U.S. Army Research, Development and Engineering Command

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

Small Arms Material and Process Technology (SAM&PT) Research Program

16 May 2012

Mr. Douglas Witkowski
US Army, RDECOM-ARDEC
(973) 724-6389
douglas.witkowski@us.army.mil

DISTRIBUTION A: Approved for public release; distribution unlimited

Project Title:
Small Arms Material and Process Technology [SAM&PT]

Core Team Membership:	**Dr. Barton Halpern**	**JSSAP Office**
	Douglas Witkowski	**APO**
	R. Ned DeWitt	**System Engineering**
	Stacey Kerwien	**Materials Engineering**
	Lydia Swanson	**Reliability Engineering**

Problem: Capability Gaps have been identified in materiel capability; 1) to avoid detection (localization) caused by weapon signature and 2) to operate reliably with minimum maintenance.

Approach: An integrated product team [IPT] was created to assess and develop state-of-the-art material and process component technology to enhance the operability and maintainability of small arms weapons and reduce weapon detection (audible and visible) for current and future warfighters

Engineering / Technology Assessments:

- **Enhanced Suppressor**
- **Lubricious Surface Treatment**
- **Low Observable Tracer [LOT]**
- **Superhydrophobic Surface Treatment**

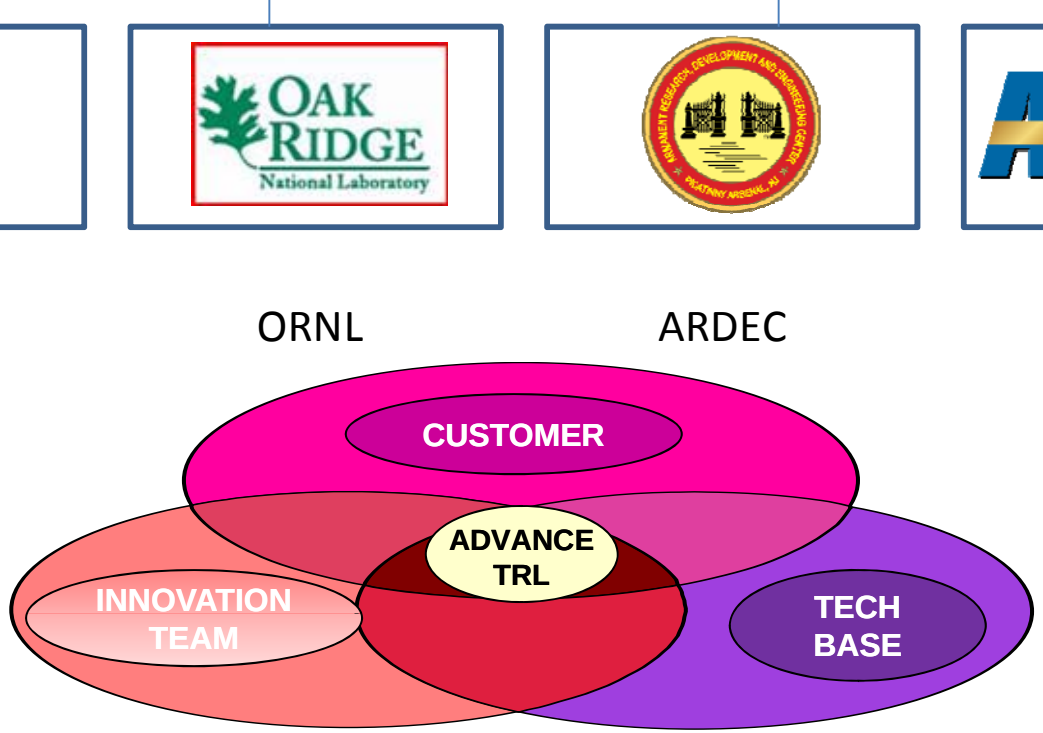
Project Supports: Small Arms Capability Based Assessment [CBA] -- Capability Gap Task Numbers 9 and 10

DISTRIBUTION A: Approved for public release; distribution unlimited

LEVERAGED TEAM PARTNERSHIPS

PM MAS | JSSAP | PM SW

INDUSTRY | ORNL | ARDEC | ARL / ACE



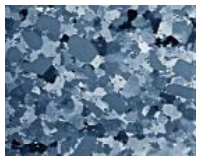
TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

DISTRIBUTION A: Approved for public release; distribution unlimited

Small Arms Material and Process Technology
SAM&PT - Applied Research Project

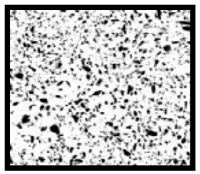
PURPOSE

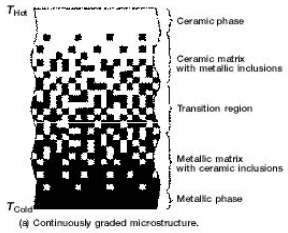
- Assess the State-of-the-Art
  - Materials
  - Supporting Processes
- Enhance Small Arms Maintainability & Operability
- Reduce Weapon Detection (visible/audible)



Schedule

	FY(12)	FY(13)	FY(14)	FY(15)
Technical Execution				
Contract Awards (6)				
Concept & Application Studies Formulated	2			
Design of Experiment				
Component Analysis/M&S Simulation Validation		3		
Component Proof-of-Concept Critical Function			3	
Component/Breadboard Validation in Lab Environment				4





(a) Continuously graded microstructure.

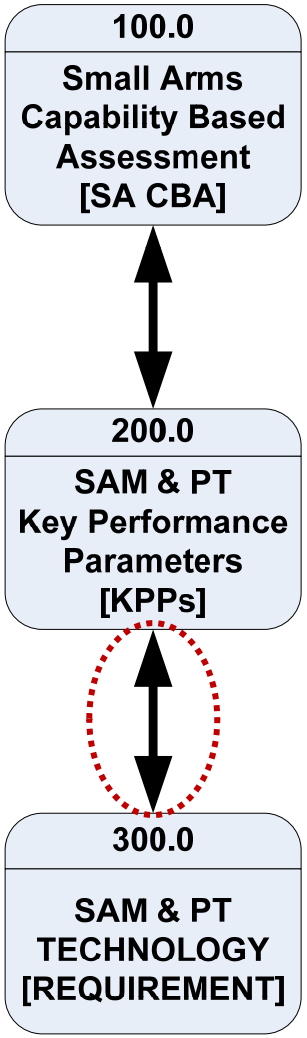
PAYOFF

- Increased System Life and Reliability
- Decreased Weapon Signature
- Maximized Operational Utility and Survivability
- Reduced Logistics and Lifecycle Costs

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

REQUIREMENTS DERIVATION

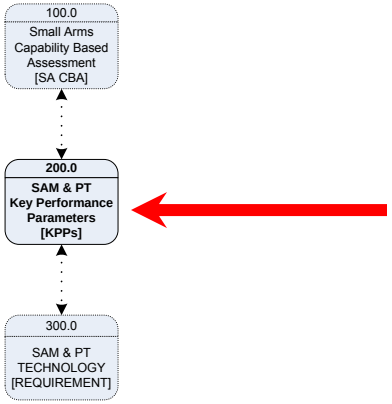
ENSURE TRACEABILITY



- **COORDINATION**
  - Capability Based Assessment [CBA]
  - Customer Requirements
  - Transition Partners
- **PROJECT OBJECTIVES**
- **DERIVED REQUIREMENTS**
  - Performed Technical Kick-offs
  - Baselined Derived Requirements
  - Investigated Metric Validation
  - Planned Requirements Review

DISTRIBUTION A: Approved for public release; distribution unlimited

Small Arms Materials & Process Technology
PROJECT METRICS



Key Performance Parameters [KPPs]

- INCREASE RELIABILITY
- AVOID DETECTION
- REDUCE MAINTENANCE

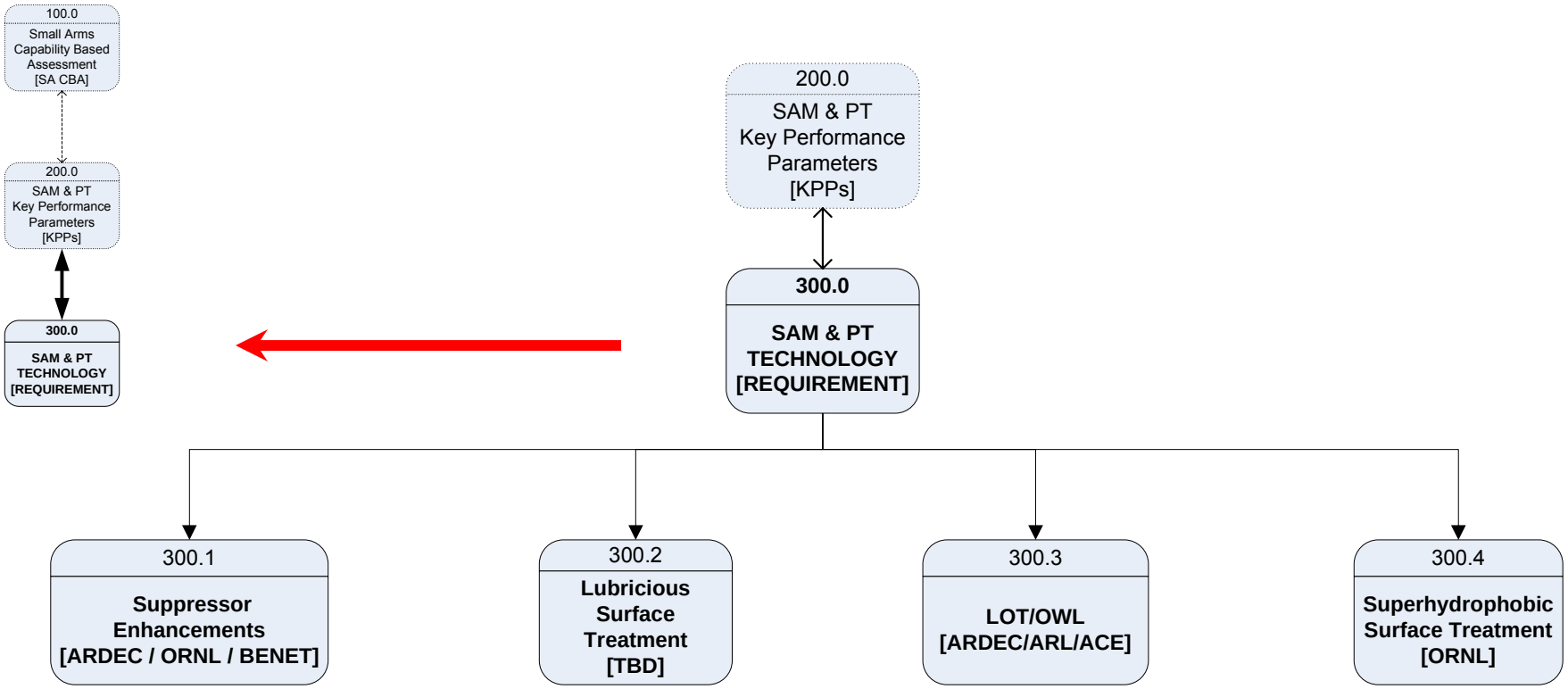
	Capability	Baseline Capability	Effort Objective	Joint Project Goal
	Key Performance Parameter (KPP)			
200.1.	RELIABILITY	WEAPON PLATFORM DEPENDENT	INCREASE RELIABILITY of WEAPON SYSTEM to IMPROVE OPERATIONAL AVAILABILITY	T : INCREASE $MRBF_{CL\ III}$ by 20%
				O: INCREASE $MRBF_{CL\ III}$ by ≥ 20%
200.2.	AVOID DETECTION	WEAPON PLATFORM DEPENDENT	DECREASE VISIBLE & AUDIBLE SIGNATURE of WEAPON PLATFORM to INCREASE SOLDIER SURVIVABILITY and LETHALITY	T: DECREASE SIGNATURE by 25%
				O: DECREASE SIGNATURE by 50%
200.3.	MAINTENANCE	WEAPON PLATFORM DEPENDENT	DECREASE MAINTENANCE DURATION and SCHEDULING to IMPROVE OPERATIONAL AVAILABILITY	T: REDUCE CLEANING TIME by 50%
				O: REDUCE CLEANING TIME by 70%

Malcolm Baldrige National Quality Award 2007 Award Recipient

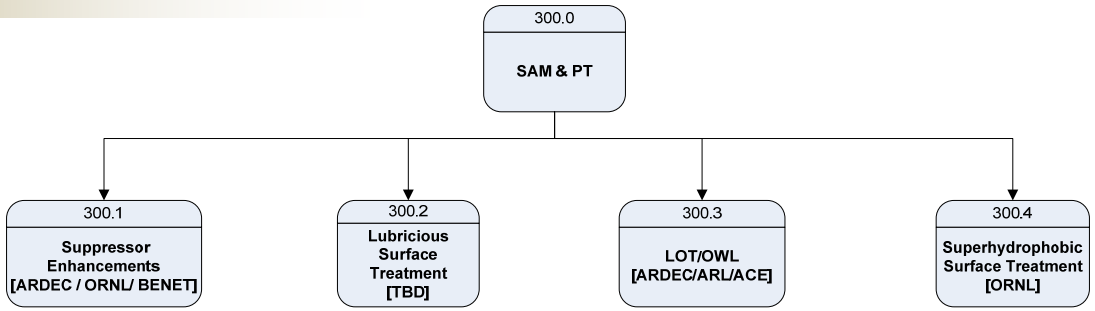
DISTRIBUTION A: Approved for public release; distribution unlimited

Small Arms Materials & Process Technology
TECHNOLOGY PORTFOLIO

	Key Performance Parameter [KPP]	SAM&PT Technology Traceability
200.1	INCREASE RELIABILITY	300.1 and 300.2
200.2	AVOID DETECTION	300.1 and 300.3
200.3	REDUCE MAINTENANCE	300.4



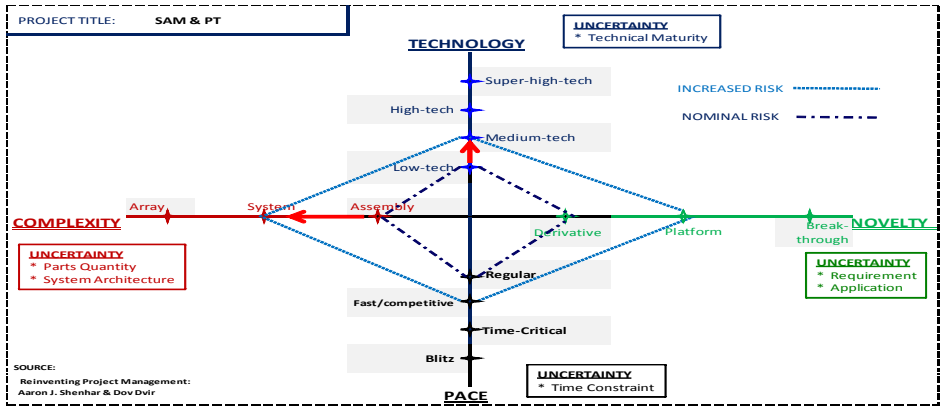
SAM & PT -- APPLIED RESEARCH
Project Risk Management Approach



CRITICAL

PRODUCT & PROCESS

REVIEWED IN TANDEM



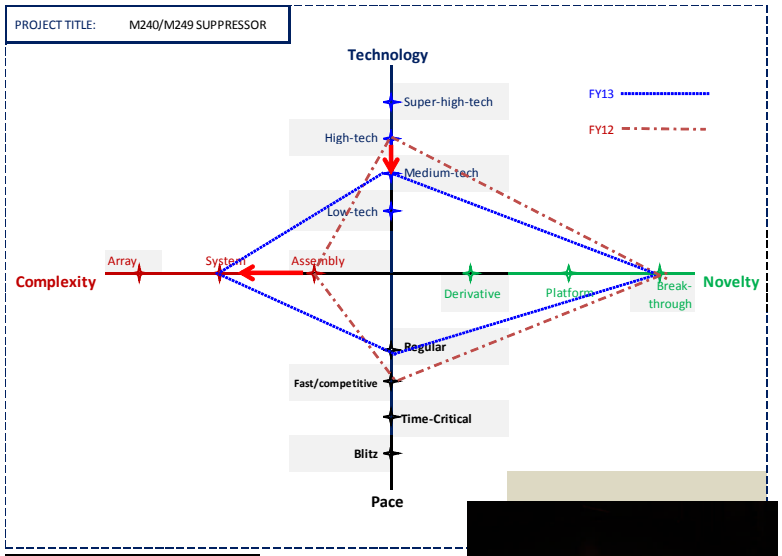
NOMENCLATURE

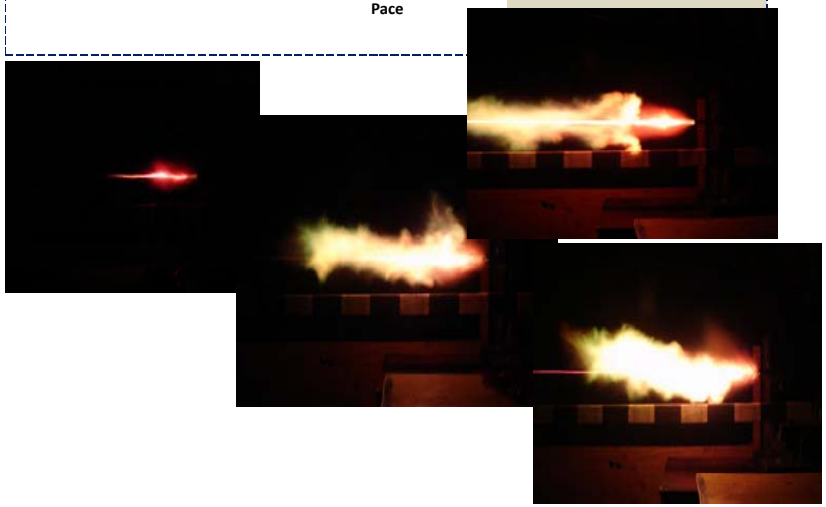
The Bigger the Diamond

The Bigger the Risk

"Diamond Approach"
SOURCE:
TITLE: Reinventing Project Management
AUTHOR: Shenhar, Aaron J. and Dvir, Dov

300.1 - ENHANCED SUPPRESSOR





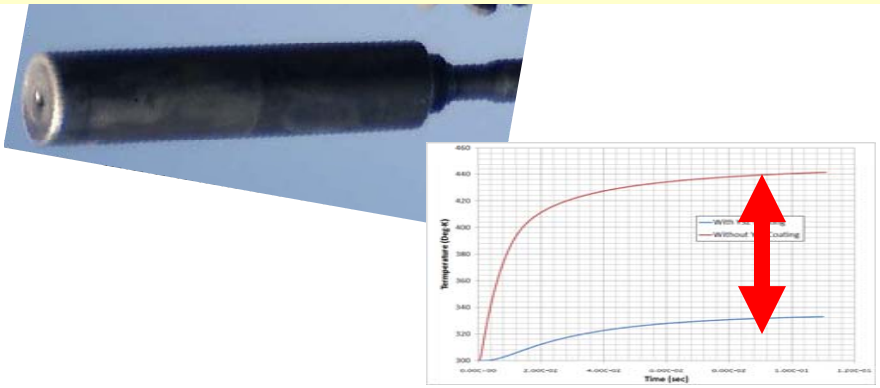
MATERIEL: CREW SERVED WEAPONS

KPP: AVOID DETECTION

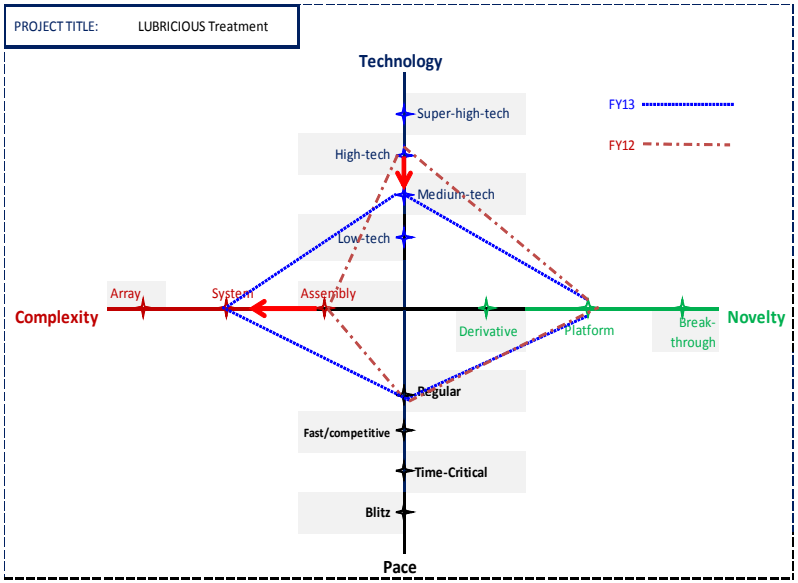
MITIGATE: WEAPON SIGNATURE

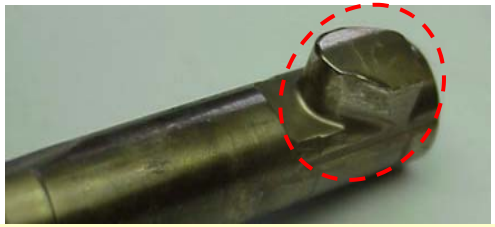
Project Attributes

- Sound Suppression
- Flash Suppression
- Heat Dissipation
- Suppressor M & S
- Benefit
  - Increase Suppressor Component Life / Function



300.2 – LUBRICIOUS SURFACE TREATMENT





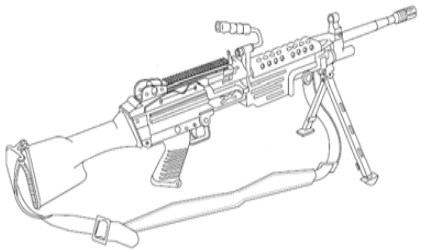
MATERIEL: INDIVIDUAL/CREW SERVED WPN

KPP: INCREASE RELIABILITY

MITIGATE: MATERIAL DEGRADATION

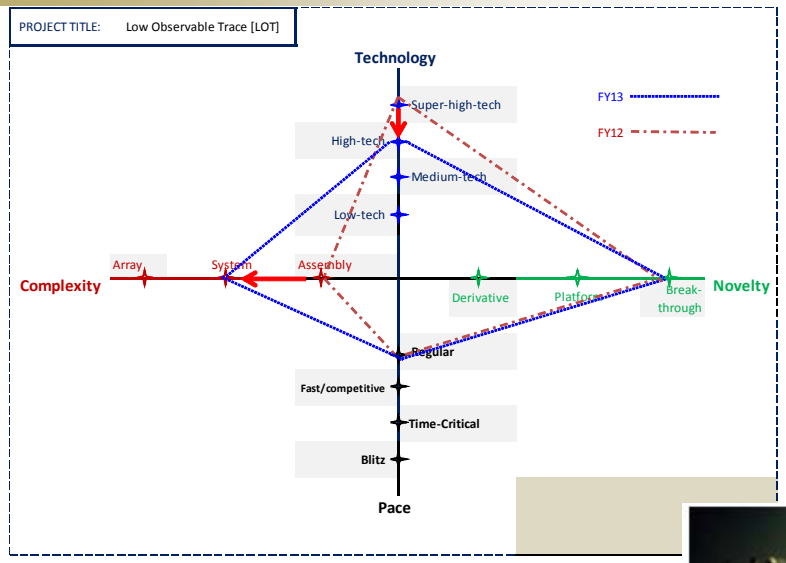
Project Attributes

- Critical Weapon Components
- Increase MRBF
- Benefit
  - -Eliminate Lubrication Requirement
  - - Minimize Impact(s) on Component Life / Function



TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

300.3 - Low Observable Trace [LOT] / OWL



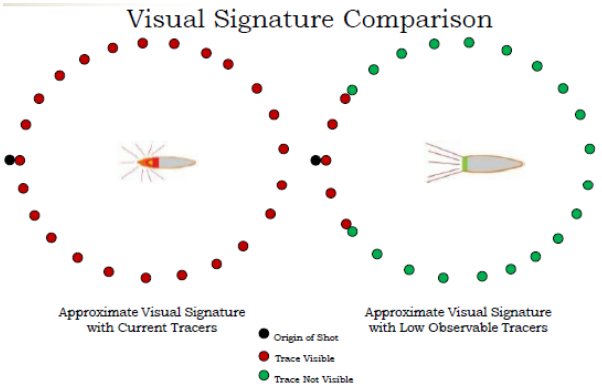
MATERIEL: AMMUNITION

KPP: AVOID DETECTION

MITIGATE: AMMO SIGNATURE

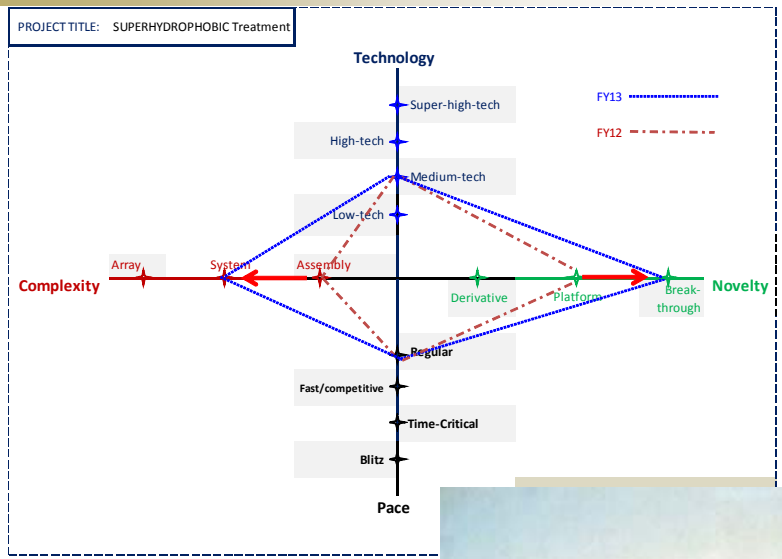
Project Attributes

- Caliber ≤ 7.62 mm
- Decrease Visible Signature
- Day / Night Capability
- Benefit
  - -Non-Pyrotechnic
  - -Every Round Trace
  - -NO Impact on Point-of-Aim



TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

300.4 – SUPERHYDROPHOBIC SURFACE TREATMENT



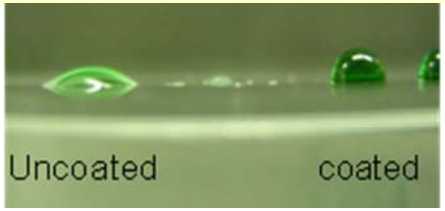
MATERIEL: AMMUNITION / LINKS

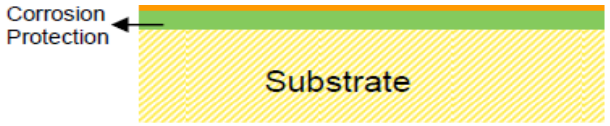
KPP : REDUCED MAINTENANCE

MITIGATE: CORROSION

Project Attributes

- Caliber ≥ 7.62 mm
- Reduce Cleaning Time
- Severe Marine Environment
- Navy / Coast Guard DODACs
- Benefit
  - -Increase Ammunition Availability
  - -Improve System Function



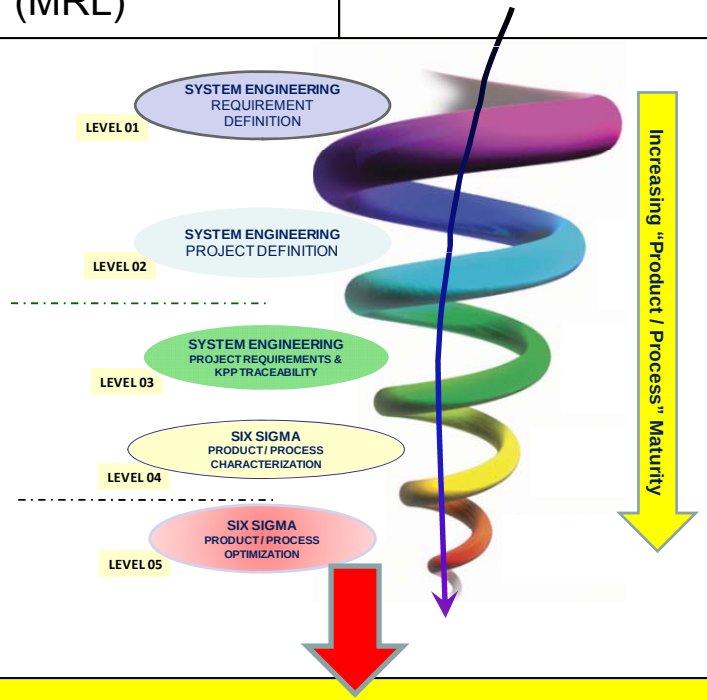


TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

TARGETED PROGRAM BENEFITS

- Avoid Detection
- Improve System Performance
- Reduce Warfighter's Burden
- Accelerate Materiel Development
  - Advance Technology (TRL)
  - Advance Production (MRL)

- Expanded Technology Pipeline
- Integrated Investigation
  - Materials
  - Quality
  - Systems Engineering



System Life-Cycle Cost Reduction

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.