Legacy of the Philosophy of Technology in STS:
An Interview with Andrew Feenberg

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Part I: On the system of the philosophy of technology

Interviewer: The relationship between the philosophy of technology and STS (Science, Technology and Society) could be considered as a macro question. Thus, firstly, we want to talk about the genealogy of the philosophy of technology. We would like to show you the table of contents (figure 1) in a textbook of the philosophy of technology used broadly now in China. The editor divided the philosophy of technology into four academic traditions that are social-political critique tradition, philosophical-phenomenological critique tradition, engineering-analytic tradition and anthropological-cultural critique tradition in sequence. Different philosophers represent different traditions and you are identified as the member and successor of the first tradition which could be traced back to Karl Marx. Do you agree with the identity the textbook defined for you?

Figure 1

Feenberg: The editor has two problems, an intellectual problem and a practical problem. The intellectual problem concerns the real relations between these scholars. The practical problem is how to put them all in a book. He solved the practical problem in an intelligent way but it's not the best solution to the intellectual problem because there are too many overlaps. Take the case of Marcuse and Feenberg. They are in the political section. But Marcuse was a student of Heidegger and I was a student of Marcuse. We both have strong phenomenological elements in our approach so we could have been put in section two. The editor's organization of his textbook is convenient but from the standpoint of intellectual history it's not strictly accurate.

Interviewer: Do you have a map like this?

Feenberg: Albert Borgmann classified philosophies of technology in several different ways. I took over his classification and I added to it. I made a chart (figure 2) which people like because it's easy to understand. It classifies philosophies of technology along two axes: whether the philosopher sees technology as autonomous or socially determined and whether the philosopher sees technology as value-neutral or value-laden. That makes four boxes. The social and value-laden ones (type IV in figure 2) would be critical theories. The social and value-neutral one (type II in figure 2) is instrumentalism. Heidegger is the leading autonomous and value-laden one (type III in figure 2). In the textbook's classification, Mumford would be critical theory but Gehlen would be the autonomous and value-neutral (type I in figure 2). McLuhan would be autonomous and value-laden.

	Autonomous	Social
Value-neutral	I	II

Value-laden	III	IV

Figure 2

Interviewer: Another clarification is from Carl Mitcham in his historical review of the philosophy of technology. He clarifies three schools geographically: UK and US, Soviet Union and Western Europe. What do you think about this?

Feenberg: It seems to me that geography is mainly relevant for a geographical review, for example, a review of the philosophy of technology in Western Europe. But it's not intellectually based on the actual commonality between the philosophers. McLuhan and Marcuse are both in North America, but in many ways they are opposite. I don't think that it's very useful to classify the philosophers according to their nationalities.

I was born in New York. I studied in the Sorbonne in Paris. What I write crosses the lines between Europe and the United States. This has to do with philosophers' personal identity, the experiences that made them who they are. Where they come from is of course one important factor. The fact that I come from the United States has a meaning for me. I've noticed visiting foreign countries that for others it seems to mean especially that I should be technically competent. In fact my father thought I should be technically competent. When I was little, he sent me to a carpentry school. I spent a lot of my childhood taking things apart and putting them back together. That's my American identity. But then in college I studied with Marcuse, I learned from Husserl and Heidegger and went to France. All these things get mixed together to form a person. The national identity is only one part.

Interviewer: But the philosophers from Europe have the continental tradition and the philosophers from UK and US have the empirical tradition.

Feenberg: That is true for some but not all. There are slippery boundaries because people communicate across traditions. When I was a student, almost all philosophers in the United States were analytic, but I got interested in existentialism when I was in high school. I wanted to study Husserl and phenomenology in university. No one in the philosophy department of my university, Johns Hopkins University, had studied continental philosophy but some of my teachers were sympathetic. I asked my advisor whether he would allow me to study books that he had never read and he agreed. I was not the only such American student; there are other students like Robert Scharff and Douglas Kellner who wanted to study Heidegger. Albert Borgmann is another example of an American philosopher who does continental philosophy. A small minority of Americans ended up studying continental philosophy, so national frontiers are not intellectual markers.

Part II: On his personal career of academics

Interviewer: As a student of Marcuse, do you define yourself as a member of the Frankfurt School or Western Marxism? How do you understand Marxism?

Feenberg: I think of myself as part of the Frankfurt School but I am far from the Habermasian mainstream. I'm much more in the line of Marcuse. Even so, I deviate from Marcuse's way of writing philosophy. I agree with him on many things but I write in such a different, less melodramatic manner my affinity with him is not obvious. My goal is to make the Frankfurt School's very abstract ideas more concrete, more relevant to particular research problems and political situations. A concept like **instrumental rationality** is very general, perhaps too general. I prefer to talk about technical disciplines as instances of instrumental rationality that have different effects which we

can study in concrete situations. This makes it possible to analyze political struggle around rationality, which one cannot do simply on the basis of Adorno's and Marcuse's concept of rationality. I think this is a necessary evolution of the Frankfurt School and I'm trying to convince others of that.

Marxism is a big subject. There are different incommensurable Marxist traditions. There is the soviet style of Marxism that was exported to China. I have no connection to that tradition. There's the western tradition, based largely on the classic *History and Class Consciousness* by György Lukács. Out of that tradition come ideas like **reification** and **alienation**. This tradition is sometimes called humanistic Marxism or Neo-Marxism. This is where I belong. But the western tradition is a highly problematic version of Marxism. The Frankfurt School studied Hegel and knew that you can not just present a moral position in opposition to the established society. Hegel demanded that critique be rooted in historically given institutions. But Marx replied that historically given institutions are contested from below. He based the critique not in the institutions but in the contestation. Critique in Marx is still historical but revolutionary. Marcuse observed that the American working class had no revolutionary class consciousness. He raised the question of the fate of Marxism without a class base. What's the difference between such a Marxist theory and moral condemnation of greed? Until Habermas took over the Frankfurt School, it was in an anomalous position of trying to maintain this Marxism without historical support. Habermas introduced **the ideal speech situation** and **a language based theory** of critique to address this situation, but in the process he dropped revolutionary demands and the critique of technology that characterized the work of Adorno and Marcuse.

Looking at this picture In the 1980s, I tried to find another kind of historical basis for Marxism. I argued for the significance of the various social movements around technology, the environmental movement, feminist critiques of medicine and so on. We didn't have a revolutionary proletariat, but we had something similar to what Marx really meant by identifying the proletariat as the revolutionary class. Technology had assembled people in factories and educated them. This is the basis of the revolutionary potential of the proletariat. Today, people are assembled around many different kinds of technology, not just production technology. This gives rise to movements of resistance to the organization and design of technical systems. These movements are not revolutionary but they provide a historical basis for critique. For example, patients belong to the medical technical system. They're not supposed to communicate with each other and form a class, but sometimes they do. AIDS patients in the 1980s formed militant patient groups to change the practice of clinical research. This is the equivalent of workers in the nineteenth century getting together around their workplace to express their interests and values. They wanted those values translated into the design of technology and social systems, just as did the AIDS patients. Constructivist technology studies was exactly what I needed to develop these ideas. Habermas offered the theory of language to ground critique, but no one is protesting in the name of speculative concepts like the ideal speech situation. People want changes like environmental protection. We can understand that as historical critique with concepts drawn from STS.

Interviewer: People like to make comparisons between you and Habermas. You're both from Frankfurt School. You both talk about modernity. More importantly, you both try to translate philosophy into a political agenda. He uses "communicative action" and you use "technical code".

Feenberg: The difference is that Habermas sought a theoretical foundation for values but I am still interested in a historical basis in social movements. The social movements that seem to me most significant for a modern society are movements around technical issues. In the new book I try to generalize to cover everything organized by technical disciplines. Whether it's a technology or bureaucracy or planning system, it's all based on technical disciplines. Some common features appear that can be analyzed with the tools of STS. Donald MacKenzie recently analyzed markets with STS. This generalizing of the

STS approach is quite different from Habermas.

Interviewer: What is the most important thing you think you inherited from Marcuse?

Feenberg: For me the most important thing is **negativity.** Negativity describes the unrealized **potentialities** created by the society. In Marx, capitalism is the condition for socialism. It has the potential to become a socialist society. Marcuse interpreted the relation of capitalism to socialism in terms of the Hegelian idea of negativity, the dialectic. I try to make this idea more concrete than it is in Marcuse. I show that protests addressed to aspects of technology can be understood as asserting the existence of unexploited potentials that can serve interests and values excluded from the original design. Those potential should be actualized. This is a way of thinking about what is going on in social struggles around technology.

Interviewer: You participated in May Events in 1968, right? Did the political movement reinforce your academic interest?

Feenberg: Yes, of course. In 1968, I was still a graduate student, in Paris trying to write my thesis without much success. I was enrolled in Jacques Derrida's course on Plato. There were student demonstrations motivated at first largely by opposition to the war in Vietnam. At one point, the government sent police to arrest the demonstrators and close the Sorbonne. Soon thousands and thousands of students gathered outside the university. They threw cobble stones at the police to get back in. After several days of this the students started to build barricades out of cobble stones. This is a French tradition. In fact, Paris originated urban renewal in the 19th century to make it harder to barricade the city.

On Friday, May 11 the police charged to the barricades. The assault was incredibly violent but the police did not try to kill people. France is a very sophisticated country. The government knew that if it started killing students everyone would turn against it. The students also knew they shouldn't kill policemen. The movement was a spectacle before an audience: the French population. The students proved the seriousness of their desire to overthrow the system by focusing on political resistance. The police defended the existing society, both the social system and the self-image of a humane society. These were the characters on the stage and everyone else in the country watched. I was one of the actors. On that Friday night thousands of people were injured and the audience said "No". The following Monday, over a million people demonstrated against the government. Then, a strange thing happened. Workers returned to work on Tuesday and seized hundreds of factories. There was a general strike. The revolution was starting. It looked like the government would be overthrown and a social revolution take place in France. This was by far the largest social movement of the 1960s. Though I was his student that year, I didn't get to hear Derrida's last few lectures on Plato, but I did get to participate in this revolution.

The revolution had an effect on me. At a certain point every school, every business, every government ministry was closed by strikers and finally all the factories were closed. There were no cars in Paris. It was unbelievable. I realized that society is an imaginary entity. It only exists as long as people obey; If they decide not to obey, we have to start over. Lukács had taught me theoretically that society is not a thing, but a process. Social things like universities or restaurants or whatever have to be reproduced daily by the performances and the practices of their members. They have no substantial reality. In 1968 I lived what I had read in *History and Class Consciousness* and that makes a difference. I became much more committed as a leftist. When I went back to the United States, I participated in many different movements, especially movements to end the war in Vietnam. Before 1968, I had been in some smaller demonstrations against the war, but it didn't seem important to my identity. After 1968, for about ten years I dedicated myself much more to radical politics.

Interviewer: Pierre Bourdieu was one of the leaders at that time. Did you know him?

Feenberg: He was already a professor. I didn't know him at the time. I met him later on but I never was really close to Bourdieu. Bourdieu wrote an early book which I found very important for my work. I think in English it's called *The Theory of Practice.* In this book, he introduced a cybernetic concept of society, which enables one to complete the picture that Lukács drew. According to Lukács, reification is the way in which social institutions appear, but they are actually created by processes of human relations and practices. What Bourdieu added was a clear explanation of how reifications motivate the practices that reproduce them in a circular process. For instance, the stock market appears not as the product of human will but as a law-governed phenomenon that acts as an irresistible fate. It is that appearance that causes investors to act towards it manipulatively, technically, as they attempt to position themselves advantageously. But It's the very fact that investors act in that way which produces the market as a reified, law governed thing.

Interviewer: Is that similar to Latour's "Matter can speak for itself"?

Feenberg: I knew Latour very early in his career because he was a postdoc in San Diego when I was teaching there. From a Lukácsian standpoint, Latour is de-reifying society by showing the kinds of processes and the inner connections that create what appear to be stable things, which he calls "black boxes". The idea that things are actually assemblages constructed through practices is pure Lukács, although Latour didn't get that from Lukács. He developed the idea in his own way, but it is perfectly in conformity with Lukács's notion of de-reification. That interests me a lot. I am very influenced by Latour, but I could never buy his idea of the symmetry of humans and non-humans. I find a certain rhetorical weirdness in his writings, brilliant though they are. Material things have causal effects, and to call those causal effects a form of speech or agency seems confusing.

Part III: On rethinking the philosophy of technology

Interviewer: You wrote three books including *Critical Theory of Technology* in the 1990s. In China, the three books are edited as a system. In 2002, you wrote another book *Transforming Technology.* Some reviews call this book a revised version of *Critical Theory of Technology.* Is that right?

Feenberg: It's not wrong, but it's not exactly how I conceived them. I wrote each book and even some of each chapter separately and then combined them, but there's one basic idea which goes through the series of books I wrote in 1990s and I'm still working on that idea. The first book on technology from 1991 is called *Critical Theory of Technology.* After that I wrote *Alternative Modernity* and *Questioning Technology*, I developed my ideas during a period in which the political climate changed and became very anti-Marxist.

Transforming Technology is a revised edition of *Critical Theory of Technology* which has many discussions of Marxism. In preparing *Transforming Technology* I condensed those discussions, and I also added some new ideas. The presentation of the instrumentalization theory is different. This is a philosophical argument about the nature of technology. There was already a chapter on automation but I added an additional chapter on education, because people had begun to talk about automating education with computers. Between the writing of the two books, I helped to create an online education program in the US, so, I knew quite a bit about computers in education. In sum *Transforming Technology* has more on computers, less on Marxism, and an improved version of the instrumentalization theory.

Let me say a few words on online education. In the early 1980s I worked at the Western Behavioral Sciences Institute. We started the first online education program in 1982. The first personal computers had just been put on the market. They only had 48 kb memory.

Can you imagine? Now they have a million times as much memory. Apple donated the Apple-II+ and E before the Mac and the PC were available. These computers could only print capital letters. They did not have enough memory to print small letters too. If you wanted both capital and small letters, you had to install more memory. The inventor who started the business in consumer modems gave us 300 bps modems. With a 300 bps modem you can read text as it comes onto the screen. A typical web page today might take a week to download.

This very simple equipment was very expensive at the time. It cost about five thousand dollars. This meant that only people who had a lot of money or support could participate in our program. These were the kind of people we wanted to enlist. The head of the research institute thought leaders of business and government ought to be better educated in social sciences and philosophy. These people couldn't leave their jobs to go to the campus and study for six months, but they could study online with us. We created a two-year program of leadership education for these high level executives. They would come to our center twice a year and learn about computers for a week. Then they would go back to doing their job and communicate online with each other and with the university professors and journalists we hired to teach them.

The big problem was getting the business executives to type on the keyboard, because typing was women's work. The would say, "My secretary does this. Am I going to do my secretary's job?" These guys were earning half a million dollars a year. They were big shots running huge companies. But they didn't know what the Enter key does. This was quite a challenge for them but very exciting.

We made a really big discovery. We learned how to do online education in 1982. No one could tell us how, because it hadn't been done before. I've written the history of our program in a book chapter but no one seems to notice. It's sad. The reason why they don't notice is that we didn't get rich. If we had made a lot of money, everyone would celebrate us as pioneers. As one of my colleagues said, we were better at turning money into ideas than ideas into money.

Interviewer: As you said, at that time, the political atmosphere was anti-Marxist. Did your views in *Transforming Technology* become softer?

Feenberg: Yes, but I still argued for socialism. I didn't believe in the old Marxist determinism according to which capitalism inevitably produces its gravedigger. But we can still understand socialism as a model of a different way of organizing industrial society. The model can be developed in interesting ways as an alternative that would be more humane, more egalitarian, better able to handle problems like the environmental problem.

Interviewer: Is it possible to say that you're making a balance between the instrumental theories and the substantive theories? You have proposed "a third way".

Feenberg: Yes. Substantive theories affirm that technology is value-laden and that it imposes a way of life. Instrumental theories say that we can do anything we want with technology, it's just a neutral means. The National Rifle Association is instrumentalist. It says "Guns don't kill people, people kill people." That's a different story from substantive theories which say the introduction of firearms is part of the process in which the world is technified and transformed. Critical theories argue that both instrumentalism and substantivism are wrong. You can't do whatever you want with technology as an individual because it frames a way of life, but societies can change technology and the way of life associated with it. Technology is not one thing that has one set of values attached to it as substantivism holds. The values attached to technology are socially determined. They can be changed on the social level. This third position would answer the NRA, "What about Gun Control?" We can decide if we want to be technified in that particular way. Japan in the early seventeenth century offers an interesting example. At

that time the government outlawed firearms and the country was practically free of this technology for two hundred and fifty years. This illustrates the third way: society makes the choice of which type of technification it wants. The Japanese rejected a world with guns. They wanted a world in which swords were the legitimate technology of killing. Why? The values embedded in technology are socially specific. Swords have a different logic from guns. It takes skill and training to use them. The sword enables an aristocracy to maintain itself by imposing a certain relationship to death. The gun is compatible with the egalitarian democratic ideal because anyone can use a gun. The Japanese aristocracy chose to exclude guns to preserve their way of life.

I don't think it's interesting to talk about technology in terms of good and evil. The values need to be more specific. For example, according to Heidegger technology has an inherent bias toward control/power, domination. But what power do diapers have? Plenty of technologies do things other than exercise power. For example, we need technologies that enable us to eat food. We cook the food on the stove. We put it in containers. We refrigerate it. These technical devices can't be subsumed under a single value, domination. We must disaggregate the values. That's what STS does, show what specific values have been translated into the technology. In Bijker's famous article on the bicycle, one type of bicycle translates the value of masculine virility into speed while the other serves for utilitarian transportation. When the values realized in design appear wrong to a large public, there is pressure for change. This process has some resemblance to instrumentalism, but it is at the level of whole social systems, not individual choice of use. Thirty years ago, the Chinese government decided to substitute cars for bikes in urban transportation without thinking about the side effects. Thirty years later, everyone in Beijing is choking from the pollution. Now a solution must be found and once again the government is making choices for the society.

Interviewer: You mean control/power is a kind of value, right? Is it different from power/ knowledge, the conception of Michel Foucault?

Feenberg: Yes, if we think of it as an ultimate boundary value associated with technology. Control/power is the ability to make something happen, to manage some natural force or human being. But it's not very fruitful to work with this abstract concept, because technology makes its way into everything and plays different roles. In many roles it mediates rather than dominating. A French scholar studying migrant labor explained to me that many fathers in her study told their children in Tunisia and Morocco bedtime stories over Skype. That's not about control of humans but of radio waves, mediation by technology not power so far as human relations are concerned.

Foucault's conception is rather narrow, because he's just looking at certain institutional frameworks that make modern society possible. As I said before, society only exists through obedience. If people stop obeying, all the institutions collapse. Foucault's problems were "Why do they obey?" "How have they been made to obey?" "What has been done to them so that they become the kind of people who will obey?" These are certainly important things to think about, but it's not the whole of technology.

Interviewer: Recently, you have published your new book *Technosystem*. The title is similar to "Technological System" used by Thomas Hughes.

Feenberg: Hughes was interested in the phenomenon of the large scale technical systems in which many different resources are brought together and coordinated. That's a general feature of modern society. The French term for this is "macro system." Hughes made important contributions to understanding the way these systems work. I invented my own term "technosystem" and gave it my own meaning independent from his concept. The technosystem is any social system organized through a technical discipline by experts. Anywhere you find expertise in the application of a rational technical discipline such as a management theory or engineering that is what I call the technosystem. It is the overall framework of governments and social organization in modern societies.

There's nothing like this in earlier history. The technosystem has advantages and flaws. Take the case of food safety. Modern technology was applied to food production in the United States around the beginning of the twentieth century. Food could be made more cheaply and distributed on a large scale. But you could also make mistakes of a new kind. Food could be contaminated and affect thousands of people instead of just a few neighbors. So, new systems were required to control food safety. Regulation was imposed on food producers and distributors. This changed the food world for people in modern society. In China, there is the same trajectory.

What interests me most is the intervention of the public in determining technological trajectories. Do you know how food safety regulation started in the US? Upton Sinclair wrote a novel in which a worker falls into the sausage making machine and becomes part of the sausages. This image upset people and encouraged the government to intervene. In China, I understand it was milk powder. Why did the government introduce more protections? To defend its legitimacy as a government. Public pressure lies behind rational regulation.

Successful democratic interventions show that the public actually knows something, even though it has no technical qualifications. We need a theory of the rationality of protest, not just the rationality of engineering work. Rationality is not the total monopoly of a small group of experts but it's distributed socially. This is fortunate for by incorporating more interests, we get a more complex and more self-sustaining system.

Here's an example. At a certain point, the air in Los Angeles became unbreathable. Los Angeles is in a basin and has very bright sun. Car exhaust gets cooked by the sun and hovers over the basin and the city. When people protested, politicians got involved and passed legislation limiting pollution from automobiles. Automotive engineers in Detroit were suddenly given a new job in response to a new actor, the public of Los Angeles. The job was to translate the demand for clean air into a device. The catalytic converter was added to the tailpipe for this purpose. It changes chemically the gases coming out of the engines. When we see a car today, we could say it's a means of transportation, but it's also an environmental device satisfying environmental demands. And it's also a safety system, because new rules specify materials that can be legally used inside the cars to protect the passengers in case of accident. The car translates all these different social influences into a single object. This is de-reifying analysis. The car, which looks like a thing, is actually the point at which many social demands are crystallized.

Interviewer: You're talking about how we are trying to invent new technologies to control old technologies. About technologies like nuclear or biotechnology which are hard to control, what should we do in the future?

Feenberg: One theory holds that when we develop dangerous technologies, like nuclear power, completely different modes of social organization must be introduced. Langdon Winner argues that nuclear power will require much more police control, a much more authoritarian social system, because it's so dangerous. I'm not so sure that this is really the biggest problem. I think nuclear power is just too difficult to do safely. Humans should not try and do things that are too hard. We should work on the stuff we can do. We're limited beings, not gods.

As for biotechnology, I think there should be limits. We shouldn't make changes in the human genome that are perpetuated across generations. Whatever changes we make to humans should be confined to the single organism. That requires regulations, but will every country conform? It's cheap to do biotechnology. Even very poor countries can do it if they want. How can we enforce international regulation? Is this going to oblige us to have new international institutions? Nuclear issues created the first such an international system around the nonproliferation treaty. It has had some effect but is not perfect. It's clear that there are many global issues now. There is only one planet and we're on it. Nuclear issue already gave people a hint of their global destiny because nuclear war

between Russia and the United States would exterminate human life. Actually, now, with climate change we can personally experience the effects of globalization. We're moving towards some new international framework. Whether it will be competent to handle issues like nuclear power and nuclear weapons, genetic engineering and so on, no one can know yet.

Interviewer: Is it because the pace of cultural development can't catch up with the pace of technological development? William Ogburn proposed "culture lag" to summarize the unbalance between technology and society. He also mentioned that our society should slow down the development of technology if necessary.

Feenberg: That is a cliché that was widely propounded by scientists after World War II. The scientists who made the atom bomb believed that natural science had advanced too far ahead of social science. This idea spread through science fiction and through magazine articles about the nuclear issue. *The Foundation Trilogy* written by Isaac Asimov is all about this supposed gap. But, in this view, social knowledge is also an instrumental knowledge. It's modeled on natural science and its technological applications. It's just not as good, because societies are much more complex than nature and much harder to control. Thus instrumentally effective knowledge of the social world lags way behind.

There is a another possibility: not more instrumental knowledge but other forms of political organization or other ways for people to be engaged politically with each other. That's why ideas like socialism still have a right to exist, because we cannot get the kind of control of the social world that we have of the natural world and we know that we need to do something about technology. The problems of global technology will not be solved by sociologists who know how to engineer social systems. That's a technocratic dream. The alternative is that human society be self-organized in some radically different way in which people are less pressured into competing with each other and struggling for power, and in which their behaviors are determined less by competitive and more by the collaborative impulses which also exist in the human being.

Interviewer: "Techno" is a very popular term. Do you have special intention in using it?

Feenberg: I'm trying to concretize the Frankfurt School critique of instrumental rationality in terms of technical disciplines. There's no such thing as rationality as such. There are engineering disciplines, urban planning disciplines, architectural disciplines. Each of these is a body of knowledge on the basis of which you can implement successful strategies for doing the work. Engineering does not start from scratch but from the accumulated knowledge of generations. All these resources from the past were worked out intelligently, tested and studied. This is rationality as an actual moving force in the social life of modern society, rather than conceived in a generalized way as an overarching thing in itself. In Heidegger, technology is the spirit of the age. For the Frankfurt School, instrumental rationality is the culture of capitalism. There is such a spirit, such a culture, but to understand it fully we need to see how it is embodied in particular institutions through technical disciplines. "Techno" refers to this and "system" refers to the fact that it's not just technical devices but technical systems and social systems organized through technical disciplines. Foucault was one of the first to think like this. With his ideas about criminology and medicine, he was analyzing fields of human activity in modern societies that are organized by what he called "epistemes", rational systems.

Part IV: On the relation of the philosophy of technology and STS

Interviewer: What do you think about the relationship between philosophy of technology and sociology of technology?

Feenberg: This is a difficult question. I presented a paper in Holland. Two sociologists

commented on the paper and one of them said "We don't really need philosophy". That's exactly what scientists and technologists say about sociology: "We don't need sociology." Everyone is trying to draw boundaries to privilege their own form of knowledge. But we have a saying in English: "If you live in a glass house, don't throw stones," because someone will throw a stone at your house and break your glass. I call this "boundary policing." But there is no such a thing as the self-sufficient, well-contained, well-defined discipline of STS. It's inter-disciplinary. People who come from all sorts of different fields with different methods meet around this symbolic entity called STS. There is no reason at all for philosophy not to be part of the show.

Interviewer: How do you evaluate your relationships to historians of technology?

Feenberg: I learn from them. I study the books they write in order to find out things that I can use, either to get new ideas or to illustrate the ideas I already have. For example, there's a wonderful article about the boilers that were used on steam ships in the old days in America. This article shows why technological determinism is wrong. There were no good roads through the wilderness back then. But there were lots of rivers on which to travel by river boat. That was the main means of long distance transportation. The boats had steam boilers which turned paddle wheels which would explode occasionally and kill people on the boats. The right kind of safety valves, the right thickness of the walls of the boilers and so on, could put a stop to the accidents. This is what we consider technical progress. The article traced the history and found it took thirty years from the time the first scientific work showed how to make safer boilers to the time when improvements were introduced. During that period, thousands of people were killed but even though a technical solution was known it was not adopted. The historian shows the way in which demands of different types affected decisions about safety. There were two different ways of thinking about this: cost-benefit, we want cheap tickets and we will take the risk; or national security, we're not going to allow any obstruction moving around the country. These are completely different criteria and neither are technological. I use ideas from this historical article to argue against technological determinism, to talk about progress, and to explain why cost-benefit analysis cannot be the ultimate philosophy of technology.

Interviewer: Is it different in philosophy of science? Lakatos once said "the philosophy of science without history of science is empty".

Feenberg: Lakatos was never accepted by philosophers of science in the United States. Unlike STS, philosophy of science, was successful in policing its boundaries, and excluded most of the people who didn't agree with positivism. For a long time, it was a completely coherent field that had no use for anything outside itself, including natural science itself. We have the phrase hermetically sealed, like a can of soup, nothing can get in or out. Philosophy of science, for many years, was hermetically sealed. Thomas Kuhn, for example, was viewed with contempt by philosophers of science. For thirty years, they rejected his work. The STS movement somehow cracked the shell. Then, philosophers of science began to look at the real world of science. That destroyed their illusions. The boundaries of the discipline collapsed. New ideas were brought into the field. Philosophy of science now is more interesting and realistic.

Interviewer: Do you think philosophy of technology is part of STS?

Feenberg: You have heard about the post-phenomenologists. They have their own panels in STS meetings. STS people don't pay much attention to them, though there is some crossing over. I think ideally, philosophies of technology and STS will merge. Historians, sociologists, some computer scientists are all in STS. The problem is the Heideggerian heritage of philosophy of technology.

The heritage stands so much in contradiction to principles of constructivist STS that there's always a suspicion among the STSers that philosophers are a bunch of technophobes. STS constituted itself as a field in opposition to the humanistic and

politicized critique of technology and science. Bijker says he belonged to a group of people who were critical of nuclear weapons, nuclear power and environmental pollution, and at some point they decided to take "the academic detour" to get a better understanding of technology and science. They had been inspired by political critique of science and technology, but they removed all the politics to create STS as a normal, politically neutral, apolitical academic discipline.

However, a younger generation of scholars entered the field, like Steven Epstein. When I met him, he was a student in STS. He's a gay man who lived through the AIDS crisis. Can you imagine him writing a neutral study? The history had to have political significance for him. Of course, that doesn't mean he propagandizes. He does his best to be objective in his study of a politically charged history but he has a point of view. A whole younger generation of scholars came in concerned about environmental issues, gender politics and so on. The field changed and went back to the main road.

Interviewer: Do you enjoy its coming back?

Feenberg: Yes. Langdon Winner wrote a famous article in the 1980s entitled "Do Artifacts Have Politics?" As we observed STS on the rise, he became more and more angry, because it abandoned politics. He wrote an attack on STS called "Upon Opening the Black Box of Science Studies and Finding It Empty". At that time I was working with computers and medical politics. I saw the methods being employed by STS as useful. So, I made a different choice. I tried to collaborate with STS for my own political vision and to write in ways that could communicate with people in STS. This proved to be a viable choice because the methods of STS are anti-positivist and anti-determinist in an implicit political argument with technocratic rationality.

Interviewer: What do you think philosophy of technology can do for STS?

Feenberg: I'll give you the example of progress. There are two kinds of progress: social progress and technical progress. Technical progress can be measured in several different ways, for example, we can measure productivity: how efficiently technologies produce goods. Social progress should have something to do with the fulfillment of fundamental values, like opportunity for people to develop their capacities and apply them in their work and life; and opportunities to receive education and healthcare. Social progress and technical progress are intertwined because social progress depends to a great extent on material prosperity. For example, technology supplies the wealth necessary for children to be freed from labor to go to school. The interesting point for me is where the intersection of social and technical progress takes place. I want to know what happens when the technology becomes directly involved with social goods.

When I started working on online education, automating education was all the rage. Automated education would be cheap and available to everyone. One day, I went to an exposition to find out how automated education was supposed to work. They put a little picture illustrating magnetism on the computer screen and a few lines of explanation underneath it. The computer asked questions and if you got the right answer you could go on to the next screen with more pictures, explanations and questions. If you got the wrong answer the computer would present another screen to help you. This is not education. You can learn how to do word processing like this, but you certainly couldn't learn physics or English literature. When we started our online education program, we believed human interaction to be essential. We were not in the business of making education cheap at the expense of human interaction. Here you have two different ways of achieving social progress using computers. We intended technical progress to enable human communication, not to replace teachers.

What's the difference? The difference is the goal. Every notion of progress presupposes a goal. Similar technologies could be engaged in making progress toward different goals. When the goal changes, technological design changes and progress looks different. This

variability of the goal is where social action plays such an important role. Today again, there's lots of talk about automating education. You've heard of MOOCs. There are people who have ambitions for MOOCs. They think MOOCs are going to replace university. There's still a competition between education delivered by human beings and education delivered by machines. A small percent of those who enroll in MOOCs succeed in using them to learn, but most people drop out. We cannot replace the existing education system with MOOCs. It would end up with a much less educated population. So, we've got to have universities; young people have to be in situations that motivate them to perform and offer them help. They can't just sit at home in their bedroom looking at their computer screens. What is progress? It's a social decision.

Philosophers of technology ask what do you mean by progress. What is the goal? Which social groups ought to define progress? Sociologists will not answer these questions. If you're a sociologist It's bad behavior. It's called bias. This is the domain of philosophers.

Interviewer: Can you depict the future picture of the philosophy of technology as well as STS?

Feenberg: I can't do that. The one thing I can say about the future is that both STS and philosophy of technology are going to respond to Trump.

The worry about relativism has to be addressed now. That was the subject of the science wars twenty years ago. Scientists argued that doing anything to subvert the ideal of objective neutral purely rational knowledge would give bad guys an opening to take over. Now they really have. I talked to Trevor Pinch about the responsibility of STS. He said, "Now everyone's blaming us for relativism. Post-truth society is supposedly our fault". I agree with him that it's not our fault, but STS is going to have to make a much more explicit defense of science and technology, and expert knowledge. We can't pretend to be on both sides of the issue. I predict that will become a big issue. You'll see people walk backwards, retreating from positions that are too close to relativism.

The problem is how to re-articulate the STS position without falling into a technocratic or positivist affirmation of pure expertise and pure rationality. STS has got to explain their original position successfully, so ordinary people can understand it. I think this can be done by referring to the model of craft. Science and technology are highly skilled crafts and that is why we can trust them, not absolutely, but up to a point and certainly more than self-interested propagandists for corporations.

Interviewer: Finally, how will you locate yourself in the map of the philosophy of technology and STS?

Feenberg: But I need to have the map, to find my position on it. I don't really know how to answer that. I can say that I'm trying to find in STS resources with which to address philosophical questions, like the question of progress, the question of power, the question of rationality. I want to bring those questions down to earth while maintaining their significance as philosophical questions. STS helps me to do that. I think that has some effect on people in STS and gives them ideas about the broader impact and significance of their field. If they want to know about that, they could learn something from my writings and those of other philosophers of technology.

Interviewer: Thank you very much.