



Ministry
of Defence



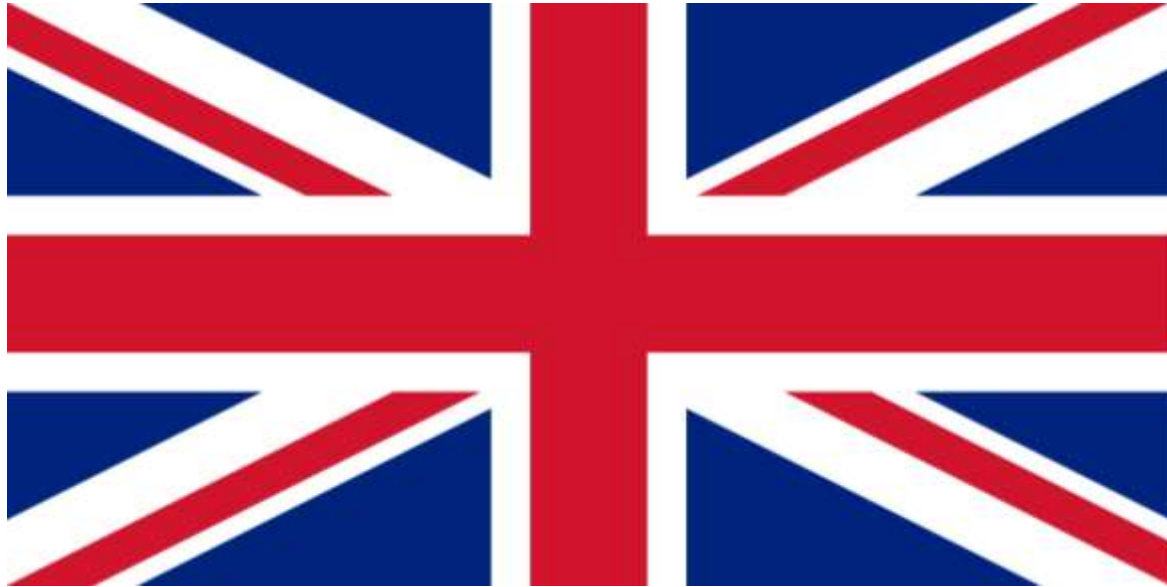
UK MOD Fuzing Strategy

John Farbrother
DOSG Fuze Guy[®]

Defence Ordnance Safety Group

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Introduction



UK Fuzing

Purpose of the Fuzing System

- A **Fuzing System** is a system that performs the **Safety, Arming & Triggering** functions in a munition
- A **Fuze** is the *component* that achieves all three

Basic Fuzing Principles

- **Safety**
 - **Isolation** of the Primary Energetic Materials
 - **Isolation** of the Electrical Firing Energy
 - Both
- **Arming**
 - Process that takes the Fuze from safe or 'Isolated' to 'Ready to Trigger'
- **Triggering**
 - Activate the munition in Design Mode eg detonate burn
 - Activate the munition in Reversionary Mode
 - eg Self Destruct dependent on Arming
 - Activate an Alternative Mode
 - eg Self Neutralize independent of Arming

Principles (Continued)

- **Fuzing Safety**
 - Throughout whole lifecycle
 - Credible Accidents
- **Fuze Arming**
 - Can be **Autonomous** or **Commanded** or a combination of both
- **Munition Triggering**
 - Can be autonomous or Commanded
 - Could be pre or post Arming

UK Safety Management Policy

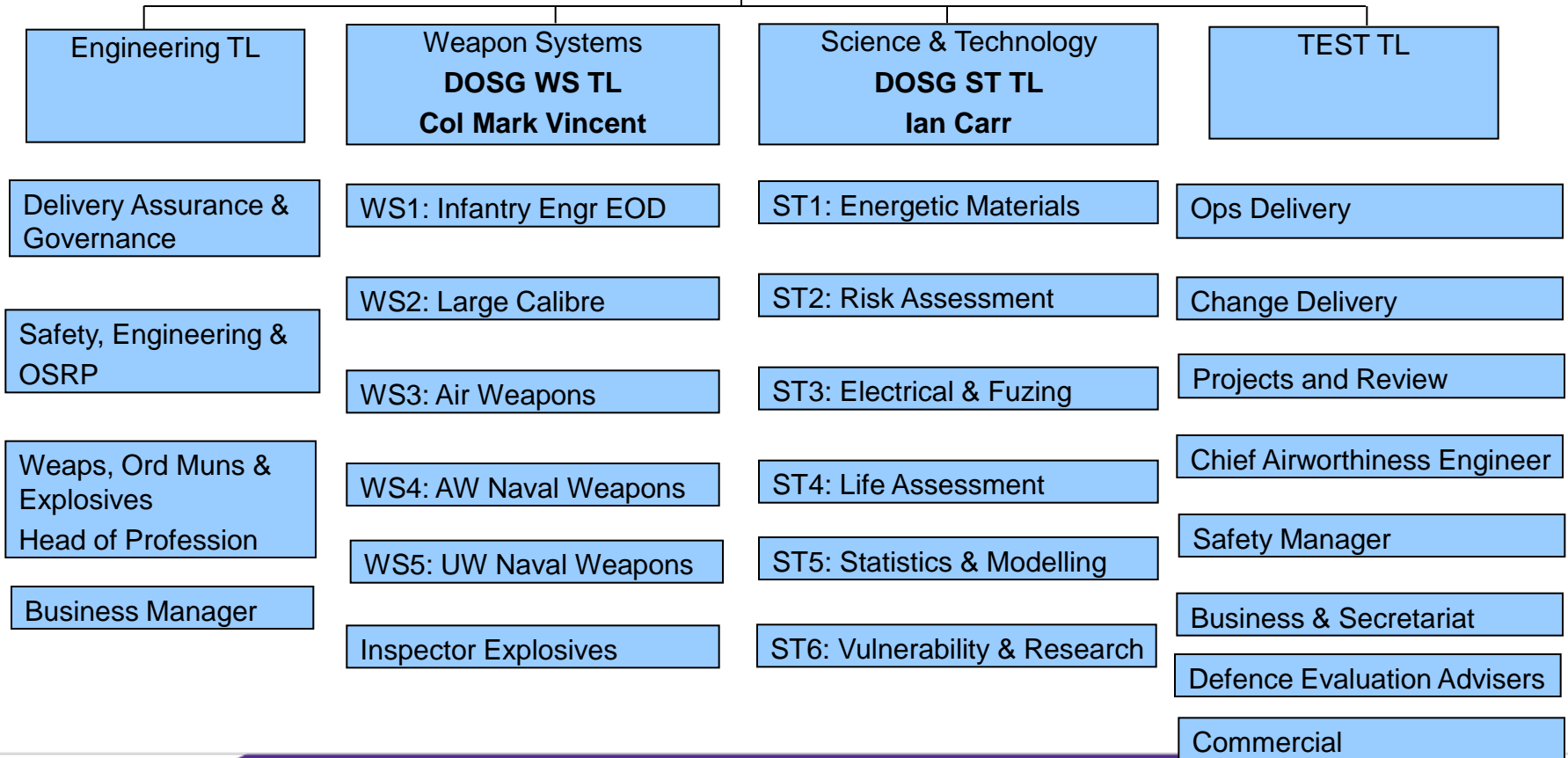
- The UK's policy for the safety and environmental management of OME is laid out in JSP 520, which takes a risk-based rather than regulatory approach
- Duty Holders are required to fulfil statutory obligations and common law duties of care whilst maintaining Defence Capability. This includes:
 - Generation and maintenance of safety & environmental cases
 - Reducing all risks to ALARP
 - Controlling Residual Risks

Ordnance Safety Review Panel (OSRP)

- Project Team's safety cases etc are reviewed by a DOSG Ordnance Safety Review Panel (OSRP) and, if considered satisfactory, a Certificate of OME Safety (CSOME) is issued.
- The CSOME is primarily to demonstrate that the relevant processes have been followed, the safety argument is logical and that it generally makes sense.
- The issue of a CSOME is not a 'Get Out of Jail Free Card' in the event of an accident!
- Nor is it an acceptance of responsibility for S³ by DOSG!

DE&S Weapons Operating Centre

Head of Weapons Air Cdre Mike Quigley



Defence Ordnance Safety Group (DOSG)

Weapon Systems
DOSG WS Team Leader
(52 posts)

WS1: Infantry Engr EOD

WS2: Large Calibre

WS3: Air Weapons

WS4: AW Naval Weapons

WS5: UW Naval Weapons

Inspector Explosives

Science & Technology
DOSG ST Team Leader
(38 posts)

ST1: Energetic Materials

ST2: Risk Assessment

ST3: Electrical & Fuzing

ST4: Life Assessment

ST5: Statistics & Modelling

ST6: Vulnerability & Research

We are where we are...

- We've dispensed with the ROFs and we've out-sourced or completely lost our Government R&D, design, integration and manufacturing capabilities
- We now rely on the contracts that we have with industry for all those things
- We place great emphasis on use of standards
- We use audit to ensure that appropriate systems and processes are being used well and effectively
- We rely heavily on a small group of assurance organizations such as DOSG

MOD Fuze Specialist
John Farbrother

So What?

The plans for DOSG & the WOC

The UK, Europe and NATO

Fuzing is often thought of as a Deep, but Narrow Specialization

Fuzing is often thought of as a Deep, but Narrow Specialization

But actually, no it isn't...

Fuzing is a **Deep** but **Broad** Discipline

The plan for the Safety Organization - DOSG

- We now only have one Fuze Guy® and we need a better plan
- Each of the six DOSG ST team has nominated one or two engineers/scientists to be their Fuzing POC
- My job is to teach them the Fuzing Fundamentals
- Their job is to look at how Fuzing impacts their specialization

In the Wider UK

- We have created The UK Fuzing Working Group
 - The forum for UK fuzing stakeholders
 - Work will centre around the development and implementation of standards
 - Forms a fuzing focus for research work in conjunction with the MOD Research programme - WSTC
 - The Group will provides me with both expert fuzing advice and a 'mandate' to represent the UK

Make-up of the UK Fuzing Working Group

- UK MOD & Other Government Agencies
 - Weapons Op Centre
 - DOSG
 - PTs (incl AWE)
 - DSTL
- UK Industry
 - Prime Contractors
 - Specialist Fuzing suppliers
- Academia (eg Research Universities)
- Specialist Companies (eg WOME Consultancies)

Fuzing R&D

We mainly use the Weapons Science & Technology Centre (WSTC) to plan our R&D expenditure so that it fits in with our broader Munition R&D programmes. Both in terms of the scope and TRL

The WSTC covers all munition related R&D, including fuzing and has a number of Expert Advisory Groups EAGs including the Effects EAG (which includes fuzing)

But we now have 'fuze aware' specialists, either from DOSG or UK Fuzing, in most of the other EAGs, who understand how fuzing relates to the relevant subject area. eg Energetic materials, sensors, power, logic devices etc

UK Policy on Standards

- Where possible, safe design shall be demonstrated by compliance with appropriate standards.
- In Fuzing terms that means compliance with:
 - Defence Standard 07-85 (Design Requirements for Weapons Systems)
 - STANAG 4187 (Safety Design Requirements for Fuzing Systems)
 - STANAG 4368 (Safety Design Requirements for Rocket motor ignition systems)
 - STANAG 4497 (Safety Design Requirements for Hand Emplaced Munitions)

But the Standards need work

- The UK has a number of issues with the current crop of NATO Fuzing Standards and is working with all our NATO colleagues to address them:
 - The close similarity between 4187 and 4368 but...
 - No explicit reference to Autonomous or Command Arming in either
 - Several similar, but different descriptions of the 500v test across 4 STANAGs
 - Inconsistent terminology
 - Role of the NSAA is too regulatory for the UK and others (specifically the NSAA shall certify the design...)
- And we're working with our colleagues to address these

Conclusion

- $F = S, A \ \& \ T$
- Our basic safety management principles remain extant
- Fuzing is a broad deep team game and we are re-organizing to match that
- R&D is key
- Standards are Key
- The Future is collaborative