

DSO Reprise
Steve Wax

Good Morning again.

What you have just heard from our office are those areas that we have chosen to highlight in detail.

Material, physics, biology, mathematics are very important technical areas.

There are, however, many other themes that are very much outside these familiar technologies. Yet, in many ways these are the most exciting ideas - because we hope they will create entirely new avenues of research and ultimately topics for future DARPA Techs.

These new ideas stem from the observation that there is much going on in warfare that isn't about the bombs and bullets - it is about defeating the hearts and minds of our adversaries as well as building bridges to those we are assisting.

While this has always been true to some extent, our experiences in Iraq have demonstrated that this is likely to become increasingly important.

For example, throughout the last few days, you have heard much about new technologies -- but almost nothing about training.

Yet, as we ask the military to do more than just fight in large, well organized units - and especially as we use the reserve more extensively -- the training of individuals becomes even more critical.

To address this often overlooked issue, we have put together a Training Superiority program.

Imagine soldiers in the field or sailors on ships -- logging onto a persistent architecture and beginning to train in a coordinated way with their fellow soldiers and sailors around the world.

This won't replace the National Training Center, but it will certainly help maintain skills that tend to quickly degrade after leaving the training environment.

For example, we are attempting to show that novel computerized learning approaches can improve training by two standard deviations above the best instructor.

This is NOT accomplished in the traditional fashion with a computerized instruction manual.

Rather it is based on observing and exploiting the interaction -- both positive and negative -- between the student and the teacher.

But not only are we interested in new ways of training, we also have to think about new areas in which to train.

At some level, the basic understanding of the language and culture of a nation must be brought to the individual soldier.

This is an impossible task at the "school house" level and requires the new approaches to training that we are bringing.

In addition to training the individual, it is now becoming clear that new techniques for training teams are required as well.

As units become smaller and more dispersed, one can no longer count on the large scale training that our military has been historically very good at.

The law of large numbers is no longer predictive for small teams -- as their performance is highly dependent upon specific group dynamics.

Unfortunately, this is very hard to measure and therefore seldom assessed -- particularly not in real time.

Moreover, there is seldom an opportunity to improve small team performance because small teams are often formed ad hoc for a specific task and then disbanded.

Then for a new task, a new team is formed.

These problems are not confined to military contexts.

Commercial aircraft flight crews are reformed about every four days.

73% of airline accidents occur on the first day that a new team works together.

44% of airline accidents occur on the first leg of the first day.

Something changes in the interactions of these teams as time passes -- but -- we can not yet measure it.

The training effort I spoke of earlier makes use of the extensive growth of massively multiplayer games -- an area the DoD has just begun to explore.

This may be a perfect medium for examining team behavior.

For example, might it not be possible to interrogate -- keystroke by keystroke -- what makes one team successful in a game and others not? Here we might expect to learn something about the subtle workings of a successful military team that isn't obvious to the casual observer -- and isn't taught as part of the conventional wisdom of the military.

Another way to judge the performance of a team might be through their group communication.

There is some evidence that automated semantic analysis -- the study of language context rather than specifics-- can be used to successfully assess performance.

Any other ideas that might help small teams succeed are more than welcome.

But perhaps the greatest implication of winning hearts and minds is that we first have to understand them.

And so it is becoming increasingly important to try to comprehend the psychology and sociology of individuals and groups - especially in the context of our military's interactions with them.

The DSO challenge is to adapt these soft sciences to a more quantitative and exploitable field of research.

There are already indications that this may be possible.

Recent studies have shown correlations between the psychological behavior of special forces during survival training and their biochemistry.

And the new mathematical approaches for understanding complexity you heard from Carey would clearly be applicable.

This is an intense, interdisciplinary effort of the type our office relishes.

But there is still a long way to go -- and probably more than a few miracles to be performed before we are successful.

Let me close by reiterating that the Defense Sciences Office is always looking for new, far reaching ideas that can grow into future Defense capabilities.

Let what you have heard today inspire you, but not limit you.

The only limit to proposing to DSO should be your imagination.

We are at Disneyland after all.

And so -- a final word from the DSO team.

□