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Some Key Questions on the Commercial Future of the International Space Station

On the 11th of February 2018, the Washington Post revealed a new approach of the United States towards the utilization of the International Space Station (ISS) after 2024, which envisages the possibility "that industry could continue to operate certain elements or capabilities of the ISS as part of a future commercial platform". In itself, this is not the first attempt since there was already a similar call under the Obama administration, but now the proposed approach well aligns both with the new space paradigm, including the recent successes of SpaceX, and with a greater involvement of private actors, particularly in Low Earth Orbit (LEO), which has been the purpose of some space Agencies worldwide in recent years.

But how does this fit with the current policy, legal and financial boundary conditions around the ISS?

And even more importantly, what could be the attitude towards this new approach from the other International Partners, signatories of the International Space Station Intergovernmental Agreement (IGA)?

1. European Past Developments and Future Utilization Strategy of the ISS

On the 7th of February 2018, Europe celebrated the 10th anniversary of the Columbus laboratory and of the launch of the first Automated Transfer Vehicle (ATV). At that time, Europe became a full partner of the ISS, with its first permanent human outpost in LEO. This success came about after almost 20 years of European considerable R&D investments, political challenges and industrial efforts. It also ensured a key role for Europe to play in the global context, demonstrating its capabilities and developing crucial international relations in challenging times. But most of all, Columbus represents one of the best European ambassadors in the so called "chain of motivation", which affects all citizens, through three phases: fascination, inspiration and finally motivation. Therefore the ISS not only provides direct benefits, such as scientific discoveries and technology demonstrations, on top of a considerable return of investment, but also immaterial benefits which have crucial implications on the future development of our society. Europe is now taking some initial steps to open up new opportunities for partnerships aiming at a commercial utilization of the ISS, such as the Bartolomeo external platform with Airbus and the ICE Cubes service with Space Applications Services for pressurized microgravity experiments. Though this approach could well complement the current utilization scenario of the ISS, it certainly could not ensure proper coverage of the mandatory contributions and running costs of the station.

So how can a credible commercial utilization scenario be defined and what could be the business case for that?

2. "Old" Budgetary Constraints and the Promise of the Future

The background behind "the decision to end direct federal support for the ISS in 2025" is that the current budget for exploration is mainly allocated to ISS activities, limiting the possibility to invest in further exploration endeavours beyond LEO, and similar financial constraints also affect the budgets of other ISS International Partners. But the willingness to go ahead with an ambitious plan for a cis-lunar "gateway" outpost for future human missions, enabling further exploration missions to other celestial bodies, represents a push factor towards a restructuring of the ISS program.

The key question is, can the ISS properly operate without governmental support? And what is at stake?

Since the initial deployment of the ISS modules, costs savings initiatives have been discussed among the space Agencies, particularly on the operations side, with the objective to progressively transfer these activities to space industry, expecting a greater deal of efficiency by the private sector but still under governmental funding. Initially, it was also expected that the private sector would develop business cases for the ISS

utilization and that private business initiatives would flourish on board. This old promise materialized only in part, but the viability of sustainable ISS operations was based on the co-existence of scientific activities and commercial ones. The debate is now shifting towards a more substantial privatization of the Station, encompassing all activities and associated costs.

The key questions here are what were the show stopper for a more substantial commercial utilization of the ISS in the last decade? Were the costs too high or wasn´t there a real business case / demand?

3. Knowledge Divide and Real Business Opportunity?

The ISS represents a major investment for many countries, and the know-how acquired in the last decades is likely to become a substantial basis for future long duration exploration missions. Since the knowledge acquired is valuable and not easily reproducible, one should ensure that proper knowledge management and transfer mechanisms are put in place between space Agencies, industry and future commercial partners in order to best prepare for the future. Science in space has become a reality almost taken for granted by the many scientists that belong to the IPs´ nations, and somehow this possibility should be assured also in the future, despite the more commercial oriented nature of the exploitation program, to avoid a knowledge divide between the scientific community of yesterday and the one of tomorrow. On the other hand, a good business case is the basis for any successful private venture, and therefore concrete business opportunities will need to be identified to guarantee a sustainable and medium term exploitation of the station by private actors.

Is this feasible and who is willing to bear such risks? What is the customership?

4. Making the ISS a Success Story

Microgravity sciences have been investigated for over 50 years, in different frameworks, conditions and timescales. The ISS represents the first laboratory allowing continuous experimentation under microgravity conditions for more than a decade, in the fields of materials sciences, physical sciences, biology, human physiology, astrophysics and technology demonstrations. So far only few partnerships could be established for the successful deployment of experiments entirely funded by third parties, a good example being the AMS, developed by CERN together with a number of national research institutes. In-space manufacturing has been one the most relevant promises of the past, though only recent developments in Additive Layer Manufacturing (i.e. more commonly known 3D printing technology) allowed for some experiments to be conducted on ISS. Whether this will open up substantial business opportunities and a market for on-orbit manufacturing is still far from being proven and this could possibly be considered only as a first encouraging step towards the creation of “orbital workshops”. The necessity of lowering the cost of access to the ISS in order to increase its utilization rate, particularly by non-traditional space actors, is of paramount importance to encourage experiments closely related to concrete business opportunities on Earth. This is due to the fact that the scenario foreseen by the U.S. is quickly approaching, which envisages that “NASA will expand international and commercial partnerships over the next seven years in order to ensure continued human access to and presence in low Earth orbit”.

At the moment the U.S. are already consulting with their national space industry on a potential privatization of the ISS, but to which extent are the International Partners involved in these consultations?

Clearly a unilateral decision from the U.S. to privatize the ISS would have a considerable impact on the operations of the IP´s modules, both in terms of accessibility and of commercial opportunities.

Would this scenario somehow represent also a push factor for Europe, and eventually Russia and Japan, to proceed to a similar privatization of their modules as well?

While it is certainly difficult to find answers to all these key questions, the dialogue among ISS stakeholders to address these issues should certainly continue and even intensify as crucial decisions need to be made in the near future.

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