U.S. ARMY ARMAMENT RESEARCH, DEVELOPMENT, & ENGINEERING CENTER (ARDEC)

Malcolm Baldrige National Quality Award 2007 Award Recipient

ARMAMENT RESEARCH, DEVELOPMENT AND ENGINEERING CENTER
PICATINNY ARSENAL, NJ

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

Dr. Barton Halpern

Joint Service Small Arms Program Futures (2012-2020)
Alternatives Strategy
19 May 2010

Bottom Line up Front

Our #1 initiative is the successful transition of technology for small arms related technology to PM Programs of Record

- Achieve this through a balanced portfolio strategy
- Focused on Capability Gaps as identified in the Joint Small Arms Capability Assessment and Army Small Arms Capability Based Analysis
- Focused on identified requirements from through the Joint Service Small Arms Master Plan
- Focused on leveraging :
  - Technology
  - Academia
  - Industry
  - Weapon concepts feasible for further research and development

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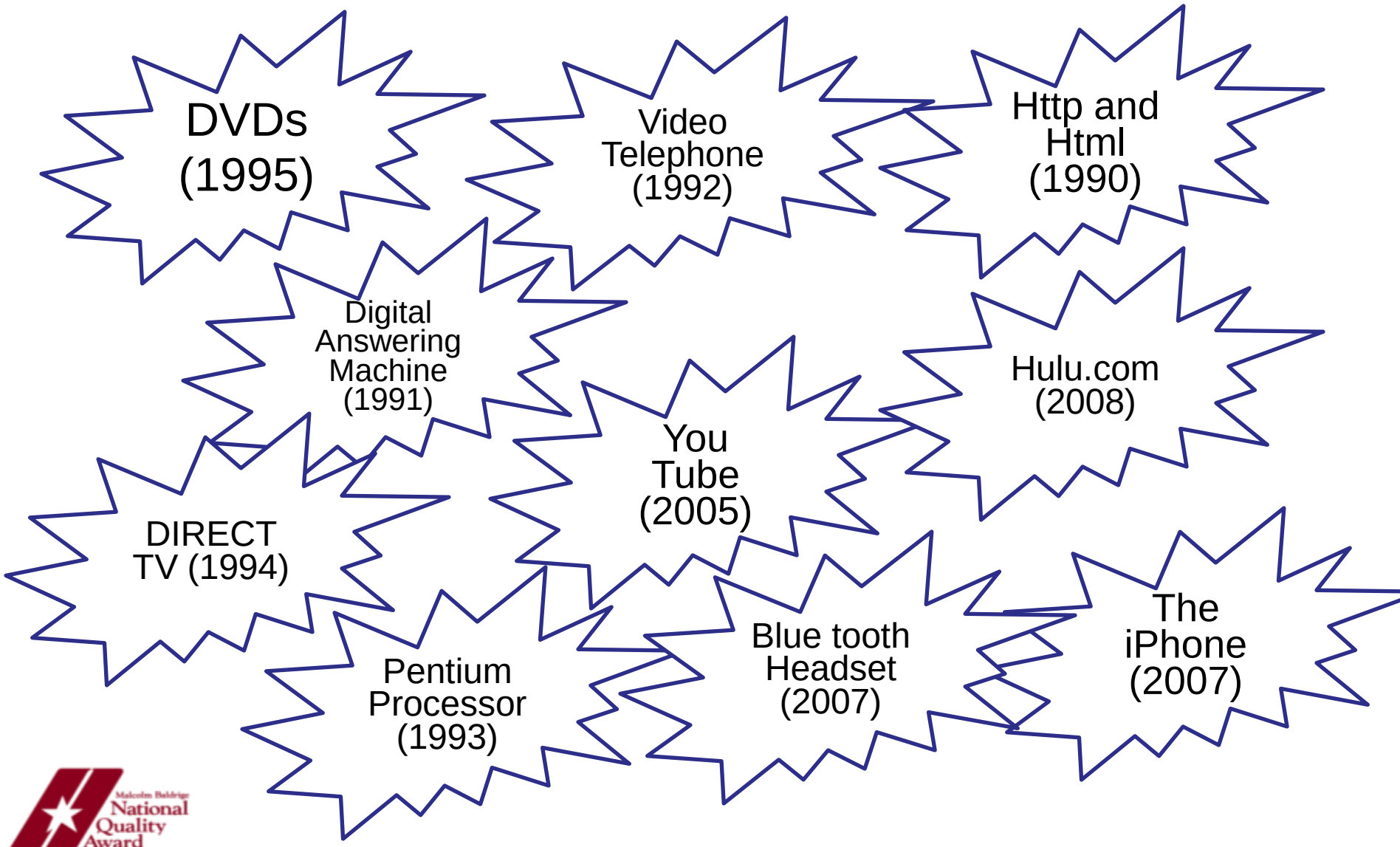
Why Do We Innovate?

Great Inventions & Technical Achievements over the last 20 years



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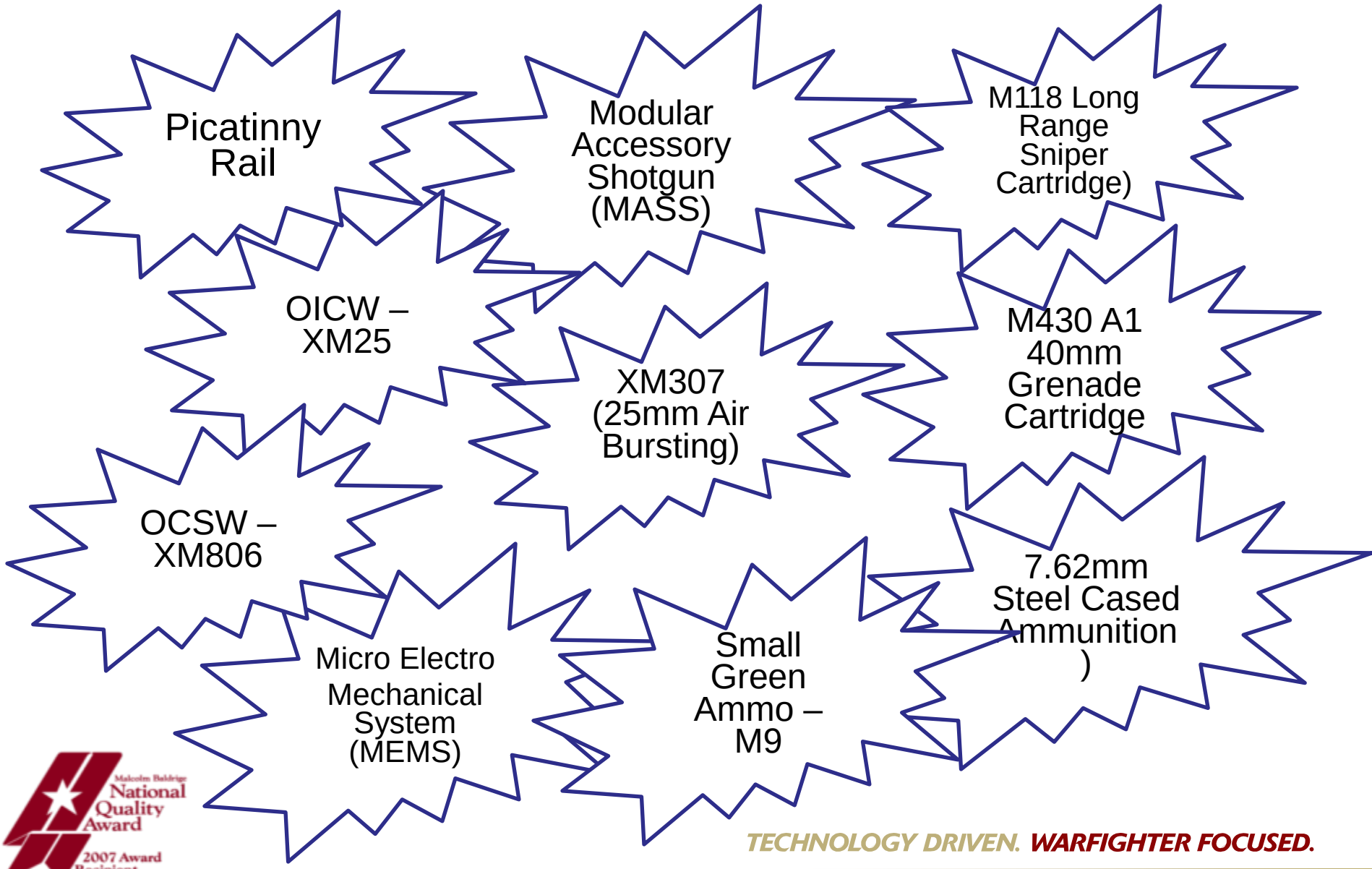
Great Inventions & Technical Achievements over the last 20 years for Small Arms from JSSAP



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Joint Service Small Arms 2009 Futures Conference

Third Futures Conference held by JSSAP (1986, 2008, 2009)

Twenty scientists met at BATELLE from November 17 -19, 2009 to:

"provide a forum conductive to 'free thinking' in order to capture the thoughts and ideas of imaginative and creative people not necessarily prejudiced with current or past weapons development"

Objective of the conference was to identify alternative candidate futuristic weapons systems that would offer high-performance payoff related to:

1) Energy Usage

2) Target Effectiveness

3) Target Engagement.

….as related to small arms…

Focus Area: Energy

Energy: This concerns supplying power for the warfighter's individual weapon system that reduces the weight and resupply issues. Discussions were encouraged on better energy management methods including generation and conservation.

*** A successful implementation of an off-weapon power supply would:

Reduce cost	Increase efficiency
Eliminate of variance	Save soldier's lives
Increase OPTEMPO	Reduce risk on multiple levels
Reduce soldier load	Reduce environmental impacts

Barriers to solving this problem are?

- Power and energy density
- Transduction efficiency for transmission and harvesting
- Ability to mask transmission signature to enemy forces

Focus Area: Target Engagement

Target Engagement: Improving the warfighter's ability to engage the target. This includes better sighting, the ability for mass fires, and engaging Beyond Line of Sight (BLOS) and Non Line of Sight (NLOS) targets.

*** Successful target engagement solutions might include technology improvements in:

Wireless Sighting	Massed Fires
Fire and forget	Automatic target identification
Weapon networking	Highest possible accuracy

Barriers to solving this problem are?

- Lack of sensors for a small guidance system and seeker.
- Will need sensor fusion (combining the information from multiple sensors) to accurately locate the target's vulnerability
- Networking information to and from other sensors/soldiers in real-time.

Focus Area: Target Effectiveness

Target Effectiveness: Improving the effectiveness of any ordinance delivered on the target.

*** Successful target effectiveness solutions might include technology improvements in:

Scalable effects	Infinite ammunition
EMP pulses	Able to hit a target regardless of the weapon aim
Weapon networking	Diagnostic and prognostic indicators on the weapon

Barriers to solving this problem are?

- Weight
- Recoil
- Size / warhead
- Delivery system?
- Initiation is critical
- Difficult to define the target (e.g., type of door, density, wall)

Potential Identified Solutions

Focus Area	Possible Solution	Time Period
Energy Concepts	Offset power use by power harvesting/transmit / collect 2-4 watts from the soldier to the weapon to benchmark the technology to quantify the benefits, needs, requirements, impacts and trade-offs in order to reduce the weapon carry weight (load) carried by the soldier.	2012-2014: Demonstration / Benchmark Power Transmission and Consolidation 2015-2017 : Further refinement depends on the demonstration / baseline effort
Target Effectiveness	Door Breaching… Concept: Remotely (15-75 M away from the target) breech man-sized holes in walls (i.e., reinforced concrete) and doors from a small arms platform.	2012-2014: Each can occur during this timeframe or earlier
Target Effectiveness/ Engagement	Defeat the soldier of the future who is similarly armed, equipped and supported through Sensor fusion .	2012-2014: The basic components are available. What is lacking is the integration and over time the miniaturization that enables more sensors and more capable sensors.

Potential Identified Solutions

Focus Area	Possible Solution	Time Period
Target Engagement	SPIDER integrated sensor system for situational awareness sent to a scope with markers for friend, foe or unknown in the view as the weapon is panned (day/night, all weather) with targets in defilade or BLOS.	2012-2014: The basic components are available. What is lacking is the integration and over time the miniaturization that enables more sensors and more capable sensors.
Target Engagement	Ability to locate and identify hidden targets using a distributed sensor network delivered by a 40mm grenade and fed to a scope on the infantry weapon.	2012-2014: Each can occur during this timeframe or earlier

Potential Identified Solutions

Focus Area	Possible Solution	Time Period
Target Engagement	Take sensor information and display it on an individual soldier's rifle using a thermal or CCD image technology. The sensor information (e.g., range, azimuth to target) is being shared may also come from other sources such that there is greater situational awareness of where potential enemy threats are located.	2012-2014: Capability to collect and integrate information into the display , Digital "overlay" into the soldier's sight picture, Potential targets (friend and foe) 2015-2017 : Add tag and mark, CCD or thermal, Prioritization / engagement of targets – given current tactics / observers / military, etc. 2018-2020 : Add Virtual weapon & heads up display, Behavioral characteristic identification / target threat assessment

Next Steps

We want you as Industry members to push the envelope of technology as related to:

Become active in The National Small Arms Center (NSAC)

- FY11 Request for Project Proposal (Summer)
  - "DARPA-Style" Excellence Challenge
  - Next Generation Small Arms Systems – Looking for industry to develop concepts for the future "Small Arms Systems" for 2016 and beyond