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Introduction

Our lives are filled with technologies. They are everywhere. We live in them. We prepare food with them. We wear them as clothes. We read and write with them. We work and play with them. We manufacture and purchase them. And we constantly cope with them in one way or another whether we realize it or not.

Human life is thoroughly mediated by technology. It is hard even to imagine a life that didn't involve at least some tools, devices, or implements. Today, it is even harder to imagine a life without complex technological systems of energy, transportation, waste management, and production. Our world is largely a constructed environment; our technologies and technological systems form the background, context, and medium for lives. We rely on what we make in order to survive, to thrive, and to live together in societies. Sometimes the things we make improve our lives; sometimes they make our lives worse. Technological devices and systems shape our culture and the environment, alter patterns of human activity, and influence who we are and how we live. In short, we make and use a lot of stuff—and stuff matters.

Philosophy of technology is a critical, reflective examination of the nature of technology as well as the effects and transformation of technologies in human knowledge, activities, societies, and environments. The aim of philosophy of technology is to understand, evaluate, and criticize the ways in which technologies reflect as well as change human life individually, socially, and politically. It also examines the transformations effected by technologies on the natural world of nonhuman life and the broader ecospheres. The assumption underlying the philosophy of technology is that the devices and substances we make and use transform our experience in ways that are philosophically relevant. That is, technology not only enlarges and extends our capacities and effects changes in the natural and social worlds but does so in ways that are interesting with respect to fundamental areas of philosophical inquiry. Technology poses unique practical and conceptual problems of epistemology, metaphysics, moral philosophy, and political philosophy. The task for a philosophy of technology is to

analyze the phenomenon of technology, its significance, and the ways that it mediates and transforms our experience.

In the area of epistemology, technology raises questions about the nature of knowledge, such as how to determine what counts as technical knowledge and technical explanation, or what the relationship is between technological experimentation and scientific discovery. Technology raises metaphysical questions about what is considered to be real, what is natural and what is artificial, and what is human and what is nonhuman. Technology raises moral questions about appropriate uses and consequences of devices, the desirability and permissibility of technological means, and whether things are value laden or value neutral. Finally, technology raises political questions about how we should live together in societies, who decides what technologies are developed and how they are to be administered, and how technologies alter our social relations as citizens, consumers, patients, and workers. These are just some of the important and philosophically relevant questions concerning technology.

Defining what precisely counts as technology is not easy. There are so many different kinds of technologies, each designed for a different purpose, made from different materials, requiring different skills, and used in different contexts, that it is unlikely that a common set of defining properties could possibly apply to all of them. The range of objects included in the class of technologies is enormous. If every humanly made object is a technology (with the arguable exception of art) and if technologies include everything from low-tech handheld tools to high-tech satellite-communications systems, it is hard to see what such different things have in common. Other than the fact that each is a humanly made artifact, there doesn't seem to be much in common among the diversity of stuff we make. Imagine trying to teach someone the meaning of the word technology. Would you point out different manmade objects? What would be the distinctly technological character of each item you point to? Would you be limited to referring to artificiality as a manufactured, nonnaturally occurring object?

There is a good deal of intuitive appeal to the idea that a technology is an artificial, nonnaturally occurring object. Technology is a manufactured artifact that would not otherwise exist on Earth. The problem is that although a natural/artificial distinction can sometimes be helpful—for example, to distinguish between real and fake flowers or natural and artificial light—that distinction quickly breaks down when pressed into service to describe more complex cases. Anything modified in even the slightest way could no longer be considered

natural if by natural we mean existing in an unchanged state if it were left alone, free from human intervention. That would rule out almost every human intervention in the world, including cooking food, farming with tools, wearing clothing, building shelter, and writing with implements, as well as countless other activities that seem to be natural for humans to do. Everything we make and do to modify our environment—including any product of culture—would be considered unnatural or artificial. That definition is unhelpfully broad and vague. Surely there is more to be said about technology than simply that it is manufactured and not naturally occurring. And if we say that it is natural for humans to make and use technology, then we have truly made a natural/artificial distinction meaningless. Every human action and creation would be considered natural. Therefore every manufactured object, no matter how high-tech and synthetic, would be a product of nature, like any other naturally occurring object. That just is false.

Another tempting way to define technology is in terms of its technical properties. Technology, it is often said, is applied science. A technology is a practical, useful device, the design of which is based on scientific (or at least rational) principles. As such it is seen to embody a kind of pure, abstract, universal rationality—in other words, a rationality governed only by natural laws and technical considerations independent of social forces. What matters most in a technology is that it works, so this line of argument goes, and what works can be determined objectively according to universally valid, scientifically established principles. Because technology is technical matter, it is also value free and neutral. It can be used for a variety of human ends and good or bad purposes. The technology itself is neutral with respect to ends; it is simply a tool. There's no such thing as good or bad technology, only good or bad users. The technology obeys a different kind of reason, one that is value free and context free. It is precisely this indifference to ends that makes technology so practical, or so proponents of the position claim. It works everywhere—and when it breaks down, it can be fixed the same way, by anyone with the right technical know-how. Like a scientific explanation, a technical explanation applies everywhere. The same standards, the same rules, the same techniques, and the same concept of efficiency govern the creation and use of technologies. In its essence, a technology is a neutral tool that functions best when it functions effectively. Or so goes the common sense, instrumental understanding of technology.

The problem with this instrumentalist view is that it overlooks the obvious fact that if a technology is made and used by human beings, then it cannot help but reflect human ends, values, and desires. Technology can't be value neutral because people aren't value neutral. All of our goals and purposes and actions are subject to social interpretation and moral judgment. Making and using technology is no exception. Human ends and values direct technological processes, making them an entirely human affair. These human concerns are designed into things; our technologies embody our humanity. It is more helpful to think of technology as a socially constructed reality rather than as the application of universally valid scientific principles. That way we can begin to appreciate—and criticize—how the things we make are human creations that, in turn, greatly affect human affairs. Technological devices are a complex of the material substances and artifacts out of which things are made, the skills and techniques required to make and use things, the ends and functions that things serve, and the social contexts of development, production, distribution, and administration in which things are made and used.

Technological systems are even more complicated networks, linking small devices to massive machinery to legal institutions and social practices. Technologies and society are like pieces of puzzle; the parts are designed to fit in with each other. They fit in terms of and in relation to technological systems. For example, it is hard to makes sense of technologies like airplanes, air conditioners, and MRI machines without considering the technological systems of transportation of energy, and health care in which they function. Explaining these technologies only in terms of their technical properties does not even begin to tell the whole story about them. To do that, one would have to take a broad view of things that would show how technologies are inextricably bound to human interests, social practices, natural laws, and a very long list of other constitutive factors. Humanity and technology are situated in a circular relationship, each shaping and affecting the other. By weaving together the technical and social, we get a more complete picture of human societies and technologies as well as the ways we are both independent of and dependent upon our machines. Creating new interpretations of these relationships helps reveal the relativity and necessity behind our technological choices and thus opens up prospects for better, more informed decisions about our current and future technologies.

The contributors to this anthology examine a range of philosophical questions concerning technology. In addition to attempting to determine its essence, they also consider technology in its moral, political, epistemological, and metaphysical dimensions. Part I examines the early foundations for a philosophy of technology. It consists of readings representing early philosophy of technology, from the 1940s to the 1970s. The philosophy of technology at that time tended to offer theories explaining the historical and transcendental conditions of modern technology, which was seen as qualitatively different from earlier technology. The readings here by the forerunners of philosophy of technology tend to view technology as an independent force. Part II consists of readings by contemporary philosophers who, by contrast, tend to view technology as a contingent process that interacts with other social forces. The representatives of the current, empirical turn in philosophy of technology are accordingly a bit less ambitious than their predecessors. They seek to determine the actual conditions in which humans and technologies are related. The readings in Parts I and II seek to establish the framework for a philosophy of technology by considering the various ways that humans and machines, means and ends, as well as social values and technical reasoning relate to one another.

Part III considers some of the moral questions raised by technology. The philosophers here are less concerned with the effects, risks, and consequences of particular technologies than they are with the ways that technology transforms how we think about moral issues. They explore how technology and morality are bound together so as to transform our notions of responsibility, human rights, constitutional interpretation, and the good life. Part IV considers some of the political questions raised by technology. The philosophers in this section examine the relationship among technological development, production, and administration as the facets of technology that relate to political values and institutions. Like its moral dimensions, the political dimensions of technology are not extrinsic but intrinsic to technological practice. The readings examine the relationship of technology to our political rights, democratic practices, and social and economic justice.

Part V considers the relationship between technology and human nature. The readings in this section examine the ways that artificial aids to human activity call into question what is natural for a person to do or to be. This class of technologies includes things that radically transform us when used (e.g., medical technologies) and things that are so lifelike they blur the lines between what is

natural and what is artificial (e.g., computer technologies). The readings examine the relationship of technology to personal and social identity, medical practice and social values, artificial intelligence, and our associations with artificial life.

Finally, Part VI examines the relationship between technology and science (also known as *technoscience*). The central insight shared by this group of philosophers is that technological instrumentation is essential to scientific practice. Without technology, there would be no science as we know it. The readings here examine the relationship of technology to scientific experimentation, laboratory life, scientific realism (determining what really exists), and democratic ideals encoded within technoscientific practice.

The contributors to *Readings in the Philosophy of Technology* explore the multiple ways that humanity shapes and affects technologies and, in turn, is shaped and affected by them. Studies of technology from a philosophic perspective enrich the way we experience it and deepen the way we understand technological development. The aim of this collection is to help us think critically about the ways in which technologies reflect as well as change human life on an individual, social, and cultural level. We make and use a lot of stuff—and stuff matters.