1 00:00:03,229 --> 00:00:08,339
welcome to a NASA live chat I'm Tabitha

2 00:00:06,419 --> 00:00:10,379
Thompson lucky to be sitting with Sunita

3 00:00:08,339 --> 00:00:12,300
Williams and Bob bankin two of the four

4 00:00:10,380 --> 00:00:13,830
astronauts elected to train for test

5 00:00:12,300 --> 00:00:16,080
flights on NASA's Commercial Crew

6 00:00:13,830 --> 00:00:18,420
program we've been collecting questions

7 00:00:16,079 --> 00:00:21,358
from NASA social channels using the ask

8 00:00:18,420 --> 00:00:22,890
NASA hashtag we had an enthusiastic

9 00:00:21,359 --> 00:00:24,210
response which we were very excited

10 00:00:22,890 --> 00:00:26,070
about and we're still accepting

11 00:00:24,210 --> 00:00:28,500
questions so we invite people to still

12 00:00:26,070 --> 00:00:31,768
send those in the first question is

13 00:00:28,500 --> 00:00:34,170
going to Bob and that is from Twitter

14 00:00:31,768 --> 00:00:36,119
user Ian what would be your elevator
pitch for NASA and the Commercial Crew program let's see my elevator pitch for NASA and the Commercial Crew program is that we're really trying to develop new vehicles to give us an alternative to the Soyuz for transportation to the space station it's really important to have that capability out of the United States and looking forward to the days when that happens excellent and why is it important to the future of human spaceflight to have this Commercial Crew program so it you know it involves of
course astronauts launching from here

the United States and we can share that

with all the people who are here but it

also involves you know the public and

all the companies out there who are

developing new technologies for new

spacecrafts so it reaches a lot farther

to the public here in the United States

and then that of course you know is

accompanied with the kids in this

country who are getting ready to

potentially follow in our footsteps and

it enforces the science technology

engineering and math part of that so
we're looking forward to coming back to
the United States to launch here and
you're working with the commercial
partners both Boeing and SpaceX through
the final phases of development and
certification of their respective
spacecraft could you walk us through a
little bit why that's important that you
be involved and what that means for the
program itself from our perspective it's
really important that we have as many
people as possible with some spaceflight
experience to help inform the designs
that the two partners are coming up with
so both SpaceX and Boeing have a lot of
a great experience but our role is to really help them anticipate some challenges that might they might face when they actually get these vehicles into space make sure that they fit well into the way that we have the International Space Station operating today there are some things that that that maybe they don't have as much experience with that we can bring to the table for example sony's soyuz experience and how we deal with an emergency response onboard space station and cruise going off to come
home on a Soyuz well we'll have to change that a little bit with one crew going off to a Soyuz and another crew going off to another vehicle and so that's the experience that we bring and it's going to be critical to making these vehicles successful okay I think that's a great point and your involvement in understanding that and then we talked a little bit about or we've talked quite a bit about the significance of having these two different systems why is it important that we have two systems so it's great
that we have a couple different companies involved in all of this and this of course was down selected from other companies who are also bidding for this as well and what's neat about having a bunch of companies interested is it involves more people and there's competition and that means that things that are developing on a rapid pace and they're trying to do as best as they can so it's really nice to have more than one company doing this at all so we have a backup for each other you know in case we have any issues along the way we have
two companies out there working toward

00:03:24,120 --> 00:03:27,799
dis goal to get us back to launch here

00:03:27,799 --> 00:03:30,400
it really Spurs the innovation and I

00:03:29,250 --> 00:03:32,120
I think that's really the driver for what

00:03:32,120 --> 00:03:36,290
we're trying to accomplish here is

00:03:36,299 --> 00:03:40,598
spurring that innovation as we develop

00:03:36,299 --> 00:03:41,810
these new vehicles and you've three

00:03:41,820 --> 00:03:44,269
months in now as selectees for the

00:03:44,269 --> 00:03:47,120
Commercial Crew program what have your

00:03:47,120 --> 00:03:50,650
days looked like so far working with

00:03:50,650 --> 00:03:54,629
our days have been really

00:03:54,629 --> 00:03:58,310
these partners our days have been really

00:03:58,310 --> 00:03:59,919
busy

00:03:59,919 --> 00:03:62,289
Tabitha for me there's always

00:03:62,289 --> 00:03:64,919
something more to learn we're just

00:03:64,919 --> 00:03:67,828
catching up on these vehicles
understanding where the designs are and where they're going you know I've had some weeks where I spent the first half of the week in Florida I may be looking at some Boeing equipment or a launch facility and then travel to Hawthorne and then been out in Southern California working with the folks out there or even in Southern California maybe seeing something associated with the Boeing design one morning and then driving out to SpaceX later in that afternoon and so really seeing these designs side-by-side and helping us understand where the
requirements that we've put together make sense to apply to both partners is really critical and you're both test pilot and so that plays a significant role in your involvement and these could you talk a little bit about how your test pilot experience has played into it and will continue to play into the development so that you know there's some fundamentals that you learn a test pilot school and part of that is approaching the envelope in a stepwise process and I think that's what sort of
we bring to the table in any spaceflight or aircraft flight you know you're reaching and reaching and understanding how this machine is going to work so I think and part of that is understanding how well things fly and and trying to put that into or allow our past experiences to bring that to these spacecraft right here so it part of it is understanding the risk that you're taking when you're advancing along those edges and taking those steps and
understanding that you have a back-up plan and how you're going to work to accomplish those goals so I think that's just the background of test piloting and we bring that to the table here I would say for me after graduating from the test bus school is a flight test engineer it really is an exercise in risk management and as we develop new vehicles we'll have to make decisions about when is good enough and when we need to actually make changes for safety or for other reasons as we go forward and so that methodology that it's instilled in the four of us from that
time that we spent at the test pilot schools I think is really going to serve us well going forward and we're talking about these two vehicles and before we came in here today we were talking a little bit about why it's such an exciting time with all of these vehicles and development could you explain why that's so significant at this point so this is the first time in both Bob's and my career that we've actually had a new spacecraft both of us have flown on in space but on the space shuttle and the Russian Soyuz and those had been
developed and we've jumped into the
training program of getting you know to
fly those spacecraft this is where we're
actually being part of the process as
these spacecraft are being developed so
we're involved in both of the ones that
are being developed for Commercial Crew
and this is also allowing NASA to focus
their attention on developing Orion so
right now even though it seems a little
at the Kennedy Space Port it's ramping
up to be pretty busy in the near future
and we're gonna have to integrate all
these different types of spacecraft into
00:06:45,389 --> 00:06:48,329
the traffic model going up to the

201
00:06:46,920 --> 00:06:49,980
International Space Station so it's

202
00:06:48,329 --> 00:06:51,539
pretty busy you know we've got the

203
00:06:49,980 --> 00:06:52,950
program the Space Station program that's

204
00:06:51,540 --> 00:06:55,080
going on we've got this commercial

205
00:06:52,949 --> 00:06:57,389
program that's ramping up rather rapidly

206
00:06:55,079 --> 00:06:59,189
and all the development for Orion that's

207
00:06:57,389 --> 00:07:00,719
coming up so people are working pretty

208
00:06:59,189 --> 00:07:02,870
hard all throughout the country to get

209
00:07:00,720 --> 00:07:05,520
this all of these space systems going

210
00:07:02,870 --> 00:07:07,230
that reminds me of one of the questions

211
00:07:05,519 --> 00:07:10,289
we got from Selene from Twitter she

212
00:07:07,230 --> 00:07:12,060
asked where do you train it's a it's a

213
00:07:10,290 --> 00:07:13,560
good question where will we train the

214
00:07:12,060 --> 00:07:14,939
Space Station crews you know that will

ride these new vehicles will still have

training all over the world to still

execute that mission but the vehicle

specific training will be a combination

of some training in Houston some

training in Florida and some training in

Southern California so all three of

those places are really going to come

together to bring a total training flow

for these out new vehicles okay and then

the user fish-and-chips from Twitter

asked what do you think a NASA

astronauts role will be in the future of

human spaceflight 10 20 50 years from
now don't you wish or 10 20 50 years younger that's gonna be a little

you know we're in low-earth orbit

right now on the International Space Station we'll be going there with these commercial vehicles which is gonna be cutting edge technology which is pretty fun in the near future

I mentioned Orion which you know has a is a bright future in front of it it's gonna probably going taking the next generation of astronauts unfortunately probably not Bob and myself a little bit farther than low-earth orbit may be back
to the moon maybe on to an asteroid

maybe to Mars so I think when you get a little bit farther and farther out you know maybe we'll actually be sending spacecraft on a routine basis to Mars and that would be pretty spectacular and we talked about this as well ahead of coming into this and part of that spurred by the questions that we were getting Commercial Crew is opening up access to deep space in a way could you explain how that is happening what commercial cruise role is and opening up our deep-space exploration I would say
that Tabitha the way that we we get that

opening up is to kind of divide up some

of the responsibilities and some and

divide up some of the work that needs to

be done to continue operating the space

station at the

time that we go forward and explore so

we've allowed the partners SpaceX and

Boeing to really focused on low-earth

orbit getting our crews back and forth

to space station and allow NASA to focus

on SLS and Orion and maybe a deeper

space exploration activity so it really

is a good division of labor and division
of responsibilities versus having NASA

00:09:10,528 --> 00:09:14,338
at the same time try to develop a

00:09:12,299 --> 00:09:16,528
commercial vehicle or develop a vehicle

00:09:14,339 --> 00:09:17,850
that was who had the same specifications

00:09:16,528 --> 00:09:19,409
or requirements as those commercial

00:09:17,850 --> 00:09:20,850
partners that would be redundant and we

00:09:19,409 --> 00:09:22,799
don't necessarily want to do that we

00:09:20,850 --> 00:09:24,659
just want to focus the resources where

00:09:22,799 --> 00:09:26,278
we can we just don't have the infinite

00:09:24,659 --> 00:09:30,058
resources to do have everybody do

00:09:26,278 --> 00:09:32,039
everything so all right ok I'm in the

00:09:30,058 --> 00:09:34,198
significance to for Commercial Crew is

00:09:32,039 --> 00:09:35,519
that it returns launched to the United

00:09:34,198 --> 00:09:37,558
States we've talked a little bit about

00:09:35,519 --> 00:09:38,938
that so tell us what will it feel like
and I'll direct this to you sunny when

you're landing here and you know that

you're all both of you I'd like to

answer this I think it's significant

you're landing in the US again and your

family and your friends won't need a

passport to come and greet you when you

return home what will that be like

that's pretty spectacular

I mean planet Earth is home so anywhere

you land is home but being right back

here at home in the United States is it

will be just amazing

you know before us when we're landing in
Kazakhstan it's a little bit of a trek to actually get home to really hug your family and friends and this you'll be right around the corner before too long you know that that same day that same afternoon you'll be able to see your spouse your kids your dog and and really just say hi and be right back here at home it's it's huge and it's not only the landing it's also the launch you know when you can actually share the launch with friends and families and people who just have to get in their car or drive their campers down to Florida
that's pretty spectacular

of course you know people see it today on social media and in the press but it

you know you'll it loses a little bit of touch when it's all the way around the world so when it's in our own backyard I think of course a lot more people will be paying attention and a lot more people be aware of all of these programs that we're working on right now and I think the kids in the country will understand that they are part of this it's not so distant for them and they are the next generation of explorers
I think sunny really covered the

00:11:02,909 --> 00:11:05,988
console' gamut there with the the

00:11:04,578 --> 00:11:08,298
to that question and there's there's a

00:11:05,989 --> 00:11:09,860
lot of pieces of it I think one of the

00:11:08,298 --> 00:11:11,149
things I tried to do over the last few

00:11:09,860 --> 00:11:12,889
years as the chief for the astronaut

00:11:11,149 --> 00:11:14,480
office was to make sure many of the

00:11:12,889 --> 00:11:16,459
astronauts had actually had a chance to

00:11:14,480 --> 00:11:18,649
travel to Baikonur to Kazakhstan to

00:11:16,458 --> 00:11:20,328
actually see a launch in some cases to

00:11:18,649 --> 00:11:21,980
participate in the landing recovery

00:11:20,328 --> 00:11:24,019
efforts that go along with that and then

00:11:21,980 --> 00:11:25,519
recognize the challenge and then respect

00:11:24,019 --> 00:11:27,470
what's going to happen here in the

00:11:25,519 --> 00:11:29,058
future in just a few short years we'll
have the capability to do that all in Florida it's really going to be awesome they're gonna really have seen ok there's a long way to do it which is to go all the way to Kazakhstan and then there's the short way to do it which is to head down to the Florida Space Coast and see it happen from there it's funny mentioned this I do think that in terms of speaking to kids and trying to motivate them to be interested in the space program and the engineering and science that goes along with that it's a
it's a tougher sell to explain hey the next launch will be in Kazakhstan the next crew will land halfway around the world they're not quite as interested in it as when Sonny mentioned you can pack up in a family SUV and head to Florida and actually see the launch for yourselves I think anybody who's seen a shuttle launch or those that are you know we're around and were able to see an ALICE 5 launch saturn v launch and actually see you know cruise launch on deep-space missions from from if you will from the u.s. space soil they
really that's it's it's a life-changing experience I think and it's be great to have more people have that opportunity to see I think you're both hitting on something significant because a lot of the questions that we got related to the inspiration and I feel like because they knew you were coming from commercial crew you would be talking about that it does seem real to them so one of the questions that we got over and over again from several Twitter users one is Rania is what should we do or what should we study in order to be NASA
astronauts yeah I think we're going to

be looking for a lot of astronauts in

the near future and you know most of us

have a science and math background but

that doesn't mean you have to be you

know straight sides as some people think

we have doctors we have a veterinarian

we have engineers we have pilots we have

divers we have teachers in the office

but everybody has a science or math

background so I would say pursue any

type of background or and

a career that has a science and math

background and you know just be the best

you can be and stay healthy you know
that your body goes through a rigorous undertaking to go into space and come back and you know you've just got to be healthy so don't take advantage of your or don't take your health for granted and you were the former chief of the astronaut office so what sort of traits would you look for when you're recruiting a new class of astronauts I will say that there's been kind of a shift over the decades and we really are going into a new direction with Commercial Crew you know there was a time when every astronaut was a test
pilot a military officer who had

graduated from one of the test pilot

schools and that's getting further and

further in the past the Commercial Crew

vehicles we expect those to be operated

by people that don't necessarily have a

military test piloting sort of a

background that's one of the

responsibilities that's on the plate of

signing myself and the two other folks

assigned Doug and Eric to make sure that

we produce a vehicle that a wide range

of people will be able to take to the

International Space Station in terms of
characteristics I really want to focus on people when I was selecting and both sunny and I sat on the recent selection board on folks that said did well at whatever they took to be their their life's doing so whether they were a scientist or they're an engineer or they were a pilot the folks that really loved what they did and did a great job at it it showed through and those were the type of people that we wanted to have in the office it wasn't necessarily as sunny pointed out that hey I needed to get another veterinarian in the
office it was I needed a veterinarian

potentially but somebody who had the

right passion if you will for what they did and to do a good job and to be ready

for all the contingencies that we had to prepare for so and this is a big team

you know and I think one of the things that we look at when we're looking for folks applying for the astronaut office is how well people play together right there are the things you learned in kindergarten but you know it's a team effort

toogether right there are the things you learned in kindergarten but you know it's a team effort

you know Bob and I and Ann and Eric and Doug you know put on this this mission
right now but there's a lot more to follow and along with that is a lot of people who support what we're doing and really get the spacecraft and everything about flying in space ready for us so yeah you have to be a team player going back to Commercial Crew and being team players are all of your peers and the astronaut core anxiously awaiting an expedition assignment now are they talking to you a lot about it what are you hearing among the Corps itself I think everybody who doesn't have a
flight assignment is anxiously awaiting

the phone call that will necessarily

present them with one but I think there

is a lot of excitement generated by the

Commercial Crew program folks that are

interested in that aspect of out

launching again out of the Florida Space

Coast versus out of Kazakhstan now we we

still will have astronauts that do

launch out of Kazakhstan we just will

need to kind of preserve that parallel

path a Space Station is a very valuable

resource and we'll want to make sure

that it's appropriately staffed to
execute the science mission but some folks will have the opportunity to fly out of Florida and folks are all interested in us getting to the point where we're launching so that the next assignments will come after our we need to move on so it the next guys will be assigned who while we are on the subject of assignments we had a question from Bozza from facebook asking have you been assigned to a specific mission yet so not quite yet so right now we're all learning about both spacecraft and you know it's a pretty complicated problem
about when exactly which spacecraft will
fly and when you know there's a little
bit of a traffic jam up at the space
station right now with other vehicles
coming up cargo vehicles as well so I
think we're still in the development of
these two programs and Bob and I are
learning quite a bit about them for the
last couple months so we don't have an
idea of exactly who's going to fly which
spacecraft yet we're getting ready to
fly both of them as best as possible and
eventually that's going to work itself
out in the manifest also because
it's like I said a little bit of a
complicated program a problem at this moment in time I would just add that from a as we develop these vehicles we want to make sure they get to the space station kind of the same way that they have some of the same requirements in terms of what crews will need to be able to do so that when the time comes to select crews and train them that we've kind of got some similarities between the different vehicles and so if we were to split too early and have one person just focus on one vehicle and another person focus on another vehicle
they may choose to do docking in a way that didn't allow us to kind of get any
synergy from training perspective or from the things that you have to know or from a NASA operations perspective it may become really inconvenient from a traffic perspective if everybody chose to do it a different way and so we are trying to do a little bit of standardization if you will of the two vehicles just so that they get to the space station in an efficient way in a smooth way that's really part of our
role and when the time comes that that's done it'll be we'll be married off to one of these vehicles and we'll head up to Space Station on one of the questions that came up in on social media was what you like working on when you are on station and we know that the Commercial Crew program is going to increase the amount of time we have to do research on the space station so could you talk a little bit about your favorite experiment well you know one that I thought that was gonna be just like Oh interesting was medaka fish for example
we actually set up an aquarium in space

for fish and you know it at first it's

like okay what you know is this going to

change the world you know maybe not but

it's amazing how what you have to think

about to just put some type of project

in space

how is it an aquarium really good at

work in space so what kind of problems

are you gonna find with that it how are

the fish are going to orient themselves

how are they going to eat you know what

kind of light do they have and actually

I came to found out a little bit later

about what they were there for which is
pretty spectacular - is there transparent fish and apparently we were looking at how their bones were developing they were young fish and they were growing as they were up there so it is actually probably you know science that's probably gonna change the way we do things not only in space because of course bone density is an issue but as also reflects packs and helps people here on earth who have osteoporosis so this one experiment just seemed nice because I love animals you know really is very multifaceted and pretty you know
spectacular and there's a myriad of experiments that are like that that include you know looking at what's happening to the human body in space for an extended period of time of course we have Scott Kelly up there right now and mr. Coney anko that were that's helping that all out as well as you know new materials and looking at a back at our planet and all this is going to help us here on earth and also going to make us smarter when we're developing new spacecraft and new systems in space craft and processes so the space station
is filled with a bunch of them but you

know I'm an animal lover so the fish

stick out and in me in my mind I

wouldn't say that I'm not an animal but

I would say that the biology experiments

you know for the biology that they are

are the ones that I found the most

interesting to perform on orbit because

I really think that there's a unique

environment that's up there and how we

live and operate in that unique

environment how genes express themselves

the challenges that the body faces

adapting all of those pieces are things
that will teach us more about you know

what happens down on earth we'll have to

understand the system really well if we

can understand it in space and that will

inform us as we make you know make

decisions about how how we protect

ourselves or operate on the ground and

so I really do think all that the

biology loving animals a fish tanker and

and other life-forms aboard with you on

board Space Station but the science

associated with biology is remarkable

and sunny you actually ran a marathon

while you were on the space station so

I'm gonna direct this question toward
you from cricket on Facebook she asks

how does zero gravity affect your muscle tone when you return to Earth Wow

interesting if you did nothing you probably would come back a little bit weak but luckily enough we have some equipment up there that keeps us sort of in a normal form when we return back to earth and that's pretty important you don't want to have lost too much bone density there too much muscle mass up in space you know we're on a pretty rigorous program up there it's about two hours worth of exercise a little bit
cardio a little bit of weight lifting

with the advanced resistive exercise

device and part of most of that of

course is focused toward maintaining

muscle mass and maintaining bone density

and along with the nutrition program

that we have up there the food that

we're eating people are coming back in

really good shape after being up in

space for you know six months or so and

that's based on or because of the

rigorous exercise protocols that we have

so like I mentioned if you didn't do

anything you would definitely have some
problems you know our body is formed and made here on earth and that's how that's why we look the way we look and being in space it's going to start to change you unless you remember back in your why you need to come back here and be able to walk around a little bit so the exercise equipment is really good okay so we're gonna end with just a few rapid-fire questions I'm gonna throw the questions out and you'll just answer them as quickly as you can what's the first food you want to eat when you return to Earth from space
sunny pizza sake and what's your

favorite food on station Russian cottage

cheese called Tavor aghh I like the

spaghetti if you could solve one space

mystery what would it be one space

mystery for me the space mystery that

I'd like to solve is hey where is the

nearest life that's in outer space and

so there's a question of is there life I

think that's there's just so much out

there that that's the answers got to be

yes but where's the nearest is the

question I'm like oh you're looking for

aliens October 21st 2015 is Back to the

Future day the day that Marty and Doc
arrived in the future the film predicted that in 2015 it would look much different than it does today what were you when you were a kid what technology did you think we would have today that we don't have yet from my perspective I kind of thought we'd have some sort of a kind of a personal hovercraft capability so I think if Marty had a skateboard that he adapted from the future and was able to fly around on we really don't have a big change from that perspective right we can still drive cars we don't have personal personal hovercraft or
flying vehicles and I was hoping that we would have that and be pretty cool when we do so but I'm pretty happy with FaceTime or any type of device that you can actually see somebody you're talking to because I never thought that the Jetsons you know phone was going to come to life and it actually has the video conferencing capability you know being able to FaceTime or Skype with your family is something that the crew uses onboard space station I'm sure all future missions are going to use that and it always even in science fiction
movies looks really clunky compared to what we actually have on the ground so it's pretty cool that we've achieved so much on that front.

I actually got to see my dog from space with a like Skype type of thing that we have so that's pretty mean things do come true.

you always somebody mentions a sci-fi so I have to ask the question is it Star Trek or Star Wars I would have to say Trek or Star Wars I'm your preferred sleep in space.

for me it's a it's Star Wars so and I'm a trek I'm your preferred sleep in space or on earth
my preferred sleep is after a good day's work and I had that both on the ground and in space so I haven't enough work to do to get a good night's sleep.

I vote for space yeah you don't use nothing you know nothing hurts you don't roll over because your shoulder is bothering or anything like that it does take about I would say probably a month for me at least to really get used to floating in there but but sleeping in space is pretty awesome you know you wake up just refreshed

you just gave somebody a great business
idea a favorite planet other than Earth

Jupiter probably Mars it's I think the

it's gonna be spectacular when we get

there and what's one personal item you

always bring with you on a mission I've

always brought a ring for my wife now

and I think in the future I'll be

bringing both her her ring and a picture

of our son all right thank you both so

much for taking time to talk with us

today thanks everyone who sent in the

great questions with the hashtag at NASA

this has been a live NASA social chat

thank you for joining us