

In his discussion on slavery Aristotle said that when the shuttle wove by itself and the plectrum played by itself chief workmen would not need helpers nor masters slaves. At the time he wrote, he believed that he was establishing the eternal validity of slavery; but for us today he was in reality justifying the existence of the machine. Work, it is true, is the constant form of man's interaction with his environment, if by work one means the sum total of exertions necessary to maintain life; and the lack of work usually means an impairment of function and a breakdown in organic relationship that leads to substitute forms of work, such as invalidism and neurosis. But work in the form of unwilling drudgery or of that sedentary routine which... the Athenians so properly despised—work in these forms is the true province of machines. Instead of reducing human beings to work-mechanisms, we can now transfer the main part of burden to automatic machines. This potentially... is perhaps the largest justification of the mechanical developments of the last thousand years.

Lewis Mumford, *Technics and Civilization*

If we are to prevent megatechnics from further controlling and deforming every aspect of human culture, we shall be able to do so only with the aid of a radically different model derived directly, not from machines, but from living organisms and organic complexes (ecosystems). What can be known about life only through the process of living — and so is part of even the humblest organisms — must be added to all the other aspects that can be observed, abstracted, measured. ... Once an organic world picture is in the ascendant, the working aim of an economy of plenitude will be not to feed more human functions into the machine, but to develop further man's incalculable potentialities for self-actualization and self-transcendence, taking back into himself deliberately many of the activities he has too supinely surrendered into the mechanical system.

Lewis Mumford, *The Pentagon of Power*

Technology [is] the knack of so arranging the world that we don't have to experience it.

Max Frisch, *Homo Faber* (1957)

Technological progress has merely provided us with more efficient means for going backwards.

Aldous Huxley *Ends and Means* (1937)

The system of nature, of which man is a part, tends to be self-balancing, self-adjusting, self-cleansing. Not so with technology.

E. F. Schumacher, in *Small is Beautiful* (1973)

I know that science and technology are not just cornucopias pouring good deeds out into the world. Scientists not only conceived nuclear weapons; they also took political leaders by the lapels, arguing that *their* nation — whichever it happened to be — had to have one first. ... **There's a reason people are nervous about science and technology.** And so the image of the mad scientist haunts our world—from Dr. Faust to Dr. Frankenstein to Dr. Strangelove to the white-coated loonies of Saturday morning children's television. (All this doesn't inspire budding scientists.) But there's no way back. We can't just conclude that science puts too much power into the hands of morally feeble technologists or corrupt, power-crazed politicians and decide to get rid of it. **Advances in medicine and agriculture have saved more lives than have been lost in all the wars in history.** Advances in transportation, communication, and entertainment have transformed the world. The sword of science is double-edged. Rather, its awesome power forces on all of us, including politicians, a new responsibility — more attention to the long-term consequences of technology, a global and

transgenerational perspective, an incentive to avoid easy appeals to nationalism and chauvinism. **Mistakes are becoming too expensive.**

Carl Sagan, in "Why We Need To Understand Science" in *The Skeptical Inquirer* Vol. 14, Issue 3, (Spring 1990)

We've arranged a global civilization in which the most crucial elements — transportation, communications, and all other industries; agriculture, medicine, education, entertainment, protecting the environment; and even the key democratic institution of voting, profoundly depend on science and **technology**. We have also arranged things so that almost no one understands science and technology. **This is a prescription for disaster. We might get away with it for a while, but sooner or later this combustible mixture of ignorance and power is going to blow up in our faces.**

Carl Sagan, in *The Demon-Haunted World : Science as a Candle in the Dark* (1995), Ch. 2 : Science and Hope, p. 26

Here I had tried a straightforward extrapolation of technology, and found myself precipitated over an abyss. It's a problem we face every time we consider the creation of intelligences greater than our own. When this happens, human history will have reached a kind of singularity — a place where extrapolation breaks down and new models must be applied — and the world will pass beyond our understanding.

Vernor Vinge, *True Names and Other Dangers* (1987)

All attempts to adapt our ethical code to our situation in the technological age have failed.

Max Born, *My Life & My Views* (1968), 52.

During my eighty-seven years I have witnessed a whole succession of technological revolutions. But none of them has done away with the need for character in the individual or the ability to think.

Bernard M(annes) Baruch, *From My Own Story* (1957), 320.

What makes genetic engineering biotechnology dangerous, in the first instance, is that it is an unprecedented, close alliance between two great powers that can make or break the world: science and commerce. Practically all established molecular geneticists have some direct or indirect connection with industry, which will set limits on what the scientists can and will do research on, not to mention the possibility of compromising their integrity as independent scientists.

Dr Mae-Wan Ho, *The Ecologist*, Vol.27, No.4, July/August

Knowing what we now know about living systems—how they replicate and how they mutate—we are beginning to know how to control their evolutionary futures. To a considerable extent we now do that with the plants we cultivate and the animals we domesticate. This is, in fact, a standard application of genetics today. We could even go further, for there is no reason why we cannot in the same way direct our own evolutionary futures. I wish to emphasize, however—and emphatically—that whether we should do this and, if so, how, are not questions science alone can answer. They are for society as a whole to think about. Scientists can say what the consequences might be, but they are not justified in going further except as responsible members of society.

George Beadle, *The Place of Genetics in Modern Biology* (1959), 20.

Nanotechnology's potential is vast and it's real. The opportunity for nanotechnology ranges from improving Olympic sports equipment to discovering better treatments for Alzheimer's disease. But our ability to reap the long-term benefits of nanotechnology -- in areas from energy production to medicine -- will depend on how well industry and government manage the safety and performance of this first generation of products.

Andrew Maynard

Thus the twentieth century was gradually speeding up to today's rate of progress; its achievements, therefore, were equivalent to about twenty years of progress at the rate in 2000. We'll make another twenty years of progress in just fourteen years (by 2014), and then do the same again in only seven years. To express this another way, we won't experience one hundred years of technological advance in the twenty-first century; we will witness on the order of twenty thousand years of progress (again, when measured by today's rate of progress), or about one thousand times greater than what was achieved in the twentieth century.

Ray Kurzweil, *The Singularity is Near*

The first rule of any technology used in a business is that automation applied to an efficient operation will magnify the efficiency. The second is that automation applied to an inefficient operation will magnify the inefficiency.

Bill Gates