“The biggest short-term challenge facing the commercial space industry is launch cost.  Depending on who’s numbers you believe, current launch costs are $25K - $40K per kilogram to low earth orbit.  Those numbers increase for deep space.

The biggest intermediate challenge is finding enough applications to support a robust enough commercial space industry to foster innovation and competition to help drive down costs.  Due to costs, there are very few commercial applications for space (chicken & egg argument).

The biggest long-term challenge (to human space travel) is human physiology: humans evolved to operate best at 1g and 760 torr of a 78% / 21% nitrogen / oxygen mix.  Prolonged exposure to micro-gravity and different atmospheric pressure / mixture has severe long-term health consequences.”- **Dan Kloop**

“I do not work the Commercial Crew programs, so I am not in a position to provide any particular insights into challenges they are facing.  We are all closely following their activities and hoping for their success.  We need to achieve the capability for sending our astronauts to ISS, without sole reliance on our Russian colleagues.”- **Michael Ciancone**

“There is only a finite amount of bandwidth and a lot of people want it.  Heavy hitters file plans for a LOT of satellites to grab that bandwidth.  The international community has to decide who gets it.  And the astronomers, who have no voice, have to pay the consequences.  We, the consumer, continue to be lured by ever increasing bandwidth candy – 4K, then 8K TV, Internet of things, broadband, all wanting to communicate using the same RF world. Ground RF world.  Space RF world.  3G phones, then 4LTE, then 5 Gen… Frequencies vary, true, but we continue to pump more and more transmitters to space, and use more and more of the spectrum with larger and larger transmitters (or small and numerous) due to bandwidth candy needs.  On the positive side, when you turn off a transmitter, the energy being pumped into its spectrum stops.  For that one frequency range, things quiet, locally.

For decades the world has dumped its space junk (upper stages, dead satellites) in orbit.  We continue to do so.  The average conjunction (orbital intersection) velocity is 10 km/sec – many times the speed of a bullet.  Hard to armor against.  Space is/was big, but how many small pieces are in the 1000’s of tons of hardware floating around up there going random directions.  Something the size of a BB will damage a satellite.  Something the size of a marble will destroy one.  The ISS is armored against the marbles, but has had an incredible number of smaller impacts.  We can track stuff down to the size of a softball, and are improving that down to the size of a golf ball.  How many marbles can you fit in a golf ball?  How many marbles will a single old upper stage be broken into.  And it all slowly, slowly descends and disintegrates into smaller and smaller pieces….    On the bright side, the small stuff burns up on reentry, and does not hit the ground.  The large stuff can be tracked, and ground impact predicted – not controlled in most cases, but predicted.

Due to item B, we are now putting satellites up (item A) that will be autonomously maneuvering to avoid what the ground has said is up there.  It’s like driving across a vast desert with your eyes closed, maximum car speed, with a lot of other cars driving there too, and being told to turn right, or turn left, and the person giving the direction only seeing a very small fraction of things you can run into.  Never stopping or slowing down.  And those things will soon be maneuvering.  They can only see the cars and semi’s – not the motorcycles or bicycles or tortoises that are crossing the same desert, in random directions.

Spaceflight debris issues have always been statistical (driving across the desert with eyes closed).  The statistics are getting interesting!

If someone can figure out how to make money off debris cleaning it up, it will make them very, very, very rich, even though the actual mass of debris is small by ground based standards.  Space is big, and self-cleaning, given enough time.” – **Warren Frick**

“ITAR - most of the GNC related hardwares are ITAR-regulated. Finding the ITAR-free GNC hardware that are orbital rocket class is really challenging. I personally think it is the right moment to lower the barrier for the sake of the evolution of the space industry.

MTCR - basically all of the orbital capable launchers are categorized as MTCR class 1. Which means it is considered to be a launch vehicle capable of carrying a nuclear bomb or biochemical weapons weighing 500 kg to more than 300 km range. Since we're launching our vehicle in Australia, it is really difficult to transport the vehicle outside South Korea.

Lack of clear regulations and management criteria on orbital debris disposal - although there is a pending ISO standard, we still need a clear-cut regulation on debris management. I'm sure you've heard the news about Starlink satellite almost hit a European meteorological satellite. These problems would arise even more seriously when the smallsat constellations start to deploy rapidly.

Lack of tangible vision for smallsat industry - we talk about constellations, but it honestly seems to me that the constellation itself is the purpose, rather that it is a way or means of achieving certain tasks. In order for current satellite industry to be truly viable, there must be a better justification for deploying these smallsat constellation plans.

JWST - I hope it really succeeds. If not, it will be a financial disaster of the space industry for the next decade. I'm afraid if the NASA won't be able to conduct any more large science programs in the future.

Are we ready for the bubble collapse in the next decade? - although we're also one of the few hundreds of launch vehicle manufacturer today, I'm worried that there will be an ice age of VC investment within the next decade when most of the small LV developers fails to survive.” – **Yoon Shin**