

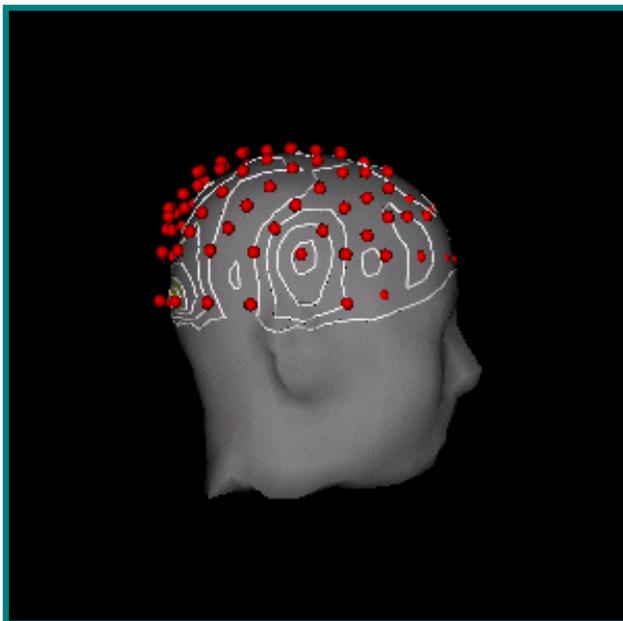


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The Future of Ideas

DSO is creating a fantastic new future made possible by its different programs. To introduce DARPA's biorevolution, Dr. Kruse showed a future in which our warfighters instantaneously assimilate all available information through modern advances in neuroscience. Her programs enable a radically new future with cognitive support technologies that will augment nearly every aspect of warfighting, from target recognition to complex decision making. Her programs promise a future in which warfighters can maintain their peak physical and cognitive performance, despite battlefield stressors such as sleep deprivation and exposure to extreme environments.

DSO envisions a future where severe pain is eliminated for weeks with a single dose and no adverse cognitive effects. Remarkably, this pain therapy is in clinical trials today.



Radical new future with cognitive-support technologies

Next, in the multidimensional world of Dr. Ben Mann, we saw a future where massive quantities of technologically sophisticated data are interpreted with the language of enlightened mathematical models. Dr. Mann's new techniques extend far beyond traditional military applications; they will elucidate new fundamental understandings of materials, networks, and even medical diagnostic data. DSO believes these new mathematical approaches will allow the discovery of fundamental quantitative laws of biology. We anticipate these laws will enlighten the world of biology, much in the same way as general relativity ushered in a new age of physics.

You saw another glimpse of the future from Dr. Chatham, who showed you that even today, a young private can learn basic Arabic via an interactive video game. His tactical language tutor not only teaches critical phrases, but also imparts a cultural awareness and sensitivity essential for human interactions. The future of this idea will be a new reality in which anyone can learn basic language and cultural skills within days or weeks.

Finally, DSO's long investment in understanding the language of the brain has led to perhaps the most exciting and certainly the most challenging future of an idea: the development of an upper limb prosthetic that responds to brain control, a prosthetic that has all the motor and sensory capabilities of a natural limb. DSO is passionately committed to this program because we want to give our wounded Soldiers the ability to pursue the future of their ideas, whether they are returning to the Department of Defense or playing the piano.

There are many other areas in which DSO has mined the "the far side of the far side" to create a

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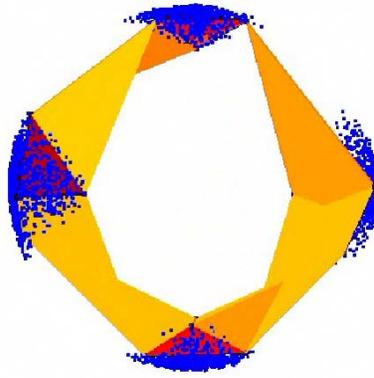
previously unimaginable future, far side ideas like power from garbage, tabletop nuclear fusion, and new metals that are corrosion-proof and nonmagnetic. Every day at DSO, we slow light, control the spin of electrons, and teach honeybees to detect explosives—and that is just the beginning. The future of these ideas will be a more secure nation by ensuring our warfighters continue to maintain overwhelming superiority.

Despite these advances, the future reality does not yet meet our future expectations. There are many capabilities for which we seek new ideas, and we need your help to achieve them

In the area of materials science, we envision a future in which materials can drastically morph based on the function required at any particular moment; for example, materials that sense defects and heal themselves autonomously.

In the biological sciences, there are nearly limitless opportunities, but also worrisome threats to our future. There is perhaps no worse threat than that of highly pathogenic infectious diseases. Whether the source is a deliberate attack or a natural pandemic, the devastating consequences are the same. What we really need, in addition to our current stockpiles, is the national strategic capability to go from the first identification of a pathogen to millions of doses of an effective countermeasure within weeks, not the current 10 to 15 years. The capability will require new ideas. We need new concepts for screening microbial targets and candidate therapeutics in chip-scale biomimetic systems. We need to drastically reduce the need for years of animal testing prior to initiating human clinical trials.

DSO's first foray into accelerating critical therapeutics will create an artificial human immune system on a chip. This chip-scale



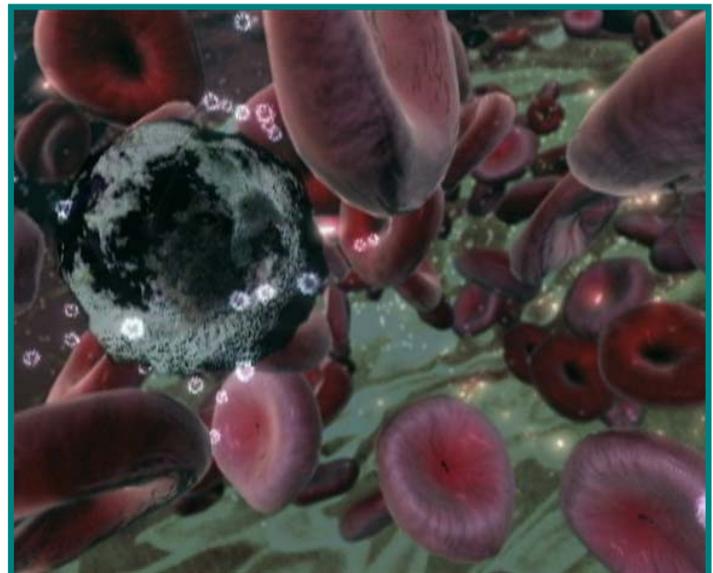
Massive quantities of data are interpreted through unique mathematical models.

human immune system will be able to rapidly screen new vaccines and immune enhancers. We expect to have a working prototype of the system by the end of this year.

In addition, we must construct a biodefense future that does not rely on archaic medical manufacturing processes that use chicken eggs or extremely expensive, non-scalable bioprocessing methods. There are many new concepts that can

potentially revolutionize our capabilities. Please talk to us about your new ideas. We can also harness the immune system to provide protection against other threats; for example, against hemorrhage or chemical weapons or even trauma. Imagine a future in which vaccination against brain injury or nerve gas were truly possible! We have already proven this year that it is possible to vaccinate against radiation injury. Results in experimental models show that vaccination is at least 5 times better than the best current radiation therapeutics. And this is only the beginning.

We invite you to share with us your ideas for the future.



Immune Systems attacking Virus Particles.