

The space race

With commercial space flight drawing ever nearer, the need for space regulations is becoming urgent.

“To boldly go where no man has gone before” is a statement familiar to Star Trek fans. But while Star Trek is a fiction, a product of a vibrant imagination, space travel is not.

The tragic accident of the Virgin Galactic SpaceShip Two in October 2014 highlighted the fact that journeys into space are becoming a reality. Further evidence comes from the nine commercial spaceports in the US alone, with many more under licensing consideration.

And there is plenty of other activity planned for the upper reaches of the Earth’s atmosphere and beyond. The Google Loon project, for example, will put a network of large balloons in the stratosphere to provide Internet access in remote areas. There is as yet no clear guidance on how to handle these solar-powered balloons and it has been left to individual ANSPs to find a solution.

Such activity has brought to the fore the challenge of space regulations.



Credit: NASA

Who is in charge?

Some paperwork is in place. The United Nations' Office of Outer Space Affairs (OOSA) has authority for everything that happens 100km or more above the Earth's surface. The problem is ICAO regulations for commercial air travel, as defined by the Chicago Convention, only go up 20km. It leaves an 80km gap – a vast tract of airspace that could be widely populated by commercial ventures in the years to come.

ICAO has set up a "learning group" to investigate a space regulation strategy, the name alone clearly indicating the present stage of the project.

The first item on the agenda is deciding who should have responsibility for that 80km gap. ICAO and OOSA are to meet for the first time in a formal setting to discuss the issue and there is an array of documentation and potentially adaptable ICAO Annexes to study. It may be that an entirely new Annex or even a new regime is the best way forward.

Whatever the decision, many challenges await. Safety, as ever, is the primary consideration. "People are on these vehicles and so it is a huge conversation," says Martin Griffin, Commercial Space Strategy, ATM Directorate EUROCONTROL.

It is also worth noting that debris from the Colombia Shuttle disaster fell through crowded air corridors so the safety conversation has to include all commercial and general aviation. It is not just about the safety of the space flights.

At the moment, a space launch in the US affects normal traffic flow for about two hours. But it very much depends on the type of vehicle. Some will go up vertically and bring only a capsule back while others will come down like an aircraft or a glider. Some will start by dropping from a mother ship as Virgin Galactic did and there will be those that take-off and land like an aircraft too.

The one thing known for sure is that any spacefaring vehicle will, of necessity, be going very fast. "How would slower commercial aircraft and their systems react?" asks Griffin.

"What would a traffic collision avoidance system (TCAS) do? And will these vehicles even have TCAS? Also, aerospace vehicles may or may not exhibit normal aircraft behaviour at lower levels. Remember, even Concorde needed special handling and special training for ATCOs."

If an alternative airport needs to be used, it may require routine commercial air traffic to be moved out of the way – which is easier said than done given the limited speed of normal aircraft and the equally limited time that may be involved.



Credit: Virgin Galactic

Another consideration is alternative airports. The Space Shuttle had numerous airports around the world standing ready for when it returned from missions. That alone is not so difficult to organise. But if an alternative airport needs to be used, it may require routine commercial air traffic to be moved out of the way – which is easier said than done given the limited speed of normal aircraft and the equally limited time that may be involved.

Separation standards and tracking are also factors. Conventional procedures obviously need to be re-assessed and even the more advanced concepts such as automatic dependence surveillance – broadcast (ADS-B) may have trouble tracking aerospace vehicles as they enter and leave the Earth's atmosphere.

"Contingency plans need to be established," asserts Griffin. "But until day-to-day operations are understood, you cannot do contingency."

Commercial priority

It is not just about safety. Other factors that come into play include infrastructure development and the procedural framework. Questions range from runway requirements and terminal operations to how ANSPs would hand over space traffic above flight level 650.

And then there is the challenge of commercial priority. "Why should space traffic force normal air traffic into irregular operations?" Griffin queries.

All parties involved will be working within normal business parameters – in other words, competing fiercely and taking care of the bottom line. In this context, there is no reason to place the needs of journeys into space above those of the routine commuter flight looking to be as efficient as possible and ensuring its customers make their connections.

This may be a good opportunity for ANSPs, however. The more proactive are positioning themselves as experts on space

SPACE REGULATIONS



Credit: ©Giuseppe Porzani

Mind the gap – a vast tract of airspace could be widely populated by commercial ventures in the years to come.

operations and will efficiently combine this knowledge with normal traffic needs, improving revenue streams from both sectors. There could be a commercial advantage for those that embrace the challenge because that would make them the ideal location for a spaceport.

UAE studying final frontier

The United Arab Emirates' (UAE) Space Agency Working Group on Space Policy and Law has met for the first time to discuss the national space policy development plan, space law in the UAE and organisational regulation.

The meeting was led by Dr. Mohammad Nasser Al Ahabbi, Director General of the UAE Space Agency.

The group identified several important topics to review during its meeting, including the goals of space sector development and setting up organisational frameworks that will apply to space related activities in the UAE. It noted that understanding local and international trends in the industry would contribute to the strategic development of a successful UAE space sector.

Dr. Al Ahabbi said that the most important issue on the agenda for the working group is a discussion of Emirati human capital in the space industry and how to improve the current capacity of the UAE in the sector.

Whatever the scenario, a light regulatory framework is needed in the very near future that can be adapted as space travel develops. Whether this will be a case of the regulatory framework having to adapt to space vehicle designs and procedures or vice versa remains to be seen. Most likely, it will be a combination of the two as the integration of remotely piloted aircraft systems (RPAS) has shown.

RPAS also provides a good model for how fast this sector might progress. Innovation in RPAS has pushed ATM into matching its momentum. And, like RPAS, demand for space travel may surpass expectations. After all, conventional air traffic has proved that people want to travel. If there is a need to get to the other side of the world in under a day, there is a need for space travel.

Rick Garceau, Manager ATO Space Operations, FAA, is optimistic that ANSPs will manage the situation. "First we had turboprops and then came a jet and then Concorde," he says. "The system adapted, just as it did for the Airbus A380. Yes, there is a lot of hard work ahead but I'm confident."

Nevertheless, the lead-in time for regulations can be 10 years or more so the ICAO and OOSA discussions need to be productive immediately. Commercial space travel must move from accommodation to integration. It is an exciting prospect and one that should not be suppressed through a lack of a regulatory framework.

Perhaps vibrant imaginations are needed after all, to boldly go where no regulations have gone before. ➤