Aviation Safety
A Journey of Knowledge, Commitment and Leadership

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Aviation Policy & Requirements

- Two directives define the essential standards and organizational structure for aviation activity
  - Safety requirements set here fall outside the Agency's safety organization
  - Agency Safety requirements are largely framed around large space-based programs
- Monetary provisioning is fractured being driven by diverse programmatic needs from space access/exploration, earth science and aeronautics.
  - Generates a resulting need to offset institutional costs with reimbursable work.
  - Works counter to an institutional asset view of the fleet. Sum of all programmatic funds does not meet the institutional needs to sustain a fleet of operators/maintainers and aircraft
  - In-house competition aggravates the problem.
- Culturally the community largely sees each of 7 flight operations as
  - "unique" both in how they conduct operations and perform/document maintenance.
  - Unwilling to accept the possibility that they are more deficient than the standard requires (essential flexibility)
  - Headquarters' Aircraft Management Division viewed as an impediment to Centers

Organizational Structure

- Headquarters Aircraft Management Division, small office that
  - Is assigned under the Institutional Support Associate Administrator
  - Ensures compliance with public law from everything from airframe airworthiness certification to lawful use of a “public” aircraft.
  - Leads interagency executive team consisting of the Directors of Flight Ops that self inspects and collaborates on policy and standards for the community.
  - Leads team of NASA program executives with Flight Directors to manage future aircraft utilization of the agency.
    - Recent managerial concept met to overcome the community’s perceived unwillingness to make difficult calls to reduce redundant capacity

Watershed Event -2001

- Learjet Model 24 Landing Accident – Loss of asset/ No injuries
- Three Personnel on board (Pilot, Copilot and Observer)
- Aircraft entered a lateral PIO during flare that resulted in a hard landing
- Analysis by board with lead outside the Center indicated
  - Lack of adherence to currency and qualification standards
  - Aircraft inexperience on the part of the PIC and copilot
  - Failure of the PIC to detect a deteriorating situation and recover the aircraft
  - Inappropriate Management Oversight
    - Failure of Management to establish procedures
    - Failure to adhere to standards
- Events are Opportunities (some are thrust upon us and others need seizing)

Corrective Actions

- Required documentation of training
- Outlined specific training events ground, simulator EP, written exam checkout flights and checkride and solo flights
- Established when flight with IP required
- Requal required after 1 year of non-currency
- Instituted supervisor responsibility ensure appropriate daily crew composition based upon risk factors.
- Prohibited aircrew from performing duties for which a documented program is not completed except via waiver
- Define qualifications and ensure adherence to OPM hiring standards

Personnel Actions

- Replaced several of the managers with the Flight Ops Chain of Command
- Replaced the Chief of S&MA with a pilot
- Created an independent Aviation Safety Management position within Safety & Mission Assurance Directorate (outside the flight operations)
  - Aviation Safety Officer still assigned within flight ops
  - Given direct access to Center Director
- Reassigned Aviation Safety Officer

First two years

- First day a close call occurs
  - Opportunity or challenge?
- Establish policy and procedures for an active program
  - Challenge- Assign responsibility while retaining cooperative approach
- Trained as a pilot
- Reinvigorate Investigation program
  - Less catastrophic events were ignored
    - Data collection hap-hazard
  - Success (no major mishap) meant good enough
  - Shift perception of where the gold lies

Aviation Safety Program Structure

- Three Key Elements
  - Leadership
  - Planning
  - Risk Managements
- Stakeholders forum – Aviation Safety Council
  - serves the Director of Flight Ops
  - Reviews metrics
  - Recommends actions
  - Develops 1 year tactical plan
  - Assess impact of interim events
  - Conduct and procure training

Aviation Safety Council

- Heavily Maintenance in membership
  - Practitioners with little time for bureaucracy (aircrew similar)
  - Included Chief of Maintenance
- Flight Operations forum chartered to bring solutions
  - Largely perceived as an organizational extension of the Safety Organization
  - Expanded membership to include a project management representative
  - Rotated lead with other members of Aviation Safety Management Team
- Working to make forum effective
  - Ownership is essential
  - Need mechanisms to move toward short-term solutions quickly
  - Ultimately enables cultural changes for the the long haul

Intervening years -significant events/forces

- Loss of Helios (UAV)
- Loss of the X-31
- Kingair Stall from excessive icing (all contractor crew)
- Shift from Aeronautics to Earth Science/reimbursable work
  - Multiple projects competing for resources (manpower and time)
- Addition of SOFIA program (747 and 750 flight hours a year all at night)
- Implementation of common IT based maintenance management system
  - ER-2 Regulator failure is catalyst event
  - Shift from a multiple informal processes to a uniform process with experts from all disciplines

Significant Changes

- Incorporation of a fatigue risk management tool
  - Manage high demands of multiple projects for extended operations at home and abroad
    - Flight Doc created matrix/directive based upon Canadian tool
    - Targets both aircrew and maintenance personnel
    - Acknowledges common Human Factors Fatigue aspects (duty day, night operations, continuous successive days of operation, crew rest, time zones shifts, etc..)
  - Conflicts with the efficiencies gained by use of overtime
  - Matrix becomes a toll to evaluate the risk
    - May lead to an acceptance of an elevated risk by management
  - Enables aircrew and maintenance to counter pressures from projects

Significant Thrusts

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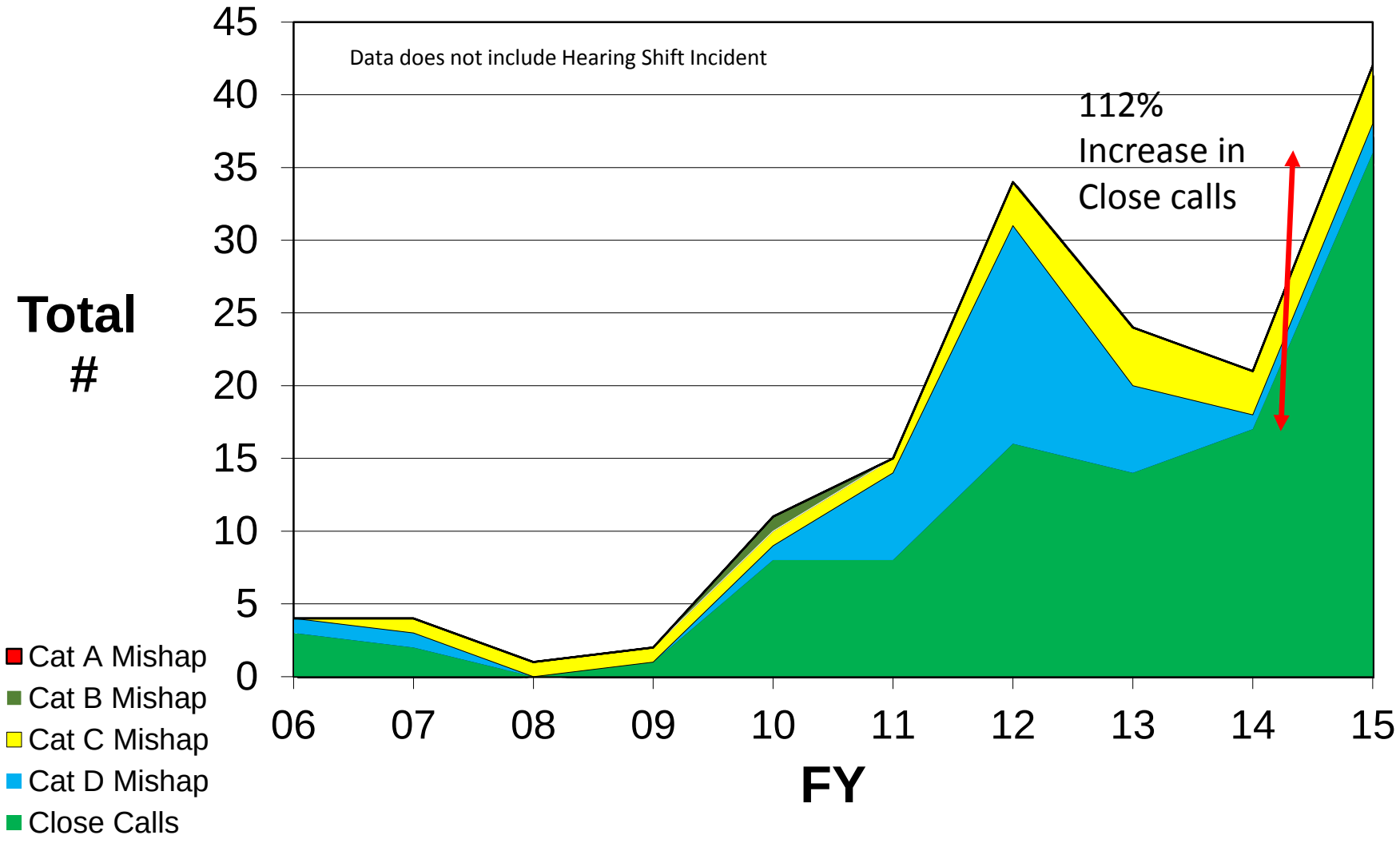
    - May lead to an acceptance of an elevated risk by management or specific hazard
  - Enables aircrew and maintenance to counter pressures from projects

Significant Thrusts

- Development and management of hazard portfolio
  - Recognizes the continuous need to mange risks as operational and factors change (addition of new aircraft, significant project expansion, etc…)
  - Provides for management acceptance of risk
  - Records history of implemented and proposed mitigations
  - Records history of precursors and events that signal hazard manifestation
- Progress slow and buy-in is essential
- One more activity that requires considerable effort to see the benefit
  - Time is the limiting resource

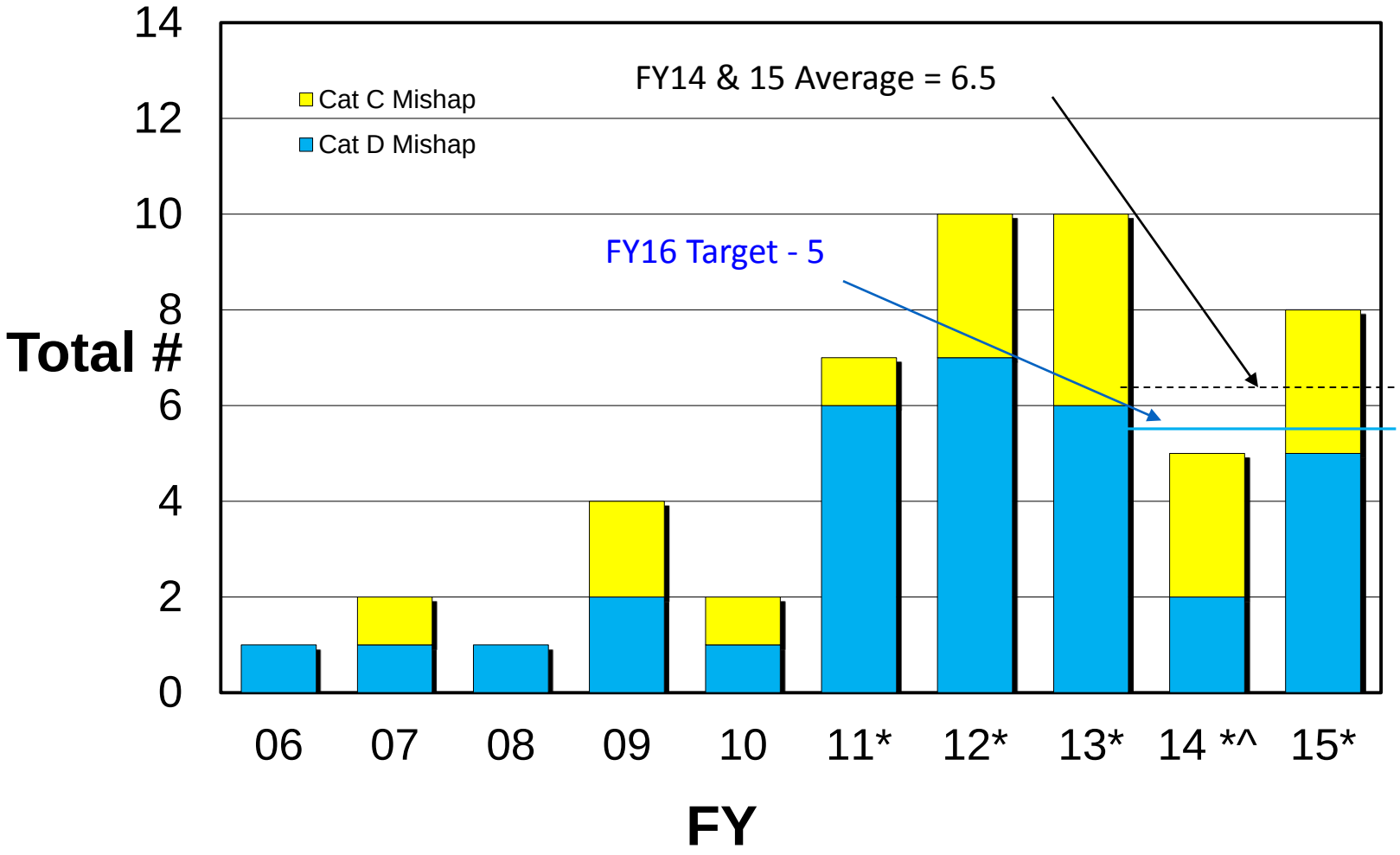
Aviation Mishap/Close Call Trends



Goal - Zero

Target -- 25% Reduction from 2 year Average

Aviation Mishap (Type C & D)



* Includes injury data (excludes hearing loss)

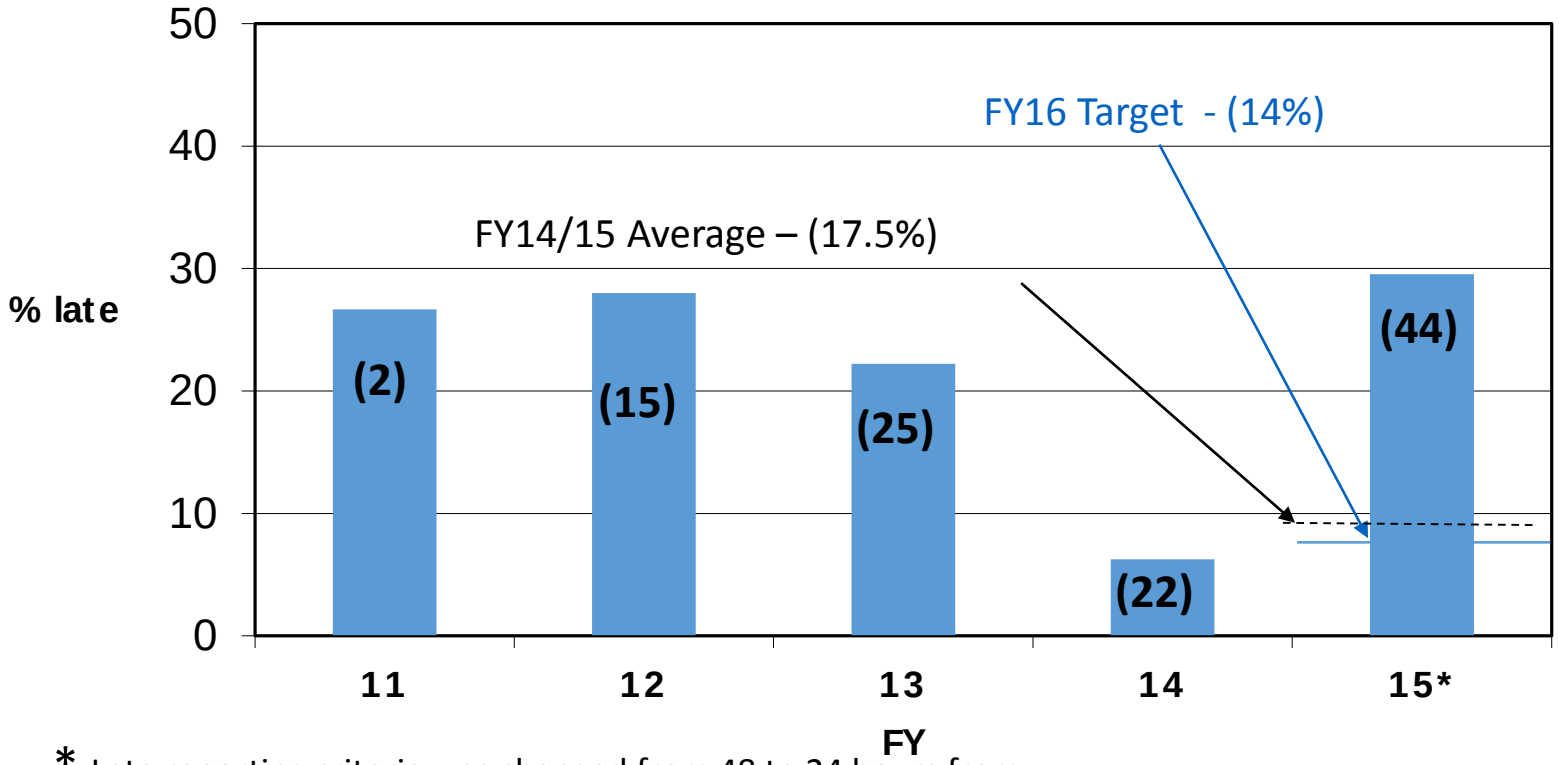
^ Type D threshold increased from $12K to $20K in FY14 and on

Incident Reporting

Goal - Zero

Criteria: Reported within 24 hours

Target -- 20% Reduction from 2 year Average



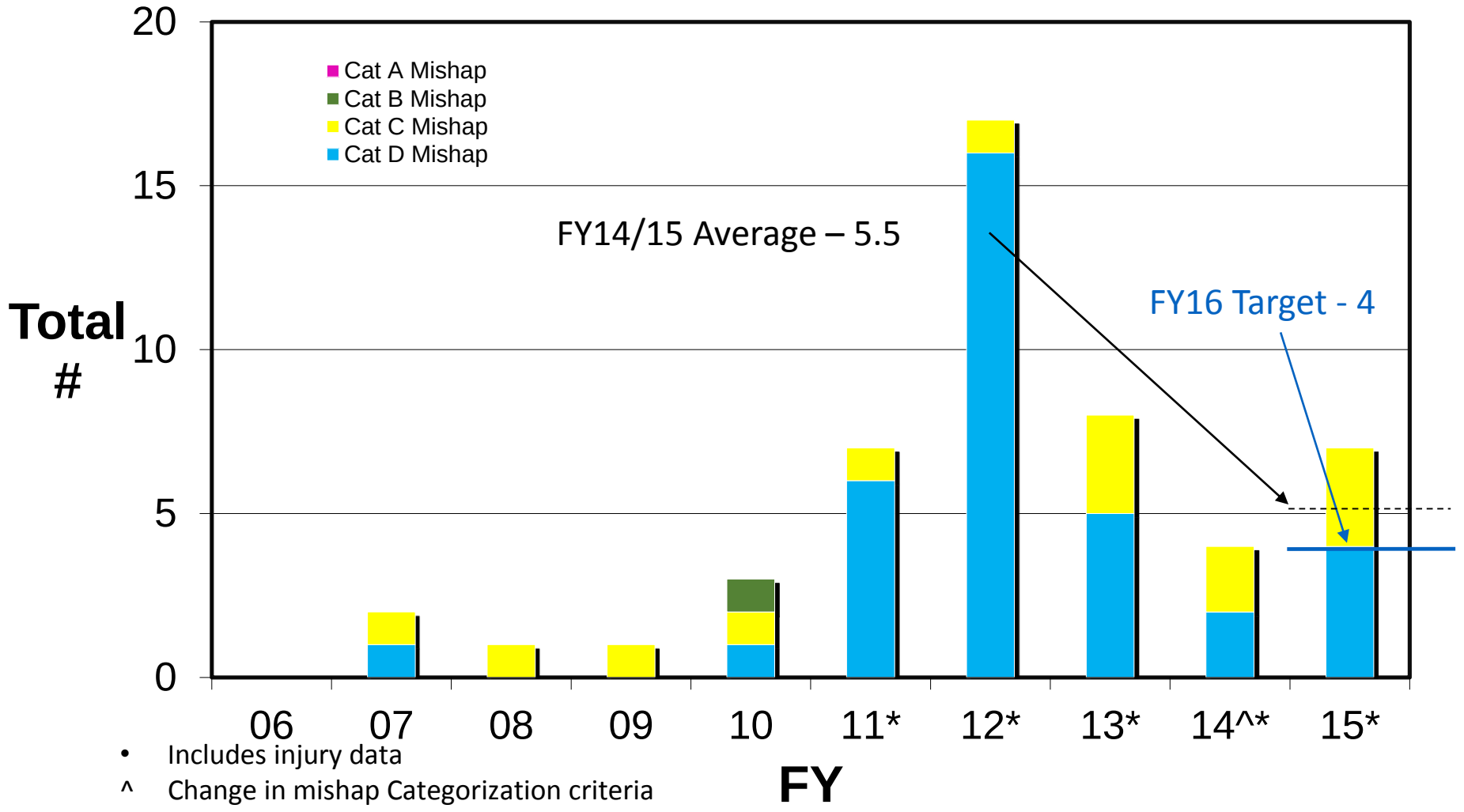
* Late reporting criteria was changed from 48 to 24 hours from incident occurrence

(7) Total Reportable

Goal - Zero

Target -- 25% Reduction from 2 year Average

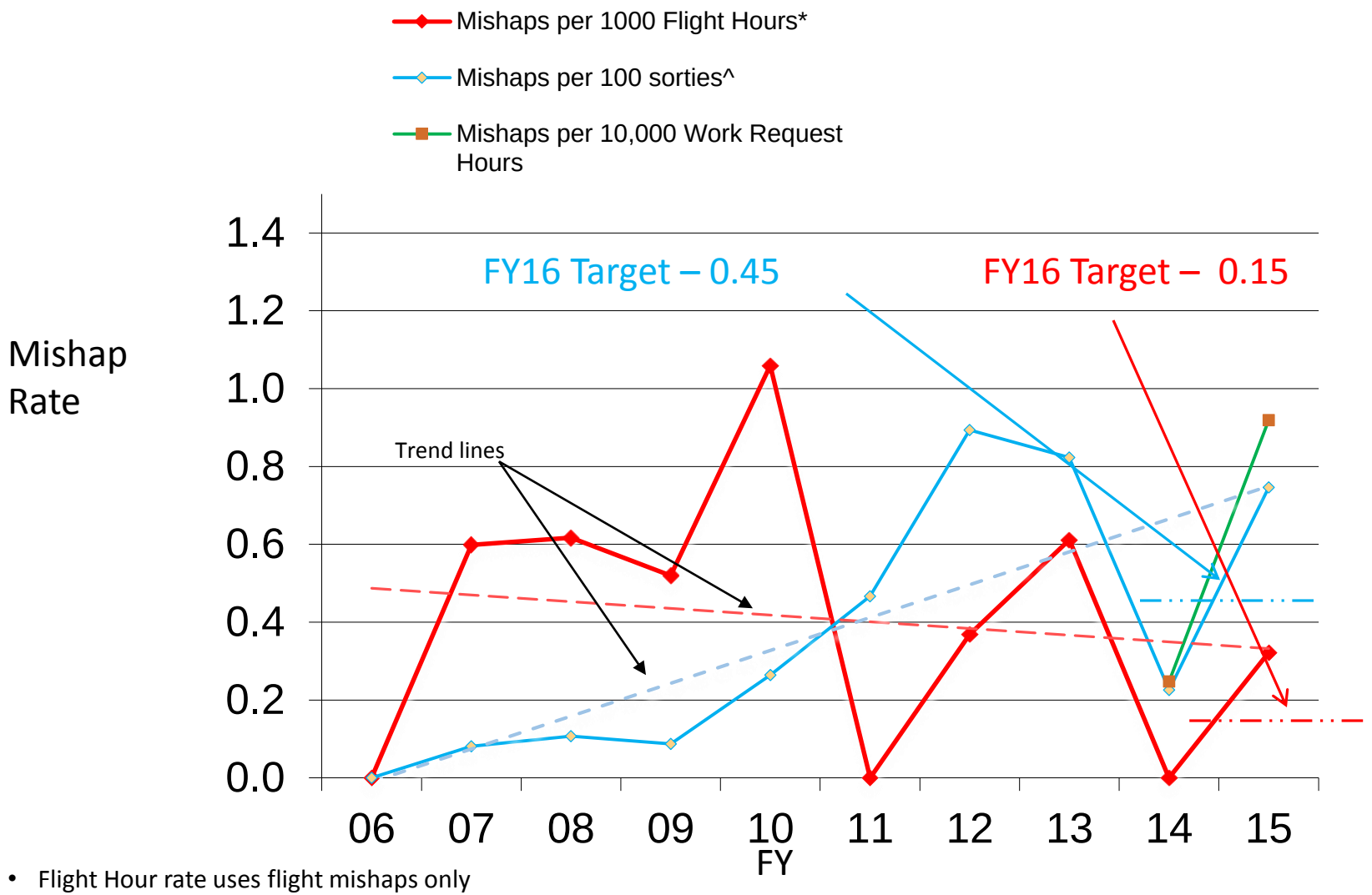
Aviation Ground Mishaps



- Includes injury data
- ^ Change in mishap Categorization criteria

10 % Reduction from previous year

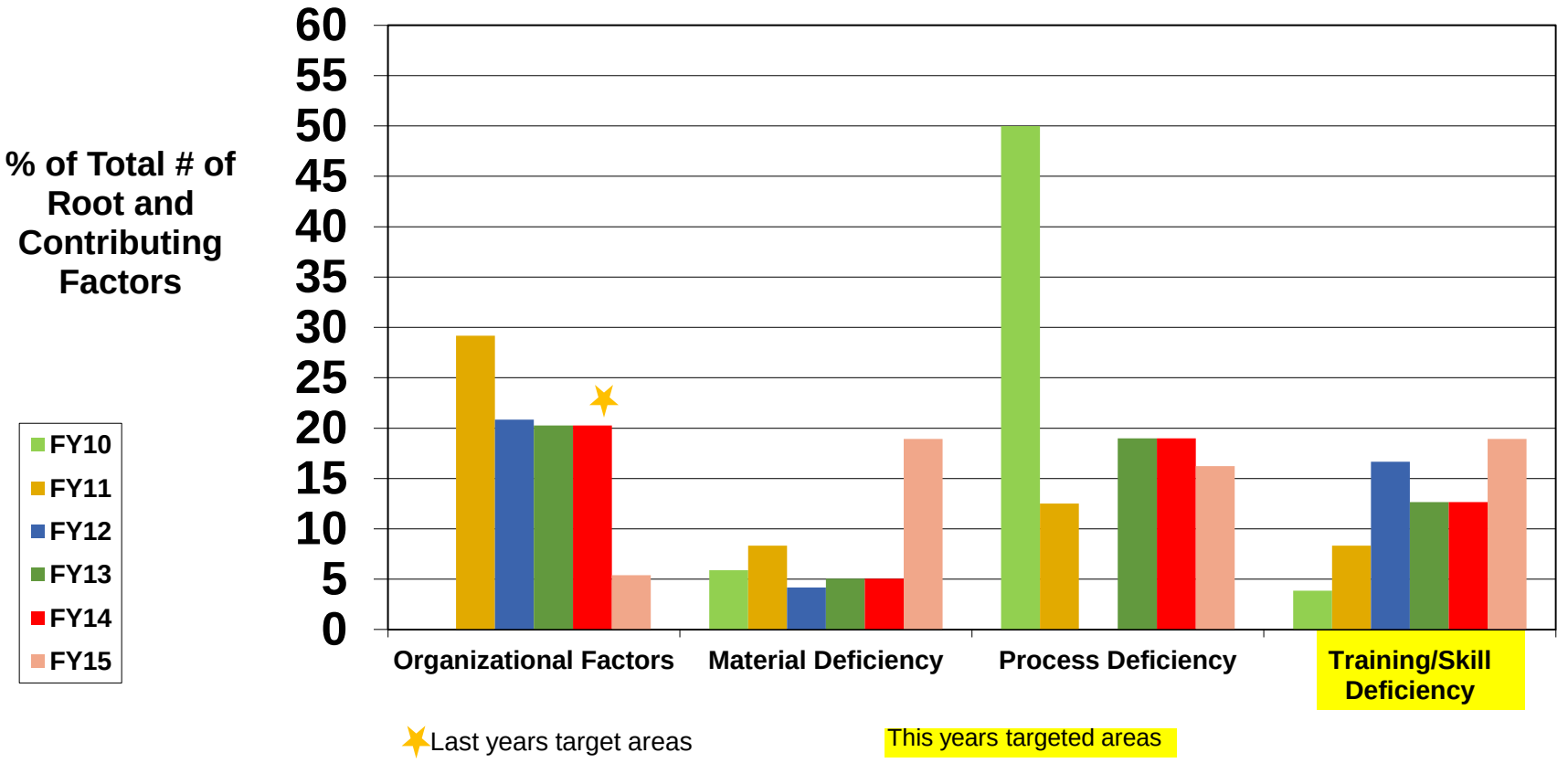
Aviation Mishap Rate



- Flight Hour rate uses flight mishaps only

^ Sortie and Work Request Hour Rates use ground mishaps only

Incident* Finding Breakout



* Includes Mishaps and Close Calls

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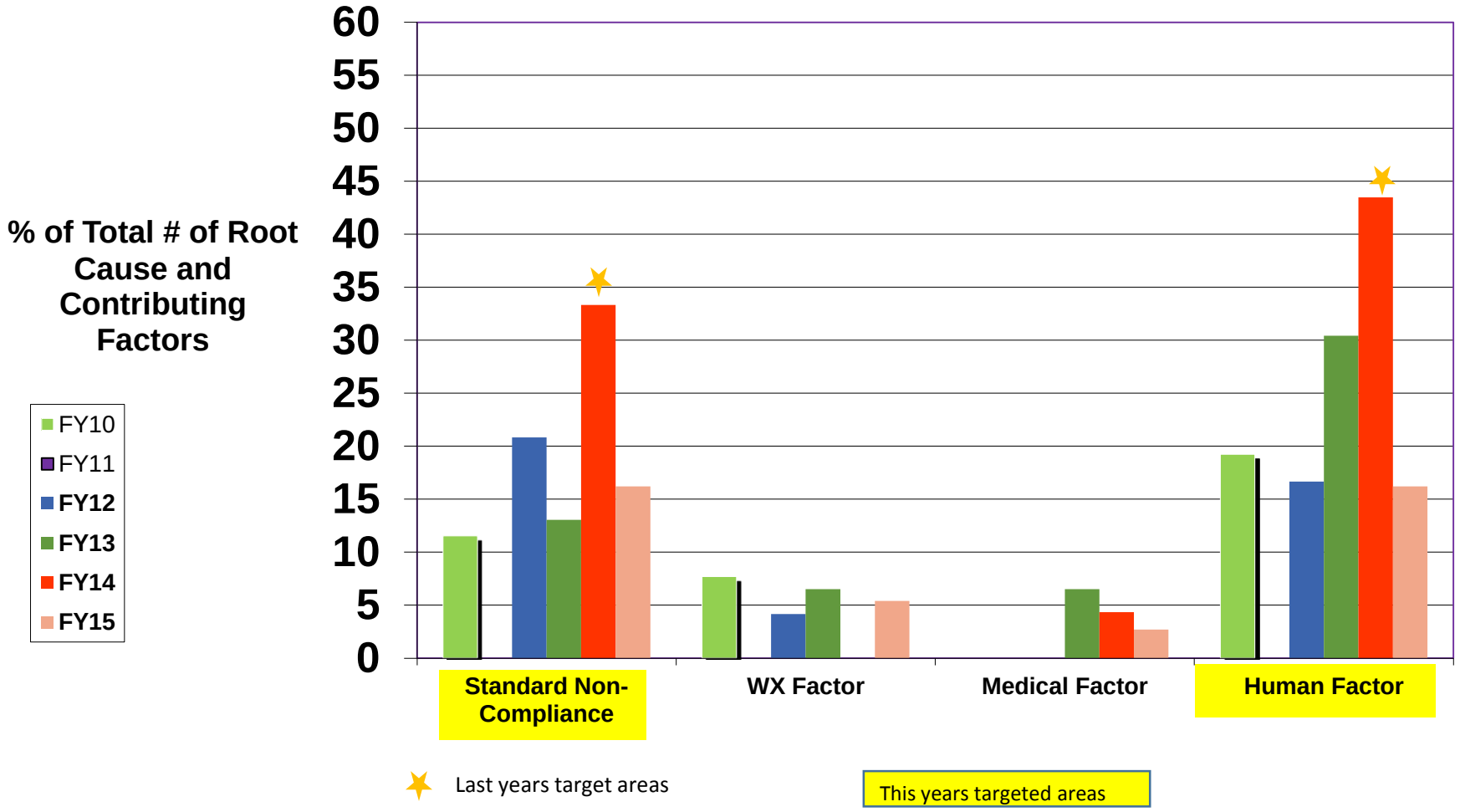

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Finding Answers

- Most data is reactive
  - Mainly Close calls and mishaps
  - Fleet limitations/diversity, culture and sample size are challenges
  - FOQA solutions not easy or culturally acceptable
- Aircraft fleet is aging and always a decade or two behind the state of the art in terms of avionics
  - Upgrades can be singular, costly or not possible
- Proactive activity – looking for precursors
  - Hazard Institutionalization - common hazards that touch more than one platform.
    - Analyzes changes to the process/organization from common threat viewpoints

The current Horizon and Vision

- Looking to institutionalize a recognition of Human Factors affecting aircraft maintenance safety.
  - Using a Threat & Error identification and mitigation approach to risk management
    - Proactive, real time and reactive
- Culturally looking to instill a vision for excellence in aircraft maintenance with process view based upon continual improvement
- Challenges
  - Fixing the process while executing a significant workload
  - Fiscal enabling will require cuts in ongoing “necessities”

Flight Test Safety

- Most mishaps in this domain are not test related
  - Inherent focus on changes from nominal ops threats & errors
  - Structured airworthiness process
  - Cockpit review committee
  - Exposure is limited
  - Loss here more closely related to organizational reputation
- Process is championed by an SES
- Expansion of unmanned platforms brings challenges to process
  - Aircrew safety shifts the loss equation to largely mission
  - Platforms are typically spawned under limited budget increased risk approach

Flight Test Safety Challenges

- Use of Commercial aircraft test services comes at somewhat hidden costs
  - Public use responsibility requires airworthiness responsibility remains with gov’t
  - Reaching deep enough across proprietary boundaries is a challenge
- Use of unmanned systems as a pathway to research progress
  - Systems on a large scale are manpower intensive for planning and execution
  - Smaller systems chosen to accept greater mission risk – tends to work against the requirement to understand the root cause to failure.