



The future regulation of suborbital flight in Europe



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ABSTRACT

The EU 7th Framework Project FAST20XX [1] aimed to enlarge the foundations of suborbital high-speed transportation in a wide variety of fields. One of the key issues of this project was to outline a desirable regulatory framework that would best serve the interests of all European stakeholders in this new activity.

The US Federal Aviation Administration (FAA) has issued a series of requirements for operators of commercial suborbital flights under the 2004 Commercial Space Launch Amendments Act (CSLAA), enabling the corresponding market to develop. These regulations were initially valid until 2012 but have now been extended until 2015.

In Europe, practical and successful attempts to fly experimental vehicles of this kind do not yet exist. However, several developments indicate that it is becoming urgent to pay attention to this potential new industry and find ways to regulate it in a safe yet flexible manner. Although the European Aviation Safety Agency (EASA) explored the possibility in 2008 to prepare for a certification approach under the concept of “Suborbital Aeroplanes” (SoA), this initiative was put on hold in 2011, and a final decision by the European Commission is still pending.

This paper highlights some of the research performed by the authors towards the establishment of a roadmap for future regulation of suborbital flight in Europe. In particular, it will present results of a survey carried out among stakeholders, including operators and manufacturers of vehicles, spaceports, national and European regulators, insurers and brokers, consultants, users and lobbyists. The paper also presents results from the workshop on the future regulatory framework for suborbital flights in Europe, which was co-organised by the present authors and held in Brussels in October 2012.

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1. The FAST20XX project and suborbital flight

The European Union Project FAST20XX [1] was aimed at exploring the activity of suborbital transportation, which takes place on the borderline between aviation and space. The Project investigated two novel concepts of suborbital manned vehicles, envisaged to take place on two separate time-lines:

Alpha: a small aerospace vehicle launched from an aeroplane that would provide a high-altitude ballistic flight experience, like those currently intended for commercial touristic flights. This concept was envisaged in the medium term of five to ten years.

SpaceLiner: a much larger, vertically launched two-stage rocket vehicle capable of hypersonic flights intended for commercial, point-to-point, long-range transportation of passengers. This concept was seen as taking place in a longer term, i.e. the second part of the 21st century.

The main focus of FAST20XX was the identification and mastering of critical technologies for such vehicles, rather than the vehicle development itself. Besides the technical aspects, the most important pre-requisites for commercial operation of suborbital vehicles were also examined such as safety issues, medical aspects of human spaceflight, business cases, environmental aspects, and legal issues.

In the framework of the legal analysis of the FAST20XX Project, the authors carried out an exploration on what could be the future regulation of private human suborbital flight in the European context. The present paper will focus on the analysis concerning the *Alpha* type of vehicle, as this type of suborbital transportation is

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envisioned to become a reality in a shorter term, and thus it presents the most pressing legal issues. The latter issues include second and third-party liability, insurance requirements, jurisdiction, registration, legal status of crew and participants, airworthiness, and authorisation regime (licensing or certification) for the new activity.

As part of the effort to identify a roadmap for future regulation and authorisation of human suborbital flight in Europe, the authors developed a survey called “FAST20XX Questionnaire on Human Suborbital Flight”. The results of this questionnaire are presented further on in this paper, together with the main results of a workshop on the future regulatory framework for suborbital flights in Europe, which was held in Brussels in October 2012 in order to gather all the respondents to the questionnaire for further discussion and exchange of ideas. To our knowledge, this was the first attempt to produce a roadmap for regulation of suborbital flight in Europe, where so far no discussion similar to the public hearing held in the USA in 2003–2004 has taken place. In that process, emerging US suborbital operators were involved and their comments actually helped shape the legislation. The authors’ effort to engage all European stakeholders by carrying out the questionnaire and organising the Brussels Workshop provided European potential regulators a unique opportunity to hear the different views.

2. Regulating suborbital flight at the international and the national level

By 2013, a number of private companies had announced their intention to start operating vehicles intended to carry passengers to the threshold of outer space on suborbital flights [2]. Although most of these ventures will take place in the United States, some have also expressed their intention to fly from Europe [3].

As two of the authors have noted in a separate paper, an analysis of applicable international law conducted in the framework of FAST20XX revealed an absence of regulation specifically addressed to suborbital flight [4].

However, in the case of *Alpha*-type concepts [5], the trajectory of the vehicle is essentially vertical, and thus the crossing of any international borders or the overflight of foreign territories can be avoided. As the ICAO Council stated in 2005, “...current commercial activities envisage sub-orbital flights departing from and landing at the same place, which may not entail the crossing of foreign airspaces” [6]. This will indeed be the case for flights taking place from a large country such as the United States. In such cases, the concerned states may be perfectly capable of regulating the entire activity in the framework of their national law. And whether they choose to apply national air law, national space law, or a new hybrid law is up to them.

The situation might well be different for flights operated from e.g. certain European countries, which are significantly smaller. Flight paths may traverse airspace of neighbouring states, and incidents or accidents may happen across national borders. The situation will also change when flights go further up into orbital space, or when they ultimately develop into suborbital point-to-point flights to cover in short time very long distances on earth [7]. In those cases, international law will be applicable, and a choice of regime must be made: international air law, international space law, or a new *sui generis* regime combining elements from both laws. ICAO, COPUOS, or both may become competent to establish the new international suborbital regulation.

So far only one country, the United States, has enacted specific legislation covering this activity. After successful flights of the first private aerospace vehicle (*SpaceShipOne*) took place in 2004, the need arose for regulating the new emerging suborbital industry. Within the framework of the 2004 Commercial Space Launch

Amendments Act (CSLAA) [8], US Congress granted power for regulation and licensing over private human space flight (both orbital and suborbital) to the Office of Commercial Space Transportation of the Federal Aviation Administration (FAA/AST). In subsequent years, the FAA has issued a series of requirements for operators of commercial suborbital flights, thus enabling the corresponding market to develop. These rules were initially valid until 2012, but recently they were extended until 2015 [9].

The idea was to establish a limited regulation at the beginning, in order to allow for the operators to try and experiment. The licensing process mostly focuses on safety of public and property not involved in the flights: hence the need to obtain authorization from the FAA before launching the vehicles. However, a number of rules and guidelines have also addressed the legal status of crew and passengers, safety and security requirements on board, and even some specific aspects of airworthiness of the vehicles involved [10].

In terms of definitions, the US law has introduced for the first time a definition of “suborbital” as opposed to “orbital” flight, as well as the crucial distinction between “crew” and “spaceflight participant” (the latter is defined as “an individual, who is not crew, carried within a launch vehicle or reentry vehicle”).

Before employing a new crew member or flying any participants for commercial purposes, the operator (or licence holder) for a suborbital vehicle must inform them of the risks and notify them that the US Government has not certified the vehicle as safe. Passengers must then provide their “informed consent” in writing in order to participate in the flight. Because the latter requirement is such an important element of the regulation, the FAA has issued further guidance about what constitutes informed consent [11].

3. Regulating suborbital flight in Europe: EASA

European countries may be facing in the next few years the same decisions that the US Government had to make ten years ago. In a similar way as the US regime for private human spaceflight, the future legal framework in Europe for suborbital activities should assure the safety of the flights, regulate consequences of accidents and damage, yet avoid over-regulation in order not to end what has barely begun, the emergence of what could become a new industry benefiting the EU and its citizens.

If EU Member States would consider winged suborbital vehicles as aircraft, this could entail application of the EU *acquis communautaire* [12], as the member states have transferred to the EU their legislative powers on this area. It could also mean that the European Aviation Safety Agency (EASA) is competent to apply its rules to suborbital flights.

EASA explored this possibility in 2008, when a number of EASA officials presented a paper proposing a certification approach under the concept of “Suborbital Aeroplanes” (SoA) [13]. It is to be noted however that in September 2011, the European Commission put EASA’s suborbital activity on hold, due to a new directive from the Commissioner’s Cabinet to investigate a lighter process, similar to the FAA/AST “Launch Licensing” procedure [14]. Hence, EASA’s Suborbital Working Group (SoWG) is currently considering how to accommodate this “lighter” approach within its own mandate. These events might indicate a gradual convergence of the two approaches.

Two paths for authorisation of suborbital flights have been under consideration both in the US and in Europe: certification and licensing. Certification of aircraft is most effective in assuring safety of aerial vehicles, as demonstrated by the extremely low rate of accidents that happen in modern aviation.

However, certification is a lengthy and costly procedure that may not be suitable at the beginning for the kind of experimental,

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