

**DARPA Tech, DARPA's 25th Systems and Technology Symposium
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Teleprompter Script for Dr. Steven Walker, Program Manager,
Virtual Space Office**

DARPA Space Vision

» **STEPHEN WALKER:**

Almost 50 years ago,

this was the simple sound heard round the world – the sound produced by a small space craft boosted into space on a Russian rocket.

Man's utilization of space had begun and America asked: why not us?

Months later, DARPA was created to ensure such a technical surprise never happened again.

DARPA's first initiatives were space programs, including the boosters for the Saturn rocket and early photo-reconnaissance satellite programs like Corona.

DARPA was so successful in the early days of space that both the space part of NASA and the NRO were created from early DARPA space activities.

From a small, beeping satellite in 1957,

we have come a long way using space to improve our lives and better understand the cosmos.

In addition, advances in space technology have played a crucial role in sustaining American power and enhancing our fortunes in the world.

But what's next?

Ten, twenty, fifty years from now –

how will we operate in and through space?

What approach do we as a nation need to take so we aren't surprised by the next Sputnik?

On January 11, 2001,

the Commission to Assess U.S. National Security Space tried to answer these questions.

The Commission recognized that the U.S. depends heavily on space-based assets such as the Global Positioning System, intelligence gathering satellites, weather prediction systems, and 24/7 communications from around the world.

This reliance on space makes our space-based systems particularly attractive targets –

and heightens the need

to be able to defend

these assets.

During a crisis or conflict, an enemy could

seek to destroy the

U.S. economy as well as our ability to fight a high-tech war by attacking GPS and other space targets, resulting in what was described by the Commission as a

“Space Pearl Harbor.”

In the years to come, many countries will compete with the U.S.

in space.

In addition,

non-state actors will become increasingly involved as commercial space activity grows in importance, adding to the potential risks, and uncertainty,

facing the U.S. in space.

Six years to the day

after the Space Commission's report –

on January 11, 2007 – China conducted a successful anti-satellite weapons test.

Like Sputnik,

this action should serve as a wake-up call.

Using the Space Commission's findings as a springboard, DARPA has returned to space during the past six years in a very big way.

DARPA investment in space-related technologies has increased significantly, and is spread over five strategic thrust areas, namely:

Access and Infrastructure; Space Situational Awareness;

Space Mission Protection; Space Mission Denial, and Space-Based Support to the Warfighter.

Space Mission Denial is an area that I can't discuss at this venue.

But this afternoon,

you will hear about where DARPA is going in the other four areas –

and you will be challenged to help make our vision become a reality.

As you think about how you can contribute,

keep in mind that a common vision defines our approach to all of these strategic areas and can be summed up in a single word: flexibility.

Why flexibility?

As the Space Commission report pointed out,

space is valuable to us.

We use it more than anyone else.

Other nations,

commercial interests, and non-state actors are getting into the game.

As this happens, uncertainty grows.

Rather than react to surprising events of the future, we need to design flexible space architectures now,

so that we are prepared for the future.

That is to say, we need space capabilities that are more responsive, more robust and can be modified easily as threats arise.

So, how do we envision our ideas taking shape?

When it comes to putting spacecraft in orbit, we envision reusable and responsive launch systems that can take off and land at today's airports, just like airplanes.

These vehicles would use air-breathing, combined-cycle propulsion systems that are being developed now in the Falcon hypersonics program.

In the interim, we are demonstrating affordable and flexible expendable launch capabilities for small satellites.

We recently launched a Space-X Falcon 1 rocket from a very small island in the Pacific, clearly demonstrating the ability to launch with minimal infrastructure quickly and cheaply.

A flexible launch infrastructure in the future will enable a flexible on-orbit infrastructure too.

We are seeing the first fruits of what on-orbit flexibility really means in the Orbital Express program.

We have recently demonstrated

on-orbit hydrazine

fuel transfer from one satellite to another,

replacement of batteries from one satellite to another,

and approach and autonomous docking between satellites from distances of seven kilometers.

These are “game changer” capabilities that will lead to other on-orbit flexible architectures such as fractioned satellites which you will hear about from Dr. Owen Brown.

In order to understand everything happening in space at any given time, sensor coverage must be robust and multi-layered.

At DARPA, we envision ground- and space-based sensors that search a wide field of view – versus today's point-and-stare capabilities.

We must accurately detect where every object is – active or inactive, big or small.

We also need to know why it's there and what it's doing.

This is what we mean when we say we want Space Situational Awareness.

You will hear how our

4 meter optical Space Surveillance Telescope will allow us to search the sky.

You will also hear about our deep space radar known as Deepview.

Together they provide a comprehensive "attribution-based" space situational awareness capability.

Of course, the more we know about our adversaries activities in space, the more we need to think about protecting our assets and we do this in our Space Mission Protection area.

Considering the recent Chinese anti-satellite test, LEO-based satellites may not be a safe option in the future and we at DARPA are already thinking about higher orbits and the technology challenges associated with using them.

The final strategic area we will look at today is
space-based Support
for the Warfighter.

Space is the ultimate “high ground” for our tactical capability.

Our troops on the ground don't care if the information they need is generated from a network of satellites providing global coverage or from a predator directly overhead – they just want the information to be consistent, reliable,
and, more to the point,
useful to them no matter where they are located.

They want something that's like Blackberry/

Google Map/ Street View capability

on the battlefield.

In all of these areas, DARPA is involved with – or soon will be initiating – ongoing projects.

You'll hear more about these projects from some of our DARPA Space program managers.

Dr. Owen Brown will be managing our new fractioned satellite program, F6.

He will tell you how fractioned satellites and flexible launch architectures complement and enable each other.

Mr. Roger Hall is managing our optical and radar sensor programs in the Space Situational Awareness area.

Roger will tell you how he plans to enable “attribution-based” space situational awareness before the end of the decade.

Lt Col Fred Kennedy recently completed the successful Orbital Express on-orbit servicing program.

Today, he will share with you how we intend to protect our valuable space assets in low and high orbits.

Mr. Tim Clark cares a lot about the warfighter.

He will tell you about our space support to the warfighter, including how we intend to put a Blackberry, or something like it, in every soldier's hand.

Finally, Dr Brian Pierce, Deputy Director of the Strategic Technology Office, will explain the best way for you to help us generate new ideas for the future.

I encourage you to take the time to meet and talk further with these folks, during both the formal and informal opportunities throughout the event.

If you take away just one concept from today's DARPA Space presentations, let it be the need for flexibility.

Fifty years ago,

when the first Sputnik ushered in the space age, it was easy to identify the threat and from whence it came.

Today, we live in a more complex world where tomorrow's threats are less predictable.

We need your best thinking to help DARPA develop the flexible systems that will allow us to protect our assets and respond to rapidly changing conditions –

as well as to create change ourselves.

That will be the key to meeting the challenges that will emerge in the years to come.

Thank you.

I'd like to introduce to you now, Dr. Owen Brown to discuss Access and Infrastructure.