good morning Bruce a missile range

facility where the Navy's premier training and test & Evaluation range and

we're hosting NASA for a program called a low density supersonic decelerator if

you're watching this you probably already know what that is so I'm not going to waste any time explaining it

because it's pretty awesome it pretty complex the reason we're here in Hawaii

and at the Pacific Missile Range

facility is because we have a lot of space if you're not familiar with our range we have two point 1 million square
miles of extended range complex and
although the balloons not going very fast it is going to use up a lot of real estate and especially in altitude so in order for us to launch it safely and then recover it safely and track it seemed like the logical place we've also supported NASA stuff here in the past and I know I'm personally very excited about watching this thing take off go active and then do all of its things it has to do before it goes in the water and I'm even more excited about the possibility of getting the test the
follow-on concepts here at the Pacific

Missile Range facility we're really

happy to be partnering here with NASA

and GPL and all the other folks that are

out here for well you've been here here four

months now it seems like so you're

almost kama Hina I don't have a lot more

to say except them again super happy to

be sharing our rangehood that our

friends from NASA and showcasing the

fantastic people we have here at the

Pacific Missile Range facility thank you

thanks for that welcome captain hey I'm

dave steets from NASA headquarters
Office of Communications and I want to

welcome everybody as well our friends in

the media who were here today I'd also

like to introduce the rest of our panel

in addition to captain hey we have dr.

Michael Gazzara --k Mike's the associate

administrator for space technology at

NASA headquarters in Washington - Mike's

left we have Ian Clark

Ian is the principal investigator for

the

density supersonic decelerator from and

ian's based at NASA's Jet Propulsion lab

in Pasadena California and next to Ian

is dr. mark Adler marks the program
manager for the low density supersonic

decelerator or ldsd Mars also with

NASA's Jet Propulsion lab in Pasadena

we'll hear some opening remarks from

mike ian and mark and then we'll take

questions from folks here in the

audience and then we'll also take

questions from reporters joining us on

telephone you can also ask questions via

our hashtag ask NASA if you're following

us on Twitter

we'll be entertained questions from the

public on hashtag ask NASA during the

briefing and with that I'll turn it over
to Dr. Garrett Mike thanks Dave and thanks captain hey I really appreciate your hospitality for allowing us to be here for months I don't know what we promised you we will leave though eventually but I want to really thank your team for hosting us here for this important and exciting test this test kicks off really three months of increased focus by NASA on the importance of technology technology to achieve our ambitious future science and robotic missions and eventually human missions to Mars
so before Mark and Ian kind of take you through the details let me just step back a little bit and talk to you about why it's so important to invest in technologies in order to go to an asteroid or go to the moon or go to Mars we need sustained and substantial investments in space technology without these investments we really can't go beyond the International Space Station you know where we have crew there today technology drives exploration and in fact technology is the surest path to Mars the space technology Mission
Directorate a little over a year old now

and running is responsible for a line

share of the technology development

which is critical again for exploration

above the low Earth orbit we continue in

the Directorate to look at a variety of

technologies and and also to engage the

best and the brightest in the nation we

have connections and programs that

involve academia

we have now over 450 activities with

over 120 us institutions and all working

on the tough difficult problems we have

at NASA for Space Exploration and for

the broader aerospace community all
while all the while doing these investments were making improvements and gains in the American economy in the innovation economy we're looking at high-priority challenges as we move forward in exploration in fact we have seven launches in the space technician director in the next 24 months that seven launches plus what we're going to do here tomorrow in the next two years the investments span a broad variety of areas and I'll talk about that in just a minute but they are important for us and they are important for the nation to
explore just last week the agency

introduced what we call the evolvable

mars campaign it's a series of steps to

really to lead to pioneer to Mars not

just explore but pioneer a technology is

certainly one of those steps in fact as

Charlie Bolden the NASA Administrator

had said and the president's science

advisor dr. John Holdren technology

development is the surest path to Mars

when we look at Mars you know we've been

there before eight successful landings

on the surface of Mars the United States

leads this area and landing on Mars it's
one of the more difficult challenges and clearly the Jet Propulsion Laboratory and these two gentlemen here to my left know a lot about that when we look at the Curiosity rover which landed a year ago or two years ago it's about a metric ton on the surface of Mars we know that for exploration for future robotic exploration for future human exploration we need more than that and how do we do that and that's what we're about here today we have been living really on the shoulders of the Giants who developed the entry descent landing
technology decades ago in fact there's a picture of it now from the Viking area back in the 1960s and 70s and so for us it's the challenges of Mars how do we get there how do we land there how do we live there how do we leave there and today and the event we're talking about focuses on that very difficult challenge of landing there we know this we need to test and we need to learn and we need to do it quickly and efficiently and that's again why we're here the specifics of the deceleration technologies we're going to talk about again I will leave to the experts here
but it will enable more mass to the

surface it's about more mass going to

more elevations on the surface of Mars

and landing more accurately EDL is

actually wanted one of many technical

challenges to get to Mars and in the

next 18 months the space technician

Directorate has a number of substantial

investments in a broad number of areas

let me just highlight a few in addition

to the entry descent and landing

technology we're talking about here also

the idea of getting their propulsion

high-power solar electric propulsion we
have a substantial investment in this area that has broad applicability for NASA the first step for us is moving beyond the low-earth orbit of the International Space Station and going and retrieving an asteroid and bringing it to the earth-moon space we call this the asteroid retrieval mission in that mission with a robotic spacecraft we will use high-power solar electric propulsion this technology not only can help move asteroids but also can serve as cargo vehicles to get to Mars and has brought applicability for our nation's
commercial spacecraft it has a number of
applications it's a multiple win not only for NASA but for the nation likewise we have investments in robotics and avionics a spirit and opportunity
the Rovers on Mars covered ten kilometers in about ten years we're trying to work on technologies that can tow ten kilometers in a week and how do we do that we know we need advances in avionics and robotics and sensing we're also looking at optical communications and the ability to send pictures in high-definition data back materials and
structures of course remain a key component for any type of exploration so these are the areas we invest in we know from previous history it is about risk we need we need to address risk and certainly the testing we're doing here has some risk in it but we need to take and address the risk today in these kinds of tests to reduce the risk for missions for Mars tomorrow and that's why we're here testing and learning as fast as we can so regardless of the outcome we know we will learn many important things we'll learn many important things about this technology
and again this is the first step we'll be back next year

hope you knew that we'll be back next year right for future testing so with

that let me turn it over to dr. Ian Clark the incredible PI of this effort

he is the EDL he's the architect behind

what you're about to see yeah thank you Mike and thank you everybody

for attending personally this is extremely exciting time for me and I really enjoy the juxtaposition of here

we are and one of the greenest and
luscious places that I've ever been
testing technologies to eventually enable much broader more capable missions to land on the surface of Mars a planet that has beauty in a number of other ways and so we're here because four decades ago the Viking Rovers landers excuse me were some of the first missions to land on another planet the United States and the world for that matter was learning what it means to land spacecraft on another planet and the technologies that were developed over four decades ago are some of the
same technologies that we still rely on
today to land our spacecraft on Mars
and one of the remnants of that
technology development program if you go
to the next image here this was some
of the testing that was done as a precursor to the Viking program at the
time they were trying to develop
supersonic parachutes that would enable them to decelerate the Viking spacecraft
land on the surface of Mars and we've been using that same parachute for several decades now and as we start looking towards the prize and want to
land more capable missions on the

00:10:10,120 --> 00:10:14,049
surface of Mars heavier to higher

00:10:11,830 --> 00:10:15,520
altitudes with more relevant science

00:10:14,049 --> 00:10:17,259
associated with them and relay them more

00:10:15,519 --> 00:10:19,329
accurately and as we want to land

00:10:17,259 --> 00:10:21,279
eventually humans on the surface of Mars

00:10:19,330 --> 00:10:23,020
we realize that we need to develop new

00:10:21,279 --> 00:10:24,759
technologies that will enable us to do

00:10:23,019 --> 00:10:27,879
that and the technologies that we're

00:10:24,759 --> 00:10:30,370
testing here two new technologies are

00:10:27,879 --> 00:10:31,899
associated with the Mars program are a

00:10:30,370 --> 00:10:34,200
supersonic inflatable aerodynamic

00:10:31,899 --> 00:10:38,049
decelerator you can go to the next image

00:10:34,200 --> 00:10:39,250
thank you it's the the image on the left

00:10:38,049 --> 00:10:40,329
is a saiad
supersonic inflatable aerodynamic
decelerator this is an inflatable torus or drag ring that we inflate at several times the speed of sound to provide more drag to slow the vehicle down as it enters the Martian atmosphere and then the technology on the right is a new supersonic parachute something significantly larger than any parachute that's ever been tested or flown supersonically in the past and will enable us to grow the landed capability on the surface of Mars by at least twice and we think it's extensible
to something even more beyond that go to
the next slide thank you
so some of the testing that we've had to
do to develop these technologies there's
a lot of questions that we have
associated with these how do they deploy
how do they inflate they're gonna be
strong enough to survive the the extreme
environments of Mars how are they going
to behave aerodynamically what is the
performance of these devices and some of
the testing that we've already done on
these is to answer the question is are
they strong enough to survive and so to
answer that we started developing new test capabilities we would have loved to have test these in wind tunnels but unfortunately there are no wind tunnels in the world that are big enough to test the size of devices that we need to test and the conditions we need to test and so we've started developing new ways to do that something that NASA hasn't had to do for several decades but again this is an exciting time and as we start thinking about trying to do even more capable missions on Mars issues that we have to wrestle with is how do you do...
those tests and so one of those was

00:12:09,419 --> 00:12:14,889
working with our Navy colleagues at the

00:12:11,860 --> 00:12:16,360
China Lake naval air weapons station we

00:12:14,889 --> 00:12:17,559
started coming up with an idea of using

00:12:16,360 --> 00:12:20,919
a rocket sled

00:12:17,559 --> 00:12:22,839
it's a 20-foot tall siege Tower if you

00:12:20,919 --> 00:12:24,610
will that we accelerate to several

00:12:22,840 --> 00:12:28,269
hundred miles an hour in a fraction a

00:12:24,610 --> 00:12:29,919
two seconds and what we do is we inflate

00:12:28,269 --> 00:12:35,559
and actually if you could go back to the

00:12:29,919 --> 00:12:37,209
previous video please thank you we

00:12:35,559 --> 00:12:39,609
accelerate this sled at several hundred

00:12:37,210 --> 00:12:42,280
miles an hour in a few seconds and we

00:12:39,610 --> 00:12:44,350
use that to replicate the aerodynamic

00:12:42,279 --> 00:12:46,059
loading that some of our technologies
will see in particular the supersonic inflatable aerodynamic decelerator so

the images that you're seeing are this first one is a shakeout test of that and now you're gonna see it inflate this is actually a slow-motion video the inflation of the side occurred over about 0.2 seconds a fraction of a second and all the testing that we've done to date shows that these devices work extremely well very exciting for sure but what we have to do is test them to make sure that they're gonna be strong enough and associated with the side we
have the new parachute and you can go to

the next video on that we handed

new ways of doing the parachute testing

to make sure that it was gonna be

structurally strong enough and so the

video that you're seeing is similarly

using a rocket sled it was a little bit

of an ingenious idea here again working

with our colleagues at the the Naval Air

Weapons Station at China Lake where we

used a helicopter to to take the

parachute up to several thousand feet

altitude where it was released dropped

and inflated and you see it inflating
now and there is a long rope that goes

several thousand feet down to the ground

wraps around the pulley you see the Rope

passing around that pulley and then we

light a rocket sled that would

accelerate horizontally down a track and

pull the parachute towards the ground

and we can generate over a hundred

thousand pounds of force to make sure

that the parachute was gonna be

structurally strong enough to survive

the environments that it would see if we

were use it at Mars that's just some of

the testing that we would do in
preparation for a Mars mission and then

Mark is going to talk a little bit about

some of the testing that we're doing

here in addition to that all right good

morning I'm going to talk about what

we're actually doing here out in kawaii

tomorrow's our first launch opportunity

for getting this balloon and test

vehicle launched I'll talked about

exactly how that all works we have

opportunities over the next two weeks

dependent on the winds and the weather

this is our first experimental test

flight of this vehicle that is designed

to carry the side and the parachute that
Ian talked about the proper conditions very high in Earth's atmosphere and very fast so it looks like to Dawid to these articles to these technologies that they're flying at Mars that they have the same conditions they have there so we test them at full-scale in those conditions to make sure that they're gonna work at Mars we want to test them here where it's cheaper before we send it to Mars to make sure that it's gonna work there now this the shakeout flight is if it's to get the first graphic here has two stages to it
we first launched in a very large 34

million cubic foot helium balloon that

balloon carries our 7,000 pound test

vehicle which is this this vehicle right

here up to 120,000 feet from one and our

20,000 feet we then dropped the test

vehicle and just for a few tenths of a

second and then it fires up a series of

spin motors which get the vehicle spun

up to lock in its attitude and then we

fire a large star 48 motor to accelerate

it from under and 20,000 feet altitude

up to the top of the stratosphere

180,000 feet and going about four times
the speed of sound about Mach four at

that point in the middle there during

the test period we deploy the saya the

six meter side that around the vehicle

to enter to the dean talked about and

see how that behaves in the environment

and then once it slows down from our 3.8

where we deploy the syad down to two and

a half times the speed of sound at Mach

2.5 we deploy the large parachute and

see that large parachute and how it

behaves that large parachute also serves

as the chute that descends the vehicle

down to the surface of the ocean where
it splashes down and we recover the vehicle from the ocean alright so if we can take a look at the at this vehicle right here this is our test vehicle it is actually 15 feet in diameter it flies in this direction with this heat shield forward it has a large star 48 rocket motor as I said to propel it in the vehicle around the side here in this gold areas where the saiad is stowed it has kept it very tightly against the vehicle during its entry into mars and its flight here on earth and then when it deploys a cover comes off and it deploys out and this inner tube which
increases the size of the vehicle to 6 meters from 4.7 meters in here we also have this parachute can this is where the parachute shoots out of after the site has done its job and the vehicle has a tremendous amount of instrumentation to observe the flight to measure the characteristics we have a camera mast here to look at the side deploy to watch the parachute deploy we have many sensors to reconstruct the trajectory and to measure the characteristics of the inflation of the devices this vehicle has been named here
in Hawaii as ke kiyokawa NOAA which is a boy from Earth and so that's the vehicle

we're gonna be launching sometime in the next two weeks we can go to the first video there so here we see the balloon

launching this was a test flight that we had out of Fort sunder New Mexico of our launch tower we have a special launch tower that we developed for this which also was named its Anika honua which is the mover of the earth and this is a large balloon most of the helium is kept up in the top of the loom when it's fully inflated at altitude the balloon
would fill a large football stadium like the Rose Bowl it's an extremely large balloon and that's what carries the vehicle up to 120,000 feet here you can see it departing and flying over the surface of New Mexico it will deploy out from here from Kauai and goes straight out over the ocean out middle of the ocean in the protected range that PMRF has provided us out there and next slide so those would get up to under 20,000 feet we do what we call the drop there you see the vehicle dropping from the balloon firing its
star 48 motor and it's pointed roughly

00:17:56.309 --> 00:18:00.809
up it goes up and then it turns over as

00:17:58.619 --> 00:18:01.979
the as the motor fires and it goes up at

00:18:00.809 --> 00:18:03.839
higher and thinner in the atmosphere it

00:18:01.980 --> 00:18:06.329
is now going roughly sideways it spins

00:18:03.839 --> 00:18:09.569
down and now in the video you'll see the

00:18:06.329 --> 00:18:10.949
saya deploy very rapidly around the

00:18:09.569 --> 00:18:12.419
vehicle and that provides the additional

00:18:10.950 --> 00:18:13.890
drag that we're gonna need at Mars to

00:18:12.420 --> 00:18:15.779
slow these vehicles down at high speed

00:18:13.890 --> 00:18:19.710
so that we can land larger payloads we

00:18:15.779 --> 00:18:21.299
go to the next video the next thing

00:18:19.710 --> 00:18:22.440
happens at Mach 2 and a half is we put

00:18:21.299 --> 00:18:23.819
out what's called a ballute this is

00:18:22.440 --> 00:18:25.200
actually a four point four meter device
that's used to pull the parachute out

here we see the parachute being pulled out of its can out of the vehicle the bridles on the vehicle stand up which is what holds that parachute and then the parachute deploys and slows it down so that's what a view from the camera will look like that we're gonna see of the parachute deploying into the high thin Earth's atmosphere simulating the Mars atmosphere and so that's our flight we this is an experimental flight we're testing now to see if we're able to do this we're able to get this vehicle up
to Mach 4 and the proper conditions to deploy these devices we are in the process of building two more vehicles that we're gonna want to fly next year those will be our flights of record to actually measure the performance of the sides and the parachute and those two flights in the summer of 2015 and also I'd like to also again thank captain Hale for hosting us here at PMRF this is a unique facility for our mission providing fantastic support for for being able to conduct this this flight so thank you I think we then Dave open
it up to questions okay thanks mark we will open it up for questions first here at PMRF and then over to reporters on the phone if you're on the phone and would like to ask a question please hit star one and you'll be added to the QA q for this briefing for folks here in the audience if you have a question please wait for the mic to get to you and if you want to raise your hands we'll send a mic over to you howdy Andrew prayer with KITV you're kind of opening yourselves up to all kinds of conspiracy theories with the
saucer shape could you tell us a little

557 00:19:59,690 --> 00:20:04,969
bit about the saucer shape design well

558 00:20:02,808 --> 00:20:06,589
this was the the shape of actually our

559 00:20:04,969 --> 00:20:08,330
entry vehicles that we send to Mars and

560 00:20:06,589 --> 00:20:09,709
so when we land something on Mars it

561 00:20:08,329 --> 00:20:11,089
looks very much like this in fact it's

562 00:20:09,710 --> 00:20:12,889
the same size we had to make it to the

563 00:20:11,089 --> 00:20:14,808
same scale I suppose it does have a

564 00:20:12,888 --> 00:20:16,488
little resemblance to a flying saucer

565 00:20:14,808 --> 00:20:19,219
though it doesn't fly like you've seen

566 00:20:16,489 --> 00:20:21,499
the movies it flies it this way now when

567 00:20:19,219 --> 00:20:24,558
that that that picture you saw of the

568 00:20:21,499 --> 00:20:26,929
flight that was in 42 years ago in the

569 00:20:24,558 --> 00:20:28,940
summer of 1972 to practice for Viking

570 00:20:26,929 --> 00:20:33,409
that flight was actually out of Roswell
New Mexico so you decide but to be clear

aerodynamics aerothermodynamics
determine the shape or more than

anything yeah it's physics okay do we

have another question from folks here if

not we'll go ahead and take a question

from our reporter on the phone the first

one is from alan boyle of NBC News Allen

thank you for taking the question I

wanted to ask what could go wrong and if

it goes wrong what is it going to look

like will you be able to recover the

vehicle go through the worst case

scenario okay so I could you repeat the
question I think I heard it I think the

question what would what a little

feedback there if something goes wrong

what would you do in that would you be

able to recover the vehicle okay so our

objectives for this first flight are to

launch it from here get the balloon off

and out over the water

to get it up to altitude where we can

drop the vehicle and to drop the vehicle

and conduct this powered flight and get

the data back from it to see how it

works as I said this is an experimental

test flight and so we want to get that
data back and see how the vehicle flies

make sure that it can get to the conditions that we want it to get to we also want to be able to recover the balloon envelope after that balloon has done its job the helium is let out of the balloon it descends into the water naturally we always want to clean up our messes and so we go out there with a recovery boat and get that plastic out of the water and bring it back for disposal so those are the objectives now what can go wrong with that we could have a problem with
the balloon on a scent the balloon the

614
00:22:13,259 --> 00:22:15,450
balloon could fail and ascend we could

615
00:22:14,279 --> 00:22:16,259
have a problem with getting the vehicle

616
00:22:15,450 --> 00:22:17,880
to operate

617
00:22:16,259 --> 00:22:19,319
there are several several different

618
00:22:17,880 --> 00:22:20,670
things that could happen there are what

619
00:22:19,319 --> 00:22:21,899
we want to really get though is the data

620
00:22:20,670 --> 00:22:23,519
we want to get that balloon to altitude

621
00:22:21,900 --> 00:22:24,930
drop it and fire that motor and if we

622
00:22:23,519 --> 00:22:26,849
fire that motor and we get data back

623
00:22:24,930 --> 00:22:28,289
from it that is a great day and that

624
00:22:26,849 --> 00:22:29,819
would then way we can learn exactly what

625
00:22:28,289 --> 00:22:33,990
happened and understand what to do for

626
00:22:29,819 --> 00:22:35,939
our next flights okay

627
00:22:33,990 --> 00:22:38,339
again if you have questions on the phone
please hit star one and we'll add you to the queue will now take a question from Tracy Watson of USA Today Tracy are inadequate thank you could you repeat the question the what is the altitude you're going to be going to wire the current technologies such as the sky crane inadequate for what you're trying to do you undo the first one and and how long will it be visible for from here at PMRF or to anyone in Hawaii looking up the balloon yeah and will you be able to see the test flight via the balloon itself will ascend the test vehicle to
about 120,000 feet altitude at that altitude the balloon expands and it's over 300 feet in diameter it's quite large in terms of visibility that's a good question I'm not really sure it's going to be you know sailing or floating west out over the Pacific Ocean I'm not sure from how far you'll be able to see there probably 50 or more nautical miles if we have I'm looking out there right now you can't see it but there are clouds out there if there are clouds out there like I see now you wouldn't be
able to see it at all yeah from distance

we'll be able to see it launch from the base here and start to ascend and leave

do have cameras on the vehicle and so we're hoping to get to lemon tree back from the vehicle in real-time and see the operation of the vehicle in flight through the radio even though the balloons vary even though the balloon is very large it's at an altitude about four times higher than a typical
airplane would fly so I'm not really

00:24:30,519 --> 00:24:34,779
sure how this would be the second

00:24:33,369 --> 00:24:36,279
question related to you know the

00:24:34,779 --> 00:24:39,190
technologies that we currently have for

00:24:36,279 --> 00:24:42,549
landing on Mars landing on Mars is an

00:24:39,190 --> 00:24:44,320
extremely challenging thing to do the

00:24:42,549 --> 00:24:45,849
atmosphere is extremely thin it's about

00:24:44,319 --> 00:24:48,519
one percent the density of the earth

00:24:45,849 --> 00:24:50,469
atmosphere that means that you need very

00:24:48,519 --> 00:24:52,000
large devices to react against the

00:24:50,470 --> 00:24:54,610
atmosphere to create the drag that we

00:24:52,000 --> 00:24:56,680
use to slow the vehicles down as they

00:24:54,609 --> 00:24:58,959
enter the atmosphere the current

00:24:56,680 --> 00:25:00,880
technologies are the the ones that we've

00:24:58,960 --> 00:25:02,640
used to land things like the Curiosity
rover the Mars Science Laboratory and

the limitations are largely associated with the conditions that we can deploy those technologies like the supersonic parachute and the size of those technologies if you want to land things that are even heavier than the Mars Science Laboratory if you want to land several tons and as you again cast your eyes to the prize and you think about landing humans on the surface of Mars missions that will be 10 to 15 tons 20 tons or more you're going to need extremely large drag devices to slow
those vehicles down as they enter the Martian atmosphere we don't have those currently and that's what Ildsd is developing are the the technologies and the drying devices that will allow us to slow those vehicles down safely to enable them to land on the surface of Mars else I'll add one more thing there was a question about the sky crane the this technology is for what we call the descent phase of landing on Mars we have entry we have descent and we have landing and so in fact this these technologies the side and the parachute
would be decelerator stages two stages

that would come before the last stage

which is where we use Rockets to slow

the thing down to the ground and so very

likely this technology would be followed

by the sky crane that we used on MSL but

if we want to put down more mass the sky

crane by itself can't do that we need

these decelerators stages before the sky

crane to slow it down enough so the sky

crane can take over and then do its job

at the very end okay thank you again if

you have questions on the phone please

it's star one and we'll take one more

you have questions on the phone please

it's star one and we'll take one more
from the phone then we'll come back here

728
00:26:31,039 --> 00:26:35,500
Mike wall from space calm

729
00:26:37,299 --> 00:26:42,250
oh dami yeah thanks guys for actually

730
00:26:41,019 --> 00:26:44,619
doing that that isn't a quick question

731
00:26:42,250 --> 00:26:47,259
um they're they're gonna be cameras on

732
00:26:44,619 --> 00:26:50,319
board right so so is it all going to be

733
00:26:47,259 --> 00:26:52,599
webcast then you're live and then we're

734
00:26:50,319 --> 00:26:56,589
going to be able to keep it happening

735
00:26:52,599 --> 00:26:58,569
just get a good sense of it looks like

736
00:26:56,589 --> 00:27:00,970
what those of us watching here at at

737
00:27:00,970 --> 00:27:02,529
home will be able to be and also when is

738
00:27:00,970 --> 00:27:04,509
it going to happen when does the window

739
00:27:02,529 --> 00:27:08,440
kind of open up for it or launch and

740
00:27:04,509 --> 00:27:11,140
everything okay so we have several

741
00:27:08,440 --> 00:27:13,120
cameras onboard the we have GoPro
cameras for GoPro cameras which are used
to give us real-time imagery for
situational awareness those send data
back in real time on the radio and so
we'll hopefully be able to see those
during the flight and see the flight
conduct and the parachute deploy side
deploy those sorts of things we also
have several other cameras onboard that
are high resolution higher speed that
will give us much more detailed data on
the operation of the devices their data
is recorded on board and so we will need
to recover the flight image recorder
which is part of the test vehicle in

order to get that data back in terms of

when we can go there there as I said

their opportunities over the next two

weeks so June 3rd 5th 7th 9th 11th and

are six possible launch days in the

next two weeks we are dependent on

whether we need to have the proper winds

to take the vehicle away from Kauai and

out over the ocean and so we're watching

the weather every day very carefully and

we'll pick a day that's the best day to

try and launch this and get it out and

conduct the mission actually I know
maybe Danny can answer on the when I was

going to say we will be webcasting live

the tests whatever day and time it takes

place we'll be streaming it live over

the Internet and carrying it as well on

NASA television we have a question from

social media I think one up here in the

front row microphone please sorry

hi one of our followers has asked will

you use a modified balloon for the

actual Mars mission use a modified

balloon know the the balloon that we're

using here is to put our test vehicle in

an altitude that will enable it to drop
from the balloon and accelerate to

00:28:56,529 --> 00:29:00,190
several times the speed of sound what

00:28:58,179 --> 00:29:01,690
we're trying to do is replicate the

00:29:00,190 --> 00:29:02,710
environment in which these technologies

00:29:01,690 --> 00:29:05,140
would be used

00:29:02,710 --> 00:29:06,808
that means replicating the atmosphere in

00:29:05,140 --> 00:29:09,759
particular the density of the atmosphere

00:29:06,808 --> 00:29:12,250
which is again met Mars it's extremely

00:29:09,759 --> 00:29:13,839
thin and so to find that thinness of an

00:29:12,250 --> 00:29:16,329
atmosphere we have to go half way to the

00:29:13,839 --> 00:29:19,359
to the edge of space or fifty kilometers about

00:29:16,329 --> 00:29:20,949
180 thousand feet here on earth to test

00:29:19,359 --> 00:29:23,289
these devices and we have to go several

00:29:20,950 --> 00:29:26,200
times the speed of sound we will not be

00:29:23,289 --> 00:29:27,069
using the balloon to land missions on
Mars

the balloon is more of a test ISM if you will it's something that we're using to test these technologies okay thank you we'll take a question here in the back
good morning gentlemen Ramsey Wharton I'm with Hawaii news now my understanding if you're looking at the largest payload as you mentioned about 20 to 40 tons that's the big one but right now this inflatable device which I understand is more for the robotic missions what is the highest load that you're looking at to be able to bring
down safely with the size of the technologies that we're testing here we think we could double the mass that we land on Mars so we could go something from like the one ton Curiosity rover to something twice that we could also land it more accurately and to higher elevations than we've been able to reach on Mars but the technologies we also think are very extensible to those Mouse ranges that you discussed the 20 to 30 tons that is for example the parachute you know the way that we use parachutes here on earth when we return say the
Apollo command module with a Orion crew capsule is we use them in clusters we use several parachutes to join even more drag even though we're only testing one parachute in the next few weeks we think that the parachute we're developing and testing is amenable to being used in clusters several parachutes at once to produce even more drag in those kinds of things are the technologies that would enable the the 20 to 30 tonnes that we're talking about so that's why we want to be good guess with our hosts because we think we'll be
back the mic here yeah quick add on to

00:31:04,470 --> 00:31:10,620
that we are we need to get to 20 to 40

00:31:09,210 --> 00:31:12,480
tents with people on Mars we can't do

00:31:10,619 --> 00:31:14,099
that in one step we have to take a kind

00:31:12,480 --> 00:31:16,079
of a step at a time so we did one ton

00:31:14,099 --> 00:31:17,609
and and we're going forward with the

00:31:16,079 --> 00:31:18,990
technology development to go up to twice

00:31:17,609 --> 00:31:20,819
that and we'll take a few more steps

00:31:18,990 --> 00:31:21,990
over the next decades to lead up to the

00:31:20,819 --> 00:31:23,099
ability to land people on Mars and

00:31:21,990 --> 00:31:25,049
that's that's the great thing about

00:31:23,099 --> 00:31:26,369
having the space technology Mission

00:31:25,049 --> 00:31:27,869
Directorate is it can fund these things

00:31:26,369 --> 00:31:29,250
well in advance of the mission so we can

00:31:27,869 --> 00:31:30,359
reduce the risk of actually trying to do
those missions when we have to go do

them get confidence in the technologies

know how we're going to do it what it's

going to take to do it and then we can

step in and build them and do it can you

hear me there he goes summertime if all

goes well now you're looking at

expanding that inflatable to the 26 foot

size diameter is that right this is the

one yep so the larger load the first one

we're testing is 6 metres in diameter it

expands off the periphery of the vehicle

that one's about 20 feet in diameter the

the we hope to come back next year in
test one that's 8 meters which is even larger and that would again enable even more mass to be landed on the surface of Mars you can grow those even further we're not really sure what the limits are you know it's one of the reasons why we're doing some of this testing but the parachute is you know the 30 point 5 meter 100 foot diameter parachute is also something that would be used in those missions ok and again if you have questions on the phone please hit star 1 we do have another question on the phone from Sarah döner of AOPA Sarah
the 8 meter model will that be a different design or just a scaled up version of the 6 meter model the 8 meter sign that we'd be testing is a very different design actually when we started thinking about what it meant to deploy inflatable decelerator x the first steps that we started taking were where how do we how do we develop this technology and how do we develop in a way that we're familiar with how do we test it how do we know how it performs and one of the the key elements of that is is making device that acts as if it
were a rigid device we fly rigid

structures to Mars routinely

and we know how they perform we can

scale them to very small sizes you know

things that are that are even smaller

than this and put them in a wind tunnel

for example and test the aerodynamics

and feel comfortable that the

aerodynamics that we're seeing are going

to be extensible or extractable to two

models or to vehicles that are several

times the size that we're testing and we

wanted to do a similar approach with the

inflatable decelerator x' so the 6-metre

is really designed to be it's something
that acts as if it were a rigid structure the eight meter device is something very different as you start developing these inflatable decelerator x' you're gonna have to wrestle with what it means to have these very flexible structures that are attached you know directly to the the front of the vehicle in the eight meter starts moving us in the direction instead of it being a high higher pressure device it's something that is much lower pressure it's actually ram air inflated using the oncoming supersonic flow to inflate the
device but it also has much more

flexibility associated with it the

aerodynamics of the device determine the

shape that it takes and vice versa and

the shape determines the aerodynamics

and so in that regard the eight meter

device is really our first foray into

understanding what it means to have very

large devices that are flexible that

will interact with the oncoming flow and

whose shape may not be determined a

priori and it's that excitement that you

know means what is it how do we develop

these technologies and what are the
behaviors of them as we move to larger

and larger devices these are the

questions that we're gonna have to

answer

okay thank you we'll take another caller

from on the phone

Tracy Watson of USA Today Tracy can you

talk about what the inflatable cushion

is made out of and how big it is when

it plates

compared to how big it is when it sewed

thank you the test vehicle is four point

seven meters in diameter about 15 feet

and it's essentially a full-scale
replica of what a Mars entry vehicle

would look like when we inflate the the

side the first sign that we're testing

is a six meter device so we go from

about a 4.7 meter to a six meter device

in that again would would enable us to

in conjunction with a parachute to

almost double the mass that we can land

on the surface of Mars the materials

that decide are made out of we actually

use Kevlar very similar to the Kevlar

that's used to build bulletproof vests

and but it's a we also apply some

coatings to it to allow it to withstand

some of the temperatures that you would
see as this thing is is inflated and deployed at several times the speed of sound so we're talking temperatures upwards of 600 degrees Fahrenheit to survive those not only do you have the Kevlar you also have some some coating associated with it that will allow it to absorb some of the heat and the energy of the that high supersonic flow okay if you have any questions on the phone please hit star one we'll come back here and see if there any more here having no takers here oh wait we do have one Sir Andrew prayer again with kitv4
news is there any earthbound uses for the technology that you're testing today absolutely aerodynamic decelerator is are devices that can be used anywhere where there's an atmosphere that can be earth that can be Mars they can be Titan that can be you know a number of bodies in the solar system the the earth atmosphere is is nice and that it's very thick and so needing to deploy these devices at supersonic conditions is not a problem that we routinely face but certainly there's there's applications where these devices would would have a
role here at earth okay any other

questions from here in the audience at

the MRF all right with no further

questions we'll go ahead and wrap up

today's briefing thank you all for

joining us on NASA television and here

in person at the Pacific Missile Range

facility on Kauai Hawaii stay tuned

we'll be updating the potential for a

launch tomorrow through our social media

websites

our mission website as well as media

advisories you can follow along with us

and find out the latest on the launch
date and time by following at NASA

00:37:57,199 --> 00:38:04,998
underscore technology or at NASA we'll

00:38:02,150 --> 00:38:07,220
also be posting updates to the ldsd

00:38:04,998 --> 00:38:11,238
mission page on the web which is linked

00:38:07,219 --> 00:38:15,848
from the space technology page on WWN SE

00:38:11,239 --> 00:38:15,849
gov thank you all for coming