Where To Now?

by

Jim Schatz

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2015 NDIA Armaments Small Arms Forum
Whippany, NJ
3 June 2015

(FINAL052115)

Qualifications – Jim Schatz

- **STUDENT OF MODERN SMALL ARMS (1969-Present)**
- **USER (1977-1981)**
  - **-1977 Graduate of the US Army Infantry and Airborne Schools.**
  - **-Assigned as 11B Rifleman, Machine Gunner, Sniper with B Co. 2/325 82nd ABN Div.**
  - **-Unit Armorer and Advanced Marksmanship Instructor**
- **TRAINER (1981-1984)**
  - **-Pistol Shooter/Instructor – Advanced Marksmanship Training Unit (AMTU), FBNC**
  - **-Pistol/Rifle/Counter Sniper Instructor – US Army MTU # 1, Ft. Meade Maryland**
- **DEVELOPER (1986-2015)**
  - **-APM or PM: USSOCOM MK23 OHWS, USP Family, USBP USP40C-LEM Pistol, MP5K-PDW, FBI MP5/10, MP5/40, MP7A1 Submachine Guns/PDW's, JSOC HK416, HK417, DIA G36C Assault Rifles, MSG90A1 Sniper Weapon System, P11 Underwater Pistol, US Army M320 GLM, JSOC AG416/417 & JSOC GMG, US M1014 Joint Service Combat Shotgun**
  - **-APM for Development: G11/ACR Caseless Ammunition Assault Rifle Family, XM8 Modular Family of Weapons, USP45CT/HK45/45C SOF Handguns. 4.6x30mm, 9x90mm MEN, MURG (6.8x43mm), 7.62x37mm, 4.73mm Caseless ammunition, L.W. Ammo**
- **SUPPORTER (1986-2006/2015)**
  - **-Sales, Tech Training, CS Support Rep, Contracts, Logistics, Fielding, Life-cycle Support Rep/Manager for US FLEA's, military, SOF, IC agencies for handguns through AGL's and ammunition.**

• NO direct affiliation since 2006 with any firearms or ammo manufacturers.

Small Arms Overmatch

and we don't have it!

"Few enemies would even consider taking America on in a naval, air or tank battle but every bad actor with an AK will engage with U.S. forces without even a second thought"

MSG Larreau – U.S. Army Special Forces - March 2014

"When you are up against the enemy in close combat, you want smoking boots on the other end. You don't want a fair fight".

LTG H.R. McMaster (ARCIC DCG) - 31 March 2015

"If not for the bullet, no one would fear the gun"

Chuck Marsh - NSWC Crane

Scenario 1 – Current Conventional (2015)

	100	200	300	400	500	600	700	800	900	900	800	700	600	500	400	300	200	100	
M4 5.56x45					500									500					AK 7.62x39
M4 5.56x45					500									500					AK 7.62x39
M4 5.56x45					500									500					AK 7.62x39
M4 5.56x45					500									500					AK 7.62x39
M4 5.56x45					500									500					AK 7.62x39
M4 5.56x45					500									500					AK 7.62x39
M249 5.56								800			800								RPK 7.62x39
M249 5.56								800			800								RPK 7.62x39
M14EBR 7.62								800	1000										SVD 7.62R
M240 7.62											1100								
				1500															PKP 7.62R
M2HB .50																		1900	
	1900																		DShK 12.7

Threat +2

“Stand-off” Shooters
Exploiting 7.62x54mmR’s 800-1500m MER

- Many more 7.62x54mmR weapons with conventional infantry:
  Russian troops in the Crimea, ISIS, Insurgents, other

Russian Infantry Squad
2 x PKM LMG’s, 1 x Suppressed VSS Rifle,
2 x SVDS Sniper Rifles

Islamic State Terrorists armed with 7.62mmR PKM LMG’s, SVD’s

Scenario 2 – RUS Crimea/ISIS Hybrid (2015)

	100	200	300	400	500	600	700	800	900	900	800	700	600	500	400	300	200	100	
M4 5.56x45					500									500					AK 7.62
M4 5.56x45					500									500					AK 7.62
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M4 5.56x45					500									500					AK 7.62
M4 5.56x45					500									500					AK 7.62
M4 5.56x45					500									500					AK 7.62
M249 5.56x45								800											
									1000										SVD 7.62R
M249 5.56x45								800											
				1500															PKP 7.62R
M14EBR 7.62								800	1000										SVD 7.62R
M240 7.62											1100								
				1500															PKP 7.62R

Threat +4

Two additional 7.62R's added

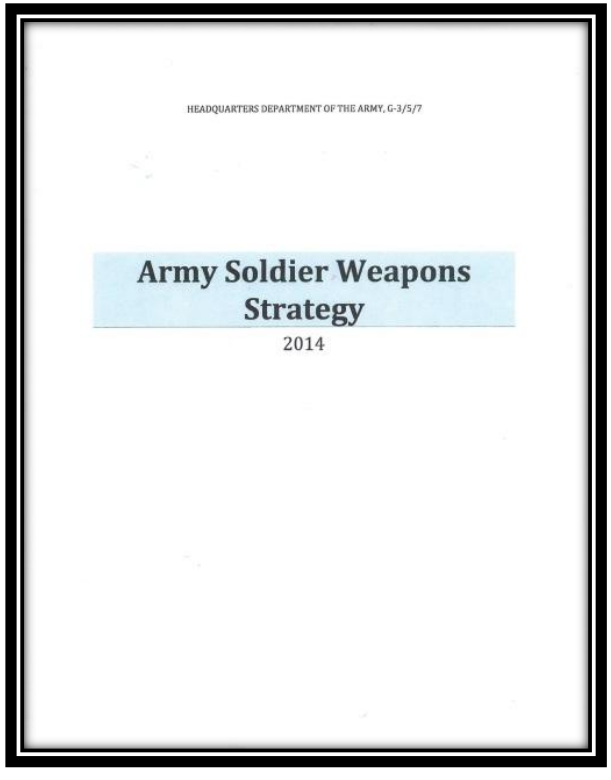
US Army Soldier Weapons Strategy 2014

- **Approved 9 December 2013.** ***Historic!***

- **"*..retain (regain?) operational overmatch…* "**
  "*in a resource constrained environment*"…

- **"*Weapon system modernization efforts that will focus on target effects*"**

- **Acknowledges that "*technology maturation does not support a revolutionary weapons development in the near term*" (FY15-19)**



- **Threat Analysis: "*Near-peer threats are moving towards a common, intermediate caliber to maximize fire-power and efficiencies for the squad in an attempt to increase lethality at close range and accuracy at long-range*".**

Army Soldier Weapons Strategy 2014 (cont.)

- ***"Potential adversaries have begun to field common intermediate caliber, advanced performance ammunition with a max effective range (MER) of 600m for the improved rifle; 800m for the light machine gun (LMG)"…***

- **Near-Term Tech Focus: Ammunition Caliber (Stand-off Range, Accuracy, Terminal Effects) and Weight Reduction. Modular Weapon Systems. Modular Fire Control. Suppression. Training.**

- **Small Arms Ammunition Configuration (SACC) Study**

  Problem Statement: "*Given improving threat small arms capabilities, the Army must determine a feasible, acceptable, and suitable ammunition configuration in order to develop and implement a small arms systems strategy that ensures overmatch at the lowest tactical level in 2025 and beyond*."

  -3QFY16 – Deadline for final Study Report to DA G-3/5/7

The Challenge

Scenario 3 – US ICC Overmatch

How do we get there?

	100	200	300	400	500	600	700	800	900	900	800	700	600	500	400	300	200	100	
ICC IW								800						500					AK 7.62
ICC IW								800						500					AK 7.62
ICC IW								800						500					AK 7.62
ICC IW								800						500					AK 7.62
ICC IW								800						500					AK 7.62
ICC IW								800						500					AK 7.62
ICC IW								800						500					AK 7.62
ICC SAW												1200							
				1500															SVD 7.62R
ICC SAW												1200							
				1500															PKP 7.62R
									1000										SVD 7.62R
.338 EBR														1500					
.338 MMG																		1900	
				1500															PKP 7.62R
.338 HMG																		1900	
	1900																		DShK 12.7

= MER but w/ 61 lb. weapon & 33% ammo weight savings!

Threat +2

USA +9

Next Gen Capabilities List

- **Extended Stand-off Range** (=/> existing, emerging threats)
- **Improved PID, pH (point target), pS (suppression)**
- **Improved Speed of Target Engagement**
- **Improved Terminal Effects/pI** (all ranges)
- **Reduced Load** (Ammo, Weapon, Soldier Combat Load, Transport)
- **Family of Weapons** (Mission-Tailorable SCW through SDMR/IAR)
- **Open Architecture** (for varying missions/AO's, UMNS response time)
- **24/7 Signature Reduction** (Flash, Sound, Blast, Location)
- **Reduced Cost Burdens & Response Times**
  (Development, Procurement, Life-Cycle Sustainment)
- **Commonality** (training, parts, operation, enablers)
- **Superior Function** (Safety, Performance, Reduced Maintenance)

ALL AVAILABLE TODAY!

BLUF (Bottom Line Up Front)

- **Small Arms:** -Kill/Destroy with HITS (10-25%)
  -Suppress/Deny with MISSES (75-90%)

- **Aiming:** Mandatory to Effectively Range, Hit, Suppress

- **Suppression:** Proximity, KE (Mass, Velocity), Volume

- **Unsuccessful past attempts to improve pH (and pS):**
  SALVO, SAWS, SPIW, CAWS, ACR, OICW, XM8, OICW i1, SCAR, IC…

- **Why not Intermediate Caliber?** (exploited by COTS/ emerging enablers – fire-control, training, LW cases)

- **The most effective warfighter? (1.3 rounds per kill)**
  The properly equipped and trained Precision Marksman

Precision Marksmen = Force Multipliers

- **Achieve a High Probability of Hit, Incapacitation and Suppression by employing:**
  - **-Larger More Effective Calibers**
  - **-Variable Magnification Optics**
  - **-Precise Ranging Capability/Devices**
  - **-Precision Marksmanship Training**
  - **-A "Rifleman's" Mind Set**

- **Are best at PID and BDA as well as reconnaissance at extended ranges**
- **Able to quickly and efficiently deal with threat targets at all ranges, both exposed & concealed/protected, moving, outside the range of organic squad weapons, at steep angles and under extreme conditions/stress**
- **Exploit the tactical advantages of immediate corrected follow-up shots**
- **Cost Effective employment and effects versus expensive air-bursting weapons, FS/FCS's and warheads with questionable, unproven pI/K**
- **US Army Marksmanship Master Trainer Course (MMTC) – *great start!***

What do they Need to Exceed?

- **140K "Front Line Combatants" versus 1.4M Members**

Mandatory

- **Capable Cartridge (that is =/> that of the enemy)**
- **1-2 MOA Weapon/Ammo "system" (12"W x 20"H target)**
- **Variable Magnification Sight (6X to 20X)**
- **Ranging Capability (reticle, rangefinder, FCS)**
- **Proper Training (to the MER of the weapon/ammo plus Moving Targets)**

Enablers

- **Lightweight Ammo**
- **Signature Suppression**
- **"Tailorability" for various:**
  - **-Environments**
  - **-Applications**
  - **-Targets/Barriers**

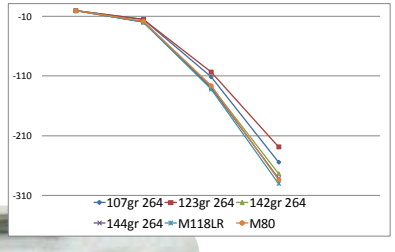
Art of the Possible – *Now*/*Emerging*

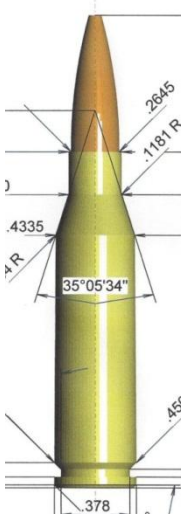
Time to Challenge the Industry!

Polymer Case Weight Savings (20-40%)

Affordable Individual Weapon FS/FCS

Intermediate Caliber Cartridge Overmatch

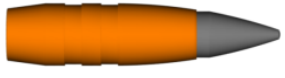




Advanced Marksmanship Training

Lightweight Barrels

One-Way Luminescent 24/7 Tracers



Novel Projectile Designs

Advanced Integrated Signature Suppression

Modular/Tailorable Caliber-Convertible Weapon Systems (SCW – LMG)

Novel Recoil Reduction Technology

The “Enablers”

Enhanced Sighting Systems

To exploit the long-range capability of an intermediate caliber cartridge

Find-Acquire-Range-Aim-Engage-Assess

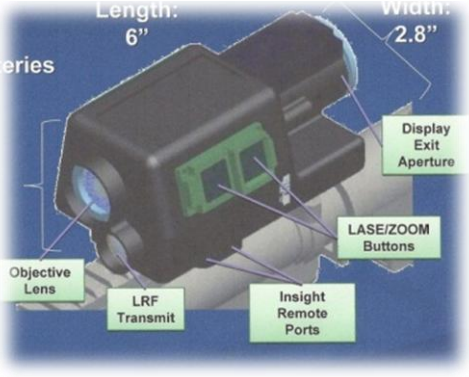
ARDEC IDRS

Trijicon Continually Computed Aiming Solution (CCAS)

Meprolight Meslas

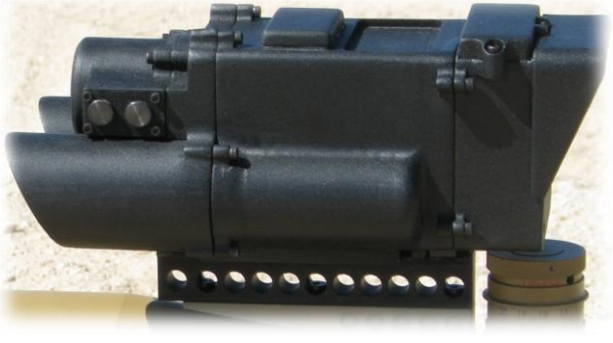
Steiner intelligent Combat Sight (ICS)

USASOC Enhanced Combat Optical Sight (ECOS-O)



Lockheed Martin "DInGO"

L3 IBRS

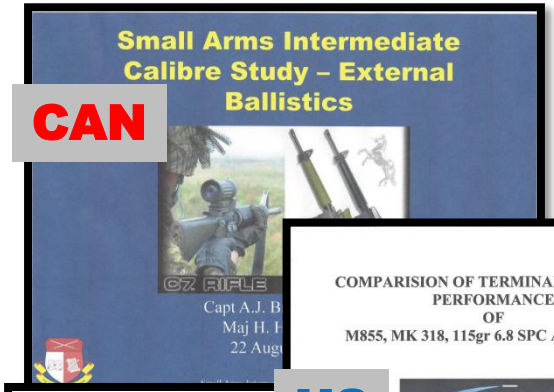


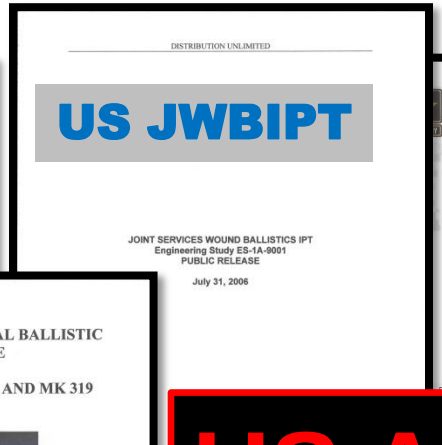
DARPA One Shot XG (reads wind)

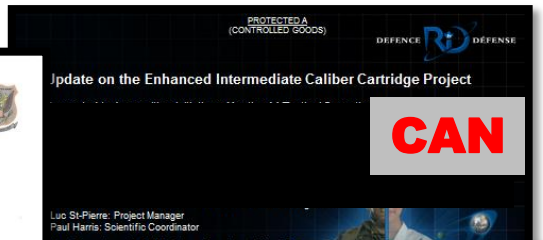
TrackingPoint "Predicted Release" FS/FCS

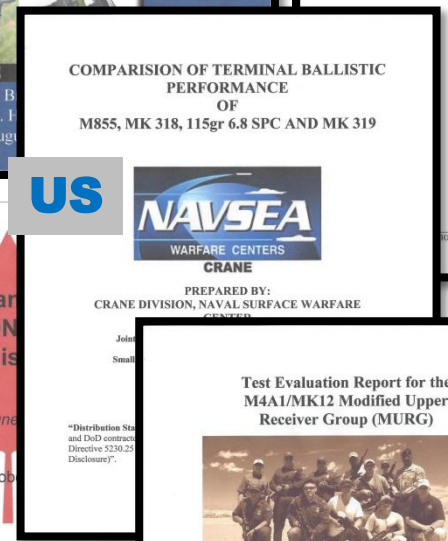
Government Caliber Studies Since 2003 (15)

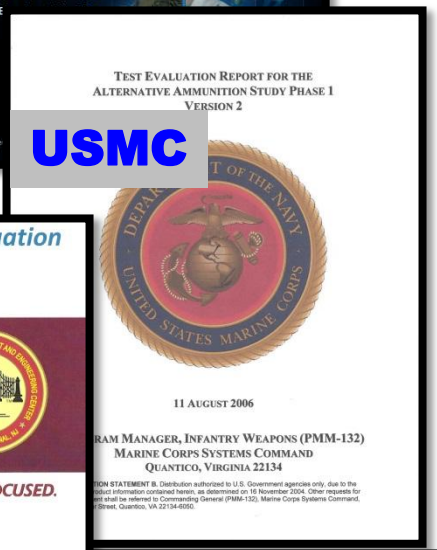
ALL Suggest an Intermediate Caliber to "Fill the Gaps"



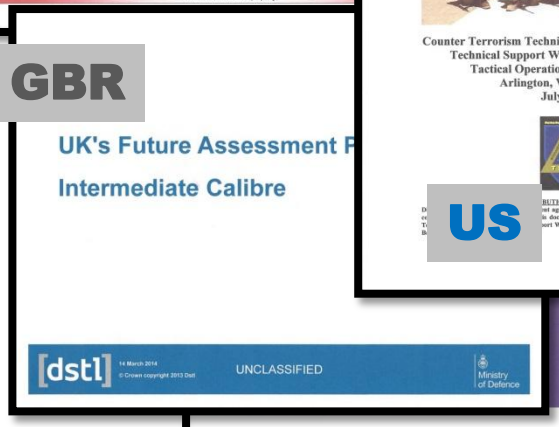


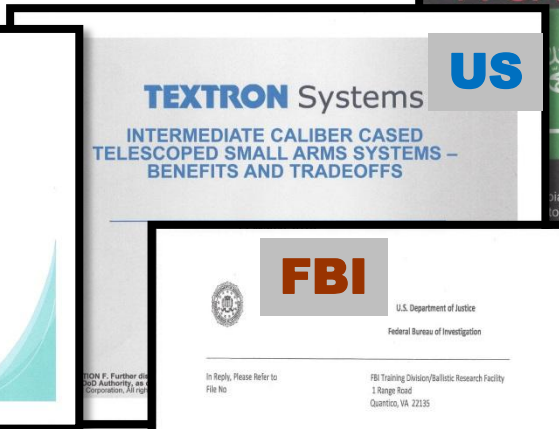


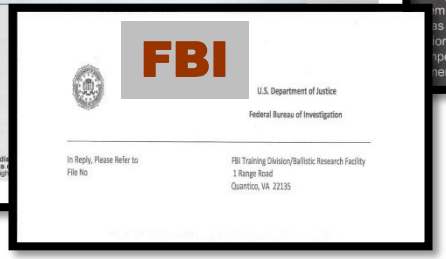




US Army SAAC Study?



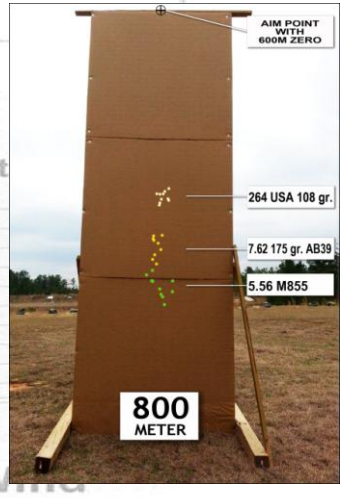




Saudi Arabia

Data Says Intermediate Calibers Work

- More Efficient "Flyers" = Improved pH/I & pS due to:
  - -Higher BC's, SD's (sectional densities)
  - -Optimum Length over Width Projectile Ratio
  - -Greater Retained Energy at Longer Ranges
  - -Improved Penetration and Target Effects



- Reduced Time of Flight
  - -Less Bullet Drop
  - -Less Cross Wind Drift
  - -Reduced Aiming Error

- ICC vs. 7.62mm NATO – Lower Projectile Mass/Chamber/ Pressure/Recoil Impulse, Greater Stowed Rounds, Reduced Combat Load Weights, Lower Cost, Common Round Option, Shorter/Lighter Weapons & Magazines

Industry Programs to Address the Capability Gaps – just since 2003 (6+)

6.5x45mm (Lapua/HK)

Conclusion

The 6.5 x 43 Lapua will provide a range of advantages:

- Performance equal to or greater than 7.62 x 51 NATO in 25%-30% lighter package
- Immediate, low risk capability improvement
- Capable of replacing 5.56 x 45 NATO thus reducing the number of calibers carried by the war fighter
- Offers increased tactical flexibility, simplified training and reduced logistics burden
- Ballistic performance 6.5 x 43 Lapua is relevant to other new ammunition technologies (e.g. LSAT or lightweight polymer cases).

6.5 Grendel (Alexander Arms)

6.5mm Grendel

From Wikipedia, the free encyclopedia

The **6.5mm Grendel** (6.5×39mm) is an

-15 platform.
be a versatile
other
and the

demark owned
y released to
standardized.
es the
the permission
k.

6.5mm Grendel showing variety of bullets 144 gr

Lightweight Full Caliber Equivalent Ammunition

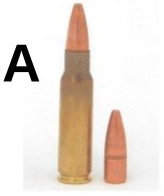
All Trending 6.5mm – 7mm

6.8mm XM68GDSA (ATK/LWRCI)

6.8mm Ammunition Technology ATK

Design Requirements:

- Reliable terminal performance
- Designed for modern automatic rifles and semi-automatic short barrel carbines (8.5)
- Low muzzle flash
- Consistent pressure and velocity over cold temperatures
- Short barrel accuracy, accuracy, and more accuracy…
- Full Product line
  - ✓Duty
  - ✓Blank
  - ✓Frangible
  - ✓Armor piercing



90 Grain (5.8g) Gold Dot XM68GDSA

6.8mm SPC LWRC PSD Carbine with 8.5 inch length barrel

7x46mm UIAC (Cris Murray)

7x46mm UIAC

(Universal Intermediate Assault Cartridge)

s a true intermediate
ber, length, case diameter,
aller diameter cartridge allows
erall weapon not just a shorter

can comfortably replace all
nfantry rifle and machine gun
ut loss of portability, lethality,

at 2650-2675 fps to regulate
, heat, and to allow
assault rifles
cartridge would use the 7mm
K, with a BC of .608, at 2400
e has better flight
d terminal energy than the
mm M1
IAC was designed for combat
recoil, and weight
duction ov
ball

7. Muzzle Velocity: 2650 fps/808 mps
   Bullet Weight: 130 grains/8.4 grams; BC 411

.260 Rem. (6.5)

6.5S (Mitch Shoffner)

Advantages of the 6.5x40mm

1. Half the size of the 7.62 NATO
2. Weight - 300 rounds
   5.56 NATO = 9.0 lbs.
   7.62 NATO = 15.0 lbs.
   6.5x40mm = 11.0 lbs.
3. Performance close to 147/ 175gr 7.62 NATC
4. Meets mission performance stan
5. Multiple roles capable (one round
6. Easley integrated into current M16 / M4 family of weapons
7. Cost effective (production
8. Less recoil and muzzle fla
9. Large number of
10. Superior ballistic

6.5X40MM

Proprietary Statement
…ains information that is proprietary to Mitch Shoffner. This information cannot be duplicated, shared, used, or …osed in part or whole for any purpose without the express permission or consent of Mitch Shoffner.

Polymer Case Enabler

- ***Game-changer!***
  - -Greater Effect and MER with Less Weight & Volume
  - -Enables Paradigm Shift in Weapon Design, Employment
  - -Increased Stowed Rounds
  - -Increased Sustained Rate of Fire
  - -Improved Safety, Reduced Cook-off
  - -Improved Accuracy

- **Weight Reduction**
  - @ 28-40% over brass (caliber dependent)

- **Volume Reduction (CTA)**
  - @ 12 to 24% (caliber dependent)

- **Production, Transport Costs (ROM)**
  - @ 10-20% lower after initial tooling costs

- **First Fielding in 2015 in caliber .50 BMG**

Telescoped Configuration (US Army LSAT/ TEXTRON 7.62mm)

Conventional Configuration (US/PCP .260 Rem Round)

Conventional Configuration (USMC/MAC MK323 MOD 0 .50cal Round)

Training (Paradigm Breaking)

- **Based on training to date with Civilians, Soldiers, Law Enforcement and SOF personnel. "Paradigm breaking" in both the capability developed and reduced training times.**
  - **Immediate capability to interdict targets to 600 meters with very limited training.**
  - **Immediate capability to PID, engage & suppress point targets out to 800 meters at threat overmatch ranges.**
  - **Remove the range estimation error component of long-range shooting.**
  - **Significant improvement in hit potential.**
  - **Engagement times reduced significantly.**
  - **Immediate measurable wind corrections.**
  - **Moving target engagement simplicity.**
  - **Improve the defensive survivability and offensive capability of the rifleman.**

1200m 7.62mm 1st rd hits w/16" barrel, 1/7" Twist.
500m Subsonic 7.62mm.

See Pete Gould

"Tailorable" Weapon Systems
(Carbines/Rifles)

User Exchangeable (without tools, special tools):
- **-Barrels (lengths, types)**
- **-Caliber & Feed Systems**
- **-Stocks (assorted)**

Colt CM901

SIG "Halo" (MCX) 2013

Beretta ARX-160
Fully modular w/o tools. 5.56mm, 7.62 x39mm, 6.8x43 mm. In service w/ Italian Army since 2011.

FN SCAR "Common Receiver" 5.56mm – 7.62x51mm Available as of 2012.

Remington ACR
Fully modular w/o Tools. 5.56mm, 6.5G and 6.8mm, 7.62x39mm. In production 2010.

Taiwan T97 conver-table from 9mm – 7.62x51mm. Fielding expected 2012-2013

CZ 805 A
Fully modular w/o tools.
In service w/ the Czech Army in 2011.

"Tailorable" Modular Weapon System
On-the-Fly "Changing with the Times"

CLIN/Item Description	Caliber	Barrel (OL/Type)	Comments
1. Subcompact Weapon, cpl.	ICC	8.5"/Standard	One Common Receiver
2. Carbine, cpl.	ICC	12.5"/Standard	
3. Rifle/IAR, cpl.	ICC	16.0"/Standard	
4. SDMR, cpl.	ICC	18.5"/Standard	
5. LMG, cpl.	ICC	18.5"/Standard	LMG Receiver
1.A.- 5.A. Barrel Assemblies, cpl.	All	SCW, Carbine, Rifle/IAR, SDMR, LMG	Operator install-able w/o tools/ special tools
1.B.- 5.B Magazines, cpl.	All	10, 20/30, Hi Capacity Magazine	
1.C.- 5.C. Accessories	All	Grenade Launcher, Sign. Suppres-sor, Bayonet, Sights, Slings, etc.	
1.D- 5.D Kits, Caliber Conversion	5.56mm, 7.62mm	Includes bolt, barrel, magazine. For support troops, trng, reverse comp.	
1.E.- 5.E Spare Parts	All		
1.F.- 5.F Tools, Gauges	All	To include Manuals	

ICC - (Intermediate Caliber Cartridge) OL - Overall Length (in.) Cpl. - Complete

Next Generation Enablers

- **24/7 Signature Suppression**
  (OSS "Flow-through" technology)

- **Lightweight (1/2 the weight of RAS/RIS)**
  Low Footprint
  Accessory Mounting
  ("KeyMod", "M-Lok", PCAP, Threaded Hard Points)

- **Improved Surface Finishes, Coatings, Surface Treatments**
  (Low Vis, Reduced Wear, Lube-Less, Camouflage)

- **Lightweight (-25-64%), High-Strength Barrels (+75%)**
  (Dynamic Flowform Corp. "SuperAlloy", Proof Research Carbon Fiber)

- **Day/Night One-Way Luminescent (OWL)Trace Ammunition**

Close the gap …..now

Scenario 3 – US ICC Overmatch

How do we get there?

	100	200	300	400	500	600	700	800	900	900	800	700	600	500	400	300	200	100	
ICC IW								800						500					AK 7.62
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ICC IW								800						500					AK 7.62
ICC IW								800						500					AK 7.62
ICC IW								800						500					AK 7.62
ICC IW								800						500					AK 7.62
ICC SAW												1200							
				1500															SVD 7.62R
ICC SAW												1200							
				1500															PKP 7.62R
									1000										SVD 7.62R
.338 EBR														1500					
.338 MMG																		1900	
				1500															PKP 7.62R
.338 HMG																		1900	
	1900																		DShK 12.7

= MER but w/ 61 lb. weapon & 33% ammo weight savings!

Threat +2

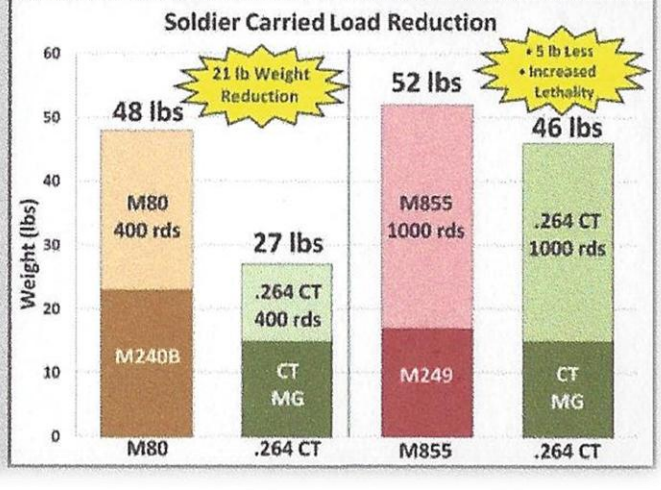
USA +9

O-T-S Lightweight ICC IW (Polymer CTA)

- .264 (6.5mm) Polymer CTA Intermediate Cal.
- 800/1200 meter MER (33% > 5.56mm)
- < Drift, Drop, > Retained Energy, Penetr.
- ME > 7.62mm M80 Ball at 600 m. & 800 m.
- Shorter than an M4 Carbine w/ stock closed

Operational and Performance Capability

- **Reduced Soldier Load** – An optimized intermediate caliber CT system will provide lethality equivalent to 7.62mm with significant weight reduction. Example-
  - 0.264" caliber CT system lethality equals 7.62mm at 1,200m
  - Provides 21 lb (43%) weight reduction vs. 7.62mm M240B/M80, same lethality
  - Is 5 lb lighter (10%) than 5.56mm M249/M855, provides significant increase in lethality
- **Improved Controllability** – long stroke, soft recoil, semi/full-auto firing modes
- **Compact Size** – 27" (folded, short barrel)
  - Reference- M4: 29.75" (collapsed)



- 43% system weight reduction over 7.62mm NATO M80/ M240B MMG

Why not a 11pound 100-round belt-fed ICC Individual Weapon?

O-T-S Lightweight ICC IW (Conventional Polymer)

Small Case Option: .450” Base, 2.60” OAL, 40gr. Case Capacity

AR-10 7.62x51mm - 9.64 lbs

AR-12 264 USA - 7.23 lbs (16” bbl)

+ 1 lb.

M4 5.56x45mm - 6.24 lbs

L: 264 USA
(Brass case)

R: 264 USA
(Polymer case - 28-31% lighter)

Large Case Option: .471” Base, 2.80” OAL, 53.5gr. Case Capacity

Brass - 24% weight savings - Polymer

.260 Rem. LaRue PredatOBR – 9.98 lbs
(18” heavy bbl, no optics or bipod)

O-T-S Lightweight ICC Support Weapon

- TRL7+ Maturity, IR&D Funded by GD-OTS, ***available now!***
- **23 lb. weapon** (versus 28 lbs. M240B, 84 lbs. M2HB)
- **2000 meter MER** (= .50 caliber M2HB, Threat DShK HMG's)
- **2X MER and 5X ME** (at 1000M) of 7.62x51mm NATO
- **.338NM Ammo Weight 1/3 that of .50BMG** (+19% in polymer)
- Can replace both MMG (dismounted) and HMG (mounted) using exiting US tripods & mounts

System weight comparison for 10 minutes of sustained fire

Min Combat System M240

M240	28 lbs
ACOG Sight	2.5 lbs
M192 Tripod	11 lbs
Spare Barrel	6.6 lbs
800 Linked Rds	53 lbs
Total	101 lbs

Load Break Down (3 person team)

Gunner (wpn, sight 100 rd	37 lbs
A. Gunner (Trpd, S.Brl 300 rd)	37 lbs
Ammo Bearer (400 rds)	27 lbs

Min Combat System MMG

MMG .338 Variant	23 lbs
ACOG Sight	2.5 lbs
M192 Tripod	11 lbs
Spare Barrel	6.2 lbs
500 Linked Rds	60 lbs
Total	102.7 lbs

Load Break Down (3 person team)

Gunner (wpn, sght 100 rds)	37.5 lbs
A. Gunner (Trpd, Sp Brl, 100 rds)	29.2 lbs
Ammo Bearer (300 rds)	36 lbs

Min Combat System M2HB

M2HB	84 lbs
ACOG Sight	2.5 lbs
M3 Tripod	44 lbs
Spare Barrel	25 lbs
400 Linked Rds	132 lbs
Total	287.5 lbs

Load Break Down (9 personnel)

3 personnel (Weapon)	84 lbs
1 person (Tripod)	44 lbs
1 person: (sp barrel and ACOG)	27.5 lbs
4 personnel (100 rounds each)	132 lbs

.50BMG .338NM 7.62 5.56

Briefing Summary

- **The threat overmatches US and NATO warfighters, who are armed with 5.56mm weapons, with current threat weapons and emerging developments.**

- **7.62mm NATO weapons and ammo (M80A1) provide a counter to the threat overmatch but add unwanted weight, cost and recoil to the warfighter.**

- **The proven abilities of an intermediate caliber cartridge combined in a systems approach will provide affordable, low-risk US and NATO warfighter overmatch in the shortest possible period of time for the least cost.**

- **Various off-the-shelf technologies and materials are available *NOW* to counter the threat. We should not wait until 2020-2025.**

- **We need not concern ourselves with providing this capability to all 900K armed personnel, just those 140K front line combatants (Cost: ~ $883M). That transition can happen downstream as ammo and weapon stocks are depleted and new funds become available, or new technology comes on line. That would save the US $2.4B and provide a much needed critical capability *NOW*.**

Three (3) fewer F22 Raptor fighters would provide that overmatch NOW!

Thank you for your attention!

Jim Schatz schtred@aol.com

Back-up Slides

The MER Capability Gap being exploited by our enemies (Insurgents, Russia, China, others)

Infantry engagements are taking place at longer than expected distances.

Capability Gap

21% KIA's - 7.62mmR

RANGE IN METERS	100	200	300	400	500	600	700	800	900	1K
ASSUMED	75%		90 %	100%						
AFGHAN-ISTAN	25%	50%	75%			100%				

US 5.56mm M4, M16 MER with M855A1 EPR

CURRENT Threat 7.62x54mmR SVD, PKM/PKP

EMERGING Threat PLA 5.8mm, RUS "Unified"

Saudi Arabian (LWRCI/ATK) "SIX8"

Sources: Hall Report (1950), Hitchman Report (1950), British Army (2006-2010), US School For Advanced Military Studies Report (2009), US Army Small Arms Strategy 2014.

9 Known Truths

General Thoughts on Modern Warfare and Small Arms Technology

1 **The asymmetric threat, unencumbered by "western" doctrine and politics, exploits our capability gaps faster than we can react within our cumbersome infrastructure.**

2 **Kinetic Energy (KE) kill mechanisms (launched bullets, fragments) have been and remain state-of-the-art weapons technology since the 15th century. That will not change anytime soon so we should embrace and improve on it.**

3 **Man-portable "directed energy" technology is decades away. One cannot "schedule a break through", regardless of what the sci fi writers and S&T community developers espouse.**

4 **For the ground combatant, pH and pI/K has not been markedly improved by so-called "Leap Ahead" or "Revolutionary" technology and "Star Wars" S&T projects, yet $B's have been spent on unrealistic and undelivered promises.**

9 Known Truths (cont.)

General Thoughts on Modern Warfare and Small Arms Technology

5 Desired Target Effects (direct hits or effective target suppression) depends on aiming and launch "hold proficiency" (marksmanship) be it used for semi, burst or full auto KE fire, air-bursting engagements via accurate lasing, XM25 or "TrackingPoint"-style FS/FCS, or even directed energy "pulses" .

6 Repeatable First Shot hits/kills will never be readily accomplished due to the many "hold" and error factors beyond the control of the operator. Immediate through-optic BDA and rapid adjusted follow-on shots offer the greatest chance of improved target effects, BUT the equipment must provide that core capability to the trained operator.

9 Known Truths (cont.)

General Thoughts on Modern Warfare and Small Arms Technology

7 Snipers as "force multipliers" exploit magnified optics, superior weapons, sights and ammunition to increase pH & PI/K at all ranges, especially those beyond assault rifle range. Rifleman can/should leverage that capability by employing affordable "paradigm shifting" precision enablers.

8 Training is paramount to effectiveness BUT advanced hardware enables advanced training and employment.

9 Incremental, available and emerging (and affordable) advancements in small arms, sighting and ammunition technologies offer the greatest return on investment and are waiting to be exploited.

Misses Count – UK "Suppression Study"

- "*Infantry Direct Fire Suppression*" – Cranfield University
  Published 31 August 2009 – Author MAJ M Baker - RIFLES

- Looked at past suppression data, studies. Interviewed UK OIF/OEF Combat Infantry Veterans.

- Determined the Chief Factors of Small Arms Suppression are:
  - -Accuracy (proximity of the rounds to the target)
  - -Kinetic Energy (mass, velocity) of the Projectile
  - -Volume of Fire (number of rounds passing the target)

- The larger and faster the projectile the greater suppressive effect it has when passing the target at a given distance

- UK Operational Feedback: "*5.56mm Taliban ignore, 7.62mm worries them, 0.5 scare them*"

- Path Forward? Intermediate Caliber Cartridge, Precision Weapons, Magnified Optics, True Rifleman Training = > Suppression, pH, pI/K

Emerging Polymer Case Payoff in Weight Savings

Near equal weights (# rounds per caliber/cartridge type)

Metallic Cases

STD COMBAT LOAD	210 rds 62gr M855 =	5.58 LBS
EQUAL WGT to 5.56 load	133 rds 108gr 264 USA =	5.55 LBS
EQUAL WGT to 5.56 load	127 rds 123gr 264 USA =	5.55 LBS
EQUAL WGT to 5.56 load	123 rds 135gr 277 USA =	5.55 LBS
EQUAL WGT to 5.56 load	97 rds 175gr M118LR =	5.55 LBS
EQUAL WGT to 5.56 load	104 rds 147gr M80 =	5.54 LBS
EQUAL WGT to 5.56 load	108 rds 135gr M80A1 =	5.51 LBS

Polymer Cases

Approx polymer wgts		
	174 rds 108gr 264 USA =	5.56 LBS
	163 rds 123gr 264 USA =	5.56 LBS
	155 rds 135gr 277 USA =	5.55 LBS

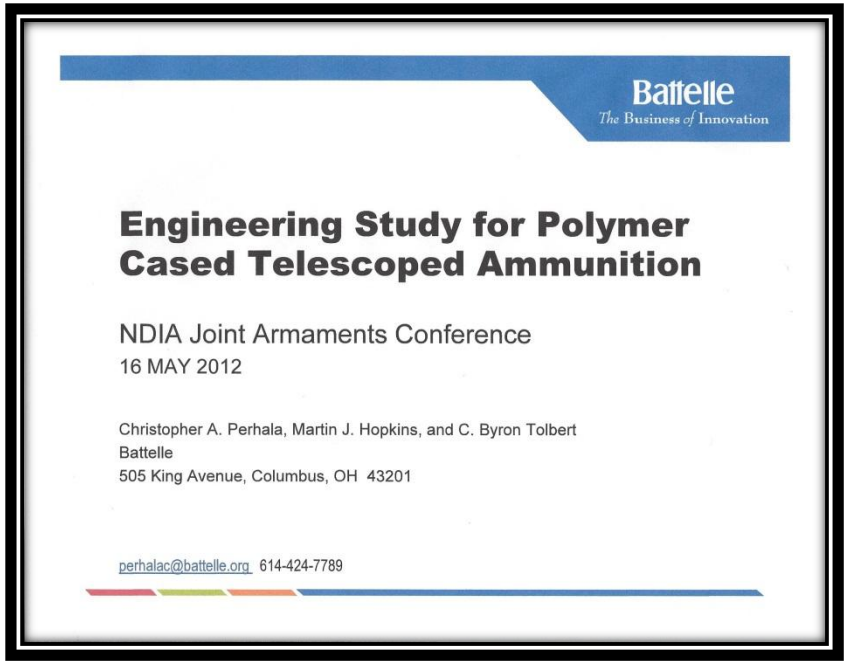
Basic Combat Load

62 grain 5.56mm M855 (brass case) = 210 rds
108 grain 264 USA (polymer case) = 174 rds (-36, 17%)
123 grain 264 USA (polymer case) = 163 rds (-47, 22%)
135 grain 277 USA (polymer case) = 155 rds (-55, 26%)
147 grain 7.62mm M80 (brass case) = 104 rds (-106, 50%)

The Cost to Change Calibers

- **2012 Battelle study conducted for JSSAP on the ROM cost to convert production at Lake City Army Ammunition Plant (LCAAP) from brass to polymer-cased telescoped 5.56mm M855 and M856 Tracer ammunition.**

- **One-time LCAAP Retooling Costs were estimated to be:**
  - **@ $98M for up to 200M rounds per year**
  - **@ $160M for up to 400M rounds per year**
  - **@ $400M for up to 1B rounds per year**


Battelle
The Business of Innovation

Engineering Study for Polymer Cased Telescoped Ammunition

NDIA Joint Armaments Conference
16 MAY 2012

Christopher A. Perhala, Martin J. Hopkins, and C. Byron Tolbert
Battelle
505 King Avenue, Columbus, OH 43201

perhalac@battelle.org 614-424-7789

- **The study's author was asked what the cost difference would be if tooling was purchased for an intermediate caliber cartridge was produced instead of 5.56mm. His response was "*same cost*".**

So for the same cost the US could not only reduce the load on the war fighter by 20 - 40% using polymer-cased ammunition but could also vastly improve the pH, pI, and pS of the entire small unit by switching to a squad-common ICC.

ROM Cost to Change from 5.56mm & 7.62mm to a Squad-Common Lightweight Intermediate Caliber Cartridge (SCLICC) for Front Line Troops

$883M

One Time Costs Estimate: $230 MIL

- SAAC Study = $10M (Department of the Army G-8 estimate)
- New Polymer Ammunition Production Machinery (LCAAP) = $160M (2012 Battelle study)
- Competition/Contract Award – Intermediate Caliber Rifle (ICR) & LMG = $30M
- Logistical Materials – ICR & LMG (gauges, rifle racks, mag pouches, etc.) = $30M

Initial Operational Capability (IOC) Estimate: $653 MIL (1)

-- {140K Front Line Ground Combatants} (2)

- Intermediate Caliber Rifles (w/ BILI) @ $1400 each x 140,000 = $196M (3)
- Intermediate Caliber LMG's (w/ BILI) @ $4500 each x 14,000 = $63M (3)
- Intermediate Caliber Optical Sights @ $1000 each x 154,000 = $154M (3)
- Rounds, LICC @ .60 each x 400M (1 year usage) = $240M
- Miscellaneous Ancillary Equipment (LICC unique spare parts, accessories) (3)

Logistical Support (3) (dollars already being spent on 5.56mm & 7.62mm systems)

-Manuals, Training, POI's, TTP's

-Spare Parts

-Ranges (LICC SRTA [ballistic match] to use current training ranges)

(1) Total Cost includes One-time Costs.
(2) 140K – Estimated number of current front line combatants (Infantry, Marines, Special Operations Forces)
(3) This funding is already being spent on 5.56mm M4A1 Carbines and M249 SAW's/M240L's and ancillary equipment
It could be preprogrammed to the new caliber with little to no increase is overall cost

"Tailorable" Weapon Systems
(CONT. - SCW through LMG)

- "Common Receiver" – Unit/User configurable.
  Adjust "on the fly" to changing missions, needs, threats, AO
  without the 3+ year requirements/approval/contract "delay"

Stoner 63

Fielded with US Navy, USMC 1960's. 1970 Army SF trials (XM207).

US Army OICW Increment 1 "Family of Weapons"

March 2005 RFP (ARDEC)
"Multi-Configurable" SCW through LMG
80/50% Parts Commonality. Save $1.2B!
8 vendors said they could comply w/ specs
Cancelled after 7 months

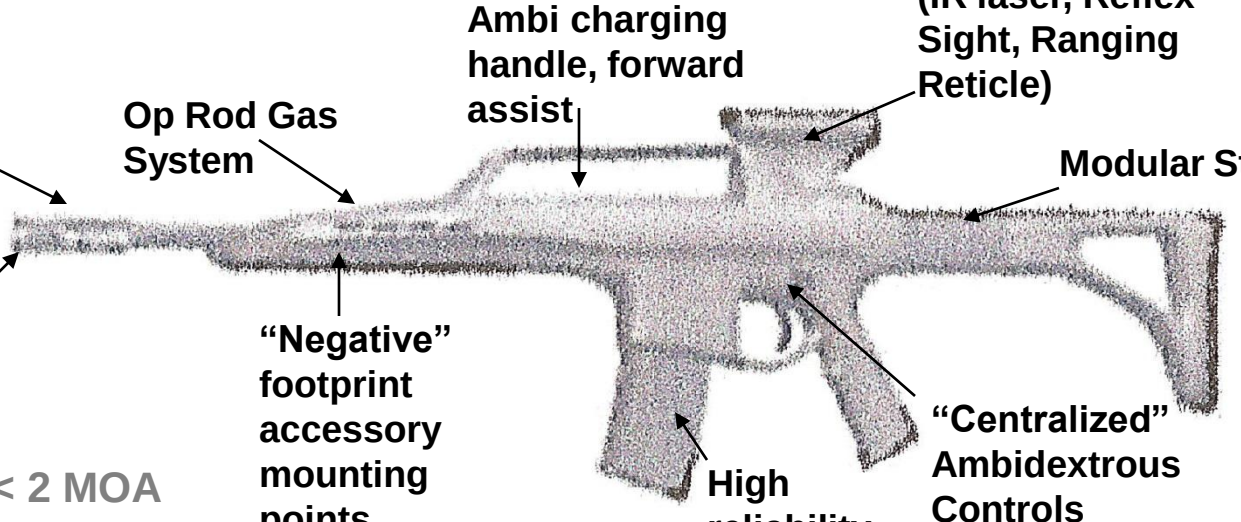
Current - COTS

Incremental Advantages Waiting to be Exploited

➢ **Safety**
- Cook-off =/> 270 rds.
- Barrel failure =/> 900 rds.
- OTB Capable (0 second drain time)
- Sustained Fire Rate > 300 RPM

➢ **Reliability** =/> 18,000 MRPF/S

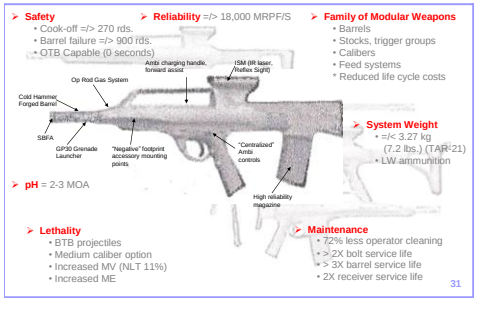
➢ **Mission/AO Tailorable**
- Quick-Change barrels, stocks, trigger groups
- Caliber Convertible
- Convertible Feed System
- Reduced life cycle costs



➢ **pH** = < 2 MOA

➢ **System weight**
- =/< 2.8 kg (6.1 lbs.)
- LW ammunition

Same Advantages for a Bullpup Configuration



➢ **Terminal Effects ("Lethality")**
- BTB projectiles
- "Intermediate Caliber" options
- Increased Terminal Effectiveness =/> 7.62mm NATO against unprotected and protected point targets out to 800 meters

➢ **Maintenance**
- 72% < operator cleaning
- > 2X bolt service life
- > 3X barrel service life
- 2X receiver service life