



Report Release Event: Lost Without Translation February 23, 2021 Virtual Event

Speakers

Paper Authors

- Ian Christensen, Director of Private Sector Programs, Secure World Foundation
- Rob Ronci, Executive Director, Caelus Foundation
- Kathryn Walsh, Masters Student, University of Denver & SWF Research Intern

Discussants

- Brendan Mulvaney, Director, China Aerospace Studies Institute (CASI)
- Ellen Chang, BMNT/Syndicate 708, Director/Managing Partner
- Blaine Curcio, Affiliate Senior Consultant for Euroconsult

Moderator: Daniel Porras, Director of Strategic Partnerships and Communications, Secure World Foundation

Daniel Porras: All right, everyone. It's coming up on nine o'clock, so I think we're going to go ahead and get started. Welcome, everyone. I would like to welcome you all to a virtual launch event for a new report from Secure World Foundation and the Caelus Foundation. It's called "*Lost Without Translation -- Identifying Gaps in U.S. Perceptions of the Chinese Commercial Space Sector.*"

It's going to be a really interesting conversation, and I'm sure many of you are already looking forward to it.

My name is Daniel Porras. I will be the moderator today. I am the Director of Strategic Partnerships and Communications at Secure World Foundation.

For those of you who don't know, Secure World Foundation is a nonprofit organization that promotes secure, sustainable, and peaceful uses of outer space and thereby contributing to the global stability and benefits of space here on earth.

The Caelus Foundation is a nonprofit organization with a mission to critically engage and expand participation in the outer-space sector.

Both of these organizations, of course, have been working quite a lot in this field and trying to develop a better sense of how to include all the different stakeholders. We always talk about new entrants to the space sector. Chinese companies, the private sector that is developing in China is one of the most watched, particularly by US stakeholders.

There are a lot of questions. Who is the Chinese commercial space sector? What services are they going to provide? What does this mean for global competition in space services? Secure World Foundation and the Caelus Foundation sought to explore these questions.

One of the things that they found that was quite surprising, for all the questions we have, so many of the answers that are being circulated amongst our own Western communities aren't answers at all. It's based more on conjecture.

We don't know very much about the Chinese commercial space sector, and unfortunately, we risk sometimes letting our imaginations create our strategies and policies rather than hard and fast data. How do US

stakeholders get a better sense of the new competition, particularly when it's so hard to engage with our Chinese counterparts?

Now, this paper that's being put out by Secure World and Caelus, it has a singular goal, and that is to increase nuance in the discussion of one of the most challenging and heated topics in the space industry, US-Sino space relations.

This paper raises more questions than it answers, but these questions will help US researchers, analysts, practitioners and policymakers to better investigate and understand the complex dynamics emerging in China's nascent commercial space sector.

We're not here to answer all the questions for you. What we are here to do is to point out where the gaps are, and what we need to start doing in order to better understand the Chinese commercial space sector.

All right, here's the agenda for today. We're going to have a quick presentation from our three authors on *Lost Without Translation*. They're going to give us the highlights and tell us a little bit about the research that they did, the methodology, and what some of the conclusions that they were able to take from that.

After that, we're going to have a discussion with three experts who are also going to provide their thoughts on *Lost Without Translation* and on this process that Secure World and Caelus have kicked off. Then after that, we'll have time for some audience questions and answers.

By the way, let me also direct all of you towards our website, <http://www.swfound.org>, where you can find the report for free, which...Let's face it. These days you can't get data this good for free everywhere.

I'm very proud to also announce that Secure World Foundation is continuing this process of including closed captions for everyone. If you need to find the closed captions button, it's down below. You find the little CC button, click that, and show subtitles. Delighted that we can provide that service for everyone.

Then, of course, we'll be asking questions through the Q&A. There is a chat function of course, but if you want to submit a question that will be answered on air, please submit it in the Q&A box. I would also remind everyone that this is being recorded.

Our authors and our experts. I am delighted to be presenting them, and I'm going to do it in reverse order from how they are presented as the authors of the paper. First up, my colleague, Ian Christensen. He is the Director of Private Sector Programs at Secure World Foundation.

He's responsible for leading our engagement activities with the commercial space sector, and he focuses on policy and governance topics in support of the development of the private sector space capabilities. His work includes topics such as space debris mitigation, norms of behavior for responsible operations, and even space resources policies.

Our other author is Rob Ronci. He's the Executive Director of the Caelus Foundation where he has produced insightful space industry research and co-leads a track two diplomatic dialogue between US and Chinese stakeholders.

Finally, last but not least in any way, Kathryn Walsh, who is currently pursuing her MS in Cybersecurity at the University of Denver, where she graduated with an MA in International Security in 2019. Before attending graduate school, she worked in nonproliferation at Los Alamos National Lab. Kathryn has spent two semesters studying abroad in China, where she developed understanding of Mandarin and regional dynamics.

As you can see, our authors here are extremely knowledgeable, and I'm looking forward to hearing their comments. Ian, let me hand it over to you, sir.

Ian Christensen: I'm going to hand it over to Rob.

Rob Ronci: Sure. I'm going to jump back in here. Quickly, can I be seen and heard at the moment because my Internet just cut out like one of our panelists? I'm on my phone now.

Ian: We've got you, Rob.

Rob: Cool. Great. Thank you very much. It's great to be talking to all of you about our research and to engage with a robust panel and a great audience.

As you are all aware, the US-China relationship is a highly sensitive subject in the space sector. Space is a high-security domain and US concerns with China have already had huge impacts on how business is conducted in the industry. From the expansion of ITAR, the Wolf Amendment, and now Space Force -- these dynamics have led to a largely hands-off relationship with very little direct engagement of any kind. Regardless, as the global commercial space sector continues to rapidly develop, the decisions these two countries make, both together and separately, will have significant implications for the rest of the industry.

With that in mind, our two organizations, the Caelus Foundation and the Secure World Foundation, organized a dialogue with the Chinese Society of Astronautics to help develop a platform to establish a mutual understanding of how both countries are approaching commercialization of space. During this process, we realized that there were significant gaps in basic information regarding how both countries operate around this idea of commercialization, which led us to the research that we're talking about now, where we want to go identify specific gaps and information and misunderstandings that we could address via dialogue and further research.

I want to hand it over to Ian to talk a little bit more about, specifically, what we did.

Ian: Thank you, Rob. This paper compares US commercial space sector perceptions of Chinese private-sector space activities, with narrative discourse and analysis on China's commercial space sector in order to identify potential areas of gaps or misalignment. It is based on a combination of US stakeholder interviews and review of both the US and Chinese written media. The focus on the US commercial space sector is deliberate. We've looked at the startup, entrepreneurial or new space community, but not the prime contractor or traditional aerospace sector.

This work began in a series of in-depth interviews with the US commercial space stakeholders. Each of these interviews lasted between 30 minutes and 1.5 hours and followed a semi-structured guide of open-ended questions. That guide is in the report for those of you who are interested in looking at that.

Interviews were conducted under anonymity. The 15 interviews that we conducted with US stakeholders represented a wide range of space industry verticals and segments, including finance, launch, remote sensing in space operations, and others. I want to thank those of you in our community who participated in these interviews. We do thank you for your time.

Common thematic perspectives emerging from the interviews were then compared with the discussion of similar thematic elements in written narrative including both the US and Chinese sources. This is complemented with an extremely limited number of interviews with Chinese stakeholders.

I now want to hand it over to my colleague, Kathryn, to talk us through some of the contextual factors we need to understand going into this research.

Kathryn Walsh: I'm going to start talking a little bit about China's commercial space companies or space industry.

We know that the US remains the most space-capable country in the world. However, China's space industry is second and quickly growing. The landscape of China's space sector includes a number of actors including the Chinese military, SOEs, and their various subsidiaries.

However, in recent years, Chinese commercial space companies have increased in scope, scale, and the number. Bryce's 2020 Startup Report found that over \$300 million was invested in Chinese space ventures in 2019. Euroconsult's China Space Industry Report found that Chinese commercial launch companies have raised over \$ 530 million in 2020 and the last two months of 2019.

Although quantification of China's commercial space sector is difficult, the Institute for Defense Analyses, STPI, published a first of its kind commercial space report in 2019, and it provided an in-depth analysis of this sector. It identified 78 commercial space companies in China, finding that satellite and component manufacturing, launch vehicle manufacturing, remote sensing data analytics, and satellite communication were among the top categories represented among China's commercial space companies.

To put this in more context of what's going on within China, Xi Jinping has led China in Pursuit of National Rejuvenation and the China Dream. He's seeking to continue China's economic growth and establish itself as a great power within the international sphere. In order to support these goals, Xi Jinping is leading the country in the development and innovation of China's science and technology sectors, which are a critical part of achieving economic growth and also establishing itself as a great power.

The space sector plays a key role in the success both in its contributions to economic development by providing services supporting effective information communications technology among other things. It also serves as a symbol of great power through successes in various launch and space exploration endeavors.

Broad policy initiatives, such as Military-Civil Fusion and the Belt and Road Initiative may have a positive impact on China's commercial space sector through creating opportunities for private companies to support various national objectives, and perhaps create opportunities to engage with external actors. In addition to these broad policy initiatives, the Chinese government has released various policies and other documents, encouraging the growth of the commercial space industry and signaling support for further development and innovation within China's commercial space sector.

We go into a little more breakdown of these in the paper, so I'm going to press forward for the sake of time.

Even though we have all this information available through China's policies and these in-depth reports like IDA's, it's not easy to understand what's going on in China's commercial space sector. Ultimately, there are a number of challenges faced by those seeking to learn more about China's commercial space industry, such as concerns about information transparency and reliability of sources.

For example, the IDA report found that many companies did not have websites. In those that did, not all of them had English sources available, which is leading us to another significant challenge of language barriers. In addition to Mandarin websites without an English counterpart, there are a number of Mandarin-dominated spaces such as WeChat that may provide a window into important and interesting narratives about China's commercial space sector that aren't necessarily available to the larger US stakeholders at this moment.

Ultimately, these challenges lead to a situation of asymmetry, meaning that the Chinese sector knows more of the US than we know about them. This asymmetry can force US stakeholders to make assumptions, and ultimately lead to various perceptions that may not be fully representative of the narratives that are happening within China's commercial space sector.

Now, I'm going to pass it off to Ian and Rob to talk more about what we found within our paper.

Ian: Thank you, Kathryn. I want to start here with a very brief summary of some of the key impressions from our interviews.

Our impression from this research is that US commercial space stakeholders are interested in and concerned about China's space activities. The emerging space industry in the US is looking towards growth and competition. China is a huge part of that equation, and US commercial space stakeholders expect competition with China's space sector to emerge.

Most interviewees expressed a general attitude of being open to or even welcoming Chinese competition, but look for it to be under fair or at least defined terms. At the most basic level, interviewees primarily wanted to know who will their competition be, what resources will they have, and what rules will they operate by.

All interviewees believe that more information on Chinese commercial space activities would be beneficial for US strategic positioning. In the next few minutes, Rob and I will be comparing common perspectives from the interviews to narrative portrayals of related topics, as primarily discussed in Chinese media.

A key factor that emerged from our interviews is that stakeholders' perceptions of China's space activities were inextricably linked to the geopolitical context. There is an expectation or framing of competition with China, as in the state, the country -- or the aerospace sector in general -- and not in terms of specific companies or SOEs versus private companies, etc. Indeed, competition with China.

Perceptions of China's space sector were very strongly influenced by perceptions of the Party, and of China's actions as a state. As the CEO of a US in-space logistics company told us, "Space is closely tied to a nation's strategic objectives, so we have to see it in terms of great power competition, which can then simplify dynamics between the US and China: good guy / bad guy camp."

A key perception that emerged was that China's space sector is viewed in a somewhat monolithic fashion by US stakeholders. This is in part due to the opacity of the system and in part due to strongly held viewpoints on the communist party and on the Chinese state. A space-focused venture capitalist described, "This perception that I have, that I know others share, that these [Chinese commercial space companies] are really state-owned actors that are probably just trying to partner with us to steal our data and our IP."

There is a concern within our interviewees that all companies within China might be under the direct control, influence, or otherwise, direction of the state in China and that key asset of China's space infrastructure and program are under the control of the PLA. There is a perspective that China's space industry is entirely directed through the state-owned enterprises or SOEs.

At the same time, many of our interviewees did admit to a general lack of knowledge of the specific structure of the Chinese space ecosystem. Most of our interviewees express both openness and skepticism to the idea that Chinese companies might be commercial in character. Respondents describe Chinese companies as acting in commercial ways, or as giving the veneer appearance of being commercial. Rob, I'm going to hand it over to you for some reaction to those perspectives.

Rob: Thank you, Ian. One of the things that was very interesting when we were diving into this is we're trying to compare these perceptions to what we could find based in discourse of literature and analysis on the Chinese commercial sector.

Over the question of whether or not the Chinese commercial sector is a monolith, we found that there's many ways to recognize that reality is a little bit more complex than that. One of the best ways that we believed was to look for sources of internal division competition and friction.

For starters, one of the things that we found most interesting and surprising was this identity discourse going on around the term, "the National Team."

The National Team is a term commonly used in the Chinese context to refer to entities or organizations, companies that are directly tied to the national government. State-owned enterprises and companies that are direct subsidiary of those would be considered as the National Team.

Where we saw this term being used in an interesting way was in conversations around commercial stakeholders where, say, you have two startups. One startup would refer to the others like, "Oh, yeah. They're all a young startup. They're a new space company, or they call themselves a new space company, but they are part of the National Team."

The use of "they" in the context that "They are that, and we are not," suggesting that there is an identity and the conceptualization of being part of the opposite of the National Team.

There's not a commonly used term that we saw that signifies those who don't consider themselves part of the National Team, but "private companies" was often used in that context. This was also usually how a lot of conversations were framed that showed sources of competition and friction.

There was one very illuminating quote that a founder of a Chinese space launch startup said. That was, "As much as startups can 'stand on the shoulders of a giant,' they are equally beholden and constrained by it." Which is emblematic of what you'd see for a lot of the aspects of the relationship where you don't see a lot of open direct competition on the business front, but you see it in other ways.

One of the most prominent examples of competition was over personnel and over staff. In 2018, there was a prominent example of a senior employee, at one of the state-owned enterprises, transferred -- or tried to transfer -- to a private launch firm.

In the process, the SOE tried to block his departure through a variety of administrative means. In the process, the documents regarding their efforts were leaked to the public. There was a large social media debate over the relatively poor compensation the SOEs gave to their employees versus private firms.

In some cases, somebody leaving an SOE can triple their salary by transferring over to a private firm. There's a context of unequal resources and unequal standards that has bubbled up into competition and friction, in some regards, regarding personnel.

Another example, there was a document released by the national government to encourage SOEs to engage with commercial firms to try to foster the development of the commercial sector. When this came out, the commercial firms believed that they would be able to do business and be able to do new transactions with the SOEs they had not before.

Some prominent examples, being able to buy a rocket engine, and they made a lot of business plans regarding that expectation. Then in the essence of it they were not going to sell it, and not supply those parts and help those private firms.

Some very embarrassing investor discussions, and was a little bit of a source of friction for a while there, as well.

Moving on to another perception that we saw that we wanted to discuss from our interviews was this perception that there's a belief that the US companies are at a comparative disadvantage because China's commercial space sector benefits from a long-term strategic approach to the space program development -- that is largely driven by strategic competition -- in both the government and private sector activities.

Some quotes that we saw there:

- “a big advantage in China is that they appear to have a long-term strategy that doesn't get interrupted for four years.” This is a common thing that you can see in discourse as well.
- “They're able to execute programs in ways that Americans are not able to.”
- “VCs in this country, the US, tap out after 10 years. In China, that could be 25. If they're in it, they're not going to walk away.”

These are some of the expectations that we saw about that. Ian, what did we see to the counter?

Ian: Thank you, Rob. Without commenting on the accuracy of that perspective, there's a more nuanced context that needs to be considered, and that might somewhat affect it.

Domestic economic and workforce development goals are important motivating factors in China's space sector and are not widely understood in the US commercial space stakeholders that we spoke with.

So, if we look, we know that the Chinese government has very ambitious domestic economic growth goals. Government goal to double GDP by 2035, which implies a four to five percent annual GDP growth reaching high-income status by 2025. The 14th Five-Year Plan, which is due to be finalized shortly, is expected to place the emphasis on urbanization, climate change, and technological independence.

As we look at these factors, the space sector -- and China's space sector activities -- need to be understood within this context, as well as the competition context and the great power dynamic context.

Provincial governments play a key role in China's space ecosystem. These provincial governments certainly respond to policy signals and policy initiatives at the national level, but they also pursue regional economic workforce and technology development goals.

China's private space companies are often focused on internal markets and downstream business and consumer services. They aren't necessarily specifically targeting disruption to the US as the goal, although competition may occur as a result. US companies would also likely be barred from, or otherwise unlikely to pursue, internal to China markets.

Let's take an example of this.

As we know, both in the US and in China, a number of entities -- commercial and otherwise -- are looking at investing in, developing, and fielding very large constellations to provide satellite Internet, broadband Internet services, from LEO constellations. This is an area of activity in the area investment in both of these countries.

In April 2020, there was a decision by China's National Development and Reform Commission, which is a national-level planning body, to add satellite Internet to a strategic list of new infrastructures.

The new infrastructures list was a policy mechanism set up around 2018 to emphasize new areas of technology, infrastructure development within China. So in April 2020, the NDRC added satellite Internet to this list.

Since that decision, several provincial governments have announced plans to make massive investments in similar kinds of industrial parks, which are focused around satellite Internet and satellite manufacturing.

These industrial parks have roles for all types of companies, including the private companies, and the provinces may be competing amongst themselves for success within these parks.

The private companies that participate are able to receive capital and funding from provincial governments, as well as certain facilities and infrastructure access, but they're also able to then use this participation to help raise very large private capital funding rounds. What we see here is a very complex, multi-level ecosystem,

where economic development, workforce development, and regional competition is all rolled up into a broader set of activities.

Moving on, a third key perspective that we encountered is that China's space sector benefits from unlimited financial resources and government support, which puts US commercial companies at a competitive disadvantage. This is somewhat related to the perspective about long-term vision but is more on the actual assets that these companies have access to.

The perception that Chinese funders, both public and private, take a more patient approach to expectation of outcomes and look to provide resources for a longer-term than do their US counterparts.

CTO, a US remote sensing company, told us that they “certainly believe that there's a large amount of government support behind these businesses. They've been very open and overt about it.”

Several perceived examples that we heard about these types of support that US companies perceive include transfer of technology from the state-owned enterprises to the commercial companies, aid from the government in completing foreign acquisitions, government subsidies -- both financial and in terms of facilities access -- and the ability of Chinese companies to offer packaged inclusions. Things such as insurance, financing, other such non-technical factors as part of international sales, and then the role in which the Chinese government links the space industry to its signature foreign policy initiatives. These are all factors that our US stakeholders raised as examples of some of this unlimited support that they perceive Chinese companies receiving from the government.

There's also a perception that the venture capitalists in China operate to a longer time frame, as Rob hinted at before. We had a space-focused venture capitalist tell us that, "I can't invest in an asteroid mining company in the US. That's not going to be profitable for 15 years. I can't do that. The Chinese can. So that patience coupled with the capital will make a big difference in the space sector.” Rob, to you.

Rob: Great. Again, this is a great example of one of those areas where looking into it a little bit more deeply, there's more nuance, and reality's a little bit more complex.

At the moment, very specifically talking about what we saw with commercial companies and not the state-owned enterprises (that's a very different dynamic), but looking at what we've suggested may be private, commercial firms in China.

Experience is that while private and commercial Chinese firms do have access to substantial amounts of buffer capital, firstly the funding comes primarily from private and provincial government sources rather than the national government.

The chart that's on the slide here. That comes from a Euroconsult report showing the breakdown of where startup funding has come from in recent years. One of the lead authors and analysts on that report is Blaine Curcio, who's on our panel today. So feel free to ask him, put in questions later, if you'd like to.

While these companies have access to capital upfront, one of the problems that they face is establishing a customer base and revenue. One of the most commonly cited sources of envy from Chinese companies about their US counterparts is that there's no equivalent to a Chinese NASA. There's no large government customer that is buying from these smaller firms, and as mentioned earlier, there's a lack of regulatory support to ensure that these private firms have market access.

Thinking about the venture capital is a source where the expectation is, they have a longer timeframe for their ROIs. In most cases, they actually have a shorter ROI timeframe than their US counterparts. So it's common to see examples of Chinese firms engaging in revenue generated activities that are outside of their actual business

models, things like marketing and education, to try to find sources of revenue to be able to pay back their investors.

So we just covered were some of the main interesting points that came up during our interviews where we saw that there were strong compelling narratives, but when you looked at some of the research or looked more in-depth, we saw that there were some misalignment. Maybe some gaps in the understanding.

Another quick one before we wrap up, because we do think this one's very interesting and emblematic of some ideology in the space sector, was this prevailing idea that launch would be the area where US and Chinese firms would be competing. A lot of those an expectation that they're competing right now, or it may be initially.

We did speak to a few individuals from US launch firms and they recognized no competition at the moment, or not clear competition, and didn't expect it in the near term. One of the most emblematic examples of those quotes is the third one here: "none of our customers take [Chinese commercial launch] seriously, but as soon as the customers start bringing up, we will start to take it seriously."

While that expectation on launch was there, we did see instead that it was the geospatial companies that we spoke to that have current competition right now with Chinese firms. A lot of it in data analytics and information gathering but those firms were actively engaged in competition. We did not speak to anybody in satellite communications or manufacturing, but we assume that there's more current competition there. There's an interesting disparity between launch and the other sectors.

Moving on to my last slide, please. Implications and further steps. Ultimate takeaway that hopefully we've talked about right here is that the US stakeholders have a clear desire to better understand their full competitive landscape.

They welcome competition but want it to be under fair and defined terms. In this regard, Chinese commercial activities are large looming and not a well-understood concern. The Chinese commercial space sector is complex and rapidly evolving making this even more challenging, therefore we propose a concerted effort to better understand these evolving dynamics.

We suggest that through two approaches. First, conducting more research focused on these evolving dynamics to try to better understand them. Second, host and develop opportunities for direct engagement and dialogue between US and Chinese stakeholders, to allow an opportunity for things that are less well-understood to come up and be directly addressed.

To help foster this, we have come up with a set of four research questions to serve as a lens to be able to focus our efforts in this regard. Kathryn is going to close us out and cover those four questions that we propose.

Kathryn: Thanks, Rob and Ian. I'm going to go through these four questions pretty quickly so we can get to our discussion panel, which I'm sure is going to be interesting and exciting to hear what everyone has to say.

We have four primary questions that we think can help guide future research themes to help get to the bottom of what's going on in China's commercial space industry.

Our first question is, is there such a thing as a private space sector in China, and if so, how is commercial space defined within the Chinese context? We want to look at understanding different types of Chinese space companies that exist and how they operate. One research question that we can look at is, can different types of Chinese aerospace companies be further defined and matched with real-world examples?

Our second question is, what is the nature of internal competition in China's space sector? In this section, the theme is to look at understanding how different types of Chinese companies interact with each other, and how

that relates to how products and services are or are not relevant to the international market. One thing that we could look at within this theme is analyzing the extent to which Chinese private space companies are motivated by domestic versus international markets. Looking at an assessment of where China's companies are looking to compete in international markets with a focus on the commercial space sector depending on how things work out, how things are defined within that market.

Three, what is the role of the Chinese government in ownership and control of commercial or private space companies? This theme is aimed at understanding how various levels of the Chinese government, including the provincial governments, interact with and influence Chinese space companies. How the activities of China space industry relate to the strategic objectives of China's national space program? A couple of things we could look at are the relationship of MCF to China's private aerospace companies. Does it present tangible and effective opportunities for companies that are not considered to be part of the National Team?

Our fourth research theme is, what resources do and will Chinese space sector companies have access to, and will that create an unfair advantage? That's looking at whether Chinese private space companies have access to support or resources that are unique to them, and how that access informs or relates to the terms of competition in the international market.

These four themes will help guide future research about China's commercial space industry. We hope we will get a chance to look at the report to see more details of things that we've talked about today. Now, we're going to move into the discussion panel. Thank you, everyone.

Daniel: Thank you, Kathryn. A good sign of good research is when the authors are willing to expose themselves to a trial by fire. What we've done today is that we've gone out and gotten three premier experts in this area to pose some questions and to get some reactions to this report that we're putting out. Without further ado, let me introduce them.

First, Blaine Curcio is an affiliate senior consultant for Euroconsult based in Hong Kong. Since joining Euroconsult in 2018, he's contributed to a wide range of consulting missions and research reports primarily covering the SATCOM sector globally and the broader space industry in China.

We also have Ellen Chang. She's a principal at BMNT Partners. In this position, she is leading efforts around innovation within the Navy, and energetically grows the San Diego ecosystem that supports National Security Innovation. Ellen is also a co-founder and managing partner of Syndicate 708, a deep tech-focused investment syndicate that looks to accelerate companies.

Finally, Brendan Mulvaney is currently the director of the China Aerospace Studies Institute at the National Defense University. He was a Marine for a quarter of a century where he flew more than 2,000 hours as an AH-1W Cobra pilot. Hoorah. He was an Olmsted scholar in Shanghai, China.

These folks, again, know what they're talking about, and we're looking forward to hearing some of their own reactions. Perhaps, we can start with Blaine.

Blaine Curcio: Thanks a lot, Daniel, for that introduction. Thank you to the SWF and the Caelus Foundation for hosting us, for the excellent report, and really good introduction. I guess I would like to first say, the report, I agree with the high-level findings. I think it was just a really, really well put together piece of research.

I just wanted to start with a framework for how to think about Chinese commercial space, which I think has been discussed throughout the report, but I think there's just a different angle that I will propose here. Then, just a couple of more recent updates that I think are reflected in the report, but just to kind of put them in a somewhat different context.

First, I think just to quickly talk a little bit about commercialization of Chinese space and what is and is not commercial. I think that one of the ways that we can think about this is that in China, oftentimes, irrespective of industry, the government will have a tendency to want to have control over the infrastructure layer of the industry.

If we think about controlling the high-speed railways, networks, or controlling the Internet infrastructure, or otherwise controlling the infrastructure and then allowing services to be built on that, which are a little bit more commercialized.

I think that in the context of space, this has meant that the government has primarily controlled the Earth observation constellations that have been launched up to this point. Most likely moving forward the SOEs will control the broadband Internet constellations. I think this government control of the infrastructure layer is one way of thinking about commercialization. Then commercialization can occur on top of that.

I think to Ian and Rob's earlier points about this recent support from the government toward space, this new infrastructure announcement by the National Development and Reform Commission this is a really, really interesting and an important point to hit on. I think that the NDRC is a very high-level organization and this endorsement has really caused a lot of different companies to really move toward satellite Internet as an industry. I think a couple of interesting questions that are worth thinking about moving forward are whether the formal endorsement - yeah, you could say formal endorsement - by the government of this sector, whether that has changed investor perceptions or investor time horizons as it relates to space.

Certainly, the report is correct in saying that investors have a rather shorter time horizon in China, particularly as it relates to space because there's so much regulatory uncertainty. There's so much pressure to produce short-term financial returns, but if the government at a very high level is being more actively supportive, it's important to think about whether that is going to influence investor's thought process.

One other question that's related to a quite current development is that we've seen about, six or eight weeks ago, iSpace, which is one of China's leading commercial launch companies, announced that they are planning to do an IPO on the STAR board in Shanghai. It was a very, very short announcement. There were not a lot of details provided. I don't think it's a 100 percent certainty to go through. Nonetheless, they've announced it, and it seems like it may happen.

If it does, it would set a precedent for investors insofar as it would give the...There's some plausible exit strategy that if you're getting into a Chinese new space company. That would be the first infrastructure-heavy new space company to do such an IPO. We've seen more of the EO service companies do IPOs on the STAR board, and also some of the traditional National Team type companies. That would be the first such commercial company to do an IPO. Again, something to watch out for.

One other point that I would mention as it relates to the government formalizing their support for the space sector is the extent to which it has led provinces to spring into action in support of different parts of the space industry.

It aligns with a lot of broader Chinese economic development philosophies in the sense that you have a lot of cities or provinces that have quite large budgets compared to what you might have in a comparatively sized city or province in the US, or state as it were. They have a fair amount of ability to do new development zones and this kind of thing.

We've seen a handful of provinces or cities have significant support for space, or for satellite Internet, or for other more specific areas of the industry, and putting these supportive measures into things like a three-year development plan. We're starting to see the government, at multiple levels, start to formally endorse space. I do think that may change investor perception a little bit.

One other thing to think about, and then I'll turn it over to the next couple of panelists, is this idea of Chinese economic development, more generally, as a self-fulfilling prophecy in the sense that you have the Chinese government setting economic development goals. They have annual GDP targets, although there have been some changes there recently.

Generally speaking, you have this very top-down economic development model where there are often repeated slogans that are quite vague but still specific enough to encourage some economic activity. These would be things like Belt and Road Initiative, which is specific enough to start to get some Chinese companies going abroad and doing business in other countries. That's particularly so when you have Chinese financial institutions that are willing to make loans on relatively easier terms because it's Belt and Road.

This idea of self-fulfilling prophecies, because the whole system falls into place behind the regulations that get made at a very high level. This idea of satellite Internet, for example, being endorsed at a very high level. We may see everything fall into place behind that.

Yeah, just some thoughts from my side. I'm happy to answer any specific questions later on. I'm rambling a little bit now.

Daniel: There will be a lot of questions. I'm also sitting here generating my own. We've got a couple of questions from the audience so far. I encourage you all to keep spinning them out. If you don't, I will be able to fill up the rest of the time. Don't worry.

Next I'd like to go to Ellen. Ellen, are you still with us? There she is. How do you see the situation? Do you agree with the report that Secure World and Caelus are putting out, that there are these gaps in the perceptions of the Chinese sector?

Ellen Chang: Absolutely. Let me give everyone a little bit about my background so there's context. I do come from the investment side. I had started Lightspeed Innovations in 2015, which was an aerospace-focused accelerator. That was when many startups on the seed stage were getting going here in the US. I noticed that that's around the same time that some of the Chinese approaches to commercial space had started to occur based on their Document 60 announcement.

I also want to give everybody a little bit of my background. I grew up in Taipei, Taiwan, as Americans abroad, and still have some family there. I came to the States for college, joined the Navy, was involved in the Intel Community, so I have space background there. Was with Northrop Grumman for 12 years in their autonomous systems group interfacing with the space sector there.

Then in 2015 till now, have been quite active within the new space/commercial space sector in the US, looking at it from how do I help grow the new space sector outside of the US government realm as well as from an investment perspective. That's the context here.

When you all came to me to talk about this project that you had, I felt compelled to go re-look at what China was doing. I'm not a China analyst. I do have some family there, so I hear about China often. Here are a couple comments that I have to the comments that were provided earlier as well as to the report.

I'll break them down into three different sections. Information access, or, from our perspective, to what the Chinese are doing, the difficulty of it. In the report, it was called information transparency, meaning that maybe there's some reason or that the Chinese are purposely keeping information away from the public, which could be true.

Does that mean lack of market access for us into China? That's one area that I'll talk about. The domains that they're focused on within China from the government perspective versus the commercial sector that's starting to burgeon, where is their development? What does that mean, whether or not those are Chinese state-owned

industry initiatives or not? I have a couple of anecdotes there that might cause us to think about what's going on as that sector there matures and what it might imply for US companies.

Then finally, the cultural element, which Blaine alluded to. President Xi coming on into that for probably over the last couple of years since he's taken power is quite different than the previous leaders. He's going back to like, "I want to be a Mao-type of person." He wants to be a president for life. A lot of ego there. There's certainly Chinese cultural pride caught up within that, and I'm wondering how we should think about this one personality as he's influencing China moving forward.

Let me dig at a couple of these elements I brought up. Information access. We're divided by language. Essentially, a lot of Chinese are taught English from probably high school and on, so there's rudimentary knowledge around English. They're able to access information about us, but we're not necessarily schooled in Chinese, especially complex written Chinese, since we're young.

How I overcame that? I speak and read and write Chinese. I went onto the websites and reviewed some of the information that the Chinese have, as well as access information on the CCTV. I see a lot of rhetoric, I should say. That may or may not be truthful to what the Chinese are doing.

The way I back into that is to access Taiwanese reporting, which gave me some insights into whether or not some of the commercial sector in China is burgeoning. There's quite a few companies. There's 70-some companies. A lot of them are state-owned or have some state-owned influence. There's a few commercial ones that seem to be moving forward a little bit.

I found it interesting that they're starting to partner, somehow, with the US companies. I know this one company here in the States, Capella Space, which we've invested in. They recently announced a partnership with SpaceWill in China which I believe is a completely commercial Chinese space company, I think for distributing their SAR-based data. So this company, Capella, is just looking for somebody to buy their data, which is interesting and I'm curious. I'm like, "Is that going to open markets for some of our US space companies?"

Even if our US space companies aren't able to...I would say they're still looking for product-market fit in a way. There's a lot of investment upfront, but the product-market fit, or the dollar revenues, coming from the commercial sector in the US is still very fairly paltry if you look at the details. Think through that.

What I see opportunities there is if that data is used to support a Chinese company, that can then sell to a Chinese app company, maybe there's consumer applications. So it's not the Chinese government. It's not Chinese space. It's just consumer applications that take advantage of space-based data. And that's one of the larger markets that's growing here in the US. Would that also be complementary development in China? Food for thought because the Chinese use their mobile devices quite differently than us. They're way more quick to innovate around leveraging different ways of communicating or visualization, or providing new types of services based on some of the data that's accessible. Food for thought there.

My second point, domains. Which ones are truly important from a China perspective? Maybe a Chinese government perspective, as well as a commercial space perspective. We know that from the report, as well as my own research, that their Chinese local space commercial companies are innovating around the satellite component area, and that makes sense.

They do have that manufacturing base there. I'm curious, from that perspective then, are the US venture capitalists looking at those types of companies as potential opportunities for investment.

We do know that Sequoia, one of the largest and most well-known venture firms here in the US, has Sequoia China and is invested in about any large successful Chinese company. Alibaba, Jack Ma, for example, is in their group, and they've been pretty active in China.

I haven't seen a lot of activity in Chinese space companies. One question I have is maybe the space companies are too undeveloped, or the Chinese don't allow for it. Here in the US, we have CFIUS that has reared its head quite strongly especially in 2018. You see the massive drop off of Chinese VC money in US space companies, for example.

My personal experience with CFIUS right now is I'm an investor and helping lead a round for Orbital Sidekick. The CFIUS process so far, with a Singaporean wealth sovereign wealth fund, is going on six months so far and still hasn't closed yet. Food for thought there on kinda the dynamic in the opposite direction.

Then my final point is this cultural pride element. I feel that President Xi coming online is...He's a catalyst on how we're starting to hedge against China. There's a lot of conversation around our national policy and our relationship with China.

Biden came in and recommissioned, and is looking at China. They have a study. The Department of Defense has a study going on, and we certainly need to be concerned. Even this past week, there's a lot of discussion around whether or not China is going to go attack Taiwan, or sequester Taiwan, or quarantine Taiwan. In the meantime, I have a lot of friends who flew back to Taiwan during COVID. Taiwan's doing well. Essentially, the travel between China and Taiwan has stopped, but before COVID started, there was probably quite a bit of different interaction between the two countries even though it's on a non-official basis.

So I think through that, and say, are we too alarmist? Are we inadvertently causing unintended consequences by threatening China in certain ways, and provoking them in certain ways, causing the supply...

The supply chains will decouple, but it's also causing Xi to push forward a little bit more on saying, "This is Chinese pride. If the US is going to do this, I'm going to be able to do this. We have enough money. We're going to go invest in this. We're going to go to Mars. We're going to go to the Moon. We're going to do all this stuff."

In my mind, that's not unhealthy for us because it has started to get us mobilized again. "We're going to go to the Moon. We're going to go to Mars." I find that kind of instigation does stimulate the markets a little bit. It's still government-funded. I do see some of the commercial entities here in the US start to react. Certainly, Bezos himself, not trying, but moving and forwarding Blue Origin or Elon Musk looking for yet another market in space. Those are the US examples.

China, I feel, copies us quite a bit. Just about any large company there has copied one of our models. Alibaba, and all of that, but they focus on the domestic market because they know it.

The question I have about the burgeoning Chinese commercial sector is, "What are they thinking about? Are they copying us, and are they able to get to where we are going? Will they have a domestic market to support, because I'm curious if they'll be able to sell to us?" We're the largest market. All the Europeans are trying to sell to us. Australian startup companies are coming here to raise money, etc. We're still large. We shouldn't be arrogant, but we're still one of the largest out there.

Going back to my argument, I'm wondering if the Chinese can sell to us, even if they were to copy our business models, and grow a little bit more significantly from the commercial perspective. My understanding is most of the government does the development. Whether they're state-owned or not, the government provides the market for launch. The government provides the market for all the assembly manufacturing for even the different initiatives they have. For example, going to Mars or going to the Moon.

I'll pause there and be quiet, and see if you have any questions or want to move on to the next panelist.

Daniel: We'll go ahead, and go through the last panelist first. Then we'll start taking questions. One question that I'm going to throw out there. It surprises me that there are...Is there no institution or centralized organization that focuses on translating Chinese documents into English, in particular, for businesses?

Especially for folks that are thinking about future competition in any domain. That would be a really important set of information that one would want to have access to, so it's surprising.

Ellen: Maybe not for this sector in particular, but yeah.

Daniel: Finally, our last expert, Mr. Brendan Mulvaney. Sir, thoughts from you on this report and the work that Secure World foundation and Caelus have done.

Brendan Mulvaney: That was a perfect leading because that's exactly what we do for the aerospace field.

We do it a little bit more broadly for security and defense, but that's exactly what CASI is focused on. Open source, publicly available information that China's putting out. Everybody speaks and reads Chinese at CASIe, and so that's what our reports are based on.

First of all, thanks for having me today and letting me talk about this. I'm going to talk more about the report. I can talk on my own about defense and security and China issues at large, but I want to focus on this report. Then we'll focus on those in the Q&A session. I think that's where the best discussion is going to happen.

I like the focus of this report. It's always good to get different inputs, especially those that aren't necessarily publicly known. We're not going to go out and hear a bunch of these space industry people making these kinds of public statements.

One, because there's no reason for them to until somebody asked them about it. I think that was a very good contribution, and it helps to round out the overall understanding of what's going on in aerospace writ large, and the space industry more specifically here.

I like the idea that there was mixed viewpoints. They said, 'Hey, here's some of the ideas that are out there. Here's some that are contrasted to public opinion.' Even among the experts that you talked to, there was a variety of understandings of what exactly is going on in China, and how the US is perceiving it. I think that's really important, especially for those of us who work in security and defense. We typically get one line of thinking or one line of information. It's always good to get the market. What is the market seeing and what is going on in the real world? Not what could be done or what is being done behind closed doors.

I thought the report did a great job of acknowledging some of the challenging issues, but not getting bogged down into them. You talked about the future questions to go for research. What exactly is a commercial company? Are there commercial companies in China, and what are the ties to the state? I would suggest adding "and/or the party" because those are two slightly different things in China, but that would be interesting for your research question.

I like the fact that you were very straightforward with saying, "Hey, here's a lot of the things that came up. We're not going to get bogged down into those details because we want to get this information about how the sector is being viewed writ large."

I also thought perhaps in a future iteration, you could go outside the United States. There's a lot of space competition out there. India, Australia, the Europeans. I thought that would be an interesting follow-on project. It would be not just how are the Americans seeing it, but how our allies and partners, and other people around the world, viewing these same questions.

I sit in DC. Everyone in DC likes to look at the DC/Beijing game and think that there's nothing else that exists in the rest of the world. We all know there's plenty of other ideas out there, and some of those are valuable because there are partners in the space. There are partners commercially. I thought that would be a great avenue to pursue.

You acknowledge the role of security and the overall relationship between China and the United States and how that affects the commercial relations, especially in space. One because governments are so heavily major actors in the sector. They have been, traditionally. Maybe that's going to be decreasing in the future, but certainly, all of the technologies we're talking about here are at least dual use. That is going to color things and it's important to talk about those.

I would say that the report did a good job of laying out how China and the United States are different and highlighting those brought out some of the viewpoints of these people you interviewed as to why that's important, and how those are military-civil fusion, a state-owned enterprise, these things which we have no concept of in the United States. Very few people understand what they are. It's important to bring those things to light, and especially as we go forward and develop either policies or programs or just how is our market. How is a free market enterprise going to compete with some of these things, because we certainly can compete, right?

It was good that there wasn't a defeatist attitude. The market brings a lot of good things that state-owned enterprises and party-dominated apparatus don't bring. It's good to highlight some of those things.

Finally, I just want to say I agree with a lot of the views that were expressed in the report and in many of the conclusions that were there. I look forward to see what the next iteration brings because it's important to get as much information out. It's been said multiple times. The first cipher is the fact that it's in Mandarin.

All this information, a lot of it is publicly available, but it's hard to get to. From our end, CASI got a whole new set of projects and documents that we're releasing called, "In Their Own Words," trying to get at some of these things.

As much information as we can get out there to as many people to make as good policy and programmatic investment decisions is what we're looking for. I look forward to the future contributions. I look forward to the next iteration of this report, and happy to talk about any or all of the above when we move to the Q&A sessions.

Again, thanks for having me, and we'll turn it over to your participants.

Daniel: Thank you. Well, in this case, let me ask all the folks who are participating in the event. Our authors, Ian, Rob, Kathryn, plus our experts, Blaine, Ellen, Brendan. Let's all throw our cameras on and participate in this next bit.

A lot of great thoughts there. Ian, would you like to start with some reactions?

Ian: Yeah. Thank you, Ellen, Brendan, Blaine. That was a great set of remarks, also to give us some things to think about both for what our two foundations can do as we continue on with this work and what broadly our community can think about in terms of some of the more...nuanced is the word we like to use...but some of the more detailed questions that we ought to be asking ourselves and our interaction with this topic. Thank you for that.

We've got a few questions in the chat. Rob and I have a couple that we prepared to ask, so we might go there. Rob, from your standpoint, your general reaction to the panel's remarks first.

Rob: Sure. Again, thank you all for all the very thoughtful feedback. We are excited to bring the three of you together because you all have very different backgrounds, and you very much balance some of our backgrounds in your research yourselves.

On one hand, I'm grateful that you didn't tear us apart, but on the other hand, it's great to be able to have a nice and productive conversation with you all. A lot of great feedback and a lot of things to think about, so this is a great conversation.

Ian: We've got about a half-hour here until we told people they could go on with their days. Let's do one question that we prepared in advance, and then move on into the Q&A and come back and forth there.

I'm going to ask, this is for all three of our panelists, are there any aspects of the involving dynamics between the US and Chinese private space sectors -- or commercial space sectors -- that are surprising to you or that you would expect to change course in the coming five or so years?

Ellen: I'll jump in there. I think the US, whether or not China moves forward, it will change course.

I'm quite interested or watching this SPAC evolution where a lot of what I would call deep tech companies -- provided that capital that they can't easily obtain within the venture realm, and then within the space domain -- several companies have gone public via a merger with SPAC sponsors.

Recently, Virgin Galactic started us off last year, and then we have Momentus and several others. I see, from the US perspective, this being a potential catalyst for stimulating quite a bit of commercial activity that hopefully will start to mature the markets that exist.

Right now, it's government funding, etc., SBIRS. Then some of these companies get to the point where they get some VC funding, and then they're not able to scale. The differences have been Jeff Bezos, Elon Musk, and Richard Branson who are billionaires self-funding. Now, these SPACs have provided these other entities some opportunities.

From that perspective, I see that allowing the US to move quite aggressively forward hopefully, whereas in China it's stayed on. US doesn't have a sovereign wealth fund. Most other countries do have a sovereign wealth fund, and so maybe that's the disparity.

I'll pause there, and suggest that the US side might mature because there's additional funding available.

Blaine: To build on that, if I may, it's a great point. One thing that we've seen recently in China is the increasing involvement by a couple of very high-profile billionaire investors, particularly Lei Jun from Xiaomi, and less recently and less actively, Robin Li from Baidu.

It's been a lot more measured...This is anecdotal and it's a little bit speculative, but it seems to have been tapered down even somewhat. To give an example, Lei Jun...Again, he's the CEO of Xiaomi, which many of you may have know. It's a large electronics manufacturer.

He's worth about \$20 billion, so he has a fair amount of money and political clout. He's been funding quite aggressively through a VC of his Shunwei Capital. He's been funding GalaxySpace, which is one of the more well-funded Chinese satellite manufacturing companies that plan to launch this LEO broadband constellation for 5G. Their most recent round of funding, they were officially considered a unicorn, in the official article from GalaxySpace, in US dollars, it said. Whether that is correct or not is debatable, but the official GalaxySpace press release did say that they are a \$1 billion valuation company.

Digressing, Lei Jun, about a year ago, he published before the National People's Congress, which is a large annual meeting of a lot of different delegates in Beijing of which he was one delegate. He published a treatise

of sorts talking about some potentials for reform and also more general development in the space industry. This included some fairly conventional ideas, like saying more government funding and more coordination between the SOEs and commercial companies. It also did include a few more somewhat, you could say, envelope-pushing ideas about private capital and deregulation, this sort of thing.

That treatise appears to have been erased from the Internet. Now, I could be wrong, but a couple of weeks ago, I was trying to find it for a different thing. I dug through Baidu quite deep. I dug through the official WeChat accounts where I was pretty sure it had been published, like the Shunwei Capital. I could not find this treatise anywhere. I could find press releases about the treatise with short little things saying, "This is what Lei Jun said," but I could not find this very long document that he had published. We haven't heard much about GalaxySpace and developing their constellation. They've raised more money, but they haven't launched any more satellites, for example.

It's an interesting point that in China, we do seem to potentially be seeing an increase in the involvement of the state sector perhaps at a time when there's an increased prominence in the industry. That might crowd out some commercial activity, potentially. It's a really interesting point by Ellen.

Brendan: I'll say certainly, the future in China is always dynamic. As we saw recently with Jack Ma, just because you got a couple of billion dollars and you a bunch of people... All these guys are part of the Communist Party and all of them are on some committee at some level.

You got to make sure you're staying within the bounds. I suspect that as we go forward, one of the things that Xi Jinping needs to do is figure out how to reform, specifically, his financial sector, but that'll have a lot of overflows into the space sector and the VCs.

It'll be largely determined if the Communist Party can figure out a way to continue to reform and liberalize, but still manage to maintain the degree of control that they want. That's going to be one of the unknown factors at this point. How much do they want to do it, and how well can they do it. It's to be written at this point, but that's certainly one of those things to keep in mind.

Ian: And how much that affects this relatively small, little sector versus the much larger context of the Chinese economy and the global economy. It's a wrinkle in there as well.

Brendan: That may actually be one of the better things in that it is a smaller piece of the whole thing. They've been able to go unnoticed, but obviously, the Jack Ma issue has reared its head. We'll see what happens going forward.

Ian: Rob, it looks like you have something. Otherwise, I'm going to start, going to go to some of the great audience questions that we have.

Rob: I'm just thoughtfully nodding.

Ian: OK.

Rob: Go ahead.

Ian: All right. We've got several questions in here and I encourage folks to keep putting them in.

I'm going to start with one that has to do with MCF, or Military-Civil Fusion policy. Brendan, I'm going to direct this to you first, and then if any of the other panelists have a thought or reaction to that.

The question is given the nature of the Chinese MCF policy, and the occurrence of personnel shifts between the "National Team," the SOEs, and then bringing in the Party's ownership as Blaine mentioned, or control over the infrastructure layer.

Given all of this, can US firms be confident in partnerships with even nominally commercial and private firms in China? What does this mean for US policy? It's a big question. How does MCF influence whether you partner with a Chinese firm as a US entity?

Brendan: Sure. That's a great question. These are one of the things that...Thankfully, recently, Military-Civil Fusion has gotten a little bit of "umph" here. CASI did a pretty in-depth report. Looking at the broad picture, it's a national strategy. It's not just a policy, which is important to understand how it fits across their entire strategic apparatus. They only have a handful of national strategies and this is one of them.

The other thing is, this goes back essentially to the founding of the PRC, but Xi Jinping has put more emphasis behind it since he's taken power. What Military-Civil Fusion is looking to do is to leverage all of the non-military things, and bring them into the military domain when they want them to.

I need to be very clear that this doesn't mean that Huawei and Xiaomi, and all of these other companies, are necessarily simply handing over everything over to the PLA willy-nilly, or everything they get their hands on. Certainly, some of the more commercial companies have financial interests which are important. They want to maintain control over what they view as an intellectual property and their ability to get market share.

We do need to be very clear-eyed that this is a national-level strategy. There are laws that back it up, and that when push comes to shove, besides the fact that all of these companies...Like I said, their leading members are most likely Party members, and if not their position but certainly their influence to the Party and their roles in the Party. For the most part, a lot of them actually believe in the Communist Party and the leadership. The great things that they've been able to do for China, bringing 300 million people out of poverty and increasing education.

They're actual Party members and believers at this point, but that the Party can use this apparatus to transfer key information, and when push comes to shove, key facilities and key access to the state-owned enterprises. Not necessarily just the PLA, but certainly other organs in the state.

Does that mean we can't trust the contracts? Absolutely not. China, by and large, likes to adhere to the contracts that they sign. They like to have a good commercial footprint, and they see all the good that comes from interacting with international trade and commerce and all the goodness that that brings. They want to be responsible partners because they want to be able to grow that sector. They're not out there to cheat people or to lie on contracts, or to go back on them.

So, depending on what a US firm is looking to do, certainly, Chinese partners are great partners because they provide access to markets or labor -- or other things that US doesn't have -- but when making those decisions, you need to be clear-eyed that this is not the same as a US market. That there is potential for that to be transferred to the state at some level.

Hopefully, that answers the question, but happy to continue to expand if it didn't.

Ian: Thank you, Brendan. The report CASI put out recently on MCF, we referenced that in the paper. Those of you who are looking at the paper, that reference is there, and you can go find that. I do recommend that you read that if you're interested in the topic because it's a very useful resource to have. Blaine...

Blaine: I was going to say one very small thing I would add to that if people are interested. It was published by CSIS. There was recently a report about COMAC, the domestic airplane manufacturer in China. It was the C919, although it may have been the ARJ21. Either one of the two airplanes that they're developing, a report

about how the vast majority of the components in the airplane were either from foreign suppliers, many of which were American suppliers.

Now granted there's not as much Military-Civil Fusion in the aerospace industry, but it's still a rather sensitive industry. It does seem to be one that's been quite lucrative for American suppliers in China.

Again, I think it was the CSIS that had published a short but still quite good report, and then there was a quite cool video from about a month ago. Maybe worth checking out.

Ian: Thanks for that. Ellen, you raised in your remarks your portfolio company Capella and SpaceWill. That is an example of where those relationships can possibly develop if you are diligent about your contracts and you work that out.

We did hear a number of examples in the geospatial industry folks that we talked to where those partnerships do exist, and there's active competition. Both parts of that relationship do exist clearly in that geospatial sector.

All right. The next question I'm going to take from our audience is a question that does pertain to something that was in our findings. Rob, I'm going to direct this at you to start, and then Blaine, you might be good to come in as well, and others.

One of our bullet points said that there's a narrative in the Chinese literature around the private space sector that there isn't a Chinese equivalent to NASA in terms of how it relates with these "private companies."

The question is, "What does it mean if there isn't a Chinese NASA? Who funded and managed the lunar missions, the Mars missions that we see? Are private space companies in China not part of that supply chain that the CNSA -- which is the civil authority in China -- is accessing?"

Rob, maybe if you can come in a little bit, more detail on that finding, and then Blaine have you react to that from what you see from your analysis of the roles there.

Rob: Great. That's a very good question, and that was probably me moving through that little quickly. Specifically, what we're talking about there is this recognition that there's no equivalent to NASA in terms of a very large dedicated customer building on the market.

One of the most common comparisons we saw is this company, LandSpace, iSpace, whomever. "Is this the Chinese SpaceX? Is this who the next SpaceX in the Chinese version. Partly, you see that in segments all around the world, that comparison.

SpaceX is the icon that everyone looks towards, but in the Chinese context, there's a prominent conversation around the fact that, "Well, SpaceX became SpaceX because there was a very large customer." -- in terms of NASA, and other parts of US government -- but largely that idea that NASA is funding huge parts of their development and helping a lot with the development costs.

The concern that a lot of the Chinese companies seem to express was that, "We don't have the same thing," and that's what we're missing out on. That's specifically what we were talking about there.

Then as to the private sector's involvement with the lunar and the Mars missions, I'm not entirely sure the extent of that, so I'm going to pass it over to Blaine. My understanding is that for private firms, it's a common concern that they don't have as much ability to participate as the SOEs do. Blaine, your thoughts?

Blaine: Yes, it's an interesting question. The comparison of NASA compared to the CNSA, and the degree to which they're each able to support both large and small private sector, space actors in their respective countries.

The first point that I would mention is that the CNSA, the Chinese National Space Administration, they are more of a figurehead organization as you mentioned in the report.

They don't give contracts to commercial companies. Most of the big projects would be done by CASC, and the contract would be given to CASC. CASC does not have a lot of incentive to subcontract out to commercial companies.

Within CASC, there are 8 or 10 very large subsidiaries, and within each of those very large subsidiaries are several sub-subsidiaries, each of which have specializes in some very specific, space-related technology.

Then CASIC, which is the secondary SOE that you mentioned as well in the report, that they have some certain space-related capabilities as well. CASC would give some subcontracts to CASIC because there's a lot of commonalities there, you could say.

There's not as much of an ability for the government in China -- let's say, for the Chinese space program -- to directly support commercial space companies in China. The mechanisms are not as much in place, and the incentive structure is not as much there.

That being said, a good friend of mine in China, he always says, "It's rather hard to start a commercial space company in China, but it is even harder to kill a commercial space company in China."

Which is to say Chinese commercial space companies, partly because of the uncertainty and regulation -- and the requirement to pivot -- and partly because of the initial skepticism around commercial space in China that persisted for several years after 2014 and now partly because of this huge increase in the number of space companies.

Chinese space companies are quite scrappy. They're quite resourceful, and they adapt very well. There are a lot of informal and formal small-scale ways that the States will support these companies. You do have a lot of provincial support for commercial companies in way of free land or tax incentives, or other such things.

You have institutes like the Chinese Academy of Sciences, which is a huge institution. They have tens of thousands of academics, possibly more than 100,000 across many disciplines.

A lot of people in space, and a lot of Chinese commercial space companies, would have been spin-offs from the CAS. They might have offices in a CAS building and are probably paying very, very low rent. That allows them to be nimble, I would say.

The other thing is you have so many universities in China, and so many institutes other than the CAS, that there are a fairly large number of opportunities for commercial companies to sell components -- or otherwise CubeSats to these universities -- even to some high schools or international schools. There's a very large, comparatively speaking, market for those things.

We've seen companies like Commsat, which is one of the leading commercial satellite manufacturers now. Their initial business was selling space-related equipment and courses to schools, and it was some single-digit million us dollar per year business for them, which it still is to this day. It helped get them going, and has helped keep things going at certain points now.

There's certainly less structures and mechanisms in place for the high-level space administration within China -- the CNSA -- to directly support the commercial industries in China, but there are a lot of smaller-scale ways.

One last point that I would close on is that moving forward, as some of these commercial companies are developing quite specific and quite high-end technologies, there's probably going to be increased scope for CASC and others to be buying technologies from these commercial companies in China.

If you get a Chinese commercial launch company that perfects liquid metal-ox engine technology before CALT or SAST does, there's probably going to be some potential for some business there. I would also point out that these commercial companies, and the rockets, the measurements are the same to the centimeter as various Long March rockets as well.

Ian: All right. Any other panelists want to react to that? We've got about six minutes left. I've got one more audience question, and then a wrap-up question, that I want to do.

Brendan: Real quickly, I'd say he hit the nail on the head that there's a lot of money in Chinese space, but most of it is internal to the Chinese state because that's the biggest customer.

CNSA is putting a lot of money, a lot of effort. They're going to the Moon. They're going to space. They're building space station. They are over Mars right now. The PLA. Lots of interest in space. There's a lot of money there, but it's mostly internal, which is different, because NASA doesn't own its own company. They have to go out and purchase it on our market, which is why it's structurally very different.

Ian: One of our further research areas is how we can document this structure in a more accessible way. A question from Andrea Malleter, a former colleague. Just a quick answer. Blaine, Ellen, this might be best for you to address.

Are there truly private investors in China's space sector? We talked about whether companies are truly private or not, but are the investors truly private? Then from Ellen, from your standpoint, how does that relate to how our VC sector, our investment sector, interacts with the investment sector in China.

Ellen: Sure. I'll jump in there. To be frank, I don't know if there's true private investors in China, at least in this sector. I believe many of the other sectors that we hear about that are burgeoning AI. There are private investors, but the market is pretty anemic.

We heard earlier that even their venture entities require a quick return on investment, and basically saying that our venture capital industry even has a longer-term view which in my mind, for deep tech types of companies, I scoff because that's not my experience here in the United States.

Most of the Silicon Valley folks like to invest in software which has a unit economics that have high gross profit, and even net profit margins, etc. whereas deep tech tends to take longer to mature. It's harder, at least for even any type of deep tech, not just space companies here in the US, to raise.

What I will say is that there are successful US investors investing in China. I did mention Sequoia, and there's several others. A couple of things, what they do, they structure their own entities over there in China. They hire locally. Some folks, they capture some of the well-known entrepreneurs that are in China to work with them.

That gives them access to entrepreneurial talent. That allows them to grow their stakes or at least be successful. Beyond that, I am not that familiar with how those interactions work.

I know that from my perspective, since I do work within national security, we watch -- I watch -- some of what US investors are doing there, and try to understand what Sequoia is doing with their US investments, too. I don't know if there's a big firewall or not.

Recently I was involved in having to restructure the investors within a US company because there was Chinese money through a variety of different structures. Over time, you pick that apart and you start finding that out, and then you have to restructure those investments.

What I can say though, and the difference -- and I can provide all of you this information -- is that the US venture investment in China had far outstripped Chinese venture investment in the US up until 2018-ish when CFIUS happened. More strict enforcement of CFIUS occurred, and then both of them dropped down.

I guess China is retaliating with us, as well as we're already putting clampers down in order to manage Chinese investment in some of our frontier types of companies.

Hopefully, that answered your question somewhat, but if not, I'm happy to circle back.

Ian: Blaine, if you have anything to add to that?

Blaine: Yes. From my perspective, I would say there is private capital in the Chinese commercial space sector. It's a matter of degree. There are probably zero companies that are completely owned by private capital, I would venture to say.

I would say that many of the companies in China that are commercial companies would have maybe 30, 50 percent, or sometimes more than 50 percent, although it's not ever particularly clear.

This type of number, of their capital coming from either a central government VC, or a provincial government VC, or a CASC VC, or a Chinese Academy of Sciences VC, I use the term VC there quite liberally as they're all VCs. I don't know if that's necessarily true.

Anyway, one of these few different sources. I would say to Ellen's point about the private capital that we do know is in China at the moment. There are the US VCs. You have Sequoia. Matrix Partners has a Chinese branch as well that has invested in a couple of space companies.

On the Chinese side then, we do have the aforementioned Lei Jun, who's the CEO of Xiaomi, through his VC Shunwei. They've invested in a handful of commercial space companies. There's a few other pretty big ones.

Within the private funding, there would be the VCs that are quite focused on space, or on frontier tech, within China. Then they would have to be on these 5 or 10 different investments in space companies. We're starting to now see some of the larger, more general, VC or PE companies investing in some of the space companies.

One quick anecdote and then I will stop talking because I know we're getting close to the end here. Landspace, the leading launch company in China, or one of the leading commercial launch companies, I should say. They raised RMB500 million, about \$75 million, in late 2019 in a round that was fully done by Country Garden VC, which is a private real estate company in Shenzhen. It's a large real estate conglomerate that is diversifying in different industries.

We've seen some large rounds that have been done by commercial companies, but again I don't think any commercial Chinese company is fully owned by private capital.

Ian: All right. Thank you. We're at the end time. I'm going to turn it over to Rob to ask a wrap-up question, but I want to thank you all for this dialogue. We could probably keep going for hours here, but I think we all probably don't have time to keep going for hours here. Rob?

Rob: Great. Thank you. Thanks, everyone for hanging out for a couple of minutes over the end here. We'll wrap things up, but this was a great conversation.

Ultimate takeaway, the thing that we wanted people to take out of this. We didn't answer a couple of questions there, talking about the larger context. It's just that, this is an issue of concern for lots of commercial stakeholders in the US, and it's a conversation that is held in lots of arenas. What we wanted to do is show that there needs to be a little bit more nuance in the conversation and that there's some hard topics that require some further digging.

Coming to the final question, I'm going to bring this back to the beginning that this research was inspired by a dialogue that we have started with the Chinese Society of Astronautics.

What I want to ask the three of you -- and I'll start in reverse order from how we presented -- is, are there any topics, now that we've had this conversation, that moving forward you think would be fruitful in a dialogue, or any topics that would not be fruitful?

Any thoughts and things that we should be discussing? We'll start with Brendan.

Brendan: Thanks, and thanks again for putting out the report because it's important to get the information. If you could find out how the Chinese, going forward, are going to...I'm going to use the term "liberalized." That may not be the right term, but how are they going to open their sector and disentangle it from specifically the state or the PLA?

That's obviously one of the major concerns that the United States government has. All the stuff gets tied back to the PLA, and strategic competition. Again, there's plenty of opportunities to cooperate, and there's some good investment opportunities both ways, but if you can figure out what the...

Again, I would guess the Chinese themselves don't know because they're still working on it -- but that would certainly be a fruitful dialogue -- is how are they going to develop a private commercial, whatever you want to use the term, space sector that's focused on economic development, and things like that.

It is a big concern. It's a lot of interest for them. They have the space corridor as part of the Belt and Road Initiative and all that stuff. If you can try to start to pull some of those threads against on those details, that'd be very helpful.

Rob: Great. Thank you very much for that. Ellen, your thoughts?

Ellen: My thoughts might be a little bit more along the capital side. The different side of the coin of what Brendan mentioned, which is in the capital coming to stimulate that sector to help move that sector forward, are there private investors coming into the fore because that's an indicator as to the maturity of the growth there. That might lend a little bit more insight into what they mean by civil-military fusion. If they're going to investor side civil-military fusion in order to promulgate and push the industry.

Rob: Sure. Definitely. Thank you. Blaine, final thoughts?

Blaine: One very important question to think about moving forward is...In this world of increasing nationalism, and increasing desire by governments to make things within one's own country. This is the world that we're living in.

We're now seeing the space industry starting from a comparatively low base, relative to aerospace or aviation, in the sense that China, it seems like, whereas they import a lot of things from Boeing or Airbus to big airplanes, they're trying to do a lot of the space industry technologies from the ground up at an earlier point in time in that general industry development cycle.

One thing that we've seen as a broadly consistent theme from China is a general desire for self-sufficiency even before it was fashionable among all governments.

I do think that moving forward, we're likely to see this desire for self-sufficiency, and this relatively early stage of broad industrial development in the space sector compared to other industries.

That's going to allow China to do a lot of things themselves, and there's still going to be things that they cannot do with themselves, probably. There's going to be technologies that they've never even thought of that we come up with, and vice versa, I suppose.

That's going to probably be the playing field that we're going to be playing on, that backdrop. An important question is how can we address that and fit into that.

Rob: Great. Thank you very much, all of you for that. That was a great note to close on. I would add that this conversation is ongoing. We're hoping to do more research and engage on this issue into the foreseeable future.

If anybody would like to participate or join us in these activities in the future, we're happy to hold these conversations with anybody who wants to participate. We'll hand it back over to Ian and Daniel to say goodbye.

Daniel: Sure. Ian, any final thoughts?

Ian: Yeah, just from my standpoint. Thank you to all of the people that attended and participated today, and thank you to the panelists.

Thank you to Rob and Kathryn for working on this report since May of last year, and thank you all for the suggestions for our next topics, to pick up both in the dialogue and research.

Daniel, take us out.

Daniel: All right. That's it. Hopefully, this is the beginning of a fruitful dialogue. I invite everyone to head on over to Secure World Foundation's website, swfound.org. Check out the report.

Again, we're very eager to hear, and to get plenty of feedback on this, and to see what next steps we can take. Thank you so much, everyone.

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