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"THE UN SPACE 2030 AGENDA – A CRITICAL REVIEW BY SPACE RENAISSANCE INTERNATIONAL"

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Abstract

With Resolution 73/6, adopted by the General Assembly on 26 October 2018, following the outcomes of UNISPACE+50 (20-21 June 2018), the U.N. GA 73 authorized the Committee on the Peaceful Uses of Outer Space (COPUOS) to continue working to produce a Space 2030 Agenda. The "Space 2030 Agenda, Space as a Driver of Sustainable Development", was prepared by the U.N.COPUOS Space 2030 Agenda Working Group, and adopted by the U.N. General Assembly 76 on 25 October 2021 with Resolution 76/3. The UN's Space 2030 Agenda, aimed at leveraging space for sustainable development, has a significant limitation: it primarily views space as a tool to support sustainability on Earth, neglecting the potential of outer space as a sustainable arena for human expansion. This oversight overlooks the fundamental contribution of civilian space development to resolving social and economic issues. While the original 2030 Agenda in 2015 – when reusable rockets were just beginning – understandably undervalued the space economy, the 2021 Space 2030 Agenda's failure to mention space settlement and manned space activities is a significant shortcoming. This omission reflects a misunderstanding of the urgency to initiate civilian development of outer space to achieve the 17 SDGs, ensuring civilizational growth, and fostering equitable international relations. Although later documents like "Our Common Agenda" and UNOOSA's Space4SDG briefly touched on human spaceflight, they still fail to highlight the critical role of space settlement. To address these shortcomings, Space Renaissance International (SRI) proposes a key amendment to the Space 2030 Agenda: adding a 5th Overarching Objective focused on civilian space development, space settlement, and space industrialization as essential components of sustainable development. The Agenda also lags behind the real-time activities of COPUOS subcommittees working on space resource utilization and the emerging cis-lunar economy. To rectify these oversights, SRI proposes 39 amendments to cover neglected topics such as space settlement, civilization expansion into outer space, and the integration of philosophical and humanistic disciplines into the space agenda. This comprehensive approach will ensure a more holistic and forward-thinking framework for space development and its contribution to a sustainable future. This paper is based upon the document presented in 2025 to UNOOSA/COPUOS by Space Renaissance International (SRI): "A critical review of the Space 2030 Agenda, by Space Renaissance International"[1]- The SRI document refers to the UN Space 2030 Agenda[2]'s articles' numbers.

THE UN SPACE 2030 AGENDA, A NEEDED EVOLUTION

The current status of our civilization, strangled between resources shorting, climate crisis and geopolitical global crisis, makes more and more evident that expanding into outer space is the real solution, to mitigate raising risks of civilization implosion. Yet, really living and working out there, extending civilization into outer space is a huge question, and it definitely needs a big long-term plan, and to give more priority to some issues, like protection of life and health, for long time staying in space. So, the real question is: are the plans we have now really well capturing everything that's exactly needed to move ahead on that roadmap?

SRI analysed in details the UN's Space 2030 Agenda, and developed a critical, proposing 39 amendments to the text.

We already know that UNOOSA[3] is not available to amend the text. The discussion taking place at the 68th General Assembly of COPUOS will just assess

how the Space 2030 Agenda was realized so far, and what was the impact on the achievement of the 17 SDGs. SRI delivered however to UNOOSA a paper including 39 proposed amendments, to remain officially published in the UN public documents database, as a witness of the UN Space 2030 Agenda's necessary evolution.

Space settlement and space industrialization might be way more critical than expected in the current plans of the spacefaring countries.

The UN space 2030 agenda kicked off back in 2018

UNISPACE+50, in 2018 in Vienna[4], kicked-off the preparation, and afterwards the 73rd UN General Assembly[5] basically instructed COPUOS – the Committee for the Peaceful Uses of Outer Space[6] – to develop the Space 2030 Agenda[7], the title of which was "Space as a driver of sustainable development"[8].

It was actually adopted in October 2021, during the 76th UN General Assembly[9], with Resolution 76/3[10].

The term "sustainability" (in several declinations) appears 44 times in the text. No doubt that sustainability is clearly the main focus, yet there's a big catch according to that space is only framed as a tool to help sustainability on Earth, and there's almost nothing about space itself being a place for sustainable human expansion. Just a toolbox in orbit, not a destination in itself.

The term "exploration" is the 2nd most mentioned one in the text of the Agenda. Fine, yet space settlement is completely missing, it is just not there, and that's a significant shortcoming. Btw, space exploration in itself will likely become fully unsustainable in few years, if a serious civilian space development program will not kick-off before 2030. Space exploration programs will sink under the overhelming financial crisis in the closed world[11].

We owe to drive our attention on the timeline.

The main UN 2030 Agenda of the 17 SDGs was drafted back in 2015, right before reusable rockets really changed the game of the launchers market, bootstrapping the kick-off of the new space economy. As analysed in a brilliant study[12] by Elton Chang, reusable rocket technology has great impact on satellite launch efficiency, brings meaningful cost reduction in space industry, and makes space technology very much more cost-effective. Reusability brings huge financial benefits, and significantly improves the sustainability of any space initiatives. It is incredibly boosting commercial space activities, increasing satellite launches. Space ports equipped for suborbital and orbital space tourism are sprouting everywhere in the world. The success rate of space missions was dramatically improved, and reusable rockets also bring numerous environmental benefits, with a reduced carbon footprint, reduction of raw materials use and of orbital debris.

Even if there are no excuses for the complete omission of space as a factor in the sustainability of development[13], we can understand that maybe space wasn't yet central in the UN's forecasts. Of course other dealers were paying very much more attention to the ongoing processes. Writes Gerd Gruppe, Member of the Board, Deutsches Zentrum für Luft und Raumfahrt e.V. (DLR), in an opening address of IAC 2015[14]: *"New Space economy is the trend slogan of 2015. Recent developments in the international space community give the impression of drastic changes in the space world today: New players in commercial space activities, new concepts for utilization of space technologies, new private investments in space assets. Last not least the number of countries investing in space keeps increasing year after year. The question is whether there is really something called "new commercial space," or are we re-labeling and tweaking slightly the way we are doing what we have always done. If the answer is yes – and there are hints to follow that impression – then the role of space agencies might has to change as well, especially when governmental space budgets stagnate."*

The title of the above article was "*New Space Economy – the dawn of a new era or the next economic bubble?*". Anything but a bubble, we can say today, in 2025, when space economy is estimated worth more than 1 trillion already in 2030, 10 years before the predictions of a few years ago[15], and climbs to 6 trillion in 2064.

However, the specific UN Space 2030 agenda, developed since 2018, and adopted in 2021, has no excuse for being so uninformed and backward, as far as the new space economy is concerned. In 2021, Space X's reusable rockets were regularly landing since at least 5 years, and the new space industry and market were growing exponentially.

Excluding space settlement and manned space activities from the Agenda meant not only a blatant underestimation of the new space economy as a driver for sustainable development, but also a full misunderstanding of the extreme need and urgency of kicking-off civilian development in outer space[16].

Ineffective remedies, actually worse than the disease

UNOOSA might have noticed the above failure, when they issued a document called "Our Common Agenda Policy Brief 7 For All Humanity – the Future of Outer Space Governance"[17], in May 2023. The introductive statement "A new era in outer space" says: *"In the past 10 years, humanity's access to and operations in outer space have fundamentally changed and the driving factors behind these changes are likely to accelerate in the coming decades. Of the many*

indicators that show evidence of this unprecedented change, three stand out: the number of objects launched to orbit; the participation of the private sector; and commitments of public and private actors to return to deep space and enable the long-term presence of humanity among the celestial bodies. This revolutionary change, like other twenty-first century technology-enabled breakthroughs, presents us with both opportunities and risks, and we need to develop further the existing governance so that we can sustainably accelerate innovation and discovery with a view to achieving the Sustainable Development Goals."

In such document, the new space is finally recognized as a revolution, and the long-term presence of humanity among the celestial bodies is finally mentioned. In the chapter titled "Return of humans to deep space" we can read a quick review of the American and Chinese plans for the Moon manned exploration. The "Space-based opportunities" chapter is limited to listing the downstream activities (Earth observation, Communication, Satellite navigation, Science) and the application of the above to the 17 SDGs. In the "Space-based challenges" chapter, the main subjects discussed at COPUOS are listed: Space Traffic Coordination, Space Debris, Resource Activities, Prevention of Conflict in Outer Space. Needless to say, all of these activities involve humans working in space. Yet UNOOSA is limiting itself to acknowledge what is happening in space, as if it was something to be scared by, and worth to try moderating it, by the action of the COPUOS Legal SubCommittee. UNOOSA completely renounces to playing a role of promoter, at least, of civilian space settlement.

On the UN 2030 Agenda side, UNOOSA has put online some more publications: "Space Supporting the Sustainable Development Goals"[18], and a "Space Solutions Compendium"[19]. Both publications talk about using near Earth orbit for development, still very much focused on Earth benefits from satellite technologies. Still no mention of space settlement and industrialization, the very key factors that can give a formidable push to sustainable development.

UN is missing the absolutely huge opportunity not just for civilization growing outwards, but even for achieving the existing 17 SDGs more effectively. The Vision remains fundamentally earthbound.

THE NECESSARY AMENDMENTS TO THE UN SPACE 2030 AGENDA

Adding an overarching objective 5, the core amendment

The proposed new Objective 5 focuses squarely on civilian space development, space settlement and space industrialization making them factors of sustainable development, not just tools but Factors in themselves. OO5 is aimed to open the pathway to the entire solar system for the whole humankind, by building human outposts in free space, on the Moon, and on other celestial bodies, utilizing the natural resources of moons, asteroids, and comets for the benefit of All Humans and all terrestrial forms of life.

That's a very much bigger picture than just using satellite technologies for downstream benefits. We report hereafter the proposed amendment of the Overarching Objective 5, from "A critical review of the Space 2030 Agenda, by Space Renaissance International"[20]

2.34 Proposed Overarching Objective 5

Overarching objective 5: Open the pathway to the entire Solar system for all humankind by building human outposts in space, on the Moon, and on other celestial bodies. Utilize the natural resources of moons, asteroids, and comets for the benefit of all humans and all terrestrial forms of life.

5.1. Promote and support the rapid establishment of space stations and space settlements in Earth orbit, on the Moon and Mars for the long-term habitation of humans, by private companies, by space agencies, and through public-private consortia, and international cooperation agreements.

5.2. Promote and support science and engineering to study the simulation of gravity by building small spinning space stations in Earth orbit as precursors for larger rotating habitats in the Earth-Moon system, in Mars orbit, and beyond.

5.3. Promote and support the utilization of all natural resources of the Solar system, especially the resources of our Moon and the Near Earth Asteroids by the development of advanced mining technologies.

5.4. Promote and support the development of industry in space, on the Moon, and in the Lagrange Points of the Earth-Moon system to process ores and extraterrestrial materials as well as orbital debris, and to produce manufactured goods, components, and propellant for spaceships in situ.

5.5. Promote and support the development of fully reusable, low-cost, ergonomic and safe space transportation vehicles for passengers and cargo.

5.6. Promote and support, and work with space agencies to assure higher priority to the research for protecting life and health in space from cosmic and solar radiations.

5.7. Support Space Tourism, as the unique industrial sector bringing untrained civilians, to travel and spend time in outer space.
5.8. Coherently with the thematic priority 4, promote an international framework for supporting state members to harmonize public and private initiatives, adopting space-friendly policies, grants, financial aids, and fiscal discounts to the civilian space industry.
5.9. Emphasize the importance of civilian space endeavours, space industrialization, and future space settlements as the next step of peaceful human evolution and the key factor of sustainable development.
5.10. Develop outreach to the public audience, raising general awareness of civilian outer space development as a key factor of terrestrial sustainable development. Emphasize the urgency to kick off the incremental process of global space settlement and industrialization. Invite celebrity testimonials, from many walks of life, including academia, artists, and astronauts.
5.11. Inspire youth to undertake studies and careers in many disciplines related to expanding civilization into space, i.e.: science, technology, engineering, philosophy, ethics, sociology, anthropology, arts, psychology, social sciences, architecture, agriculture, farming, tourism, computer sciences and artificial intelligence, real-time automation, project management, systems engineering, quality standards, and methodologies.
5.12. Promote and support space-based AI, big data banks, and big servers for electronic money utilities and banking attributes also considering the needs of global 17SDG realization.
5.13. Support policies for lunar and asteroid mining in order to achieve critical minerals such as cobalt for the green energy transition (SDGs 13, 14, 15).
5.14. Promote and support peaceful development, fair competition, and collaboration in space, namely between ARTEMIS Accords, ILRS, and any new cooperative initiative that might arise, within the frame of the incoming cislunar economy.
5.15. Promote and support a ban on weapons in outer space, as an evolution of the Outer Space Treaty Article IV. Designate a comprehensive space weapons ban as a set of mutual agreements that cover all pertinent issues including usage of dual technologies such as satellite-maneuver vehicles and power beaming attributes.
5.16. Add an 18th SDG[21], focused on civilian space development, to the U.N. 2030 Agenda. Achieve this key milestone during U.N. General Assembly 80, in 2025. Determine that the placement of an 18th SDG will ensure the progressive and durable status of outer space development for the indefinite future. The Space 18th SDG to provide a clearing house, included in the Committee for the Peaceful Uses of Outer Space, harmonizing the various and concurring interests of all stakeholders: Governments, Space Agencies, Private Companies, Non-Governmental Organizations, Space Faring, and Not-Yet-Space-Faring Countries.

<u>Proposed amendments to the original four Overarching Objectives</u>

A few tweaks are also proposed to the original four Overarching Objectives.

On objective 1 – "Enhance space-derived economic benefits and strengthen the role of the space sector as a major driver of sustainable development" – we propose a subtle but important shift: instead of space being "a" major driver of sustainable development space should be defined "the" major driver. And not just to be about Earth benefits, but including settlement and industrialization on Earth and beyond. To integrate traditional jobs in outer space, like hotel, catering, maintenance, farming, food production: usual jobs that will exist in space facilities, not just astronautical vehicles. Commercial activities need to partner with research entities, for protecting life from radiation, developing simulated gravity, green environments in the habitats, and explicitly include non-space businesses in space activities and habitats.

SRI amendments also underline assuring a fair share of opportunities for non-space faring Nations. Not just opening the doors to participation, but using expertise coming from places we might not expect, leveraging knowledge from rural or marine economies, advanced farming or aquaculture techniques and applying them in space. "*The issue is not whether the non-spacefaring countries, will gain something from space development, but whether they receive fair share and opportunity. Ensure that all the countries, including the not-yet-spacefaring ones, have access to the highest level of space opportunities and capacity building.*" In this paper[22], presented at IAC 2024 in Milan, Adriano Autino talks about a *Permanent Space Revolution* going ahead, with new countries joining the space enterprise each year.

On objective 2, improving quality of life, SRI wants to add that space potential should also ensure the survival growth and continual evolution of human

civilization so it's not just about making life better on earth, it's about ensuring we have a long-term future. Ensure that a transition to low-emission societies will not happen at the detriment of Earth's natural environments. For example, promote the mining of critical elements on the Moon and Asteroids, and not within the deep sea-bed: protecting Earth's Oceans by looking upwards!

Big Data servers in orbit, fuelled by solar power, moving massive power-hungry data centres off planet will contain the raise of the global electrical demand on Earth[23].

SRI underlines the importance of making sure that all countries, even the not-yet-spacefaring ones, have equal opportunities to join in and participate in the incoming cislunar economy, the Earth-Moon economic sphere, ensuring the necessary support for capacity building.

On objective 3, about leveraging the potential of space for inspiring young people, SRI fosters the teaching of the history of altruism and compassion, as opposed to the history of violent wars. Expound the histories of those who were dedicated to the progress of humanity, scientists, philosophers, artists. Inspire the interest of young people in humanistic sciences and disciplines, since these attributes are fundamental in space development, and have an equal consideration with technical matters. Where the Agenda just promotes space exploration as a long driver of innovation we propose to complete the statement: *"Enhance space settlement and further human exploration…"*. Where the Agenda just promotes space exploration beyond low Earth orbit, we propose: *"Promote settlement, industrialization, and further exploration beyond low Earth orbit…"*[24]

Not only capacity-building, education and training in space science and applications should be enhanced. Space philosophy and related humanistic disciplines should have the same consideration and priority, for both space-faring and non-space-faring countries[25]. Using knowledge from developing countries agriculture and water management for space applications and education will enhance the space know-how culture, and give to the new entries a reason to be proud of.

SRI also proposes that UN should work with member states to evolve the general education systems world wide[26]: *"Foster a better comprehension of the roles of space science and technology, using facts to rectify misconceptions widely present in popular culture, adding the history of space science in all schools, promoting the history of the progress of humanity, rather than the history of violent wars, and explaining how civilian space advanced technologies replace military outlooks as a fundamental support of advancements in the aerospace industry."*

As far as Near Earth Objects (NEOs) are concerned, SRI proposes a policy that's not limited to the necessary defense from potential killer asteroids and comets. Humanity needs to start mining and using such resources for building space infrastructure[27]. Asteroids might even be engineered into supply bases or habitats really utilize what's out there and for international cooperation strengthen.

Where the Agenda indicates the need to address the obstacles that impede the implementation of the Space2030 Agenda, and to strengthen international multilateral and bilateral cooperation in the exploration and use of outer space for peaceful purposes, SRI wants to better specify *"…cooperation in the settlement, industrialization, further exploration, and comprehensive use of outer space…"*. Also, we propose the following reference, for the sake of weapons banning in space: *"Uphold and encourage fully globalized settlement agendas through the pursuance of the PAROS mandate and the ban on space weapons."*[28]

On Objective 4, about safety and sustainability, SRI wants the UN to *"Acknowledge the deep anthropological momentum, moving from space exploration to space settlement[29]. Promote all requisites to protect human life in space. Enhance the priority of scientific research for protection against solar and cosmic radiation. Promote urgent experimentation with simulated gravity. Promote the research of plant species ensuring green environments in space habitats, and a healthy environment for space citizens. Promote research, testing, and deployment of AI-driven health systems, including behavioural monitoring and tele-psychiatry avatars, to support human adaptation and well-being in long-duration missions. Platforms like ISPS-VETA (Integrated Space Psychiatry System – Virtual Embodiment Tele-Psychiatrist Avatar) and multi-omics profiling initiatives should be endorsed and supported across analog and orbital missions. Establish an international telemedicine and biosensor infrastructure, incorporating frontier technologies such as wearable AI diagnostics, remote robotic surgery, and personalized omics platforms. These will ensure rapid intervention capabilities in space environments lacking immediate human medical responders."*[30]

SRI proposes an addendum:

"23.Bis. An essential plan for kicking off civilian space development should include the following steps, at a minimum:

1. Recovery and reuse of orbital debris, to produce fuel in space and build space infrastructure[31]

2. Use Moon and asteroid resources for the same objectives

3. Accelerate research for the protection of life and health from sun and cosmic radiation
4. Start experimenting with simulated gravity[32]
5. Accelerate research to select, and eventually modify, plant species to implement green environment in space habitats
6. Promote the design and production of fully reusable, safe, and ergonomic space vehicles, for passengers and goods transportation
7. Support the space tourism industry, vehicles, logistics and accommodation infrastructures, on Earth and in space."

We also propose to *"Allocate dedicated resources for the establishment of a Space Health Task Force and an International Academy for Space Medicine and Ethics, enabling a unified global education and clinical infrastructure for space crew health and safety."*

The thematic priorities

UNISPACE+50 defined 7 thematic priorities:

1) global partnership in space exploration and innovation (thematic priority 1),
2) current and future perspectives of the legal regime of outer space and global governance (thematic priority 2),
3) enhanced information exchange on space objects and events (thematic priority 3),
4) an international framework for space weather services (thematic priority 4),
5) strengthened space cooperation for global health (thematic priority 5),
6) international cooperation towards low-emission and resilient societies (thematic priority 6)
7) and capacity-building for the twenty-first century (thematic priority 7)

TP 1, 2, and 7 are generic, missing samples, the other are arbitrary choices, cutting off many other priorities.

We want to expand the thematic priorities, adding 10 more TMs, making 17 total:
"To the seven thematic priorities identified by UNISPACE+50, ten more thematic priorities are added, and the whole list is resorted as follows:

1) global partnership in space settlement, innovation and further exploration (thematic priority 1),
2) current and future perspectives of the legal regime of outer space and global governance (thematic priority 2),
3) an international framework toward supporting research for life and health protection in space, i.e. protection from cosmic radiation, simulated gravity, green environment in space habitats (thematic priority 3),
4) an international framework for supporting state members to adopt space-friendly policies, grants, financial aids, and fiscal discounts to the civilian space industry (thematic priority 4)[33]*,*
5) enhanced information exchange on space objects and events (thematic priority 5),
6) an international framework for orbital debris recovery and reuse (thematic priority 6),
7) space resources utilization, financial and legal aspects (thematic priority 7)[34]*,*
8) an international framework for space traffic management services (thematic priority 8),
9) international cooperation toward fair and equitable coordination of the geo-lunar space industrialization initiatives (thematic priority 9),
10) an international framework for space weather services (thematic priority 10),
11) an international framework to coordinate the Cislunar communication network (thematic priority 11),
12) an international framework to support and harmonize civilian space industry and commerce (thematic priority 12),
13) strengthened space cooperation for global health (thematic priority 13),
14) international cooperation towards low-emission and resilient societies (thematic priority 14),
15) capacity-building for the twenty-first century (thematic priority 15)
16) ethical AI deployment and biosensor governance models for autonomous agents in off-Earth missions, focusing on transparent, inclusive, and non-exploitative use of medical data (thematic priority 16)
17) an international framework for astronaut health and analog testing, including long-duration adaptation, space pharmacology, mental health systems, and the integration of multi-omics research in simulated gravity and radiation conditions (thematic priority 17)"

UNOOSA and COPUOS to achieve a very much larger visibility

Considering the huge epochal task that our historical age assigns to UNOOSA and COPUOS, SRI urges to increase the budget and available funds for the UN Space Branch. The following amendment was proposed:

"Paragraph 29. The Secretary-General is urged to consider the sufficiency of resources provided to the Office for Outer Space Affairs in its role as secretariat to the Committee on the Peaceful Uses of Outer Space and its subcommittees, and to ensure that the Office can fully and effectively implement its mandate, including capacity-building activities for Member States in the field of space science and technology and their applications, as well as in space law and policy, taking into account the "Space2030" Agenda and implementation plan. *The budget assigned to UNOOSA and COPUOS should be increased, allowing the Office and the COPUOS to develop an extensive public campaign, raising public awareness of outer space activity as the primary and key factor of sustainability. Such a campaign should emphasize the urgency of kicking off civilian space development by 2030. The ensuing and upgraded 2030-2050 U.N. Space Agenda will be critical in establishing the parameters of our future world. Emphasis on global collaboration and fair competition for space settlement, together with the proposed ban of weapons in space will orient human society towards peaceful and productive legacies.*" (in italic the text suggested to be added).

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