INTEGRATION INTO CIVIL AIRSPACE
AIRWORTHINESS and SAFETY

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**Integration into Civil Airspace Airworthiness and Safety**

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See also ADM001676, UAV 2002 Conference & Exhibition., The original document contains color images.
Integration into civil airspace

● Purpose:
  - to explore and propose French process and means for integrating UAV into civil airspace.

● Method based on:
  - first French experience with Hunter,
  - experiences, flights with interim systems (SDTI, SIDM) for testing procedures, improving method, acquiring experience, knowledge and confidence,
  - common civil-military analysis, modification, creation and/or implementation of air regulation text,
  - technical specification for future systems
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- **Situation:**
  - French UAVs (Hunter, Crecerelle) fly in restricted military areas linked by temporary restricted airways,
  - flights are reglemented by followings texts:
    - Chicago convention (art 8),
    - OACI R-133-1 : distance between UAVs and other planes
    - RCA1 and RCAM1 : responsibility of pilot,
    - Specific DGAC regulation (25/08/86): UAVs classification, condition for using small UAVs in civilian air space
    - Specific DIRCAM regulation n°750 for using UAVs during militaries exercises in restricted areas.
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- Problems and Challenge:
  - restricted areas are inadequate for testing, using futures MALE, HALE systems (great endurance, long range, high altitude flights, payloads) and for training operators,
  - we must define with civilian authorities, test and agree on specific rules for using UAVs into civil airspace,
  - we must be and/or become trustful in the system (safety, security, reliability, delay)
  - we must define (if necessary) specific payloads assuming security constraints, redundancy, “detect and avoid” and others safety functions
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**Background:**

- 1999: DNA and DIRCAM created a joint staff for evaluating UAVs flight condition into airspace, it proposed specific rules for restricted areas only. Analysis for the civil airspace will be done.

- Flight tests Center (CEV) elaborate specific rules allowing the flight of new UAV systems within restricted areas (safety, test and qualification).

- Hunter experiments in CEAM
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Experiments:

- Interim MALE system (SIDM) could be used
  - to define and test new ATC/ATM procedures with civil and military authorities,
  - to test integration within controlled airspace with other aircraft (pilot attitude, time of response, return home procedure, flight plan.....)
  - to be trustful in safety procedures, mechanism, pilot and ATC operator attitude, reliability, redundancy....,
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Studies:

- Analysis Air traffic regulation text (RCA, RCAM…)
- Analysis Airspace Class characteristics, constraints, rules
- Analysis, “airprox”, accidents, incidents (IFR/VFR)

What are the responsibilities of UAV operators?

What kind of hazards scenario with UAV?

to propose

- operational certification and ATC procedures,
- legal text for operator responsibility, formation and training,
- safety equipment (technology, “detect and avoid function”, specification, qualification)
Requirements for airworthiness and safety for MALE

Tailoring review of JAR 23-25, OPS for MALE and HALE proves that
- only 40-45% of requirements are directly applicable to UAVs
- safety system objectives must be defined
- JAR implies great impacts on design and safety systems
- additional safety criteria for compliance must be defined on GCS, MMI, data link, flight termination system, software, operational and emergency procedures, ATC control
- “detect and avoid” functions are a key point for acceptance by civilian authorities
Requirements for airworthiness and safety

- Procurement services:
  - need to authorise the flight of their own UAV systems
  - need to demonstrate that these UAV will satisfy the same level of security than piloted air-planes
  - do not actually dispose of any legal text (as JAR of FAR texts) dedicated to UAV system to do so

- French position for MALE system:
  - Write a “book of requirements” : list of all items we will have to verify to authorise UAV flights
  - Completely reuse JAR and FAR rules with no modification according to security and safety proofs
  - Ease its acceptance by civilian authorities
Requirements for airworthiness and safety

Method:

- Take each requirement of JAR and FAR, DO178B…. rules
- Withdraw requirements not applicable to UAV MALE systems
- Allocate requirements upon a generic UAV MALE architecture
- Formally prove the same level of security (new MALE rules = existing JAR and FAR rules)
- Define safety specification for future MALE (design, equipment, safety equipment)

in accordance with civilian authorities