

**DARPA Tech 2004 Welcoming Speech**  
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Good morning, ladies and gentlemen!

Welcome to DARPA Tech 2004 and welcome to the Far-Side!

The Far-Side? Those of you who are familiar with DARPA and DARPA Tech know what I am talking about! And for those of you who are with us for the first time, Welcome to our world! A world where science fiction morphs into reality.

Welcome to a world where hard work and a commitment to our men and women in the military enable DARPA to “Bridge the Gap.” The gap between the Near-Side capabilities of today’s military services and the Far-Side possibilities for tomorrow’s warfighter.

For fiscal year ’04, the Department of Defense received approximately \$12 billion for science and technology research. Out of this, DARPA received \$3 billion for long-term investment into fundamental research and discovery.

Let me show you how we fit into DoD’s overall S&T process.

The terms Near, Mid and Far are notional terms. They are a measure of the time to go for an idea to become an acquisition program.

Service investments in science and technology emphasize the Near-Side. They spend their S&T money on incremental improvements in existing technology, and weapons. They look for advancements that improve existing capabilities. This is great S&T. It makes RADAR more sensitive and jet engines more efficient. But typically this S&T is all about things whose value is known.

On the other hand, the Far-Side is about those ideas and concepts whose value is still unknown. The people who inhabit the Far-Side are anything but conventional. I know some of these people. So do you. Some of them are here in this audience. In fact, one of them may even be you. You know who you are.

You are always coming up with ideas, many of which do not prove out but then again some prove to be truly revolutionary. You are the one who visualizes combining two existing systems to produce a capability that no one else had even thought possible. You are the one with the idea to manipulate atoms to atoms in a wonderful new material, a new material like, Un-a-tainium.

No doubt, you have been frustrated because no one on the Near-Side will fund your idea.

But DARPA might.

DARPA was created 46 years ago to bridge the gap between the Near-Side and the Far-Side. What DARPA does, and does extremely well, is mine the Far-Side for those surprise ideas that could make a tremendous difference, and bring them to the Near-Side as fast as possible. We bridge the gap between fundamental discoveries and new military capabilities some of which might never have occurred without DARPA.

We have mined the Far-Side for many years. Some of the capabilities DARPA has brought forth range from the original space projects, to the Arpanet, to Stealth, to Predator and Global Hawk, and the Army's Future Combat System.

Where do these Far-Side concepts and ideas come from? They come from creative people like you, people who are interested in making a difference. We rely on all of you to bring forth those Far-Side ideas.

Our military forces operate in a world where conflict accelerates the pace of innovation. The combination of stealth, precision weapons, and information technology is a deadly combination. With it, we attack relentlessly. No enemy can feel safe at night — darkness is gone forever as a sanctuary. Adversaries cannot even feel safe during bad weather. Day, night, bad weather, it does not matter.

But, let us not forget: necessity is the mother of invention, and out of necessity our enemies innovate. In fact, you might even say that some of our adversaries have moved to a Far-Side of their own as they experiment with new weapons and tactics. Our everyday communication tools give them the ability to connect and share knowledge. We have no choice but to stay ahead of their innovations. The well being of our children and our grandchildren, depends on it.

Therefore, our mission is to make sure the United States is always ahead.

At DARPA, we do this by asking two key questions:

“What technologies would allow an adversary to surprise the US?” and

“What technologies are needed to ensure that US forces will always have new capabilities to surprise our adversaries?”

DARPA's research efforts are about answering these questions. We have done that in seven major areas. These are our “Strategic Thrusts. These thrusts are the guideposts by which DARPA makes sure that the US stays well ahead of our adversaries.

Today I have a surprise of my own. A new strategic thrust. One driven by a global imperative that commands our attention.

Force Multipliers for Urban Area Operations.

Why is this new strategic thrust area important? Urban operations are the most dangerous, costly and chaotic form of combat. America's enemies are moving from the open battlefield to urban centers. They want to fight us in the cities, where they can blend in with the civilian population. We need to do for the urban environment what has been done so successfully for combat operations in the open battlefield. That is, we must find technology that significantly multiplies our forces power and flexibility.

In the next few days, our program managers will describe and ask for ideas in this new thrust area. Not only will hear some fresh new ideas about the other strategic thrusts, be aware, there is one capability that is key to all of those thrusts. Networks!

You have all heard the term “net-centric warfare.” You already know that our military forces are embracing this concept. It integrates separate surveillance and force projection platforms. This reduces the latency between detecting and destroying an enemy’s assets. This allows us to react to an enemy’s tactics faster than they can be changed. In addition, integrating otherwise separate platforms into one system allows missions to be accomplished with fewer assets. Fewer assets, in turn, allows us to deploy forces more rapidly anywhere in the world than one can even imagine. The deterrent effects of our capability to deploy forces quickly to detect and destroy enemies at a rate faster than our enemies can respond will cause them to think long and hard before engaging US forces.

But what will such a system look like? “Networked operations” means that everything will be connected — on land, sea and air; weapons, platforms, sensors, radars, the whole works. That’s the good news. The problem, the part that we call the DARPA-hard challenge, lies in building the network, and not just any network. This network has to be as available and reliable as the sensor and weapon platforms themselves.

We cannot wait for the network to be created. As platforms enter a battle zone, the network must create itself, adjust, and adapt to conditions as they occur -- all without human interaction. It must bring new platforms into the network as they arrive, and automatically drop departing platforms.

Why do we think this is possible? Well, because we have developed the first effort in this area. We call it the Small Unit Operations Situational Awareness System. This system proved that it is possible to have a network that is self-forming. But even with this development, we still have a fundamental challenge. These networks, the same networks that will give our forces incredible capability, also represent our greatest vulnerability. Why? Because our adversaries know that if they can damage or destroy the network, they can put us out of action. Therefore, they will do everything they can to bring the network down. How might they try to do that? Most self-forming networks require a common time base.

The GPS system, which is mostly known for its ability to geolocate with high accuracy, is used more often for the time signal carried on its downlink. By having every platform receive the GPS time signal, all platforms will have a common time needed for self-forming networks. So one technique to bring down our networks would be to jam the GPS signal. To bridge this gap, a Far-Side person had an idea to build a Chip-Scale Atomic Clock using MEMS technology. The atomic clocks will be used for the time signals. This removes a GPS vulnerability.

We are looking for more ideas on how to bring a robust network to the Near-Side!

Speaking of the Near-side.

The conflicts in Iraq and Afghanistan are representative of current and future challenges. DARPA is bridging the gap for the current conflicts by harvesting those ideas that have been brought to the Near-Side. We are developing and deploying capabilities ranging from countering snipers to just being able to read, speak and understand the local language.

We cannot discuss these capabilities in great detail. After all, we do want the enemy to be surprised. But I can give you some idea of our efforts. As you know, snipers are a continuing problem. DARPA created a vehicle, mounted sniper detection system, called Boomerang -- that will determine the direction of sniper fire. Our troops have tested and trained with this system and, as I speak, Boomerang is on its way to protect our troops.

We are also dramatically improving our troops' capability to communicate beyond line-of-sight to long distances. DARPA developed an aerostat relay making this possible. This system will be deployed soon.

We have also developed technology to overcome language barriers. The Phraselator. This is a hand-held device that electronically translates English phrases into one or many languages. This is being used today in Iraq and Afghanistan.

One of the most significant problems today is improvised explosive devices. In the past 8 months there have been over 1,300 incidents in Iraq. We have some efforts underway to detect and neutralize them. But more work needs to be done.

We must develop technology to defeat these devices. Any ideas you may have will be considered.

As I said earlier, Bridging the Gap is about shortening the time it takes to turn ideas into reality. It's about the difference between the atomic chip clock of the future and the Phraselator of today. It's all about narrowing the distance between the Far-Side and the Near-Side.

Sometimes, that distance, the gap, seems so great!

Sometimes, the progress seems slow.

The Far-Side can seem so far away. But other times, you can actually see that gap narrow. Sometimes, you can actually see movement. Sometimes, the Far-Side is no farther away than Las Vegas. This coming Saturday morning, the world will get a glimpse into the future.

All of us will see the first foundations of a new DARPA bridge, a bridge that will mean the difference between life and death of a warfighter.

The DARPA Grand Challenge.

DARPA is offering \$1,000,000 to the first team that builds an autonomous ground vehicle that can travel a couple of hundred miles across the desert to Las Vegas. The vehicle must make the tough journey alone. The vehicle can have only two commands: start and stop.

The teams participating in this event include high school students in Pales Verdes, California; a calibration engineer from St. Louis; to college students in Walden, New York. The Grand Challenge is a DARPA-hard problem.

I myself have absolutely no idea what's going to happen this Saturday. But I do know this: No matter what happens, the DARPA Challenge will represent a huge success. Why? It has sparked interest in science and engineering to a level possibly not seen since the early days of the APOLLO space program.

Even if no team wins, thousands of people have been inspired to develop technology that ultimately will save the lives of untold numbers of US soldiers. We will have robotic vehicles doing the dangerous jobs of moving fuel, water and supplies.

After this technology is developed, there will never again be a situation where a soldier like Jessica Lynch will risk her life to drive a truck.

DARPA was 46 years old last month. But we still are an Olympic athlete when it comes to creating technological surprise. On the other hand, we are only as good as the ideas we fund. And those ideas come from you.

That's right. You! The people sitting in this hall.

You scientists, you engineers, you biologists, you internet experts, even you physicists and computer scientists. I mean you! And you.

And especially you.

We bridge this gap together.

Thank you all very much. Enjoy the conference.