Person : Smith, Michael

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87A

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I guess most of us in this culture when we hear the word technology, think of objects. Whether it's a VCR or an ICBM and it usually does have initials if its new. It's the object that we identify with technology. But that's not all there is to it, I mean if we were pressed, all of us would recognize at some level that there's a decision making process behind that object. Every piece of technology is an artifact of a set of decisions made by a certain group of people for a particular reason, or group of reasons. And it's hard to break open the object and see the decisions behind it, much less to understand is how we can participate in those decisions.

00:01:42:14Þ And I think that is very important because if we don't enter into the decision making process, about what we as a culture wish to do with our resources, then we are at the receiving end of an assembly line of those objects. And that's why we have come culturally to think of technology as object-oriented.

I was thinking about
this not too long ago,when I pulled into a gas station, in
Berkeley, California. And was filling up my gas tank and as
I looked up to the tank, I realized that it was measuring
the gasoline to the thousandth of a gallon. I wasn't just
buying six gallons of gas, I was buying 6.214 gallons of
gas. And I got intrigued by this because someone designed
this pump in such a ways so as to let me know, down to
the thousandth of a gallon, how much gas I was buying. Three
separate wheels with numbers on them giving me that
information.

Now, why was that done? I did a little poking
around and the nearest I could come up with was, well, this
was put together because once we had digital enumeration, it
was simple to do. But this pump was not digital. It was an
old mechanical pump. And it had been produced right after
the 1978-79 energy crisis. It was a way of allowing the gas-
pumper, the customer, to feel that something was going on
while pumping this very expensive gasoline now, into one's
tank. If there weren't a lot of numbers going around,
because you were getting more gasoline for the dollar, at
least, the same amount of gas could give you more numbers.
It was a wonderful example of, impression management, and a
fairly harmless version, after all. The world won't come
crumbling down because we unnecessarily have gas tanks that
measure our gas to the thousandth of a gallon. But what

about that kind of attention to detail in other settings.

00:03:50:03Þ For example, if we have one of the most remarkably sophisticated technological societies ever in the US, in the late twentieth century. Why do we also have such an outrageously high rate of infant mortality? Now obviously the decision to design a gas pump is a different one from the decision to provide health technologies. And yet at some level if you push them back far enough, I have to believe that they are connected. We could eliminate a great number of the infant deaths and infant health problems if we provided prenatal care. We certainly have the technology for that. I think it could be argued that economically it makes more sense to do that. So there's a decision there, we have lots of extremely sophisticated medical technology for prenatal care now, what we don't have is the social commitment to concern for that. So if you just sat down any person in a culture and said, which is more important to you, a gas pump that gets to the thousandth of a gallon or healthy children. That would be an easy choice,most of us could make that decision. But that 's not how we interact with technology. We see instead, the artifacts of decisions already made.

SMITH

87A

Antonello: What about the relationship of high technology and the ...

00:06:34:20Þ I remember as a child seeing those television commercials when an actor called, Ronald Reagan would come out and do ads for General Electric. In which he said, "Progress is our most important product." And in a way he was saying the same thing when he became president. The ideology of progress is so deeply interwoven with Americans' expectations about their culture, we're the "can do" society. Give us enough time and we can put this together, we can make it work. It's very difficult to either challenge that or to question, what's overlooked. When that is the primary mode of thought.

00:07:14:11Þ Not too long ago I went to Disneyworld, in Florida, and visited Epcot Center, the experimental prototype city of tomorrow. And this place is the ultimate shrine to the ideology of progress. It is a collection of corporate sponsored exhibits which show, how through time, from the beginning of civilization into the foreseeable future, the march of progress, which is very much a technological progress rather than a social one, has carried us to greater and greater vistas. And one of the interesting things about these rides, you sit in a little chair and it carries you through the exhibits, and little voices come out of the chair, it's kind of like your own personalized Greek Chorus, that tells you, what to think about what you are looking at. And at one point the little voices are saying, " If we can dream it, we can do it." And I realized, that really does capture the working assumption, very much a political assumption, about how technology operates in this society.

00:08:26:03Þ But what

happens if that assumption, if we can dream it, we do it. It is applied as it is in other settings. For example, the nuclear arms race.I started wondering what the little voices would start saying to me, if it were commenting on something that is not shown at Epcot. Which is the militarization of technology and the arms race. And I decided it would probably say something like this, if we can dream it up, they can dream it up. If they can dream it up, they'll do it. Therefore, we have to do it. It takes everything about that belief in progress and stands it on its head.

It's still an imperative, it still is a form of technological determinism. But now it requires you to take the most terrifying thing you can imagine, and implement it. There was a poem that Bertold Brecht wrote, half a century ago addressed to future generations, there was very much about this issue, he said something to the effect of, those of you who look back on us and judge us, don't judge too harshly. For I fear that in the struggle for change, we have become too much like our enemy. And I'm afraid that if you watch what the super- powers have done since 1945, it falls very much into exactly that formula.

Antonello: Can you give us more examples of the social implications of this idea of progress?

00:10:09:12Þ Yeah...progress is primarily a concept filled with expectation. When you talk about progress you're asking a group of people to agree on what they think will happen. And in American culture, its been very much a part of how well society presents itself. We may not have the same past as other older cultures do, but the future is ours. And everything we can point tothe social implications of this idea of progress?

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00:13:00:23Þ What happens when image drives design? And I think the space program, in the fifties and sixties, was very much an example of that. Both powers, particularly the US, looked for ways to put together the engineering problems that had to be solved in such a way to create the image of Americans standing on the moon. There's the American flag being planted and all the world can see it. Of course one of the problems with the space program was that it couldn't change as fast as many other products do. When Sputnik went up in 1957, immediately the US was told, that it had to be on alert, because the

Soviets had done something first. And we had to catch up.

From that moment on, American leaders were looking for ways of making sure that Americans were the first to stand on the moon. But by the time they got there, in 1969, a lot had changed in the culture. It wasn't 1957 anymore, it wasn't Ossie and Harriet, and it's very possible that the Sea of Tranquility, was the only place in the Solar System, where you could plant the American flag, and not have it torn down again. The ideology from the moment of that projects conception was still intact. The culture was changing.

00:14:22:18Þ A lot of the discussion about social attitudes to technology in the sixties and seventies, centers on anti-technology. Suddenly from out of nowhere there seemed to be people criticizing technology. Particularly those that were large government sponsored ones. I think that's only part and parcel of the ideology of progress itself. Once you allow for a technology to take on emblematic meaning, to have it stand for something not related to its function, this is a nuclear power plant but it stands for Americas role in the developing world. So we're going to build this here in this country to show you what we stand for.

00:15:05:24Þ Once you've done that, then any attempt to question details about, say a nuclear power plant, can be construed as an attack on

American society. For example, in 1970, one of many panels of decision-makers in the government and the nuclear industry discussed this seemingly sudden attack that was coming from several quarters on nuclear power. It's interesting, that one of the first attacks on nuclear power, was actually, simply an article in Sports Illustrated, 1969, that said, "Nuclear power plants create thermal pollution, and fish die from that." And several people within the AAC, and in congress, and among the nuclear venders were quite upset that this publicity had got out. And then there were other pieces of information and other contentions among scientists about, the effects of radiation.

00:16:08:15Þ Now, if I were in charge of a technology like, nuclear energy and someone questioned something specific like, thermal pollution or radiation, or waste disposal, would my first response be to address the problems connected with that issue? Seems to me that wouldn't be too wild an expectation to make. But what happened in 1970 and ever since, was very different from that. We're accustomed to seeing protesters come forward and say, this technology is flawed. But I think we also have to notice what the decision-makers themselves did.

00:16:48:12Þ At this meeting in 1970, Theas Thompson, who was one of the commissioners on the Atomic Energy Commission, said that, those that were criticizing technology were attacking

quote:"The American Way of LIfe." And he focused a little bit on some of the discussions about risk. And he said, "It's as if we decided not to get out of bed in the morning for fear that we might trip on the way to the bathroom." Now I think that Mr. Thompson was articulating was something that most of the culture could recognize. You just get out there and you take those risks and that's what makes us great. The problem with that very emblematic approach to technology, is that it doesn't allow for gradations. It doesn't allow for genuine technical assessment, let alone social assessment.

And so what you have, is an all or nothing pattern. Either you accept whole heartily, the Appollo Project, the proliferation of nuclear power, whatever, or the whole thing comes crumbling down. And I think it's very difficult for cultures to operate without those gradations, since that's what our lives are primarily composed of.

SMITH

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Antonello: How important is the role of the media in selling the idea of progress and technology?

00:18:15:19Þ We're now a culture educated primarily by mass media, and we are also very much creatures of a media designed for impression management. I don't want to go to far by

suggesting the similarities between Madison Avenue and Pennsylvania Avenue. But I think that we can see the techniques that have emerged in this century around advertising, have also become a part of political decision making. And both require a saturation through the mass media.

00:18:49:07Þ For example, assume for a moment that there is something in common between an anti-balistic missile and an anti-perspirant. It sounds absurd on the face of it, but then if you think about it, how are these products, these devices presented to their perspective constituencies? They're important not for what they do, but for what they prevent. You decide to acquire them because they will make you secure. They will assure you against something that will make you vulnerable. And so you use this anti-perspirant or you deploy this anti-balistic missile, not really knowing exactly what it has done for you. But feeling more assured as all the people in the commercials for the antiperspirants do, and as all the leaders in Washington somewhat less obviously also do. Because they feel that this item has added to their security.

00:19:56:17Þ Now there's a set of responses that we have to learn in order to recognize a product for something that doesn't really happen. And the best evidence that people can give for the success of the arms race is, well, we haven't blown ourselves up yet, it's a thing that

hasn't happened yet. But sometimes the ability to create the impression by itself, is not enough.

Several years ago, I think in the early eighties, in the Bronx, there was a famous case of the window decal. There was a very small sum of money available, maybe $150,000, I've forgotten now, it could be used for the betterment of the community. Well, if any place in the US need betterment, it was the Bronx, particularly the South Bronx. But there was clearly not enough money to re-fashion a building, to really do much of anything, and so, what they did was produce decals to put in the windows of crumbling buildings, that showed geraniums and curtains and signs of domesticity. So that when you walk down the street, you would see this decal and of course you knew it was a decal, but at least there was this gesture towards having made an improvement.

Now this struck me as a remarkable thing, the decal has now taken the place of the change. We weren't able to make the change, but we were able to afford the decal, and somehow that's got to do the job for us.

00:21:25:01Þ Well we learned actually to think in terms of tattooing, meaning from one arena to another, long before the government became a participant. Thirty years ago, more than that I guess, Marlboro Cigarettes, were marketed

primarily as a woman's cigarette, because they had filters and of course before everyone had the information they needed about the cancer causing effects of cigarettes, filters were seen as effeminate. They even came in a red and white striped box, and they weren't selling very well. And the account was switched over to a different ad agency, and they said," Alright, this is a male-dominated culture. If we want to sell cigarettes to men and to women, we have to fashion it an image of 'The Man'." And so they were put into a new box, and the Marlboro Man, was created.

And the Marlboro Man was a pilot, or he was the captain of a ship, or he was on horseback, he was always piloting his way through the world of goods. He knew how to navigate his ways from point A to point B. Sometimes you would see him under the racecar, working on it, and then he'd get up and talk about the technical advantages of the flip-top box. The most remarkable thing about the Marlboro Man campaign was, that for the first segment of it, if you looked in the commercials, you'd see a tattoo of an anchor on the wrist of the Marlboro Man. Signifying he was the helmsman, he was the pilot, he was at home in the world of technology. And when you bought your Marlboro cigarettes, enclosed was a little tattoo of an anchor that you could rub on to your wrist. So that you too could be a Marlboro Man, that showed that you as well, at least vicariously, had acquired this savior fair, with the world of objects.

00:23:21:06Þ There's a wonderful kind of innocence about that campaign, but to me it's very much like what the US government found itself doing with the Appollo Project. Or for that matter with the civilian uses in nuclear power, atoms for peace. Somehow, the tattoo of capability in this new world, was going to take the place of genuine knowledge of what choices were available to us.

SMITH

87A

Antonello: What is the relationship between technology and war?

00:24:01:19Þ There's an old saying that warriors are always fighting the battle by the rules of the preceding war. And WW2 is the consummated example of that. What has happened since then because of that lag, has had untold costs. It isn't a new pattern, that every technological breakthrough can be appropriated for military uses. But something did change, I think, after Hiroshima. Because now for the first time the notion of Global extermination took the place of the ability to predict victory. the number of people who died at Hiroshima was not what was different, a comparable number of people died in Dresden, or in Tokyo, but the fact that one device, dropped by one plane took that many lives. Was a stepping-off point.Some people at that time and hopefully a growing number of people since then recognized that not just

the quantity, but the quality of destructiveness had changed. But for leaders, for political leaders at that time, it was much harder to make that switch.

00:25:24:15Þ I think we can now go back historically and say, when the bomb was dropped on Hiroshima, two weapons were introduced in the world: one was the bomb, the other was the idea of the bomb. And it's that second weapon that has played the central role in geopolitics since 1945. We haven't dropped the bomb, we dropped the notion of the bomb. That's what we deployed. And that's a very tricky issue.

00:25:59:07Þ If you're accustomed as our leaders were in 1945, to use everything you've got. And suddenly you're confronted with a weapon that in some ways preclude to that, makes at least more difficult to simply go out and use it. And what are you going to do in its place? You're going to be involved in oppression management. You as the military, are going to do what advertising has always done. But you're going to have to do it with conflicting mandates.

Look at the way the arms race has gone in the past forty years. To the rest of the world, particularly, your adversaries, you have to create an image that says, don't even think about doing something we disapprove of, because if you do, we have the capacity to vaporize you. Not only

that, but we have the will to do so. It's very important that both parts of that message be sent. What actually happens in terms of weapons, what you actually have is secondary to what idea you convey to that enemy. But at the same time, you as the builder-up of arsenals, must turn to your own culture and say, we don't have nearly enough. We've got to build a lot more of these. There's a window of vulnerability. Why, times a'wastin', if we don't move at once, to increase our arsenal by x per cent, put in new delivery systems, devise star wars, then it's all over.

00:27:32:10Þ So you have to say to the rest of the world, and to the folks at home, totally opposite things at exactly the same time, in order to make the success of the arms race an ongoing thing. Once you set that in motion, the contradictions that are built into it, come to look more normal because they're familiar. And the contradictions are the key to the way the arms race works.

00:28:00:05Þ One of the contradictions that is not generally acknowledged is, to me, the most important one, which is that in the nuclear age security has taken on a very different meaning than the one it had before. It was customary before WW2, to assume that, if you had a new military technology, you had to accumulate it for safety, for defense purposes. And that thinking hasn't gone away since WW2, but the implications have changed completely.

If you cover Western Europe or the plains of the US, or Siberia or wherever you happen to be, with land-based missiles have you increased your security or have you increased the number of targets, that are guaranteed to be destroyed in the case of a nuclear exchange? If you put in multiple warheads into a delivery system, that allows you to drop ten or fourteen or twenty nuclear devices instead of one, have you made the world safer? Have you made it easier for your own troops, your own decision-makers to protect their culture? If the possibility for nuclear destruction is six minutes away and you are frantically spending your revenues to keep that six minute window as small as possible, has that created a more secure world?

SMITH

88A

00:00:45:16Þ

I'm a historian, and historians try to plot changes, not just in events but in thinking. And the question of how people have changed their thinking and experiencing technology is a difficult one because there are several different things to track. In American culture, one of the things that historians like to do is look at, worlds fairs in the 19th and 20th centuries. Because they assemble deliberate emblems of people's attitudes towards technology.

If you went to the 1876 Cenntennial expedition, in

Philadelphia, the reigning emblem there was the Corliss Engine. Named after George Corliss, who built it, this massive double piston engine, which drove all of the machinery in machinery hall. Well if you attended this exposition as a normal American citizen, you might actually have some understanding of what the principle behind those pistons was. You may have gone to Chettaqua talks, you may have seen material from the local mechanics institute. There was lots of interest in technological change and it was still within grasp.

00:02:01:09Þ If you fastforward that to, let's say, the 1939 worlds fair in New York, the reigning emblems there are the trilon and the parisphere. The trilon is this huge abstract tower that diminishes to a point. And the parishere is a ball. And they are meant to stand for streamlining and technological change and the future. But they don't actually do anything. You look at them and they create an image of change. But they don't invite you to participate in how the parts work or how something was designed.

00:02:41:14Þ I think that's one of the main things that has changed in the past hundred years. Technology itself has obviously become more complex and more varied . So it's more difficult for ordinary citizens to be literate in the workings and design of technology. But something else has changed too. The nature of expertise has changed and the way in which information is

presented to us, has changed.

00:03:13:11Þ Increasingly, those with scientific and technological expertise have learned to withdraw from the arena of open advocacy. If you who collect information about a given technology for example, formulate ideas about how it should or should not be applied, if it's considered unprofessional for, let's say a, nuclear engineer to speak on the problems with nuclear technology, if people have lost their jobs because they've done that. Then that only leaves the people who don't have that training who can do that speaking. And if they are dismissed because they don't have the expertise and if the people who have the expertise, whether they like it or not, have a vested interest in projects that are in place. Who is left to step forward as the 20th century progresses? And say I have the expertise and the social concern and here is my perspective.

00:04:15:11Þ Where's the arena for dialogue? That has become more difficult. It is now more likely that we'll see a stand-in for the technology. What we don't have and what we need, is an understanding that social expertise, is different from technical expertise. Knowing how to design a warhead or a VCR, is not the same thing as being able to make sensible decisions, collective decisions about what a society needs. And what the costs collectively of one approach rather than another will be. Part of what we've lost then, is a sense of the possibilities, the alternatives inherent in every human

use of technology.

00:05:09:23Þ One of the reasons we lost that is that,
along with the partitioning of expertise and the increasing
complexity of technology, is our increasing reliance on
image-making. If you worked in one of Henry Ford's
auto plants, in the 1920's, you may be a craftsperson who
remembered working on a much more individual scale. Now they
have you working on an assembly-line. You may not have the
slightest idea how internal combustion engine works, you
simply know how to perform the task that you've been
assigned to. But you do know the social meaning of the
automobile that you're creating because as you've seen the
advertising, and you've seen the people who participate in
those discussions. And you know that a person who drives
this sort of car, plays this kind of social rule and it's
very different from the person who drives that one.

00:06:07:18Þ So it's
not now the decision to design a car in a particular way or
the decision to rely on the automobile as part of the
culture, it's a socially contrived meaning that advertising
is able to introduce into mass media that helps you identify
this car as being driven by this kind of person. This
technology in other words, stands for a set of attributes
which you can pretend to require by purchasing that object.
And that's very different from knowing, for example, the
social or environmental implications of the automobile, the

internal combustion engine.

SMITH

88A

Antonello: Now we are in the electronic age. Do you think people are able to participate more fully in society with the new capabilities?

00:07:21:15Þ If you're asking me, do I think there are other ways for society and technology to interact, yes I do. But there are several things that have to happen first. One of the most important implications of the way we now experience technology, is that it is decontextualized. If you take this product a new automobile, a new missile, and you talk about its attributes, and you don't talk about the larger social implications of designing that automobile or that missile, then you've removed it from it's context. And when you do that, technology becomes magic. You can no longer see the process behind it, you only see the appearance of the final product rolling down the assemblyline.

00:08:15:03Þ When you decontextualize technology, when you create a society in which technology is experienced as magic, then you leave yourself open for good for as well as bad magic. If no one is responsible because it's magic, its progress its the next thing, then where's the room for any kind of discussion of

choices. So what we need is a way in which we can all enter into the social literacy required for technological decision-making.And that means having the criteria for development be entirely different. What we need to do is demystify technology and make it no longer magical.

You know
there's a wonderful scene at the end of "The Wizard of Oz," when Dorothy and her companions have gone all over the countryside to do what they've been told to do, and they come back to the wizard, to now have their wishes granted. And there's this disembodied head there on the stage, and lots of dry ice in different colors, it's magic. And the wizard, the spokesperson, the patriarch of magic is telling them that he still can't grant their wishes because they have not satisfied his requirements. And at that moment, Dorothy's little dog runs over to a curtain and pulls it back, and behind the curtain we this perfectly ordinary little old man, pulling levers and switches and talking into a microphone. And everybody realizes that what they saw on the stage was the magic, and what they see behind the curtain is the ordinary person. Just as fallible as the rest of us, who's making the decisions and pretending to be the wizard. And his response when he's been exposed, of course, is to speak into the microphone, and say, "Pay no attention to that man behind the curtain." But it's too late, because they've seen and now they know. And I think that's really what the late 20th century task in technological society is for

all of us, is to pull back that curtain and to see the human dimensions of these decisions, and the wealth of possibilities behind each one of them.

SMITH

88A

Antonello: Is technology deskilling people?

00:11:04:13Þ There are two kinds of de-skilling, that are worthy of our attention. One has to do with a process that has been going on really as long as the industrial revolution, replacing skill and worker control over the completion of a task, with individuated steps and detailed division of labor, that makes it more difficult for the worker and easier for the owner to control the process. But there's a second kind of de-skilling, which I think is very much related to the first, and that is a form of social de-skilling. If your craft and your control over production is diminished, then you think of yourself and your role in society as also having been diminished.

00:11:59:11Þ And if decisions are made about large-scale projects outside your own workplace but within your culture, decisions that affect your life, but decisions that have to do with very sophisticated technologies. If you assume that you're not part of that decision-making process because you lack the expertise, then we have a form of social de-skilling as well, that causes most of us to feel that we're

not qualified to determine the location of a nuclear power plant, the decision to send humans to Mars. The notion of social priorities, what must be done, is left in the hands of people who presumably do have a set of skills unavailable to the rest of us. I think that notion of de-skilling is one that we have to pay very close attention to, because it's no longer just the case that what goes on in the workplace is the primary arena of technological combat. It's now everywhere. What was happening in the factories at the turn of the century, and which happened in the office after WW2, is now happening in the global arena.

SMITH

88A

Antonello: What is the difference in the relationship between science and technology before and after WWII?

00:13:49:17Þ One of the legacies of WW2 is that we created a remarkable system of research development, production and deployment, probably unprecedented in the human experience. The capacity to simply produce for the war effort is almost unimaginable. What is sometimes overlooked is that a great deal of the mechanism, the social structuring, the bureaucratic propping up that made WW2 possible stayed in place after the war. Unlike WW1, most of the war preparedness stayed after the war. The Pentagon is an artifact of wartime capacity converted into permanent postwar social application. So our

assumption about what is needed for security, day-to-day maintenance of a status quo, is far more militarized than it was before the war. The implication that this has for the scientific and technical communities, is manifold.

00:15:04:01Þ For one thing, it's very difficult for people in a number of different fields to work outside of military implications. They're either directly funded by the department of defense or their work is going to have military applications. And that is much more the case than it would have been before.

But I think there are other implications as well, I think before WW2 it was possible for scientists, technicians, engineers to concentrate on their work, and if they chose to look at the social implications, they could. But there didn't seem to be a driving need to. The war changed that and it introduced into 20th century parlance a group of scientists and engineers with a social agenda. They didn't all have the same one, but many of those involved in the production of the bomb, decided that the enormity of this new technology required them to enter into the social debate of what should be done with it. I think we've come to see nuclear scientists and engineers as being at the heart of that phenomenon, but I have a feeling we are going to see it in far more other places, as we go into the 21st century.

00:16:24:08Þ We're only beginning to realize, for example now, with bio-

engineering, that the human and military applications of life sciences and technologies can have as a dramatic an effect as nuclear technologies did in the last generation. We don't yet look at bio-technology as having the same weight of social meaning attached to it as nuclear, but that may very well be the case similarly with computer technology, with information technologies. We're only beginning to see what applications and what positive or negative results may come from that . The next Los Alamos may have nothing to do with nuclear technology. It may come from a technological arena that seems perfectly benign and comfortable to us right now.

SMITH

88A

Antonello: Is there a difference between scientific research before and after WWII?

00:18:56:07Þ I think part of what we've seen since WW2 is the ascendancy of what I would call engineering culture, I don't know a better way to define this. The difference between research and application, is something that seems fairly simple. But we've seen a couple of important changes that made the application take precedence. Engineering by itself has a problem solving orientation, which is fine. But what happens if that model, which is intended for one set of tasks, is applied to a different setting, a social setting? What if we

try to assume that there is a social component to engineering? Engineers who begin with training specific to their technical task found themselves in the mid 20th century increasingly taking on a managerial role, and the modern corporate model for managerial work, is the engineer. When you combine that with the difference between research and problem solving, you start to find a way of approaching a given set of questions that looks for a fairly narrow set of applications, because it is problem solving.

A good example might be, Project Plow Share. Between 1956 and about 1971, the Lawrence Livamore Laboratory, in California, worked on the application of earth moving projects; building canals, building harbors, excavating for drilling and for mining, all with thermo-nuclear devices. Hydrogen bombs; the idea came up during the Suez Canal Crisis in 1956. And a group of Lawrence Livamore scientists and engineers proposed to the AAC, in Washington,"Hey, we can build another canal through Isreal, with hydrogen bombs. We can do it fairly quickly, the excavation can be done with great dispatch." The crisis ended before they were able to put that into effect. There were over the next 15 years, a number of other similar proposals. One for example, was to build a pan-atomic canal through Nicaragua, once again, using hydrogen bombs. Project Chariot was going to create the harbor on the north coast of Alaska. Most of theses projects never got off the ground, but the interesting thing about

them is that they were seen strictly as engineering problems.

And from that point of view they were relatively simple and applicable. Here is a piece of landscape which can be transformed by the application of this energy in this device. But that left out a number of other things, like what are you going to do about the 200,000 people who live downwind of the area you intend to detonate these devices in? As long as the problem was only presented as an engineering one, it was impossible to introduce into the discussion all the other concerns. So Project Plow Share continually came forward with engineering projects that even the AAC decided were socially too risky.

SMITH

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Antonello: Are science and technology improving people's lives?

00:23:27:24Þ Well we ask the question, is science, is technology making the world better? I guess my first reply is, which science? Which technology? It isn't all one piece that either has to be taken in total or rejected. For better or worse we have devised ourselves a culture that seems incapable of gradations. And I think that is because we have assigned so many cultural meanings to given technologies. That to

question the technology is to question the culture. And when you do that, then there isn't any room for a discussion.

If I can't talk about alternatives to the internal combustion engine, without questioning the American way of life, then we're not going to get very far in devising forms of mass transit. Why does the American way of life preclude mass transit? Well clearly it doesn't. Each of these technologies is one among a number of choices, but if we come to think of everything that has been done as part of a process that can only be enjoyed if you take the whole thing on examine, then you're right back to technology, love it or leave it.

SMITH

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Antonello: It is difficult to question the main stream all over the world..

00:25:11:07Þ Well I think one thing that is helpful is to try to examine and illustrate how technologies are social devices and social products. For example, nuclear technology in France is seen as patriotic. Even the socialist government there sees the application of nuclear technology as part of what makes France great. In West Germany, throughout the 80's, it was patriotic to be anti-nuclear, and the whole push for reunification of Germany was seen as directly tied to protesting nuclear power. So in those two countries, the social meaning of the same technology had utterly different

meanings. Once that we can see there is no single social meaning for technology, then we can begin to understand the process by which a culture assigns those meanings.

00:26:08:01Þ Another example, every technology that enters an industrial culture is assigned some kind of gender role, because when it's new and it first appears, it's not obvious where it should go. For example, in the late 19th century, in this country, secretaries were men, and they transcribed and did paperwork for their employers who were also men. But then the typewriter was invented and there was also a shortage of men after the Civil War. So, the typewriter as an object did not have a gender assignment yet, could be presented as something women would work on. And literally the woman who worked on this machine, was called the typewriter at first. It's kind of like Dr. Frankenstein, the monster and creator seen with the same name. Gradually we redefined the role of secretary to be a woman, partly by the introduction of the typewriter.

00:27:07:10Þ A better example is the airplane. Most people first experienced the airplane by seeing barnstormers performing feats of amazing skill. But they also saw people die, because it was very dangerous and the plane might crash into the hillside before them. What happens by the 1920's, when you want to start marketing airplanes? You want people to buy a plane, and they know that they are wonderful, but

they also know they are dangerous. Well, one of the things that airplane manufacturers in the US did was hire women as pilots.Because if you as a male prospective buyer of an airplane were worried about how dangerous it was, how could you still think that if this woman put you in the plane and flew you around?

00:28:01:08Þ It took your assumptions about gender and forced you to rethink your attitude towards this technology. And so a whole generation of women pilots appeared, who were remarkably successful. They competed with men, not in separate womens' competition, but in international competitions. They did very well, and their demise was not because of the technology but because of the change in social uses. By the 30's, it seemed clear that everybody was not going to have a private airplane, instead we were going to have commercial airlines and you would pay to ride on one of these planes.

Well now, suddenly the notion of having a woman as a pilot, had a completely different meaning. You didn't want her flying the plane that all of your passengers got onto, so suddenly all of the women pilots were dismissed. And there were all sorts of explanations for this. It was said by one of the companies, for example, that well, we'd have to ground women pilots seven to 10 days a month and so they wouldn't be as efficient as the other pilots.

00:29:03:18Þ And of course the real reason was, that now the gender meaning that was already in place was going to be applied in a different way to the technology. And so the women they hired in the airline industry after that, were registered nurses, who could serve as the first stewardesses and fluff up the pillows for the customers. When you can see that the use of a technology has these very different meanings and that a culture will assign those meanings based on what's already there, then you can begin to discuss what is arbitrary about the meanings that we have assigned to technology. Do they need to be perceived in the way that we now do? Of course not. Are there other choices? Yes.

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00:01:26:14Þ I want to say something else about the airplane, before we go on... Another thing worth noticing about the introduction of a new technology into a culture is, that it's often seen as either this wonderful new source of salvation, or the sure sign of doom. In the case of the airplane, when it first became apparent, that, yes heavier than air vehicles could fly, and yes, they could be militarized. There were a number of people who subscribed to the notion that the airplane had ended the threat of war, because war would be so horrible, in the air age. Because of the possibilty of aerial bombings, that no country would

undertake such an insane prospect. And in fact there were air globes in the 30's, which were globes of the earth, entirely white with simply points from one city to the next. Without the countries, without the continents of the ocean, suggesting that it really was one air connected village.

00:02:33:21Þ Well, of course, we discovered all too soon that the airplane didn't rule out the possibility of combat, but that's one of the things that was said about the atomic bomb. And right after WW2, Edward Teller began arguing the same thing for the hydrogen bomb. Well the atomic bomb could be used in combat, but the hydrogen bomb is a thousand times more powerful and this will end forever the possibility of war. Because no country would untertake it, in the time of the hydrogen bomb. And the same Edward Teller in the 1980's came to a different president and said the same thing about star wars. Well, hydrogen bombs and multiply targeted re-entry vehicles, all of these things might be used but if we had this new technology it will end the possibility of war. Our capacity collectively to pick up the expectation for total transformation, total social change through a technology seems to be inexhaustable.

SMITH

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Antonello: What about science as a neutral arena?

00:03:40:18Þ I think we all want very much to subscribe to the belief that there is a thing called science, a process which creates a nuetral arena, a place where the normal concerns and passions and schisms and dislocations, that mark our lives, are somehow held at bay, that this is a sanctuary. Where rules far too delicate and fragile for ordinary human life, can now apply. And I think it's commendable that the scientific method aspires to that kind of nuetrality. But we also know, all of us, not just scientists, but all of us who are part of the human condition, that that noble goal is an impossibility. And that every project, whether it be scientific or otherwise, is vulnerable to all the same human foibles, the same pressures that it can become politicized that it can simply fail to ask certain questions. That it can become a creature of habit, that it can choose not to recognize alternatives because they are more difficult. And so, the invocation of science as this magical lofty peak, this olympian overlook that somehow exempts us from the normal concerns, that invocation is something we still partake in as a society. But the place itself where that occurs is on an ever receiving horizon, it becomes more and more difficult to locate, that place. Whether it's a cold fusion project or a new high definition television, whether we like it or not, every application of knowledge to some extent is touched by, shaped by, perhaps even driven by the politics of its application.

SMITH

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Antonello: What do you think about High Definition Television?

00:05:57:06Þ Well I don't know a thing about high definition television, so, I won't try to talk about that. Except to say that it is an example of a technology that is seen as attractive partly because it's visual, and anything visual is much easier to attract attention to, partly because it has a commercial application and partly because it also has a military application. There's also another interesting sidelight to it, which is an international phenomenon, which country will develop it, who will control it. Bu tyou need a high definition television expert to say whether that.....

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Antonello: What about the power of the media...it can sell anything...

00:07:12:00Þ You make it sound as though we were hopelessly at the mercy of a system so reinforced by mass media, that the liklihood of alternatives is negligible. I'm just not willing to subscribe to that and it may be my own form of wishful thinking. It mat be my own substitute for the idea of progress. But I can't help feeling that historically the media that we now rely on, will change and transform just as

other media have done. Look at how the politics of the book changed from the time that printing was introduced through the centuries. Its constituency, its political and social impact, the ways in which it could be used changed dramatically. I think the same thing is going to be true of television and of instant global telephonic communication. The satellite hookup that makes us all one, has all sorts of different implications,not all of which are necessarily predictable. For example, about eight years ago, a group of people in a room, no larger than this, met in a little town in Massachussets, to discuss the idea of a nuclear freeze. None of them held official positions of any kind, their only expertise was, a reading and working knowledge of the importance of some kind of arms reduction. And they put together a position, a arguement for a freeze, and it became an international issue. Now it didn't end the arms race, but it became recognized by people, that this little roomful had never heard of, so much so, that the White House and the Congress had to decide how to contain and control this challenge. And President Reagan made speeches that suggested that the advocates of reducing arms were dupes of a communist conspiracy, because that argument had always worked before. And congress dashed around to look for some kind of bill they could pass that would give approval to a nuclear freez, without actually being constrained by it. What actually changed on paper, is hard to see, but what was entered into the global dialogue, about the use of weapons and of militarism, I think was very significant. And it happened

because, once the idea was audible no one could stop people from hearing it. I think what's happened in Eastern Europe, in the past year, the ongoing struggle in China and the siginificance, the importance of radio communication, television connection, the faxes that go back forth between Chinese students in the US and other parts of the world, and their friends in mainland China. All of these things suggest that the media are there waiting for human use to be attached to them, and the degree of ingenuity people have when the situation presents itself to them, I think is almost boundless. So I'm not willing to feel that we're all herded into an electronic cage, where we'll be held indefinitely.

SMITH

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Antonello: Do you have any examples?

00:11:04:01Þ That's what I was getting at in the examples that I just gave. The effort to overthrow a government requires not just lots of people willing to go out into the street and call for change. It requires awareness on the part of everyone else that this thing is happening, a demonstration of 100,000 people needs one thing, but the demonstration seen by everyone means something very different. The access to that simple knowledge of what is happening is one of the

side effects of a wired globe. It's very difficult to

control the flow of information now in the way that it used

to be. What people would do once they have that information,

something that we're only beginning to find out.