



Capability Gap in Urban Ops – Working Towards a Solution

Prepared for 2012 – NDIA Joint Ammunition Conference, Seattle, US





Netherlands

IFV – CV9035

with 35/50 Bushmaster III;



Armament: **35mmx228** cn Bushmaster III

7,62mmx51 coax Machinegun

76mm smoke grenade launchers





Ammunition vs Target Set

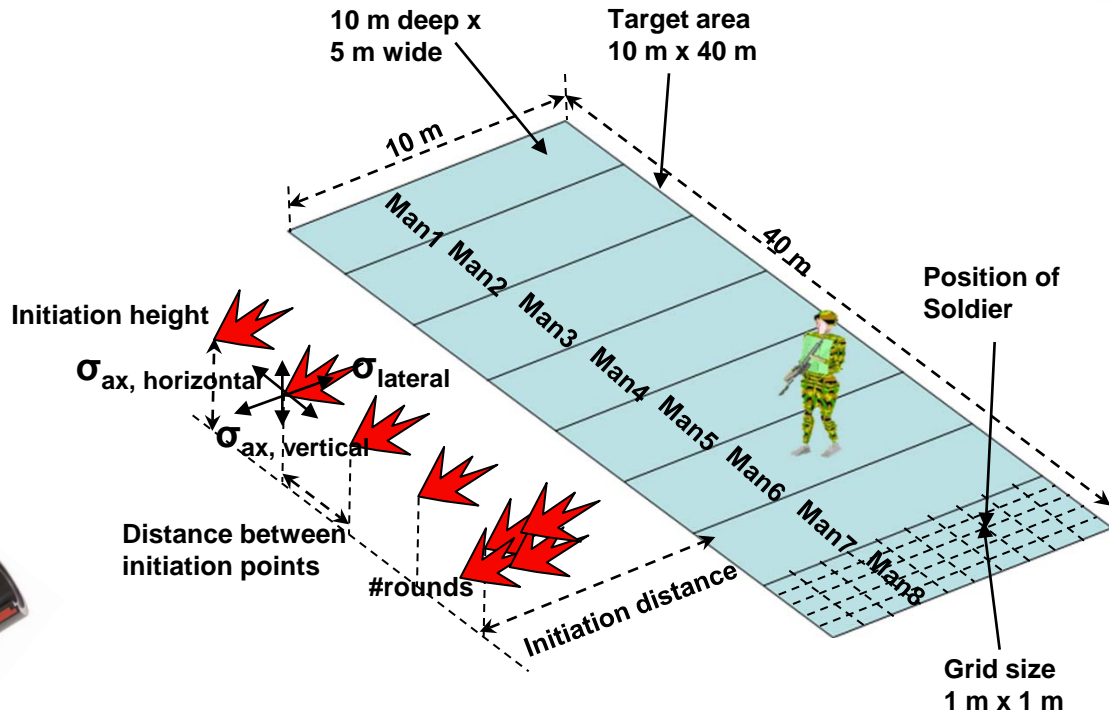
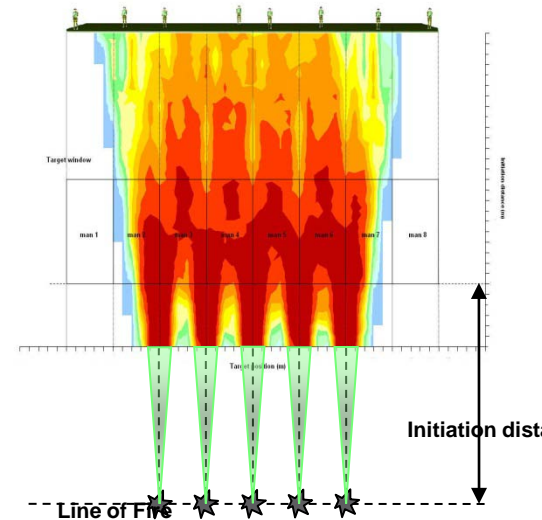


↑
Measure of
Performance

	Infantry			Armoured Vehicle BMP 1 ↔ BMP 3			Battle Tanks		Heli
TPFDS-T									
KETF (ABM)									
APDS									

KETF ABM firing doctrine: Infantry in the open

- › Variables:
 - › Initiation distance to target
 - › Initiation height (offset wrt aimpoint)
 - › Distance between rounds
 - › Number of rounds per location
 - › System errors included
- › Tools: Fragment trajectory + ComputerMan





Operational Experiences and Trends

Infantry



Infra



Asymmetric Threat



Non-Traditional

Armoured Vehicles



Upgrades



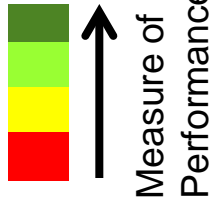
Proliferation



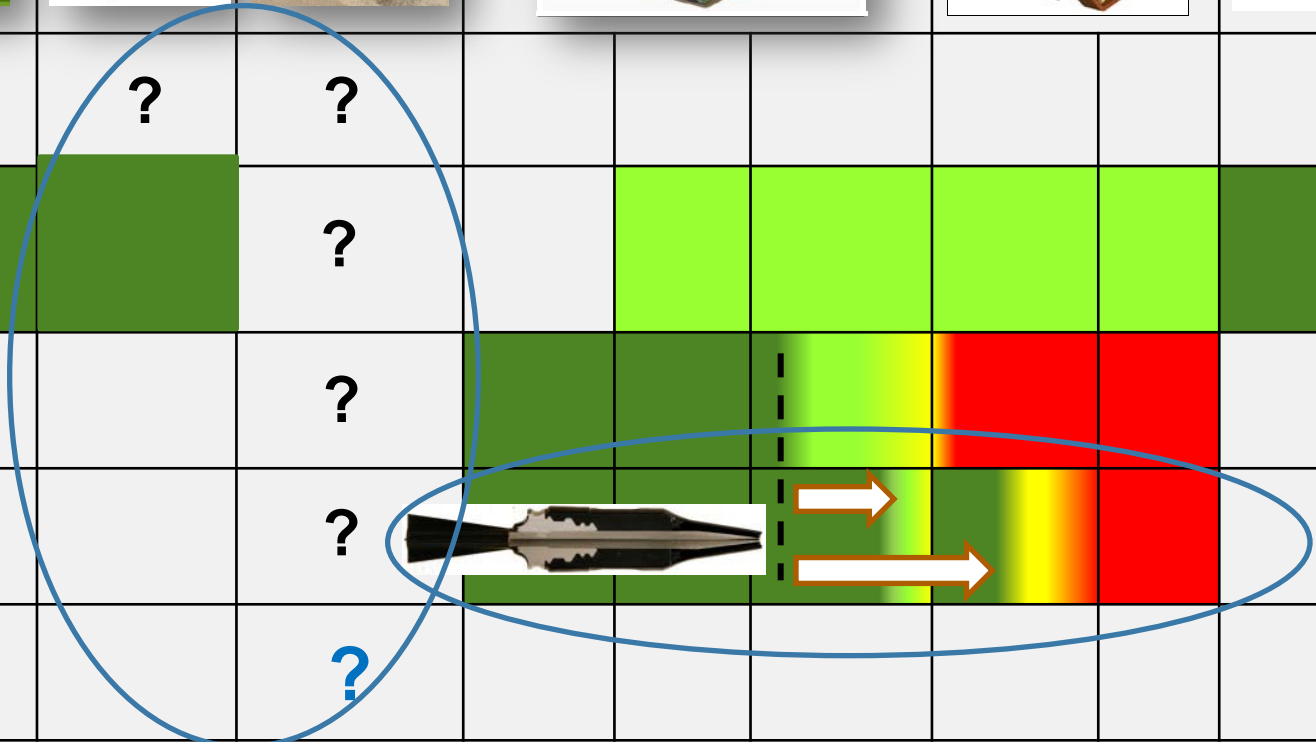
Battle Tanks



Ammunition vs Target Set

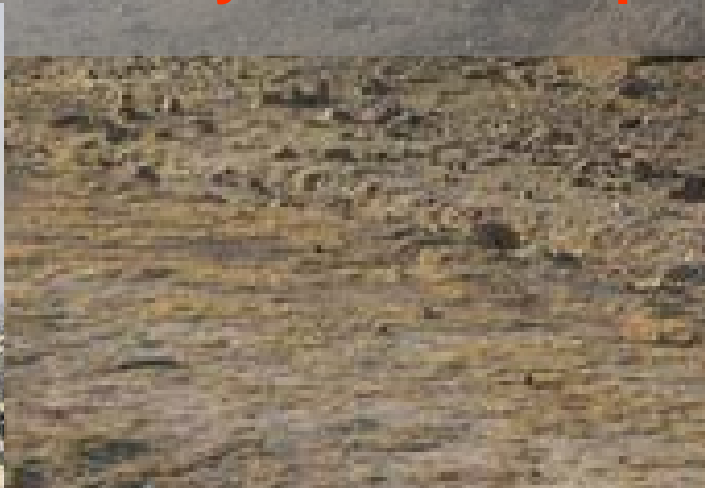


	Infantry			Asym		Infra		Armoured Vehicle BMP1 ←→BMP3			Battle Tanks		Heli	
TPFDS-T				?		?								
KETF (ABM)						?								
APDS						?								
?						?								
?						?								





**Ammunition and Weapon Effects
in
Confined Urban Theatre
in the
vicinity of own troops**





Measures of Performance <-> Requirements



- **Breach a Wall (DRC, E&TB, etc.)**
 - Produce a 30" x 50" hole or 24" diameter hole
 - Clear rebar
- **Defeat Structure (E&TB, BoB, TB, Command Post, etc.)**
 - Collapse
 - Functional kill
 - Deny use of aperture
 - Sever Communications
- **Incapacitate Inhabitants**
 - Penetrate & Burst inside
 - Penetrate Wall (DRC, BoB, TB, etc.)
 - Burst inside – warhead blast & fragmentation
 - Burst in wall
 - Warhead blast & fragmentation
 - Secondary Debris
- **Collateral Damage**
 - Warhead blast & fragmentation
 - Secondary debris
 - Extreme overmatch – perforates more than one wall
 - Precision



Measures of Performance <-> Ammunition effects

POTENTIAL COMMANDERS OBJECTIVES	Ammunition				
	1	2	3	4	5
Defeat target in front					
Defeat target after wall					
Breach wall					
Defeat infra					

POTENTIAL AREAS OF COMMANDERS CONCERN	Ammunition				
	1	2	3	4	5
Around weapon platform					
Flight zone					
In front Wall					
“Integrity” Wall/infra					
Behind Wall					



IST: Experiments... ammunition effect on, in front and behind the target

› Indirect fire (155mm) › Tank (120mm)



› IFV (25 – 30 – 35 mm)



› AT/ASM



› Infantry (12.7mm)



25 mm

- APDS
- APFSDS
- MP

30 mm

- TPDS
- MP
- TP
- PELEpen
- APFSDS
- FAPIDS
- PABM

35 mm

- TPFDS
- HE
- APDS
- APFSDS
- FAPDS
- ABM

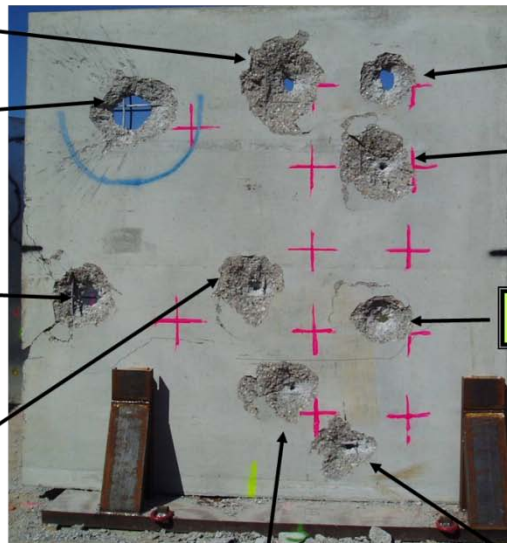
› Air-to-ground (20 – 25 – 30mm)





Medium Calibre Ammunition on Infra Targets

Concrete 20cm ITOP / 45 NATO



35mm FAPDS

35mm HEI-T

30mm P-ABM

25mm APDS

35mm APDS-T

30mm MP

30mm TPDS-T

30mm PELE-pen

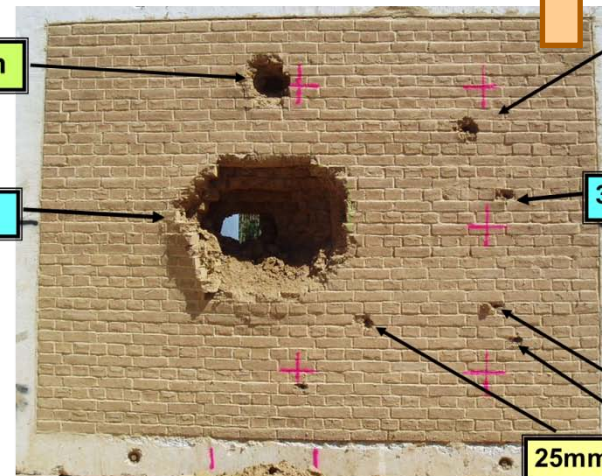
30mm PELE-pen

25mm FAP

35mm HEI-T (5x)



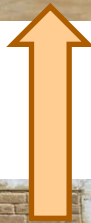
ADOBE 80 / 45 NATO-Front



25mm FAP

35mm APDS-T

25mm APFSDS (3x)

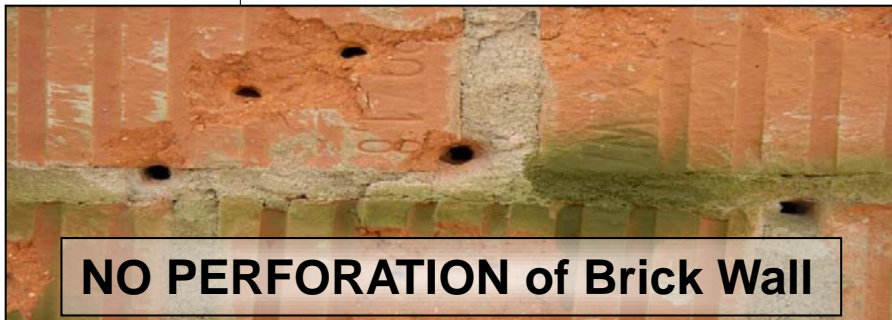




35 mm KETF (nr468) **programmed** Airburst: ignition at various distances



Ejected pellets



NO PERFORATION of Brick Wall



Damage at normal initiation distance



35mm KETF **unprogrammed**



35mm KETF vs 24cm Brick, 20cm Concrete and 40 & 80cm Adobe

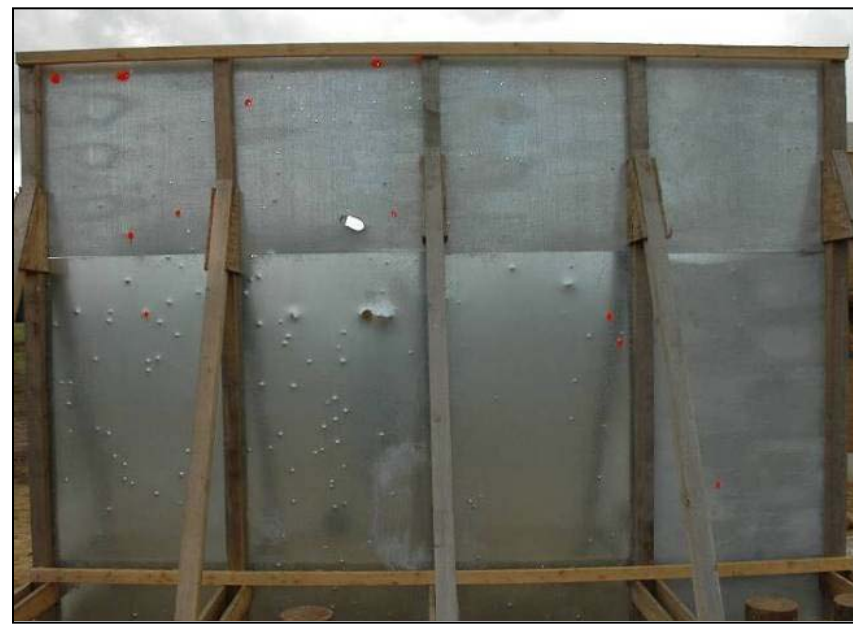


35 mm KETF **unprogrammed** (Brick wall)





35 mm KETF unprogrammed (Adobe wall)





Conclusions from the experiments

Projectiles with fuze (20 to 35 mm HE & MP) are NOT capable to defeat 80 cm Adobe wall

- **Fragment debris in front of wall**
- **No fragment debris after the wall**

NOT capable to breach

KE projectiles (25 to 35 mm APDS and APFDS) are capable to defeat 80 cm Adobe wall

- **No fragment debris in front of wall, but during flight**
- **No fragment debris after the wall**

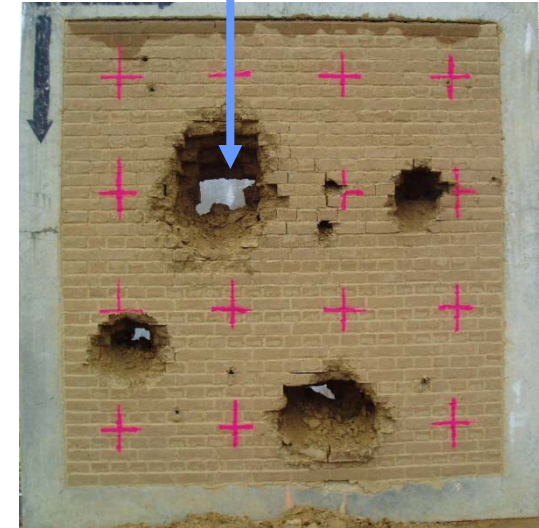
PABM and KETF unprogrammed are capable to defeat 40 cm Adobe

- **No fragment debris in front of wall**
- **Fragment debris after the wall**

Frangible and PELE-PEN (25 to 30mm) projectiles are capable to defeat 80 cm Adobe wall

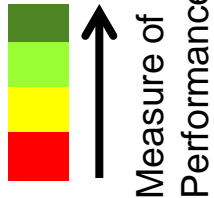
- **No fragment debris in front of wall**
- **Some Fragment debris after the wall**

35mm HEI (5x)





Effect vs Target Set: Summary



	Infantry			Asym	Infra	Armoured Vehicle BMP1 ←→ BMP3			Battle Tanks		Heli
TPFDS-T											
KETF					Prog Unprog						
APDS											
APFSDS											
?					?						



Defensie Materieel Organisatie
Ministerie van Defensie



TNO innovation
for life



RHEINMETALL
DEFENCE



Thank you for your attention