

Reliable Replacement Warhead (RRW)

A panel discussion co-sponsored by the UNM Office for Policy, Security, and Technology; Women in International Security (WIIS); and Sandia National Laboratories

September 29, 2006

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Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

Key Drivers for RRW

- **Certification without underground testing**
- **Allows significant improvements in nuclear safety and security**
- **Provides an enabler for transformation of the stockpile and complex**

RRW assures the long-term reliability, safety, and security of the stockpile

Reliable Replacement Warhead Study

- **Competitive study began May 2005**
 - NM Team: LANL, SNL-NM, and Plants
 - CA Team: LLNL, SNL-CA, and Plants
- **First deployment planned on submarine launched ballistic missile (SLBM) platforms**
- **Preliminary Design Data Packages (DDPs) were submitted in March 2006**
- **Nuclear Weapons Council (NWC) will be briefed in November 2006**



Reliable Replacement Warhead Study Goals

- **Certi fiable and safe without underground test**
- **Integrated nuclear safety and security capabilities**
- **Easier to manufacture and less costly**
- **Robust to future aging effects**
- **Compatible with multiple delivery platforms**

“The Reliable Replacement Warhead concept will provide the research and engineering problems necessary to challenge the workforce while at the same time refurbishing some existing weapons in the stockpile without developing a new weapon that would require underground testing to verify the design.”

Rep. Hobson ACA Address -- Feb. 3, 2005

RRW Priorities – Draft Military Characteristics

- Nuclear Safety
- Nuclear Security
- Certifiability
- Cost
- Manufacturing
- Reliability
- Survivability
- Yield
- Longevity

Trade Space

Yield was traded for increased margins and enhanced safety and security

RRW Enables Significant Improvements in Safety and Security

- **Life Extension Programs (LEPs) enable modest improvements in nuclear safety and security to Cold War weapons**
 - Cold War designs are optimized for maximum yield to weight
 - Weight and volume are not available for improvements
 - Cold War designs were designed with small margins
 - Small margins limit the changes which can be made and maintain certification
- **RRW offers the opportunity for significant improvements in safety and security not possible in LEPs**
 - RRW is not optimized for yield to weight
 - Weight and volume available in RRW allows for increasing design margins, safety, and security

RRW provides no new military capabilities

30 Years of Technology Enables Significant Advances in Safety and Security

1978 Honda Civic



Safety Features

- Seat belts

Security Features

- Key lock

2006 Honda Civic



Safety Features

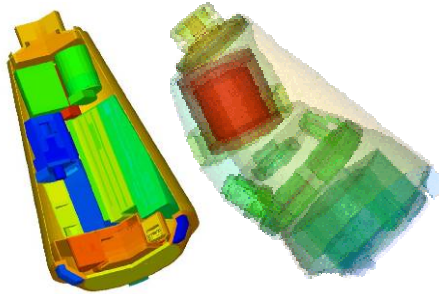
- Front air bags
- Side air bags
- Child safety door locks
- Power door locks
- Anti-lock brakes
- Limited slip differential
- Trunk anti-trap release

Security Features

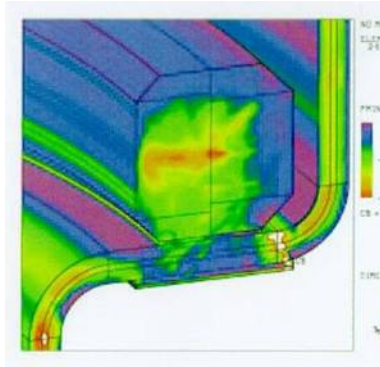
- Keyless entry
- Coded anti-theft key
- Alarm system
- Anti-theft ignition
- Coded components

30 years of technology also enables significant advances in reliability, improved maintainability, decreased cost of ownership, and reduced environmental impact

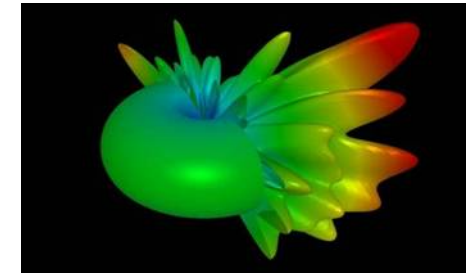
Science-Based Engineering will be Embedded in Critical RRW Contributions



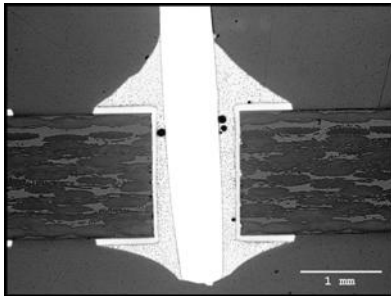
Flexible/validated design-to-analysis tools for rapid prototyping



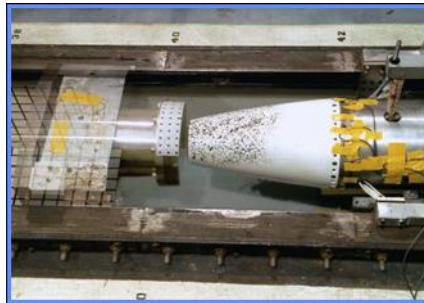
M&S-driven validation of performance & margins



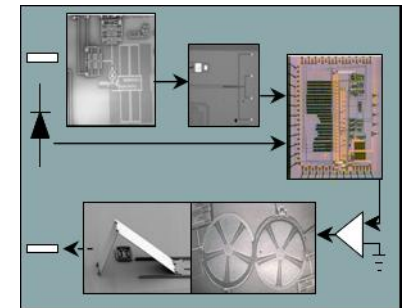
Robust radar antenna modeling



Aging phenomenology to support replacement strategy



Experimental facilities for model validation and subsystem testing



Utilization of microsystems and microelectronics

RRW Addresses the Key Program Drivers

- **RRW provides a path to future weapon certification without underground testing**
- **RRW creates a higher level of safety and security in the stockpile than possible through LEPs**
- **RRW enables reduction in the size of the stockpile through developing a responsive infrastructure**
- **RRW has the objective of reducing total life-cycle costs**

Summary

RRW – A Safe and Secure Replacement Warhead

- **While RRW is important for**
 - maintaining competency in the NW complex,
 - enabling a responsive infrastructure, and
 - enabling transformation of the complex and stockpile,

the compelling need for RRW is ensuring long-term reliability and improving safety and security
- **The historical trend shows that the need for improved safety and security will continue to grow**
- **It is the combination of new technologies with the opportunity of RRW that allows significant advancement in safety and security**