

# UK MOD IM INSERTION STRATEGY – THE ROUTE TO A SAFER INVENTORY

**Alastair MacKichan - Charlcombe Associates Ltd\***  
**Dr Peter Barnes - MOD DOSG ST6**  
**Wg Cdr Clive Roads – MOD DOSG WS-3**

**NDIA IM & EM Technology Symposium**

**Miami - 16 October 2007**

# UK MOD IM POLICY - BACKGROUND

- UK MOD IM Policy is not new!
  - First promulgated in OB Pillar Proc in 1990
    - Less of a requirement, more of an aspiration
  - Major revision to mandate compliance with STANAG 4439 - 1996
  - Top level endorsement – 1996
    - But no effective means of publication due to re-organisation
  - Top level review and re-endorsement by DOSB/JCB in 2001
  - Formally published in 2001
- Lesson learned: momentum was lost at a critical time through failure to publish endorsed policy

# UK MOD IM POLICY

- The vulnerability of the munitions in the MOD inventory will be reduced over time to meet the requirements of STANAG 4439.
  - All new munitions requirements are to stipulate compliance with the criteria for IM set out in STANAG 4439.
  - All legacy munitions are to be kept under review to identify opportunities to achieve IM compliance (eg mid life update, refurbishment and re-provisioning programmes).
  - Formal 2-star dispensation is required for any non-compliance (for both new and legacy munitions).

# 2-STAR IM WAIVER PROCESS

Objective is to provide a clear audit trail demonstrating that:

- The reasons for any non-compliance have been identified, evaluated and justified,
  - The operational and safety implications of the non-compliance have been properly evaluated
  - Risks have been fully understood, particularly by the User, and reduced to ALARP.
- All waivers are reviewed by IM Assessment Panel and Director DOSG
  - 2-star endorsement is not a rubber stamp process

# IM ASSESSMENT PANEL (IMAP)

- Set up in 2002, reports to JIMSG
- Chaired by DOSG-ST6 (Peter Barnes) with permanent expert members from DOSG, QinetiQ, Health & Safety Executive, Defence Academy
- Associate Members – Safety Adviser, IPT, Design Authority, Range Staff – relevant to each munition
- IMAP tasks
  - To provide advice on assessment and achievement of IM compliance at any stage of a munition programme.
  - To provide an assessment of IM test plans before full-scale testing takes place.
  - To categorise the results of IM full-scale tests and assign an IM signature.
  - To review the scientific and technical aspects of draft IM waiver submissions

# IMAP

- IMAP has now assessed all 600+ munitions in the UK MOD Inventory
- IMAP uses the 'body of evidence' approach advocated in AOP-39 and does not rely solely on full-scale test results
- Using the same experts to assess all munitions has introduced consistency; IMAP's processes have improved
- IMAP commissioned an IM Testing Best Practice Guide – now incorporated in AOP-39 Ed 2
- IMAP is taking the lead on combining UK IM and Haz Class testing
- Joint IMAPs have been held with the French MOD (DGA) on munitions of common interest (SCALP/Storm Shadow, Aster, Meteor)

# IM DATABASE

- IM database has been developed progressively over 7 years
- Currently contains data on over 200 munitions
- Being expanded and reformatted to include all 600 munitions in the inventory
- Data includes:
  - Description of munition and major components
  - Details of energetic materials
  - Full details of all IM tests
  - IMAP assessment and rationale
  - IM signature
- Wide range of users, both MOD and Industry

# IM INSERTION PLAN (IMIP)

- IM Insertion Plan (IMIP) addresses every munition in the inventory
- IMIP includes:
  - IM Signature (IMAP assessed)
  - Non-compliances and associated risks
  - Opportunities for IM insertion (mid life update, re-procurement....)
  - Required technology and its availability
  - Indicative costs
  - IPT plans for IM upgrade
  - Progress achieved
- IMIP is a living document



# IMIP – EXAMPLE

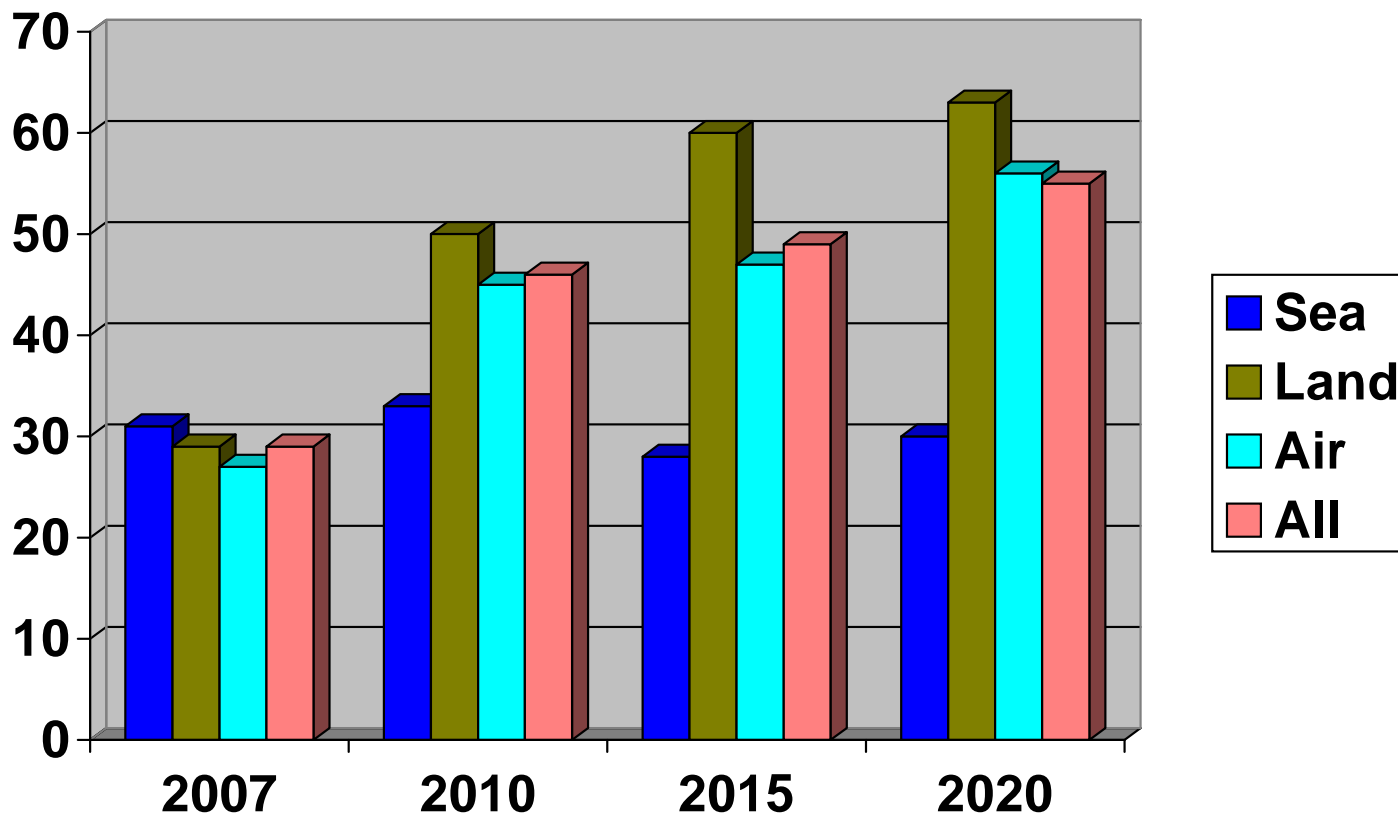
Munition/ IPT	IM Signature	Energetics/ Design	IPT Comments	JIMSG Comments	Technology Implications	Funding Implications	OSD
Sky Rocket AAM  (ALM IPT)	<p><b>AUR:</b> FH: IV SH: II BI: III FI: I SR: I</p> <p><b>Warhead:</b> FH - IV SH - II BI - III FI - II SR - I</p> <p><b>Motor:</b> FH - IV SH - II BI - IV FI - I SR- No Prop</p>	<p><b>Warhead:</b> 5.4 kg Comp B92</p> <p><b>Motor:</b> 31.5 kg SRZ6 composite propellant in monolithic steel case</p>	<p>This is a UK developed and produced missile for which there is a planned mid life update in 2011 when the motor becomes lifex. The opportunity will be taken to introduce a new, IM-compliant motor. A TDP to demonstrate the required technology is due to complete in 2008. The design authority has been asked to provide costed proposals for an IM-compliant warhead as part of the mid life update programme.</p>	<p>The Mid Life Update provides an excellent opportunity to introduce IM technology. DOSG has funded a TDP to develop an HTPE-filled composite case motor and test results so far indicate that it should provide full IM compliance.</p>	<p>For the motor, existing technology is unable to provide full IM compliance. The suitability of HTPE and composite case technology is being explored.</p> <p>For the warhead, filling with a PBX such as Rowanex 1234 in place of the TNT-based Comp B92 should achieve IM compliance without any loss in performance.</p>	<p><b>Motor TDP Programme (Funded):</b> £4.6M</p> <p><b>Design Authority estimate of likely additional costs:</b></p> <p><b>Motor development and Qualification:</b> £8.4M</p> <p><b>Warhead development and Qualification:</b> £5.3M</p>	2021



# IMIP STATUS as at 16 Oct 07

Category	Description	No of Munitions
1	Strong Candidates, near term insertion opportunities, solutions available	36
2	Strong candidates, insertion opportunity some years away, solution yet to be developed	20
3	Candidates for insertion if solution becomes available.	84
4a	Out of Service within 5 yrs	14
4b	No insertion opportunity	15
4c	IM replacement already in procurement	10
4d	Close to IM compliant	235
5	IM compliant	186
	Total	600

# IM COMPLIANCE FORECAST



IM COMPLIANCE FORECAST (100 key IMIP MUNITIONS)

PERCENTAGE COMPLIANT (PI SCORE >75)

# JOINT IM STRATEGY GROUP (JIMSG)

- Responsible for developing MOD IM Policy and monitoring its implementation
- JIMSG brings all key stakeholders together, to ensure a coherent approach
- Stakeholder groups represented include:
  - DOSG, Capability (Requirements) staff, Front Line Commands, Munitions IPTs, Science and Technology staff, Hazard Classifiers, IMAP, Research Organisations and Industry
- JIMSG is responsible for developing and maintaining the IM insertion Plan and categorising each munition
- JIMSG maintains oversight of the IM Waiver Process
- The IM Assessment Panel reports to JIMSG

# EDUCATION AND PUBLICITY

- IM education and publicity through a range of activities:
  - IM brochure
  - One-day IM symposia ('Stakeholder Days') for MOD and Industry staff, held every 18 months
  - IM briefings and tutorials to smaller groups of key MOD personnel (Capability Staff, IPTs, Safety Advisers) and Industry
  - IM module included as part of a munitions MSc course at the Defence Academy, Shrivenham.
  - Guidance on IM and implementation of policy (JSP 520)

# INTERNATIONAL DIMENSION

- Links with other nations have been essential component of UK IM Policy development and implementation
  - US/UK bilateral (IEA)
  - Fr/UK bilateral
  - MSIAC Workshops and publications
- A continuing challenge: Articulation of costs and benefits of IM, despite much good work, eg
  - MSIAC Cost Benefit Workshop 2001
  - CBAM

# ACHIEVEMENTS

- Storm Shadow – IM compliant (and HD 1.2.3)
- Close to IM compliant:
  - Next Generation Light Anti-Armour Weapon NLAW
  - Anti Structures Munition ASM
  - Paveway IV PGB
- PBX fillings for artillery and general purpose applications
- Sting Ray lightweight torpedo – replacement warhead
- ROXEL Smokeless Large Insensitive Motor – IM compliant solution for Hellfire/Brimstone class missiles
- Packaging solutions for smaller stores – eg Detonators

# CONCLUSION

- Significant progress achieved 1996 – 2007
  - Clear and pragmatic IM policy
  - Much improved IM assessment process
  - Every munition in inventory now assessed
- IMIP provides a practical means of managing IM insertion across the inventory
- Strong support from the highest levels of the MOD
- Better understanding of the risks
- Acceptance of the need for IM – now part of core business
  
- Bottom line: The Inventory is becoming progressively safer





# QUESTIONS?

