

AIR ARMAMENT CENTER



"TRANSFORMING THE SWORD"

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40th NDIA Air Targets, UAVs Range Operations Symposium
Panama City, FL
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Overview



Why I'm Here

**Present my Vision of How UAVs, Aerial Targets,
and Range Operations Will Transform**

I'll Discuss

- 1. UAVs From an Aerial Armament Perspective**
- 2. How this Perspective Shapes Range Requirements**



1st Generation Unrecoverable UAVs



- **Gravity Bombs**
 - Short Range, Minimum Duration
 - Reliance on Large Quantities
 - **DESERT STORM** – Only 9% of Munitions Were Precision Guided





1st Generation Recoverable UAVs



- **Aerial Targets – Drones, Towed Decoys**
 - Used for Testing/Training
 - Operated by Remote Control





1st Generation Rules of Engagement (ROE)



- **Targets Developed 24 Hours Prior**
- **Positive Identification of Target by Pilot Prior to Engagement**
 - Visual or Radar Indication to Minimize Fratricide
- **Collateral Damage Considered**

**Man-in-the-Loop at Point of Release
Provides Positive Control**



2nd Generation Unrecoverable UAVs



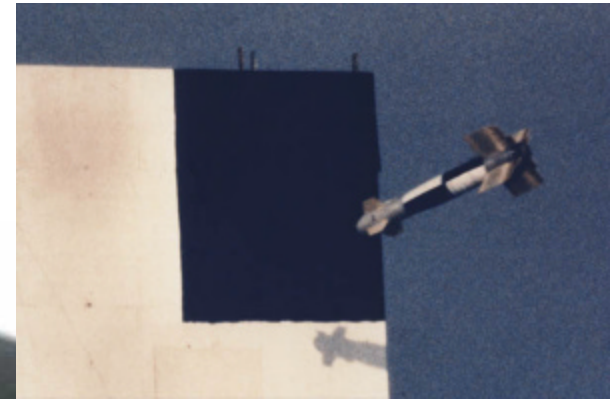
- Technology Added Guidance, Control, and Stand-Off Capability
- ENDURING FREEDOM – 69% Were Precision Guided Munitions



Joint Air to Surface Standoff Missile



ALCM



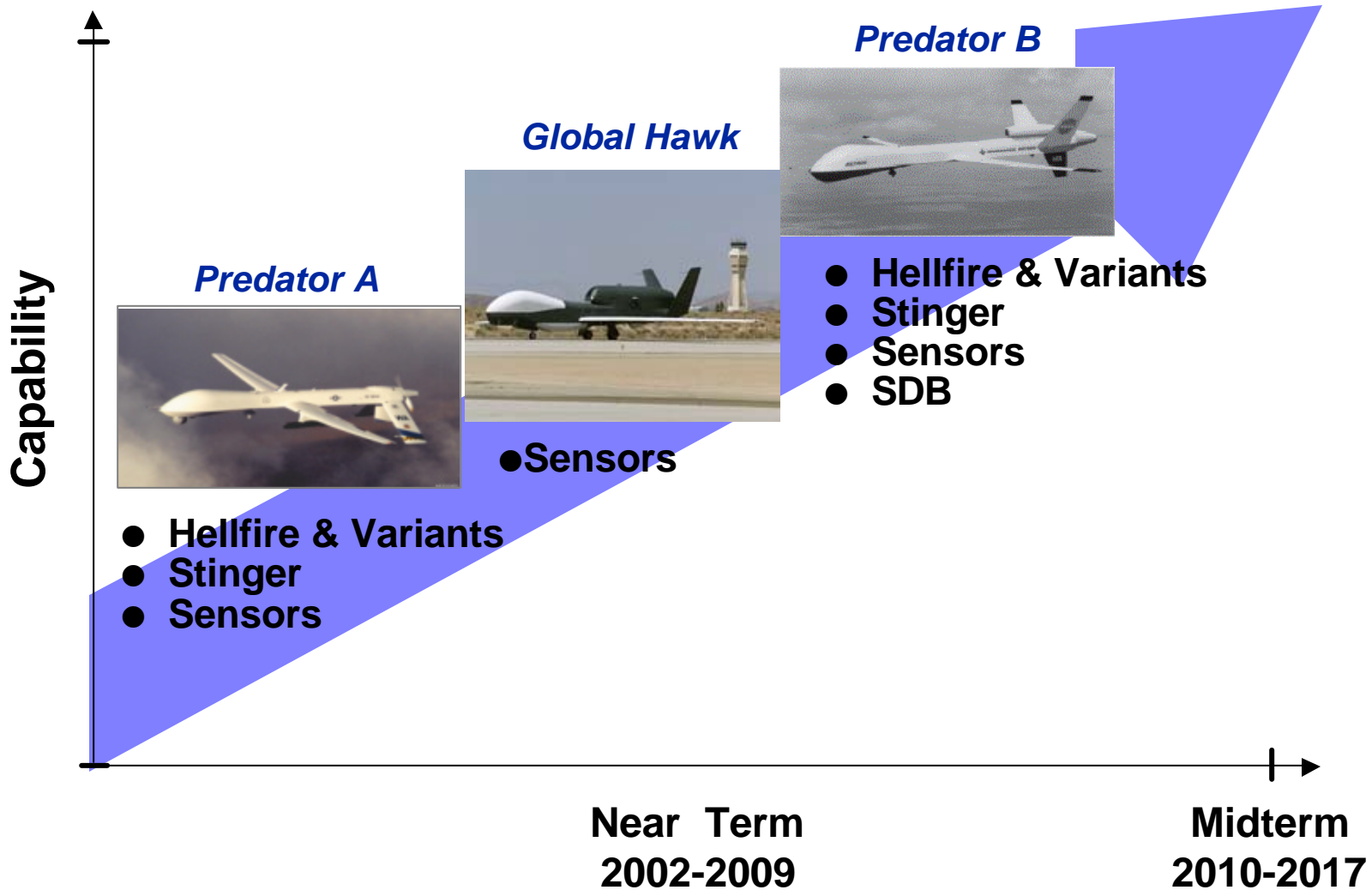
GBU-15



Joint Direct Attack Munition



2nd Generation Recoverable UAVs





2nd Generation Rules of Engagement (ROE)



- **Targets Developed 12 Hours Prior**
- **Positive Identification of Target by Operator in the Kill Chain Prior to Engagement**
 - **GPS, Terrain Matching, Cockpit Radar, Laser**
- **Minimize Fratricide and Collateral Damage**

**Man-in-the-Loop at Point of Release
Provides Positive Control**



Next Step in Munitions

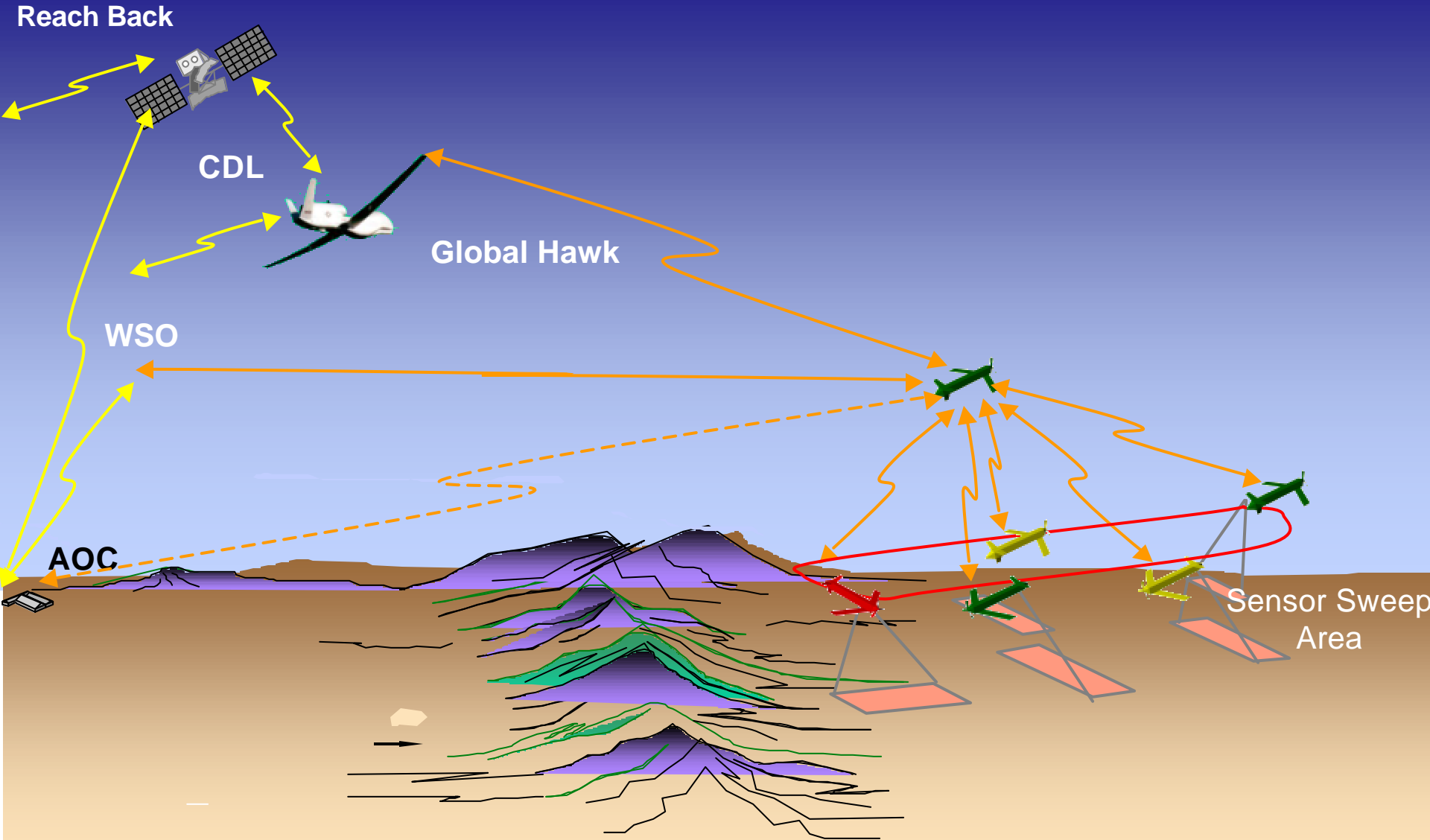


- Standoff Capability Extended
- Weapons Optimized for Internal Carriage to Complement Stealth
- Persistent Capability





Persistent Area Dominance (PAD)





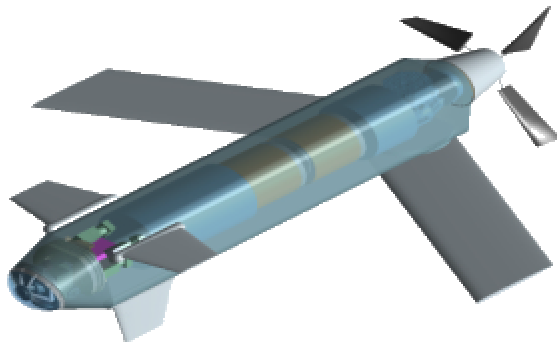
3rd Generation Unrecoverable UAVs



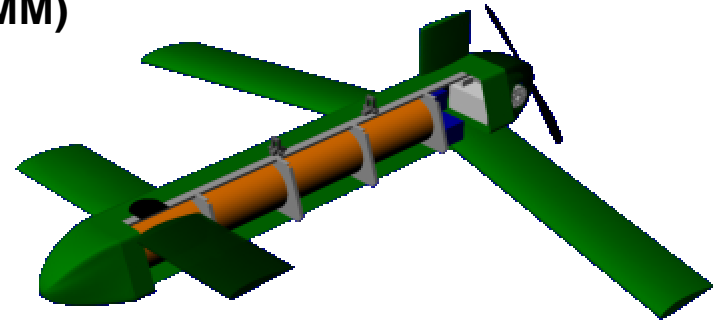
- **Persistent Area Dominance (PAD)**
 - Powered Search and Destroy Weapons
 - Connect with Integrated Networks



**Wide Area Search
Autonomous Attack
Miniature Munition
(WASAAMM)**



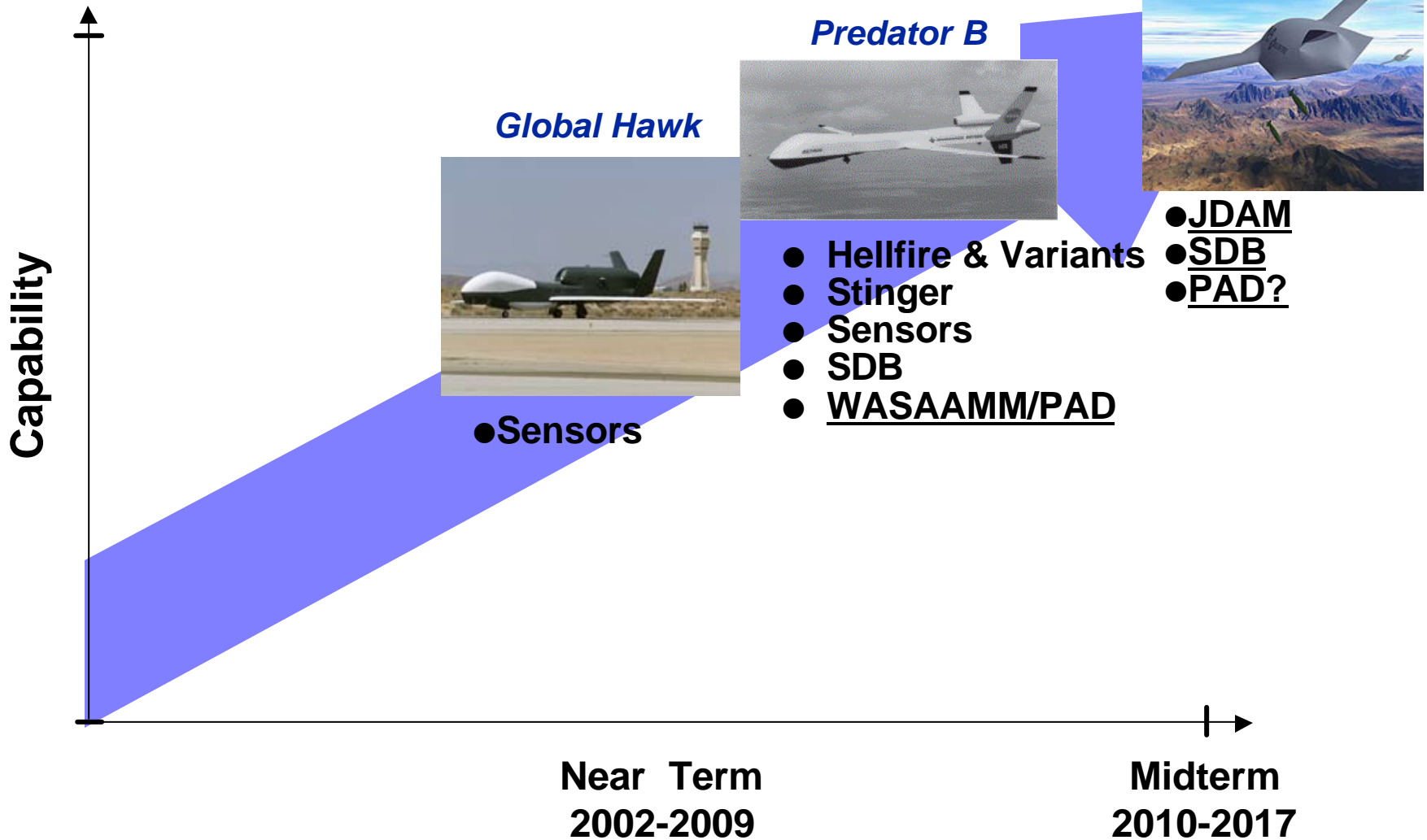
**Low Cost Persistent Area
Dominance Miniature Missile**



Covert Standoff Dispenser



3rd Generation Recoverable UAVs





3rd Generation Rules of Engagement (ROE)



- **Targets Developed 30 Minutes Prior**
- **Positive Identification of Target by Operator in/out of the Kill Chain Prior to Engagement**
 - **Global Grid**
- **Minimize Fratricide and Collateral Damage**

**Man-in-the-Loop at Point of Release
Provides Positive Control**



UAVs Summary



- **We Have Years of Experience and Vast Expertise in This Area**
- **Technology is Currently Available for Us to Take the Next Step Towards Persistent Area Dominance**
- **Target Cycle Shortened: Means of Positive Identification Changed but...Positive Control Still Required**

Air Force Needs Your Insight to Match Up Weapon-Like Concepts with Future UAVs



Challenges



- **Mission Planning Systems**
 - Accuracy
 - Must Integrate Flexibility to Make Drastic Flight Plan Changes – In Flight
- **Rules of Engagement (ROE)**
 - Man-in-the-Loop Still Required for Positive Control
 - Technology Must Increase our Ability to Identify Friend vs Foe
 - Who Will Decide to Hit the Pickle Button In the Future
- **Collateral Damage – Constant Consideration**
- **Need to Measure Effects Real-Time**
 - Real-Time Data Link
 - Bomb Impact Assessment
 - Battle Damage Assessment
- **Our Test and Training Ranges Must Transform to be able to Meet These Challenges**



Industry Focus Points



- **Develop a Technical Solution to Allow a New Version of Fire and Forget**
 - **After Release into Global Grid, the PAD Concept Requires the Ability to Preclude Fusing or Divert to Safe Area at Last Minute**
 - **Data-Links are More Important Than Ever**
- **Testing and Training**
 - **Our Ranges Must Become C2 Systems Capable**
 - **In Future Combat We May Release Hundreds of Small PAD Weapons...Ranges Must Transform to Accommodate this CONOPS**

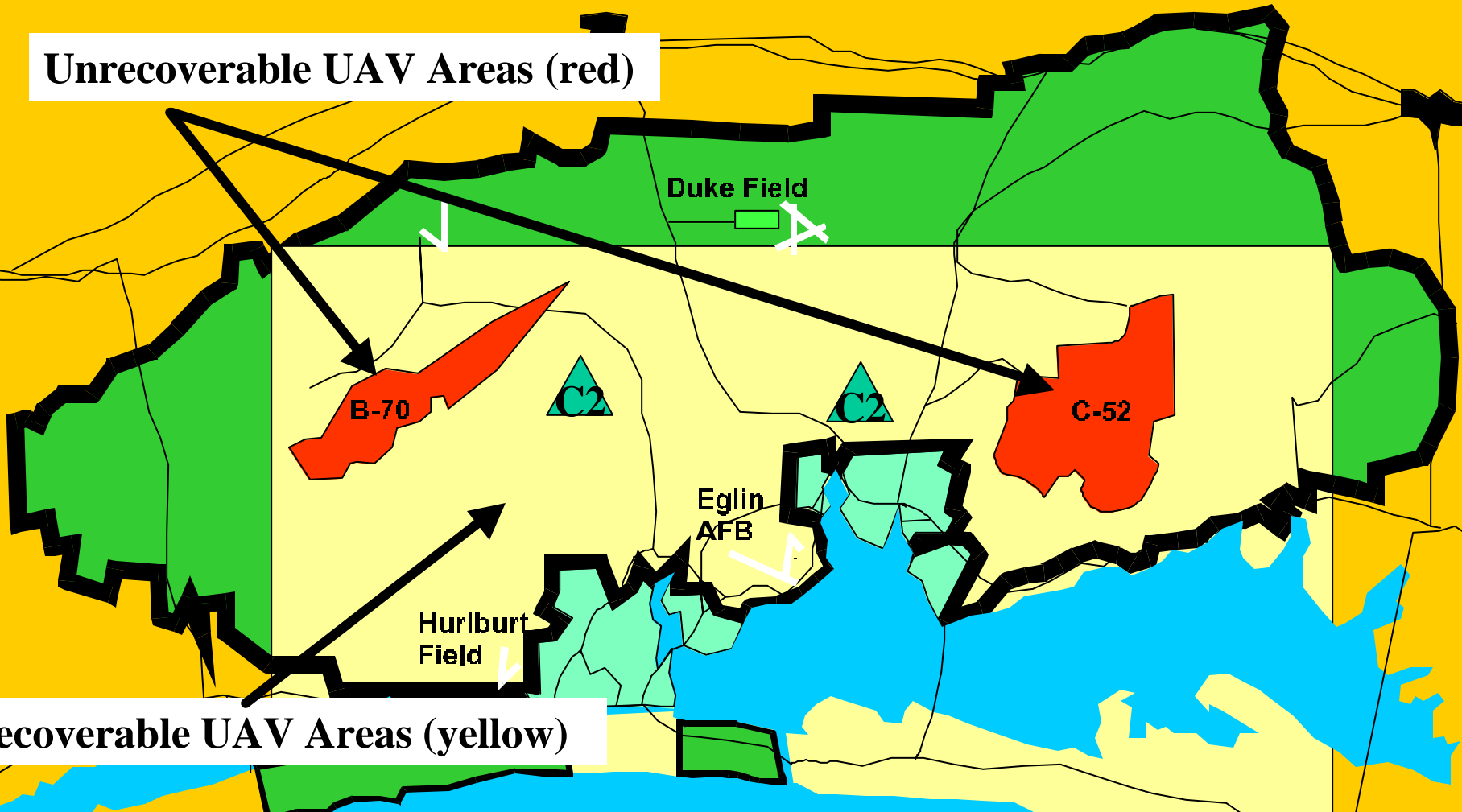
Range Preservation Critical With Stand-off Weapons



How to Make Eglin Range A Test Component – Notional



Unrecoverable UAV Areas (red)



Recoverable UAV Areas (yellow)

Ranges Will Become a Test Item



Summary



- **Need to Experiment in CONUS Prior to Employing in Combat**
- **Transformation is on the Horizon With Standoff and Persistent Area Dominance Capabilities**

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