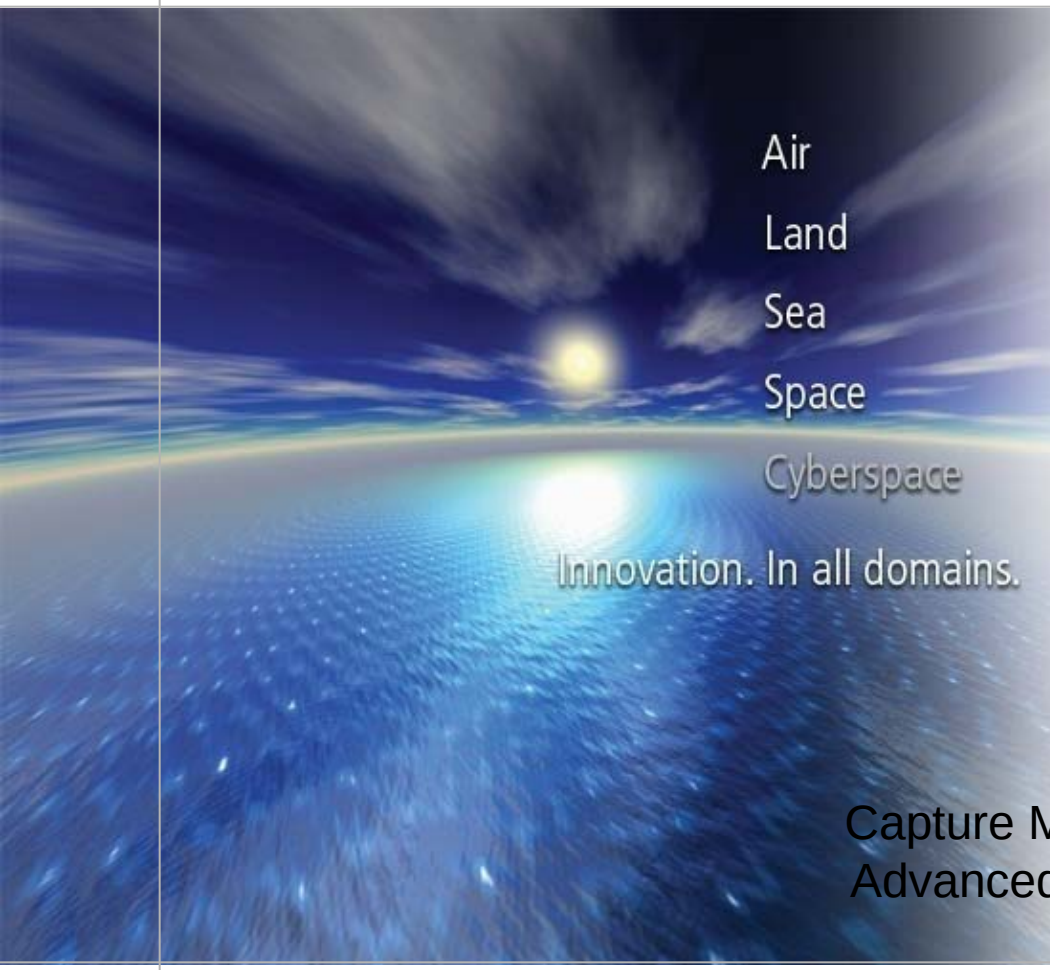
Raytheon

Customer Success Is Our Mission



Weaponizing Small Unmanned Aircraft Systems

STM
SMALL TACTICAL MUNITION

Cody Tretschok
Capture Manager, Advanced UAS Weapons
Advanced Missiles and Unmanned Systems

UAS Weaponization Has Unique Challenges

Raytheon

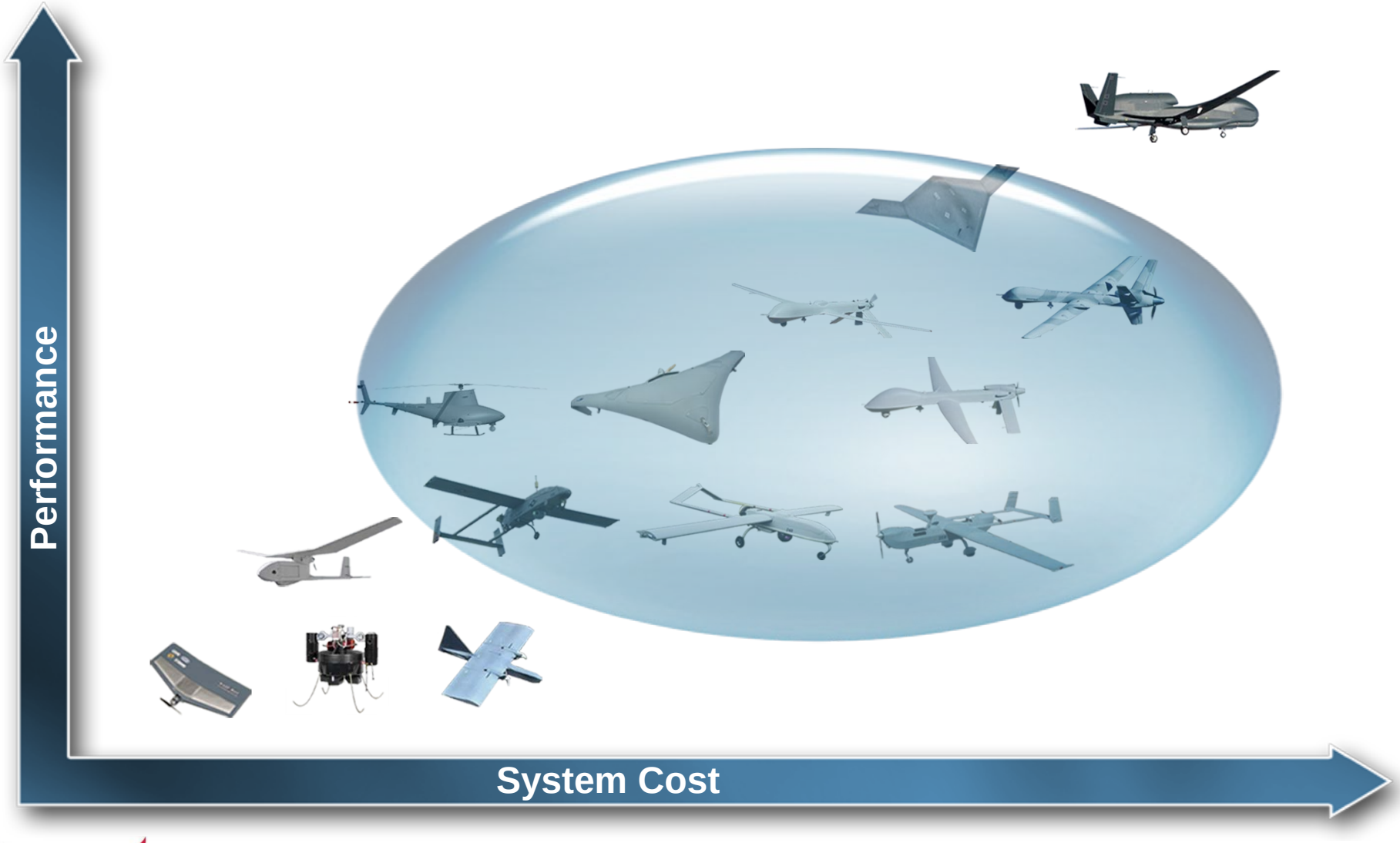
- Limited payload drives need for precision and lethality
- Target set dictates size, accuracy, warhead type
- Long sortie duration drives increased loadout capability
- Self-defense may require air-to-air weapons
- Wide spectrum of effects: from small with confined lethality to significant kinetic effects
- Arming ISR UAS should not significantly impact endurance or primary mission
- Need UAS-unique weapons to fill gaps
- Component reuse necessary to reduce unit costs

Lethal weapons effects at reduced weight a “game-changer”

STM
SMALL TACTICAL MUNITION

Raytheon

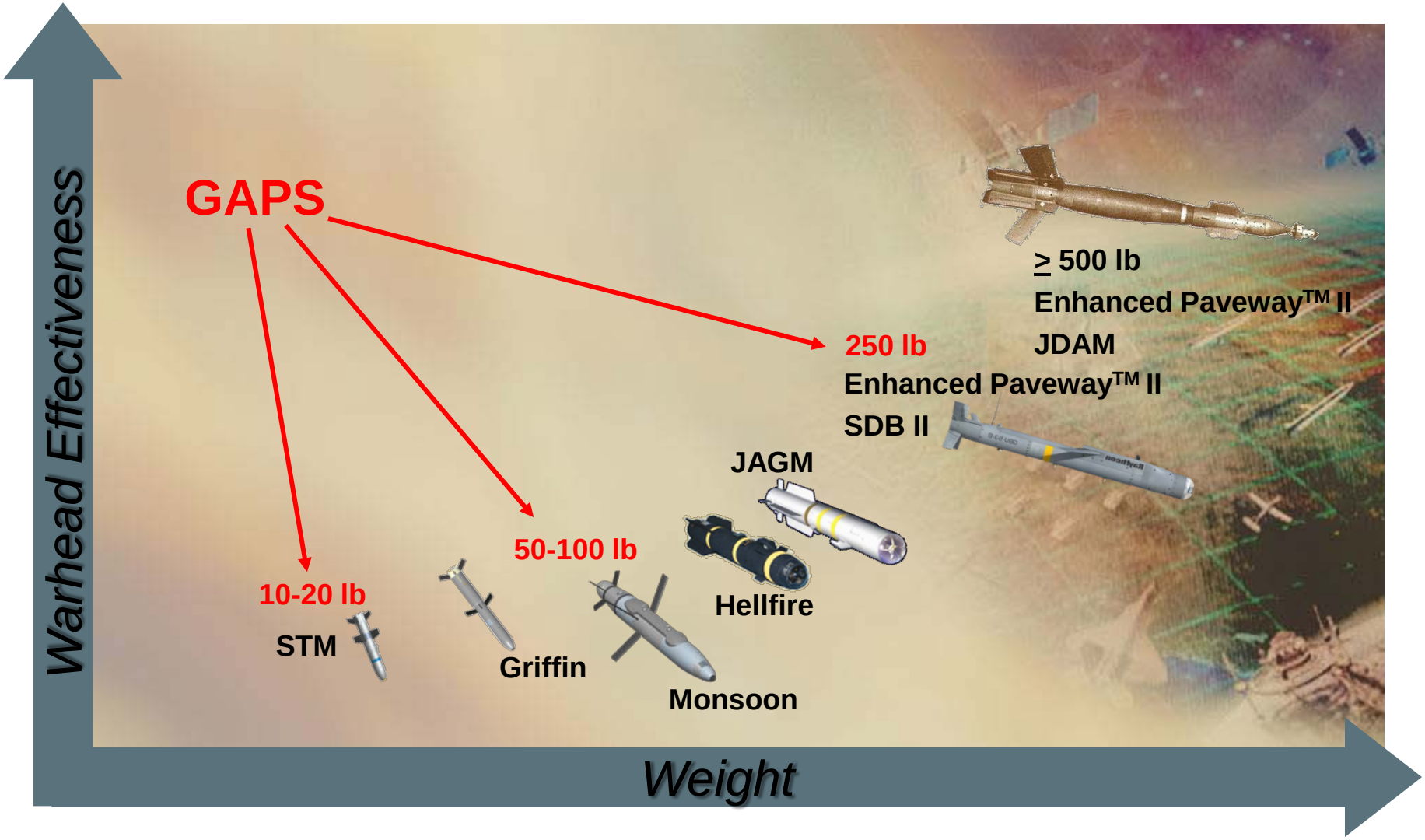
Potential Weaponized UAS Spectrum



STM
SMALL TACTICAL MUNITION

Raytheon

Current Gaps in Weapons for UAS

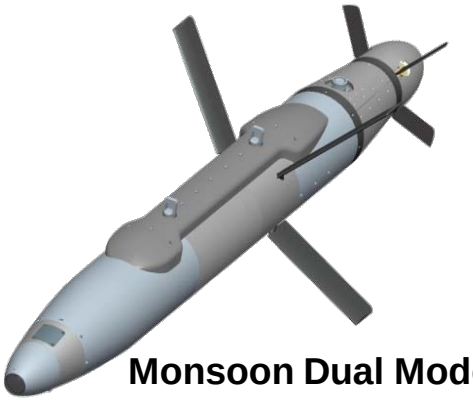


STM
SMALL TACTICAL MUNITION

Image source for all images: Raytheon

Raytheon UAS Weapon Options

Mini Fires Munition (MFM)

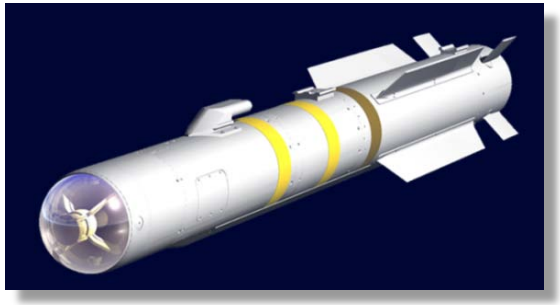


Monsoon Dual Mode Weapon

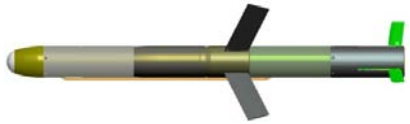
Small Tactical Munition (STM)

Small Diameter Bomb (SDB) II

Griffin™ Tactical Missile



Joint Air-to-Ground Missile (JAGM)



Falcon Laser Guided Munition

TALON Laser Guided Rocket

STM
SMALL TACTICAL MUNITION

Image source for all images: Raytheon

Armed Class 3 UAS is the Next Tactical Step

Raytheon

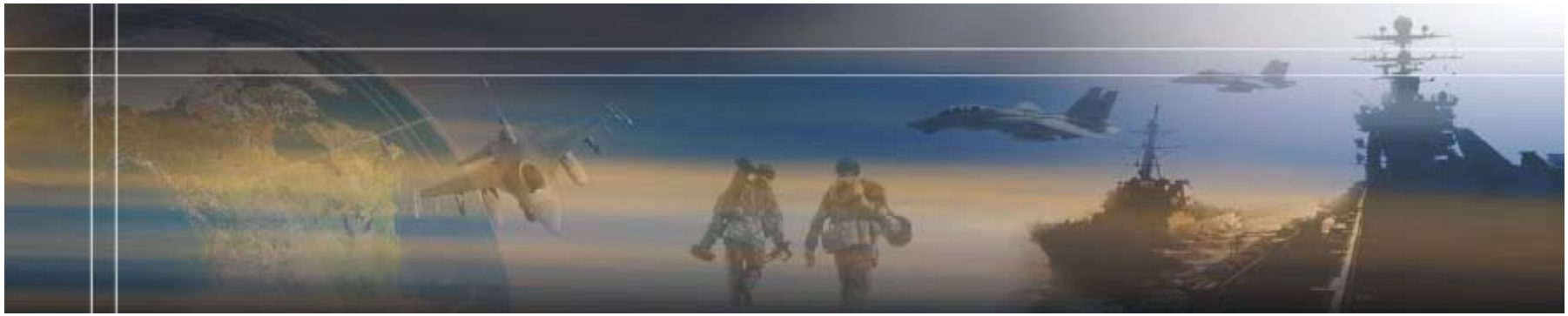


Image Source: Raytheon

Shadow 200 users report frequent weapon use opportunities in the current battle-space[1]

- Currently there is no way to quickly prosecute these targets
- Smaller, lighter, precision weapons are needed for these platforms
  - Maximum loadout capability
  - Shorten sense-to-shoot timeline

To meet the current needs, UAS must now offer everything:

- 24/7 persistence
- Organic sensors (and designators)
- Organic weapon capability
  - Enables higher fidelity time-sensitive target (TST) strike

1 -Defense Daily, Jan 19, 2011, “Army Tackles UAV Weaponization”

STM SMALL TACTICAL MUNITION

Precision strike is flowing down to small UAS

Small Tactical Munition (STM)

Raytheon

- Features & Capabilities :
  - SAASM GPS/INS guidance
    - Multi-mode, “gets it to the basket”
  - WFOV Fixed-body SAL seeker
    - Precision end-game targeting
  - 5 lb warhead
    - Tremendous lethality in a small package
  - 12 lbs overall weight
    - Designed for small UAVs
  - 21.5 inches long, 3.6 inches in diameter
    - Compact, easy to handle
  - Full logical interface
    - Allows cockpit-selectable:
      - BIT, PRF code, target coordinates, detonation mode

STM
SMALL TACTICAL MUNITION

- Performance:
  - Target set:
    - Personnel in the open, light vehicles, personnel inside small structures
  - Lethality:
    - Radius: approximately 5 meters (personnel)
    - Will destroy a light vehicle, small structures with direct/interior impact
    - Can damage light armor (mobility kill)
  - Range:
    - Approximately 2 Km when dropped from 5,000 ft
    - Approximately 7 Km when dropped from 12,000 ft

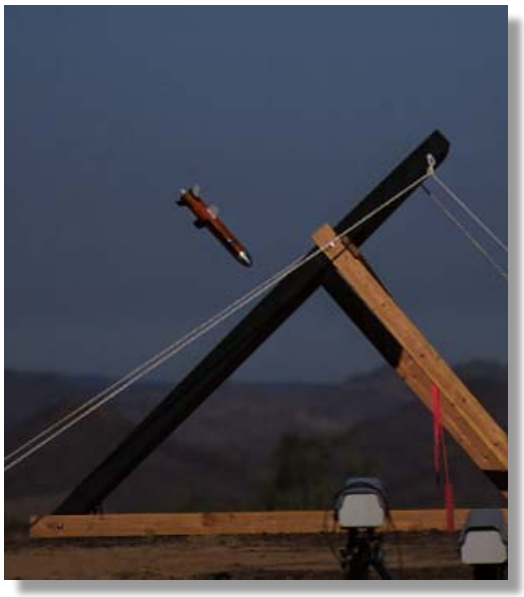
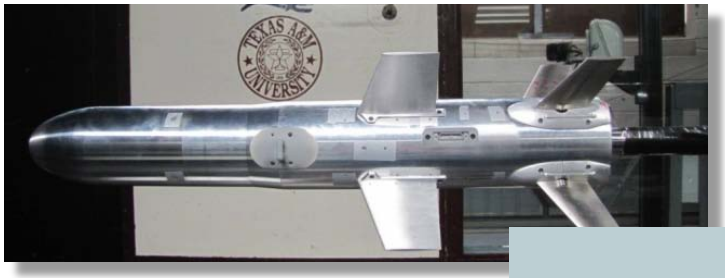


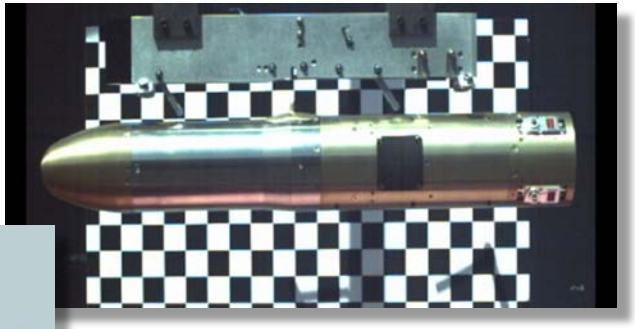
Image source for all images: Raytheon

STM System Development

- Raytheon is investing in development of this new capability:



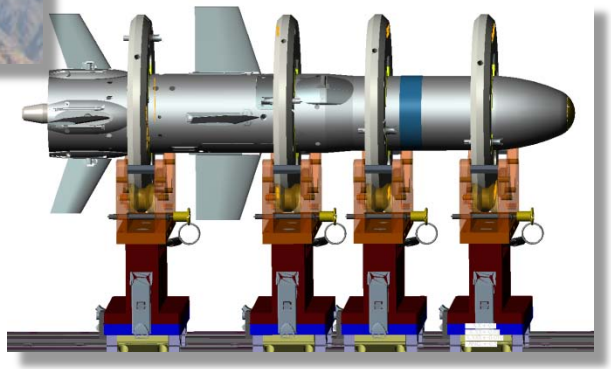
Wind tunnel testing,
aero database,
full 6DOF simulation



Ground testing

Lethality analysis and simulation

Spread-bench integration & testing



Producibility analysis and simulation

Initial flight testing completed August 2010

Click for movie

Other Weapon System Integration Considerations

Raytheon

Current Class 3 UAS were not designed for weapons:

- Hard points and pylons are either add-ons or non-existent
  - Landing gear, platform launcher, aero surfaces offer potential interference concerns
- Stores management systems need to be integrated into the payload bay
  - Safety, BIT, launch sequencing (i.e. ripple fire) all must be managed on the platform
- Launcher systems for small weapons are in their infancy
  - Single lug, dual lug, rail, tube – there is no current "14-inch bomb lug" equivalent
- Weapons interfaces need to be carefully addressed
  - GPS and other data feeds from the platform
  - Standardizing platform/rack interface connections and message sets (MMSI and UAI)
- Safety, Seek Eagle and other certifications factor into all of the systems

UAS weaponization is more than just the bomb

STM SMALL TACTICAL MUNITION

Image source for all images: Raytheon

Potential Platforms for Small Weapons

- **Shadow 200**

Image Source: www.militarynewsnetwork.com

- **Gray Eagle**


Image Source: original photo courtesy of US Army


Image Source: Raytheon

- **Fast-movers**


Image Source: rendered 3-D model

- **Reaper**

Concept illustrations show loadout/weapon flexibility

Summary & Path Forward

- UAS weaponization provides unique challenges
  - Smaller classes are a new, emerging market
- STM was designed for Class 2 and above size platforms
  - Full-featured and flexible
- Due to its small size, STM can also adapt to other applications:
  - Common launch tube (CLT) launch capability
  - Large loadout on fast-movers
  - Light attack aircraft weaponization

STM
SMALL TACTICAL MUNITION

Image source for all images: Raytheon

Raytheon

Customer Success Is Our Mission

Customer Success is our Mission

Questions?

Cody D. Tretschok

Capture Manager, Advanced UAS Weapons

Advanced Missiles and Unmanned Systems

520.545.9975

cdtretschok@raytheon.com