

Time to Open Hong Kong for the Business of "Space"

***A Technological and Commercial Tidal Wave is Coming, and
Hong Kong Needs to Be Prepared Now***

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I. Executive Summary

The world is entering an exciting and daring new space age. A new era of human spaceflight is dawning, and its ripples have reached the shores of Hong Kong. Satellites launched globally into orbit will quintuple over the next decade. Satellite data are inundating the cyber-world, searching for business models that can leverage them. The space industry is transforming and growing exponentially outside Hong Kong. The waves of wonder for Space that participating nations have started are forming into surges and tidal waves to come. This month, these waves have created a crescendo that is sending louder signals for Hong Kong to be prepared. It is time to wake up and connect the world's business of Space to Hong Kong.

- **For our youth:** Less endowed neighbours like the Philippines, Thailand, Malaysia, or even Korea initially faced a bias against the adoption of Space because it is irrelevant to most businesses, but they have welcomed "NewSpace" in the last five years. Hong Kong, blessed with a space-faring nation called China and surrounded by Belt and Road nations, can become a hub for Space commerce and complement their actions. Every second of delay in opening erases days of opportunities for our youths, for our start-ups, and for our industries.
- **Regaining connectivity:** Hong Kong has remained disconnected and non-engaging thus far. We must act now to arrest the disconnect and recover the new narrative in the commercial use of Space that is now presented to us. NewSpace can permeate and complement many of our solid sectors and expand the dimensionality of key pillars of HK -- from education to Space law to maritime logistics, to medical research on Space labs, to Parametric Insurance and finance (securitisation of Spacecrafts, for example), to broadcast and satellites, to sky taxis and delivery drones, and Space tourism. NewSpace expands and complements our key sectors.
- **Waking up to NewSpace:** New standards in the use and protocol of space data are being set worldwide, and Hong Kong needs to be at the table of discussion. Many in Hong Kong recognise the power and future of data but need to see how Space Data is the missing piece to becoming a Smarter City. Autonomous driving, IOT connectivity, or even Low Attitude Economy only work with an understanding of the Space Data Infrastructure that underpins these technologies. Therefore, a policy to study and integrate the NewSpace economy for Hong Kong is called for. This paper highlights some opportunities and risks that Hong Kong needs to recognise and be in a better position to rise above the clouds and biases of Space. It is time for Hong Kong to wake up NewSpace¹.

¹ NewSpace generally means the commercialization of Space and the involvement of the private sector.

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III. Introduction²

Space has been the closed realm of government. Namely, this was the playground of the US, China, and Russia. Since Hong Kong doesn't have a military tradition, we never grew akin to satellites and ground stations. Civilians and businesses did not get involved. Space is not easy to grasp for many adults, including parents and educators, and one assumption is that one must be well-versed in Physics and Math to qualify. Space was secretive and belonged exclusively to governments. Exclusivity is old thinking. Experience elsewhere has shown that bureaucrats who did not participate initially displayed a similarly cavalier attitude but quickly woke up when they could see the interlinkages in their present economic sectors. Government officials in Korea³, Taiwan, and even Mauritius⁴ saw the light, and by 2024, they established their new Space Agency to get things organised. Every nation has a boundary with Space and shares everyday surroundings with adjacent neighbours.

Hong Kong is immensely blessed. We have one of the most aggressive and far-sighted hinterlands in the world. Not only is China a Spacefaring nation, but she also now wants to see the commercialisation of Space⁵. This year, Beijing and Shanghai have called for a speedier commercialisation process.



² This paper is a set of "personal" observations and assessments of the recent situation and development of the NewSpace economy, which Hong Kong can potentially play a part in. There is a growing trend and, in my opinion, a narrative that Hong Kong's future is being marginalised internationally in NewSpace by mainly Western nations. The danger is that many in Hong Kong, not being introduced to NewSpace, need to be more sceptical, thus unprepared to capture new and exciting opportunities.

³ See this link about the establishment of the Korea Space Agency. <https://www.space.com/south-korea-space-agency-mars-landing-2045>

⁴ Mauritius relies on satellites to help monitor the ocean's health from which much of the economy depends. For more information, see <https://spaceinafrica.com/2024/04/15/new-space-for-mauritius1st-international-space-symposium-on-space-for-mauritius/>. The Taiwan Space Agency was reorganised in 2023 under the direct supervision of their National Science and Technology Council.

⁵ Both Shanghai and Beijing saw the need to commercialise the Space sector early this year. See <https://www.info.gov.hk/gia/general/202310/04/P2023100400578.htm>.

Hong Kong thus far remains largely noncommittal because those outside of the Space sector don't recognise the many signs of NewSpace. Many leaders are not cued into the possible development and opportunities or to the purposeful disengagement of increasing foreign Space players at the outset.

As we know, Hong Kong's economic pillars are shifting, and this new sector presents a huge and present opportunity. The danger is that this window that has opened is also rapidly being shut by some of our contemporaries. Once a rocket company is set up in Singapore, for example, there is less need to do so in Hong Kong.⁶ Critical issues in the supply chain, trade, talents, and many of our core strengths should be considered with the Western narratives. Hong Kong is not a player, and I fear we will soon be removed from the playing field. We need to step up in 2025.

IV. Background

This paper is divided into four sections: introduction, background, observations and interpretation, and suggested actions. I begin with some general information to help set the background for the readers who have generally not been exposed to Space or made aware of NewSpace.⁷

A. What is NewSpace?

Space has always been the remit and discussions only for governments and academics after 1957 when the first satellite by the USSR was launched. Companies and individual citizens do not get involved. However, that all changed in 2009 when the US government opened its doors to commercial operators like Elon Musk because entrepreneurship was the answer to NASA's many pressing innovation and quality issues. In 2014, the Chinese government followed suit and opened its doors to private companies. NewSpace was born, and it meant the business of Space – combining government, academia, entrepreneurship, and innovation. It wasn't just the participation of giant commercial companies like Boeing but also start-ups and, with them, the many venture capitalists and super connectors. Today, in 2024, Hong Kong remains one of the rare economic powerhouses that has yet to recognise or declare its policy on this matter. Singapore has, and so has Macau⁸.

⁶ Currently, from my personal travels internationally, I have noticed that Hong Kong is not being invited or represented (in the business of Space) at international space conferences.

⁷ Although many of my peers have contributed their views and educated me about NewSpace, the ideas in this report are my own and grew from my own biases. I dare not taint their wisdom with my biased perspectives.

⁸ Macau doesn't yet have an articulated policy but has many project initiatives with the Chinese Space Agency and the CNSA. <https://www.must.edu.mo/en/news/55518-article1204193507-e>

Crudely speaking, three business segments are behind the NewSpace sector. The first is the upstream market or getting things into Space. Rockets or launch vehicle systems would best represent this market.⁹ The second is the downstream market, where data from earth observations (called remote sensing) and solar observations are sent to ground stations.¹⁰ Hong Kong could play a part in the downstream, set against China's aggressive and highly successful space endeavours. The final segment would be the spare parts needed for equipment in the sky, which can potentially come from the world's factory in Shenzhen, mediated by trade experts in Hong Kong. Western countries have now begun building supply chains for the Cislunar economy, which generally refers to the supply chain for parts and spacecraft between the Earth and the moon.

B. A Longer-Term Vision for Hong Kong

Inevitably, any discussion about the future of Hong Kong must touch on the future adaptation and implications of the Space sector in Hong Kong. It is more a matter of when and not if. Interestingly enough, space touches on virtually all sectors of the economy because it fundamentally addresses the movement and processing of data across long distances. Without data, and we can all agree on this, there is no next economy. (A diagram by NASA on the future of Space development in the US provides a good overview. Please see *the Future Brought to you by NASA*)¹¹

Using old sectoral classifications, we have known that Space would underpin any discussion in maritime trade, in insurance as in disaster payout, in location as in GPS and Beidou, in broadcasting and international communication, and even of law as in the mediation over space activities¹². But these discussions are advancing, and sadly, outside Hong Kong.

What do we need to do to ensure the Hong Kong logistic sector can embrace and contribute to such discussions?

⁹ The cost of payload to Space used to cost about US\$ 10,000 for one kilogram. With re-usable rockets, that cost has come down to about US\$ 2000. This economic improvement was a key contributor to the new vibrancy of NewSpace. China aims to drop that to below US\$ 500.

¹⁰ With the power of AI, new patterns can be discerned. From identifying cracks in bridges to an impending landslide, satellites have become reliable early warning sensors.

¹¹ <https://unifiedpoptheory.com/the-future-brought-to-you-by-nasa-infographic/>

¹² For example, I recently attended a conference at the July 2004 SpaceTide Conference in Japan, I noted a discussion about maritime and logistics today. That discussion automatically involves sharing satellite logistics data seamlessly and instantly among the players.

V. Key Observations and Early Warnings

Risks and Opportunities Today in NewSpace for Hong Kong

Space is far, complicated, and highly risky. Comparison with investment into similar industries like the IT or computer industry cannot be realistically done as the assumptions underpinning the Space sector are different. Space investments are longer term, with many unknowns. Costs are excessive comparatively with planning cycles to demonstration, stretching into years. The Space environment remains a mystery, and the environmental conditions are unique. Space equipment is complex, moves at seven kilometres per second in its orbit around the Earth, is bombarded by solar radiations, and is remotely connected to the Earth with communications that can be hacked. Space investment often spans multiple partners and multiple jurisdictions, thus requiring lengthy negotiations and scale.

But the risk of disengagement is far riskier and, over time, would remove Hong Kong as a key player with the onset of the NewSpace economy. According to McKinsey and the World Economic Forum, the NewSpace Economy is growing, and by 2035, this planet should be looking at a US\$ 1.8 Trillion contribution to the world's economy. This report showed that lower costs and improved access to space-enabled technologies such as communications, positioning, navigation and timing, and Earth Observation services could take the global space economy to \$1.8 trillion by 2035, up from \$630 billion in 2023.¹³ It is one of the fastest-growing economies in the world.

For all the reasons cited, timing and understanding are everything in Space. Opportunities favour the prepared minds. It is time to get prepared, Hong Kong. In Hong Kong, other than learning news about space from China, the lunar economy has remained a mystery in many schools, homes, and businesses. For example, lunar commercial activities, which have become the new remit for some countries, require a thorough understanding of the lunar environment, which is just becoming known. Nations are talking about establishing their new moon bases by 2030. ESA¹⁴, the European Space Agency, and the US have made the lunar economy faster. Lava tubes, which could house future astronauts, were just identified in July 2024 by Italian researchers on the moon at the Sea of Tranquility¹⁵. By comparison, after more than 12 months of speculation, Hong Kong has just appointed a Payload Specialist. The contrasting pace at which development and news about space are spreading and how quickly we are moving in Hong Kong provide a stark backdrop. For once, Hong Kong runs at a much slower pace.

¹³ See <https://www.weforum.org/publications/space-the-1-8-trillion-opportunity-for-global-economic-growth/>

¹⁴ See ESA's Objectives and Priorities. <https://www.esa.int/esapub/br/br114/br114obj.htm>

¹⁵ <https://www.theguardian.com/science/article/2024/jul/15/underground-cave-found-on-moon-could-be-ideal-base-for-explorers>. Underground cave found on the moon could be an ideal base for explorers. The Guardian. Jul 15, 2024.

Opportunities

Conversely, the opportunities that modern Space technologies can provide to Hong Kong are multifaceted, complementary, and immediate. Here are some grounded examples and references:

- a. The use of modern SAR¹⁶ Satellites that would pierce through clouds would, for example, provide hourly status reports on the condition of impending typhoons in Hong Kong. A few years back, the entire Hong Kong was shut down under Typhoon Number 8, which came a day late. Space technologies can now provide better, instantaneous and much more accurate information.
How much more productivity and economic gain would one day of work provide for all of Hong Kong?
- b. After a storm, satellite companies would use AI to map out the disaster zones. They could use Ground Deformation Monitoring to tell us where land masses are being flooded, thus speeding up rescue and recovery efforts and financial payouts. The way we manage rapid responses to disaster recovery would vastly improve with the applications of such Space technologies. ***How might we adopt such technologies in Hong Kong?***
- c. Satellites can now track centimetre-level movements of hillsides before a landslide. Mitsubishi uses its Centimetre-level Positioning Augmentation System, or CLAS, in combination with Generative AI to track the movement of land shifts. The same technology can also track delivery drones for a Low Altitude Economy. Right technologies, such as the adoption of drones for delivery or bigger ones for air taxis, are made much easier with Space technologies. Adopting the Low Altitude Economy for Hong Kong would require a broader understanding and acceptance of relevant Space technologies.
- d. Our biotech and medical services sectors are very strong. Complementing and extending Hong Kong's strengths is knowing how best to leverage the limited research space inside the Tiangong space station. Because of micro-gravity, formulation of new drugs in Space laboratories is now possible. Unfortunately, the ISS will be deorbited soon, and new replacements, such as the US Starlab, are mostly off-limit to Chinese (and increasingly Hong Kong) researchers.¹⁷ But Tiangong is not. ***Can Hong Kong be made a broker for researchers across the BRI?***

¹⁶ Synthetic Aperture Radar.

¹⁷ Bit by bit and conversation by conversation, the world is awakening to NewSpace. At the ESA Space Conference in Amsterdam last October, I was introduced to the world of micro-gravity research that foreign universities are pursuing through the ISS and potentially StarLab, a new commercial space station.

- e. Grounding Space applications is not easy, but we are seeing more and more start-ups apply Space technologies to improve the quality of life. In Hong Kong, a start-up called YAS is providing micro-insurance for joggers. Joggers would turn on their GPS to track and initiate the contract. The use of Space data is limitless. We need to nurture and encourage more start-ups to leverage Satellite data, which is mostly free at present.
- f. ESG¹⁸ Which has become a leading barometer of our contribution to a circular economy and is parallel to the UN's SDG 17 goals. Space is a universal asset, and the UN, through its institutions, has tried to help govern Space through Space treaties and principles. Much still needs to be debated. This division creates tremendous opportunities for our professional mediators and arbitrators and complements Hong Kong's initiative to make itself a hub for business mediation and arbitration.

Space technologies can complement when selected wisely. What other entrepreneurial ideas can be ignited with a purposeful understanding of Space and Space Technologies? Any city that does not integrate satellites into its Smart City IOT infrastructure is neither smart nor timely. We must know that a city without data is without AI. Autonomous driving and delivery drones require a functional Satellite network. Satellites and mobile phones are two main generators of data. Satellite data are verifiable, ubiquitous and plentiful. We need to help create an environment that can nurture and foster start-ups in developing new solutions for remote sensing, for example.

Opportunities are ample, but adoption requires many trials and errors and is quite distasteful to civil servants whose culture does not permit making mistakes. Fast learning and rapid prototyping, a central philosophy in entrepreneurship in risky sectors, is called for. Start-ups are purposely designed for innovation, and we need to create a more vibrant NewSpace ecosystem. Creating an ecosystem for start-ups to venture into is the preferred strategy. Generally, with the NewSpace initiative, the Hong Kong Government can help by reducing risks for start-ups and commercial players, educating the public about NewSpace, and bridging commercial opportunities outside Hong Kong. Space is inspirational and great for national posturing, as a recent selection of a Taikonaut for Hong Kong and Macau has shown.

Foreign companies could use Tiangong, but I was told they have no connections to Tiangong and that Hong Kong could offer an introduction.

¹⁸ ESG stands for Environment, Sustainability, and Governance. SDG stands for Sustainability Development Goals. There's even a goal initiative to make Space the 18th sustainable goal for the world.

A. The Need for a Space Policy in Hong Kong

We need to work on a new Space policy to resonate better with the public and focus our limited resources. The Space policy could first address more immediate and supportive technological improvements, such as mitigating issues of social benefit that appeal to a broader constituency. The experience gained from other countries is that space initiatives must be linked to societal benefits, making the trade-offs easy to accept. Investment in Space can be costly. The general population tended to believe that Space research and studies are esoteric, way too expensive, too blue-sky, and whose budgets cannot be exchanged for more hospitals or better healthcare.¹⁹

Human acceptance and familiarity with technology should proceed with technological introduction or adoption. For example, many governments - the US, China, and Japan – would lay down clear Space policies to de-risk. Strategies will be forthcoming from these policies. China has already laid down its Space Commercialisation Policy, and it is time for Hong Kong to complement it. Clear policies reduce risks for commerce and allocate scarce resources better than no policy. Currently, we do not have this policy in place. Fortunately, we do not need to develop one in a vacuum; just adapt other nations and tailor a draft for debate.

Relevant space policies today would have to include some discussions of commercial activities, including authorisation and supervision, Space Sustainability, transition to commercial in LEO and lunar economy, lunar activities, space resources, and export controls.²⁰

Measuring Space Economics

An effective policy can be measured and monitored. Economic statistics and contributions need to be identified. We do not measure the NewSpace economy in Hong Kong, so we have no idea how much or less the Space sector has contributed. Unlike the UK, which can claim that its Space sector contributes close to 20% of its GDP, Hong Kong does not have such insights. *"The UK Space sector is worth over 17.5 billion pounds in income to the UK economy and employs 48,000 people...Global satellite services unpin at least 18% of UK GDP."*²¹ On a smaller scale, Singapore has over 2000

¹⁹ In Thailand, according to the Deputy Executive Director of Geo-Informatics and Space Technology Development Agency of Thailand, Dr. Damrongrit Niammuad in his speech at the SpaceTide Conference on 9 July 2024, **"Space solutions must first address social issues on earth to resonate."** The Thai government demonstrated that safety and timeliness are being improved by using satellite tracking services on buses. The public needs to be made aware of Space's features, benefits, and impacts, and parallel investing in education should proceed as soon as possible. *What has Hong Kong done to begin selling Space to our populace? What should we do to further promote NewSpace after the appointment of Hong Kong's first Payload Specialist, announced in June 2024?*

²⁰ US and Japan Space Policies can be accessed at the following links. For US, <https://www.whitehouse.gov/wp-content/uploads/2021/12/united-states-space-priorities-framework-december-1-2021.pdf>. For Japan, see <https://www8.cao.go.jp/space/english/index-e.html>

²¹ "The Case for Space" Know.Space. Pages 3 to 6. July 2023.

professionals, 60 start-ups, and 50 international companies in NewSpace.²² With Singapore blasting into NewSpace and Hong Kong not, this only means a massive brain drain of Space talents moving to our neighbouring state²³.

Because Space is precarious and disconnected, we need a government policy to lower risks for commercial players and bridge the players across geography. As such, government policy does not exist and cannot pull vast resources and parties to bear it. We are disadvantaged and marginalised by international initiatives and governments with such articulated policies.

Space Sustainability or “Space Debris”

One of the latest and hottest topics in existential threat is Space Sustainability, sometimes also known more popularly as Space Debris. This is humanity's next existential threat at the level of climate change. Space Sustainability should be one of the themes in Hong Kong's Space Policy.

Space Sustainability aims to use Space's environment to meet society's current needs without compromising future generations' needs. Like climate change, young leaders are particularly concerned about such threats, and many blame adults for being insensitive and negligent about their future. The growing pieces of Space Debris, in the millions of tiny pieces by now, and the rate with which this is growing, is most alarming. Space debris doesn't recognise Earth's geopolitical boundaries. Every country has a border with Space.

More relevant to space sustainability and its implications for Earth. Spacefaring nations and the UN have already imposed a series of new regulations to arrest this runaway train, including the mandatory de-orbit of satellites within five years. In NewSpace, new businesses are being built. New treaties are being discussed at the UN. New agreements are being implemented to mitigate the challenge of space debris. These issues are not yet embraced in Hong Kong in general but are being adopted by some bright youths as their following calls to arm of adult's hubris and indifference. Hong Kong needs to get on the table and be a member of such discussions because we, too, have a boulder with Space, and we, too, have intelligent young leaders who want to be tomorrow's leaders.²⁴

²² “Singapore's Space Ecosystem.” Office for Space Technology & Industry, Singapore. August 2022.

²³ I know of at least 10 Space professionals in this sector who have gone or will emigrate to Singapore and elsewhere. For privacy reasons, I will not disclose the names and professions of other individuals without their permission.

²⁴ At the last Space Sustainability Conference organised by the Japanese government and the Secure World Foundation on 11 to 12 July 2024 in Tokyo, which I attended, one conclusion was how to get China and Russia onto the table for discussion because space debris does not recognise land boundaries and the majority of the large derelicts belonged to the Russians. Someone called out the possible role of Hong Kong in stepping up and providing an avenue for dialogue with a business perspective. Why not, indeed?

Countries today talk about Space Situational Awareness (SSA), which tracks and compares the orbital path of satellites and debris on a 24/7 basis. Orbit, like radio spectrums, is a limited commodity. Countries are presently discussing how to access and share orbits. In Japan, we can even find commercial companies, such as Astroscale, that actively remove space debris along each layer of orbit. This company recently IPO'ed in Japan. Would such companies be able to survive in Hong Kong's ecosystem? This quote from LeoLabs, a company that engages in active debris removal, summarises best the dire situation for countries that are aware of this challenge, *"The global space community is running out of time to gracefully transition from the current world of reliable LEO (Lower Earth Orbit) space operations to an environment where mission lifetimes are routinely curtailed due to orbital debris impacts..."*

Space is infinite, but usable Space is not. Orbit, for example, is an extremely limited resource. Likewise, opportunities can be endless, but unpreparedness quickly removes any opportunity. We have yet to discuss orbits or space debris in Hong Kong openly. Our youths are not exposed to such things at present. Our school system does not teach such topics.²⁵

B. Space Education in Hong Kong

Understanding NewSpace must begin with Space Education. The best place to start is with our youths and later with adults. Before the kids have this in their school curriculum, the leaders of Hong Kong must allocate scarce resources to this initiative. Soon, it is the adults who must also be exposed to NewSpace. Understanding this means preparing for such opportunities when they are at our doorstep.

Space education has not been the norm in Hong Kong. It is still an extracurricular activity. Granted, good efforts have been underway to make STEM or STEAM a regular offering in schools. However, the perception of Space is still archaic, and such discussions belong in academia and postgraduate studies, not in business.

We have found that the best way to teach Space is through hands-on problem-based challenges that combine theories with practices. CubeSat, or miniature satellites the size of a 10 cm cube, was invented by Stanford and Cal Poly nearly 30 years ago and has

²⁵ The University of Hong Kong and EPFL are organizing, with OASA, Hong Kong's first Space Sustainability Conference, from 2nd to 4th December at HKU. www.lsr.hku.hk/ss2conf/. This is the first time such an international topic is being discussed openly and with consideration for the business of Space. A few young Hong Kong students we have interacted with have heard of space debris or active debris removal companies like Astroscale or the implication that such existential threats can have on humanity, such as climate change.

been quite popular in the US educational system.²⁶ Unfortunately, CubeSats has never been endorsed or made popular in Hong Kong.²⁷ Vietnam, the Philippines, Thailand, Korea, Singapore, and even Nepal, which are less financially endowed, all have such an educational programme for their children. We struggled²⁸.

Because our education in space is still lacking, we are losing intelligent Space talents. Other nations are stealing our talents because our Space industry is so nascent, divided, and delinked. Opportunities and a more comprehensive network best attract talents. Suitable employment is rare because the space industry is nascent in Hong Kong.

C. Space Port Hong Kong?

No country can be a true Space nation without its ability to launch rockets. We don't need a big launch pad. Today, miniature rockets can launch CubeSats in their LEO orbits. But Hong Kong has no such launch pad. However, a simple launch pad from the sea can be installed with the help of a Chinese launch vehicle company, and Hong Kong's southern position gives Hong Kong a natural advantage in getting spacecraft into orbit by being near the equator. Every country can truly experience Space by launching its rockets.

Building a port is much more than clearing the skies above. Moving logistics from combustible materials through our tunnels to amending our outdated legislation preventing projectiles from entering the sky are just a few of the many hurdles we must

²⁶ NASA no longer takes CubeSats from foreign countries and piggybacks them onto rockets. With Hong Kong's help, China may be able to do this better in the future.

²⁷ OASA tried and started a brand-new programme with HKU, whereby 29 secondary schools participated for the first time in 2021. Today in 2024, OASA has a 4-week programme made of parts from Shenzhen that would help kids build a CubeSat in 12 hours. Learning is much more than coding, putting components, or building a team. This hands-on learning gives students confidence and raises them to the next learning platform. Satellites are just big sensors in the sky, but these sensors woke us up to the reality of climate change. Before OASA started on this journey and introduced CubeSats to 29 schools, Hong Kong realistically needed a more structured programme.

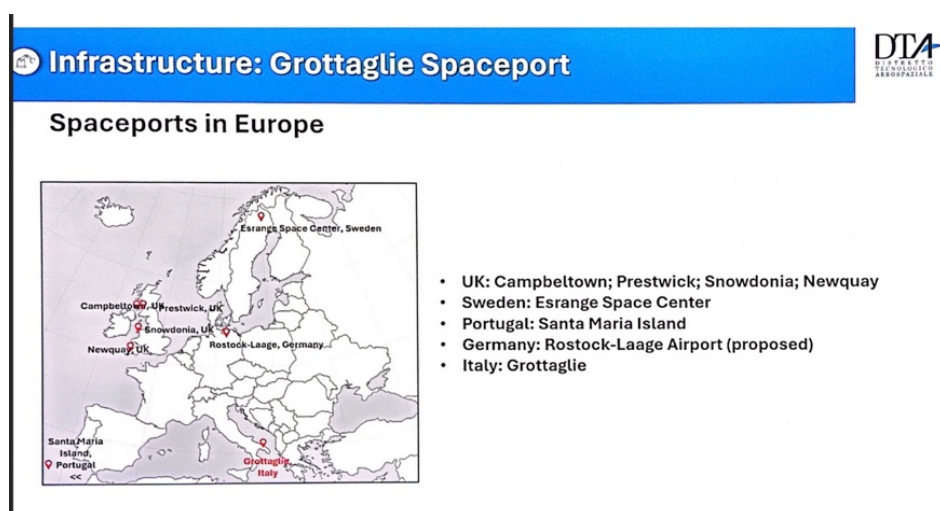
²⁸ In the three years OASA has been running such CubeSat programmes for mostly international schools, we have found that the biggest impediment is the ignorance and biases of teachers and parents. Kids love Space. Parents and teachers, not having been exposed to NewSpace, found the topic too esoteric, unrealistic, and out of curriculum. When we informed them that by 2030, we should expect to see a moon base where each astronaut on the moon would probably need thousands supporting each, their perspectives would completely change. By the time their children graduate from university, the world of commerce will have changed. This is the same level of misunderstanding of NewSpace when parents wondered why there is a need for Payload and Mission Specialists in the future, not astronauts. Payload or Mission Specialists are professionals who have a unique role within a space mission. They could be a doctor, a cook, or a miner, and each has a role they can play in Space. All of them are naturally astronauts.

overcome. Such ventures can create new employment opportunities, and innovation will further diversify our economy.

For Hong Kong, why not a micro launcher from a launch pad in the sea?



Nations are aggressively setting up launch pads, and a few of their representatives inquired directly with me last week about having China build theirs in their own country. The Space Race is real, but it is much more than between the US and China or with Russia. Many less endowed nations want a seat on the table. The fear of missing out for less endowed countries is another coming tidal wave. Are we in on this table? If not, how can we get on the circuit and become a super-connector in this ecosystem? As shown below, we see at least five spaceports in Europe alone. Despite our natural geographic advantages, we are still looking for a launch pad in Hong Kong.



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²⁹ I borrowed from a speech made by Mr. Giuseppe Acierno of DTA at the SpaceTide 2024 Conference in Tokyo.

D. AI and the Need for More (Space) Data

AI does not work without data, volumes and volumes of data. Many must know that satellites can provide a massive volume of verifiable data. Each picture snapped by a satellite contains gigapixels of data. The current strategy for many satellite companies is sharing their remote sensing data for free in the hope that entrepreneurs can take advantage of this and develop practical applications with which they become dependent on data availability. How many entrepreneurs in Hong Kong do we know of who are being given access to such data?

One of the most exciting developments is combining Edge Computing on Satellites with Generative AI. Using AI, the deployment of miniature constellations can be better optimised, designs of rockets can be more efficient, and the use of digital twins in city planning can further reduce costs through such use.³⁰ What new applications can new Generative AI be developed by coming Space data with AI?

E. Opportunities in the Belt and Road Initiative

There also lies an opportunity for Hong Kong to set the narratives for NewSpace across the BRI because we have China, which can provide technical support in all three sub-sector locations. Hong Kong needs to handle the trade and business associated with the three sub-sectors as described earlier. Many BRI countries do not have the capabilities or resources to reach into Space, but they are still eager to play their rightful parts. The fear of being left behind is real and pressing. A parking space for a satellite assigned to country A cannot be assigned to country B. None of them want to be marginalised and left behind. Through our mediation and arbitration infrastructure, Hong Kong can work with these BRI countries and, through collective strength, make an impact at the UN and indirectly strengthen the soft power of the PRC.

Hong Kong has a role to play in this convening role, to pull together the BRI countries and to represent the collective view of using and applying space resources. However, this bold initiative requires the HKSAR Government's foresight, investment, and China's endorsement.

Leading such narratives, however, requires a sound understanding of the context and language of NewSpace. Space education today, for adults, needs more depth and variety. Future Space is about peaceful co-existence. We can tip the discussions

³⁰ In fact, according to the AWS Director of Aerospace and Satellite, Major General (retired) Clint Crosier, AWS aimed to invest close to US\$100 million in Japan to help their companies learn and make better use of satellite data. This was the content of his speech at the Space Sustainability Conference in Tokyo in mid-July 2024. Has AWS promised to invest the same in Hong Kong? This is unlikely, given our nascent NewSpace ecosystem.

towards peaceful co-existence if we lead the narrative. However, that requires a sound grounding in the NewSpace context, of which terminology, development, and physics are fundamental. Achieving this leadership level requires us to think for decades, not just a few years, and build on the UNCITRAL Model Law jurisdiction. Hong Kong may not need its own policy if we can act as a platform for the BRI to trade, mediate, or arbitrate theirs. Our policy would be a platform. We would need a robust infrastructure for this, building on top of arbitration institutes already in Hong Kong³¹. Let the BRI's use us to run their policy.³²

F. The Missing Space Agency of Hong Kong

We currently do not have a Space Agency in Hong Kong. A Space Agency would focus Hong Kong's efforts much more prudent and strategically. It could leverage our existing resources much better and extend our capabilities.³³ The Space Agency can even help frame the many innovation and technology initiatives being promoted by the ITC because expanding ground-based innovation into Space would be a natural extension when such a market becomes vibrant. NewSpace is becoming vibrant, but currently outside Hong Kong. Currently, there are nearly 20 space agencies in Asia Pacific alone.³⁴

³¹ There are institutions in Hong Kong, including HKIAC, eBRAM, ICC, CIETC, AALCO, HKMAG, and SCIA.

³² BRI can and do intersect with space development in the following ways:

- a. **Satellite Navigation and Earth Observation:** China has been actively deploying its BeiDou satellite navigation system as part of the BRI. This system provides global positioning services, enhancing navigation and location-based applications for partner countries. Additionally, China's Earth observation satellites contribute to disaster management, agriculture, and environmental monitoring in BRI regions.
- b. **Space Infrastructure:** BRI projects often involve building space infrastructure, such as ground stations, satellite communication networks, and remote sensing facilities. These investments strengthen connectivity and data exchange across participating nations.
- c. **Space Cooperation Agreements:** China has signed agreements with several BRI countries. These agreements facilitate joint research, technology transfer, and capacity building. For instance, China and Pakistan collaborate on satellite development and remote sensing applications.
- d. **Space Commerce and Investment:** BRI encourages space-related commerce, including satellite manufacturing, launch services, and data sharing. Chinese companies like Commsat and Expace are expanding their presence in BRI countries, offering cost-effective solutions for satellite deployment.
- e. **Space Diplomacy:** China's space diplomacy through BRI fosters goodwill and strengthens bilateral ties. It provides an avenue for technology transfer, training programs, and knowledge exchange, benefiting China and its partners.

³³ OASA is currently the closest thing to a Space Agency of Hong Kong, but we are not a statutory body. We cannot regulate licenses or report flight plans for CubeSats to the UN, a role which a Space Academy must do. OASA is a non-profit education academy and perhaps a developing association for the Space ecosystem in Hong Kong. It is hardly sustainable with less than 50 or so companies in this ecosystem.

³⁴ Australia, Bangladesh, China, India, Indonesia, Japan, Malaysia, Mongolia, New Zealand, Pakistan, Philippines, Singapore, South Korea, Sri Lanka, Taiwan, Thailand, and Vietnam.

The Hong Kong Space Agency would help extend the research capabilities of our universities and help them connect research in microgravity in Space labs such as Tiangong, where a massive amount of innovation, from new drug developments to space seeds, is being done. Many of our academics do not know how to leverage the power of Space, and our own ASTRI barely touches research in Space.

The Agency can even house or help coordinate Space Labs. Before CubeSats can be flown on real rockets, they must be tested and certified. Imagine these foreign CubeSats coming into Hong Kong and conducting over 20 tests for certification. These tests are located throughout NAMI, HKPC, ASTRI, Science Park, and various university labs. Somebody needs to coordinate and make better use of these entities.

Hong Kong does not have a Space Authority to regulate or license the market. Spacecraft (and even low-altitude crafts) need to be licensed, and spaceworthy ones must be immediately reported to the UN for Space Situational Awareness. Space sustainability is a new narrative, and Hong Kong needs to create an infrastructure and an authority on such matters.

Because space technology moves at light speed, most space academies around the world are arms-length from the government, and a few are being established as independent bodies. The Luxembourg Space Agency is even more innovative. It is an agency created by civilians under the leadership of a minister because their founders felt the government was moving too slowly when the broader space economy was moving too fast. One of Luxembourg's critical contributions to global space exploration is not probes or launch vehicles. Still, rather than the legal framework and infrastructure, governments and private firms must govern space activities. As in Japan, a space fund was established to foster and support start-ups. The world of NewSpace and the governing bodies are changing, and the strategy with which these are being created is changing as well.

Perhaps this Hong Kong Space Agency would aim to compile and integrate the equipment and resources we already have at our research centres and labs like HKPC, NAMI, ASTRI, and those throughout our universities. Doing that well will require a Space Policy from which a Space Academy would spring forth. Unfortunately, we do not have such a policy. No Policy; no agency.

VI. Actions Needed Now

Given the urgency and incoming but narrowing window of opportunities, we need to gather and think through the many strategic options quickly. Let's begin with compiling a stocktake of our current challenges.

My initial suggestions follow:

1. Set up a task force on NewSpace.
2. Initiate an independent study that will develop a draft Space Policy, a provisional Space Agency, and a Strategic Blueprint for this new sector in Hong Kong. The study may take six months to a year.
3. Measure the current impact and contribution of the NewSpace economy to Hong Kong and extrapolate into the future when integration with related industries can be achieved.
4. Consider establishing a Space Fund or a Space Accelerator, which would complement efforts already underway through Raise+ and other incubation programmes.
5. Encourage adults to learn about NewSpace and set up matching funding to create an online NewSpace programme for Hong Kong at Cyberport or HKSP.

Of the five recommendations for action, setting up a task force is the most straightforward and sensible first option. Eventually, this task force may morph into a provisional Space Agency that would begin to guide Hong Kong after 2025.

Ignorance can be a silent killer, and ignorance of NewSpace is slowly killing our future! Hong Kong is losing our future each second we don't understand Space. For every second of ignorance, we are losing hours of opportunities.