



# Airservices Australia

ATM Modernisation and Research Initiatives

**Greg McDonald**

Senior Operational Specialist

AFS Solutions ATM Automation



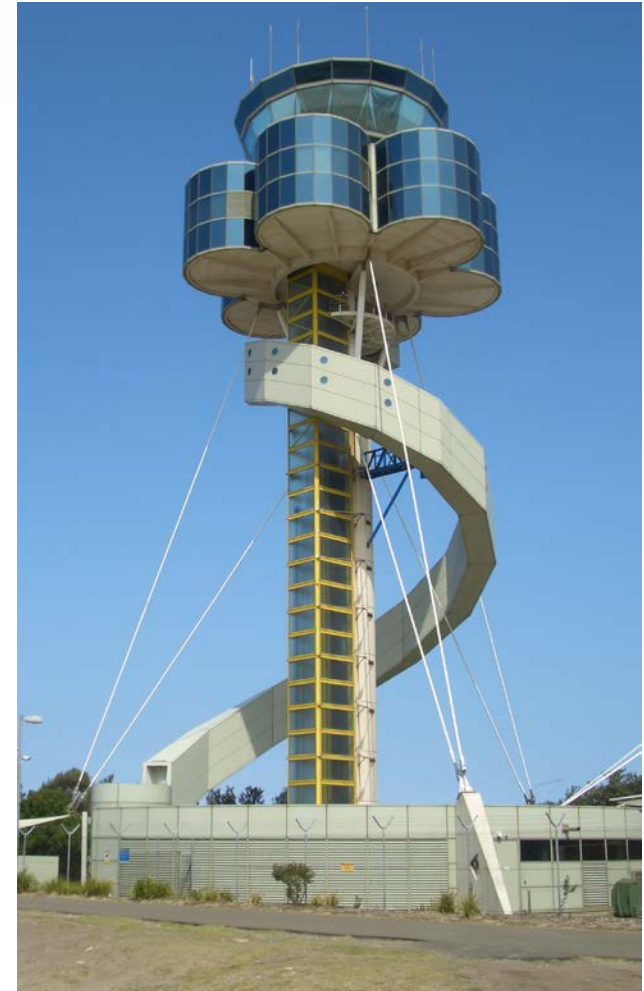
## In brief

- Air Traffic Control (ATC)
- Aviation Rescue and Fire Fighting (ARFF)
- Communication, Navigation, Surveillance (CNS) supported by the Projects and Engineering business group



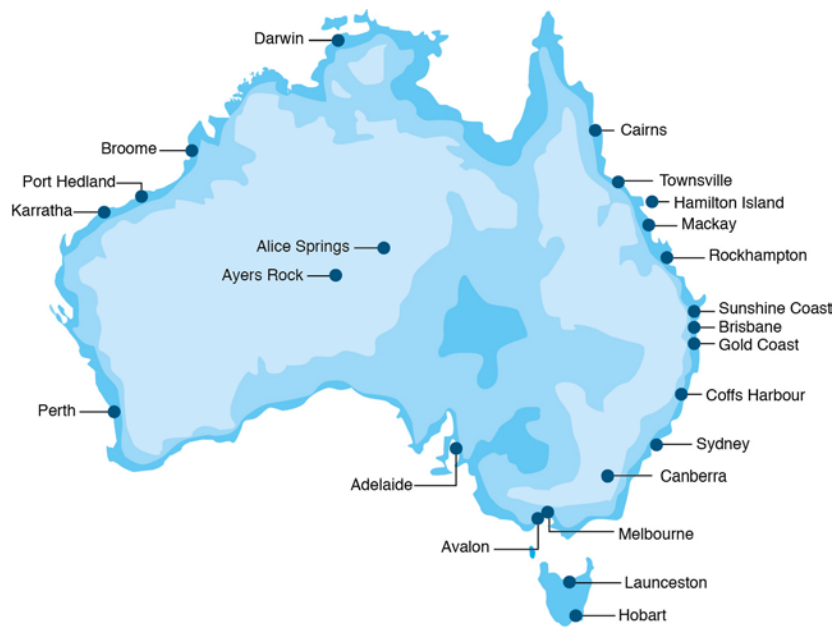
## In brief

- Government-owned corporation
- Over 4000 employees
- Total income 2011-12 was \$898m
- 11% of the world's airspace
- More than four million flights per year
- Around 80 million passengers per year

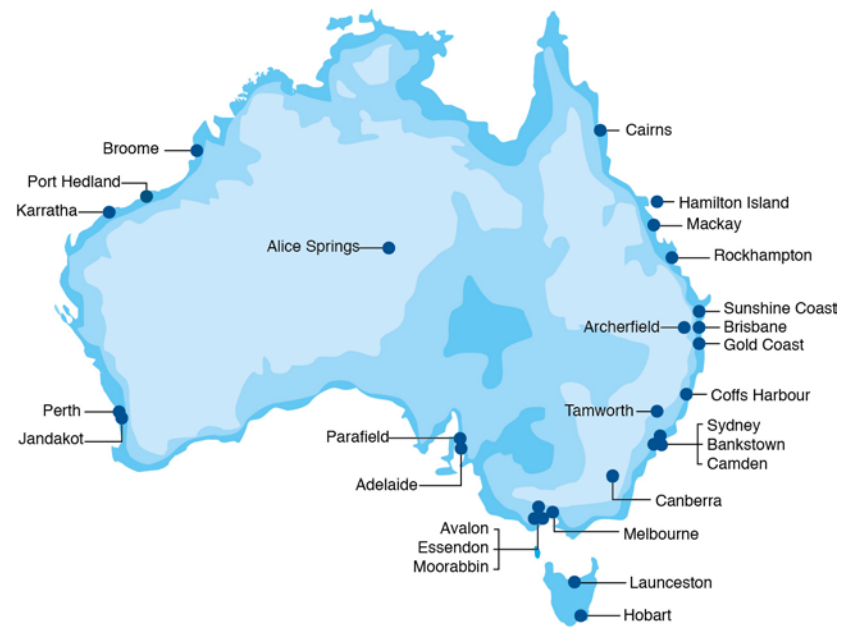


# Locations

## ARFF Stations



## ATC Towers



## Our Vision

**Connecting the Australian aviation industry to deliver world best industry performance.**

## Our Mission

**To provide safe, secure, efficient and environmentally responsible services to the aviation industry.**

## Technologies for future Australian ATM – to 2020

- GNSS primary means navigation for PBN with a back-up network of ground based navigation aids
  - About half the existing navaids to be retained
  - Mainly VOR and NDB numbers to be reduced
- Mode S SSR and primary in terminal areas, with ADS-B
- ADS-B & MULTILAT for A-SMGCS at 4 major aerodromes
- ADS-B surveillance in controlled airspace across the continent (plus Mode S SSR in high density en-route airspace on east coast)

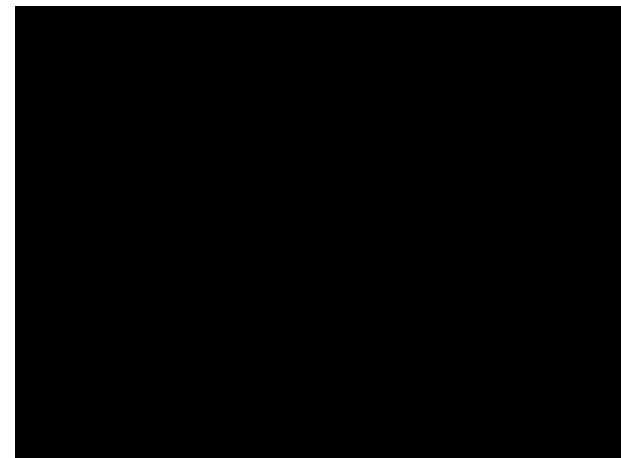
## **Aircraft mandates to support future Australian ATM**

- GNSS primary means navigation – minimum equipage mandates required for PBN and ADS-B (CAO 20.18)
- PBN NAV specs (NPRM 1002AS) include RNP 10, 4, Basic RNP 1, RNP APP, RNP AR, Baro-VNAV
- Mode S transponders (with ADS-B capability)
- Further ADS-B mandates in controlled airspace
- TCAS II Version 7.1 – new turbine-powered aircraft i.a.w. the ICAO Annex 10 Volume IV standard



# Rebuilding – assets

- We are investing \$1.1 billion over five years on upgrading and modernising our infrastructure and facilities
- Nationwide surveillance
- Navigation program
- New towers
- Building upgrades
- Fire vehicle replacement
- Fire control centre upgrades
- Integrated civil military ATM system





Australian Government  
Department of Defence



# oneSKY

## AUSTRALIA

One Team ▶ One System ▶ One Sky

# Why are we doing this?

---



Meet customer, stakeholder and owner expectations

Address limitations of existing system

Manage future growth and complexity

Improve service provision

## 1. Demand and capacity

- >50% increase in daily movements by 2028
- Increased complexity
- Network approach required
- Current ATM system cannot meet demands
- Technology is the solution

## 2. Future operating environment

- ICAO Operating Concept
- Greater collaboration by all stakeholders
- New gen aircraft and emerging technologies
- Close the aircraft and ATM technology gap

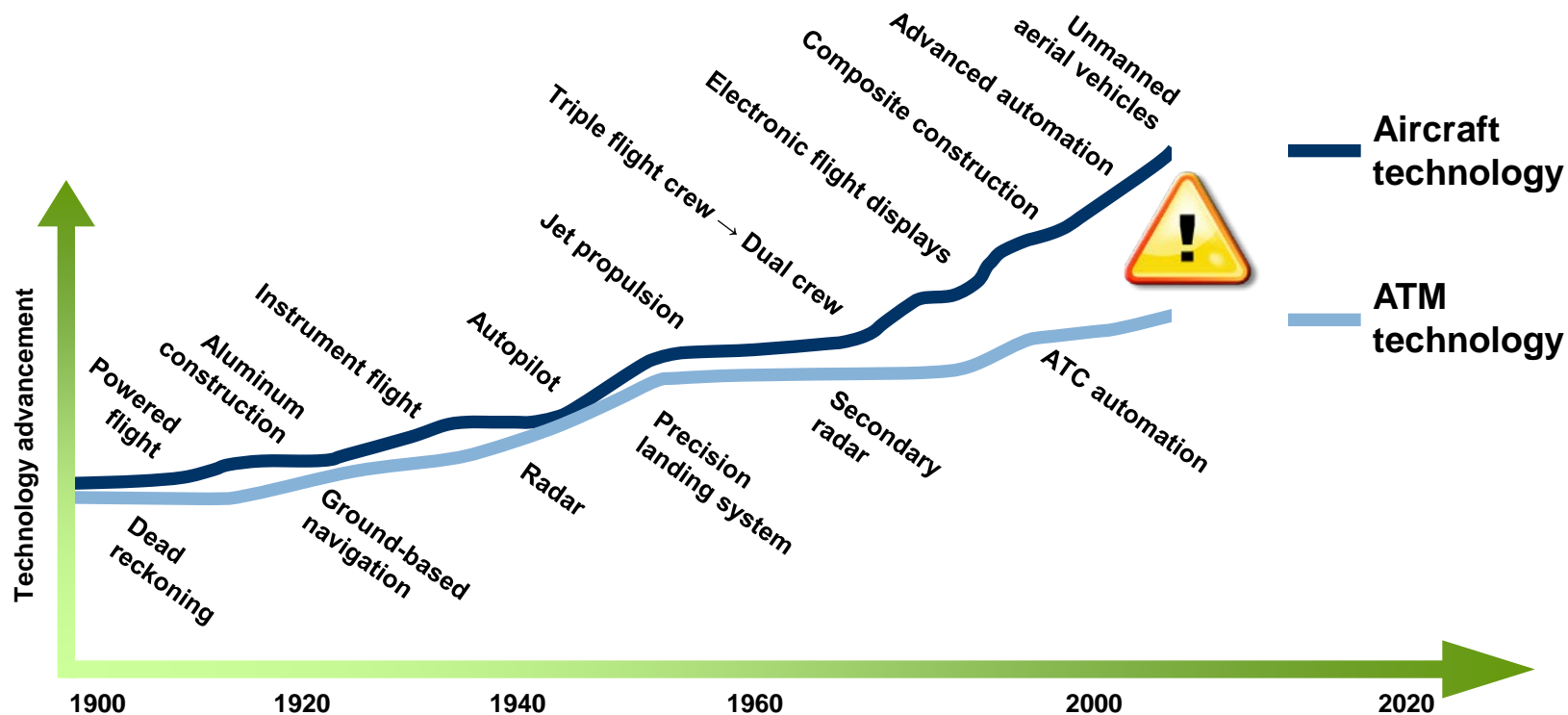
## 3. Customers and stakeholder expectations

- Currently struggle to meet expectations
- Closer management of network
- Airlines – use new aircraft capability
- Community – aircraft noise management
- Improved system capability required

## 4. Limitations of existing system

- Limitations of existing system already evident
- Legacy software
- Impact on business continuity
- Limitations of Brisbane and Melbourne FDRs
- Lack of civil military integration

# The aircraft and ATM technology gap



These milestones represent individual technology improvements

ATM technology has not kept pace with aircraft-based technology

# Key capability improvements

---



Improving our safety through...

One national system

One Australian FIR

Business continuity and contingency responses

ATC workload management

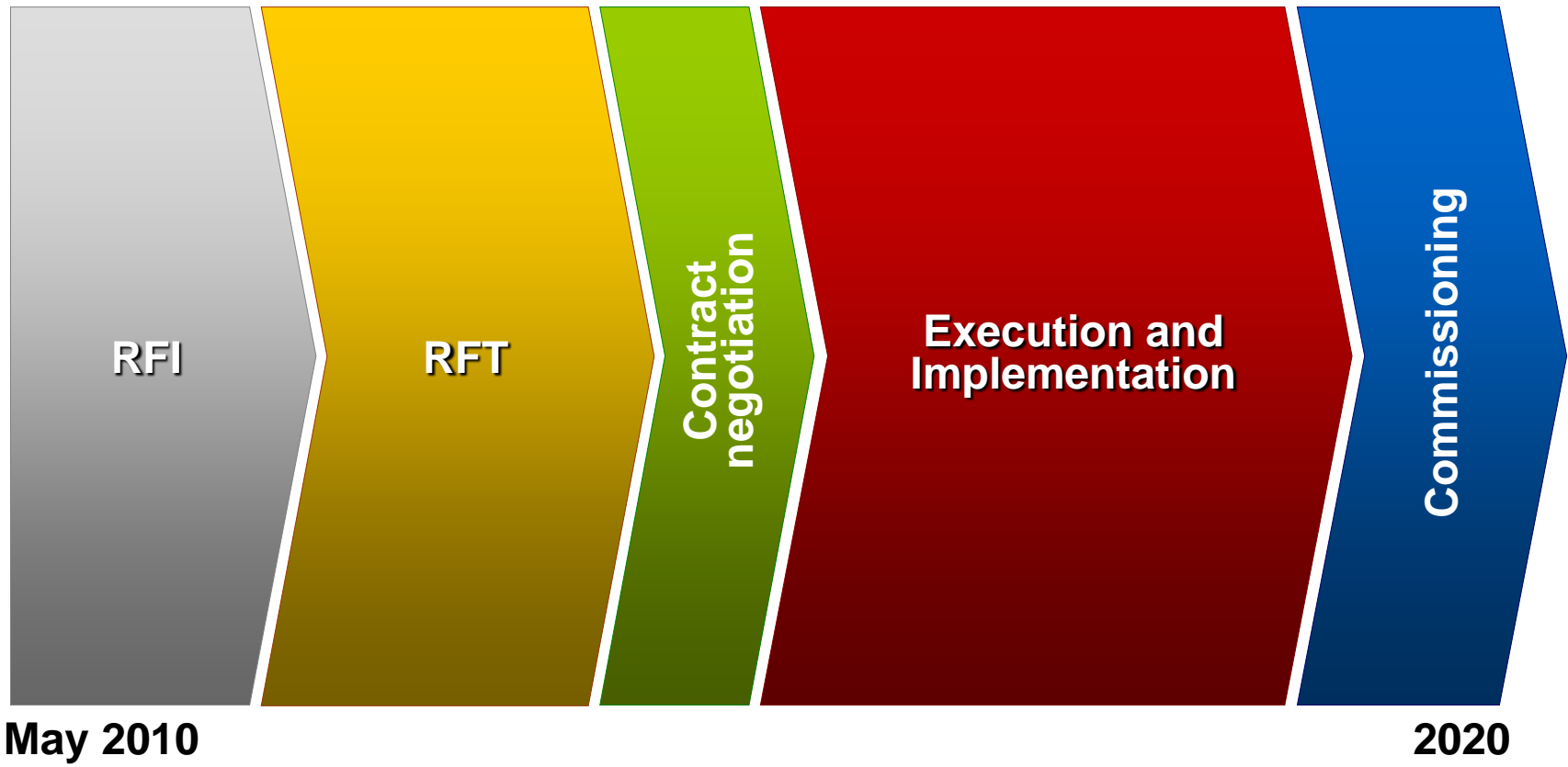
Customer benefits

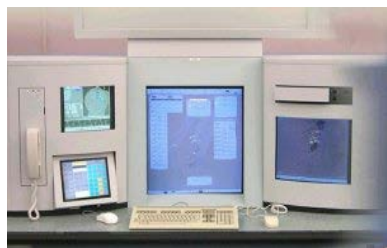
Modular and open architecture

Modern design standards

Globally-aligned development path

# Program timeline





**Ground Based**



**Air Based**

**or Combination?**

## Ground Based

- + Has complete forecast
- + ATC intent
- Missing aircraft intent
- Unclear aircraft performance

## Air Based

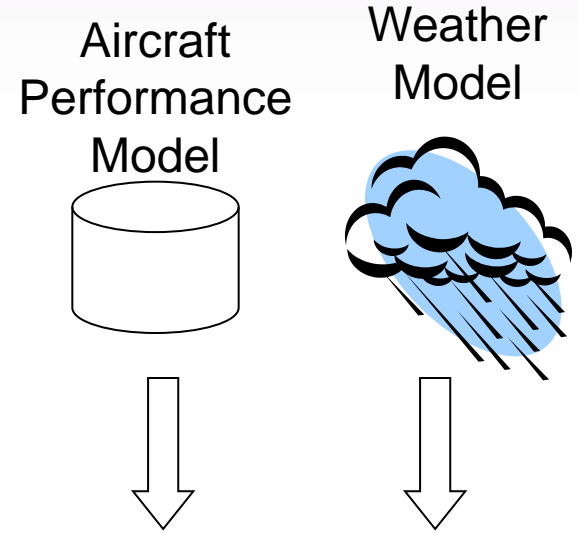
- + Actual weather
- + Actual aircraft performance model
- Limited forecast
- Unaware of ATC intent



# ATM Research - Trajectory Prediction

## Aircraft Intent

- Flightplan
- Speeds
- AIP
- FANS IPI



## Initial Conditions

- Start position
- Weight



# ATM Research - Trajectory Prediction

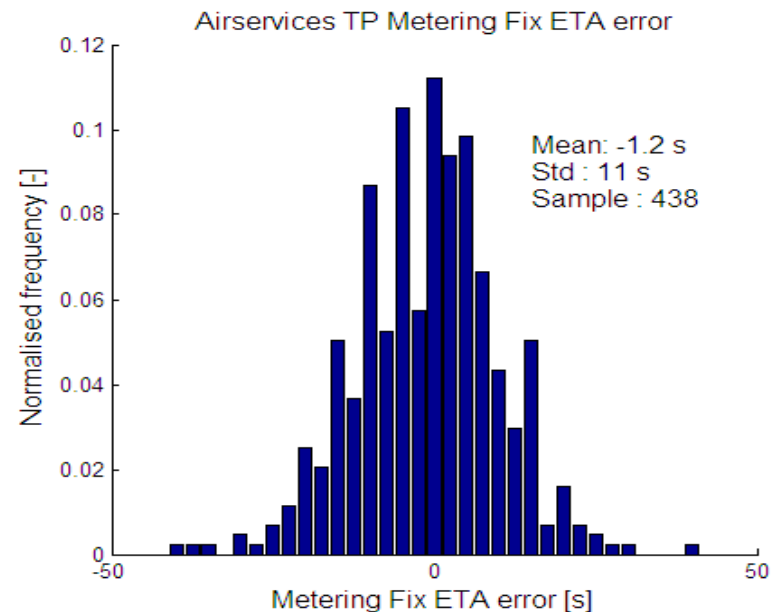
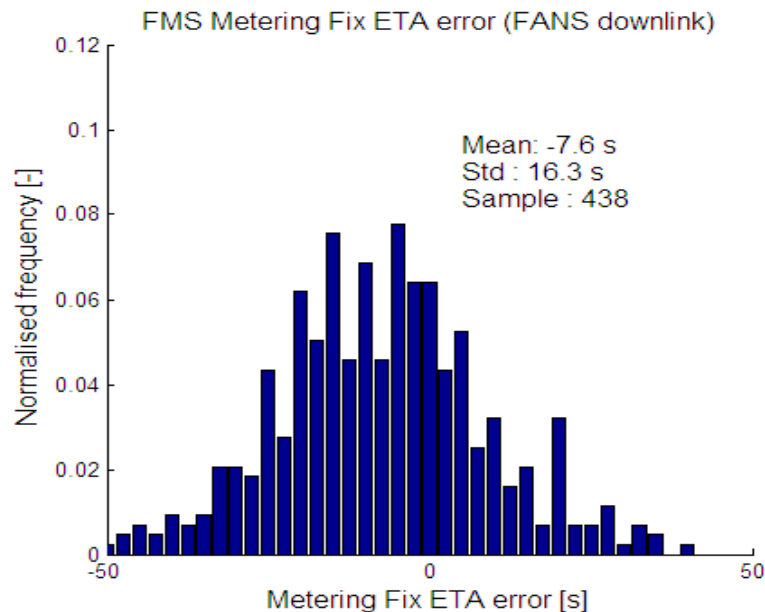
Collaborative approach to Trajectory Prediction uses best available information

- Best available aircraft intent
- Best available aircraft performance models
- Best available weather models

Combined appropriately to provide:

- Understanding of Estimate Uncertainty
- Allow aircraft to efficiently optimise their operation for a speed to meet a time

Results achieved are better than the current ground system and the aircraft itself.





**airservices**  
connecting australian aviation