11th Annual NDIA Expeditionary Warfare Conference

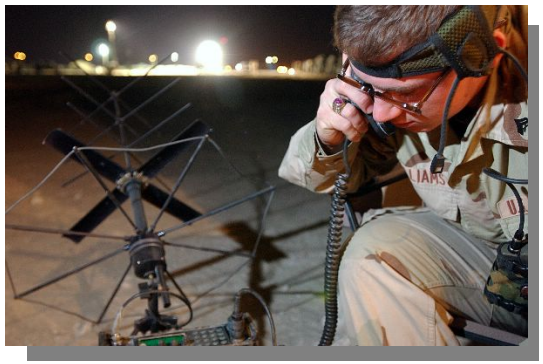
Rear Admiral William Landay III

October 23, 2006

Technological Dominance

Laser-Guided Munitions

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



Mobile Communications

GPS Navigation and Targeting

Network-Centricity, Information Warfare, and Intelligence

Technological "Democratization"

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.

Internet—Information Warfare and Intelligence

Cell Phones—Mobile Comms

Commercial Laser Rangefinder—Precise Targeting

Handheld GPS—Location with Extreme Accuracy

A Technological "Perfect Storm"?

For decades, Western militaries have held a decisive technological advantage…

"It is by devising new weapons, and above all by scientific leadership, that we shall best cope with the enemy's superior strength."

--Winston Churchill

Today, enemies are able to acquire weapons and technology quickly and cheaply…

"Acquiring weapons for the defense of Muslims is a religious duty. If I have indeed acquired these weapons, then I thank God for enabling me to do so. And if I seek to acquire these weapons, I am carrying out a duty. It would be a sin for Muslims not to try to possess the weapons that would prevent the infidels from inflicting harm on Muslims."

--Osama bin Laden

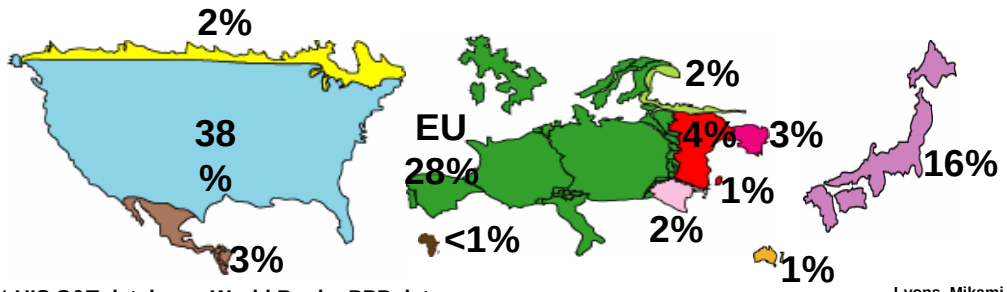
And there also are adversaries willing to invest significantly in new technology

The 21st Century is also going to be an age of scientific change, with certain cutting-edge technologies likely to be applied to naval warfare...high-tech arms will make direct attacks on naval battlefields possible from outer space, remote altitudes and remote land bases...superconduction technology will bring superconductor ships to the naval order of battle, enabling ships to travel faster without noise...submarines will be able to go faster and deeper, with the seabed being the ideal place to build military bases."

--Chinese Naval Officers at the Navy Research Institute in Beijing

World Science and Technology Investment

1996*



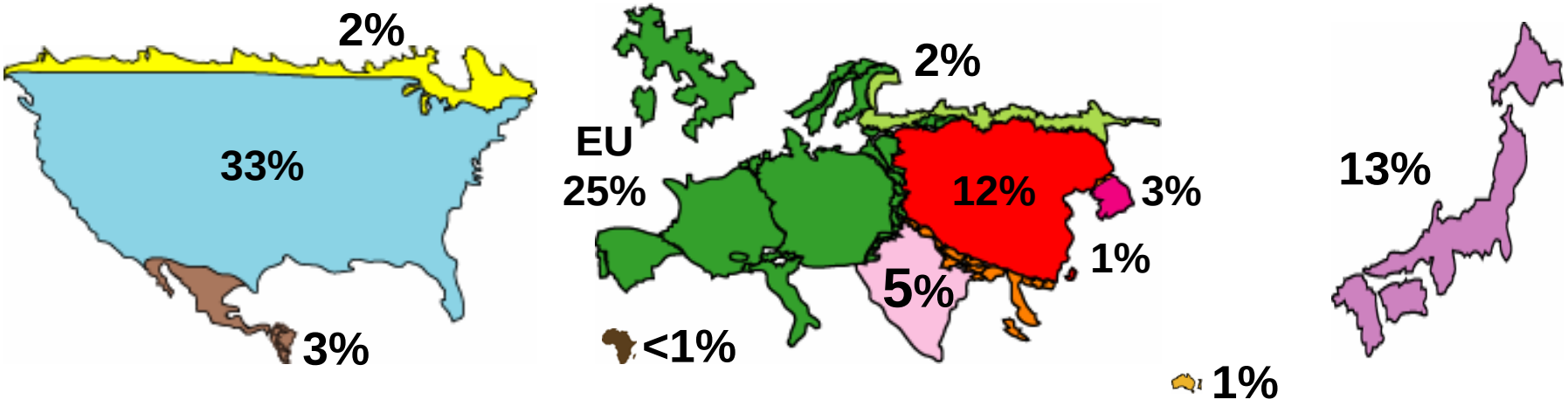
Asia Share
1996: 26%
2004: 35%

* UIS S&T database; World Bank - PPP data

Lyons, Mikami 2005, AOARD

+78%

2004**

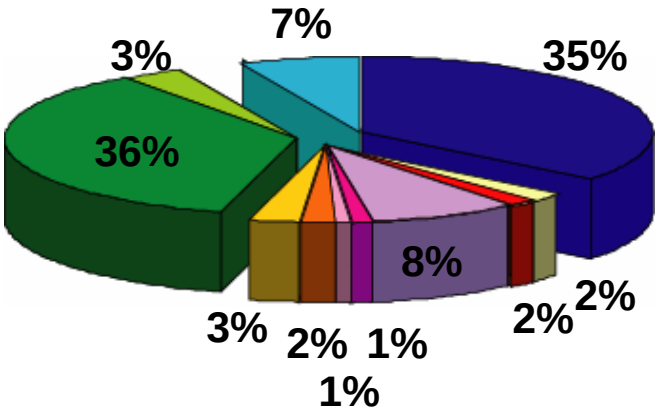


Lyons, Mikami 2006, AOARD

** OECD 2005 PPP; Global S&T Report (Batelle) - PPP data

World Science and Technology Publications

1996



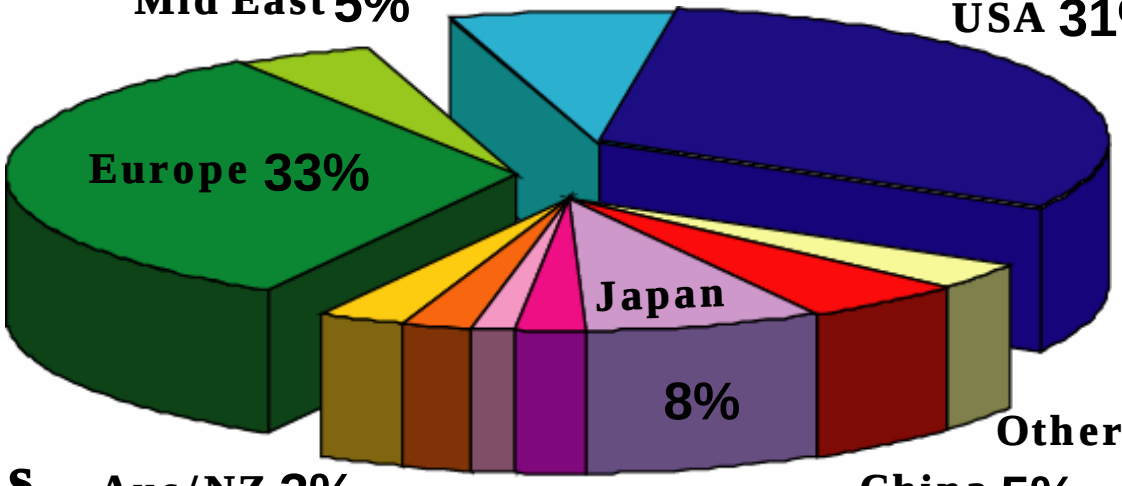
851,764 articles

Asia Share
1996: 19%
2004: 24%

+28%

1,094,017 articles

2004

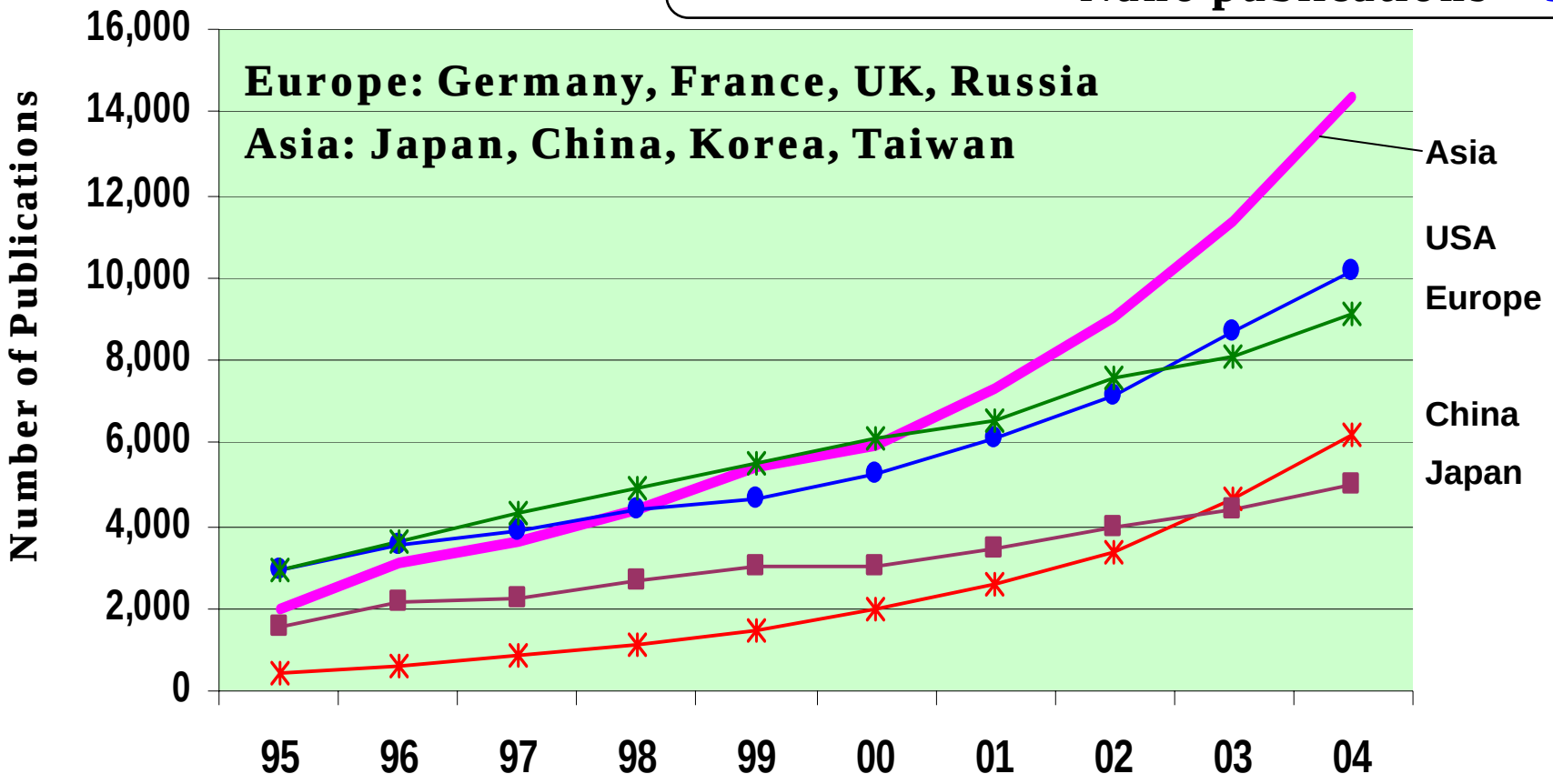


* Data from Science Citation Index, Web of Science, Thomson Scientific; November 2005 (Lyons, Wegener, Hubbard)

Nanotechnology Publications (1995-2004*)

N-E Asia Share: Overall publication = 16%

Nano publications = 38%



Japan: MEMS, materials & electronics, CNTs, quantum dots/wires, photocatalysis

U.S.: biomaterials, drug design, environmental catalysis, quantum computing

* Data from Science Citation Index, Web of Science, Thomson Scientific; November 2005 (Lyons, Wegener, Hubbard)

"Tech Transfer"

What are the key discriminators of U.S. technology?

- Fast movers
- Innovative
- Leading-edge scientists
- Flexible
- Focused on quality

What are the top U.S. technology companies?

HP, IBM, GE, Microsoft, Dell, and Google?

We see these companies operating today in India, China, Russia, and elsewhere in the "developing" world…

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

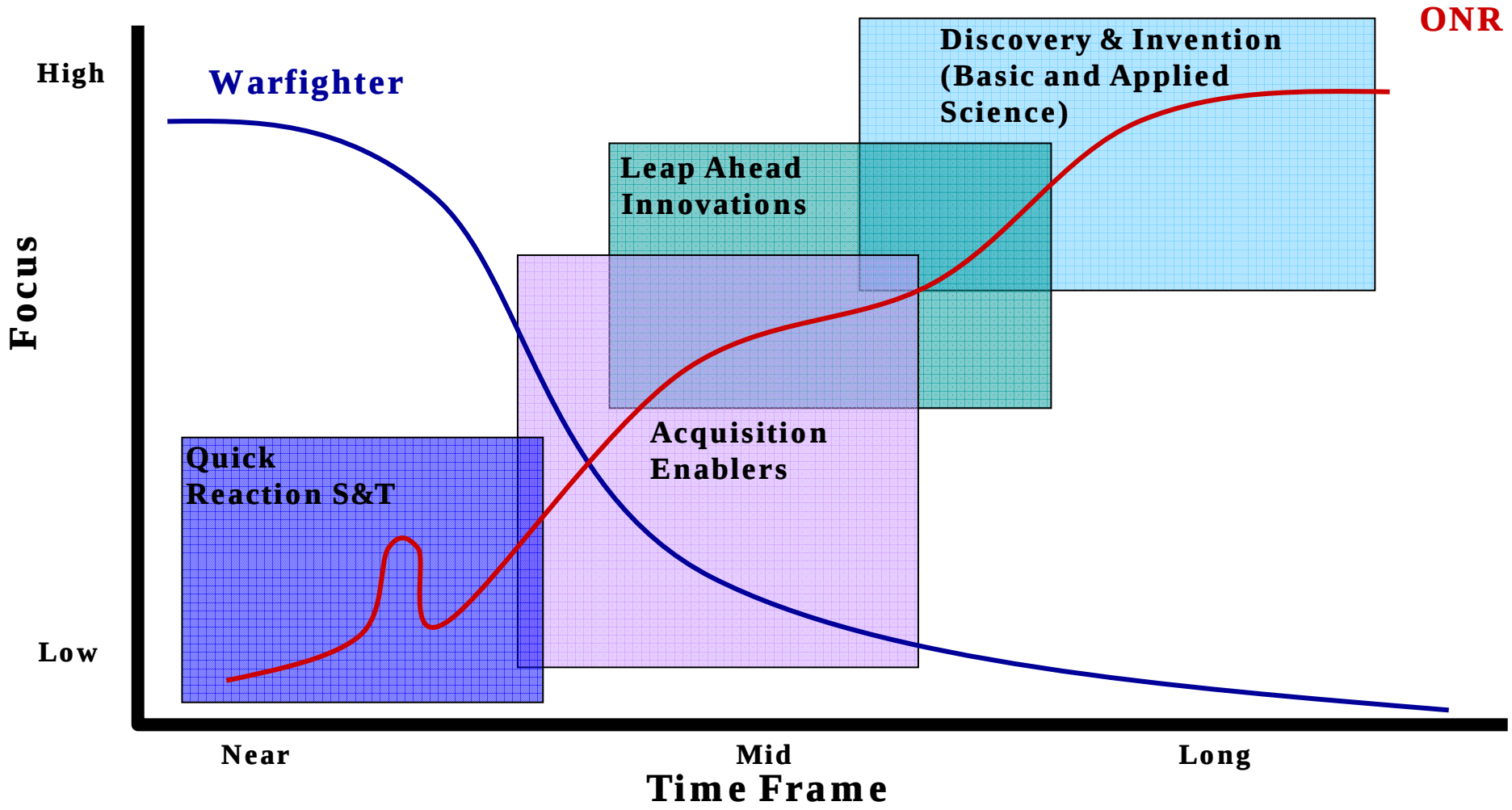
• We must accept the fact that adversaries will use our technology against us

• To stay competitive on tomorrow's battlefields, we must:

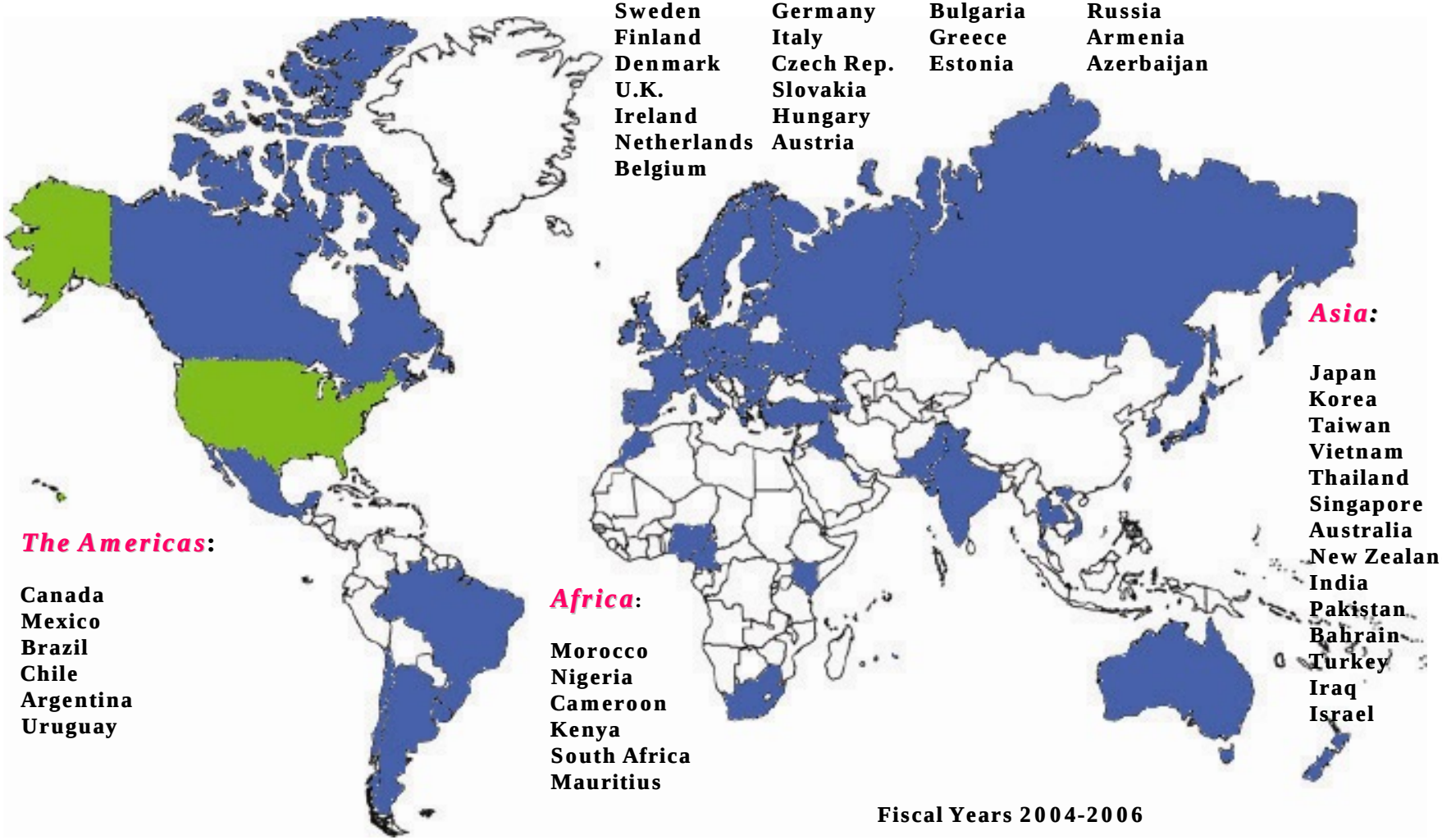
- **Ensure** our people and research enterprises are more innovative

- **Maintain** our technological advantage

S&T Focus to Meet Naval Needs



ONR's International Engagement



***Europe*:**

Norway
Sweden
Finland
Denmark
U.K.
Ireland
Netherlands
Belgium
France
Spain
Portugal
Germany
Italy
Czech Rep.
Slovakia
Hungary
Austria
Slovenia
Poland
Romania
Bulgaria
Greece
Estonia
Latvia
Lithuania
Ukraine
Russia
Armenia
Azerbaijan

***The Americas*:**

Canada
Mexico
Brazil
Chile
Argentina
Uruguay

***Africa*:**

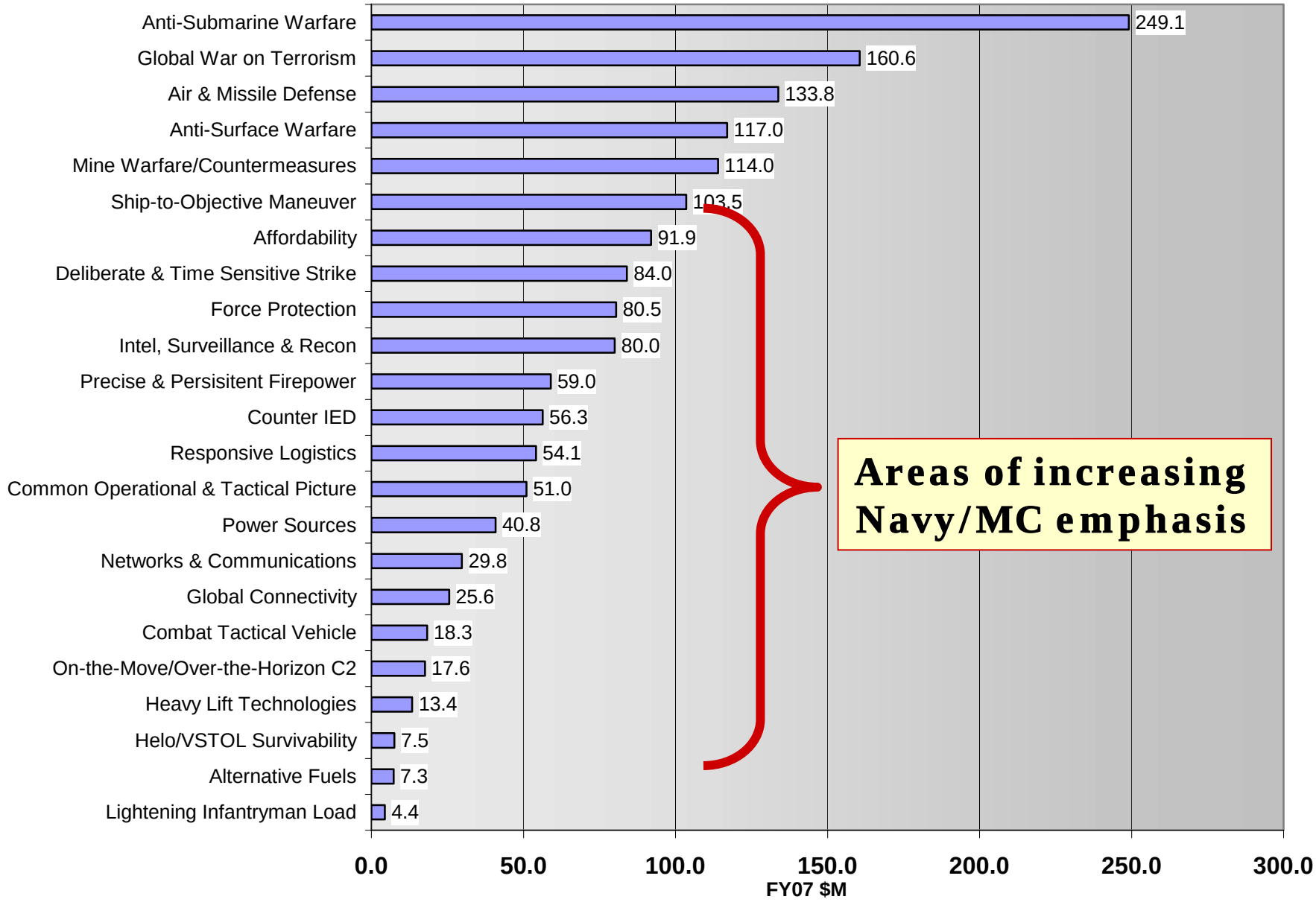
Morocco
Nigeria
Cameroon
Kenya
South Africa
Mauritius

***Asia*:**

Japan
Korea
Taiwan
Vietnam
Thailand
Singapore
Australia
New Zealand
India
Pakistan
Bahrain
Turkey
Iraq
Israel

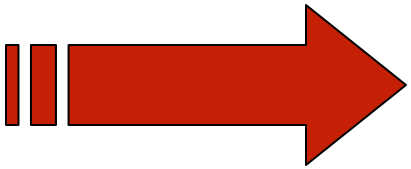
Fiscal Years 2004-2006

Science and Technology Investment by Current Capability Area



Resulting Focus Areas

Naval S&T Focus Areas
Maritime Domain Awareness
Information, Analysis & Communication
Operational Environments
Asymmetric & Irregular Warfare
Distributed Operations
Assure Access & Hold at Risk
Power Projection
Survivability & Self-Defense
Naval Warrior Performance & Protection
Platform Mobility
Fleet/Force Sustainment
Affordability, Maintainability, & Reliability
Power & Energy



Operational Concepts & Missions

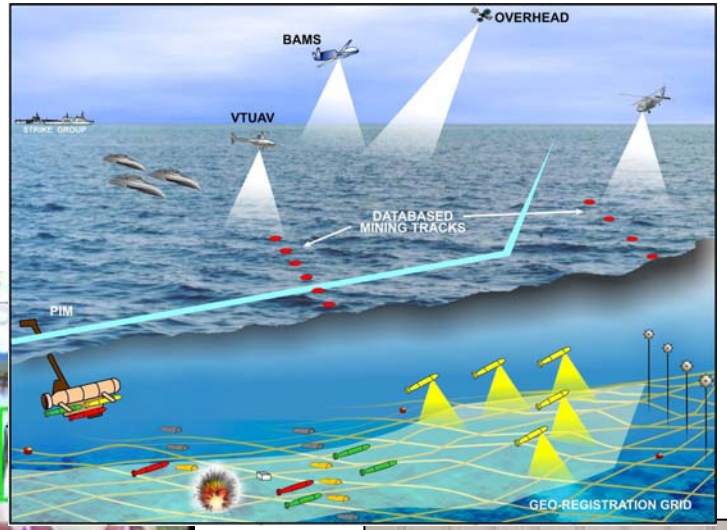
Warfighting & Support Functions

- **Functions that S&T would enable or enhance**
- **Include accepted and projected future functions**

ONR Technology for the Expeditionary Warfighter

Joint Light Tactical Vehicle: A family of survivable combat vehicles

Mine Warfare



Visual Understanding Research

SpeechGear: Bi-directional Free Speech Language Translation

QuadGuard: Arm and leg protection to protect against blast injuries

Video Understanding Research

ONR Technology for Expeditionary Warfighter Improvement

Dietary Performance Enhancement

VirtuSphere

Conclusions

- Rapidly changing global technology is creating challenges—as well as opportunities—for today's expeditionary warfighter
- ONR is flexible enough to solve today's critical challenges while focusing on tomorrow and the Navy and Marine Corps after Next
- Committed to maintaining our warfighter's superiority to ensure victory on today's as well as tomorrow's battlefields...

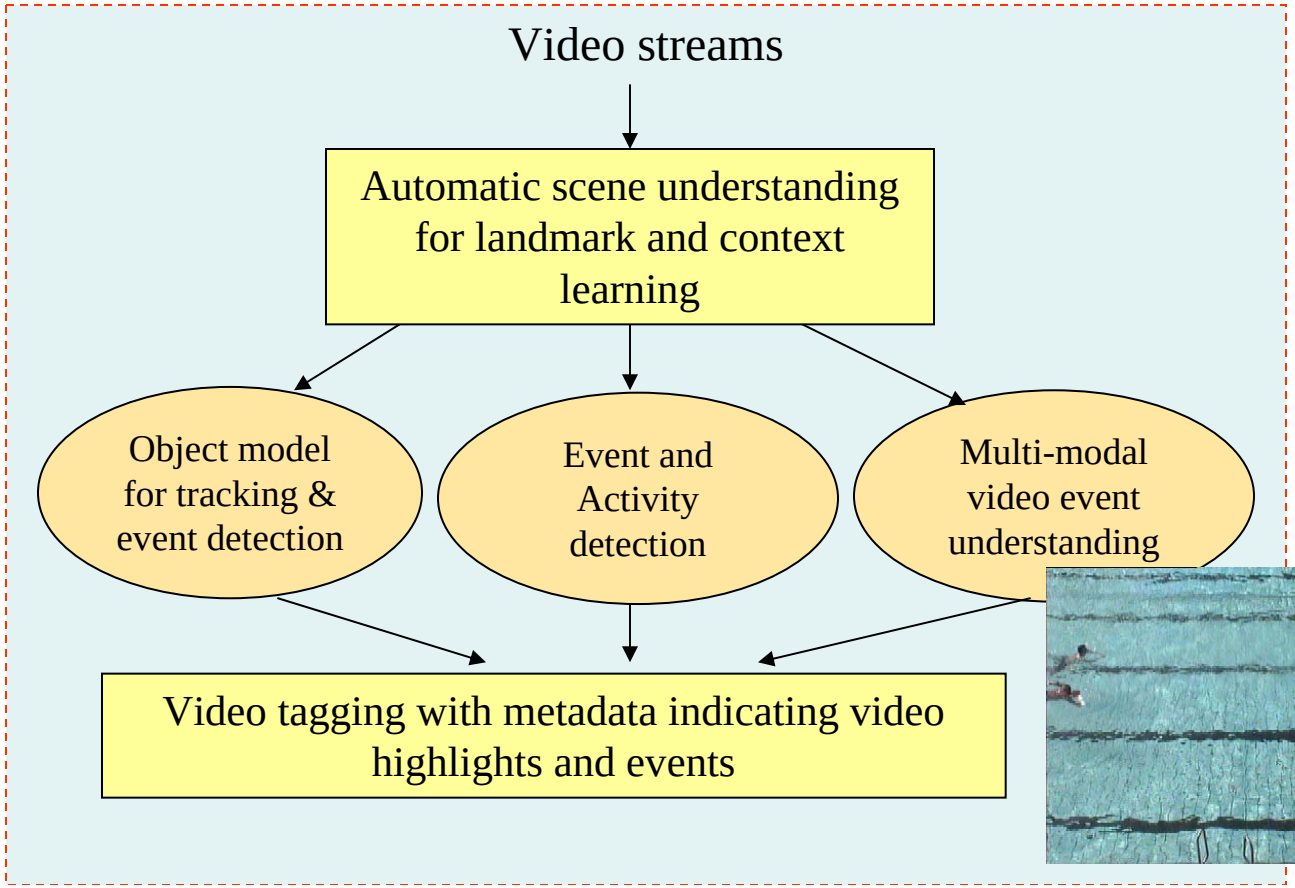
Questions?

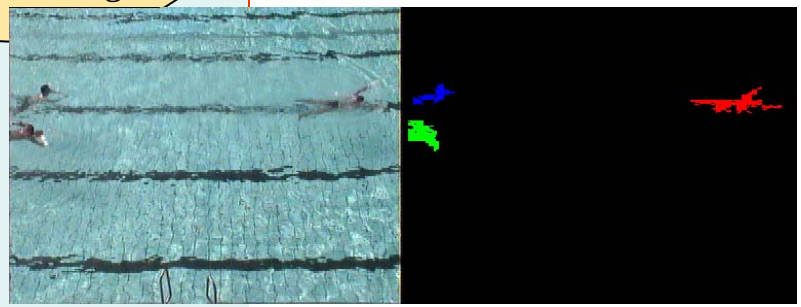
WWW.ONR.NAVY.MIL

BACK UP

Visual Understanding Research

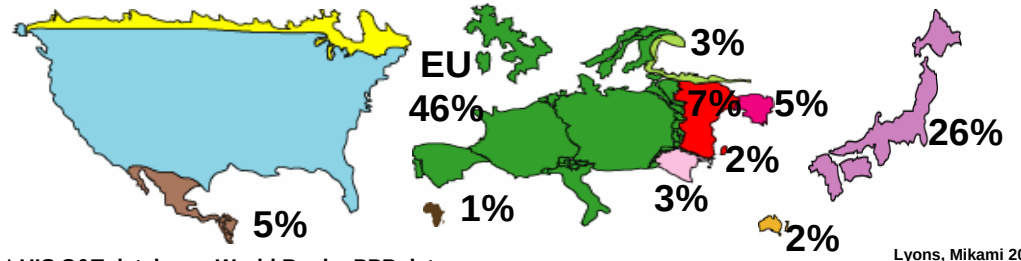
To develop video understanding technology for real time event detection and easy access of the massive video content by semantic scene understanding, video categorization and concept detection





Non-North American S&T Investment

Normalized without US and Canada



Asia Share
1996: 45%
2004: 53%

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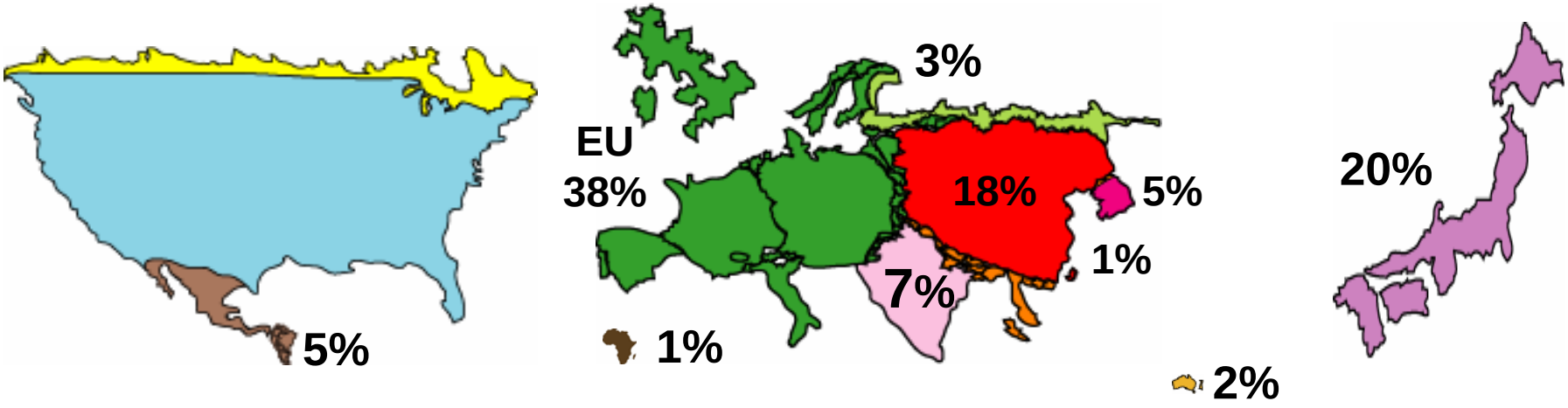
+78%



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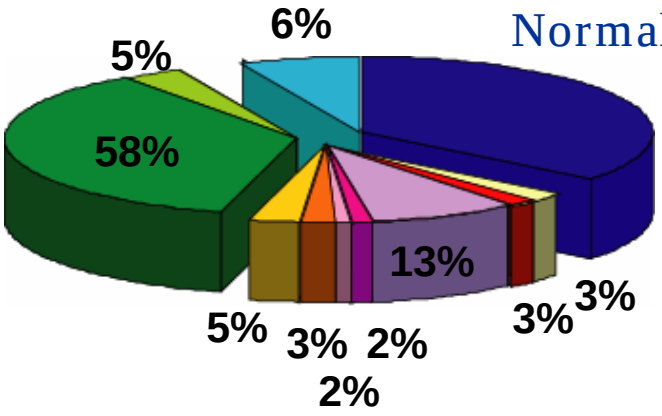

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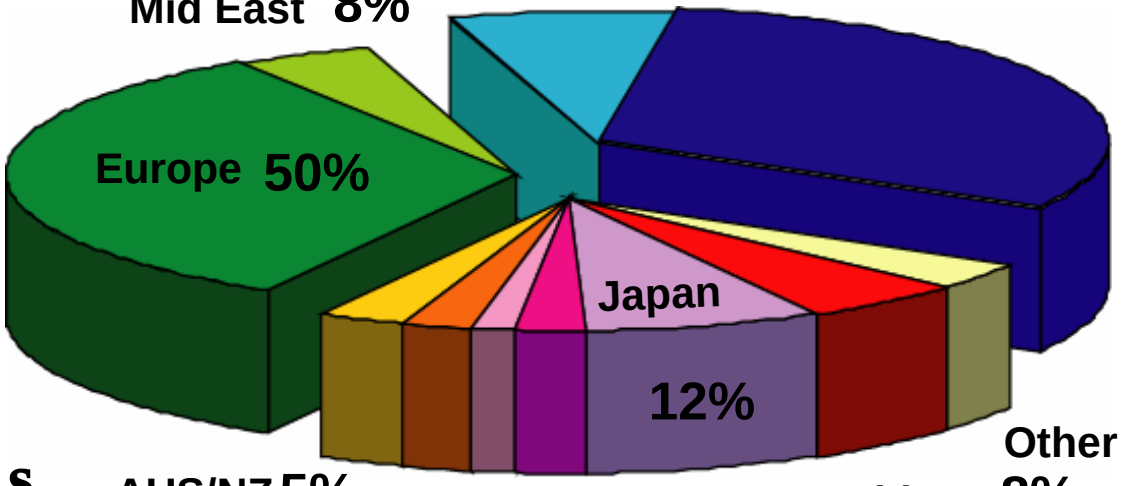

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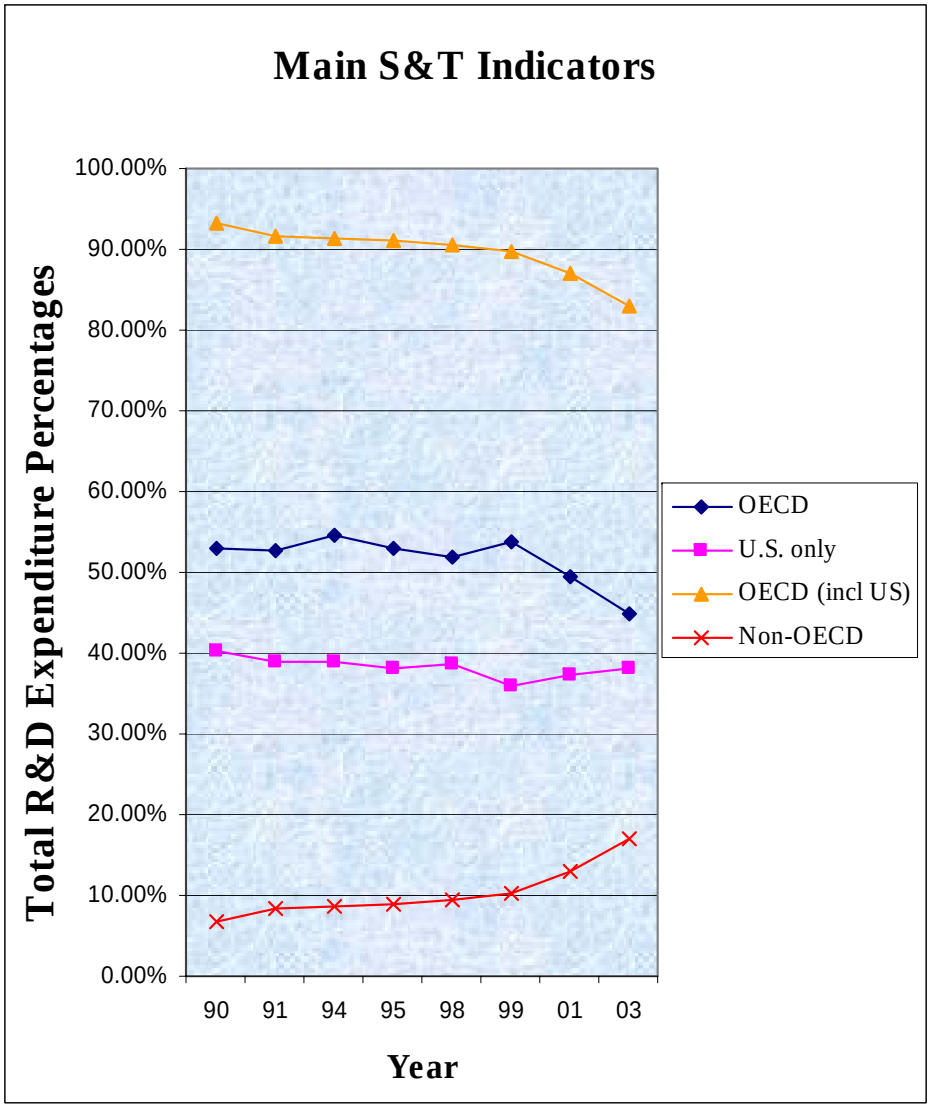
Global R&D Funding



The developing world is making an increasingly significant contribution to the total global investment in R&D

Joint Light Tactical Vehicle

Trades, Concepts, Technology Demonstrator:
Conduct trade studies, design, build & test a combat science and technology demonstrator platform. Leverage simulation-based design tools.

Superior Mobility/Performance:

State of the art drive train & suspension technologies. Leverage hybrid electric systems from the RST-V, ECASS, and private sector.

Advanced Armor Design:

Leverage Army Research Lab ceramic composite and EM armor designs for medium vehicles.

Crew station:

Expand on lessons learned from ULTRA to design superior ergonomics, safety and "fightability" of platform.

Integrate Active RPG Defense:

Incorporate evolved active net system from current effort.

Advanced Automotive Safety:

Best available safety features to reduce roll-over, collisions and from AugCog platform (autonomous obstacle avoidance system, optical lane sensing, computer stability control).

Integrated Combat Systems:

A "plug & play" ready vehicle that can be quickly adapted to a variety of missions. Power, hard points and crew stations compatible with remote weapons and sensor systems. Leverage Gunslinger and AugCog programs.

Mine/ IED Survivability:

Cab floor and crew seats designed to mitigate shock loading from mines & IEDs.

Automated Object Recognition

SpeechGear: Bi-directional Free Speech Language Translation

Description

A hand held rugged device to allow dismounted troops to translate bi-directionally from Arabic to English and back

Benefits

- Uses commercial/government off-the-shelf equipment

- Lessens the need for trained translators in field

- Allows for translation of written, visual & spoken language

- Greater than 90% accuracy for in-field translation of free speech

QuadGuard: Arm and Leg Protection to Reduce Blast Injuries

Design philosophy

- Optimizes protection, mobility, weight and comfort
  - Protection against blast fragments and small arms
  - Designed to reduce likelihood of severe injuries
  - NIJ Level IIA protection (NIJ Level II option also available)

Design features

- Protection zones based on anatomical vulnerability
- Flexible joints for mobility
- Vented for comfort
- Integrates with Interceptor vest system
- Arm guard weights
  - 1.6 lbs per arm
- Leg guard weights (including suspenders)
  - 3.1 lbs per leg - open vented design
  - 3.5 lbs per leg - closed vented design
- Volume production cost less than $1000 per set

Program team

- Funding
  - Office of Naval Research “Tech Solutions” Program
- Design and production
  - Naval Research Laboratory
  - Army Research Laboratory
  - FS Technology
  - Oklahoma State University

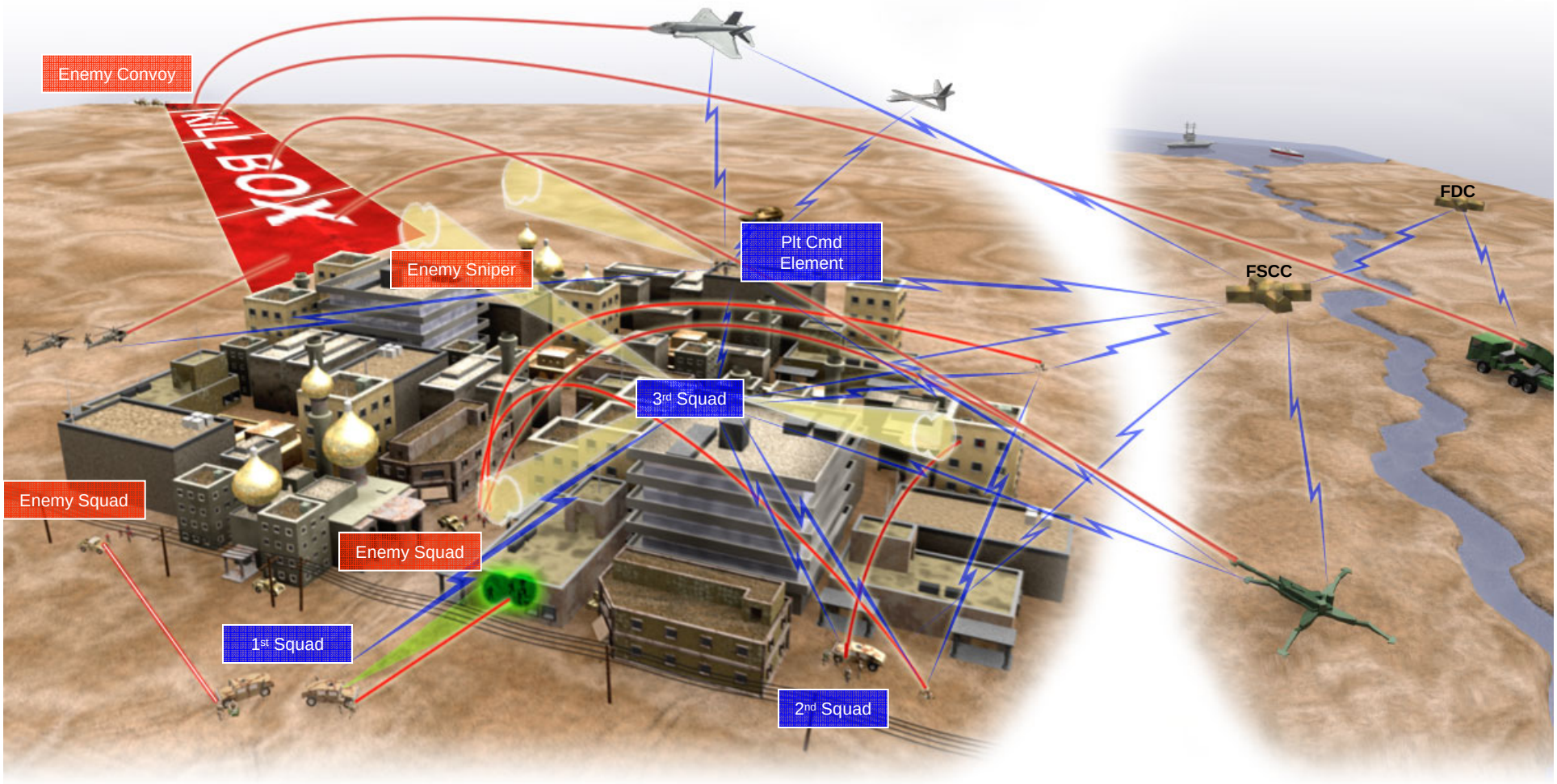
FST ARL OSU

Distributed Operations

DO Tenets

- Enhanced Fires Against Larger Forces
- Increased Unit Separation
- Small Unit Control of Integrated Fires
- Effective in Unique Battlefield Geometries
- Reduced Weight

Simultaneous Distributed Ops



DO Operational Environment

ONR Technology for Expeditionary Warfighter Improvement

Computer Training
Testing Combat Decision-Making Skills

VirtuSphere

Blue Screen Simulator
Virtual Reality Training for the Aviator

Dietary Performance Enhancement

Fatigue and Stress Management