coming to you live from Houston Texas at

the idea synthesis workshop

at the lunar and planetary institute my

name is Jason Kessler I am a co-lead for

the partnership and participatory

engagement session this morning I am the

program executive of the asteroid grand

challenge based in headquarters my

partner in crime Jen gasps tetek is the

program exec for prizes and challenges

and we're joined by Joe Gardez Martyr

moderator who's based here at the

Johnson Space Center to get things

started it's good to be back we were
here at the end of October and had a little hiatus and I'm really grateful for everybody that was willing to travel back and join us in person we have a number of folks that will be doing so virtually as well and really look forward to a lively discussion you can see up up front now is the agenda that we've got and the way we've got it organized there are three sections will start with Mike ohara from Aerojet bone as from Goddard and Charlie chafer they'll all have ten minutes each and then we'll we'll open it up to 15
minutes of questions for each of them

have a 10 minute break followed by chris

lewicki scott subject David Gump Eric

mom again open it up to 15 minutes of

questions I followed by another break

then we'll have David gustan Margaret

race jill Lepore Tony Freeman and

jean-claude kid booth again 15 minutes

of questions after their presentations

again a break and then we want to open

it up into a lively conversation that

the idea here really is to take these

ideas and pull apart how we might be

able to move forward in the planning for
both the mission and the grand challenge

I'd like to direct you to the hashtag asteroid partners if you're following us online and join in with questions through that or through the Ustream live chat to set the stage real quickly you've probably seen this slide it's the Venn diagram of the asteroid initiative it's made up of both the asteroid redirect mission and the asteroid grand challenge we were really excited when the RFI got released that we were able to include this section that we're speaking about today and that's the partnership and participatory engagement
how can we in both the mission and the Grand Challenge figure out ways to bring in new fresh ideas and innovate on some concepts to help us do this better it's obvious that the overlap is in the Neo observation and manipulation or excitingly there there's opportunities for partnership and engagement both in the mission whether it's the robotic piece or the crewed mission aspects as well as the underpinnings of the Grand Challenge to enable us to do the work that we've already doing better and
accelerate that work so a couple of desired outcomes to set the stage
for this morning I think it's important that we get a shared understanding of how this partnership efforts can really benefit both the mission and the Grand Challenge ultimately again we're really wanting to have a rich dialogue and I'm hoping that the structure that we've set for this session today is going to enable that and if it turns out that we're not having the discussion I'm certainly open to change in the schedule around a bit so that we can get into the
conversation that that's really going to lead to the findings that that both the mission and the Grand Challenge are looking for ultimately the idea is to be able to feed this into the session tomorrow the plenary session and that can then be pulled into the mission planning moving forward and as as Jen and I continue to work on this co-created implementation plan for the Grand Challenge this really is our first step of of engaging and then ultimately we want to be able to find what our next steps and actions are going to be so we
really want to have the discussion to

00:05:09,829 --> 00:05:15,560
pull out the salient points that we can

00:05:11,750 --> 00:05:17,949
then move forward with as we continue

00:05:15,560 --> 00:05:17,949
this process

00:05:18,300 --> 00:05:22,978
another word char I had to do it just to

00:05:21,389 --> 00:05:24,840
kind of set the tone I know it's early

00:05:22,978 --> 00:05:30,779
for some and those that are around the

00:05:24,839 --> 00:05:30,779
world maybe it's really late but just to

00:05:27,389 --> 00:05:32,908
set the context of what we were talking

00:05:30,779 --> 00:05:36,029
about here I'm not going to read through

00:05:32,908 --> 00:05:40,139
all this but these were the questions

00:05:36,029 --> 00:05:42,869
that we asked in the RFI and these for

00:05:40,139 --> 00:05:45,030
the most part are what are going to be

00:05:42,870 --> 00:05:49,110
discussed today not every presenter

00:05:45,029 --> 00:05:51,299
focused on all these bullets because
that was not the requirement but this is what we sent out in the RFI to kind of trigger the thinking and so let us from there turn it over to our first speaker so that we can get started it's going to be Michael O'Hara from aerojet rocketdyne talking about the initiative unique opportunities that one's for good morning thank you for having me here i am the director for civil space propulsion i work in Washington DC in the wash ops office what is participatory engagement what does it
mean to us aerojet rocketdyne well its

really three categories the way we see

it its broad and diverse participation

sustained multi-mission engagement and

doing business differently it's kind of

timely for us as most of you might be

aware we just had an acquisition at

Rocketdyne so we're internally looking

at ways to do business cheaper more

effectively and meet the costs the costs

and customer needs as we move forward

under the broad and diverse

participation we see participation

definitely with the community other
agencies and that whole business segment is rapidly growing universities international space agencies and industrial partners private government observation observatories and laboratories Congress and for this particular endeavor the United Nations this is a world issue potentially with asteroids and there is international interest sustained multi-mission engagement a single mission does not result in real engagement opportunities we cannot afford one off programs
anymore multiple missions on timescales

consistent with the needs of the community so we need to be able to do things and touch the community and bring them in and engage them and of course we have to be cost-effective broad market applications beyond intended primary objective so like I said we can't do one also whatever we do we have to have a broader scope in mind get the most bang for the buck to keep these things going repeated broad community and public engagement through workshops industrial conferences industry association XPrize competition that's a lot like a shape
and capture

your BD person a lot of the same

theories the same objectives need to

apply to what we're doing here and of

course doing business differently offer

incentives to participate in a

appropriate for each community prize IP

ownership property ownership accept

cetera minimize or reduce the barriers

to participation in schedule costs you

know we need to get things going a lot

quicker it costs industry a lot of money

to respond to things and you know a lot

of time and energy and from the agency
00:09:07,220 --> 00:09:12,110
perspective it would really help us if

00:09:09,528 --> 00:09:14,509
y they could expedite things and not be so

00:09:12,110 --> 00:09:16,190
demanding but yet be reactive and

00:09:14,509 --> 00:09:17,899
proactive and move things along much

00:09:16,190 --> 00:09:21,860
quicker quicker it will reduce the

00:09:17,899 --> 00:09:24,049
overall costs we need to emphasize

00:09:21,860 --> 00:09:26,269
applicability of technology development

00:09:24,049 --> 00:09:29,838
paths to multiple exploration goals and

00:09:26,269 --> 00:09:32,509
non-users so you know spin-offs you i'm

00:09:29,839 --> 00:09:34,519
a former wangler guy and was involved in

00:09:32,509 --> 00:09:36,709
a lot of spin-offs in my work there so

00:09:34,519 --> 00:09:39,078
the more bang for the buck that we can

00:09:36,708 --> 00:09:41,088
do with these programs the more we're

00:09:39,078 --> 00:09:42,739
going to bring in people and we need to
leverage industries investments of existing available high TRL capability to expedite the program so if there's something in the hopper that has a reasonably high TRL let's not go back to the drawing board you know let's use what we have let's take minimal resources to get it to the TRL level that we need to move things forward but most importantly participating gagement requires affordable sustained and multi-mission opportunities for participation and diverse communities how does aerojet rocketdyne approach
participatory engagement well we look at

00:10:14,419 --> 00:10:18,229
how we can do things differently

00:10:16,120 --> 00:10:20,179
affordability of containing missions

00:10:18,230 --> 00:10:22,938
with multiple player involvement the

00:10:20,179 --> 00:10:25,818
more people we can bring in the more the

00:10:22,938 --> 00:10:27,230
more congressional you know advocacy we

00:10:25,818 --> 00:10:28,698
can get more people who touch more

00:10:27,230 --> 00:10:30,709
people you know people that are on the

00:10:28,698 --> 00:10:32,498
payroll you know it's a different

00:10:30,708 --> 00:10:35,708
environment guys you know we

00:10:32,499 --> 00:10:37,778
have a one big program and minimal

00:10:35,708 --> 00:10:39,218
participation but we're going to have to

00:10:37,778 --> 00:10:41,528
share everything and that's one thing

00:10:39,219 --> 00:10:43,989
aerojet rocketdyne we're looking at

00:10:41,528 --> 00:10:45,938
doing is expanding and bringing in as
much expertise and people and things we can do to help our programs be sustained

what are we doing to help others do things broad scope of applicability so you know whatever we do it needs to be applicable to multiple things it's all about bang for the buck and if we can keep that in mind I think we're going to have a good chance of things and we need to focus on the industrial return so you know I have board of directors you know we have stockholders as much as I love our job we all don't do it for free so we have to be able to sell what we do
inside as much as outside we need to

focus engagement on technology science

and policy we definitely need to have a

stem component academia component of the

entrepreneurial space folks the venture

capitalists media outreach campaigns we

need to do things differently than we

have been doing and things were doing

ultimately support going to Mars so you

know the objective is to get the Mars

and we can't do it cut right out of the

box so we got to take step by step so

whatever we do has to build to an

objective and that objective for us the
way we see is ultimately getting to Mars

so what do we do once there is a program

but we need to promote the affordability

right now this is the least expensive path to exploration beyond low Earth orbit there's no Lander required

it tests several key technologies in a realistic environment that have applicability to a Mars mission how do we use asteroids once it's in place well broad export exploitation is the key to reduce costs and to engage non-traditional and in east entrepreneurs Google prize for asteroids
resource utilization engage universities

keeps at missions to asteroids students

suggestions and experiments and engage

the scientific community it's going to

be imperative that the science and human

space guys work together for what

we do and leverage each other from the

most outcome and of course we need to

keep this sold like any program you win

we need to work to keep it sold in this

environment and it this program is

certain asset as a leader in space

exploration which we all want defined

mission will current encourage infusion

of young talent which we all need in
this industry and encourage interest in

science and engineering the technologies
developed can be used for cargo
transportation for human missions to Mars and its SLS and Orion logistic

support you know it it gives the program
something to do in the near term and keeps things moving and enables a mission Cannes that will maintain public

engagement with its visibility approach is critical to the vision so for us because we're a propulsion company we've

been working with the architecture is specifically oh sorry okay sorry about
that so we have in space transportation

efficient movement of assets and

supplies and multiple customer

applicability aerojet rocketdyne

sustainability space transportation

approach for exploration as you can see

it's cross-cutting what we want to do

and our piece to this can apply to DoD

orbit-raising robotic missions SLS Orion

planetary defense satellite servicing

repositioning of assets and situational

awareness can contact myself Michael

Hera or Jocassee be happy to answer any

questions thank you
next up is bone as from Goddard oh

okay well I'm going to tell you a little bit about some work that we've been doing in NASA Goddard for the last few years on satellite servicing

partnerships I'm not going to talk a lot about the satellite servicing activity because that's not why we're here but maybe try and make some parallels to what's going on here and what we've been trying to do with servicing and tell you about the partnership approach that we've been working towards and then talk a little bit about you know just my
perspective on some of the

329 00:15:02,259 --> 00:15:07,210 partnership opportunities that might be

330 00:15:03,850 --> 00:15:08,680 available for this mission so as I said

331 00:15:07,210 --> 00:15:10,690 I’m from the satellite servicing

332 00:15:08,679 --> 00:15:13,779 capabilities office we’ve been working

333 00:15:10,690 --> 00:15:16,450 since 2011 on a public-private

334 00:15:13,779 --> 00:15:20,199 partnership to do satellite servicing in

335 00:15:16,450 --> 00:15:21,940 geosynchronous orbit okay so there's

336 00:15:20,200 --> 00:15:24,970 some parallels here there's some

337 00:15:21,940 --> 00:15:26,620 complete differences here we've talked a

338 00:15:24,970 --> 00:15:29,889 lot about how we need to do cots like

339 00:15:26,620 --> 00:15:31,600 things and bring private industry and to

340 00:15:29,889 --> 00:15:35,470 make NASA missions cheaper and more

341 00:15:31,600 --> 00:15:37,899 sustainable satellite servicing is kind

342 00:15:35,470 --> 00:15:40,090 of a similar concept we know there's a
strong commercial market existing for satellite servicing we know there's some technology development that still needs to happen our goal is to work with private industry to develop the final stages of that technology and go fly missions that are beneficial to both the government and the commercial partner so the public-private partnership that we've put together is one where there's a lot of skin in the game from both sides there's not a lot of government intervention in what happens on the private sector side and
there's a guarantee that the private sector has rights to their intellectual property that they've developed in this partnership. So, I think those are important things. This is definitely a mission-based partnership. Unlike the asteroid industry mining industry, it's a very mature customer base. There's a direct return on investment in the immediate future. So, maybe there's not, direct parallel willful to talk more about that. So, the approach is a cooperative research and development agreement or crater combined.
with a standard far running in parallel

and the way that works for us is we work with the partner to develop the technologies necessary to complete the mission we do that mostly through the crater we have a separate far that is enables us to do some bartering and some exchange of money but most of the work is done under the coop research agreement and it's kind of much more like a 50-50 split at the cost going into this so what that does for the government is it enables us to fly missions cheaper on the
government side but it also forces
industry or enables industry depending
on how you look at it to go off and and
open new markets okay so I'm not going
to talk a lot about crater if you encourage you to go look at it it's an alternative to Space Act that we found more suitable for this type for the for the servicing type of activity so what are some areas where the government and industry can partner clearly there's a lot of work in solar arrays and electric propulsion and so here's the question does the government need to pay for the entire development does the government
need to pay for the entire build cycle

and test cycle is there some commercial

interest in entity who has something to

gain financially by having a spaceflight

proven system and selling it to a be

commercial industry or maybe the

government is their investment that

partner

could make that could help the

government make this mission more

affordable is there asteroid Boulder

capture mechanisms capture capture

mechanisms I don't I don't know that

that there is are there mining
414
00:18:50,739 --> 00:18:56,409
tools I don't know that there are so but

415
00:18:55,239 --> 00:19:00,729
certainly these are the kind of things

416
00:18:56,409 --> 00:19:03,539
that a partner could invest in partner

417
00:19:00,729 --> 00:19:06,249
with the government and fly and

418
00:19:03,538 --> 00:19:08,709
potentially at very low cost to the

419
00:19:06,249 --> 00:19:10,509
government and while guaranteeing

420
00:19:08,709 --> 00:19:13,389
intellectual property rights for that

421
00:19:10,509 --> 00:19:15,069
partner from the through the crater so

422
00:19:13,388 --> 00:19:18,368
the other idea obvious this one I think

423
00:19:15,069 --> 00:19:20,078
is the most obvious one for the asteroid

424
00:19:18,368 --> 00:19:22,718
mining community and for the planetary

425
00:19:20,078 --> 00:19:25,450
defense community we want to partner we

426
00:19:22,719 --> 00:19:27,190
need to partner on how we're collecting

427
00:19:25,450 --> 00:19:28,569
data or at least really good I'd like to
see us partner on how we're collecting

data and one option is a data by there's

another option which would be if NASA

does decide that we need to fly new

space telescopes that instead of seeing

NASA and private industry as competing

to build a scout type mission we could

actually work together poor resources do

more for less those kinds of things so

so those are the kind of things that

I think we could do using this approach

so here's just one example of a data by

so if we want to go find asteroids that

are coming to Earth in our and our load


delta v return the place we need to look

443
00:20:05,798 --> 00:20:08,950
is not as they're flying by earth and

444
00:20:07,659 --> 00:20:10,809
not going to come back for another

445
00:20:08,950 --> 00:20:12,609
hundred years it'd be nice if we could

446
00:20:10,808 --> 00:20:16,598
go look where they are now which is

447
00:20:12,608 --> 00:20:18,638
slowly looping in it needs to be the few

448
00:20:16,598 --> 00:20:20,019
asteroids are very many asteroids

449
00:20:18,638 --> 00:20:25,658
actually that are in very earth-like

450
00:20:20,019 --> 00:20:27,999
orbits with long synoptic periods and

451
00:20:25,659 --> 00:20:30,429
and therefore a low Delta V to return to

452
00:20:27,999 --> 00:20:33,038
Earth these are great candidates for arm

453
00:20:30,429 --> 00:20:33,720
they're awesome candidates for asteroid

454
00:20:33,038 --> 00:20:36,420
mining and

455
00:20:33,720 --> 00:20:40,529
kind of activity so just just one

456
00:20:36,420 --> 00:20:44,490
example maybe maybe a partner provides a
telescope and NASA provides a bus or vice versa and you go off and do this scouting mission together just something to think about this is kind of a the kind of partnership arrangement that you could do with this approach so in conclusion I think clearly public-private partnerships can yield significant benefits to both parties there's a great history of those things geochem industry started that way with echo the Coxes Cox is a great example hopefully satellite servicing in the near future will be another example
don't forget when you're looking at partnership opportunities it's not just SpaceX it's not just far based contracts and grants and the traditional things but create as an option too and so if anyone wants to talk to us about this approach come see me after all give you my contact information I'll put you in touch with the right people great so thank you next up we have Charlie chafer space services holdings Shelly thank you morning everybody my name is Charlie chafe i'm the CEO space services
I was delighted to see the topic of today's discussion because I believe we do have a mission that's ongoing that is a public-private partnership and is widely focused on participation so I'd like to talk to you a little bit about it I think it might be a model so everybody knows about solar sails this is really a dream come true for me and for everybody back to Galileo that NASA decided to release as part of its technology demonstration mission program the Sun jammer mission solar sails aren't this won't be the
first sale mission ever flown the

500 00:22:43,529 --> 00:22:49,599 Japanese it gross spacecraft is still

501 00:22:47,200 --> 00:22:53,200 flying this will be the largest mission

502 00:22:49,599 --> 00:22:55,990 ever flown 1,300 meters squared it's

503 00:22:53,200 --> 00:22:59,500 designed to answer all questions about

504 00:22:55,990 --> 00:23:01,269 sales as flight hardware that's worthy

505 00:22:59,500 --> 00:23:06,190 of your consideration for future

506 00:23:01,269 --> 00:23:08,319 missions so sunjammer has the as l

507 00:23:06,190 --> 00:23:11,250 mentioned it's a nasa-funded solar sail

508 00:23:08,319 --> 00:23:15,490 mission it's focused on technology

509 00:23:11,250 --> 00:23:18,400 demonstration and within the procurement

510 00:23:15,490 --> 00:23:20,769 the rfp and the award there were

511 00:23:18,400 --> 00:23:26,110 infusion requirements we'll talk mostly

512 00:23:20,769 --> 00:23:28,779 about those 2014 maybe early 2015 launch

513 00:23:26,109 --> 00:23:33,879 work o manifested on the discover launch
and we will fly the sale to l1 where
will calibrate some space weather
sensors that have been provided by the
UK space agency and then move on out to
a sub l one position about twice as far
from Earth to demonstrate the value of
sales one value of which is doubling the
warning time for solar storms we also
have a global participation component
which we head up so the team is of
course NASA providing the funding and
the
technical oversight the contractors
lagarde in tustin california they've
built and flown a hundred and fifty inflatable and deployable missions in space so they're not newcomers my core air space solutions of melbourne my company and then of course noah as one of the infusion partners so the opportunity here is that we are one of the first ever commercial rights holders to a NASA mission how do we get it we asked for it in the RFP the infusion requirement envisioned participation by commercial partners we provided an offer that includes direct cash payments to the mission to fly some of our payload
and an extensive EPO outreach effort
centered around the website and in
exchange for that we now have the rights
to monetize web traffic and to provide sponsorship opportunities throughout the
mission a little bit about us we go back about 30 years plus a gentleman named deke slayton who lived not far from here and work even closer to here was our president then in 82 we we conducted the first privately-funded launch in outer space since that time we've been busy many of you may have heard of celeste asst the world's first public
participatory space mission we've flown

dozen flights have two more scheduled

and we've put more than a thousand people symbolically into space which I like to say is more than any government has done solar sails the the accomplishments today include the deployment of the sail quarter size of the sail on the ground and for those of you that know sail craft you'll know that it's harder to do it in 1g than it is in zero-g we have worked with Noah over the course of five competitive

the awarded contracts to help them define a sale based approach to a data
by for commercial space weather and back

in the early days when we're first working on solar sails we entered into a space act agreement with NASA Langley at their request to share some ideas about deployable booms so here's the core of what I'd like to speak about today it's our business model and it does include sort of three components the first is that you and and this is why i think it's applicable not just to sales but to any technology asteroid retrieval has all of these components so the first thing you have to have is a real and a
compelling space mission we have a motto

at our company no cartoons only flight

the mesh the mission can be compelling

on the basis of where it's going who's

on board or what it's doing any of those

components can make a compelling space

mission but remember has to be real the

second component is make the world aware

of what you do it you do that through

earned media of course our most recent

Celeste is flight where we launch Scotty

and Gordo Cooper and 300 other folks

attracted more than a billion media

impressions in our website and our
The webcast was an equal number of unique impressions, so getting earned media is easy for compelling space missions if you know how to do it. It's more difficult if it's a boring space mission. I'll give you that, but it is a key component of global awareness. The second is through advertising. We are a group on evergreen partner, we do pay per click on Google. We have a broad scope of methods by which we let the world know that we're involved in a compelling space mission. The final component of the business model, which again I think is
relevant for missions going forward it's

00:28:10.450 --> 00:28:15.460
pretty simple take money wherever it

00:28:12.849 --> 00:28:17.769
exists so we have traditional revenues

00:28:15.460 --> 00:28:20.769
we have US government customers we have

00:28:17.769 --> 00:28:23.029
commercial customers that buy data or

00:28:20.769 --> 00:28:24.710
buy hardware by demonstrate

00:28:23.029 --> 00:28:27.410
shins but we also have what i call

00:28:24.710 --> 00:28:29.840
non-traditional revenues we monetize

00:28:27.410 --> 00:28:32.870
internet and yet unique visitors I was

00:28:29.839 --> 00:28:35.359
asked to give a testimony to the Senate

00:28:32.869 --> 00:28:37.339
Space Committee a few years back I told

00:28:35.359 --> 00:28:40.389
senator brownback that if NASA had a

00:28:37.339 --> 00:28:42.769
shopping cart on its Mars landing

00:28:40.390 --> 00:28:44.900
webpages they probably could have

00:28:42.769 --> 00:28:46.609
financed two subsequent missions I'm
glad that they don't because that's my business but taking interested space interested web traffic and learning how to monetize it something we've been doing for 15 years sponsorship we've done missions for 20th Century Fox nescafe barrels writings instruments in England and a number of other key sponsors and then finally memorial spaceflights certainly a non-traditional revenue stream so in the form of solar sail commercial infusion the first application I've already mentioned this is the outcome of a study we did for
Noah that shows how a data purchase approach to sail delivered space weather information is a lower cost be more comprehensive and see provides at least double the warning time and if you're a nuclear power plant trying to shut down during a solar storm because you're worried about the grid overheating at extra 45 minutes matters if you're piloting an airplane over the poles and you need to come down to a lower altitude or even land having that extra time matters if you're in this space station and you need to get to the
Russian side of it because it's more heavily shielded that extra time matters so I'll skip communications I'll talk about entertainment missions certainly anybody that's ever seen an America's Cup race understands the concept of logos on the sale we've already tested the paint we know how to do you know how to cover X percent of sales and not reduce the propulsive reflectivity it's just a matter of time once sales get going that you'll see the race are on the moon that actually is what Sun jammers
aim for back in June we announced that

Sir Arthur Clarke's DNA would be part of our cosmic archived on the Sun jammer

mission and Clark wrote sunjammer as a story about a race around the moon so

space weather I'll stick let's say one

thing about space weather this is a chart provided by the new director of

Noah dr. Katherine Sullivan Assistant Secretary of Commerce last year

everybody in commercial space is seeking the hockey stick many people are

promising the hockey stick in terms of just get started and you'll see dramatic

growth in the use here's the hockey
stick the consumer growth in the Space

Weather Prediction centers subscription

service as we become a more wired planet

and dependent upon space weather

information creates an obvious market

game changer I've described that and so

what are we doing with sunjammer we call

it explore educate and entertain the

exploration component is the proof of

the technology we're going to take it

fly it into deep space educate we have

kids school students from Tustin

California to Zambia participating in

the mission and remember we're 14 to 18
months out from the flight you only
heard about curiosity you all heard
about curiosity well in advance the
world learned about curiosity seven days
in advance so we're in the process of
building that Prashant oh I guarantee
you when there are six HD cameras and
one GoPro flyaway camera taking images
of that fully deployed sail out in
deepest space isn't a sports bar on the
planet that's not going to have that on
CNN and
we're going to see that finally and
that's slips over into the entertainment
component we have the music of sunjammer

we have launch events we have any number of things planned and we're beginning to implement them Celeste is we're flying payload so I'll finish up here with what my thoughts about what is relevant for today's topic the first is that innovative partnerships can succeed there's some hiccups along the way I thought for certain when we when we were announced the winner that I was going to have a huge I'll say it battle at NASA dragging a space act agreement out of them to allow me to do the things
I've won in the procurement at not a bit
cots and new ways of doing things took
hold we have an agreement we have the
rights those rights include don't mess
with our mission which we understand all
of our activities occur post the
accomplishment of the NASA mission but
there was a lot of give and take in
terms of what is the proper format to do
that but we can succeed the science and
technical goals of the mission came
first the infusion between Noah and us
accomplished also and we figured out a
bunch of new man missions and things
that we can use solar sails for i
mentioned space weather obviously anyone that's been to an asteroid conference knows that sales have a role there but again i will say that it is not the model is not unique to solar sails asteroid sale missions already in planning public engagement technologies and methods evolving is as almost as fast as the mission technologies we're trying to keep up with developing apps with developing new forms of interaction for our public the more folks the more eyeballs we show on this mission the more dollars flow to us and the more
dollars that flow to the mission

so that's me I'm here in Houston and happy to be a part of today's proposed program Thanks fantastic all right so we've got now 15 minutes of questions I want to throw it out first do we have anything that's come on lon Joe okay we've got our speakers in the room any questions ideas peaked from our audience members there Mike runners we do have oh please so i have question about solar sails and and gravity her planetary defense where you go oh so presumably you can use a solar sail
like a kite yes yes yes you can it's a

in-space propulsion system that has a

variety of applications the sunlight is

the photonic pressure is constant so we

have to end up driving and tacking just

like you use a sailboat but that's what

we'll be demonstrating is that

maneuverability at and it can be

attached to you know that depends on the

size of the sail the thickness of the

material that you use but certainly

that's an application actually have a

question on that on the solar sail too

I'm not sure when they launches of the
Sun jammer but have you already started

00:36:36,789 --> 00:36:42,400
with your public outreach have you

00:36:39,579 --> 00:36:44,619
gotten a following already have you

00:36:42,400 --> 00:36:51,519
started to see people hitting the site

00:36:44,619 --> 00:36:55,450
and things like that love that question

00:36:51,519 --> 00:37:00,608
sunjammer mission calm and yes we have a

00:36:55,449 --> 00:37:00,608
large number of people that are already

00:36:57,849 --> 00:37:02,680
on the mailing list we also facebook and
tweet on a regular basis about the

00:37:00,608 --> 00:37:05,549
mission we've done a number of media

00:37:02,679 --> 00:37:08,230
rollouts we did a press conference in

00:37:05,550 --> 00:37:10,450
June where we announced Sir Arthur we

00:37:08,230 --> 00:37:12,250
another one coming up in December

00:37:10,449 --> 00:37:14,529
Wilmore announced the first major

00:37:12,250 --> 00:37:17,050
consumer products marketing partner that
we have I can't do that today but but we
have that as well and so we have a
series of planned events and
announcements some which I think are
pretty cool coming to the point of the
launch to answer your question the
launch is currently on the manifest for q4 of 2014 my guess is having been doing
this stuff for 30 years that will move
to the right a little bit but we are a
secondary I have a t-shirt that says
being a secondary sucks but oh in this
case we're a happy secondary
and so will be manic Oh manifested with
the discoverer spacecraft that that's fine for that time

you had a photograph of a band and you mentioned the music of sunjammer what would you explain more there's sort of two components to that one is on our website in q1 next year we're going to open it up for everybody's playlists mine includes come sail away here comes the Sun all that kind of stuff old guy music others are picking other music but we also have are lining up a series of celebrities who are doing songs for the mission they'll be part of what we call
the cosmic archive sort of like the Voyager mission only in this instance

some of the performers will be performing the music for the first time and some of their concerts I wish I could tell you more I’m dying to tell you more because it will increase the traffic on our website but we do plan both broad-based participation where anybody will have people submit songs that will put on the cosmic archive as well so broad-based public participation as well as some entertainment against this question is for Jason or
gin we heard some different kinds of

842
00:39:20,608 --> 00:39:26,130
partnership ideas different ways of

843
00:39:22,880 --> 00:39:28,739
engaging with NASA from the program

844
00:39:26,130 --> 00:39:31,798
perspective what are you guys more

845
00:39:28,739 --> 00:39:33,778
amenable to for just grand challenge

846
00:39:31,798 --> 00:39:35,759
type activities or ones that crossed

847
00:39:33,778 --> 00:39:37,400
that the other side too into the mission

848
00:39:35,759 --> 00:39:43,318
how do you guys see it structuring that

849
00:39:37,400 --> 00:39:47,249
so I represent the grand challenge and

850
00:39:43,318 --> 00:39:51,389
so I'm listening with my ears for that

851
00:39:47,248 --> 00:39:54,448
number one but number two as the lead

852
00:39:51,389 --> 00:39:58,170
for this session I'm listening for all

853
00:39:54,449 --> 00:40:00,659
the ideas that can then be put into the

854
00:39:58,170 --> 00:40:03,719
findings for the mission as well so

855
00:40:00,659 --> 00:40:07,708
while I do where the Grand Challenge hat
and Jen helps me with that hat this is

about the asteroid initiative right now

and so it's pulling out all the best

ideas that can be laid on the table and

factored into planning for both

kanisa solar sails be configured in an

array so that you use the solar pressure

in the air kospi effect to your

advantage when trying to move an

asteroid

I went to the Foreign Service School of

Georgetown have to ask the engineers

that that question sorry I'll jump in

we've got a question from Mike Helton at
a che da y ano on Twitter his question

is has there been or is there a

consideration to involve a group of philanthropists to partner with NASA to supply funds and I'll throw that out there to to our speakers since you've been out engaging in partnership has as discussion with philanthropy philanthropists cross your mind or actually been successful yes yeah from our perspective we generally approach them as invest invest or is not for philanthropist but a huge part of what we do is through 501 C 3 s
we're partnered with the Conrad foundation we're working with other C 3s around the world and so would be easy to try to vector interested people who are looking for that tax deductible t and into the education programs i should also mention if I may that we've been working very closely with our partners at the Marshall Space Flight Center in epo have been unbelievably supportive they've asked us to do some events that they couldn't didn't have the budget for we have the budget to do it so that in that way we're also trying to benefit
the mission do it making education and

public outreach opportunities happen

I haven't personally talked with with

such people but I know that there are

talks with philanthropic potential to do

philanthropic things one example would

be you know helping solve world hunger

for example by using space assets to

measure soil nitrogen composition and

things like that and I have

certainly heard of philanthropic

organizations meeting with NASA

discussing with NASA ways that we could

partner to do things that those kind of
organizations would be interested in

this is actually still a response but

I've talked to a number of people who

seem to have an interest in promoting

the idea of education I mean in this

country in particular I think there's a

role for philanthropy in in providing

educational tools for schools to embrace

this whole thing

yeah so one from online the question is

about engaging universities as well as

foreign countries or foreign space it

entities who are interested in

participating in that kind of thing and
it's kind of generic I'll just open that

up to any of the presenters so far

I alluded to the fact that we're having

we have to space weather instruments

magnetometers it's no bigger than this

Senate my e-cig machine and it's solar

wind analyzer both provided by

University College and I believe its

King's College in London through the UK

Space Agency so sunjammer is also

involving foreign non US Space Agency

youths on universities I think us

questions for mr. Schaeffer specifically

pick up I don't quite understand the
full revenue model for your company

but can you talk a little bit about proportionately how much of it comes from government sources versus private

and on the private side do you see that that source of revenue extensible to those orders of magnitude more expensive missions where we're talking about human missions to deep space taking the second part first there are companies out there that are talking about using the same model that we're implementing for human missions I have to say that the jury's out on that just because we're in the
very early parts of doing of doing these

00:45:21.599 --> 00:45:25.860
types of missions there's no question

00:45:24.059 --> 00:45:27.779
that if you look at the Olympics or you

00:45:25.860 --> 00:45:32.039
look at the world cup or you look at any

00:45:27.780 --> 00:45:34.769
sort of of high visibility activity the

00:45:32.039 --> 00:45:36.659
the dollars available to monetize the

00:45:34.769 --> 00:45:39.480
eyeballs that are on those events are

00:45:36.659 --> 00:45:42.989
quite high and at the level that that

00:45:39.480 --> 00:45:46.079
permit that our money is mostly private

00:45:42.989 --> 00:45:49.079
the good news is is that the mission is

00:45:46.079 --> 00:45:52.440
paid for by in this for sunjammer the

00:45:49.079 --> 00:45:54.900
mission is paid for by the government we

00:45:52.440 --> 00:45:57.420
are flowing additional dollars and

00:45:54.900 --> 00:46:00.059
activities into it but we're not getting

00:45:57.420 --> 00:46:03.900
any government dollars out of sunjammer
It's all risk capital involved at this point. I think that going forward the model can really apply across any space mission as long as you deliver what people are looking for, which is a compelling experience that's handled professionally and provides a reason for people to stay on your website and click through to website users some of our follow on missions, for example, with Noah envisions that being a data by very much like the inventory business went from Landsat.
only to government data buys for imagery

and so we believe that we can make a case for lowering the cost to the government of providing that service by using the platform to serve multiple revenue streams as opposed to being dedicated only to the government mission so I believe the model kind of can extend in all those ways having said that you got to get out there and actually do it and then we can have the discussion so we're looking forward to a really busy year followed by some additional implementation
activities as questions for bow so when

in your talk you talked about you know

convincing commercial partners to come

on and invest in what you're doing so

traditionally NASA's the funder for

activities and providing the

spacecraft's so what have you found that

you have to do differently or think

differently as NASA to convince you know

let's say the larger holders of the

technology to invest their own money to

you know so be able to see a business

case and move forward with you know

projects like you're doing in space

projects like you're doing in space
yeah what does NASA have to do
differently to be a good partner i think

is part of the question i think there's
two main things that come to mind the
first is NASA has to accept that private
industry knows what they're doing that
we don't need to have a lot of
oversight into what they're doing we can
trust that if they have skin in the game
you're going to do the job right and
that we don't need to make something
that would cost private industry 100
million cost the government 300 million
just because we make them do more paper
so I think that's one of the things we need to back off and let industry do what it's good at. I think the second thing is much more challenging and especially in today's climate it's hard for the government to be a good partner when we don't have stable year-to-year programmatic funding and so for something like space station and cots the government can be a good partner because we're committed so certainly we need to be committed and we need to not be subject to the whims of
change in Washington and that's much

more challenging it's your question

how much

oh so the other question is how much

effort do you need to put into

understanding the business case I think

that's a great example a great question

i think we really really have to

understand it well because we're making

decisions now that are going to impact

that business case and in order to bring

partners on i think they need to know

that we understand their business case

so in the mining exam asteroid mining
example right we need to make sure that
we understand the phases of their program and that we're doing things now
that move them forward in those phases
and not just giving them setbacks

and those kind of things so a very vague answer i know but i think it's very important that we understand what motivates our partner yeah i have
another one for Charles the question is school participation what levels is it

school participation what levels is it

high school community college
universities all of the above if you go
to sunjammer mission com you'll see

00:50:04,650 --> 00:50:08,720
e
1056
00:50:06,480 --> 00:50:11,639
we understand the phases of their
1057
00:50:08,719 --> 00:50:14,129
program and that we're doing things now
1058
00:50:11,639 --> 00:50:18,150
that move them forward in those phases
1059
00:50:14,130 --> 00:50:21,570
and not get just giving them setbacks
1060
00:50:18,150 --> 00:50:23,579
and those kind of things so a very vague
1061
00:50:21,570 --> 00:50:25,950
answer i know but i think it's very important that we understand what
1062
00:50:23,579 --> 00:50:33,059
very important that we understand what motivates our partner yeah i have
1063
00:50:25,949 --> 00:50:35,689
another one for Charles the question is
1064
00:50:33,059 --> 00:50:39,829
school participation what levels is it
1065
00:50:35,690 --> 00:50:41,940
school participation what levels is it
1066
00:50:39,829 --> 00:50:52,199
high school community college
1067
00:50:41,940 --> 00:50:55,400
universities all of the above if you go
1068
00:50:52,199 --> 00:50:59,819
to sunjammer mission com you'll see
1069
00:50:55,400 --> 00:51:02,220
about a little video of about I think 30

Zambian kids who are in elementary school all going we are going to space

we had high school and middle schoolers

into the Lagarde facility to see the sail under construction and they actually witnessed the deployment test

as part of their advanced science activities I universities will be announcing a couple of partnerships both in technology and in non technology components of the mission down the road so I think you know we we're about trying to evangelize the mission wherever we can and certainly a key
component of it is the education side of

things that we're doing so we've got a

current director of education that was

a high school teacher in Houston and

went on

to run an urban debate League in

Minnesota and is now full-time working

doing our blog we have a university

student at Ohio State University that

runs a really cool Facebook called space

weather trackers and he writes blogs for

us about space weather that are targeted

at students of all ages okay folks that

will conclude our questions for now
we'll have a 10-minute break i

just want to remind everybody that we're

going to have discussion period at the

end of all the speakers so if you have

thoughts other things get triggered

during the break that there's going to

be an opportunity to continue this

conversation so thanks to our presenters

will have ten minute break and then

start up again at five after nine thank

you