

ROLAND
BETA 129

ANTONELLO: WHAT'S THE RELATIONSHIP BETWEEN WAR AND TECHNOLOGY?

There are really two relationship between war and technology, two questions, one is, Does technology drive warfare? and the other is of course, Does warfare drive technology? In the first one its very clear that it does. That is that technology has been shaping warfare since earliest recorded history. The impact that its having on warfare grows more pronounced over time. I often ask my students to define modern warfare. We find that when you stop to think about it, its divided into technological periods largely. One definition of modern warfare is that it began with the invention of gunpowder. Its different but where....

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There seem to be two issues in the relationship between war and technology. One is, Does technology shape warfare and the other is does warfare drive technology ?. Clearly technology shapes warfare and it has been doing so since the beginning of time. What is different is that in the modern era getting closer to today it seems that the impact of technology is becoming greater. Historians who have looked at this issue and tried to evaluate it, see several different periods at which you might describe something called modern warfare. One break comes with the introduction of gunpowder around 1500. Another natural break comes in the 19th century with the industrial revolution. And the possibility that created for total warfare which we saw in the first half of the 20th century. And then a third natural break comes at the end of WWII with the introduction of nuclear weapons and the beginning of the nuclear age. All those great divisions in modern warfare are essentially defined by the technological change that were taking place at the time.

The other question is more difficult to get at and interestingly historians have shied away from it perhaps because its more difficult. Does warfare drive technological development?. Werner Sommbard(?) wrote a very insightful book around the turn of the century called, "_____ and Capitalism" in which he argued that warfare was in fact the primary driving force behind the rise of industrial society. Other scholars have disagreed with him but not many have done the kind of research that would be necessary to prove that. What you tend to see in the latter part of the 20th century is the impact of warfare on society at large and technology in particular growing at a faster rate than elsewhere. And it suggests that at least in this modern period, if not before, that warfare is driving technological development and the development of sophisticated industrial societies.

ANTONELLO: CAN YOU GIVE AN EXAMPLE OF THIS?

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The best example of that is what has happened here in the US in the period of the cold war. It was largely because of the perception at the end of WWII, that research and development would determine the outcome of the next war that the govt got into large scale funding of science and technology which it hadn't done very much before WWII. So it was a military belief that fed that in the first place. And additionally, because of the demands for research and development

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in the cold war, military spending on research and development has tended to outpace civilian spending for research and development. And an

argument that's often made for that is well the civilian society gets spinoff from that military R&D anyhow. But that's a poor argument for military research and development because all research and development gives you spinoff. It's not an argument for one kind or another. But many people, many historians who have looked at it, believe that what we're seeing in the US now, and in fact in the Soviet Union as well, is what can be called a COMMAND ECONOMY, in which the national govt, for reasons of national security, is increasingly directing, not just civilian technological development, not just military technological development, but civilian as well. For example the civilian space program, while nominally civilian, is nonetheless another facet of the cold war. And it has been funded at the pace it has in order to demonstrate our technological superiority to the Soviet Union.

ANTONELLO: WAS WWII A WATERSHED FOR THE RELATIONSHIP BETWEEN TECHNOLOGY AND SCIENCE??

WWII was different from other wars in several important ways. In one way it was like WWI in that it was a war of industrial production. The US finally won because it could overwhelm its enemy with more men, more material more supplies. But WWII was also the first war we know of in which the weapons in use at the end of the war were significantly different than the weapons in use at the beginning of the war. That is many of the weapons like nuclear weapons, radar and so on were developed in the course of the war. And it was because of this that the leading military powers in the world came to believe that research and development in new science and technology would be the determining factor in the outcome of the future wars. The most important technology in WWII was perhaps the internal combustion engine which was in existence at the outset but nonetheless the path into the future was clearly laid out by nuclear weapons, radar and other technologies developed in the hothouse research and development atmosphere of the war.

ANTONELLO: WHAT WERE THE CONSEQUENCES OF THIS HUGE, JOINT VENTURE OF SCIENTISTS AND TECHNOLOGISTS??

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The transformation was probably most pronounced in the US which up until WWII had a tradition of suspecting large standing military establishments. It had essentially free security throughout most of its history. And now with the new dispensation provided by WWII and the need to have an arsenal immediately ready and to have an arsenal constantly under preparation was that the US moved to a permanent standing military establishment for the first time in its future. And it wasn't just people in uniform. It was also the armies of scientists and engineers that were enlisted to develop the new weapons. And the standing army that we always feared in this country, really turned out to be the military industrial complex. That is it just took a form that we hadn't anticipated before. Comparable changes, of course, were going on in the Soviet Union. But they were somewhat less dramatic there because that was already, to a certain extent, a militarized state. So the change was simply more pronounced in the US. But that's what we've seen ever since I think with the world's leading powers.

A permanent stage of mobilization for war, a large investment in preparation for war and a constant state of readiness for war. That uses up an unprecedented share of the national treasure.

ANTONELLO: WHAT ARE THE ECONOMIC AND SOCIAL CONSEQUENCES??

The social consequences of this phenomenon of the permanent command economy, of the permanently mobilized state are hard to measure. Because, at least in the US, for example there has been a conscious effort to keep military and civilian considerations separate. I think the US did succeed, though with considerable trouble at times, in maintaining civilian control of the military during this unprecedented buildup. The economic consequences are clearer I think, that is an increasing percentage of our national treasure invested in military research and development and military operations. And in the minds of many economists, that is money that is not invested productively in the economy. So there's a double penalty to it. First of all you have to pay that money out and secondly you're paying it out in investments that don't duplicate themselves by increasing productivity in the civilian economy. So I think we've paid a very severe price. Now from the perspective of the end of the cold war, it looks as if one judgement that can be made about the cold war is that the US was simply able to pay that price more fully than the soviet Union was. That is we simply won the cold war by bankrupting them.

Economic consequences of militarization..The social and economic consequences, I think, are different. The social consequences are more difficult to evaluate. In the US for example it is unprecedented for us to be militarized at the rate that we have been in the cold war. Nonetheless, I think, the govt has been successful in maintaining civilian control over the military. And maintaining some separation over military and civilian spheres of influence. As difficult as that has been at times. In a country like the soviet Union in contrast, they were a militarized state before this began and the social differences are much less pronounced than they are here. The economic consequences, I think, are clearer. That is an increasing portion of our national treasure came to be invested in military science and technology, military equipment and military operations. And economists believe that works a double disadvantage on the economy. First of all that that's money that you.....

The social consequences of this militarization of the state in the cold war period are perhaps more difficult to get at than the economic consequences. In the US its particularly pronounced because we have eschewed militarization in the past. And we have been suspicious of large standing military establishments and when we were forced to have one it changed our society profoundly. Nonetheless, I think we have been reasonably successful in maintaining the separation between civilian and military spheres, and maintaining, precariously at times, but nonetheless, maintaining civilian control over the military. So I think, even though it was an unfortunate experience for us, nonetheless we came through fairly well. The change is less pronounced in the Soviet Union, which was a more militarized state to begin with and the transformation was hardly noticeable.

The economic consequences of this militarization of the state are less happy I think. The US was forced to invest a far larger percentage of its national treasure in military operations, military equipment, military personnel and military research and development. And the consequences are two fold. First of all there's that amount of national treasure that you're forced to spend. And secondly, you are spending it in such a way that you don't get the increased productivity that you might get from investing those funds in your economy directly. And I think the consequences of that are obvious. In part in the budget problems that the US faces now at the end of the cold war. In fact one measure of the cold war and how it went may well be that the US was able

to outspend the Soviet Union and finally force them out of the cold war through bankruptcy essentially.

ANTONELLO: WHAT ABOUT THE REORGANIZATION OF THE MILITARY AFTER WWII???

Nuclear weapons became so dominant and so powerful in the cold war period that many people see them as the organizing principle around which the American military establishment formed. But in fact each of the services responded very differently to nuclear weapons. The Air Force, in fact did come to organize itself around Nuclear weapons. But the reasons were in its history, not so much in the discovery of the weapon itself. The air force had been, through WWII and up to 1947, a part of the army. And what it had wanted for 20 years or more, more than anything else, was autonomy, independence. Because it believed as long as it was subordinated to the needs of the army, it would be subordinated to ground troops and the full potential of the air power would never be realized. And so in the 1920's and 30's and going into WWII the air force had made the argument that air power was capable of winning wars independently. It could be a decisive weapon. Events during the course of the war did not prove that out. That is strategic bombing had had a serious impact on Germany and Japan but it had not by itself been decisive until the atomic bomb. And with the dropping of the atomic bombs and the immediate surrender of Japan the air force could now make the argument that even if strategic bombing had not been decisive before, it was now in the nuclear age. And so the air force embraced nuclear weapons immediately and made it the centerpiece of their activities thereafter. In fact to the neglect of tactical air power.

The navy continued to think of itself primarily as a conventional fighting force and it wanted to maintain, in the post-WWII world, the same kinds of fleets that it had maintained during the war.

And the army, because it had very little opportunity to engage in strategic use of nuclear weapons, did not pursue nuclear weapons immediately either. And it was only when those two services, the navy and the army, came to see that the airforce was getting the lion's share of the defense budget in the late 1940's and early 1950's that they too redirected their efforts. And looked for strategic nuclear missions.

In the case of the navy this came to be a marrying of nuclear submarines which were developed independently of strategic warfare and the nuclear missile that the navy pioneered in developing. In the case of the army it came to be when the air force shut them out of long range missiles. It came to be short range missiles and what have subsequently come to be called tactical or theater nuclear missiles. Neither of the navy or the air force was able, at least for a long while, to make much of an argument that it was an important part of the strategic nuclear strike force of the US. And for that reason the air force remained the dominant military power through the 50's and into the 60's.

ANTONELLO: FROM A CULTURAL POINT OF VIEW WHAT CONSEQUENCES DID THE BOMB HAVE ON THE COUNTRY??

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The consequences of the bomb, I think, are two fold. First of all it terrified most people who were aware of its existence and what it could potentially do. And made most people live through a real reign of terror in fear that a 3rd WW could break out. And if it did we possibly faced extinction of the human race. On a more practical level I argue that what the atomic bomb really did was finally contributed to an era of

world peace. And this of course is a relative term, we haven't reached peace yet. But what we have found with the nuclear weapon is a weapon that frightens us so much that we are driven to find ways other than war to solve our international problems. And I think the end of the cold war is proof of this. It isn't that the Soviet Union and the US are more enlightened, or are more altruistic, or love each other more than other great super power rivals have done in the past. Its just that they don't dare get into a shooting war with each other. And because they dare not do it, they have found other ways to solve their problems. I think the other leading industrialized nations will follow them in this pattern. And I think we're unlikely to see the major world conflagrations between superpowers that we've seen before. What we are going to see, unfortunately is an increase in small scale warfare within the 3rd world and between the 3rd world and the leading powers. But not I think any more world wars and I think we have nuclear weapons to thank for that.

ANTONELLO: CAN YOU DISCUSS THE COLD WAR FROM 1946 UNTIL THE BEGINNING OF THE KOREAN WAR??

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I think the craziest and the most dangerous time of the cold war was really the 1950's. What happened after WWII was that the US had a monopoly of the atomic weapon. It was building up that monopoly so that it would seriously have enough weapons to threaten the Soviet Union. But not anticipate that it would have to use them because the Soviet Union was still an economy that was recovering from the devastation of WWII. Nonetheless, the Soviet Union, under Stalin, pursued what was perceived in the US as an aggressive policy of establishing buffer states around the border of the Soviet Union and trying to bring in to its orbit additional client states, which we perceived as very threatening. In was in that atmosphere that the US developed the policy of containment which it pursued throughout the rest of the cold war. And the policy came to be built around nuclear weapons. And it was simply that we would threaten the Soviet Union with the use of our nuclear weapons if it tried to escape from its own borders and its own appropriate spheres of influence in a way that threatened our vital national interests. But it wasn't, I believe until 1949, with the fall of China and the detonation of the first Soviet atomic bomb that the real, sort of paranoia, of the cold war started to heat up. And that was fed in large part by Stalin and his extreme policies near the end of his life. But, by the time he died in 1953, the US was so frightened of the Soviet Union and so frightened of the spread of world wide communism, that we operated in the 1950's in a state of paranoia of our own I think And we drove each other to escalating positions. To building up arsenals for fear that we would be overpowered, out flanked by the other side. And indeed the arms race took on a sort of logic of its own. Because we no longer had the luxury of responding to a war once it broke out. But had to be prepared to fight a war instantaneously should an attack be launched against us. We were more fearful, more on guard than we had ever been in our history. So we increased our arsenals. That simply encouraged the soviet Union in its beliefs that we were trying to encircle and destroy them. So they increased their arsenals. And the thing spiraled out of control. Reaching, I believe, a climax with the Cuban missile crisis when we came very close to starting WWIII. But I think that crisis had a therapeutic affect on both sides. And the two sides came away saying, "We almost did it then and it wasn't worth it. And from now on we have to act in concert to avoid any confrontation that could engage us in a shooting war with each other". And I think the two super powers more or less consistently, since 1962, operated in a way so as to avoid those confrontations until the cold war ended at the end of the 1980's.

ANTONELLO: WAS SPACE A CIVILIAN PROJECT??

Sputnik had an enormous impact for two reasons. First of all, if the Soviet Union could insert a satellite into a precise orbit then it meant that that launch vehicle that put it up there could also insert a nuclear warhead on any city in the US. That is the capability to launch that satellite demonstrated the capability to successfully fly an intercontinental ballistic missile. And that meant they were considerably ahead in their program beyond what we thought. And that was very frightening by itself. On a public level, Sputnik also demonstrated that the Soviet Union had technological capability which most Americans and indeed most people around the world had not suspected. They had essentially beaten us in a declared race to get into space and they continued to beat us over the course of the next 3 1/2 years until in 1961 they put the first human in space. And this had an enormous impact in the US. Because it was seen that if they could best us technological there than perhaps they really were turning into a superior society, better able to compete in the kind of technological race, not just in arms, but in civilian developments as well. So the US committed itself to a space race to demonstrate that we were technologically superior to the Soviet Union. And this was really what the Apollo moon mission was about. It was a demonstration of our technological superiority. By the middle of the 1960's, long before we ever landed on the moon, the Russians had dropped out of the space race and conceded essentially that they were incapable of building a moon rocket. So we finished the last half of the race alone. And our superiority in space technology has not really been in doubt yet. Nonetheless, the civilian space program in the US goes on as a sort of artifact of the cold war. Some how or other it seems to be perceived that if we don't stay ahead of the Soviet Union, that will demonstrate that they've caught up and might be passing us again. So we continue to conduct a large part of our space program, that is the manned space flight program, primarily as an artifact of the cold war. Even though the cold war is now over.

ANTONELLO: WHAT ABOUT SDI, STAR WARS??

As soon as the super powers in the cold war realized how powerful the new missiles were, the intercontinental ballistic missiles, they began to think of ways to defend themselves against them. And concluded during the 1960's that realistic defense against ballistic missiles was impossible. It was technologically impossible. Hitting a bullet with a bullet, as it was phrased at the time. Was too difficult a task technologically. And so they agreed in the first SALT agreement that they would limit their defensive ballistic missile systems. And then they limited them still further in the protocol of 1974. Nonetheless, in the ensuing years in the 1970's a series of technological developments took place which made some scientists and engineers in the US believe by the early 1980's that the technology of ballistic missile defense was now possible. And they succeeded in convincing president Reagan that it was possible. And he initiated a large scale program to develop a program for ballistic missile defense. The most intelligent critique, I think, of ballistic missile defense was provided by the so-called MacNamara condition. And that was any ballistic missile defense system which you are going to deploy has to be cheaper than the system that it is going to intercept. Otherwise its in the advantage of the enemy to simply build more missiles and overwhelm your system. They will bankrupt you that way. You can't afford to pay more for defense than your enemy is paying for offense. By that standard no ballistic missile defense system that has yet been proposed, including Star Wars, has any prospect on any

foreseeable horizon of working. Nonetheless, parts of the Strategic Defense Initiative might work. It is a layered defense system. And one aspect that could work is point defense. In fact that's the kind of defense we saw in the Gulf War. That's what Patriot missiles are. If you know where the missile is trying to go, you can set up a missile at that site to intercept it at the last minute. That's an easier technological problem to solve than intercepting all missiles that might be coming into a larger area like the US. So some aspects of the Strategic Defense Initiative are likely to pay off and prove to be practical. And we might even want to employ them. The complete layered system that president Reagan proposed is as yet, no where in sight.

ANTONELLO: WHAT WAS THE DIFFERENCE BETWEEN THE GULF WAR AND THE VIETNAM WAR??

In the Vietnam war the enemy chose to engage the US on his, that is the enemy's, terms. The North Vietnamese adopted a style of warfare that they took and modified from Mao's warfare against the Japanese in WWII. And they used it very successfully. One technique that always works in warfare is make the enemy fight on your terms. Which we essentially were forced to do. The US was unsuccessful in getting the enemy to fight on our terms. The big difference with the Gulf War is that Saddam Hussein, incredibly, chose to fight on the US terms. He chose to fight the kind of war, the kind of conventional war that we had been preparing to fight for 40 years. That is large scale tank and aircraft engagements on the plains of Europe transplanted to the desert. And we could make that transfer very easily. In that kind of warfare, he never had a chance of winning from the outset. He played exactly right into our hands.

ANTONELLO: WHAT ABOUT FROM THE TECHNOLOGICAL POINT OF VIEW. WHAT WERE THE DIFFERENCES BETWEEN THE GULF WAR AND THE VIETNAM WAR??

The major differences, technologically between the Vietnam war and the Gulf war were that in the Vietnam war, the enemy adopted a technology that was appropriate to the circumstances under which he was fighting. That is guerrilla warfare in the jungle, warfare of movement, subterfuge. And the US tried to apply the weapons and techniques that it had developed for warfare in Europe. In the Gulf war it was perfectly applicable to apply that technology that we had developed for Europe because it worked perfectly in the desert. In fact it probably worked better in the desert than it would have worked in Europe. Because of the difficulty that the Iraqis had in hiding and camouflaging their resources. They stood out there and the US found it very easy to apply its superior firepower and simply destroy them in place. Without the great stand-up confrontation that the Iraqis hoped to provoke.