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Teleprompter Script for Mr. Donald Woodbury, Program Manager, Tactical Technology Office

"Imagine: Delivering Precision Effects"

» **DON WOODBURY:**

During Operation Desert Storm, the success of the F-117 over Baghdad demonstrated the effectiveness of precision strikes against heavily defended targets.

By allowing flight directly over one of the most heavily defended cities in the world, stealth technology enabled tactical aircraft to deliver precision effects ….

We saw on CNN how the F-117 could deliver laser-guided bombs that could literally fly down the vent on the roof of a building.

This degree of accuracy played an important part in crippling the military infrastructure while minimizing collateral damage and civilian casualties.

In today's world, the need for precision effects is more vital than ever.

We've seen a paradigm shift with fighting being waged in urban environments instead of out in the open.

More and more,

our enemies operate within a city's population – and they are increasingly willing to use civilians

as shields.

To counter these tactics, we need to be able to deliver even more precise effects to deprive the enemy of the sanctuary of operating from within population centers.

Let's use the term ultra-precise effects to describe the capability to get exactly the effect that

we want,

exactly when and where we want it with minimal collateral damage.

How can we deliver effects exactly when and where they are needed?

Is it possible to target a portion of a building, or even a specific room?

How about targeting a single combatant within a building or in a crowd, instead of dropping a bomb that takes out the target as well as everything around it?

I'll focus the initial portion of my talk on platform characteristics that could enable the delivery of ultra precise effects.

In the past two decades, the U.S. has established dominance of the skies, thanks to the investments that DARPA made in Stealth programs like Have Blue, Tacit Blue, and others.

Stealth provided a revolutionary capability to defeat air defenses,

but maintaining this dominance in the future will depend upon our ability to remain undetectable to all classes of threats until it suits our purpose to be seen.

Imagine having the capability to fly at the very low altitudes that provide optimal performance from sensors and weapons.

Getting close to the target allows us to differentiate combatants from

non-combatants,

and to identify, track, and prosecute specific targets – because proximity to the enemy enables improved sensor resolution and increased weapons accuracy.

Today we are forced to utilize our soldiers and Marines to identify and track targets by positioning them in close proximity to the enemy.

In the future, we need to be able to perform these functions from the air.

I believe that the development of capabilities to operate close to targets to enable the delivery of ultra-precise effects will provide opportunities for the Defense community to develop new platforms, just as the breakthroughs demonstrated by the

Have Blue program provided opportunities for the first generation of stealth aircraft.

My vision of these future platforms is expansive –

it includes

fixed wing aircraft, helicopters, heliplanes, loitering munitions, boats, and ground vehicles.

One platform opportunity that I want to highlight is a future gunship.

The ability of a gunship to deliver overwhelming firepower on demand makes it one of the

most sought after assets

on the battlefield.

But today's threats and concerns about collateral damage limit our ability to employ the gunship when and where we need it.

Imagine a gunship that could operate day or night and fly at low altitudes – close to the enemy –

and deliver ultra-precise effects against individual targets.

Developing the next generation of stealth or countermeasures are approaches that could enable platforms to operate where and when they are needed,

but these are not the only ways to achieve our goals.

Another promising approach is

aircraft self-defense.

I'd like to propose the use of high energy lasers to defend against the entire spectrum of air-to-air and ground-to-air threats.

Imagine an aerodynamically efficient platform like the B-1 bomber that is not very stealthy or very fast being able to destroy a salvo of surface-to-air missiles – and to be able to do so until the enemy runs out of missiles or the aircraft runs out of gas.

Could this capability enable a B-1 to penetrate enemy air defenses and, like the F-117s over Baghdad, fly in a manner that is best suited for the delivery of precision effects?

Could such a system perform some of the missions envisioned for future hypersonic or stealthy platforms?

Could moderate levels of stealth and speed, combined with

self-defense, provide a more affordable path for future platforms?

To minimize the burden of employing directed energy weapons from tactical aircraft, we need compact power sources that can provide megawatts of power on demand.

We want to efficiently supply that power without imposing undue penalties on the aircraft –

penalties in terms of weight, volume, fuel consumption or drag.

And more power means more heat,

so we also are looking for new approaches to get the waste heat out of

the platform.

The effectiveness of high energy lasers would also be improved by technologies that mitigate aero-optic effects caused by turbulence –

a challenge in the rear sector of aircraft moving at high speeds.

We need to provide aircraft with all-aspect high energy laser weapons that can be employed from subsonic through supersonic speeds.

Next I'd like to talk about increased precision in the engagement of targets.

Our warfighters need the capability to target individual soldiers and small groups of combatants.

Can we develop weapons that can maneuver inside of a building –

targeting a single room, instead of destroying the entire structure?

These weapons could be transported on a small UAV or fly under their own power.

What about a new generation of smart weapons with the capability to move systematically through a building to clear it of threats while leaving the building structure –

and non-combatants – unharmed?

What about non-lethal approaches?

These too can be used to provide ultra-precise effects and we are looking for new ideas in this area.

For targets in the open, laser weapons offer the potential for increased precision.

DARPA has played a major role in the development of high energy lasers.

In the past, our focus was on scaling to higher power without a lot of attention being paid to the practical issues associated with the tactical use of a laser weapon.

Today we are focused on the development and maturation of high energy laser weapons that can be integrated on tactical platforms without detracting from the existing capabilities
of the platform.

The work that is underway as part of the HELLADS program has the potential to bring a practical laser weapon to many tactical platforms.

In addition to developing a laser, we have explored design approaches to miniaturizing the beam control, power, and thermal management components of the

laser weapon system,

but more work is needed in these areas.

Are there approaches to miniaturizing and reducing the complexity of beam control components?

Can we do a better job of correcting atmospheric distortion of the laser beam at long ranges?

Are there approaches that will reduce the integration penalties of beam directors, power sources, and heat exchangers on tactical platforms?

To maximize the capabilities of a laser weapon on the battlefield, we need to be able to scale power output from levels low enough for use as a sensor to find targets, to levels sufficient to temporarily incapacitate,

and up to lethal levels.

Imagine using a wide beam for search and track, a more focused beam to disable,

and a tightly focused beam to destroy targets.

All in an integrated package that shares a single aperture.

The investments that we are making in component technologies and in a prototype laser weapon system will provide an opportunity for the Services to field tactical laser weapons 5-10 years earlier than would otherwise be possible.

For more than thirty years we have been told that laser weapons were only 10 years or so from fielding.

I believe that we are now at the point where DARPA is prepared to make this possible.

I began today by showing how a novel aircraft configuration enabled the precise delivery of laser guided bombs,

then shared a vision of approaches to enabling platforms to operate when and where they are needed,

and have concluded with a discussion of the use of a laser to provide effects that previously required a bomb but without collateral damage.

My colleagues in TTO and I are looking forward to hearing your ideas on

how to achieve the revolutionary technology improvements necessary to deliver ultra-precise effects.

Now back to Steve Welby to conclude the TTO presentations.