

James FALLOWS

24a

1.

00:07:48:11

Well, there is in American culture, both for better and worse, a strong impulse to find the ideal invention that will solve all of your problems. This was, on the good side, this was the impulse that created Henry Ford and before him, Benjamin Franklin, and Thomas Edison. Other people have tried to invent things that could solve the worlds problems. The bad side of this has often been found in the US military, before the US military it was a strong impulse within the Nazi military to find the wonder weapon. The one weapon that was going to make the Nazi war machine overcome the limits that it faced. Probably the US was propelled further down this path by the success of the atomic bomb, because the atomic bomb was in a sense a wonder weapon, it was a weapon that by itself it ended the war in Japan. It convinced the Japanese that they probably could not otherwise have been convinced to surrender. And so, then that part of American culture, that experience with the atomic bomb, I think, developed the belief in the post war American military. That if they concentrated all of their effort in one magical weapon, that it could do everything. And so you had these designs for, for a certain kind of radar guided missile, it was suppose to give American airplanes a one thousand to one kill ration against war planes from another country. Which of course has never happened, any kind of real circumstances of combat.

00:09:26:11

You had , you had the natural progression of the American military towards smaller and smaller numbers of more and more expensive and theoretically capable aircraft. In 1944, the US produced 100,000 military airplanes. Now it is very lucky to produce 100 airplanes in a year, because each one is so much more expensive and so much more intended to be a wonder weapon in itself. When everything works right, these things may conceivably be wonder weapons, but usually the circumstances of combat don't permit that.

FALLOWS

24a

24a

FALLOWS

Antonello: Can you give an example of a spinoff?

00:05:39:21

Thelet me give you first an example of the dilemma, of the kind of imprecise spinoff that often occurs. The emphasis in semi-conductor design for the US military had been making chips that could withstand very extreme conditions. That could be put in the freezing conditions of the outerspace, and they would work. They could survive the very high temperatures of having some rocket descend into the earth, that could survive the radiation from a nuclear blast. Could withstand shock, so a lot of money went into finding chips that could endure all those things. And finally they were produced. And there was some imprecise spinoff from that, in other kinds of chip making technology, but most of the spinoff did not have commercial application.

It was to make things for which there was only one market, and that was the military, not commercial producers. And other companies and other countries could more easily make chips that couldn't withstand 5000 degrees of heat, couldn't withstand the nuclear bomb, but were perfectly acceptable and cheaper for normal use. So that's an illustration of the dilemma.

00:06:55:17

An illustration of the successful application, I think, comes mainly, most of it comes from the world of aviation. Because whats the , there is at least a rough connection between the techniques used to make new fighter plane engines, and the techniques are then used in commercial aircraft. The avionix that are used to

guide fighter planes, they've been able to lead the progression in many commercial applications. I think aviation is where most of the useful spinoffs have occurred.

FALLOWS

3

24a

00:10:25:21

I should say first, as I comment, you probably won't want to broadcast, I know you've been thinking much more seriously about this recently than I may have been thinking, so I may not be able to engage fully with all of your points, I will try my best.

Thethere is of course a profound difference between the circumstances in WW2, and those the US economy faces today, in the late 1930's, in all of the 1930's, the US economy was running at a very depressed rate. Of course, factories were producing only ten or twenty percent as much as they could theoretically produce. And what the war did in an economic sense was to end the depression, they had this tremendous surge of demand which through its sheer volume and through the sort of coordinated national effort, gave the industries, both an incentive and an excuse to modernize very rapidly and to specialize in mass production. Because mass production was what won the war, the US side it was the arsenal of democracy. Now it's a very different situation, the industries here are running on very near the peak of their capacity, and the amount of the shift in overall demand, that a peace dividend might create in the US is a much smaller share of the economy than wartime demand meant in, during WW2.

00:11:48:03

And so it's, although, the economic problem the 1930's was more acute and more crisis like, than is the problem now, it's harder to turn the economy now, I think, than it was then. Because the shift, the extent to which the government

can effect the economy is much smaller now than it was beginning in 1942, when there was this tremendous surge of wartime demand. What...and in a way the task is more complicated now, then of course the task was simply to start making many more things to increase the volume and use resources so much more. Now it's shifting to a different kind of production, a change in the overall economic balance within the society.

FALLOWS 24A

00:14:48:08

Yes, this is one of the difficult truths about American life and American political culture, which I might discuss two ways. One is the natural political tendency of the US, this is of course a nation of, that lacks the historical unity and the ethnic unity that most western European countries have, that Japan has. It's a nation of a lot of different people, they've all come here more or less to do what they want. So the natural condition of society is to be fairly fragmented and not to be cooperative. And unfortunately the main times, the main forces that have created cooperation in this country, have been wartime forces. It's been responding to an external threat, the time in its history when the US was most unified was during WW2. That is one of these tragic dilemmas of American history,

00:15:44:22

so in that sense, there is a, if not a permanent war culture in the US, there's a permanent need for some kind of external enemy as a unifying force. The best way to do this is something like the Sputnik phenomenon in the late 1950's, where it was not a war but kind of scientific foreign threat, but in that way there's a permanent wartime problem.

00:16:07:15

In a technical way there's a different kind of permanent war culture, which is

that the main engine of governmental interaction with industry, the main source of government money for industry and one of the most reliable parts of the government budget has been the wartime budget. Now of course, there...during the 45 years since the end of WW2 in about 8 of those, well about ten of those years, including Korea and Viet Nam, the US was actually at war. But not in the kind of war for which this machine was produced, the machine was produced of course for the threat of war with the Soviet Union and the need for deterrent. And so, for most of the post war era, I think this wartime culture has had, it's been justified in strategic and military type terms but its real rationale, I think, has been economic and political. Political in that major alliances have been built and major sources of money and money flow have been built on this. Economic in that the military has been the only acceptable source of industrial guidance, in American society. In the 19th century, the US felt very free to build canals, and build railroads and to have that kind of industrial guidance. Since WW2 most industrial promotion has come through the military budget, so, in that way it has been a permanent wartime culture to keep the industry going.

FALLOWS

24a

00:18:01:01

One of the perceived lessons of WW2, that is, whether or not it was true in reality, it was perceived to be the case. In the American military after the war, that strategic bombing it was true in reality, it was perceived to be the case. And the American military after the war, that strategic bombing was a decisive advantage for the US. That is, that long range bombing of the enemy homeland to destroy factories, destroy the popular will, etc., this was a crucial advantage for the US, the US had. Now of course there are bitter military debates about whether this actually had any effect, whether it had any crucial effect in the German war industry, whether in North Viet Nam it made any difference, etc.. But putting those debates to one side, the perceived effect was that this was the route the US had to take. And this also fit into the

idea of a military industrial culture, because the natural tool that you would use for strategic bombing was a very sophisticated kind of machine. That meant the long range technological projection of force.

00:18:59:12

Now as a, there had been various tiers of this strategic bombing philosophy. In one sense it lies behind the whole nuclear arsenal, because it is the epitome of the strategic bombing approach, to be able to send missiles and cruise missiles, and others to the enemy homeland. So it is promoted as very exotic technology in that way, in the realm of bombing as such, that is, by airplanes most of the American force has been on a fairly old technological level. From the B52 bombers, which have been around since the Korean War, but in the last decade, during the Reagan era, the strategic bombing rationale has created a lot of new technology projects, the B1 and the B2 bombers. These again show the Faustian bargain the US has gotten into with this military technology policy. First in certain technological ways, both of these bombers represent the most advanced work noise that's done anyplace on earth. They, if you want to have aircraft that can avoid radar detection, this approach has produced it. But from the overall economic and industrial point of view, I think they have to be considered a ruinous approach because they have so little commercial application. At least so little that's evident now, and their cost is so enormous, not simply in money but in talent, especially engineering talent. We find the most sophisticated designers from American technology institutes, working on the B2 bomber, or working on SDI rather than working on commercially useful products.

00:20:55:06

From the point of view of the whole world's welfare, it goes without saying, that the war culture is bad of course mankind could be better off without these enormous systems producing weapons. But speaking from a different perspective, that's simply of speaking as an American about the overall American position. I think it is bad in an entirely different way. Because it has consumed a tremendous amount of the nation's resources in the broadest sense. The most obvious measure is of course money, where seven percent or so

of the gross national product has gone towards defense, and where a very disproportionate share of the research expenditures, that the US puts out, are for military research. In dramatic contrast, especially to Japan, but in most European countries as well. Perhaps, the most profound distortion of all has been in a human distortion, it is shocking for me. Again, speaking as an American, to compare interviews I've conducted to engineering schools in Japan and those in the US, where you find the very brightest people from the American schools, from MIT and Cal Tech. First, they're mainly foreigners, they're mainly foreign students that are coming here for advanced study, but the work they are most excited about is usually military work. Partly because that's where the money is, that the money the government provides. But also because some of the most exotic and rarified theoretical questions can be answered there. And so, I understand their desire to get involved in this kind of work, but from the entire system's point of view when you see the greatest talent going into this area, which is not only bad for humanity, but also has a very imprecise economic benefit. It sometimes has an economic benefit but not predictably. And then you contrast that to the engineering graduates from the University of Tokyo or others in Japan, and see them most excited about commercial applications. Often, on the basis of some of this military work in the US, you see a profound imbalance of system. You see one system is likely to remain stronger in the longrun, because it has avoided this war culture. Again, I'm not speaking about the effects on all of our health in the future, but just the solvency of the American system in the longrun. I think it's gone beyond the point where it can afford this diversion of talent.

FALLOWS

TAPE 25A

00:01:05:04

I think the central sin of postwar military, probably, especially the American and military, has been to follow technological impulses to the far extreme or forgetting their military application. Probably the classic and

tragic illustration of that in the American experience has been in the development of the M16 rifle, which came to a very unfortunate end or more unfortunate fate in Viet Nam. Its predecessor was a rifle called the AR15 which is still used in much of Southeast Asia and other places. Which was a rifle of elegantly simple brutality. It was extremely reliable, I say perhaps when my family comes in the front door here.....

00:02:03:16

The tendency of the postwar military which had been accentuated in the US military, has been to pursue technological possibilities to their extreme, often at the expense of real military effectiveness. The most emotional illustration of this for the US was the M16 rifle, which was the standard infantry weapon in Viet Nam and was the cause of many disasters for the US side, there. Its predecessor was a rifle called the AR15 which was privately invented by a man named Eugene Stillner, and is still used in sort of a bootleg versions in much of South East Asia. This was a rifle which by military standards had elegantly simple brutality and had tremendous killing power. It used a small round which tended to do more damage in human flesh when it entered. It was a very reliable weapon, it was light, it enabled infantry men to do more of what they were designed to do. When this got into the US army's procurement bureaucracy, suddenly it became not a weapon designed for soldiers to use, but an object for the procurement system to operate upon. And there were a variety of improvements to the rifle. You had different kind of powder, a different kind of firing mechanism, a different kind of this or that whose overall effect was to turn what had been a very simply reliable weapon into one that was tragically unreliable for the American soldiers.

00:03:31:14

Now, I'm not trying to minimize the damage that the rifle did to the people who were being shot at, the civilians and the other soldiers in Viet Nam. But for the soldiers who were trying to rely on it, they found that there were hundreds upon hundreds of examples of American soldiers being found stabbed dead or shot with jammed M16's in their arms. Because the changes that the technological wizards inside the procurement system had made, made it an unreliable weapon. In theory it worked better but in practice it jammed, because

whenever anything was wrong, when it was the conditions weren't clean, they couldn't be shined or it couldn't be dried, then it wouldn't work. And so you had cases which caused a bitter congressional inquiry of American soldiers using the AK47's they took from the North Viet Nameese, or the Viet Cong, because they were cruder, but they worked, as the original AR15 had.

00:04:24:14

At a less emotional level, similar patterns have effected most American post war weapons. In aviation I think the main example was the F15 fighter plane, which is essentially the top of the line fighter plane for the US air force now, since the mid 70's has been. This is a plane that was a... there's a commercial product often advertised in American tv called the vego-matic. This is a machine that's supposed to do everything, it slices, it dices, it could do everything to every kind of vegetable, and the F15 has become in a way the vego-matic of fighter aircraft. And it was designed to do everything, it was made much bigger than other fighter aircrafts, so it could house a large enough radar system to detect other planes at tremendous distance and guide radar guided missiles to them. Now the problem is, that in practice fighter pilots almost never shoot a plane they can't actually see, and the main reason for this is, they don't know what they're shooting otherwise. It's a very unreliable system of identifying planes at long range and shooting them down. And so, this system which is a tremendous part of the plane's cost and its size is almost never used in practice, similarly, the plane was designed to go at extremely high maximum speeds. It was given a very large and heavy motor, it was, the cost went up for exotic materials, so its maximum speed could be nearly three times the speed of sound. Again, in practice, pilots almost never fly at that speed, and because they use fuel so fast and they can't see what they are flying at. So this was another example of a plane that became much bigger than it had to be, much more expensive than it had to be and much more unreliable than it had to be, because of exotic requirements that were grafted onto it by this technological system.