Headquarters USAF Warfare Center

Air-to-Ground Weapons System Evaluation Program (WSEP)

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86 FWS/CC

UNCLASSIFIED

Perfecting Lethality

- **86 FWS Program**
- **Ranges and Targets**
- **Instrumentation / Data Collection**
- **Challenges**

Perfecting Lethality

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53 WEG MISSION

- **Conduct Follow-on Test and Evaluation for air-to-air missiles and precision-guided air-to-ground munitions under the USAF's Weapon System Evaluation Program**

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Mission Statement

COMBAT HAMMER

"**Evaluate the effectiveness, maintainability, suitability, and accuracy of precision guided munitions and high technology A/G munitions from tactical deliveries against realistic targets with realistic enemy defenses.**"

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A/G WSEP Mission

- **End-to-end evaluation**

- **Integral part of AF / DOD life cycle acquisition and sustainment program**

- **Not just ACC…evaluations support AFMC / DOD WRM considerations**
  - **Extensive Program Office liaison**
  - **Symbiotic relationship (Hardware & Software)**

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1986 - 2010

- **Initial charter 1986 - *COMACC PLAN 90, "Air-to-Ground Weapon Systems Evaluation Program"***

- **1986: 9 units / 50 weapons**

- **2010: 17 units / 374 weapons**

- **We own a growth industry**
  - Annual program resource requirements (infrastructure, funding, manpower) increasing in scope commensurate with rapid rise in CAF PGM capabilities
  - Sustained requirement is 20 WSEPs annually with a 22-24 WSEP "surge" capacity in any given year employing 350 weapons

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CAF Air-to-Ground Arsenal

- **B-1B**
  - GBU-31/38
  - CBU-103/4/5
  - AGM-158

- **B-2A**
  - GBU-28/31/38
  - AGM-154A
  - AGM-158

- **B-52H**
  - AGM-86C/D
  - GBU-31/38
  - GBU-12
  - CBU-103/4/5
  - AGM-154A
  - AGM-158

- **MQ-1 Predator**
  - AGM-114
- **MQ-9 Reaper**
  - AGM-114
  - GBU-12

- **A/OA-10**
  - AGM-65D/G/G2/H/K
  - GBU-10/12
- **A/OA-10C**
  - AGM-65D/G/G2/H/K
  - GBU-10/12
  - GBU-31/38/54
  - CBU-103
- **F-15E**
  - EGBU-15
  - AGM-130
  - GBU-10/12/24/28
  - GBU-31/38/54
  - CBU-103/4/5
  - GBU-39
- **F-22A**
  - GBU-32

- **F-16C**
  - AGM-65D/G/G2/H/K/E
  - AGM-88
  - GBU-10/12/24
  - GBU-31/38/54
  - CBU-103
- **F-16CG**
  - AGM-65D/G/G2/H/K/E
  - GBU-10/12/24
  - GBU-31/38/54
  - CBU-103/4/5
- **F-16CJ**
  - AGM-65D/G/G2/H/K/E
  - AGM-88
  - AGM-154A
  - GBU-10/12/24
  - GBU-31/38/54
  - CBU-103/4/5
  - AGM-158

**Today – 12 Platforms
103 weapon system combinations**

CAF Air-to-Ground Arsenal

- **B-1B**
  - GBU-31/38/54
  - GBU-154A
  - CBU-103/4/5
  - AGM-158
  - GBU-39
- **B-2A**
  - GBU-28/31/38
  - AGM-154A
  - AGM-158
  - GBU-28
  - GBU-39
- **B-52H**
  - AGM-86C/D
  - GBU-31/38/54 (FY10)
  - GBU-12
  - CBU-103/4/5
  - AGM-154A
  - AGM-158
  - GBU-39
- **MQ-1 Predator**
  - AGM-114
- **MQ-9 Reaper**
  - AGM-114
  - GBU-12
  - GBU-38
  - GBU-39

- **A/OA-10**
  - AGM-65D/G/G2/H/K
  - GBU-10/12
- **A/OA-10C**
  - AGM-65D/G/G2/H/K
  - GBU-10/12
  - GBU-31/38/54
  - CBU-103/4/5
- **F-15E**
  - EGBU-15
  - AGM-130
  - GBU-10/12/24/28
  - GBU-31/38/54
  - CBU-103/4/5
  - GBU-39
- **F-22A**
  - GBU-32
  - GBU-39
- **F-35**
  - GBU-31/32/38/39
  - AGM-154
  - AGM-158
  - CBU-103/4/5

- **F-16C**
  - AGM-65D/G/G2/H/K/E
  - AGM-88
  - GBU-10/12/24
  - GBU-31/38/54
  - CBU-103
- **F-16CG**
  - AGM-65D/G/G2/H/K/E
  - GBU-10/12/24
  - GBU-31/38/54
  - CBU-103/4/5
  - AGM-154A
- **F-16CJ**
  - AGM-65D/G/G2/H/K/E
  - AGM-88
  - AGM-154A
  - GBU-10/12/24
  - GBU-31/38/54
  - CBU-103/4/5
  - AGM-158

**Future – 13 Platforms
124 weapon system combinations**

A/G WSEP Mission Execution

- **Fighter squadrons deploy to Eglin and Hill AFB**
  - **8-12 jets; one and two week evaluation deployments**
    - **Typical unit 12-18 aircrews; 100-150 people deployed**
    - **Ammo troops up front (2 wks early)**
- **Bomber / RPA squadrons execute from home station**
- **Hammer constructs realistic scenarios**
- **Weapons, platforms, and targets "instrumented"**
- **Hammer collects data, conducts analysis, and determines weapon system effectiveness**

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Ranges and Targets

- **Eglin (35%)**
    - **High humidity / green environment**
    - **Shoot cones more restrictive / limited airspace**
    - **High / slow speed moving targets**
    - **Urban CAS villages**

- **UTTR (65%)**
    - **Desert / barren environment**
    - **Permissive shoot cones / high altitude**
    - **Urban CAS village**
    - **High / slow speed moving targets**

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Ranges and Targets

~10 miles

Perfecting Lethality

Ranges and Targets

~10 miles

EGLIN RANGES

Hill AFB

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Ranges and Targets

MOVER
CIRCLE

APC
CONVOY

URBAN VILLAGE
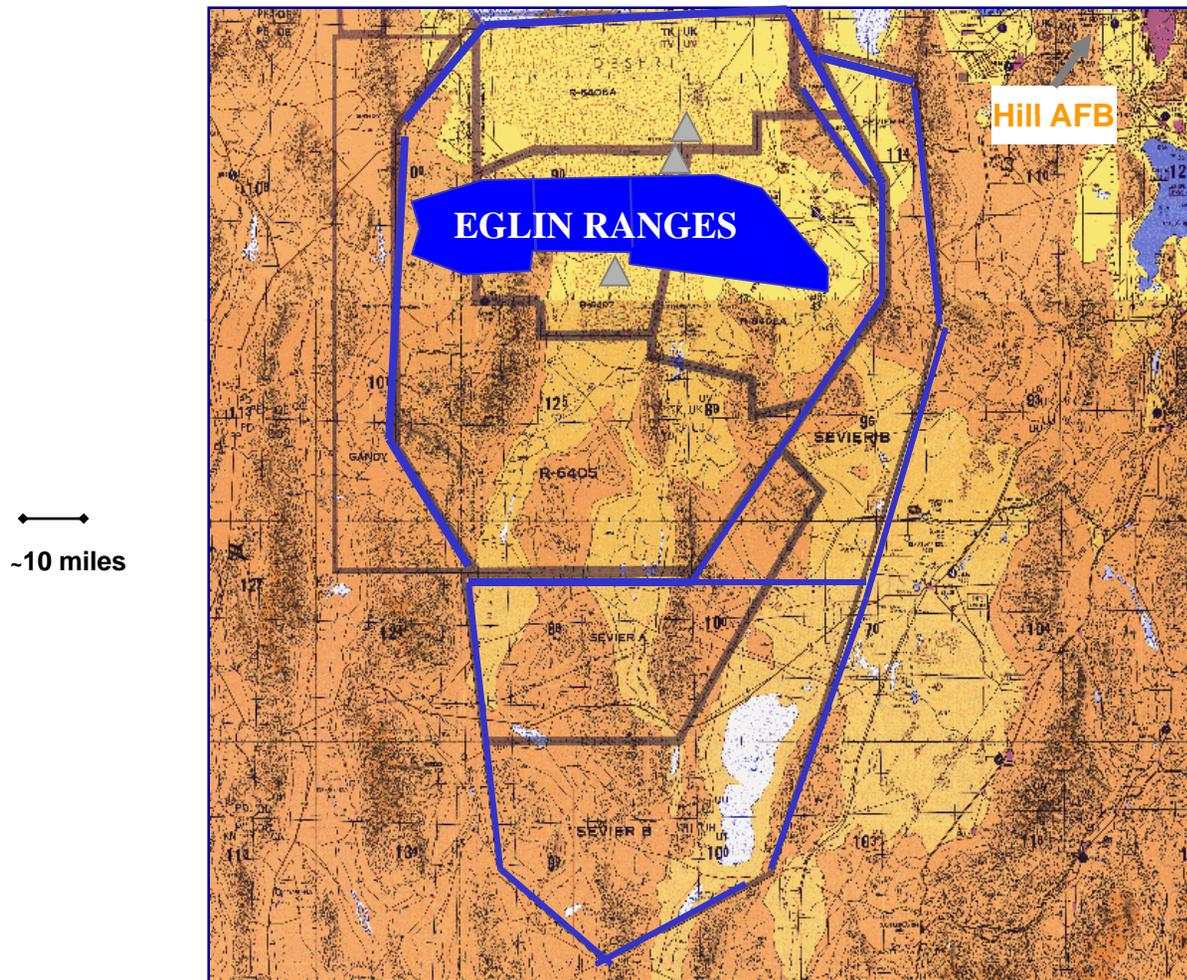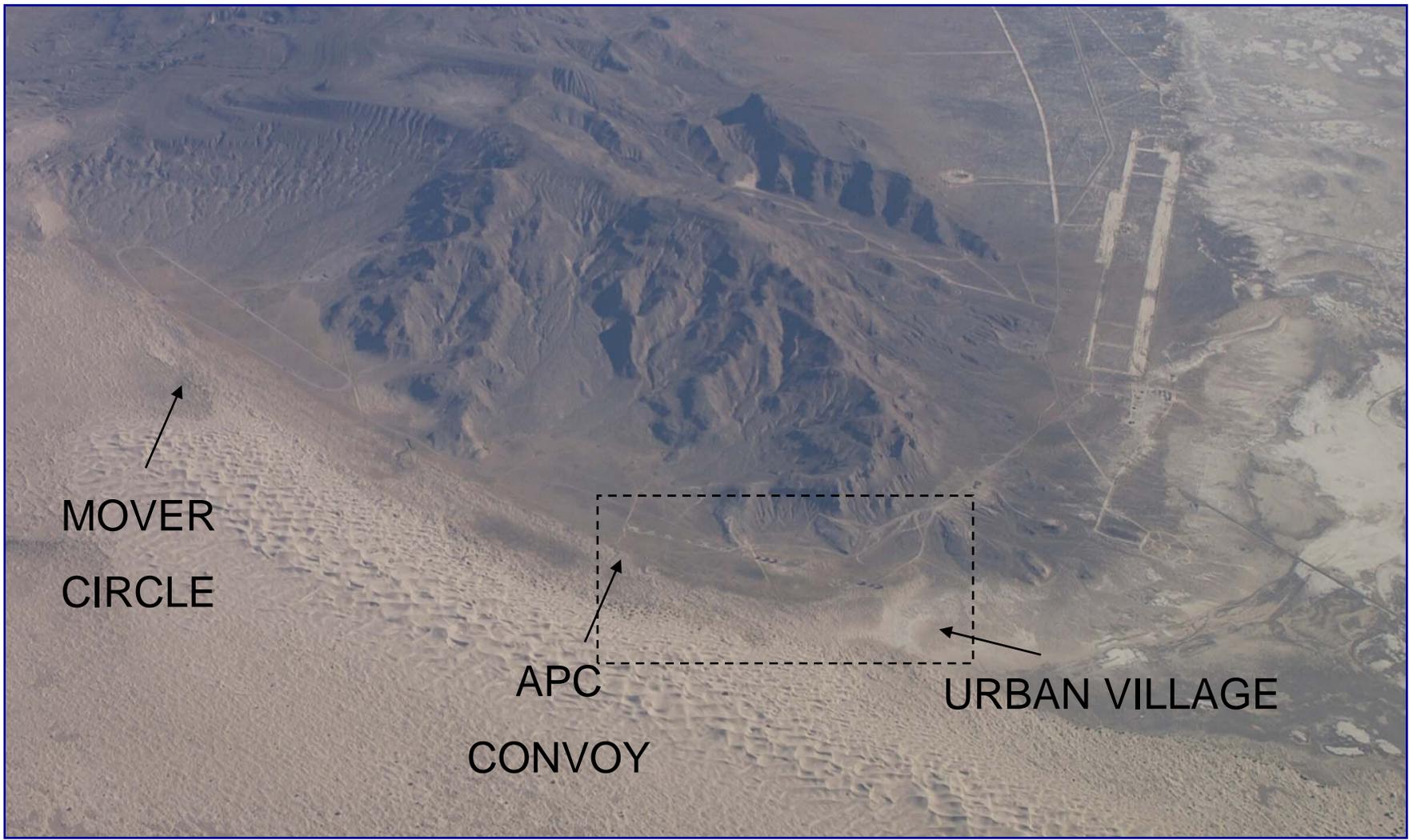
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Ranges and Targets (Caves)

A/G WSEP 10-12
366 FW / 391 FS

Hammer 15A
Day 1
GBU-15V1 C/B (TV)

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Ranges and Targets

Perfecting Lethality

Ranges and Targets (Geckostan)

A/G WSEP 10-11
355 FW / 354 FS

Hammer 22A
Day 2
AGM-65G2

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Ranges and Targets

Perfecting Lethality

Ranges and Targets (Hammer Pads)

A/G WSEP 10-15
20FW / 79FS

Hammer 13A
Day 3
GBU-10

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Ranges and Targets

Perfecting Lethality

Ranges and Targets
(Mover Track)

A/G WSEP 10-11
355 FW / 354 FS

Hammer 21
Day 2
Strafe

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Ranges and Targets
(High Speed Mover)

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Ranges and Targets (HARM)

A/G WSEP 10-15
20FW / 79FS

Hammer 13A
Day 1
AGM-88

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Instrumentation / Data Collection

- **Time / Space / Position / Information (TSPI)**
  - **Radar Tracking**
  - **Global Positioning System (GPS)**
  - **A/C AVTR / DVS**

- **Telemetry**
  - **Used to the maximum extent possible**
  - **Assess weapon performance--launch to impact**
  - **Paveway / AGM-130 exceptions**

- **Improve Laser Tracker (ILAST)**
  - **Measures Laser Designator Performance**
    - **Power Output, Spot Stability, And Spot Position**
    - **Boresight Check**

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Instrumentation / Data Collection

- **Videometric Analysis System (VMAS)**
  - Measures weapon impact conditions
  - Impact angle, bomb body yaw, and impact position

- **Effects (LPA)**
  - Video record of target condition - before / after
  - Video record of munitions impacts relative to DPI / DMPI

- **Chase Aircraft**
  - Assess tactics and weapon performance post release
  - Ensures range safety
  - Fills in where no telemetry available
  - Desired - not required

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Challenges

- **Realistic Targets**
  - 5th Gen sensor integration needs emitting / CCD / jamming
- **Air to ground range encroachment**
  - Airspace availability
  - Frequency conflicts
  - UTTR viability / funding
- **Weapons**
  - Large footprint
  - Limited quantities of several wpns
  - Telemetry availability ($)
- **Funding**

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53^D Weapons Evaluation Group

Integrity - Service - Excellence

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A/G WSEP Overview

- **Formed in 1985 by TAC/CV**
  - **No capability to operationally assess PGMs**
  - **Verify combat capability on annual schedule**

- **Objectives**
  - **Evaluate the total A/G weapons system**
    - **Reliability, maintainability, accuracy**
    - **Deficiencies and causes**
  - **Provide recommendations to CAF and HHQ**
  - **Enhance operational training - 50% 1st time shooters**

- **Evaluation Results**
  - **PGM Probability of Success (P_s) & Probability of Hit (P_h)**
    - **Storage-to-Impact**
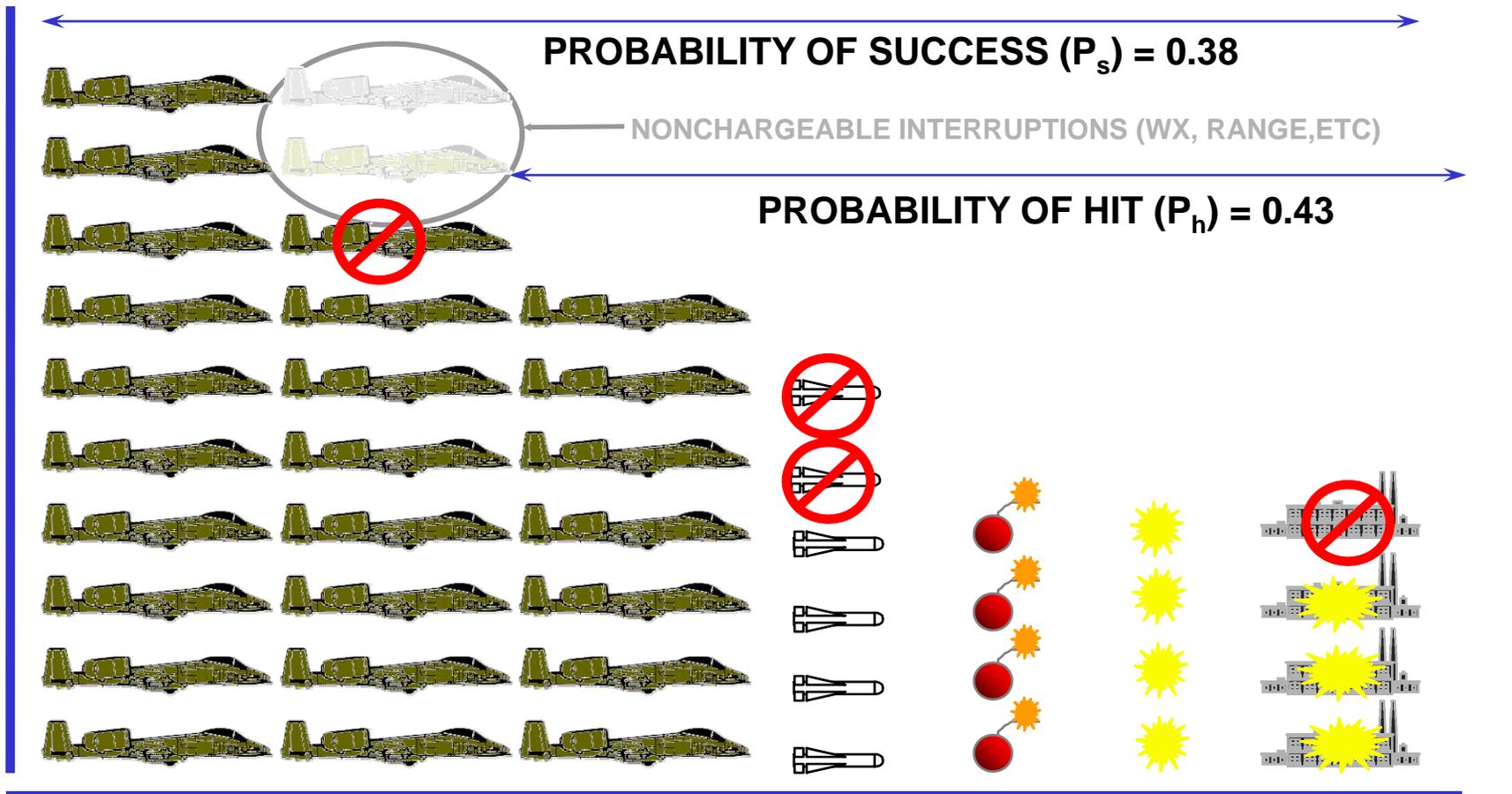 - **Data collection**

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Statistical Analysis

- **8 Evaluation Phases**
  - **Munitions Buildup**
  - **Ground, Enroute**
  - **Employment, Guidance, Fuzing, Warhead, Target Damage**
- **Probability Of Success**
  - **Encompasses All Phases Except Munitions Buildup**
- **Probability Of Hit**
  - **Encompasses Last 5 Phases**
  - **Probability Of Target Damage Given The Opportunity To Employ**
- **Non-chargeable Interruptions**
  - **Weather, Range Closure, TM Failure**

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Statistical Analysis

PROBABILITY OF SUCCESS (P_s) = 0.38

NONCHARGEABLE INTERRUPTIONS (WX, RANGE, ETC)

PROBABILITY OF HIT (P_h) = 0.43

GROUND		ENROUTE		EMPLOYMENT		GUIDANCE		FUZING		WARHEAD		TGT DAMAGE	
10/10		7/8		6/7		4/6		4/4		4/4		3/4	
1.0	X	.88	X	.86	X	.67	X	1.0	X	1.0	X	.75	= .38

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Statistical Analysis

- **As defined by COMACC Plan 90:**
    - **80% Confidence Level**
    - **10% Accuracy Level**
    - **80% chance Hammer probabilities will be replicated in the real world ($\pm$ 10%)**

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Statistical Analysis

- **Can't meet statistical significance all the time**
  - **Currently 103 Different Weapons System Combinations**
  - **Goal Achievable Over 5 Year Period (7-10 Wpns per Yr)**

- **Confidence Level Does Not Differentiate Between:**
  - **Different Delivery Parameters**
  - **Environmental Factors**
  - **OFP Changes**
  - **Scenario**

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Combat Hammer Charter

- ***EMPLOY* A/G PGMs and High Technology Weapons**
  - **A/G WSEP "COMBAT HAMMER"**
  - **Investigative Firing Program**

- ***ASSESS/VALIDATE* Combat Capabilities**
  - **Total Weapons System**
  - **"Storage through impact"**
  - **Ops units, combat realistic scenarios, and realistic threat replication**

- ***IMPROVE* A/G PGM Effects**
  - **Telemetry**
  - **Recommend changes**
  - **Maintain comprehensive database**

- ***PROVIDE* PGM expertise on demand**
  - **"ON-CALL" capability**

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