pinstrup-Andersen, and Rosegrant, 2001).

The gap between *Homo Technicus* and *Homo Simplex* is a reality, but not an unsolvable burden on society’s future. The direction in which we travel must be to add to the numbers of *Homo Technicus*. The dream of subsistence economy and “back to earth” communities of yesteryear is but a dream. For society to feed, house, and clothe its members, and to provide them with employment, health care, and a satisfying life—it must utilize S&T and its outcomes.

When properly implemented, S&T can be “The Great Equalizer” by closing the aforementioned gap, and by allowing the development of conditions that lead more people into the ranks of *Homo Technicus*.

CONCLUSIONS

The answers to the dilemma of S&T and to the gap it creates between groups of people and between nations lie somewhere between the extremes of no S&T and more S&T. The blame lies not with S&T itself, but with the manner in which we implement its outcomes. By allowing the natural growth of S&T and its innovations, and by reducing society’s controls over its applications, solutions to critical problems are likely to be generated.

Geisler (2001) has concluded that society and the economy are intertwined with S&T. The best possible scenario for coexistence and a shared prosperous future is not to increase control over S&T, but to provide adequate conditions that will allow it to progress at its own rate, while maintaining a balance between incentives and boundaries—based on the analysis of benefits versus risks.

S&T is essential to our lives and to our form of civilization. We should not fear it, nor idealize it. We should view it for what it is: a tool devised by humans to create value and benefits to our society and economy. Just as we have established laws and rules and ethical principles that have controlled and domesticated the basic instincts of human ferocity, violence, and fear—thus creating

lasting civilizations—so can we master the very S&T we create and exploit. The answer to any Neo-Luddism is for all to see. It shines in the eyes of a child who is cured from a dreaded disease by the outputs from medical S&T; it is embedded in the smile of a crippled worker whose limb has been restored to full function; and it is glowing in the face of the grandparents who lived long enough to see their grandchildren accessing in one hour more information than the total knowledge that existed in their own time.

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Figure 1
S&T as Catalyst for Social Change

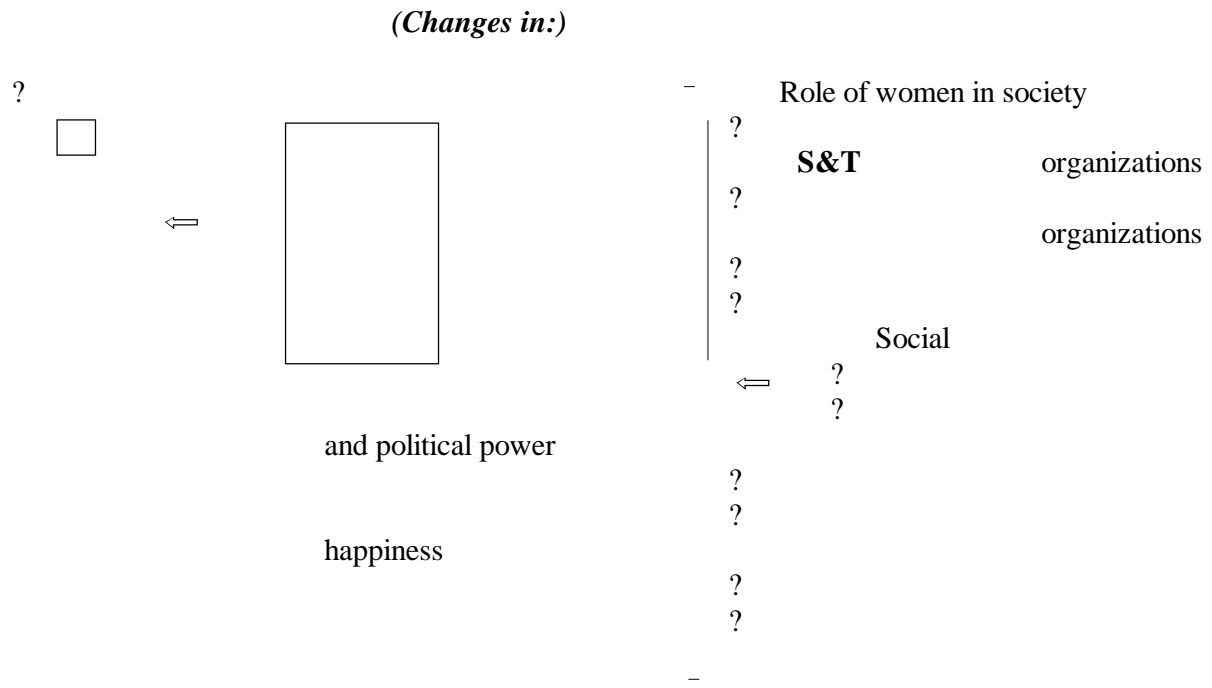


Figure 2
Characteristics of *Homo Technicus*


- ? Dependency on technology for mundane and routine activities at work and
- 
- pleasure
- ? High level of sophistication and urbanity
- ? Affordable and easy access to information, knowledge, solutions, opinions, news, and ideas
- ? Proneness to sentiments of social alienation
- ? Proneness to loss of sense of community
- ? Development of eclectic terminology, preferences, and avocations
- ? Heightened interest in, and awareness of, progress in S&T and innovation, and the need to incorporate them in routine applications
- ? Development of a sense of intolerance for those in society who are not engaged in S&T and its applications
- ? Transfixed on trends of S&T over the horizon
- ? Development of a strong sense of belief in the value of S&T and its ability to solve social problems
- ? Dependency on a continuous flow of S&T innovations in practically all aspects of existence
- ? Inability to operate on a daily basis without the technology to which it has been accustomed
- ? Belief in the strong link between healthy economy and progressive society—and S&T
- ? Belief in the need to increase and improve S&T education

Figure 3
Differences Between *Homo Technicus* and *Homo Simplex*

<i>HOMO TECHNICUS*</i>	<i>HOMO SIMPLEX*</i>
<p>? ositive attitudes toward S&T ? ransfers attitudes and benefits to offspring ? wareness of emerging technologies ? wareness of utilization of S&T ? wareness of benefits from S&T ? ccess to technology ? elatively frequent use ? urther incorporation of S&T in routine aspects of life (home, work, and leisure) ? se of distinctive terminology ? erives various benefits from S&T: in education, health care, communication, and transportation ? eels life is enriched by S&T ? nclined to politically support S&T ? wareness and supports the link S&T-Economy & Society</p>	<p>? ack of clearly defined attitudes toward S&T ? o various degrees, unaware of existing or emerging S&T ? enerally unaware of the benefits to be derived from S&T ? acks access to S&T ? nable to incorporate S&T in daily life ? enerally ignorant of facts, theories, and the terminology of S&T ? enerally lacks access and incentives to access education and training portals to S&T ? enerally unable to derive adequate benefits from S&T ? nable to transfer awareness and use to offspring, hence perpetuating present situation</p>

?
 *The different items as shown in the figure are not necessarily arranged in matching pairs.