

7 Long-range Challenges of Information Technologies

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This chapter will go “outside the envelope” and identify issues that may not yet be on the radar screens of most policymakers. I especially focus on new challenges to governance. Much of my research centers around information technology, so my questions are: What are the new challenges to governance being created by technology in general and especially by information technology? How will technology make governance more difficult, or will it just make governance different? Will it create the need for new attitudes, frameworks, structures, or policies? Will information technology make governance harder or easier? Will it change the very nature of governance?

A Shifting Paradigm—The Politicalization of Science and Technology

I have identified several answers to these questions. The first is very broad and has nothing to do with information technology *per se*. I believe a subtle change is taking place in the way people think about science and technology. Perhaps, it is not a new view but rather one that has been below our radar screens and is now moving to the surface. It is a paradigm shift from science and technology as value-neutral to science and technology as value-laden. This shift moves science and technology from being thought of as nonpolitical to being thought of as social and political in nature. In the old paradigm,

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scientific and technological development was understood to have its own logic and pattern. As such this development could not be controlled. Interference from government could only ruin it. In the new paradigm, science and technology are political. The most obvious places this can be seen is in the funding of science (which areas get funded and which do not), in the funding and regulation of various technological endeavors (again, which public projects get funded and which do not), and which projects are framed as public endeavors and which are not.

In the early 1980s, Langdon Winner wrote a seminal article titled “Do Artifacts Have Politics?”¹ In the article he makes the case that technologies are infused with value. He uses a powerful example to make his point. His example is the bridges on the Long Island Parkway, which were designed by Robert Moses. The example is somewhat controversial so I present it not for its historical accuracy but for its illustrative quality. In other words, even if the story is historically inaccurate, it illustrates how values can be embedded in technology.

According to the story, Robert Moses, a well-known architect of much of New York City in the 1930s, designed the Long Island bridges at a certain height so that public buses could not go under them. The claim is that Moses did this intentionally because he was trying to protect the Long Island beaches from the lower classes. The beaches were the refuge of white, wealthy, suburban residents. While people from the city could drive to the beaches, the height of the bridges ensured that only wealthy, and typically white, city dwellers (those who owned automobiles) could get to the beaches. Those who used public buses would not have access.

This story illustrates the idea that technologies are political. The bridge reinforced social hierarchy and was value-laden. Winner goes on to develop the point by explaining how nuclear power plants, for example, embody a political form because they cannot exist without a hierarchical and centralized social organization. Nuclear power plants cannot exist or run unless the people who are maintaining them are organized for hierarchical decision making. The behavior of all the workers has to be coordinated. The decision making form must be centralized, because decentralized decision making would lead to a dysfunctional plant.

Winner's argument is that technology, in its very being, carries social organization, social hierarchy, and politics. In contrast to the nuclear power plant are things like windmills that allow individuals to control their own energy use independent of any complex hierarchical system. Nuclear power plants are hierarchical; windmills are a democratic technology.

Since Winner's article, several other authors have picked up on and developed this idea. For example, in *Democracy and Technology*, Richard Sclove makes the argument that technology embodies social structure.² He uses the example of a water system coming into a village that had a certain life around the river. People went to the river to do their laundry and other tasks and while they were there, they talked, gossiped, and shared news. When a modern plumbing system was installed bringing water to residents' homes, the entire civic life and politics of the village changed.

I will not go into the parallel story that might be told about science and public recognition of the politics of science. Suffice it to say that these stories go far beyond public decisions about which illnesses get research funding and how acceptable levels of risk are determined. The point is that science and technology are increasingly being understood to be social and political. Indeed, scholars in science and technology studies are redefining technology so that its social and political nature is understood by definition. Technology is not just material objects but material objects together with social practices, social institutions, and social relationships. Material objects cannot come into being and be sustained without those social practices, social institutions, and social relationships. Once these are acknowledged as part of technology, it is a small step to see the politics and values of a technology.

The political nature of science and technology will increasingly be recognized. This will create a significant challenge to government especially when it comes to using that expertise, and not undermining the authority of the expertise and the public trust that usually goes with it. In the old paradigm of neutral science and technology, their political character stayed below our radar screens. Of course, political decisions were made but the public saw the political implications only

after the fact. The public was left with the impression that science and technology follow a “natural” course, when, in fact, that is not accurate.

The Challenge of Globalization

How will information technology challenge government in the future? Perhaps the most powerful challenge will involve globalization, especially globalization brought about or facilitated by the Internet. The Internet makes possible much more intense interaction among geographically distant individuals, groups, companies, and nation states than was possible before. The intensity of global interaction necessitates common rules of operation. Thus, the need for global governance and global coordination—in laws, policies, and regulatory frameworks—will become more and more demanding.

We can see this more clearly by starting with the increasingly global economy and following the consequences. A teaching exercise can illustrate. I was trying to explain the implications of the Internet and the global economy to the 18- and 19-year-old students in my class. (They do not know much about economics to begin with.) I asked them to imagine four people playing a game of Monopoly, a metaphor for economic activity. Then I asked them to imagine that every two hours, the four players get up and leave and a new set of four players takes over. After two more hours a third set takes over from the second set and so on. Each set of players represents a generation. The success of each player is determined by a variety of factors including luck, strategy, and the rules of the game. Luck comes into play in several ways. For one thing, one’s success depends on the outcome of random throws of the dice. For another, it depends on who preceded you when you enter the game. You are much better off if you take over from someone who has done well than from someone who has gone into bankruptcy. The rules of the game are also a determinant of success—in combination with luck in that the rules may or may not favor your throws of the dice. And, of course, an individual player’s strategy or cleverness does make a difference in how well the player deals with whatever good or bad luck brings.

So far the thought experiment illustrates how economic success and failure is a function of who preceded you (generation to generation), luck, and strategy. Now we must add the shift from a national economy to a global economy. We can imagine that at some point it becomes possible for any of the four players to simultaneously play in other Monopoly games. Imagine that four players are sitting around a table in a room with many tables—each with players playing Monopoly. Further imagine that a player at any table can turn around and join any of the other games. Players can take money they have acquired in one game to another game; they can roll the dice in another game, buy property, collect rent, pay rent, etc.

This exercise was effective with my students in illustrating two points. First, it became clear that as players at one table began to enter games at other tables, rules would be necessary to regulate such things as entry and exit to and from games, the movement of money and resources from one game to another, and so on. Of course, some mechanism of enforcement would be necessary for the rules to be effective. Global governance of some kind would be needed.

Second, and more important for the point I am trying to make, the more the players participated in games at other tables, the more what they did at one table would be impacted by what was happening at other tables. Not only did players have increasing interest in the other tables and the rules (governance) of table-to-table interaction, but outcomes of one game became increasingly influenced by outcomes at other tables. This shows that the global economy will increasingly impact our national economy, and, hence, global governance will become increasingly important.

We cannot have a global economy without enormous political and social implications. In fact, it is likely that the power of nation-states, not to speak of state and local economies, will be enormously weakened. We are a long way from figuring out how to address these issues. Global governance has always been a daunting challenge. As the Internet facilitates an intensification of the global economy, global governance will become all that more daunting. Currently we are reacting and developing *ad hoc* policies. We need to get ahead of the curve.

The Challenge of Insularity

Another issue arising from information technology and the Internet has to do with increasing insularity. This is a more subtle issue and it seems contrary to globalization but it is not. Information technology and the Internet make it possible for individuals to insulate themselves from ideas and activities—those to which they do not want to be exposed. Of course, the Internet has the potential to both insulate and expose, but much more attention has been given to the Internet's potential for exposing individuals to more and more information. Less attention has been given to the potential of the Internet to allow individuals to select information of a limited kind. Because information technology and the Internet bring to individuals endless quantities of information, individuals have to filter what they read, see, and do. Consequently, individuals are likely to filter and customize information. When they do, they have the potential to narrow rather than broaden their exposure.

Consider access to information 40 or 50 years ago. If we wanted news, we would read our local newspaper. That was the only game in town. (We might be able to read several newspapers, and many people read local or regional newspapers.) Now we can go on the Internet and we can select from an ever-expanding range of sources. We have to select because we cannot read everything. We can select the newspapers that are slanted the way we want them to be slanted and we can read just what we want to read and we can ignore everything else. In the past we might have read stories that we would not have chosen because our local newspaper brought them to us. Yes, the newspaper made decisions for us and, yes, they had enormous power to influence us, but without their attempts to influence us, we have the danger of simply becoming more and more of what and who we already are.

Instead of the newspaper sending us stories it thinks important, we can now just sit at home and read on the Internet what we think is important. And, an intelligent agent will record and analyze what we are reading, figure out our interests and biases, and send us more and more of what we already like. This also works for buying patterns, political and religious preferences, and so on.

When you go out into the world and talk to people, you may be exposed to things you never thought of. Your perspective may be broadened. But why deal with the often-frustrating world? It is unpredictable and may threaten you. On the Internet you can find exactly what you want without leaving your house. You can find chat groups of like-minded people and Web sites that reinforce your current interests and views. Thus, it seems we have the worry that there will be an intensification of what we already are. In fact, with virtual reality technologies we can create people and places that are exactly what we like. Why deal with real people at all when we can find pleasant like-minded virtual people on-line? We do not have to deal with “difficult” people in the neighborhood we create. We can have people who are just what we want.

The Challenge to Privacy

Some people think of the privacy issue as arising from the use of computer technology, but it is not just because of this technology that we need to be concerned. Biotechnology, bioinformatics, nanotechnology, and other technologies pose challenges to our privacy. We do not have to think very far out in the future to know that this is going to create an enormous challenge.

It has been suggested that in the future there will be 10,000 micro-processors for every individual. Whatever the number, it means an enormous amount of data being collected about each of us each day. I do not need to go over all the information that is currently being collected about us already. Credit records, banking records, cell phone records, and much more are already being recorded, and can be put together by people using the Internet.

In the United States we have taken an *ad hoc*, piecemeal approach to privacy. We do not have a comprehensive privacy policy. We have one policy for credit records, another for medical records, separate legislation about financial records, yet another policy for real estate records, and so on. We also have lots of records that are public, and we think it is good that those records are public. In the past, having public records meant you could go to the courthouse and get access to those records. We never thought when we were making records

public that people could get them at their fingertips. The geographic distance of those records had an impact on us and served as a disincentive. That has now disappeared. We let this happen without thinking about what the geographic distance was doing for us.

Why should we care about this? Why is privacy important? I can use the metaphor of a panopticon, or “all-seeing place,” to illustrate. The British social philosopher Jeremy Bentham came up with a very powerful design for a prison.³ He called it a “panopticon.” It had all the cells placed in a circle, with each cell having a glass door. In the middle of this circle was a guard tower. The guard in the guard tower can, at any time, see into each cell, but the prisoners cannot see the guard in the tower. This was considered a great idea because the thought was that when the prisoners believed they were being watched, they would behave well. Supervisors discovered that the guard did not have to be in the guard tower at all because the prisoners could not see the guard. The prisoners’ behavior could be controlled simply by generating the belief in the prisoners that they were being watched.

Michel Foucault applied this idea to develop a metaphor for the oppressive use of information in a society disciplined by unseen observers.⁴ We can already see that we have, in effect, created a panopticon because of the Internet. We are in those prison cells being able to be viewed. You could say we do not have to worry because the tower in the middle has no guard. But, it is not government that we must fear. Any number of private organizations can watch us that way because of the Internet.

Another standard counter to this concern about privacy is to say, “I don’t have anything to be ashamed of; why should I worry?” The reason the panopticon works is because you come to view yourself as the guard does. In other words, you take into your identity, the guard’s view of you. You come to think of yourself as the guard and then you behave accordingly. You are guarding yourself. You behave the way that the guard expects you to behave or at least you think about your behavior as the guard would view it.

The concern about privacy is that the lack of privacy changes the nature of personality. It is a threat ultimately to democracy. If you walk around all the time viewing yourself with the idea that you are being watched by watchers who want you to act in a certain way, then

this is going to affect your behavior and reduce the likelihood of your going against any norms. You believe that anything you do may come back to haunt you. The lack of privacy not only affects your behavior, it changes your personality. Your identity becomes how you think your watchers see you. You become the person your watchers see you as. People like this cannot function in a democratic society.

In the future we will have not just the mind-body distinction, but three parts. We all have our bodies, our minds, and our records. These three will always go with us. We will have this cloud of information that is connected to us and walks around with us. I do not know what to think about that.

Other Challenges

Ethics

Hans Jonas, in his book about ethics in a technological age, argues that our traditional ethics are no longer suited for the modern technological age.⁵ He is worried about the fact that in traditional ethics throughout Western society, at least, we have never had to deal with the environment (nature) as something that we could control. We had always seen ourselves as *in* nature. Nature was a force that had infinite resilience. Now we have the power, he says, to change nature. We also have the power to change ourselves in a way that we never could before. He argues that our old ethics are not suited for this. So this seems to be another way that we are not well-prepared for the future.

Man-Machine Hybrids

Another trend just below the radar screen, and now coming above it, is that we are going to become man-machine hybrids. This started off with the simple pacemaker attached to the heart, but we now see that nanotechnology is going to be in us in various ways. Drugs are going to be administered in us in various ways, such as under-the-skin chips. We will be partially virtual because of the things im-

planted in us. We are not going to have to wear glasses because we will have lenses implanted in our eyes. We are not going to have trouble hearing because we will have hearing aids implanted in our ears. We ought to be thinking about what this means and trying to develop some guidelines before we go too far down this path.

Virtual Reality

Virtual reality is a very broad set of technologies. It is not just games. In many different types of work, people are not going to be dealing directly with processes or people; they are going to be looking at computer screens and seeing images of things. For example, workers in a paper pulp mill would look at images on a computer screen instead of putting their hands into the paper pulp to know when it is ready.

Medicine offers many possibilities for this technology. Instead of going to the doctor you might just stand in front of a camera and have a doctor who is at a different place look at your images. We already have these imaging technologies and they are being used, especially in remote areas and with less accessible specialties.

Simulation and training is another area that will be changed by virtual reality. Much of it will be done through virtual reality systems. Why send pilots up in airplanes to learn to fly when we can have them practice in a virtual system on the ground? Doctors can learn how to do surgery in a virtual system. Boat captains can learn to steer large ships from a classroom.

More and more, our behavior is going to be mediated by technology. This is going to raise complicated issues of responsibility because in tough moments, those virtual systems may not be reliable. We may find out the hard way that the systems we rely on are not designed to make tough decisions or to give individuals the information they need to make those decisions. If something goes wrong, we will be inclined to blame the system for having the glitch rather than take responsibility for making the decision based on the information that was in the system. On the one hand, you might say this is not a very difficult problem because we will just work out liability rules, and determine the party or parties to sue. But what it does to human

decision making and moral accountability is a difficult problem. If you are not in an environment where you have the information necessary to make a moral decision, how can you ever be morally accountable?

Endnotes

1. Langdon Winner. "Do Artifacts Have Politics?" *The Whale and the Reactor: A Search for Limits in an Age of High Technology*. (Chicago: The University of Chicago Press, 1986.) pp. 19-39.
2. Richard E. Sclove. *Democracy and Technology*. (New York: The Guilford Press, 1995.)
3. Jeremy Bentham. *Panopticon or, The Inspection House*. (London and Dublin, 1791.)
4. Miran Bozovic, ed., *Jeremy Bentham: The Panopticon Writings*. (London: Verso, 1995).
5. Hans Jonas. *The Imperative of Responsibility: In Search of an Ethics for the Technological Age*. (Chicago: University of Chicago Press, 1985.)