SUPPORTING EUROPEAN AVIATION

Integrated CNS Conference 2025
Plenary V

Synergies with Military to Enhance Aviation CNS Infrastructure Resilience

Jorge PEREIRA
Head of Unit CNS & Security
Civil-Military Cooperation (CMC)
EUROCONTROL
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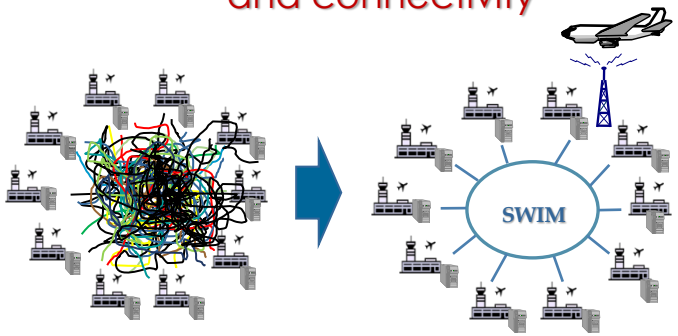
CNS Optimization and Rationalization

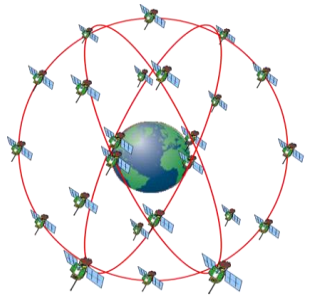
Increasing the level of automation and connectivity



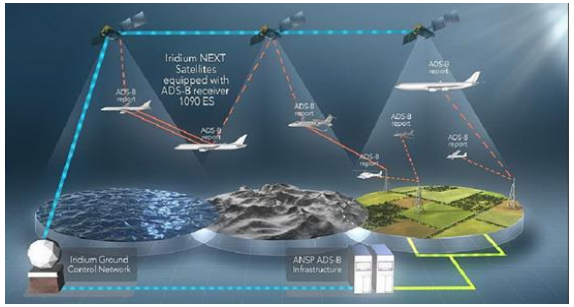
Migrating CNS from ground to cockpit (avionics predominance)

"RESILIENCE": justified buzzword !

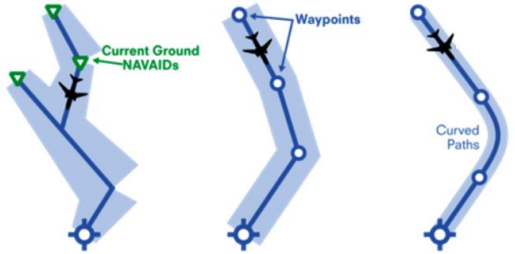
Reliance on Satellite Technologies



CNS cross-domain systems



Technology hybridization: from sensor based to performance-based CNS



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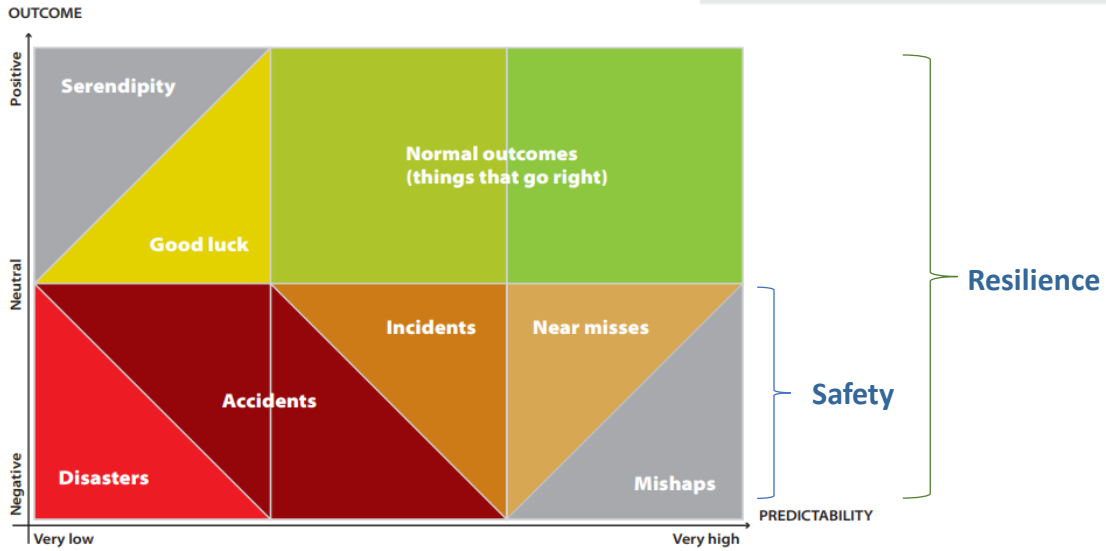
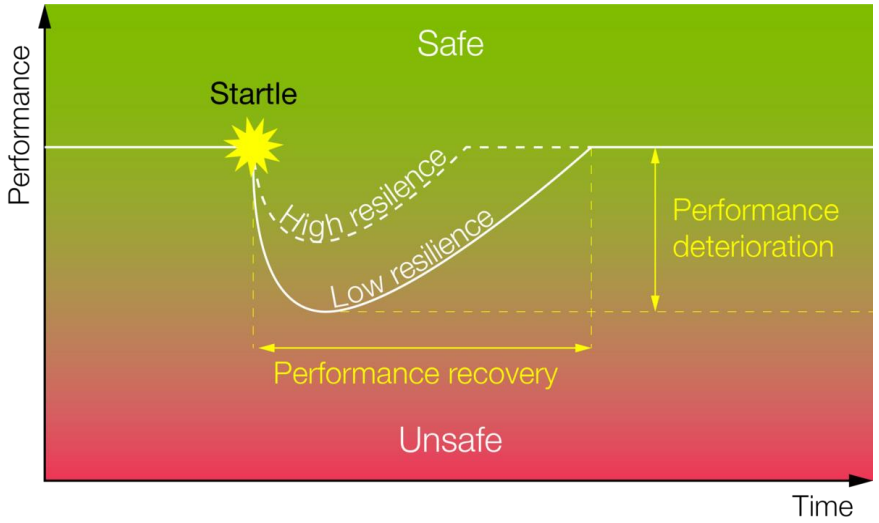
What does it mean Resilience ?

Resilience is the intrinsic ability of a system to adjust its functioning prior to, during, or following changes and disturbances, so that it can sustain required operations under both expected and unexpected conditions.





Safety processes focus mainly on things that go wrong (disasters, accidents, and incidents). The focus of Resilience is on the whole set of outcomes including those that that go right. Resilience is the ability to recognize, absorb and adapt to disruptions.

Resilience is about how to continuously adapt to changing situations for which we may not necessarily have procedures. It goes beyond ICAO management processes for safety and security. Resilience assessment techniques are available*.

More details here: https://www.eurocontrol.int/sites/default/files/2019-07/white-paper-resilience-2009.pdf

*FRAM: Functional Resonance Assessment Method

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Infrastructure Obsolescence in Aviation

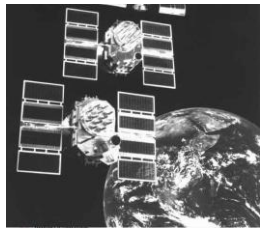
Distance Measuring Equipment (DME) – **1950s**

Instrument Landing System (ILS) - **1964**

VHF AM Radio 25 kHz - **1974**

VHF AM Radio 8.33 kHz - **1994**

HF AM SSB Radio – **1950s**



FANS Datalink – **1983**

VDL2 Datalink - **1990s**

GPS – **1987**

VOR - **1960**

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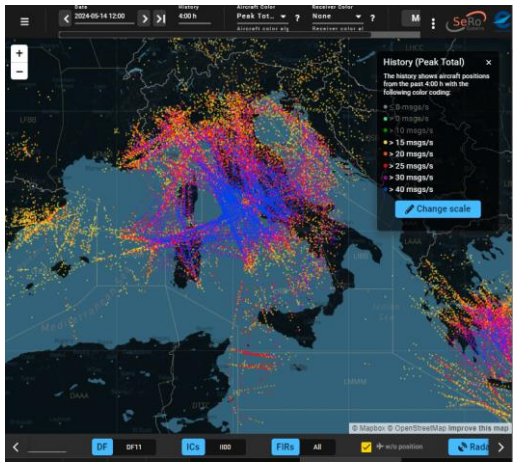
Impact of Infrastructure Obsolescence in Aviation

(Performance Monitoring is key)

GNSS JAMMING AND SPOOFING

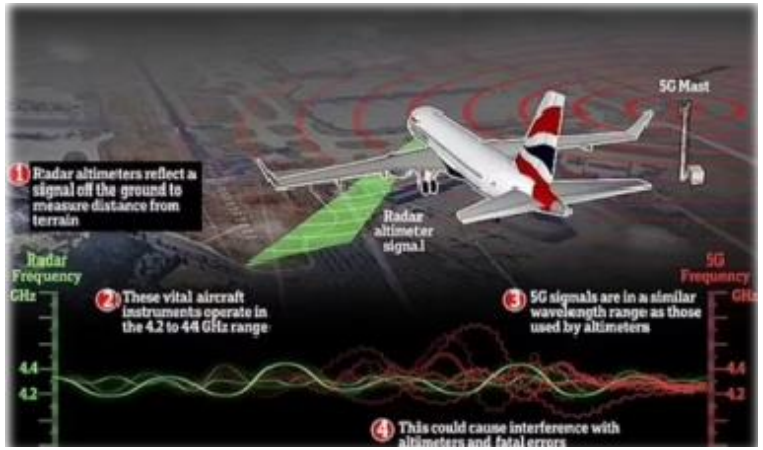
- **Military perspectives:** use of robust military systems: GPS/PPS, TACAN, etc.

1030/1090 MHZ OVERINTERROGATION



- **Military perspectives:** operational security maintained, reversion to 3/A, spectrum compatibility, mil radar configuration, code coordination (NATO).

5G VERSUS RADIO ALTIMETERS



- **Military perspectives:** civ-mil spectrum coordination. MIL considered in CEPT studies.

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A Future Resilient Aviation Critical Infrastructure

Synergies with Military to address CNS Resilience

Cooperation Opportunities

- **NATO Resilience Committee**
- **NATO Aeronautical Communications, Navigation, and Surveillance Strategy**
- **NATO Total System Approach to Aviation (TSAA)**
- **NATO-EUROCONTROL ATM Security Coordinating Group (NEASCOG)**
- **NATO Network Enabled Capability (NNEC)**
- **Reach specific communities within National Military.**

Nuggets (1)

- Different approaches to **C-I-A (Confidentiality, Integrity, Availability/Non-Repudiation)**
- **Encryption** and key management (trade-offs)
- **Authentication** to mitigate spoofing
- **Frequency hopping** – the anti-jam equation
- Focus on **electromagnetic spectrum** – the "new EW"
- **Network interconnection**. Use of IP, PKI, directory services, gateways, etc.
- **Information and data management/security**
- **Data Link security**
- **GNSS mitigations.** Use of PPS by military
- **Back up policies**. Use of TACAN. C-PNT.

Nuggets (2)

- **Hybridization**/combination of sensors
- **Operational security** in SUR environment
- **Civ-Mil SUR Coordination** (e.g. IC codes, data sharing, etc.)
- **IFF Mode 5** (spectrum supportability)
- **Use of PSR** for non cooperative targets
- Address **SUR RF pollution**/congestion (1030/1090)
- **Network interconnection**. Use of IP, PKI, directory services, gateways, etc.
- **Information and data management/security**
- **Frequency clearance** arrangements
- **Dual-use and pooling.**

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Thank you!

jorge.pereira@eurocontrol.int
www.eurocontrol.int

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FOUNDING MEMBER sesar JOINT UNDERTAKING
NETWORK MANAGER