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Report on the 2006 ECSL Practitioners' Forum

The 2006 ECSL Practitioners' Forum was organised on 17 March at ESA Headquarters, by the ECSL, (**Mr. A. Marchini**), in cooperation with the Coordinator of the Practitioners' Forum, **Dr. F.G. von der Dunk** (International Institute of Air and Space Law, Leiden University). The theme was "Space tourism: legal and institutional issues". The forum was attended by some 100 participants from various institutional, commercial and academic professions as well as from a host of countries (including non-European such as the United States, Mexico, Canada, India and Thailand). Most notably, they included the Director-General of ESA, Mr. J.J. Dordain, and the former Astronaut and Former French Minister for Research and New Technologies, Mrs. C. Haigneré, during the key-note speech.

After some welcoming words on behalf of ECSL by **Dr. G. Lafferranderie** (Chair of the ECSL and Chair of the morning session), **Dr. Von der Dunk** introduced the theme. He noted that as recently as five years ago, space tourism essentially was still theory. He referred to the three orbital space tourists that have flown so far to the International Space Station, as well as to the Ansari X-Prize won in 2004 by SpaceShipOne that led to Virgin Galactic's plans to use the licensed technology for sub-orbital tourism. Considering this rapid take-off, it was necessary to start addressing the major legal and policy issues involved in a fundamental manner. Whilst recognising that for obvious reasons the current legislative developments almost exclusively focused on the United States, he pointed out that there were a number of international elements to space tourism which needed to be taken into account: the international character of outer space as an area, the fundamentally international basis of space law, the fact that Virgin Galactic was a UK company, that Space Adventures, another player in the field, envisaged launchings from the United Arab Emirates and Singapore, as well as using a Russian aircraft as launch facility, and finally the proposals of the US Federal Aviation Administration to establish an International Space Flight Organisation (ISFO) along the lines of ICAO.

The second speaker was **Mr. A. Farand** (ESA Legal Department, Paris), on "Space tourism: lessons learned from the ISS experience". He offered an extensive overview of the way in which the legal framework for the International Space Station (ISS), as the 'destination' for the first few proper space tourists Tito, Shuttleworth and Olsen, had dealt with those special visits. The analysis focused firstly on the general framework as provided by the Intergovernmental Agreement of 1998, after which the Crew Code of Conduct (CCOC) passed scrutiny. The CCOC was the key document dealing with space tourists, by incorporating them in the phrase "space flight participants".

Then Mr. Farand dwelt on some specific issues such as liability, where he made a comparison of the space law liability regime as principally arising under the Liability Convention and the air law liability regime. The latter offered, in addition to third-party liability, also a system for dealing with passenger liability (from the 1929 Warsaw Convention to the 1999 Montreal Convention); and the speaker concluded therefore that the latter regime would be much more appropriate, and possibly even amenable, for purposes of space tourism. Finally, he briefly touched upon the regime dealing with criminal law issues on board the ISS, as one of the special areas of particular importance for space tourism on the ISS.

The third speaker was **S. Bochinger**, Director Institutional Affairs with Euroconsult (Paris), who addressed the



question "Is there a market for space tourism?". He noted that going to space now starts to constitute a market in itself, requiring a paradigm change in combining two different worlds in terms of revenues, market and market players – those of tourism and of space respectively. Furthermore, he pointed out that one should clearly distinguish orbital and sub-orbital tourism. With regard to orbital tourism, the technology is available and reliable – that is, only the Russian one, as far as the current market is concerned, which is moreover a very limited market. In addition, since infrastructure costs are enormous and unlikely to come down at short notice, operations basically consist of piggy-backing.

Sub-orbital tourism constitutes an altogether different market, requiring relatively light structures. In profile it comes close to the (risky) entertainment market, such as theme parks, adventure diving and near-space flights (some of which markets are actually being addressed by the same Space Adventures that also sent three tourists to the ISS). It is difficult to predict the market here, but the speaker warned for experiences such as with LEO satellite and micro-gravity flights where the envisaged markets did not really take off.

The fourth speaker was **C. Dubreuil**, Vice President and General Counsel with EADS Space Transportation, on "Space tourism, from pioneers to industry: an EADS Space overview". She started her presentation by pointing out that so far almost 500 persons have actually been in outer space, and that some 99% of those should be

considered professional astronauts. For the overall manufacturing industry, this certainly put things into perspective, although it would of course be very interesting to follow how the 'industry' of space tourism would evolve in the near future.

From a manufacturing point of view, she assumed that orbital tourism will continue to require special and very expensive vehicles the time being. The quality of the 'service' as perceived by the 'customers' would depend highly on the comfort and the accommodation of the spacecraft concerned; certainly sub-orbital tourism would meet most tourist expectations merely by earth vision and weightlessness. Thus, the market was essentially one of an entertainment-nature – it certainly is not transportation, as it is not basically about going from A to B!

The speaker then briefly touched upon certification constraints as these might severely negatively impact upon the development of tourism. Whilst the United States seemed to be quite advanced in dealing with this issue, Europe would need to take it up as well. Finally, it was obvious that product liability would be scrutinised in detail by manufacturers interested in addressing the space tourism market.

Then, the keynote speaker, **Mr. W. Whitehorn**, took the floor. Mr. Whitehorn is President of Virgin Galactic, the London-based company within the Virgin Group (headed by Sir Richard Branson) that is currently developing the first proper sub-orbital tourist vehicle. For that purpose, Virgin Galactic essentially used the technology used for the SpaceShipOne (SS-1) vehicle which had won the Ansari X-prize, of 10 million US\$, in October 2004. That technology, developed by Scaled Composites of the United States, had already been licensed to Virgin Galactic for the purpose.

Thus, whilst he showed a film with extensive coverage of the winning SS-1 flight, Mr. Whitehorn addressed the issues involved. First, he explained the revolutionary design of the White Knight-cum-SS-1, which was based on

three key premises. The first was a design as simple as possible: SS-1 itself had a total of only 30 moving parts, with some redundancy throughout – whereas the US shuttle has some 365 000 moving parts, with no redundancy. The second was air launch as opposed to ground-based launch, thus avoiding the need to deal with the tremendous power necessary for vertical lift-off and the attendant vibrations and consequent risks involved – the carrier aircraft White Knight flew to an altitude of 55 000 ft, before SS-1 separated to launch itself towards its ultimate altitude of 110 km. The third was re-entry not in a controlled mode, but – through the appropriate design of the SS-1 – as a sycamore leaf floating down until back at 55 000 ft altitude finally transforming into a glider, descending pilot-controlled from there – thus avoiding the problems usually connected to re-entry into the denser parts of the atmosphere.

The speaker proceeded to highlight some further facts regarding SS-1. Thus, the whole mission from development of the system to completion of flight cost a mere 27.5 million US\$. Both White Knight and the SS-1 were registered as experimental aircraft. The SS-1 was adorned with the FAA registration number N 328 K, where 328 k referred to the 328 000 ft that was the intended altitude for the Ansari X-prize.

Mr. Whitehorn then moved on to the plans of Virgin Galactic for SS-2; with a special company owning the intellectual property rights, then licensing the technology to Virgin Galactic. The special company was majority-owned by Virgin Galactic, whilst Scaled Composites also was shareholder. This construction was chosen, in order in the long term neither to monopolise access to the technology, nor to foreclose Virgin Galactic's use of other technology.

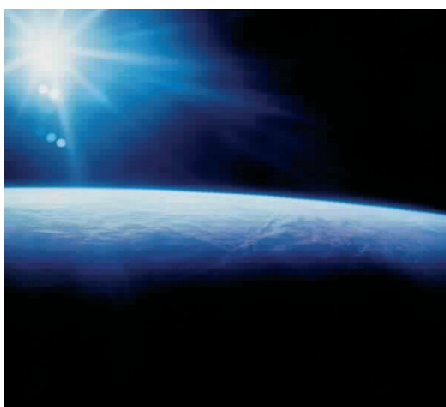
As for the SS-2, of which a fleet of five was to be built, some 43 000 bookings had already been done, with down-payments adding up to a total of 13 million US\$ deposited. The costs of the overall operation were estimated to amount to some 200 million US\$, of which the design phase would take up

some 20 million US\$. The main aim was to achieve a risk of accidents happening of better than 1 in 50 000 flights, that is roughly equivalent to current civil aviation in the United States. As a matter of fact, individual medical risks now would constitute the highest ones, not those of equipment or vehicle failure.

Virgin Galactic in the end was targeting three flights per day; with additional passengers also in the carrier – a Boeing 757-like aircraft – just for witnessing the launch proper. The price was to be 200 000 US\$ per SS-2 ticket to start with. The combination of carrier and SS-2 would be formally defined as a spacecraft under authority of the Office of the Administrator for Space Transportation with the US FAA, even as the carrier is a more or less normal aircraft and SS-2, like SS-1, in its return phase will operate as a glider and will be registered under N 400 K, 400 000 ft being the intended altitude for SS-2. Virgin Galactic moreover is looking for Part 25 certification for aircraft in the United States, without however intending to go through all the testing normally required for that purpose.

Finally, it was noted that the investment for the SS-2 operations would be totally taken care of by the Virgin Group. The general strategic idea for Virgin Galactic with respect to SS-2 was not so much to undertake space tourism, but to prove technology – and *then* draw in the required external financing for the next generation of private spaceflight vehicles, SS-3, which was intended to go orbital.

After the lunch, under the Chair of **Dr. Von der Dunk**, the afternoon session was opened by **Mr. M. Stanford**



(UNIDROIT, Rome), speaking on “Financing and security issues”. Mr. Stanford explained the background to and history of the Convention on International Interests in Mobile Equipment opened to signature in Cape Town on 16 November 2001 and how its benefits should be extended to commercial space financing. This was specifically to be achieved by means of a Space Protocol currently being developed in the framework of UNIDROIT. Whilst the Convention provides the rules generally applicable to all the different categories of mobile equipment covered by its sphere of application, specific rules such as under the future Space Protocol are needed to implement and, where necessary, adapt these general rules to the particular characteristics of the classes of assets concerned. The future Space Protocol is expected to confer benefits also on developing and emerging economies.

Mr. Stanford highlighted the main issues as being dealt with in the current process destined to arrive at such a Space Protocol, such as regarding the international security-registration system, definitional issues and the sensitive issue of public services as it was conceived to be potentially interfered with by bankruptcy proceedings and similar processes under the Protocol. With a view furthermore specifically to the topic of today’s session, the speaker pointed out to the potential value of licenses for operations also in terms of securities.

The second speaker after lunch was **Prof. P. Achilleas** (University of Paris XI), who dealt with “The status of crews and passengers”. The speaker scrutinised the UN space treaties for references to such terms as “astronauts”, “personnel” and “persons”; in the end making an effort to relate them to the specific context of private space flights carrying private tourists to the edge of outer space. He noted the absence of any authoritative definition of astronauts, concluding that every person moving beyond the lower limit of outer space so far is to be considered an astronaut – in respect of which limit an altitude of 110 km was quoted.

Prof. Achilleas proposed to develop an international statute on the status of astronauts, crews and passengers, to sort out the many inconsistencies, including clauses on protection of such various categories along the lines of the Rescue Agreement. He pointed out that some of the terms and principles were at least further defined and developed in the context of the ISS. What is clear, generally speaking, is that astronauts are specifically and extensively selected and trained to go into outer space, in obvious contrast with space tourists. Hence also the classification within the ISS context as between expedition and visiting crew members respectively spaceflight participants.

The third afternoon speaker was **Mr. P. Montpert**, Managing Director of Willis Aerospace Consulting (Paris), on “Liability and insurance issues”. Mr. Montpert started by saying that, as for space tourists, there is no insurance as of today. He proceeded with a general analysis of existing space insurance with a view to the possibilities of insuring space tourist ventures in the future. Most insurance in space activities, he noted, concerned performance insurance (damage) contracts, constituting some 90% of the overall space insurance business, not (third-party) liability insurance. In the past ten years for example 18 launching insurance claims, 65 in-orbit insurance claims and only one third-party liability claim could be listed. Standard procurement contracts limited responsibility to a ‘best efforts’ obligation, leading to *de facto* isolation of space tourism participants as there would be no guarantees available.

An additional problem would be that international law on the issue can be interpreted in different ways, and that there is more or less a complete absence of case law as far as liability insurance is concerned. Open questions which in this regard would be relevant for potential insurers are: what would the definition of space tourism be; and to what extent would air law liability regimes apply in addition? In any case, even damage risk would constitute a niche business, compared to overall global insurance business; it remained to be seen to

what extent new applications, such as space tourism but also Galileo, would drive new liability-insurance products.

The final speaker was **Prof. A. Kerrest de Rozavel** (University of Western Brittany, Brest), who discussed the topic of "The role of national laws in licensing companies and activities". He noted, first of all, that licensing of any space activities, including space tourist activities, is (still) exclusively to be arranged through national laws. He defined a license in this context as referring to any qualification of the capacity of a person or object to do something, and opposed this definition of that of an authorisation, which was more of a case-by-case nature (with reference also to Article VI of the Outer Space Treaty). He further distinguished in his analysis between the licensing of companies and the licensing of specific activities.

In this regard, as he pointed out, international space law offers two bases for licensing: the international

responsibility for states and the international liability for states, both leading (under the space treaties) also to powers *and* obligations to control relevant private activities. Finally, he dwelt, from the perspective of application of this body of international and national space law to space tourism, on the definitions required of such concepts as national activities *in* outer space, damage caused *by* a space object, fault of the launching state – or the person he represents, and last but not least of humans (legally speaking) as space object.

An interesting and extended discussion followed, which was summarised by the afternoon session's Chair, **Dr. Von der Dunk**. He reiterated the fundamental difference between orbital and sub-orbital tourism, as being subjected to totally different market paradigms. The first essentially meant piggy-backing with enormous infrastructure costs, the latter was all about adventure entertainment – with the real markets

for the near future being in sub-orbital. He summarised the key issues involved in the plans of Virgin Galactic, and proceeded to shortly summarise discussions on the main legal issues as they had arisen during the presentations and the discussion: licensing, registration, liabilities, certification, financing and some overarching typical international law issues like the question on the boundary between the airspaces and outer space. Finally, on behalf also of Dr. Lafferranderie he thanked ESA and its Director-General for usage of the main Room at ESA Headquarters, ECSL for organising the Forum, especially Mr. Marchini, Executive Secretary of ECSL, as well as all speakers and the audience, and invited all present for drinks.

Frans G. von der Dunk

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