Future Sensor/Visualization Concepts for the Dismount Warfighter
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Imagine you are a Dismounted Warfighter on a mission in a hostile
environment-perhaps like the mountains of eastern Afghanistan or streets of Baghdad.

[PAUSE]

 Think about what you could do differently if you knew that an adversary was waiting
around the corner or the bend in the trail just ahead preparing an ambush.
You could decide whether to prepare for combat, signal others to surprise him or
choose a different route-options that you didn't have a few minutes ago and that
give you the advantage.
 That advance knowledge is what we must give our warfighters.
 We need your help to come up with new ideas on how to get the individual warfighter
what information he needs, when he needs it...to take advantage of the increase in
lethality for Dismount Warfighters... to lift the "Fog of War" for America's most
deployed "combat system"... the individual soldier.
 In IXO, we are working to make network-centric, collaborative visualization a
reality for the Dismount Warfighter.

The Dismount Warfighter of today is a disadvantaged user of information technologies
but requires extraordinary capabilities if he is to fight and survive.
 We are in an age where information is accessible from almost anywhere through
commercial wireless devices.
 Our military information networks are being exploited in revolutionary ways, yet
the Dismount Warfighter's technology remains limited.
 Using existing vision and radio technologies or relying on the close groupings of
dismounts using hand signals is cumbersome and dangerous.

In an urban environment, a Dismount Warfighter is dealing in meters rather than
kilometers, seconds rather than minutes.
 Remember the enemy gets a vote - while on a mission to clear a building or find an
enemy stronghold, an adversary could be planting mines and booby-traps or planning
an ambush at any moment.
 The Dismount Warfighter needs that information NOW...information that reduces any
uncertainty he might have and that allows him to carry out his mission block by
block, floor by floor, room by room without adding any distraction in a highly
complex and rapidly changing environment.

Today we are taking a step toward providing the future Dismount Warfighter with
enormous improvements in warfighting capability with networked visualization through
a program called MANTIS-Multispectral Adaptive Networked Tactical Imaging System.
 MANTIS will provide the Dismount Warfighter with a helmet-mounted, multispectral
sensor suite and high speed digital processor-a system that will dramatically
enhance the warfighter's situational awareness, understanding, and survivability by
giving him the advantage to visually collaborate with his fellow warfighters in
combat ... in real time.
 With MANTIS in the battlefield network, the Dismount Warfighter will not only
receive sensor information, but also become a sensor in the network by contributing
data and imagery.
 MANTIS will provide up close and personal, eyes on target battlefield imagery and
hard-earned understanding for higher-level information fusion.

To help us realize these revolutionary capabilities, I give you two major
challenges: deployment of netted sensors and visualization techniques for
information exploitation.
 Our sensor technology continues to advance and there is no shortage of pixels.

We continue to improve resolution and sensitivity while reducing size, weight and power, making these sensors more deployable on a variety of military platforms.

We are approaching the point where we can saturate an area with sensors through unmanned aerial platforms of all types.
 These sensors can be networked to provide greater access of multi-source information to higher level commanders and command centers and to build extensive databases detailing all aspects of critical battlefield areas.
  But access to all this sensor data does not solve the problem.
 It can actually contribute to the problem of information overload.

We have the sensors, and they can be networked, but how do we get them where we want them, when we want them?
 Are there better ways to exploit small, agile sensors to blanket an area?
 What types of sensors, density and deployment techniques can more effectively accomplish the mission?

The challenge of information exploitation is how to exploit this enormous amount of sensor data-to filter it, interpret it and visually present it to the warfighter in a way that's meaningful and useful in real time.
 You might call this "Smart Fusion" ... multi-platform, multi-source information that's relevant without overloading the warfighter.
 We often talk about getting the right information to the right place at the right time but haven't come any closer to solving this crucial problem.

We need to go even further and consider advanced concepts with immersive environments for the Dismount Warfighter on up through the squad leader, platoon leader and company commander.
 This would take us beyond netted sensors to netted minds linking the tactical unit into a single, distributed, thinking entity with the ability to act and react as one.

We are looking for ideas in information fusion and visualization techniques to process massive amounts of imagery and other sensor data.
 We need to deliver it to the Dismount Warfighter in a way that's as seamless and ubiquitous as the Internet...not only located and combined by advanced "search engines"...but intelligently filtered and fused.
 And most importantly, present it in a form that allows him to visualize, understand, and act rapidly and decisively to bring force against the enemy before the enemy can act against him.

Imagine that a Dismount Warfighter has a helmet-mounted visualization system that is networked to an offboard "associate" in a remote location ... a "guardian angel" if you will: a teammate not in the immediate battle, but one who has access in real time to imagery, information, and expertise around the area of a particular warfighter.
 The idea is that the guardian angel is providing vital information to a warfighter, like the image you see here!
 The "guardian angel's job is to anticipate the warfighter's needs and send him critical information regarding changes in the battlefield picture when he needs it to help this warfighter survive and complete his mission.
 This guardian angel could be a combination of human and smart, software agent that could be in real-time contact with the warfighter through an immersive audio and visual process.
 We welcome your ideas!

I will expand this concept even further.
 Suppose we could give the Dismount Warfighter "Virtual Presence".
  Imagine a Dismount Warfighter is about to conduct a military mission in a hostile urban environment, and a sufficient number of networked sensors have been placed along those hostile streets to give him real-time video and audio coverage.
  What if he could then put on a helmet with an immersive display, "click" on the location of that hostile area and virtually "be there," in real time.
 He could see and hear in 3D and get the full sensation of being there through immersive visualization.
 We can achieve "Virtual Presence" through deployment of highly netted sensors and high speed processing of imagery and signals for 3-dimensional rendering into immersive displays.

Now suppose we also give this warfighter "Virtual Mobility" and allow him to move seamlessly within this real environment by means of a control-perhaps an advanced version of today's video-game joysticks.
The processing would display a real-time volumetric view, in the correct perspective, no matter where he moved.
 He could see the enemy's movements, assess the enemy's weapons, and even hear the enemy's conversations as though he were actually present in real time.

Let me push this concept one step further.
 What if we could network this "Virtual Presence" and "Virtual Mobility" to include the capability for multiple warfighters to join forces in real time, see each other's icon, or avatar, and virtually collaborate to conduct an actual mission?
 Such a system would allow a fire team or squad to communicate and move naturally without really being there.

Warfighters on a Search and Destroy mission using "Virtual Presence and Mobility" could even identify and handoff targets to real time weapons systems ... then virtually move to just outside the targeted area, wait for the munitions to hit the target, and conduct battle damage assessment immediately after the strike.
 During this entire scenario, the Warfighter's presence would be virtual, but the kill would be real.

Mission accomplished through "Virtual Presence and Mobility" .

Difficult? Yes. Impossible? No.

We need to pursue more creative ways for the individual warfighter to connect to this network as a user and a supplier of real-time battlefield information ... up close and personal to lift the "Fog of War" for the Dismount Warfighter.

We invite you - NO, WE CHALLENGE YOU - TO HELP US MAKE IT HAPPEN!

Thank you.