



Naval EM Railgun Innovative Naval Prototype

3 August 2006



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Report Documentation Page

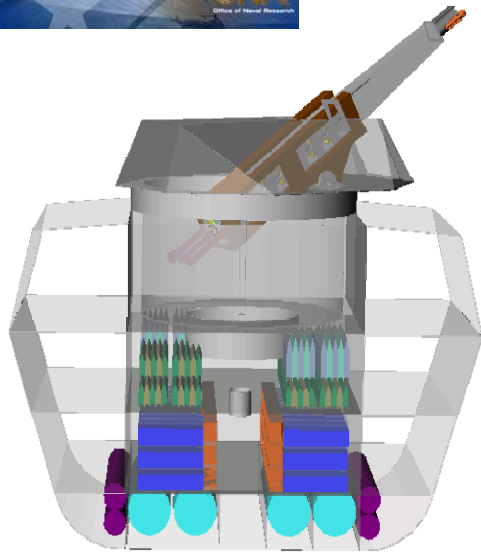
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Navy Electromagnetic Railgun



Why is it important?

- Volume & Precision Fires
- Time Critical Strike
- All weather availability
- Variety of payload packages
- Scalable effects
- Deep Magazines
- Non explosive round/No gun propellant
 - Greatly simplified logistics
 - No IM (Insensitive Munitions) Issues
- Missile ranges at bullet prices

What is it?

- Gun fired with electricity rather than gunpowder
- Revolutionary 250 mile range in 6 minutes
- Mach 7 launch / Mach 5 hit
- Highly accurate, lethal GPS guided projectile
- Minimum collateral damage

Who needs it?

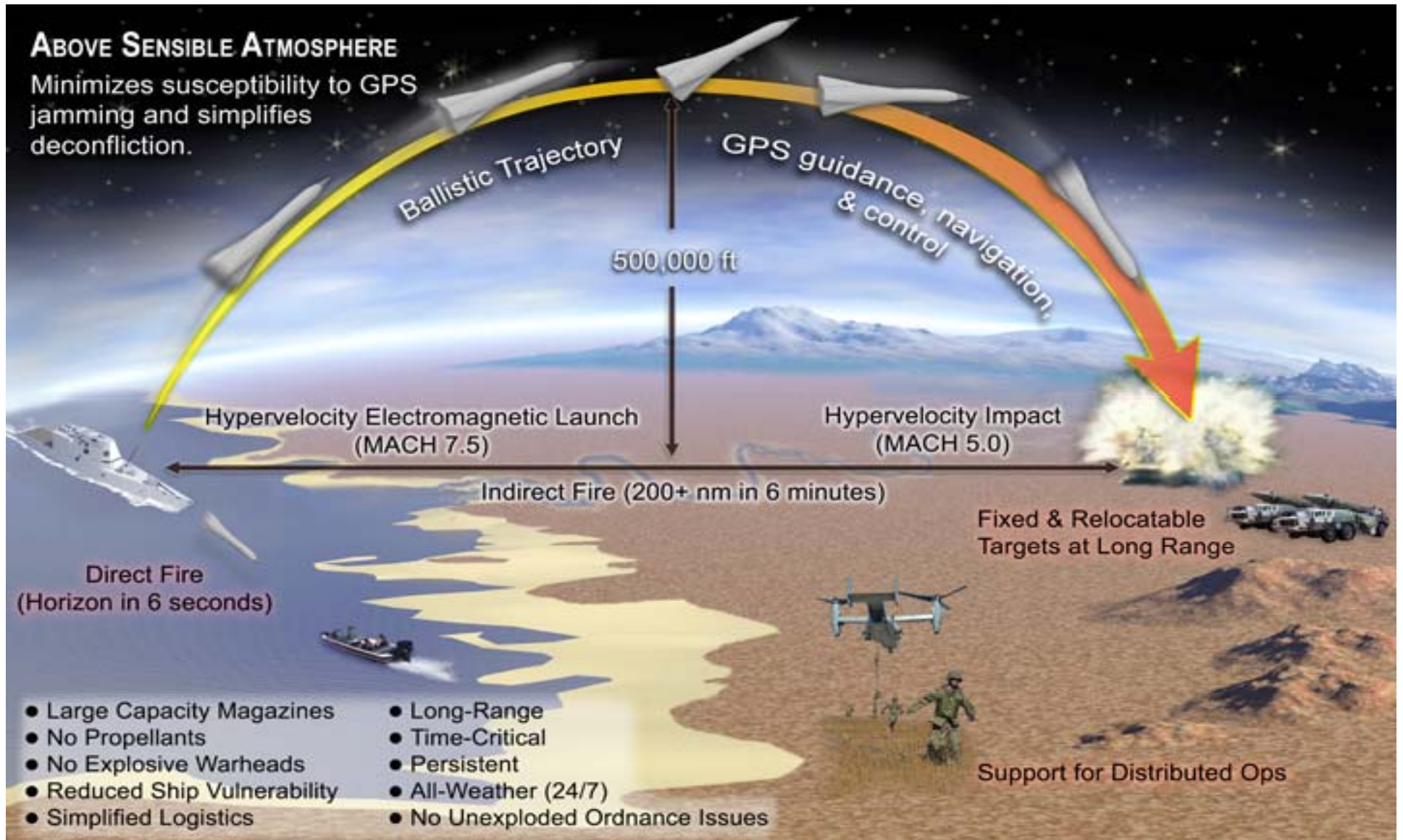
- Marines and Army troops on ground
- Special forces clandestine ops
- GWOT
- Suppress air defenses

When?

- Initial 32MJ Test Capability 2008
- Feasibility Demo 2011
- System Demo 2015
- IOC 2020-2025



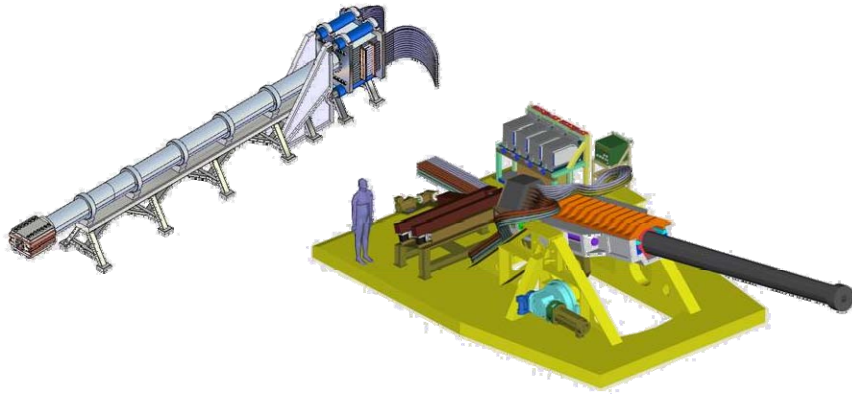
EM Railgun – Game Changing



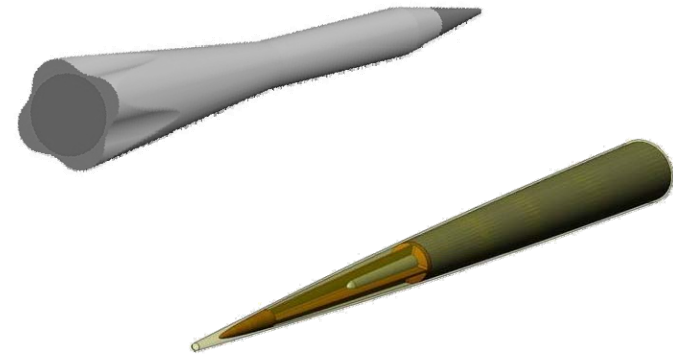


Naval Railgun – Key Elements

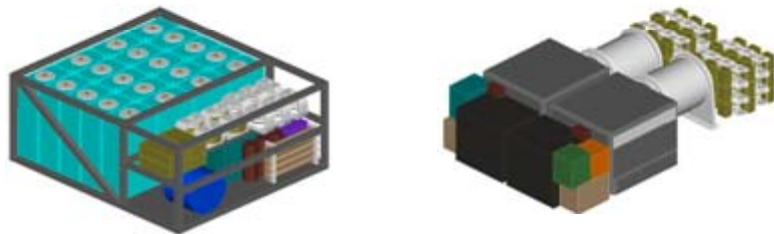
Launcher



Projectile

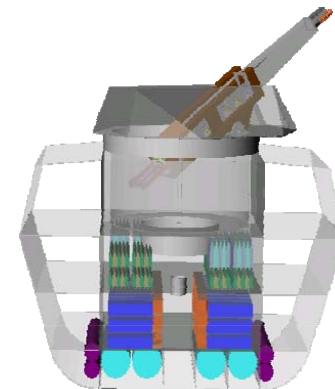


Pulse Forming Network (PFN)



Capacitors or Rotating Machines

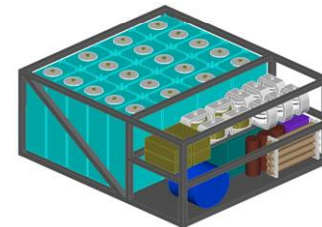
Ship Integration





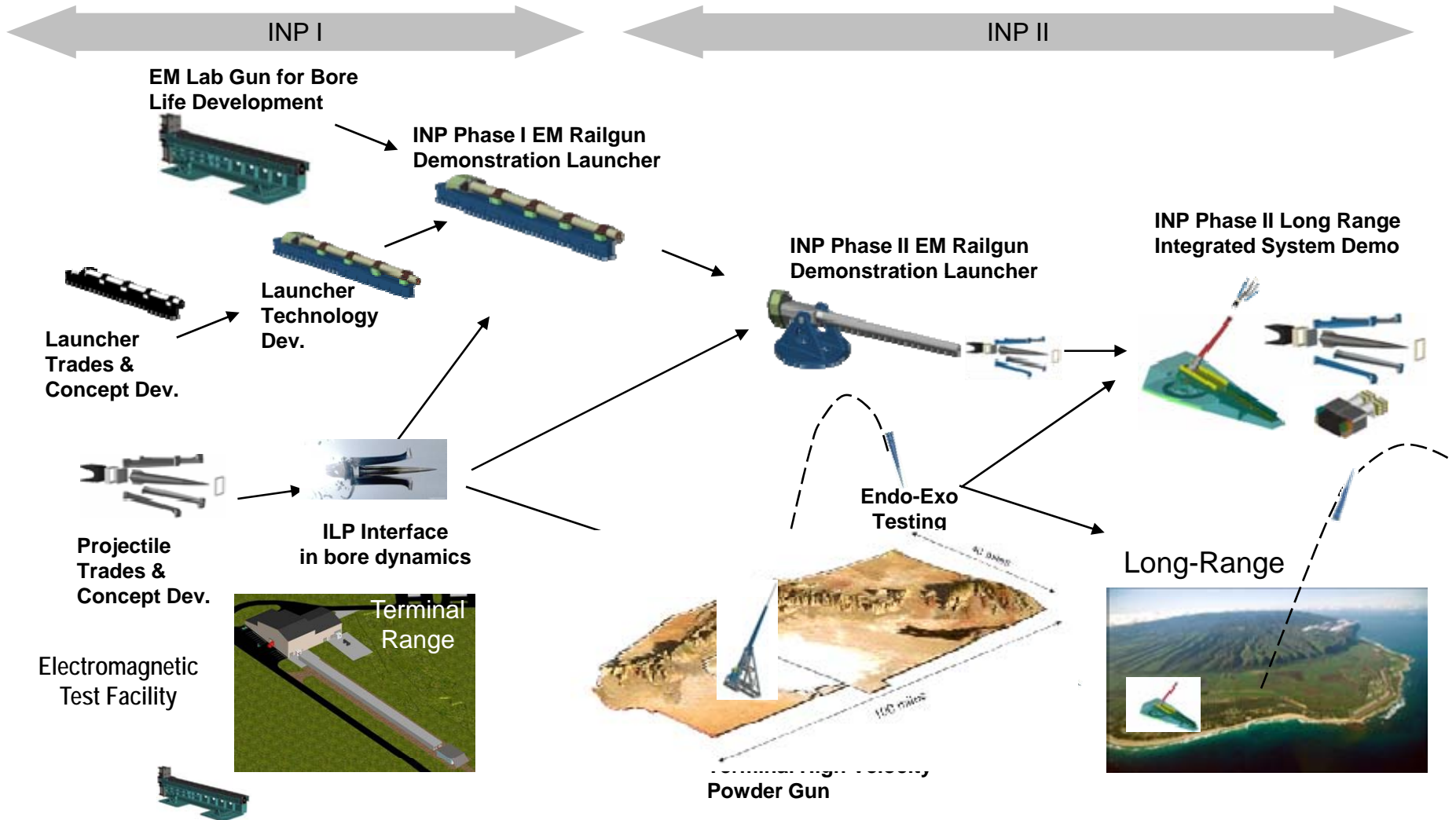
S&T Technology Challenges

- Launcher
 - Multi-shot barrel life
 - Barrel construction to contain rail repulsive forces
 - Scaling from 8MJ (state of the art) to 32MJ → 64MJ Muzzle Energy
 - Thermal management techniques
- Projectile
 - Gun launch survivability (45 kGee acceleration, Electromagnetic Interference Potential)
 - Hypersonic guided flight for accuracy
 - Lethality mechanics
- Pulsed Power System
 - Energy Density
 - Rep rate operation & thermal management
 - Switching
 - Torque management and multi-machine synchronization (rotating machine)





Path to Integrated System Demo



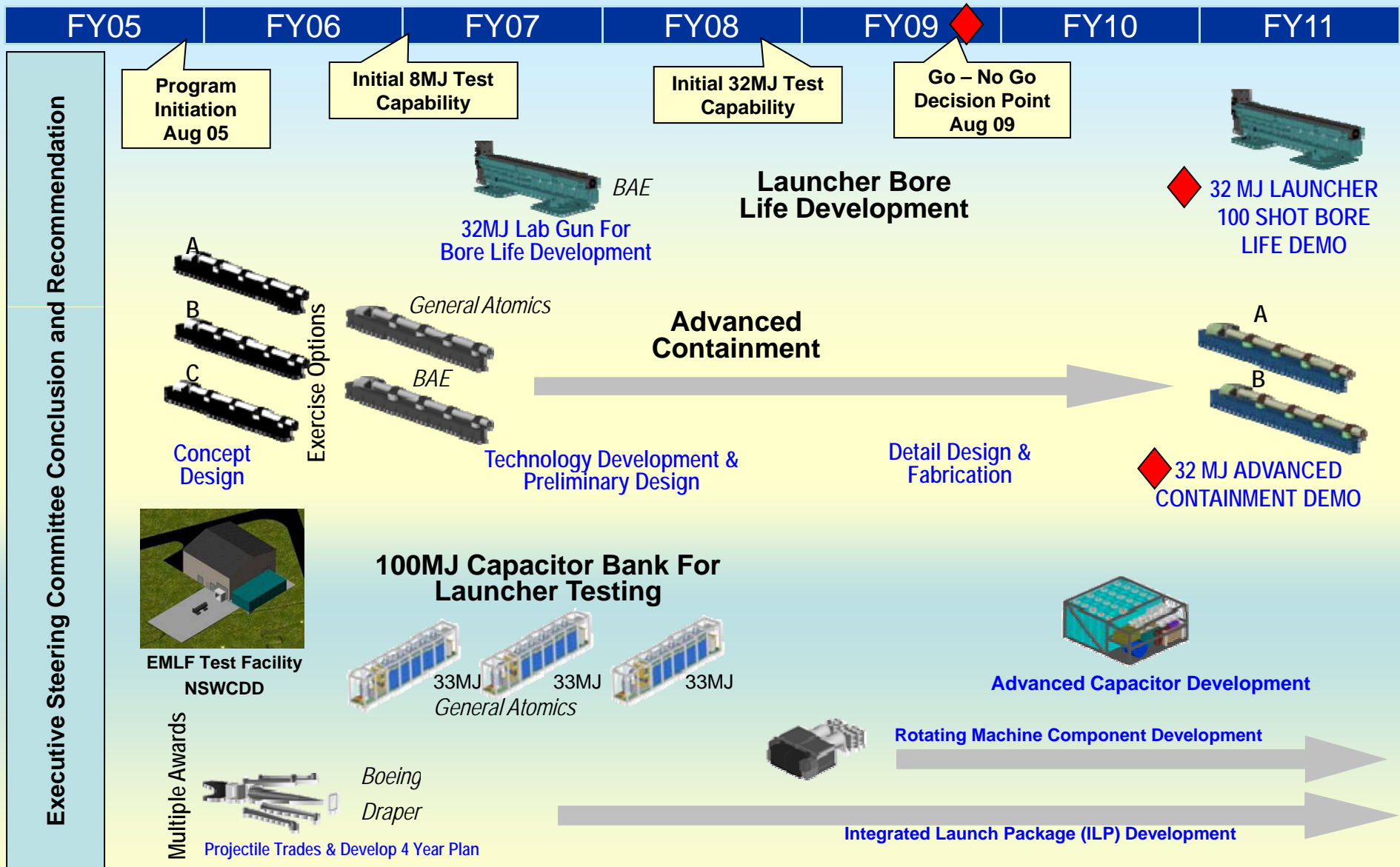


ONR INP Phase 1 Objectives

- **Traceability** to 64MJ, 6-10 round / min indirect fire weapon system
- **Bore Life**
 - 32 Mega-Joule (Muzzle Energy) EM Lab Launcher
 - 10kg launch package; full muzzle velocity of 2.5km/sec
 - 20kg launch package with full current of ~5.5MA
 - Demonstrate more than 100 shot bore life
- **Containment**
 - 32 Mega-Joule Advanced Containment Launcher
 - 10kg launch package; full muzzle velocity of 2.5km/sec
 - 20kg launch package with full current of ~5.5MA
 - 1000+ round predicted containment structural barrel life
 - Design for thermal management at a rate of 6 round / min
 - Design launcher for minimal round dispersion
 - Transportable on pallets and/or in sea containers,
 - Consider marine environment

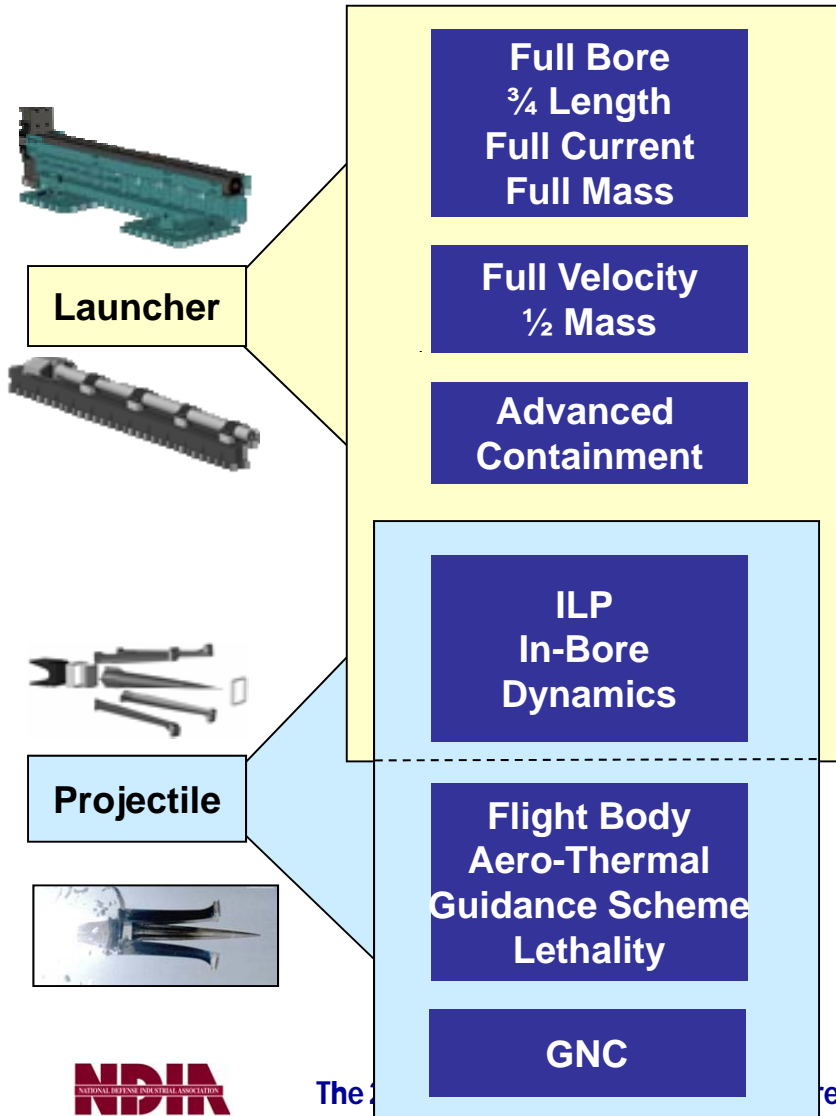


ONR INP Phase I Program





Launcher and Projectile Thrusts



- Launcher Technology
 - Bore materials and geometry
 - Advanced containment techniques
- Develop Integrated Launch (ILP)
 - Armature
 - Sabot, bore riders
 - Nominal projectile shape
- Critical Focus Areas
 - Launch survivability
 - Hi-Gee GNC
- Leverage Other Programs
 - Conventional Guided Munitions
 - Re-entry Flight Body Vehicles



Summary

- Naval EM Railgun is a “Navy after Next” Game Changer
- Navy EM Railgun INP Program is Established
- Risk Mitigation
 - Establish Bore Life Consortium
 - Advanced Containment Launchers – Competitive solutions
 - Integrated Launch Package (ILP) and Projectile development
 - Understand Ship and Weapons System Requirements Integration

Challenges Understood and Being Addressed



Railgun INP Contact Information

**We need your help in moving this innovative effort forward.
Ideas/comments/etc. should be sent to:**

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