

**DARPA Tech, DARPA's 25th Systems and Technology Symposium
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Teleprompter Script for Ms. Barbara McQuiston, Deputy Director,
Defense Sciences Office**

THE ULTIMATE Q

So, do you want to see the latest we have for you?

This mission could be your most dangerous yet.

Just like Bond,
we want **you** to be able to scale buildings, fly,
swim underwater, and fight off multiple attacks.

Like Bond **you** will be our asymmetric advantage.

What a DSO dream:
equip every soldier with James-Bond-like technology.

In the 007 movies,
the legendary Q is the master mind research and development genius
for the British Secret Service.

Q provides all the best widgets and gadgets giving Bond his edge.

Some might recall Q's favorite line to
James Bond:
"without me, you would have died long ago."

Like Q, the Defense Sciences Office is committed to **preventing**

technological **surprise**
by creating it for our adversaries.

Let's compare Q's organization to DSO.

The British have Q.

We have Brett Giroir ...

The British have Bond.

We have Army Colonel Geof Ling!

The gadgets available to Bond range from x-ray glasses to morphing aircraft.

DSOs gadgets range from hyperspectral radiographic sources **to *morphing aircraft!***

DSO's passion is to ***mine the far side of the far side to radically change the Nation's defense capabilities.***

This leads to really cool stuff!

Let me show some of it to you now.

21st century technology enables individuals or small groups to significantly influence strategic success.

Today, the empowered individual can be anyone, to an Air Force Captain, a Navy Seal, Marine Corp gunny, or the Army combat infantryman.

Our soldiers are reaching back to the U.S. and to 20,000 feet or more above.

They have become part of a fully integrated network of operation.

Today's individual warfighter requires technology for creating **revolutionary** responsiveness, adaptability, and flexibility.

The scope of military missions is expanding.

Today's warfighter role is to be a combination Green Beret Peace Corp volunteer.

We call on them to do everything from assuring safety, repairing lives to ultimately restoring Nations.

Our warfighters must have superior technology and capabilities to provide them with the asymmetric advantage.

What they need is the Ultimate Q!

DSO wants to enable scientific discoveries that can rapidly produce new technology for the military.

This is DARPA's mission and DSO's mainstay.

How can DSO bring this about?

In looking at human advancement, Jacob Bronowski noted that "although science and art are social phenomena, an innovation in either field occurs only when a single mind perceives in disorder, **a deep new unity.**"

DSO is reaching out to the Far Side to find these ***deep new unities***.

We believe that seeing these new unities is the path towards creating foundational breakthroughs.

As you heard earlier, DSO discovers these “deep new unities” by assembling diverse, talented, and innovative teams.

Here one theme consistently emerges at the intersection of these diverse disciplines.

Foundational scientific discovery can be operationalized in revolutionary technology.

We are seeking out these foundational scientific discoveries.

For instance, the multidisciplinary teams in Ben Mann’s TDA and FunBio programs – biologists, computer scientists, mathematicians, physicists and statisticians – will help Michael Callahan realize his dramatic vision for rapid vaccine development.

We think of this as “From Ben’s far side of the pencil to Michael’s far side of the test tube.”

Dan Kauffman is creating a new paradigm for simulation building ***without*** programmers.

This will enable warfighters to use immediate on-site data to train, learn, and carry out their military mission in real time and at any location.

DSO encourages program managers like Lt. Col Jay Lowell to use their creativity to envision the use of Bose Einstein Condensates for developing precision inertial navigation systems,

developing material that stops and stores light pulses – technology feats ***unimaginable*** just 10 years ago.

At DSO, we believe a single mind can change the world.

So, what is the DSO “secret formula” used to create these breakthroughs in scientific barriers?

Well, like the Coca Cola Company, I can not divulge the exact formula, but perhaps we can bottle creativity?

... Now ***there*** is a project for the scientists and math guys!

So what can be envisioned for the DSO future?

What unknown territories and creative far side discoveries will DSO explore?

Let’s look into the DSO crystal ball to see...

Solving the energy needs of our warfighters is a dominant thrust area at DSO.

Today, our warfighter carries up to 16 pounds or more of batteries just to power the electronic gear for one day.

As reliance on electronics grows, so does our demand for power.

DSO is investing in a wide portfolio of power technologies to reduce the burden.

We are developing novel energy conversion devices operating at 20 Watts average power that can offer 5 to 10 times the energy of batteries.

We are developing power sources in the 150 W ranges to extend mission durations for UAVs and robotic systems.

We are developing advanced fuel cells for unmanned underwater vehicles for 30-day missions to provide 5-10 Kilowatts of continuous power.

We are developing highly efficient, solid state electric generators to convert thermal energy to electricity with thermal to electric efficiencies approaching 20 percent.

These efforts highlight our current efforts.

But, we want to go further with future investments to change the energy paradigm from one of conserving energy to one of creating energy abundance.

We want to make investments in the far side non-traditional energy sources.

Consider this: in just one hour, the total amount of solar energy striking the earth's surface is equivalent to the total amount of energy consumed on earth

in one year!

Recent studies indicate that the mechanism of energy transfer through chromophore complexes could be coherent –

a quantum mechanical effect!

Could we explore the quantum level of photosynthesis to create energy efficiencies nearing 100%?

Can DSO move this potential forward for the warfighter – even if we violate the laws of classical physics?

Why not!

At DSO, we need your unbridled imagination to envision the new far side laws of physics yet to be discovered.

And, speaking of far side energy ideas: how about using plants to produce hydrogen or grow plastics?

Many plants still have their ancient genes that allowed them to survive in earth's primordial, methane-rich, atmosphere.

Under these conditions, plants produce hydrogen.

Can we use the far side science to utilize plants for hydrogen production?

Plants have also been used to grow long-chain hydrocarbons – like the ones in plastics.

Could you envision a far side idea of growing military MRE packaging with plants?

That is creativity at DSO!

Another thrust at DSO is to explore new ways to better train our forces to deal with the social and environmental factors in their deployed area of operations.

We need to better understand the responses of diverse cultures to different US military activities.

DSO continues to search for far side ideas bringing together the use of biological materials and processes enabling breakthroughs in technology.

Sometimes DSO looks in very unlikely places ...

Did you know that complicated germanium nano structures are manufactured by marine sponges without the use of foundries and clean rooms?!

I am truly humbled by sponges and believe we can learn to leverage these processes to advance our own state of the technology.

Perhaps someday, we can build high performance optoelectronics in a beaker at room temperature!

Can you imagine?

DSO can.

Mitch Zakin told you that he is looking for revolutionary ideas for programmable materials where material can be programmed on demand to meet the need.

DSOs ideas in energy, training, and biologically based engineering advances are transformational.

For future soldiers, there is a great need for transformation.

They require rapid adaptation to changing battlefield environments and missions.

DSO is committed to do everything we can to make this happen successfully.

In the opening remarks, Brett Giroir wondered if perhaps **you** have a vision that someone else says is just too hard, or for which there is no community or scientific principles.

Maybe your vision is as much fantasy as – oh say – bringing the high price of Aerospace grade titanium down to \$3.50 per pound.

Or, make whole a warfighter who has lost a limb with a fully functional, neural controlled prosthetics arm?

Or, building real-time simulators for warfighters without programmers?

Or, slowing light down to build totally new measurement systems?

Or,...**Wait a minute!**

We are already doing all these things at DSO!

Come visit our booth, learn about our far side visions and perhaps share with our Program Managers your revolutionary far side dreams.

We'll I had better get back, either Mitch Zakin our chemist has invented something new; or the robotic dogs are chasing around the TelePrompTer operator.

Good luck with your mission and bringing your ideas to DSO –

the home of the far side.