Retrieving spacewalk tools stowed aboard the robotic capture vehicle

1
00:00:06,050 --> 00:00:03,470
good afternoon Houston Texas for the

2
00:00:08,509 --> 00:00:06,060
asteroid initiative ideas synthesis

3
00:00:11,720 --> 00:00:08,519
workshop over the next two and a half

4
00:00:14,120 --> 00:00:11,730
days we will be talking about the 96

5
00:00:16,540 --> 00:00:14,130
ideas selected from the overwhelming

6
00:00:19,250 --> 00:00:16,550
response to the request for information

7
00:00:23,029 --> 00:00:19,260
released for the asteroid initiative in

8
00:00:25,370 --> 00:00:23,039
June this is an active conversation and

9
00:00:33,740 --> 00:00:25,380
I encourage you all to watch on NASA TV

10
00:00:36,229 --> 00:00:33,750
or online at WWF gov / asteroid workshop

11
00:00:40,610 --> 00:00:36,239
you can also follow us on twitter with

12
00:00:42,920 --> 00:00:40,620
the hashtag nasa asteroid and we have

13
00:00:45,529 --> 00:00:42,930

specific hashtags for each of the

14
00:00:49,250 --> 00:00:45,539
breakout sessions which you can find at

15
00:00:52,040 --> 00:00:49,260
the asteroid workshop website first up

16
00:00:54,680 --> 00:00:52,050
to welcome us to Houston is Ellen Ochoa

17
00:01:03,110 --> 00:00:54,690
who is the center director at NASA's

18
00:01:05,030 --> 00:01:03,120
Johnson Space Center Allen thank you

19
00:01:07,670 --> 00:01:05,040
it's my pleasure to welcome you to the

20
00:01:10,399 --> 00:01:07,680
ideas synthesis workshop for NASA's

21
00:01:11,750 --> 00:01:10,409
asteroid initiative thank you all for

22
00:01:14,990 --> 00:01:11,760
joining us whether you're here in person

23
00:01:16,580 --> 00:01:15,000
or virtually to examine the responses

24
00:01:19,370 --> 00:01:16,590
that we've received to the request for

25
00:01:21,140 --> 00:01:19,380
information released in June I hope

26
00:01:22,880 --> 00:01:21,150
those of you who joined us for the tour

27
00:01:24,649 --> 00:01:22,890
this morning found it interesting to see

28
00:01:27,109 --> 00:01:24,659
some of the facilities and activities

29
00:01:28,880 --> 00:01:27,119
were working on here at Johnson Space

30
00:01:31,640 --> 00:01:28,890
Center to support the asteroid

31
00:01:33,469 --> 00:01:31,650
initiative we're excited about this

32
00:01:35,749 --> 00:01:33,479
opportunity to share with you NASA's

33
00:01:38,600 --> 00:01:35,759
planning activities for the asteroid

34
00:01:40,609 --> 00:01:38,610
initiative and to obtain ideas from the

35
00:01:43,550 --> 00:01:40,619
broader community to improve the way the

36
00:01:45,530 --> 00:01:43,560
mission can be conducted your ideas and

37
00:01:46,940 --> 00:01:45,540
contributions to the discussions over

38
00:01:49,160 --> 00:01:46,950

the next couple of days will be

39
00:01:51,289 --> 00:01:49,170
important in developing the plans for

40
00:01:53,929 --> 00:01:51,299
the NASA budget request for fiscal year

41
00:01:57,920 --> 00:01:53,939
15 both the asteroid redirect mission

42
00:01:59,959 --> 00:01:57,930
and the asteroid grand challenge this

43
00:02:02,510 --> 00:01:59,969
workshop builds on an internal review

44
00:02:04,700 --> 00:02:02,520
that NASA recently completed of the

45
00:02:07,670 --> 00:02:04,710
technical and programmatic feasibility

46
00:02:09,979 --> 00:02:07,680
of the overall mission concept as well

47
00:02:12,770 --> 00:02:09,989
as some trade studies and alternative

48
00:02:13,520 --> 00:02:12,780
mission options it also builds on our

49
00:02:15,290 --> 00:02:13,530
more detailed

50
00:02:17,870 --> 00:02:15,300
discussion of the redirect mission at

51
00:02:20,630 --> 00:02:17,880
the I double a space 2013 conference

52
00:02:22,340 --> 00:02:20,640
earlier this month where NASA shared

53
00:02:25,160 --> 00:02:22,350
details of the concept for the first

54
00:02:27,199 --> 00:02:25,170
time our concepts are still developing

55
00:02:29,630 --> 00:02:27,209
so we're grateful for your time and

56
00:02:31,910 --> 00:02:29,640
energy to improve our NASA reference

57
00:02:34,309 --> 00:02:31,920
mission so that we can accomplish the

58
00:02:37,190 --> 00:02:34,319
goal of sending humans to an asteroid in

59
00:02:39,380 --> 00:02:37,200
the next decade the asteroid redirect

60
00:02:41,150 --> 00:02:39,390
mission is an important step forward in

61
00:02:43,370 --> 00:02:41,160
building and demonstrating the

62
00:02:46,310 --> 00:02:43,380
capabilities and operational experience

63
00:02:49,940 --> 00:02:46,320

we need to safely send humans further

64
00:02:52,250 --> 00:02:49,950
into space and eventually to Mars the

65
00:02:55,520 --> 00:02:52,260
mission advances human exploration by

66
00:02:57,860 --> 00:02:55,530
performing rendezvous docking and extra

67
00:03:00,949 --> 00:02:57,870
vehicular activity operations in deep

68
00:03:03,229 --> 00:03:00,959
space as early as possible laying the

69
00:03:05,660 --> 00:03:03,239
foundation for more ambitious missions

70
00:03:07,820 --> 00:03:05,670
to follow it uses the initial

71
00:03:10,790 --> 00:03:07,830
capabilities of the Space Launch System

72
00:03:12,979 --> 00:03:10,800
and the Orion crew vehicle which is well

73
00:03:15,640 --> 00:03:12,989
suited to execute the human portion of

74
00:03:18,710 --> 00:03:15,650
the mission in an affordable manner

75
00:03:20,390 --> 00:03:18,720
couple logistics notes we're just down

76
00:03:22,250 --> 00:03:20,400
the street here from Johnson Space

77
00:03:24,289 --> 00:03:22,260
Center and we've brought over a few

78
00:03:26,449 --> 00:03:24,299
exhibits in the great room that will

79
00:03:28,699 --> 00:03:26,459
showcase some of the activities involved

80
00:03:30,560 --> 00:03:28,709
in an initiative so I hope you'll find

81
00:03:33,620 --> 00:03:30,570
some time to visit them as you move

82
00:03:36,170 --> 00:03:33,630
between the sessions and for those of

83
00:03:38,360 --> 00:03:36,180
you in Houston please let the staff of

84
00:03:41,240 --> 00:03:38,370
the lunar planetary institute and or

85
00:03:43,400 --> 00:03:41,250
NASA team know if you need anything to

86
00:03:45,860 --> 00:03:43,410
make the workshop even more successful

87
00:03:48,349 --> 00:03:45,870
and I would like to thank LPI for

88
00:03:51,259 --> 00:03:48,359

graciously agreeing to serve as our host

89
00:03:53,840 --> 00:03:51,269
for this event and this is a good

90
00:03:55,940 --> 00:03:53,850
opportunity to congratulate the orbital

91
00:03:58,220 --> 00:03:55,950
sciences corporation and our NASA team

92
00:04:00,530 --> 00:03:58,230
for their successful commercial cargo

93
00:04:03,319 --> 00:04:00,540
demonstration mission which completed

94
00:04:06,440 --> 00:04:03,329
rendezvous approach capture and berthing

95
00:04:09,140 --> 00:04:06,450
to ISS yesterday and we'd also like to

96
00:04:11,990 --> 00:04:09,150
congratulate SpaceX on their successful

97
00:04:15,620 --> 00:04:12,000
launch yesterday of the Falcon 9 version

98
00:04:18,440 --> 00:04:15,630
1.1 from Vandenberg as you can see

99
00:04:21,080 --> 00:04:18,450
there's a lot going on at JSC across the

100
00:04:23,300 --> 00:04:21,090
agency with both the International Space

101
00:04:26,530 --> 00:04:23,310
Station and our exploration activities

102
00:04:28,930 --> 00:04:26,540
and now I'm pleased to introduce a show

103
00:04:31,120 --> 00:04:28,940
video from nasa administrator charlie

104
00:04:33,100 --> 00:04:31,130
bolden to kick off the workshop which

105
00:04:35,410 --> 00:04:33,110
will be followed by nasa associate

106
00:04:37,690 --> 00:04:35,420
administrator Robert Lightfoot versal

107
00:04:39,820 --> 00:04:37,700
presentation on both the asteroid

108
00:04:47,530 --> 00:04:39,830
redirect mission and the asteroid grand

109
00:04:49,990 --> 00:04:47,540
challenge thank you greetings I'm sorry

110
00:04:52,480 --> 00:04:50,000
I couldn't be with you today but I send

111
00:04:54,630 --> 00:04:52,490
my best wishes for what I know will be a

112
00:04:57,640 --> 00:04:54,640
very productive and informative workshop

113
00:05:00,370 --> 00:04:57,650

it's a wonderful time to be involved in

114
00:05:02,800 --> 00:05:00,380
exploration and this workshop is a prime

115
00:05:04,840 --> 00:05:02,810
example of what I'm talking about we're

116
00:05:07,960 --> 00:05:04,850
actually making plans for humans to

117
00:05:11,200 --> 00:05:07,970
visit an asteroid and soon Mars that's

118
00:05:13,450 --> 00:05:11,210
very exciting the work you do here to

119
00:05:16,140 --> 00:05:13,460
help us discuss the many fine ideas we

120
00:05:18,610 --> 00:05:16,150
received for identifying asteroids

121
00:05:21,310 --> 00:05:18,620
developing the technologies to redirect

122
00:05:23,980 --> 00:05:21,320
12 lunar orbit and then to visit it with

123
00:05:26,470 --> 00:05:23,990
astronauts is truly harnessing American

124
00:05:29,440 --> 00:05:26,480
innovation you're helping us once again

125
00:05:32,560 --> 00:05:29,450
write history and do the things that are

126
00:05:34,600 --> 00:05:32,570
challenging but worth doing I know we

127
00:05:36,790 --> 00:05:34,610
can reach our goals if we apply the best

128
00:05:39,370 --> 00:05:36,800
minds in the world to the big questions

129
00:05:40,990 --> 00:05:39,380
of how to reach higher visit new

130
00:05:43,630 --> 00:05:41,000
destinations and develop the

131
00:05:45,940 --> 00:05:43,640
technologies to do it our asteroid

132
00:05:48,010 --> 00:05:45,950
initiative comprises the mission to

133
00:05:50,620 --> 00:05:48,020
redirect an asteroid and the agency

134
00:05:52,600 --> 00:05:50,630
Grand Challenge to identify asteroids

135
00:05:55,390 --> 00:05:52,610
that might prose a threat to human

136
00:05:58,720 --> 00:05:55,400
populations and know what to do about

137
00:06:01,300 --> 00:05:58,730
them it draws on the best of NASA across

138
00:06:03,850 --> 00:06:01,310

disciplines and directorates and bills

139
00:06:06,040 --> 00:06:03,860
on the many strategic investments we've

140
00:06:08,500 --> 00:06:06,050
been making since we began pursuing a

141
00:06:11,170 --> 00:06:08,510
new era of exploration after the space

142
00:06:13,000 --> 00:06:11,180
shuttles retirement our Space Launch

143
00:06:15,610 --> 00:06:13,010
System rocket and the Orion crew capsule

144
00:06:18,280 --> 00:06:15,620
are making great progress to carry

145
00:06:19,930 --> 00:06:18,290
astronauts to new destinations and many

146
00:06:22,270 --> 00:06:19,940
space technologies are in the pipeline

147
00:06:24,970 --> 00:06:22,280
to make their exploration missions

148
00:06:26,890 --> 00:06:24,980
possible I know we're going to learn

149
00:06:28,870 --> 00:06:26,900
more about our solar system from this

150
00:06:31,240 --> 00:06:28,880
initiative and we're going to make it

151
00:06:33,510 --> 00:06:31,250
possible to travel father I thank

152
00:06:36,220 --> 00:06:33,520
everyone who submitted ideas and

153
00:06:38,560 --> 00:06:36,230
everyone who traveled to be a part of

154
00:06:40,460 --> 00:06:38,570
this event or is participating virtually

155
00:06:42,110 --> 00:06:40,470
right now is a time

156
00:06:44,300 --> 00:06:42,120
fresh initiatives that build on our

157
00:06:48,800 --> 00:06:44,310
depth of expertise and experience and

158
00:06:50,120 --> 00:06:48,810
you all are part of it welcome and I

159
00:07:16,090 --> 00:06:50,130
look forward to hearing about the

160
00:07:21,830 --> 00:07:19,610
nasa associate administrator and he is

161
00:07:23,600 --> 00:07:21,840
going to give us an overview of the

162
00:07:25,760 --> 00:07:23,610
asteroid initiative which is made up of

163
00:07:28,340 --> 00:07:25,770

two parts the asteroid redirect mission

164
00:07:36,790 --> 00:07:28,350
and the asteroid grand challenge so

165
00:07:42,219 --> 00:07:40,990
here you all right good well first of

166
00:07:43,570 --> 00:07:42,229
all a bit excited to get to this point

167
00:07:46,749 --> 00:07:43,580
we've been talking about this this

168
00:07:48,339 --> 00:07:46,759
workshop for a long time and it's very

169
00:07:49,779 --> 00:07:48,349
encouraging to see how many folks were

170
00:07:51,700 --> 00:07:49,789
interested in how many great ideas we

171
00:07:55,360 --> 00:07:51,710
had sorry I couldn't be there in person

172
00:07:57,879 --> 00:07:55,370
much like Charlie uh but because if you

173
00:08:00,100 --> 00:07:57,889
think going on up here so it's it's a

174
00:08:01,480 --> 00:08:00,110
it's interesting to interesting time

175
00:08:02,589 --> 00:08:01,490
let's just say that so I'm glad you guys

176
00:08:06,309 --> 00:08:02,599
are down there throughout some real work

177
00:08:08,230 --> 00:08:06,319
in and get enough to uh getting the

178
00:08:10,180 --> 00:08:08,240
plans in place that we need to go do

179
00:08:12,339 --> 00:08:10,190
this this this grand challenge in this

180
00:08:14,110 --> 00:08:12,349
mission so what I thought I would do is

181
00:08:16,480 --> 00:08:14,120
I thought I take some time this mornin

182
00:08:18,879 --> 00:08:16,490
nurse afternoon to walk everybody

183
00:08:21,159 --> 00:08:18,889
through where we are kind of summarize

184
00:08:23,499 --> 00:08:21,169
where we've been over the past couple of

185
00:08:24,459 --> 00:08:23,509
months a lot of you meant for a pieces

186
00:08:26,409 --> 00:08:24,469
that's before what we thought we could

187
00:08:28,930 --> 00:08:26,419
everybody start off on the same same

188
00:08:31,059 --> 00:08:28,940

point and you guys get ready to do your

189
00:08:33,850 --> 00:08:31,069
workshop and have all your all your

190
00:08:36,370 --> 00:08:33,860
different sessions for the next couple

191
00:08:39,850 --> 00:08:36,380
of days again very excited about hearing

192
00:08:41,409 --> 00:08:39,860
hearing about these and ninety-six

193
00:08:44,019 --> 00:08:41,419
proposals and get the information when

194
00:08:47,410 --> 00:08:44,029
you guys get it all wrapped up so we

195
00:08:49,389 --> 00:08:47,420
created a set of the next chart if you

196
00:08:51,160 --> 00:08:49,399
look at the overall initiative really

197
00:08:52,540 --> 00:08:51,170
we're really trying to leverage all

198
00:08:54,240 --> 00:08:52,550
sorts of different portions of science

199
00:08:58,120 --> 00:08:54,250
technology and our human exploration

200
00:08:59,620 --> 00:08:58,130
capability is Ellen said in opening

201
00:09:01,840 --> 00:08:59,630
remarks I mean this is this the first

202
00:09:03,850 --> 00:09:01,850
air which impressed to get people beyond

203
00:09:05,260 --> 00:09:03,860
Earth orbit and beyond the moon to

204
00:09:06,610 --> 00:09:05,270
destination other the surface of the

205
00:09:09,790 --> 00:09:06,620
Moon so this is a good chance for us to

206
00:09:12,720 --> 00:09:09,800
do that and really start advancing human

207
00:09:14,680 --> 00:09:12,730
exploration beyond low Earth orbit and

208
00:09:16,990 --> 00:09:14,690
naturally or products at that

209
00:09:18,880 --> 00:09:17,000
opportunity so we we really look at this

210
00:09:21,930 --> 00:09:18,890
was a technology demonstration mission

211
00:09:24,160 --> 00:09:21,940
as well for deep space exploration and

212
00:09:26,650 --> 00:09:24,170
the kind of systems that we're going to

213
00:09:27,850 --> 00:09:26,660

need in place down down the road for

214
00:09:31,269 --> 00:09:27,860
anything that we're going to do from a

215
00:09:33,189 --> 00:09:31,279
human exploration standpoint lots of

216
00:09:35,079 --> 00:09:33,199
other benefits with this is where so we

217
00:09:36,880 --> 00:09:35,089
hope you put in just this workshop

218
00:09:38,530 --> 00:09:36,890
itself is allowing us to engage so many

219
00:09:41,460 --> 00:09:38,540
new partners and so many new folks in

220
00:09:43,780 --> 00:09:41,470
this into this initiative so we also

221
00:09:45,730 --> 00:09:43,790
heard elude the broader effort that the

222
00:09:47,920 --> 00:09:45,740
agency has about asteroids rishta nuin

223
00:09:50,290 --> 00:09:47,930
populations and what we could do about

224
00:09:52,210 --> 00:09:50,300
them and we call that a grand challenge

225
00:09:54,850 --> 00:09:52,220
the mission itself and the Grand

226
00:09:56,800 --> 00:09:54,860
Challenge are two activities that they

227
00:09:58,390 --> 00:09:56,810
very much overlap with each other and

228
00:10:00,400 --> 00:09:58,400
we'll talk about that this morning her

229
00:10:01,270 --> 00:10:00,410
Stephanie as we go through this and so I

230
00:10:04,630 --> 00:10:01,280
think you're going to see a lot of

231
00:10:06,700 --> 00:10:04,640
parallel activity a lot of a lot of

232
00:10:08,380 --> 00:10:06,710
parallel development and a lot of

233
00:10:11,770 --> 00:10:08,390
opportunity for partnerships and that's

234
00:10:15,370 --> 00:10:11,780
why you guys are there today ok the next

235
00:10:17,560 --> 00:10:15,380
chart this kind of shows how we how we

236
00:10:19,480 --> 00:10:17,570
talk about two pieces within the agency

237
00:10:22,180 --> 00:10:19,490
you've got Grand Challenge which is

238
00:10:24,220 --> 00:10:22,190

which is you know pretty much fun engage

239
00:10:25,770 --> 00:10:24,230
the diverse stakeholders you can't do a

240
00:10:28,240 --> 00:10:25,780
grand challenge without other

241
00:10:30,430 --> 00:10:28,250
involvement in here as an aid to do it

242
00:10:32,230 --> 00:10:30,440
and you know a big thing for the for the

243
00:10:33,970 --> 00:10:32,240
going to look they look sooo it really

244
00:10:36,070 --> 00:10:33,980
requires the broad engagement leveraging

245
00:10:37,570 --> 00:10:36,080
of all the activities that we're doing

246
00:10:41,380 --> 00:10:37,580
with there's public or private seller

247
00:10:43,690 --> 00:10:41,390
grand challenge of you know client area

248
00:10:46,180 --> 00:10:43,700
defense or protecting the earth is it is

249
00:10:49,300 --> 00:10:46,190
a pain right the crew of this activity

250
00:10:50,590 --> 00:10:49,310
I'm part of that in NASA is of course is

251
00:10:51,880 --> 00:10:50,600
I'm going to walk through today's for

252
00:10:53,710 --> 00:10:51,890
the asteroid mission and part of our

253
00:10:55,810 --> 00:10:53,720
ability to characterize the detection

254
00:10:58,030 --> 00:10:55,820
and do the things that we need to do so

255
00:10:59,260 --> 00:10:58,040
this is kind of the one in the house and

256
00:11:01,950 --> 00:10:59,270
again they're both leverage and

257
00:11:07,030 --> 00:11:01,960
capabilities we have within the agency

258
00:11:08,800 --> 00:11:07,040
with the next check for me so when you

259
00:11:10,780 --> 00:11:08,810
look at this you can see as I said a

260
00:11:12,730 --> 00:11:10,790
minute ago that you've got the different

261
00:11:14,260 --> 00:11:12,740
sources different ways that bringing

262
00:11:15,840 --> 00:11:14,270
everybody together and we're looking for

263
00:11:19,840 --> 00:11:15,850

that I impact in that multidisciplinary

264
00:11:21,040 --> 00:11:19,850
collaboration that you guys all

265
00:11:22,750 --> 00:11:21,050
represent their I mean that's why

266
00:11:24,100 --> 00:11:22,760
everybody's there today and including

267
00:11:25,750 --> 00:11:24,110
the ones online and you could

268
00:11:28,960 --> 00:11:25,760
opportunity to get all the ideas on the

269
00:11:32,230 --> 00:11:28,970
table that's it attack this grand

270
00:11:35,770 --> 00:11:32,240
challenge that we've been given next

271
00:11:37,660 --> 00:11:35,780
charge slide by asleep so the imaging

272
00:11:40,750 --> 00:11:37,670
Raptors it's a meteor strike in Russia

273
00:11:42,790 --> 00:11:40,760
back in February most off I dashboard

274
00:11:44,650 --> 00:11:42,800
cam you know this is this is one that

275
00:11:47,440 --> 00:11:44,660
intro a thousand people and then college

276
00:11:49,780 --> 00:11:47,450
names is always damaging and I think the

277
00:11:52,450 --> 00:11:49,790
image on the right is kind of our prior

278
00:11:54,490 --> 00:11:52,460
to think of how we've got to go focus

279
00:11:56,380 --> 00:11:54,500
the father is that we're focusing on for

280
00:11:58,510 --> 00:11:56,390
the Grand Challenge pieces in the first

281
00:12:00,940 --> 00:11:58,520
to detect the second is track that

282
00:12:02,500 --> 00:12:00,950
drives mitigate and communicate what

283
00:12:03,600 --> 00:12:02,510
we're trying to do so that kind of gives

284
00:12:08,870 --> 00:12:03,610
you

285
00:12:13,110 --> 00:12:08,880
idea of what we're trying to do here

286
00:12:15,810 --> 00:12:13,120
next chart so if there's several ways

287
00:12:17,940 --> 00:12:15,820
that will engage the public using this

288
00:12:20,009 --> 00:12:17,950

brand challenge the first will be the

289
00:12:21,750 --> 00:12:20,019
public-private partnership activity you

290
00:12:24,690 --> 00:12:21,760
can see the image of this is to propose

291
00:12:27,150 --> 00:12:24,700
b612 mission to send an IRS Oh scope

292
00:12:28,530 --> 00:12:27,160
into a Venus trailing orbit we have an

293
00:12:30,600 --> 00:12:28,540
unfunded Space Act agreement with them

294
00:12:33,120 --> 00:12:30,610
and there are nonprofit raising funds to

295
00:12:36,090 --> 00:12:33,130
launch and operate their telescope

296
00:12:37,410 --> 00:12:36,100
there's incentive incentive prizes we've

297
00:12:39,150 --> 00:12:37,420
had this we've had the authority to use

298
00:12:40,829 --> 00:12:39,160
incentive prizes for a while now and we

299
00:12:43,949 --> 00:12:40,839
found them to be very successful in

300
00:12:46,410 --> 00:12:43,959
spurring innovation the picture is a

301
00:12:48,389 --> 00:12:46,420
Santino challenge for green green flight

302
00:12:50,519 --> 00:12:48,399
and the chat challenger with the flop

303
00:12:54,210 --> 00:12:50,529
200 miles it lets two hours in the

304
00:12:57,180 --> 00:12:54,220
winter was it went to Quentin 1.3

305
00:12:58,980 --> 00:12:57,190
million pop on over 400 miles the third

306
00:13:00,540 --> 00:12:58,990
is crowdsourcing and crowdsourcing is an

307
00:13:02,550 --> 00:13:00,550
approach you know we're products and

308
00:13:04,110 --> 00:13:02,560
services and ideas or content or

309
00:13:05,579 --> 00:13:04,120
basically obtained by soliciting

310
00:13:07,470 --> 00:13:05,589
contributions for a larger group of

311
00:13:08,790 --> 00:13:07,480
people especially from an online

312
00:13:10,410 --> 00:13:08,800
community rather than from the

313
00:13:13,470 --> 00:13:10,420

traditional employees or suppliers that

314
00:13:15,689 --> 00:13:13,480
the images from the Galaxy Zoo effort to

315
00:13:17,699 --> 00:13:15,699
identify galaxies using the crowd and

316
00:13:20,850 --> 00:13:17,709
collected 15 million classifications in

317
00:13:22,710 --> 00:13:20,860
its first year of operation and then the

318
00:13:24,150 --> 00:13:22,720
bottom right is citizen science it

319
00:13:25,829 --> 00:13:24,160
software alone is proud clients or a

320
00:13:28,380 --> 00:13:25,839
thousand source science Network science

321
00:13:30,630 --> 00:13:28,390
and its scientific research conducted in

322
00:13:33,090 --> 00:13:30,640
our Park counted by the amateur of

323
00:13:35,340 --> 00:13:33,100
professional sciences often found sword

324
00:13:37,079 --> 00:13:35,350
for fell funded for the image under the

325
00:13:39,120 --> 00:13:37,089
valence band who their this was

326
00:13:40,350 --> 00:13:39,130
operation moon watch people are lined up

327
00:13:41,790 --> 00:13:40,360
at the entrance of a satellite

328
00:13:45,180 --> 00:13:41,800
demonstration set incorrectly

329
00:13:46,769 --> 00:13:45,190
Mississippi and in the moon watch

330
00:13:49,050 --> 00:13:46,779
diffusion of the Smithsonian heiress

331
00:13:51,180 --> 00:13:49,060
paris astrophysical observatory was

332
00:13:53,519 --> 00:13:51,190
paraded in 56 as part of the satellite

333
00:13:54,930 --> 00:13:53,529
tracking program and established

334
00:13:56,550 --> 00:13:54,940
attracting photograph the artificial

335
00:13:59,280 --> 00:13:56,560
satellites to be lost during the

336
00:14:01,079 --> 00:13:59,290
international geophysical year in 57 and

337
00:14:03,480 --> 00:14:01,089
58 so we think there's lots of

338
00:14:06,240 --> 00:14:03,490

opportunities here to to engage others

339
00:14:09,110 --> 00:14:06,250
as we go in into this grand challenge

340
00:14:11,510 --> 00:14:09,120
and of course that based on some of the

341
00:14:13,889 --> 00:14:11,520
submittals we've gotten it looks like

342
00:14:15,519 --> 00:14:13,899
this there are a lot of folks to do one

343
00:14:17,259 --> 00:14:15,529
engage others here

344
00:14:18,699 --> 00:14:17,269
so let's switch now from the grand

345
00:14:23,619 --> 00:14:18,709
challenge to the mission to go to the

346
00:14:25,960 --> 00:14:23,629
next chart type 7 plea NASA what we're

347
00:14:28,210 --> 00:14:25,970
trying to do is align our kind of a

348
00:14:29,319 --> 00:14:28,220
three of our four three or four mission

349
00:14:31,809 --> 00:14:29,329
directorates the science of space

350
00:14:34,840 --> 00:14:31,819
technology in the human exploration and

351
00:14:37,210 --> 00:14:34,850
operations Mission Directorate and again

352
00:14:39,030 --> 00:14:37,220
we're looking to identify and

353
00:14:40,960 --> 00:14:39,040
characterize the efforts for targets

354
00:14:44,679 --> 00:14:40,970
we're looking at solar electric

355
00:14:46,689 --> 00:14:44,689
propulsion for transport to and from to

356
00:14:48,910 --> 00:14:46,699
institute transferred to the target and

357
00:14:50,470 --> 00:14:48,920
then bringing it back looking at some of

358
00:14:52,179 --> 00:14:50,480
the autonomous guidance and navigation

359
00:14:53,980 --> 00:14:52,189
and control technique we're going to

360
00:14:57,280 --> 00:14:53,990
need for Fox some of the operations are

361
00:14:59,350 --> 00:14:57,290
round around the asteroid and then will

362
00:15:01,900 --> 00:14:59,360
utilize as we sellin and charter so

363
00:15:03,340 --> 00:15:01,910

early we utilize Orion's and special on

364
00:15:04,689 --> 00:15:03,350
the Space Launch System to get our

365
00:15:07,389 --> 00:15:04,699
astronauts through the asteroid once

366
00:15:08,470 --> 00:15:07,399
we've returned it to the lunar orbit and

367
00:15:10,840 --> 00:15:08,480
then we've got the technologies that

368
00:15:15,040 --> 00:15:10,850
we're talking about 4 eb a extra pair

369
00:15:17,470 --> 00:15:15,050
for activity that will need to come out

370
00:15:20,819 --> 00:15:17,480
of the Orion and then go into the go up

371
00:15:23,139 --> 00:15:20,829
to the asteroids you interact with each

372
00:15:24,910 --> 00:15:23,149
individual activity of course is kind of

373
00:15:26,439 --> 00:15:24,920
important it all right we you know

374
00:15:28,240 --> 00:15:26,449
that's that's what that's what we find

375
00:15:29,679 --> 00:15:28,250
really compelling for my own perspective

376
00:15:31,119 --> 00:15:29,689
we're working on office this is stuff

377
00:15:32,740 --> 00:15:31,129
that we're already doing it's an agency

378
00:15:36,030 --> 00:15:32,750
and this is a good way for us integrated

379
00:15:40,720 --> 00:15:36,040
around one common goal and one common

380
00:15:43,059 --> 00:15:40,730
activity we're working to utilize all

381
00:15:45,759 --> 00:15:43,069
these activities and I think again we'll

382
00:15:48,059 --> 00:15:45,769
bring will bring the small asteroid into

383
00:15:51,040 --> 00:15:48,069
a stable orbit around around the moon

384
00:15:54,490 --> 00:15:51,050
and take our folks to it and that's what

385
00:15:56,110 --> 00:15:54,500
the fy14 budget submit that we have on

386
00:15:58,710 --> 00:15:56,120
the hill right now was was used to

387
00:16:03,490 --> 00:15:58,720
continue the advancement of all days to

388
00:16:05,230 --> 00:16:03,500

go to Charlie eight for me solutely kind

389
00:16:06,369 --> 00:16:05,240
of the three mission segments that we've

390
00:16:08,530 --> 00:16:06,379
talked about you'll hear them quite

391
00:16:11,110 --> 00:16:08,540
often it it's identify redirect and

392
00:16:12,480 --> 00:16:11,120
explore so the first the first Air Force

393
00:16:15,100 --> 00:16:12,490
is going to be asked for identification

394
00:16:18,189 --> 00:16:15,110
and that's using ground and potentially

395
00:16:21,699 --> 00:16:18,199
space-based targets to detect

396
00:16:23,610 --> 00:16:21,709
characterize and select will redirect as

397
00:16:28,179 --> 00:16:23,620
I said using solar electric propulsion

398
00:16:29,230 --> 00:16:28,189
and capture techniques that were working

399
00:16:31,360 --> 00:16:29,240
on now and looking

400
00:16:35,949 --> 00:16:31,370
information in this workshop from we

401
00:16:38,050 --> 00:16:35,959
will capture a asteroid and then bring

402
00:16:39,940 --> 00:16:38,060
it back to that orbit and then we'll

403
00:16:43,329 --> 00:16:39,950
send the crew out we'll explore from

404
00:16:47,440 --> 00:16:43,339
there you throw the next chart i think

405
00:16:51,790 --> 00:16:47,450
we show that both our movie if i'm not

406
00:17:10,750 --> 00:16:51,800
mistaken yes so you put by that you let

407
00:17:10,760 --> 00:18:27,590
okay it's starting

408
00:18:27,600 --> 00:18:41,039
okay he's ended

409
00:18:49,379 --> 00:18:47,609
okay so we should be to the chart turtle

410
00:18:51,269 --> 00:18:49,389
weapon which is the first steps to Mars

411
00:22:07,750 --> 00:18:51,279
never destinations Robert we're in the

412
00:22:19,820 --> 00:22:18,500
ok so 11 HR jiguro I guess here and what

413
00:22:23,870 --> 00:22:19,830

you guys are helping with us to turn

414
00:22:26,289 --> 00:22:23,880
those into reality you look at your

415
00:22:29,270 --> 00:22:26,299
Island which is kind of the first steps

416
00:22:31,159 --> 00:22:29,280
to to Mars and other destinations as you

417
00:22:33,080 --> 00:22:31,169
can see we're what we're trying to do

418
00:22:35,539 --> 00:22:33,090
this is somewhat of a stepping stone

419
00:22:37,940 --> 00:22:35,549
approach rested to take humans humans

420
00:22:39,260 --> 00:22:37,950
further and further out and you can see

421
00:22:40,909 --> 00:22:39,270
the type of missions that we're talking

422
00:22:42,529 --> 00:22:40,919
about and then the type of things that

423
00:22:46,130 --> 00:22:42,539
this particular mission will allow us to

424
00:22:48,440 --> 00:22:46,140
go do in particular it kids our solar

425
00:22:51,350 --> 00:22:48,450
electric propulsion demonstration

426
00:22:53,000 --> 00:22:51,360
hopefully successfully completed gives

427
00:22:55,399 --> 00:22:53,010
us some goods be alone on deep space

428
00:22:57,950 --> 00:22:55,409
guidance and navigation and give us some

429
00:23:01,159 --> 00:22:57,960
crew ops beyond low-earth orbit it is

430
00:23:03,440 --> 00:23:01,169
different operating the weather than 200

431
00:23:05,149 --> 00:23:03,450
miles away are you operating further and

432
00:23:06,760 --> 00:23:05,159
further away and the teams that worked

433
00:23:09,409 --> 00:23:06,770
really hard to have to characterize that

434
00:23:11,870 --> 00:23:09,419
and then that the high entry science

435
00:23:13,310 --> 00:23:11,880
high speed entry something to work on

436
00:23:14,990 --> 00:23:13,320
unfortunately lift we talked about that

437
00:23:16,399 --> 00:23:15,000
already that's what we have to

438
00:23:19,430 --> 00:23:16,409

accomplish here in terms of getting

439
00:23:21,610 --> 00:23:19,440
these first steps for human spaceflight

440
00:23:23,840 --> 00:23:21,620
beyond Earth orbit for the next truck

441
00:23:26,870 --> 00:23:23,850
which is I we call it our swim Lane

442
00:23:28,370 --> 00:23:26,880
chart this gives you an idea video imma

443
00:23:30,830 --> 00:23:28,380
strategy up to three segments the

444
00:23:34,480 --> 00:23:30,840
benefile redirects and Explorer segments

445
00:23:36,919 --> 00:23:34,490
as you can see from the identification

446
00:23:38,630 --> 00:23:36,929
identification piece you can see the

447
00:23:42,289 --> 00:23:38,640
type of things are trying to do they're

448
00:23:44,060 --> 00:23:42,299
bringing things online using the budget

449
00:23:47,090 --> 00:23:44,070
that we've got plus any augmentation we

450
00:23:50,600 --> 00:23:47,100
get with a request from 14 to enhance

451
00:23:53,659 --> 00:23:50,610
the ground assets and get them up and

452
00:23:55,310 --> 00:23:53,669
running faster the asteroid redirect

453
00:23:56,840 --> 00:23:55,320
mission that you can see we're talking

454
00:23:59,930 --> 00:23:56,850
where we talk about launching that

455
00:24:03,200 --> 00:23:59,940
mission for the demo and go out once we

456
00:24:04,490 --> 00:24:03,210
want to identify the target and then if

457
00:24:07,850 --> 00:24:04,500
you look at the bottom of course epic

458
00:24:11,299 --> 00:24:07,860
pass that we're all for SOS on a lion in

459
00:24:13,399 --> 00:24:11,309
our big slice of EST one and a m1 and m2

460
00:24:16,370 --> 00:24:13,409
which are going to be m2 being the first

461
00:24:18,260 --> 00:24:16,380
crewed mission so she overall picture he

462
00:24:18,780 --> 00:24:18,270
take the next chart we kind of compress

463
00:24:21,240 --> 00:24:18,790

that

464
00:24:23,010 --> 00:24:21,250
a little bit just give you the next next

465
00:24:24,840 --> 00:24:23,020
five years to kind of give you kind of

466
00:24:27,930 --> 00:24:24,850
give you some idea what we're trying to

467
00:24:29,610 --> 00:24:27,940
do here if you'll notice if there was a

468
00:24:32,460 --> 00:24:29,620
we are here today kind of chart it's the

469
00:24:34,290 --> 00:24:32,470
ideas synthesis piece where we really do

470
00:24:35,640 --> 00:24:34,300
hit all three swim lanes here with this

471
00:24:39,540 --> 00:24:35,650
that the type of work you guys are

472
00:24:41,190 --> 00:24:39,550
bringing forward to keep see how that

473
00:24:44,370 --> 00:24:41,200
all feeds forward into the mission

474
00:24:47,760 --> 00:24:44,380
concept based one as you as we can the

475
00:24:48,900 --> 00:24:47,770
robotic spacecraft echelon so this is

476
00:24:50,460 --> 00:24:48,910
what's important you can see the

477
00:24:52,710 --> 00:24:50,470
different activities we've got and we'll

478
00:24:53,910 --> 00:24:52,720
be really populating this you know as we

479
00:24:55,530 --> 00:24:53,920
go through 14 there'll be other

480
00:24:59,190 --> 00:24:55,540
opportunities for us our discussions

481
00:25:03,120 --> 00:24:59,200
these things this things come about but

482
00:25:04,680 --> 00:25:03,130
this is our current path toward a from a

483
00:25:06,600 --> 00:25:04,690
mission concept to a robotic spacecraft

484
00:25:08,250 --> 00:25:06,610
design on it all feeds in and you see

485
00:25:12,060 --> 00:25:08,260
out there is 2017 where they all come a

486
00:25:17,100 --> 00:25:12,070
lot up from us from that perspective so

487
00:25:19,560 --> 00:25:17,110
next chart 14 so as you know tho thought

488
00:25:21,150 --> 00:25:19,570

I was released on june eighteenth and

489
00:25:22,980 --> 00:25:21,160
the responses were doing month later and

490
00:25:25,380 --> 00:25:22,990
you can see the repairs of requests now

491
00:25:27,600 --> 00:25:25,390
Lou there's a panel session for each one

492
00:25:30,060 --> 00:25:27,610
of these we received four hundred and

493
00:25:32,580 --> 00:25:30,070
two responses and apush you guys are all

494
00:25:36,660 --> 00:25:32,590
there to explore the 96 highly rated

495
00:25:38,760 --> 00:25:36,670
responses I just got there we were just

496
00:25:42,780 --> 00:25:38,770
filled with their response we got from

497
00:25:44,610 --> 00:25:42,790
everybody and it's just this is very

498
00:25:46,830 --> 00:25:44,620
encouraging to hear or to see some of

499
00:25:48,090 --> 00:25:46,840
these proposals in pen in and now we

500
00:25:49,860 --> 00:25:48,100
have thought a child was going through

501
00:25:51,000 --> 00:25:49,870
them and then working through how they

502
00:25:52,620 --> 00:25:51,010
would how they would fit in and what

503
00:25:54,300 --> 00:25:52,630
what elements of the mission that I just

504
00:25:55,550 --> 00:25:54,310
described it is that so the grand

505
00:25:59,520 --> 00:25:55,560
challenge that they could actually

506
00:26:01,110 --> 00:25:59,530
actually help us with I'm going to walk

507
00:26:03,060 --> 00:26:01,120
through some of the pieces now this and

508
00:26:04,110 --> 00:26:03,070
show you where we are to take and kind

509
00:26:07,880 --> 00:26:04,120
of where we're going if you go to the

510
00:26:10,800 --> 00:26:07,890
chart 15 an apt already has a near-earth

511
00:26:12,890 --> 00:26:10,810
object search program this kind of our

512
00:26:15,090 --> 00:26:12,900
current system as you see it we've got

513
00:26:18,870 --> 00:26:15,100

stuff it in the University of Arizona

514
00:26:21,750 --> 00:26:18,880
and Hawaii and in my teeth so where you

515
00:26:23,520 --> 00:26:21,760
can see that the activities that were

516
00:26:26,420 --> 00:26:23,530
using the Catalina Scott there were a

517
00:26:29,040 --> 00:26:26,430
fan stars and linear and these are all

518
00:26:30,510 --> 00:26:29,050
activities that you can see how many of

519
00:26:33,020 --> 00:26:30,520
what the person is an alphabetic

520
00:26:36,510 --> 00:26:33,030
relation orbit determination is done

521
00:26:38,820 --> 00:26:36,520
you know by the manner of minor planet

522
00:26:40,410 --> 00:26:38,830
center but we also had the folks at JPL

523
00:26:42,240 --> 00:26:40,420
but dude kind of the precision orbital

524
00:26:44,040 --> 00:26:42,250
house with an eight other ones they come

525
00:26:45,510 --> 00:26:44,050
in and early childhood so we think the

526
00:26:46,620 --> 00:26:45,520
enhancements they gave of those are all

527
00:26:49,830 --> 00:26:46,630
going to bring off the next two years

528
00:26:51,750 --> 00:26:49,840
and they're going to help us to find you

529
00:26:53,160 --> 00:26:51,760
know not only just not only the smaller

530
00:26:55,080 --> 00:26:53,170
candidates like we're looking for for

531
00:26:58,710 --> 00:26:55,090
this mission but also those potentially

532
00:27:00,570 --> 00:26:58,720
hazardous asteroids as well if you go to

533
00:27:03,960 --> 00:27:00,580
the next shot i'll talk about some of

534
00:27:05,820 --> 00:27:03,970
those enhancements you know we're

535
00:27:09,210 --> 00:27:05,830
looking for some time on the DARPA space

536
00:27:11,520 --> 00:27:09,220
with Raylan telescope that sell cups now

537
00:27:14,400 --> 00:27:11,530
I'm testing and we believe this Greek

538
00:27:16,730 --> 00:27:14,410

Week we're going to demonstrate or Jim

539
00:27:19,380 --> 00:27:16,740
attempting to demonstrate this month

540
00:27:21,510 --> 00:27:19,390
there's the neo detection capability

541
00:27:22,920 --> 00:27:21,520
especially handsome Panthers morning

542
00:27:27,270 --> 00:27:22,930
we're completing pants or us to these

543
00:27:31,650 --> 00:27:27,280
are again we simulate that just

544
00:27:33,900 --> 00:27:31,660
basically we can start that time in 2014

545
00:27:36,210 --> 00:27:33,910
and then lay 2014 with answer a suit

546
00:27:40,440 --> 00:27:36,220
coming on board the simulations we run

547
00:27:42,030 --> 00:27:40,450
it look like we yes just that discovery

548
00:27:46,020 --> 00:27:42,040
Rachel pants are too could be other

549
00:27:48,540 --> 00:27:46,030
percent we knew that it had a hundred

550
00:27:50,280 --> 00:27:48,550
percent will be about five per year but

551
00:27:51,480 --> 00:27:50,290
that gives us some encouragement that

552
00:27:53,730 --> 00:27:51,490
we're going to have more candidates to

553
00:27:55,980 --> 00:27:53,740
look at it to figure out as we get ready

554
00:27:57,870 --> 00:27:55,990
to decide when we're going to go when we

555
00:27:58,920 --> 00:27:57,880
took one that we're going to go to we

556
00:28:00,480 --> 00:27:58,930
think we're going to have over the next

557
00:28:02,520 --> 00:28:00,490
couple years several more candidates

558
00:28:04,140 --> 00:28:02,530
coming there and then there's

559
00:28:08,430 --> 00:28:04,150
externality completion of Alice this is

560
00:28:09,960 --> 00:28:08,440
a small hotel cook you see the picture

561
00:28:13,500 --> 00:28:09,970
on the Rio dollars rendition on the

562
00:28:19,290 --> 00:28:13,510
right and in with exam extremely well

563
00:28:22,920 --> 00:28:19,300

with like what your views and you know

564
00:28:25,110 --> 00:28:22,930
every night movie old equipped with over

565
00:28:26,550 --> 00:28:25,120
the titanite got every night but not

566
00:28:27,600 --> 00:28:26,560
quite as deeply as some of the others so

567
00:28:30,090 --> 00:28:27,610
the violence direction there will be

568
00:28:32,610 --> 00:28:30,100
early 2015 and again this is a case

569
00:28:35,190 --> 00:28:32,620
where we could we could increase even

570
00:28:36,750 --> 00:28:35,200
even more festive potential again now

571
00:28:38,310 --> 00:28:36,760
that that's not in in addition sometimes

572
00:28:39,720 --> 00:28:38,320
there's overlap until all pick up the

573
00:28:44,070 --> 00:28:39,730
same ones but just just to give you an

574
00:28:45,750 --> 00:28:44,080
idea where we are next chart but it's

575
00:28:47,460 --> 00:28:45,760
not just about the

576
00:28:50,040 --> 00:28:47,470
observation pieces about the

577
00:28:51,810 --> 00:28:50,050
characterization piece as well and this

578
00:28:54,210 --> 00:28:51,820
is where our radars and I read

579
00:28:55,650 --> 00:28:54,220
facilities and then even yeah on orbit

580
00:28:58,110 --> 00:28:55,660
assets so we have can we read or

581
00:29:01,200 --> 00:28:58,120
redirect them so we got the rail autos a

582
00:29:02,940 --> 00:29:01,210
ghost on an air sea Belle we're looking

583
00:29:04,530 --> 00:29:02,950
for increased time for neo observations

584
00:29:06,930 --> 00:29:04,540
and then it's streamlined active

585
00:29:08,850 --> 00:29:06,940
response capability this is an important

586
00:29:11,310 --> 00:29:08,860
important piece we have to be able to

587
00:29:13,350 --> 00:29:11,320
identify them with the with the assets I

588
00:29:14,490 --> 00:29:13,360

showed on the previous chart get them to

589
00:29:16,260 --> 00:29:14,500
the radar so they can start the

590
00:29:17,790 --> 00:29:16,270
characterization process and we did it

591
00:29:21,150 --> 00:29:17,800
pretty quickly with the window the small

592
00:29:23,670 --> 00:29:21,160
the small asteroids and so that we've

593
00:29:25,290 --> 00:29:23,680
been exercising that process already you

594
00:29:27,480 --> 00:29:25,300
through the near infrared telescope

595
00:29:29,940 --> 00:29:27,490
facility that's another place together

596
00:29:32,040 --> 00:29:29,950
give us we're going to prove the

597
00:29:34,700 --> 00:29:32,050
instrumentation there too it still

598
00:29:37,530 --> 00:29:34,710
allows for better mr. inspect ops

599
00:29:41,400 --> 00:29:37,540
spectroscopy and thermal signatures and

600
00:29:43,710 --> 00:29:41,410
then we just reactivated the new arrives

601
00:29:45,440 --> 00:29:43,720
and when the warm-up phase for that too

602
00:29:49,800 --> 00:29:45,450
started to allow it to start on orbit

603
00:29:51,780 --> 00:29:49,810
providing us that occurred station we

604
00:29:54,110 --> 00:29:51,790
think we need that's what we're doing in

605
00:29:57,240 --> 00:29:54,120
the in the detect and characterized

606
00:29:59,370 --> 00:29:57,250
portion of this of that of the effort

607
00:30:02,160 --> 00:29:59,380
naturally we talking about the space

608
00:30:04,530 --> 00:30:02,170
technology piece and where space

609
00:30:07,170 --> 00:30:04,540
technology mission directorate is is is

610
00:30:09,900 --> 00:30:07,180
engaged from the most part says that big

611
00:30:11,430 --> 00:30:09,910
advantage here is that we that the space

612
00:30:14,070 --> 00:30:11,440
technology team has been working really

613
00:30:16,200 --> 00:30:14,080

hard on their solar electric propulsion

614
00:30:18,240 --> 00:30:16,210
activities for a while and in several

615
00:30:19,590 --> 00:30:18,250
key pieces as though our a technology

616
00:30:21,540 --> 00:30:19,600
that they've been stretching for the

617
00:30:23,190 --> 00:30:21,550
last couple years it's really going to

618
00:30:24,600 --> 00:30:23,200
be that he's going to be the enabler

619
00:30:26,070 --> 00:30:24,610
here to get the solar electric

620
00:30:27,900 --> 00:30:26,080
propulsion up to what we need for this

621
00:30:30,420 --> 00:30:27,910
so we're talking about that is the prime

622
00:30:31,980 --> 00:30:30,430
initial portion we were going to do a

623
00:30:34,230 --> 00:30:31,990
technology demonstration mission with

624
00:30:37,020 --> 00:30:34,240
that with that particular propulsion

625
00:30:38,580 --> 00:30:37,030
capability at some point as part of the

626
00:30:40,380 --> 00:30:38,590
space technology programs are we really

627
00:30:42,420 --> 00:30:40,390
doing here is accelerating some pieces

628
00:30:43,830 --> 00:30:42,430
of that so that we can make this give

629
00:30:48,230 --> 00:30:43,840
the technology demonstration mission a

630
00:30:52,080 --> 00:30:48,240
good a really good mission to go do so

631
00:30:53,520 --> 00:30:52,090
again it as I've talked before it is it

632
00:30:55,170 --> 00:30:53,530
is that the component that they're

633
00:30:57,720 --> 00:30:55,180
developing especially the solar array

634
00:30:59,110 --> 00:30:57,730
area to get high official says so how

635
00:31:01,500 --> 00:30:59,120
efficient and

636
00:31:05,020 --> 00:31:01,510
their solar arrays this is a big deal so

637
00:31:06,520 --> 00:31:05,030
we think this is a retrieval mission of

638
00:31:08,410 --> 00:31:06,530

the redirection retrieval mission is

639
00:31:10,390 --> 00:31:08,420
going to be a really critical technology

640
00:31:12,610 --> 00:31:10,400
demonstration of the hype ourself and

641
00:31:15,910 --> 00:31:12,620
you can see that we're talking about 30

642
00:31:18,460 --> 00:31:15,920
kilowatts per kilowatt solar arrays in

643
00:31:20,890 --> 00:31:18,470
the 15 kilowatt hi trusters and then

644
00:31:24,130 --> 00:31:20,900
power power processing unit and then the

645
00:31:25,660 --> 00:31:24,140
xenon propellant tanks as well because

646
00:31:30,280 --> 00:31:25,670
next chart is gives you some kind of

647
00:31:32,200 --> 00:31:30,290
some indication of a gesture robotic

648
00:31:34,030 --> 00:31:32,210
mission concept this is this is or just

649
00:31:36,940 --> 00:31:34,040
the robotic thesis is just going in and

650
00:31:39,190 --> 00:31:36,950
retrieving the asteroid and bringing it

651
00:31:40,960 --> 00:31:39,200
back very similar to the video you just

652
00:31:44,020 --> 00:31:40,970
show against two options here you can

653
00:31:46,000 --> 00:31:44,030
launch with an atlas 5 it's the low

654
00:31:47,919 --> 00:31:46,010
profile to the lunar you can use it SOS

655
00:31:49,690 --> 00:31:47,929
or falcon heavy this is still part of

656
00:31:52,870 --> 00:31:49,700
our trade space that we're doing now

657
00:31:54,700 --> 00:31:52,880
that I you to do a direct launch which

658
00:31:57,310 --> 00:31:54,710
which can which means you can actually

659
00:32:00,070 --> 00:31:57,320
watch later potentially they get to get

660
00:32:02,549 --> 00:32:00,080
to Atari one well then do this as the

661
00:32:05,580 --> 00:32:02,559
lower special trajectory to the asteroid

662
00:32:07,950 --> 00:32:05,590
things then bring it back into the

663
00:32:10,240 --> 00:32:07,960

earth-moon system and let the lunar

664
00:32:13,600 --> 00:32:10,250
Linux when we get into the loot bring it

665
00:32:15,280 --> 00:32:13,610
into the sportage orbiters we're calling

666
00:32:17,530 --> 00:32:15,290
it which is the dispositions retrograde

667
00:32:20,530 --> 00:32:17,540
orbit around the moon and then seven of

668
00:32:24,580 --> 00:32:20,540
courses that is Orion rather doing with

669
00:32:25,990 --> 00:32:24,590
it as we go down to the next chart will

670
00:32:27,400 --> 00:32:26,000
talk about the mission and pipe system

671
00:32:28,960 --> 00:32:27,410
concept or kind of an overall this was

672
00:32:31,630 --> 00:32:28,970
the design reference mission we've been

673
00:32:34,210 --> 00:32:31,640
we've been looking at this gives you

674
00:32:36,850 --> 00:32:34,220
some idea skill-wise what it looks like

675
00:32:38,410 --> 00:32:36,860
it's really trying to minimize the cost

676
00:32:41,680 --> 00:32:38,420
and Technology Development risk and you

677
00:32:43,419 --> 00:32:41,690
can see that actually the team led by

678
00:32:45,790 --> 00:32:43,429
Brian your head is JP approaches on a

679
00:32:48,160 --> 00:32:45,800
fantastic job of putting together a

680
00:32:50,410 --> 00:32:48,170
mission that utilizes crunch components

681
00:32:52,780 --> 00:32:50,420
this to have always call heritage with

682
00:32:57,220 --> 00:32:52,790
them from previous missions that said we

683
00:32:58,240 --> 00:32:57,230
we've used that push immediately you

684
00:32:59,950 --> 00:32:58,250
know it's knocked down some of our

685
00:33:01,750 --> 00:32:59,960
development risk not that we don't have

686
00:33:03,880 --> 00:33:01,760
any but it just balances it's pretty

687
00:33:06,280 --> 00:33:03,890
well it's off here so you can see that

688
00:33:07,840 --> 00:33:06,290

we found you could get a feel for how

689
00:33:09,460 --> 00:33:07,850
this looks with the capture mechanism on

690
00:33:11,500 --> 00:33:09,470
top permission module and then the

691
00:33:12,790 --> 00:33:11,510
sub-module you see there's a nun thanks

692
00:33:15,010 --> 00:33:12,800
in there as well

693
00:33:18,220 --> 00:33:15,020
adapter at the bottom so this is a very

694
00:33:21,100 --> 00:33:18,230
very feasible concept from what we've

695
00:33:24,130 --> 00:33:21,110
looked at from from from a mission

696
00:33:29,470 --> 00:33:24,140
formulation review and we're we think

697
00:33:30,580 --> 00:33:29,480
this is a very doable mission force to

698
00:33:32,650 --> 00:33:30,590
go to the next chart this gives you an

699
00:33:34,120 --> 00:33:32,660
idea of how how we're going to capture

700
00:33:36,460 --> 00:33:34,130
that you can see that the capture

701
00:33:38,500 --> 00:33:36,470
mechanism is currently proposed but I

702
00:33:41,080 --> 00:33:38,510
call design reference capture mechanism

703
00:33:43,210 --> 00:33:41,090
we're going to be kind of creepy if you

704
00:33:45,310 --> 00:33:43,220
you approach and you match the spin of

705
00:33:49,990 --> 00:33:45,320
the asteroids and then winters in the

706
00:33:51,490 --> 00:33:50,000
bag you close the top top piece and you

707
00:33:53,320 --> 00:33:51,500
know we're looking at in fighting some

708
00:33:55,540 --> 00:33:53,330
air bags with with a very small pressure

709
00:33:58,150 --> 00:33:55,550
to limit roads we don't want to disturb

710
00:34:01,240 --> 00:33:58,160
the S word per se that it allows you to

711
00:34:02,500 --> 00:34:01,250
control it pretty quickly and n control

712
00:34:03,610 --> 00:34:02,510
the loads on the solar arrays that's one

713
00:34:07,060 --> 00:34:03,620

of the big challenges we have it's

714
00:34:10,300 --> 00:34:07,070
always on the on the robotic spacecraft

715
00:34:11,710 --> 00:34:10,310
itself you don't want to say we have to

716
00:34:14,260 --> 00:34:11,720
have to be very careful not to overload

717
00:34:16,720 --> 00:34:14,270
them those kind of website as we move in

718
00:34:18,760 --> 00:34:16,730
this delisa epic Christ design reference

719
00:34:21,310 --> 00:34:18,770
mission and again we reach spec to seize

720
00:34:24,460 --> 00:34:21,320
them to feed back in earth in this

721
00:34:25,960 --> 00:34:24,470
workshop on that you go to the next try

722
00:34:29,290 --> 00:34:25,970
to talk about our alternative approach

723
00:34:31,830 --> 00:34:29,300
the robotic for the robotic concept this

724
00:34:35,890 --> 00:34:31,840
is this is to go to a much larger on

725
00:34:37,030 --> 00:34:35,900
nearly asteroid how to decide but not

726
00:34:38,950 --> 00:34:37,040
necessarily potentially hazardous

727
00:34:41,860 --> 00:34:38,960
asteroids but still thats that side and

728
00:34:44,260 --> 00:34:41,870
it allows communicate this to the

729
00:34:46,480 --> 00:34:44,270
planetary defense techniques in a little

730
00:34:49,210 --> 00:34:46,490
bit a little bit more obvious way to

731
00:34:53,710 --> 00:34:49,220
maybe alter the trajectory of it and

732
00:34:55,419 --> 00:34:53,720
then pull off a boulder I call it that's

733
00:34:58,390 --> 00:34:55,429
what I call it off of the surface of it

734
00:35:00,070 --> 00:34:58,400
as we've seen and some of the other from

735
00:35:03,120 --> 00:35:00,080
the other missions that have gone out to

736
00:35:05,470 --> 00:35:03,130
these to these asteroids you can see

737
00:35:07,240 --> 00:35:05,480
potential targets on home the larger

738
00:35:10,480 --> 00:35:07,250

folders that could bring back and bring

739
00:35:13,930 --> 00:35:10,490
it back in the 20 to 25 20 20 25 25

740
00:35:15,310 --> 00:35:13,940
pound frame services just adding out

741
00:35:16,570 --> 00:35:15,320
what I would say is in the design

742
00:35:18,340 --> 00:35:16,580
reference mission some of these were not

743
00:35:19,930 --> 00:35:18,350
mission objectives but it's a way for us

744
00:35:22,720 --> 00:35:19,940
to look at other ways to do this and can

745
00:35:24,280 --> 00:35:22,730
we do this within the same the same

746
00:35:25,520 --> 00:35:24,290
dollars in the same Portability and

747
00:35:27,440 --> 00:35:25,530
capture more

748
00:35:30,350 --> 00:35:27,450
more more mission this way so that's

749
00:35:31,880 --> 00:35:30,360
what we're looking at without to

750
00:35:34,910 --> 00:35:31,890
identify which thomas but take us to do

751
00:35:36,710 --> 00:35:34,920
this and the kind of the kind of time so

752
00:35:38,150 --> 00:35:36,720
we when we drip the mission formulation

753
00:35:40,940 --> 00:35:38,160
review this one was a little this is

754
00:35:43,100 --> 00:35:40,950
what i would call a follower kind of

755
00:35:45,980 --> 00:35:43,110
activity where as far along as the as

756
00:35:49,130 --> 00:35:45,990
the design reference mission so they'll

757
00:35:50,930 --> 00:35:49,140
be back to see us probably around the

758
00:35:52,460 --> 00:35:50,940
end of every time frame and provide us

759
00:35:54,380 --> 00:35:52,470
more information on this alternative

760
00:35:56,120 --> 00:35:54,390
approach you know the next chart it

761
00:35:59,350 --> 00:35:56,130
gives you an idea of what kind of how we

762
00:36:03,800 --> 00:35:59,360
would how we would deal with capture of

763
00:36:06,560 --> 00:36:03,810

taking a a potential target off of the

764
00:36:08,120 --> 00:36:06,570
surface of a larger asteroid you can see

765
00:36:11,540 --> 00:36:08,130
we look at several different ways to do

766
00:36:12,890 --> 00:36:11,550
that and again same issues we've never

767
00:36:14,360 --> 00:36:12,900
out of the same issues but we also have

768
00:36:15,680 --> 00:36:14,370
a lot of same common hardware depending

769
00:36:17,600 --> 00:36:15,690
on which one which mission you're

770
00:36:20,930 --> 00:36:17,610
talking about but allows same issues

771
00:36:22,280 --> 00:36:20,940
associated with the loads on solar rays

772
00:36:24,320 --> 00:36:22,290
and things like that that we have to do

773
00:36:29,150 --> 00:36:24,330
deal with as we get closer to the larger

774
00:36:31,430 --> 00:36:29,160
one ok now it's not about the crude

775
00:36:34,430 --> 00:36:31,440
crude version of it if you go to church

776
00:36:36,110 --> 00:36:34,440
25 you can see you know one doubt that

777
00:36:39,400 --> 00:36:36,120
is reality and we get to see that that

778
00:36:42,740 --> 00:36:39,410
picture as the crew is going up to start

779
00:36:46,010 --> 00:36:42,750
things off of the asteroid to bring back

780
00:36:48,050 --> 00:36:46,020
for us as an agency so if you go to

781
00:36:51,770 --> 00:36:48,060
chart 26 just gives you a pretty good

782
00:36:54,560 --> 00:36:51,780
idea of the trajectory and the type of

783
00:36:56,840 --> 00:36:54,570
mission excuse me the five emission that

784
00:36:57,980 --> 00:36:56,850
we would be doing the change of you

785
00:37:01,090 --> 00:36:57,990
Steve stitch and this thing done a

786
00:37:04,130 --> 00:37:01,100
fantastic job I think laying this out

787
00:37:07,520 --> 00:37:04,140
and I think that you can you can see

788
00:37:09,920 --> 00:37:07,530

we're talking roughly a 26 de mission

789
00:37:11,810 --> 00:37:09,930
here with the time at the asteroid of

790
00:37:16,550 --> 00:37:11,820
five days and just gives you an idea

791
00:37:18,140 --> 00:37:16,560
this is a they've been in my opinion

792
00:37:20,000 --> 00:37:18,150
tremendous amount of work to get us to

793
00:37:21,610 --> 00:37:20,010
this point in terms of looking at what

794
00:37:23,900 --> 00:37:21,620
we would do and that even the abort

795
00:37:25,550 --> 00:37:23,910
scenarios things like that along the way

796
00:37:27,440 --> 00:37:25,560
where it could be aboard how would we

797
00:37:28,820 --> 00:37:27,450
get out if we had a problem and all that

798
00:37:30,590 --> 00:37:28,830
activity associated with that but I

799
00:37:33,260 --> 00:37:30,600
gives you an idea with this and this is

800
00:37:35,240 --> 00:37:33,270
far away she said there's a front this

801
00:37:39,259 --> 00:37:35,250
is against the design reference mission

802
00:37:40,339 --> 00:37:39,269
was against asteroid 20 2009 BD

803
00:37:42,679 --> 00:37:40,349
which would be scheduled around the

804
00:37:43,789 --> 00:37:42,689
20-23 timeframe not the 2020 longtime

805
00:37:45,109 --> 00:37:43,799
friend but we're still looking but we

806
00:37:46,569 --> 00:37:45,119
had that one to go look at solutions

807
00:37:49,549 --> 00:37:46,579
this is what we're talking about here

808
00:37:51,139 --> 00:37:49,559
and of course the mission duration and

809
00:37:53,839 --> 00:37:51,149
timing will change depending on where we

810
00:37:56,059 --> 00:37:53,849
where we want up to go to the next chart

811
00:37:58,309 --> 00:37:56,069
who doing all so far as to start looking

812
00:37:59,809 --> 00:37:58,319
at the s back attitude privacy for

813
00:38:02,209 --> 00:37:59,819

thermal and lighting conditions if we

814
00:38:04,039 --> 00:38:02,219
want to do the EBA so you can get a feel

815
00:38:05,899 --> 00:38:04,049
for how they how they looked at it if

816
00:38:09,499 --> 00:38:05,909
you look at this a picture on the right

817
00:38:10,849 --> 00:38:09,509
you can see the crew coming from side of

818
00:38:14,149 --> 00:38:10,859
the robotic spacecraft to get through

819
00:38:16,759 --> 00:38:14,159
the asteroid and so this is again good

820
00:38:18,109 --> 00:38:16,769
good work for us to do from it from a

821
00:38:21,919 --> 00:38:18,119
guided navigation control perspective

822
00:38:24,620 --> 00:38:21,929
get a feel for how we operate as an

823
00:38:26,870 --> 00:38:24,630
integrated stacked next charge you show

824
00:38:29,569 --> 00:38:26,880
some of the example accommodations that

825
00:38:30,979 --> 00:38:29,579
we've talked about the guys divide

826
00:38:33,019 --> 00:38:30,989
looked at in terms of the talking

827
00:38:35,539 --> 00:38:33,029
mechanisms because that the vehicle to

828
00:38:37,519 --> 00:38:35,549
vehicle calm there's things that we will

829
00:38:40,009 --> 00:38:37,529
you know as we get closer we'll make

830
00:38:42,679 --> 00:38:40,019
sure that the robotic space have had so

831
00:38:45,229 --> 00:38:42,689
we want to take you with us targets the

832
00:38:48,139 --> 00:38:45,239
power and data transfer reflectors and

833
00:38:51,439 --> 00:38:48,149
just status kind of activity that we

834
00:38:53,299 --> 00:38:51,449
need to go to the next chart which gives

835
00:38:55,159 --> 00:38:53,309
you an example again of spacecraft

836
00:38:56,509 --> 00:38:55,169
accommodations for the crewed mission

837
00:38:58,639 --> 00:38:56,519
you can see we've talked about tether

838
00:39:00,249 --> 00:38:58,649

point translation beams these are

839
00:39:04,370 --> 00:39:00,259
similar things you see if operate with

840
00:39:07,009 --> 00:39:04,380
on station today when the crew and the

841
00:39:09,019 --> 00:39:07,019
crew moves around on the ISS which

842
00:39:10,339 --> 00:39:09,029
you're using a lot of that you even

843
00:39:15,199 --> 00:39:10,349
looked at the type of suits that we will

844
00:39:18,289 --> 00:39:15,209
use from this perspective next check of

845
00:39:20,809 --> 00:39:18,299
your the EBA concept which is soo Ryun

846
00:39:24,620 --> 00:39:20,819
by TVA we've got to prove of course in

847
00:39:27,139 --> 00:39:24,630
this activity and they do should be

848
00:39:29,829 --> 00:39:27,149
planning for 2v2 EVs porcelain

849
00:39:31,429 --> 00:39:29,839
contingency and they'd be short duration

850
00:39:33,709 --> 00:39:31,439
activities and some of the missions

851
00:39:35,179 --> 00:39:33,719
mission-specific kiss the babies of the

852
00:39:37,279 --> 00:39:35,189
Orion would have would be supportive of

853
00:39:39,379 --> 00:39:37,289
this request type capability for the

854
00:39:43,969 --> 00:39:39,389
Orion once we once we get out there and

855
00:39:45,559 --> 00:39:43,979
everything up that we need next icon

856
00:39:46,759 --> 00:39:45,569
gives you the best in my opinion gives

857
00:39:49,009 --> 00:39:46,769
you the benefits of the password

858
00:39:51,799 --> 00:39:49,019
initiative and the redirect mission all

859
00:39:52,940 --> 00:39:51,809
together it really does enhance our

860
00:39:55,849 --> 00:39:52,950
goals

861
00:39:59,000 --> 00:39:55,859
for human exploration assistance you

862
00:40:00,319 --> 00:39:59,010
know this is a this is a mission not the

863
00:40:02,480 --> 00:40:00,329

mission for the agency I mean we're

864
00:40:03,859 --> 00:40:02,490
really trying to impress and this is a

865
00:40:05,030 --> 00:40:03,869
good mission blowing that way much like

866
00:40:07,099 --> 00:40:05,040
I asked them do it today the

867
00:40:08,599 --> 00:40:07,109
International Space Station is providing

868
00:40:09,800 --> 00:40:08,609
this those same kind of its bandaging

869
00:40:13,460 --> 00:40:09,810
and we think we get benefits from this

870
00:40:15,200 --> 00:40:13,470
as well because it's a good good mission

871
00:40:16,670 --> 00:40:15,210
for the SLS and Orion angel capabilities

872
00:40:19,460 --> 00:40:16,680
to prove we can do those things with

873
00:40:21,589 --> 00:40:19,470
those activities and really Kenny gets

874
00:40:23,630 --> 00:40:21,599
our there's a complex set of ground

875
00:40:26,480 --> 00:40:23,640
operations in space operations that we

876
00:40:28,849 --> 00:40:26,490
have to do related samples and sampling

877
00:40:32,030 --> 00:40:28,859
and small projects give us a in my

878
00:40:33,710 --> 00:40:32,040
opinion a fantastic opportunity here to

879
00:40:35,569 --> 00:40:33,720
show collaboration between human and

880
00:40:39,050 --> 00:40:35,579
robotic missions for exploration I think

881
00:40:41,810 --> 00:40:39,060
too often we we make it an or in the

882
00:40:43,460 --> 00:40:41,820
agency we make it a human or robotic I

883
00:40:45,460 --> 00:40:43,470
think it's a great example of human and

884
00:40:47,300 --> 00:40:45,470
robotic and pulling them together

885
00:40:49,819 --> 00:40:47,310
Deborah furthers our science and

886
00:40:51,020 --> 00:40:49,829
technology especially in terms of the

887
00:40:53,450 --> 00:40:51,030
small bodies observation and

888
00:40:56,450 --> 00:40:53,460

characterization get very really get the

889
00:40:58,940 --> 00:40:56,460
demonstration that we so so will so need

890
00:41:02,150 --> 00:40:58,950
and so want for future exploration solar

891
00:41:05,870 --> 00:41:02,160
to proportion and then works on a sample

892
00:41:07,490 --> 00:41:05,880
return activity as we move forward and

893
00:41:09,410 --> 00:41:07,500
then of course this application for the

894
00:41:11,780 --> 00:41:09,420
commercial products with sondra advanced

895
00:41:13,160 --> 00:41:11,790
solar electric propulsion which we know

896
00:41:15,829 --> 00:41:13,170
a lot about commercial partners can use

897
00:41:19,550 --> 00:41:15,839
even NGO orbit for common birds and

898
00:41:20,960 --> 00:41:19,560
things like that so because the next

899
00:41:22,730 --> 00:41:20,970
chart will talk about the benefits of

900
00:41:24,950 --> 00:41:22,740
the initiative is it relates to the

901
00:41:26,809 --> 00:41:24,960
Grand Challenge you know it's the first

902
00:41:29,390 --> 00:41:26,819
broad engagement with a bunch of folks

903
00:41:31,280 --> 00:41:29,400
that's really what we want why a lot of

904
00:41:33,050 --> 00:41:31,290
people are there to take in the next

905
00:41:35,210 --> 00:41:33,060
couple days and then it combines natural

906
00:41:36,800 --> 00:41:35,220
complement of open innovation techniques

907
00:41:38,960 --> 00:41:36,810
toward a single cause public-private

908
00:41:40,430 --> 00:41:38,970
partnerships that incentivizes that

909
00:41:41,750 --> 00:41:40,440
occupy the early Earth outsourcing and

910
00:41:44,089 --> 00:41:41,760
then citizen science we think the

911
00:41:48,140 --> 00:41:44,099
tremendous opportunity here to engage

912
00:41:50,480 --> 00:41:48,150
folks to help us with it and it focuses

913
00:41:52,880 --> 00:41:50,490

attention on a global issue of you know

914
00:41:54,319 --> 00:41:52,890
the global problem of planetary defense

915
00:41:57,950 --> 00:41:54,329
what are we going to do is one of these

916
00:41:59,780 --> 00:41:57,960
is they were coming at it and again the

917
00:42:02,599 --> 00:41:59,790
key is to leverage the NASA activities

918
00:42:03,920 --> 00:42:02,609
we're doing already doing in a way that

919
00:42:06,530 --> 00:42:03,930
pulls them together an integrated

920
00:42:09,320 --> 00:42:06,540
fashion I think they're really

921
00:42:11,690 --> 00:42:09,330
benefits not only human exploration

922
00:42:14,570 --> 00:42:11,700
piece for the grand the grant the Grand

923
00:42:15,920 --> 00:42:14,580
Challenge piece as well and so with that

924
00:42:18,590 --> 00:42:15,930
I'm going to let you guys get to work

925
00:42:21,380 --> 00:42:18,600
and start start dealing with all their

926
00:42:24,050 --> 00:42:21,390
pieces that are there I do I mean I just

927
00:42:25,580 --> 00:42:24,060
can't express my gratitude for everybody

928
00:42:28,280 --> 00:42:25,590
and for their inputs that they've had in

929
00:42:29,450 --> 00:42:28,290
this process and really looked for the

930
00:42:30,980 --> 00:42:29,460
change the NASA teams who have been

931
00:42:32,600 --> 00:42:30,990
working this and that the teams deserve

932
00:42:36,740 --> 00:42:32,610
person I suppose that are leading the

933
00:42:38,270 --> 00:42:36,750
workshops today you know they're just

934
00:42:39,710 --> 00:42:38,280
you guys are doing great and then it's

935
00:42:41,120 --> 00:42:39,720
all for people that are there to

936
00:42:45,680 --> 00:42:41,130
participate leaders from academia

937
00:42:48,200 --> 00:42:45,690
industry or even other NASA folks it

938
00:42:49,520 --> 00:42:48,210

gets exciting to see the level

939
00:42:51,920 --> 00:42:49,530
engagement that you got to do brought

940
00:42:53,780 --> 00:42:51,930
forward and really look for the results

941
00:42:55,250 --> 00:42:53,790
look forward to sharing those with some

942
00:42:59,240 --> 00:42:55,260
of our stakeholders as we move forward

943
00:43:01,670 --> 00:42:59,250
just to show what kind of what kind of

944
00:43:05,060 --> 00:43:01,680
excitement we can generate with this

945
00:43:08,270 --> 00:43:05,070
community as we move forward so that's

946
00:43:14,270 --> 00:43:08,280
the ruck and with that I'll turn it back

947
00:43:17,210 --> 00:43:14,280
over to Michelle thank you Robert and

948
00:43:19,670 --> 00:43:17,220
just Roberts presentation as a reminder

949
00:43:21,470 --> 00:43:19,680
of how critical we consider virtual

950
00:43:24,590 --> 00:43:21,480
participation over the next two and a

951
00:43:27,230 --> 00:43:24,600
half days so remember you can follow on

952
00:43:29,420 --> 00:43:27,240
twitter you can ask questions in the

953
00:43:34,100 --> 00:43:29,430
ustream chat room and you can find this

954
00:43:36,620 --> 00:43:34,110
all online at wws a govt asteroid

955
00:43:38,780 --> 00:43:36,630
workshop we will really want to hear

956
00:43:40,130 --> 00:43:38,790
from everybody out there just as much as

957
00:43:42,770 --> 00:43:40,140
we want to hear from everybody here in

958
00:43:45,740 --> 00:43:42,780
the room it's a great conversation so

959
00:43:49,940 --> 00:43:45,750
please join us online as well as in here

960
00:43:51,920 --> 00:43:49,950
and next up is chris moore who is the

961
00:43:54,410 --> 00:43:51,930
deputy director of the advanced

962
00:43:56,090 --> 00:43:54,420
exploration systems he's part of the

963
00:43:58,940 --> 00:43:56,100

human in operations Mission Directorate

964
00:44:01,910 --> 00:43:58,950
at NASA headquarters and chris is our

965
00:44:03,290 --> 00:44:01,920
RFI guru he is going to talk a little

966
00:44:05,390 --> 00:44:03,300
bit more about the request for

967
00:44:08,930 --> 00:44:05,400
information process and how we got to

968
00:44:11,540 --> 00:44:08,940
these 96 great ideas Chris

969
00:44:13,790 --> 00:44:11,550
good afternoon everyone when we first

970
00:44:17,359 --> 00:44:13,800
started thinking about this asteroid

971
00:44:20,270 --> 00:44:17,369
initiative we realized we were trying to

972
00:44:23,960 --> 00:44:20,280
do something extraordinary for the first

973
00:44:27,800 --> 00:44:23,970
time in human history we were going to

974
00:44:30,079 --> 00:44:27,810
try to rearrange the solar system and we

975
00:44:33,980 --> 00:44:30,089
can only imagine where this new

976
00:44:36,829 --> 00:44:33,990
capability a lead us we also realized

977
00:44:39,260 --> 00:44:36,839
that protecting the earth against the

978
00:44:42,650 --> 00:44:39,270
threat of asteroid collisions should

979
00:44:46,520 --> 00:44:42,660
involve everyone on Planet everyone has

980
00:44:50,270 --> 00:44:46,530
a stake in this so we knew that we had

981
00:44:53,930 --> 00:44:50,280
to gather the best ideas from around the

982
00:44:56,540 --> 00:44:53,940
world to help us formulate our plans so

983
00:45:00,319 --> 00:44:56,550
to get the conversation started we

984
00:45:04,849 --> 00:45:00,329
issued this request for information to

985
00:45:06,910 --> 00:45:04,859
gather innovative ideas so I'd like to

986
00:45:10,520 --> 00:45:06,920
tell you a little bit about the

987
00:45:14,510 --> 00:45:10,530
responses we received and the process we

988
00:45:19,550 --> 00:45:14,520

use to select the ideas that are

989
00:45:23,270 --> 00:45:19,560
presented here at the workshop today the

990
00:45:26,900 --> 00:45:23,280
RFI was released on june eighteenth and

991
00:45:30,589 --> 00:45:26,910
we requested information in six main

992
00:45:33,050 --> 00:45:30,599
areas esther eight observation asteroid

993
00:45:36,140 --> 00:45:33,060
redirection systems deflection

994
00:45:37,849 --> 00:45:36,150
demonstrations capture systems accrued

995
00:45:39,140 --> 00:45:37,859
systems for asteroid exploration and

996
00:45:43,480 --> 00:45:39,150
partnerships and participatory

997
00:45:46,190 --> 00:45:43,490
engagement the RFI was open to everyone

998
00:45:49,309 --> 00:45:46,200
to individuals and all types of

999
00:45:54,710 --> 00:45:49,319
organizations and we received four

1000
00:45:57,819 --> 00:45:54,720
hundred and two responses this is a

1001
00:46:03,260 --> 00:45:57,829
breakdown of responses by the type of

1002
00:46:06,349 --> 00:46:03,270
organization and the surprising thing we

1003
00:46:08,540 --> 00:46:06,359
learned was that we had really captured

1004
00:46:11,569 --> 00:46:08,550
the interest and imagination of the

1005
00:46:14,040 --> 00:46:11,579
general public you can see that about

1006
00:46:16,710 --> 00:46:14,050
forty percent of the responses were

1007
00:46:20,550 --> 00:46:16,720
from individuals who were not affiliated

1008
00:46:24,180 --> 00:46:20,560
with any type of organization we also

1009
00:46:28,560 --> 00:46:24,190
received about quarter the responses

1010
00:46:32,790 --> 00:46:28,570
from small businesses and the remaining

1011
00:46:36,180 --> 00:46:32,800
responses came from universities large

1012
00:46:43,800 --> 00:46:36,190
corporations international organizations

1013
00:46:46,830 --> 00:46:43,810

and the NASA centers and this shows you

1014
00:46:51,660 --> 00:46:46,840
a breakdown of the responses by the six

1015
00:46:56,720 --> 00:46:51,670
areas in the RFI and the area with the

1016
00:47:04,190 --> 00:46:56,730
most ideas was asteroid deflection

1017
00:47:11,930 --> 00:47:07,320
we did receive responses from all over

1018
00:47:15,920 --> 00:47:11,940
the world from 16 different countries

1019
00:47:18,540 --> 00:47:15,930
besides the u.s. so we were really

1020
00:47:23,240 --> 00:47:18,550
gratified to see the international

1021
00:47:30,110 --> 00:47:27,440
so how did we select the ideas that

1022
00:47:33,620 --> 00:47:30,120
would be discussed here today we had a

1023
00:47:36,830 --> 00:47:33,630
team of NASA reviewers who looked at all

1024
00:47:40,580 --> 00:47:36,840
the responses and we evaluated them

1025
00:47:43,520 --> 00:47:40,590
against four criteria relevance to the

1026
00:47:48,310 --> 00:47:43,530
RFI objectives does the idea fit into

1027
00:47:52,810 --> 00:47:48,320
one of those six areas listed in the RFI

1028
00:47:56,500 --> 00:47:52,820
does the idea have substantial impact to

1029
00:47:59,720 --> 00:47:56,510
ensuring mission success accelerating

1030
00:48:01,970 --> 00:47:59,730
asteroid observations and improving

1031
00:48:06,350 --> 00:48:01,980
performance is it a really innovative

1032
00:48:10,250 --> 00:48:06,360
idea and is it feasible a third factor

1033
00:48:12,440 --> 00:48:10,260
was maturity is the concept ready to be

1034
00:48:15,280 --> 00:48:12,450
incorporated into mission plans or does

1035
00:48:18,410 --> 00:48:15,290
it require a lot of technology

1036
00:48:21,530 --> 00:48:18,420
development and is Sarah an approach

1037
00:48:24,500 --> 00:48:21,540
outlined for reaching the required level

1038
00:48:27,110 --> 00:48:24,510

of maturity and finally we were

1039
00:48:30,080 --> 00:48:27,120
interested in affordability and could

1040
00:48:32,690 --> 00:48:30,090
the concept have the potential to

1041
00:48:37,390 --> 00:48:32,700
significantly improve mission

1042
00:48:41,270 --> 00:48:37,400
affordability so based on those factors

1043
00:48:47,960 --> 00:48:41,280
we chose 96 ideas out of the four

1044
00:48:51,430 --> 00:48:47,970
hundred responses and the ideas are very

1045
00:48:55,870 --> 00:48:51,440
rich and very innovative we did receive

1046
00:48:58,100 --> 00:48:55,880
responses from all over the world we're

1047
00:49:02,330 --> 00:48:58,110
excited about the level of public

1048
00:49:03,770 --> 00:49:02,340
participation and you can see the

1049
00:49:08,660 --> 00:49:03,780
abstracts of all the invited

1050
00:49:12,830 --> 00:49:08,670
presentations on the web under asteroid

1051
00:49:17,450 --> 00:49:12,840
initiative on the NASA homepage so

1052
00:49:20,750 --> 00:49:17,460
that's just a brief snapshot of the RFI

1053
00:49:22,840 --> 00:49:20,760
responses and we're glad all of you can

1054
00:49:25,400 --> 00:49:22,850
be here today we helped us with the

1055
00:49:28,580 --> 00:49:25,410
discussion and this is just the

1056
00:49:36,489 --> 00:49:28,590
beginning of many more discussions to

1057
00:49:43,190 --> 00:49:40,670
thank you Chris and next also from the

1058
00:49:45,559 --> 00:49:43,200
human exploration operations Mission

1059
00:49:47,989 --> 00:49:45,569
Directorate at NASA headquarters we have

1060
00:49:50,630 --> 00:49:47,999
Michelle gates Michelle is leading the

1061
00:49:52,700 --> 00:49:50,640
planning effort for the asteroid

1062
00:49:54,769 --> 00:49:52,710
redirect mission she's going to talk a

1063
00:49:56,329 --> 00:49:54,779

little bit more about at the individual

1064
00:49:58,519 --> 00:49:56,339
sessions that are going to going to

1065
00:50:00,680 --> 00:49:58,529
start happening at the conclusion of

1066
00:50:01,999 --> 00:50:00,690
this plenary session and tell us a

1067
00:50:05,269 --> 00:50:02,009
little bit more about exactly how

1068
00:50:07,759 --> 00:50:05,279
they're going to work Michelle thanks

1069
00:50:09,019 --> 00:50:07,769
Becky just to note at first that we

1070
00:50:11,120 --> 00:50:09,029
actually have a really great team

1071
00:50:14,390 --> 00:50:11,130
there's a lot of really good people

1072
00:50:17,569 --> 00:50:14,400
involved in developing the current

1073
00:50:19,339 --> 00:50:17,579
concepts in preparation for fy14 many of

1074
00:50:22,249 --> 00:50:19,349
those books are in the room so I just

1075
00:50:24,349 --> 00:50:22,259
like to thank everyone and just

1076
00:50:29,120 --> 00:50:24,359
reiterate and emphasize what Robert said

1077
00:50:31,819 --> 00:50:29,130
as well the purpose of this workshop is

1078
00:50:35,299 --> 00:50:31,829
to further examine and foster a broader

1079
00:50:37,849 --> 00:50:35,309
discussion on the newest ideas which

1080
00:50:40,279 --> 00:50:37,859
have come in through the RFI and further

1081
00:50:44,390 --> 00:50:40,289
help inform our planning activities

1082
00:50:46,910 --> 00:50:44,400
within NASA and so this week the next

1083
00:50:49,759 --> 00:50:46,920
two and a half days will be listening

1084
00:50:52,940 --> 00:50:49,769
discussing debating and synthesizing

1085
00:50:55,759 --> 00:50:52,950
these 96 responses that will be

1086
00:50:58,249 --> 00:50:55,769
presented at this workshop the sessions

1087
00:51:03,019 --> 00:50:58,259
are consistent with the RFI format so

1088
00:51:05,809 --> 00:51:03,029

each of the session leads is either has

1089
00:51:07,130 --> 00:51:05,819
led the review of rfi's so there can be

1090
00:51:09,979 --> 00:51:07,140
a discussion they plan to actually

1091
00:51:12,410 --> 00:51:09,989
discuss that with you in their session

1092
00:51:14,599 --> 00:51:12,420
and there are two additional sessions on

1093
00:51:17,180 --> 00:51:14,609
the Grand Challenge which Jason Kessler

1094
00:51:19,130 --> 00:51:17,190
and jenga static have added to the

1095
00:51:22,339 --> 00:51:19,140
agenda so we look forward to those

1096
00:51:26,239 --> 00:51:22,349
conversations as well serving as leads

1097
00:51:28,400 --> 00:51:26,249
for each session is a NASA personnel who

1098
00:51:31,309 --> 00:51:28,410
served as either lead for concept

1099
00:51:33,019 --> 00:51:31,319
studies or lead for the RFI reviews we

1100
00:51:35,269 --> 00:51:33,029
are really looking forward to your

1101
00:51:39,680 --> 00:51:35,279
active participation and your thoughts

1102
00:51:41,329 --> 00:51:39,690
and ideas as was stated earlier by Becky

1103
00:51:44,090 --> 00:51:41,339
each of the sessions will be streamed

1104
00:51:47,540 --> 00:51:44,100
online and so we'll be getting in

1105
00:51:49,940 --> 00:51:47,550
questions questions virtually during the

1106
00:51:52,160 --> 00:51:49,950
discussions we have moderators assigned

1107
00:51:55,700 --> 00:51:52,170
to each session as well as a session

1108
00:51:57,500 --> 00:51:55,710
lead and co-lead and so so the

1109
00:51:59,390 --> 00:51:57,510
conversation will be in the room very

1110
00:52:01,760 --> 00:51:59,400
active but also we're expecting to bring

1111
00:52:03,650 --> 00:52:01,770
in the virtual component as well to try

1112
00:52:07,340 --> 00:52:03,660
to get the best overall synthesis of

1113
00:52:10,190 --> 00:52:07,350

these ideas for you forward the session

1114
00:52:13,700 --> 00:52:10,200
leads have architected each session to

1115
00:52:17,000 --> 00:52:13,710
encourage active Q&A so in some cases

1116
00:52:18,890 --> 00:52:17,010
you'll see the Q&A portion constituted

1117
00:52:23,200 --> 00:52:18,900
at the end after all the briefings and

1118
00:52:27,950 --> 00:52:23,210
in other cases you'll see Q&A after

1119
00:52:31,340 --> 00:52:27,960
topic areas which have collected RFI

1120
00:52:34,400 --> 00:52:31,350
responses briefed in each topic area so

1121
00:52:36,470 --> 00:52:34,410
so please know that each session may be

1122
00:52:38,930 --> 00:52:36,480
architected differently to try to bring

1123
00:52:42,470 --> 00:52:38,940
out the best conversation in that RFI

1124
00:52:45,740 --> 00:52:42,480
topic area and even though the seating

1125
00:52:48,070 --> 00:52:45,750
is auditorium style we're really looking

1126
00:52:50,480 --> 00:52:48,080
for the open two-way conversation is

1127
00:52:53,510 --> 00:52:50,490
auditorium style because of the seating

1128
00:52:56,000 --> 00:52:53,520
capacity I here at this facility which

1129
00:52:58,220 --> 00:52:56,010
we wanted to be in this location and

1130
00:53:01,640 --> 00:52:58,230
have this kind of conversation so so

1131
00:53:04,250 --> 00:53:01,650
don't let that deter you we really want

1132
00:53:07,190 --> 00:53:04,260
to know what you think we all have read

1133
00:53:10,190 --> 00:53:07,200
all the rfis already we've already had

1134
00:53:11,750 --> 00:53:10,200
our discussion about what we think of

1135
00:53:13,730 --> 00:53:11,760
them and so we're really looking for

1136
00:53:16,670 --> 00:53:13,740
that broader input to bring in

1137
00:53:20,270 --> 00:53:16,680
additional ideas and innovation into our

1138
00:53:22,280 --> 00:53:20,280

thinking and planning the session leaves

1139
00:53:25,370 --> 00:53:22,290
will all be everything on Wednesday

1140
00:53:28,580 --> 00:53:25,380
morning and we've asked them to capture

1141
00:53:32,840 --> 00:53:28,590
major discussion topics and a set of

1142
00:53:35,480 --> 00:53:32,850
findings that will be out briefed also a

1143
00:53:39,670 --> 00:53:35,490
live stream during that time so the out

1144
00:53:41,660 --> 00:53:39,680
briefing will also be public as well as

1145
00:53:45,620 --> 00:53:41,670
available for short discussion

1146
00:53:48,320 --> 00:53:45,630
afterwards here in this room both the

1147
00:53:50,000 --> 00:53:48,330
mission in the grand challenge will use

1148
00:53:54,080 --> 00:53:50,010
the findings of this workshop in

1149
00:53:56,720 --> 00:53:54,090
planning we have as Robert described to

1150
00:53:57,410 --> 00:53:56,730
mission concept development studies in

1151
00:54:00,319 --> 00:53:57,420
process or

1152
00:54:03,260 --> 00:54:00,329
now internally in NASA we've also kept

1153
00:54:05,329 --> 00:54:03,270
kicking off a robotic concept

1154
00:54:09,500 --> 00:54:05,339
integration team to look across those

1155
00:54:11,030 --> 00:54:09,510
studies as well as the RFI synthesis and

1156
00:54:14,120 --> 00:54:11,040
the ideas that come out of this workshop

1157
00:54:16,940 --> 00:54:14,130
and the Grand Challenge folks Jason

1158
00:54:20,089 --> 00:54:16,950
Kessler has a implementation planning

1159
00:54:21,620 --> 00:54:20,099
activity that he's going to be

1160
00:54:26,120 --> 00:54:21,630
discussing more with you this week as

1161
00:54:28,849 --> 00:54:26,130
well so briefly just the request for

1162
00:54:30,710 --> 00:54:28,859
these results of the session and what

1163
00:54:34,099 --> 00:54:30,720

the chairs are being asked to breathe on

1164
00:54:39,309 --> 00:54:34,109
Wednesday morning is the agenda that you

1165
00:54:41,780 --> 00:54:39,319
see on this package but specifically for

1166
00:54:43,460 --> 00:54:41,790
findings that are relevant towards the

1167
00:54:45,559 --> 00:54:43,470
redirect mission we're asking for a

1168
00:54:47,289 --> 00:54:45,569
summary of the most promising ideas out

1169
00:54:49,789 --> 00:54:47,299
of the discussion in each session

1170
00:54:52,309 --> 00:54:49,799
including innovativeness and the

1171
00:54:55,309 --> 00:54:52,319
potential for improving mission system

1172
00:54:57,799 --> 00:54:55,319
performance and affordability we're also

1173
00:55:00,079 --> 00:54:57,809
looking for any technology development

1174
00:55:01,520 --> 00:55:00,089
that may be needed to mature the idea so

1175
00:55:05,870 --> 00:55:01,530
that they can be incorporated into

1176
00:55:08,480 --> 00:55:05,880
mission and system designs relationships

1177
00:55:11,539 --> 00:55:08,490
linkages interface between ideas that

1178
00:55:15,230 --> 00:55:11,549
could help us with mission and/or system

1179
00:55:17,240 --> 00:55:15,240
concept integration and really a read on

1180
00:55:19,819 --> 00:55:17,250
further potential for their studies and

1181
00:55:22,490 --> 00:55:19,829
next steps that is a synthesis of the

1182
00:55:24,920 --> 00:55:22,500
discussion in the session for the grand

1183
00:55:27,849 --> 00:55:24,930
challenge Jason Kessler has asked for a

1184
00:55:30,319 --> 00:55:27,859
summary of the most promising ideas and

1185
00:55:33,740 --> 00:55:30,329
identification of overlap and synergy

1186
00:55:36,829 --> 00:55:33,750
between ideas and also prioritization of

1187
00:55:49,640 --> 00:55:36,839
immediate actions so please prioritize

1188
00:55:55,709 --> 00:55:53,190

and now we're going to hear from our

1189
00:55:58,229 --> 00:55:55,719
gracious hosts here at the lunar and

1190
00:56:00,900 --> 00:55:58,239
planetary institute Steve Mac well is

1191
00:56:03,420 --> 00:56:00,910
the director of LPI and he is going to

1192
00:56:05,789 --> 00:56:03,430
tell you everything that you need to

1193
00:56:09,539 --> 00:56:05,799
know to have a great next two and a half

1194
00:56:12,809 --> 00:56:09,549
days Steve thank you I want to add my

1195
00:56:15,390 --> 00:56:12,819
welcome to everybody to Sandy Houston at

1196
00:56:17,039 --> 00:56:15,400
the tail end of the summer season it's

1197
00:56:21,569 --> 00:56:17,049
actually almost Pleasant outside at the

1198
00:56:23,279 --> 00:56:21,579
moment compared what it has been about

1199
00:56:24,599 --> 00:56:23,289
16 months ago we had a similar sort of

1200
00:56:26,339 --> 00:56:24,609
meeting here in the building and that

1201
00:56:28,890 --> 00:56:26,349
time it was in response to an hour

1202
00:56:30,900 --> 00:56:28,900
Susilo solicitation looking at near-term

1203
00:56:33,299 --> 00:56:30,910
robotic and longer-term human

1204
00:56:35,670 --> 00:56:33,309
exploration of Mars that was a

1205
00:56:38,729 --> 00:56:35,680
tremendously exciting meeting very

1206
00:56:40,199 --> 00:56:38,739
similar in structure to this and many of

1207
00:56:41,609 --> 00:56:40,209
the same aspects in terms of the

1208
00:56:44,190 --> 00:56:41,619
opportunity for discussion the

1209
00:56:46,170 --> 00:56:44,200
opportunity for people to present there

1210
00:56:48,539 --> 00:56:46,180
are very clever and innovative ideas

1211
00:56:50,999 --> 00:56:48,549
about enabling exploration and its

1212
00:56:53,249 --> 00:56:51,009
various forms I'm very much looking

1213
00:56:55,199 --> 00:56:53,259

forward to the next couple of days and

1214
00:56:57,239 --> 00:56:55,209
hearing similar sorts of things about

1215
00:57:02,370 --> 00:56:57,249
our exploration activities towards an

1216
00:57:04,529 --> 00:57:02,380
asteroid going forward and and seeing

1217
00:57:06,799 --> 00:57:04,539
how this all kind of rolls out NASA

1218
00:57:09,209 --> 00:57:06,809
really took the results of the mass

1219
00:57:10,680 --> 00:57:09,219
meeting very seriously and it became

1220
00:57:12,749 --> 00:57:10,690
part of the architecture for the Mars

1221
00:57:15,959 --> 00:57:12,759
2020 mission which is planned for launch

1222
00:57:19,069 --> 00:57:15,969
obviously in 2020 but also took note of

1223
00:57:22,140 --> 00:57:19,079
some of the very clever and somewhat arm

1224
00:57:25,410 --> 00:57:22,150
off-the-wall ideas many of them for

1225
00:57:27,569 --> 00:57:25,420
enabling human exploration in the 2030s

1226
00:57:29,699 --> 00:57:27,579
so these meetings are immensely valuable

1227
00:57:31,259 --> 00:57:29,709
to NASA we understand and it's great

1228
00:57:35,039 --> 00:57:31,269
that people are prepared to come and

1229
00:57:38,880 --> 00:57:35,049
give their ideas and thoughts and input

1230
00:57:40,769 --> 00:57:38,890
to NASA at this point in terms of the

1231
00:57:45,599 --> 00:57:40,779
logistics around here there's not really

1232
00:57:48,569 --> 00:57:45,609
much to say except um the building here

1233
00:57:52,650 --> 00:57:48,579
if there is a fire alarm you will know

1234
00:57:56,130 --> 00:57:52,660
about it the alarm is not quiet there

1235
00:57:58,080 --> 00:57:56,140
are doors at the back of the room don't

1236
00:57:59,670 --> 00:57:58,090
use them unless you really

1237
00:58:01,200 --> 00:57:59,680
have to because the alarm that will set

1238
00:58:03,870 --> 00:58:01,210

off a different alarm and you don't to

1239
00:58:06,360 --> 00:58:03,880
hear that one either so mostly if you do

1240
00:58:08,100 --> 00:58:06,370
hear a fire alarm exit the building out

1241
00:58:10,110 --> 00:58:08,110
through here the doors to start here and

1242
00:58:12,750 --> 00:58:10,120
go out into the parking lot where

1243
00:58:14,940 --> 00:58:12,760
everybody will accumulate if you're in

1244
00:58:16,470 --> 00:58:14,950
the rooms over there you've got the hess

1245
00:58:17,400 --> 00:58:16,480
room or the burp nurs you go out the

1246
00:58:19,170 --> 00:58:17,410
front doors of the building and

1247
00:58:21,840 --> 00:58:19,180
accumulate in the parking lot will have

1248
00:58:24,090 --> 00:58:21,850
the meetings staff by meeting staff here

1249
00:58:26,730 --> 00:58:24,100
will make sure that everybody leaves and

1250
00:58:29,580 --> 00:58:26,740
has a place to be hopefully none of that

1251
00:58:31,350 --> 00:58:29,590
will happen people probably figured out

1252
00:58:32,820 --> 00:58:31,360
where the bathrooms are already but just

1253
00:58:34,440 --> 00:58:32,830
in case you haven't if you go down the

1254
00:58:36,680 --> 00:58:34,450
hallway over there past the Buckner and

1255
00:58:41,100 --> 00:58:36,690
has rooms you'll find them on the left

1256
00:58:44,280 --> 00:58:41,110
so the main thing I really wanted to say

1257
00:58:46,560 --> 00:58:44,290
is that my staff are here and I'm here

1258
00:58:48,930 --> 00:58:46,570
to make this as good a meeting as you

1259
00:58:51,210 --> 00:58:48,940
can possibly have and if that means

1260
00:58:52,740 --> 00:58:51,220
trying to find places for you to go and

1261
00:58:54,660 --> 00:58:52,750
sit and have conversations and things

1262
00:58:56,790 --> 00:58:54,670
like that then we will do the best that

1263
00:58:58,170 --> 00:58:56,800

we can to enable that we want this to be

1264
00:59:00,510 --> 00:58:58,180
a great meeting we'll do whatever we can

1265
00:59:02,760 --> 00:59:00,520
to help so please if you have questions

1266
00:59:04,530 --> 00:59:02,770
or concerns or just done there's

1267
00:59:09,030 --> 00:59:04,540
something we can do to help you within

1268
00:59:10,500 --> 00:59:09,040
reason then then then my staff will be

1269
00:59:19,080 --> 00:59:10,510
sitting out here and be able to help you

1270
00:59:21,690 --> 00:59:19,090
so thank you very much thanks Steve I

1271
00:59:25,140 --> 00:59:21,700
know we're all very eager to get to the

1272
00:59:27,000 --> 00:59:25,150
discussion our first two sessions begin

1273
00:59:28,830 --> 00:59:27,010
at the same time they're concurrent

1274
00:59:31,020 --> 00:59:28,840
sessions they begin at one-thirty

1275
00:59:33,560 --> 00:59:31,030
central time if you're here with us and

1276
00:59:39,000 --> 00:59:33,570
that's 230 Eastern for those of you

1277
00:59:42,540 --> 00:59:39,010
watching on NASA TV or online at WWE say