

**Remarks  
at  
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We've heard considerable discussion about some of the details of the planned revision of the U.S. air transportation system. So, in a metaphor that I sometimes use and which I believe to be especially appropriate on this occasion, I'd like pull the stick back a little, climb to a higher altitude, and look at the bigger picture as to why we want to make changes at all.

In the end, I think it comes down to America's position and station in the world, and what we want that to be. We are five percent of the world's people. If we want to exercise more than five percent of the world's influence, and I think we do, then we have to work harder, work cheaper, or work smarter, than other societies. I know which of those I prefer. I already work as hard as I can, and I certainly don't want to make any less money. I'll bet you don't either. We all try to work smarter. So, how does NextGen help us "work smarter" in aviation, and why is that important?

I believe that it cannot be stated often enough that the Earth's atmosphere is a strategic medium, a strategic arena for any nation that chooses to operate in it. In some ways, I believe this is best seen by considering first another strategic medium, the sea.

In the late 1800s, Alfred Thayer Mahan, an academic at the Naval War College wrote a book on the influence of maritime power on the status of nations. That book had great influence in the United States, which was then still a new society on the world stage. Mahan, of course, discussed the military implications of naval power projection. But he went well beyond that, writing also about the broader impact of maritime capability, which brings with it the ability to project not only military power around the world, but also economic and commercial power, as well as the influence of a society's culture and values. A clear conclusion of Mahan's was that those things are the real guarantor of a nation's importance in the world, of its role on the world stage.

A later president who had, at the age of 24, also written a book on the role of naval power, fully embraced Mahan's concepts. President Theodore Roosevelt started the U.S. Navy on the road to preeminence in the world.

By the time World War II came along, the United States was able, though its infrastructure and capability in the maritime arts, to wield influence out of all measure to the size of its population to help in the winning of World War II. Coincidentally, World War II was also the period in which the importance of supremacy in the air first came to the fore. World War II would have been won by the Allies without air power, but it would not have been won as quickly or easily.

This leads me to my belief that in the decades following that war, the United States rose to its position of preeminence in the modern world as a result of our mastery of the arts and sciences of aeronautics.

And we have achieved mastery of the air, or more properly, we've taken it about as far as it can go. In my other life, I am also a professional pilot, an active Flight Instructor. I fly regularly in the system. And I observe that, in the northeast sector or on the West Coast, where I used to fly, the system is choked. It can't grow anymore. If we're going to meet the needs of commerce, power projection, and influence in the world that aviation can satisfy, if American air power is going to be all that we want it to be in the larger world, then we need a new system.

The system we have today wasn't designed. It grew. It evolved. It is a patchwork quilt of processes and procedures that work, and work well, but which evolved as a result of continually band-aiding existing procedures, each time in response to the last accident. Almost everything in the aeronautical information manual, everything in the FARs (Federal Aviation Regulations), is written in someone's blood. And that's about what we would expect of a system that grew as the technology grew.

But now, for the first time, we have to design a system from top to bottom. We have to sit down and say: What do we want it to do, what do we want it to be, what do we want it to be capable of? That requires some very careful decision-making. It's also going to require some new technologies, and that takes me to NASA's role.

We're not going to have a better system just by having a more labor intensive system. Again, do you want to work harder, cheaper, or smarter? We need to work smarter.

We need a system with optimally controlled air traffic management flying optimal wind routes, one that takes into account weather constraints and traffic flow and other impediments, capable of being flexible and adjusting in real time, a system capable of adjusting itself.

We need a system that is even safer than it is today. And that will be a tall order. I often remark upon the fact that, in less than a century, American aviation went from contraptions made of cloth and sticks to a transportation system which is so safe that you incur a higher risk of dying from a lightning strike than in an air transport accident. We did that in this country. And yet, if we're going to be hauling a thousand passengers on an airplane, or ten passengers each on thousands of airplanes, it's going to have to become even safer.

If we're going to be doing all of that, if we're going to be increasing the traffic flow, we're going to have to have more fuel-efficient systems because costs must drop. We're going to have to have quieter airplanes, because airports are the choke point in the system. If we're going to haul more passengers, we need more airports, and the familiar NIMBY syndrome – not in my backyard – is always there. And that requires new technology.

The airplanes of the future have to produce lower levels of emissions. Irrespective of whether you think that greenhouse gases are a major or minor contributor to global warming, control of greenhouse gases is important, simply because it is never a good idea to foul your own nest. We

live in this atmosphere and, adding more unnatural components to it cannot be a good thing. So we need to reduce emissions carefully if we're going to be flying more often.

These are the areas where NASA helps. The things we do at NASA will allow us to design a new system, under the guidance of the JPDO. Our contribution is to produce the technical elements which will allow us to design a new system that can do new things that haven't been done before; a system that didn't just grow and didn't just evolve and isn't a patchwork quilt of responses to the last accident, but rather is designed from the outset to yield a system that will be better, and that we can prove to be better, than we have today.

That's what engineers do. And that's what we need to do with NextGen.

Thank you.