"What can we do for them today, what can we do for them tomorrow?"

UK MOD Director of Equipment Capability (DEC)

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Outline

- Introduction
- FIST Lethality Update
- Discussion of the results
- How we can uplift lethality capability today
- The Future (a personal view!)
- Conclusions

SDE - Location & Capabilities

- *ISO 9001/2000*
- *List X*

System Approach

Major Project Support/Partnerships

- FIST – Thales, DCC IPT, Dstl
- NORMANS - FFI
- FDCC Research - QQ
- Type 45 BAE Sys
- CVF – BAE Sys, Thales
- Attack Helicopter - IPT, Westlands, Devonport
- Swedish Squad Support Weapon – FMV, NAMMO, FN, NICO

The UK Perspective

Today

- Iraq & Afghanistan (**all** our infantry units are deployed on, training for, or returning from operations)
- Still largely equipped to fight a war in central Europe
- Provision of capability through Urgent Operation Requirement (UOR) procurement

Tomorrow

- **?**
- Current SA family due to be replaced 2015-20?
- Changing nature of both research and procurement

“The difficulty lies not so much in developing new ideas as in escaping from old ones”

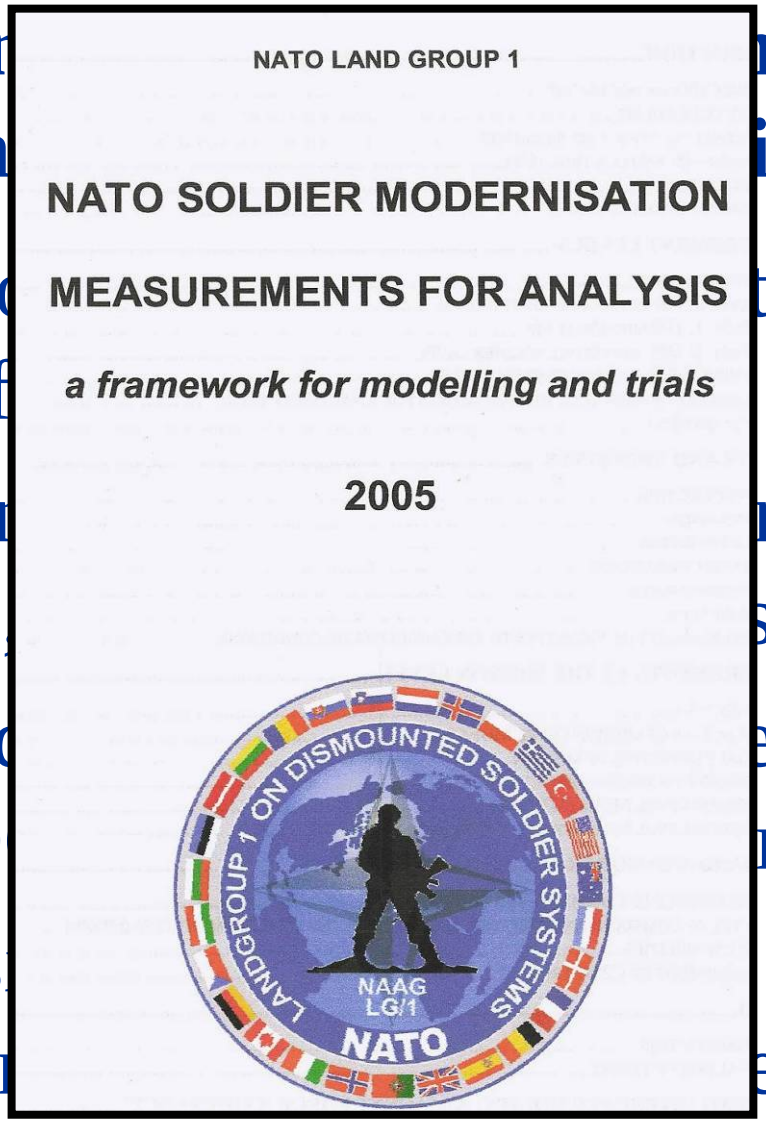
“It is better to be roughly right than precisely wrong”

John Maynard Keynes

Introduction

Any small arr **mprovements should be con** **ing context:**

- The sectio the BG context, system of
- Understan nt threats, scenarios, s and target sets.
- A full und e interaction of NATO D ribute to lethality.
- The trans through performan effect.

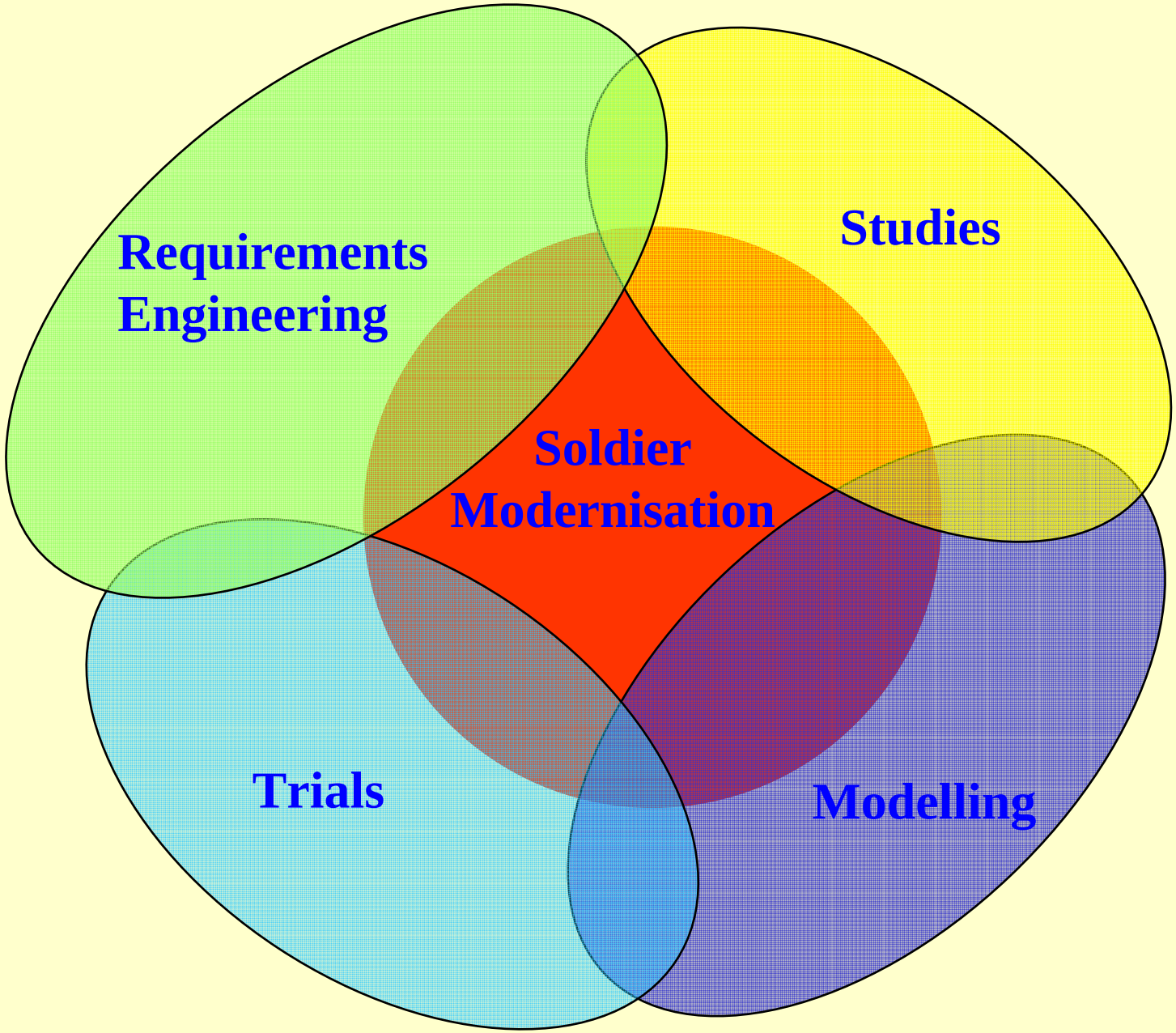


Other factors :

- Interoperability with NATO and other allies.
- The requirements process can be complex due to the interdependencies of NATO DCC Domains.
- And then there is reality:
  - We need it now!
  - No support available!
  - Reversionary mode critical!

Soldier Modernisation


Training
Logistics
Equipment
Lethality
Mobility
C4I
Infrastructure
Personnel
Sustain
Survive
Organisation
Information
Doctrine


Requirements Engineering
Studies
Soldier Modernisation
Trials
Modelling

Trials

- System Effectiveness C4I
- System Effectiveness Lethality
- Baseline Lethality
- Judging Distance
- LRF
- FCS
- MGL
- Suppressors
- 40 mm First Round Accuracy and Engagement effectiveness
- STA (laser aimer, red dot, HUD, optics, II, TI, DWS etc)

Etc,Etc

Error Budgets, Effectiveness Modelling (ASPECT™) and Studies

- 5.56 mm (IW, LSW, LMG)
- 40 x 46 mm Low Velocity
- 40 x 46 mm Medium Velocity
- PDW
- Round Firing Sensors
- Lethality Operational Effectiveness
- Lethality Survivability
- Lethality Tempo
- C4I Trial Planning

Etc, Etc, Etc

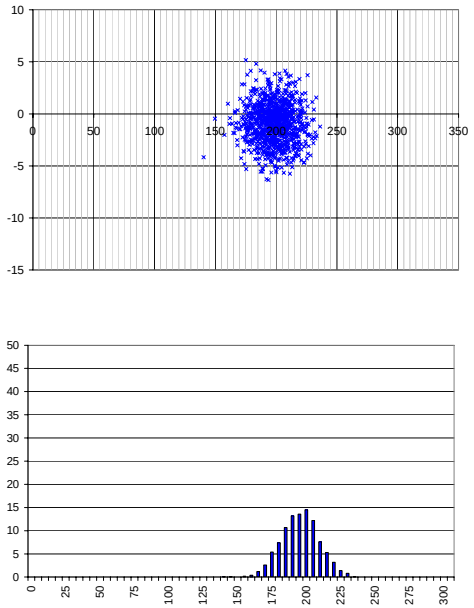
Modelling

Analysis of System Performance and EffeCtiveness Tool (ASPECT™)

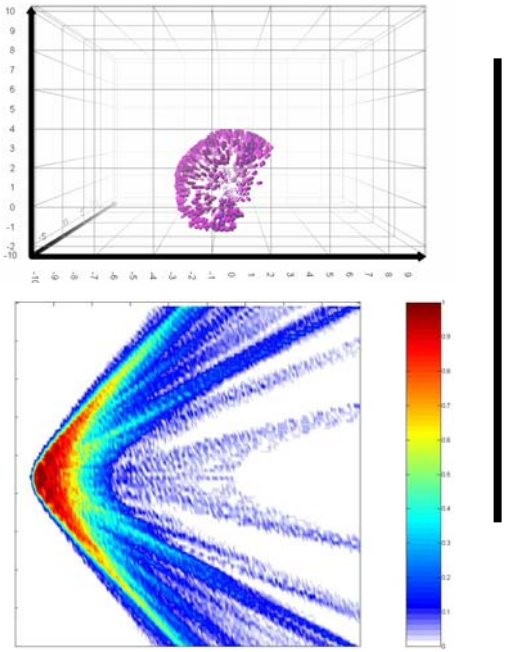
SDE

- Analysis Capabilities of SDE's *ASPECT™* Software Suite

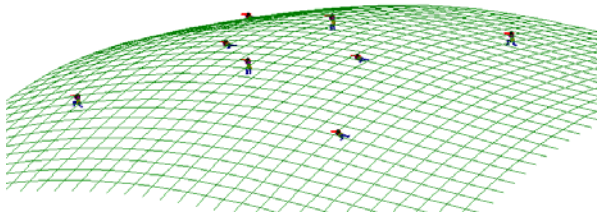
System Error Budgets



Terminal Effects



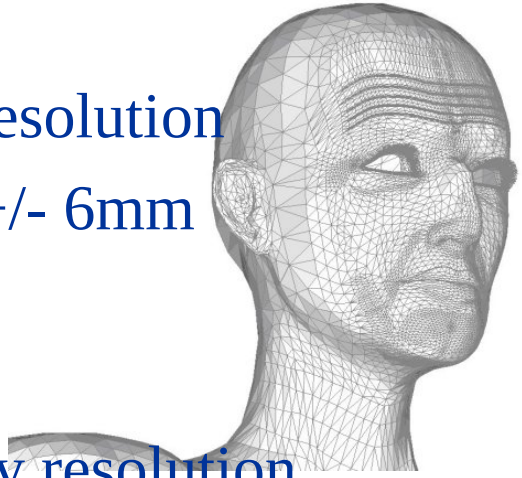
System Effectiveness



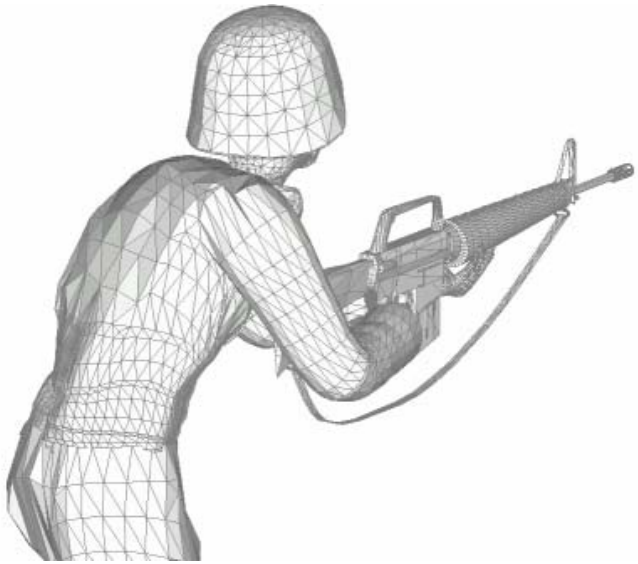
Against static or moving target / target array

Weapon Effectiveness
Target Arrays - Personnel

Head resolution
= +/- 6mm



Main body resolution
= +/- 10mm



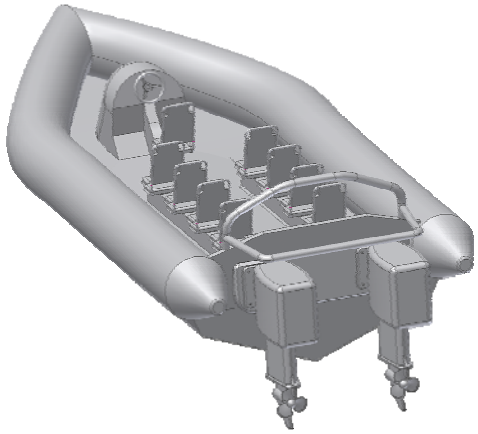
Benefits of high resolution models

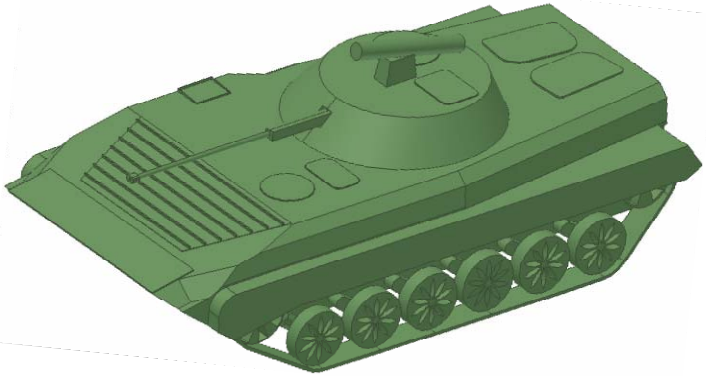
- High degree of accuracy

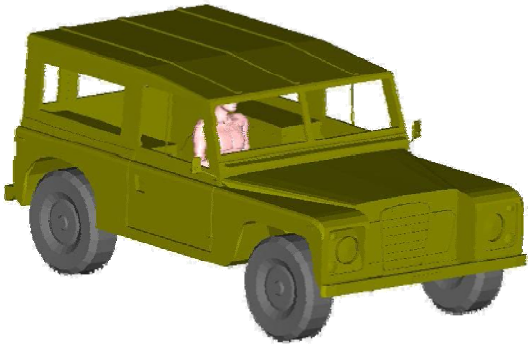
- Detailed point of hit data

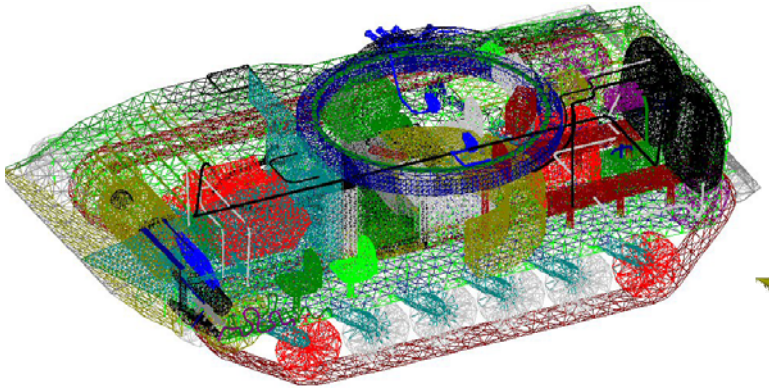
- 3D models allow fully customisable postures and equipment load

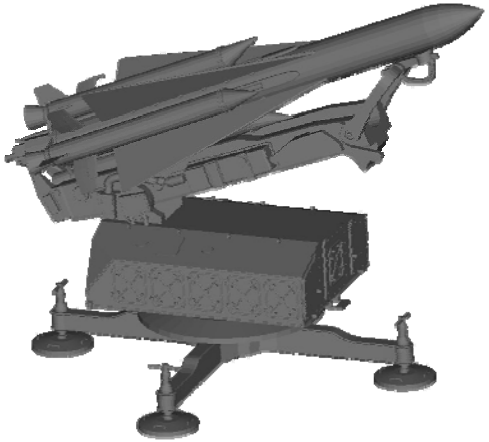
Weapon Effectiveness
Target Arrays - Vehicles

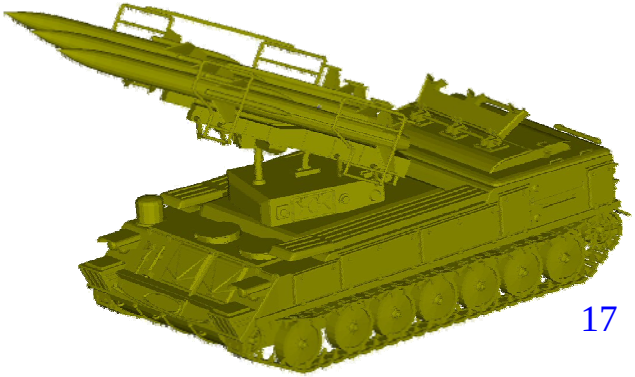












Dual Purpose Model

Lethality

Probability of Initial Suppression:
- Rounds Required
- Time Required

Probability of the Maintenance of Suppression:
- % of time suppressed
- Average Rounds Suppressing
- Average Rounds Incapacitating

'Cost' of Suppression:
- % Ammo wastage
- Suppression time per Kg of ammunition

Protection

Probability of Incapacitation

Trade Off Metrics
- Probability of fragments/projectiles hitting specific areas of the body
- Residual energy of the fragments/projectiles

Design Assessments

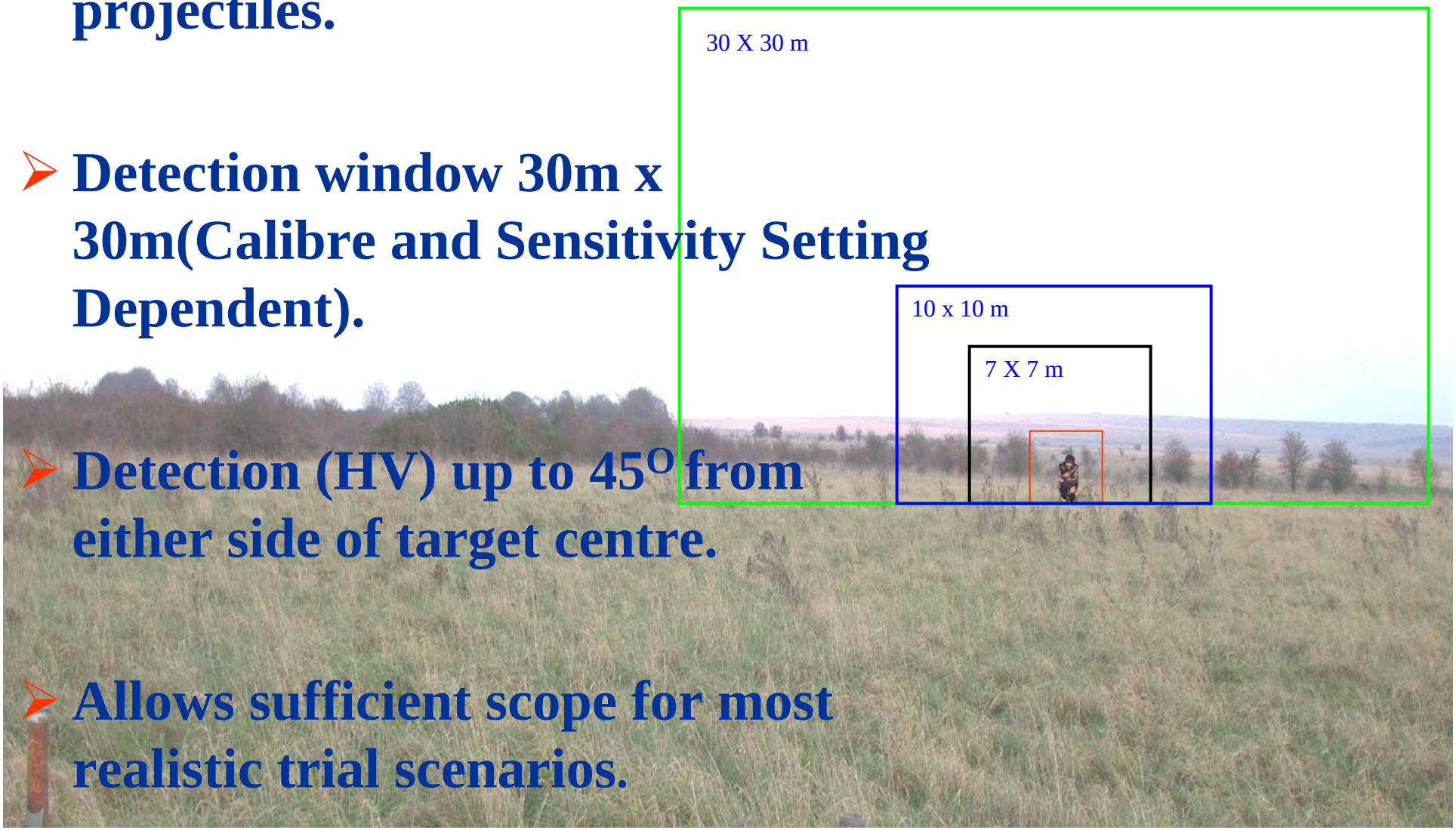
- Multi dimensional analysis of protection system performance including area coverage and protection level (e.g Helmet shape, Plate size)

Soldier/Weapon System Assessment Range

Weapon/Soldier System Assessment Range

Characteristics - Shot Detection

- **Accurate detection of high velocity projectiles.**
- **Detection window 30m x 30m(Calibre and Sensitivity Setting Dependent).**
- **Detection (HV) up to 45^{O} from either side of target centre.**
- **Allows sufficient scope for most realistic trial scenarios.**



Live Fire Intelligent Target (LFIT) System

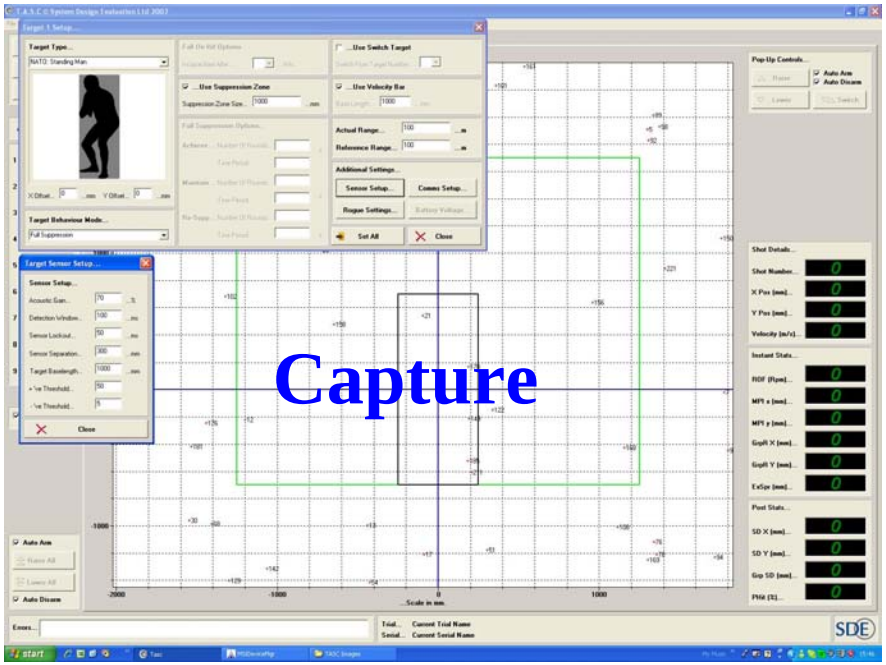
Live Fire Intelligent Target (LFIT)

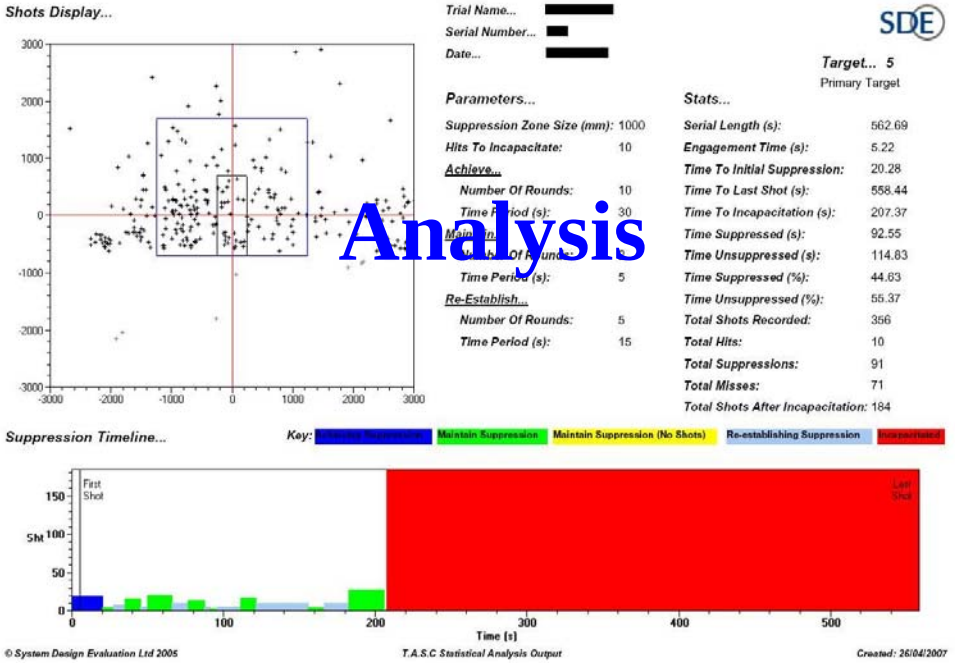
The 'intelligent' targets capture the time and position (in 3D-space) of all shots that pass within close proximity to the target. The software processes this information to determine whether that specific shot would have resulted in a **miss**, a **hit** or a **suppressive effect** upon the target.

The LFIT simulate the response of a potential enemy to the effectiveness of the incom[illegible]om the exercising troops and the targets re[illegible] **'intelligently'** to the incoming fire, in **autonomous** manner

Suppression can be measured!

Software





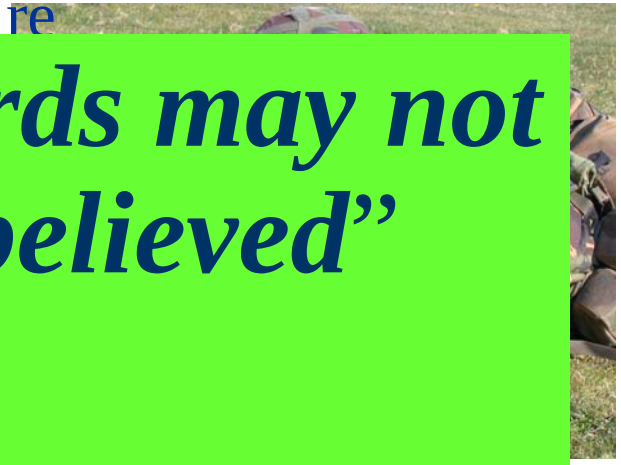
Measures Of Effectiveness (MOE)

- Time to engage target;
- Ti
- D
  ar
- Pr
  effect upon the target;
- Proportion of serial duration for which the target was suppressed;
- Time to kill the target

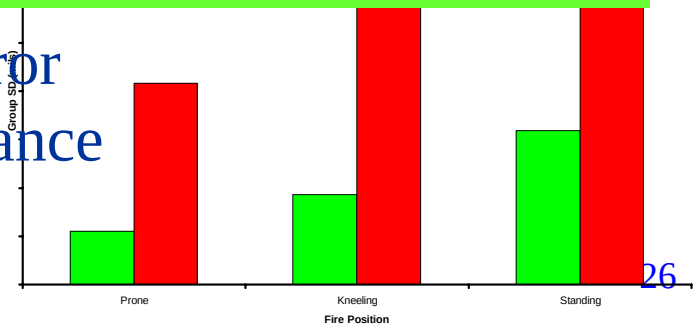
Output feeds directly into SDE's ***ASPECT***™ And the UK MOD Defence Science and & Technical Laboratory's (Dstl) Close Action ENvironment (CAEn) OA model

Baseline Trial - MOPs

- Comprehensive set of performance data for all in service SA weapons & sights covering: day, night, NBC IPE, all combat fire positions, modes of fire



- **“*Overall shooting standards may not be as high as commonly believed*”**
- Infantry Trials Development Unit (ITDU) Baseline Trial Report
- The man is the greatest contributor to the error budget and there is a wide range of performance within the section



Recent Lethality Enhancements
STA

HUD

Optic + Red Dot

Red Dot

Optic

NO DRI
Day Only

TI

Night

LLM

STA Trials

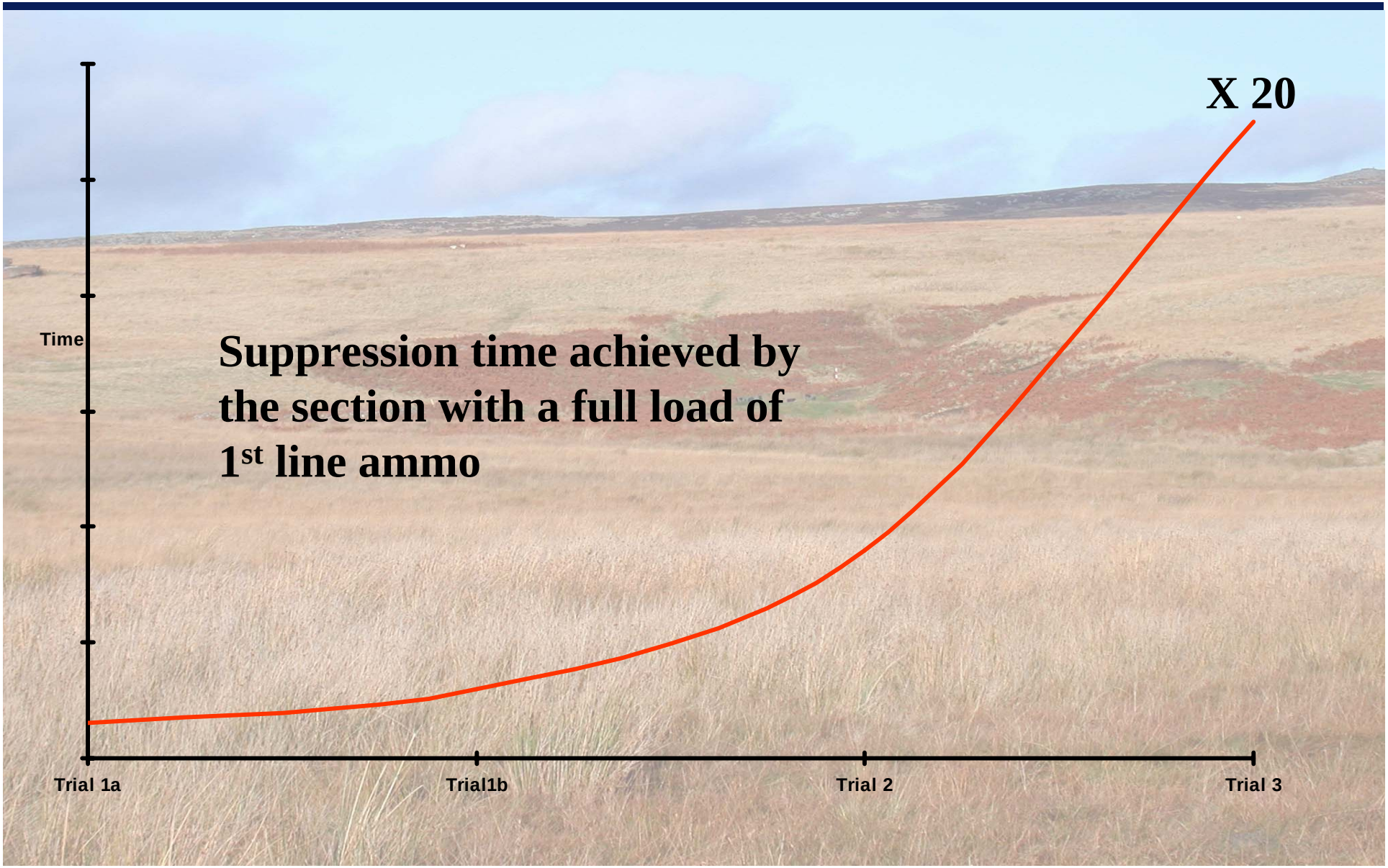
Are we tweaking?

&

Does it improve performance?

Laser
Red Dot
Optic
TI
HUD

System Weapon Effectiveness Trials
Suppression Time



Dstl Comment on LFIT

"An evolutionary step has been taken in the design, development and implementation of a measurement strategy, with supporting instrumentation, to help evaluate the effectiveness of small arms fire on the battlefield."

[dstl]

The Holistic View

Training

Dstl Key Recommendation

The SSAR instrumentation be used to enhance training and in particular train fire team commanders in developing the key skills of control and co-ordination of fire.

Infantry (Individual)

The Infantry soldier must be able to react quickly and to fire accurately to kill or suppress an enemy to the limits of the battle range of his personal weapon, or at close quarters, from different static positions, on the move and from cover.

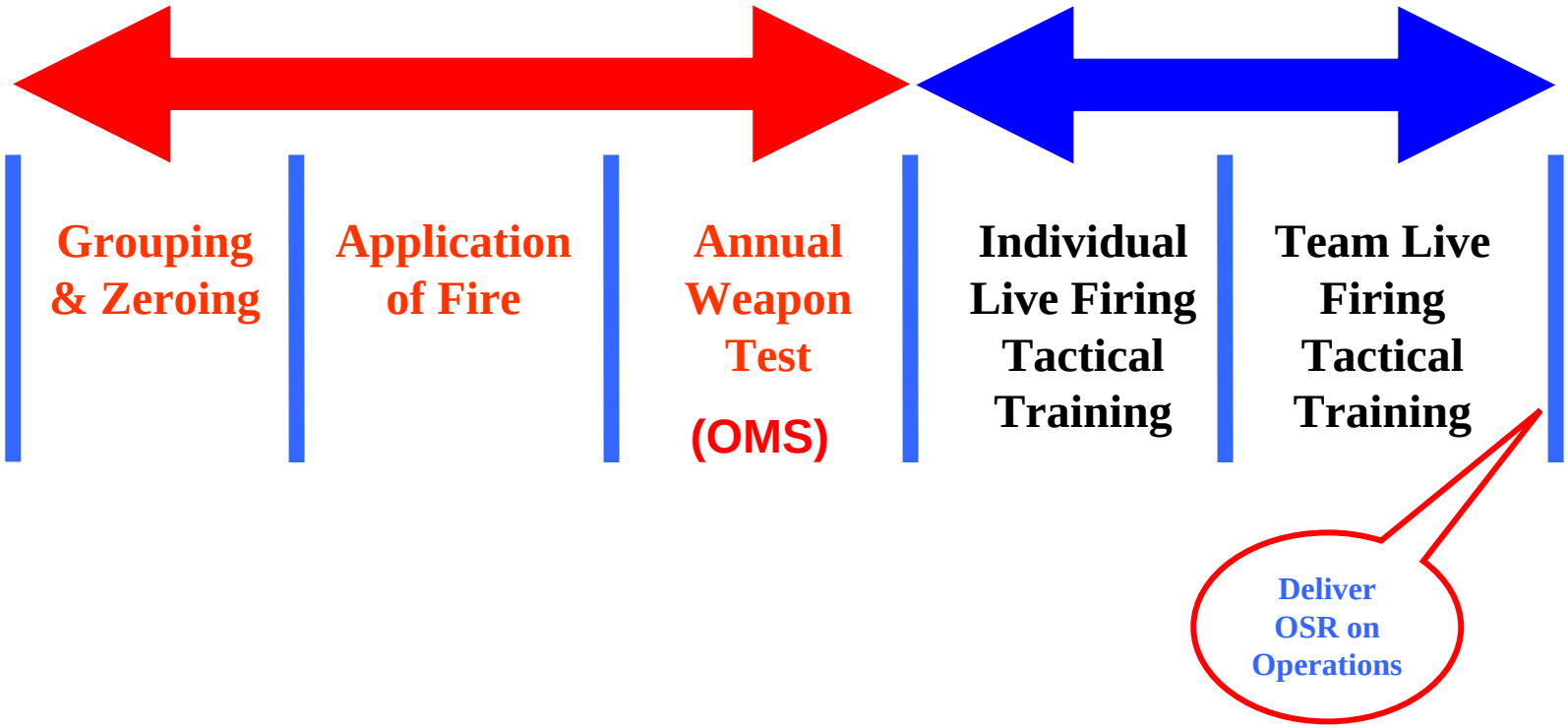
Reference: UK AOSP Chapter 1

Infantry (Fire Team)

Four-man teams must be able to kill or suppress an enemy in defence and in offensive operations at battle ranges to X metres.

Reference: UK AOSP Chapter 1

Current Process



Measure Of Performance (MOP)

- The Operational Marksmanship Standards (OMS) are Measures Of Performance.

- The Measured Performance is “achieve “X” % hits at “Y” range on “Z” target”.

Current Process

Grouping & Zeroing

Application of Fire

Annual Weapon Test

OMS=MOP

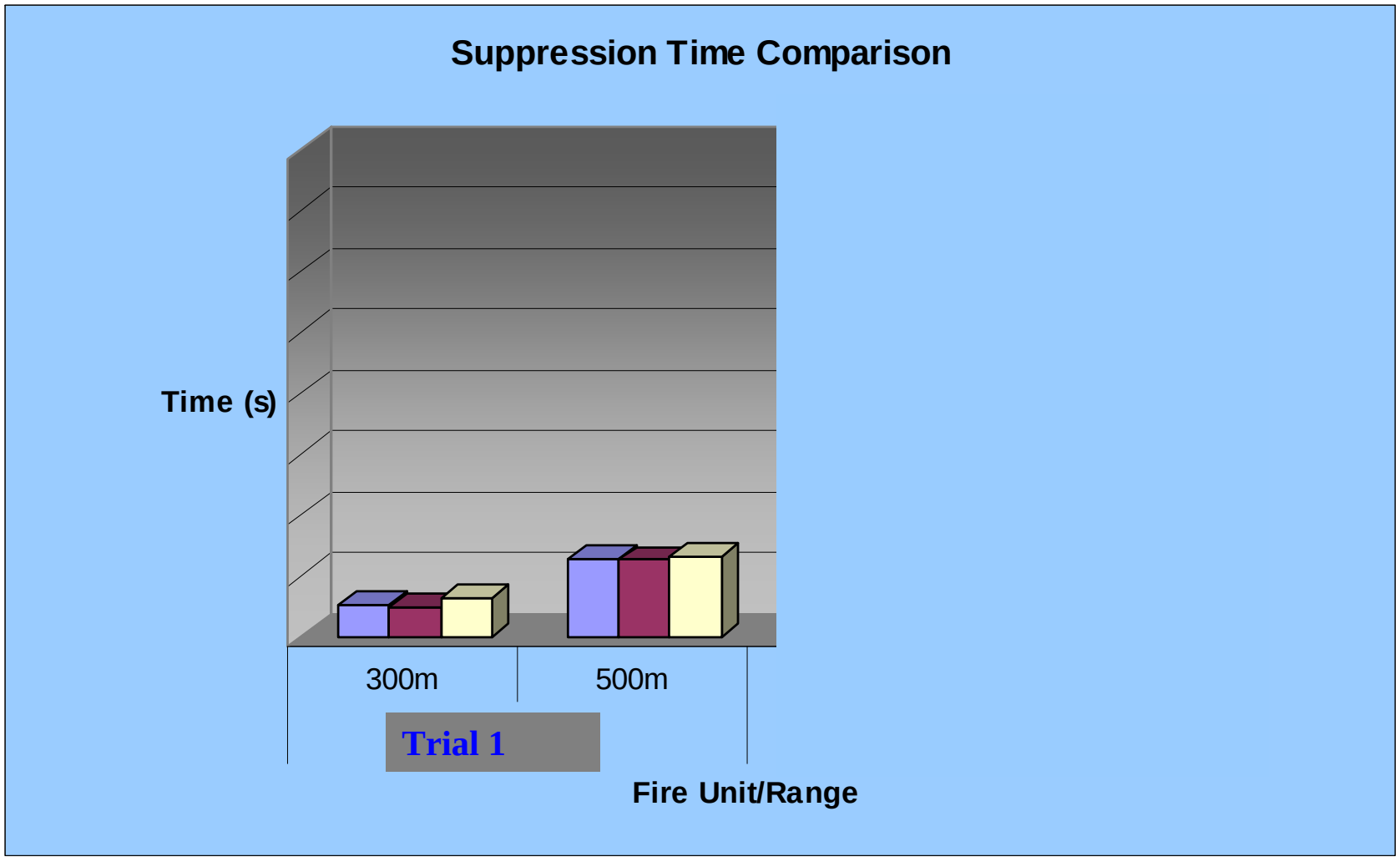
Individual Live Firing Tactical Training

Team Live Firing Tactical Training

Delivery of Effect

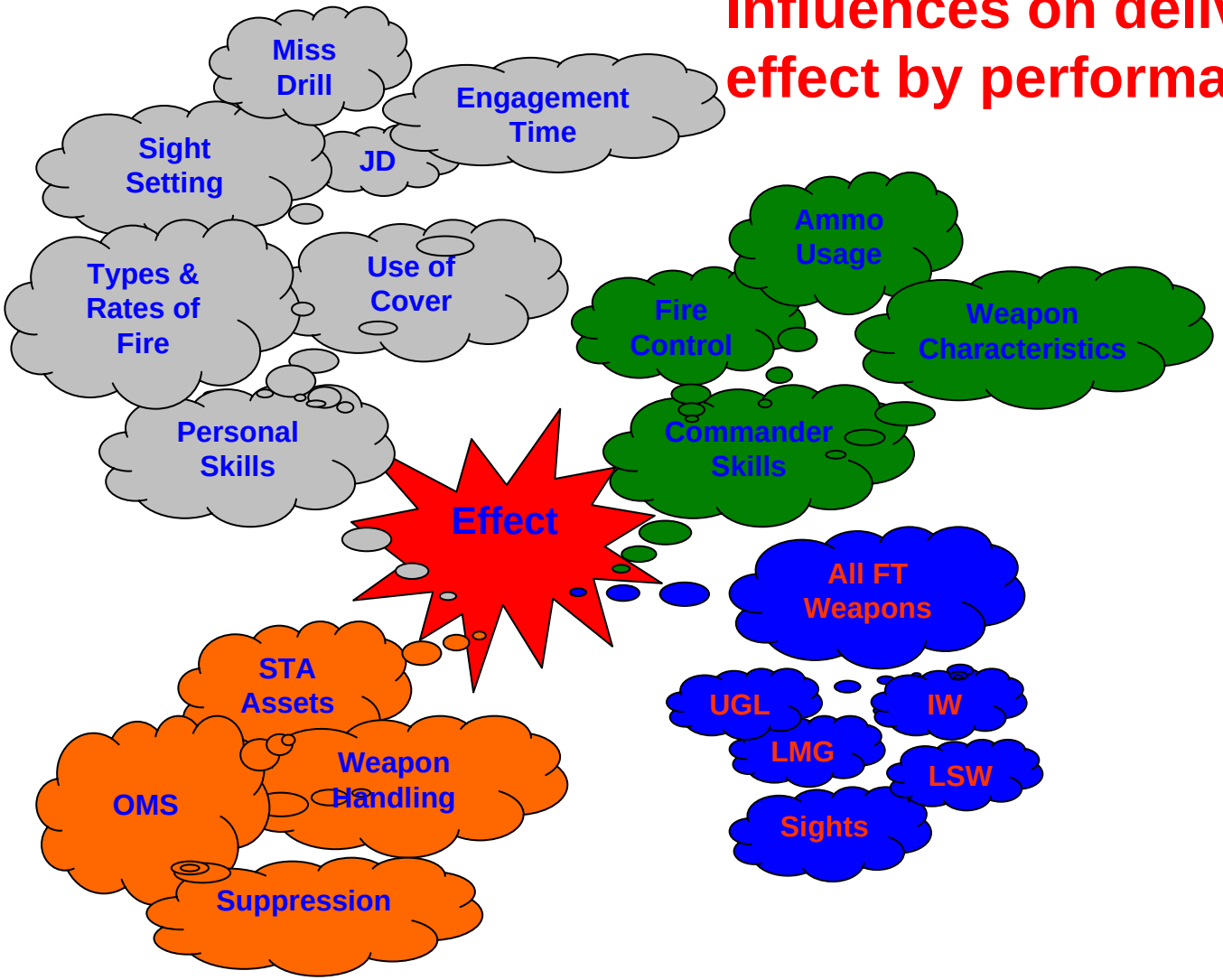
Robust Link?

A Different Approach

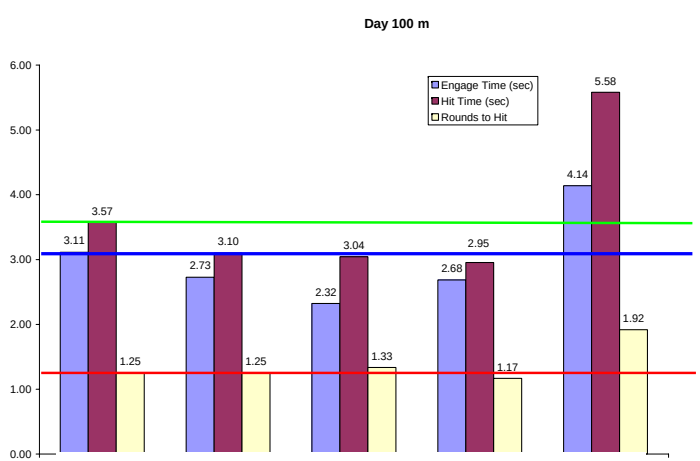


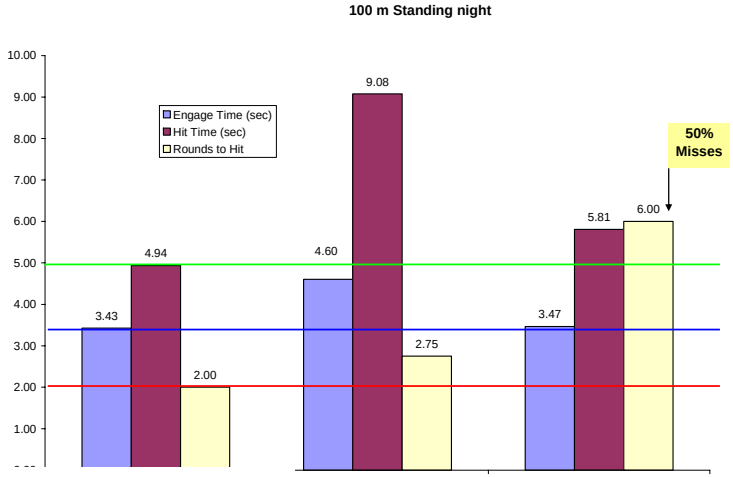
System Weapon Effectiveness Trials
Suppression Time

Influences on delivery of effect by performance

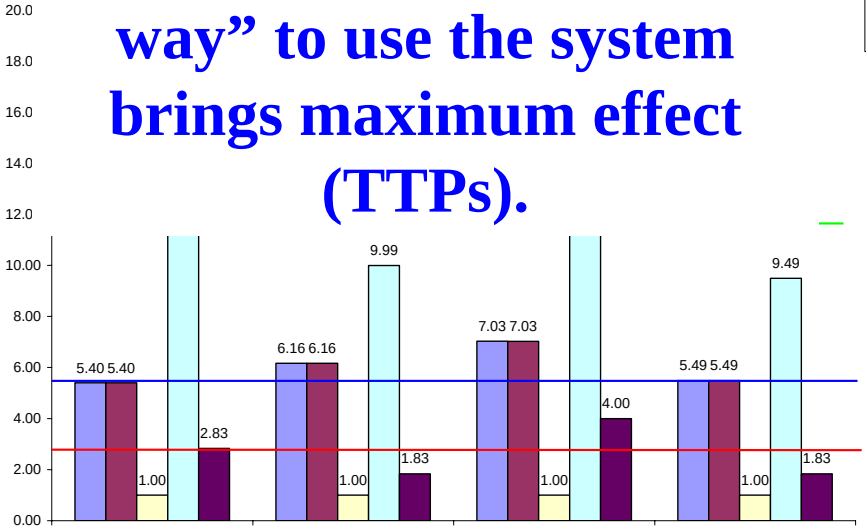


What About Effect?





Determining the "best way" to use the system brings maximum effect (TTPs).



Tomorrow

Achieving dominance by maximising firepower at the applicable level

Questions

So once the infantry have identified and fixed the enemy how do we achieve dominance by maximising firepower at the applicable level?

What are the technologies and developments that need to occur for the enemy to be defeated?

Some Factors

- Asymmetric Threat
- Current Operational Environment will shape our ideas and structures
- Casualties will be less tolerable
- Precision
- Coalition Environment. Commonality of:
  - Protocols
  - TTPs
  - Natures
- Capability lift by the delivery of the right effect at the right time (C4I)

Calibre
(Optimise or/is it Compromise?)

PH – PIH - PI

Modularity

HMG

Mortars

Snipers

IFV

Organic DCC Crew Served Weapons

MMG

A/TK

AGL

LSpV

Conclusions

- Technology developments will continue to enhance performance (Caseless (reduce weight), shooter sensor link etc).
- Technology is not the holy grail for shoulder controlled weapons in DCC.
- Significant advances in “individual fires at section level” will only be realised by a holistic approach including:
  - Interaction with other NATO DCC domains.
  - Evolving TTPs.
- The user must become change agents.

Conclusions (continued)

- **Today** Other than improving sights and STA the most significant uplift in capability could be achieved by changing the way we train our fire team Comds and individual soldiers. **"Train to make the best use of what we already have!"**
- **Tomorrow** the most significant uplift in capability is likely to achieved by changes to TTPs that advances in technology will offer and harnessing the lethality offered by both organic and non organic support weapon systems through C4I. **"Doing better things not doing things better!"**
- Quick Wins are rightly important.
- In DCC robust reversionary modes are vital

Questions?

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