# Perspective on S&T Collaboration

**Tae-In Choi, Vice President**

**Agency for Defense Development**

**Operational S&T Conference**

**PACOM, Hawaii**

**April 2007**

# Overview of Talk

- RoK Battle Lab Status
- RoK/US S&T Cooperation
  - Examples of Joint Development
- Conclusion

# Naval Battle Lab.

## Under New SBA System

- The Role of Battle Lab.
- ROKN BL and ADD BL for SBA
- 2007 US-ROK NBE Symposium

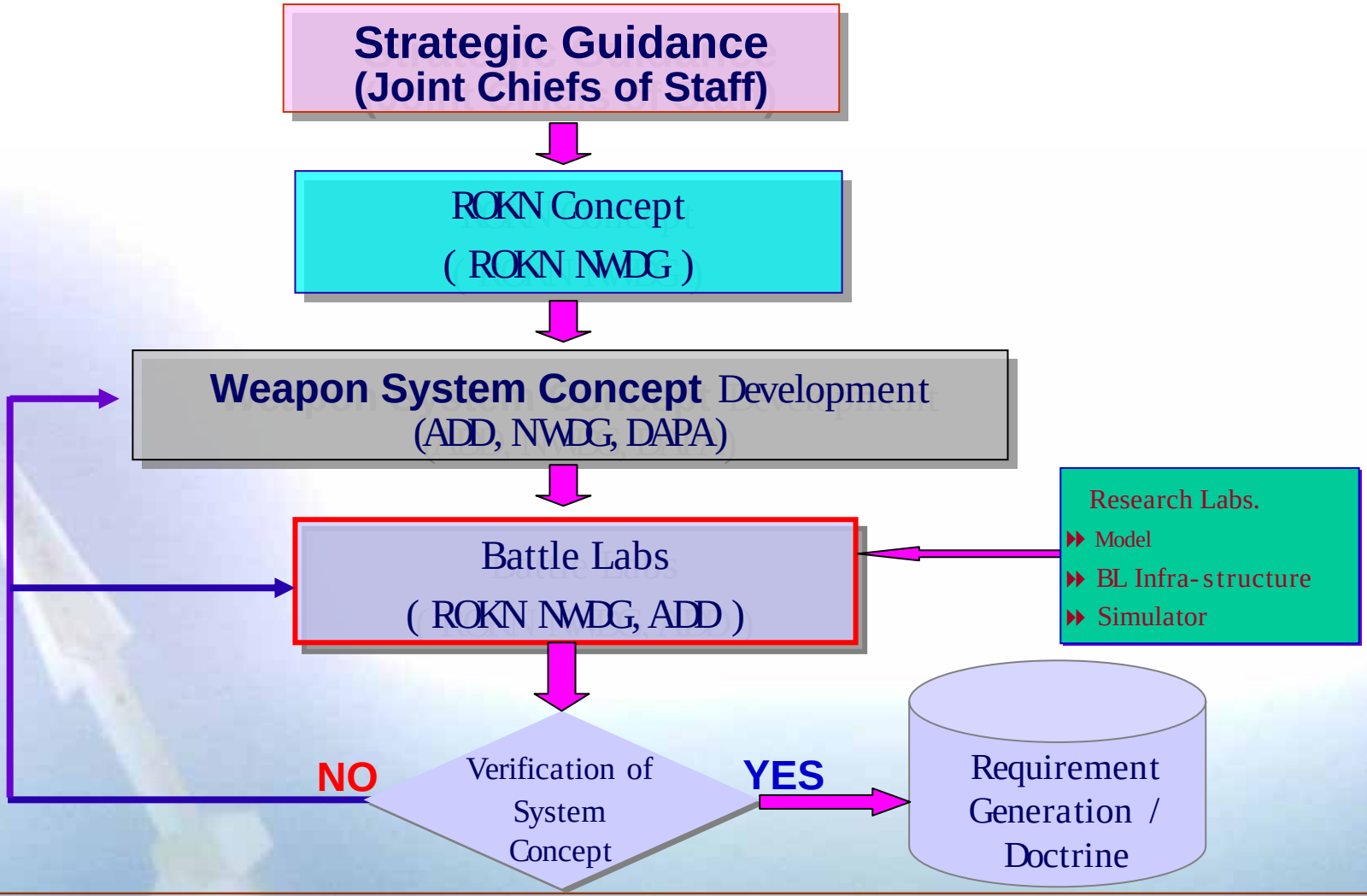
# The Role of Battle Lab. (1/3)

## What is Battle Lab?

- A mechanism for assessing New Ideas & Capabilities provided by advanced technologies
- An innovative mechanism for scientific requirement generation based on the operation concepts of future battlefield
- A core verification tool in Top-down/Born-Joint weapon development flow
- Battle Lab needs to be designed to meet diverse requirements as engineering test beds for R&D Program Managers and as simulation tools for field commanders, tactical planners, and war gamers.

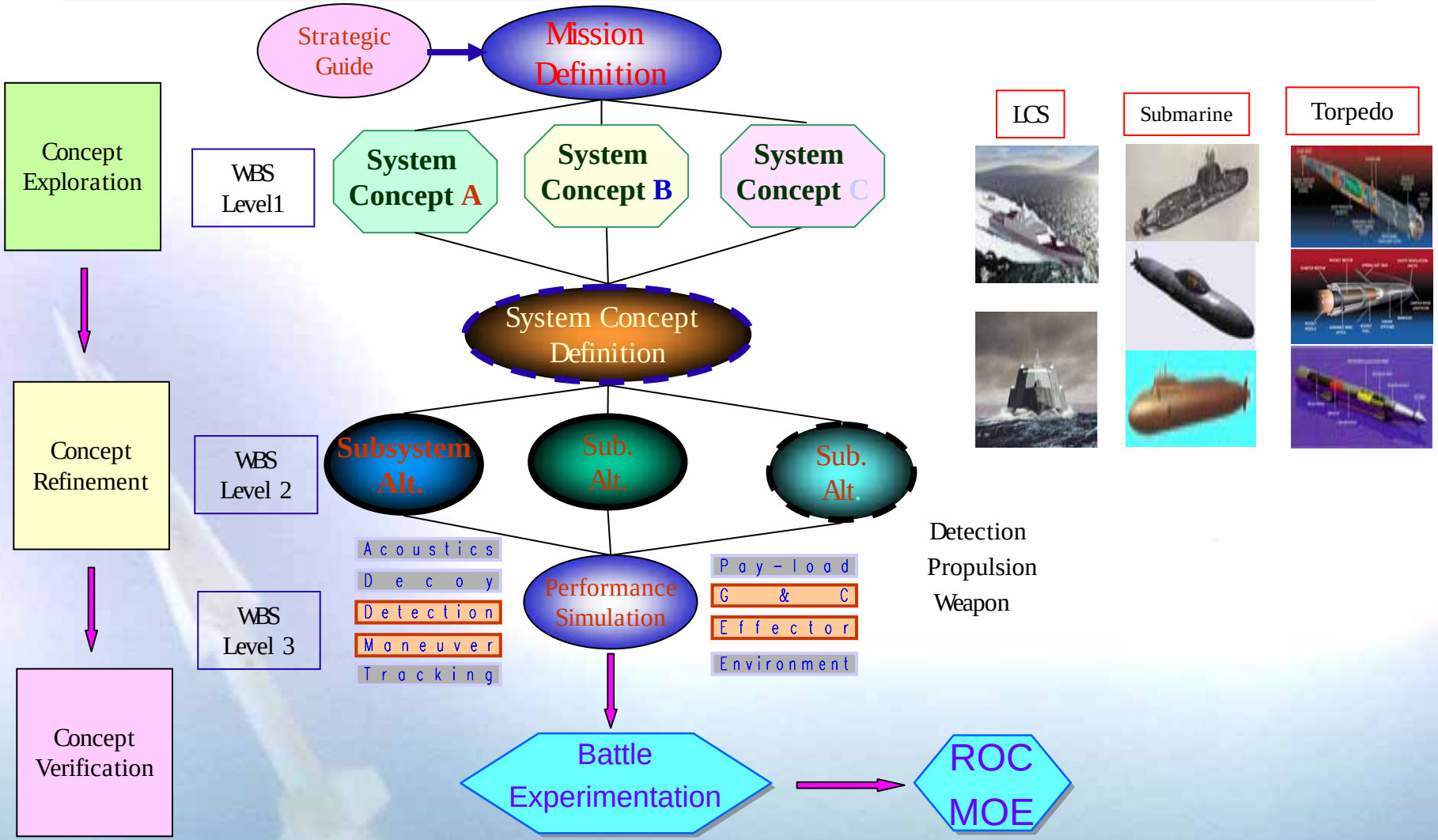
# The Role of Battle Lab. (2/3)

## ROKN New Weapon System Development Flow



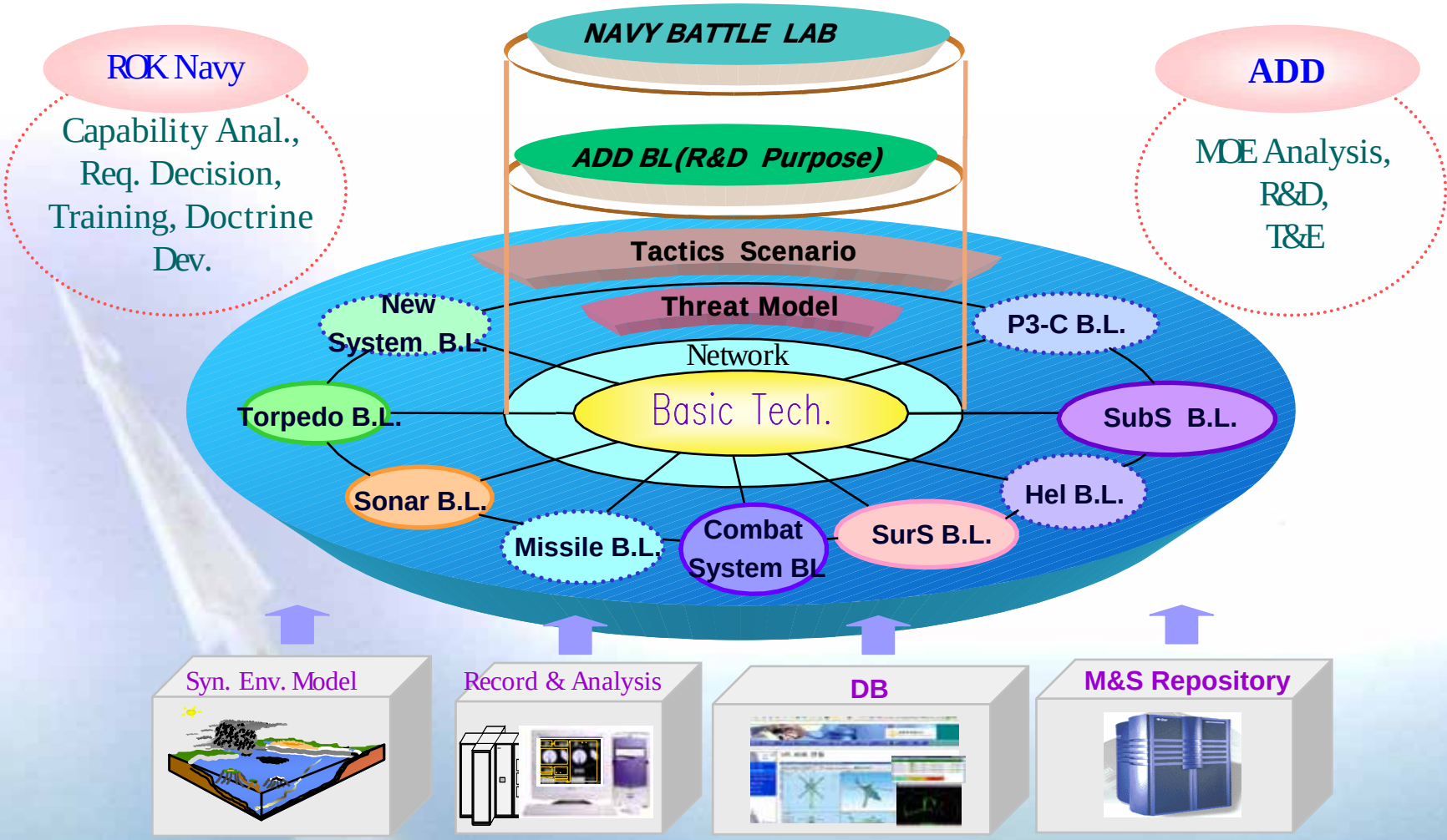
# The Role of Battle Lab. (3/3)

## ROK Navy: Top-down Weapon Requirement Generation



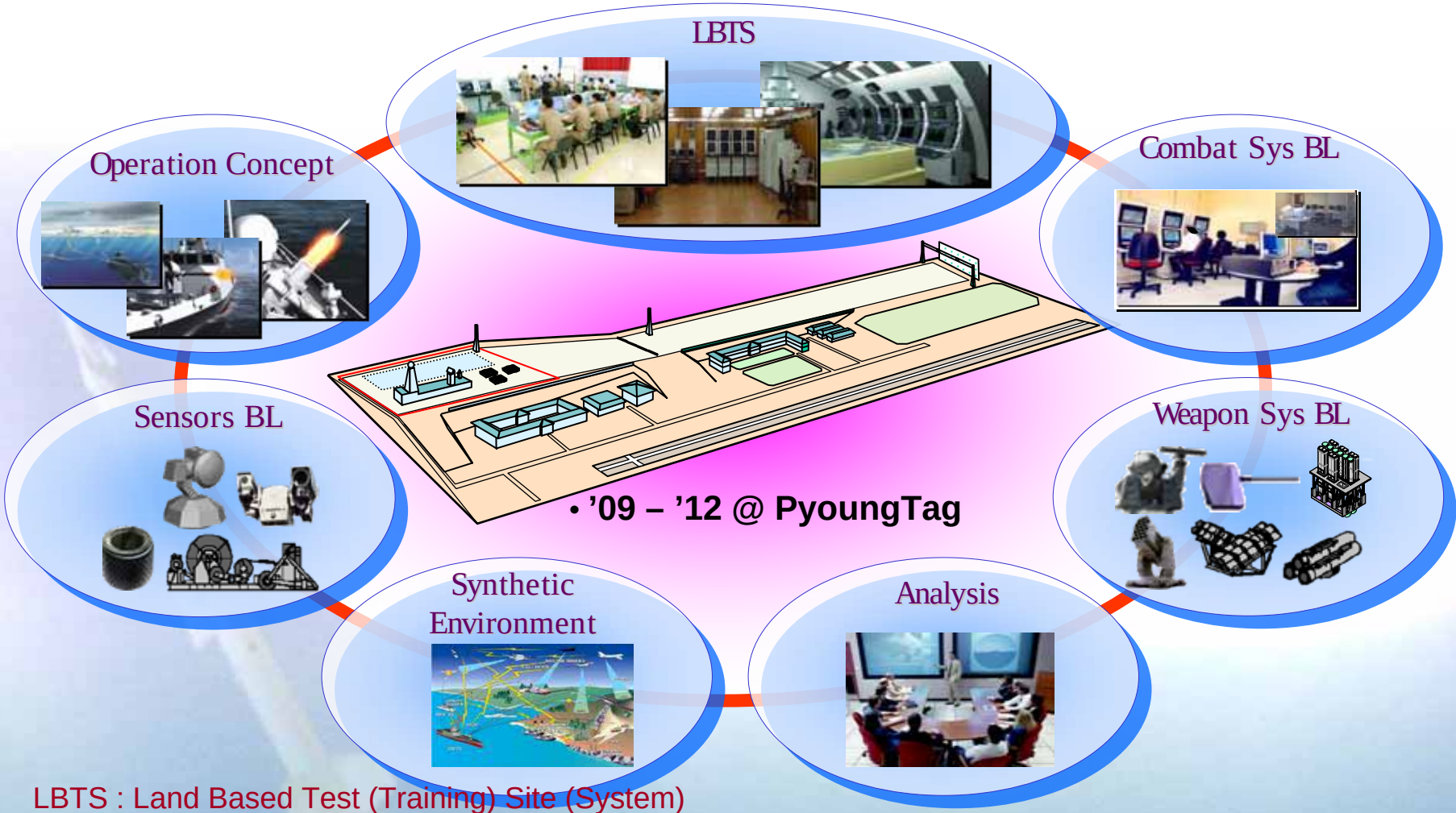
# ROKN BL and ADD BL for SBA (1/3)

## Simulator-based ADD BL and ROKN BL Building



# ROKN BL and ADD BL for SBA (2/3)

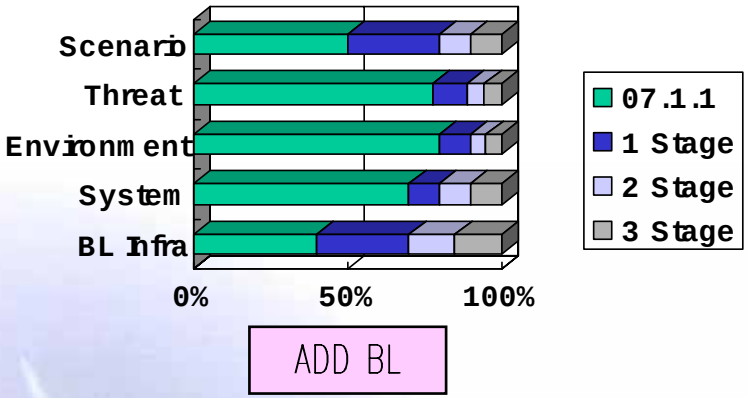
## ADD Battle Lab Development Center based on LBTS



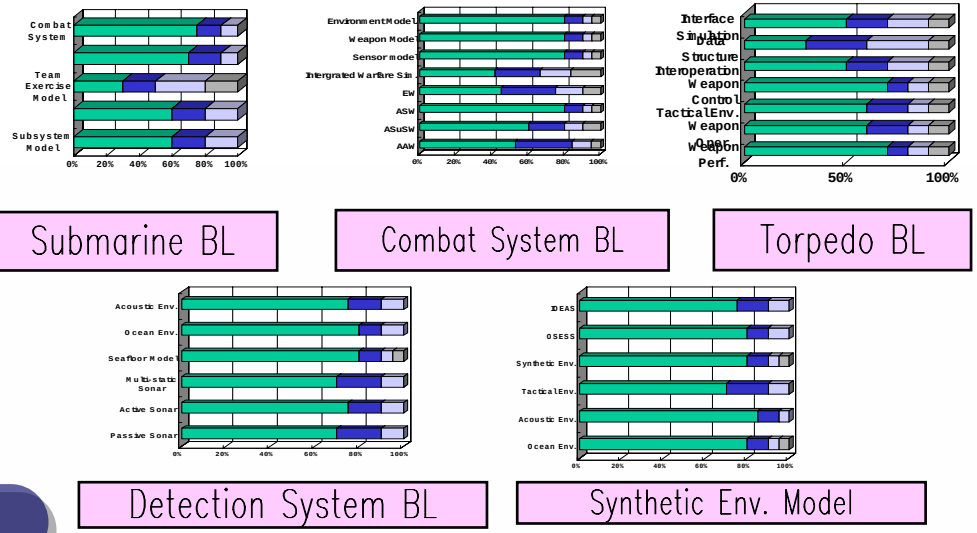

LBTS : Land Based Test (Training) Site (System)

# Status and Roadmap for ROKN BL and ADD BL (3/3)

## ADD BL Status




## Weapon System BL Status




## Roadmap of Battle Lab Development

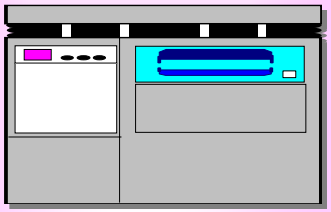
| Year | 2006 ~ 2008 | 2009 ~ 2011 | 2012 ~ 2014 |
|---|---|---|---|
| Stage | Infra Build-up | NBL BL Development | LVC based BL Development |
| ROKN | Mission Model<br>ROKN Wargame for Analysis<br>Battle Exp. for Future Program | ROKN Wargame PIP<br>ROKN BL Build-up | LVC based ROKN BL |
| ADD | Weapon System B.L.<br>ADD BL R. G. | Battle Lab Development Center<br>ADD BL Development | Battle Lab Dev. Center PIP<br>LVC based ADD BL Build-up |

# Synthetic Battle Environment Model

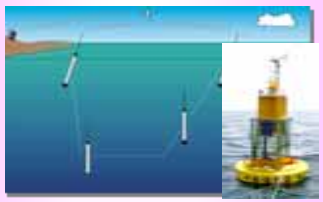
Real Ocean Data System

SATELLITE

DBMS

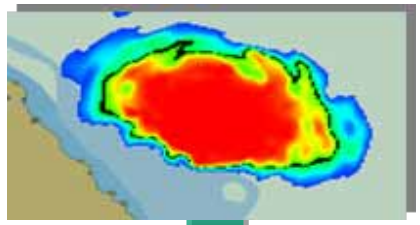


Ocean Buoy

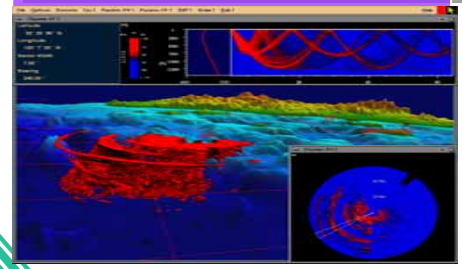


National Data Link

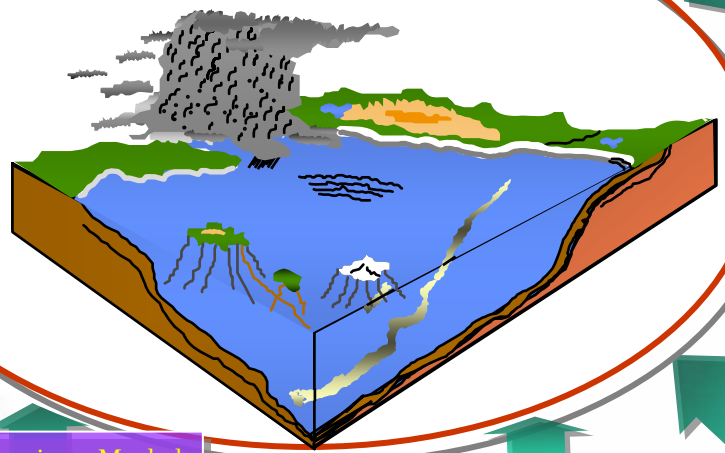
Wave Propagation Model



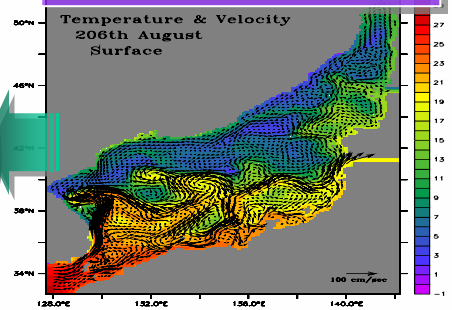
Tactical Simulation Model



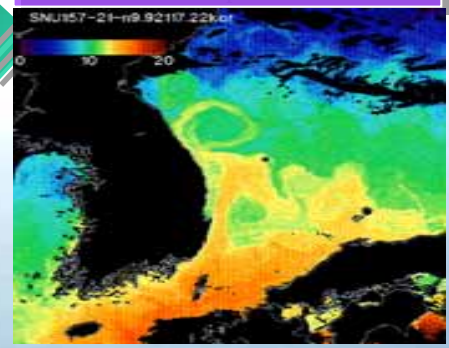
**Synthetic Battle Environment**



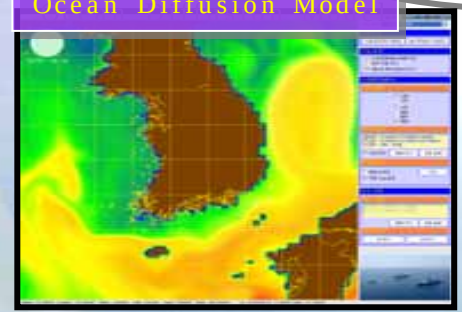
Ocean Circulation Model



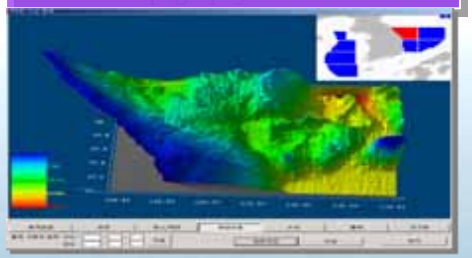

Sea Surface Temperature



Ocean Diffusion Model

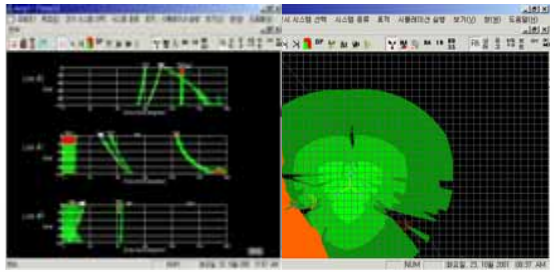


Bottom Topography Model

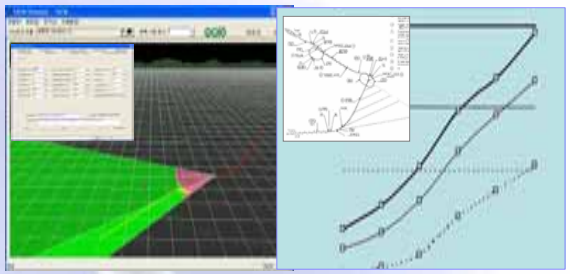


# Detection System BL

## M&S Resources for Underwater Detection System BL

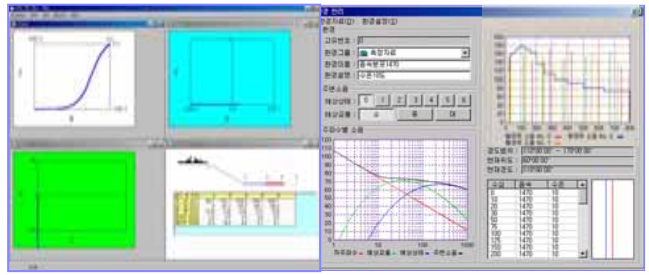


**Detection Effectiveness Analysis for Harbor Underwater Surveillance System**

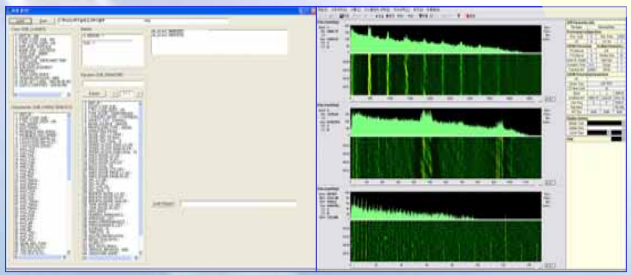


**Operational Effectiveness Analysis for Torpedo Acoustic Countermeasure System**

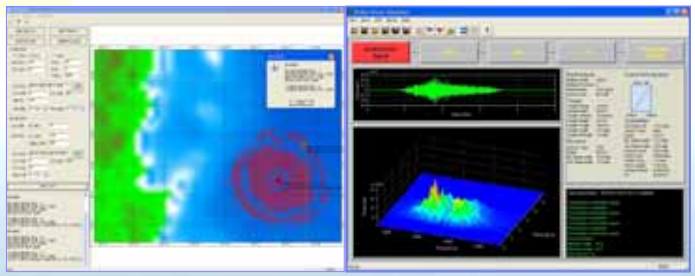
M&S Resources for DSBL-ADD



**Detection Performance Analysis for Towed Line Array Sonar System**



**Signal Classification Algorithm Analysis for Navy Acoustic Information Management System**

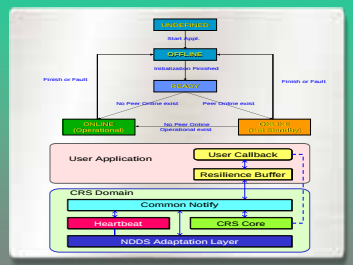


**Detection Probability Estimation for Hull Mounted Sonar System**

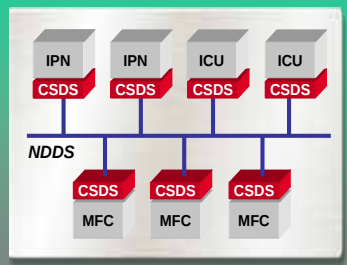
# Naval Combat System BL

## Combat System BL Status

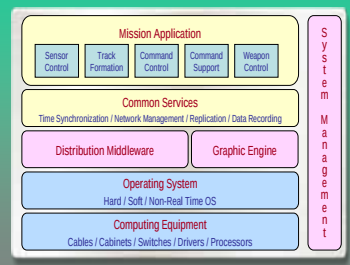
**System Monitoring / Analysis Model**



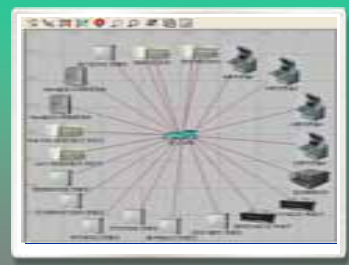

**Common Infra (Middleware) Model**




**System Software Architecture Model**

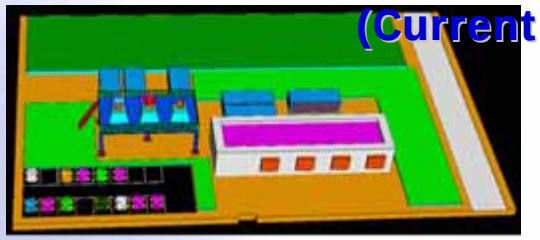



**Network Architecture Model**

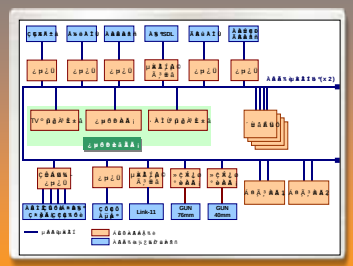


*SYSTEM INFRA STRUCTURE MODELING & ANALYSIS*

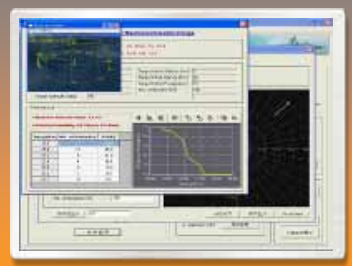
**COMBAT SYSTEM LAND BASED TEST SYSTEM (Current Project, LPX & PKX)**



*SYSTEM & TACTICAL WARFARE PERFORMANCE MODELING & ANALYSIS*



**System Construction Model**



**Sensor System Model**

**Self Defense Model**

**Naval Gunfire Control Model**

# 2007 US-ROK NBE Symposium

- Date: October 25-26, 2007
- Place: JINHAE NAVY CLUB
- Objective of Symposium
  - Technical Information Exchange regarding Battle Lab. & Naval Battle Experimentation
  - Cooperative relation build-up between BL–related organizations of US & ROK
- Major Topics
  - Requirement Generation via Battle Experimentation for Naval Weapon Systems
  - SBA Strategy for US & ROK Naval Systems.
  - Synthetic Ocean Environment Modeling for NBE
  - Threat Modeling for Air/Surface/Undersea Warfare
  - Methodology for Fleet Battle Experimentation
  - Design and Analysis of Naval Battle Experimentation


* NBE: Naval Battle Experimentation

# RoK/US S&T Cooperation

# Evolution of Strategic Alliance

**Dependency on Conventional Forces**

**Combination of US and ROK technologies enabled ROK self reliant defense**

**Deterrence on the Korean Peninsula and within the Asian Pacific Region**

**Defense/Economic/democratic growth**

**Enabling U.S. Strategic Flexibility – 3rd largest in OIF**

**Direct Support**

**Less Soldiers/FMS**

**Cooperate Self-reliant Defense**

**Cooperation**

# Cooperation in Defense R&D

Some examples of mutually beneficial exchanges include:

- Engineer and Scientist Exchange Program (ESEP)
- Data Exchange Agreements (DEA)
- Project Agreements (PA)
- S&T co-development: LOGIR
- Look forward to participating in PACOM's JCTD
  : Medusa, AWSS

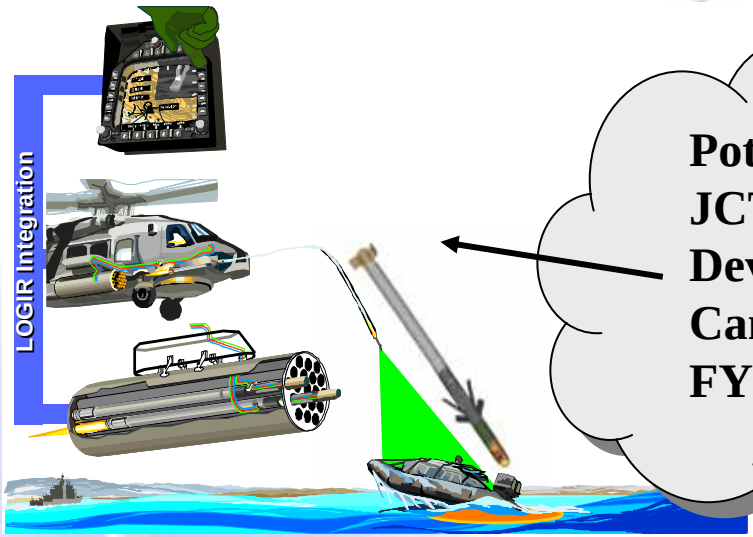
  * Medusa: JCTD version of LOGIR
  * AWSS=Airborne Weapons Surveillance System.

# Technology Cooperation Sub-Committee (TCSC)

**An-Heung PG/Feb. 2007**

# Ongoing/Upcoming Joint Efforts

## LOGIR



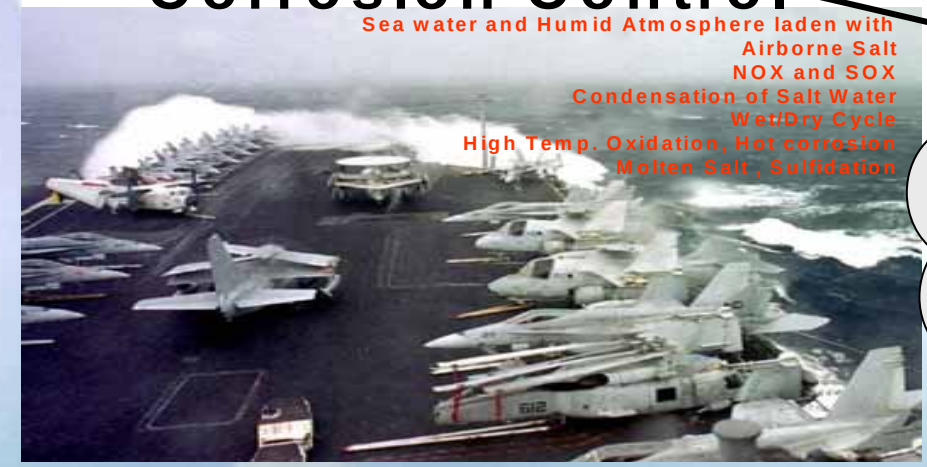

**Potential JCTD Developments Candidates for FY 08-10**


## AWSS


Form Fit & Function

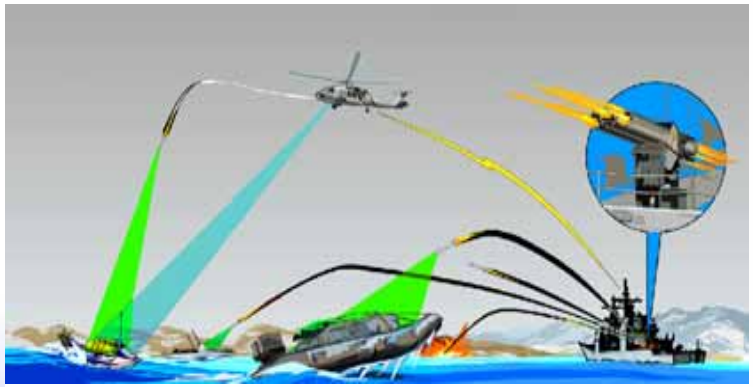
FOR OFFICIAL USE ONLY RT0804.0137b 9

## Corrosion Control




**Cooperative Program US Government/ ROK Industry with anticipated Savings to US in $ Billions**

# LOGIR Collaboration



**Operation Concept**



**Warhead/ Fuze (Korea)**
- **M151 baseline (US)**
- **Plans improved performance given guidance section in front (Korea)**

**Tail Assembly Improvements (Korea)**
- **MK 66 Mod 4 baseline (US)**
- **Plans improved aerodynamics & stability characteristics (Korea)**
- ***Part of an overall Korean initiative to improve performance through aerodynamic improvements to tail, seeker, and CAS***

**Control Actuation System (US/ Korea)**
- **LOGIR demonstration design baseline (US)**
- **Design to cost to maintain required performance at a reduced cost (Korea)**

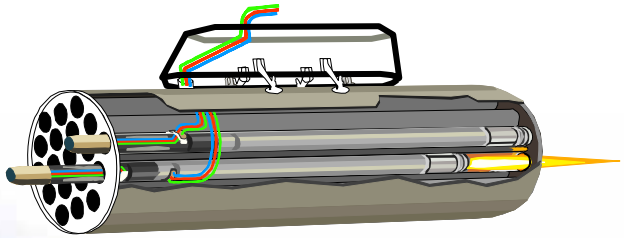
**Seeker/ Guidance & Control (US/ Korea)**
- **LOGIR demonstration design baseline (US)**
- **Improvements in electronic assembly design to reduce overall cost (Korea)**
- **Aerodynamic improvements (Korea)**

# LOGIR Status

- LOGIR
  - Currently S&T MOU for '07 ~ '09
    between ADD and NAWC/China Lake
  - To complement LOGIR technology in the areas of aero, structure, G&C, actuator, signal processing, and fuze.
  - Unique Opportunities for T&E:
    IR Data on Korea's Harsh Terrain/Weather
  - Hope to continue on with SDD

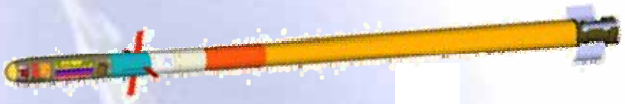
- JCTD: Medusa
  - April 4 workshop for details

# Medusa JCTD



DRL

MH-60R

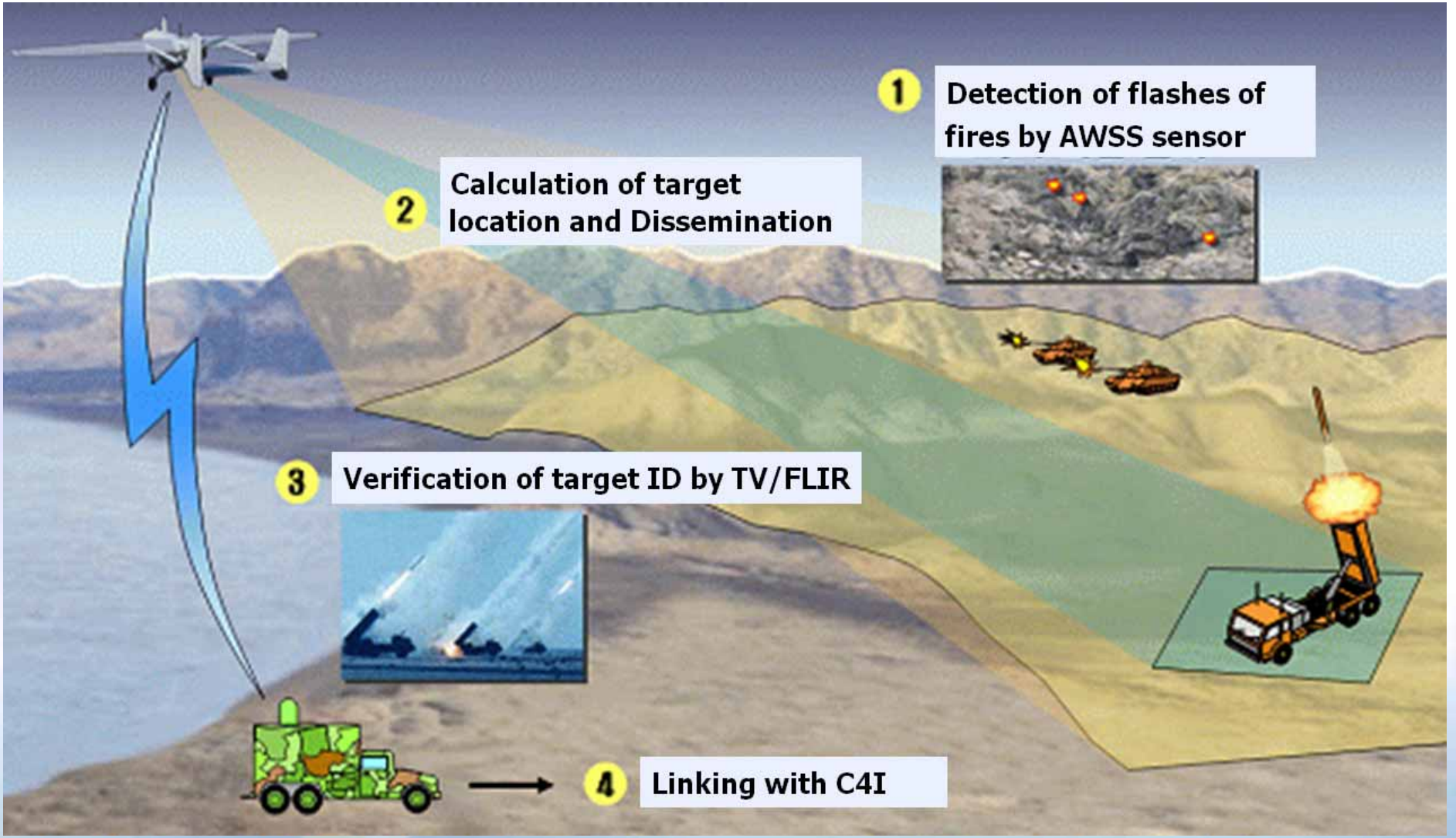


LOGIR

KO-1

- Develop core capability of LOGIR/DRL for MH-60R and KO-1 to address FAC/FIAC scenarios
- Demonstrate capability of LOGIR-enhanced platforms to engage and destroy multiple moving maritime targets

# AWSS JCID


1 Detection of flashes of fires by AWSS sensor
2 Calculation of target location and Dissemination
3 Verification of target ID by TV/FLIR
4 Linking with C4I

# Airborne Weapon Surveillance System (AWSS)

- Offers target locations and classification information in near real-time by detecting, classifying, and locating flashes from target NK fires

- To combine AWSS sensor with UAV System (Falcon)

Talks are under way between ADD and US Army.

# AWSS Components

Falcon Vehicle (Modification)

LCS (Development)

TV/FLIR

**Replacement**

**AWSS sensor**

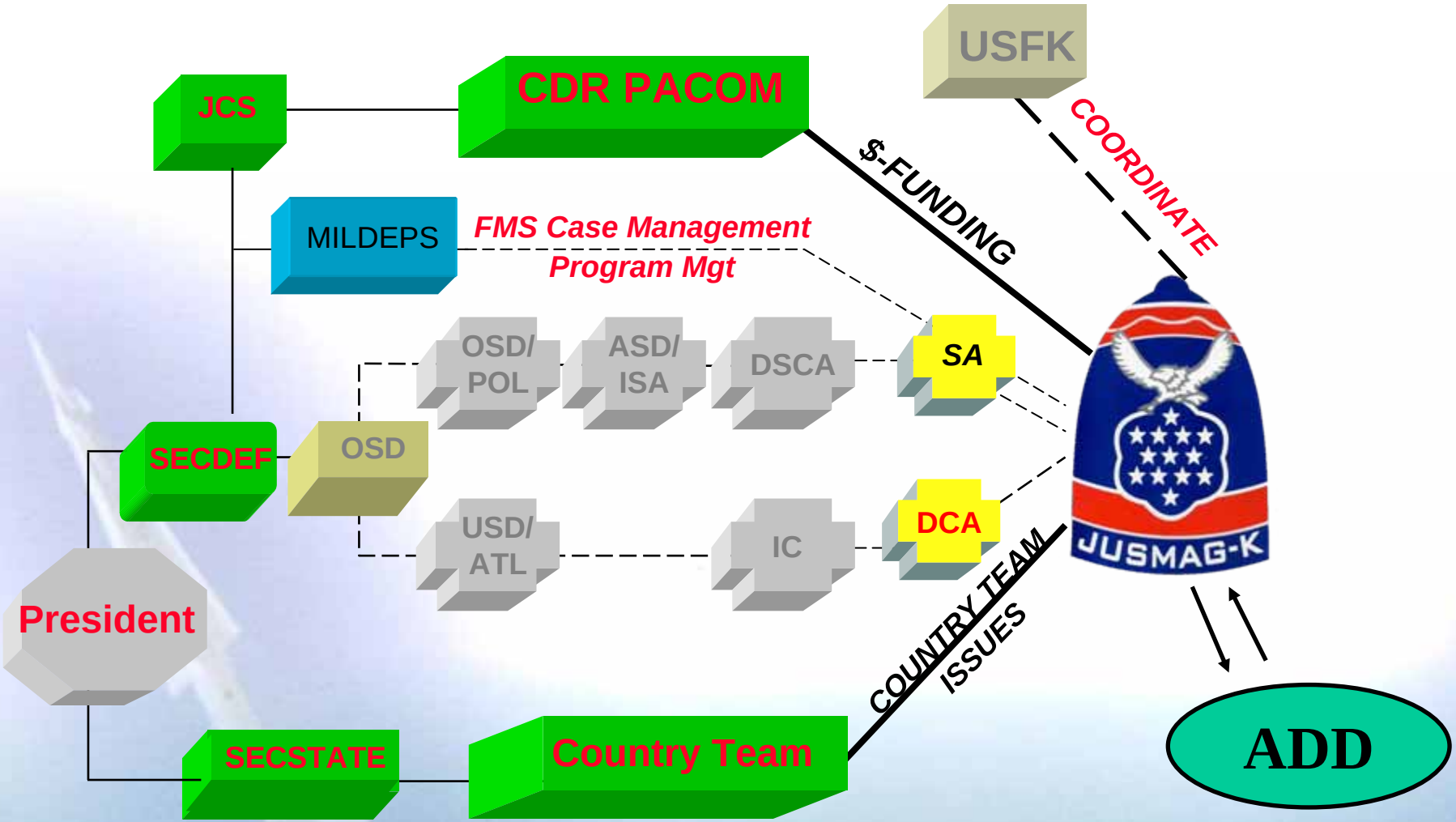
Mini Camera

* LCS : Launch & Recovery Control Station

# Positive **Signs for Cooperation**

- Has taken a long time to come to present status
- Shift from DEA to PA, PA to Co-Development takes place
- The seeds we have sown for 50 years start to sprout

# JUSMAG-K was behind the Scenes



# Conclusions

- RoK Battle Lab program introduced
- Current cooperation status briefly reviewed

  ADD is looking for more opportunities:

  e.g. LOGIR, M&S, GPS, C3**...**
- International cooperation is viewed as a means of delivering capability faster and cheaper to the warfighter