WASHINGTON ROUNDTABLE
ON SCIENCE & PUBLIC POLICY

Deterrence in Space:
Responding to Challenges to the U.S. in Outer Space

By

Dr. Robert Butterworth
and Dr. John Sheldon

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Nov. 13, 2008

Jeff Kueter: Good morning, all. It is my pleasure to welcome you here for this discussion of the application of the concepts of deterrence to space. Most of you that have followed the work of the Marshall Institute National Security and Space project understand that we strive to provide opportunities for scholars to engage with the policymaking community on topics related to preserving America's power in space. In particular we work to provide productive advice to our friends in Congress and the Administration, and to the new Administration, on the steps that they can take to preserve, protect and defend U.S. capability for action and to advance our national interest. Now we understand that there is a considerable discussion going on today about the application of concepts of deterrence to space power, so we thought it was particularly pertinent to assemble my colleagues to provide some comment on that subject and then to engage you in a dialogue on that subject. That is our purpose today. Out on the front table you will see two papers, one, an op-ed by Dr. Butterworth released earlier this month on the website DoDBuzz,[1] and the other, a paper by Dr. Sheldon which we are releasing today, referencing the subject of today's meeting, to take with you.[2]

It is my pleasure, then, to introduce our two speakers. I will introduce them in the order in which they will speak. Dr. Robert Butterworth is the President of Aries Analytics, a consultancy here in town. He has had a long career working in space and national security issues. He is a member of the Marshall Institute board of directors and has been working with me extensively on our security space project these last several years. The second speaker is Dr. John Sheldon, a Fellow at the Marshall Institute as well as a visiting professor at the School of Advanced Air and Space Studies at the Maxwell Air Force Base in Alabama. Gentlemen, thank you for being here.

Robert Butterworth: Thanks, Jeff, for putting this on. Thank you ever so much. I had the great pleasure of reading John's paper last evening, and I thought "I couldn't have said it better myself." And then I looked at my paper and in fact, I didn't. So I

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[1] Robert Butterworth, "Fight For Space Assets, Don't Just Deter," George C. Marshall Institute Policy Outlook, November 2008 http://www.marshall.org/pdf/materials/614.pdf

[2] John Sheldon, "Space Power and Deterrence: Are We Serious?" George C. Marshall Institute Policy Outlook, November 2008 http://www.marshall.org/pdf/materials/616.pdf

get to start today because I will provide sort of the Cliff Notes version of what we want to talk about and then the real substance comes from Dr. Sheldon's very fine paper.

Since this is Washington, we know that we have to start with things like "what is the meaning of 'is'?" We want to be sure that we know what we are talking about. There is a Shakespeare play going on right now at the Folger Theater, the first part of Henry IV, where there is a lively exchange between Glendower, the magician from Wales, and Hotspur. Glendower is talking about his prowess in the magic world and he says, "Why, I can call the spirits from the vasty deep." Hotspur, having had enough of Glendower's bragging, snaps back at him, "Ah, yes, but will they come when you do call?" So he is playing on the word call. He is also parsing one of the issues that we have when trying to deal with deterrence, which is that if the spirits didn't come, would we then say that they were deterred?

Of course, the problem is that we wouldn't know, and that is, in fact, one of the central problems with deterrence policies. There are many others as well, but we found deterrence to be a very tricky course to pursue, especially with nuclear weapons during the Cold War. And I found it quite strange actually to find people wanting to buy into these problems with deterrence policies for our space programs today, especially when there are so many very sound programs that are actually defending our interests in space that we don't have to get back into this business about threats of punishment and so on. So let me try some clarification at least of what I want to talk about, what I want to rail against, and what I want to encourage.

I realize that people can make words mean what they want, like Humpty Dumpty in *Through the Looking Glass*, but we do need a little clarification. Otherwise the corruption of the concept will bring us some consequences that we are not particularly pleased with. You might notice that deterrence can result from many different actions, but a deterrence policy is quite distinct from a defense policy, involving some conceptual differences which were admirably summarized by Glenn Snyder in a 1961 article. Remember that NATO, for example, is not a collective deterrence treaty, that President Reagan didn't try to transform the strategic relationship with a Strategic Deterrence Initiative, that the programs that he started there are not today pursued by a Missile Deterrence Agency, that they are not under the leadership of Secretary Gates as the Secretary of Deterrence, and that if you look back at the Cold War, our strategic deterrent forces were in fact strategic offensive missiles.

So I want to insist on this distinction between deterrence and defense. It has been very useful for a very long time and I would hate to see it be occluded just because we are now talking about space rather than nuclear weapons. The distinction is one between punishment and denial, between prevention and retaliation, a question of the capability, and a question of the capability to attain an objective versus the

cost/benefits of doing so. For example, I might decide that someone in the audience is interested in pushing me off the podium (which could well happen soon, but maybe not quite yet). If I had a defense policy, I would simply arm myself and say, "You can't do it. Give it a try, but it won't work." If I had a deterrence policy, on the other hand, I might well recognize that you are younger and more vigorous and there are more of you and that you could certainly push me off. But if I had my hands on your little baby daughter and a vat of lye here, I could certainly tell you that if you push me off, I will dump her in the lye. And if you believe that, you might not push me off. The difference between a threat of punishment or a threat of retaliation and a capability to protect an objective – that is what I am trying to insist on.

The chief problems that we have found with trying to pursue a deterrence policy with nuclear weapons during the Cold War are as follows: first of all, if your deterrence policy fails for any reason at all, accident or whatever, you lose. All you can do at that point is to exercise your punishment threat, if you want to. And revenge might in fact be sweet, but it's not the first order of business. Under a deterrence policy, you have made little or no provision for what you would want to do if deterrence fails. What you haven't done, then, is to pursue what Frederick Iklé recommended, which is to think through how a war would end and what kind of capabilities you would want if your deterrence failed. Closely related to that is the fact that you don't know how to make a deterrence policy work, because it's in the eye of the other side and how the other side views things in general, not just in peace time but in a crisis time, a time when everything looks bleak, or maybe in a time when the drums of war have been pounding and the times are driving everyone toward a crisis, as in the summer of 1914 perhaps.

Then there is the problem of what the other side is. It is hard enough to figure out what our side is. We have a congeries of actors, of bureaucrats, of organizations, of views and perceptions. Do we really understand the other side so well as to make the threat that we use precisely meaningful to them in a way that they believe it and that they will, in fact, be deterred? To the extent that we do understand the views of the other side, we essentially become prisoner of their strategic outlooks, and that can lead to a bit of a Catch-22. For example, when Secretary Weinberger changed our nuclear strategy, he did so in response to what we had found out about how the Soviets viewed the prospects of nuclear war. They tended to value the capability for a long, protracted war much more than we ever did. As a result, Secretary Weinberger made that a part of our declaratory strategy, that we would have the capability to persist under nuclear conditions, the idea being that that would speak more loudly to the Soviets in terms of their calculations and assessments as to how the war would actually go. But of course as he did that, our own side started complaining, "Wait a minute, we are thinking about making nuclear war more winnable, and if you make it more winnable or if you act as if it could be winnable, isn't that going to undercut deterrence because it will make the other side worry that you might actually launch one?" There is no way

out of these "Alice in Wonderland" semantic traps once you step out to try to pursue this policy of deterrence.

The question is one of communication and shared understanding, not your real intention, but what the other side believes it to be. How can you be credible about that threat of revenge when that is the last option for a rational response? It is very difficult. It leads to lots of questions about nibbling at the edges, of escalation dominance, ties to allies, and all that stuff that we had to deal with during the period of the Cold War. But also, of course, as we saw, it requires serious amounts of money to put it together. And as I mentioned before, it wasn't in fact our nuclear strategy, or if it was, it was so only for about two minutes when McNamara first talked about mutually assured destruction. But after that, we had something that was militarily much more sensible.

Those are key problems with the deterrence strategy that we saw in the nuclear era. How does it apply to space systems? Well, it is actually even trickier, I think. John's paper elaborates on these sins in some better detail as well. Let me just summarize a few. One, we can't do a tit-for-tat kind of strategy: if they hit our satellites, we'll hit theirs. There is absolutely nobody in the world that depends on space to the degree that we do, that has so fully integrated space systems into theater and global military power. That is one of our great strengths and an asymmetrical advantage that the United States has. So if we take away the Chinese satellites or take away the Russian satellites, it has nowhere near the same effect and presumably won't be as deterring as their efforts to target ours. If we fail to protect our satellites, that will have direct battlefield consequences, because those satellites are not just space support, they are an integral part of how we do business in the military today. It can be very difficult to identify who is attacking you, so if you have trouble with one of your satellite support systems, it could be quite tricky to decide whether it was Venezuela or Indonesia or China or whoever. It wasn't that hard to decide who was launching ICBMs against us; that part was certainly easier during the Cold War.

What is important, I think, is that the inseparability of our space capabilities from our total national security relationship, whether it is theater power or global capabilities, means that we are going to have a different view of what is meaningful in terms of threats and capabilities than anyone else. We have to make sure that if we are going to pursue deterrence, that we have punishment that links up to whatever it is that we are trying to dissuade people from attacking, and that can be enormously difficult for us, because to be effective our deterrence strategies must take into account our overall context.

But we don't have to worry about those, in fact, and this is my final point, because we really don't need them for our space systems. We have defense programs that are available. We have technology that doesn't require miracles to be imple-

mented. We can do a lot of strategic things to protect them and it is not going to cost us as much as the National Reconnaissance Program, for example, by a long shot. For example, we could try rapid augmentation and reconstitution of low earth orbit (LEO) satellites. That would in itself reduce the benefits of initial attack. We could have a quick-planned launch for our LEO birds and have silent spares, for example, for ones in higher orbits. That is an option. We could have tighter coordination with our allied and commercial systems and create a virtual armada that could preclude a sudden and debilitating strike against our systems and would also complicate the targeting of someone who was trying to take after us in space. Those are near-term things that we could do actually starting this year.

A little further away, we can improve our space situational awareness, which is going to take a while, and improve our command and control for active measures, such as orbit adjustments or perhaps intercepting things that are on their way up to get us in higher orbits. We might also move toward a distributed architecture for our military support systems. What is interesting about this as well is not only that these things that are real defenses and don't depend on the deterrent threat of punishment, but that they have also don't put weapons in space nor do they invite warfare in space. We need space in order for warfare here on the ground, but we don't particularly need warfare in space.

So in sum, I am urging you to consider only the capability to deny someone the military incentive to strike our space assets. That is the defense option, a response to more of the risks that might initiate attacks and that provides more options for limiting the consequences if those attacks should happen. The defense of our military assets in space is possible without requiring miracles of technology. They are sustainable and effective, no matter what other governments or their constituent elements believe. The defenses provide options that we want if the attacks do come anyway. And if an attack is then seen as too difficult to blind or deafen us, then presumably opponents will seek options other than attacks on our satellites. Now if you want to say then that they are deterred, fine. They might be inhibited, dissuaded, discouraged, diverted – I don't care. But if they get it wrong and they do try to attack us, we have something that we can do about it and we can survive. So our mantra in responding to those would threaten our space assets, I think, should be, in keeping with the latest campaign, "No, you can't." If you seek defense, I think deterrence will look after itself.

John Sheldon: Thank you, Bob. I think you are being too kind about my paper; where mine is long, yours is certainly more succinct and I think you also cover the issues very, very well. Thank you, Jeff, for organizing this. I do relish the opportunity to come here and talk to you today about space and deterrence. Before I begin, I would like to clarify that because my employer is the United States Air Force, the views expressed here are strictly my own and certainly do not represent those of my employer.

My paper starts out with something rather rhetorical that I do believe to be quite true. I don't say these things just in order to create a stir. Talk is cheap when you talk about space and national security. We talk about how important it is to U.S. national security and how it enables the U.S. military to do what it does, everything from nuclear operations right through to counter-insurgency; counter-insurgency, being important today in Iraq and Afghanistan is space-enabled, critically so. What is more, the United States – and I am saying this as a Brit – is probably the premier force in the world today that fights counter-insurgencies. The United States has learned some hard lessons and now fights it very effectively, at least from the military point of view. Politically is another issue, but nonetheless, it is space-enabled. If you talk to anyone in the Army or the Marines fighting that counter-insurgency and ask them if they could do without, for example, communications or the counter-insurgent support without imagery, the answer is yes, you probably could, but it would be much more difficult, far more expensive, would require far more manpower, etc. So it does become an issue for them. When I hear Army guys say to me at the Air War College that space isn't really that important as long as their coms are there, I know it is important. They may not necessarily realize it, but I know it is important there.

There are, of course, people out there who are looking at ways of mitigating the power we enable through space or from space. China certainly demonstrated at least a limited capability in January 2007, but there are others not necessarily looking to use such spectacular systems as kinetic anti-satellite weapons, but issues like jamming and so on. Talk is cheap. We talk about how important it is that there are assets up there and yet we seem to be doing very little with the exception of the Space Protection program to actually protect these very valuable space systems. But more recently, policymakers have now begun talking about deterring attacks against our space systems, which is something to be encouraged. My problem with it is that there is a yawning gap between the intent to deter and our capability to actually bring about a deterrent posture. In other words, the intention to deter lacks credibility so long as key vulnerabilities remain unaddressed.

Now with the invasion of Iraq in 2003, certainly in light of events after 9/11, deterrence as a concept went out the window for quite understandable reasons, and the talk was about pre-emption and prevention. These are certainly security tools that any United States administration should preserve as an option; it always has and probably always will. I am not so sure that it is wise to place those options in writing, so to speak, as the status quo of U.S. security strategy, but nonetheless it is always an option. Deterrence is making a comeback. As my mentor Colin Gray said quite recently, deterrence went into half-retirement and had fallen on hard times, perhaps needlessly so. So deterrence is back, but in a way, it never really went away and it is certainly back in vogue now. It is sad but true that concepts such as deterrence are always rediscovered by those easily captured by fads, and many national capitals, Washington,

London, Paris, are very easily captured by fads. When you are dealing with the media issues and so on, it is very easy to do so. Of course, I am an academic living in Alabama and I have the luxury of sitting back in my ivory tower and looking down on things! I am joking, but nonetheless, we do have a luxury of taking a longer view.

A brief overview of deterrence is needed here in terms of what we are talking about, because there does seem to be some element of confusion. My definition of deterrence is as follows: Deterrence is the attempt to persuade an adversary by the threat of force, and perhaps other measures such as diplomacy or economic sanctions, not to pursue an undesirable course of action. As a result, to be deterred, as Bob pointed out, is a state of mind. It is psychological. On that issue I would also like to point out when I hear pundits and other commentators talk about "the deterrence" or "the nuclear deterrence," I understand its use as a form of shorthand, but there is no such thing as "the deterrence." It is a psychological state of mind. You may have a nuclear force. You may not necessarily maintain it; you may think you have some sort of existential deterrence. We agree that there will be people out there who will choose not to be deterred by it if you don't do something with that force to make it a deterrent, for example, by signaling what you would do with that force in the event of some undesirable course of action.

Just possessing something doesn't necessarily make it a deterrent. I'm a former nightclub bouncer. Before I took up academia, I used to "bounce" nightclubs in Glasgow and Edinburgh. (Don't be confused by the accent; I can really do one if I have to.) What I found was that just being a big guy wasn't really enough, because some of these guys were crazy; they had had a few drinks and you know the Scottish. You didn't really deter by size alone. You had to do things in order to deter people from doing something you didn't want them to do. One of those things might be demonstrating your deterrent effect against somebody who was perhaps getting a bit too rowdy in the nightclub, to send a signal. I, of course, never did that; I just made sure that those who worked with me did.

So we have to do something with the capability we have in order to make other people realize that this can deter. Nuclear deterrence, for example, to use the shorthand, may well deter, but other factors of American power will certainly deter. For example, if you have prowess in the use of Special Forces, that might deter. If you have overall military prowess, which we certainly do in a conventional sense, that certainly may deter. The U.S. economy, despite current difficulties, can deter; having the kind of reserve in depth whereby it can come back in a big way after an attack, as Pearl Harbor demonstrated when the Japanese attacked and the United States wasn't necessarily well prepared, can deter. Other countries noticed that.

Given that deterrence is essentially an exercise in psychological manipulation in order to modify or prevent modes of behavior, it is fraught with uncertainty. Deterrence fails and throughout strategic history, it has failed often because the object of deterring measures fails to notice them. A country may think that it is not being deterred in spite of our efforts to deter; it does not find the measures credible. We think we are deterring, we tell them that we are trying to deter them, but they look at us and think, "You are not serious." Or an adversary is pursuing an agenda sufficiently important enough to its interests that it is prepared to ignore the deterrence attempt, and that certainly has happened.

Because deterrence fails, it has been much maligned in recent times, much like, for example, the United Nations. The task of deterring apocalyptic terrorism and WMD-armed rogue states certainly poses significant challenges for deterrence. Instead, preemptive and preventive force has been identified as a means of dealing with these threats. The problem, as Colin Gray points out, is that the use of preemptive and preventive force is similarly encumbered with uncertainty as well. We may fail in the use of preemptive force. The burden on intelligence for the successful use of preemptive and preventive force is growing all the time. Whatever you do, by the way, is going to be an intelligence burden; it is a question of how much of a burden. Similarly, diplomatic inducements such as offers of arms control negotiations are equally uncertain in their prospect for success. The problem for U.S. policy makers immersed in a distinctive American strategic culture is that whatever approach to security is adopted, it carries a significant risk of failure.

I am reminded of the military historian John Shy, who argued convincingly that American strategic culture has become accustomed, at least in the recent past, to a large degree of certainty in its security affairs, thanks in part to the unique geographical position of the United States and a large measure of fortune. The United States is unique in enjoying this degree of certainty in its defense arrangements. No other country in the world has come to expect the kind of security, close to 100 percent, as the American people demand. Even in France or Germany or Russia, you live with a certain amount of insecurity as a fact of life. You are surrounded by various people who may turn on you any day, as history has proven. The United States has never really had to deal with that, and so understandably and quite rightly, the American people have come to expect a high degree of certainty in their security affairs and arrangements. As a result, the inherent uncertainties of strategy continue to be a source of profound discomfiture for an American strategic culture that strives for certainty beyond doubt.

This inherent uncertainty of deterrence might seem at first glance to contradict the widely-held belief that deterrence during the Cold War was a resounding success. After all, the line of argument goes, nuclear annihilation never took place, so obviously

deterrence worked. Perhaps it did, or maybe we just got lucky. The point is, no one can say one way or the other. Perhaps the Soviets had little or no intention of starting a Third World War, despite U.S. attempts at deterring Moscow. The wider point is that we just do not know, and any notion that we can rest on our laurels because we have tried and tested ways to deter any adversary should be treated with deep skepticism and profound caution. In deterrence, we can only do our best and hope that the adversary is deterred and the only way of mitigating the inherent uncertainty is to prepare for deterrence failure. Again, just as Bob pointed out and as Frederick Iklé also points out, look beyond deterrence failure.

If deterrence is to be successful, at least as successful as we might hope it to be, if we are determined to make deterrence something that's far more plausible, there are a number of measures we can do. These are measures that can certainly be adopted in the upcoming Congress in a bipartisan manner if we are serious, as many of us like to think we are, about protecting our space assets and deterring attacks on them.

One of the first measures is that deterrent threats must be credible. If a deterrence strategy rests on military threats, then well-equipped, trained and organized military forces are required to back up such threats. Furthermore, those military forces should be enabled by plausible doctrine, robust and comprehensible command and control arrangements, and their use should be authorized by policy. Similarly, if a deterrence strategy rests on the threat of some form of diplomatic or economic sanction, then the appropriate means, authorities, and allies are required to back up and enable such threats. The absence of any of these measures can undermine deterrence credibility.

Another requirement or another measure that we can perhaps achieve is common agreement within political, policy, and military circles as to who needs to be deterred and how. Deterrence must also be politically credible, and if doubts about the policy or means of deterrence exist substantially within the leadership of a polity, then the object of deterrence may be forgiven for assuming that the polity in question is not entirely serious. Talking deterrence down, as some people have been doing for the past eight or so years, or even a fundamental misunderstanding of what deterrence is supposed to achieve can be fatal to a successful and meaningful deterrence.

Third, seeing beyond deterrence, which is what I mean and what Bob has made pretty plain. Even if all diplomatic and military measures are in place and political and policy consensus is achieved, deterrence can still fail, as I have mentioned. The issue then becomes one of survival. Can diplomatic resources and military forces still be marshaled to defend interests and continue operations after deterrence has failed? If the security strategy of a government rests solely on the maintenance of successful de-

terrence and nothing more, then all is lost if deterrence proves to be less than perfect, which it is.

There are more concrete measures for deterring attacks on U.S. satellite systems. I have five possible measures that we could perhaps use or at least put in place that might help support a deterrence strategy to deter attacks on U.S. satellite systems. These are not exhaustive; they are just suggestions as a springboard for further discussion.

Try and pursue a strategy of deterrence by denial. Deny the adversary the benefits of attacking your satellite systems by installing, whenever possible, passive defenses on satellites, such as hardening against electromagnetic pulse attacks, measures to make jamming more difficult, and ablative shielding to help satellites both withstand actual physical attacks and survive space debris impacts. Eventually, as individual threats become more defined, active defenses should also be seriously considered, although this will be much further in the future. In tandem with passive defenses, develop and accelerate programs for rapid launch of satellites to reconstitute lost systems and to bolster constellations in times of crisis. Also needed are spare satellites in storage here on earth that can be launched at short notice. While the Operationally Responsive Space (ORS) program is seeking to address these issues with the use of small satellites, efforts should also be made to speed up the time it takes to place larger satellites and more traditional systems that are being used in orbit.

I suggest that we prioritize space situational awareness programs in order to build as quickly as possible a comprehensive picture of the space environment, something that we are severely lacking today. If policy makers and commanders possess the ability to differentiate between purposeful attacks and the hazards of the natural space environment, then the potential for misperception and miscalculation is dramatically reduced. Furthermore, effective deterrence is strengthened by the fact that space situational awareness could potentially indicate the nature and origins of any attempted attack on a satellite, something that would be very challenging given that there are many ways in which one can attack a satellite, including cyber.

As Bob mentioned, we need to work better with our allies, the European allies especially, but also countries such as Japan and possibly India, who are developing quite significant space capabilities in the national security realm. In Germany and Italy, they have space radar systems, radar and imaging satellites and Cosmos Skynet, for example, which the NGA is using right now in support of forces in the Middle East. We need to work much better with these allies for a number of reasons. One is that it is the right thing to do. The United States can no longer live in a world where it thinks it is the only country out there doing this thing. Also it would complicate any adversary's plans and intentions to strike against U.S. space systems if the U.S. were able to

seamlessly access the systems of allies if it should lose a system, so that an adversary has not only to contend with a U.S. response against an attack, but with an international response as well.

If the deterrence by denial strategy fails or is not enough in the context of the time, then we also need to start looking at a deterrence by punishment strategy and how that can be exercised. I am with Bob on the point that a deterrence by retaliation strategy at this point in time is probably not useful. As Bob says, the United States is the only country that uses satellites to the extent that it does. We might take out, for example, China's satellites. Iran has a space program, by the way, and it might even be successful one day, so let's say there is an Iranian satellite out there. Sure, we can take it out, it might feel good to do so, it might even irritate our adversary, but we are not actually bringing about any measurable improvement in security. So until such a time as other countries actually integrate their space systems into their national security structures to the extent the United States does, a strategy of deterrence by retaliation is probably not useful.

We need to look at the failure of a deterrence by punishment strategy. One of the ways we can start doing that, and this is before we even start talking about somewhere down the road like space weapons, weaponization of space and so on, is to take a thorough look at the command and control arrangements that exist within Strategic Command between StratCom, Air Force Space Command and the 14th Air Force out at Vandenberg Air Force Base. The reason why I say that is if you look at the command and control structure that does exist, there are certain dotted lines that exist between the commanders of these three organizations, which seem to me to suggest the attitude, "Well, when the day happens, we'll sort it out when it happens and we'll decide then." Now you might argue that this gives substantial political flexibility to decision making. You could also argue from a potential adversary's point of view, they look at that and say, "They are not sure what they would do if we were to do this." That is something that we should take a look at again and perhaps strengthen those command and control arrangements, so that when something happens and a deterrence by punishment strategy is to be pursued, we are not sorting out the command and control arrangements on the day of the attack; we are actually ready to go.

That means talking to the other Combatant Commands such as PacCom and CentCom and individual services, not just the Air Force, but also the Navy, the Marines, the Army, even the Coast Guard and other civilian agencies, about how when a situation arises such as this, what forces they can provide that will support the pursuit of a deterrence by punishment strategy. That might involve, for example, using terrestrial forces, air power, sea power, special forces, cyber attacks, whatever combination of all those, alongside diplomatic and economic measures to punish counter-value targets of the adversary.

If an adversary – and I am not naming any adversaries, because I am not sure they are that well defined that we can do so – but if an adversary is identified that does pose an immediate threat to our space systems, then we should be start identifying counter-value targets that those forces should be able to strike, should an attack on our space systems occur. When I say counter-value targets, I mean counter-value targets where we can also strike and find some sort of measure of controlling escalation.

These measures are by no means exhaustive; as I said, they are merely set out here as a springboard for further discussion and consideration. Overall, it must be noted that many of these measures would contribute to what Patrick Morgan calls a condition of general deterrence, whereby measures are not aimed at any particular adversary. When threats to space systems from individual adversaries do become defined, then tailored deterrence strategies can be developed, including the identification of suitable counter-value targets in case a deterrence by punishment strategy should be pursued. In such cases, threats by individual adversaries can be deterred by signaling the capability to punish the adversary should it choose to carry out attacks against U.S. satellite systems. On a more general note, dissuasion is possible before this situation even arises if the U.S. is able to unambiguously demonstrate clear and robust command and control arrangements that are able to not only assure the critical U.S. national security space mission, but can also be supported at short notice by the other Combatant Commands, the individual services, and other agencies.

My final point would be, and this bears repetition, that deterrence is inherently uncertain and will *probably* fail at some point. This said, it poses less of a political and intelligence burden than its alternatives, preemption and prevention. These latter approaches can never be disavowed, as there will be occasions when they are of critical necessity, but these occasions should be rare. Ultimately, however, what Clausewitz described as friction – that is, if something can go wrong, it will go wrong – alone will impede attempts at deterrence just as much as it will impede the plans and intentions of the adversary. No amount of capability, organizational restructuring, or diplomatic skills can overcome friction entirely, but they can go a long way to mitigating its worst effects. Doing nothing while hoping for the best, however, will only court catastrophe and failure. If we are serious about doing deterrence, then we must back it up with capability. There is no free ride if U.S. policy makers are serious about deterring space attacks. Resources are required and a modicum of political capital will probably have to be expended. The current financial crisis will have severe budget implications for many years to come and the protection of U.S. satellite systems may fall victim to such cuts, but only to the detriment of U.S. national security. If U.S. national security space is truly as important as many of us are saying, then the political will should be there to secure the necessary funding for what must be done. Money may be scarce, but if it is

important enough, it can be found. After all, we did find $700 billion out of nowhere. Anything less than this is just hot air. Thank you.

Questions and answers.

Question: My question is for Bob. I certainly agree with you about the importance of protective measures for space assets, but I disagree with you about your definition of deterrence. It sounded from what John said that he is also including deterrence by denial as an aspect of deterrence. Why do you separate denying benefits instead of just imposing costs as part of deterrence? You talk a lot about Cold War deterrence where a specific application of deterrence concept was to focus on the threat of punishment, retaliation, mainly through nuclear weapons. We have moved on in deterrence thinking since then. If you talk with most folks or read the Strategic Deterrence Operations Concept, you will see there is an emphasis on both denying benefits – deterrence by denial – as well as imposing costs. That is the punishment side. Why do you define deterrence the way you define it?

Butterworth: Because I have a clearer view than you do! It is not that you have moved beyond it; you have moved backwards. All that work that we put in in the 1950s to try to understand how to deal with this new phenomenon has essentially become corrupted semantically as this term "deterrence" was applied to almost everything. It is fine with me if you want to call that deterrence. I don't mind at all when John did it in terms of pursuing that, but let me tell you a brief anecdote. John and I were together at a small grouping in Colorado Springs a few weeks ago which was looking at space deterrence. The person chairing it kicked all this off and I asked the question, "Why are we looking at deterrence rather than defense?" It became clear as it went on throughout this relatively painful day of semantic obscuration that when they talked about space deterrence, they were not talking about defenses. They were not talking about denial. They were not talking about weapons, counter-weapons, or any of those other four things that John mentioned. They were, in fact, talking about retaliatory punishment and that is what they meant by deterrence. So I am insisting because I don't want to buy into something, saying, "Absolutely I am in favor of space deterrence, positively!" when what I mean by that is protecting those assets. But I absolutely don't mean trying to do something like incinerate a city or use nuclear weapons on their homeland because they took out a satellite. As long as we are quite clear what we are talking about, you can call it what you like.

Question: I think you are right. We need to start by defining what we mean, because people do throw the word deterrence around sloppily. We agree on substance.

Question: Bob, I have a question for you. I understand what you are saying. I don't share your optimism, though, for how successful space defense can be in a truly defen-

sive sense. I think it is absolutely important to provide protection to the extent that we can for our satellites, at a minimum, so that nobody gets a free ride and they don't have to worry that there is something they have to overcome. At the end of the day, the satellites follow predictable orbits; we know pretty well where they are going to be. At least in my area of study, aerospace, the consensus with very few dissenting opinions was that it is awfully hard to successfully defend orbiting assets against a determined adversary who wants to attack them. Operationally responsive space (ORS) and backup satellites are fine, although I might point out that it is not cheap at all. One of the biggest problems that ORS has run into is the financial one and I would observe that at this particular time, there might not be money available to buy big satellites and keep them on the shelf. I would like to challenge you and draw you out a little more about this question. What I hear you saying is that with a little bit of effort it is very easy to defend our satellites. What I am hearing from many people is that it is actually not. If China really wants to take out our satellites, despite our best efforts, they probably are going to be able to do that.

Butterworth: My response is that you caught me being guilty of what I was accusing the deterrence people of doing, which is to use a term, defense, rather broadly. Thanks to your kind invitation, I will try to pull that apart a little bit. If one imagines a one-on-one encounter between an orbiting low-earth-orbit American satellite and a mobile launcher that has shown a capability to take out that satellite, you are perfectly right. The geometry and the ballistics are going to do it to us. There simply isn't time, even if we had much better space situational awareness, to do much in terms of orbit adjustment or, an intercept or whatever else people can imagine. However, you and I might differ a bit. Let me put this in a context of a scenario like the Taiwan Straits scenario, because that is the one that has been kicking around for a while. The idea presumably is that the Chinese would like to delay the involvement of U.S. power projection capabilities and the way to do that is to take out these low-earth-orbiting satellites. That will confuse and delay us and then they can be in Taiwan and say, "Let's negotiate now" and we have a terrible choice to make about what we want to do. But they can't take all our satellites out at once, and taking out a satellite does take some pretty good guidance from the ground. You have to know where things are. So if I suddenly complicate their targeting problem, either by working against their SOSI capabilities or by proliferating things up in orbit, it is going to make it a lot more difficult for them to be confident that they can buy that seventy-two hours or whatever it is to keep the carriers from getting there. That was the idea behind the rapid augmentation or reconstitution business. And the first time they kinetically destroy a satellite in low earth orbit in such a crisis situation, they will have to sort out the 20,000 pieces and figure out which ones are fragments of whatever they hit and which ones are our satellites that we have adjusted a little bit or that we have launched. So it is defense in the sense of a combination of strategy and capability. It is protection of a capability for us. But you're quite right; it is not the idea of a shield in front of the satellite or something

that would intercept an interceptor *a priori*. That is low earth orbit. Now for higher orbits, it is a rather different problem because it takes quite a while to get up there and there you are perfectly right; we don't want to be moving these NRO behemoths and trying to re-launch them. That is just not going to work. Those we have to make hard to target or have silent spares for. One of the principles of doing things militarily is redundancy and resiliency, so you might be able to do something along those lines, but that is enormously expensive and quite happily, as far as I know, the proximate threats are to the low-earth-orbit assets. Is that responsive?

Question: Yes, I would agree there are actually a variety of measures that we ought to take. I disagree with some, but I would endorse a number of the steps you recommend. Defense, in that sense, has a much broader context. I think we have seen that on 9/11, where all kinds of landline communications went down because there were a few vulnerable points, but internet connectivity survived because it is such a distributed capability. There is a lesson for us there in space as well.

Butterworth: I might go a little further. As we think through the military scenario, the kinds of satellites that we want to surge or augment or replace are probably not what are kicking around up there today. We are talking about military capabilities, so in particular I can name two, and neither of them has been envisioned in the BASIC decisions. One is a synthetic aperture radar, because we are bound to be doing military operations at night, through fog and all that kind of thing, and the other, of course, is OPELINT, so that we can establish air superiority, if nothing else. Those are the two that should probably be surged right away, and they can be made relatively small and launched on Minotaurs. That can keep the price down a little bit. We might be able to launch one every six months or so to maintain proficiency

Question: I have a series of related questions. I didn't hear either of you talk about the threat to the space assets that are home-grown, that is, typical with the technology, problems in terms of getting these satellites into orbit on schedule in time to avoid some kind of gaps in coverage. There have been so many problems plaguing the space program and given the threats that are out there, do you think that the pendulum has swung a little too far in allowing national security to become so reliant on space assets? Because of the advances in UAV technology, do you think it is desirable to move into those assets? Should there be more reliance on the operating or available commercial assets?

Sheldon: Has the pendulum swung too far? Maybe it has, but we are where we are and we have invested a great deal of money in space and we organize around it to the point that we are utterly dependent upon it. To take that apart would be expensive and be fraught with even more uncertainty than we have been talking about. UAVs are great, but they can't do what space can do for you. UAVs are essentially unmanned

airplanes and there is international law about infringements of sovereign airspace. Satellites are not encumbered by that law and you can see what another country is up to by sending a satellite into a certain orbit which will overpass that country and legally there is nothing that country can do about it. If you send a UAV into that country, certainly in peacetime, you are breaking international law and you might invite all kinds of repercussions. Is there merit, though, in finding ways of being able to carry on the fight, should space be denied to us? Absolutely, though I would counsel that that would somewhat restrict the kind of uses of military force that politicians might consider getting involved in. One of the great things that space does is lessen the burden on the United States in terms of manpower and casualties, including friendly casualties. It doesn't eradicate it, but it lessens the burden and allows the U.S. to conduct military operations that hitherto it might have thought twice about doing. When it comes to conflicts where the stakes are very high, can the United States survive without space? Absolutely, because it would have to, and any soldier, Marine, pilot or sailor will tell you we can do that. But if you are fighting in a situation where the object is very limited politically, space brings about advantages that you cannot replicate in any other way. UAVs are helpful, but they are also dependent on satellites for GPS and reconnaissance imagery from space is used to determine areas of interest. In terms of how we fix the acquisition problem, I would rather avoid that altogether. Yes, we should. How we do it, I don't know.

Question: It seems to me, in terms of relative force building exercises, that there is an implied sub-argument when you move to deterrence to defend your space assets, which is that deterrence is particularly applicable in certain kinds of parity as opposed to asymmetry, which you alluded to. The argument, therefore, would be let a potential space adversary achieve parity because that is uniquely suited to deterrence structure: allow them to catch up so they are as dependent on space as we are. Is that a dangerous approach to addressing security issues?

Sheldon: You make a good point, but I would argue that no matter what we do, it wouldn't necessarily prevent those kinds of countries from developing the capabilities they want to develop. There is a danger that that might occur. As I said, this is fraught with uncertainty and you are damned if you do and damned if you don't. Is it a good idea to pursue a deterrence strategy of whatever kind predicated on a country like China eventually developing military space the same way the United States does? Would that be a bad thing? Probably. How do we dissuade China from doing that? That is something that is beyond space; that is a fundamental political question between China and the United States and how they view each other and their roles in the world and especially in the Asia-Pacific region. Anything we do or don't do in space wouldn't necessarily change those equations. That is something that will have to be dealt with on a far more fundamental geopolitical way. Of course, we are not just talking about China; there are other countries that also qualify in that regard. How we go

about doing that, and without doing it in a way that somehow inhibits their domestic right to develop whatever capability they want to, without coming across as a bully when we shouldn't, is a very tricky question. I am not sure how we can do that or if that even answers your question, but I am aware that might happen.

Question: I have a question, and John touched on this very briefly, in terms of identification of an adversary. With the rise of cyberspace insecurity, for want of a better phrase, how do you see identifying it? Assuming we have some cyber-attack on a U.S. satellite, it might come from Russia, having been routed through Uzbekistan, China, Japan or who knows where. Now identifying whether that is a government actor, a non-government actor, a rogue actor or whatever is very different to seeing an ICBM go off and a kinetic ASAT blowing a satellite out of the sky. Do you think that that pushes the bounds somewhat towards a dissuasion game as opposed to more of the defense question?

Sheldon: Possibly, only because at the moment cyber is such an amorphous subject. The DoD has produced three definitions in as many years as to what cyberspace is. I run the cyberspace course down at SAASS and whatever the DoD and Air Force are up to, I try to ignore because otherwise my syllabus is a complete mess. So we are not even there yet conceptually as to what it is. However cyber-forensics can usually trace back the source of an attack, at least in a general sense. We have precedents for this in space.

In 1999, there was a report in a British newspaper that the U.K. Skynet satellite communications system had been hacked into via the command and control system outside of London and someone had taken over control of the satellite for several hours. When I talked to my friends in the British Ministry of Defence about this, they were cagey about answering questions. A few months later, I was called in and told that there was strong evidence that the hacker was actually trying to get to an American satellite because Skynet and Milstaff work very closely together and they traced it to an "Eastern European entity." Read into that what you will. Apparently the matter was dealt with and the individuals were arrested and prosecuted, but because of the Defence-Advisory Notice system in the U.K. for national security issues, it was never published. You never hear anything about it. The individuals responsible are probably living in some black hole somewhere right now and will never see the light of day again. And there are other ways we can do it. In 1991, a Dutch anarchist hacker collective decided they would offer their services to Saddam Hussein during the Gulf War. There is a physical element to cyberspace; those ambitions were halted when Dutch police and Special Forces kicked down the door of their commune, smashed their computers, beat them up and put them in jail. So you can do it.

Cyber-forensics probably needs to get better and quicker and faster. We also need to get our arms and minds wrapped around cyberspace much better than we have

been doing hitherto. That said, we are not the only ones encumbered with this uncertainty; so are China, Russia and others. They have been very clever using these hacker collectives and hacker movements and bands of teenage boys who live in basements and who should get out more often. Nonetheless, they are now posing threats and what motivates them, how they work, how they are able to manipulate networks and so on is something that, at least in the open, unclassified world, we are not very good at understanding. Of all the threats that you could make against a space system, that would be the one I think that would cause the most uncertainty and doubts among planners in terms of how we deal with that and how we know when that actually happens. A kinetic attack is a return-to-sender address; I know exactly who I need to talk to. Even with a jamming attack, I have a pretty good idea who is behind it. With cyber, the network itself changes every day; it is not a domain that can be mapped. We know where space begins and ends; we know where the sea ends and land begins. But the cyber domain changes every day as new nodes are added and taken away, new links are created between nodes, and so forth. Mapping that from an intelligence or situational awareness point of view is very difficult, and therefore tracing an attack is very difficult or even identifying whether something is an attack or something accidental. It something we are getting our arms and minds wrapped around.

Jeff Kueter: Thank you, gentlemen.

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