



March 18, 2014

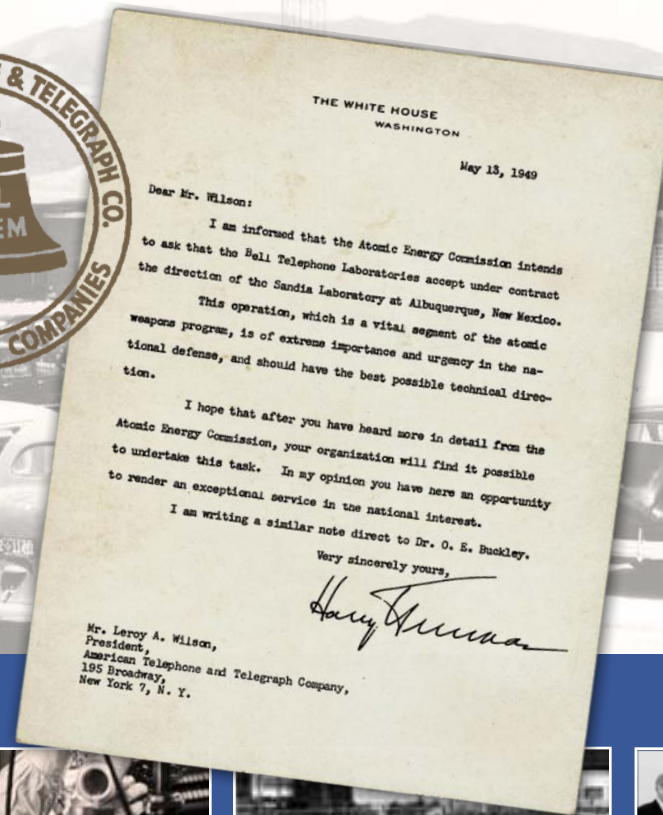
Sandia National Labs support for Precision Strike

David L. Keese

Director, Integrated Military Systems

Sandia's history

Exceptional service in the national interest



Sandia's governance structure



Sandia Corporation

- AT&T: 1949–1993
- Martin Marietta: 1993–1995
- Lockheed Martin: 1995–present

Government Owned, Contractor Operated (GOCO)



Federally Funded Research and Development Center (FFRDC)

Sandia's Broad National Security Mission



Nuclear Weapons

Energy Climate and Infrastructure Security

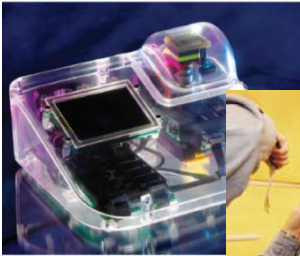


International Homeland and Nuclear Security



Lab on a Chip

Manufacturing for chemistry, biology & bioengineering



RSC Publishing | Point-of-care Microfluidic Diagnostics



Defense Systems and Assessments





FFRDC Roles & Responsibilities

- FFRDCs meet a long-term R&D need which cannot be met as effectively by existing government or contractor resources
- Maintains long-term relationships with the Government to preserve familiarity with sponsor needs, provide quick-response capability, maintain independence and objectivity, and attract high-quality personnel
- Has access to Government and supplier data, beyond that which is common to a normal contractual relationship
- Conducts business in a manner befitting its special relationship with the Government
- Operates in the public interest with objectivity and independence
- Cannot use its privileged information or access to facilities to compete with the private sector

National Lab Role in Tech Development and Transition

- ✓ Facilitates Rapid Tech Development & Response
- ✓ Emphasizes Prototypes & Demos
- ✓ Enables Government to Be Smarter Buyer
- ✓ Enables Industry to Be More Effective Supplier
- ✓ Government, University, Industry, Lab Development (GUILD) team



“No member of a crew is praised for the rugged individuality of his rowing.”

Ralph Waldo Emerson

Long-term Technology Investment



Challenge: Develop and Demonstrate advanced technologies for precision strike.

LDRD Investment:

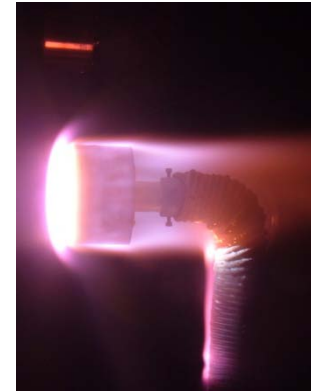
- FY 2005–2007— PGR Grand Challenge
- FY 2006-2009 — Thermal Protection Systems
- FY 2009-2012 — Boundary Layer Transition
- FY 2008-2009 — Hypersonic Dispense
- FY 2008-2009 — Hypersonic Transition Receiver
- FY 2005-2010 — Kinetic Energy Projectiles
- FY 2012-2013 — Optimal Adaptive Control Strategies

System Application:

- SWERVE (DOE/DARPA)
- HyTEX (NASA Marshall)
- SHARP B1 and B2 (NASA Ames)
- RFTx (Navy SSPO)
- Falcon HTV-2 and ArcLight (DARPA)
- Advanced Hypersonic Weapon (OSD & SMDC)



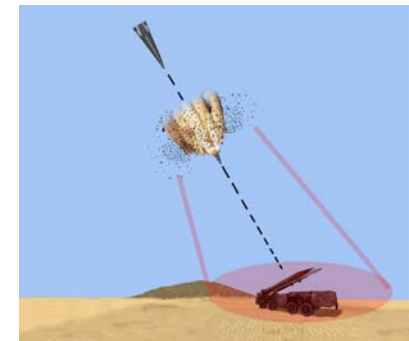
Advanced Hypersonic
Weapon Flight 1A
Nov 2011



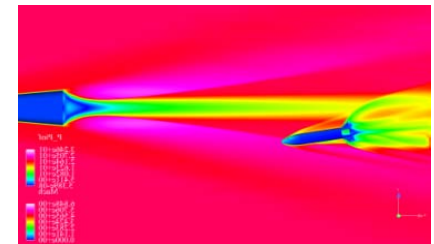
TPS in Arc Jet Tests



AHW Glide Body

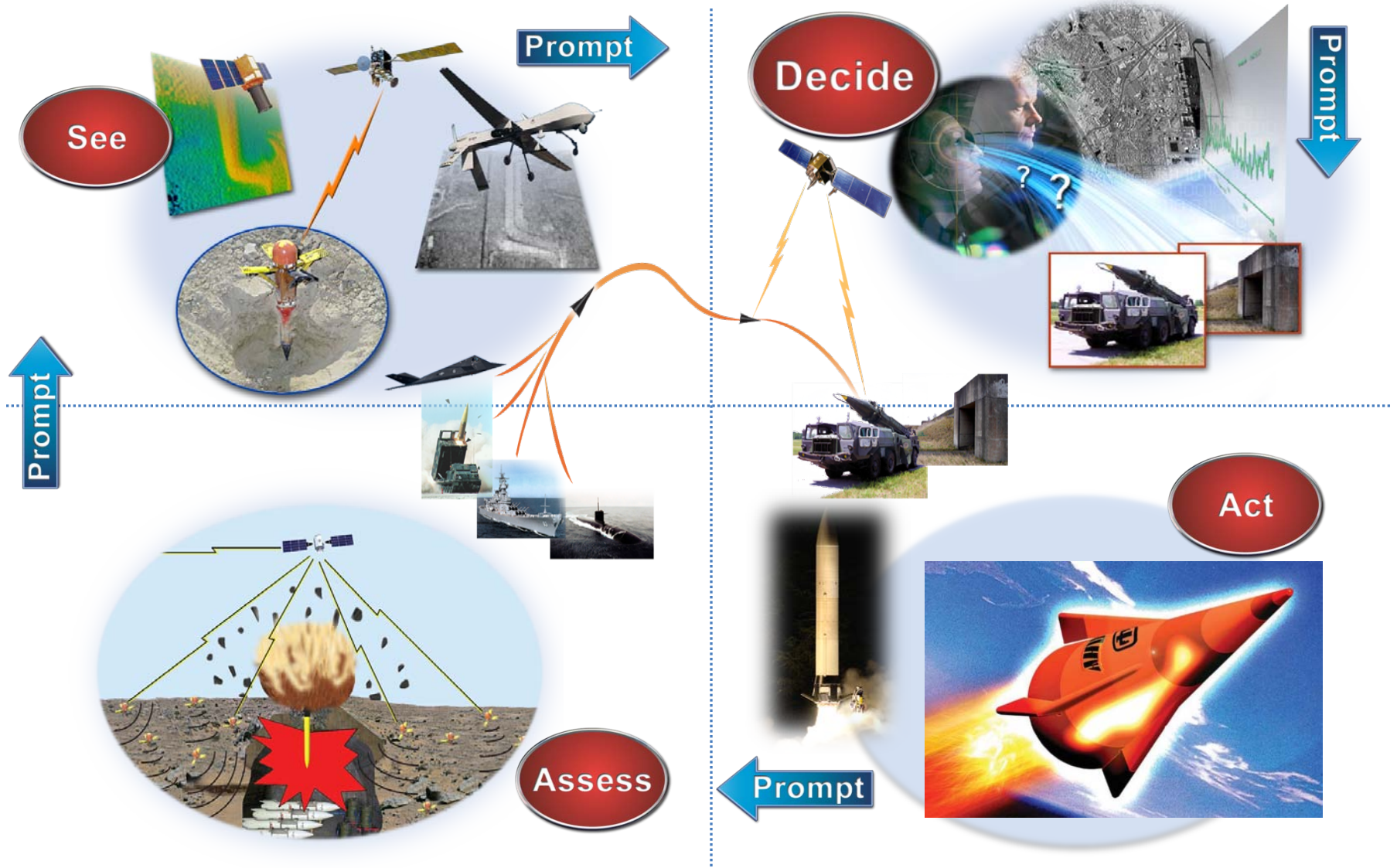


Kinetic Energy Projectiles



Hypersonic Dispense

Precision Strike ... Systems View of the Challenge



TACMS-P Precision Strike ACTD



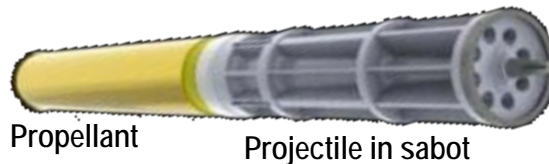
For Mk 45 5-inch gun

Missions

NSFS - Strike

ASCM

ASuW



Technologies

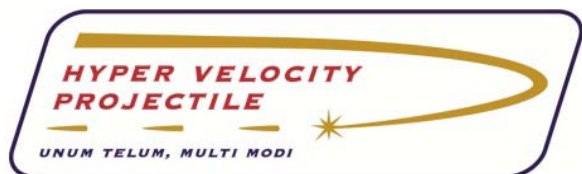
<p>High-G Electronics</p>	<p>Packaging</p>
<p>Thermal Protect</p>	<p>Miniaturization</p>
<p>Adv. Energetics</p>	

Weapon Systems

<p>5-Inch Mk 45</p>	<p>Railgun</p>
<p>155 mm - AGS</p>	<p>155 mm</p>

Future Threats

5 inch OD at fins
x 24.4 inch long



Slide courtesy of ONR

CHAMP, Non-KE Precision Effects

Counter-electronic High Power Microwave Advanced Missile Project

- **What is CHAMP?** A Joint Capability Technology Demonstration (JCTD), led by AFRL, to demonstrate integration of High Power Microwave (HPM) into a missile for use as a directed energy weapon.
- **Why is it important?** The first demonstration of a directed energy weapon integrated into an air launched missile platform capable of engaging multiple targets and affecting electronic systems within those targets without direct kinetic-energy effects.



- **Why Sandia?**
 - Our world class expertise in Pulsed Power, HPM Sources, and Field Testing

- **Partners**



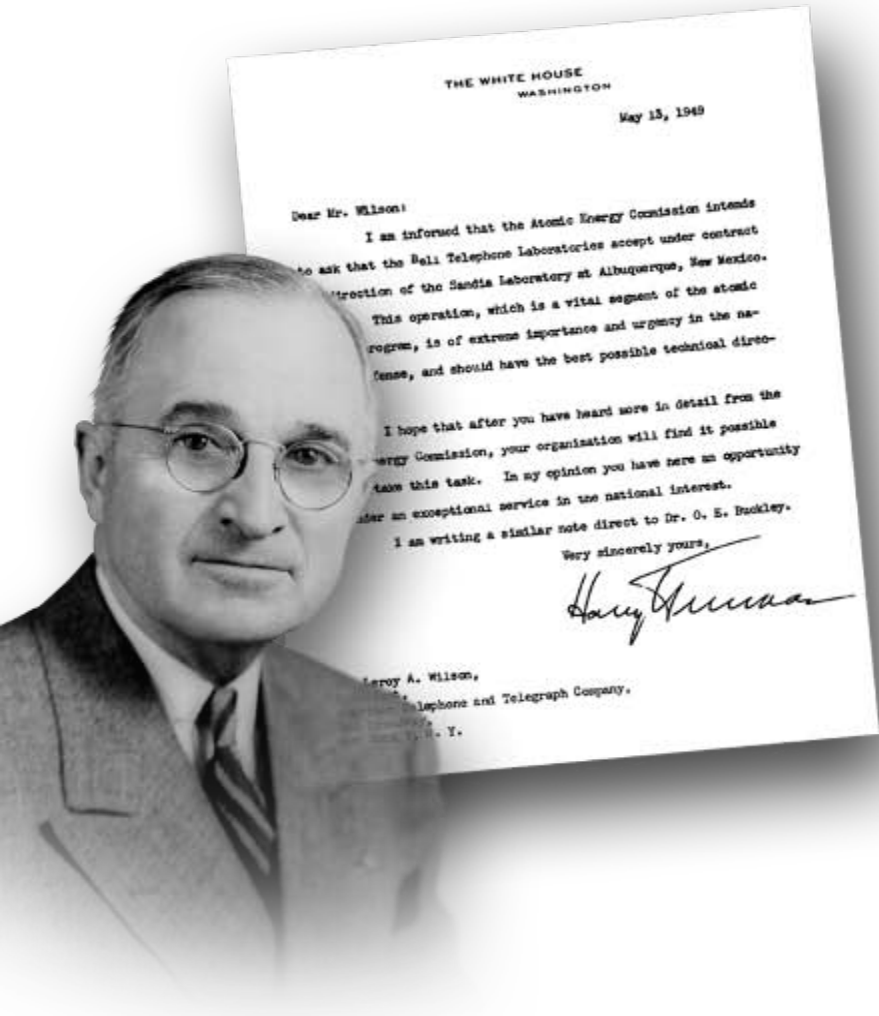
CPGS Program (AHW Flight 1A) Successfully flown November 17, 2011



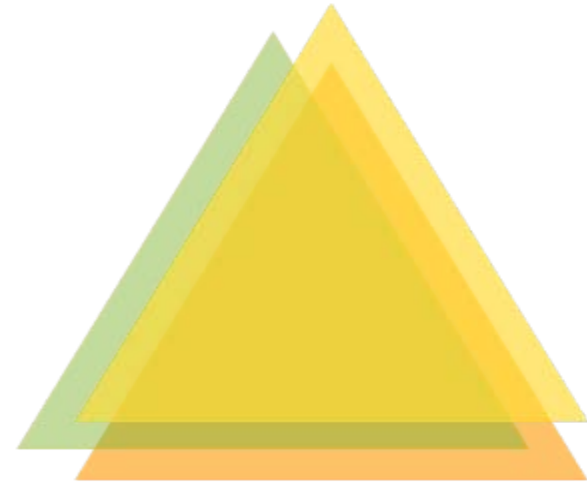
Demonstration of CPGS Technologies/Systems



Exceptional Service in the National Interest



Mission Impact



Relevant
Capabilities

Operational
Excellence



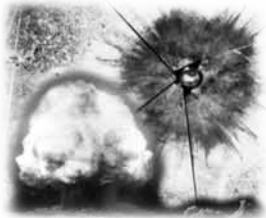
Backup Charts

Capability Leverage



AF&F

Radars



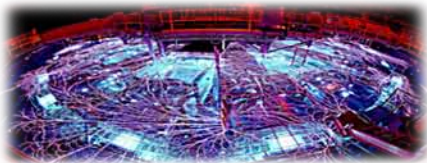
Nuclear
Detection

Space
Sensors



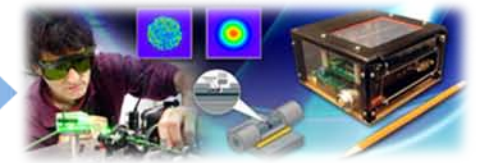
Use Control/PAL

Cyber



Pulsed Power/
Extreme Environments

Directed
Energy



Reentry Vehicles

Hypersonic
Systems



Integrated Military Systems Program Area

Strike Systems & Aerospace Technologies

Successful AHW Launch
Nov 17, 2011



Sandia-developed booster system, glide vehicle and range support



Missile & Air Defense



- Advanced Target Capability Cell
- Threat Design & Analysis
- Integrated Target Systems
- Target Launch Vehicles
- Target Reentry Vehicles

Military Systems & Technologies

- Campaign Portfolio Analysis Tool (CPAT)
- “Game-Changer” ... Gen Pete Chiarelli

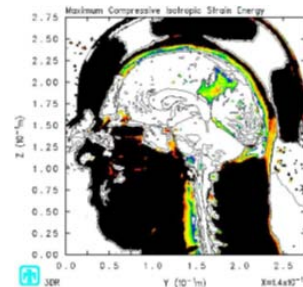


ONR Advanced Containment Launcher

Warheads and Energetics



Over 1500 Explosive Events in FY11



Traumatic Brain Injury