



# **Insensitive Munitions and the U.S. Army**

## **A Perspective for the NDIA 2003 IM/EM Symposium**

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**Why is the U.S. Army  
interested in IM?**

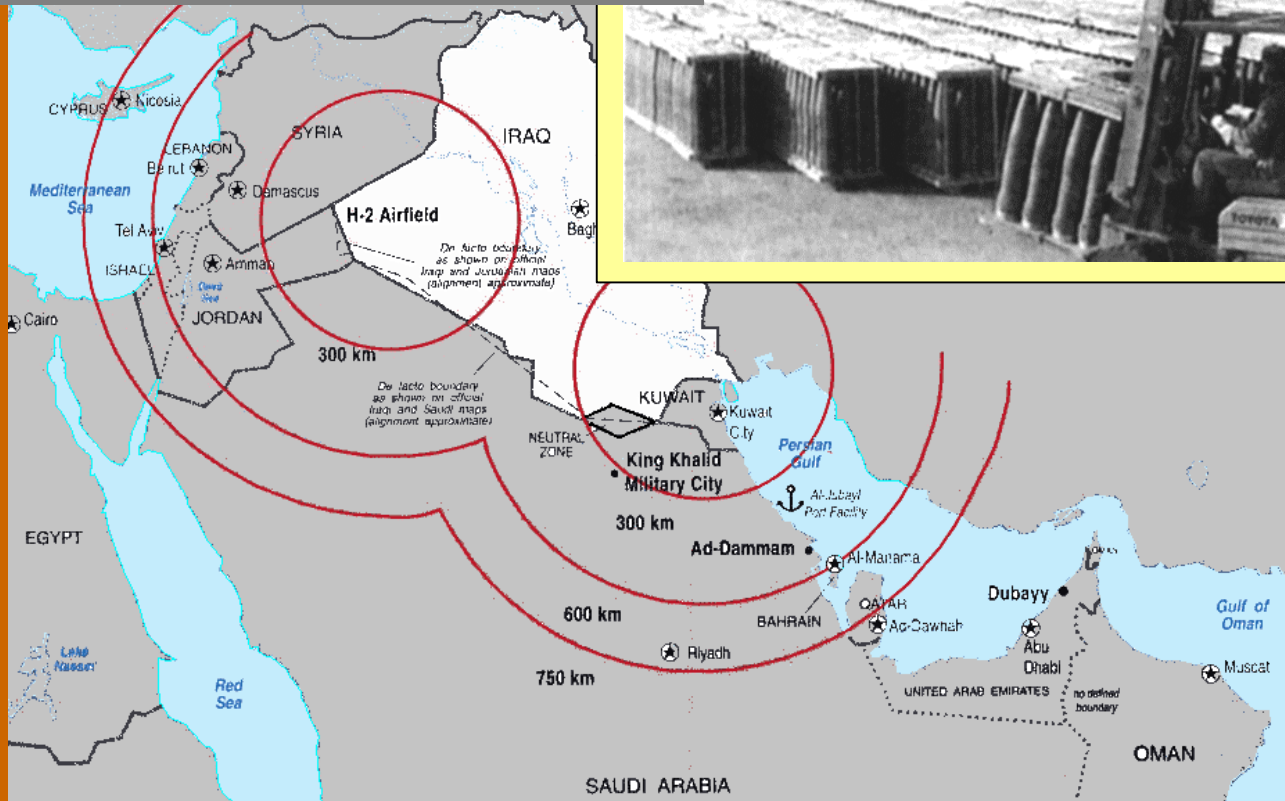


# IM Can Help Increase Logistics Survivability

## Iraqi Missile Capabilities

- OPFOR has capability and intent to destroy munitions at insertion points
- Space & resource constraints lead to high density of munitions
- Munitions nodes are not survivable
- Potential loss of critical preferred munitions

Ports and Transportation Nodes are Lucrative Targets



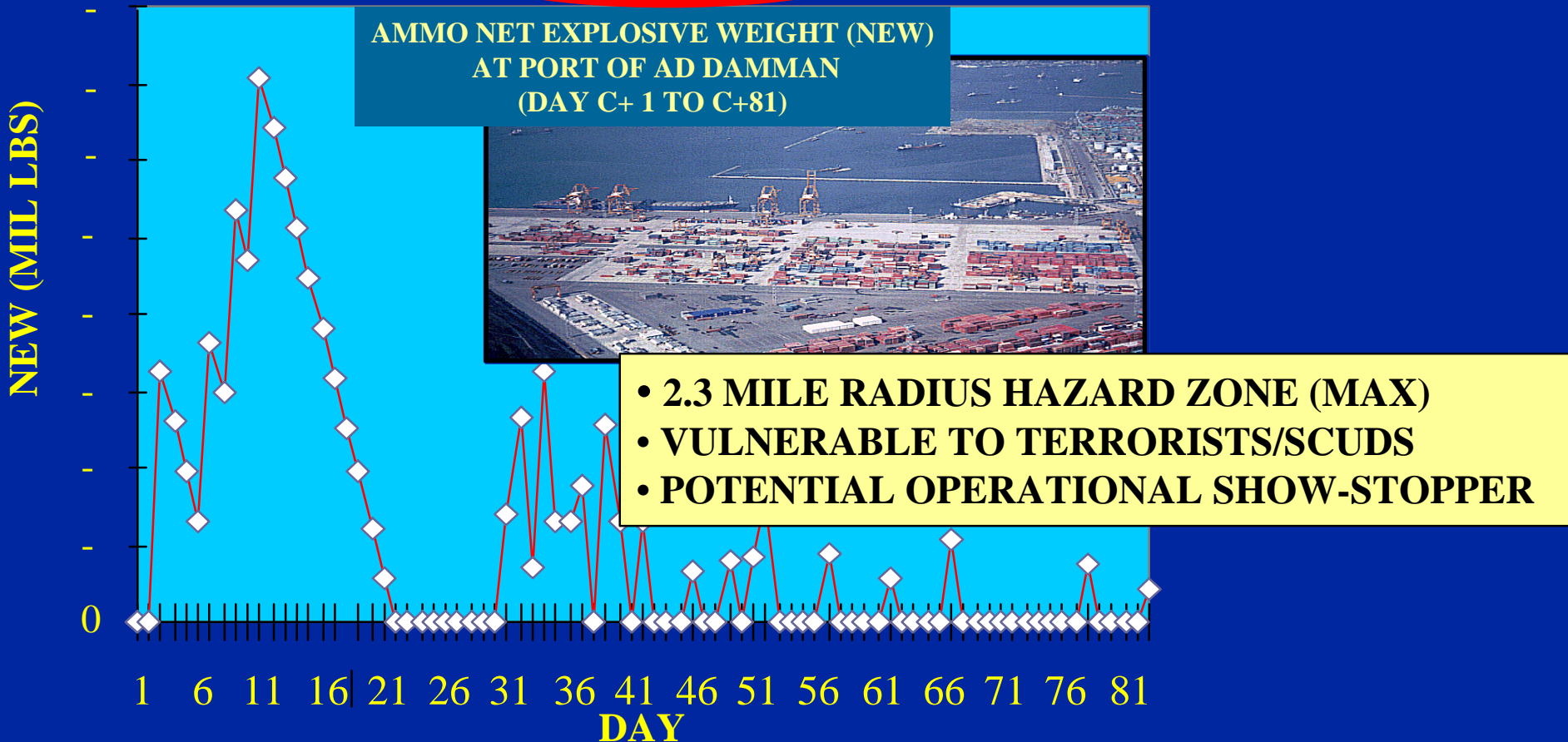
# The Logistics Lifeline is Critical to Operational Success



INTRA-THEATER  
OPERATIONS PILLAR

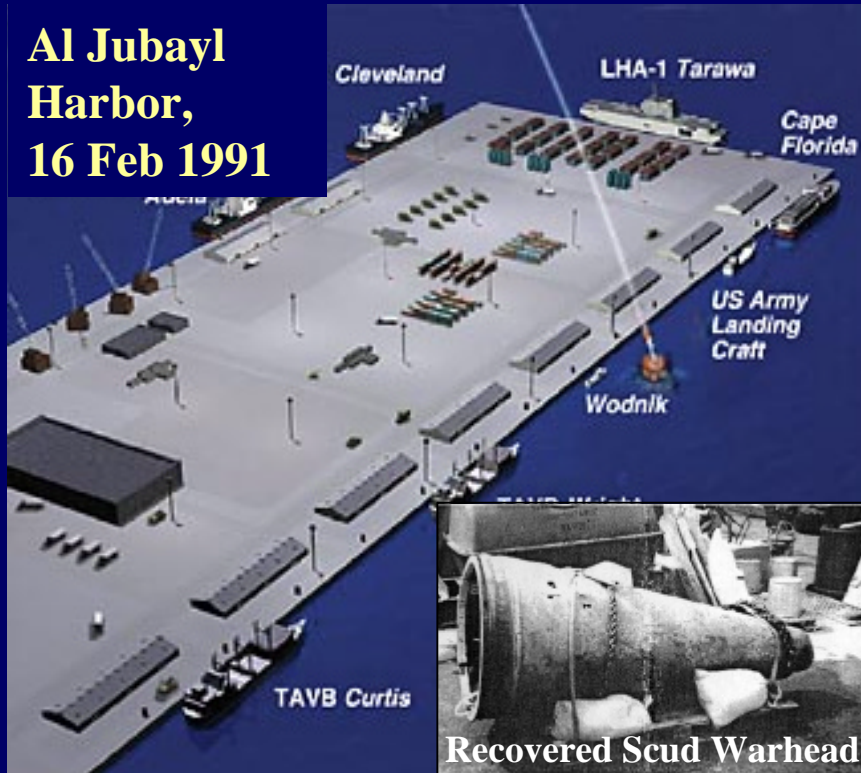
There is a need for-

- Improved explosives safety planning
- Risk assessments
- Development of explosives safety technologies
- **Insensitive Munitions**



# IM Can Help Reduce the Potential for Disaster

**Al Jubayl  
Harbor,  
16 Feb 1991**



**2003?**



In February 1991, a single Iraqi Scud splashed harmlessly into the waters of the Arabian Gulf 150 meters from the massive commercial pier at Al Jubayl in Saudi Arabia. Had this missile landed on the ammunition-laden pier, or been part of a volley of multiple missiles, the results could have been catastrophic. With another possible war looming, defending vulnerable ports from such a threat is more important than ever. Insensitive munitions could make the difference between minor and major collateral damage



# IM Can Increase Saf



July 11, 1991- Camp Doha North Compound, Kuwait City- Fire in M992 Ammunition Carrier

Subsequent explosions

49 Injuries

Depleted Uranium contamination

102 vehicles damaged/destroyed

>24 buildings damaged

\$15M destroyed ammunition

IM Can Help to Reduce  
System Vulnerability  
and Save Lives





# System Replacement Cost

M1A2 Abrams MBT  
Unit Cost \$6M (FY98)



**Source:**  
**Director, Operational Test & Evaluation**  
**FY98 Annual Report**

# IM Can Contribute to Survivability and Combat Success

## Operational performance goals

Lethality, Overmatching capability,  
Reliability, Maintainability, Precision,  
etc.

## Insensitive Munitions Goals

Munitions which enhance survivability  
of logistical and tactical systems, reduce  
risk of injury, and are potentially more  
efficient to transport, store and handle.

**Synergy**



**The worlds  
most lethal  
best performing  
and survivable  
munitions**

**SEC. 834. REQUIREMENTS REGARDING INSENSITIVE MUNITIONS.**

**(a) REQUIREMENT TO ENSURE SAFETY.--(1) Chapter 141 of title 10, United States Code, is amended by inserting after section 2388 the following new section: "§2389. Ensuring safety regarding insensitive munitions**

**"The Secretary of Defense shall ensure, to the extent practicable, that insensitive munitions under development or procurement are safe throughout development and fielding when subject to unplanned stimuli."**

**(2) The table of sections at the beginning of such chapter is amended by inserting after the item relating to section 2388 the following new item:**

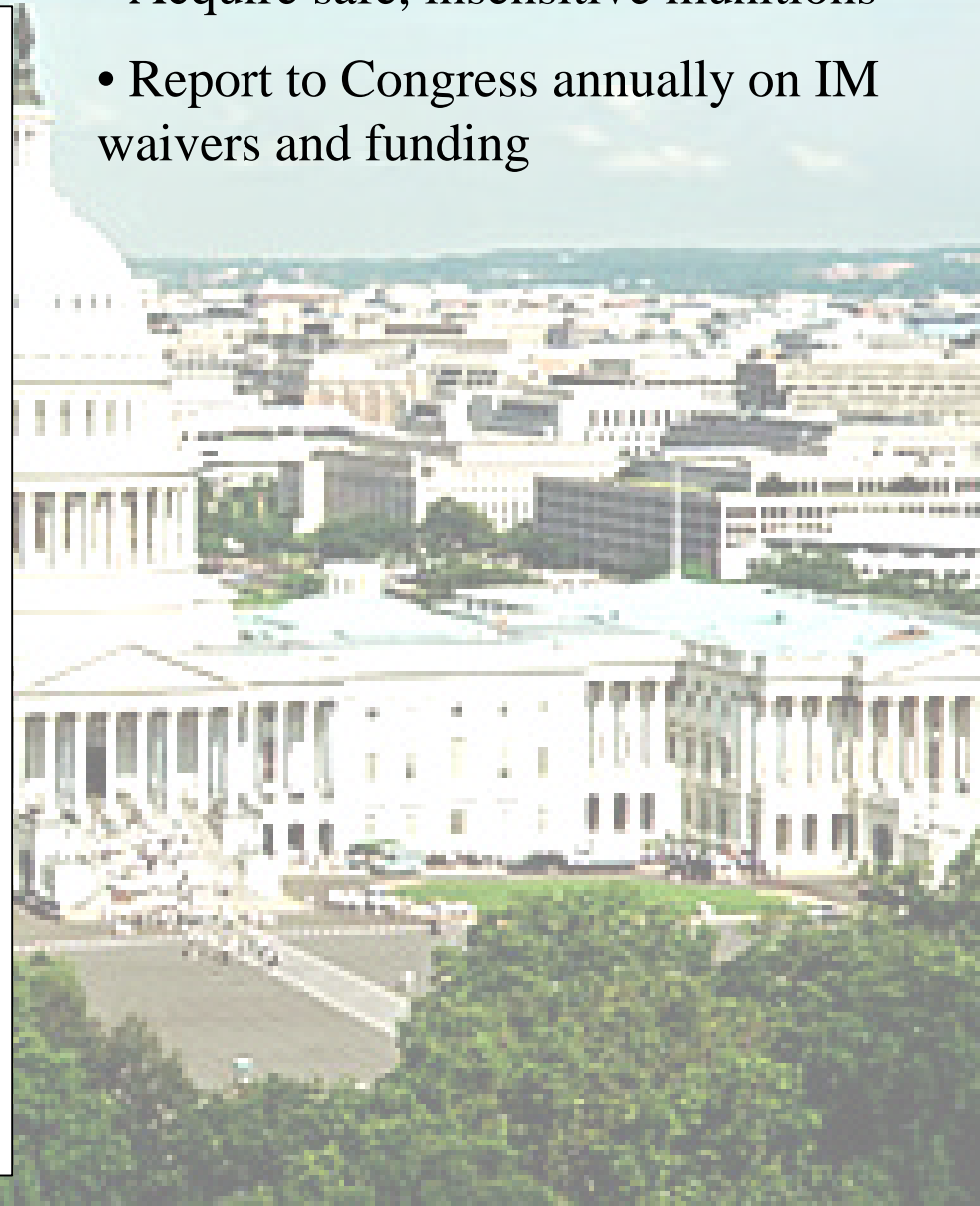
**"2389. Ensuring safety regarding insensitive munitions."**

**(b) REPORT REQUIREMENT.-- At the same time that the budgets for fiscal years 2003 through 2005 are submitted to Congress under section 1105(a) of title 31, United States Code, the Secretary of Defense shall submit to the Committees on Armed Services of the Senate and the House of Representatives a report on insensitive munitions. The report shall include the following:**

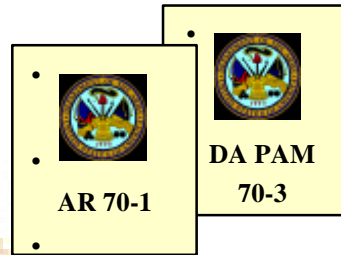
**(1) The number of waivers granted pursuant to Department of Defense Regulation 5000.2-R (June 2001) during the preceding fiscal year, together with a discussion of the justifications for the waivers.**

**(2) Identification of the funding proposed for insensitive munitions in the budget with which the report is submitted, together with an explanation of the proposed funding.**

- Acquire safe, insensitive munitions
- Report to Congress annually on IM waivers and funding



# Policies Driving Army IM



## **AR 70-1**

**Army Acquisition Policy, 15 Jan 1998**

### **1-4. General Acquisition Policy**

s. Insensitive Munitions. Munitions survivability is crucial to the success of combat systems. The reactive nature of munitions and combat systems makes them susceptible to degradation and destruction when exposed to stimuli such as fragments and fires. Design features shall be developed and introduced via a total systems engineering approach which ensures that all combat system requirements are met while enhancing survivability to unplanned stimuli.

## **DA Pam 70-3**

**Army Acquisition Procedures, 15 Jul 99**

Detailed procedures for implementation of the IM requirement.  
(Program design, planning, execution)

# Policies Driving Army IM

CJCSI 3170.01B

Requirements Generation System, 15 Apr 01

(3) Director, J-4, Joint Staff

(b) Insensitive Munitions. J-4 will certify that all ORDs for munitions, regardless of ACAT level, contain the requirement to conform with insensitive munitions (unplanned stimuli) criteria. As a minimum, these ORDs will contain the statement "Munitions used in this system will be designed to resist insensitive munitions threats (unplanned stimuli)."

(c) Insensitive Munitions Waiver Requests. Insensitive munitions and cross-Service interoperability waiver requests require approval by the JROC. Waiver requests will be submitted to J-4 for review and then forwarded to the JROC secretariat for JROC consideration.



CGCSI 3170.01  
Requirements  
Generation System

# Policies Driving Army IM



TRADOC  
PAM 71-9

## **TRADOC Pam 71-9 Requirements Determination, 5 Nov 99**

### **11-3. Writing MRDs.**

- i. ORDs for [or containing] munitions. ORDs for munitions or containing munition subsystems must include the following statement in para 4c:  
"Munitions used by this system will be developed to withstand unplanned stimuli identified in a lifecycle system threat hazard assessment."

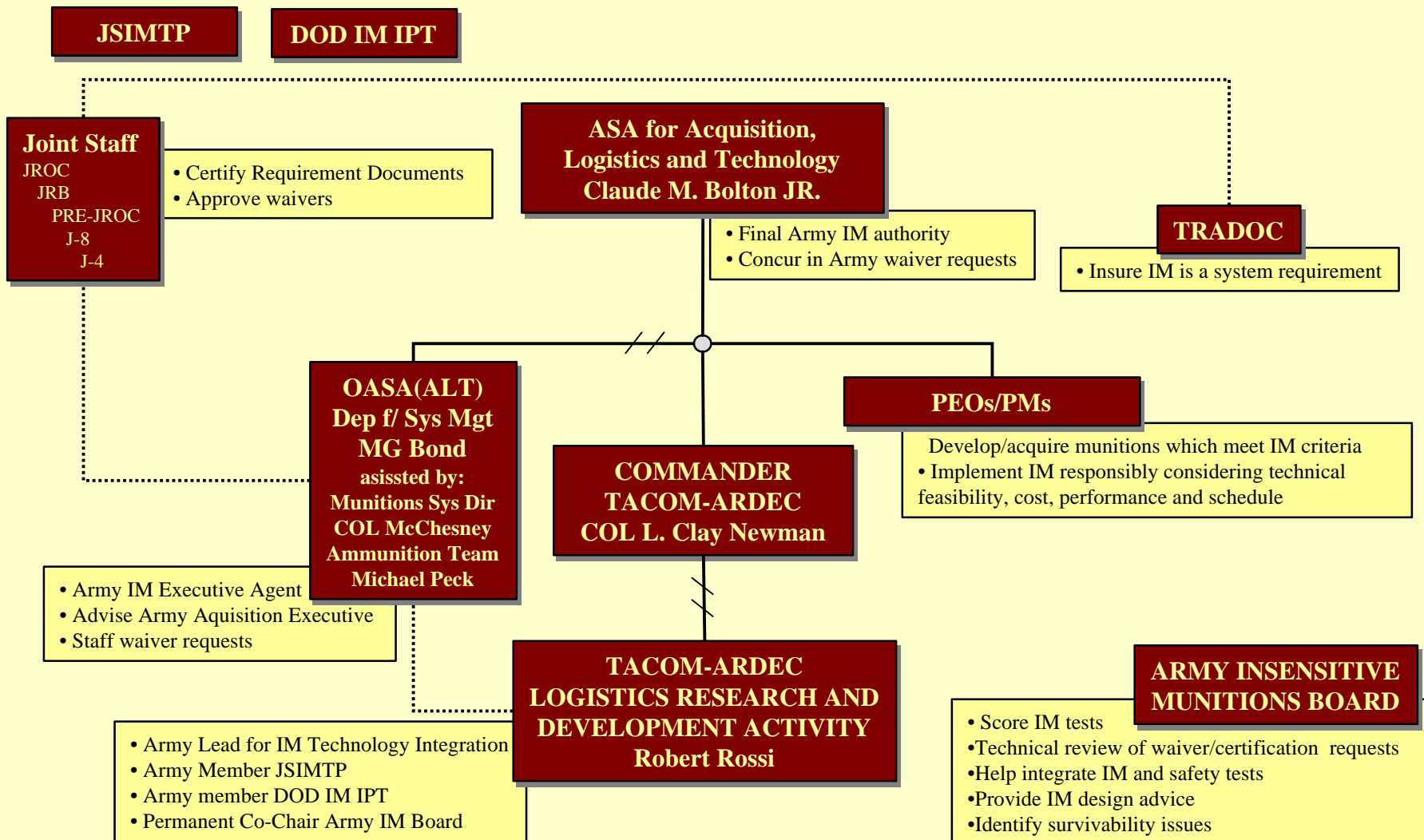
### **Appendix I**

#### **Materiel Requirement Document (MRD) Formats**

##### **Paragraph 4c: Other system characteristics.**

Address...unplanned stimuli (for munition systems or systems which include munitions, add the statement, "Munitions used by this system will be developed to withstand unplanned stimuli identified in a lifecycle system threat hazard assessment." )...

# Army IM Management and Support



1988 Army IM Executive Agent identified  
 Army IM Office formed  
 1992 Army IM Board established

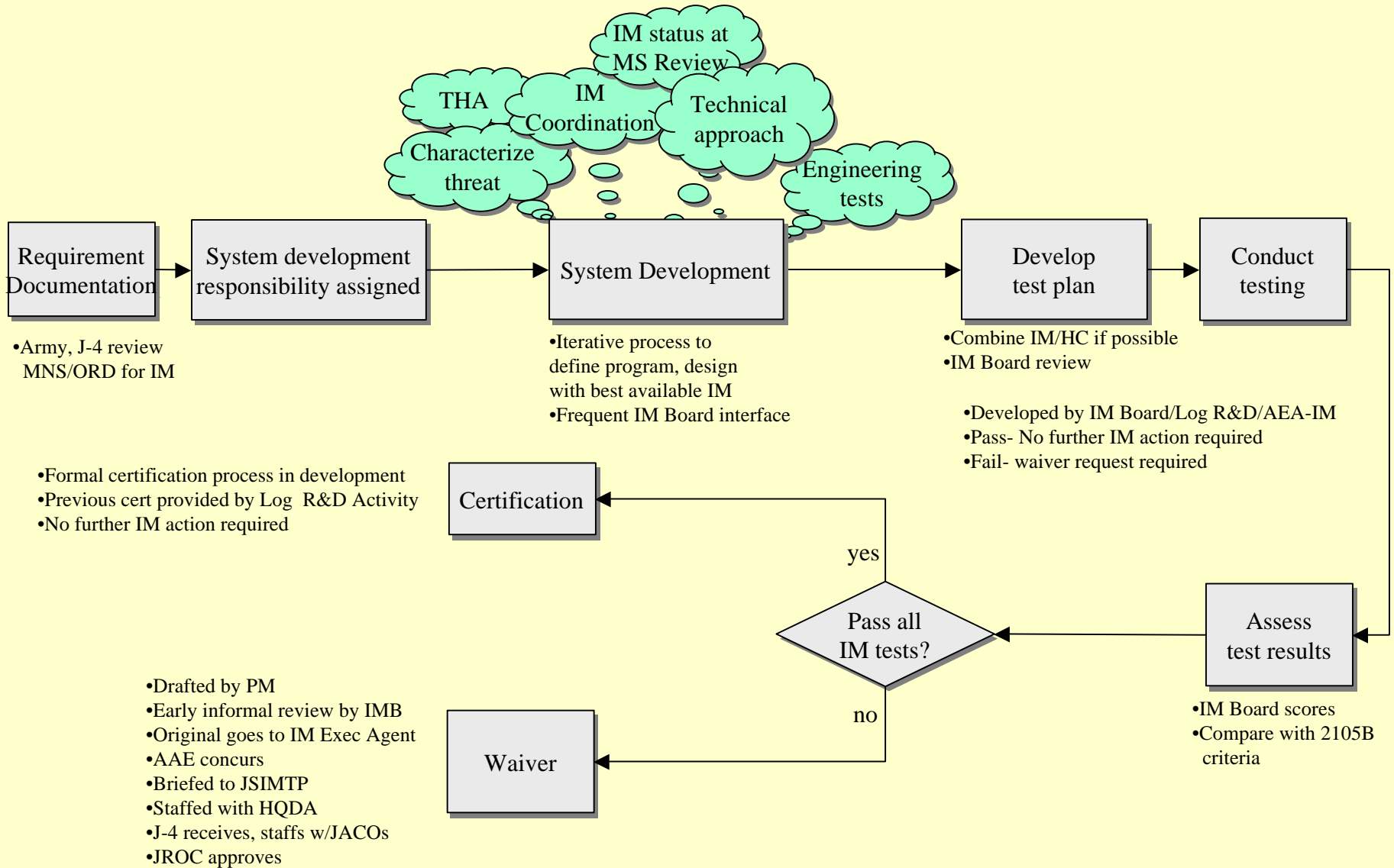
# U.S. Army Insensitive Munitions Board



- **Chartered by Army IM Executive Agent for IM**
  - **Score IM tests**
  - **Technical review of waiver requests, and certifications**
  - **Help integrate IM and safety tests**
  - **Advise on energetics, system design, packaging,**
  - **Identify survivability issues.**
- **Principle members-**
  - **USA Tank-Automotive Command Armament RD&E Ctr**  
(Current: Dr. Pai Lu)
  - **USA Army Aviation and Missile RD&E Ctr**  
(Current: Ms. Jamie Fisher)
  - **USA Army Space and Missile Defense Command**  
(Current: Ms. Patricia Vittitow)
  - **USA Army Research Laboratory**  
(Current: Dr. Patrick Baker)
  - **USA TACOM-ARDEC Logistics R&D Activity- Permanent Co-Chair**  
(Current: Mr. Ken Duncan)
- **Supported by-** **U.S. Army Evaluation Center**      **USA Joint Munitions Command**  
**Executive Director for Conventional Ammunition**  
**USA Special Operations Command**



# Army IM Process



# Recent IM Successes

M829A3 120mm tank ammo with vented packaging design passes all IM tests except fragment impact. Scored container now in development predicted to allow MACS to pass all IM tests.



THAAD- Graphite/epoxy SRM case, Propellant reformulated for better IM response, Investigation of replacement hypergolics to improve IM, Subscale tests completed. Significantly reduced testing cost, Benchmark Threat Hazard Assessment used to characterize threats, Saved several millions of dollars in missile assets.



M720E1 60mm HE Mortar Cartridge unique fuzewell venting and PAX fill greatly improves IM characteristics



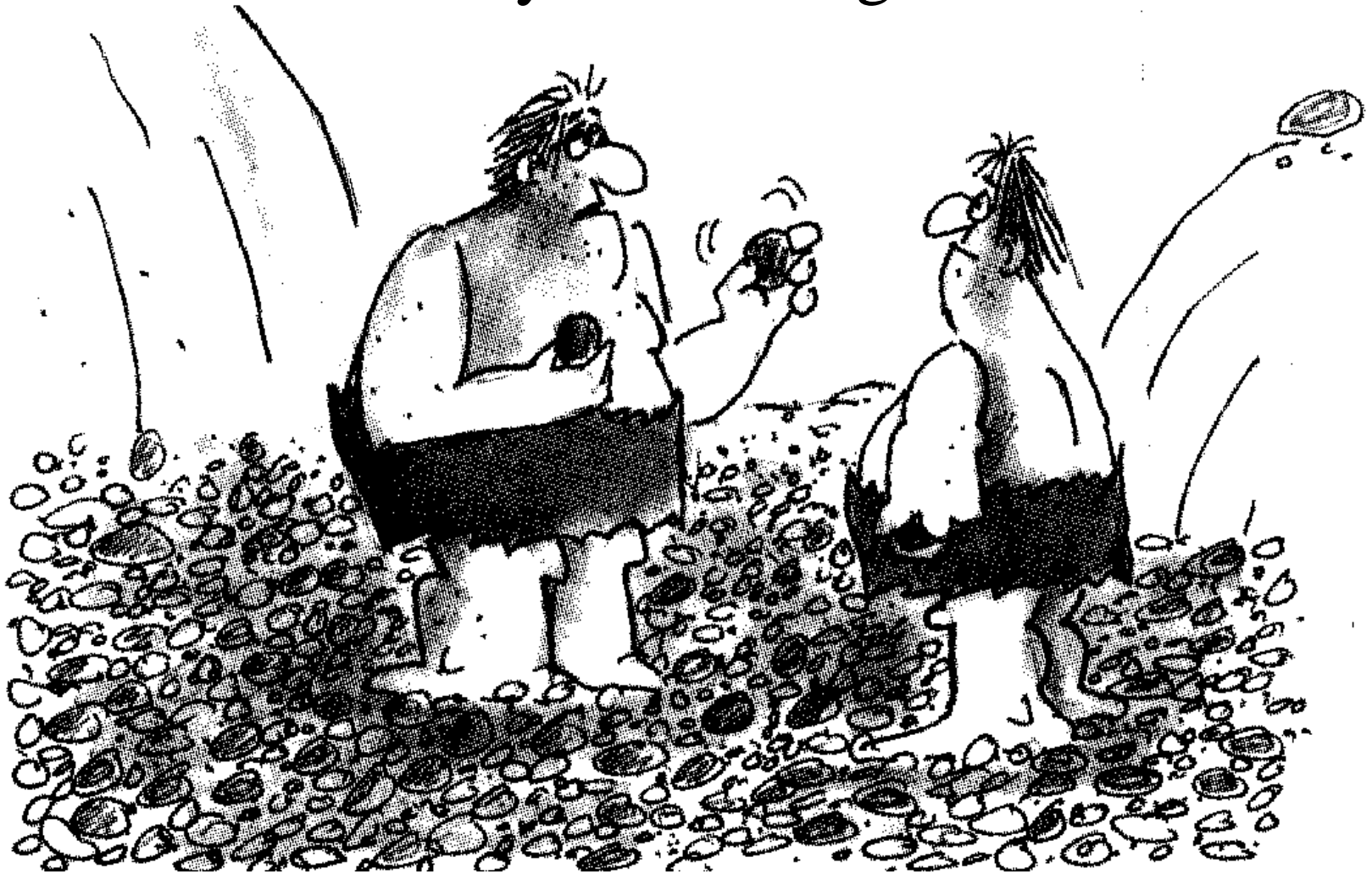
Patriot Advanced Capability (PAC-3)- Graphite/epoxy SRM case, Subscale material characterization, Lightweight barrier materials investigation, Combined IM and FHC testing, Benchmark Threat Hazard Assessment used to characterize threats, Saved several millions of dollars in missile assets.



Modular Artillery Charge System (MACS) M231, M232- Least sensitive artillery charge to date, less shock sensitive than predecessors, dimensions below critical detonation diameter, Survives rough handling, thermal venting of container, flame-spread barriers. Scored container now in development predicted to pass all IM tests.



# Early IM Testing



"Grog throw donor rock at acceptor rock. Then assess reaction"