ADS-B and WAM implementation in Europe

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CAAC – Thales ADS-B Seminar

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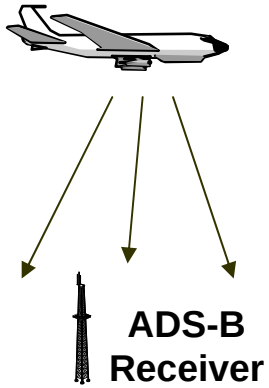
CASCADE Programme Scope

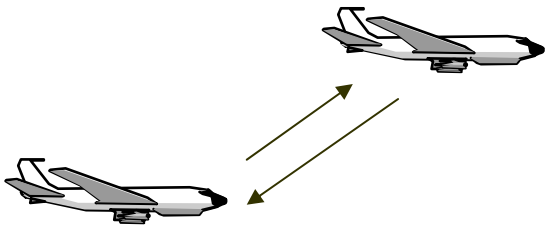


- **Ground Surveillance Applications (ADS-B-out)**
  - In a non-radar environment
  - In a radar environment
  - On the airport surface

From 2010

- **Airborne Surveillance Applications (ADS-B-in)**
  - Airborne situational awareness
  - In Trail Procedure
  - Visual separation on approach
  - Situational awareness on the surface

From 2011

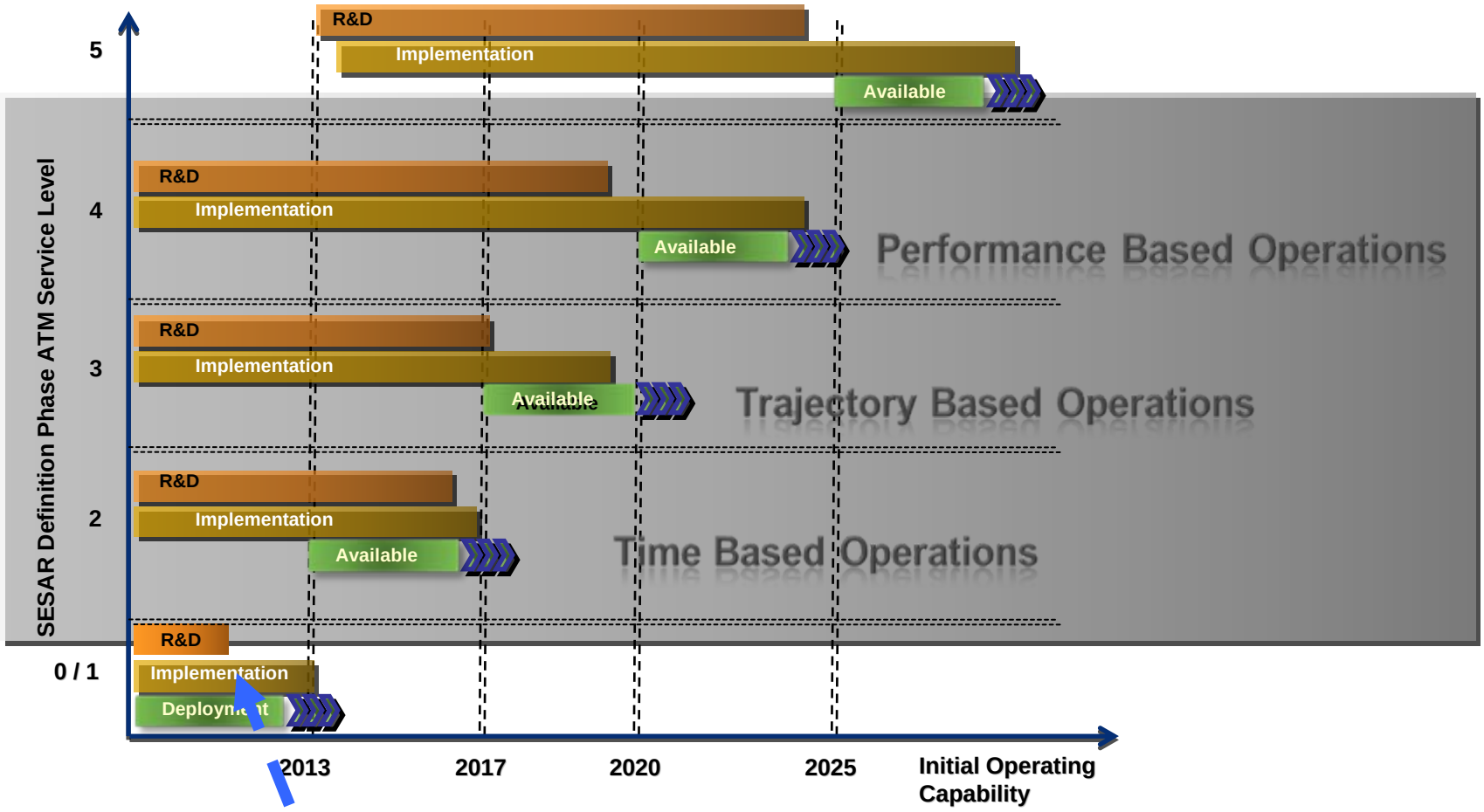


Traffic Situational Awareness “only”

- **Wide Area Multilateration (WAM)**

Strategic Context

SESAR ATM Operational Roadmap



ADS-B and WAM – Strong synergies

- Dependent Surveillance & Independent Surveillance
- Integration -> ‘Shared’ composite infrastructure
  - Analogy with SSR Mode S and 1090 ES ADS-B avionics
- Use in partial ADS-B equipage scenarios
  - Early deployment
- Smooth transition path
  - From radar-like surveillance (WAM) to ADS-B ground and airborne surveillance
- Improved target detection
- Spectrum efficiency
- Security

Implementing Rule

European Commission Single European Sky Surveillance Performance & Interoperability Implementing Rule (SPI IR)

- All aircraft flying IFR/GAT
  - Mode S ELS
  - Mode S EHS and "ADS-B Out"
    - Fixed wing >5700 kg or >250kts TAS

  (Option for ADS-B specific airspace mandate)

Forward fit	2013 (tbc)
Retrofit	2016-7 (tbc)

- Second consultation phase completed. Stakeholder Workshop 1 June 2010
- Publication: 1st haf 2011

ADS-B Deployment Phases

European Commission Single European Sky Surveillance Performance & Interoperability Implementing Rule (SPI IR)

ADS-B out

Pioneer Phase

Voluntary implementation in pocket areas
Certified existing equipage

Avionics: ED102/DO260

2013 Forward-fit

2016 Retro-fit

2017

Mandate Phase

IR based implementation in wider areas
Upgraded equipage

Avionics: ED102A/DO260B

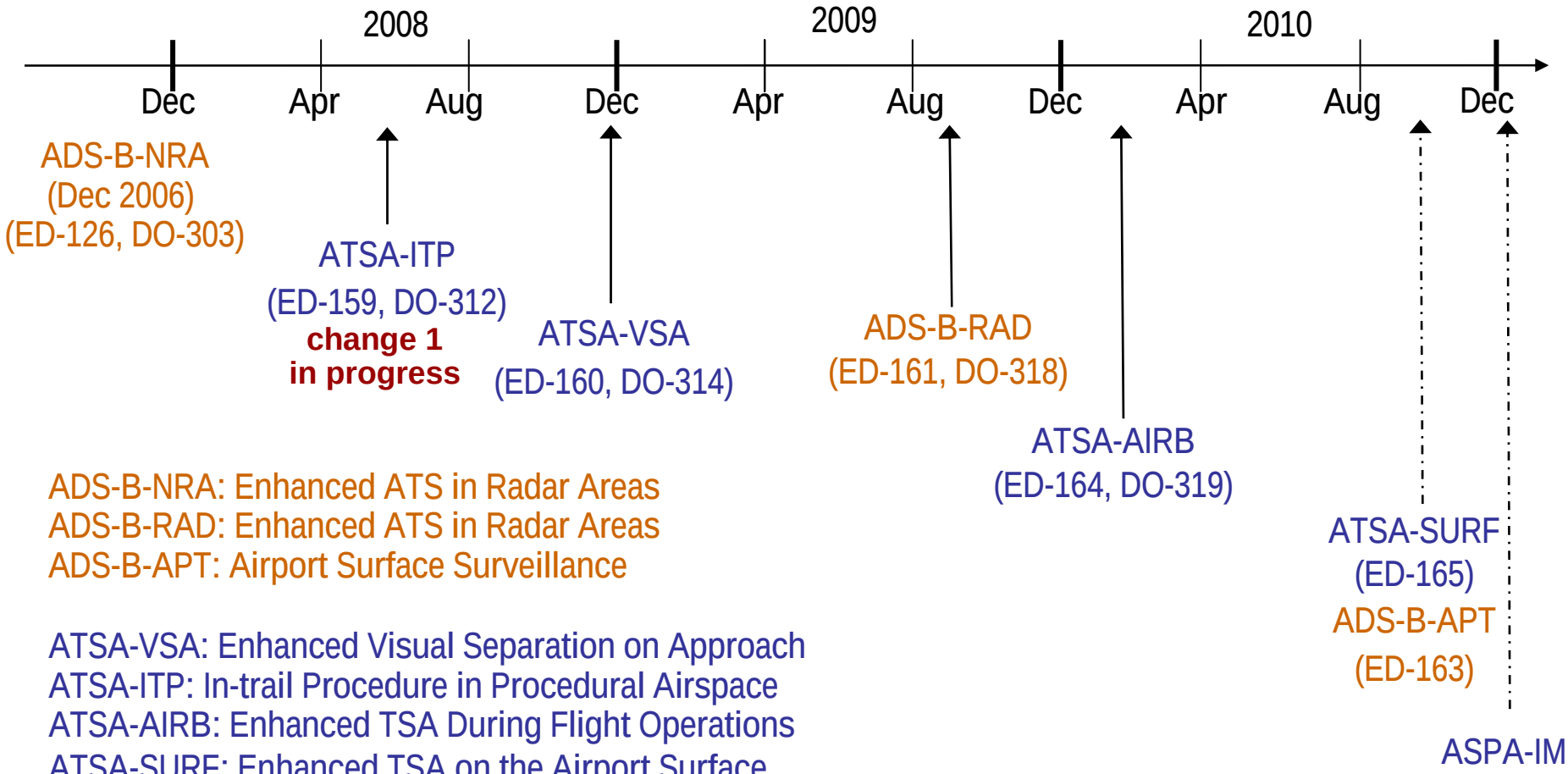
ATSAW

Pioneer Phase

Voluntary implementation in wider areas
New equipage

Avionics: ED102/DO260 and later ED102A/DO260B

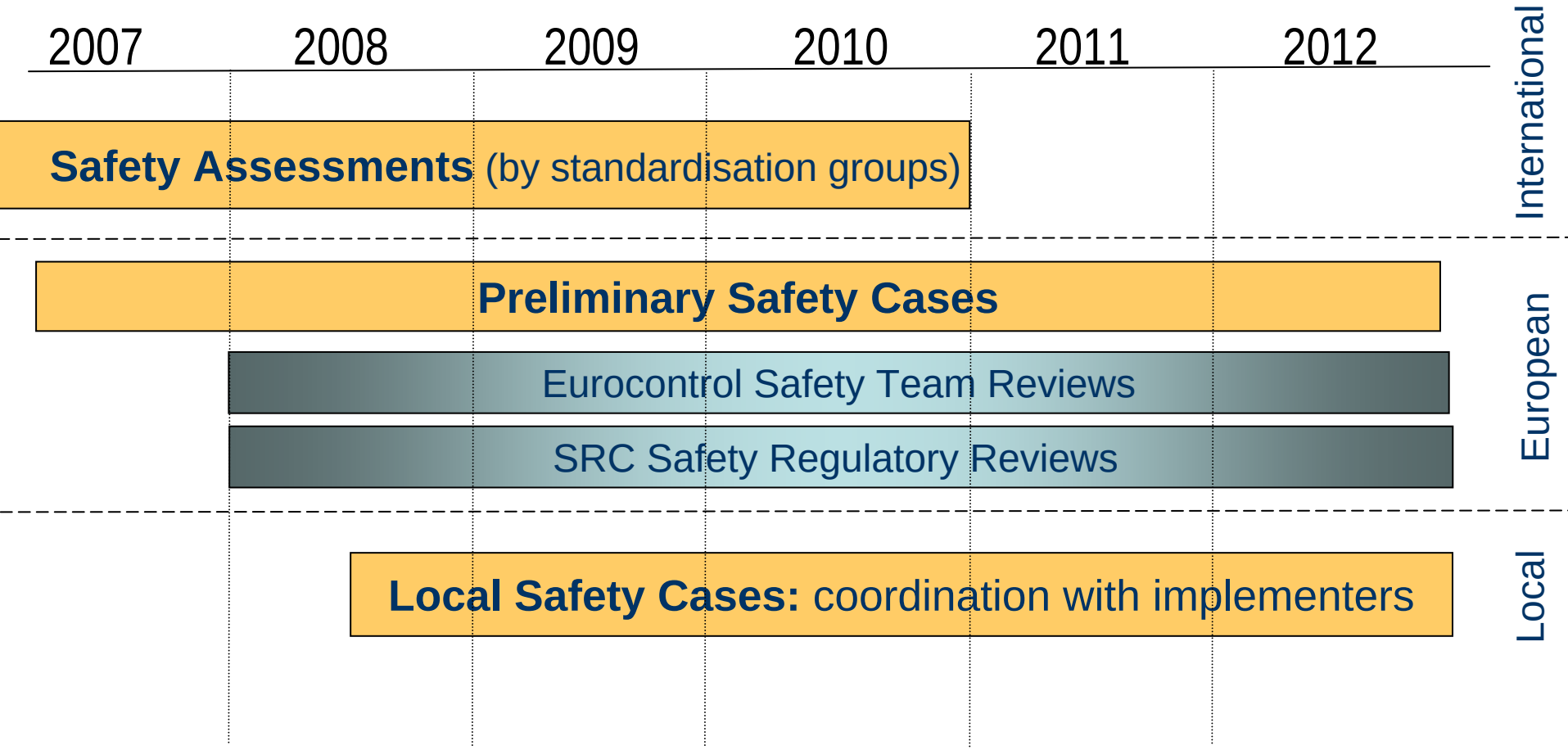
Requirements Focus Group (RFG)
ADS-B Applications & Timeline



ADS-B-NRA: Enhanced ATS in Radar Areas
ADS-B-RAD: Enhanced ATS in Radar Areas
ADS-B-APT: Airport Surface Surveillance

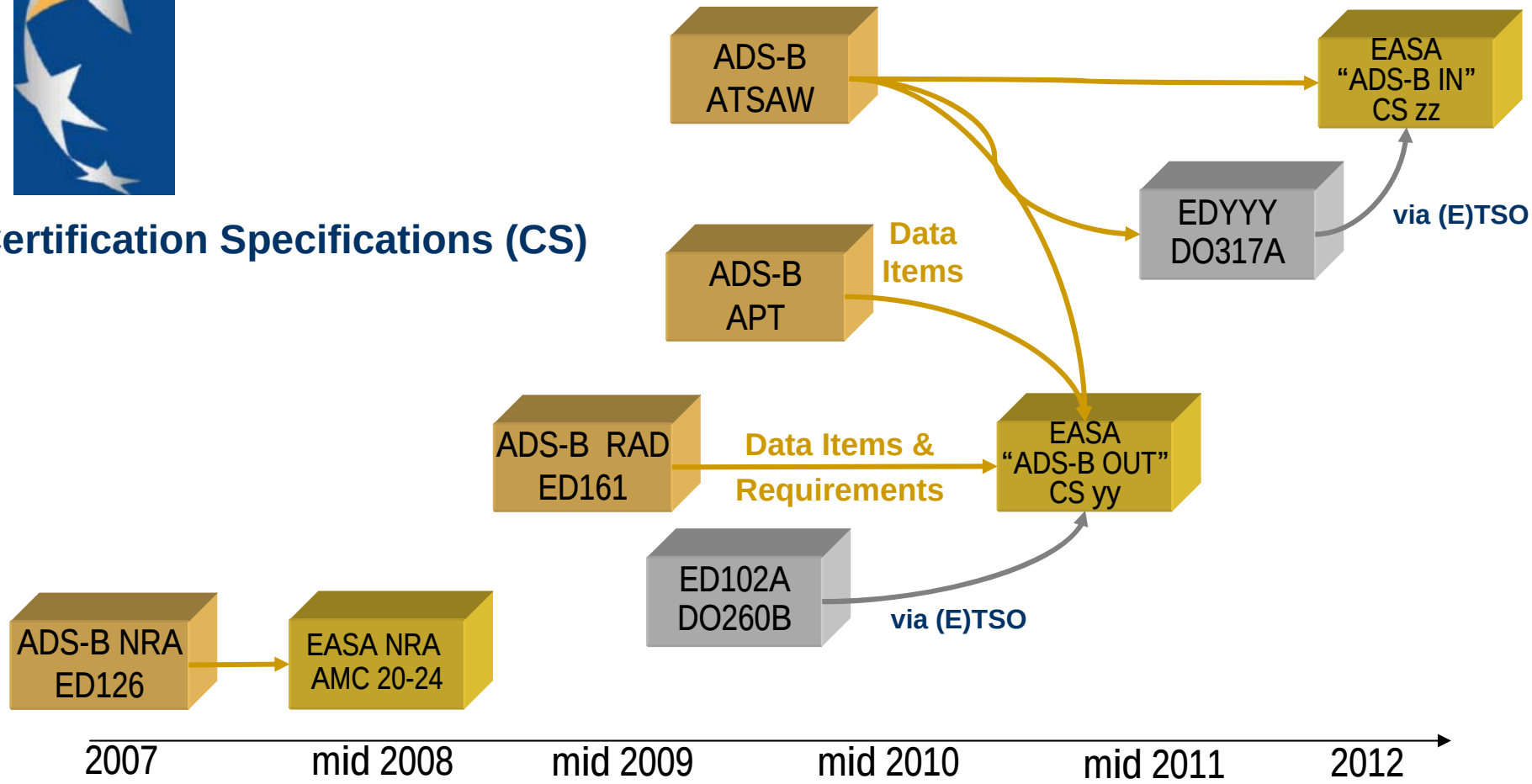
ATSA-VSA: Enhanced Visual Separation on Approach
ATSA-ITP: In-trail Procedure in Procedural Airspace
ATSA-AIRB: Enhanced TSA During Flight Operations
ATSA-SURF: Enhanced TSA on the Airport Surface
ASPA-IM: Interval Management

SAFETY PROGRESS



EASA ADS-B Rulemaking Timeline

Certification Specifications (CS)



Transponder Baseline: ED-102A/DO-260B and ED73C/DO-181D, change 1

Pioneer “ADS-B out” Ground Implementation

- CASCADE Partnerships with ANSPs
- Accelerate ground implementation
  - Assist ANSPs to deploy “ADS-B out”
  - ADS-B NRA and RAD
  - ADS-B only or with WAM

- Support both the “ADS-B out” pioneer phase and the mandate (SPI IR) phase
- Synchronise with airborne implementations
  - Pioneer - later IR (mandate) driven

CRISTAL “ADS-B out”

- Avinor (Norway)
- Bulatsa (Bulgaria)
- DCA (Cyprus)
- DFS (Germany)
- HCAA (Greece)
- Isavia (Iceland) & Naviair (Denmark)

CRISTAL RAD High-Density

- NATS (UK)

CRISTAL Dual-link Interoperability

- LFV (Sweden)

Pioneer Airlines (ADS-B NRA and ATSAW)

- ADS-B NRA Pioneer airline project (completed)
  - Incentives to certify for ADS-B NRA
  - 18 airlines
  - 500+a/c
  - 14 a/c types

- ATSAW Pioneer airline project (in progress)
  - Incentives to install certified “ADS-B in” (ATSAW)
  - Validate ATSAW in revenue service conditions
    - ATSAW AIRB, ITP, VSA, SURF
    - Accelerate transition to operations
    - Co-ordination with SESAR
  - Contracts with selected aircraft operators
    - 3 airlines with 11 a/c already, more to follow

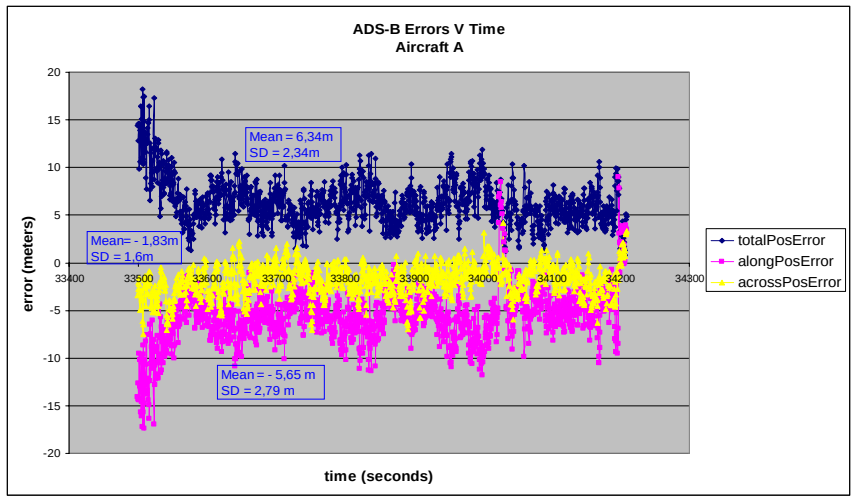
ADS-B Monitoring

8700 ADS-B aircraft being monitored

6 billion ADS-B reports analysed

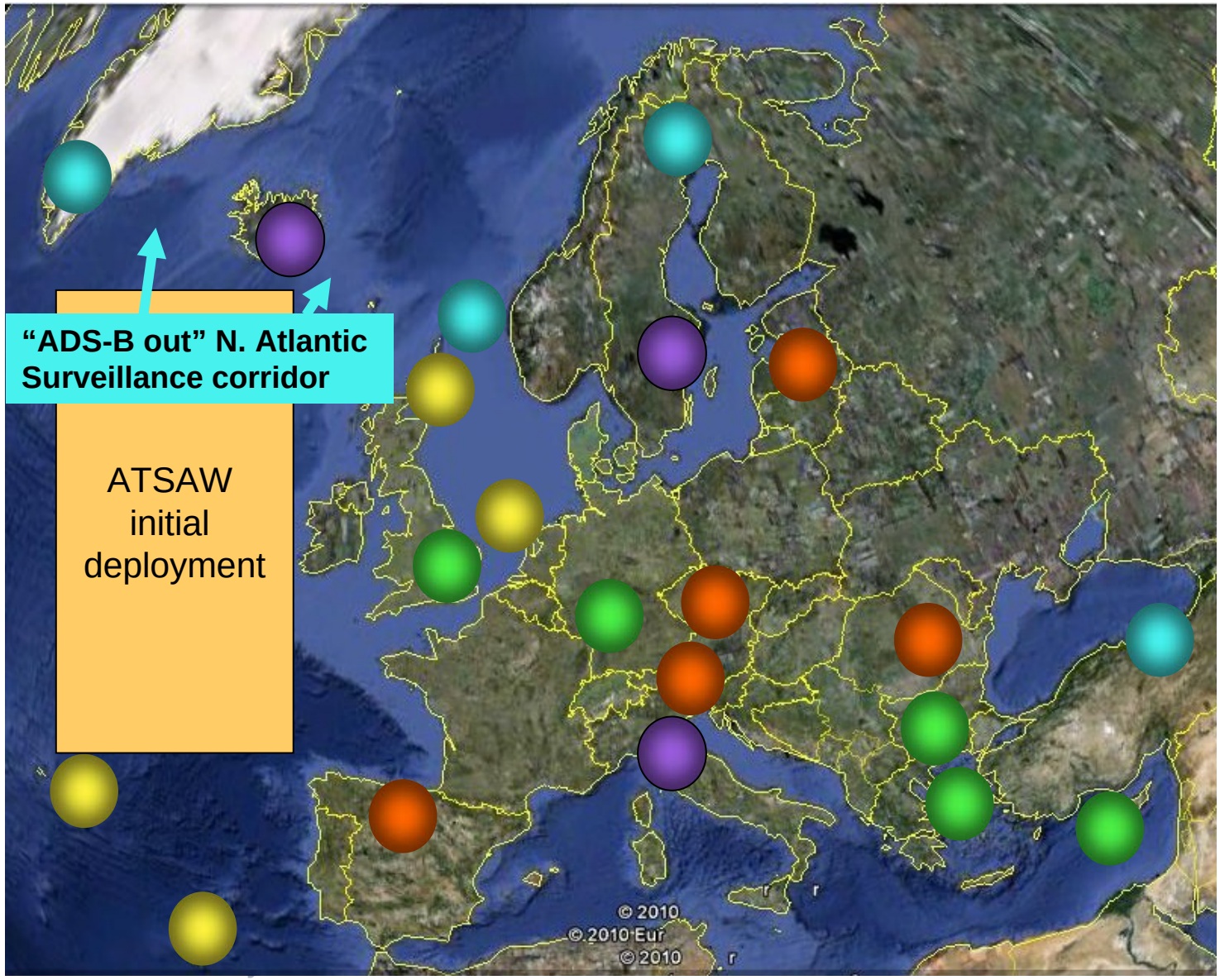
CASCADE ADS-B Monitoring Project

- ADS-B equipage
- ADS-B Airborne Monitoring
- ADS-B Airport Monitoring



ADS-B errors vs time on the airport surface

ADS-B and WAM Deployment in Europe



WAM

Operational or to be installed

WAM+ADS-B NRA

From 2010-2012

ADS-B NRA

From 2010-2012

ADS-B RAD

From 2015

WAM+ADS-B RAD

WAM from 2010-2012

↓

ADS-B RAD from 2015

(UK NATS: WAM/ADS-B RAD from ~2018)

ADS-B Global Picture

SPI IR
2016
Early target deployments

Hudson Bay
2009

Upper airspace
Now, 2012

All airspace
2020

SESAR - Surveillance Projects

- Building on the CASCADE Programme baseline
- R&D on future ADS-B applications
  - Spacing, Separation and Self-Separation applications addressed by several SESAR projects
    - WPs 4, 5, 9, 15 etc.
    - System Engineering is key
- Surveillance Rationalisation
  - WP15

European Target Surveillance System

- **Ground Surveillance En-Route and TMA**
  - ADS-B & one layer of independent surveillance (Mode S or WAM)
  - Primary Radar surveillance, where necessary
- **Airport Surveillance**
  - Locally optimal mix of available techniques (MLAT / ADS-B / Surface Movement Radars)
- **Airborne Surveillance**
  - ADS-B applications
    - ATSAW
    - Spacing
    - Separation
- **Rationalisation**
  - Performance
  - Cost-efficiency
  - Spectrum efficiency

ADS-B and WAM in Europe