Performance-based certification concept

A powerful enabler of ATM performance improvement

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Aircraft certification and approvals

Airworthiness

Safe to fly → no link with ATM

Operational approvals

Safe to operate → Link with ATM

Operational approvals contribute to safety AND ATM performance

- First objective of OA is to harmonize the capabilities of the airspace users' systems to manage the level of safety in that airspace.

- OA is a legitimate subject for ATM
  - Non compliance leads to derogations or exemptions (State aircraft) which degrade the ATM network capacity / performance : Network manager is impacted in its responsibilities

- OAs are signed by the operators (recognized by the Aviation Authorities)

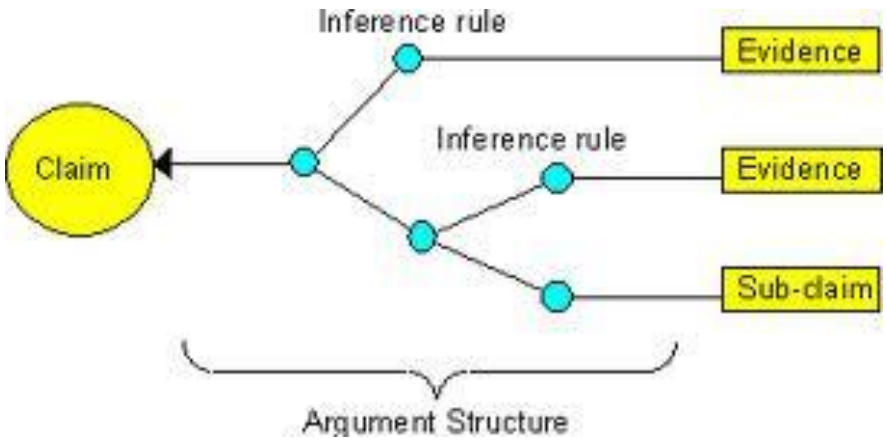
Maybe fit for space dogfight, but as for air navigation…

How to demonstrate that State of the art systems are compliant against requirements designed for other systems ?

Is there another way ?

What is an OA made of ?

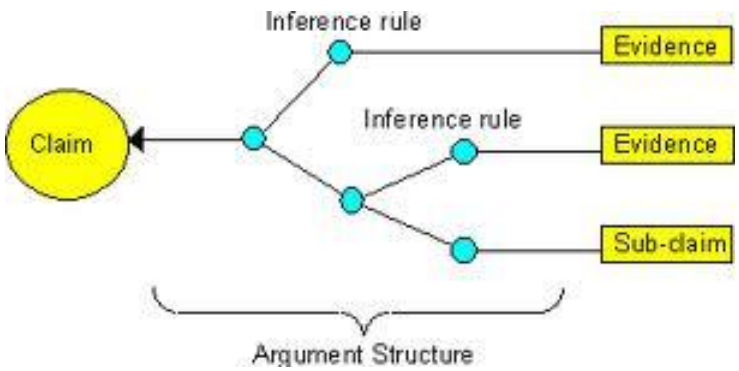
Set of requirements



Safety case(s)

Duality Requirements / Safety case

Set of requirements



Safety case

Categories of requirements

- There are usually two categories of ATM/CNS requirements supporting OAs
  - **System-related**
    - Performance
    - Architecture
    - Safety
    - Interoperability
  - **Environment-related**
    - Airworthiness
    - Procedures
    - Training

Types of requirements

- Hard requirements
  - Interoperability of equipments / technology
    - E.g. 8.33
  - Mandatory architectures

- Soft requirements
  - Interoperability of performance
    - E.g. RNP x / BRNAV / PRNAV…
  - Training and maintenance

- Mix of soft and hard requirements
    - E.g. RVSM (architecture and performance)

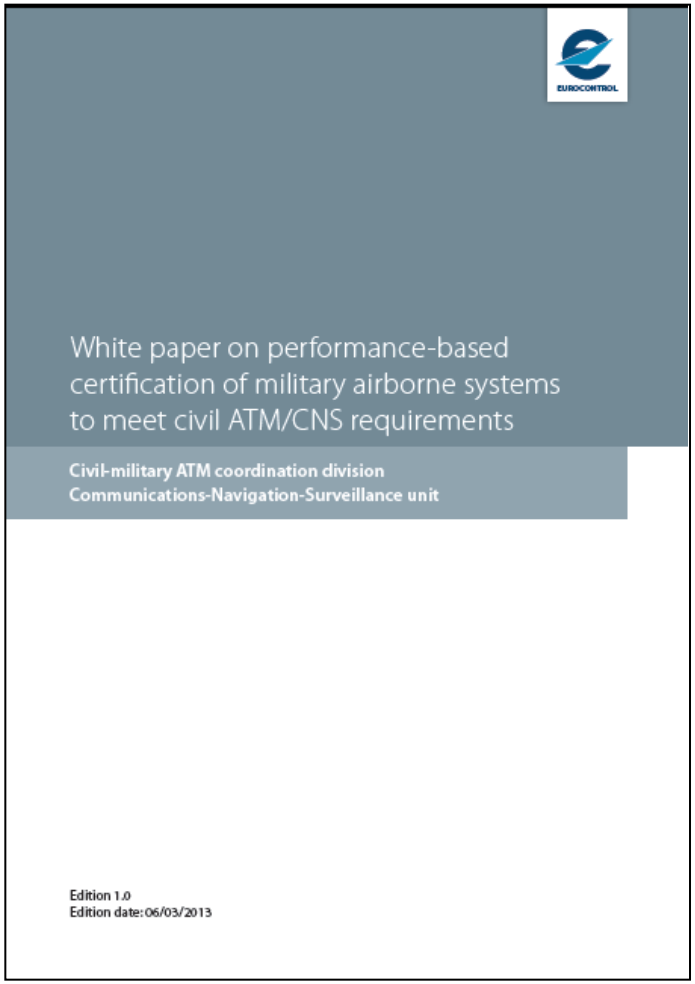
Performance based certification concept

Because of the link of OA with ATM Network performance

- The NM responsibilities in the network performance
- State of the art aircraft lag in meeting some OA requirements, although meeting the performance

EUROCONTROL / CMAC proposed in Spring 2013 a PBC concept

- PBC concept is approved by the EUROCONTROL military ATM board and implementation guidelines from CMAC are expected in 2014.



http://www.eurocontrol.int/sites/default/files/content/documents/single-sky/cm/library/cmac-performance-based-certification-v1.0-final-issue.pdf

Performance based certification as of today

- A very popular topic since 2006 but no development as of today

- For airborne systems
  - Focus on the performance / interoperability of the system instead of equipment / fitting / integration.
  - It is not just an AMC-like because some requirements are allowed to be modified as long as (if and only if) safety and interoperability are granted

Performance based certification

- aims at achieving the level of safety within the airspace vis-à-vis the regulatory and certification powers of the civil aviation and the State aircraft aviation authorities.
- must be designed
  - to minimize the cost of certification activities and
  - to build trust between military and civil aviation by providing comprehensive and sound processes and documentation supporting certification.
- focuses on the technical performance of a system
  - in the context of its integration into a network of systems, it might include additional interfaces with other systems introduced by a different technical architecture.

Equivalence….

The main challenge with the performance approach is

1. to precisely define “equivalence” and
2. be able to demonstrate
   - The equivalence in performance
   - The safety levels remain the same
   - The technical interoperability of the certified system with the other systems meeting the initial requirements

- Equivalence of performance includes the measurable (e.g. with metrics deriving from the regulation) and non- measurable requirements (e.g. procedures or technical architecture).

  The definition of
  - all the performance requirements to be certified against and
  - the means used to demonstrate them

  must be precisely and extensively documented.

Principles of Performance based certification

1- Safety is at the heart of the performance-based certification concept.

2- The competent certification Authority is the national military aviation Authority or any other one mandated by the military.

3- The concept of performance-based certification is designed to focus on the technical performance of the system rather than its architecture or its components, and is thus intended to define tailored means of compliance in support of the certification activity.

Conditions for correct use of PBC (1/2)

“Soft” conditions : build trust

- **The labels and certificates issued by the certification authority using PBC must provide at least the same level of confidence as those issued using different certification techniques.**

- **The environment for maintenance of performance-based certification should be as reliable as that referred to in the EASA implementing rules, and FAA FARs or similar certification environments documents.**

- **Restricted information on technical components or functions must be assessed to be kept minimal**

Conditions for correct use of PBC (2/2)

“Hard” conditions : provide evidence and consistency

- **Using PBC does not create a specific environment for certification**
- **Performance-based certification must be supported by appropriate safety cases.**
- **Performance-based certification requirements must be regrouped in a specific functional requirements document when deviating from the initial set of requirements**

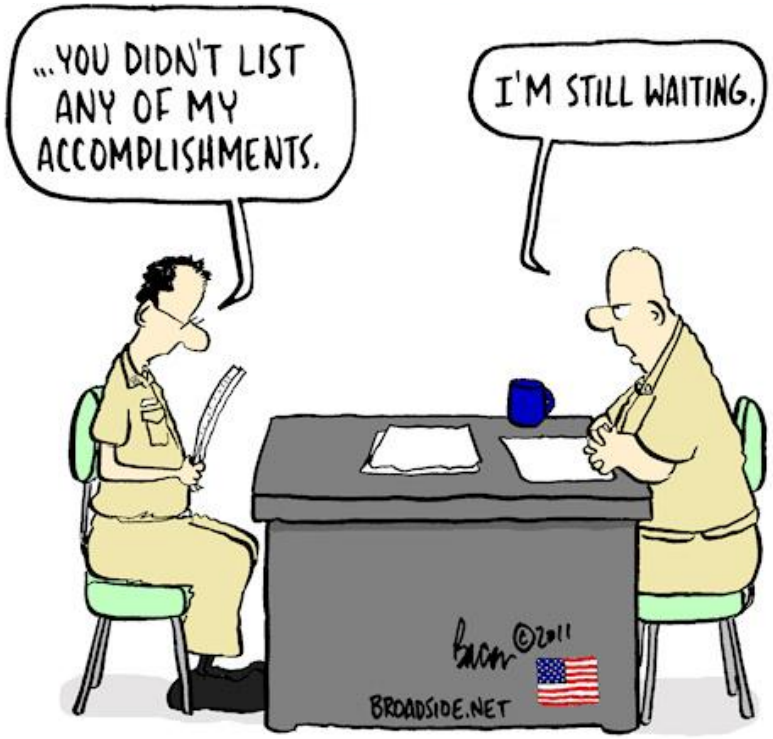
Way forward

- Based on those principles and conditions, EUROCONTROL CMAC has been mandated to go further and develop guidelines for performance based certification.

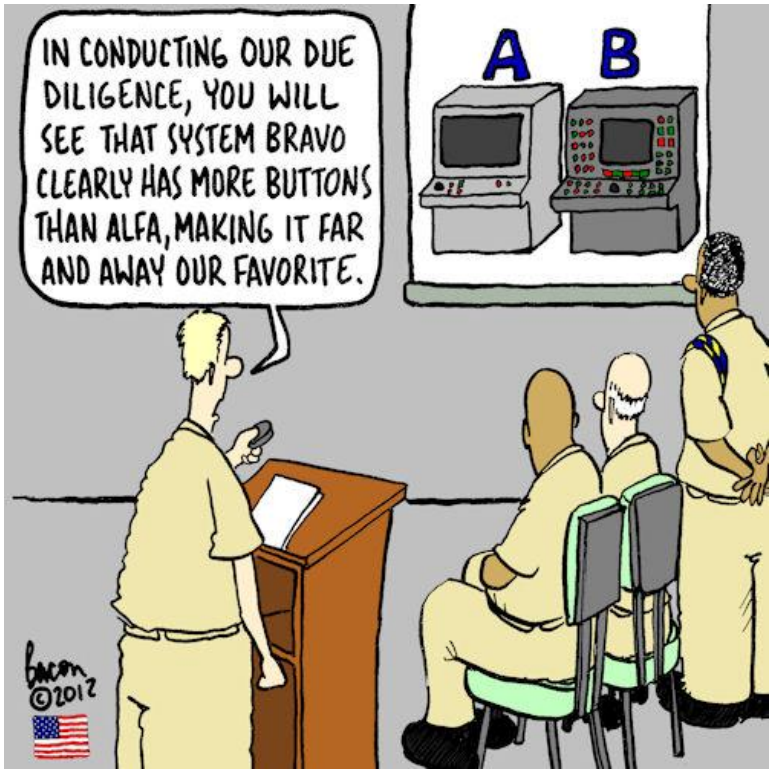
- Those guidelines are planned to be available in the course of 2014.

Questions ?

A pictorial description of the relationship between the civil and military aviation Authorities ?



Trust is about putting behind some preconceived notions



Military people are gizmo nerds

LT Jones couldn't shake the feeling he was losing the Captain's confidence.

Is military certification really trustworthy ?