

Lieutenant General Steven L. Kwast
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America's Spacefaring Future

Lt. Gen. Kwast: Hello, Schriever Fellows. I'm Lieutenant General Steve Kwast, Commander of Air Education and Training Command, and I want to congratulate you on this momentous occasion where you have been chosen to think about and study the enterprise of space for our nation.

This is a unique time in history, and I want to start by just sharing with you a few of my reflections as an astronautical engineer who has been studying the technology of space, strategy of warfare, human nature, and capabilities over the last 32 years. And just frame the picture without restricting your freedom to go anywhere you want, but just to reflect on a few universal truths that hold up in the test of time and the test of history.

So I'd like to start by saying that you live in a unique time in the history of our nation and that is that we are at an intersection of technologies and great competition powers that make a sense of urgency key at this juncture. And why I say that is because the time line of the technologies that sit on the table today, that have truly not been put together with a unique idea of operationalizing space and protecting an economy where mankind is going into space. The time line of those technologies is not on a 100-year path or a 50-year path. It is on a 10-year path, and America, if it wants to change its strategy with regard to space, it's got to be on a 5-year path or at least something that gets us there quicker than our competition.

And that's the second part of this, is that our competition is on a footing and on a pace that is not slow. And they have an ambition and an aspiration to operationalize space and to break open that economy into space that will have implications for our national security, our politics and our economy.

Journeys like this generally do not happen by the institutions themselves. In other words militaries and civilizations don't tend to change their strategy dramatically unless there is a crisis and/or there is leadership that's willing and has the political and money, power, to change it.

So these journeys only really change when there is policy and money that is aligned to a purpose that shifts the strategy.

Now my fear is, and the reason for my sense of urgency is that back in World War II we were able to recover from the surprise of Pearl Harbor. We had the luxury of turning to a might industrial base and building up the power to paralyze and crush both Germany

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and Japan. Space, though, has a unique characteristic where it is ubiquitous, it is a network in the way it behaves, and a network has the characteristic of not only being able to deliver power to one node or all nodes at the speed of light and simultaneously, but it can do it at price points that are not linear. Meaning the linear model is if you have one activity and it costs \$10. A second activity is going to be \$20. In a nodal networked model you can deliver power to one node and the second node is not twice as much. It's a fraction of that. And one node or all nodes is a very incremental growth, not a linear growth in cost.

So space is powerful enough to deliver any effects, anywhere on the globe, with speed of light and cost efficiencies that you just do not experience in something that is not a networked model.

So if we get surprised in space it can be existential before we even get started. We may not have time if, for example, China were able to keep us from launching anything, anywhere into space. Because they own the high ground, we may never have the chance to turn to our industrial base and say save us, because that takes time. There are certain temporal dimensions to these journeys, and it takes time.

So this is why we need your thinking up front. We need you to study history, study technology, study capabilities, study human nature, and study culture, and help us design a journey into space to achieve what our Chief and Secretary have asked for and that is let's operationalize space and let's think about this for national security purposes.

Now, the real main event here is not the fact that we have a space guard or any kind of guardianship of the marketplace of space. It's the fact that we are breaking into a new market. That's the powerful trend of history.

Whenever a civilization hits a slowdown of its economy -- and all of the analysts and economists will tell you that we have a global secular slowdown of our economies -- that the great winners of that moment in time are those that break into new markets. And there are two markets that we're breaking into. One is cyber and one is space. And the two of them are very tightly coupled.

Now we don't know what we're doing in cyber yet. We're like teenagers in cyber. And in space, we're like infants. Space

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right now is like the balloons of the air where we don't have any maneuver. We can just see a little further. But we really are not able to dominate.

So space. A sense of urgency and a sense that when we break into a new economy the growth of the economy is the foundation of national security. The growth of the economy is how a civilization sustains itself. And as this activity of America saying we are going to move into space with our people, our politics and our economy, that is the big event.

Because with every new economy there is something foundational to the human condition that you will not benefit from that new economy if you do not have protection.

Now we are breaking into this new economy not just because of economic growth. We're breaking into it because of other deeper parts of the human condition that you cannot quench. The sense of purpose and drive to explore new frontiers and to discover. The ability to write more American stories and human stories on a new canvas. The ability to move into new places and create new adventures, new loves, and new heroes. Space is inspiring, and the human spirit craves inspiration.

These are the main events. But we can't achieve success unless we protect them. Protecting space and the economy of space is key. Because wherever there is potential money, wherever there is potential money, and space you could say is one of those environments that has almost unlimited money.

When you have money, you will have other bad actors that come and try to steal it away.

So let's talk about each of these.

First, let's talk about the economy. There's a lot of articles out there that talk about the trillion-dollar economy out in space. But a deeper analysis of the evidence will show you that it's almost infinite. A trillion-dollar economy is to underestimate its power. Just the asteroids alone and the rare earth elements and the ice on the moon that can turn into water and fuel is just a fraction of what we're talking about. Asteroids can also support over one million times the amount of capacity the earth can sustain for human life.

So in addition to this marketplace of money, there is also a marketplace of opportunity for humans. Not only to live and

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thrive in space, but also to have a place to go if there's ever any problem with earth. Whether it's from an asteroid, from a disease, or any kind of scourge of human nature or of nature that can threaten human life. This is the broad arc of history that we sometimes forget because we've lived in such a cocoon of protection and security for so long that we forget the fact that there is a cycle of asteroids and of contagion that can wipe out from the dinosaurs to the human race, and there's nothing you can do about it unless you have a sanctuary to go to.

This is why Elon Musk and Jeff Bezos are motivated. They see this broader arc of history and their eyes are on a broader horizon.

So back to point number one. Security is required, because as human beings go and take risk in this space, and actually build economic value, pirates, thugs and thieves will infest that area and they will steal everything they can. And whoever gets to this space first will set the values of international law, international norms, the value of human life.

So America has always been international and inclusive on this journey into space. But somebody will have to set the values. Somebody will have to provide the public works that protect people, property and values. Protecting people, property and the rights of people that are there based on values has always been the journey of any new frontier because policies, laws, and the rule of law and the justice by force if necessary to enforce those rules of law have to exist or it becomes chaos, it becomes bedlam, and it becomes anarchy. Rules help the human spirit and the human condition actually make productive progress in any new marketplace.

Historically, this investment in the guardianship of a new environment is relatively small. The analysis will show you that it's less than one percent of the GDP that it generally takes in order to protect the place through some kind of strength. And this is peace through strength. This is not creating a space race.

There are those that will suggest to you that we should not invest in anything that has any kind of military component in space because it will just start a space race and encourage others to weaponize or operationalize the same space. That has been a refrain throughout history. When the airplane was first invented there are people who said it would be immoral to operationalize the aircraft because it just means that bombs

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would be falling on people's heads. Likewise with the invention of the submarine and the torpedo. People said do not go there. Do not build it because it will just encourage others to build it. And that's not necessarily a bad thing. That's people that do not want violence in our world. I don't want violence in our world. No self-respecting warfighter wants violence. That's why we exist. We exist to be so strong that deterrence rules and we do not have to invest in any kind of lethal means because lethal means are not required. But human nature teaches us differently. That if you do not have strength and the force of power in a new environment, only the evil will survive and the good will be destroyed.

So history is filled with analysis and fact that strength buys more growth and more security than it does conflict or war. So as we move into space, if we ignore this fact we will have conflict in space. If America builds the ability to guard people, property and values, we have a fighting chance at peace.

The key to this journey is something, though, that America has not done in quite a while and that is couple this journey with the industrial base. What do I mean by that? Well, when you read Mahan and his theory of sea power, or you read Billy Mitchell and his theory of air power, they both understood that the most powerful journeys of mankind into a new environment will only be good for our security and our economic vibrancy if it is connected to an industrial base. The industrial base is the key. And if that industrial base accentuates cheaper price points and more mobility in transportation, energy, information and manufacturing, it can change the human condition.

There were men and women who would stand on the edge of a river and some would say this is a barrier to me. There were others that stood at the foot of that river and said this is a highway to new markets. Likewise with the oceans. There were people that stood on the shores of the oceans and said this is a barrier, and others that said this is a highway to new marketplaces.

Make no mistake, space is a highway to new marketplaces, and if we build the infrastructure, the services, the transportation, the energy, the modalities that make humans capable of creating wealth, space will be a highway to new marketplaces for America. But those marketplaces and those highways need something to keep them safe.

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We've done this three times in our past. We did it with the great Western expansion. Lewis and Clarke went out there as pioneers, looking for what was possible, and we built the great railways, and then the highways that followed. With those railways and highways popped up towns, gas stations, restaurants, which was economy, it was commerce. And we protected them with the cavalry, the military, police forces. We always had security.

The second great expanse that we went into was the great wide-open oceans, and we have the great white fleet and the Mahan Doctrine and the theory of sea power that brought security to a global commons of commerce to protect everyone.

And then the air. Billy Mitchell talking about air.

Each of these, though, built an industrial base. The industrial base of the automobile, the train for the westward expansion. The industrial base of the great white fleet and the merchant marine for the seafaring nation that built our economy. And the industrial base of our aerospace industry, the largest export economic industry in America.

The same has to be true in space. And right now we have an industrial base. It is in its infancy stages but it is struggling. There is a role for the state to play at accentuating the industrial base of a new economy in order to make it competitive with our competition.

If we sit back and do nothing as a nation, other countries that are motivated and see the power and potential of space will out-spend us and beat us into operationalizing space, and if they get there first, their values will rule and we will be under their foot.

So as we build these highways and new marketplaces into space, we need to lay an investment in the future. And like with every great investment such as your investment and savings in the bank, it grows with interest. An investment made today will reap huge benefits in the future. But even a one-year delay in that investment can cost you big. Time matters. Aggressiveness matters.

And this is where I come back to where I started from, a sense of urgency. A sense of urgency not only for the fact that our military, political and economic life could be in harm's way if we are not in space first. But also the benefits to humanity in

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energy delivery, transportation modalities, manufacturing and information that can be given to the globe are marketplaces with trillions and trillions, almost infinite potential.

The greatest gifts require vision. We have that vision in America. We have that passion. It's deep in our soul. And we have the creative juices to do it like no other civilization on planet earth.

But like Einstein is so famous for saying, if I have to save the world and I only have one hour to do it I'll spend 55 minutes thinking and 5 minutes acting.

So let's think first. And you Schriever Scholars are the thinkers of our future.

Good luck and bring me thinking that helps us take our Air Force to the next level and take our nation into space.

Thank you very much.

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