GADSS
GLOBAL AERONATICAL DISTRESS and SAFETY SYSTEM
SEARCH AND RESCUE ASPECTS

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ICAO Adhoc Working Group SAR Member
Topics

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

Emergency Locator Transmitter (ELT)

Aircraft Systems

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

Communication and Position Data
Improvements

Air Traffic Services

- Complacency
- Procedures
- Experience
- Information Sharing
- Airspace coordination
  Position accuracy
  30 min period
- Across ANSP boundaries
- Civil/Military
- Training Exercises
- HF disruptions
- ATSU crossings
Improvements

- Coordination complexity
- Delayed or inadequate response
- Annex 12 compliance
- Complex coordination
- Response times
- Annex 12/13 transition
- ATSU/RCC
- Understanding of responsibilities
- FIR and SRR Area alignment
- Search & Rescue Systems
- Experience
- Training Exercises
Aircraft Operator (operational)

ATSU RCC

Geographic picture and situational awareness
GADSS Key Components

Aircraft Tracking
- Normal Operations
  - Possible Subset of ATS Surveillance
  - Used for Airline Operational Functions
  - Controllable by Flight Crew
  - Multiple solutions

- 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

SWIM

ATS/RCC

Airline
Elapsed Time from Incident: 89 min

NO TRACKING
60 minute ATC reporting environment

Incident at 1 minute

EMERGENCY PHASE

RESCUE COORDINATION CENTER
Incident at 1 minute

AOC tries to establish contact

Elapsed Time from Incident: 44 min

Elapsed Time from Incident: 89 min

NORMAL TRACKING
60 minute ATC reporting environment

CURRENT

EMERGENCY PHASE

GADSS CONCEPT

RESCUE COORDINATION CENTER
DISTRESS TRACKING

TRIGGER
→ Automatic
→ Manual
→ Ground

AUTONOMOUS

Trigger Examples:
○ unusual attitudes
○ unusual speed conditions
○ loss of power on all engines
○ ground proximity warnings

6 NM

ADFR
ELT

Retrieval of CVR/DFR data

AOC

GADSS CONCEPT
Present System for Distress Alerts
COSPAS-SARSAT System Overview
Rescue Coordination Center

DISTRESS TRACKING
TRIGGER
- Automatic
- Manual
- Ground

AUTONOMOUS

Mission Control Center
ATC
Search & Rescue Satellites
Local User Terminal

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
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 protocols 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 of 27,000 kg and more than 19 seats

Upcoming Normal Tracking SARPs

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)
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

<table>
<thead>
<tr>
<th>Task</th>
<th>Block</th>
<th>Lead</th>
<th>Due Date</th>
<th>Status</th>
<th>Notes</th>
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<tr>
<td>AT.01 - Resolve ADS-C tracking initiation issues linked to FPL correlation.</td>
<td>Block 0</td>
<td>CP</td>
<td>Nov-14</td>
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<td>In Annex 10 proposal from OPLINKP</td>
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<td>AT.02 - Assess and identify possible means of compliance.</td>
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<td>AT.03 - Develop and implement basic provisions for Aircraft tracking.</td>
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<td>Proposed SARPS published in State Letter AN 11/1.1.29-15/12 issued 25 February 2015</td>
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<td>AT.04 - Develop and implement revised provisions for aircraft tracking based on operational experience.</td>
<td>Block 1</td>
<td>FLTOPSP</td>
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<td>AT.05 - Assess extending applicability to other aircraft operations.</td>
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<td>ADT.02 - Assess and identify possible means of compliance.</td>
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<td>ADT.03 - Specification for flight event detection and triggering criteria.</td>
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<td>ADT.04 - Specification for new generation ELTs</td>
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<td>ADT.05 - Assess issue of non-carriage and/or non-registration of 406 ELTs and taken appropriate measures.</td>
<td>Block 0</td>
<td>ICAO</td>
<td>Nov-15</td>
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<td>PIRGS and COSPAS/SARSAT to provide information</td>
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<td>ADT.06 - Rationalisation of existing ELT SARPs.</td>
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<td>FLTOPSP-FLIREC WG</td>
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<td>ADT.07 - Assess extending applicability to other aircraft operations.</td>
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<td>ADT.08 – Specifications for ADT</td>
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## Flight Data Recovery

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<td>Mar-16</td>
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<td>Proposed SARPS published in State Letter AN 11/1.1.29-15/YY issued XX May 2015</td>
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<td>ADFR.01 - Develop and implement performance based standards for automatic deployable flight recorders.</td>
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<td>FLTOPSP-FLIREC WG</td>
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<td>Requires development of MOPS for ‘streaming’ of flight recorder data</td>
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<td>ADFR.02 - Develop and implement performance based standards for alternative means of flight data recovery</td>
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<td>SWIM.01 - Develop GADSS Information Management framework including data formats taking account of information ownership, security and confidentiality.</td>
<td>Block 1</td>
<td>IMP</td>
<td>Mar-18</td>
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<td>SWIM.02 - Develop GADSS Communication framework including analysis of communication needs and constraints of current communication infrastructures.</td>
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<td>SWIM.03 - Identify FF-ICE information elements in support of GADSS (e.g. to associate ADT messages to the aircraft operator).</td>
<td>Block 2</td>
<td>ATMRPP</td>
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# Repository Services

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<td>IRS.01 - Set-up GADSS</td>
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<td>areas of jurisdiction)</td>
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## GADSS Procedures

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<tr>
<td>PROC.01 - Assess the shortcomings in coordination and information sharing between ANSPs and between Civil/Military in support of emergency and SAR situations.</td>
<td>Block 0</td>
<td>ICAO</td>
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<td>PROC.02 - Assessment of the impact of FIR and SRR boundaries (non-coincidental, overlapping and gaps).</td>
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<td>PROC.03 - Assessment of compliance to existing Annex 12 standards and development of an action plan.</td>
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<td>PROC.04 - Review of Standard Operating Procedures (SOP) for in-flight activation of ELTs.</td>
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<td>PROC.05 - Review of Annex 11 Chapter 5 (emergency phases and time sequence including initial 30 minute period).</td>
<td>Block 0</td>
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<td>Seconded expert from Australia</td>
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<td>PROC.06 - Develop guidance material on initial and recurrent in-flight emergency training for ATS units.</td>
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<td>PROC.07 - Explore ways to enhance SatVoice usability in distress situations (see INMARSAT-C).</td>
<td>Block 0</td>
<td>ATMOPSP</td>
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<td>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).</td>
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<td>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).</td>
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<td>PROC.10 - Assess feasibility of new provisions to require ANSPs to share aircraft position data.</td>
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# GADSS Procedures

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<tr>
<td>PROC.11 - Review and assess the coordination responsibilities during the transition of operations from Annex 12 to Annex 13.</td>
<td>Block 0</td>
<td>AIGP</td>
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<td>First AIGP meeting in Spring 2015</td>
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<td>PROC.12 - Review ATS and SAR procedures to take account of aircraft tracking and Autonomous Distress Tracking.</td>
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<td>OTHR.01 - Ensure spectrum protection of frequencies used in the GADSS (e.g. frequency used by space based ADS-B)</td>
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<td>OTHR.02 - Update of the GANP</td>
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<td>ICAO</td>
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<td>Needs to include 'ASBU' on GADSS</td>
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<td>OTHR.03 - Resolve datalink delivery assurance for downlink messages (ATN baseline 2 deployment)</td>
<td>Block 2</td>
<td>CP-OPLINK</td>
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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