

NATIONAL PRESS CLUB HEADLINERS LUNCHEON WITH
ELLEN STOFAN, DIRECTOR, NATIONAL AIR AND SPACE MUSEUM

SUBJECT: THE FUTURE OF THE MUSEUM

MODERATOR: DONNA LEINWAND OF THE NATIONAL PRESS CLUB

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ANDREA EDNEY: –Andrea Edney. A couple of really important
announcements. The first one is, this is your device. This is your device on mute, vibrate,
silence, et cetera. If your phone rings, I'm going to point at you on live television. So
please take this opportunity to silence your cell phone now.

Also, if you are on Twitter, we do encourage you to tweet during the program.
Our hashtag today is #NPCLive. That's #NPCLive. And then also, you have on your table
these fabulous cards. If you have questions for our speaker today, please write your
questions on these cards. Please print or write as legibly as you can. If you write in
cursive, your chance of my reading your question on TV is about the same as the Mega
Millions lottery. [laughter] So please print.

And then when you've written your question, you can pass it up to the head table,
however you want to do it. Either come up by the side or hand it to another table and
they'll pass it up for you. But we'd love to get lots of questions.

And that is about it. We're going to get started in about three minutes. Thank you.

DONNA LEINWAND: [sounds gavel] Good afternoon, everyone. Welcome to the National Press Club. I'm Donna Leinwand. I'm the 102nd president of the National Press Club sitting in today for our current president, Andrea Edney.

Welcome to the Press Club. It's the place where news happens. And today we will be hearing from Dr. Ellen Stofan, the director of the National Air and Space Museum, a museum that I'm sure has delighted and enlightened almost all of us at one time or another. But before we hear from our speaker, I'd like to introduce our head table; if you could please hold your applause until everyone has been introduced.

So starting from my left, we have Patrick Host, Americas aviation reporter at *Jane's*; Heather Forsgren Weaver, freelance journalist and NPC Headliners Team member, and also an editor for our internal newsletter, *The Wire*; Stephen Trimble, defense editor at *Aviation Week*—oops sorry, Stephen is not here, sorry. Scott Maucione, defense reporter at Federal News Network; Allan Holt, board member at National Air and Space Museum.

Skipping over the podium, Betsy Fischer Martin, executive director of the Women and Politics Institute at American University and co-chair of the NPC Headliners Team. Skipping over our speaker for a moment, Joe Anselmo, editor-in-chief, *Aviation Week & Space Technology*; Yasmin Tadjdeh, reporter at *National Defense Magazine*; and finally, Ken Dalecki, writer and editor at Global D. And I have to point out that Ken covered the Gemini space launch for the *Asbury Park Press*. [applause]

Let's also acknowledge the additional members of the Headliners Team responsible for organizing today's event: Betsy Fischer Martin, Lisa Matthews, Lori Russo, Tamara Hinton, Bill Lord, Danny Selnick; and Press Club staff, specifically, Lindsay Underwood, Laura Coker, and executive director William McCarren.

And finally, a quick note. For our C-SPAN and Public Radio audiences, if you hear applause or comment or reaction from the audience, please be aware that it is not necessarily from the working press.

We are delighted today to welcome today Dr. Stofan, Director of the National Air and Space Museum. Before leading the Air and Space Museum, Dr. Stofan served as NASA's chief scientist and principal advisor to NASA Administrator Charles Bolden from 2013 until 2016. Her achievements at NASA literally were out of this world. They include developing plans to put humans on Mars.

She has been vice president at Proxemy Research in Laytonsville, Maryland, and an honorary professor in the Department of Earth Sciences at University College London, in England. Dr. Stofan's research has focused on the geology of Venus, Mars and Saturn's moon Titan, and also earth.

During the 1990s, Dr. Stofan held a number of senior scientist positions at NASA's jet propulsion laboratory in Pasadena, California. These posts include chief scientist for NASA's New Millennium program; deputy project scientist for the Magellan mission to Venus; and experiment scientist for space-borne imaging radar C-band, an instrument that provided radar images of earth on two Space Shuttle flights in 1994.

Dr. Stofan holds both a master's and a doctorate degree in geological sciences from Brown University, and a bachelor's degree a little closer to home at William and Mary.

Today, she will share her vision for the future of the National Air and Space Museum and how the museum is helping lead the national commemoration of the 50th anniversary of the Apollo lunar program. Ladies and gentlemen, please join me in welcoming Dr. Ellen Stofan. [applause]

DR. ELLEN STOFAN: Good afternoon. Thank you so much for having me here today. It's really an honor to be invited to speak at such a historic organize. And I'd like to begin with what I consider to be literally and figuratively history's highest achievement.

Everyone who was alive to see it remembers where they were when we landed on the moon. The coverage of Apollo 11, from launch to splashdown, gave an unprecedented level of intimacy to a historic act of exploration. One hundred thousand people saw Charles Lindberg land in Paris; hundreds of millions saw Eagle set down on the Sea of Tranquility. Never before had we ventured so far from home. And yet, somehow, it was all happening in our living rooms.

I was only eight years old at the time – to date myself – but naturally my parents let me and my sister stay up to watch; my father was a NASA rocket scientist, after all. Neil and Buzz needed \$100,000 space suits to keep them safe on the moon. I joined them in my pajamas, sitting on the carpet in front of our black-and-white old TV. CBS broadcast the mission for 30 continuous hours, and Walter Cronkite was on the air for 27 of them; the most trusted man in America, narrating one of the nation's defining achievements. When Neil Armstrong took his one small step, 94% of televisions in the United States were tuned in. Can you believe 6% of people were watching something else at 11 p.m. on a Sunday?

Jules Verne wrote about the voyage to the moon in 1865. He surprisingly got some things right, including, somehow, the future location of Kennedy Space Center. But even if we'd been able to reach the moon in some Victorian-era Apollo program, it wouldn't have resonated in the same way: The immediacy of live television and the warmth of the pictures in *Life* magazine, a color photo of the earth rising above the lunar horizon, and the voice of Jim Lovell on the radio confirming the existence of Santa Claus from the moon on Christmas Eve.

The coverage of Apollo was more than a record of a program. It put the bravery, risk and, most of all, the humanity of the endeavor center stage, and invited us all to join in on what President Kennedy had called our greatest adventure. The level of excitement and engagement is what I want people to feel when they visit the National Air and Space Museum. I know capturing the energy of breaking news can be a challenge for our museum, even one full of famous flying machines. But we had it once.

When construction began on our museum, Apollo hardware was still flying. The country was still buzzing with the excitement of the moon landings, even as television ratings had faded with subsequent missions. And a new race was on, to open a museum dedicated to that most American of innovations, human flight, by the Bicentennial in 1976.

Air and Space was going to be a birthday present to the American people, celebrating the journey from that first test flight on the beach at Kitty Hawk to the ultimate test flight on the Sea of Tranquility. It was a deadline 200 years in the making, but my predecessor, the museum's first director and Apollo 11 astronaut Michael Collins, was confident that it could be done. He would say, "If we can put an American on the moon by the end of the decade, we can put a museum on the National Mall by the Bicentennial."

Of course, they succeeded, and the results surpassed all expectations. Our building was designed to accommodate up to two million people per year, which sounded like a big number at the time. But more than two million people poured through our doors in the first month alone. Forty-two years later, our all-time visitorship exceeds the total population of the United States, and it's growing every day.

Many of you have probably read about the multiyear renovation project the museum is entering this fall. We need to modernize one of the world's most popular tourist destinations while remaining open for business for our eight million visitors a year. That presents a challenge, but also an important opportunity. This will be the museum's biggest project since we began construction of the Steven F. Udvar-Hazy Center near Dulles almost 20 years ago. And the project has two distinct elements:

The first element is a complete renewal of the building, from refacing the exterior cladding stones, to replacing major systems like the HVAC that is now so important to us with DC summers that seem to last into October. Those systems were designed with a 40-year lifetime in mind, and even with the attendance at four times what was anticipated they went the distance. But they certainly now need replacing.

The second element will be much more exciting to our visitors, air conditioning notwithstanding. Just as we can't welcome another 350 million visitors with our aging infrastructure, we can't educate and inspire 21st-century audiences with 20th-century exhibits. We want to recapture the excitement the public felt when we first opened, when one giant leap still echoed across the country and the possibilities for exploration seemed limitless.

To that end, we will be reimagining all of our exhibition galleries and public spaces to help inspire a second century of aviation and exploration achievement. Our museum on the National Mall currently holds more than 3800 artifacts, including some of aviation history's greatest icons, like the Wright Flyer, Amelia Earhart's Little Red Bus, and John Glenn's Friendship 7. All of them need to be deinstalled, inspected and conserved before going into temporary storage and eventually put back on display in new exhibits. Luckily, the Udvar-Hazy Center is one of the world's premier facilities for air and spacecraft conservation and restoration, in addition to being one of the country's most visited museums in its own right.

Fourteen hundred new objects will also be included in the redesigned galleries, giving our 350 million guests 1400 new reasons to come back for another visit. I hope that includes all of you here today.

We are already America's favorite museum, and reinventing an icon is no small task. But I know my team is up to the challenge. Heading into seven years of transformation that will touch on every facet of their work, they remain focused on their mission to help build a nation of innovators and explorers, and to answer one important question. Our renovations will be completed in 2025, just ahead of the museum's 50th and the country's 250th anniversary. Fifty years ago, at that point, we have opened as a bicentennial birthday present to the nation. But what is our role going forward? Do we still serve the country best as a laurel wreath, or can we be a launch pad to future achievement?

Human history is punctuated by great feats of exploration, and for more than a century aviation and space flight is where we have asked ourselves, what's next? So what's next for the National Air and Space Museum? Certainly a seven-year renovation should be enough, but the 50th anniversaries of the Apollo missions are upon us. And as the nation's repository for the legacy of the moon shots, we have a special responsibility to help lead the national celebration of our highest achievement. In collaboration with NASA, the White House, and other agencies, and with our aerospace industry partners, we are planning a year of commemorations and conversations around history's greatest adventure that will challenge a new generation to top it.

More than 75% of our visitors are Millennials or younger, who have no firsthand experience of a time when humans walked on the moon. We came in peace for all mankind, and we left again before they were born. Our program will include a special focus on capturing a piece of that electrifying moment in history for them, inspiring them to look forward to their own moon shot. We will highlight the concerted national effort that made the program successful and celebrate the astronauts who put their lives in the hands of 400,000 of their fellow Americans atop some of the most powerful machines ever built.

Our outreach will engage K-12 students, new and emerging scholars and the general public, not only here in DC, but across the country and around the world. Our

Apollo programming kicked off earlier this month with the unveiling of a new coin from the US Mint to commemorate Apollo 11, with part of the proceeds going to fund our new Destination Moon gallery.

In December, to mark the 50th anniversary of Apollo 8, we will celebrate the spirit of Apollo in Washington National Cathedral with Captain Jim Lovell. Apollo 8 was our first voyage to the moon, and provided a bright, unifying moment at the end of the 20th century's most tumultuous and divisive years. Our events will continue through the spring to leverage the public's excitement leading up to the anniversary of Apollo 11 in July, when we have planned high profile activations around the National Mall, culminating in an all-night celebration at Air and Space.

The last time we stayed open all night was in July of 2016 for our 40th birthday. Fifty-four thousand two hundred people turned out. That's as much as a sold-out night at Yankee Stadium. I hope you all be there to help us top that.

After the anniversary of the first landing, we'll turn our attention fully to the legacy of Apollo and its meaning to the future, specifically moon shots beyond the context of space exploration. President Kennedy defined the race to the moon as a goal that will serve to organize and measure the best of our energies and our skills, a challenge that we accept and are unwilling to postpone. Whole sectors are poised for their own moon shots in the years ahead – in medical research, higher education, transportation, green energy and beyond; and of course, yes, space flight and aviation.

The second century of flight stands to be as transformative as the first, and sweeping changes are just around the corner. Autonomous systems will drive rapid economic growth, even as they shrink the world and bring critical lifesaving services to the most remote areas of the globe. Supersonic airliners and private jets will return with new technologies and techniques to improve safety, efficiency, performance and, most importantly, noise reduction.

Closer to earth, but not quite all the way down, flying cars will finally arrive after generations on the drawing board. It's a seemingly simple invention, but the challenges of creating personal aerial vehicles that are both safe and affordable have kept us grounded for decades. With new tech borrowed from their drone cousins, we may be only a decade away from semi-autonomous commuting in three dimensions, which we need here in the DC area. [laughter]

I know how it sounds, the promise of flying cars and three-hour trans-Atlantic commercial flights. Everything old is new again. But as these technologies mature and new markets emerge, a renewed spirit of innovation will take hold around the world, and off of it. New commercial enterprises and international partnerships will provide unprecedented access to outer space. Our astronauts will fly beyond earth for the first time in nearly 50 years, and a new era of pioneering, but sustainable exploration will begin with our return to the moon; this time, to stay. There, we can study, mine new

resources, and perfect the long-range deep space skills we need for the inevitable, long-awaited next giant leap, a human mission to Mars.

My generation grew up with Mars seemingly within our grasp. I started down the path of becoming a planetary scientist after hearing Carl Sagan speak about the tantalizing possibility that evidence of life may be there on Mars waiting for us to turn over the right rock. On the heels of Apollo, the red planet felt so close at hand, even from 34 million miles away. The moment humans walk on the surface of Mars will be like that first small step 50 years ago, a century-defining moment.

But there is another discovery on the horizon, which I consider more fundamentally important to understanding our world and its place in the universe. As humans explore our neighboring planets, robotic missions will be probing the icy moons of the outer solar system. Somewhere in the briny subsurface oceans of Europa or Enceladus, or even in the windswept hydrocarbon seas of Saturn's moon, Titan, awaits evidence of life beyond earth.

We will find definitive proof within the next 20 years, either in the outer solar system or on Mars, or both. We have the technology and we understand what biology to look for. We know where to look. And we know how to look. Within our lifetime, we will find life elsewhere in the universe. There is no topic that I find as exciting and so prime for fundamental and profound future discoveries that will one day be highlighted in my museum as this one.

But we can do none of this, none of it, without engaging the full spectrum of talent available to us. The opportunities and challenges of the 21st century will outmatch any workforce that marginalizes half of its population. And yet, despite decades of investment, the gender and minority gaps in STEM disciplines persist. Early exposure to science and technology can have a profound impact on a young person's future. As I mentioned, my father is a rocket scientist and worked for NASA for many years. He would take me and my sister to launches, thinking maybe one day we'd want to follow in his footsteps. But everyone at NASA looked like him; few, if any, of his colleagues were women or people of color. It was very difficult to find role models to see where I might fit in to his – always his – world of engineers and technicians. And of course, as Marian Wright Edelman has wisely observed, you can't be what you can't see.

Nevertheless, I benefited from those early brushes with science and technology. And it encouraged me to choose a STEM career, albeit a quite different one from my father's as a geologist. After my freshman year in college, I interned at the Center for Earth and Planetary Studies which is located at the National Air and Space Museum. So I'm back where I started.

I remember walking into work every day before the crowds arrived and standing underneath the Spirit of St. Louis and the Wright Flyer. Right beside me was the command module Columbia that had carried the Apollo 11 crew to the moon. Here was

this magical place where you could see the arc of progress as we learned to get up off the ground, cross the ocean, and leave the planet.

For me, the Air and Space Museum was an inspiration. But when I got upstairs to the Center for Earth and Planetary Studies, just like when I was at NASA, I didn't really see anyone who looked like me. Here were really scientists doing important work across the solar system. And while I did find mentors there, none of them could be a role model for the challenges I would encounter as one of the few women always in the room.

Women make up 49% of the world population. They account for 47% of the US workforce, but fill only 24% of STEM jobs. We know that diverse teams are stronger, more creative and more agile at problem solving. But somewhere between childhood and that key first or second job, whole segments of society drop away from STEM courses and careers. Whether it's stereotyping, inflexible learning environments, or unconscious – or conscious – discouragement from peers, professors or even parents, this attrition in the STEM pipeline remains an enduring problem that threatens not just individual careers but whole industries.

And those that do choose a STEM discipline in college often encounter a gauntlet, by design. There's a mentality of weeding people out, sink or swim. We should be widening, not winnowing, the pipeline. You don't need perfect scores and a photographic memory to be an engineer or a scientist. You need dedication, imagination and curiosity. And I want to make sure the stories told at the new National Air and Space Museum spotlight those qualities.

Wilbur Wright used to talk about something called the standard of impossibility. That was an idea so outlandish that it stood as a symbol for other impossible things. For a while, it was understood that "you may as well try and fly" meant that something just couldn't be done. Wilbur and his brother Orville defied that conventional wisdom, and that standard of impossibility had to change. "You might as well walk on the moon" worked for a long time, but then we went and did that, too.

The National Air and Space Museum is an institution dedicated to cataloguing an ever-eroding standard of impossibility, reflecting the spirit that gave rise to human flight on our shores after centuries of striving and dreaming. My hope is that every visitor to our Museum has the same experience I did years ago, a catalyzing glimpse of our ascent, and a desire to add their own discoveries and perspective to that body of knowledge.

I don't know who the first person on Mars will be, but I hope that before she sets out on her path into the history books, she'll stand in the same spot that I did, looking up at the Spirit of St. Louis, and wondering where she fits into that great heritage of adventure and discovery.

Thank you very much. [applause]

MS LEINWAND: Okay, we've got a great packet of questions here, so we're going to start by delving a little bit more deeply into women and STEM. So as you mentioned, your dad was a NASA scientist and you developed your interests by watching him. Not everyone has a dad who's a NASA scientist, so how do you think we should be going about attracting more women into the STEM fields?

DR. STOFAN: You know what's great is we're at a point now where there has been quite a bit of research done on how to move the needle. And one of the things that we certainly know is that it is a pipeline problem. And so, for example, we know that middle school age is where people of color and white women tend to turn away from STEM fields. So that is the reason that at the National Air and Space Museum, we actually focus our educational efforts around middle school because we know that's where students are most likely to say, Hey, this isn't for me. So how can we use that age cohort? How can we think about what we exhibit, how we exhibit, how we put our exhibits together to really attract that age group.

I think the other thing that's been found through research is, for example, there's been some engineering programs that have been really successful, by saying, All right, we're not electrical engineering or chemical engineering; we're engineering for the developing world. When that happens, some of those programs have found that they get 50% women applicants. So a lot of the times it's, what is this for? How can I make a difference in the world? And those kind of programs tend to attract more women.

So I think you have to take each piece of the pipeline where we know we're losing people and say, How can we attack each of these? Just trying to fix one part of it won't fix the problem.

MS LEINWAND: So who are your role models or heroes in science?

DR. STOFAN: I have so many that it's hard to even put them on a list. Certainly one of them is Charles Elachi, the former head of the Jet Propulsion Laboratory. This is the importance of having not just mentors, but sponsors in your career. To the point where I know that Charles was— he helped get my first job at the Jet Propulsion Laboratory and he also put my name forward to the search committee for the head of the Air and Space Museum. So people like that in your career really shows you the importance of mentors and sponsors. And he's done amazing work to really guarantee the future of our exploration of the solar system.

One of my other heroes is Dr. Kathy Sullivan, who was the first American woman to walk in space. She just finished being the head of NOAA. And Kathy is another person who's just an amazing individual, but also always there to help with some advice when you need it.

MS LEINWAND: So the lunar landing gave us so many firsts and so much human drama. In fact, I actually wrote a fan letter to Neil Armstrong. So now, most space

exploration is conducted robotically. How do you generate that level of excitement in kids today?

DR. STOFAN: You know, what I love about space right now is that we actually have a really strong both human and robotic program. And I actually think our robotics space exploration program does amazingly well. In fact, I find that the discovery of a new exoplanet, the latest discovery of water, possibly current water on Mars's surface, when we discovered with Cassini mission the seas on Saturn's moon Titan, those things made the front page. And I feel like the coverage that we've gotten of this amazing solar system and universe that we live in has really kept the public's strong support of NASA's scientific programs.

I think the human exploration program, when I go around to audiences around the world, I often would ask kids, How many people are up on the Space Station right now, and I would get answers anywhere from zero to 50. And you're like, okay, the 50, no; zero, no. Six. I think that's been more of a struggle.

But what I really loved is what we saw with Scott Kelly's mission, that when you had the year in space and people understood that the work that Scott was doing on the ISS was really to get us to go to Mars, I think you saw the public interest. And the coverage we got from the press really spiked.

So I think when we can offer a compelling vision, either we're looking for life in the solar system, we're getting humans ready to go to Mars, that the public does get engaged.

MS LEINWAND: As NASA's chief scientist, you developed a long-range plan to send humans to Mars. Do you think the United States has the will and the money to actually do it?

DR. STOFAN: I think there are affordable architectures to get to Mars. And that was one of the things that I worked on at NASA headquarters, in conjunction with a lot of folks there, including Dr. David Miller who's now back at MIT. And we really looked at sort of the range of ways you can get humans to Mars, how fast we could do it, what were the technologies. And you had to look to say, well, to keep the costs down, you basically sort of have to keep the number of miracles you're requiring, the number of things you need to invent down.

I don't worry so much about the money. I think there are ways to do it affordably. And when you look back, obviously, at the time of Apollo, NASA was 4% of the US budget; it's now about 0.4-0.5% of the federal budget. On the other hand, look at what they had to do to make Apollo happen. They had to invent new math. We've all seen *Hidden Figures*. They had to build the Johnson Space Center, the Kennedy Space Center. It was a huge infrastructure project. We have all that infrastructure.

So I think it gets back to the will, actually. Technologically I think it's possible. There are no things that make it impossible. It really is a question of do we have the will to actually do it. And it really did take President Kennedy saying "within a decade, we will set foot on the moon." And it happened. I think going to Mars is actually way easier than that, personally.

MS LEINWAND: Of course, President Kennedy was in a space race; there was a competitor out there, and the US likes nothing better than a competitor. Do we have that competitor today?

DR. STOFAN: I would probably argue not so much. Obviously, there's certainly talk about China's space program. But I would argue what we have now is not a competition, but we have this amazing point where you now have 16 different space agencies from around the world working on a human exploration roadmap. We didn't have that at Apollo; we basically had NASA. We have private companies – and we could all list them – that have come forward and said, We want to be part of this.

To me, what we have now is, we have incredible cooperation, not incredible competition. And I'm hoping that incredible cooperation is actually what moves us forward this time.

MS LEINWAND: So you noted in your speech that we might find life elsewhere in the universe in the next decade. Do you think that there is intelligent life beyond earth?

DR. STOFAN: Yeah, I always disappoint people when I'm talking about life. I am talking about microbes, sorry. I know, it's exciting for scientists, but is that really exciting for people beyond the scientific community? It should be. Because we really want to find out, does life beyond earth, does it have RNA, DNA, does it have cell structure like ours? And how can we use that information to better understand life here on earth. So I could try to get you excited about microbes, but most people want to know about intelligent life.

I think when you look at the number of planets that are out there– and one of the remarkable things is the Kepler space telescope over the last five or so years detecting thousands of planets around nearby stars. What that's told us is just about every star in the night sky has a planetary system around it. So when you start putting that into the Drake equation, which is a famous equation that was put together with this very idea of saying what's the likelihood of life, to me it gets to the point where there has to be intelligent life out there somewhere.

MS LEINWAND: All right, the Drake equation, I like when, at the National Press Club, we introduce you to math concepts. So I'm going to bring us back to the museum for a little bit. The Air and Space Museum is the third most visited museum in the world. What have you learned from the number one and number two museums, which would be the National Museum of China and the Louvre?

DR. STOFAN: I think especially when you look at a place like the Louvre that's got an amazing, enduring, historical collection, I think that is what it takes – and certainly the museum in the China – that is what it takes to bring in large numbers of visitors. But in my mind, the more interesting question is, in 10, 15, 20, 30 years, are museums still going to be relevant? When you look at kids today, they access information completely differently than my generation did. They access things much more digitally with video. How likely are museums and even thrive as we move into the future?

I think we have to as a whole community really be constantly reevaluating ourselves – which Secretary Skorton of the Smithsonian certainly is – in saying, how can we make sure that museums are relevant 10, 15, 20, 30 years from now. As you well know, understanding the present or even beginning to look towards the future, it helps to have a historical context to allow you to do that. So I do think museums are a really critical institution. And right now, they're actually one of the few really trusted institutions.

And so, I think it's important that we go forward, but I think we have to be constantly reflecting on how we put forward information, how we reach out beyond the walls, the physical walls of our museums into the digital realm, and think how do we really engage this next generation of kids who just aren't really the same as the generation that came before them in terms of how they access information.

MS LEINWAND: So as you embark on this new renovation, what are some of the things that you think that you're going to embrace that feel futuristic to us now?

DR. STOFAN: You know what I love is that we're an art museum; we have over 5500 pieces of art. We're a history museum. I mentioned the Wright Flyer. We have the Sopwith Camel. We tell the story of military aviation from the beginnings up to the present day. We're also a culture museum. Those of you who know, if you walk into the door of our National Mall museum, one of the first things you're going to see is the Starship Enterprise, the original model used in the TV show. But we're also a science and technology museum.

And I think as we go forward with this renovation, we're really thinking, again, about how do we put yesterday and today in the context of the future? How do we think about innovation. How do we think about where aviation and exploration are going? And how do we bring some of that constantly changing, cutting-edge excitement to the museum. And we're very much going to be incorporating that into our galleries. So stay tuned.

MS LEINWAND: So you mentioned that there were going to be 1400 new items that a visitor might encounter in the renovated museum. Give us a preview. What's going to be really cool?

DR. STOFAN: Well, I don't want to give everything away, but one of the things I can tell you is, for example, we have a Sopwith Camel, an iconic aircraft from World

War I that's now on display at Hazy. It was actually be moved downtown. So some of the items we'll have downtown will actually come from Hazy into the downtown museum. And a lot more than that. But again, I'm not going to give it all away.

Some of the things though to look forward— and one of the things I realized I never said, and I really want to emphasize, is all during this seven-year renovation, we will never close. We're actually doing the museum almost in a series of chunks, but we wanted to make sure during the renovation that we will never close. And the first set of the new galleries will actually open in 2021. So you won't have to wait all the way till the end of the project to see some of what's new and different that we're going to be putting into the museum.

MS LEINWAND: Nonprofit venues have sought to diversify their activities in order to shore up their bottom lines. And I know we have a fabulous gift shop at the National Air and Space Museum where we all bought astronaut ice cream. So what are some of the things that the Air and Space Museum might do to have more events and more moneymaking activities, if at all?

DR. STOFAN: For those who don't know, the Smithsonian is partially funded by the federal government, very generously. And in fact, the renovation of our downtown building will be funded by Congress very generously. And we appreciate the bipartisan support that we've gotten. So they're funding the outside of the museum. Everything we do inside the museum we are raising private funds for that transformation of the galleries.

And obviously, when the Smithsonian looks across the way we do raise revenue outside of the federal government revenue that we get, we certainly look to our shops and our food. But we also have a channel where we have television shows, we publish books. And so we're really looking across all those areas of the revenue stream and thinking, how can we be more effective at raising money for the institution because there are so many exciting things that we want to do going forward.

MS LEINWAND: When it comes to preservation, what would you say are your biggest challenges?

DR. STOFAN: I have the most amazing conservation team at the museum who takes articles of technology – they're really some of the leaders in the world – taking artifacts like aircraft, but also things like hatches from the Gemini capsules, space suits that were never intended to last for 100 years, and say, What are these materials? What's happening to them? What's the degradation? How can we stabilize them? And how can we make sure they're preserved basically for the future?

And so, one of my favorite things that we've been working on is actually Neil Armstrong's suit. Again, that suit was made to withstand being out on the surface of the moon, but no one thought it would have to last for so long. And there were some interior layers of the suit that were actually really degrading and kind of falling apart. So we've had a huge effort. We had a Kickstarter campaign to help raise money to restore the suit.

They've been hard at work on it. To be able to go into the conservation lab and stand next to that suit and see the lunar dust that's embedded in the suit because it's so incredibly fine literally sent chills down my spine; it's so inspiring to see that. That renovation will be finished and the suit will go back on display before the 50th anniversary next summer.

MS LEINWAND: So what has been the hardest part of your job as you are trying to put together this new technologically fabulous museum?

DR. STOFAN: I think the hardest job is really trying to decide what stories we want to tell. When you look at something like looking at the Space Age, from Sputnik up to the present day, there are so many stories we could be telling. You could fill the whole museum with just stories about early flight, early aviation. You could fill the whole museum with stories about Apollo and the early days of the space program, let alone what's going on now.

So I think the hardest part is looking across this amazing— I mean, again, when you think back to the fact that we made it from Kitty Hawk to the Sea of Tranquility in a lifetime, basically, and that since then we've accomplished amazing things, and all that has to fit into one museum, that's the hard part.

MS LEINWAND: I heard you mention Kickstarter. So that means you put it out there to the public to say, Hey, can you fix Neil Armstrong's space suit? What kind of response did you get? And what kind of money did you raise?

DR. STOFAN: We did get the funding to restore the suit, which we were obviously really thrilled about. And I think that's one thing; obviously, our museums are free at the Smithsonian because of the federal support that we receive, but when we want to put on extra programming, when we want to do extra things, we do need to raise private funds for that.

And I think one of the things that, to me, that's always surprising, ever since I had this job in the last six months, everywhere I go I have people come up to me and say, "I went into your museum when I was a kid and it inspired me." I can't tell you how many people have said that to me. I met a man the other day who owns a technology company. And he was telling me that he was growing up in India and he saw the Apollo landings and he decided he wanted to get into science and technology. And sure enough, he came to this country and founded a company.

And I think when you think of the stories that we tell in the museum and how inspiring that is, it, to me, is really amazing. And I think you see that kind of support when we do something like a Kickstarter campaign.

MS LEINWAND: Okay, here's a tough one. It took eight years to put men on the moon. Why will it take seven years to renovate a building? [laughter]

DR. STOFAN: Yeah. It's a great question. And how I try to think of it is, it's basically two three-and-a-half year projects. When you think of how big that building is, and when you think that we basically actually kind of have to take it apart and put it back together again – we have to take all of that stone off the outside of the building and replace it, we have to take a lot of the glass in the museum and replace that, we have to move security outside the periphery of the museum – there's a lot of work that needs to get done.

So we're going to do the west half first. In fact, the first gallery closures will start in December. Then you'll see a lot of galleries closing in January. We do that first half of the building basically in three-and-a-half years. Then we swap around and do the other half of the building. And again, the big part of the intent of that is that we never wanted the museum to close, so that those eighth-grade kids who come in on their big field trip to DC, we wanted them to be able to come to the Air and Space Museum. And on top of that, we also really didn't have anywhere to put all the stuff that's inside of the museum. [laughter]

MS LEINWAND: And, hey, did you ever try and get an air conditioning repair person to repair your air conditioning in a DC summer? [laughter]

So any chance of an Air and Space Museum being built outside of Washington; say, on the West Coast?

DR. STOFAN: One of the things I've learned since I got this job is how many aviation museums there are around the country. And it's been really impressive to me because they're all good partners of the Air and Space Museum. We have our artifacts out on loan to Smithsonian affiliates around the country, which I think is really great because, again, we hold this collection for the nation. And so, for people who can't make it to DC, our affiliates around the country actually have articles on loan, which, again, is critically important.

And it's also the reason we've realized we need to enhance our digital presence for those kids who never make it to DC, don't get that eighth-grade field trip. We want to make sure they can come and visit our objects digitally. And in fact, one of the things that we just digitized was the Space Shuttle Discovery, and we had a partnership with Google Arts and Culture where you can actually– it's Charlie Bolden and Kathy Sullivan giving you a tour of the inside of the Discovery, which was really fun.

MS LEINWAND: So how would the Udvar-Hazy Center be affected by the construction and renovation?

DR. STOFAN: We're going to have a lot more programming at Udvar-Hazy because we're not going to be able to accommodate it all downtown. We're going to have more artifacts on the floor. We're going to be cramming some more stuff in there. It's always crowded, but we're going to put even more artifacts in there as we're doing the restoration.

And I'm really excited about it because for those of you who have not been to Udvar-Hazy, you are missing something incredible. I hate to pick favorites amongst my children, but we have the coolest artifacts at Hazy. We have the Space Shuttle Discovery, we have the SR-71, we have amazing artifacts there. So I really encourage people who've not been to Hazy to go there. And I'm hoping this opportunity of downtown being open, but a little smaller, that people will go to Hazy and really be impressed and excited by the amazing collection that we have there.

MS LEINWAND: How will the renovated museum incorporate women and bring more attention to women?

DR. STOFAN: I want every single child who comes into my museum to see themselves. Not just in one place, not just in one gallery, but throughout the museum. I want them to know all those stories that have not been told. And that, to me, has been—one of the best things of the last few years, is we've had Margot Lee Shetterly's book, *Hidden Figures*, that came out. Those stories are there. We just haven't been telling them. And we have to tell them, again, across the museum, not just in one place.

I think you heard from my remarks, those things are important. It was important to me that I had so few role models to look forward to. And I want to make sure that we have the opportunity to inspire every child who walks into that museum, no matter what background or where they come from.

MS LEINWAND: Since we're on women, why, in your opinion, do women not pursue STEM careers at the same rate as men?

DR. STOFAN: There's been a lot of research done on that. And again, it's a combination of a lot of different factors. It's active discouragement, it's passive discouragement that occurs throughout. And that's why, again, it's a pipeline program; so we know girls get turned off in middle school where they have peer pressure, or maybe they are with a teacher who doesn't encourage them, or their parents think that's not a field that has women are in it, "why are you going into that field?"

And so, I think the pressures, again, are societal, they're cultural, and they're pervasive. And so, to change it is hard. And it's going to take time. And it's been taking time. But I do think it's solvable. And when you look at the work that's been done in terms of what does it take to get the numbers up, it's usually really small things.

There was one study that showed that all you had to say to girls in a math class was, "You can really do well in this class," and their scores went up. So the fact when you tell girls "this is not for you, girls don't do math," it actually shows in the numbers. So the fixes are out there. They're research-based. And we need to start implementing them.

MS LEINWAND: Okay, this is, I think, my favorite question of the day because they appear to be offering you both money and volunteers.

DR. STOFAN: [laughter] Awesome.

MS LEINWAND: So we're going to go back to the Apollo program commemoration. How can DC universities engage with the National Air and Space Museum to help commemorate the 50th anniversary of the Apollo program both as partners and participants? And the questioner notes that the NASA DC Space Grant Consortium has grant money.

DR. STOFAN: Email me. [laughter] No, we'd love to. And a lot of what we've been doing over the last few months— in fact, the first day I started at Air and Space, we had a meeting to say, do we want to take a big role in this, or is transformation and revitalization, is it just keeping us too busy? And we said, this is so incredibly important, and it was so incredibly important to me to take this celebration and say, how can we not just celebrate the past, but how can we make this, again, a launch pad? How can we look forward? What's next? We're going back to the moon; we're on the verge of so much in aviation and space exploration. And let's put that excitement into this 50th anniversary celebration.

So we're looking for partners. We're happy to partner. And we've got a lot of events coming up with lots of opportunities for partnership.

MS LEINWAND: You also mentioned that we were going to be up all night and just wondering what we're going to be doing.

DR. STOFAN: I don't want to give away the programming we've decided on, but we're going to keep you busy all night long. Lots of fun movies, lots of fun activities. And we'll make sure everybody stays away. I can't promise *Night at the Museum*, but it's going to be fun.

MS LEINWAND: How are you working with current federal agencies and other parts of the government on the renovation, on moving the museum forward?

DR. STOFAN: Obviously, we do have partners with other museums, frankly, that are holding some of our artifacts for us that we don't have the room to take right now. And so, part of this is our good partner museums around the country who are helping us prepare for this. We actually have some other museums that are doing a little bit of conservation work on some of the artifacts that'll be coming into the museum. So we have lots of really valuable partners out in the museum world.

And obviously, again, the main thanks go to Congress, who, in the FY '18 budget, very generously has funded the Smithsonian to get started on the project because having the repairs done to the building is so critical. That stone that's on the outside of the building is warped and cracked, and it's been letting moisture into the structure of the

building for all these years. And so, the damage to the building is pretty pervasive. And so, Congress, again, has been very supportive of understanding that unfortunately we need to invest in America's favorite museum.

MS LEINWAND: All the time museums have controversy when you're thinking about how you put exhibits together; people have different ways of thinking of things. It's been 20 years since the Enola Gay exhibit controversy. How do you think that has affected the way museums deal with such controversies? And what are you anticipating on the horizon? Will you reach out to the public when you're putting exhibits together to sort of head some of this off?

DR. STOFAN: I think if you look at what Secretary Skorton has done, part of his emphasis for the Smithsonian has been, how does the Smithsonian help in challenging conversations? When you consider that there's a lot of things in the country these days that seem to point out our differences, how can the Smithsonian be sort of a safe place to come together and talk about what we have in common? And so, to me that's one of the strengths of the Air and Space Museum, is that we sort of hold some of the better aspects of our accomplishments as Americans, where we did cross the ocean, we did reach the moon.

But there are complexities, and I think as we go forward, and we put together our different, new galleries, we're going to be thinking about what are conversations that we can help bring people together around some of the themes in these galleries? For example, one of the new galleries is going to be called One World Connected. And it's going to be about how aviation and space have made the world a lot smaller. And you could say some aspects of that are positive, and some aspects of that are negative.

And so, to me, how do you have an open conversation? How do you make sure that you engage all the people who want to be in the conversation and give people a voice? So to me, it's how you go about having a challenging conversation; it's not that you should avoid them.

MS LEINWAND: What are your thoughts on commercial space companies like SpaceX? What do they contribute to science? And what do they take away?

DR. STOFAN: Again, the value, to me, of a museum – and this is the role of museums – is obviously there have been private companies involved in exploration. When you look at the companies that are around today that were part of Apollo, Boeing played a huge role, Lockheed Martin, other companies. They may have moved around a little bit and merged and come together, but one of the things I think that we can do is put into a historical context that private companies have always worked with the government to help explore space.

What I think is interesting about, you look at SpaceX who obviously also has contracts with NASA to help with eventually getting humans launched from Florida to go to up to the International Space Station, but you have people like Elon Musk and Jeff

Bezos talking about what can they do as a private company apart from the government. And I think it's great that we were sort of starting to look at maybe a place like low earth orbit where the International Space Station sits that have historically been a place where only governments were and now we're moving into maybe an era 10, 15 years from now where maybe lower earth orbit will be not much the government at all and mostly private companies.

And I think that's great. It's an evolution. If you look at communications satellites, that started out a government thing. Now it's mostly a private thing. And I think you have to put this into a broader evolution and say, NASA increasingly will do the things that private companies either can't or won't do, and private companies will take over what is doable.

When you look at the fact that we actually seem to be on the verge of space tourism actually becoming a real thing, I think the next ten years are going to be really exciting.

MS LEINWAND: What do you think of President Trump's proposed Space Force?

DR. STOFAN: Again, that's something where I hope my museum can put things into a historical context, that when you look, there's been a military space program since the beginning of exploration, and how that evolves over time, what its role is, who runs it, that's something that we can put into a broader historical context. And then to also educate people, how does that differ from NASA. And hopefully those two will stay different, where NASA is the civilian space program and there always has been and always will be a military side to the space program. They do help keep us safe.

MS LEINWAND: Before I give the final question, I'd like to remind the audience of some of our upcoming events at the Club. On October 26th, we'll have a Headliners Newsmaker with the Young Turks. On October 29th, we have a Headliners book event with Paul Offit. On October 31st, Halloween, we have Headliners Luncheon with Nebraska Senator Ben Sasse. And on November 5th, we have a Headliners Luncheon with Doris Kearns Goodwin; that's November 5th.

I'd also like to thank our guest today by presenting her with the National Press Club mug. [applause]

DR. STOFAN: Awesome, thank you.

MS LEINWAND: Before we go, we have one more question for you. This is probably the toughest one of the day. What is your favorite space movie? [laughter]

DR. STOFAN: I have lots of favorite space movies, but I got asked this a couple years ago and I'm going to stick with my answer. It is especially appropriate now, moving into the 50th anniversary of Apollo. It's a slightly obscure movie so you may not all have

seen it. It's called *The Dish*. And it's about the Australian antenna that's part of the Deep Space Network where it ended up that the signal of Neil Armstrong, that signal coming down the TV feed as he took that first step on the moon, was actually going to come down to the antenna in Australia. So it went from being this kind of obscure country radio dish where they mostly did scientific research to all of a sudden having the spotlight of the world upon them. And it's a charming movie; it's a feel-good movie. And that's what I hope we all come out of this year of Apollo, is feeling good and looking to the future.

Thank you. [applause]

MS LEINWAND: Thank you, everyone, for joining us at the National Press Club. We are adjourned. [sounds gavel]

END