



# **ITALIAN COMMERCIAL SPACE TRANSPORTATION POLICY AND ONGOING ACTIVITIES**

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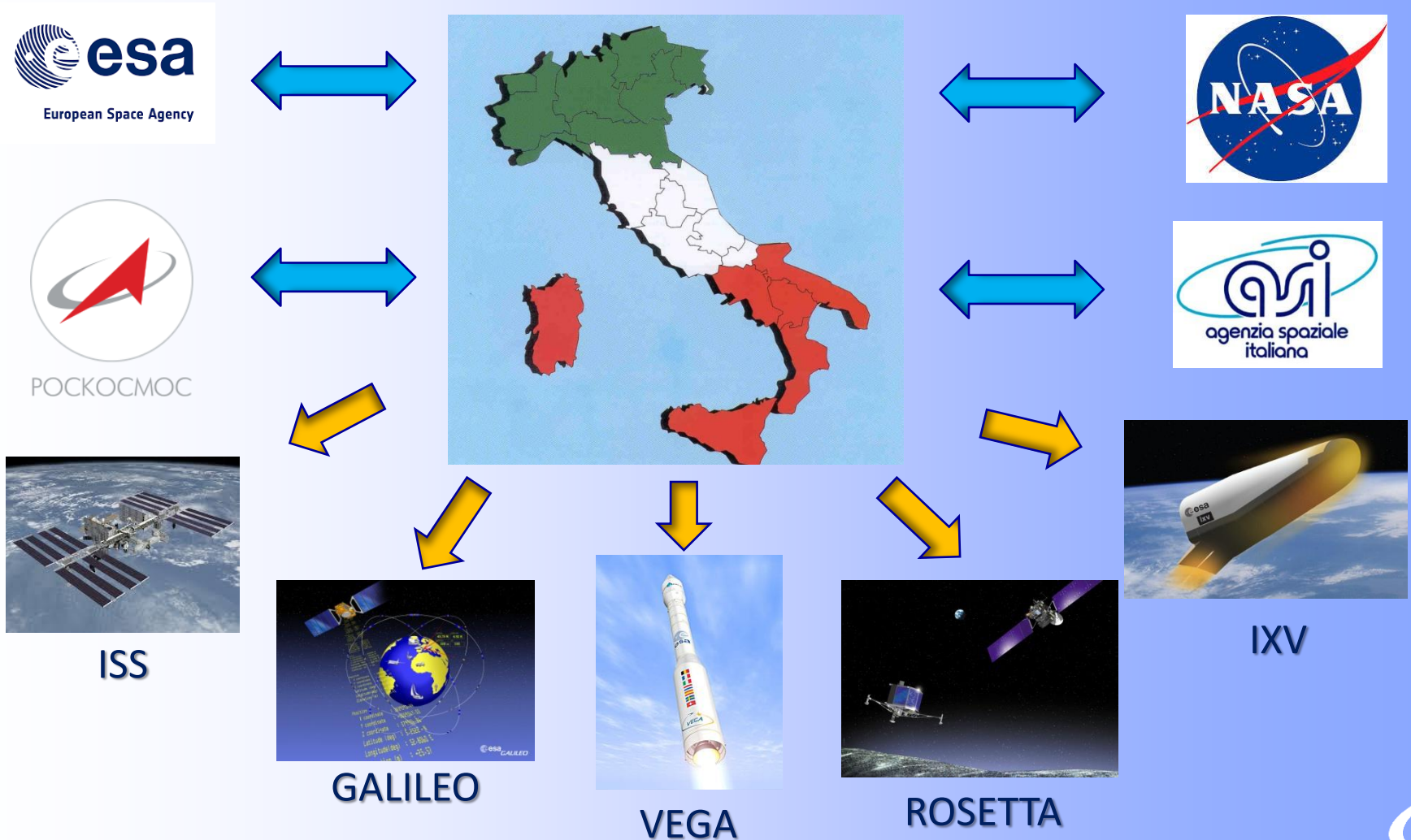
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# I. INTRODUCTION AND NATIONAL BACKGROUND

## ITALY HAS A CONSOLIDATED "ATTITUDE" FOR SPACE ACTIVITIES



# I. INTRODUCTION AND NATIONAL BACKGROUND

Near future space travel implications:

- winged vehicles,
- horizontal take-off and landing from/to runways
- aviation airspace engagement
- humans and goods transportation services



**ENAC , the Italian Civil Aviation Authority, has considered it necessary to start a progressive involvement in the matter**



**FAA – ENAC “Memorandum of Cooperation on Commercial Space Transportation Development” [March 12<sup>th</sup>, 2014]**



**ENAC – Italian Air Force Letter of Intent for the developing of procedures and standards to support flight test activities [March 17<sup>th</sup>, 2014]**

## II. SPACE OPERATIONS REGULATORY AND LEGAL FRAMEWORK

### EUROPEAN UNION



To provide for and promote, for exclusively peaceful purposes, cooperation among European states in space research and technology and their space applications  
[*ESA Convention, Art. 2*]



European agency with regulatory and executive tasks in the field of civilian aviation safety [Regulation (EC) No 216/2008].

### ITALY



**ENAC is the unique national authority for technical regulation, certification, surveillance and control in the civil aviation sector.**

[*Italian Air Navigation Code (ANC), Art. 687*]



**Italian Air Force (ITAF)** holds significant technical and operational expertise and resources in space operations and capabilities to conduct experimental activities





## II. SPACE OPERATIONS REGULATORY AND LEGAL FRAMEWORK

According to the ICAO definition, spaceplanes are “aircraft” in the lower segment of a sub-orbital mission: horizontal take-off and climb (the ones not carrier-assisted), re-entry and landing.



Aviation law applies in principle to spaceplanes operations

**BUT**

No EU regulation applicable to civil spaceplanes  
has been issued yet

**AND**



Current EU civil aviation safety standards **cannot be considered fully adequate** and are recognised to be **too demanding** for the initial development of commercial space transportation



## II. SPACE OPERATIONS REGULATORY AND LEGAL FRAMEWORK

Any option at European Union Member States level ?

**PROBABLY YES,**

if EU Regulation EC 216/2008 Annex II (b) applies to spaceplanes  
[ i.e. *aircraft specifically designed or modified for research, experimental or scientific purposes, and likely to be produced in very limited numbers* ]

**BUT**

(for commercial air transportation) still, Italian ANC requires air operators to hold a licence and an AOC i.a.w. European regulations

**UNLESS**

an *ad hoc* regulatory regime is established for spaceplanes operations,

[e.g.: so far, for aerial works both licence and AOC are i.a.w. Italian regulations]

### III. SPACEPLANE SAFETY AND AIRWORTHINESS ASPECTS

Concepts of “airworthiness” should apply to spaceplanes – to be designed, manufactured and maintained to be fit for its intended purpose.

#### Which standards should be applied in EU ?



#### CONSIDERATIONS

- Specific (EASA) standards not established yet
- Existing (EASA) commercial aviation standards too demanding, at least at this stage
- Spaceplanes will be mainly US manufactured and operated, initially
- FAA AST has in place a working regulatory system

As start-up at national level (applying EU Reg. 216/2008 - Annex II), **Italy is:**

- familiarizing with AST standards and licensing process, in the frame of the MoC with FAA
- **defining a policy and a methodology for developing a regulatory system that will allow operations of commercial space vehicles in Italy**, mainly based on the FAA AST licensing system recognition
- Identify regulatory differences an US operator should comply with to operate in Italy.





### III. SPACEPLANE SAFETY AND AIRWORTHINESS ASPECTS

Due to the lack of certification codes and technical requirements, a **global risk based assessment** covering design, manufacturing, maintenance and operation activities could be an alternative option for initial operations.



#### **SAFETY OBJECTIVES need to be set** (examples)

- uninvolved people and properties on ground and other airspace users - same as aviation operations
- spaceplane and occupants: at an “acceptable” level

Operator should manage risks associated to spaceplane design, production, maintenance and operations within a comprehensive

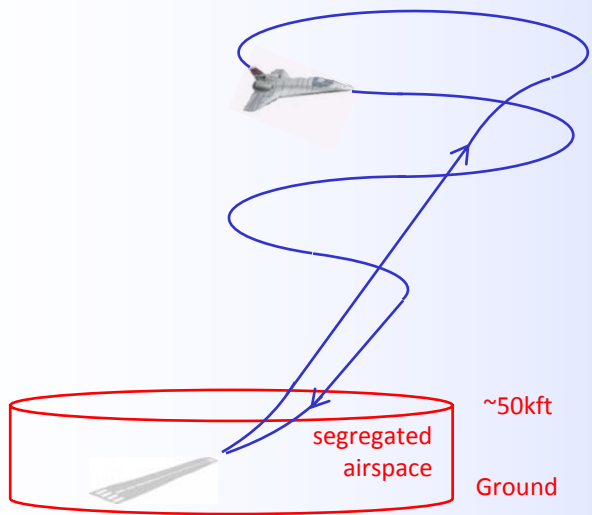
#### **Safety Management System (SMS).**

#### Possible **critical issues**:

- Italian national standards might pose additional compliance burden
- SMS data and spaceplanes design/manufacturing data might be under USA ITAR segregation
- future EU regulation might not be harmonized with this approach



## IV. AIRSPACE MANAGEMENT AND REQUIREMENTS



- Any spaceflight mission will necessarily impact airspace below 50.000 ft
- Nature and maturity of spaceflight operations impose conservative standards for separation with other airspace traffics
- In order to minimize the risk to uninvolved parties on ground, low or no flexibility in designing low altitude routes, paths and trajectories
- Spaceplanes will be unable to comply with ICAO Annex 2 standards of the air (e.g.: precedence, ability to manoeuvre)
- Very low number of spaceflight operations in coming years



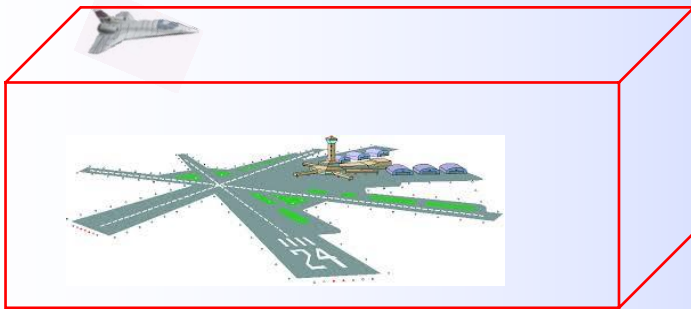
Segregated airspace would be the most adequate mean for safe operations in the near term



## IV. AIRSPACE MANAGEMENT AND REQUIREMENTS

### Segregation of airspace:

- in line with USA policy for spaceplanes operations
- common approach in Italy for RPAS experimental activities management



There should be at least a spaceport connected to a segregated airspace structure; they both need to be adequate to safely support the operations of a given spaceplane.



## V. SPACEPORTS MANAGEMENT AND REQUIREMENTS

### Identification of a suitable spaceport is a necessary condition to allow spaceplane operations from Italy

Spaceport main requirements (horizontal take-off only) :

- 1. Spaceplane operating criteria**  
(runway length 2750 m minimum)
- 2. Meteo conditions**  
(VMC statistics + prevalent winds characteristics)
- 3. Uninvolved people/properties safety factors**  
(low density populated areas, segregated airspace structure integration)
- 4. Logistic issues**  
(capability of manage rocket propellant and good ground/sea transport connections for general supply related issues)
- 5. Environmental aspects**  
(emissions and noise related to rocket engines, use of hazardous materials)

**PLUS**

**Harmonization** with standards already adopted for licensed space launch sites (FAA AST, ESA, NASA)



## V. SPACEPORTS MANAGEMENT AND REQUIREMENTS

Feasible options and near term plans :

- **Brand new spaceport construction deemed unrealistic** (also due to lack of applicable European standards). Evaluation of existing (civil or military) Italian aerodromes is under way
- Preliminary analysis identify **coastal and insular sites in the South of Italy** as possible candidates
- Benefit of ENAC-ITAF cooperation could result in a **military aerodrome “converted” for spaceplane operations** as an option for initial activities, at least experimental; ITAF has already stated its interest in such activity
- Another solution could be an **airport already designated for experimental RPAS activities** complying with spaceport *ad-hoc* requirements
- FAA AC 431.35-1 *“Expected Casualty Calculations for Commercial Space Launch and Reentry Missions”* should be taken into consideration





## VI. CONCLUSIONS

- I. A Draft Italian Regulatory Policy for Commercial Space Transportation is ready to be issued
- II. A national specific regime for spaceplanes operations needs to be set (impact at Italian Air Navigation Code level/ENAC regulation level ?)
- III. In the lack of spaceplanes certification codes, global risk based assessment approach could be an option (design – manufacturing - operation - maintenance)
- IV. Identification of a spaceport connected to a segregated airspace structure is mandatory
- V. Need to understand, familiarize and harmonise with FAA AST standards set for licensing launch sites and spaceplanes operators
- VI. Provide flexibility for future European spaceplanes regulations



## VII. ITAF FEASIBILITY STUDY



ITAF developed a spaceplane flight test feasibility study in the Italian airspace

Maj Ferdinando Dolce of Italian Air Force - Flight Test Wing is going to present it.