



International Association for the Advancement of Space Safety

Commercial Spaceflight Panel – Session 40

**6th IAASS Conference
Montreal, Canada
May 2013**



Orbital Commercial Spaceflight

- Welcome by IAASS President/Suborbital Safety TC Chair
- Introducing panel Chairs:
 - Dr Andy Quinn (IAASS Suborbital TC Chair)
 - Jean-Bruno Marciacq (EASA)
- Main theme question:
Which Regulatory Framework for the Future?
- Open floor questions



Orbital Commercial Spaceflight

- Current Suborbital Commercial Spaceflight Framework
 - US
 - FAA-AST **Launch Licensing** Regulation
 - **then phased certification (people and then vehicle)**
 - NASA Certification Requirements for Spaceflight
 - 1100 Series
 - Successes:
 - SpaceX
 - Europe
 - **No Orbital requirements at present**
 - Standards
 - ISO Space Standards



Suborbital Commercial Spaceflight

- Current Suborbital Commercial Spaceflight Framework
 - FAA-AST **Launch Licensing** Regulation
 - Successes:
 - Scaled Composites (Virgin Galactic)
 - Issues:
 - Safety issues relating to explosion at Scaled Composites during cold flow rocket tests killing 3 scientists
 - Blue Origin Sheppard RLV loss of vehicle during testing
 - Europe – no decisions yet
 - Possible **certification** framework as follows:



Suborbital Commercial Spaceflight

- Proposed European Regulatory Approaches (8 options)

Option 0. Member States Regulate:

- MS to develop own regulations: no harmonisation, no interoperability, legal framework TBD
- EU to ensure compatibility with EU/Aviation laws

Option 1 . Member States with EASA involvement:

- EASA cooperates with MS to ensure safety/environment and foster harmonisation

Option 2. Association of States (=JARSOA):

- International, with EASA participation
- Rules to be implemented at National Level

Option 3. EU Policy for SOA (=UAS):

- Guidance to MS, Designers, Manufacturers and Operators
- No legal framework



Suborbital Commercial Spaceflight

- Proposed European Regulatory Approaches (8 options)

Option 4. “Light” Process

- Essential Requirements
- National Implementing Rules and Technical requirements
- No full harmonisation, responsibility with MS

Option 5. Full set of Rules for SoA

- Following EASA established rules and processes
- With provisions for High Altitude/High Speed Transportation Aircraft (HST)

Option 6. Phased approach (e.g: 1+2+3+4+5)

- Progressive implementation along with projects development
- Full set of rules published at maturity

Option 7. Full set of Rules for Sub-orbital, Orbital and HST

- Covering full spectrum from Ground to Orbit and A-B
- Long and comprehensive process (~10 years)



Suborbital Commercial Spaceflight

- Proposed European Regulatory Approaches (cont)
 - The European Commission is currently reviewing options
 - Development will start as soon as decision is taken
- On Essential Requirements
 - Based on EASA Basic Regulation ERs, adapted
 - Could be also based on 14.CFR.400 series
- On Technical Requirements
 - Based on respective projects
 - Following a CS+AMC/GM structure
 - Taking into account **existing Standards**



Suborbital Commercial Spaceflight (cont)

- ICAO – **not yet involved**
- Standards
 - None (formally)
 - IAASS Suborbital Safety TC produced standards & guidelines – to be ratified/put forward to ISO; a summary of these were presented in session 27
- Guidelines
 - FAA-AST Guidelines



Is Self-Regulation the Way of the Future?

- **Provides**
 - Flexibility
 - The reason is that on one side the technological dynamism of such kind of industry would require fast evolving safety regulations and standards to keep the pace with the progress, and on the other side compliance verification would require skills and decisional flexibility well above those currently available (or allowed) in government bureaucracies like FAA.
 - Complex, fast-evolving industry
 - the self-regulatory approach for commercial human spaceflight is justified by the unavoidable evolution of the content of safety standards in a highly-advanced and fast-evolving industry, from being prescriptive and static to become generic, goal oriented and dynamic.
 - Goal Based Approach
 - The safety-case regime, is based on the principle that the regulatory authority sets the broad safety criteria and goals to be attained, while the system developer proposes the most appropriate technical requirements, design solutions, and verification methods for their fulfilment.



Is Self-Regulation the Way of the Future?

- **Provides**
 - Risk of the ‘unknown unknowns’
 - Due to the fact that there is nothing as “absolute safety”, and that the acceptable risk is usually the one defined by government standards and regulations, without such reference, in any litigation following an accident the operator would have a hard time defending his vehicle risk level and demonstrating the thoroughness of the information he passed to the customer. The fleet would be grounded, and probably made obsolete by newly issued (strict) standards in the emotional wake of the accident.
 - Best interest of the customer
 - We can say that obtaining a certification of compliance with safety regulations serves the interests of the customer, but at the same time may also provide some protection to industry from tort liability by implicitly or explicitly defining the acceptable risk level at the current state-of-art.



Commercial Spaceflight – Next Steps

- ICAO – should extend their mandate to include commercial spaceflight
- FAA-AST
 - Monitor experimental flights
 - Certification (of people on board)
 - Certification full
- EUROPE
 - Appetite for involvement with 8 framework options
- HARMONIZATION REQUIRED
 - When the FAA-AST change to certification this should be done in conjunction with the EASA whom will have a framework in place
 - Existing suborbital vehicles will then have to provide evidence of compliance to new standards of airworthiness/space worthiness codes and safety targets



Commercial Spaceflight – Next Steps (cont)

- REST OF WORLD
 - Engage with National Authorities to determine what framework is suitable
 - Sweden for instance – Sounding Rockets/FAA-AST licensing?
 - Malaysia – National certification framework?
- SELF REGULATION
 - Is there an appetite for self-regulation?

Open Floor Question on the Future Regulation of Commercial Spaceflight

Option A – Existing approaches

Option B – Existing approaches + ICAO

Option C – Self Regulation + ICAO

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Thank you