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## “SPACE 4 ALL, SPACE 4 PEACE, A SPACE 18<sup>TH</sup> SDG FOR THE 2030 U.N. AGENDA”

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### Abstract

Our civilization is besieged by many global crises, such as pandemics, climate changes, and economic crises, just to name the main ones. Instead of uniting our efforts to go over, the primitive practice of war – the state’s legal murdering – is expanding to the whole planet Earth. Humanity is not driven by the best practices but by the worst ones. Governments complain about the lack of financial resources, but they spend 2 \$trillion/year on military expenditure, and that will get worse, considering the continuous rise of new wars. Old imperialist strategies – already and many times condemned by history – are raising their backward head once again over the sacrosanct right of all peoples to self-determine their future and how they want to govern themselves.

In 2015, the United Nations delivered an Agenda of Sustainable Development Goals, 17 SDGs to be achieved within 2030. The agenda includes social, environmental, and methodology goals. Achieving such goals would resolve many global issues, eliminate the reasons for conflicts and wars on Earth, and restart the growth and development of civilization. Yet, should our development restart inside the boundaries of Earth’s atmosphere, industrial growth would conflict with the environmental goals. Furthermore, any tentative to restart growing within the limits of Earth immediately drives to conflicts – now dramatically heading to a global war – to grab the scarce resources, remaining on our mother planet.

Space development is a strong factor of peace and a true alternative to war, maybe the only one, nowadays. From an anthropologic point of view, collaboration among scientists from different Countries on the ISS, even during hard confrontations on Earth’s surface, represents a clear example of enhanced more evolved human relationships. As Frank White pointed out, the Overview Effect experimented by many astronauts while observing our planet from

orbit shows us that there are no physical borders among countries. Borders are nothing more than conventions, which may be overcome, in a more advanced and broader vision of the world, in a Solar System Society.

Only by expanding the domain of life into space can we fulfill the 17 SDGs, and a free peaceful development in the long term. Since 2015, reusable rockets have dramatically decreased the cost of transportation from Earth to orbit. Such a process is paving the path toward civilian space development. 2015 can be identified as a “turning point” in history, signifying a change of paradigm, from “traditional” aerospace to a “new space” age. The U.N. 2030 Agenda needs to be updated. Therefore, the Space Renaissance International and the National Space Society, in partnership with 90 space organizations, have kicked off a worldwide campaign, working with UN COPUOS State Parties to develop and introduce a resolution for a **Space 18th Sustainable Development Goal (SDG)**, calling for the expansion of communities into space, to achieve universal and sustainable development for the whole humanity, and all the other living species, on Earth and Beyond.

This paper describes the rationales supporting the Space 18<sup>th</sup> SDG, the expected outcomes, with a particular focus on peace, and the practice used by the promoting Coalition, to outreach large public opinion and to get the necessary consensus, appreciation, and mobilization for success.

### THE POLITICS OF WASTING RESOURCES, THE ENVIRONMENT, AND HUMAN LIVES

The syndrome of the closed world is showing its worst effects on the human psyche. Notwithstanding 50 years of warnings about the cumulative environmental damages caused by insane waste management, we allowed microplastics to invade the whole earthly biosphere, just to mention one of the

worst pollution cases. We shouldn't blame our parents and grandparents: they have done their best, to make the human condition improve, and give us a better world. Our parents and grandparents should be honored forever for their hard work. There were no scientific means to understand, up to a certain point in history. Mistakes are the way progress advances. Yet, it is a duty to learn from mistakes and apply the due corrections. That's what our leaders have not made, for many years, after the damages were evident. We kept on consuming the resources of this planet as if they were infinite. But of course, the key resources of this planet, such as water, ground, air, and biological life-sustaining systems are not infinite. Though the Earth's ecosystem is a fantastic recycling self-regulating machine, we cannot expect Mother Earth to do her job forever, for any number of children, *for any number of humans* on her surface. After the number of humans on this planet exceeded the psychological threshold of 8 billion, a taboo has begun to waver: the awareness that there are too many of us in the world is now allowed to be mentioned in the large mainstream narration. Does it mean that our general philosophy is finally moving toward an open vision of the world? Not at all! The concept of "being too many humans in the world" is just a first, primitive, sight of awareness. We should step forward, to the concept of "being too many humans on one only planet". So far, the popular meme says that "we don't have planet B". Should our understanding remain at this primitive level, the "logical" reaction (for our *one-move-chess-player* leaders) would be to decrease our number, to re-enter in a sustainable size.

In fact, we have witnessed serious opinion leaders applaud the pandemics, that's doing part of the dirty work: reducing the number of humans. Of course, pandemics will not be enough, unless a true billions-killer one will arise. To really achieve the goal, of reducing humanity below 4 billion – the population size considered sustainable by scholars in demography and sustainability<sup>[1]</sup> – another kind of monster will be needed, nothing less than a global nuclear war. Unfortunately pursuing such an anti-human crazy goal is very much easier than conceiving projects to support human development, in the age of increasing difficulties. It is enough to allow the existing noxious social vectors to go ahead as they are already doing, and the big war is already working to connect its various fires to ignite the big fire. The world was spending 2 \$trillion per year on weapon systems. The global military expenditure increased by 9% in 2023, reaching 2.2 \$trillion. The forecast for 2024<sup>[2]</sup> is near 2.4 \$trillion. Many earthly governments prefer to prepare for fighting instead of negotiating for peace. They opt for spending 2.4 \$trillion of money given by their citizens, not to improve their lives, but to kill

many of them! With the same amount of money or even a modest 20% of it, many global issues could be routed to a solution, including a robust plan for industrializing the cislunar space region. How can such crazy governance be explained?

In a recent newsletter<sup>[3]</sup>, A. V. Autino mentions the issue of the birth rate falling, in many "advanced" countries. If considered locally, that is a big problem, making the retirement systems unsustainable, due to a lowering number of active workers. "*An elderly society weighs more on the state's resources, due to increasing public expenses on health systems, in addition to all the negative effects an aging society has on innovation, education, culture, and shrinking markets.*" Each local government tries to restart its demographic growth while thinking that, globally, humanity should decrease. The logic is primitive (LOL): humans have made a mess on this planet, and they should decrease, but we (our nation, or ethnic, or religious group) are the best, therefore others, not us, should decrease. As written in the quoted newsletter, such "logic" leads to belligerent confrontation, not to collaboration. However, governments may keep on showing themselves coherent with their oath of office, to nominally defend the interest of their *own* people. But there's a "small" detail, to be considered: war is never in the interest of any people. And any war fired in a situation like the current one may be compared to having a barbecue in a dense forest during a long drought. Where is the benefit for citizens, in whatever corner of this planet?

Still quoting from the above-mentioned article "*Any politician thinking like a one-move chess player, and not considering how their decisions will impact human lives in the middle and long term, should be discarded as soon as possible. One-move players will not have any chance of winning a chess tournament, so why should they win elections? But, sadly, they keep on winning!*". It means that we don't have only a problem of psychopathic leaders. The problem is more deeply rooted. It is a philosophic lack of sane humanist concepts. If we start thinking in the interest of all humans – and not in the interest of a "nation" or an abstract a-numeric "humanity" – everything becomes clear. Humans, with their thinking brains, know-how, and innovation capabilities, are a richness. 8 billion of humans is the greatest richness ever achieved before. We cannot afford to waste lives anymore, because our next evolution step requires our whole human patrimony, and maybe more. Also, we should stop wasting resources in fratricidal fights. Those resources should be redirected to more worthy goals, as soon as possible.

Should we then hope for some sudden miracle, swiping away the war attitude from the face of the Earth? Well, why not, if possible... Yet, we need a

plan B. In fact, there is something we – namely the space community – can do. It is what we're already doing, with some small but meaningful needed corrections, and putting more effort into it.

### SUSTAINABILITY, DEVELOPMENT, AND PEACE: WHICH RELATIONSHIP?

There's a strict connection between development and peace. All peoples of Earth aspire to social growth, prosperity, improved living conditions, and a future for their children. According to the brilliant analysis done by Amartya Sen<sup>[4]</sup>, the rise of global information – since many decades enabled by satellite communication technologies – made all people, even in the most lost and hidden corners of the planet, aware of the huge social differences existing between developed and underdeveloped countries. Before the advent of global information, many people in poor countries believed that the social situation in the whole world was similar to the one in their own country. After the reality began to circulate, people started to feel that their social development was blocked. Reactions are different: emigration, rebellion, or becoming available for war adventures, in the absurd hope that it was possible to achieve development through violence, to the detriment of some other nations, seen in some way as responsible for their underdevelopment.

The failure of industrialized societies in helping a process of industrialization in poor countries has a great responsibility in the persistence, in some of those countries, of a general willingness to use war to resolve conflicts and contrasts of interests. As a blatant sample, a Western coalition has occupied Afghanistan for 20 years, yet they neither tried to seed the growth of an industrial society in that country. Any tentative to seed democracy, in the absence of an industrial economy, has been demonstrated totally ineffective. Democracy and the industrial economy are very much connected and interdependent. Such an anthropological paradigm is a cultural knowledge that was not yet achieved, by the Western post-industrial leaders. Furthermore, the importance of the industrial society was not truly understood, considering that a general willingness to trash important industrial segments is rising everywhere. Typical *one-move-chess-player* policies, dictated by an immature method of reacting to damage by applying the opposite behavior, in a permanent emergency management, without thinking about the consequences, and without a due trade-off among different solutions. Western countries operated in Afghanistan on the basis of at least two wrong concepts: a) that democracy can be exported and imposed by weapons and b) that the poor countries should be “educated” to become consumers,

but not producers, of industrial goods. A short-sighted and greedy fear of breeding new competitors is also in the background of such policies.

It should now be clear – as it was already too many times demonstrated – that the lack of an industrial society is the main reason that makes people available to be pulled into war ventures and to keep on following despotic tyrants. Helping poor countries to develop an industrial society is the only way to contribute to the establishment of long-lasting peace worldwide. Not only. Multiplying the number of industrial producers will lead to a larger market, and more business opportunities for everybody: the poor will become wealthy, the wealthy will become rich, and the rich will become richer! The United Nations' SDGs 7, 8, and 9 (Energy, Economic Growth, Industry Innovation) may resolve global issues, eliminate reasons for conflicts, and restart civilization growth.

Everything fine, then? NO, wait... Planet Earth does not offer enough resources to allow such a general growth of new industries, and the environment cannot support it as well. If conned inside the boundaries of Earth, industrial growth (SDGs 7, 8, 9) would conflict with the environmental goals (SDGs 13, 14, 15). Furthermore, restarting growth within the limits of Earth immediately drives to conflicts (now dramatically heading to a global war), to grab the scarce resources remaining on our mother planet.

To resolve the equation of Peaceful Sustainable Development for 8 billion citizens, the advanced countries hold a big responsibility. Not only do they have the moral duty, and the full convenience, to help the emerging countries to develop an industrial society. They also have a huge responsibility to help them to develop a space industry and to facilitate their evolution into space-faring countries, offering opportunities to join the incoming cislunar economy, and to develop the key factors of civilian expansion into outer space – reusable, low-cost, safe, and ergonomic space vehicles, lunar and asteroid mining, producing fuel in space, orbital debris reuse, space tourism infrastructures, protection from cosmic radiation, simulated gravity, growing food and green environment in space habitats, just to mention some of the main scientific challenges.

### CIVILIAN SPACE DEVELOPMENT, THE STRONGEST FACTOR OF PEACE

Civilian-led Space development is a strong factor, maybe the only true alternative, to a ferocious fight for scarce terrestrial resources.

#### End of Resource Wars

We refer here to a recently published position paper by Space Renaissance International<sup>[5]</sup>: “There's an eternal common misconception, that humans are bad

in their nature and that thousands of years of evolution haven't changed and will never change that very basic animal behavior." According to humanist philosophy, "when humans have enough resources and space to develop in peace, only psychopathic characters will stick to using violence. Why the heck should we prefer to fight and kill to get what we can have in peace? Very much better to have fun, well-being, and love, than to have corps, destruction, desperation, and hate!"

The only way to get abundant resources is to adopt an expansionist strategy. For the first time in history, humans have the possibility to expand without stealing the ground to anybody, in the Solar System! Space is open to the peaceful use of enormous abundant resources. Such a condition represents a formidable opportunity to enhance and pursue universal peace, with full freedom for all the peoples of Earth.

Quoting from the already mentioned paper: "Achieving the immense resources of the Solar System will decree the obsolescence of the reasons for resource wars on Earth. [...] Technological advances have often progressed in history thanks to war efforts. This is not the case, in the 21<sup>st</sup> Century. The world is appalled and dismayed by the rise of conflicts at the boundary of Europe – Ukraine and Palestine. The global economy is depressed. Even worse, the creativity of the good willing people of Earth is frozen by the backward violent strategies pursued by ramping immature political leaders."

Wrote Patrick Collins and Adriano Autino, in their paper<sup>[6]</sup> presented at the Plenary Session of the International Academy of Astronautics' 1<sup>st</sup> Symposium on Private Human Access to Space, at Arcachon in France, in May 2008: "The major source of social friction, including international friction, has surely always been unequal access to resources. People fight to control the valuable resources on and under the land, and in and under the sea. The natural resources of Earth are limited in quantity, and economically accessible resources are even more so. As the population grows, and demand grows for a higher material standard of living, industrial activity grows exponentially. The threat of resources becoming scarce has led to the concept of "Resource Wars". Having begun long ago with wars to control the gold and diamonds of Africa and South America, and oil in the Middle East, the current phase is at the center stage of world events today. Other resources are nowadays gradually replacing oil, while electric mobility tries to trash fossil fuels. However, the needed materials – rare earth metals, used in smartphones, computers, and advanced technologies – are even scarcer than oil on Earth and are already a cause of resource wars. Btw, rare earths are present on the Moon, including scandium, yttrium, and the 15 lanthanides, according to research by Boeing<sup>[7]</sup>. Metallic asteroids<sup>[8]</sup> are primarily iron and

nickel, but can contain rare metals like platinum, gold, iridium, palladium, osmium, ruthenium, and rhodium at concentrations several times higher than what is found on Earth."

A general and global disarmament is very much needed.

#### Trashing many jobs? Trashing the military culture?

The whole weapons industry may be reconverted into a civilian astronautic industry, without losing any jobs, but incrementing employment, both on Earth and in Space. Many technologies used for military purposes are also used for space – the so-called "dual use". Often the same company is a supplier of weapon systems and space systems. With the quick development of the space sector – that is already happening – these companies would simply experience growth of their incomes from the space market, compensating for the downsizing of the military part of their turnover. These companies will experience an evolution, from working for death to working for life.

As far as soldiers, officers, and military infrastructures are concerned, we observe that they will have however reasons to remain and to evolve into some more worthy function, though conserving some of their anthropological characters. Also in this case, we are talking about some functions already covered in the military tradition. Just to make a few examples: humanitarian aid in situations of natural disaster, protection of people in danger, rescuing shipwrecked people, police duties and maintaining public order, management of emergency situations. In any emergency situation, the military culture is of great aid. When time is of matter, to save lives, military people understand the relevance of obeying the commands of experienced and responsible officers: first, execute the command, and then – when there is time – ask for explanations as to why that command was essential to survive.

#### The overview effect as a new romantic vision of brotherhood

In September 2023, Annahita Nezami has written<sup>[9]</sup>: "The 'Overview Effect,' coined by space philosopher Frank White, encapsulates the extraordinary experience of witnessing our home planet from space. This perspective, as revealed through interviews with astronauts, bestows a unique psychological signature. Astronaut diaries, interviews, and autobiographies consistently narrate a profound sense of interconnectedness with all life, a transformative shift in self-perception, and a renewed sense of purpose. Sigmund Freud termed this subjective interconnectedness the 'oceanic feeling,' signifying a sense of eternity and unity with the natural world. While only a little over 630 people have had the

privilege of this unique encounter, many of us can relate to feelings of awe and reverence when encountering terrestrial natural wonders like a tornado or the Grand Canyon from afar. The 'Overview Effect' embodies the epitome of such experiences.”

Said Apollo 11 astronaut Michael Collins: “Seeing the Earth from a distance has changed my perception. The pity of it is that so far the view... has been the exclusive property of a handful of test pilots...rather than the world leaders who need this new perspective... or the poets who might communicate it to them.”

Write Frank White and Charles E. Smith, in their pamphlet “Bringing the Overview Effect Down to Earth”<sup>10</sup>: “The Overview Effect is an experience that has been reported by astronauts and cosmonauts who have traveled into Low Earth Orbit or to the moon. There are many aspects to the Overview Effect, but at its most basic level, it represents a cognitive shift in which one sees the Earth as a planet moving through a star-filled universe. For most, there is also a realization that there are no borders or boundaries on this planet, except those created by human beings. Many of these space travelers returned to Earth with an altered point of view about possibility, collaboration, and the future of our species. Some of them considered the experience to be transcendent and life-changing.”

White's astronaut interviews confirmed the importance of the difference between intellectual knowledge versus experience, of perceiving the "striking thinness of the atmosphere", of thinking of ourselves as interconnected and part of the Earth as an organic system, and that we as different people "are all in this together".

Though it is worth sharing this view with as many people as possible, as soon as possible, the effect is not the same: being there is different. No visual reproduction, including virtual reality, will render the emotion of being there, with the void of space and the black sky full of stars all around, the solitude, and the magnificent mysterious universe watching us, stupid insignificant fragments of living matter, killing each other a few hundred kilometers below.

People in space, disregarding if a few dozen or many thousand or millions, are maturing a new concept of belonging to the same species, that was presumptuously called “human”. A new brotherhood and a new romanticism, that will reject any idea of killing each other. Living in space, humans will do their best to become 100% humans.

#### Collaboration in space, a long-lasting experience of best practices

Affirmation of peace, on Earth, is directly proportional to the number of people who will see the

Earth from space. Or, better, as Michael Collins said, the number of political leaders who will travel in space.

Should these leaders remain here, on the bottom of the Earth's gravitational well, their vision would be subject to the current suffocating war climate. They could even try ordering astronauts into orbit to kill the “enemy”. Not sure they will be obeyed.

The annals of space navigation, so far, tell us a different story. A story of collaboration and friendship. In his book “Endurance”<sup>[11]</sup>, Scott Kelly writes about eating and drinking together, Americans, Russians, Italians, and a lot of people coming over there from different countries, without any difference among allies and non-allies. Share their food, happy to make it taste to their colleagues, smiling at the same jokes, being happy and proud to be there, alive together, in that small outpost at the border of the infinite. Not a military outpost, but a living cell, expanded into the Solar System.

During the many years of the ISS service, several critical moments occurred: technical failures, loss of life-sustaining cargos, and insufficient air recycling performance when 10 or more people were onboard, just to mention the most common issues. Not always the relationships on the ground were optimal, but nothing could change the collaborative atmosphere onboard. Btw, often the astronauts and cosmonauts are not only scientists, they are military, too. Yet their sentiments never have fallen below the level of civil coexistence and affectionate collaboration.

Five space agencies representing 15 countries operate the ISS. Five space agencies including NASA, Roscosmos, ESA (European Space Agency), JAXA (Japan Aerospace Exploration Agency), and CSA (Canadian Space Agency), have contributed to the station's assembly. The Space Station Intergovernmental Agreement (IGA), is an international treaty signed on January 28, 1998 by 15 governments: Canada, Japan, the Russian Federation, the United States, Belgium, Denmark, France, Germany, Italy, The Netherlands, Norway, Spain, Sweden, Switzerland, and the United Kingdom). The IGA is a long-term international cooperative framework on the basis of genuine partnership, for the detailed design, development, operation, and utilization of a permanently inhabited civil Space Station for peaceful purposes, in accordance with international law. Several legal layers (Memoranda Of Understanding) regulate relationships between the partners. NASA is the designated manager of the ISS. The MOUs are used to describe the roles and responsibilities of the partners in more detail.

Such a complex and articulated system of interdependent agreements has worked perfectly for 26 years, from the very first modules assembled in orbit, in 1998. The ISS may be identified as a case of best

practice, for peaceful collaboration in space. Its methodology should be taught in school, and adopted to solve collaboration issues on Earth as well. It is clearly one of the cases in which the experience matured in space may have relevant use on Earth too.

### THE SPACE ECONOMY IS GROWING FASTER THAN EXPECTED AND IS LEADING OUTSIDE

“Space technologies can tackle many of the world’s most pressing business and societal challenges.” This stunning assessment is written in a report by the World Economic Forum and McKinsey & Company<sup>[12]</sup>. Lower costs and improved access to space-enabled technologies could take the global space economy to \$1.8 trillion by 2035, up from \$630 billion in 2023.

The key findings of the report are clear and enlightening. Freely abstracting from the document: “*Space will be a larger part of the global economy by 2035. The space economy will grow 9% /year, which is above the growth rate of global gross domestic product (GDP). Space’s impact will increasingly go beyond space itself.* Satellite-based technology will benefit a growing variety of non-traditional players, on Earth and beyond, which would never have reached the global scale they have without. *Space will become more about connecting people and goods: supply chain and transportation; food and beverage; state-sponsored defense; retail, consumer goods and lifestyle; and digital communications – will generate more than 60% of the increase in the space economy by 2035. In addition, many other industries will see space-related revenues reach several billion dollars – creating opportunities for traditional and non-traditional players alike. Space’s return on investment will be more than financial.* Beyond revenue generation, space will play an increasingly crucial role in mitigating world challenges, ranging from disaster warning and climate monitoring to improved humanitarian response and more widespread prosperity. Collaboration between public and private players will be key to ensure that space capabilities reach this potential. Public sector investments continue to broaden, with countries such as Japan, Peru, Saudi Arabia, and Thailand all investing in space initiatives and India becoming the first to land a spacecraft near the lunar south pole. Meanwhile, private sector space investments continue to drive innovation and access in areas such as in-orbit inspection, maintenance services, and commercially funded space stations, while non-space private sector partnerships with space players are also expanding.”

The report also quotes some meaningful statements, about the leading role of outer space activities. Nobu Okada, Chief Executive Officer,

Astroscale: “In-orbit servicing is central to a thriving space economy, fostering a safe space environment and sustainable infrastructure. It achieves this by facilitating essential activities such as active debris removal, refueling, life extension, and inspection. Furthermore, it serves as a catalyst in shaping the future of space, unlocking the potential of a circular space economy, and expanding possibilities.” Takeshi Hakamada, Founder and Chief Executive Officer, of ispace: “There is no doubt that the expansion of space-based infrastructure in the next decade will contribute to many important economic activities on Earth. As infrastructure around the Earth expands, the ecosystem in space will expand to include the Moon, cis-lunar space, and beyond, enabling access to deep space and space resources.” Kalyan Kumar, Global CTO, HCLTech: “Similar to the early days of the internet, the true impact of space technologies will extend far beyond the realm of space itself. We are on the cusp of a revolution where space-based applications will permeate diverse industries and economies, creating unprecedented opportunities for growth and societal advancement.”

### A meaningful revision of the conservative Morgan Stanley’s forecast

The forecast issued by the WEF’s report marks a meaningful revision of a forecast advanced just a few years ago, talking about a \$1 trillion worth of space economy in 2040. Space development is accelerating, and new countries enter the space race each year, aiming directly at the most updated technologies.

The space economy – according to many forecasts – will grow mainly in the frame of the so-called downstream technologies. Yet, there’s an incoming new sector, that will become a giant dealer in the next decade: the cislunar economy. As the economy forecasts were constantly delayed, concerning the true threads of the space economy, nowadays they are mostly under-evaluating the upstream – civilian space development. In 2011, when NASA’s space shuttle was retired, the main economic analysts were talking about the end of space exploration: “Inner space is useful. Outer space is history” titled *The Economist*, in a (in)famous editorial<sup>13</sup>. Yet, Elon Musk was already working on reusability, and Falcon 9 was just around the corner. Financial analysts – and banks – only work on *bankable* projects, and don’t care about innovation. Yet, innovation was the constant paradigm, during the last centuries, and even more during the last decades. Multiple crises have not stopped the progress, so far. SRI, as a philosophic association, only bases its reasoning upon innovation, and analyzing the most progressive vectors. Definitely, during the last 70 years, at least, the most progressive space vectors aimed at space exploration, firstly, and space

settlement in a more mature stage. That is, definitely, *upstream*. Without aiming high, our civilization would be scrapped.

In 2021, the Congress Thesis of the SRI 3rd World Congress<sup>[14]</sup> dared to advance a forecast of a \$3.5 trillion space economy in 2040. SRI wrote that such a result would be possible only if civilian space development kicked off before 2030, taking the lead of the space economy, and of the whole global economy, i.e. only if the upstream development will take the lead. Otherwise, should the global economy only rely on Earth (and downstream technologies), not only the 2040 \$1 trillion space economy will not take place, but the whole global economy will sink into the vortex of the multiple crises grasping the world.

As reported in the recent “SRI position paper on the key critical issues before 2030”<sup>[5]</sup> Leonard and Williams, in their paper "Viability of a circular economy for space debris"<sup>[15]</sup>, prospect a net value of \$1.2 trillion for the space circular economy alone! “It is worth observing that such a figure is higher than the foreseen volume of \$1 trillion attributed to the space economy within 2040 or earlier by several specialists. It is reasonable to think that, if developed, the CSE-generated \$1.2 trillion would add to the \$1 trillion of the space economy. And likely, the combined outcome

of the orbital industry and CSE will be more than the mere sum; therefore, the forecast of \$3.5 trillion for the space economy in 2040 will not be unrealistic at all.”

The diamond edge of the space economy is and will be more and more the upstream

What is the meaning of all this? The big numbers of the space economy may still come from downstream technologies for some years. Yet the diamond edge of the space economy is and will be more and more the upstream, i.e. the cislunar economy, orbital industries, orbital debris reprocessing and reuse, lunar and asteroid mining, new commercial space stations, industrial settlements and orbital cities at Lagrange points, and all the related business, tourism, entertainment, sport.

The downstream technologies will keep on living and generating profits and social growth for all the peoples of Earth, only if the upstream – civilian space development – will keep leading and growing. More and more countries understand this paradigm and urge to enter the club of the space-faring countries.

What is the breaking news, in 2024? Economists are finally waking up, and recognizing the real trends: space economy is leading the global economy, i.e., without space development, there is no future at all.

Morgan Stanley's Space Team estimates that the roughly \$350 billion global space industry could surge to over \$1 trillion by 2040.

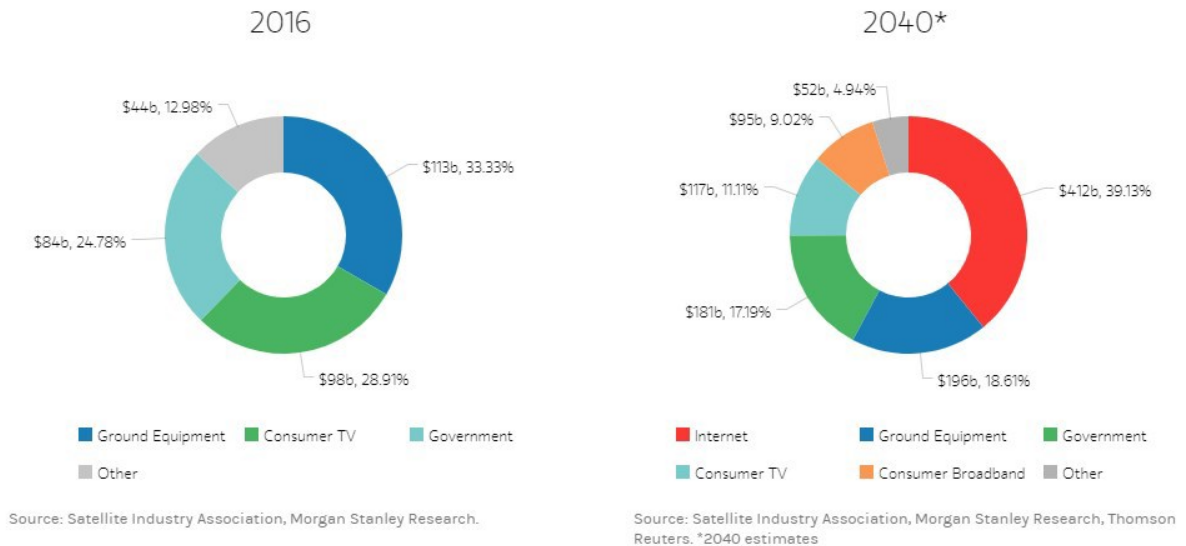


Figure 1. The Morgan Stanley Space Team 2016 estimation of space industry development to 2040



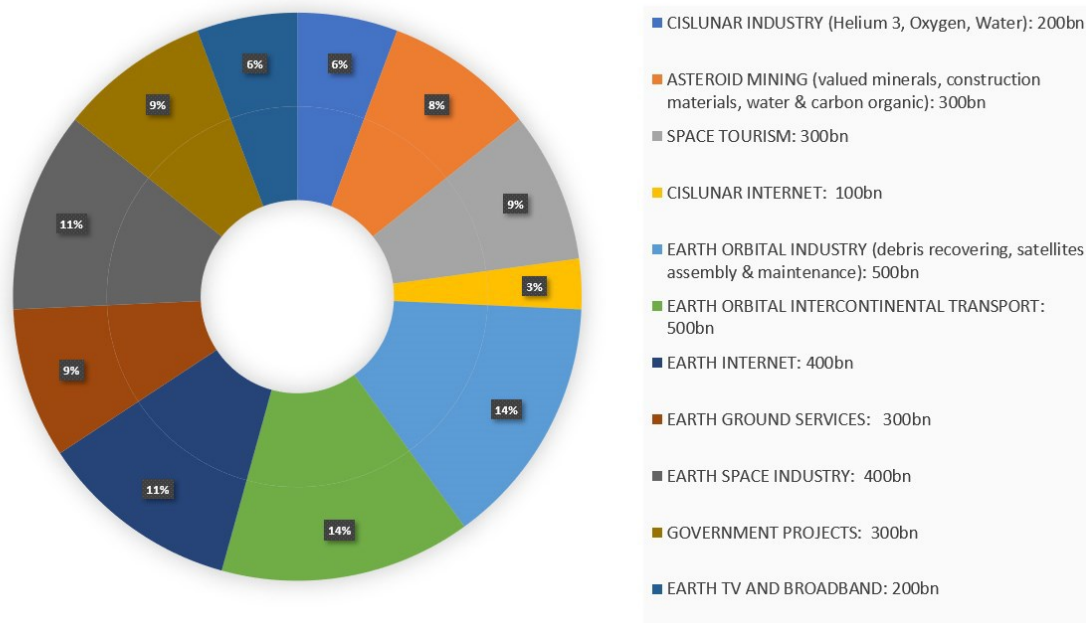


Figure 2. The SRI 2021 Forecast: Space Economy 2040, with Civilian Space leading Global Economy: \$3.5 Trillion

It is paramount important to acknowledge that the World Economic Forum – not a space advocacy visionary organization! – states the following: “New commercial ventures: Tourism and manufacturing. By 2035, new commercial activities such as manufacturing and tourism are likely to become possible and expand in space. Space tourism has been highly publicized for some years now, with some high-profile sub-orbital flights and industrial alliances. This might only be the tip of the iceberg. The growth of the space tourism industry will depend on several factors, including the capacity to accommodate people in orbit, regulation and legislation, and interest from end-users. In the base case for this report, the accommodation capacity remains a constraint by 2035, with limited launch flexibility to go up and down to the stations. Until 2035, the market size is expected to remain capped at around \$4-6 billion per year, with most of the space tourism revenues coming from in-orbit stays aboard space stations as ultra-high-net-worth customers purchase their space travel experience. Sub-orbital flights are expected to continue and become more financially accessible but will represent only a small share of the market (no more than \$1-2 billion per year by 2035). This baseline could increase significantly if a super-heavy launcher like Starship were leveraged for manned flights for larger groups of people making short stays in orbit. However, the growth potential will remain limited, with most individuals viewing a trip to space as a once-in-a-lifetime experience – thus limiting repeat visitor potential through 2035.”

Notwithstanding the prudent approach, the potential impact of fully reusable large space vehicles is finally considered, and the above statement represents a true acknowledgment of a great revolution, the greatest revolution in human history so far!

The downstream technologies will keep on living and generating profits and social growth for all the peoples of Earth, only if the upstream – civilian space development – will keep leading and growing. More and more countries understand this paradigm and urge to enter the club of the space-faring countries.

**ALL THE PEOPLES OF EARTH ARE STRONGLY INTERESTED IN SPACE**

The interest in space development is growing among all Countries. This trend is certified by the number of Countries that have founded a space agency in the last years, and the number of state parties that have joined UN COPUOS (the United Nations Committee for the Peaceful Use of Outer Space), including many Countries not having a space agency yet. Hereafter some data<sup>[16]</sup>.



Categories	Numbers
Number of space agencies in the world	84
Countries with launch capabilities	23
Countries with exploration capabilities	6
Countries with human space flight capabilities	3
Expected space agencies	29
Countries members of COPUOS (2022)	102
Countries members of ARTEMIS (July 2024)	43
Countries members of ILRS (2024)	12

Table 1. Figures representing the global interest in space

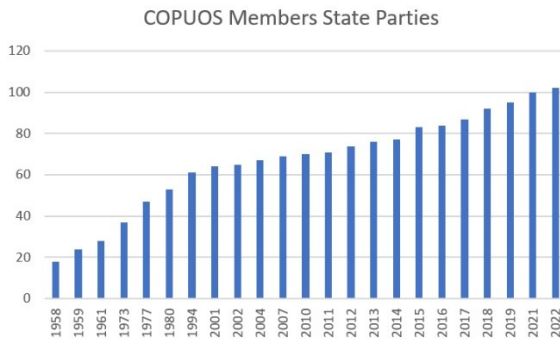


Figure 3. Evolution of Member State Parties at COPUOS

Interesting to note that 18 Countries members of COPUOS do not have a space agency, yet, neither have plans to found a space agency. However, they are interested in space.

Space represents a great opportunity for all the peoples of Earth, whatever the current status of the country where they used to live – *industrialized or “post”-industrialized, emerging, developing, underdeveloped, ...* None of the above definitions truly describe the real persons’ capacities, desires, projects, hopes, and expectations. New Einstein, Mozart, Marie Curie, Goddard, Ehricke, and Von Braun may have been born in any country, under any social conditions. If governments are not capable of bringing all the brilliant minds on board the human evolutionary effort, that will be a tragic failure, since we might miss that unique person who could make a difference, through his/her curiosity, ingenuity, desire to travel, raising their social status, meeting other people, loving, exploring this world and beyond. If their countries do not offer proper educational and industrial infrastructures, brilliant explorer minds will find ways to move away. So what is the really important concept? That nobody should be excluded a priori, just because living in a not-yet-spacefaring country. And the vital information shall circulate without limitations.

### The Permanent Space Revolution

India, Saudi Arabia, and Peru are leveraging their space programs. By investing in space technology, these nations are catching up with traditional space powers, aiming at economic diversification, improving their security, and pursuing technological innovation. Clearly, they are not only aiming at the traditional satellite market, but they are also targeting a competitive edge in the global arena. India is achieving remarkable milestones, burning several steps in the road to the high frontier, exemplified by its Chandrayaan missions to the moon and the Mars Orbiter Mission. These achievements have spurred further interest in commercial space. As reported by Simon Mansfield in a recent article<sup>[17]</sup>, “India's approach combines government backing with support for private enterprises, aiming to reduce costs and stimulate innovation”.

United Arab Emirates – not exactly a poor country, yet a fast emerging space-faring country for sure – has recently issued a law regulating space resources extraction, ownership, and exploitation<sup>[18]</sup>. UAE also launched, on 20 July 2020, its Mars mission "Hope Probe", which aimed to be the first probe to provide a complete picture of the Martian atmosphere and its layers. A clear goal to achieve a primary position in the new space contest, certainly not begging for a secondary place, at the tail end of the major competitors.

Other examples, reported by the previously mentioned article, are Saudi Arabia and Peru. Saudi Arabia aims to diversify its oil-dependent economy and develop a high-tech sector, by now in the traditional satellite sector. The Peruvian Space Agency’s satellites provide critical data for natural disaster management and rural education, ensuring that remote areas are not left behind in the country's digital transformation.

India is the first country to land near the lunar south pole. Its government-funded space technologies are on the way to commercialization and private companies are enabled to offer cost-effective space services. Japan is also pursuing a very advanced policy, promoting cross-industry collaborations, with Toyota developing modern lunar transport. The Hayabusa missions to the asteroid Ryugu testify a huge interest of Japan for asteroid resources. Thailand launched its first communications satellite and is planning to develop a domestic launch site to cater to Asian demand.

The worldwide Space Program is a beautiful opportunity for everybody, and nobody should be discriminated against. This is our meaning when we say “*Space For All*”. We don’t mean that space is bestowing a small handout to everyone, yet that space

is open for everybody, as a fantastic highway to social and cultural growth.

Traditional space technologies – namely telecommunication and remote sensing – provide invaluable help to all human activities on Earth. The global telecommunication network makes information available to all Peoples of Earth, an enormous anthropological evolutionary boost. People become more and more aware of the huge social differences among different regions of planet Earth, as a baseline to make plans for personal and collective beneficial social growth. Starlink and similar networks, connecting all peoples of Earth, make simpler and more affordable global communication and access to information worldwide. GPS helps navigation on the ground, sky, and sea. Earth observation helps agriculture, forest protection and management, monitoring disaster situations, forecasting the weather, understanding the global environment, understanding climate changes and global temperature trends, biodiversity, infrastructure, land use, and physical assets of all kinds. Earth observation also helps archeology and reconstruction of civilization's history.

Satellite technologies are a formidable aid for agriculture, and to prevent deaths due to geological, marine, or meteorological disasters. But that doesn't mean that the people living in not-yet-spacefaring countries are interested only in those space technologies, the so-called *downstream* space technologies, or that their interest in space should be limited to those technologies. If their economy is currently based on agriculture, that doesn't mean they should be peasant forever. A clear sample case is India, which passed from preindustrial status to developing space exploration capacities in a few years. Nowadays Indian researchers are first, in both advanced and emerging countries. The ongoing worldwide process may be called a *permanent space revolution*, characterized by an unequal and combined development. It means that emerging countries do not need to travel the long and arduous road previously traveled by the forerunners. They can profit from the experience established by the forerunners. In this process the space agencies and the connected research centers have a key role, as developers of the needed scientific and technology advance, and as communication channels, to support the efforts wherever they are, without borders nor any kind of barriers or cartels.

A useful comparison may be made with the evolution of telephone technologies, thanks to the cell phone revolution<sup>[19]</sup>. Emerging countries are having a clear benefit from accelerated technology deployment and adoption. It took years to develop cells and then years to fight against the entrenched legacy of hardwired telephones in homes. The hardwired fought

to keep cell deployment down. Meanwhile, nations that had no legacy phone systems at all had better and more flexible systems.

Last, but not least, a formidable opportunity is offered, to all countries of planet Earth, by the development of space tourism, in all of its forms. Spaceports for suborbital flights are already rising in many countries and spaceports for orbital and lunar travels may be arising soon as well. Such infrastructures, being devoted to civilian space flight, will also require the development of many related services in the neighbors, e.g. hotels, restaurants, entertainment, and sports settlements. A network of suppliers will also grow around, to provide food, and consumable goods, as well as technical and logistical services. Not to be forgotten, until when passenger space vehicles will not become fully ergonomic, a training period will be requested for civilian passengers. That will require astronaut training centers to flourish near the spaceports: another business opportunity for local entrepreneurs.

From “The Future is Now: Embrace the Opportunities of Space Tourism Entrepreneurship”<sup>[20]</sup>, a panoramic overview of the opportunities offered by space tourism: “The commercial space race has created a wealth of opportunities for entrepreneurs to enter the space tourism market. As companies like SpaceX, Blue Origin, and Virgin Galactic continue to develop their technologies and make space travel more accessible, the potential for innovative businesses to thrive in this new frontier is immense. Entrepreneurs can explore a range of possibilities, from creating innovative space travel experiences and accommodations to developing cutting-edge technologies that support space tourism. For example, companies could focus on creating virtual reality experiences that allow individuals to simulate the sensation of space travel or develop advanced life support systems for long-duration spaceflights.”

Any position oriented to “freeze” the not-yet-spacefaring countries into their current social status would be a chauvinist and condescending position. All peoples of Earth own capabilities to quickly develop their capacities, and enter the space race from the upstream door if they have persons desiring so. The demonstration of this paradigm is the many countries that joined COPUOS even before having a space agency! And by the many countries which are developing their own space agencies. And the countries who are forming the Caribbean and Latin America Space Agency, to join their efforts, expand into space, and use that effort to boost the social growth of their people.

The above concept was also brilliantly argued by Amartya Sen, talking about Globalization<sup>[21]</sup>, and fair sharing of global opportunities: “The confounding

of globalization with Westernization is not only a historical, it also distracts attention from the many potential benefits of global integration. Globalization is a historical process that has offered an abundance of opportunities and rewards in the past and continues to do so today. The very existence of potentially large benefits makes the question of fairness in sharing the benefits of globalization so critically important. The central issue of contention is not globalization itself, nor is it the use of the market as an institution, but the inequity in the overall balance of institutional arrangements which produces very unequal sharing of the benefits of globalization. *The question is not just whether the poor, too, gain something from globalization, but whether they get a fair share and a fair opportunity.* There is an urgent need for reforming institutional arrangements--in addition to national ones--in order to overcome both the errors of omission and those of commission that tend to give the poor across the world such limited opportunities. Globalization deserves a reasoned defense, but it also needs reform.”

Exactly: the not-yet-space-faring peoples must not be eternally kept in a position to beg for the crumbs that fall from the table of the rich, but they must be offered real opportunities for social growth and development.

#### Space for the post-industrial countries

If Civilian Space Development may be a great epochal opportunity for social growth in the pre-industrial world, the post-industrial world is looking to space as a key solution to relaunch a structural industrial development. During the last decades, the global economy appeared more and more based on the so-called “new technologies” – communication

devices and related network services – and, more worrisome, on self-targeted finance. Such processes, combined with the growth of automation in production processes, robotics, and artificial intelligence even in activities traditionally reserved for intellectual labor, are leading to a loss of jobs in all sectors. In addition, the relocation of productive manufacturing industries from industrial countries to emerging economies has contributed to the depletion of jobs in the so-called 1<sup>st</sup> world. Civilian astronautics, booming space tourism, and the building of infrastructures on the Moon and in the cislunar space will work as a formidable development engine, calling for many new jobs, startups, and commercial ventures. That will restart a robust structural industrial development.

#### A Space 18<sup>th</sup> Sustainable Development Goal

Humanity is facing the biggest challenge of all time, and the large majority of people is not aware of the urgency of kicking off Civilian Space Development before 2030. None of the U.N. 17 SDGs mention space as a factor of sustainability. The U.N. 2030 Agenda needs to be updated, to ensure a large understanding and consensus in the global society. That’s why the Space Renaissance International and the National Space Society, in partnership with 90 space organizations, have kicked off a worldwide campaign, working with UN COPUOS State Parties to develop and introduce a resolution for a **Space 18th Sustainable Development Goal (SDG)**, calling for the expansion of communities into space, to achieve universal and sustainable development for the whole humanity, and all the other living species, on Earth and Beyond. A key necessary condition for peace.

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