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AFI Secondary Surveillance Radar Codes Allocation and Review Workshop (ASCAAR)

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ATM Automation System Role and Scope

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This presentation covers

- ATMS and ATM automation
- ICAO Provisions
- Transition to future



Background

- R&D on automation system
 - Since late 1960's
 - Surveillance data processing
 - Conflict detection and resolution advice
 - Human-in-the-loop (HITL)
 - Diversity, Event driven operations
 - Safety, efficiency and capacity



Equipment or Project

- A joint effort of users and equipment supplier incorporating local practices, constraints and optimizations
 - Not a procurement of a piece of COTS equipment
 - Challenging project practice focusing on engineering software to support critical mission through interactive process between stakeholders under strict restrictions.



Scope of Automation System

- Information centralization and information exchange
- Safety tool, Planning tool, Efficiency tool
 - Under interactive conditions
- Contingency fallback system
 - one of the biggest problems with automation system is that it can fail/mal-function



input

- Radar
- ADS-B (ground/space based)/ADS-C
- MLAT
- Flight plan
- Weather
- Cooperative surveillance tool
- AIDC
- Datalink
- Aeronautical Info
-



- Surveillance Data Processing,
- Flight Data Processing,
- Electronic data displays,
- Electronic flight strips,
- Mode S down-linked airborne parameters,
- Safety nets such as STCA, MTC
- Pre-Departure Clearance
- Arrival and Departure Manager,
- Time Based Separation support tools,
- Aeronautical Message Handling Systems,
- Aeronautical Information Management,
- ...



output

- Enhanced Situational awareness
- Improved capability for: safety, efficiency, capacity and environmental protection

(By taking over many routine tasks, automation increases controller capacity and productivity)

Automation system

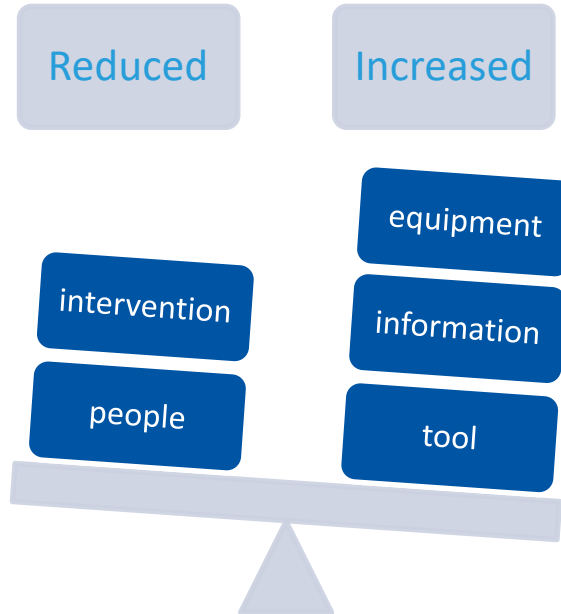


Automation Today

- The use of automation is limited to the provision of information / advice / alert to the controller, it does not make decisions. The controller remains decision maker in control.



Automation is a key component



Automation will continue to increase its role in the future of ATC.



Automation Tomorrow

- Take most tasks and controller interventions as exception.
- Full automation will combine automated planning (and plan updates) in a look-ahead time horizon of up to several hours.
- The benefits are assumed to be significant improvement in overall operational safety, efficiency and capacity.

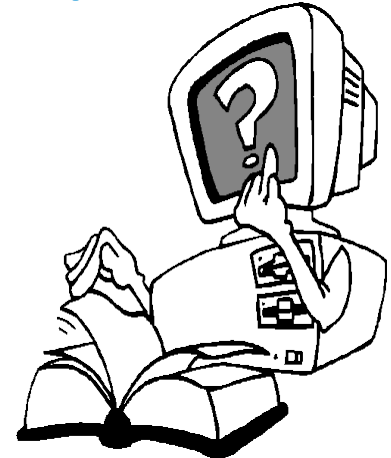


ICAO provisions

- Annex 2,4,10,11,15,19,...
- PANS ATM/OPS
 - Doc 4444,8168
- GANP Suite
 - Doc 9750,
 - Doc 9854, 9882, 9883
- Doc 7030, 9673, 9985,...

Standard?

Specification?





ATM

- Air traffic management (ATM)*
 - The dynamic, integrated management of air traffic and airspace — safely, economically and efficiently — through the provision of facilities and seamless services in collaboration with all parties.

*Doc 9854 Global Air Traffic Management Operational Concept



ATMS

- Air traffic management system
 - A system that provides ATM through the collaborative integration of humans, information, technology, facilities and services, supported by air and ground- and/or space-based communications, navigation and surveillance. (CNS/ATM)



Operational Concept

- It describes how the air traffic management system will operate and identifies the services that will be required.
- A CONOPS portrays an ideal state in the future (2025), to be reached progressively through a number of discrete change steps from the current situation.



Architecture

- Architecture includes the (overall) infrastructure and a technical system description that includes specific technologies and personnel functions.
- **Architecture defines what specific technologies are implemented to deliver services, to be developed by planning and implementation regional groups (PIRGs) and States.**
- A CONOPS drives the architecture.
- For the global ATM operational concept, **2025** was selected as the point in which the majority of expectations described could be realized.



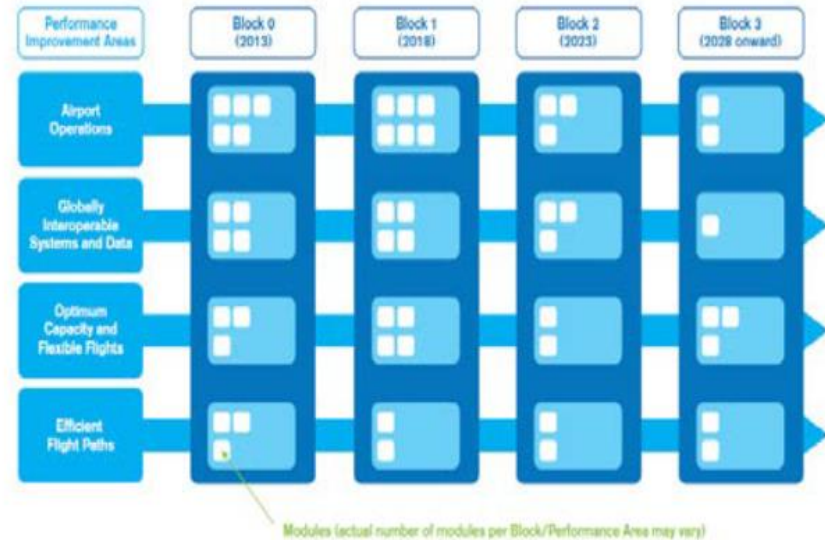
Concept of Use

- An ATM “concept of use” is a more detailed description of how a particular functionality or technology could be used.



Where is automation

- GANP
 - ASBU modules
 - Safety net?
 - Surveillance integration
 - Technology Roadmap
- TWR, APP, ACC, FOC, ...





Automation in GANP Technology Roadmap

- The ANC/12 requested ICAO to develop a roadmap for ground air traffic automation systems. This work could **not be achieved** during the past triennium but will be included in the 2019 edition. The purpose of this roadmap will be to:
 - 1. Ensure **interoperability** between States;
 - 2. Function and operate these systems resulting in **consistent and predictable** air traffic management **across States and regions.**

APPENDIX 5

Automation

The Twelfth Air Navigation Conference requested ICAO to develop a roadmap for ground air traffic automation systems. This work could not be achieved during the past triennium but will be included in the 2019 edition. The purpose of this roadmap will be to:

1. Ensure interoperability between States;
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Regional Air Navigation Plan

- ICAO Doc.7474 Africa-Indian Ocean Air Navigation Plan (Regional ANP Vol. I & Vol. II)
- In Vol. I, regional policy on surveillance is specified:

Planning of aeronautical surveillance systems should be made based on a system approach concept, where collaboration and sharing of data sources should be considered in support of an efficient use of airspace.



Regional Air Navigation Plan

- In Vol. II, the **required surveillance infrastructure** is detailed under Table CNS II-AFI-2, Surveillance.
 - Column 4: Integration of Surveillance Information into **ATC Situation Display**
 - Column 5: **Multi-Surveillance Data Processing Capability**
 - Column 7: Level of A-SMGCS Implemented



Evolutionary Implementation

2005

Requirements in GANP suites

2025
(2030)

- Performance based approach in steps
- Formulate Regional and National ANPs
- Continuous Investment
- Training
- Business continuity (contingency plan)



Transition to future

- Participating and contributing in ICAO meetings/ symposium
- Early improvement in operational safety, efficiency, capacity and environmental protection
- Initiating city-pairs joint trials
- Experience sharing for future
- Today is a beginning



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