Commercial Aviation Safety Team (CAST) Initiatives to Improve Runway Safety

Presented to: Second MID Regional Runway Safety Seminar

By: James Fee

Date: June 3, 2014

Presentation Overview

- **Voluntary Safety Philosophy and Benefits**
- **Commercial Aviation Safety Team (CAST)**
- **Aviation Safety Information Analysis and Sharing (ASIAS)**
- **Aviation Safety InfoShare (InfoShare)**
- **Leveraging CAST, ASIAS, and InfoShare to continuously improve aviation safety**
- **Key Enablers**
  - CAST International Outreach
  - CAST-IATA Information Exchange

VOLUNTARY SAFETY PHILOSOPHY

Critical Elements of a Successful Voluntary Safety Information Program

- Establish Trust and Build Confidence
- Clear Purpose – Dedicated to Safety, Non-Punitive
- Agreements Documented in “Governance”
- Transparent and Collaborative
- Act on the results
- Demonstrate value

Safety Management Continuum

Interplay of Mandatory and Voluntary Actions

Mandatory

- Fully implemented
- Enforceable
- Generally target specific problems
- More rigid in application
  - Exceptions require significant regulatory coordination
- Longer implementation times
- Can be controversial and/or generate opposition

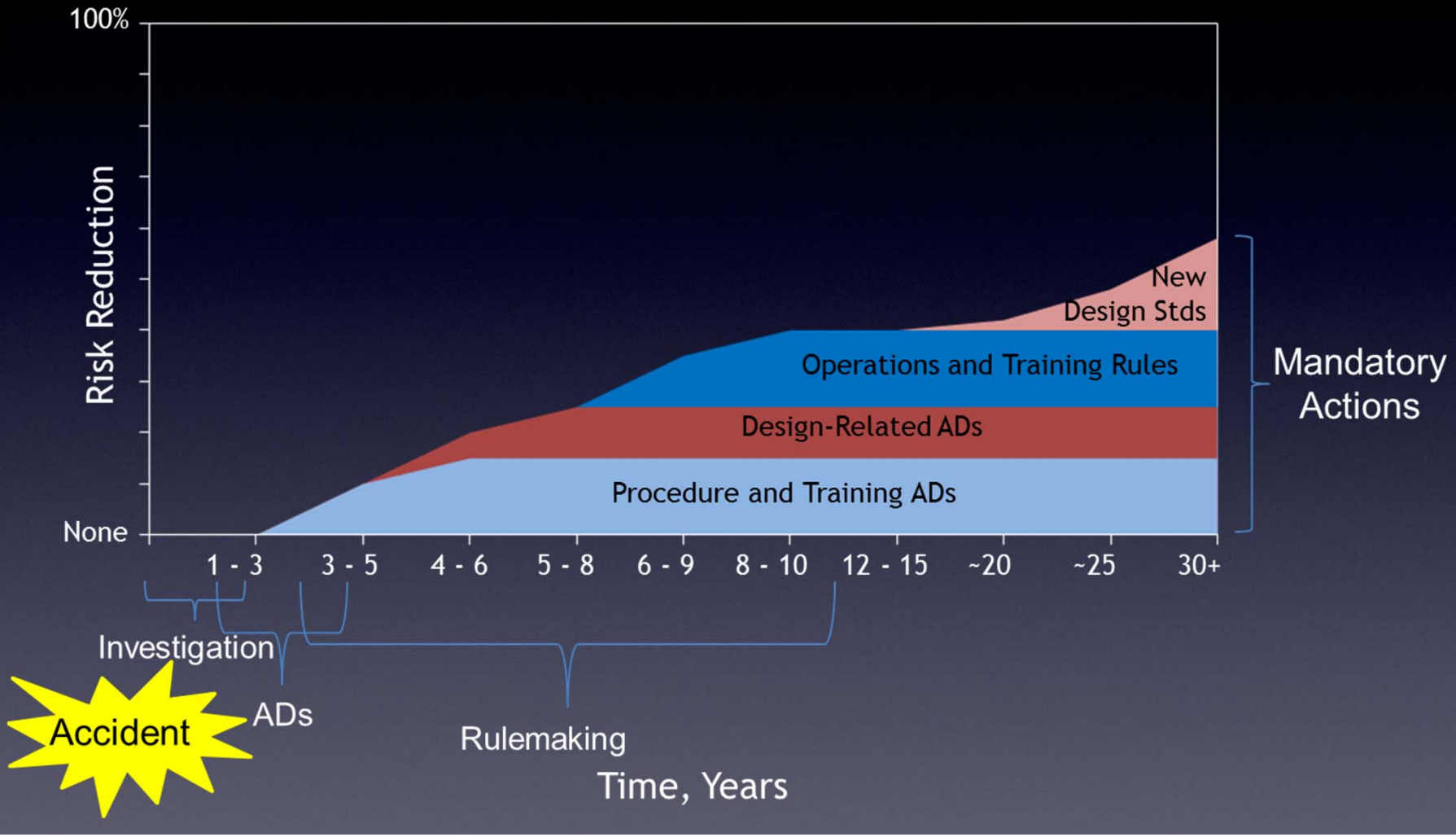
Voluntary

- Full implementation not guaranteed
- Not enforceable
- Generally target broader systemic issues
- Easily tailored to variations in operations or design philosophies
- Shorter implementation times
- Usually have consensus

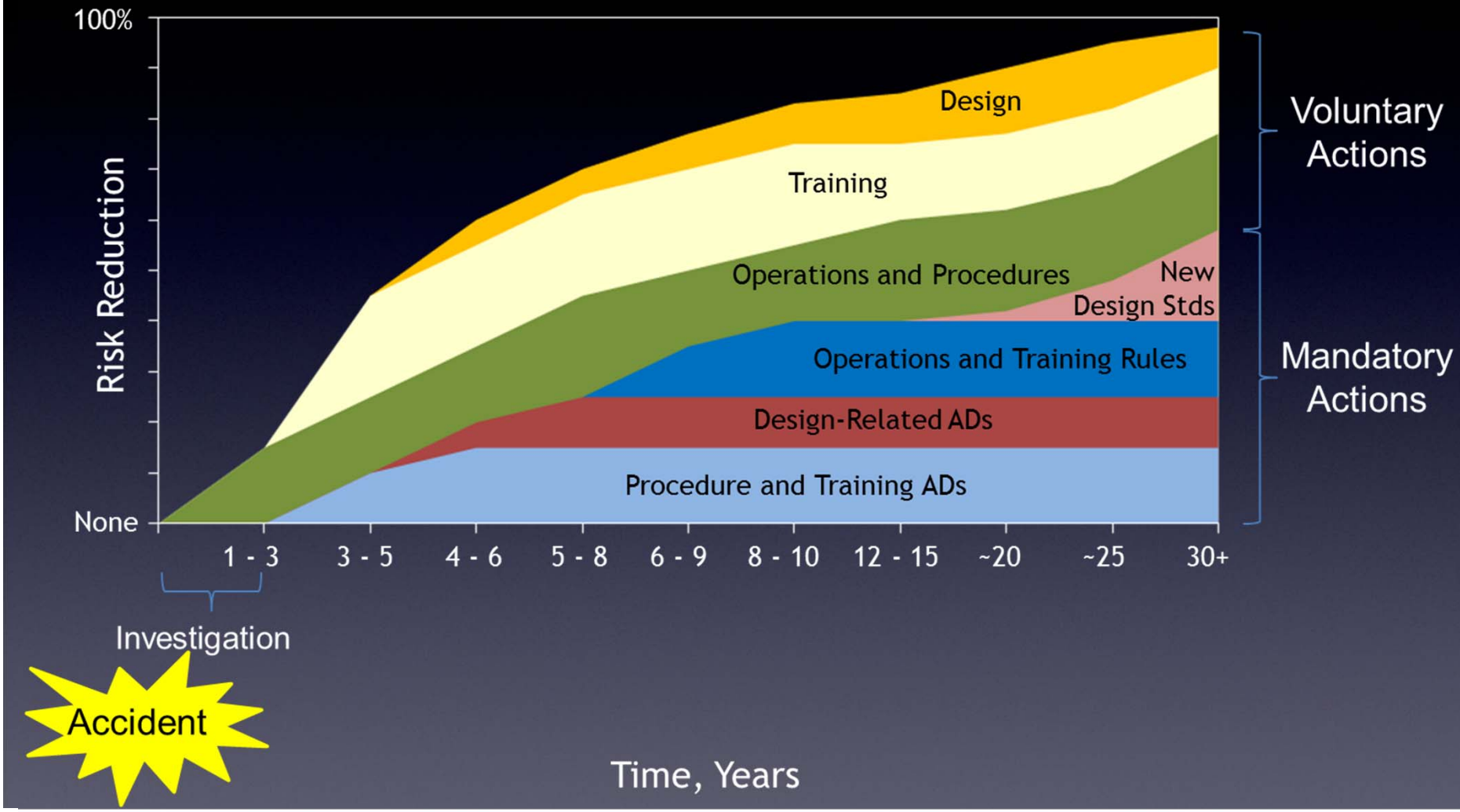
Voluntary Safety Programs

- Commercial Aviation Safety Team (CAST)
- Aviation Safety Information Analysis and Sharing (ASIAS)
- General Aviation Joint Steering Committee (GAJSC)
- International Helicopter Safety Team (IHST)

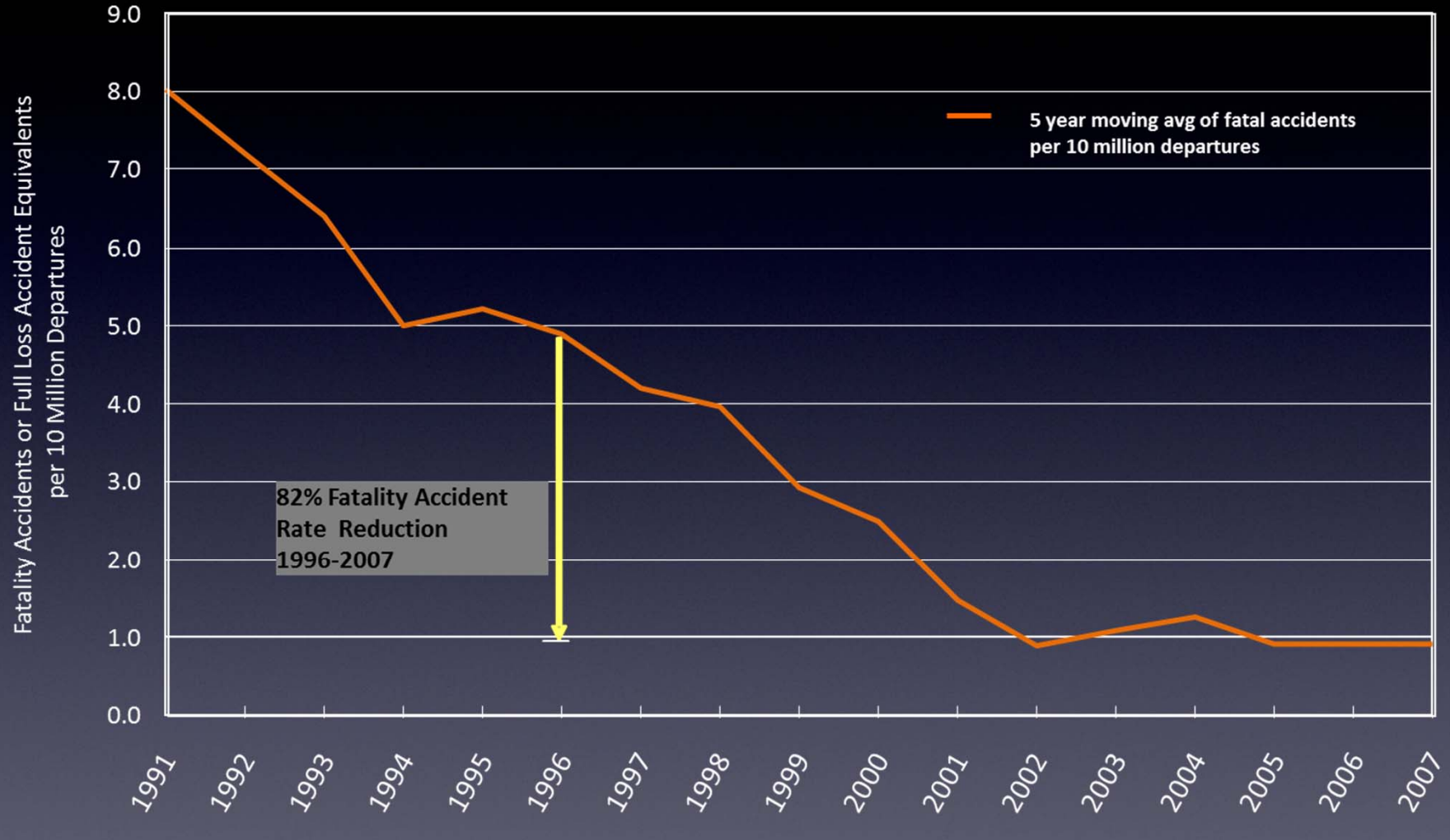
Safety Management Continuum



Safety Management Continuum



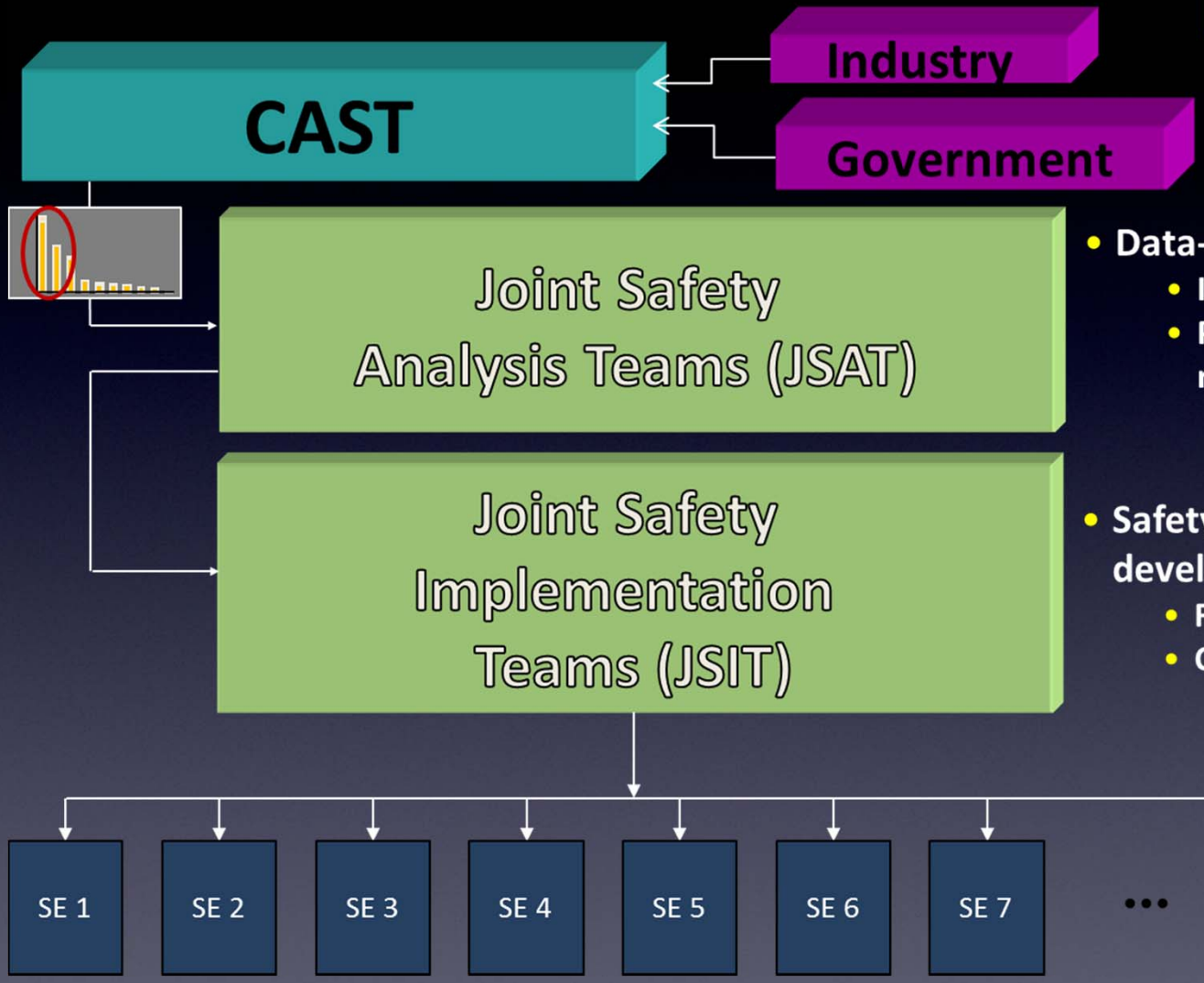
Outcome of Combined Mandatory and Voluntary Actions on U.S Part 121 Accident Rate



CAST OVERVIEW

COMMERCIAL AVIATION SAFETY TEAM (CAST)
"CAST OF THE PAST"

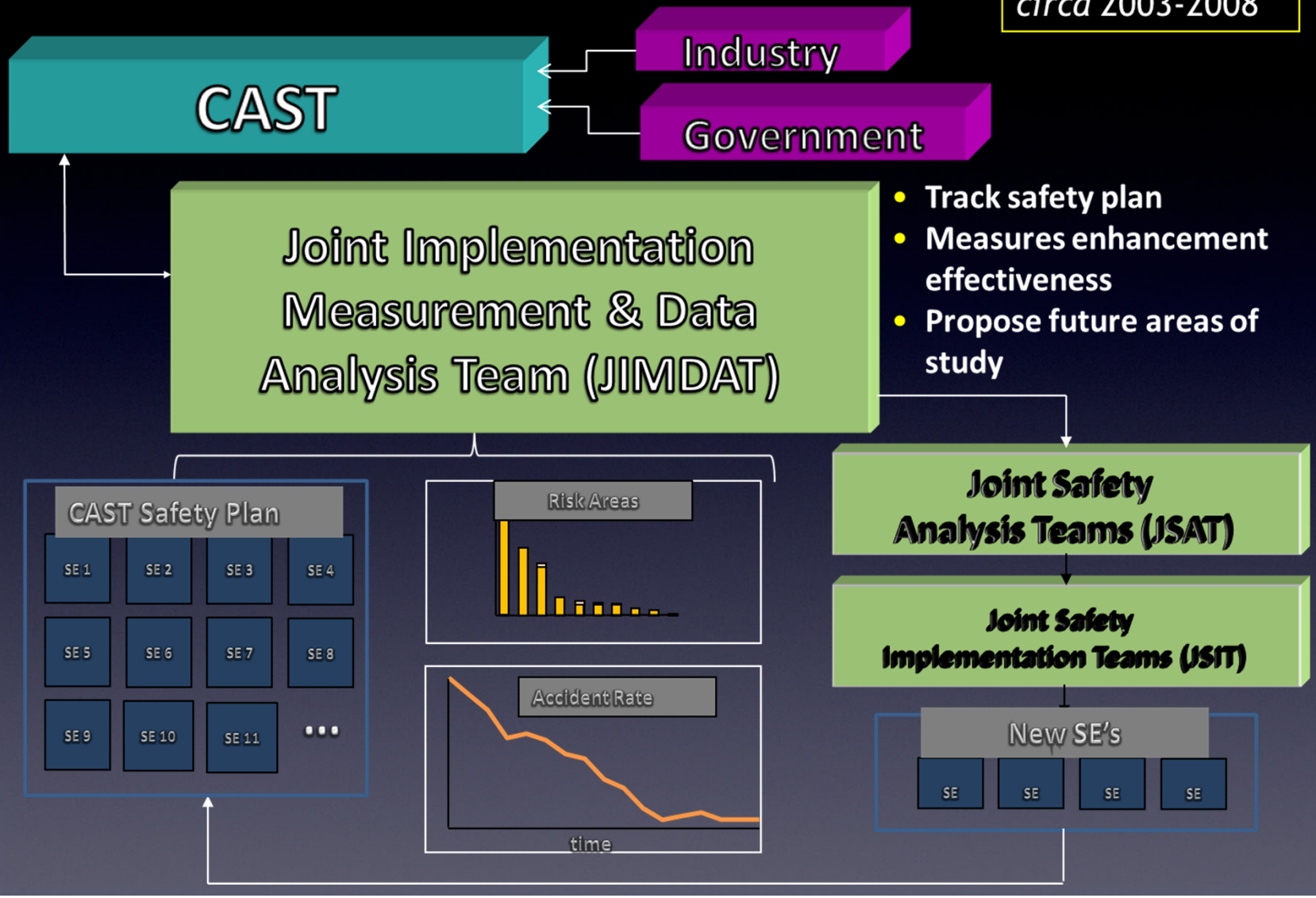
circa 1997-2002



- **Data-driven accident analyses**
  - **Identified problems**
  - **Proposed interventions, ranked by effectiveness**
- **Safety enhancement development**
  - **Feasibility assessment**
  - **Cost-benefit estimate**

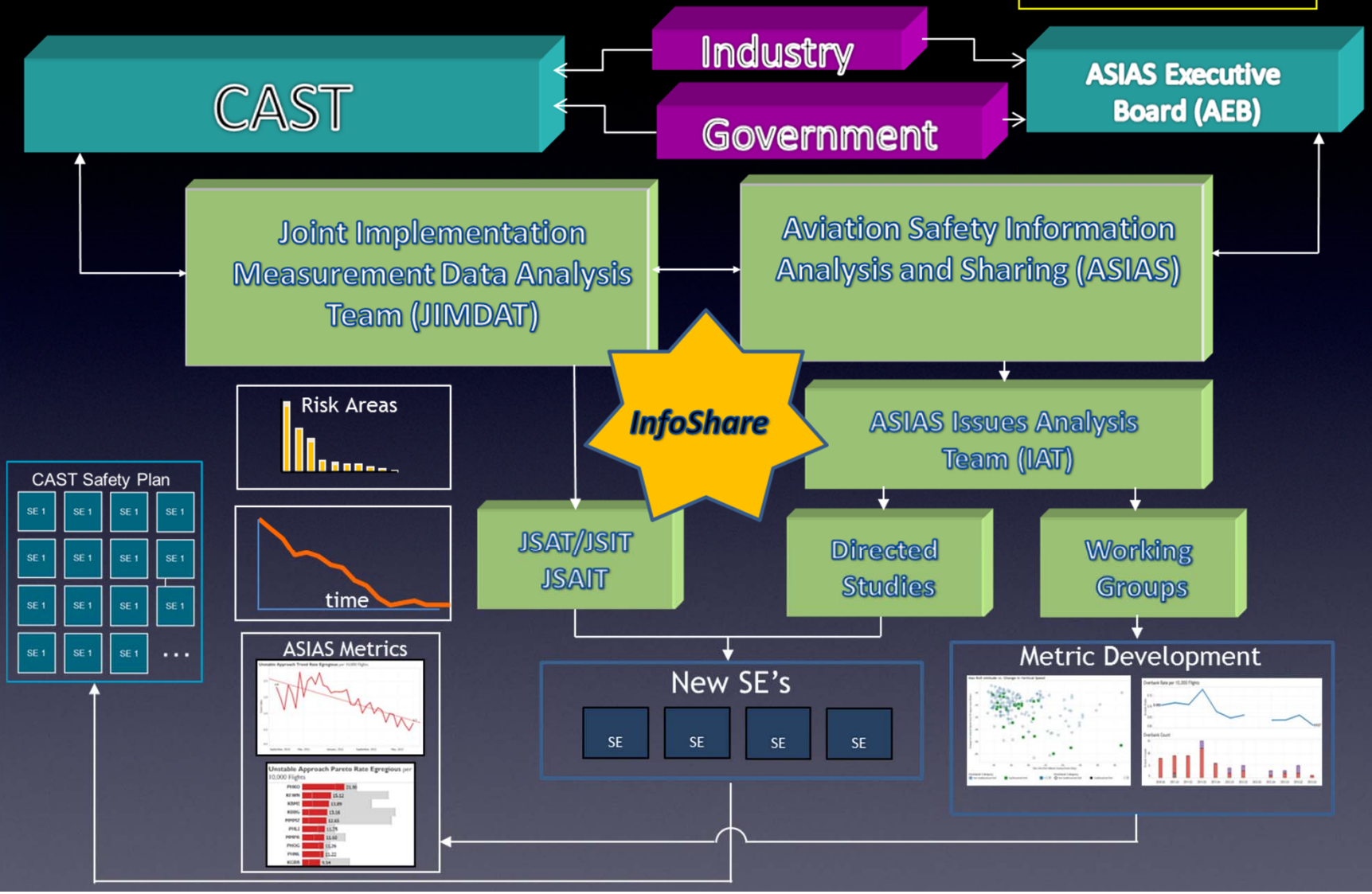
COMMERCIAL AVIATION SAFETY TEAM (CAST)
"CAST – SECOND GENERATION"

circa 2003-2008



COMMERCIAL AVIATION SAFETY TEAM (CAST)
"CAST TODAY"

circa 2009-2014



Runway Safety Initiatives

Wrong Runway Departures

Runway Incursion (RI) Joint Safety Analysis Team (JSAT) and Joint Safety Implementation Team (JSIT)

Runway Excursion (RE) Joint Safety Analysis and Implementation Team (JSAIT)

Wrong Runway Departures report – August 2007

- **Reviewed events that involved airplanes departing from or taxiing into position on a wrong runway.**
- **Common elements and/or contributing factors:**
  - Multiple runway thresholds located in close proximity to one another.
  - A short distance between the airport terminal and the runway.
  - A complex airport design.
  - The use of a runway as a taxiway.
  - A single runway that uses intersection departures.
- **Contributing factors can be mitigated and wrong runway events avoided when—**
  - Airport communities employ a coordinated effort;
  - Technological, procedural, and infrastructure are enhanced as proposed by the CAST and are implemented by the FAA, industry, and airport administrations;
  - Aeronautical information enhancements are made;
  - Threat analysis based on the contributing factors of past wrong runway departures are conducted at individual airports; and
  - Electronic flight bags with own-ship moving map display functionality and/or an aural runway and taxiway advisory system are incorporated into the part 121 fleet.

Wrong Runway Departures Safety Enhancements

CAST approved the following Wrong Runway Departure SEs to be included in the CAST Plan:

- SE 176 – Runway Safety Action Team Evaluations (Completed)
- SE 178 – Enhanced Surface Marking and Lighting (Completed)
- SE 179 – Scenario-Based Training for Pilots (Completed)
- SE 180 – Scenario-Based Training for Tower Controllers (Completed)
- SE 181 – Taxiway and Runway Configuration (Completed)
- SE 182 – Air Traffic Control Clearance Procedure Review (Completed)
- SE 183 – Cockpit Moving Map Display and Runway Awareness System (Underway)

The CAST plan is available on the SKYbrary website:

- http://www.skybrary.aero/index.php/Portal:CAST_SE_Plan

Runway Incursion (RI)
Joint Safety Analysis Team (JSAT) and Joint Safety Implementation Team (JSIT)

- **CAST chartered the JSAT and JSIT to address Runway Incursions.**
- **JSAT studied a large number of well-documented accidents and incidents from around the world to identify problems or sources of risk with Runway Incursions.**
- **These RI interventions include the most significant recommendations for ATC and pilots:**
  - Training (Aviation/Airport Environment)
  - Situational Awareness (Environment)
  - Procedures (Ground Operations and SOP Compliance)
  - Technology Applications to Equipment/Facilities
  - Controller/Flight Crew Resource Management (CRM)
  - Safety Cultures (Airline/Operator)
  - ATC/Pilot/Vehicle Communications
  - Human Physiological Limitations

Runway Incursion Safety Enhancements

CAST approved the following Runway Incursion SEs to be included in the CAST Plan:

- SE 46 – Air Traffic Control Training – Enhanced Tower Controller Training (Completed)
- SE 47 – Tower Controller CRM Training (Completed)
- SE 49 – SOPs for Ground Operations (Completed)
- SE 50 – SOPs for Ground Operations for GA (Completed)
- SE 51 – SOPs for Tow Tug Operators (Completed)
- SE 52 – SOPs for Vehicle Operators (Completed)
- SE 53 – Situational Awareness Technology for Air Traffic Control (Completed)
- SE 55 – Air Traffic Control Procedures – SOPs for Controller Situational Awareness (Completed)
- SE 59 – Air Traffic Control Procedures – Readback Requirement (Completed)
- SE 60 – Pilot Training – Runway Incursion Prevention (Completed)

The CAST plan is available on the SKYbrary website:

- http://www.skybrary.aero/index.php/Portal:CAST_SE_Plan

Runway Excursion (RE) Joint Safety Analysis and Implementation Team (JSAIT)

- **CAST identified REs as an area of ongoing concern in both U.S. and worldwide accident data trends.**
- **RE JSAIT was chartered in spring 2012 to review 15 industry RE events, summarize findings and recommendations, and prioritize them into SEs using a modified version of the CAST process.**
- **RE JSAIT completed its review of the reports by ranking and prioritizing its recommendations in early 2013.**
- **RE JSAIT has since developed SEs from the concepts.**
- **CAST is reviewing the draft RE SEs. Once approved, the new SEs will be added to the CAST plan on SKYbrary.**
  - http://www.skybrary.aero/index.php/Portal:CAST_SE_Plan

Runway Excursion Metrics – Overview

The CAST metric monitoring working group is working with the RE JSAIT to develop appropriate runway excursion metrics.

The following concepts are being investigated as *potential* metrics.
Note: the definitions below are not final/approved.

Excessive Float: Aircraft touches down outside of the 1/3 of runway or greater than 3,000 feet.

Rejected Takeoff: Deceleration is detected 30 seconds after takeoff thrust application.

Throttle Lever Angle: Throttle not at idle during touch down (5 seconds before and 3 seconds after touchdown).

ASIAS OVERVIEW

ASIAS moves from REACTIVE Analysis to PROACTIVE Analysis

From "What went wrong?"

To "What COULD go wrong?"

What is ASIAS....

A ***collaborative*** Government and Industry initiative on ***data sharing & analysis*** to proactively discover safety concerns ***before accidents*** or incidents occur, leading to ***timely mitigation*** and prevention.

Governance

- **ASIAS P&O Plan**
  - Governs purpose, use and protection of data
  - Created by the FAA and industry
- **Cooperative agreement between each ASIAS member airline and data exchange and analysis (The MITRE Corporation)**
  - Defines airline-specific data use
- **MITRE exempt from Freedom of Information Act (FOIA) requests**
  - Federally Funded R&D entity
- **14 CFR Part 193 protection of voluntarily submitted information**
  - Protection of voluntarily supplied safety-related data, that is FOQA and ASAP
- **SMS Reauthorization Act data protection**
  - Protection of data in support of SMS program
- **Operates with consensus approval of AEB**
  - Ensures all parties operate in accordance with the ASIAS P&O Plan
- **ASIAS-NTSB memorandum of understanding**
  - Provide governance and protection of interactions
- **Joint industry-government decision-making**
- **FAA-funded and industry-supported program**
- **Separate general aviation ASIAS P&O and cooperative agreements**

ASIAS is Governed by Formal Principles

Data used solely for advancement of safety

Endorsement of voluntary submission of safety-sensitive data

Carrier/OEM/MRO data are de-identified

Transparency – knowledge of how data are used

Procedures & policies established through collaborative governance

Analyses approved by an ASIAS Executive Board

ASIAS Members

9 Corporate/Business Members

Altria
Boeing Executive
CitationAir
Flexjet
Jet Edge International
Midwest/Kiewit Engineering
Netjets
Pfizer
Travel Management Company

12 Industry Members

A4A—Airlines for America
*AAR Aircraft Services
AIA—Aerospace Industries Association
Airbus
ALPA—Air Line Pilots Association
APA—Allied Pilots Association representing Coalition of Airline Pilots Associations (CAPA)
Boeing
NACA—National Air Carrier Association
NATCA—National Air Traffic Controllers Association
RAA—Regional Airline Association
*SWAPA—Southwest Airlines Pilots' Association
*TIMCO Aviation Services

45 Air Carrier Members

ABX Air
Air Wisconsin Airlines
Alaska Airlines
Allegiant Air
Aloha Air Cargo
American Airlines
Atlas Air
Cape Air
Chautauqua Airlines
CommutAir
Compass Airlines
Delta Air Lines
Empire Airlines
Endeavor Air
Envoy Air (was American Eagle Airlines)
ExpressJet
FedEx Express
Frontier Airlines
GoJet Airlines
Hawaiian Airlines
Horizon Air
JetBlue Airways
Kalitta Air
Mesa Airlines
Miami Air International
*Mountain Air Cargo
National Airlines
North American Airlines
Omni Air International
Piedmont Airlines
Polar Air Cargo
PSA Airlines
Republic Airlines
Shuttle America
Silver Airways
SkyWest Airlines
Southern Air
Southwest Airlines
Spirit Airlines
Sun Country Airlines
Trans States Airlines
United Airlines
United Parcel Service
US Airways
Virgin America

5 Government Members

*AMC—Air Mobility Command
FAA
NASA
Naval Air Force Atlantic
USAF Safety Center

*Newest Member

As of 1 May 2014

Data Sources Supporting ASIAS InfoSharing and Analysis

De-Identified FOQA Data

De-Identified ASAP Data

- Flight Operations
- Maintenance
- Dispatch
- ATSAP

Safety Reports

- Aviation Safety Reporting System
- Runway Incursion
- Surface Incident
- Operational Error / Operational Deviation
- Pilot Deviation
- Vehicle or Pedestrian Deviation
- National Transportation Safety Board
- Accident/Incident Data System
- Service Difficulty Reports

ATC Information

- Traffic Management Reroutes and Delays
- Airport Configuration and Operations
- Sector and Route Structure
- Procedures
- Surveillance Data for En Route, Terminal and Airport

Other Information

- Bureau of Transportation Statistics
- Weather / Winds
- Manufacturer Data
- Avionics Data
- Worldwide Accident Data

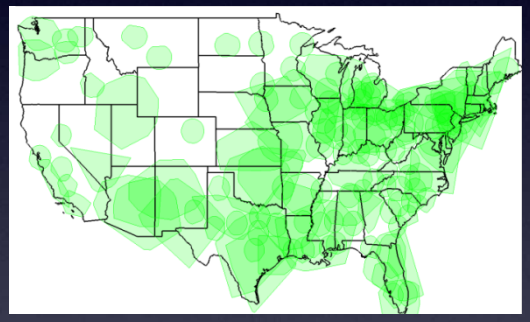
Summary of Data Available to ASIAS

	Dataset		# Programs in ASIAS	# Available to ASIAS	# Records for Analysis
Commercial	FOQA		37	29	12,936,998
	ASAP	Flight Ops	45	44	154,264
		Maintenance	38	25	4,300
		Dispatch	37	24	5,834
		Cabin	14	4	1,771

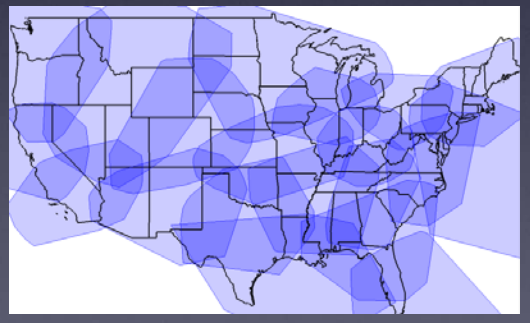
Summary of Data Available to ASIAS (cont'd)

35 ASDE-X airports

159 NOP Tracons



20 NOP Centers



Daily feeds from a wide range of ASDE-X and NOP facilities provides the input to the threaded track

Each flight may be tracked by up to 10 facilities simultaneously

Summary of Data Available to ASIAS (cont'd)

	Dataset		# Facilities Available to ASIAS	# Records for Analysis
Air Traffic	Radar Surveillance	ASDE-X	35	84,000,000
		TRACON	159	
		En Route	20	
	ATSAP			65,974

ASIAS Analysis

- **Directed Studies**
  - *COMPLETED*: TAWS, Runway Safety, TCAS RAs, Unstable Approach, Rejected Takeoffs, RNAV Departures, Pilot-Controller Communications, STAR (RNAV) Ops
  - *IN PROGRESS*: Data Fusion Demonstration, Aircraft Misconfiguration
- **Known Risk Monitoring**
- **Safety Enhancement Assessment**
- **Vulnerability Discovery**
- **Benchmarking Operations**

AVIATION SAFETY INFOSHARE OVERVIEW

Background

- **InfoShare is a confidential biannual conference sponsored by the FAA, in which government and industry representatives share aviation safety concerns and discuss current aviation safety issues and mitigations.**

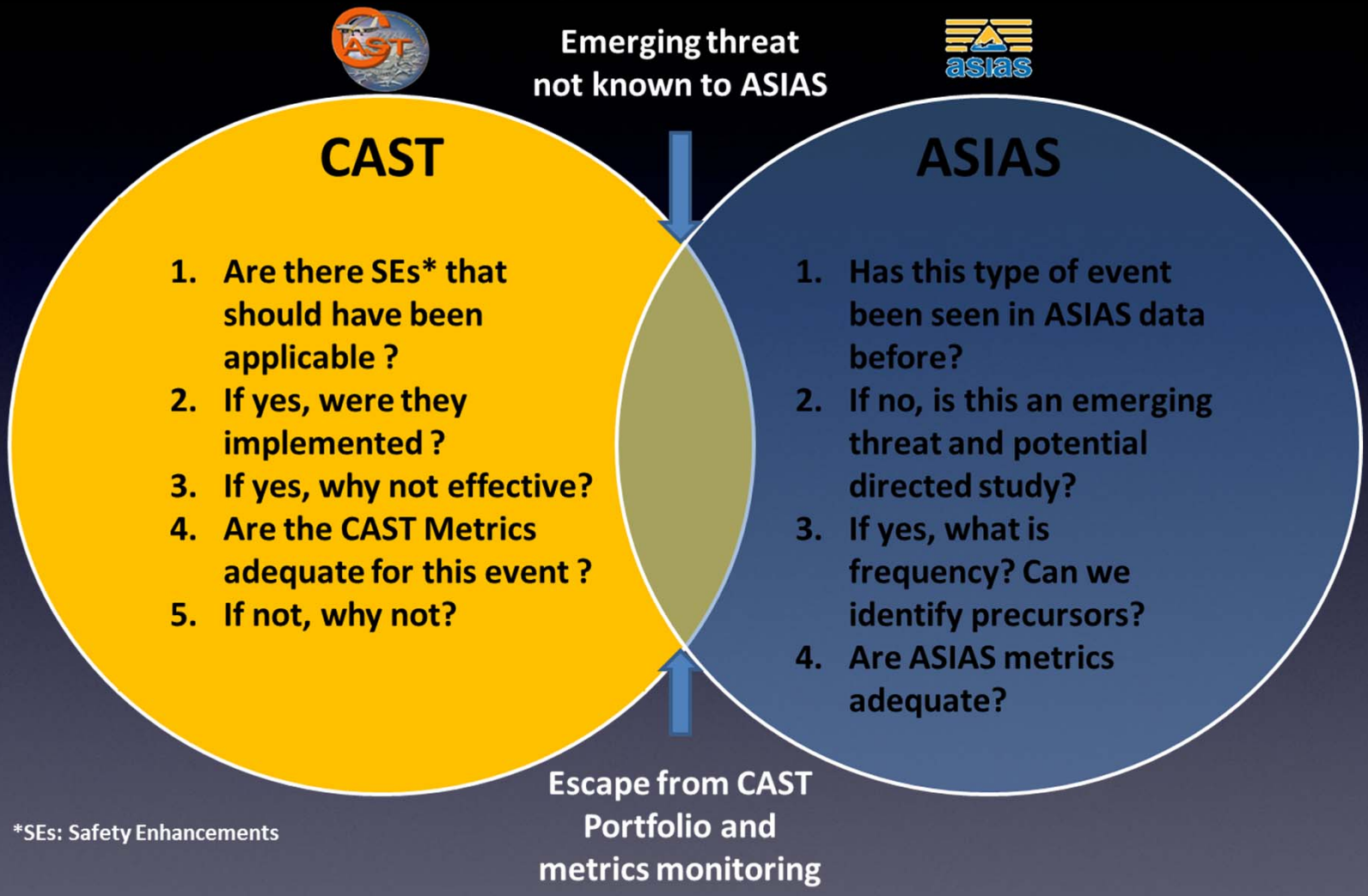
- **Attendance is limited to air carriers, trade associations, labor organizations, and select government attendees.**
  - Oversight agencies (e.g. DOT IG, GAO) are not invited at the request of the airline participants
  - FAA inspectors are invited but may not use any information from these meetings in any type of enforcement activity

March 2014 Aviation Safety InfoShare Highlights

- **Over 700 attendees, representing—**
  - 68 Air Carriers/Operators
  - 15 Labor Organizations
  - 7 Trade Associations
  - 9 Government Organizations
  - 4 Colleges/Universities
  - 5 Manufacturers
  - 7 Other Organizations
- **88 formal presentations**
  - 38% were based on FOQA and/or ASAP
  - 62% were based on other sources/programs
- **2nd Director of Safety session**
- **CAST briefing on ASA (Specifically, Low Airspeed Events) and RNAV departures/STAR operations.**
- **IAT/JIMDAT will review safety concerns presented to identify any vulnerabilities not addressed with current studies and/or the CAST Safety portfolio.**

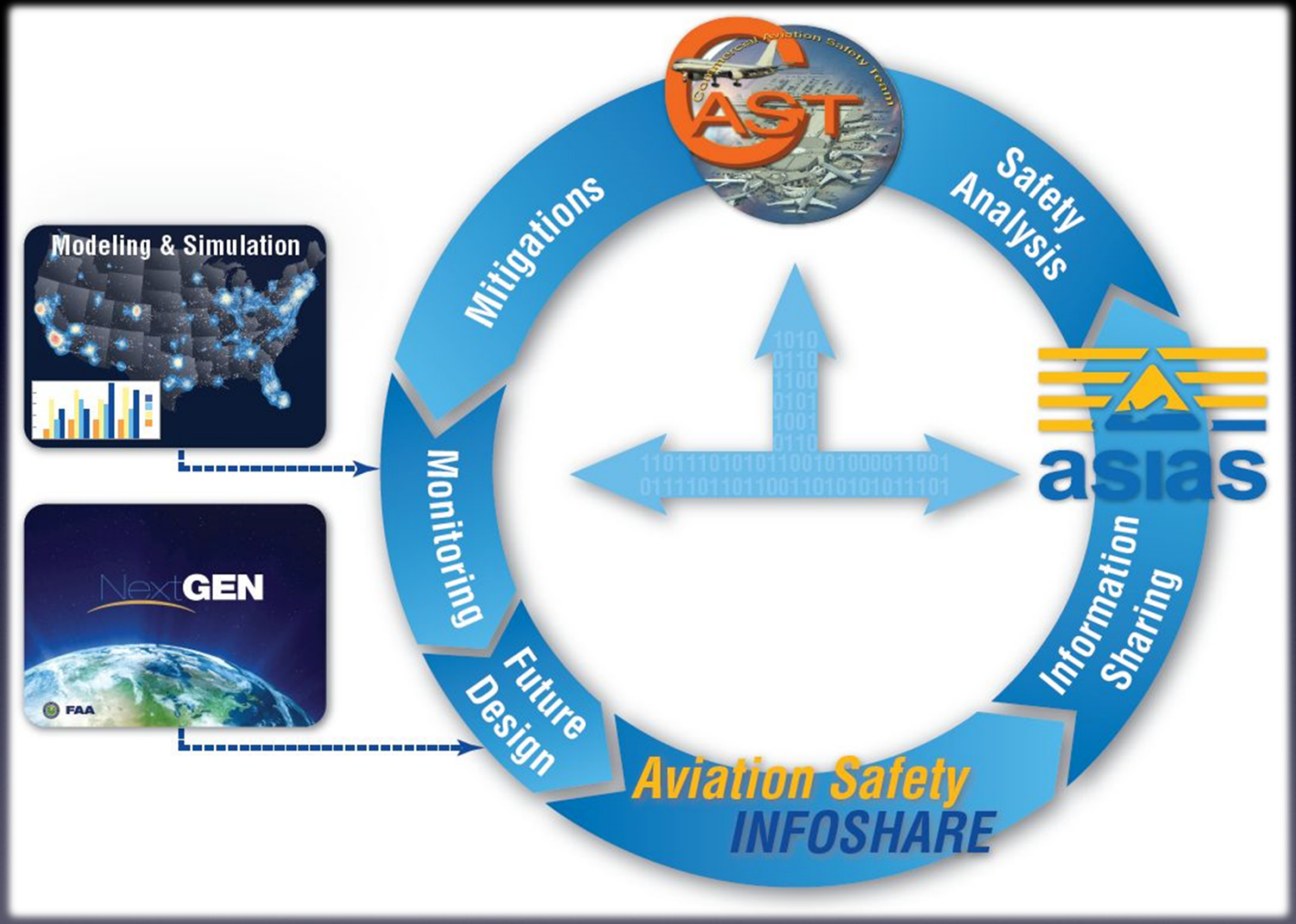
LEVERAGING CAST, ASIAS, AND INFOSHARE TO CONTINUOUSLY IMPROVE AVIATION SAFETY

ASIAS/CAST Questions



*SEs: Safety Enhancements

Continuous Improvement in Aviation Safety



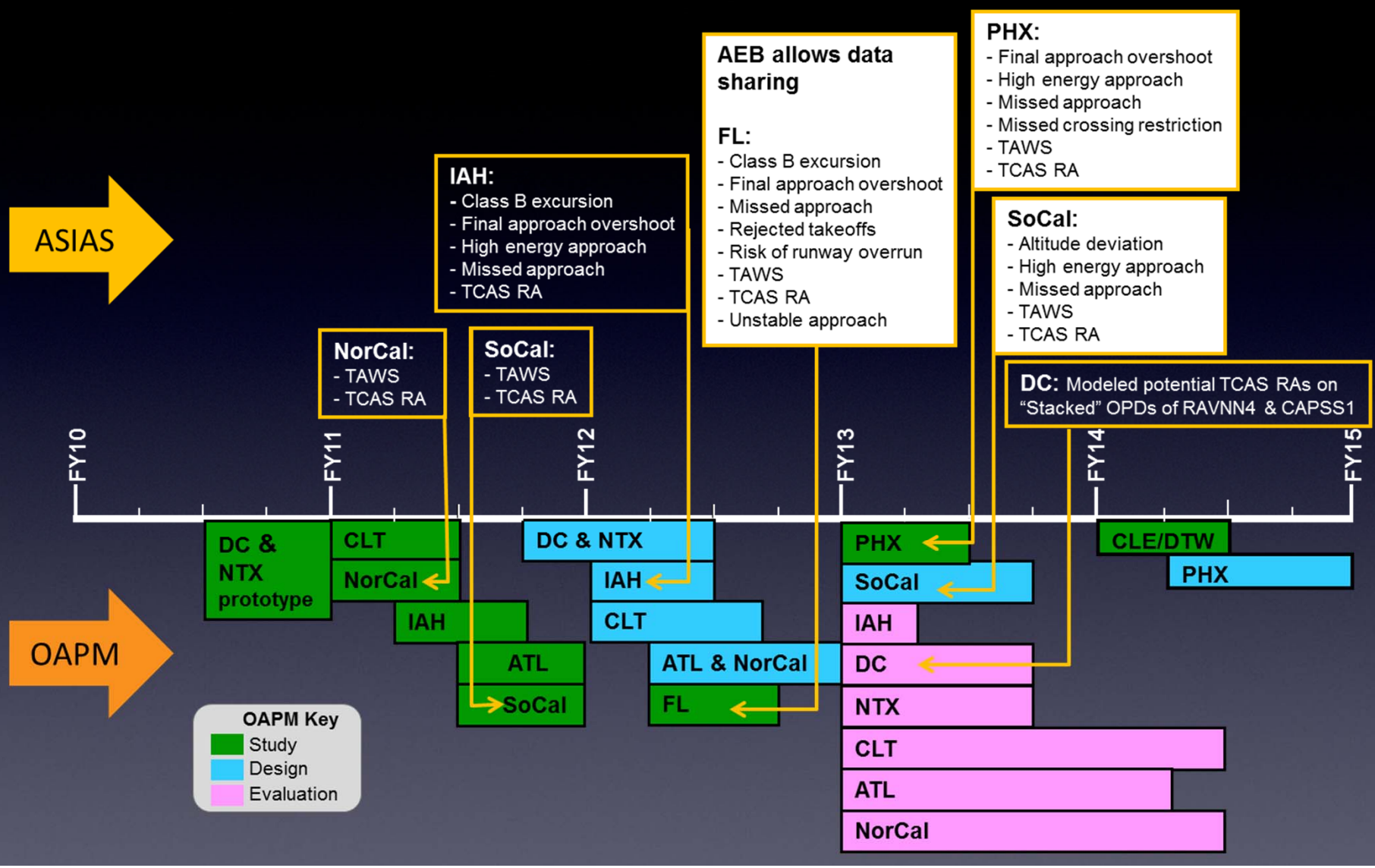
Benefits: CAST/ASIAS/NextGen Synergy

- **Strategy**
  - Seek opportunities for CAST and ASIAS to support increment design and post-implementation performance tracking
  - Seek opportunities for enhancement of ASIAS data collection and analysis upon Operational Improvement implementation
- **Portfolios with near-term win potential**
  - OAPM (Optimization of Airspace & Procedures in the Metroplex)
    - Approach: support arrival route design and performance via TCAS/TAWS subject matter expertise and incident data
  - IMRO (Improved Multiple Runway Operations)
    - Approach: apply blunder model analysis and ASDE-X acquired flight data to validate design and performance of improved operations procedures
  - Low Visibility Operations
    - Approach: support taxi routing and taxi conformance procedure development, based on surface incident analysis and subject matter expertise

What is OAPM?

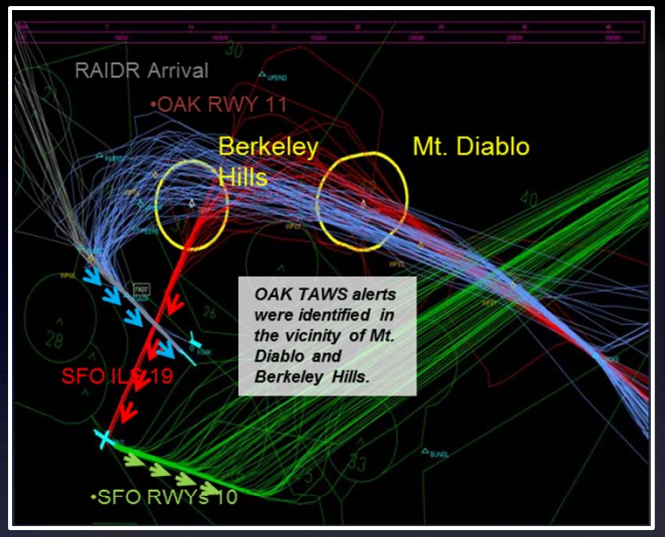
- Takes a systems approach to PBN initiatives and airspace design
- Provides a geographic focus to problem solving
- Delivers an expedited process for integrated airspace and procedures efforts
- Uses collaborative teams
- Uses an educated prioritization process
- Enables predictable and repeatable flight paths
- Reduces task complexity while maximizing safety and efficiency

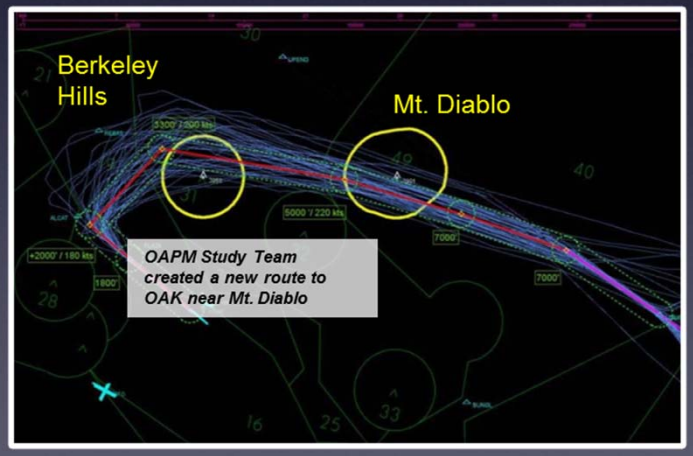
OAPM Collaboration Timeline



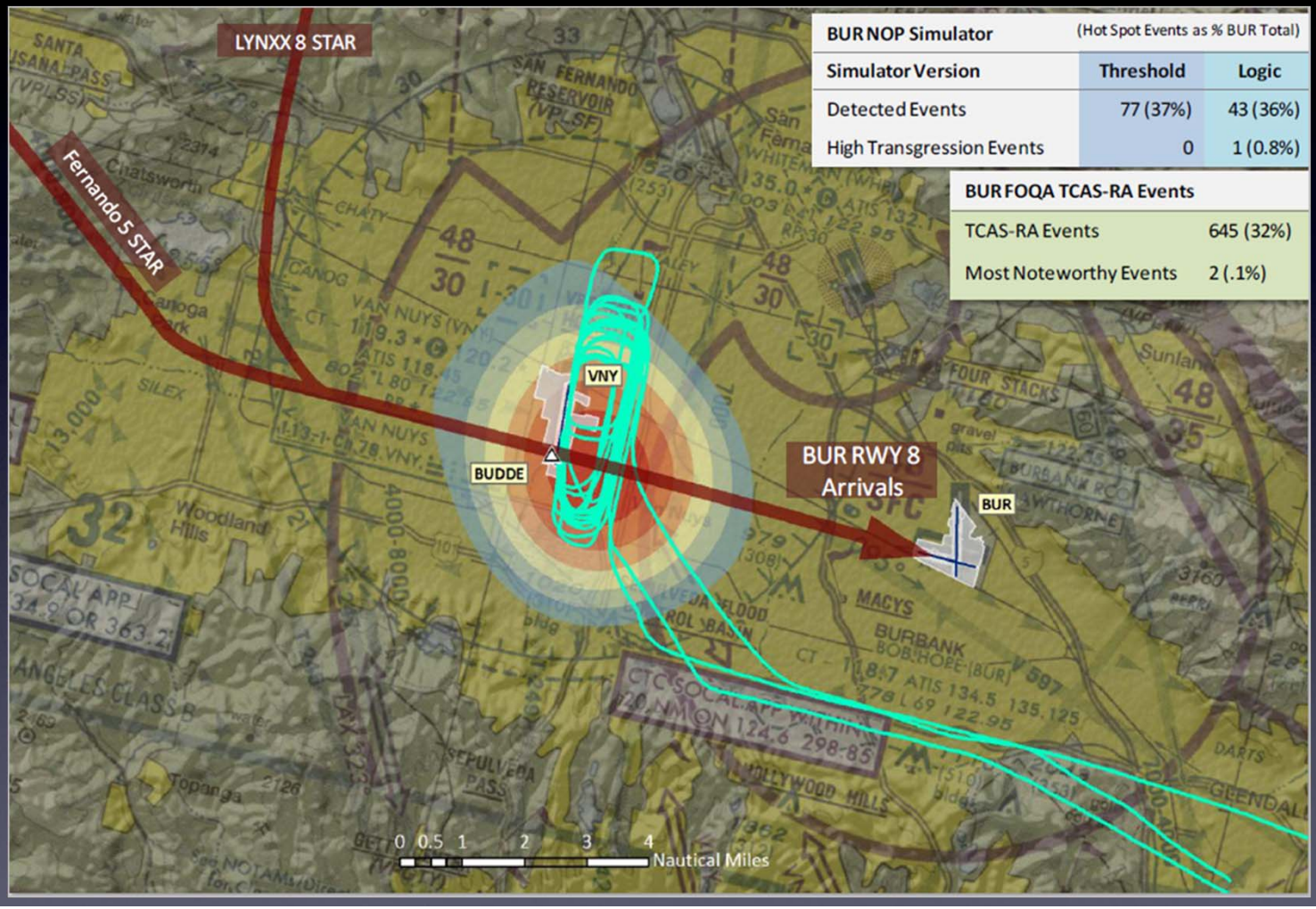
Working with OAPM to mitigate TAWS alerts in Northern California

- OAK TAWS alerts were identified in the vicinity of Mt. Diablo
- OAPM Study Team proposed a new routing in the vicinity of Mt. Diablo
- Recommended the route be evaluated and shifted during Design Phase to minimize TAWS alerts





Working with OAPM to mitigate TCAS alerts in Southern California

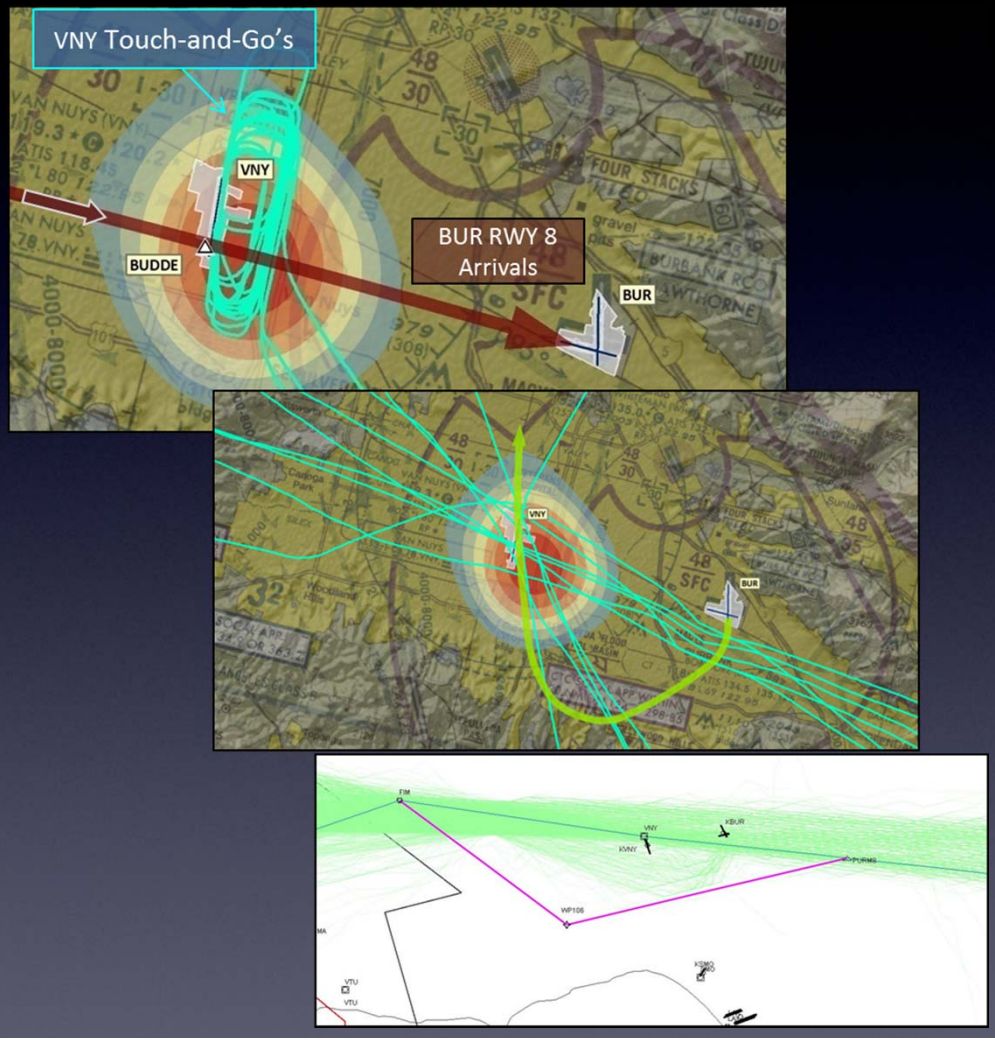


BUR NOP Simulator	(Hot Spot Events as % BUR Total)	
Simulator Version	Threshold	Logic
Detected Events	77 (37%)	43 (36%)
High Transgression Events	0	1 (0.8%)

BUR FOQA TCAS-RA Events	
TCAS-RA Events	645 (32%)
Most Noteworthy Events	2 (.1%)

Working with OAPM to mitigate TCAS alerts in Southern California

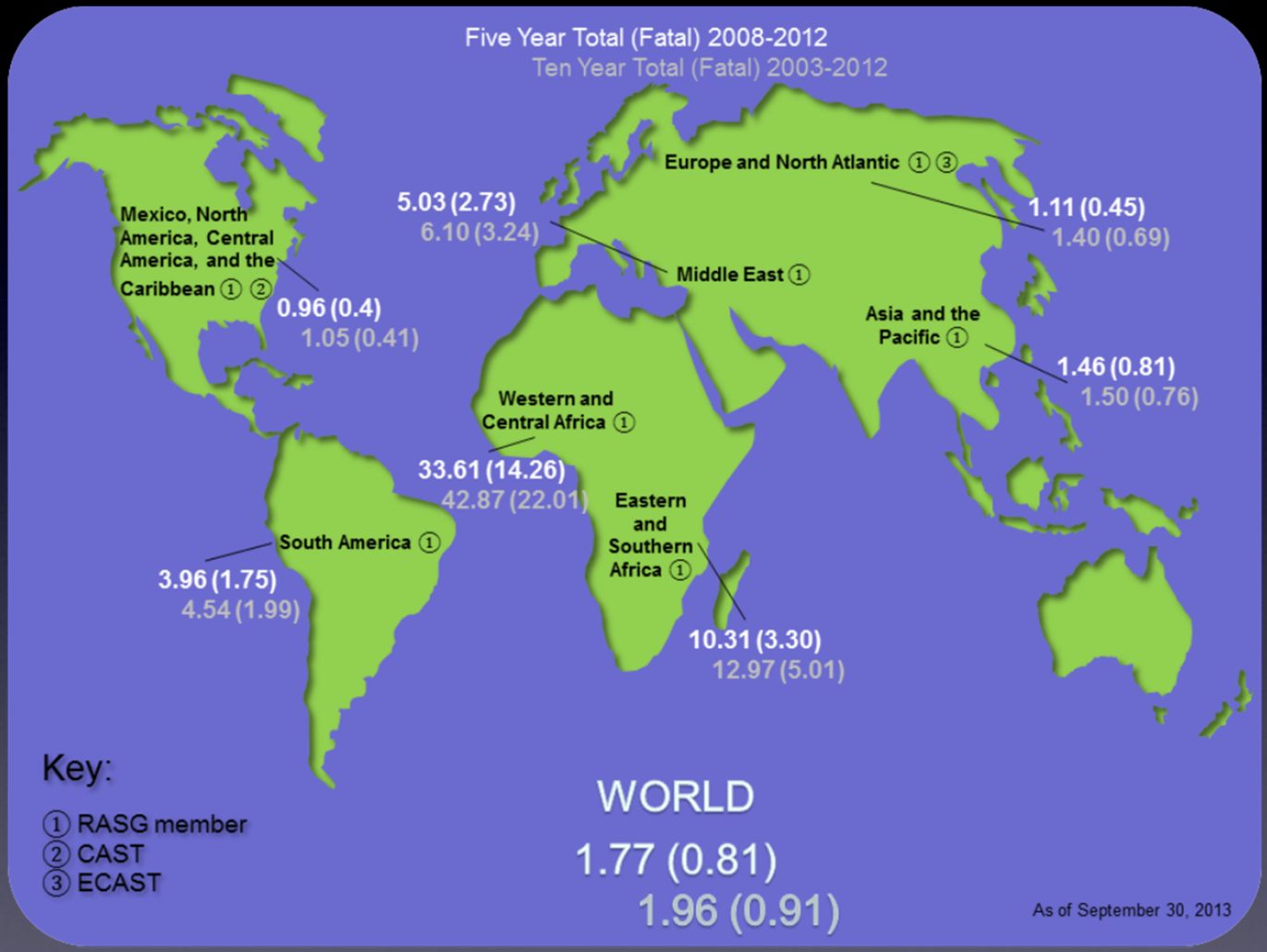
- **BUR/VNY TCAS alerts were identified as a concern**
- **OAPM Study Team proposed two solutions**
  - Raising BUR FAF altitude by 250’ (for consideration during Design)*
  - Address VNY/V186 “hot spot” with a T-route to offload traffic



KEY ENABLERS

CAST International Outreach

Accident Rates Worldwide



Top Risks Worldwide

Region	Accident Risk	Fatal Risk
Asia and Pacific Regions	Controlled Flight Into Terrain	Controlled Flight Into Terrain
	Runway Excursion-Landing	Loss of Control-Inflight
	Loss of Control-Inflight	System Component Failure-Powerplant
North America, Latin America, and the Caribbean	Controlled Flight Into Terrain	Controlled Flight Into Terrain
	Runway Excursion-Landing	Loss of Control-Inflight
	Loss of Control-Inflight	Runway Excursion-Landing
Russia and the C.I.S.	Runway Excursion-Landing	Controlled Flight Into Terrain
	Controlled Flight Into Terrain	Loss of Control-Inflight
	Loss of Control-Inflight	Runway Excursion-Landing
Europe	Runway Excursion-Landing	Controlled Flight Into Terrain
	Controlled Flight Into Terrain	Loss of Control-Inflight
	Abnormal Runway Contract	System Component Failure-Non Powerplant
Middle East	Runway and Ground Safety	Loss of Control-Inflight
	Inflight Damage	Controlled Flight Into Terrain
	Loss of Control-Inflight	Mid-Air Collision
Africa	Loss of Control-Inflight	Loss of Control-Inflight
	Runway Excursion-Landing	Controlled Flight Into Terrain
	Controlled Flight Into Terrain	Mid-Air Collision

Asia and Pacific Regions Top Risks by Region

Accident Risk	Applicable SEs in Progress	Fatal Risk	Applicable SEs in Progress
Controlled Flight Into Terrain	CFIT1, CFIT2, CFIT4, CFIT5, CFIT6	Controlled Flight Into Terrain	CFIT1, CFIT2, CFIT4, CFIT5, CFIT6
Runway Excursion-Landing	RE2, RE6, RE3, RS1, RE8/LOC2	Loss of Control-Inflight	LOC1, LOC4, LOC5, LOC6
Loss of Control- Inflight	LOC1, LOC4, LOC5, LOC6	System Component Failure-Powerplant	

North America, Latin America, and the Caribbean Top Risks by Region

Accident Risk	Applicable SEs in Progress	Fatal Risk	Applicable SEs in Progress
Controlled Flight Into Terrain	CFIT1, CFIT2, CFIT9, CFIT10, CFIT11, CFIT12, CFIT46, CFIT47, CFIT120	Controlled Flight Into Terrain	CFIT1, CFIT2, CFIT9, CFIT10, CFIT11, CFIT12, CFIT46, CFIT47, CFIT120
Runway Excursion-Landing		Loss of Control-Inflight	LOC26, LOC27, LOC28, LOC29, LOC30, LOC31
Loss of Control-Inflight	LOC26, LOC27, LOC28, LOC29, LOC30, LOC31	Runway Excursion-Landing	

CAST – IATA
Information Exchange

CAST – IATA Information Exchange

- In March 2014, CAST and IATA signed information sharing arrangement
- High-level partnership agreement, similar to working arrangements developed with the Regional Aviation Safety Groups – Pan America and Asia Pacific
- CAST and IATA intend to exchange respective top-level safety risk portfolios and associated mitigation strategies.

CAST – IATA Information Exchange

- **Arrangement Facilitates:**
  - Harmonization of analytical methodologies, analytical products
  - Collaboration between CAST and IATA in providing Regional Aviation Safety Groups aggregate, de-identified safety trend information to help identify and assess effectiveness of deployed mitigations
  - Discussions on possible exchange of aggregated, de-identified trend information between CAST and IATA on mutual top-level safety risk areas

CAST – IATA Information Exchange

- CAST and IATA are committed to protecting all information provided under the exchange arrangement
- The arrangement will enable a closer working partnership between CAST and IATA and further supplement the important work being done by ICAO and key stakeholders around the world.