Joint Services Small Arms Systems Annual Symposium

"Meeting the Needs of Our Joint Ground Forces in the Fight Against Terrorism"

Presented by

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8 May 2007

Revolutionary Research . . . Relevant Results

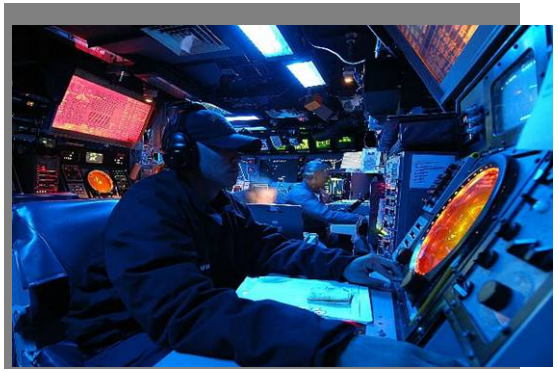
Technology is Dominant

Today, Marines and Sailors have at their disposal the world's most sophisticated military technology

Laser-Guided Munitions

Mobile Communications

GPS Navigation and Targeting



Network-Centricity, Information Warfare, and Intelligence

Technological "Democratization"

Revolutionary Research . . . Relevant Results

Internet—Information Warfare and Intelligence

In the global war on terror and in Iraq, our adversaries are leveraging sophisticated technology that is now easily available anywhere in the world—and at a modest cost.

Cell Phones—Mobile Comms

Commercial Laser Rangefinder—Precise Targeting

Handheld GPS—Location with Extreme Accuracy

Revolutionary Research . . . Relevant Results

A Swiftly Changing Planet

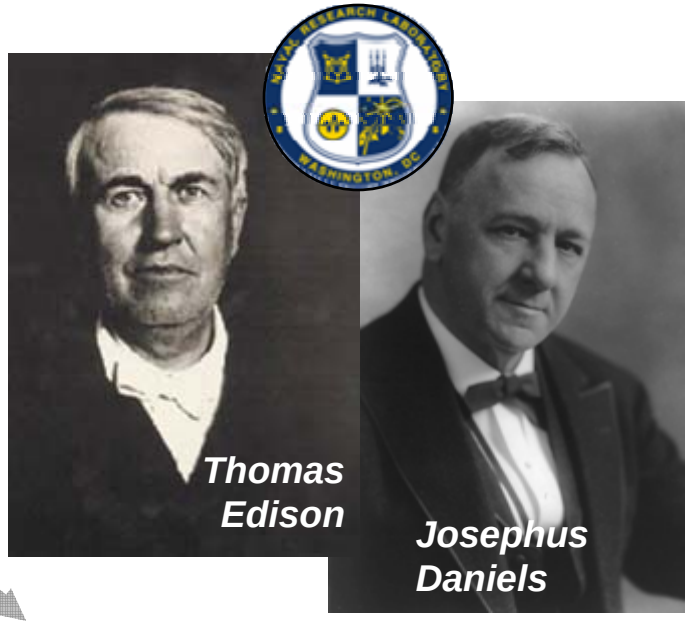
- In an era of increasing globalization, new technology is more readily available—and more quickly—than ever before
- The natures of "combatant" and "weapon" are changing, and new challenges can come from anywhere in the world

- We must accept the fact that adversaries will use our technology against us
- To stay competitive on tomorrow's battlefields, we must:
  - **Ensure** our people and research enterprises are more innovative
  - **Maintain** our technological advantage

Naval Research: A Statutory Mission

Naval Research Laboratory ***(Appropriations Act, 1916)*****:**
"[Conduct] exploratory and research work…necessary… for the benefit of Government service, including the construction, equipment, and operation of a laboratory…."

Office of Naval Research ***(Public Law 588, 1946)*****:**
"… plan, foster, and encourage scientific research in recognition of its paramount importance as related to the maintenance of future naval power, and the reservation of national security…. "



Transitioning S&T ***(Defense Authorization Act, 2001)*****:**
"…manage the Navy's basic, applied, and advanced research to foster transition from science and technology to higher levels of research, development, test, and evaluation."

ONR 30 Mission: Expeditionary Maneuver Warfare and Combating Terrorism

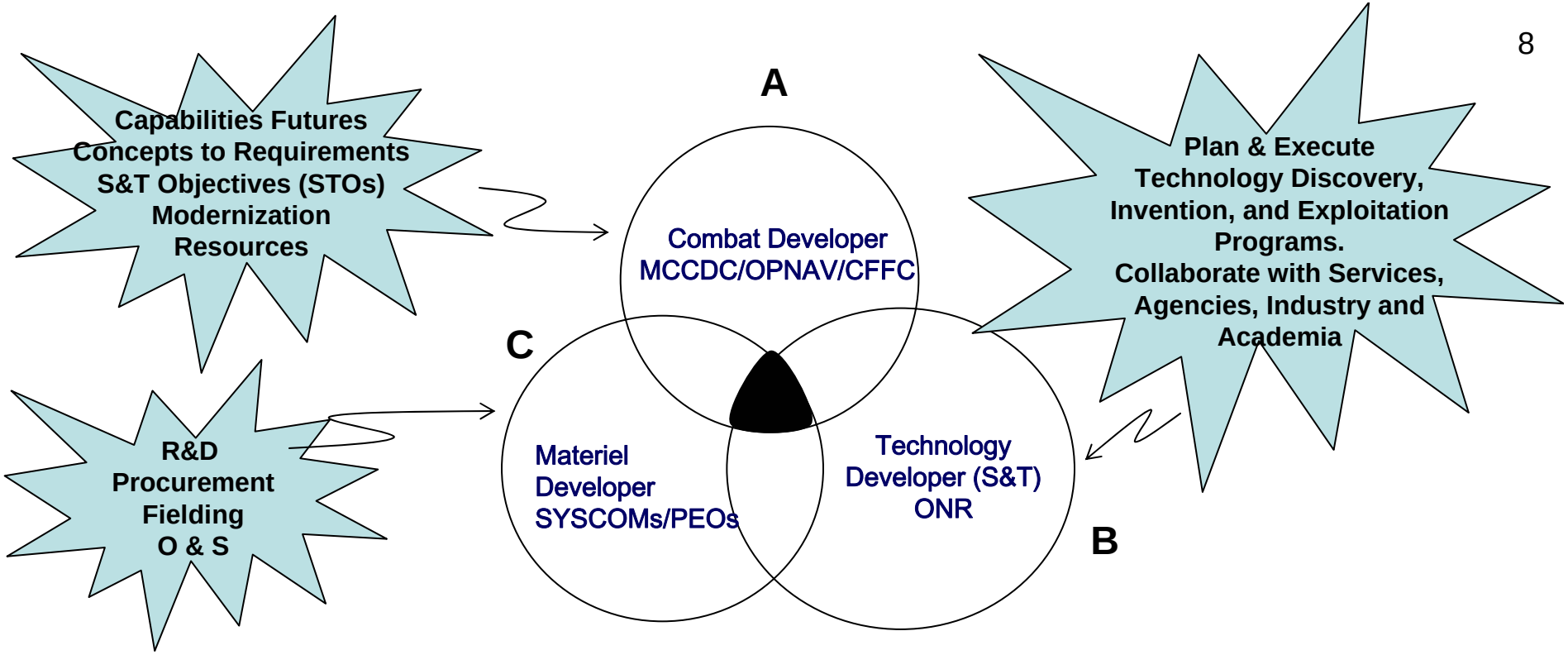
Office of Naval Research *(Public Law 588, 1946)*:
*"… **plan, foster, and encourage scientific research** in recognition of its paramount importance as related to the maintenance of **future naval power**, and the **preservation of national security**…. "*

Expeditionary Maneuver Warfare and Combating Terrorism (Code 30)
*To lead the Department of the Navy's Science and Technology efforts that develop future **combat capabilities for Naval Expeditionary Maneuver Warfare and the Department's role in Combating Terrorism**:*

*…the exploitation and subsequent application of Science and Technology in order to enhance the ability of the **Navy-Marine Corps team to achieve assured access and conduct decisive operations as the naval portion of a joint campaign.***

Investment Thrust Areas:

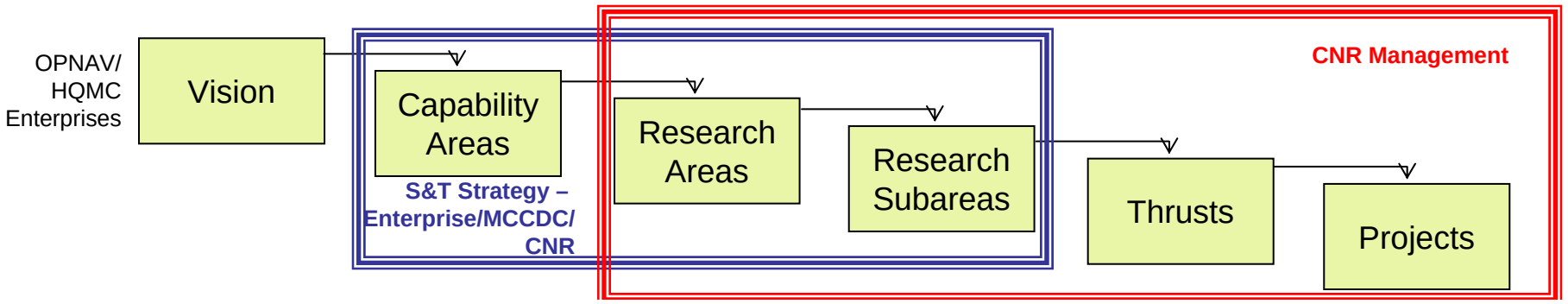
- **C4**
- **Fires**
- **Force Protection**
- **Human Performance**
- **Operational Adaptation**
- **Logistics**
- **Manuever**
- **Mine Countermeasures**
- **Maritime Irregular Warfare**



A Concept → Capability Futures → Gaps → Requirements

B Capability Futures → Gaps → Requirements → Technology

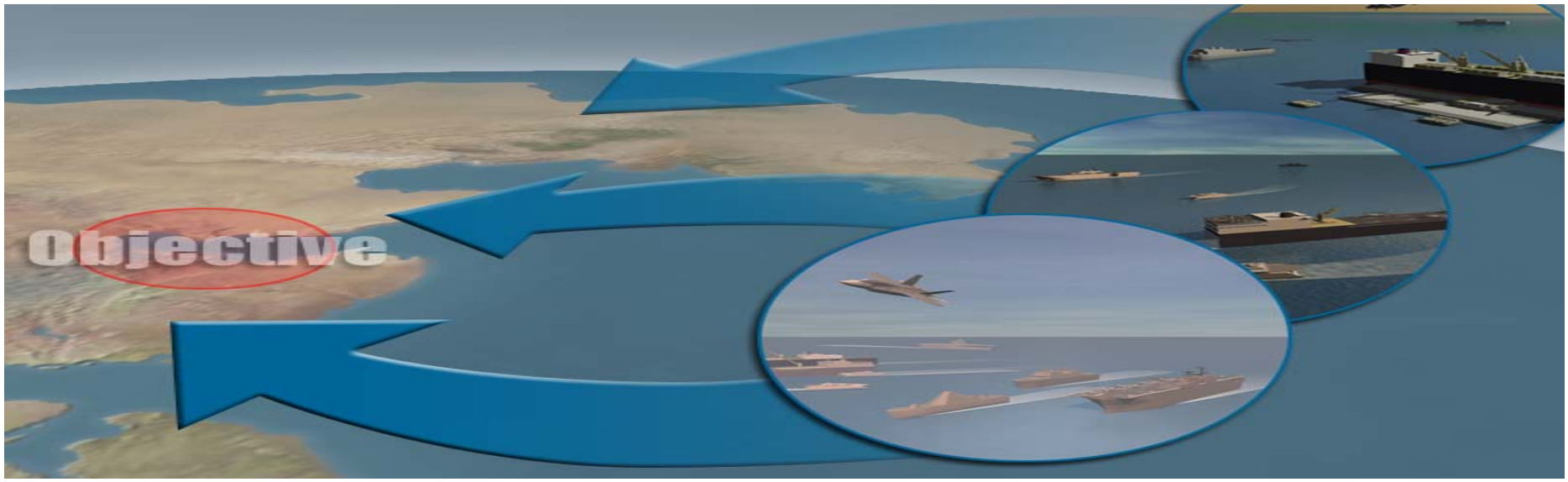
C Requirements → Technology → R&D/ Production → Capability



Revolutionary Research . . . Relevant Results

Distributed Operations (DO)

"***Maneuver Warfare** is the shift from quantitative characteristics of warfare – mass and volume – to qualitative factors of speed, stealth, precision, and sustainability*"



"***Distributed Operations** constitutes a form of Maneuver Warfare. The essence of this concept lies in the capacity for coordinated action by highly capable units, dispersed throughout the breadth and depth of the battlespace, ordered and **connected** within an operational design focused on a common aim."*

Distributed Operations

Vision: **Enable dispersed small units to dominate extended battlespace through advanced warfighter training, unambiguous situational awareness, robust communications and sense and respond logistics.**

Objectives

Training
- Enhancement of Physical and Cognitive Performance
- Simulation – based scenarios for enhanced training
- Rapid assimilation of cultural environments

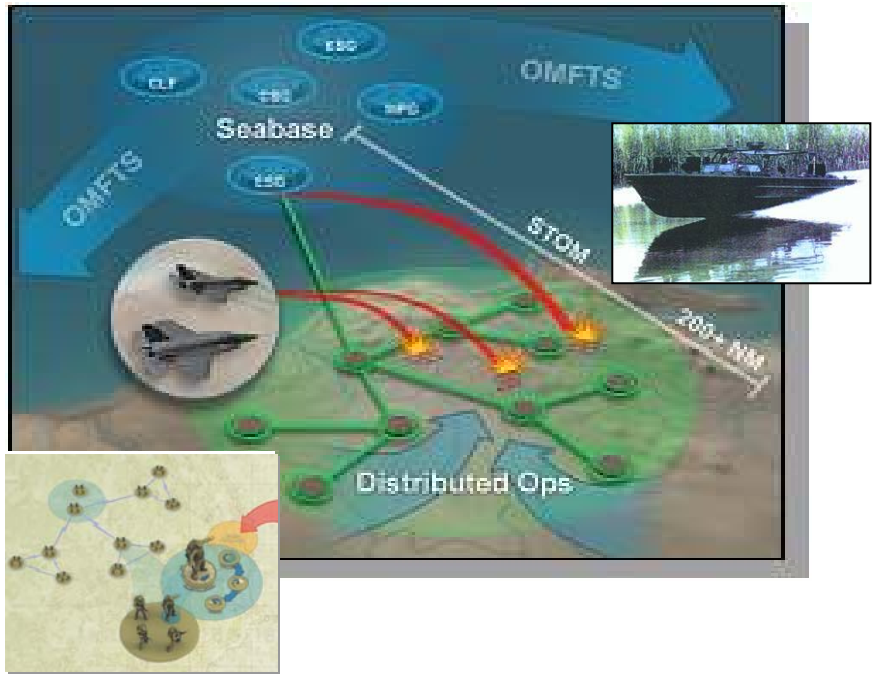
Communications
- Robust Command and Control networks
- Airborne relays on manned and unmanned platforms

Logistics
- Rapid re-supply and medical evacuation whenever possible
- Real–time automatic supply sensors and network
- Optimize medical self-sufficiency

Fires
- Integrate firepower of distributed ground, offshore, and air assets
- Blue Force Tracking down to the individual

Survivability
- Warfighter stealth technology
- Warfighter exoskeleton technology

Maneuver
- Adaptable and survivable tactical mobility systems to enhance operational tempo and extend range of vehicles and soldiers
- Advanced materials to reduce combat load



Key Research Topics

Training, Education & Human Performance
Expeditionary C4
Communications and Networks
Expeditionary Logistics
Expeditionary Firepower
Precision Strike
Expeditionary ISR
Unmanned Air and Ground Vehicles
Special Warfare / EOD
Land Mine Countermeasures
Expeditionary Maneuver/ Individual Mobility

Revolutionary Research . . . Relevant Results

HPT&E S&T Enables DO Excellence

- DO Marine as a system
- Information exploitation at all echelons in real time
- Enhanced combat capabilities at individual & small unit level
- DO-enabled training technologies & methodologies

Human Performance

Closing capability gaps in how individuals & teams of Marines perform, survive & excel in complex, DO environments via:

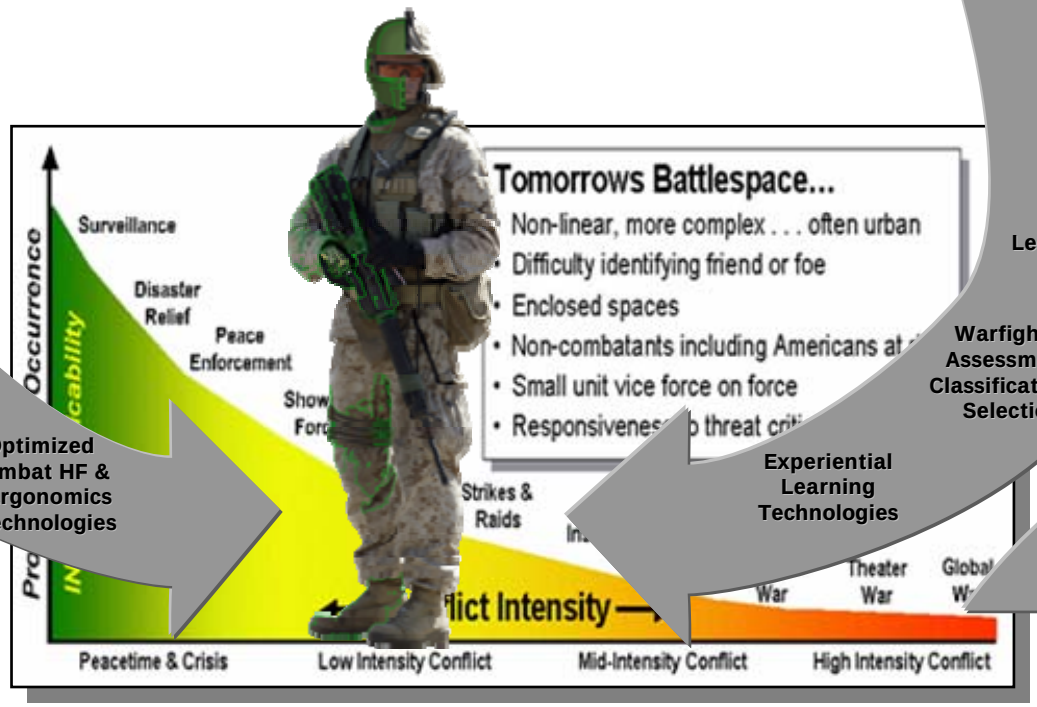
- Optimized Warfighter Cognition
- Optimized Warfighter Physiology
- Optimized Combat HF & Ergonomics Technologies

Leverage:

DARPA, SSC-SD, NHRC, Natick, USARIEM, PSE, NRL, RDECOM, MARCORSYSCOM

Goal: USMC technological superiority in all combat conditions

"Our most effective weapon remains the individual Marine who out-learns, out-thinks, and out-fights any adversary" -- CMC



Training & Education

Closing capability gaps in how Marines learn, train for, & think in complex, DO environments via:

- Accelerated Learning Science
- Warfighter Assessment, Classification & Selection
- Experiential Learning Technologies

Leverage:

DARPA, TECOM, TRASYS, NPS, DI, NRL, Clemson, UCF-IST, FAU, EGI, Sarnoff

Revolutionary Research . . . Relevant Results

The Ultimate Customer – The Warfighter!

Caveat: Real Customer: SYSCOMs, PEOs, DRPMs

HOT Buttons:

1. **Survivability**
2. **Reduce Combat Load**
3. **Small Unit Excellence**
4. **Fuel Efficiency**
5. **Light weight portable power sources**
6. **“Transparent” Urban Structures**
7. **Modular, Scaleable Weapons**
8. **CIED, MCM, CRAM**
9. **Operational Adaptation**
10. **Infantry combat load reduction**

Revolutionary Research . . . Relevant Results

F-22 Raptor vs "The Grunt"

Cost	$120M	per aircraft
	$200K	pilot's training
	$87K	pilot Salary
	$12K	1 hour flight time

Cost	($500K	SGLI)
	$20K	PFC Salary
	$10K	Training
	$3.5K	Equipment

Limiting factor for Grunts should not be $

Do we really think they have enough effective, lightweight, relevant equipment?

Revolutionary Research . . . Relevant Results

Lighten the Load

Yesterday's & Today's Marine – Overloaded!

1960s

Today

No Change

Treat the Marine as a system – Focus on the entire individual

~Make smart tradeoffs between performance & weight~

Improvements in:

- Combat Load
- Ergonomics
- Nutrition
- Physiologic Performance (Endurance, Strength)
- Fatigue Management
- Protection

Tomorrow's Marine: Optimized for Combat Endurance

Equals improvements in a Marine's load-bearing capability

Revolutionary Research . . . Relevant Results

Challenges for the Future

- Improved sensing / identification of targets in the urban environment….”Transparent Urban Structures”.
- PID targets at greater ranges + ability to engage at greater range.
- “Precision strike” capabilities in small arms.
- Increased lethality or lower “specific volume / weight”.
- Reduced overall logistics overhead (from the factory/depot to the theater of operations; to the field; to the customer (grunt)).
- More electrically/thermally efficient electronic gear to reduce demands on portable power.
- Training – think about the “Strategic Corporal.”

Revolutionary Research . . . Relevant Results

Conclusions

- Rapidly changing global technology is creating problems—as well as opportunities—for today's expeditionary warfighter
- We must be flexible enough to solve today's critical challenges while focusing on tomorrow and the Army, Navy and Marine Corps after Next
- Break Industrial Revolution mindset; commit to exploring disruptive technologies. Stable funding for JSSAP for "the Grunt after next."
- Money tree will eventually stop growing – industry must adapt to make cheaper, lighter, lower power, even more effective systems

Revolutionary Research . . . Relevant Results

QUESTIONS?