ICAO Asia/Pacific SAR Task Force
Bangkok, Thailand, 6-10 July 2015

GADSS

GLOBAL AERONATICAL DISTRESS and SAFETY SYSTEM

SEARCH AND RESCUE ASPECTS

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Topics

- Background
- Areas of Improvement
- Brief description of the concept
- Standards development
- Implementation Plan
- Summary

GADSS History

March, 2014 Malaysia Airlines Flight MH370 disappeared and remains missing

12-13 May 2014 **Multi-disciplinary** meeting with States, Industry, Chairs and co-chairs of several panels, and related specialists

Attendees: **207** participants from

- **44** Member States
- **19** International Organizations
- **5** Industry representatives
- **8** Panel chairs

Outcomes:

- *Consensus that **aviation's near-term priority is to track airline flights**, no matter the location or destination*
- Industry to initiate **global tracking on a voluntary basis**, and establish an Aircraft Tracking Task Force (ATTF) to provide recommendations on best practices
- Establish an ICAO Ad-Hoc Working Group
  - Concept of Operations, incorporating outcomes of the IATA ATTF
  - Present ConOps to the HLSC 2015

Improvement Areas in Current Operating Environment

- **Current systems and processes**
- **4 areas identified for potential improvement**
  - Aircraft Systems
  - ATS
  - SAR system
  - Information Management

Improvements

Reduction in reliance
Timely activation
Carriage of 406 Mhz
Registration
Aircraft SOPs

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

Improvements

Improvements

Improvements

GADSS Key Components

Aircraft Tracking

Normal Operations

- Possible Subset of ATS Surveillance
- Used for Airline Operational Functions
- Controllable by Flight Crew
- multiple solutions

Aircraft Tracking

Abnormal Operations

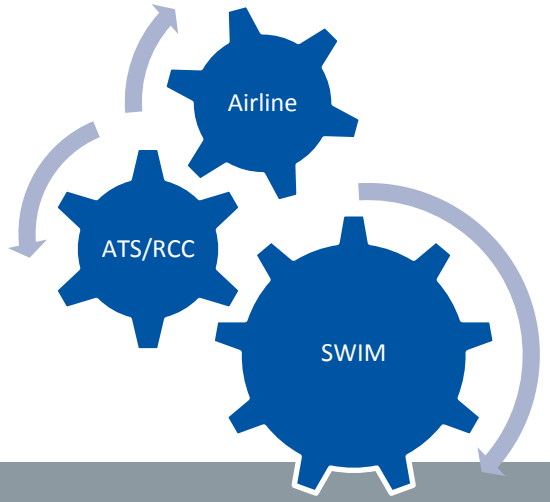
- Triggered by abnormal events
- Provides flight location data at least once per minute
- Controllable by flight crew
- multiple solutions

Autonomous Distress Tracking (ADT)

- A Distress Signal
- Auto Triggered by very specific events
- May be manually activated
- Can not be isolated

Flight Data Recovery

- **ADFR**
  - Automatically deployed
  - Floatable
  - Contains ELT to aid location
- **Alternate Solution**
  - Performance Based
  - Provides a minimum CVR and FDR dataset
  - Operation Approval Required



NO TRACKING

60 minute ATC reporting environment

Incident at 1 minute

Elapsed Time from Incident: **89** min

EMERGENCY PHASE

RESCUE COORDINATION CENTER

NORMAL TRACKING

60 minute ATC reporting environment

AOC

AOC tries to establish contact

Incident at 1 minute

CURRENT

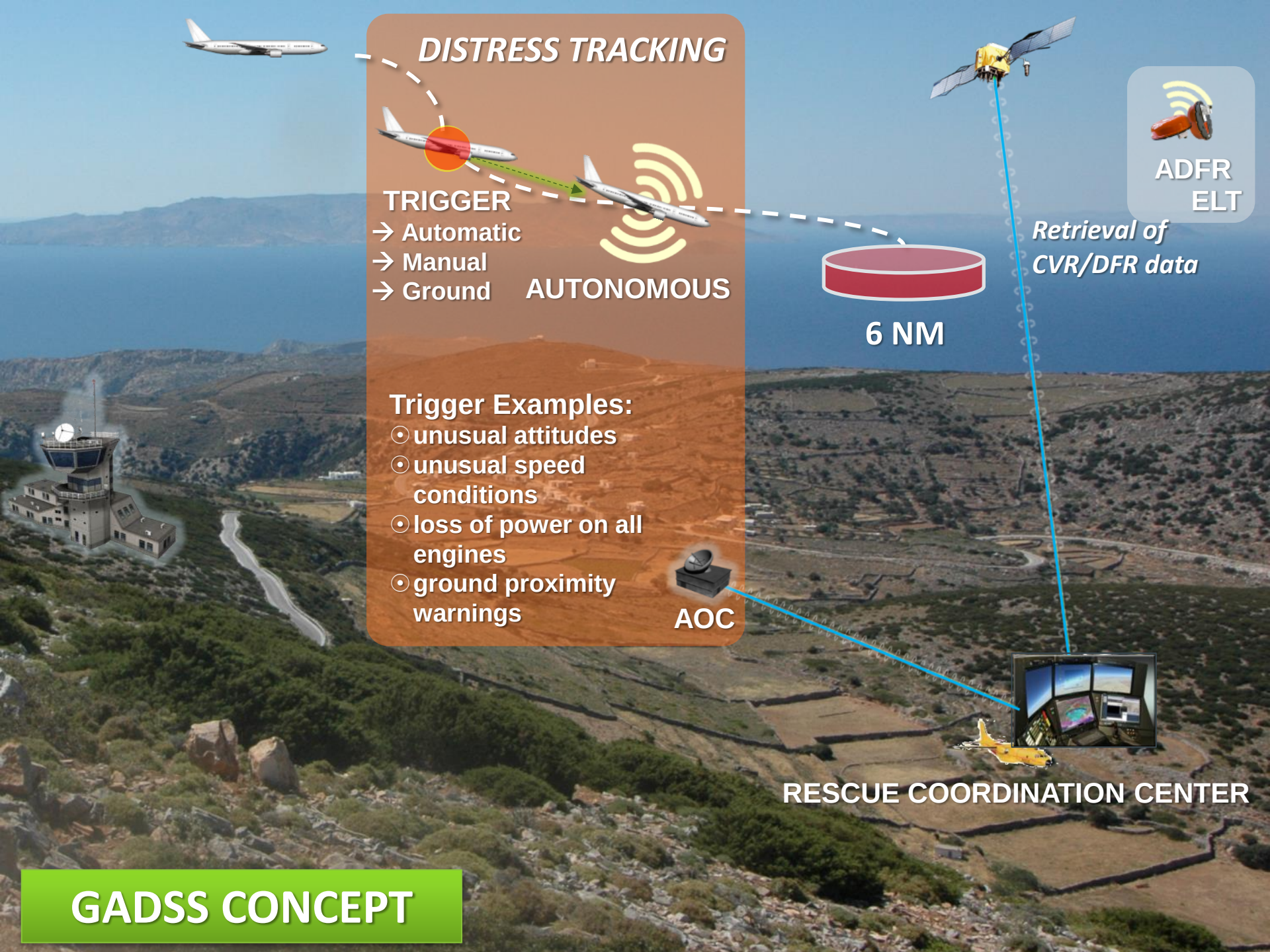
Elapsed Time from Incident: 44 min

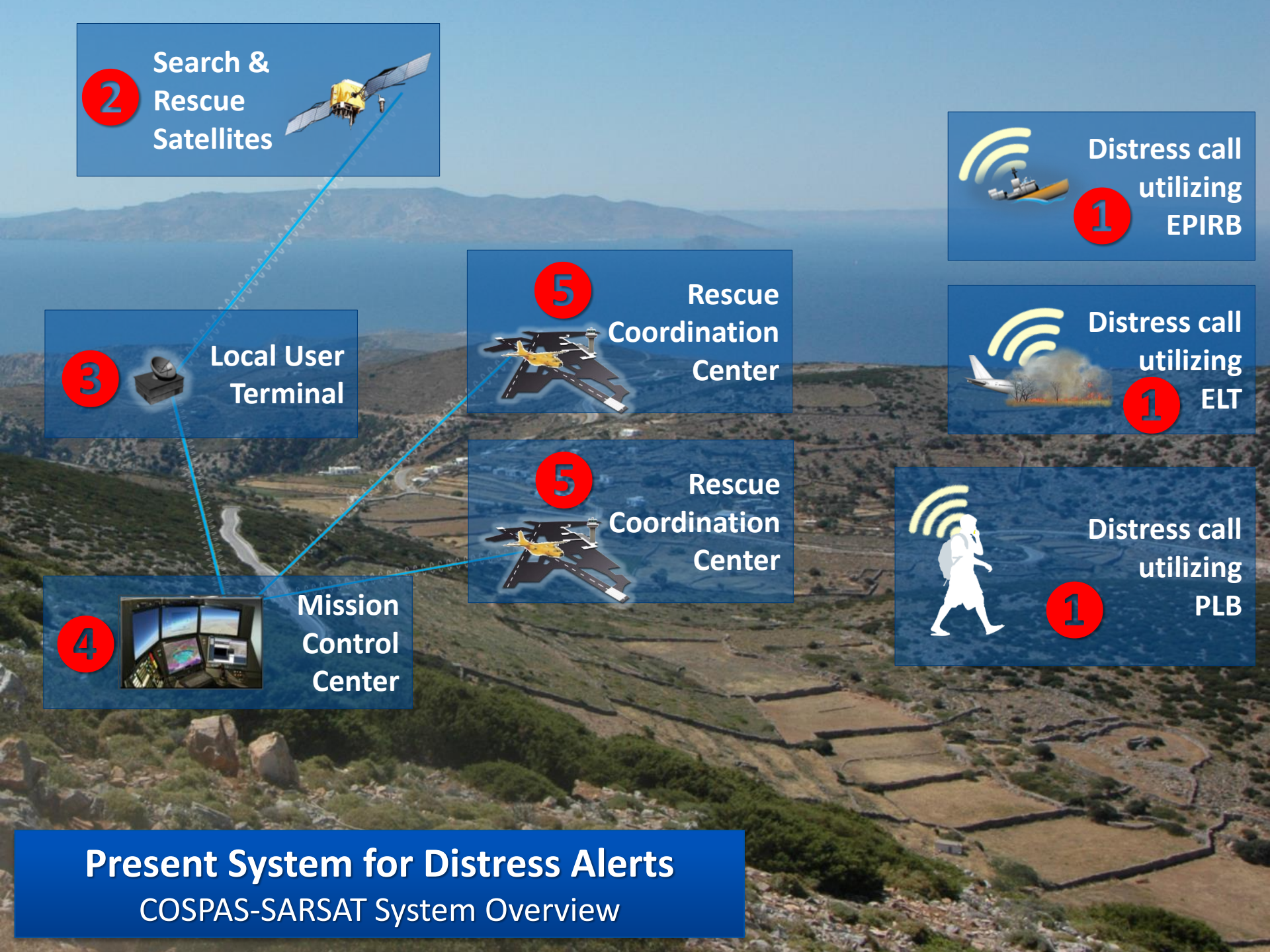
Elapsed Time from Incident: 89 min

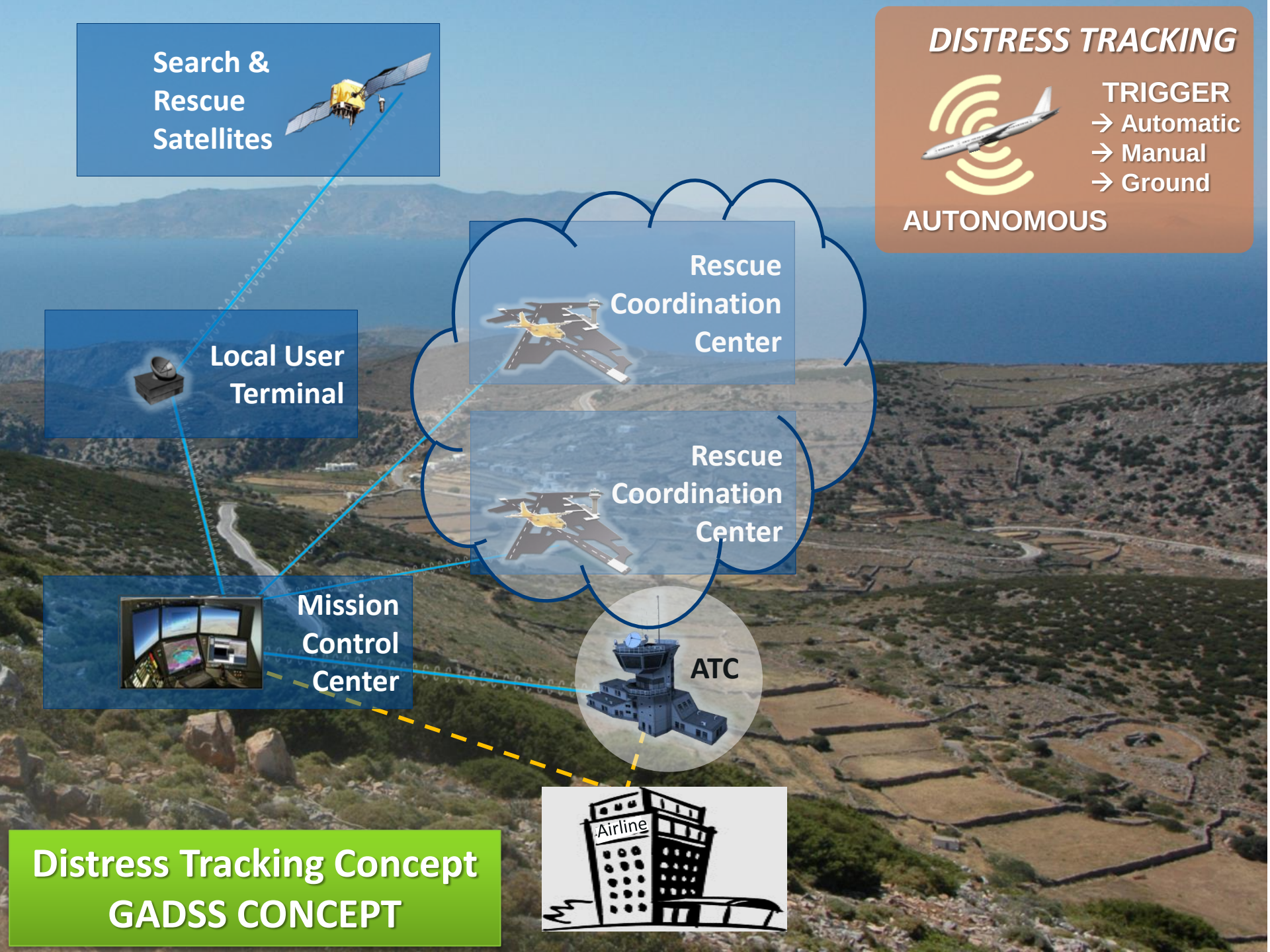
EMERGENCY PHASE

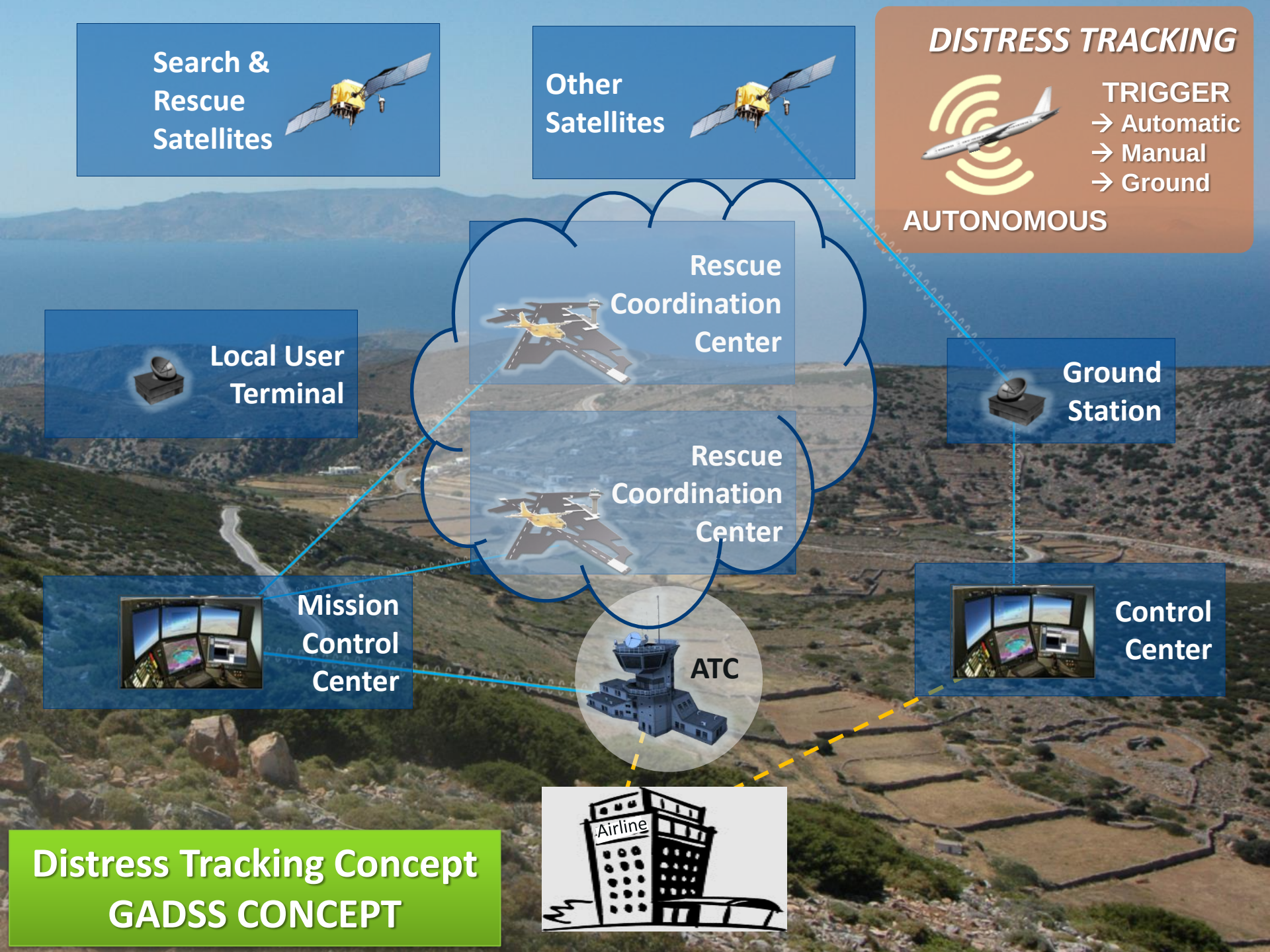
RESCUE COORDINATION CENTER

GADSS CONCEPT


DISTRESS TRACKING
TRIGGER
→ Automatic
→ Manual
→ Ground
AUTONOMOUS
6 NM
ADFR
ELT
Retrieval of
CVR/DFR data
Trigger Examples:
⊙ unusual attitudes
⊙ unusual speed conditions
⊙ loss of power on all engines
⊙ ground proximity warnings
AOC
RESCUE COORDINATION CENTER
GADSS CONCEPT


2
Search & Rescue Satellites
Distress call utilizing 1 EPIRB
3
Local User Terminal
5
Rescue Coordination Center
Distress call utilizing 1 ELT
5
Rescue Coordination Center
Distress call utilizing 1 PLB
4
Mission Control Center
Present System for Distress Alerts
COSPAS-SARSAT System Overview


Search &
Rescue
Satellites
DISTRESS TRACKING
TRIGGER
→ Automatic
→ Manual
→ Ground
AUTONOMOUS
Local User
Terminal
Rescue
Coordination
Center
Rescue
Coordination
Center
Mission
Control
Center
ATC
Airline
Distress Tracking Concept
GADSS CONCEPT


Search & Rescue Satellites
Other Satellites
DISTRESS TRACKING
TRIGGER
→ Automatic
→ Manual
→ Ground
AUTONOMOUS
Rescue Coordination Center
Rescue Coordination Center
Local User Terminal
Ground Station
Mission Control Center
ATC
Control Center
Airline
Distress Tracking Concept
GADSS CONCEPT

Some of the Major Outcomes during the HLSC 2015

- **Global Tracking**
  - Member States endorsed the **GADSS Concept of Operations**
  - Plans for adoption of a new **15 minute aircraft tracking standard** was also endorsed
    - **Performance-based**, allowing airlines the choice of several available and planned technologies and procedures
    - Proposal was sent to Member States on 25 February
    - Expected to be adopted by ICAO Council this fall
    - **Applicability date of 2016**
  - ICAO is working with industry on an **implementation initiative**
    - To assist States, ANSPs, and airlines in the implementation of the standard and respond to abnormal flight behavior in an **integrated and multidisciplinary manner**

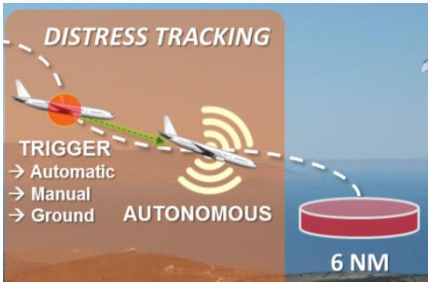
Upcoming Normal Tracking SARPs

Performance-based Standards and recommended practices for normal flight tracking

- No change to ATC procedures i.e. no change to SAR alerting
- Establish operator responsibility to track aircraft
- Not technology-specific – using existing technology
- Establish communication protocoled between Operator , ATC and RCC
- Targeted area is Oceanic where ATC gets position information with interval more than every 15 min
- Aeroplanes with a take-off mass in excess off 27,000 kg and more than 19 seats

Timelines

- **January 2015**
  - Preliminary review by ICAO ANC
- **February 2015**
  - State Letter
- **November 2015**
  - Adopted
- **November 2016**
  - Applicable



Autonomous Distress Tracking SARPS

Performance-based Standards and recommended practices for *distress* flight tracking

- Not technology-specific
- Location of an accident site within 6 NM
- Activated
  - Automatically based on flight behavior
  - Manually from the air
  - Manually from the ground
- Power and position information autonomous from other a/c systems
- Applies to new built aeroplanes from 2021
- Incentive for early adoption as an alternative to second ELT

Timelines

January 2015
- Preliminary review by ICAO ANC

May 2015
- State Letter

March 2016
- Adopted

January 2021
- Applicable *(if adopted)*

Retrieval of Flight Data SARPs

Prescriptive Standards and Recommended practices for ADFR with a performance-based alternative for data retrieval

- ADFR prescriptive baseline
  - Recommendation for new aeroplanes from 2019
  - Applies to new aeroplane types from 2021
- Performance-based alternative
  - Not technology-specific
  - Optional for all aeroplanes from 2016
  - Incentive for early adoption as an alternative to ADFR

Timelines

- **January 2015**
  - Preliminary review by ICAO ANC
- **May 2015**
  - State Letter
- **March 2016**
  - Adopted
- **November 2016**
  - Applicable
- **November 2019**
  - Applicable
- **January 2021**
  - Applicable

Procedures and Information Management

- **Procedures will need to be revised**
- **Action / re-action may not need to be the same as current procedures**
- **Tracking and contacts information availability**
  - SWIM/Information Repository
- **Performance-based provisions**
  - Not technology specific
  - Procedures need to be in place by 2021

Implementation Plan

Chapter 5:

Concept Steps

Implementation Plan

Aircraft Tracking

	Task	Block	Lead	Due Date	Status	Notes
Aircraft tracking	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	In Progress	Proposed SARPS published in State Letter AN 11/1.1.29-15/12 issued 25 February 2015
	AT.04 - Develop and implement revised provisions for aircraft tracking based on operational experience.	Block 1	FLTOPSP	Nov-18	Not Started	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

ADT

	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	In Progress	Proposed SARPS published in State Letter AN 11/1.1.29-15/15 issued 15 May 2015
	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	In Progress	
	ADT.04 - Specification for new generation ELTs	Block 0	EUROCAE/ RTCA	April-17	In Progress	
	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

Flight Data Recovery

	Task	Block	Lead	Due Date	Status	Notes
Flight Data Recovery	ADFR.01 - Develop and implement performance based standards for automatic deployable flight recorders.	Block 0	FLTOPSP-FLIREC WG	Mar-16	In Progress	Proposed SARPS published in State Letter AN 11/1.1.29-15/YY issued XX May 2015
	ADFR.02 - Develop and implement performance based standards for alternative means of flight data recovery	Block 1	FLTOPSP-FLIREC WG	Mar-18	Not Started	Requires development of MOPS for 'streaming' of flight recorder data
	ADFR.03 - Assess extending applicability to other aircraft operations.	Block 2	FLTOPSP-FLIREC WG	Nov-21	Not Started	Pending completion of ADFR.01

SWIM

	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	

Repository Services

	Task	Block	Lead	Due Date	Status	Notes
Info repository services	IRS.01 - Set-up GADSS repository (including Point of Contact information and areas of jurisdiction).	Block 0	ICAO	Sep-16	Not Started	

GADSS Procedures

	Task	Block	Lead	Due Date	Status	Notes
GADSS Procedures	PROC.01 - Assess the shortcomings in coordination and information sharing between ANSPs and between Civil/Military in support of emergency and SAR situations.	Block 0	ICAO		Not Started	Circ 330 to be revised.
	PROC.02 - Assessment of the impact of FIR and SRR boundaries (non-coincidental, overlapping and gaps).	Block 0	ICAO		Not Started	Seconded expert from Australia
	PROC.03 - Assessment of compliance to existing Annex 12 standards and development of an action plan.	Block 0	ICAO		Not Started	Seconded expert from Australia
	PROC.04 - Review of Standard Operating Procedures (SOP) for in-flight activation of ELTs.	Block 0	FLTOPSP/ INDUSTRY		Not Started	
	PROC.05 - Review of Annex 11 Chapter 5 (emergency phases and time sequence including initial 30 minute period).	Block 0	ICAO		Not Started	Seconded expert from Australia
	PROC.06 - Develop guidance material on initial and recurrent inflight emergency training for ATS units.	Block 0	ICAO		Not Started	
	PROC.07 - Explore ways to enhance SatVoice usability in distress situations (see INMARSAT-C).	Block 0	ATMOPSP		Not Started	
	PROC.08 - Assess current status (inventory) of the world airline fleet's carriage of distress beacons other than fixed ELT's (legacy 121.5 MHz versus 406 MHz beacons).	Block 0	ICAO/ COSPAS SARSAT		Not Started	Seconded expert from Australia
	PROC.09 - Raise awareness among airlines of the impact carriage of legacy 121.5 beacons (that are no longer detected by the COSPAS SARSAT system).	Block 0	ICAO/IATA		Not Started	Seconded expert from Australia
	PROC.10 - Assess feasibility of new provisions to require ANSPs to share aircraft position data.	Block 0	ICAO		Not Started	

GADSS Procedures

	Task	Block	Lead	Due Date	Status	Notes
	PROC.11 – Review and assess the coordination responsibilities during the transition of operations from Annex 12 to Annex 13.	Block 0	AIGP		Not Started	First AIGP meeting in Spring 2015
	PROC.12 - Review ATS and SAR procedures to take account of aircraft tracking and Autonomous Distress Tracking.	Block 0	ATMOPSP		Not Started	
OTHER	OTHR.01 - Ensure spectrum protection of frequencies used in the GADSS (e.g. frequency used by space based ADS-B)	Block 0	FSMP		In progress	ITU WRC 2015
	OTHR.02 - Update of the GANP	Block 0	ICAO	Apr-16	In progress	Needs to include 'ASBU' on GADSS
	OTHR.03 - Resolve datalink delivery assurance for downlink messages (ATN baseline 2 deployment)	Block 2	CP-OPLINK		In progress	

Implementation Plan

- **Work in Progress**
- **Convert to ICAO work programme**
  - Secretariat
  - Panels
  - External Organisations

Normal Tracking Implementation Initiative

- **Consistent with the Multidisciplinary Meeting on Global Tracking recommendations**
- **The theater of operations is the ASIA/PAC, however, it's a Global initiative.**
- **The implementation initiative is being conducted in a multi-national context**
  - Led by ICAO with support from States and industry stakeholders
  - NATII Steering Committee Established 5 March 2015
  - Two Sub-groups addressing Airspace and Scenarios
- **The implementation initiative will help establish guidance on best practices in use today.**
- **Australian trial**
- **More details on the NATII in next presentation**

Summary

- **Tragic events brought focus to the issues addressed by GADSS**
  - Not all issues are directly related to the events
- **Initial steps were taken based on:**
  - Extensive work last summer by the ATTF (Normal Tracking) and Adhoc group
  - SARPs
- **GADSS will**
  - Track aircraft everywhere and under all conditions
  - Locate aircraft when in distress
  - Ensure the timely recovery of Flight and Cockpit Voice Data

ICAO

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South American (SAM) Office
Lima

ICAO Headquarters
Montréal

Western and Central African (WACAF) Office
Dakar

European and North Atlantic (EUR/NAT) Office
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Nairobi

Asia and Pacific (APAC) Sub-office
Beijing

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Bangkok

THANK YOU