FROM TECHNOLOGY TRENCHES

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There comes a time when technology for technology sake is not enough. There comes a time when getting more power or more efficiency or more anything else from the latest laser is not enough. Or implementing the latest algorithm in beam control. Or a few more decibel gain from microwave transmitters. In mathematical terms, while all that is necessary, it is not sufficient to justify our continued existence. We must find a way to serve the Warfighter. We must transition our technology, some of which is very mature, to acquire the weapons Warfighters need. We must get out of the "technology trenches" and onto the battlefield. Perhaps this symposium will show us the way.

We in DEPS have worked hard to bring the worlds of Beam Control, Lethality, Modeling & Simulation, and Employment together in the same symposium. We welcome your participation and are very glad that we can communicate with each other at a fairly detailed level. I urge you to crossover from your own discipline and sample the issues that arise from other disciplines. I feel very strongly that these are the subjects which will get us out of the technology trenches. These are the subjects that have most to do with providing the capability the warfighter needs in the new anti-terrorist campaigns of today and tomorrow. I am glad that we are not going to be spending our time discussing laser and microwave devices this week. This must be one of the first major DEPS symposia for which that is true. The energy devices are certainly necessary, like the rabbit for the rabbit stew. They are the engines of our business. But when you buy an aircraft, for instance, there is a lot more than the engine that must be considered. In fact, I doubt that the engine by itself ever sold an aircraft. This analogy breaks down, but it is not bad as the default of our transition viewpoint.

We have been very fortunate that for about 40 years we have had a fairly robust DE technology program. There have certainly been ups and downs, but I believe there has always been substantial funding in our business. This has required a lot of fortitude and visionary thinking on many senior leaders in DOD and the Services. The result of that is a very broad technology base that is now ready to move in any one of several directions to serve the warfighter. Specifically, the result is now a number of weapon demonstrators recently operated or about to come on line so that the warfighter can touch and feel the result and not be unduly influenced by "Powerpoint" engineering. Every scientist and engineer here should take great pride in the technology base we have generated. While there remains much to be done, we have truly come a long way in our basic understanding of speed-of-light weapons.

For example, we have seen the demonstration of THEL successfully engaging Katyusha rockets and the impact that has had on Army DE thinking. We have seen an HPM device successfully engage MANPADS. And much more. In the next couple of years we will see the major demonstrations of Airborne Laser (ABL), and Advanced Tactical Laser (ATL). These experiments will show that we can integrate HEL weapon

prototypes on dynamic platforms and engage targets. These are among the most complex systems we have ever demonstrated in the DOD. We will also soon have a prototype of an Active Denial System (ADS) which can transform our approach to non-lethal warfare. And again much more. So in the next couple of years much of our technology will be demonstrated for first weapon applications. This is occurring at the same time that new classes of laser technology are being actively pursued by JTO, DARPA and the Services; such as increased power and better beam quality from Solid State Lasers (JHPSSL) as well as the Free-Electron Laser (FEL).

So what? I am not aware of any transition to acquisition or production of any HEL or HPM technology. It is not at all clear that if we "build it, they will come". We certainly must build it; demonstrations are absolutely crucial. But we must get the operator a lot more involved before "they will come". That involvement must come from all levels; the commanders, the staffs, and certainly the guys and gals in the trenches of warfare. I hope that this symposium is a step in that direction. I am aware that there are also concerted efforts in the Services to accomplish this. They are necessary and must be emphasized and prioritized. To be parochial, one of those is the Air Force's Long Range Combat Aircraft Study where the operator, Air Combat Command, is in dialog with the technologist, AFRL/DE. At a broader level there is also the DE Task Force in the Air Force, wherein both defensive and offensive effects of DE weapons are being evaluated for importance. This Task Force is being led from the Air Staff by General Officers and involves senior leaders throughout the DE, acquisition, and operator communities.

Whether the warfighter becomes familiar with DE technology and status from formal studies, informal talk at the bar, participation in demonstrations, or indeed through symposia such as this, there are critical issues the warfighter must provide for us to move forward. We desperately need critical thinking by the warfighter on the shortfalls that DE technology can address. Eventually that must show up in a CONOPS or a Requirement, but first we must do the thinking and that is the hard part. I personally doubt that the initial deployment of DE weapons will be for applications that are already being achieved, however poorly, by conventional weapons. I believe that the applications which will drive requirements are those that cannot be achieved today or, at best, can only be done with great cost and risk. Simply doing today's missions better, cheaper, etc., is interesting and ultimately important, but not sufficiently compelling to divert the resources needed to field the first DE system, in my opinion.

What are potential scenarios which might identify shortfalls which could best, and perhaps only, be served by DE capabilities? Admittedly there is great danger in technologists, such as me, proposing warfighting scenarios. I would fully expect the warfighter to put a big BS label on it. And that is OK; in fact, that is desirable if the warfighter then comes back with the "right" scenario. But let us fearlessly press on anyhow. Consider the tactical/terrorist world. Our precision strike weapons are so good today that once a target is identified, we almost always have the right weapon to destroy it (leaving out collateral damage for the time being). Therefore, much resource is going

into the ability to locate and identify targets much more quickly. But the current response is from speed-of-sound platforms and weapons. That usually means many minutes from tasking to execution during which time the target can disappear. Wouldn't it be great to be able to engage instantly at the speed-of-light even if, in some cases, that engagement was not lethal but delaying until precision munitions could be brought to bear?

Or consider the Long Range Strike Aircraft mentioned earlier. Our technology (or related sensor technology) could acquire, track, and ID threats against the aircraft and then destroy those threats creating an almost invisible shield around the aircraft. That same technology could also engage targets offensively. The ability to do this at the speed-of-light with a large magazine is not available today.

Closer at hand we can consider crowd control in a terrorist environment. We may see even by the end of this year a prototype Active Denial System with RF emission providing point defense as well as area defense. Also potentially close at hand is the ability of HPM weapons to defeat MANPADS, a capability which is ultimately important for civilian aircraft as well as military.

At the other end of the spectrum, consider global domination at the speed-of-light. Such a capability could arise from relay mirrors operating either in orbit or at high altitude fed by lasers either from fixed points on the ground or from moving platforms. That capability is a long way off, but initial relay mirror experiments will be conducted by the Air Force later this year.

I have been very parochial in describing only scenarios that I know something about. Each of you probably has your own favorite list; but all of our lists may be wrong as judged by the warfighter. But this is the level (in much more detail) at which we need to enter the discussion in order to find out what is "right", or needed, or acceptable.

We desperately need right now the warfighter and operator to provide the conceptual framework for DE weapons. We need to get the technologists and system developers out of that business. We need an environment that provides close dialog and interface between the "wish I had" of the warfighter and the "I can do this" of the technologist. If this symposium starts to provide that kind of dialog, it will be an unqualified success.

In summary, and in Air Force lingo, we don't need more Orville and Wilbur Wrights (we are blessed with many of those). We desperately need a Billy Mitchell. Or if you don't care to be court-martialed, a Jimmy Doolittle will be just fine.

Thank you and Good Luck!