

# Enhancing Readiness Through System Safety Engineering

Presented by:

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System Safety Manager's

US Forces – Afghanistan (UAFOR – A)

USFOR – A Safety Directorate, NKC Kabul

CYs 2011 - 2012

*KHOSTAN TAWANESTAN... "WE CAN, WE WILL"*

Presented to Washington D.C. Chapter of  
the International System Safety Society

: August 2016

# Could this be a future Job Category...?

## “Forward deployed System Safety Engineers (SSE) to enhance readiness”



# USFOR-A Safety Mission

- Promote, Sustain, and Enhance the Force by providing a safe and healthy environment for Soldiers, civilian employees, and contractors.
- Foster a culture where Safety and Occupational Health (SOH) are enablers of Service Member readiness and quality of life.
- Train, develop, and **deliver leading edge safety services to USFOR-A** Soldiers, civilian employees, and contractors.

## System Safety Mission (proposed):

- Enhance safety of the Warfighter through proactive system safety engineering assessments of new or incoming weapons and systems
- Conduct post-mishap assessments of weapons and systems to develop, or input into, engineering solutions
- Respond to DoD / CAE System Safety Authority's requests for safety of systems of interest

# Safety Functional Areas at USFOR-A

- Aviation Safety
- Ground Safety
  - Tactical/Operational
  - Garrison
- Explosives Safety
- Range Safety
- *System Safety*

Typical safety functional areas for deployed staffs, with the exception of System Safety

# USFOR-A System Safety Staffing

- USFOR-A Operation Enduring Freedom (OEF)
  - Combat System Safety Engineer (CSSE) Personnel:
    - Dr. Tom English (HQ) FY 11; Mr. Demmick (HQ) FY 12; Ms. Peggy Rogers (HQ) FY13;
    - No system safety replacement beyond 2013 for OEF
    - Limited geographic COCOM SSE's Worldwide at this time
      - USSOCOM has established a full-time SSE position
      - FORSCOM has a SSE representative providing Reach-back to OEF in absence of full time SSE's at USFOR-A

# System Safety Management

## System Safety Engineering:

Application of scientific and engineering principles, criteria, and techniques to identify and eliminate, or mitigate, safety hazards and manage the residual risk in system designs

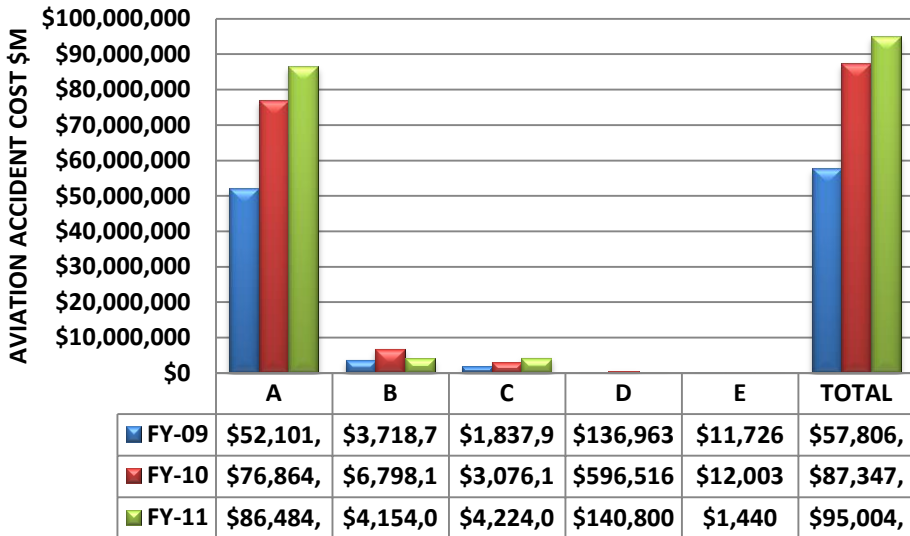
- USFOR-A SSE:
  - SS Manager for all US Forces within the CJOA-A
  - Monitor mishaps, conduct root cause assessments, and archive information
    - Assess Safety mishaps and accident trends
    - Analyze use of systems, and safety design changes
      - Reduce mishaps & improve availability, reliability, and sustainability
    - Recommend feedback loop to Acquisition PM with system metrics, etc.
    - Communicate design safety issues with weapon system Life Cycle Managers
  - Supports liaison, as needed for:
    - Service Program Managers / Service PFSs
    - DASN System Safety Manager
    - DoD Service System Safety Authorities

Duties and Responsibilities of SSE would be similar for all forward deployed staffs.

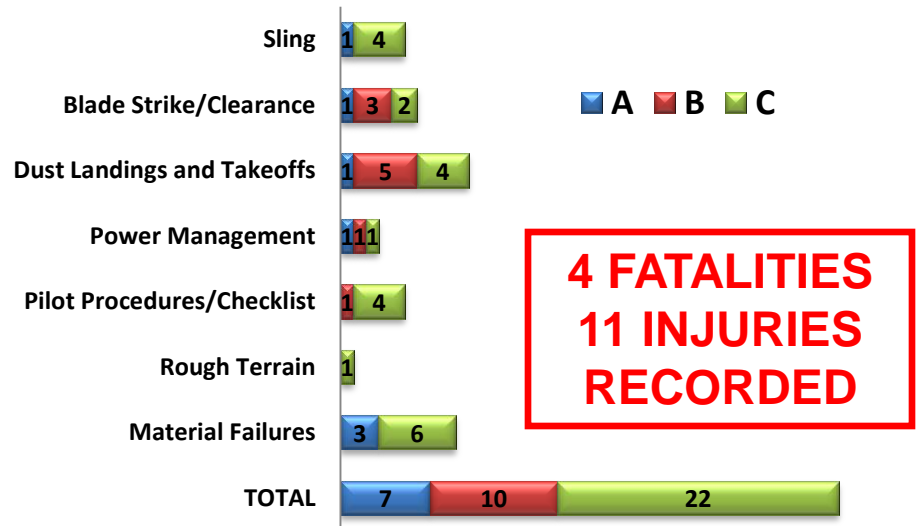
# AVIATION ACCIDENTS BY FY, COST, CLASS, & CATEGORY

## AVIATION ACCIDENT TRENDS

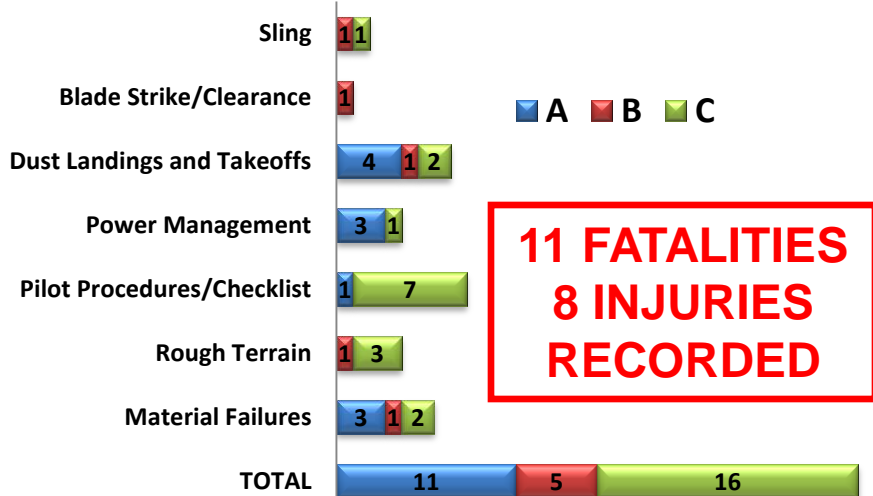
### BY COST FY-11



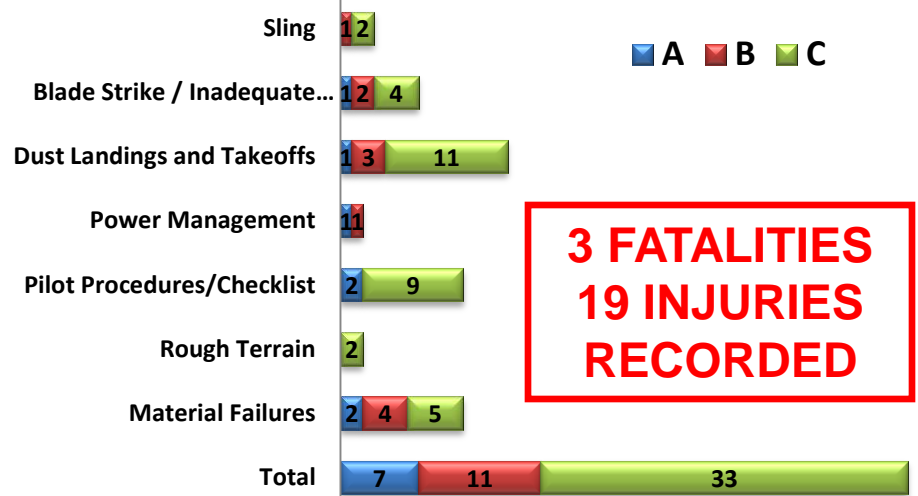
### ACCIDENTS BY CLASS & CATEGORY FY-09



### ACCIDENTS BY CLASS & CATEGORY FY-10

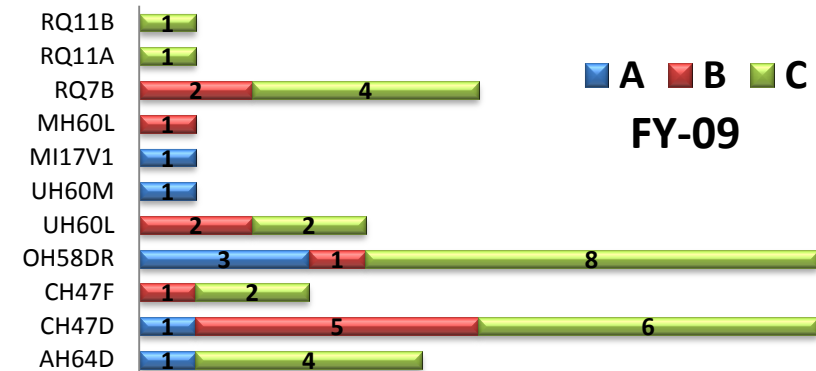


### ACCIDENTS BY CLASS & CATEGORY FY-11

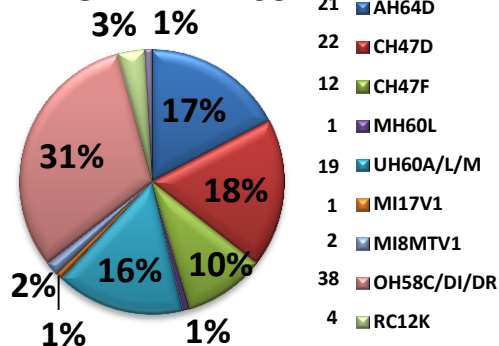


NOTE: STATS FROM USFOR-A-SAFETY & RMIS DATA

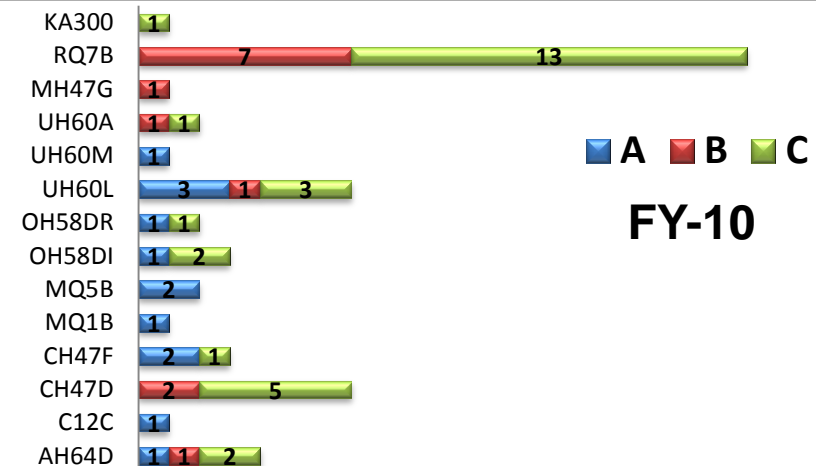
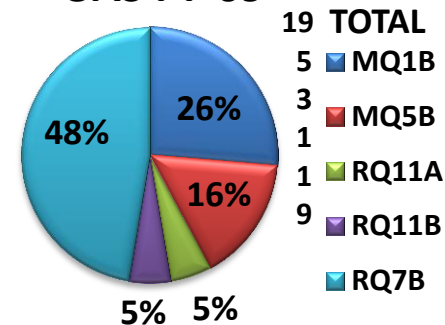
# AVIATION ACCIDENTS BY FY, AIRFRAME, & CLASS



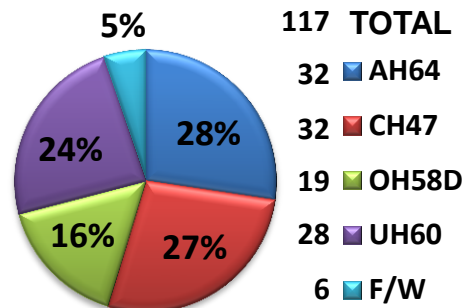
**AIRCRAFT FY-09**



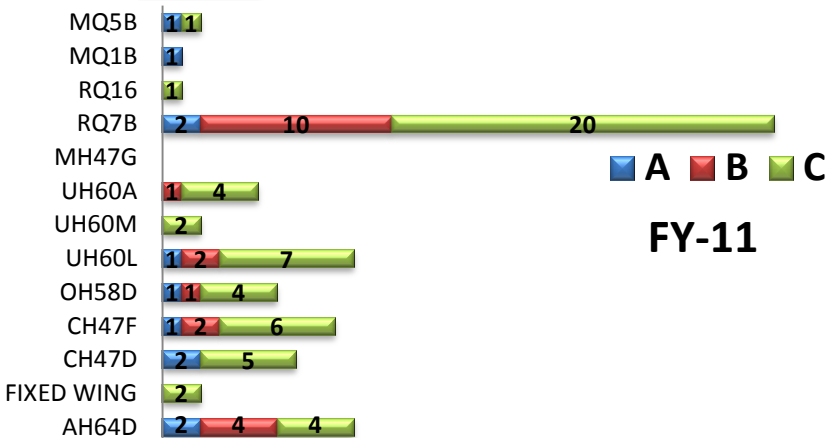
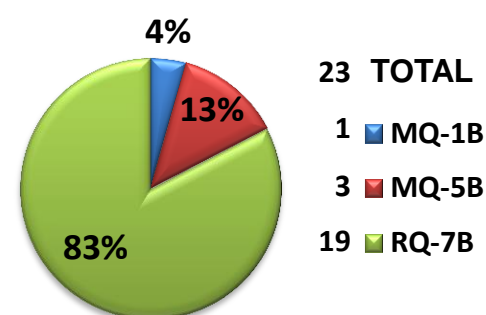
**UAS FY-09**



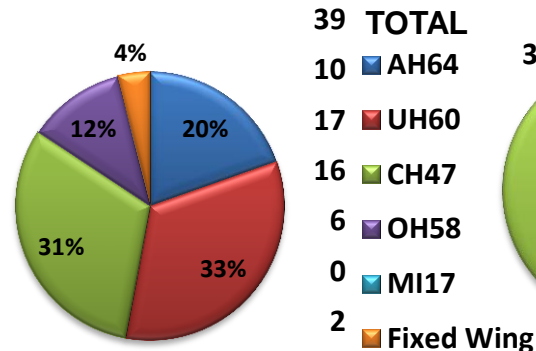
**AIRCRAFT FY-10**



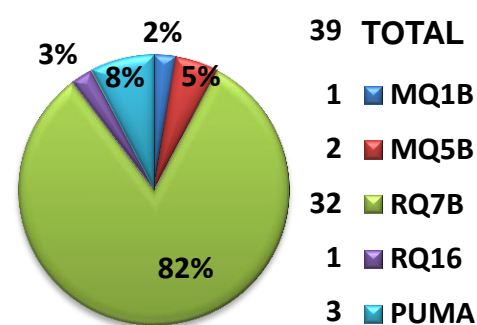
**UAS FY-10**



**AIRCRAFT FY-11**



**UAS FY-11**



NOTE: STATS FROM USFOR-A-SAFETY & RMIS DATA



# System Safety Management

- Accomplishments

- USFOR-A System Safety has become a resource to USFOR-A Acquisition Advisor (J-3) supporting validation of new incoming systems safety statements and risk analysis

- Challenges & Recommendations

- The nature of the UNS fielding process introduces limited analytical data
- No evidence [*in the field*] that the PM or PEO has accepted safety risk up to the point of fielding (Required per DoDI 5000.02 and MIL-STD-882E)
- Limited analytical information for developing a Theater-based safety recommendation to the DCDR-S
- Timeline between receipt of new systems and DCDR-S acceptance of safety risk is very short
- System safety expertise/capability needs better positioning
  - Position presently assigned to the Theater Safety office -- Not optimum for Engineering
    - Good place to observe Combined Joint Operations Area – Afghanistan (CJOA-A) Trends, but outside of the mainstream chop chain
  - Recommend SSE be organizationally placed on J3 staff
- Limited system safety reach-back to expert resources/support

# System Safety Management

- Initiatives

- Enhanced capture of lessons learned

- CIDNE Database modification to capture System Design shortfalls that may have contributed to SIGACTS
    - Need a lot more work in this area... Requires close coordination with Service Safety Centers

- In Theater System Safety Analyses

- Persistent Surveillance Systems (PSS)
    - RQ-7B
    - CROWS II
    - MRAP 7.62 Ammo Cook-off Incident
    - Mortar Base Plate cracking
    - Man-Portable Line Charge (MPLC)
    - Roadmaster Direction Finding System
    - MaxPower
    - Bistatic Surveillance System
    - XM1156 Precision Guidance Kit

- System Safety DSOC Initiatives

- DSOC initiatives were funded to develop new policy, procedures, and tools for a system safety engineer on Combatant Command Staffs

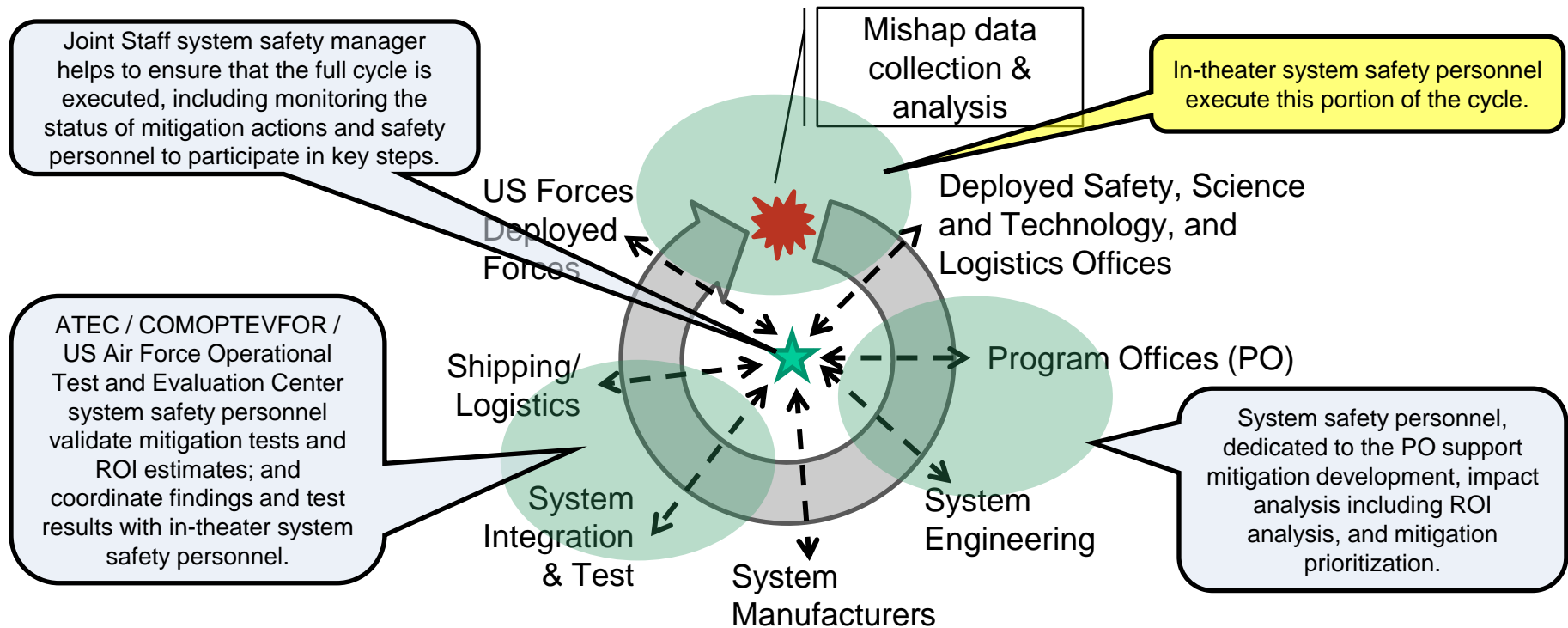
# CSSE Future / Vision

- Recommendation
  - One CSSE at each geographic COCOM
    - Monitor Theater mishaps for trends
    - Travel to mishap sites, gather real-time SA, and interview Users at time of mishap
    - Analyze weapons or systems involved in mishap
    - Provide safety engineering input to safety report and back to Program Office or ISEA
    - Member of pertinent AIB's for that COCOM

# CSSE Management

- In addition to in-theater CSSEs:
  - Senior SSE coordinator / manager:
    - Location- probably Pentagon, possibly the JS (J3, J4, or J8)
    - Oversight / Coordination of all CSSE's at COCOM's
    - Policy development; Guidance; Briefings; etc.
    - Integrate with FORSCOM / CFFC / Air Combat Command / USMC & Service[s] Safety Organizations
    - Manage an end-to-end IT system and processes that analyze mishap data to prioritize allocation of safety technology insertion-
      - Synchronize safety with other priority areas e.g. survivability, reliability, etc.

# CSSE Future Vision for the Complete Hazard Mitigation Cycle



- Efficacy of the cycle:
  - Depends on IT tools to capture, track and leverage data (DSOC funding prototype.)
  - May depend on the reporting hierarchy of the various safety personnel executing the cycle.
- Personnel to execute the cycle will/may:
  - Comprise an adjustment of the activities of existing personnel,
  - Require augmenting safety staff to handle the additional load,
  - Include new, specialized roles performed by new especially trained personnel.

# Questions?



# **Back Up Slides**



# CSSE In Action





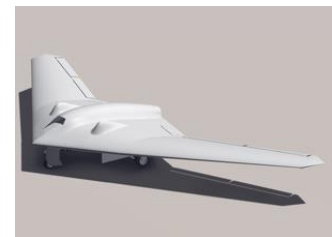
# Why We Pay Attention!



COMMON  
UNMANNED  
ARIAEL VEHICLES  
(UAV) USED IN  
CJOA-A



- **MQ-1 Predator**
  - **MQ-1C Grey Eagle**
- **RQ-4 Global Hawk**
  - **RQ-5 Hunter**
- **RQ-7 Shadow**
  - **MQ-9 Reaper**
- **RQ-11 Raven**
  - **RQ-170 Sentinel**
- **Scan Eagle**
  - **MQ-8 Fire Scout**
- **PUMA**





# MATV Round Cook-Off In Cab



# Mortar Base Plate Cracks





# MRAP Roll-overs



# What's Wrong with this Picture?





# What's Wrong with this Picture?

*Ammunition Magazine*



# Most of the Wait Time...

