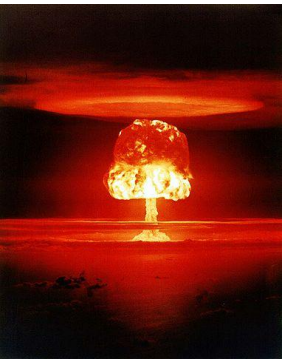
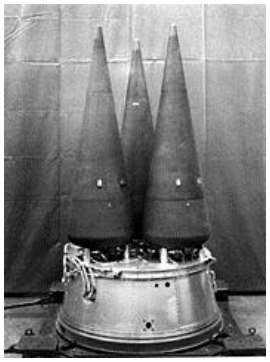
SAND2012-3039 C
SAND2012-3039C

Exceptional service in the national interest

Sandia National Laboratories

Supporting Arms Control Initiatives with Technology

The Benefits and Challenges of using Active Monitoring in Support of Verification

Jay Brotz
Justin Fernandez

April 18, 2012
Spring PONI Conference

U.S. DEPARTMENT OF ENERGY | NNSA National Nuclear Security Administration

Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

Introduction

- New START may be the last bilateral arms control agreement limited to strategic deployed nuclear weapons
- Verification under New START:
  - On-site inspections
  - Data exchanges and notifications
  - National technical means

Future Arms Control Agreements

Sandia National Laboratories

2009 Prague Speech

2010 NPR

2011 NNSA Strategic Plan

"… the United States will take concrete steps towards a world without nuclear weapons." "[New START] will set the stage for further cuts…"

"Key NPR recommendations include: Address non-strategic nuclear weapons, together with non-deployed nuclear weapons of both sides, in any post-New START negotiations with Russia."

"By 2016, develop warhead monitoring and chain-of-custody capabilities for end-to-end field demonstrations in support of new arms control commitments."

Opportunity

Sandia National Laboratories

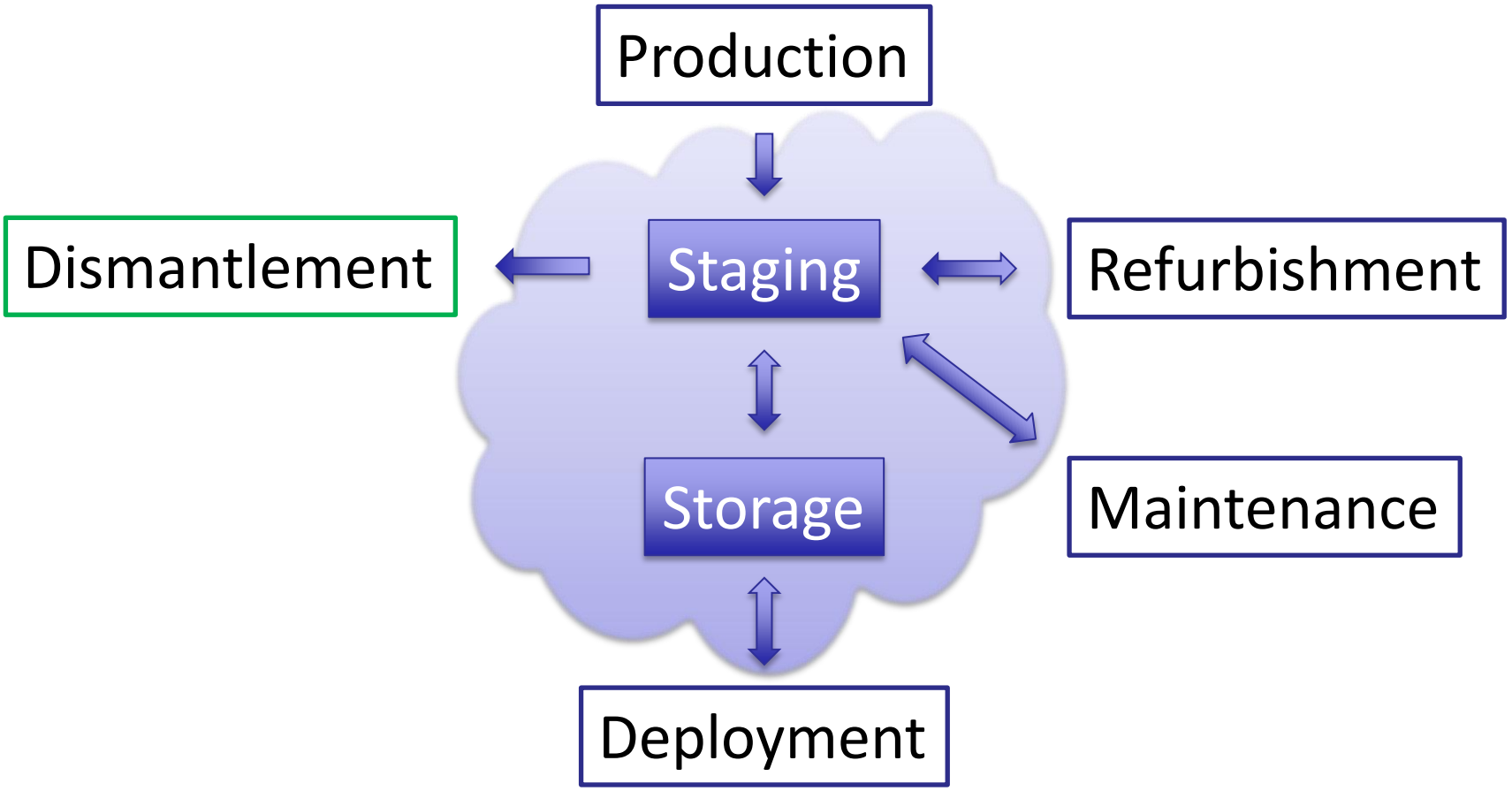
- Verifying limitations of all nuclear weapons will be challenging
  - Deployed strategic weapons (limited today)
  - **Non-strategic weapons (not limited today)**
  - **Non-deployed weapons (not limited today)**
- An opportunity exists for technology to support accounting and monitoring the entire stockpiles of the US and Russia
- An active monitoring system could maintain the chain-of-custody of weapons throughout their lifecycle
  - A trustable system could increase confidence in agreement compliance while reducing the number of on-site inspections needed

System Characteristics

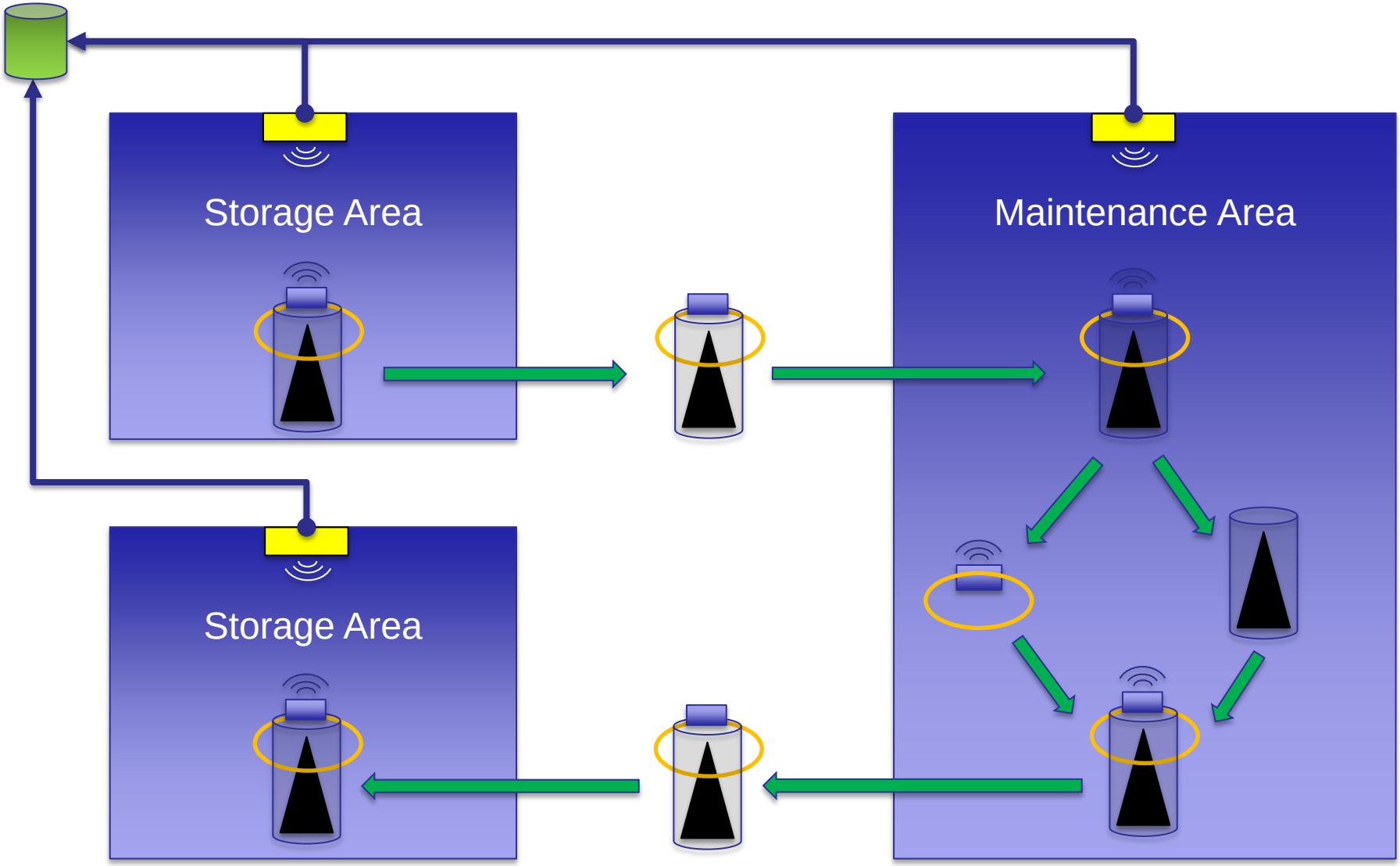
Sandia National Laboratories

- An active monitoring system would:
  - Monitor the status of each accountable item throughout its lifecycle, where appropriate
  - Monitor the facilities where accountable items exist, where appropriate
  - Send all system generated information to aggregation points at each site, and further to a national aggregation point
- All generated information must be trustable
  - Information reported must be authenticated
  - System equipment must be tamper-evident and inspectable
  - Multiple layers of tags, seals, and sensors provide “defense in depth”

Weapon Lifecycle



Site View



Challenges

Sandia National Laboratories

- Political Will
  - Fear of technology
  - Engaging all parties to agree on common monitoring regime – negotiations will take significantly longer than New START
- Opposing objectives (but it goes both ways)
  - The inspecting party must have confidence that the system is trustworthy
  - The host party must have confidence that the system does not compromise the safety, security, reliability of their nuclear weapons
- Releasing potentially classified information

Benefits

- Enablement of future arms control agreements
  - Potential to allow both/all sides to draw down with increased trust
- Increased transparency
  - Would increase strategic stability regardless of reductions
- Could encourage other parties to adopt similar monitoring regimes
  - Possibility of multilateral arms control technology development