

## **A Technology Strategy to Discourage Strategic Rivals**

### ***Background for "Using the Military to Defend Against the Economic Threat"***

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In military terms the United States today is entirely without peer, with about half of the entire world's defense spending. It is not surprising that the world's richest nation should have its strongest defense forces, but the United States spends a much higher proportion of its GDP on defense than most rich nations. It is clearly an important economic drain and we should ask whether we really need it.

The three principal rationales for our defense establishment are

- We seek to protect against the emergence of what is termed a *peer competitor*, by which is meant a state or coalition with the wealth, manpower, and military capacity to gravely disrupt the world order. This is a concern which stems ultimately from the experiences of the late 1930s

and early 1940s where we found ourselves ill-prepared to respond to Nazi Germany and its Axis coalition.

- We want to be ready to deter and if need be act decisively against any reckless adventures by local powers such as Saddam Hussein's 1990 invasion of Kuwait, or Iran's often-repeated threat to close oil traffic through the Strait of Hormuz.
- We attempt to dampen potentially disruptive instability and unrest through counter-insurgency, peacekeeping, stability operations, counter-terrorism, etc. – operations that can be lumped somewhat bluntly but not inaccurately as *world policing*. This is a mission which goes back on a more localized scale to the founding of the nation, and for long was the principal mission of our armed forces, but it grew world-wide in the Cold War and was given a great impetus by the 9-11 terrorist attacks.

The world policing mission does not require massive forces. In fact, mass tends to be self-defeating, since it evokes destabilizing counter-reactions.

We have been approaching the problem of forestalling peer competition in a way which does involve mass, and it accounts for most of our heavy forces – armored forces, as well as most of our naval and air forces. In essence, we maintain most of the forces we would need to fight a peer competitor if there were one

(leaving an ample margin for dealing with localized contingencies).

But there isn't a peer competitor, nor one in sight. The candidates most often named, China and Russia, don't come close to our capabilities, not even in combination. Our massive forces may tend to discourage them from trying in some respects, but we can also see instances in which they give would-be competitors a target to shoot at. In many cases the military in China, Russia, and elsewhere justify "requirements" for systems and forces on the grounds that they are needed against this or that American capability. Thus our posture tends, in some degree, to stimulate the threat we hope to guard against.

Our massive forces are to a considerable extent the legacy of the Cold War, when we could find no realistic alternative to them in the face of what seemed to be a serious threat from the Soviet Union. Now, however, we face the prospect of large expenditures to replace and renew legacy capabilities, at a time when we are becoming acutely aware of the economic dangers we face. Is there a way to meet this need more efficiently? Specifically, can we discourage others from seeking to become peer competitors (in the military sense) without maintaining a huge force margin?

Standard international relations theories of state action are of limited value in this because they do not probe into the

motivations of leadership structures. But we can learn a good deal by looking at history.

For two millennia and more, European states and proto-states adhered to the pattern elegantly summed up by Charles Tilly: "War made the state, and the state made war."<sup>1</sup> Rulers were almost always a military aristocracy who saw warmaking as the principal public function of any government, at least in principle.<sup>2</sup>

Of course furthering the private interests of the rulers had always been an important state function and when in the late 16<sup>th</sup> century Netherlands governments led by merchants and bankers emerged, economic development of the state itself naturally took a high place in government priorities – even as the Northern Netherlands waged an intense and ultimately successful campaign to secure its independence from the greatest conquest state of its age.

The English took up the developmental model and expanded upon it beginning late in the 17<sup>th</sup> century. England's success in combining economic development with military

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<sup>1</sup> Charles Tilly, *The Formation of National States in Western Europe* (Princeton: Princeton University Press, 1975) p. 42.

<sup>2</sup> There were notable exceptions, such as Medieval Venice and the Vatican states, but even they spent heavily on military forces and made war freely.

strength encouraged emulation and the model slowly spread. In most places this involved strong opposition from a military aristocracy, but in what became the United States the developmental state model was accepted from the outset as the logical norm and the warmaking state model was rejected.

Warmaking had always been widely seen as a certain form of development, involving conquest of territory to increase the state's power and wealth (on the model especially of Rome). It was *extensive development*, in the sense that it sought to extend the state. But the developmental broadened and shifted the focus, with new emphasis on *intensive* development, getting more output from the existing resources.

The military aristocrats who dominated warmaking states sneered at the weakness of developmental states run by lawyers. But developmental states proved efficient at generating not only economic but military power, and at using it when it served them. In 1918 a coalition led by developmental states vanquished and destroyed the last remaining warmaking states, the German and Austro-Hungarian empires. All the world's remaining military aristocrats were reduced to powerlessness and it seemed that the era of warmaking states was at last closed.

But the Great Depression of the late 1920s and 1930s was widely seen as discrediting the developmental state model, and brought a curious and terrible revival of the warmaking state in

Germany and Japan. Their destruction in 1945 left the Soviet Union, a strange hybrid – ostensibly a developmental state but one which rejected law and espoused a doctrine of revolutionary if not outright military worldwide extensive development.

Today, with the Soviet Union gone, we continue to find ourselves bedeviled by states such as North Korea and Iran, which reject or do not fully accept the developmental state model and embrace at least portions of the warmaking alternative. But with their limited size and resources limited by their developmental limitations these are unpleasant nuisances rather than major menaces. All large and powerful states have embraced the developmental model, including those usually listed as potential peer competitors.

States which grew able to match our wealth through intensive development could limit our security options, but if this is a "threat" it is not one we can hope to avert by military means. On the other hand, it is reasonable to look to military options for reducing the risk that powerful developmental states might veer off to become warmakers, as Japan and Germany did in the 1930s.

In those cases there was initially a spectrum of views among the members of influential groups. Some strongly favored non-military intensive development while others stridently called for extension of the state by military means. The both cases the political strength of the developmentalists was undercut by a

combination of factors, including economic collapse and some ill-advised policies pursued by the United States and European developmental states. A further factor was that the developmental states were seen as lacking both defense strength and determination, lending credence to the militarists' insistence that warmaking or even the threat of it could reap great rewards.

It is the somewhat distorted and partial recollection of this history that largely underlies the arguments of those who today insist that military strength is needed to guard against another Nazi Germany or Imperial Japan. They tend to forget or ignore both the specific mechanism by which greater strength might have averted these misfortunes and the other important factors that were involved. They tend to conceive of our military strength as deterring a monolithic warmaking party already in place, not as strengthening the position of those who might avert a takeover by warmakers in the first place. They distort or forget the actual history in the service of this preconception.

In reality the United States maintained a Navy that was more than 50% larger than Japan's throughout most of the period before World War II. This was unsurprising since navies are heavy investments and the Japanese Empire never had a GDP that was more than 15% as great as America's, even counting Japan's conquests and colonies.

To Japanese militarists, however, U.S. naval superiority was not a deterrent but a challenge. It was a threat to Japan and

its rightful place in the world, they thundered, and this rhetoric helped them to gain power and to stir the public to a supreme effort which carried their fleet to near parity in some critical categories just as they launched their attack.

Rhetoric of this sort about "encirclement" is widely employed by would-be warmakers. In the case of countries anywhere remotely close to our matching the strength of their powerful rivals it is much easier to find historical examples of this sort than of warmakers who have been overawed by the threat of superior military power. Today we hear strident warnings of American and western encirclement from many quarters in a variety of states, including China and Russia. We can scarcely hope to shout them down from afar, but we may be able to strengthen the hands of developmentalists in their internal struggle for power against warmakers.

To prevail the developmentalists must be able to convince the politically powerful group in their country – whether it is a narrow clique or a broadly-based electorate – that they offer a realistically superior alternative. They need to be able to argue that intensive development can work, that military expansionism will not work, and that fears of encirclement are not realistic. We should pursue policies that support them on all three points. Our own military posture can have a powerful effect on the second and last.

Imagine that in country X developmentalists and warmakers are contesting for power. The economy is doing poorly and America is widely perceived as having pursued policies against X's interests, while ignoring and slighting X's leaders. Would-be warmakers demand extraordinary powers and resources to "defend" the motherland against "American aggression." *We can sink America's aircraft carriers with our missiles, they insist, and build defenses to overwhelm their attacking planes and missiles. Their corrupt and effeminate soldiers will flee at the first shock of our steely attack. Even their nuclear weapons will avail them nothing, for they will not risk our strikes on their cities. Give us the resources and we can prevail.*

Even if their claims turn out to be as hollow as Saddam Hussein's, a conflict or even a serious threat of one with a major country could be hugely costly.

Of course there is some level of military superiority beyond which the claims of the militarists become absurd bluster which not even the most credulous will credit. Perhaps there are closet warmakers in Mexico who would urge their nation to arm itself and defeat the evil machinations of the *Yanquis*, but if so they have no hope of power. But in a state that is even tolerably close to our wealth such proposals might have more force, especially when the credibility of the developmentalists has been undermined.

So must we really maintain forces that are five times as large and costly as those of our nearest rival? Is that what it takes? Is it even enough?

It is questionable whether it is either necessary or sufficient to guard against a state like China or Russia "going rogue." The main restraints on their behavior have little to do with our level of military force, and if these restraints should burst then our existing forces could well serve as much to stimulate as to dampen their own military development.

What we should want to do is to increase the anxiety in places such as Moscow and Beijing about the consequences of military opposition to the United States while at the same time reducing anxieties about American military action against them and their own core interests.<sup>3</sup> At the same time, we should seek to reduce the costs of accomplishing this.

Anxieties are not altogether calculable or predictable, but they tend to be strongly related to uncertainty. We should seek to increase uncertainties about what unpleasant surprises we might have in store for those who pursue a course of military

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<sup>3</sup> The *interests* of a state are whatever its ruling elite agrees it is interested in, and thus can vary widely. Self preservation is almost always high on the list of interests and I take this as a state's core interest. We must be aware, however, that elites may define their core of interests more broadly.

expansionism, while fostering assurance that we are not building capabilities to attack others.

One of the key differences between the situation of today and that of 75 years ago is the greatly expanded role of technology, both in actuality and perception. American and allied technological developments in nuclear weapons, radar, communications, electronic warfare, precision weapons, stealth, have transformed warfare. And all came as disagreeable and even shocking surprises to our opponents and enemies. Accounts by former Soviet officials have made clear how repeated American technological shocks demoralized the Soviet military and undermined its credibility with officials. The expectation and dread of technological surprise can be a powerful weapon.

To work well it needs to be strongly asymmetric – they must see good reason to fear that we have technology they do not and that their technological capacities are not in any way equal to our own. We have a good start on this, have the potential to increase our lead, and could benefit in many areas beyond defense by doing so.

It is impossible to do more than sketch, in broad terms, a few of the areas in which S&T might yield further important advances that can be used as technological surprises for defense.

As I showed decades ago, sensors are generally the most highly leveraged aspects of defense technology. Identifying and precisely locating or tracking an enemy's key targets – and preventing him from doing the same to us – gives us an enormous advantage in war. There are a great many important kinds of targets that we already have adequate means to neutralize or destroy, if only we can find them.

In very broad terms we can distinguish two classes of sensors: remote and proximity. Remote sensing generally depends on understanding the physics of target radiated signatures and their propagation, and processing of the signals they generate, as well as the necessary electronics. There are also potentials to interfere with the operation of enemy sensors. Ideally, these would leave the enemy unaware that his sensors were not serving him.

Many signatures do not lend themselves readily to remote sensing. This is particularly true of chemical signatures, which can often provide very precise discrimination. For these it may often be better to go to the source with proximity sensors.

Many animals have proximity sensing systems that are exceptionally sensitive to certain chemical signatures – drug-sniffing dogs are a well-known example. Modern biological research is revealing the mechanisms by which these natural sensing systems work, and opening the door to development of artificial systems that exploit these same principles. As these

sensors operate on molecular scale they lend themselves to incorporation in highly miniaturized systems. They can be made to emit signals which can be detected by remote sensors in order to transmit their information.

Highly sensitive miniaturized sensors might also be integrated with weapon delivery systems to permit highly precise placement, so that a target may be destroyed by a very small amount of explosive with very little damage except to the target. Further, the mastery of chemistry and biology that can produce these sensors might also be turned to production of other damage agents that are tuned to the particular vulnerabilities of the intended target.

It is not only the physical destruction of physical targets that matters. Research on past wars has shown instances where specific cultural blind-spots seriously affected military performance. If social scientists can identify an enemy's cultural weaknesses and devise methods to exploit them very precisely, it could gain our forces a significant edge.

These are only a scattering of examples, out of a wide universe of possibilities. It must not be thought that because we can describe them easily in general terms that it will be easy to identify specific opportunities and develop successful systems. This is very far from the case. I have been directly involved in several projects that successfully discovered and developed very advanced systems based in entirely new principles, and have

observed and studied a number of others. Generally they involve intensive, sustained efforts by a team with deep knowledge of the relevant science and technology. They must be guided by an understanding of military operations and needs, but allowed to range widely. The outcome can never be clearly foreseen at the outset and there can be no guarantee of any sort of success. It is not an activity for the easily discouraged.

The examples I have outlined here, diverse as they are, all share one characteristic: they depend on fields of science and technology in which the United States has a very large margin of superiority over any possible adversary.

We are often told that China's scientific and technological capabilities are increasing rapidly. That is true as far as it goes, but a number of international comparisons have shown clearly that China is still far behind the United States in most critical S&T areas. Chinese S&T resources remain much smaller and less mature, and heavily concentrated in development of products for China's growing industries. Russia has a stronger history of scientific effort than China but Russian S&T resources lag far behind our own, too.

Our superiority in S&T is not a God-given right or a result of any innate American virtue: it is the legacy of past efforts to develop American science, led and largely funded by the federal government. In recent years U.S. government support of science and technology has slackened a great deal in many ways, and by

many measures American S&T is slipping, but it is not too late to reverse these trends. To do so, however, will require not only money but widespread public appreciation and support, and some way of convincing young people that a career in science or technology can compete with one in finance or law. Absent this, the United States seems destined to sink into decline, and not only in defense.

The kinds of technologies I outline here are at the farthest pole from weapons of mass destruction. Instead they are weapons of highly discriminate effects. If we can combine capabilities of these classes with an understanding of just how the enemy operates (using information supplied in part by advanced sensor systems) we can blunt or neutralize his attacks and overcome his defenses in very selective and precise ways. It is a fearsome prospect for a warmaking state that stands to see all its operations crippled.

To achieve the best effect in discouraging states from ceding power to would-be warmakers it is important to ensure that they recognize our technological capabilities without knowing too much about them. The projects themselves need to be conducted under conditions of tight security and news and demonstrations of their products need to be carefully managed.

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