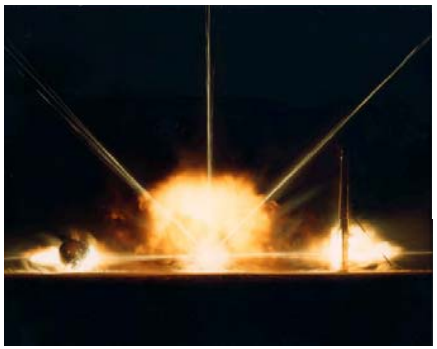
What's So Important About Energetics?
EVERYTHING



9 June 2009

Dr. Robert V. Gates
Technical Director
Indian Head Division
Naval Surface Warfare Center
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Fallujah 2004

“An awesome piece of ordnance”

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"It would be a strategic mistake for the United States to fail to have a forward-looking, aggressive R&D program in energetics. Furthermore it is inconceivable that the United States should be anything but at the cutting edge of "energetics"...it is fundamental for achieving battle space dominance".

Retired General Michael Hagee
former US Marine Corps Commandant

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Energetics Are Critical to the Warfighter

Challenges of Tomorrow

- Asymmetric Warfare
  - Precise Application of Force
  - Avoid Collateral Damage

- Increased Effects Application
  - Greater standoff, stealth and lethal radius
  - Defeat buried/covert/moving targets
  - Increased energy on target
  - Multi-mode warheads
  - Structural energetic materials

Energetic materials are a critical enabler for war-fighting dominance

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5

A New Technology Approach

Numerous new Energetic technologies are emerging to meet capability based requirements:

- Energetic materials by design
- Structural energetic systems
- Energetic materials for power generation systems
- Micro detonics for sensor deployment
- Nano material technology
- High energy density materials
- Reactive materials
- Directed Energy
- Thermobarics
- Micro Electro-Mechanical Systems
- Adaptable ordnance
- Miniature munitions
- Non-toxic liquid propulsion
- 0-signature
- Low collateral damage ordnance
- Selective effects
- Green AP replacement

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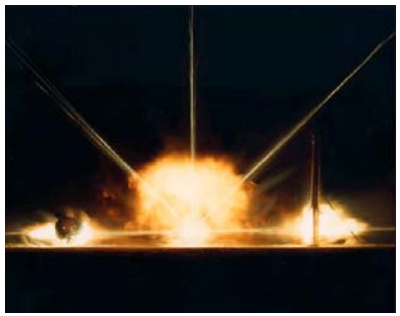
Waning Investments

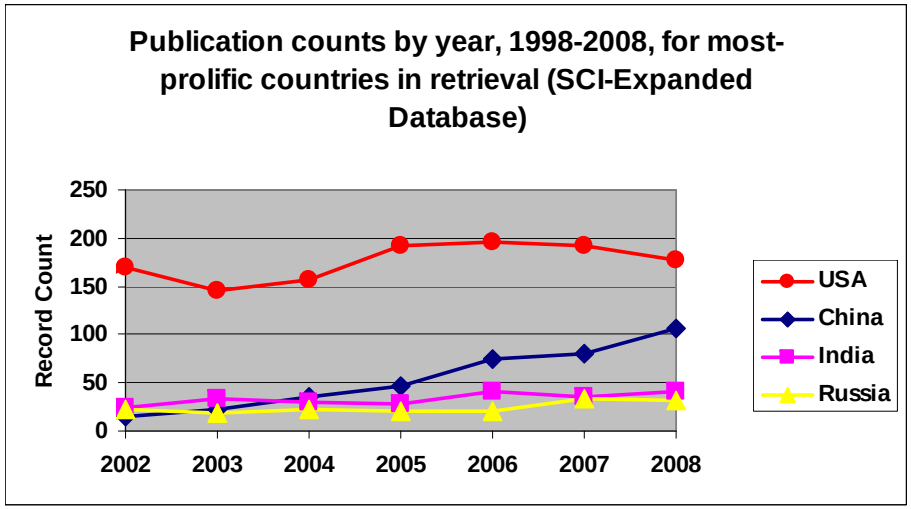


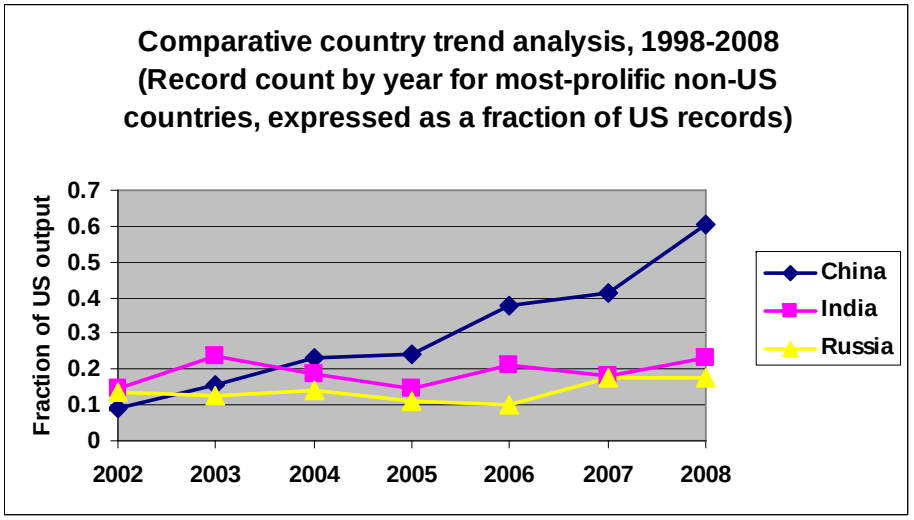




Research and development is waning in a field responsible for advanced firepower. We allow this decline to continue at our peril.

Investment on the Rise Globally





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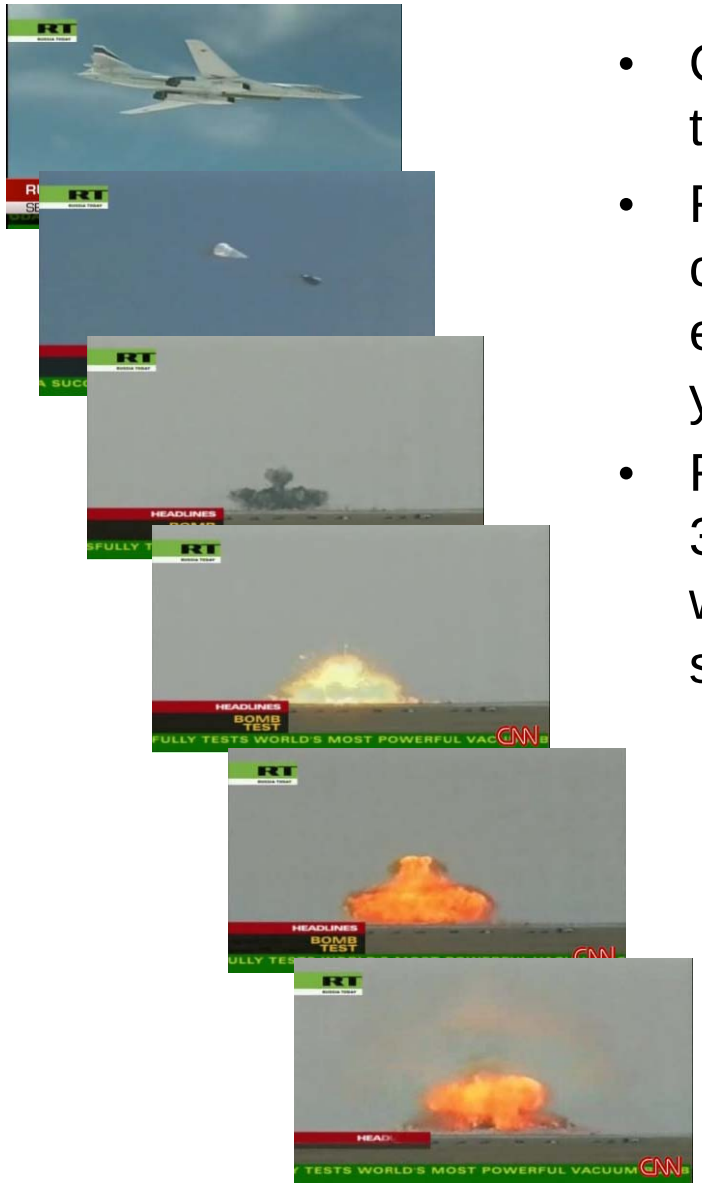
Technological Surprise



- On 11 September 2007, the Russian military tested a massive yield warhead.
- Russian officials claim that the warhead contained 7.8 tons of “highly efficient” explosives that produce an effective explosive yield equivalent to 44 tons of TNT explosive.
- Russian claims are that the blast radius was 300 meters (990 ft) and the blast and pressure wave had a similar effect on the ground as a small nuclear device.

Enhanced explosives 4 to 10 times TNT's energy density were not expected to be produced before 2010. (Office of Naval Intelligence)

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New Weapons with Legacy Energetics

Predator

Fire Scout

Reaper

Armed Robotic Vehicle

Vigilante

Ferraris on Kerosene

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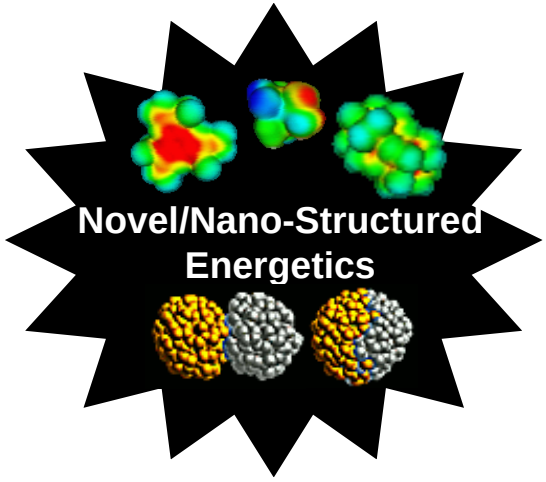
Energetics from the Start

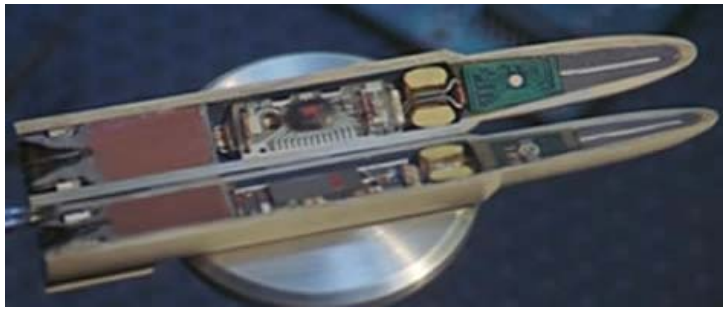
Micro Munitions

Bio Inspired

UCAV

JSF





Smart Bullet

The Key “Ingredient”

- One-third of the current energetics “experts” will retire in the next three years,
- It can take five years or longer to fully train a college graduate with a science or engineering degree to work with energetic materials.

  “Without the opportunity for the current workforce to train the next generation of expert scientists and engineers, much corporate knowledge may be lost. This knowledge is key to maintaining the current weapon stockpiles safety, to ensuring their performance, and to developing the next generation of energetic materials.”

- Critical shortages exist in rocket propellant formulation, underwater explosive formulation, ingredient synthesis, chemical scale-up, detonation physics, explosive effects modeling, and modeling of energetic manufacturing processes.

Summary

- There is a National Security imperative for continued effort in energetic materials research, development, and manufacturing technology
- The overarching issue is one of ensuring a critical national defense capability is nurtured and maintained
- A coordinated and sustained effort is required to focus the energetics community on addressing the warfighting challenges of the future
- A revitalized energetics workforced is required
- Requires visionary leadership, competent scientists and engineers, challenging work, and state-of-the-art facilities

Energetics is a National Responsibility

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Thank you …