



Wuhan – China's centre of the commercial universe including interviews with Enrique Pacheco, Andrew Paliwoda, Philippe Cyr

By Chen Lan, Dr. William Carey, Jacqueline Myrrhe



Entrance to the conference hotel. credit: GoTaikonauts!

For the GoTaikonauts! Team, and most likely for many of the foreign guests as well, it was the discovery of the year 2017: the 3rd China (International) Commercial Aerospace Forum (CCAF) which took place on 30 August 2017 in Wuhan, the capital of central China's Hubei Province. The annual forum was held only twice before and in 2017, for the first time, it went international – and this – with unprecedented success.

Around 400 government officials, company representatives and industry experts from more than 20 nations, including the United States, Russia (with the largest foreign delegation), Canada, Costa Rica, Germany, the UK, The Netherlands, Iran, Singapore, and African nations like Burundi, Gabon, Kenya, and Madagascar, followed the wide range of presentations, discussed technological developments and last but not least: evaluated business opportunities in the commercial space sector, making the forum a priceless networking opportunity.

But why Wuhan? For sure, the conference venue was a perfect choice: the Eurasia Convention International Hotel, with very good facilities for a conference of this scale offered a generous ballroom, state-of-the-art technical equipment including for simultaneous translation, convenient services for lunch and breaks, and areas for the accompanying exhibition by space companies, making it easy to get in direct contact with commercial players.

But there is more to Wuhan, a mega-city which is home to 11 million inhabitants and a university cluster where more than 1 million students learn and live. The forum was made possible through a strong partnership between the organisers, co-organisers, sponsors, and supervisors – consisting of local and central governmental authorities, state-owned space companies, private companies, as well as international companies and organisations. For a foreign observer, the most striking fact was the enthusiastic and serious commitment by the local, regional, provincial and central government politicians in full support of commercial space efforts. The leading role in all of this was with CASIC, the China Aerospace Science and Industry Cooperation. CASIC is also the driving force behind the country's first commercial space industry base. And this is what makes Wuhan primarily special.

WUHAN NATIONAL SPACE INDUSTRY BASE

Almost all speeches and presentations given during the forum by Chinese representatives reflected on this unique project: the National Space Industry Base in the Yangluo Economic



The CASIC Wuhan administration, just across the hotel. credit: GoTaikonauts!

CASIC

China Aerospace Science and Industry Corporation, CASIC, headquartered in Beijing, is a large state-owned, hi-tech enterprise under direct management of the central government. It employs 150,000 people. Next to being the biggest missile weapon designer and manufacturer in China, CASIC is responsible for a very wide range of high-tech products in aerospace defence, information technology, equipment manufacturing and intelligence industry.

CASIC contributes to space delivery systems, micro and small satellites, various types of space payloads and satellite applications, and has made important contributions to China's manned space flight programme, to lunar exploration, to the Beidou satellite navigation system, and the high-resolution Earth observation system.

CASIC's advanced aerospace technology in casting, welding, surface treatment has been even applied in the manufacturing of Buddha statues or monuments like the "Lotus in flourishing age" in Macao or the "Forever Blooming Bauhinia", a present given by the China Central Government to the Hong Kong Special Administration Zone.

CASIC also exploits new fields like trade, financial affairs, securities and investment.

Recently, the state enterprise has taken the lead in the commercialisation of the country's space technologies. It supports more than 6,000 private innovative, entrepreneurial programmes and has set up eight innovation incubators across the country.

The main activities in the field of commercial space are focused on the development of a reusable Earth-space-Earth delivery system, on low-cost and highly-reliable solid fuel rockets, micro and small satellite constellations, near-space resources and the development of space technology applications.

In 2015, CASIC founded the CASICloud Internet platform, which helps enterprises globally to find the advanced technologies they need.

In a move to promote innovation and entrepreneurship, the State Council of the People's Republic of China approved in 2016 the National Space Industry Base in Wuhan, strongly aiming at the integration of the available resources of talent, capital and policy support. CASIC took the responsibility for this mammoth project.



Development Zone of Wuhan's Xinzhou District, with a total investment plan encompassing 150 billion RMB.

The initiative goes back to a proposal, made by CASIC President Gao Hongwei in May 2014. His idea called for the establishing of "The Third National New Comprehensive Development Base of Space Industry" in Wuhan, which was to be dedicated as the first national commercial space hub in China. (The first two Development Bases of Space Industry are in Beijing and Shanghai.) The proposal got the support of Premier Li Keqiang and in the autumn of 2015, CASIC signed the investment framework agreement with Wuhan's municipal administration. In parallel the 1st CCAF took place. Already the next year, in late summer of 2016, the National Development and Reform Commission approved the plan as national high-tech industrial base. In September the same year, during the 2nd CCAF, CASIC, the Hubei provincial administration, and the Wuhan municipal government signed a cooperation agreement and marked officially the starting point of the industrial base.

In April 2017, a public-private partnership between China Fortune Land Development and the Xinzhou District of Wuhan City was agreed. On China's 2nd National Space Day, 24 April 2017, the construction of the 68.8 km² Wuhan National Space Industry Base started officially with the first three projects: the General Production and Assembly Line for Carrier Rockets, the new materials facility and the high-end equipment production. It is expected that at least 100 enterprises involved in the space industry join the Wuhan commercial base before 2020, while the overall construction period will last for 10 years.

CASIC is not only the main driver behind the commercial hub in Wuhan but also - with its commercial spin-off Expace Technology Co - the entity behind the commercial rocket production and assembly facility for its new flagship rocket, the Kuaizhou launcher, developed by CASIC's Fourth Academy. The rocket production will become China's first commercial research and development business for rocket development, production as well as applications and represents the commercial hub's core business. CASIC settles into Wuhan's National Space Industry Base with an investment volume of 1.7 billion RMB and expects to be operational in 2018. Calculations estimate that CASIC should be able to generate within two years an annual turnover of 1.5 billion RMB what translates into approximately 20 Kuaizhou rockets per year.

Next to the development of carrier rockets, another focus of the Wuhan base is on satellite development and manufacturing, aerospace ground equipment production, and applications of

satellite data. In the realm of satellites, the main investor will be CASIC's Second Academy with a budget of 300 million RMB for the construction of a research, development and manufacturing complex for small satellites. The production capacity might reach an annual output of 40 satellites over 100 kg and up to 100 satellites under 100 kg weight. As from 2018, CASIC plans to install a LEO constellation of 156 small communication satellites, the Hongyun Project, to form a global coverage network. One can expect that those small satellites will be "Made in Wuhan".

Expace Technology Co. might be seen as the backbone of the Wuhan National Space Industry Base but the space hub has attracted interesting neighbours also. The National Memory Base, a semiconductor manufacturer for memory chip mass production and the National Intelligent Connected Vehicle Demonstration Zone, a test area for self-driving cars have also settled in Wuhan along with a geo-information applications industrial base and a laser optics innovation centre.

Against this background, the city of Wuhan was a natural choice for hosting a commercial aerospace forum which introduced already in its third year of existence an international reach. And indeed, the forum showcased a balanced programme of Chinese and international presentations – reflecting the latest state of progress in the field of commercial space efforts.

Aerospace as a top-priority

Opening remarks came from officials of all levels of political life. On the municipal level, Liu Yingzi, the Deputy Mayor of the town of Wuhan gave an enthusiastic, welcoming and highly encouraging speech. She stressed that the Wuhan National Space Industry Base is one of the top priorities of the municipal administration. She is convinced that the aerospace industry



Deputy Mayor of Wuhan, Ms Liu Yingzi. credit: GoTaikonauts!

Commercial Space Activity Definition

In China, a commercial launch usually means a space launch financed by an entity other than the Chinese government or a military agency.

right: Map of the town of Wuhan with the Wuhan National Space Industry Base - marked in red. credit: Wuhan National Space Industry Base Investment Guide CFLD - China Fortune Land Development





is having a positive impact on other parts of the economy. Wuhan City is making sure that the investors find the best possible conditions, starting with infrastructure connectivity and ending with policy support, and the full attention of the local and central government. Liu Yingzi's speech was also particularly noticeable because she spoke clearly and continuously without reference to any notes.

A spirit bigger than space

On the provincial level, Zhou Xianwang, the Vice Governor of the Hubei Province outlined his clear understanding of the strategic importance of the aerospace industry which is an emblematic indicator of the overall industrial strength of a country. Disruptive technologies, regularly emerging from the aerospace sector, are leading other industries to new inventions and developments, cross-fertilising innovation. Also, the active and purposeful integration of resources will translate into more business opportunities and services. Hubei Province is providing a fund of 10 billion RMB to boost aerospace industries. He also pointed out that the Wuhan National Space Industry Base needs a global view and he wishes that the initiative attracts global talents and foreign experts. Zhou Xianwang ensured the conference participants that the provincial government would actively push forward a policy system to create a favorable development environment in a bid to support the aerospace industry development. He ended his remarks with a quote by President Xi Jinping, who said that China is small compared with space but - we Chinese - have a big spirit, bigger than space.

Aerospace on the overtaking lane – a strategic choice

Tian Yulong, Chief Engineer of the State Administration of Science, Technology and Industry for National Defence represented the central governmental level. He explained the idea that the Chinese government connects with the promotion of China from being a big country of aerospace to becoming a great country of aerospace. Aerospace is a strategic choice, taken by President Xi Jinping's introduction of the National Strategy of Aerospace Development.

While embracing globalisation, China is looking for new models of innovation, new applications and for an accelerated transformation of the governmental aerospace sector into a commercial one. The government feels responsible for setting up the suitable legal framework to guarantee IP rights, technology development and technology transfer.

Those thoughts were reiterated by Xia Mingjiu, Deputy Director of the State Administration of Foreign Experts Affairs. He added the dimension of human resources when he spoke about the governmental initiative of the talent recruitment system to attract global talents to China.

The super jet engine, called market economy

The last introductory talk was given by Gao Hongwei, Chairman of CASIC and the mastermind of the Wuhan National Space Industry Base. He put it in a nutshell: "Market economy acts like a super jet engine. It absorbs all available resources, processes them with a series of innovative work in technology, business model and management, and eventually creates some remarkable innovations that drive all industries in this system to thrive ... In China, the socialist market economy is a strong institutional support for market-driven competition in the commercial aerospace industry, which makes clear sense for CASIC to join in the development and ecological establishment of global commercial aerospace industry."

CASIC's Five Clouds

The first technical presentation of the day was by Liu Shiquan, CASIC's Vice President.

Under the title "Develop Commercial Aerospace with Innovative Business Model", he explained that knowing that aerospace is a tool for economic development and after analysing the global status quo, CASIC realised the importance of innovation in the development of business models and the implementation of the new strategy of transformation from governmental driven

aerospace activities to commercial business models. He gave an overview on the commercial projects, CASIC is working on: Kuaizhou launcher development, the CASICloud platform, and the Five-Clouds Projects – see box below.

Also, Liu Shiquan announced CASIC's plan to develop an ultra-high-speed maglev vacuum tube train with a speed of 1,000 to 4,000 km/h.

left: CASIC's Five Cloud Projects.
credit: Wuhan National Space Industry Base Investment Guide
CFLD - China Fortune Land Development



CASIC's Five-Clouds Projects

In addition to the focus on rocket production, CASIC identified five core projects, the so-called: Five Clouds (or Five-Yun. 'yun' means 'cloud' in Chinese), for its Wuhan National Space Industry Base aiming at becoming the national centre of excellence in those respective fields:

Feiyun Project

- Local area network of unmanned aerial vehicles (UAV) and its applications

Kuaiyun Project

- Local area network of near space airships and its applications

Xingyun Project

- Narrow-band global mobile internet of things of 56 satellites and its applications

Hongyun Project

- Broad-band (Ka-band) global mobile internet of things of 156 satellites and its applications

Tengyun Project

- Aerospace round-trip air vehicle (two-stage to orbit, horizontal take-off and landing TSTO HTL) and its applications



The Case for Space: hands-on and down-to-Earth

Sun Weigang, Chief Engineer of China Aerospace Science and Technology Corporation (CASC) gave some interesting impetus and food for thought with his talk, titled: "Develop Commercial Aerospace with Intelligence to Expand Precisely."

He outlined that the rise of global commercial aerospace is the result of a transformation process. In the past, space technology has been traditionally a "high-end" industry for governmental endeavours in defence and space exploration. On the global scale, aerospace technology and applications are becoming the fields of increasing venture capital investments. Aerospace products and services are growing fast, becoming more present in the everyday life of ordinary people, becoming "hands-on" or "down-to-Earth" for civil purposes. This again, generates a higher interest in aerospace and consequently feeds a circle of fruitful interdependence and constant exchange of technology, products, and services between purely space applications and terrestrial applications. The more present space applications are in everyday life, the more creative will people use and improve them. As a consequence, investments will follow, leading to the integrated development of space technology and terrestrial applications, because commercial aerospace means more than rockets and satellites.

Costa Rica

The speech by Carlos Alvarado Briceño, President of the Central American Association for Aeronautics and Space (ACAIE), was an event all of its own. With his refreshing Latin American spirit – full of enthusiasm and passion - Carlos Alvaro represented his small Central American country of Costa Rica with a stage performance which embraced the audience entirely and let everybody for 20 minutes travel virtually to his homeland. He spoke about the beautiful nature, the determination by the government and citizens to follow ecological and sustainable development. In support of this, a crowdfunding activity was started to build and launch Irazú - the first Central American satellite, made in Costa Rica. The 1U cube sat is designed to provide environmental data to monitor the country's contribution to climate change. The second aim of the project under the lead of ACAIE and in cooperation with the Costa Rica Institute of Technology (TEC) is to go through the full cycle of a space engineering project to give the young generation experience in a space mission. Irazú is scheduled for launch to the ISS by SpaceX CRS-14 in April 2018. From there it will be deployed from the KIBO module using JAXA's cubesat dispenser.

In Wuhan, Carlos Alvarado also spoke about the National Stadium of Costa Rica which was financed and built by China.



Carlos Alvarado is talking about: "Identifying opportunities for China and Costa Rica in the aerospace field". credit: GoTaikonauts!

In March 2016, in the very same stadium, astronauts from 6 nations spoke to 10.000 young Costa Ricans about space and exploration. It was impressive to see, how motivated a small country, more famous for coffee than space initiatives, is to use science and technology for its long-term sustainable future.

Information Network is key to the future

Wu Wei, Chief Scientist of the China Electronics Technology Group Corporation, gave a presentation on the "Construction and Operation Plan of Space-ground Integrated Information Network". He outlined the proposed implementation of a Space-Ground Information Network. The starting point of his remarks was a thorough analyses of the existing global and Chinese capacities as well as plans in the tele-communication sector. China's domestic economic demands along with requirements stemming from the Belt and Road Initiative are calling for a unified and standardised information network infrastructure, combining space-based facilities with terrestrial infrastructure contributing to China's National Civil Space Infrastructure.



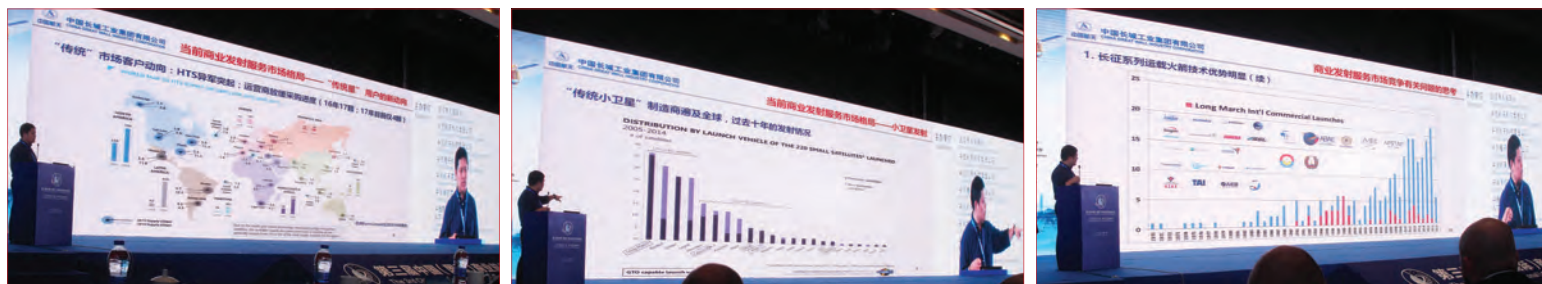
Quite an analysis Wu Wei presented. credit: GoTaikonauts!

A strong alliance

It was the task of Chen Xingai, the Secretary of the CPC of Xinzhou District, to give an overview presentation on how the Wuhan National Space Industry Base fits into the comprehensive development of the Xinzhou District and the surrounding region. He confirmed that the initiative is based on a solid foundation. There is a 3D transportation infrastructure of rail, motorways, water and air connections already in place. He outlined the plans which Wuhan has for the establishment of a commercial industry park also housing an industrial base for geo-data applications and for laser optics supporting the Beidou Satellite Navigation System. Chen Xingai explained that the investment will be done in three phases, fed by the 100 billion RMB fund made available by the provincial administration. He also mentioned that the success of the project is owed to the fact that CASIC succeeded in building up a strong alliance of complementary stakeholders.



Chen Xingai is explaining the importance of the Wuhan National Aerospace Industry Base. credit: GoTaikonauts!



Si Yuan, General Manager of Americas for the China Great Wall Industry Corporation showed an extensive analysis of the capacities of current launch service providers in the world, of global HTS capacities and a balance of the commercial launches by Long March. He concluded that China has a matured technology already in place. However, launch services alone is becoming less and less attractive. The current main business focus is the delivery of turn-key satellites to customers. credit: GoTaikonauts!

NANORACKS - the “Concierge to the Stars”

Clearly, NanoRacks's Managing Director Jeffrey Manber's presence in Wuhan made the audience sit up and take notice. Less of a surprise was that no other U.S. company was present. Needless to mention that Manber is an excellent speaker with neat and professionally designed slides. He explained the portfolio of his company, without missing the opportunity to state that NanoRacks is a truly commercial space company, working with private money and its own real-estate, aka hardware, in space. NanoRacks achieved the feat of flying the first Chinese experiment on the ISS, outstripping – actually embarrassing – other potential organisations like ESA or European national space agencies, who have long-standing relations with China's science institutions and could have built on that to achieve this accomplishment.

Jeffrey Manber put a lot emphasis on the fact that the first Chinese payload on the ISS was approved by all appropriate U.S. governmental authorities. He stressed that it was not China but a university, which happened to be a Chinese university, coming to the ISS. Nevertheless, he admitted that it was an unusual mission but more in the sense that everything worked: the payload was ready in time, the launch was in time, and the experiment, dedicated to DNA research, ran flawlessly. He also outlined his ambitious plans for the future like the installation of NanoRack's own air-lock on the ISS or the utilisation of spent second stages or repurposing in-space launch vehicle components for building space stations, calling it “Space Stations for Everyone”. Last but not least, Manber did not forget to flatter the Chinese audience a little bit when he let drop that he considers Chinese universities among his most important customers. It was beyond any shadow of doubt that he is seeking further cooperation with China including commercial activities on the planned Chinese Space Station (CSS) culminating in a scenario of sustainable equal cooperation. “We look forward to growing our relationship with the Beijing Institute of Technology and involving other Chinese universities!” One can trust that he means that.



Jeffrey Manber is giving his talk. credit: GoTaikonauts!

U.S. “Concierge to the Stars”

gives China's Research Access to the ISS

The agreement was signed in summer of 2015 and already two years later the Chinese experiment was floating in Earth's orbit, was unpacked and stored on board of the International Space Station ISS.

When the Falcon 9 rocket lifted-off from LC39A at Kennedy Space Center in Florida, U.S.A. on 3 June 2017 at 21:07 UTC (17:07 local time), inside the cargo space craft Dragon CRS-11 were 25 of NanoRacks' commercial payloads, including the NanoRacks Module-70, housing the experiment of the Beijing Institute of Technology (BIT) School of Life Science. All one can do, is to congratulate NanoRacks on this feat of becoming BIT's “FedEx to Outer Space” and conducting the first-ever Chinese experiment on the ISS – confined to the NanoRacks platform on the ISS. Chinese scientists have been contributing to ISS experiments before but this is the premiere of an independently designed and built one.

Back in 2015 it was reported that BIT partnered with NanoRacks for the transport of the 3.5 kg research facility, for on-board data collection and payload return to Florida, paying around 200,000 US\$ for the overall service. The figureheads in this initiative were Deng Yulin, Dean of BIT's School of Life Sciences and jack-of-all-trades Jeffrey Manber, CEO of NanoRacks. BIT Professor Zhuang Fengyuan, served the project as adviser, consultant and facilitator – becoming the good soul of the endeavour.

The experiment “DNA Mismatch during a PCR Reaction Exposed to the Space Environment is about studying the effect space radiation has on different types of deoxyribonucleic acid (DNA) – on the rapidly changing and more stable parts - that create the human immune system. By activating the polymerase chain reaction (PCR) the synthetic DNA samples will duplicate. The DNA samples will be returned to Earth and analysed to see whether strand breaks occurred during the replication process.



The research had already been flown on the earlier Chinese Shenzhou 8 space mission in 2011. The scientists detected after return a DNA abnormality but they could not identify whether this was caused by microgravity or radiation. The 2017 flight opportunity to the ISS was hoped to help answer this question.

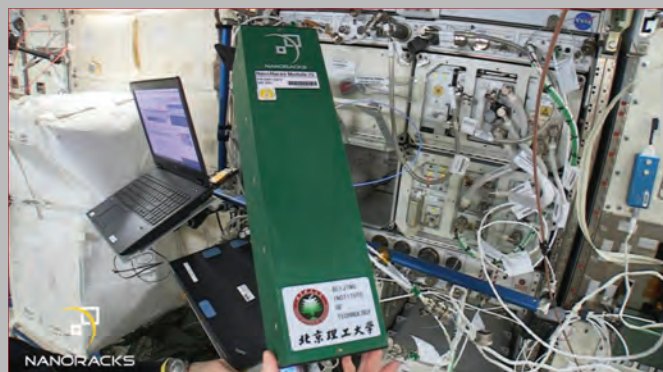
Knowledge about how radiation might damage different types of DNA is not only useful for astronauts during long-duration missions in space. To understand the different speed of gene mutation gives a profound insight into genetic diseases and respective cures or can even support preventive medicine.



The BIT team preparing the experiment. In the left middle of the back row: Deng Yulin, Dean of BIT's School of Life Sciences and to his right: Professor Zhuang Fengyuan. credit: BIT credit: GoTaikonauts!

On 5 June 2017 Dragon berthed with the ISS and NanoRacks Module-70, containing the experiment from Beijing, was stored into the General Laboratory Active Cryogenic ISS Experiment Refrigerator (GLACIER). In the morning of 7 June, the crew took the payload out of the deep-freeze and installed it into the NanoRacks Platform-2 in the Japanese Experiment Module (JEM). Next day, on 8 June, the experiment was stored back into GLACIER where it remained until 19 June. That day, the samples were installed for a second 24-h period into the NanoRacks Platform-2. On 20 June, the NanoRacks Module-70 was put into final storage in the deep-freeze until it was prepared for departure with Dragon CRS-11 on 2 July and splash down in the Pacific Ocean the next day.

"Our mission at NanoRacks is to democratize access to space," said Jeffrey Manber in a NanoRacks press release after the



NASA astronaut Jack Fischer is holding the BIT DNA experiment – the first-ever Chinese experiment on the International Space Station, launched via NanoRacks. credit: NanoRacks

launch. "Professor Yulin and his team have been conducting innovative DNA research for years, regularly publish in Western journals, and have shown a dedication to space exploration. For us, it's not about a political statement, but that we now have another unique international customer — and we're thrilled to be facilitating this access to space. We look forward to growing our relationship with the Beijing Institute of Technology, to working with new partners in China, and to partnering with other educational institutions around the world and at home. Exploring the universe is a global effort, and NanoRacks is proud to be the leading provider of access to low-Earth orbit, making it possible for researchers around the world to access the greatest unknown."

And Deng Yulin told Chinese media: "This is a new model of cooperation that we can follow in the future".

Enrique Pacheco, CEO of the Mexican space company inComSpace – Innovation in Communications and Space - spoke about the situation in his country with respect to space companies and international cooperation. In 2016, when the city of Guadalajara in Western Mexico hosted the International Astronautical Congress, the global world community realised how much the government of Mexico is committed to welcome the space sector in the middle-American country. Enrique Pacheco has been fully involved in the organisation and management of the very successful IAC2016, which deeply

impressed the space world. In Wuhan, he confirmed the strong governmental support for space start-ups. Therefore, the current activities for establishing a space port supporting the launch of approx. 200 kg payload has good chances to succeed.

ALBA ORBITAL

Andrew Paliwoda, Business Development Manager of Alba Orbital in Glasgow, UK, gave an amazing introduction to 'Pocketcubes' - small cubesats that can literally fit in your pocket. To prove the correctness of the title of his talk: "The

Enrique Pacheco

CEO inComSpace –

Innovation in Communications and Space, Mexico

Presentation: Development of SpacePorts Capabilities in Mexico for Commercial Activities

What was your objective in attending the 3rd China (International) Commercial Aerospace Forum in Wuhan?

As one of the few space companies in Mexico, we think it is very important to look for opportunities to participate in the new space economy and this meeting was without any doubt a great opportunity for that. The Asian market and in particular the Chinese participation and achievements on space are the perfect place to explore alternatives to present the Mexican and Latin American space ecosystem and try on that to find synergies to develop new products, systems and services.

Was it worthwhile for you or your company to attend the conference?

Both, personally and as a company I think the meeting exceeded my expectations. On the personal side I was lucky to share the floor with many highly appreciated colleagues from the space sector and to make new professional contacts was very important. As a company we were able to use the meeting as an opportunity to develop new strategic alliances for future projects and that has proven to be very important to us!!

What are your plans for the future with respect to cooperation with China? Do you plan to attend the next year's conference?

China is an important space leader, we look forward to cooperate and develop a joint effort that helps to achieve a win-win relationship, we are very optimistic and we truly believe that this will be an important path for our customers in Mexico and Latin America. Yes, we are very excited to participate in the next year conference to continue to develop our relationship with China and Asia!!



Andrew Paliwoda

Business Development Manager AlbaOrbital, Glasgow, UK
presentation: The Future is Small: New Space, Pocket Qubes and the Future of Space

What was your objective in attending the 3rd China (International) Commercial Aerospace Forum?

Our objective was to learn more about what China is doing in the space world. Being a NewSpace company we are constantly looking for innovative solutions to problems, from the trip we made many great connections which will help us to build and launch more PocketQubes. To companies in the West, the Chinese space industry is really unknown.

Was it worthwhile for you or your company to attend the conference?

Yes, speaking at the conference was a great experience. Everyone was amazed at how advances in technology are allowing further miniturisation of satellites. It's built further market interest in the PocketQube format which was definitely worthwhile.

What are your plans for the future with respect to cooperation with China? Do you or your company plan to attend the next year's conference?

We will see what the future holds.

www.albaorbital.com



Andrew Paliwoda during his presentation in Wuhan. credit: GoTaikonauts!



Zha Xiongquan introduces the Expace Technology Corporation. credit: GoTaikonauts!



Zha Xiongquan showed an overview of the Expace buildings for the mass production of the Kuaizhou launcher. credit: GoTaikonauts!



Philippe Cyr could show in his presentation how versatile, flexible and creative the young and dynamic team of Disrupt Space operates. credit: GoTaikonauts!



Andrew Paliwoda is showing his PocketQubes at the Space Tech Expo Europe in October 2017 in Bremen, Germany. credit: GoTaikonauts!

Future is Small: New Space, PocketQubes and the Future of Space", Andrew had this very impressive pocket cubesat innovation from the Scottish start-up company with him and could show hands-on that the young team in Glasgow is indeed working on a future which is small – almost tiny.

Kuaizhou – faster and cheaper

The 3rd China (International) Commercial Aerospace Forum (CCAF) saw many more Chinese and international presentations which have all been highly interesting. However, the project, the media reported the most about, was the commercial launch services provided by Expace Technology Corporation, a commercial subsidiary of CASIC, and responsible for the Kuaizhou series of launchers. The media attention has been triggered by some brand-new announcements which Zha Xiongquan, the Vice President of Expace Technology Corporation made with his talk "Kuaizhou series commercial launch services".

He spoke about the intention to launch several Kuaizhou 1A rockets in 2018. The solid-fuel rocket carrier would transport each time a remote-sensing satellite into orbit.

Kuaizhou 1A has a liftoff weight of 30 t and a payload capacity of 200 kg into SSO or 300 kg into LEO. It flew for the first time in January 2017, launching 3 satellites from a mobile base at the Jiuquan Satellite Launch Center.

Zha Xiongquan also informed the audience about the new generation, a solid-fueled Kuaizhou 11, the improved version of Kuaizhou 1A, likewise designed and manufactured by CASIC.



Philippe Cyr

Disrupt Space, co-founder, Shanghai, China
presentation: How Entrepreneurs are building Space
Start-ups: Grassroots Perspective

What was your objective in attending the 3rd International Commercial Space Forum?

My work relates to supporting entrepreneurs building space ventures. This emerging community of 'space entrepreneurs' really do come from all over the world so connecting key players from entrepreneurial ecosystems for space in different regions has become a significant part of my job.

Although it is well known that China has made significant achievements in space, I don't think many people know about the increasing amount of Chinese space start-ups that have popped up over the past few years. From my experience, our team first started engaging with Chinese space entrepreneurs in 2015 by organising a hackathon called 'Start-up Weekend Space: Shanghai'. In 2016 and 2017 we worked with a local partner to organize several B2Bs and investor-start-up meetings with Europeans and Americans wanting to connect with Chinese space start-ups. This grassroots community is growing, and growing fast.

I participated in the Wuhan space forum because I saw it as a valuable touchpoint to meet established players in China's space sector. Community building requires engaging with key stakeholders, so these types of touchpoints are quite

useful for me to gain a better understanding of what different organisations are working on and to hear their thoughts about entrepreneurial space.

Was it worthwhile for you or your company to attend the conference?

The conference was useful because I gained some good contacts and saw how other international participants were pitching various ideas to work with Chinese organisations. Whether these ideas come to fruition is another question, however, it is very insightful to better understand the internationalisation of space projects in more detail. It would have been great if more companies and organisations from outside the space sector were to participate, but I recognise this is a broader problem for the entire space sector.

What are your plans for the future with respect to cooperation with China? Do you or your company plan to attend the next year's conference?

We will definitely continue collaborating with community leaders to develop China's entrepreneurial ecosystem for space. In practice this means figuring out what combination of touchpoints - hackathons, meetups, workshops, start-up-investor meetings, etc. - need to be organised. The growth of quality space start-ups over the past few years is incredible and we want to continue supporting this trend. I would certainly consider attending next year's conference as it directly helps us achieve our ecosystem building goals.

www.disruptspace.io

Kuaizhou 11 uses a mobile launch platform allowing for short preparation time and quick-response to launch demand. It has a lift-off mass of 78 t and can carry satellites of 1.5 t into LEO or 1 t into SSO. The first Kuaizhou 11 launch is planned to carry six satellites. While currently the cost per kg payload are in the range of less than 10,000 US\$, CASIC aims at a further reduction of the costs with its Kuaizhou series, bringing it down to the range of 5,000 US\$ per kg payload. This fact alone almost counts as a sensation!

DISRUPT SPACE

The last presentation of the forum was given by the young Canadian entrepreneur Philippe Cyr. His company 'Disrupt Space', based in Germany with a branch in Shanghai, is helping start-up companies on their entrepreneurial journey, including Chinese start-up's who in particular face the impression that "China is a black box". Disrupt Space is quite a big name, poised to attract attention. For the moment, Philippe Cyr might pale against the commercial capacities such as Manber, but it was evident that the mindset of people like Paliwoda, Cyr, Manber and the Chinese space experts is similar. Space business needs a long breath. Manber's Mir Corp adventure was surely disruptive but had to give in to unfavourable conditions. What

honours Manber is his endurance, creativity and his business accumen – something commercial space, regardless whether it is based in China, Europe or the Americas, needs more than any other sector.

Although meant as an opening remark, CASIC President Gao Hongwei's words sum up in a poetic and sincere way what the Wuhan spirit was about: "Life itself is meaningless; it is the unremitting pursuit and striving spirit of humans that have enriched the connotation and significance of life. As explorers of aerospace technologies and pioneers of commercial aerospace cause, we share a common goal, that is, to exploit a new living space for humans in the outer or even deep-space and expand the range of human civilization through our endless endeavours."

Brilliant hospitality

Explicit Thanks! and gratitude goes to Professor Yang Yuguang of CASIC. He has been an excellent host, making sure that all the foreign guests felt particularly welcome. He was instrumental in creating a warm, cooperative and open atmosphere. After the experience of Wuhan 2017, one is inclined to make sure not to miss the 2018 edition.



Welcome to the CCAF 2017. credit: GoTaikonauts!



CASIC building in Wuhan, on the other side of the road opposite the conference venue Eurasia Convention International Hotel. credit: GoTaikonauts!