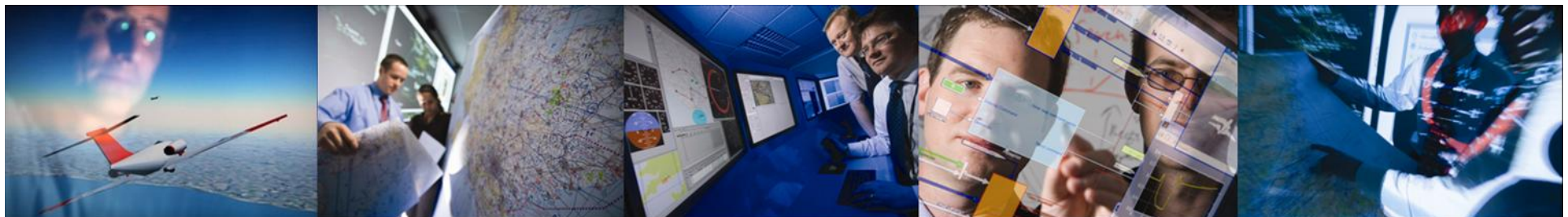




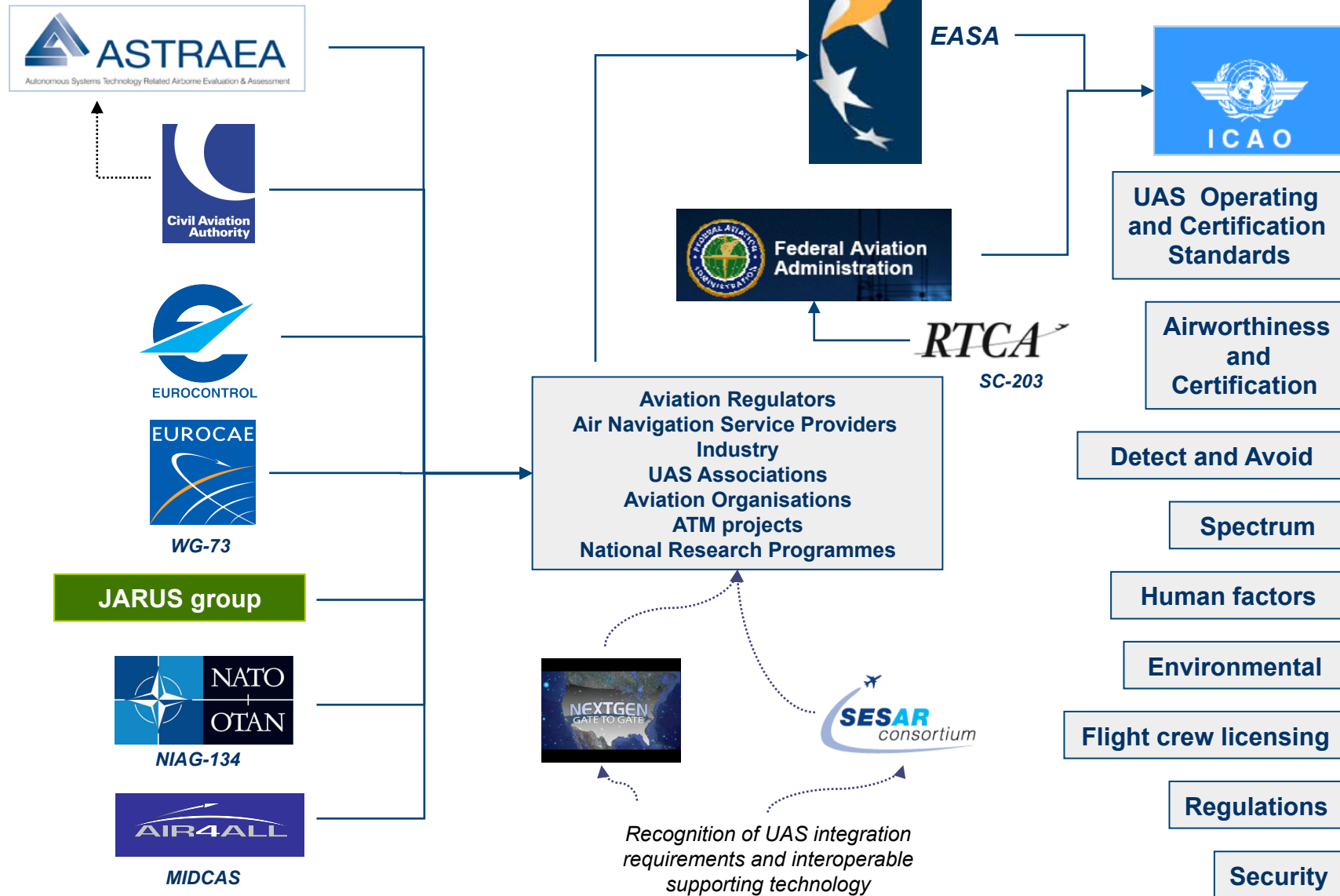
# UAS Virtual Certification

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# UAS International Regulatory Route



# The Virtual Certification Aims & Outcomes



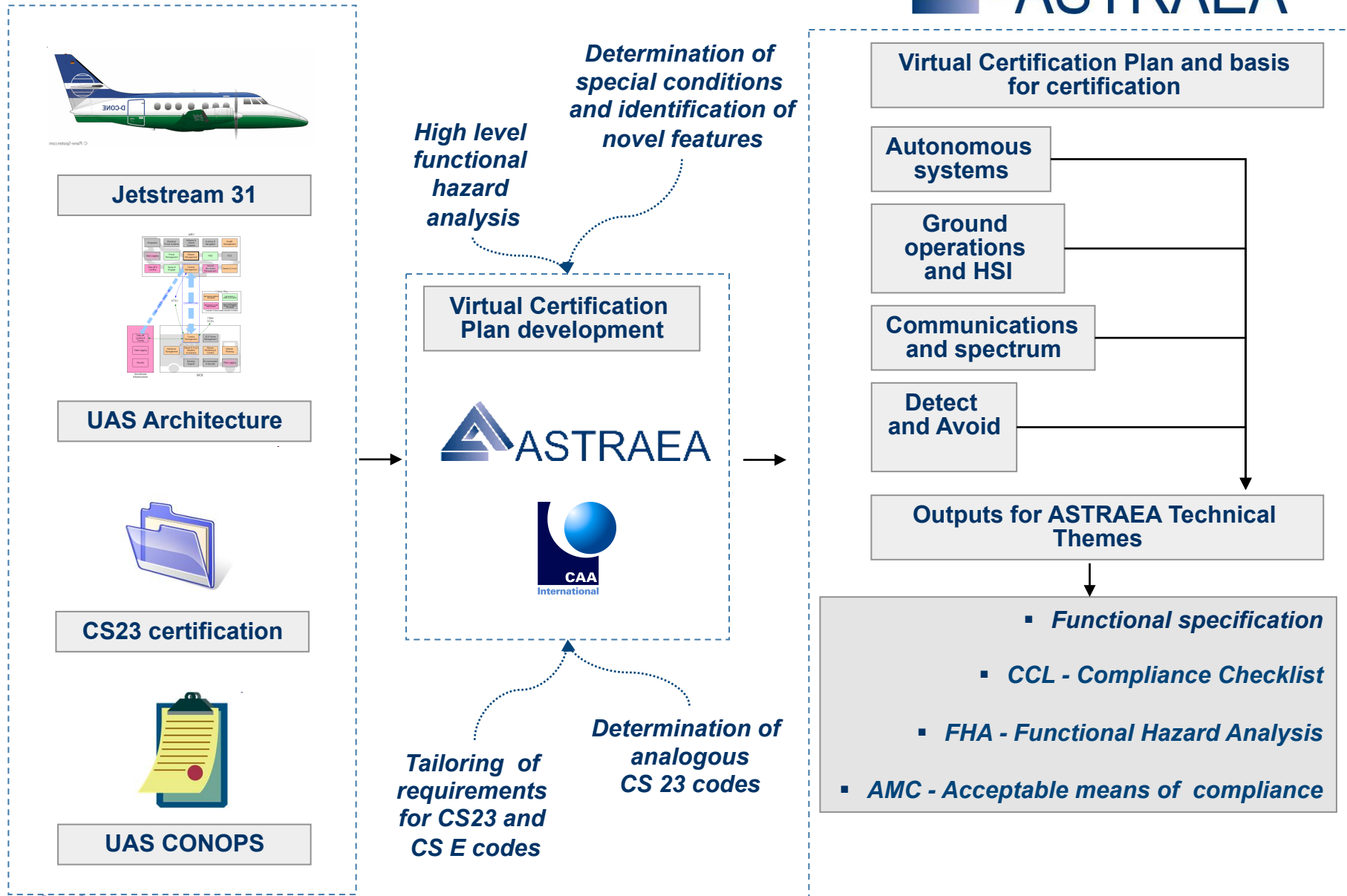
- **The aims of the ASTRAEA - CAA Virtual Certification Plan are;**
  - To reduce the risk to commercial development of a UAS
  - To plot and document the route to UAS certification
  - To enable a forum whereby the CAA will comment upon (*without commitment*) and provide guidance towards an acceptable technical and regulatory framework
  
- **ASTRAEA and CAA have agreed that any consensus or agreed outcomes will be considered as generic guidance only**
  - It will not be used as directly read across acceptance material or as an acceptable means of compliance without first demonstrating a full showing of compliance to the requirements of any real UAS certification programme

# UAS Virtual Certification components



- **EC Regulations state that unmanned aircraft of over 150 kg are within the remit of EASA, this programme is virtual, so it will remain as a national project**
  - However the process will be in line with the EASA Policy Statement:
    - *Airworthiness Certification of Unmanned Aircraft Systems (UAS)*
  
- **The ASTRAEA UAS (virtual) Architectural Overview Document will form the basis of the high level UAS components of the surrogate platform;**
  - High level assumptions
  - System operation
  - Sub-system description
  - Concept of operations
  
- **The baseline airworthiness code will be analogous CS23 and CS E with Special Conditions developed for;**
  - Emergency recovery capability
  - Command and control link
  - Autonomy levels
  - GCS and human factors
  - Operational requirements
  - System safety assessment

# The Virtual Certification Process



# Virtual Certification Special Conditions ASTRAEA

- **Special Conditions are developed when the available CS do not adequately address the design.....**
- **Top level considerations will include**
  - Emergency recovery capability and procedures
  - Flight termination system
  - Capability for continued safe flight and landing
  - Determination of pre-selected emergency landing sites
- **Command and control link**
  - Indication to UAS pilot of link status and range capability
  - Redundancy to ensure no single point of failure will affect control
  - Protection from electro magnetic interference
  - Contingency failures for loss of data link
- **Level of autonomy and impact on certification issues**
  - Human machine interface (HMI)
  - Compliance with ATC
  - Command and control link integrity
  - Collision avoidance
  - Handling of system failures

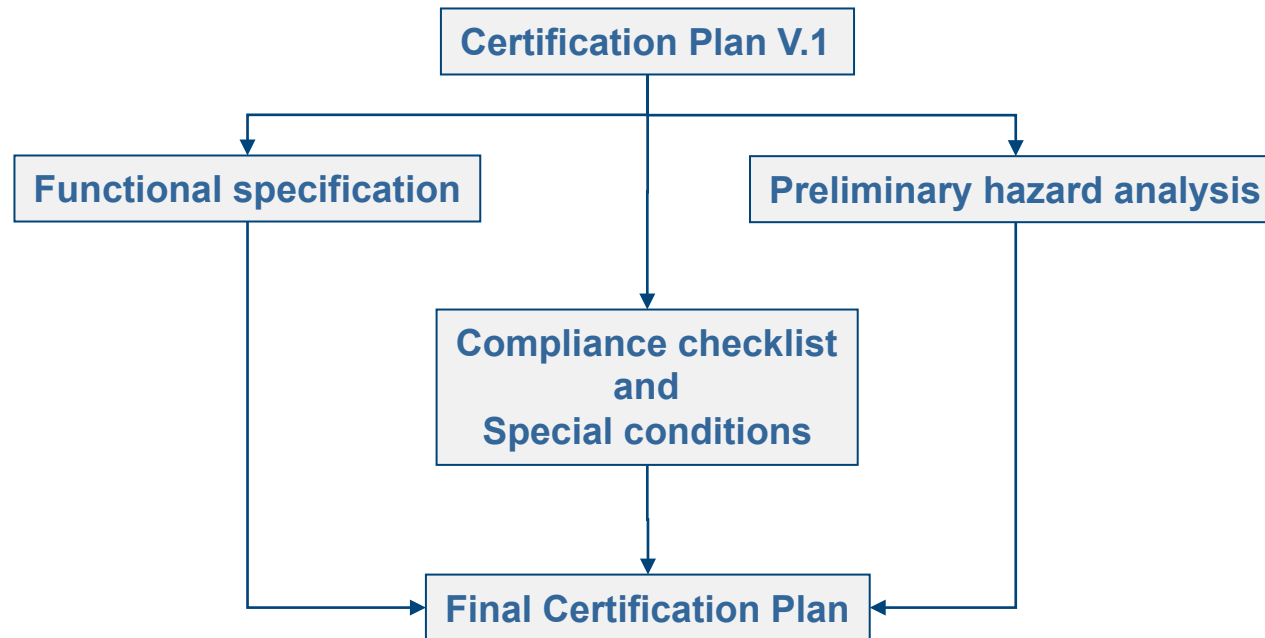
# Virtual Certification Special Conditions ASTRAEA

- **Human Machine Interface**
  - Situational awareness
  - Display layouts, display content, dark cockpit concept
  - Minimum number of operators
  - Levels of autonomy and automation
  
- **SC for operational requirements capability**
  - IFR or VFR operations
  - Detect and avoid equipment
  - Maintenance of safe altitude over urban areas
  
- **System safety assessment**
  - To demonstrate compliance with safety objectives to attain agreed probability levels for safe flight and landing
  - Consideration will focus on the protection of people and property on the ground

# UAS Virtual Certification Deliverables



- **The key technologies for incorporation in the VC process are;**
  - Detect and Avoid
  - Autonomy
  - Command, Control and Communications
  - Ground Operations and HSI
- **Key Deliverables for each technology theme are;**



# Virtual Certification Summary



- **Virtual certification will de-risk the commercial development of UAS**
- **ASTRAEA, through collaboration with other European initiatives will contribute to the overall UAS integration process**
- **The baseline code will be analogous CS23**
- **Special conditions will be developed for;**
  - Emergency recovery capability
  - Command and control link
  - Autonomy levels
  - GCS and human factors
  - Operational requirements
  - System safety assessment
- **Key deliverables for ASTRAEA technical themes will be;**
  - Certification Plan
  - Functional specifications
  - Preliminary hazard analysis
  - Compliance checklist
  - Special conditions