



# ICAO's Global Aeronautical Distress and Safety System (GADSS)

Beacon Manufacturers Workshop  
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# Origin of the Global Aeronautical Distress and Safety System (GADSS)

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- Malaysia Airlines flight 370
- Air France flight 447

International Civil Aviation Organization (ICAO) review & analysis of recent tragic aviation events highlighted vulnerabilities in the current air navigation system with respect to:

- timely identification
- localization of aircraft in distress
- notification of/coordination with search & rescue services



# The Need

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ICAO's review identified a capability gap:

- effective, globally consistent approach to alerting search and rescue services
- effectiveness of current alerting and then notification of search and rescue services
  - address key improvement areas
  - develop and implement a globally integrated system



# Phases of An Aviation Event

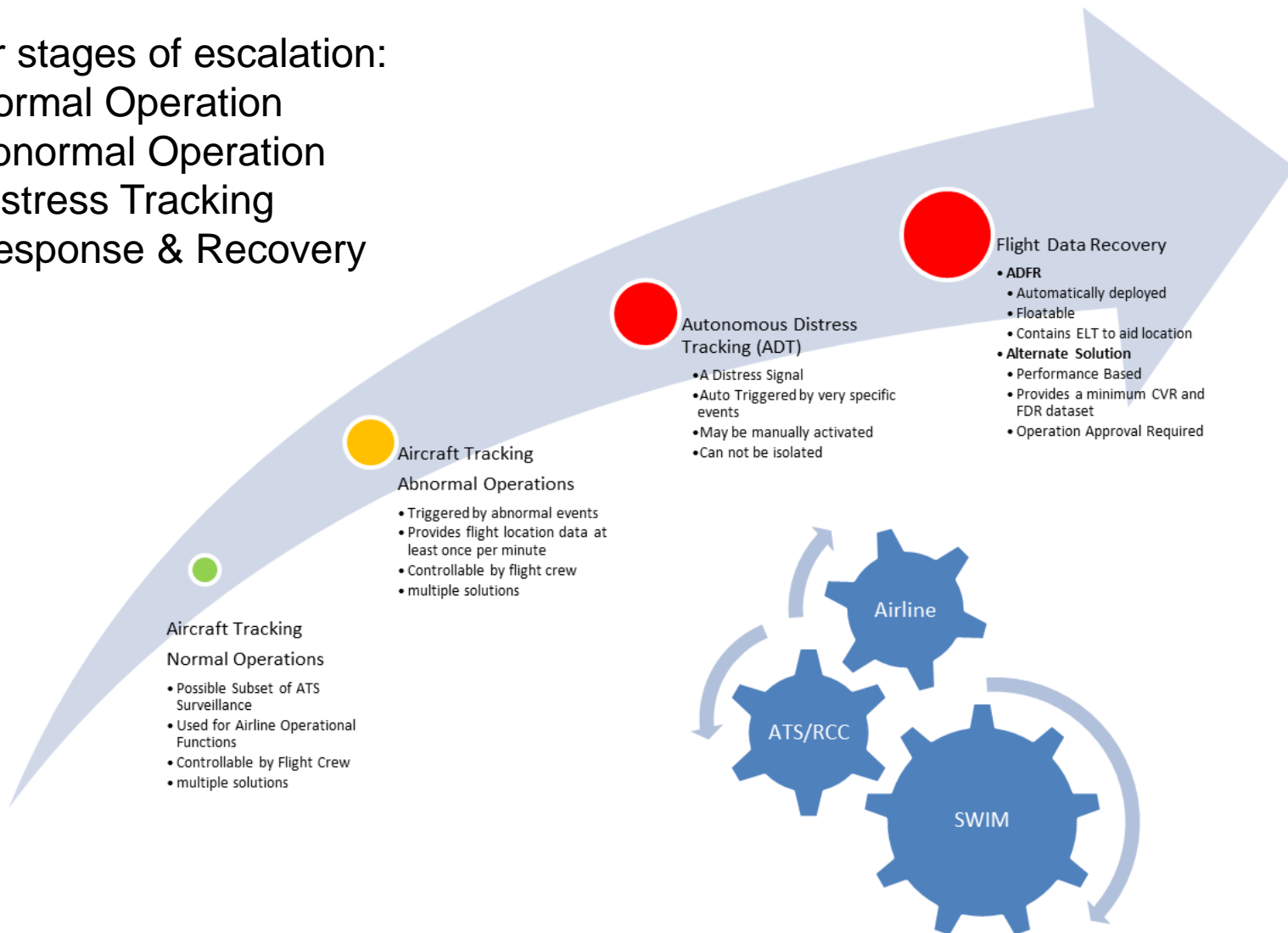
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- ## ICAO Ad-hoc Working Group on Flight Tracking
- formed in 2014 to develop Concept of Operation (CONOP)
  - identified following event phases:
    - detection of an abnormal situation (uncertainty phase)
    - alert phase
    - distress phase
    - search and rescue activities
  - GADSS CONOP draft released in July 2015, updated in December 2015

# GADSS Concept of Operations

Four stages of escalation:

- Normal Operation
- Abnormal Operation
- Distress Tracking
- Response & Recovery





# International Air Transport Association

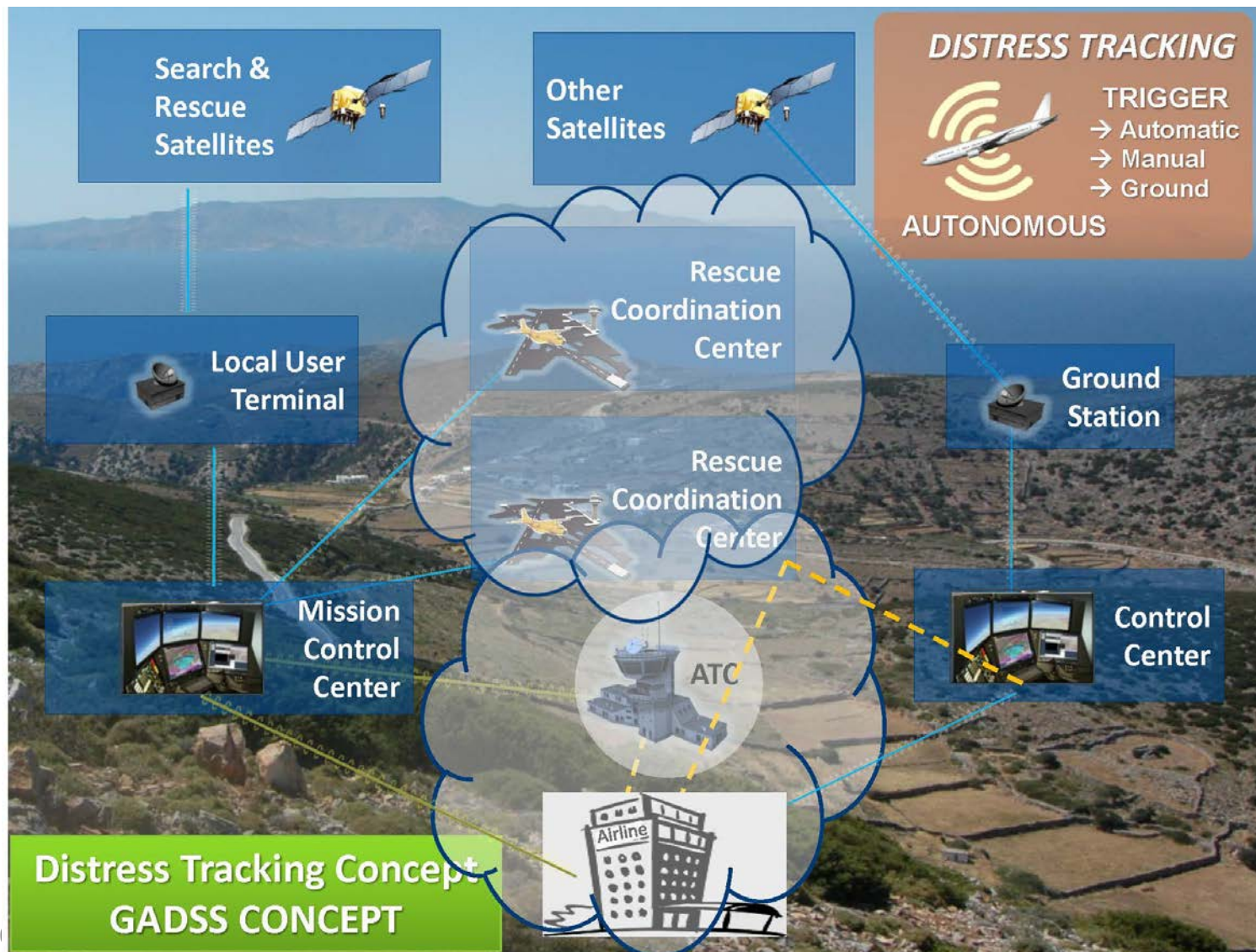
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- Concurrently in May 2014, IATA established the Aircraft Tracking Task Force to address near term and voluntary aircraft tracking solutions
- Close collaboration between IATA and ICAO has ensured that the IATA solutions fit within the GADSS Concept of Operations (ConOps)





# GADSS Tracking Concept





# GADSS Objectives

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- Global perspective
- Evaluate existing procedures
- Improve coordination and information sharing
- Enhance training of personnel
- Evolutionary implementation
  - Short term activities
  - Medium term activities
  - Long term activities





# GADSS Requirements

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- Enhance the ability to rescue survivors
- Provide immediate notification of abnormal event
- Locate an accident site with a degree of accuracy in a timeframe & level of confidence
- Function worldwide
- Specified using performance based standards
- Independent of any one prescriptive technology
- Flexible to accommodate diverse regional needs
- Not degrade baseline SAR services
- Seamless across Air Traffic Service (ATS) unit boundaries



# Current Systems

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- Emergency Locator Transmitters (ELTs)
  - ELTs can be tracked in order to aid in the detection and localization of aircraft in distress
  - uniquely identified almost instantly (if registered)
  - ICAO mandated 406 MHz ELTs from 1 JAN 2005.
- Flight Recorders
  - underwater locator beacons (ULB)
  - in 2012, duration of ULB transmission increased from 30 days to 90 days



# GADSS Improvements



- Timely activation
- Carriage of 406 MHz
- Registration

Improve capability to transmit 4D posn  
Ground/Space based Infrastructure  
Reduce sole HF reliance



# GADSS Elements

## Aircraft Systems

- Most lead time
- Forms baseline for future development

## Air Traffic Services

- Leverage existing ATS framework
- Coordination with SAR units
- Global coverage

## Search & Rescue Systems

- SAR Regions align with Flight Info Regions
- Coordination with ATS
- Global coverage

## Information Management

- IRM Framework
- Interoperable
- Info sharing



# Future GADSS Components

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- Aircraft Tracking
  - aircraft' s position reported at least every 15 min
  - accuracy within 1 NM
- Autonomous Distress Tracking (ADT)
  - 4D position (Lat, Long, altitude, time)
  - autonomous transmission at least every minute
  - localize accident site to within 6 NM radius
  - immediate or no later than five seconds latency



# Future GADSS Components

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- Flight Data Recovery
  - equipped with a means to recover flight recorder data in a timely manner
  - alternatives for flight data recovery
    - Automatically Deployable Flight Recorder (ADFR)
    - Transmission of flight data
      - Data streaming
      - Near real-time data-link



# Future GADSS Components

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Supported by:

- **System Wide Information Management**
  - standards, infrastructure and governance enabling management & exchange of ATS information between qualified parties via interoperable services
- **Information repository service**
  - supports correlating Aircraft position information with ATS unit and RCC areas of responsibility
  - available 24/7
  - accurate and complete to the maximum extent possible and practical





# GADSS Implementation Timelines

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- Aircraft Tracking
  - Normal tracking; existing equipment with 15 minute reporting interval
  - Develop & implement basic provisions, November 2016
  - Implement revised provisions, November 2018
  - Applicability to other aircraft operations, November 2022
- Autonomous Distress Tracking (ADT) System
  - Specification for new generation ELT, March 2018
  - Performance specifications for ADT, March 2018
  - First implementations, January 2021



# GADSS Implementation Timelines

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- Flight Data Recovery
  - Performance specifications, March 2016
  - Guidance for compliance, March 2018
- System Wide Information Management
  - Develop GADSS Information Management framework, March 2018
  - Develop GADSS Communications framework, March 2018
  - Identify information elements, March 2020
- Information repository service
  - Set-up GADSS repository, September 2016



# Impacts & Outcomes

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- Covered aircraft will require modifications
- States may need to invest more in the implementation of SAR responsibilities
- Enhanced Aircraft Tracking may provide additional benefits in Air Traffic Service and airline operations
- Enhanced awareness and information sharing across operators, ATS and RCCs



# Questions ?

Thank you for your attention!





# Backup Slides





# GADSS Definitions

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- ***Abnormal event.*** Event during flight which may trigger an emergency phase.
- ***Aircraft Tracking.*** A ground based process, established by the operator, that maintains and updates, at standardized intervals, a ground-based record of the four dimensional position of individual aircraft in flight.
- ***Alerting service.*** A service provided to notify appropriate organizations regarding aircraft in need of search and rescue aid, and assist such organizations as required.
- ***Autonomous Distress Tracking (ADT).*** The aircraft capability to broadcast for distress situations, independent of aircraft power or systems, aircraft tracking information.



# GADSS Definitions

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- ***Emergency phase.*** A generic term meaning, as the case may be, uncertainty phase, alert phase or distress phase.
  - Uncertainty phase. A situation wherein uncertainty exists as to the safety of an aircraft and its occupants.
  - Alert phase. A situation wherein apprehension exists as to the safety of an aircraft and its occupants.
  - Distress phase. A situation wherein there is reasonable certainty that an aircraft and its occupants are threatened by grave and imminent danger or require immediate assistance.
- ***Rescue Coordination Centre (RCC).*** A unit responsible for promoting efficient organization of search and rescue services and for coordinating the conduct of search and rescue operations within a search and rescue region.





# Chicago Convention Annex References

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- **Annex 2** provides provisions for flight plans, distress and urgency signals.
- **Annex 6** Part I provides provisions for aircraft operators. Some specific examples include requirements for ELTs and flight recorders, in-flight fuel management, and communication and navigation equipment.
- **Annex 8** provides provision for the design, production and maintenance of aircraft including the requirement for safety and survival equipment.



# Chicago Convention Annex References

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- **Annex 11** Chapter 5 details the provisions for an Alerting Service.
- **Annex 12** details the operating procedures for Search and Rescue.
- **Annex 13** provides the provisions for accident investigation, including the availability and protection of information related to an incident or accident.



# GADSS Implementation Plan

	Task	Block	Lead	Due Date	Status	Notes
<b>Aircraft tracking</b>	AT.01 - Resolve ADS-C tracking initiation issues linked to FPL correlation.	Block 0	CP	Nov-14	Complete	In Annex 10 proposal from OPLINKP
	AT.02 - Assess and identify possible means of compliance.	Block 0	ATTF	Sep-14	Complete	
	AT.03 - Develop and implement basic provisions for Aircraft tracking.	Block 0	ICAO	Nov-16	Complete	Amendment 39 to Annex 6 Part 1
	AT.04 - Develop and implement revised provisions for aircraft tracking based on operational experience.	Block 1	FLTOPSP	Nov-18	In progress	Pending completion of AT.03 and industry experience
	AT.05 - Assess extending applicability to other aircraft operations.	Block 2	FLTOPSP	Nov-22	Not Started	Pending Completion of AT.04



# GADSS Implementation Plan

	Task	Block	Lead	Due Date	Status	Notes
ADT	ADT.01 - Develop and implement performance based Standards for Autonomous Distress Tracking.	Block 0	FLTOPSP- FLIREC WG	Mar-16	Complete	Amendment 40 to Annex 6 Part 1
	ADT.02 - Assess and identify possible means of compliance.	Block 0	ICAO / INDUSTRY	Mar-16	In Progress	
	ADT.03 - Specification for flight event detection and triggering criteria.	Block 0	EUROCAE	Feb-16	Complete	ED-237 published
	ADT.04 - Specification for new generation ELTs	Block 0	EUROCAE/ RTCA	April-17	In Progress	



# GADSS Implementation Plan

	Task	Block	Lead	Due Date	Status	Notes
	ADT.05 - Assess issue of non-carriage and/or non-registration of 406 ELTs and taken appropriate measures.	Block 0	ICAO	Nov-15	In Progress	PIRGS and COSPAS/SARSAT to provide information
	ADT.06 - Rationalisation of existing ELT SARPs.	Block 1	FLTOPSP- FLIREC WG		Late	Existing jobcard addresses this issue
	ADT.07 - Assess extending applicability to other aircraft operations.	Block 2	FLTOPSP- FLIREC WG	Nov-18	Not Started	
	ADT.08 – Specifications for ADT	Block 1	EUROCAE/ RTCA	Mar-18	Not Started	Requires development of MOPS for ADT



# GADSS Implementation Plan

	Task	Block	Lead	Due Date	Status	Notes
Flight Data Recovery	ADFR.01 - Develop and implement performance based standards for Flight data recovery	Block 0	FLTOPSP-FLIREC WG	Mar-16	Complete	Amendment 40 to Annex 6 Part 1
	ADFR.02 - Develop guidance on acceptable means of compliance for flight data recovery	Block 1	FLTOPSP-FLIREC WG	Mar-18	In progress	ICAO Doc 10054
	ADFR.03 - Assess extending applicability to other aircraft operations.	Block 2	FLTOPSP-FLIREC WG	Nov-21	Not Started	Pending completion of ADFR.01 and ADFR.02



# GADSS Implementation Plan

	Task	Block	Lead	Due Date	Status	Notes
SWIM	SWIM.01 - Develop GADSS Information Management framework including data formats taking account of information ownership, security and confidentiality.	Block 1	IMP	Mar-18	Not Started	
	SWIM.02 - Develop GADSS Communication framework including analysis of communication needs and constraints of current communication infrastructures.	Block 1	IMP	Mar-18	Not Started	
	SWIM.03 - Identify FF-ICE information elements in support of GADSS (e.g. to associate ADT messages to the aircraft operator).	Block 2	ATMRPP	Mar-20	Not Started	





# GADSS Concept of Operations

