Virtual Space Office Introduction (Graham)

Space.

In one word, we capture the infinite, the star-filled void, the romantic-playful stars that twinkle night after night, inspiring us, comforting us, guiding us on history's seas, ...

Space engages the most talented scientists of our time.
It engages ordinary folks, who marvel at the sky every night.
More than any science I can think of, astronomy has been the most widely accessible.
Books like Stephen Hawking's A Brief History of Time explain the most profound and exotic scientific theories of our time, to all who look to the skies.
Books with titles like "Einstein's Space and Van Gogh's Sky" bridge the gap between art and science.
Children sing "Twinkle, Twinkle Little Star."
Elton John sings "Rocket Man."
Tom Robbins writes, "If the universe be expanding, they gotta be something chasing it."
Space inspires everyone - philosophers, theologists, astrologers, poets, painters, musicians, comedians, children, explorers, scientists,...

And Space inspired the creation of DARPA.
In 1958, in response to Sputnik, DARPA was born.
We launched space research and programs but more importantly, we helped launch two legendary organizations - NASA and the NRO, the National Reconnaissance Office.
For four decades these organizations have led us into space.
As we enter the new millennium, DARPA has been asked to return to space.
And we've done it with energy and passion, as you'll soon see.

Why is DARPA back in space?
Because we still have a few tough problems to tackle...

It takes too long and it's too expensive to put things into space.

Our satellites are so expensive that we have become very conservative - and slow - in designing and building them.

The world scene is changing - many nations have growing capabilities in imaging and communications and navigation, the Chinese have a manned space program, England's Surrey University is leading the world in microsatellites, and the Cold War is over.
Because the world scene is changing, we have to quickly shift gears in space.
That is DARPA's forte.
We are the agile, free-thinking, high-risk, high-payoff arm of the Defense Department.
And so we have been given the assignment to help the nation reconfigure its space program.
Our budget is small compared with the big space organizations, but we are agile and I think we can make a difference.
History will tell.

Let me show you what we're up to - in the larger sense - then the next speakers will dazzle you with the details of what we're doing.
And where we're headed.

We think of space operations as a collection of five elements.

First, we need affordable, timely, assured access to space.
To launch a satellite, it takes one to two years and tens to hundreds of millions of dollars.
The dream of $100 per pound to put material into orbit is still a dream.

Tim Grayson will tell you about our launch activities.
But to give you a quick preview - the Rascal program's goal is revolutionary.
Drive up with your microsatellite in a truck, write a check for $750,000 and watch your launch by this time tomorrow.
One-day turnaround - that's a leap that's typical of DARPA's approach to space.

The value of scheduled, remote sensing from space is steadily decreasing.
If our satellite comes by at the same time every day, our adversaries can use camouflage, concealment, and deception to defeat our sensors.
Scheduled satellites were valuable for seeing whether the Soviet fleet left port, but they are much less useful against people who have only small numbers of things to hide, like a rocket launcher in the back of a truck or hidden by a tarp in a donkey-cart.
We need a different paradigm.
Agile satellites, enabled by on-orbit refueling, will make sensing much less predictable, and much better suited to today's intelligence challenges.

Second, in today's world, we need to know what's up there.
Space situational awareness is a critical need because it's getting crowded.
There are functioning satellites, dead satellites, space junk and natural objects.
We are currently tracking thousands of objects in space, and global space use is just getting off the ground.
We need not only to catalog what is in space over the long term, but we need to watch for quick changes as well.
You will hear about DARPA's work in the area of Space Situational Awareness from Tim Grayson as well.

Third, we need to support the tactical application of Space Based Engagement.
Over the years there have been many valuable space-based reconnaissance satellites, which provide thousands of images and other data.
As mentioned earlier, space allowed us to watch the construction of missile silos and track naval activities during the cold war, at a time when over-flights of aircraft like the U-2 and SR-71 were dangerous to both pilots and foreign relations.
As the world has evolved, the military threats are quite different.
And the pace of war demands real-time collection and dissemination of data.
Space is becoming a valuable tactical, operational element in the conflicts of today, as opposed to its traditional role as a slower-paced strategic source of intelligence.
Michael Zatman will describe some revolutionary changes that will enable us to provide space-based engagement capabilities to tactical operations.

The fourth element is providing Space Mission Protection.
As space becomes more crowded and more important to both military and civilian users, we need to ensure that our satellites are protected.
We must guard against natural objects, space debris, dead satellites and operational satellites.
Each presents its own challenge.
We also need to protect against space radiation, both naturally-occurring and intentional.
Michael Zatman will address some of the activities that we have in the area of protection.
There is still a lot of work to be done in this area and we are looking for good ideas.

The fifth and final element is Space Mission Denial.
We have been asked to think about technologies to deny enemy missions and we are looking for innovations in this area as well.

To achieve these five elements, a lot of cutting edge technology is needed.
Our third and fourth speakers, John Evans and Leo Christodoulou, will look at our space program in a different coordinate system.
They will highlight key technologies - new materials, structures and devices - that will enable us to make quantum improvements in space.

DARPA's technology offices, MTO and DSO develop basic technologies, and work closely with the systems offices, TTO and SPO which apply these technologies in new systems.
For example, MTO's curved focal plane array technology is a key element of TTO's Space Surveillance Telescope.

As you listen to the following presentations, you will see a common thread that runs through DARPA's space efforts - that is the growing role of microsatellites.
Much of our work is focused on enabling, designing, building, launching, servicing and tracking microsatellites.
We believe that many missions can be accomplished with the new generations of microsatellites - satellites that launch small and expand on orbit, satellites that use structural members as fuel, but more importantly, satellites whose exact structure and function can be designed at the last minute before launch.
It is not enough to have rapid access to space - we need rapid satellite design capabilities to keep pace with today's volatile space requirements.

Please join us.
We are looking forward to working with you -government users, contractors, universities, visionaries - to bring new ideas from the far-side, to bridge the gap, and make them a part of DARPA's effort to reshape the nation's future - across the skies, amid the stars - in Space.

Thank you.