
AMES
ARMSTRONG
GLENN
GODDARD
JOHNSON
JPL
KENNEDY

1
00:00:04,849 --> 00:00:02,810
just as the United States was the first

2
00:00:07,010 --> 00:00:04,859
nation to reach the moon in the 20th

3
00:00:09,259 --> 00:00:07,020
century so too will we be the first

4
00:00:12,530 --> 00:00:09,269
nation to return astronauts to the moon

5
00:00:14,930 --> 00:00:12,540
in the 21st century and I'm here on the

6
00:00:16,250 --> 00:00:14,940
president's behalf to tell the men and

7
00:00:19,609 --> 00:00:16,260
women of the Marshall Space Flight

8
00:00:20,779 --> 00:00:19,619
Center and the American people that at

9
00:00:23,870 --> 00:00:20,789
the direction of the President of the

10
00:00:26,570 --> 00:00:23,880
United States it is the stated policy of

11
00:00:29,269 --> 00:00:26,580
this administration and the United

12
00:00:31,999 --> 00:00:29,279
States of America to return American

13
00:00:39,229 --> 00:00:32,009

astronauts to the moon within the next

14
00:00:42,709 --> 00:00:39,239
five years and let me be clear the first

15
00:00:46,549 --> 00:00:42,719
woman and the next man on the moon we'll

16
00:00:52,130 --> 00:00:46,559
both be American astronauts launched by

17
00:00:54,189 --> 00:00:52,140
American rockets from American soil the

18
00:00:56,569 --> 00:00:54,199
president has directed NASA and

19
00:00:58,880 --> 00:00:56,579
administrator Jim bridenstine to

20
00:01:02,060 --> 00:00:58,890
accomplish this goal by any means

21
00:01:06,109 --> 00:01:02,070
necessary in order to succeed we must

22
00:01:08,390 --> 00:01:06,119
focus on the mission over the means you

23
00:01:10,969 --> 00:01:08,400
must consider every available option and

24
00:01:13,070 --> 00:01:10,979
platform to meet our goals including

25
00:01:16,130 --> 00:01:13,080
industry government and the entire

26
00:01:19,280 --> 00:01:16,140
American space Enterprise history is

27
00:01:24,920 --> 00:01:19,290
written by those who dare to dream big

28
00:01:29,539 --> 00:01:24,930
and do the impossible you have given us

29
00:01:31,370 --> 00:01:29,549
a charge today and it is right on time

30
00:01:35,120 --> 00:01:31,380
and I want to say thank you for that

31
00:01:37,910 --> 00:01:35,130
vision and the leadership our agency

32
00:01:40,249 --> 00:01:37,920
NASA is going to do everything in its

33
00:01:43,310 --> 00:01:40,259
power to meet that vision to meet that

34
00:01:45,620 --> 00:01:43,320
deadline and you have my full commitment

35
00:01:48,230 --> 00:01:45,630
to to achieving that mr. vice president

36
00:01:51,710 --> 00:01:48,240
I can tell you I am confident we can get

37
00:01:56,360 --> 00:01:51,720
to that first launch in 2020 for SLS and

38
00:02:00,960 --> 00:01:58,890

we will be using the Gateway as a

39
00:02:03,570 --> 00:02:00,970
reusable command module to get boots on

40
00:02:05,730 --> 00:02:03,580
the moon as soon as possible

41
00:02:07,170 --> 00:02:05,740
2008 and 2009 NASA made important

42
00:02:08,910 --> 00:02:07,180
discoveries hundreds of millions of tons

43
00:02:10,260 --> 00:02:08,920
of water ice on the poles of the Moon

44
00:02:12,180 --> 00:02:10,270
we want to be able to get to that polar

45
00:02:13,920 --> 00:02:12,190
region we need a reusable command module

46
00:02:15,720 --> 00:02:13,930
we need a command module that can no

47
00:02:17,670 --> 00:02:15,730
kidding maneuver around the moon that's

48
00:02:21,240 --> 00:02:17,680
what the Gateway is all about America

49
00:02:24,270 --> 00:02:21,250
will once again astonish the world with

50
00:02:27,150 --> 00:02:24,280
the heights we reach the wonders we

51
00:02:31,740 --> 00:02:27,160
achieve and we will lead the world in

52
00:02:32,940 --> 00:02:31,750
human space exploration once again now

53
00:02:45,559 --> 00:02:32,950
let's get to work

54
00:02:50,400 --> 00:02:48,509
well as I said at the national space

55
00:02:53,940 --> 00:02:50,410
Council and as everybody here is aware

56
00:02:56,610 --> 00:02:53,950
that was an amazing charge and of course

57
00:02:59,220 --> 00:02:56,620
as Bettina outlined earlier it has

58
00:03:02,040 --> 00:02:59,230
resulted in a lot of questions and a lot

59
00:03:03,690 --> 00:03:02,050
of discussion and I will tell you more

60
00:03:06,240 --> 00:03:03,700
than anything it's resulted in a lot of

61
00:03:07,620 --> 00:03:06,250
excitement a level of energy quite

62
00:03:10,680 --> 00:03:07,630
frankly that I haven't seen in a long

63
00:03:13,920 --> 00:03:10,690

time at least in my short almost 12

64
00:03:16,890 --> 00:03:13,930
months here but I will tell you this is

65
00:03:19,410 --> 00:03:16,900
what I know throughout history when this

66
00:03:21,300 --> 00:03:19,420
agency is given a task by the President

67
00:03:23,850 --> 00:03:21,310
of the United States and it is also

68
00:03:26,250 --> 00:03:23,860
given the resources and the tools this

69
00:03:27,900 --> 00:03:26,260
agency can deliver and what I want to

70
00:03:30,030 --> 00:03:27,910
talk about today is how that's going to

71
00:03:33,390 --> 00:03:30,040
be achieved and there's there's not

72
00:03:35,819 --> 00:03:33,400
going to be at this point the answer is

73
00:03:38,400 --> 00:03:35,829
not going to be perfect but the answer

74
00:03:41,069 --> 00:03:38,410
is going to be clear there is an end

75
00:03:43,680 --> 00:03:41,079
state that is possible to achieve and

76
00:03:45,089 --> 00:03:43,690
there is a way to get there and I just

77
00:03:47,930 --> 00:03:45,099
wanted to make sure I had an opportunity

78
00:03:50,520 --> 00:03:47,940
at this point to talk to the NASA family

79
00:03:52,949 --> 00:03:50,530
about how important this objective is

80
00:03:54,420 --> 00:03:52,959
and really just open the discussion the

81
00:03:56,640 --> 00:03:54,430
dialogue about how we're going to be

82
00:03:59,160 --> 00:03:56,650
able to achieve it so with that I'm

83
00:04:01,620 --> 00:03:59,170
going to just go straight to questions

84
00:04:05,250 --> 00:04:01,630
concerns if people have ideas I'm open

85
00:04:07,559 --> 00:04:05,260
to it I have seen some of the online

86
00:04:09,000 --> 00:04:07,569
questions already there is no shortage

87
00:04:11,430 --> 00:04:09,010
of questions so if you don't feel like

88
00:04:12,720 --> 00:04:11,440

you want to ask feel free not to well

89
00:04:16,770 --> 00:04:12,730
there's no way we're going to get to all

90
00:04:18,360 --> 00:04:16,780
of them but they're being voted on right

91
00:04:19,740 --> 00:04:18,370
and because they're being voted on we

92
00:04:22,080 --> 00:04:19,750
can kind of rack and stack and

93
00:04:23,580 --> 00:04:22,090
characterize what what is on the highest

94
00:04:24,870 --> 00:04:23,590
on people's agenda and I just want to

95
00:04:27,000 --> 00:04:24,880
make sure we have an opportunity to have

96
00:04:28,800 --> 00:04:27,010
this discussion early as we begin this

97
00:04:30,930 --> 00:04:28,810
process of putting humans on the moon in

98
00:04:32,279 --> 00:04:30,940
2024 so Bettina

99
00:04:33,750 --> 00:04:32,289
I'll turn it over to you if you've got

100
00:04:36,600 --> 00:04:33,760
some questions and if you're in the

101
00:04:38,940 --> 00:04:36,610
audience and you're thinking we're here

102
00:04:40,740 --> 00:04:38,950
to you know have an open discussion with

103
00:04:42,300 --> 00:04:40,750
the members the audience as well great

104
00:04:44,430 --> 00:04:42,310
Thank You administrator there are a ton

105
00:04:46,080 --> 00:04:44,440
of questions online we're gonna get to

106
00:04:47,820 --> 00:04:46,090
one of the top questions we have online

107
00:04:50,279 --> 00:04:47,830
and then we're you get headed to the

108
00:04:51,870 --> 00:04:50,289
room our workforce is not one to be shy

109
00:04:53,250 --> 00:04:51,880
so I'm sure they're ready to ask their

110
00:04:56,850 --> 00:04:53,260
questions so the number one question

111
00:04:57,690 --> 00:04:56,860
online is will the administration in

112
00:04:59,730 --> 00:04:57,700
Congress back

113
00:05:02,580 --> 00:04:59,740

this audacious goal with an appropriate

114
00:05:05,460 --> 00:05:02,590
influx of funding will the

115
00:05:07,410 --> 00:05:05,470
administration and Congress based on

116
00:05:09,720 --> 00:05:07,420
what I heard from the vice president at

117
00:05:12,180 --> 00:05:09,730
the National Space Council he said this

118
00:05:14,280 --> 00:05:12,190
was a charge from the president and he

119
00:05:16,170 --> 00:05:14,290
said he has tasked NASA and

120
00:05:18,690 --> 00:05:16,180
administrator Jim bridenstine to

121
00:05:19,620 --> 00:05:18,700
accomplish this task by any means

122
00:05:22,320 --> 00:05:19,630
necessary

123
00:05:23,790 --> 00:05:22,330
I heard that loud and clear he backed it

124
00:05:26,190 --> 00:05:23,800
up after that and he said the mission

125
00:05:28,800 --> 00:05:26,200
matters more than the means to me that

126
00:05:30,480 --> 00:05:28,810
says we're going to need additional

127
00:05:33,420 --> 00:05:30,490
means I don't think anybody can take

128
00:05:36,810 --> 00:05:33,430
this level of commitment seriously

129
00:05:38,640 --> 00:05:36,820
unless there are additional means and so

130
00:05:40,440 --> 00:05:38,650
that's that's what I intend to support

131
00:05:42,630 --> 00:05:40,450
as we go forward

132
00:05:45,530 --> 00:05:42,640
we think about the history of this

133
00:05:47,730 --> 00:05:45,540
agency we can accomplish amazing things

134
00:05:50,670 --> 00:05:47,740
but we also think about the history of

135
00:05:52,920 --> 00:05:50,680
the agency and we see that in history

136
00:05:54,720 --> 00:05:52,930
and I know there's a lot of questions

137
00:05:57,150 --> 00:05:54,730
about this as well if I've seen the

138
00:06:00,870 --> 00:05:57,160

online questions the idea that from time

139
00:06:03,210 --> 00:06:00,880
to time in in in in in the past we've

140
00:06:05,850 --> 00:06:03,220
had an agenda to get to the moon and

141
00:06:07,500 --> 00:06:05,860
then the resources don't materialize and

142
00:06:09,090 --> 00:06:07,510
it gets canceled and then we have

143
00:06:10,590 --> 00:06:09,100
another agenda to go to the moon and the

144
00:06:12,090 --> 00:06:10,600
resources don't materialize and it gets

145
00:06:14,190 --> 00:06:12,100
canceled I'll tell you from my

146
00:06:15,780 --> 00:06:14,200
perspective it is my objective to get

147
00:06:18,510 --> 00:06:15,790
the resources necessary to accomplish

148
00:06:20,160 --> 00:06:18,520
the objective it is also my commitment

149
00:06:21,930 --> 00:06:20,170
to make sure people understand the

150
00:06:24,240 --> 00:06:21,940
history here and that we can have a

151
00:06:26,580 --> 00:06:24,250
great ambitious goal but without the

152
00:06:28,350 --> 00:06:26,590
resources it won't be accomplished based

153
00:06:31,200 --> 00:06:28,360
on the comments that I've heard and the

154
00:06:34,050 --> 00:06:31,210
conversations I've had the commitment

155
00:06:36,870 --> 00:06:34,060
from the administration is there I can't

156
00:06:38,730 --> 00:06:36,880
speak for Congress of course but I will

157
00:06:40,650 --> 00:06:38,740
tell you I'll be talking to members of

158
00:06:43,440 --> 00:06:40,660
Congress about what the what the plan is

159
00:06:45,660 --> 00:06:43,450
it's also true that before that happens

160
00:06:48,360 --> 00:06:45,670
I'll be working with OMB to make sure

161
00:06:51,060 --> 00:06:48,370
that there is broad consensus throughout

162
00:06:52,770 --> 00:06:51,070
the entire executive branch before we go

163
00:06:54,810 --> 00:06:52,780

to Congress because what we can't do is

164
00:06:57,120 --> 00:06:54,820
be divided as we go forward and that

165
00:06:58,560 --> 00:06:57,130
broad consensus doesn't just include

166
00:07:01,410 --> 00:06:58,570
within the administration it also

167
00:07:03,570 --> 00:07:01,420
includes bipartisan support in the house

168
00:07:06,870 --> 00:07:03,580
and the Senate again if this is a

169
00:07:09,270 --> 00:07:06,880
divided task it won't be achievable in

170
00:07:10,770 --> 00:07:09,280
the year 2024 so we've got to get that

171
00:07:11,550 --> 00:07:10,780
broad consensus this is an all of

172
00:07:13,590 --> 00:07:11,560
America of

173
00:07:15,840 --> 00:07:13,600
approach it's a bipartisan kind of

174
00:07:17,790 --> 00:07:15,850
effort and we can't do it one party over

175
00:07:18,990 --> 00:07:17,800
another and we can't do it with

176
00:07:21,030 --> 00:07:19,000
divisions within the executive branch

177
00:07:23,460 --> 00:07:21,040
and so my goal is to work with all

178
00:07:24,990 --> 00:07:23,470
players all players within the executive

179
00:07:27,570 --> 00:07:25,000
branch within the House and within the

180
00:07:31,200 --> 00:07:27,580
Senate to achieve the end state which is

181
00:07:32,490 --> 00:07:31,210
boots on the moon in 2024 great but that

182
00:07:42,540 --> 00:07:32,500
we're going to go to questions from the

183
00:07:44,610 --> 00:07:42,550
audience go ahead ok good afternoon hi

184
00:07:45,870 --> 00:07:44,620
my name is Patrick Murphy and I work for

185
00:07:48,840 --> 00:07:45,880
the space technology Mission Directorate

186
00:07:53,580 --> 00:07:48,850
and so my question is this last

187
00:07:58,290 --> 00:07:53,590
Wednesday India held a anti-satellite

188
00:08:00,390 --> 00:07:58,300

test now this test created a cloud of

189
00:08:03,900 --> 00:08:00,400
orbital debris that's flying in

190
00:08:05,550 --> 00:08:03,910
low-earth orbit and so when I think at

191
00:08:07,740 --> 00:08:05,560
orbital debris that they're tracking

192
00:08:10,800 --> 00:08:07,750
it's the size of my fist several several

193
00:08:13,290 --> 00:08:10,810
pieces of that now that's potentially of

194
00:08:15,240 --> 00:08:13,300
high risk to NASA assets and more

195
00:08:18,719 --> 00:08:15,250
importantly to our NASA astronauts

196
00:08:22,250 --> 00:08:18,729
what's NASA's reaction to that thank you

197
00:08:26,250 --> 00:08:22,260
oh that's a great question Patrick and

198
00:08:30,170 --> 00:08:26,260
there there's um this is a town hall in

199
00:08:32,159 --> 00:08:30,180
and of itself it is absolutely true that

200
00:08:34,260 --> 00:08:32,169
intentionally creating orbital debris

201
00:08:36,630 --> 00:08:34,270
fields is not compatible with human

202
00:08:39,000 --> 00:08:36,640
spaceflight here's what we know about

203
00:08:40,770 --> 00:08:39,010
the most recent direct ascent

204
00:08:43,820 --> 00:08:40,780
anti-satellite test that was done by

205
00:08:46,350 --> 00:08:43,830
India we know that we have identified

206
00:08:50,370 --> 00:08:46,360
four hundred pieces of orbital debris

207
00:08:52,800 --> 00:08:50,380
from that one event that's what's been

208
00:08:55,800 --> 00:08:52,810
identified now all of that cannot be

209
00:08:57,449 --> 00:08:55,810
tracked what we are tracking right now

210
00:08:59,660 --> 00:08:57,459
objects big enough to track we're

211
00:09:03,240 --> 00:08:59,670
talking about 10 centimeters or bigger

212
00:09:04,800 --> 00:09:03,250
about about 60 pieces have been tracked

213
00:09:06,810 --> 00:09:04,810

in other words I've got a tracking

214
00:09:09,240 --> 00:09:06,820
number and we're able to keep keep up

215
00:09:11,970 --> 00:09:09,250
with where they are of those 60 we know

216
00:09:13,470 --> 00:09:11,980
that 24 of them are going above the

217
00:09:16,440 --> 00:09:13,480
apogee of the International Space

218
00:09:19,320 --> 00:09:16,450
Station that is a terrible terrible

219
00:09:21,120 --> 00:09:19,330
thing to create an event that sends

220
00:09:22,740 --> 00:09:21,130
debris in an Apogee that goes above the

221
00:09:24,410 --> 00:09:22,750
International Space Station and that

222
00:09:26,810 --> 00:09:24,420
kind of activity is

223
00:09:28,490 --> 00:09:26,820
not compatible with the future of human

224
00:09:29,920 --> 00:09:28,500
spaceflight that we need to see have

225
00:09:32,930 --> 00:09:29,930
happen we are charged with

226
00:09:35,329 --> 00:09:32,940
commercializing low-earth orbit we are

227
00:09:36,920 --> 00:09:35,339
charged with enabling more activities in

228
00:09:38,840 --> 00:09:36,930
space than we've ever seen before for

229
00:09:40,519 --> 00:09:38,850
the purpose of benefiting the human

230
00:09:43,759 --> 00:09:40,529
condition whether it's pharmaceuticals

231
00:09:47,480 --> 00:09:43,769
or printing human organs in 3d to save

232
00:09:49,879 --> 00:09:47,490
lives here on earth or manufacturing

233
00:09:52,250 --> 00:09:49,889
capabilities in space that aren't you're

234
00:09:54,199 --> 00:09:52,260
not able to do in a gravity well like

235
00:09:56,689 --> 00:09:54,209
all of those are placed at risk when

236
00:09:58,129 --> 00:09:56,699
these kind of events happen and when one

237
00:10:00,040 --> 00:09:58,139
country does it than other countries

238
00:10:02,840 --> 00:10:00,050

feel like they have to do it as well so

239
00:10:06,530 --> 00:10:02,850
Patrick I'm with you I get it I

240
00:10:08,720 --> 00:10:06,540
understand it it's unacceptable and NASA

241
00:10:11,509 --> 00:10:08,730
needs to be very clear about what its

242
00:10:13,939 --> 00:10:11,519
impact to us is now we're learning more

243
00:10:15,410 --> 00:10:13,949
and more every hour that goes by about

244
00:10:17,050 --> 00:10:15,420
this orbital debris field that has been

245
00:10:19,879 --> 00:10:17,060
created from this anti-satellite test

246
00:10:22,519 --> 00:10:19,889
where we were last week with an

247
00:10:24,410 --> 00:10:22,529
assessment that comes from NASA experts

248
00:10:26,180 --> 00:10:24,420
as well as the joint Space Operations

249
00:10:28,850 --> 00:10:26,190
Center I guess it's the combined Space

250
00:10:31,579 --> 00:10:28,860
Operations Center now the C Spock was

251
00:10:37,519 --> 00:10:31,589
that the risk to the International Space

252
00:10:39,680 --> 00:10:37,529
Station was increased by 44% the risk

253
00:10:41,540 --> 00:10:39,690
and that I'm talking about small debris

254
00:10:46,160 --> 00:10:41,550
impact to the International Space

255
00:10:48,410 --> 00:10:46,170
Station the risk went up 44% over a

256
00:10:50,600 --> 00:10:48,420
period of 10 days so the good thing is

257
00:10:53,870 --> 00:10:50,610
it's low enough in Earth orbit that over

258
00:10:58,160 --> 00:10:53,880
time this will all dissipate you go back

259
00:11:00,290 --> 00:10:58,170
in time 2007 direct ascent

260
00:11:02,480 --> 00:11:00,300
anti-satellite test by the Chinese all

261
00:11:03,829 --> 00:11:02,490
of that orbital debris is not all of it

262
00:11:05,300 --> 00:11:03,839
but a lot of it is still in orbit and

263
00:11:08,000 --> 00:11:05,310

we're still dealing with it and we're

264
00:11:09,500 --> 00:11:08,010
still we as a nation are responsible for

265
00:11:11,420 --> 00:11:09,510
doing space situation awareness and

266
00:11:13,400 --> 00:11:11,430
space traffic management conjunction

267
00:11:14,689 --> 00:11:13,410
analysis for the entire world and we're

268
00:11:16,939 --> 00:11:14,699
doing it for free compliments of the

269
00:11:18,590 --> 00:11:16,949
taxpayer of the United States of America

270
00:11:22,280 --> 00:11:18,600
from an orbital debris field that was

271
00:11:23,689 --> 00:11:22,290
created by another country why do we do

272
00:11:25,519 --> 00:11:23,699
that as a nation because it's the right

273
00:11:27,769 --> 00:11:25,529
thing to do because we want to preserve

274
00:11:29,930 --> 00:11:27,779
the space environment and I know I know

275
00:11:31,699 --> 00:11:29,940
why you asked the question Patrick's the

276
00:11:33,680 --> 00:11:31,709
the the space technology Mission

277
00:11:35,689 --> 00:11:33,690
Directorate you're responsible under

278
00:11:36,829 --> 00:11:35,699
space policy directive 3 signed by the

279
00:11:37,390 --> 00:11:36,839
president United States

280
00:11:39,160 --> 00:11:37,400
for the

281
00:11:40,300 --> 00:11:39,170
first time in American history for

282
00:11:42,940 --> 00:11:40,310
building the technologies and the

283
00:11:45,760 --> 00:11:42,950
capabilities ultimately to to ensure

284
00:11:47,380 --> 00:11:45,770
that we can track this kind of debris in

285
00:11:50,170 --> 00:11:47,390
the future at a better state than we can

286
00:11:53,290 --> 00:11:50,180
right now with the United States Air

287
00:11:55,090 --> 00:11:53,300
Force and Strategic Command right now

288
00:11:57,670 --> 00:11:55,100

they've got a lot of different programs

289
00:12:00,100 --> 00:11:57,680
in place the space fence right now we're

290
00:12:01,450 --> 00:12:00,110
able to track about 23,000 pieces of

291
00:12:03,160 --> 00:12:01,460
orbital debris things that are 10

292
00:12:04,450 --> 00:12:03,170
centimeters are bigger with the space

293
00:12:05,920 --> 00:12:04,460
fence coming online we're gonna be

294
00:12:06,970 --> 00:12:05,930
looking at hundreds of thousands of

295
00:12:09,100 --> 00:12:06,980
pieces of orbital debris

296
00:12:11,290 --> 00:12:09,110
some people say 200 thousand some people

297
00:12:13,510 --> 00:12:11,300
say 500 thousand bottom line is we don't

298
00:12:15,970 --> 00:12:13,520
know what we do know is whatever it

299
00:12:17,710 --> 00:12:15,980
looks like it's going to be scary and

300
00:12:20,730 --> 00:12:17,720
what we have to do is we have to get a

301
00:12:23,530 --> 00:12:20,740
lot better at figuring out how to reduce

302
00:12:25,540 --> 00:12:23,540
the bubbles around each one of those

303
00:12:27,640 --> 00:12:25,550
objects in low-earth orbit that could

304
00:12:29,890 --> 00:12:27,650
risk put at risk the international space

305
00:12:32,440 --> 00:12:29,900
station so we don't have to constantly

306
00:12:35,800 --> 00:12:32,450
be maneuvering the international space

307
00:12:37,810 --> 00:12:35,810
station I guess the point is this NASA

308
00:12:39,670 --> 00:12:37,820
has a role to play here especially when

309
00:12:41,860 --> 00:12:39,680
it comes to protecting the lives of our

310
00:12:43,750 --> 00:12:41,870
astronauts nASA has a role to play here

311
00:12:45,790 --> 00:12:43,760
when it talked about the new technology

312
00:12:47,650 --> 00:12:45,800
the new capabilities under space policy

313
00:12:49,990 --> 00:12:47,660

directive 3 signed by the president to

314
00:12:52,150 --> 00:12:50,000
make sure that our people are safe and

315
00:12:54,220 --> 00:12:52,160
that our hundreds of billions of dollars

316
00:12:57,610 --> 00:12:54,230
worth of assets in low-earth orbit are

317
00:12:59,170 --> 00:12:57,620
safe and we have a role to play with the

318
00:13:00,880 --> 00:12:59,180
Commerce Department under Space policy

319
00:13:02,560 --> 00:13:00,890
directive three space situation we're in

320
00:13:04,840 --> 00:13:02,570
a space traffic management is not going

321
00:13:05,980 --> 00:13:04,850
to be done by Strategic Command anymore

322
00:13:07,740 --> 00:13:05,990
it's going to be done by the Commerce

323
00:13:10,060 --> 00:13:07,750
Department which i think is a great move

324
00:13:12,000 --> 00:13:10,070
because this is not just about national

325
00:13:14,830 --> 00:13:12,010
security it's about economic development

326
00:13:17,080 --> 00:13:14,840
how that gets developed of course again

327
00:13:19,720 --> 00:13:17,090
that's another Town Hall but at the end

328
00:13:20,880 --> 00:13:19,730
of the day we need to be clear with

329
00:13:23,620 --> 00:13:20,890
everybody in the world

330
00:13:25,480 --> 00:13:23,630
we're the only agency in the federal

331
00:13:29,020 --> 00:13:25,490
government that has human lives at stake

332
00:13:30,760 --> 00:13:29,030
here and it is not acceptable for us to

333
00:13:33,090 --> 00:13:30,770
allow people to create orbital debris

334
00:13:35,830 --> 00:13:33,100
fields that put at risk our people I

335
00:13:37,750 --> 00:13:35,840
wanted to I want to anchor here because

336
00:13:39,130 --> 00:13:37,760
there's probably people here sending

337
00:13:43,870 --> 00:13:39,140
tweets and all kinds of things right now

338
00:13:47,230 --> 00:13:43,880

based on my comments know this while

339
00:13:49,330 --> 00:13:47,240
their risk went up 44% our astronauts

340
00:13:51,049 --> 00:13:49,340
are still safe the international space

341
00:13:53,419 --> 00:13:51,059
station is still safe

342
00:13:57,019 --> 00:13:53,429
if we need to maneuver it we will the

343
00:13:58,549 --> 00:13:57,029
probability of that I think is low but

344
00:14:01,369 --> 00:13:58,559
at the end of the day we have we have to

345
00:14:03,529 --> 00:14:01,379
be clear also that these activities are

346
00:14:05,719 --> 00:14:03,539
not sustainable or compatible with human

347
00:14:06,409 --> 00:14:05,729
spaceflight so thank you for the

348
00:14:08,239 --> 00:14:06,419
question

349
00:14:10,789 --> 00:14:08,249
again I will do a whole nother Town Hall

350
00:14:12,889 --> 00:14:10,799
about this and and the vision nASA has

351
00:14:15,229 --> 00:14:12,899
ultimately for how situational awareness

352
00:14:17,719 --> 00:14:15,239
and space traffic management should

353
00:14:21,559 --> 00:14:17,729
unfold in the future but Patrick that's

354
00:14:22,759 --> 00:14:21,569
a that's a great great point okay we're

355
00:14:25,809 --> 00:14:22,769
gonna take one more question from the

356
00:14:30,919 --> 00:14:28,489
alright Jim Green NASA chief scientist

357
00:14:33,889 --> 00:14:30,929
to go to the moon in five years we need

358
00:14:36,049 --> 00:14:33,899
to focus so that means a whole series of

359
00:14:37,459 --> 00:14:36,059
new things we'll have to get get started

360
00:14:40,789 --> 00:14:37,469
but one of the things that I'm thinking

361
00:14:43,819 --> 00:14:40,799
about of course would be to narrow in on

362
00:14:46,489 --> 00:14:43,829
a location yeah where we can create an

363
00:14:49,819 --> 00:14:46,499

architecture around it where we can with

364
00:14:52,009 --> 00:14:49,829
clips have precursors where we can bring

365
00:14:56,119 --> 00:14:52,019
in the science community to really be

366
00:14:58,279 --> 00:14:56,129
able to help make that five year goal

367
00:15:00,649 --> 00:14:58,289
reality yeah what are your thoughts on

368
00:15:03,379 --> 00:15:00,659
how we can do that next a great great

369
00:15:04,969 --> 00:15:03,389
point and with you hundred percent in

370
00:15:07,579 --> 00:15:04,979
fact the vice president said it in his

371
00:15:09,079 --> 00:15:07,589
speech he said that when we go to the

372
00:15:11,149 --> 00:15:09,089
moon next time we're going to the polls

373
00:15:13,369 --> 00:15:11,159
of the moon in fact the South Pole

374
00:15:15,199 --> 00:15:13,379
specifically is what he said so the

375
00:15:17,059 --> 00:15:15,209
reason for that is that's where the

376
00:15:18,889 --> 00:15:17,069
resources are the president's first

377
00:15:21,079 --> 00:15:18,899
space policy directive says to go to the

378
00:15:22,819 --> 00:15:21,089
moon go sustainably go with commercial

379
00:15:26,179 --> 00:15:22,829
partners go with international partners

380
00:15:28,399 --> 00:15:26,189
and he said to utilize the resources of

381
00:15:30,439 --> 00:15:28,409
the moon that resource utilization

382
00:15:32,269 --> 00:15:30,449
that's a new policy for the United

383
00:15:34,039 --> 00:15:32,279
States in history what what does that

384
00:15:36,439 --> 00:15:34,049
mean well we know that there's water ice

385
00:15:38,389 --> 00:15:36,449
at the poles of the moon we know that

386
00:15:40,999 --> 00:15:38,399
that water ice is life support it's air

387
00:15:43,459 --> 00:15:41,009
to breathe it's water to drink and in

388
00:15:45,409 --> 00:15:43,469

the future it could in fact be fuel I

389
00:15:47,059 --> 00:15:45,419
mean its hydrogen and oxygen same fuel

390
00:15:49,189 --> 00:15:47,069
that powered the space shuttles same

391
00:15:50,509 --> 00:15:49,199
fuel that will power the SLS and it's

392
00:15:52,339 --> 00:15:50,519
abundant and hundreds of millions of

393
00:15:54,619 --> 00:15:52,349
tons on the surface of the Moon at the

394
00:15:56,299 --> 00:15:54,629
poles specifically so what we have to do

395
00:15:59,210 --> 00:15:56,309
with these as you identified the Klipsch

396
00:16:01,309 --> 00:15:59,220
missions as precursors we want to get

397
00:16:03,199 --> 00:16:01,319
those going very soon we're not delaying

398
00:16:04,519 --> 00:16:03,209
we're moving out fast we believe that

399
00:16:04,879 --> 00:16:04,529
there are commercial partners out there

400
00:16:09,710 --> 00:16:04,889
that

401
00:16:11,059 --> 00:16:09,720
where the best value is for the missions

402
00:16:15,049 --> 00:16:11,069
that we do to the surface of the Moon

403
00:16:16,609 --> 00:16:15,059
and with clips and in fact even em1 we

404
00:16:18,379 --> 00:16:16,619
can actually put things on the surface

405
00:16:20,419 --> 00:16:18,389
of the moon to do characterization of

406
00:16:21,859 --> 00:16:20,429
where would be the best place to go the

407
00:16:24,679 --> 00:16:21,869
other thing that we need to consider are

408
00:16:26,389 --> 00:16:24,689
potentially impactor missions so that we

409
00:16:29,329 --> 00:16:26,399
can actually characterize what comes

410
00:16:30,889 --> 00:16:29,339
from those impacts on the moon to

411
00:16:32,389 --> 00:16:30,899
determine you know where are the

412
00:16:35,929 --> 00:16:32,399
volatile x' in other words where is the

413
00:16:37,699 --> 00:16:35,939

where is the water so all of that I

414
00:16:39,559 --> 00:16:37,709
think is important I think it's even

415
00:16:41,449 --> 00:16:39,569
more impressive that the vice president

416
00:16:44,659 --> 00:16:41,459
declared that's where we're gonna go and

417
00:16:46,159 --> 00:16:44,669
we have to deliver on it and talking to

418
00:16:48,889 --> 00:16:46,169
some of the folks that are here in the

419
00:16:50,869 --> 00:16:48,899
front row I was asking what the

420
00:16:52,340 --> 00:16:50,879
complexity when you talk about orbital

421
00:16:53,599 --> 00:16:52,350
physics the complexity of going to the

422
00:16:56,509 --> 00:16:53,609
poles which is going to equatorial

423
00:16:58,879 --> 00:16:56,519
regions what's the difference well the

424
00:17:01,280 --> 00:16:58,889
key is the Gateway if we're gonna put

425
00:17:03,859 --> 00:17:01,290
humans on the South Pole we have to have

426
00:17:05,329 --> 00:17:03,869
a reusable command module that has more

427
00:17:07,039 --> 00:17:05,339
access to more parts of the moon than

428
00:17:09,019 --> 00:17:07,049
ever before in other words it's got to

429
00:17:10,069 --> 00:17:09,029
be maneuverable and the Gateway is our

430
00:17:13,189 --> 00:17:10,079
key and there's a whole host of reasons

431
00:17:15,470 --> 00:17:13,199
why the Gateway is key to that but but

432
00:17:17,960 --> 00:17:15,480
at the end of the day I think it's I

433
00:17:19,909 --> 00:17:17,970
think it's possible it's doable and the

434
00:17:22,009 --> 00:17:19,919
science Mission Directorate and I know

435
00:17:23,750 --> 00:17:22,019
the chief scientists right the science

436
00:17:25,730 --> 00:17:23,760
Mission Directorate is going to be

437
00:17:28,639 --> 00:17:25,740
critical to helping us characterize and

438
00:17:30,889 --> 00:17:28,649

understand where that first human in

439
00:17:32,960 --> 00:17:30,899
this century is going to land on the

440
00:17:35,360 --> 00:17:32,970
surface of the Moon and I loved how the

441
00:17:37,250 --> 00:17:35,370
vice-president put it the next man and

442
00:17:40,519 --> 00:17:37,260
the first woman are going to be American

443
00:17:42,230 --> 00:17:40,529
astronauts on the moon great we're gonna

444
00:17:44,570 --> 00:17:42,240
take a question online reminding

445
00:17:46,009 --> 00:17:44,580
everyone that you can go to NASA gov

446
00:17:49,519 --> 00:17:46,019
backslash town hall and submit a

447
00:17:51,529 --> 00:17:49,529
question or vote went up our second most

448
00:17:53,419 --> 00:17:51,539
voted question is isn't this first step

449
00:17:55,909 --> 00:17:53,429
of the return to schedule over safety

450
00:17:59,750 --> 00:17:55,919
been there done that with catastrophic

451
00:18:02,389 --> 00:17:59,760
results your thoughts I I would not say

452
00:18:03,799 --> 00:18:02,399
that it's a return to schedule over

453
00:18:07,430 --> 00:18:03,809
safety I would say it's a return to

454
00:18:09,560 --> 00:18:07,440
schedule safety is paramount for

455
00:18:13,190 --> 00:18:09,570
everybody at this agency it always has

456
00:18:14,720 --> 00:18:13,200
been as a Navy pilot I've I've flown

457
00:18:17,450 --> 00:18:14,730
many a mission off an aircraft carrier

458
00:18:18,190 --> 00:18:17,460
and I remember sitting in briefs from

459
00:18:20,349 --> 00:18:18,200
you know diff

460
00:18:23,049 --> 00:18:20,359
element leads of different strike

461
00:18:25,029 --> 00:18:23,059
packages etc and everybody always says

462
00:18:26,979 --> 00:18:25,039
right before we step to our aircraft

463
00:18:29,529 --> 00:18:26,989

they always say number one mission today

464
00:18:32,169 --> 00:18:29,539
is safety actually no that's actually

465
00:18:35,560 --> 00:18:32,179
not the case if it was we would all just

466
00:18:37,810 --> 00:18:35,570
stay in the ready room and watch CNN so

467
00:18:40,479 --> 00:18:37,820
number one mission is not safety safety

468
00:18:43,259 --> 00:18:40,489
is critical I think you know after the

469
00:18:47,049 --> 00:18:43,269
cabe report the Columbia accident

470
00:18:49,210 --> 00:18:47,059
investigation board we now understand

471
00:18:51,489 --> 00:18:49,220
independent technical authority and that

472
00:18:54,039 --> 00:18:51,499
is strongly in place and it will make

473
00:18:56,049 --> 00:18:54,049
sure that we have a safe return to

474
00:18:57,909 --> 00:18:56,059
flight especially we talk about going

475
00:18:59,560 --> 00:18:57,919
all the way to the moon all of those

476
00:19:01,840 --> 00:18:59,570
elements of safety are currently in

477
00:19:03,999 --> 00:19:01,850
place they are keenly focused on safety

478
00:19:06,430 --> 00:19:04,009
we're not going to land boots on the

479
00:19:09,759 --> 00:19:06,440
moon in 2024 unless we can get there

480
00:19:12,519 --> 00:19:09,769
safely I mean if it's not safe

481
00:19:14,739 --> 00:19:12,529
everything else is at risk so if we're

482
00:19:16,389 --> 00:19:14,749
gonna land in five years on the surface

483
00:19:18,489 --> 00:19:16,399
of the Moon safety has to be paramount

484
00:19:21,159 --> 00:19:18,499
and it will be prymaat this is an agency

485
00:19:23,889 --> 00:19:21,169
that understands the history better

486
00:19:25,690 --> 00:19:23,899
better than better than anyone else and

487
00:19:28,570 --> 00:19:25,700
we're committed to the safety element

488
00:19:31,379 --> 00:19:28,580

great thank you questions from the

489
00:19:37,029 --> 00:19:35,200
Oh while you are by the way when I said

490
00:19:38,590 --> 00:19:37,039
we stay in the ready room and watch that

491
00:19:47,080 --> 00:19:38,600
Network what I meant was we'd watch NASA

492
00:19:48,669 --> 00:19:47,090
TV Steve Clark science Mission

493
00:19:52,239 --> 00:19:48,679
Directorate I have a slightly different

494
00:19:54,369 --> 00:19:52,249
question recently the FCC decided to

495
00:19:56,499 --> 00:19:54,379
auction off certain bandwidths to

496
00:19:59,200 --> 00:19:56,509
support the 5g initiative here in this

497
00:20:02,080 --> 00:19:59,210
country and from the SMD standpoint

498
00:20:03,669 --> 00:20:02,090
we're very concerned because part of one

499
00:20:06,129 --> 00:20:03,679
of the bandwidths is the twenty three

500
00:20:08,619 --> 00:20:06,139
point eight gigahertz frequency that our

501
00:20:10,989 --> 00:20:08,629
earth science researchers use and our

502
00:20:12,759 --> 00:20:10,999
NOAA colleagues use for critical

503
00:20:14,979 --> 00:20:12,769
microwave sounding data for terrestrial

504
00:20:17,349 --> 00:20:14,989
weather forecasts right so what I'd like

505
00:20:18,999 --> 00:20:17,359
to know is what is the agency doing to

506
00:20:21,639 --> 00:20:19,009
address this what we really feel it's an

507
00:20:24,759 --> 00:20:21,649
alarming issue at this point it yeah

508
00:20:27,430 --> 00:20:24,769
well yeah it is a couple of things to to

509
00:20:28,899 --> 00:20:27,440
keep in mind number number one you're

510
00:20:30,700 --> 00:20:28,909
absolutely right when it comes to

511
00:20:31,600 --> 00:20:30,710
characterizing the water vapor in the

512
00:20:34,450 --> 00:20:31,610
atmosphere we

513
00:20:37,299 --> 00:20:34,460

have to have access to that 23.8

514
00:20:39,180 --> 00:20:37,309
gigahertz what they're auctioning or

515
00:20:42,970 --> 00:20:39,190
what they have already auctioned is a

516
00:20:46,030 --> 00:20:42,980
frequency range right next to that the

517
00:20:48,460 --> 00:20:46,040
concern becomes what is the what is the

518
00:20:50,169 --> 00:20:48,470
splash into our frequency range that

519
00:20:52,330 --> 00:20:50,179
that comes from that the interference if

520
00:20:54,880 --> 00:20:52,340
you will and there's a whole host of

521
00:20:56,830 --> 00:20:54,890
things that go into that the power out

522
00:20:58,600 --> 00:20:56,840
how many cell towers are going to be

523
00:21:00,700 --> 00:20:58,610
placed around the globe that or at least

524
00:21:02,440 --> 00:21:00,710
throughout our own country those cell

525
00:21:04,630 --> 00:21:02,450
towers and the power out and all those

526
00:21:06,370 --> 00:21:04,640
things that result in interference into

527
00:21:08,260 --> 00:21:06,380
our part of the spectrum that is so

528
00:21:13,770 --> 00:21:08,270
important to characterizing weather

529
00:21:17,080 --> 00:21:13,780
forecasting you you you are correct that

530
00:21:19,830 --> 00:21:17,090
given what we understand that they're

531
00:21:24,880 --> 00:21:19,840
looking at as far as power requirements

532
00:21:27,690 --> 00:21:24,890
we're at risk and I will characterize it

533
00:21:29,740 --> 00:21:27,700
this way I was in the House of

534
00:21:30,880 --> 00:21:29,750
Representatives in the House of

535
00:21:32,710 --> 00:21:30,890
Representatives I was in the House of

536
00:21:35,530 --> 00:21:32,720
Representatives when he passed the

537
00:21:37,480 --> 00:21:35,540
appropriation bill to augment Hurricane

538
00:21:39,250 --> 00:21:37,490

sandy the the augmentation to the

539
00:21:41,620 --> 00:21:39,260
appropriation bill for Hurricane sandy

540
00:21:44,950 --> 00:21:41,630
and I don't I think it was something

541
00:21:47,950 --> 00:21:44,960
like forty billion dollars here's the

542
00:21:50,289 --> 00:21:47,960
thing we missed that we missed that

543
00:21:52,840 --> 00:21:50,299
hurricane making landfall all of our

544
00:21:55,390 --> 00:21:52,850
models made it taking a right hook out

545
00:21:58,960 --> 00:21:55,400
to see the European model had it hooking

546
00:22:00,520 --> 00:21:58,970
and hitting land how did we miss it well

547
00:22:02,140 --> 00:22:00,530
we missed it not because the model was

548
00:22:03,520 --> 00:22:02,150
bad although a lot of people said that I

549
00:22:05,110 --> 00:22:03,530
eventually became chairman of the

550
00:22:07,150 --> 00:22:05,120
Environment subcommittee we missed it

551
00:22:09,070 --> 00:22:07,160
because the data was bad we didn't have

552
00:22:11,350 --> 00:22:09,080
enough data and we didn't have the best

553
00:22:13,690 --> 00:22:11,360
data the Europeans had better data than

554
00:22:16,600 --> 00:22:13,700
we had and that ultimately resulted in

555
00:22:18,880 --> 00:22:16,610
them knowing that that hurricane was

556
00:22:21,030 --> 00:22:18,890
going to make landfall and because of

557
00:22:24,190 --> 00:22:21,040
them we were able to accurately you

558
00:22:26,200 --> 00:22:24,200
evacuate the right people and maybe even

559
00:22:29,549 --> 00:22:26,210
not evacuate the wrong people which also

560
00:22:33,159 --> 00:22:29,559
has an economic impact so my point is

561
00:22:35,620 --> 00:22:33,169
Steve I get it this is a big deal for

562
00:22:37,180 --> 00:22:35,630
this agency it's a big deal for the

563
00:22:40,750 --> 00:22:37,190

United States of America it has huge

564
00:22:43,780 --> 00:22:40,760
economic impact on our country it's it's

565
00:22:45,070 --> 00:22:43,790
not just about hurricanes though it's

566
00:22:48,100 --> 00:22:45,080
also about

567
00:22:50,139 --> 00:22:48,110
severe weather events and the way I

568
00:22:52,419 --> 00:22:50,149
characterize it if this particular

569
00:22:54,029 --> 00:22:52,429
frequency band stays as it is with the

570
00:22:58,119 --> 00:22:54,039
power requirements or the power

571
00:23:00,549 --> 00:22:58,129
allowable that it currently has we're

572
00:23:04,629 --> 00:23:00,559
looking at going back to 1978 levels of

573
00:23:07,210 --> 00:23:04,639
data 1978 levels of data in other words

574
00:23:09,399 --> 00:23:07,220
instead of giving a seven-day weather

575
00:23:11,619 --> 00:23:09,409
forecast you're going to get a two or a

576
00:23:15,159 --> 00:23:11,629
three day weather forecast that has huge

577
00:23:18,039 --> 00:23:15,169
economic impact for our country so this

578
00:23:19,659 --> 00:23:18,049
is this is you know people say it's it's

579
00:23:21,549 --> 00:23:19,669
it's earth science its weather

580
00:23:25,659 --> 00:23:21,559
forecasting I'll tell you something else

581
00:23:27,099 --> 00:23:25,669
that's on my mind I'm at a town hall

582
00:23:30,129 --> 00:23:27,109
this could get me in trouble but it's

583
00:23:31,239 --> 00:23:30,139
the truth we've got how was the chairman

584
00:23:33,159 --> 00:23:31,249
of the Environment subcommittee in the

585
00:23:33,609 --> 00:23:33,169
House of Representatives when JP SS fell

586
00:23:36,190 --> 00:23:33,619
behind

587
00:23:37,869 --> 00:23:36,200
JP SS 1 why did that matter because

588
00:23:38,200 --> 00:23:37,879

Swamy NPP was at the end of its useful

589
00:23:40,749 --> 00:23:38,210
life

590
00:23:43,779 --> 00:23:40,759
JP SS was being delayed and delayed and

591
00:23:46,330 --> 00:23:43,789
delayed and if Swamy NPP ceased to

592
00:23:48,009 --> 00:23:46,340
operate we were going to lose 80% of the

593
00:23:50,470 --> 00:23:48,019
data that fell to fed into our numerical

594
00:23:53,499 --> 00:23:50,480
weather models from the United States of

595
00:23:55,239 --> 00:23:53,509
America and the testimony that I had

596
00:23:56,889 --> 00:23:55,249
from NOAA at the time on the Science

597
00:23:59,109 --> 00:23:56,899
Committee was that that would put us in

598
00:24:00,639 --> 00:23:59,119
a position to miss 25% of the severe

599
00:24:02,979 --> 00:24:00,649
storms in the state about in the state

600
00:24:03,369 --> 00:24:02,989
of Oklahoma 25 percent of the severe

601
00:24:05,169 --> 00:24:03,379
storm

602
00:24:10,090 --> 00:24:05,179
so that was JP SS well what's the

603
00:24:11,799 --> 00:24:10,100
primary instrument on JP SS a TMS which

604
00:24:14,379 --> 00:24:11,809
of course is doing what it's it's

605
00:24:15,789 --> 00:24:14,389
sounding in the microwave spectrum for

606
00:24:18,549 --> 00:24:15,799
the purpose of characterizing water

607
00:24:22,840 --> 00:24:18,559
vapor so the question is does this

608
00:24:25,060 --> 00:24:22,850
country intend to make multi billion

609
00:24:26,979 --> 00:24:25,070
dollar investments into satellite

610
00:24:28,989 --> 00:24:26,989
programs for which the flagship

611
00:24:32,229 --> 00:24:28,999
instrument is now not going to be able

612
00:24:35,019 --> 00:24:32,239
to return its investment do we put a

613
00:24:36,489 --> 00:24:35,029

hold on these programs I don't know at

614
00:24:38,950 --> 00:24:36,499
this point I've got to work with NOAA

615
00:24:40,720 --> 00:24:38,960
I've got to figure out what's real and

616
00:24:41,769 --> 00:24:40,730
what's not real as far as the data that

617
00:24:43,899 --> 00:24:41,779
we're going to be able to accumulate

618
00:24:46,299 --> 00:24:43,909
once this spectrum is no longer

619
00:24:48,609 --> 00:24:46,309
available but this has huge impact to

620
00:24:50,859 --> 00:24:48,619
existing programs already on orbit with

621
00:24:52,779 --> 00:24:50,869
tens of billions of dollars worth of

622
00:24:54,669 --> 00:24:52,789
investment it has impact on programs

623
00:24:57,129 --> 00:24:54,679
that are underway right now it has

624
00:24:58,659 --> 00:24:57,139
impacts to the people in the United

625
00:25:00,519 --> 00:24:58,669
States who rely on weather for

626
00:25:02,409 --> 00:25:00,529
casting it has impact to the people on

627
00:25:04,029 --> 00:25:02,419
the East Coast who need to understand

628
00:25:07,739 --> 00:25:04,039
where a hurricane is going to make

629
00:25:11,289 --> 00:25:07,749
landfall I get it

630
00:25:13,479 --> 00:25:11,299
NOAA understands the Commerce Department

631
00:25:16,749 --> 00:25:13,489
understands they're calling us so we've

632
00:25:18,099 --> 00:25:16,759
got to figure out how we're going to

633
00:25:20,590 --> 00:25:18,109
continue the missions that we've been

634
00:25:22,690 --> 00:25:20,600
tasked to accomplish under this kind of

635
00:25:24,310 --> 00:25:22,700
new environment and I don't know at this

636
00:25:27,310 --> 00:25:24,320
point I'm gonna be honest we've got to

637
00:25:29,499 --> 00:25:27,320
figure it out but it's a big deal and

638
00:25:31,149 --> 00:25:29,509

it's important and we're gonna continue

639
00:25:33,609 --> 00:25:31,159
working on the key is Steve to your

640
00:25:35,409 --> 00:25:33,619
point what are we doing about it dialog

641
00:25:37,330 --> 00:25:35,419
we need to communicate with all parts of

642
00:25:39,549 --> 00:25:37,340
the federal government about why this is

643
00:25:41,049 --> 00:25:39,559
a challenge and figure out how we're

644
00:25:43,989 --> 00:25:41,059
going to deal with it because it's gonna

645
00:25:47,259 --> 00:25:43,999
have a big impact thank you for that

646
00:25:49,180 --> 00:25:47,269
question Thank You mr. mr. eater we're

647
00:25:51,609 --> 00:25:49,190
looking at the questions on nasa.gov

648
00:25:54,609 --> 00:25:51,619
black Fest Town Hall and we're seeing a

649
00:25:58,090 --> 00:25:54,619
theme so we're gonna combine some Vice

650
00:25:59,649 --> 00:25:58,100
President Mike Pence said NASA must

651
00:26:01,930 --> 00:25:59,659
transform itself into a leaner more

652
00:26:04,419 --> 00:26:01,940
accountable and more agile organization

653
00:26:06,279 --> 00:26:04,429
he also said if NASA is not currently

654
00:26:08,169 --> 00:26:06,289
capable of landing American astronauts

655
00:26:10,029 --> 00:26:08,179
on the moon in five years we need to

656
00:26:12,820 --> 00:26:10,039
change the organization not the mission

657
00:26:15,070 --> 00:26:12,830
what does this mean do you think NASA

658
00:26:17,229 --> 00:26:15,080
will meet the 2024 deadline and how

659
00:26:20,409 --> 00:26:17,239
specifically can NASA be reformed to

660
00:26:21,879 --> 00:26:20,419
meet these ambitious goals the answer is

661
00:26:23,440 --> 00:26:21,889
do I believe it's gonna we're gonna meet

662
00:26:27,549 --> 00:26:23,450
the deadline absolutely

663
00:26:31,320 --> 00:26:27,559

and that that's a point of emphasis

664
00:26:33,609 --> 00:26:31,330
because here you have an administration

665
00:26:35,649 --> 00:26:33,619
that declared we were going to land

666
00:26:38,080 --> 00:26:35,659
humans on the surface of the Moon during

667
00:26:39,669 --> 00:26:38,090
the time which that administration might

668
00:26:41,349 --> 00:26:39,679
potentially still be in office that's a

669
00:26:44,409 --> 00:26:41,359
very serious declaration even if you go

670
00:26:46,330 --> 00:26:44,419
back to john f kennedy's day he said

671
00:26:48,700 --> 00:26:46,340
within by the end of the decade which

672
00:26:49,989 --> 00:26:48,710
guaranteed he would not be in office by

673
00:26:52,330 --> 00:26:49,999
the end of the decade that's a 10-year

674
00:26:55,119 --> 00:26:52,340
horizon so this is a this is this is a

675
00:26:57,129 --> 00:26:55,129
very serious proposal to make it happen

676
00:26:58,899 --> 00:26:57,139
and to get it done I hear the comment

677
00:27:00,999 --> 00:26:58,909
all the time about Lucy in the football

678
00:27:03,340 --> 00:27:01,009
Lucy in the football I've heard it since

679
00:27:06,159 --> 00:27:03,350
I've been here probably I don't know a

680
00:27:08,710 --> 00:27:06,169
couple of hundred times this is not Lucy

681
00:27:10,749 --> 00:27:08,720
in the football and the executive branch

682
00:27:12,310 --> 00:27:10,759
people are very serious we're going to

683
00:27:13,779 --> 00:27:12,320
the moon and we're going fast

684
00:27:15,940 --> 00:27:13,789
and we're going with international and

685
00:27:18,159 --> 00:27:15,950
commercial partners with international

686
00:27:20,200 --> 00:27:18,169
and commercial partners so I don't want

687
00:27:23,289 --> 00:27:20,210
to discount how important that question

688
00:27:26,049 --> 00:27:23,299

is do I believe it's possible absolutely

689
00:27:27,399 --> 00:27:26,059
why because you're here you're the ones

690
00:27:29,340 --> 00:27:27,409
that are gonna make it possible you're

691
00:27:31,870 --> 00:27:29,350
the ones that are going this is a

692
00:27:35,560 --> 00:27:31,880
once-in-a-lifetime opportunity I hope

693
00:27:37,389 --> 00:27:35,570
everybody here takes that away this this

694
00:27:39,159 --> 00:27:37,399
is an opportunity for people in this

695
00:27:41,680 --> 00:27:39,169
room and people watching from across the

696
00:27:43,570 --> 00:27:41,690
agency to say where you were when you're

697
00:27:46,299 --> 00:27:43,580
talking to your grandchildren or your

698
00:27:48,820 --> 00:27:46,309
great-grandchildren this opportunity

699
00:27:50,409 --> 00:27:48,830
before us is something we haven't had in

700
00:27:51,820 --> 00:27:50,419
a very long time saying we're gonna go

701
00:27:54,159 --> 00:27:51,830
to the moon and we're gonna do within

702
00:27:55,060 --> 00:27:54,169
five years it's never it's never

703
00:27:57,879 --> 00:27:55,070
happened before

704
00:27:59,799 --> 00:27:57,889
but now it has happened so yes we're

705
00:28:02,139 --> 00:27:59,809
gonna do it the vice president is

706
00:28:03,490 --> 00:28:02,149
correct if we have to reorganize we're

707
00:28:05,230 --> 00:28:03,500
going to reorganize and a lot of people

708
00:28:07,749 --> 00:28:05,240
are familiar with the new moon to Mars

709
00:28:09,970 --> 00:28:07,759
Mission Directorate and that is a part

710
00:28:11,950 --> 00:28:09,980
of this initiative which is you know

711
00:28:13,659 --> 00:28:11,960
when we talk about operations and we

712
00:28:16,480 --> 00:28:13,669
talk about development those are two

713
00:28:17,740 --> 00:28:16,490

very different kind of capabilities and

714
00:28:20,590 --> 00:28:17,750
I don't ever want to say that

715
00:28:22,269 --> 00:28:20,600
spaceflight is somehow normal but when

716
00:28:23,860 --> 00:28:22,279
we talk about operations we're talking

717
00:28:27,430 --> 00:28:23,870
about existing Hardware existing

718
00:28:29,019 --> 00:28:27,440
capability and a cadre of people that

719
00:28:30,490 --> 00:28:29,029
are trained and prepared and ready to go

720
00:28:33,340 --> 00:28:30,500
do these activities when we talk about

721
00:28:34,659 --> 00:28:33,350
development we're talking about things

722
00:28:36,700 --> 00:28:34,669
that have never been done before

723
00:28:39,700 --> 00:28:36,710
and we're talking about brand new things

724
00:28:42,909 --> 00:28:39,710
that require a whole different skill set

725
00:28:45,490 --> 00:28:42,919
than operations not that there's not a

726
00:28:47,889 --> 00:28:45,500
lot of over overlap I believe me there

727
00:28:49,029 --> 00:28:47,899
is but we talk about what we're talking

728
00:28:51,519 --> 00:28:49,039
about here is a Mission Directorate

729
00:28:52,869 --> 00:28:51,529
focused on development but we don't want

730
00:28:54,279 --> 00:28:52,879
to call it the development Mission

731
00:28:56,710 --> 00:28:54,289
Directorate because what mission is

732
00:28:58,509 --> 00:28:56,720
development it's not a mission this is

733
00:29:00,519 --> 00:28:58,519
the moon to Mars Mission Directorate

734
00:29:04,450 --> 00:29:00,529
it's it's focused on ultimately getting

735
00:29:06,549 --> 00:29:04,460
us to the moon with an intent to retire

736
00:29:08,740 --> 00:29:06,559
risk proof capability proof technology

737
00:29:10,269 --> 00:29:08,750
and then reuse as much of that

738
00:29:12,279 --> 00:29:10,279

capability and technology for our

739
00:29:13,779 --> 00:29:12,289
mission to Mars that's what the moon to

740
00:29:15,940 --> 00:29:13,789
Mars mission director it is all about

741
00:29:18,789 --> 00:29:15,950
and it's a little it's different than

742
00:29:21,279 --> 00:29:18,799
human operations which is now going to

743
00:29:24,220 --> 00:29:21,289
be a separate mission Directorate as far

744
00:29:25,750 --> 00:29:24,230
as I think a lot of people heard the

745
00:29:27,010 --> 00:29:25,760
vice president say

746
00:29:30,820 --> 00:29:27,020
that we're not committed to any one

747
00:29:32,710 --> 00:29:30,830
contractor that is 100% true as well at

748
00:29:35,620 --> 00:29:32,720
the end of the day we're going in 2024

749
00:29:37,420 --> 00:29:35,630
and whatever that takes the the

750
00:29:41,440 --> 00:29:37,430
vice-president said by direction of the

751
00:29:43,630 --> 00:29:41,450
president that any means necessary and

752
00:29:45,550 --> 00:29:43,640
that the mission matters more than the

753
00:29:47,170 --> 00:29:45,560
means and we're going to the South Pole

754
00:29:49,450 --> 00:29:47,180
so that's the goal that's what we're

755
00:29:50,650 --> 00:29:49,460
trying to achieve here and and not

756
00:29:52,750 --> 00:29:50,660
trying that's what we're going to

757
00:29:55,510 --> 00:29:52,760
achieve and this is a great opportunity

758
00:29:57,520 --> 00:29:55,520
for everybody in this room great

759
00:29:59,890 --> 00:29:57,530
so recently during your workforce

760
00:30:01,630 --> 00:29:59,900
message we sent out last week you

761
00:30:04,090 --> 00:30:01,640
mentioned the top lines of a two-week

762
00:30:05,950 --> 00:30:04,100
review about commercial offshore options

763
00:30:09,040 --> 00:30:05,960

for the Orion can you give us some more

764
00:30:12,610 --> 00:30:09,050
details of that the review okay so that

765
00:30:15,520 --> 00:30:12,620
the review of commercial options for the

766
00:30:19,690 --> 00:30:15,530
first launch of Orion around the moon

767
00:30:22,780 --> 00:30:19,700
so good good question this could take a

768
00:30:25,440 --> 00:30:22,790
little bit of time but I'll try to put

769
00:30:28,870 --> 00:30:25,450
it in a nutshell here here's the thing

770
00:30:30,910 --> 00:30:28,880
the SLS with an Orion crew capsule in a

771
00:30:33,190 --> 00:30:30,920
European service module was intended to

772
00:30:35,140 --> 00:30:33,200
launch in December of this year December

773
00:30:39,160 --> 00:30:35,150
of nineteen with a no later than date of

774
00:30:41,440 --> 00:30:39,170
of June of 2020 that slipped

775
00:30:44,950 --> 00:30:41,450
significantly based on a brief that I

776
00:30:47,320 --> 00:30:44,960
got from Boeing and others and since

777
00:30:49,450 --> 00:30:47,330
that slipped significantly and we're

778
00:30:50,770 --> 00:30:49,460
trying to accelerate I said okay we're

779
00:30:53,050 --> 00:30:50,780
gonna look at all the options what is

780
00:30:54,340 --> 00:30:53,060
the trade space to put Orion around the

781
00:30:57,430 --> 00:30:54,350
moon with the European service module

782
00:30:58,360 --> 00:30:57,440
and test it the goal here is is to test

783
00:31:00,100 --> 00:30:58,370
it and if we were to do that

784
00:31:03,130 --> 00:31:00,110
commercially then we would still have

785
00:31:04,870 --> 00:31:03,140
that first SLS for a launch in the

786
00:31:06,820 --> 00:31:04,880
future that could put some kind of

787
00:31:08,710 --> 00:31:06,830
habitation module maybe you know

788
00:31:10,030 --> 00:31:08,720

whatever else might we might want to put

789
00:31:11,980 --> 00:31:10,040
in orbit around the moon as part of the

790
00:31:13,360 --> 00:31:11,990
gateway that first SLS would still be

791
00:31:15,490 --> 00:31:13,370
available that was the intent now here's

792
00:31:17,890 --> 00:31:15,500
the thing we looked at those options

793
00:31:19,960 --> 00:31:17,900
very carefully over a period of two

794
00:31:21,550 --> 00:31:19,970
weeks and there's a lot of people that

795
00:31:23,440 --> 00:31:21,560
got no sleep for two weeks because I

796
00:31:25,720 --> 00:31:23,450
toss them with this so thank you number

797
00:31:30,910 --> 00:31:25,730
one for doing that work here's what we

798
00:31:33,430 --> 00:31:30,920
learned number one a delta 4 heavy is

799
00:31:35,140 --> 00:31:33,440
not it cannot launch an Orion crew

800
00:31:37,330 --> 00:31:35,150
capsule with the European service module

801
00:31:38,399 --> 00:31:37,340
to orbit it just doesn't have the throw

802
00:31:41,500 --> 00:31:38,409
weight capable of doing

803
00:31:43,389 --> 00:31:41,510
so I I asked what about an ICP s can we

804
00:31:45,130 --> 00:31:43,399
put in cryogenic propulsion stage well

805
00:31:46,330 --> 00:31:45,140
actually no you can't why because that

806
00:31:48,460 --> 00:31:46,340
weighs it down even more

807
00:31:50,710 --> 00:31:48,470
so it still prevents it from getting to

808
00:31:52,659 --> 00:31:50,720
orbit so then the question was what

809
00:31:54,730 --> 00:31:52,669
about to delta 4 heavy x' can you launch

810
00:31:56,889 --> 00:31:54,740
an ICP s on a delta 4 heavy and another

811
00:31:58,360 --> 00:31:56,899
you know delta 4 heavy with the Orion

812
00:32:00,039 --> 00:31:58,370
crew capsule in the European service

813
00:32:02,169 --> 00:32:00,049

module the answer is yes you can launch

814
00:32:04,870 --> 00:32:02,179
both of them the problem is we only have

815
00:32:06,970 --> 00:32:04,880
one launch pad on each coast for a delta

816
00:32:08,560 --> 00:32:06,980
4 heavy and by the way we don't have any

817
00:32:09,880 --> 00:32:08,570
extra delta 4 heavy sitting around so

818
00:32:12,490 --> 00:32:09,890
we'd have to steal those Rockets from

819
00:32:14,769 --> 00:32:12,500
another agency two of them so we looked

820
00:32:16,810 --> 00:32:14,779
at that and we said ok well is it

821
00:32:18,759 --> 00:32:16,820
physically possible if if we had the

822
00:32:20,320 --> 00:32:18,769
support to take rockets from other

823
00:32:21,669 --> 00:32:20,330
places and the answer was yes it's

824
00:32:23,710 --> 00:32:21,679
physically possible here's the problem

825
00:32:25,509 --> 00:32:23,720
when you launch one from the East Coast

826
00:32:26,889 --> 00:32:25,519
and one from the West Coast the one on

827
00:32:28,419 --> 00:32:26,899
the west coast can only launch polar

828
00:32:30,970 --> 00:32:28,429
because you can't launch it East over

829
00:32:32,409 --> 00:32:30,980
the United States from the west coast so

830
00:32:34,659 --> 00:32:32,419
when you launch a polar orbit now you

831
00:32:36,190 --> 00:32:34,669
have to switch orbits when you're in

832
00:32:39,009 --> 00:32:36,200
orbit around the Earth we've caught it

833
00:32:40,629 --> 00:32:39,019
that could takes a ton of Delta V and it

834
00:32:43,330 --> 00:32:40,639
takes a ton of time that's the big

835
00:32:45,070 --> 00:32:43,340
problem is the time because if and I

836
00:32:46,180 --> 00:32:45,080
don't want to say what that time is but

837
00:32:48,519 --> 00:32:46,190
it's enough time to where you're gonna

838
00:32:49,690 --> 00:32:48,529

have cryogenic boil off and then you're

839
00:32:51,399 --> 00:32:49,700
not going to be able to accomplish the

840
00:32:54,430 --> 00:32:51,409
objective anyway so two Delta fours

841
00:32:57,149 --> 00:32:54,440
proved to be unworkable so then we said

842
00:33:02,049 --> 00:32:57,159
what about at Delta 4 and a Falcon Heavy

843
00:33:04,000 --> 00:33:02,059
or even better let's pretend the two

844
00:33:05,500 --> 00:33:04,010
delta fours worked we don't have any way

845
00:33:07,960 --> 00:33:05,510
to do automatic rendezvous and docking

846
00:33:11,110 --> 00:33:07,970
that capability does not exist in our

847
00:33:13,299 --> 00:33:11,120
country except for one solution which is

848
00:33:15,430 --> 00:33:13,309
a crew dragon which we just proved on

849
00:33:17,529 --> 00:33:15,440
the International Space Station so okay

850
00:33:18,940 --> 00:33:17,539
let's take a crew dragon and dock it to

851
00:33:21,460 --> 00:33:18,950
the Orion and push it around the moon

852
00:33:23,830 --> 00:33:21,470
we'll launch the crew dragon on a on a

853
00:33:25,389 --> 00:33:23,840
Falcon and we'll watch the Orion a

854
00:33:27,100 --> 00:33:25,399
European service module a delta 4 heavy

855
00:33:28,600 --> 00:33:27,110
can we do that put them both on the pad

856
00:33:29,740 --> 00:33:28,610
by the way I was for it because the

857
00:33:32,080 --> 00:33:29,750
visuals would be beautiful

858
00:33:33,909 --> 00:33:32,090
can we put both of them on the pad at

859
00:33:36,639 --> 00:33:33,919
the same time launch them an hour and a

860
00:33:38,680 --> 00:33:36,649
half apart one orbit apart and get that

861
00:33:40,480 --> 00:33:38,690
done here's the problem while the crew

862
00:33:43,029 --> 00:33:40,490
dragon is capable of doing automatic

863
00:33:44,950 --> 00:33:43,039

rendezvous and docking it doesn't have

864
00:33:47,799 --> 00:33:44,960
the thrust to throw it around the moon

865
00:33:50,710 --> 00:33:47,809
so it would be basically be a replay of

866
00:33:51,700 --> 00:33:50,720
eft-1 which isn't what we're trying to

867
00:33:53,769 --> 00:33:51,710
achieve here

868
00:33:56,529 --> 00:33:53,779
we want to test it around the moon so

869
00:34:00,370 --> 00:33:56,539
then we said okay can we can we use any

870
00:34:04,360 --> 00:34:00,380
other kind of upper stage and here's

871
00:34:07,419 --> 00:34:04,370
here's a solution that did work a falcon

872
00:34:10,270 --> 00:34:07,429
heavy with a regular old Falcon upper

873
00:34:12,700 --> 00:34:10,280
stage and an Orion and a European

874
00:34:15,579 --> 00:34:12,710
service module that actually did work on

875
00:34:18,639 --> 00:34:15,589
one rocket here's the problem there is a

876
00:34:22,359 --> 00:34:18,649
whole host of challenges that had to be

877
00:34:23,409 --> 00:34:22,369
addressed we talked about a falcon being

878
00:34:24,790 --> 00:34:23,419
launched you know everything is

879
00:34:27,099 --> 00:34:24,800
integrated horizontally and then the

880
00:34:30,129 --> 00:34:27,109
erector R makes it vertical well you put

881
00:34:31,990 --> 00:34:30,139
an upper stage with a European service

882
00:34:34,119 --> 00:34:32,000
module and an Orion on top of that

883
00:34:37,300 --> 00:34:34,129
making it vertical is extremely

884
00:34:40,389 --> 00:34:37,310
difficult would take a lot of changes to

885
00:34:43,659 --> 00:34:40,399
that erector arm by the way then then

886
00:34:45,010 --> 00:34:43,669
the the the European service module

887
00:34:46,810 --> 00:34:45,020
would not have any of the hypergolic

888
00:34:48,399 --> 00:34:46,820

SONET so now you have to load the

889
00:34:50,260 --> 00:34:48,409
hypergolic s-- in the vertical which

890
00:34:52,329 --> 00:34:50,270
means that the launch pad itself would

891
00:34:54,220 --> 00:34:52,339
have huge changes that it would need to

892
00:34:55,629 --> 00:34:54,230
be that would need to be made on top of

893
00:34:59,200 --> 00:34:55,639
it all we're talking about putting a

894
00:35:01,660 --> 00:34:59,210
massive fairing on top of the on top of

895
00:35:03,040 --> 00:35:01,670
a Falcon Heavy and that massive fairing

896
00:35:04,660 --> 00:35:03,050
of course is going to create some kind

897
00:35:06,940 --> 00:35:04,670
of shock wave as it goes through max Q

898
00:35:09,280 --> 00:35:06,950
and those shockwaves are going to impact

899
00:35:10,750 --> 00:35:09,290
the side boosters on a Falcon Heavy in

900
00:35:12,040 --> 00:35:10,760
ways that right now we we don't even

901
00:35:13,630 --> 00:35:12,050
know which means we got to go back into

902
00:35:15,760 --> 00:35:13,640
Windtunnel testing the end of the day

903
00:35:18,339 --> 00:35:15,770
while that option was attractive and

904
00:35:20,560 --> 00:35:18,349
possible there was so much risk and so

905
00:35:22,390 --> 00:35:20,570
much cost and so much schedule involved

906
00:35:25,990 --> 00:35:22,400
that it wouldn't accelerate on either

907
00:35:27,820 --> 00:35:26,000
cost or schedule but here's the thing it

908
00:35:31,240 --> 00:35:27,830
could be used in the future if we could

909
00:35:34,420 --> 00:35:31,250
get through all of that the one downside

910
00:35:37,480 --> 00:35:34,430
of that is that it barely made it around

911
00:35:38,859 --> 00:35:37,490
the moon it is true we could get around

912
00:35:41,200 --> 00:35:38,869
the moon but it would be a free return

913
00:35:43,120 --> 00:35:41,210

trajectory and there'd be no no possible

914
00:35:45,670 --> 00:35:43,130
way to insert at the moon into an orbit

915
00:35:46,960 --> 00:35:45,680
not even a near rectilinear halo orbit

916
00:35:49,750 --> 00:35:46,970
which is course with the gateways it

917
00:35:51,790 --> 00:35:49,760
would be so even that capability was

918
00:35:53,380 --> 00:35:51,800
limited that was not the right solution

919
00:35:55,510 --> 00:35:53,390
either I know we're getting short on

920
00:35:56,710 --> 00:35:55,520
time and this is more detail but I think

921
00:36:00,640 --> 00:35:56,720
there's people here that are interested

922
00:36:04,210 --> 00:36:00,650
in this at the end there is another

923
00:36:05,620 --> 00:36:04,220
solution out there a Falcon Heavy with a

924
00:36:09,820 --> 00:36:05,630
nice EPS at the top

925
00:36:11,560 --> 00:36:09,830
talk about strange bedfellows a falcon

926
00:36:13,300 --> 00:36:11,570
heavy with an ICPs at the top with an it

927
00:36:15,640 --> 00:36:13,310
with the European service module and

928
00:36:18,640 --> 00:36:15,650
Orion crew capsule that ultimately has

929
00:36:20,440 --> 00:36:18,650
the ability to put us to potential Akash

930
00:36:23,530 --> 00:36:20,450
Gerst is going to be so mad at me for

931
00:36:24,700 --> 00:36:23,540
saying it but at the end of the day by

932
00:36:26,740 --> 00:36:24,710
the way none of this was cleared by

933
00:36:36,940 --> 00:36:26,750
Gerstenmaier he's still the best rocket

934
00:36:38,740 --> 00:36:36,950
scientist that we have so going back to

935
00:36:40,840 --> 00:36:38,750
it - at the end of the day there there

936
00:36:43,360 --> 00:36:40,850
is a solution here that could

937
00:36:46,390 --> 00:36:43,370
potentially work for the future it would

938
00:36:48,880 --> 00:36:46,400

require time it would require cost and

939
00:36:50,350 --> 00:36:48,890
there is risk involved but guess what if

940
00:36:54,130 --> 00:36:50,360
we're gonna land boots on the moon in

941
00:36:55,840 --> 00:36:54,140
2024 we have time and we have the

942
00:36:57,400 --> 00:36:55,850
ability to accept some risk makes and

943
00:37:00,070 --> 00:36:57,410
modifications all of that is on the

944
00:37:03,490 --> 00:37:00,080
table there is nothing sacred here that

945
00:37:06,520 --> 00:37:03,500
is off the table and that is a that is a

946
00:37:08,980 --> 00:37:06,530
potential capability that could help us

947
00:37:11,140 --> 00:37:08,990
land boots on the moon in 2024 I don't

948
00:37:13,360 --> 00:37:11,150
want to take away for one second the

949
00:37:18,010 --> 00:37:13,370
best option to get us to the lunar orbit

950
00:37:19,510 --> 00:37:18,020
as soon as possible is SLS and an Orion

951
00:37:21,220 --> 00:37:19,520
with the European service module there

952
00:37:22,600 --> 00:37:21,230
is nothing that beats that capability

953
00:37:24,490 --> 00:37:22,610
and right now what we were doing is

954
00:37:26,320 --> 00:37:24,500
everything possible to accelerate that

955
00:37:27,490 --> 00:37:26,330
so instead of doing things in series

956
00:37:28,990 --> 00:37:27,500
we're doing things in parallel

957
00:37:31,930 --> 00:37:29,000
I'm sorry I'm gonna anchor here we've

958
00:37:34,240 --> 00:37:31,940
got some time got 15 more minutes here

959
00:37:36,670 --> 00:37:34,250
and by the way when I went one minute

960
00:37:38,590 --> 00:37:36,680
over when I did the budget rollout they

961
00:37:40,660 --> 00:37:38,600
chopped me off on time so I'm gonna end

962
00:37:42,100 --> 00:37:40,670
right on time they just did a hard

963
00:37:42,820 --> 00:37:42,110

cutoff so I wanna make sure that I don't

964
00:37:45,430 --> 00:37:42,830
do that again

965
00:37:47,710 --> 00:37:45,440
don't go overtime on NASA TV they will

966
00:37:49,270 --> 00:37:47,720
cut you off it doesn't matter doesn't

967
00:37:52,950 --> 00:37:49,280
matter if you're the administrator or

968
00:37:58,210 --> 00:37:56,440
so the SLS and the Orion crew capsule

969
00:38:00,460 --> 00:37:58,220
the European service module is the best

970
00:38:02,200 --> 00:38:00,470
solution we have to accelerate the SLS

971
00:38:04,600 --> 00:38:02,210
how do we make that happen the engine

972
00:38:06,430 --> 00:38:04,610
section ended up in the critical path

973
00:38:08,470 --> 00:38:06,440
that's what happened the engine section

974
00:38:10,950 --> 00:38:08,480
and everything has to be stocked on top

975
00:38:13,180 --> 00:38:10,960
of the engine section so given the

976
00:38:15,250 --> 00:38:13,190
property plant and equipment that we had

977
00:38:18,640 --> 00:38:15,260
we were stuck on the engine section and

978
00:38:19,390 --> 00:38:18,650
we can't integrate the the hydrogen tank

979
00:38:21,579 --> 00:38:19,400
with the oxygen

980
00:38:22,989 --> 00:38:21,589
the inner tank and the fairings they

981
00:38:24,730 --> 00:38:22,999
couldn't be integrated with the engine

982
00:38:26,380 --> 00:38:24,740
section what do we do we just bought

983
00:38:28,450 --> 00:38:26,390
hardware that's going to help us

984
00:38:31,960 --> 00:38:28,460
integrate horizontally all of those

985
00:38:33,549 --> 00:38:31,970
components for an eventual one so in

986
00:38:35,620 --> 00:38:33,559
other words we can continue working on

987
00:38:36,940 --> 00:38:35,630
the rest of the rocket while the engine

988
00:38:38,559 --> 00:38:36,950

section is caught in the critical path

989
00:38:40,539 --> 00:38:38,569
that's going to accelerate our schedule

990
00:38:42,579 --> 00:38:40,549
by a number of months in a very positive

991
00:38:44,620 --> 00:38:42,589
way then what we're looking at is

992
00:38:46,120 --> 00:38:44,630
ultimately how much testing do we have

993
00:38:47,620 --> 00:38:46,130
to do we don't want to do anything that

994
00:38:49,720 --> 00:38:47,630
is absolutely not necessary there's a

995
00:38:51,609 --> 00:38:49,730
lot of tests that we'd like to do a lot

996
00:38:53,769 --> 00:38:51,619
of tests that we would love to see the

997
00:38:55,660 --> 00:38:53,779
result of and we talked about a flight

998
00:38:58,089 --> 00:38:55,670
envelope we want to test it at every

999
00:39:00,339 --> 00:38:58,099
single part of that flight envelope in

1000
00:39:02,140 --> 00:39:00,349
the extreme friends the question is what

1001
00:39:04,059 --> 00:39:02,150
is it what does it take to be qualified

1002
00:39:05,799 --> 00:39:04,069
to fly not we don't have to test

1003
00:39:08,109 --> 00:39:05,809
everything to failure what does it take

1004
00:39:09,279 --> 00:39:08,119
to be qualified to fly those are the

1005
00:39:11,470 --> 00:39:09,289
ultimately the questions that we need

1006
00:39:13,150 --> 00:39:11,480
answer and if we can accelerate whether

1007
00:39:14,650 --> 00:39:13,160
it's the green run test

1008
00:39:15,999 --> 00:39:14,660
we have other capables we're talking

1009
00:39:19,749 --> 00:39:16,009
about Space Shuttle main engines here

1010
00:39:22,960 --> 00:39:19,759
these are rs.25 they've got millions of

1011
00:39:24,880 --> 00:39:22,970
seconds of test on top of 130 shuttle

1012
00:39:27,069 --> 00:39:24,890
flights with three engines each that's a

1013
00:39:29,019 --> 00:39:27,079

lot of flight time on these engines now

1014
00:39:32,079 --> 00:39:29,029
they have digital controllers digital

1015
00:39:34,690 --> 00:39:32,089
controllers enable them to accept very

1016
00:39:36,220 --> 00:39:34,700
high off nominal fuel fluid flows

1017
00:39:39,099 --> 00:39:36,230
whether it's liquid oxygen liquid

1018
00:39:41,109 --> 00:39:39,109
hydrogen so the question is how much off

1019
00:39:42,819 --> 00:39:41,119
nominal can they accept and it's

1020
00:39:44,829 --> 00:39:42,829
possible that we could discuss some of

1021
00:39:46,569 --> 00:39:44,839
the green run based on the fact that we

1022
00:39:48,759 --> 00:39:46,579
now have these new capabilities digital

1023
00:39:50,079 --> 00:39:48,769
control which are important I used to

1024
00:39:51,609 --> 00:39:50,089
fly airplanes that had digital

1025
00:39:54,870 --> 00:39:51,619
electronic controls what we call that

1026
00:39:57,249 --> 00:39:54,880
Dec and it made a world of difference

1027
00:39:58,599 --> 00:39:57,259
again I'm not saying that an airplane is

1028
00:39:59,859 --> 00:39:58,609
the same as a rocket I get it it's

1029
00:40:03,609 --> 00:39:59,869
different in all the rocket engineers

1030
00:40:05,259 --> 00:40:03,619
are like yeah at airplane whatever but

1031
00:40:06,729 --> 00:40:05,269
it does help it makes a big difference

1032
00:40:09,900 --> 00:40:06,739
and I think it's important for us to

1033
00:40:12,190 --> 00:40:09,910
understand that it might not be

1034
00:40:13,299 --> 00:40:12,200
necessary again I'm taking nothing off

1035
00:40:14,979 --> 00:40:13,309
the table and we're not going to

1036
00:40:17,589 --> 00:40:14,989
compromise safety going back to a

1037
00:40:19,059 --> 00:40:17,599
previous question but the question is

1038
00:40:22,960 --> 00:40:19,069

what do we need to do and anything we

1039
00:40:24,579 --> 00:40:22,970
don't need to do we can delay there's

1040
00:40:26,410 --> 00:40:24,589
future launches there's future things we

1041
00:40:28,120 --> 00:40:26,420
can test but right now how do we get

1042
00:40:29,739 --> 00:40:28,130
boots on the moon in 2024 that's our

1043
00:40:31,599 --> 00:40:29,749
focus thanks for the question

1044
00:40:32,650 --> 00:40:31,609
great we're gonna take one more of the

1045
00:40:36,250 --> 00:40:32,660
online questions then we're

1046
00:40:37,960 --> 00:40:36,260
the audience besides SLS and Orion what

1047
00:40:40,120 --> 00:40:37,970
other critical hardware needs to be

1048
00:40:44,200 --> 00:40:40,130
designed built and tested for a lunar

1049
00:40:46,089 --> 00:40:44,210
mission the Gateway what are a plant is

1050
00:40:47,620 --> 00:40:46,099
it the Gateway what our plans building a

1051
00:40:49,480 --> 00:40:47,630
lunar lander

1052
00:40:52,450 --> 00:40:49,490
it seems we might need one of those

1053
00:40:54,430 --> 00:40:52,460
pretty soon yeah we might need a lander

1054
00:40:56,079 --> 00:40:54,440
pretty soon yes that is that is true

1055
00:40:57,370 --> 00:40:56,089
whoever said that you are correct in

1056
00:40:59,490 --> 00:40:57,380
fact if you could deliver one yesterday

1057
00:41:02,620 --> 00:40:59,500
I'd appreciate it

1058
00:41:04,559 --> 00:41:02,630
so what what other hardware needs to be

1059
00:41:06,970 --> 00:41:04,569
developed this is it I guess another

1060
00:41:08,289 --> 00:41:06,980
important point we're running out of

1061
00:41:10,140 --> 00:41:08,299
time and I can't let the clock get me

1062
00:41:12,839 --> 00:41:10,150
again

1063
00:41:14,770 --> 00:41:12,849

so we went through this exercise

1064
00:41:17,819 --> 00:41:14,780
commercially how do we get to the moon

1065
00:41:20,410 --> 00:41:17,829
what we learned is that it's possible

1066
00:41:22,420 --> 00:41:20,420
but it's not but it's going to take cost

1067
00:41:24,190 --> 00:41:22,430
it's going to take schedule that's going

1068
00:41:26,890 --> 00:41:24,200
to take a lot of testing and we're

1069
00:41:29,109 --> 00:41:26,900
looking at like a 2020 to 2023 kind of

1070
00:41:29,559 --> 00:41:29,119
timeframe to be able to insert at the

1071
00:41:32,410 --> 00:41:29,569
moon

1072
00:41:34,299 --> 00:41:32,420
commercially that that ultimately if we

1073
00:41:37,059 --> 00:41:34,309
if we do all of that and we're able to

1074
00:41:37,720 --> 00:41:37,069
insert around the moon in 2022 2023 it's

1075
00:41:39,819 --> 00:41:37,730
too late

1076
00:41:42,099 --> 00:41:39,829
so that needs to happen quite frankly in

1077
00:41:45,519 --> 00:41:42,109
parallel to what we're doing on SLS and

1078
00:41:48,579 --> 00:41:45,529
Orion and when we talk about SLS and

1079
00:41:51,309 --> 00:41:48,589
Orion there is nothing even commercially

1080
00:41:53,410 --> 00:41:51,319
that can insert into low lunar orbit

1081
00:41:54,910 --> 00:41:53,420
which is necessary for us to get some

1082
00:41:56,970 --> 00:41:54,920
kind of lander on the surface of the

1083
00:41:59,410 --> 00:41:56,980
Moon with humans

1084
00:42:01,299 --> 00:41:59,420
SLS with it was even with an exploration

1085
00:42:02,920 --> 00:42:01,309
upper stage doesn't get us to that low

1086
00:42:04,990 --> 00:42:02,930
lunar orbit what does that mean that

1087
00:42:07,510 --> 00:42:05,000
means we've got to get the hardware that

1088
00:42:09,339 --> 00:42:07,520

is that we're already working on whether

1089
00:42:10,720 --> 00:42:09,349
it's the power and propulsion element of

1090
00:42:12,760 --> 00:42:10,730
the Gateway whether it's a habitation

1091
00:42:16,660 --> 00:42:12,770
module a gateway we need to get those on

1092
00:42:18,730 --> 00:42:16,670
orbit very very rapidly and and and

1093
00:42:20,230 --> 00:42:18,740
guess what we're on schedule to do that

1094
00:42:23,140 --> 00:42:20,240
and we can do that so we get those

1095
00:42:25,870 --> 00:42:23,150
elements on orbit quickly then going

1096
00:42:28,870 --> 00:42:25,880
back to the questioners question we need

1097
00:42:31,660 --> 00:42:28,880
to have three separate stages to get to

1098
00:42:33,160 --> 00:42:31,670
the lunar surface from the Gateway well

1099
00:42:35,410 --> 00:42:33,170
again going back to why is the Gateway

1100
00:42:36,940 --> 00:42:35,420
important we don't have any hardware

1101
00:42:39,579 --> 00:42:36,950
right now that can get too low lunar

1102
00:42:41,079 --> 00:42:39,589
orbit apart from the Gateway so we need

1103
00:42:41,440 --> 00:42:41,089
a transfer vehicle attached to the

1104
00:42:43,960 --> 00:42:41,450
Gateway

1105
00:42:46,420 --> 00:42:43,970
we need a descent module attached to the

1106
00:42:50,500 --> 00:42:46,430
Gateway and when we launch crew

1107
00:42:54,960 --> 00:42:50,510
on SLS with Orion to the gateway we need

1108
00:42:58,930 --> 00:42:54,970
with them an ascent module by the way

1109
00:43:01,779 --> 00:42:58,940
Gerst is going to be so mad but all of

1110
00:43:04,059 --> 00:43:01,789
this right now is in the we're looking

1111
00:43:06,549 --> 00:43:04,069
at it for what is possible to put humans

1112
00:43:08,769 --> 00:43:06,559
on the moon in 2024 I'm not suggesting

1113
00:43:10,750 --> 00:43:08,779

that there are not holes here the

1114
00:43:12,400 --> 00:43:10,760
reality is we're moving quickly and

1115
00:43:14,950 --> 00:43:12,410
we're looking at all options and there

1116
00:43:17,710 --> 00:43:14,960
is nothing off the table so when we when

1117
00:43:19,599 --> 00:43:17,720
we do this we need to have the gateway

1118
00:43:21,309 --> 00:43:19,609
with a transfer vehicle that can get us

1119
00:43:23,680 --> 00:43:21,319
to low lunar and we need to have a

1120
00:43:26,019 --> 00:43:23,690
descent module and a nascent module all

1121
00:43:27,579 --> 00:43:26,029
of that needs to be launched and put in

1122
00:43:29,200 --> 00:43:27,589
place around the moon I told Gerst I was

1123
00:43:31,299 --> 00:43:29,210
like here's what we need to do we're in

1124
00:43:33,010 --> 00:43:31,309
a meeting just the other day I said we

1125
00:43:34,450 --> 00:43:33,020
need it we need to get an a set module

1126
00:43:35,289 --> 00:43:34,460
built quickly and we need to get it on

1127
00:43:37,390 --> 00:43:35,299
the surface and we need to get a

1128
00:43:38,740 --> 00:43:37,400
pre-positioned on the moon and he said

1129
00:43:40,809 --> 00:43:38,750
we've already got that plan it's called

1130
00:43:43,779 --> 00:43:40,819
the Gateway it will be pre positioned on

1131
00:43:45,849 --> 00:43:43,789
the Gateway this is evidence that this

1132
00:43:47,589 --> 00:43:45,859
reusable command and service module is

1133
00:43:49,480 --> 00:43:47,599
the right architecture first not as not

1134
00:43:52,359 --> 00:43:49,490
just sustainability but also for speed

1135
00:43:53,589 --> 00:43:52,369
you've got to have both sustainability

1136
00:43:56,109 --> 00:43:53,599
so that this time when we go to the moon

1137
00:43:58,569 --> 00:43:56,119
we can actually stay and speed we need

1138
00:43:59,920 --> 00:43:58,579

to get there in 2024 and we have the

1139
00:44:02,589 --> 00:43:59,930
right architecture right now to

1140
00:44:04,029 --> 00:44:02,599
accomplish that now certain things are

1141
00:44:06,370 --> 00:44:04,039
going to have to be discovered

1142
00:44:07,990 --> 00:44:06,380
and I get that we're not building the

1143
00:44:10,150 --> 00:44:08,000
International Space Station around the

1144
00:44:11,769 --> 00:44:10,160
moon as many people would love to do

1145
00:44:13,599 --> 00:44:11,779
that's not what we're doing here the

1146
00:44:15,789 --> 00:44:13,609
Gateway has a purpose what is its

1147
00:44:17,170 --> 00:44:15,799
purpose right now speed we want to get

1148
00:44:18,609 --> 00:44:17,180
to the surface of the Moon as soon as

1149
00:44:20,890 --> 00:44:18,619
possible we need that ascent module

1150
00:44:23,260 --> 00:44:20,900
quickly and by the way we can leverage

1151
00:44:25,779 --> 00:44:23,270
existing hardware for transfer vehicles

1152
00:44:29,200 --> 00:44:25,789
and descent modules descent modules we

1153
00:44:31,000 --> 00:44:29,210
can use existing hardware but I'm not

1154
00:44:32,529 --> 00:44:31,010
taking off the table any broad area

1155
00:44:33,700 --> 00:44:32,539
announcement or any kind of commercial

1156
00:44:36,010 --> 00:44:33,710
partnership that can help accelerate

1157
00:44:38,559 --> 00:44:36,020
either one of those nothing right now is

1158
00:44:41,620 --> 00:44:38,569
off the table but we've got to go fast

1159
00:44:44,140 --> 00:44:41,630
if we're gonna land in 2024 we've got to

1160
00:44:46,630 --> 00:44:44,150
be under contract very very soon and

1161
00:44:49,089 --> 00:44:46,640
that's that that is just the ground

1162
00:44:50,799 --> 00:44:49,099
truth reality of what we're up against

1163
00:44:54,809 --> 00:44:50,809

great we'll take a question from the

1164
00:44:58,150 --> 00:44:57,309
hi Margaret Roberts I'm in the legal

1165
00:44:59,800 --> 00:44:58,160
office hey Margaret

1166
00:45:01,030 --> 00:44:59,810
um when we're thinking about boots on

1167
00:45:03,940 --> 00:45:01,040
the ground I'm just wondering with the

1168
00:45:05,550 --> 00:45:03,950
crew that we would see be two people is

1169
00:45:08,200 --> 00:45:05,560
that what we would see and then also

1170
00:45:10,839 --> 00:45:08,210
with the vice president's direction

1171
00:45:12,609 --> 00:45:10,849
allow for two women ha ha not a man and

1172
00:45:18,910 --> 00:45:12,619
would we have are we designing suits

1173
00:45:22,390 --> 00:45:18,920
that are small so it'd be twins there

1174
00:45:24,849 --> 00:45:22,400
you go number one there are different

1175
00:45:28,089 --> 00:45:24,859
architectures that we have been kicking

1176
00:45:29,650 --> 00:45:28,099
around for the last week and it is true

1177
00:45:31,870 --> 00:45:29,660
that one of those architectures could be

1178
00:45:34,480 --> 00:45:31,880
a two-person descent module and a

1179
00:45:36,130 --> 00:45:34,490
two-person ascent module at the at the

1180
00:45:37,930 --> 00:45:36,140
end of the day the goal here is a

1181
00:45:39,160 --> 00:45:37,940
sustainable return to the moon where we

1182
00:45:39,760 --> 00:45:39,170
can get two more parts of the moon than

1183
00:45:41,920 --> 00:45:39,770
ever before

1184
00:45:43,660 --> 00:45:41,930
I honestly like a two-person module

1185
00:45:45,010 --> 00:45:43,670
because then you can send two people to

1186
00:45:46,180 --> 00:45:45,020
one side of the moon and two people to

1187
00:45:47,589 --> 00:45:46,190
the other side of the Moon and have

1188
00:45:50,500 --> 00:45:47,599

multiple missions going on at the same

1189
00:45:52,839 --> 00:45:50,510
time again the Gateway being that

1190
00:45:54,700 --> 00:45:52,849
reusable command and service module that

1191
00:45:56,650 --> 00:45:54,710
it is enables us to do those kind of

1192
00:46:00,430 --> 00:45:56,660
activities that before we're not even

1193
00:46:03,339 --> 00:46:00,440
imagined so that's a positive thing but

1194
00:46:04,809 --> 00:46:03,349
again we're assessing what do we need to

1195
00:46:07,620 --> 00:46:04,819
do to get humans on the surface of the

1196
00:46:09,550 --> 00:46:07,630
Moon soonest I think that two-person

1197
00:46:11,829 --> 00:46:09,560
ascent module might be the right

1198
00:46:13,210 --> 00:46:11,839
solution but if other people have

1199
00:46:15,300 --> 00:46:13,220
different ideas on how to go faster

1200
00:46:18,339 --> 00:46:15,310
we'll certainly look at that as far as

1201
00:46:20,589 --> 00:46:18,349
suits the answer is absolutely the vice

1202
00:46:21,790 --> 00:46:20,599
president was clear the next man and the

1203
00:46:23,230 --> 00:46:21,800
first woman on the moon will be the

1204
00:46:25,329 --> 00:46:23,240
United States from the United States of

1205
00:46:30,000 --> 00:46:25,339
America and we will build everything

1206
00:46:34,000 --> 00:46:30,010
according to making that a reality yep

1207
00:46:36,490 --> 00:46:34,010
great so another one of the more popular

1208
00:46:38,530 --> 00:46:36,500
questions we have online over the past

1209
00:46:40,780 --> 00:46:38,540
15 years the agency has been directed to

1210
00:46:42,760 --> 00:46:40,790
go to the Mars then the moon then an

1211
00:46:44,920 --> 00:46:42,770
asteroid in the asteroid around the moon

1212
00:46:47,140 --> 00:46:44,930
then Mars then the space station around

1213
00:46:49,630 --> 00:46:47,150

the moon and now the moon again what

1214
00:46:51,910 --> 00:46:49,640
steps do you plan to take to reduce the

1215
00:46:53,410 --> 00:46:51,920
programmatic whiplash that takes us from

1216
00:46:56,079 --> 00:46:53,420
actually accomplishing any of these

1217
00:46:58,030 --> 00:46:56,089
grand plans what assurances can be given

1218
00:47:00,250 --> 00:46:58,040
that this plan for lunar return will

1219
00:47:02,920 --> 00:47:00,260
survive a change in ministration after

1220
00:47:05,260 --> 00:47:02,930
the 2020 election how can we protect our

1221
00:47:07,960 --> 00:47:05,270
long-term human spaceflight spaceflight

1222
00:47:11,100 --> 00:47:07,970
plans from rapid changes like these

1223
00:47:13,390 --> 00:47:11,110
oh man a lot in there so the answer is

1224
00:47:14,800 --> 00:47:13,400
one of the things that I did when I was

1225
00:47:16,270 --> 00:47:14,810
in the House of Representatives as we

1226
00:47:18,400 --> 00:47:16,280
voted on the NASA transition

1227
00:47:20,920 --> 00:47:18,410
Authorization Act which made sure that

1228
00:47:22,390 --> 00:47:20,930
we kept a constancy of purpose going

1229
00:47:24,550 --> 00:47:22,400
from what administration in the next

1230
00:47:25,900 --> 00:47:24,560
administration so Congress has a role to

1231
00:47:29,770 --> 00:47:25,910
play here that has been very successful

1232
00:47:31,540 --> 00:47:29,780
in the past it hasn't always Congress

1233
00:47:32,950 --> 00:47:31,550
hasn't always been successful in doing

1234
00:47:34,720 --> 00:47:32,960
that but in this particular case there

1235
00:47:36,460 --> 00:47:34,730
was bipartisan support for keeping a

1236
00:47:38,110 --> 00:47:36,470
continuity of purpose and because of

1237
00:47:40,900 --> 00:47:38,120
that we now have these options available

1238
00:47:43,960 --> 00:47:40,910

to us but this questioner is exactly

1239
00:47:45,370 --> 00:47:43,970
right if we throw out all of the things

1240
00:47:47,170 --> 00:47:45,380
that we're doing right now and start

1241
00:47:48,850 --> 00:47:47,180
with a clean slate number one we're

1242
00:47:50,590 --> 00:47:48,860
never going to get to the moon in 2024

1243
00:47:52,810 --> 00:47:50,600
and number two it won't be sustainable

1244
00:47:56,320 --> 00:47:52,820
which are the two objectives right now

1245
00:47:57,760 --> 00:47:56,330
so Congress has a role to play here but

1246
00:48:00,520 --> 00:47:57,770
I think the other thing that's important

1247
00:48:01,900 --> 00:48:00,530
is when you have administration support

1248
00:48:03,580 --> 00:48:01,910
that is saying this is going to be

1249
00:48:05,830 --> 00:48:03,590
accomplished potentially while we are

1250
00:48:07,600 --> 00:48:05,840
still in office that's the level of

1251
00:48:08,080 --> 00:48:07,610
certainty that has not existed in the

1252
00:48:10,870 --> 00:48:08,090
past

1253
00:48:13,750 --> 00:48:10,880
I will also say that this is not a

1254
00:48:16,630 --> 00:48:13,760
political or a partisan thing at all

1255
00:48:18,580 --> 00:48:16,640
you know the people people say you know

1256
00:48:20,260 --> 00:48:18,590
John F Kennedy got us to the moon well

1257
00:48:21,760 --> 00:48:20,270
it's Richard Nixon's name on that plate

1258
00:48:23,200 --> 00:48:21,770
on the surface the moon because he was

1259
00:48:26,590 --> 00:48:23,210
in office when the event actually

1260
00:48:28,300 --> 00:48:26,600
happened so the this is not political

1261
00:48:30,070 --> 00:48:28,310
partisan this is about achieving

1262
00:48:32,380 --> 00:48:30,080
something and having people held

1263
00:48:34,060 --> 00:48:32,390

accountable to those achievements during

1264
00:48:36,250 --> 00:48:34,070
the time in which they serve including

1265
00:48:38,830 --> 00:48:36,260
me guys that's on me right I have to

1266
00:48:40,090 --> 00:48:38,840
achieve this we as an agency have to

1267
00:48:44,260 --> 00:48:40,100
achieve this and I think it's good

1268
00:48:46,240 --> 00:48:44,270
leadership so I think I don't think

1269
00:48:48,250 --> 00:48:46,250
we're going to be cast to and fro on

1270
00:48:50,920 --> 00:48:48,260
this one I think we're gonna go to the

1271
00:48:53,920 --> 00:48:50,930
moon in 2024 and by the way we talked

1272
00:48:56,050 --> 00:48:53,930
about bipartisan support we have to have

1273
00:48:58,060 --> 00:48:56,060
it this can't be this can't be a

1274
00:48:59,920 --> 00:48:58,070
one-party only kind of agenda and I'll

1275
00:49:02,830 --> 00:48:59,930
tell you why because when you think

1276
00:49:04,450 --> 00:49:02,840
about the budgets coming up there's a

1277
00:49:06,760 --> 00:49:04,460
high probability that we're going to end

1278
00:49:07,900 --> 00:49:06,770
up in a continuing resolution and if we

1279
00:49:09,820 --> 00:49:07,910
end up in a continuing resolution it

1280
00:49:11,410 --> 00:49:09,830
makes it very difficult to achieve what

1281
00:49:14,170 --> 00:49:11,420
we're trying to achieve we can't get a

1282
00:49:16,120 --> 00:49:14,180
new asset module under a continuing

1283
00:49:18,100 --> 00:49:16,130
resolution we can't get a descent module

1284
00:49:19,180 --> 00:49:18,110
under a continue we can't get to the

1285
00:49:21,290 --> 00:49:19,190
surface of the Moon under a continuing

1286
00:49:23,840 --> 00:49:21,300
resolution which means we have to

1287
00:49:25,550 --> 00:49:23,850
as an agency and an anomaly to the

1288
00:49:27,770 --> 00:49:25,560

1289
00:49:29,900 --> 00:49:27,780
bill well that anomaly needs bipartisan

1290
00:49:32,200 --> 00:49:29,910
support or it's not going to pass this

1291
00:49:35,000 --> 00:49:32,210
is not a partisan or a political thing

1292
00:49:36,500 --> 00:49:35,010
nobody knows what the what the world is

1293
00:49:38,420 --> 00:49:36,510
going to look like in 2024

1294
00:49:40,880 --> 00:49:38,430
all we know is that we have an agenda to

1295
00:49:42,470 --> 00:49:40,890
get to the moon in 2024 right we have

1296
00:49:49,370 --> 00:49:42,480
time for one more question anyone from

1297
00:49:50,600 --> 00:49:49,380
the audience I think you've done such a

1298
00:49:53,810 --> 00:49:50,610
great job you've answered everyone's

1299
00:49:55,340 --> 00:49:53,820
question well we have lots of questions

1300
00:49:57,590 --> 00:49:55,350
online here's one

1301
00:50:00,320 --> 00:49:57,600
besides being given the mandate to just

1302
00:50:02,030 --> 00:50:00,330
go to the moon or what are the goals for

1303
00:50:04,820 --> 00:50:02,040
the first crew that lands there to

1304
00:50:07,790 --> 00:50:04,830
accomplish on the lunar surface okay so

1305
00:50:09,730 --> 00:50:07,800
we go to the moon for a number of

1306
00:50:11,990 --> 00:50:09,740
reasons number one we need to prove

1307
00:50:13,610 --> 00:50:12,000
technology we need to retire risk we

1308
00:50:15,290 --> 00:50:13,620
need to build the capabilities

1309
00:50:17,480 --> 00:50:15,300
ultimately to go to Mars the moon is the

1310
00:50:19,180 --> 00:50:17,490
proving ground so it's a technology

1311
00:50:21,830 --> 00:50:19,190
demonstration it's a technology

1312
00:50:24,080 --> 00:50:21,840
development kind of mission to begin

1313
00:50:26,480 --> 00:50:24,090

with we also under space policy

1314
00:50:28,310 --> 00:50:26,490
directive one need to start utilizing

1315
00:50:30,170 --> 00:50:28,320
the resources of the moon namely the

1316
00:50:32,960 --> 00:50:30,180
water ice so we need to learn how to

1317
00:50:35,030 --> 00:50:32,970
live and work on another world that's

1318
00:50:36,260 --> 00:50:35,040
what the moon is all about why because

1319
00:50:37,760 --> 00:50:36,270
when we go to Mars you're going to be

1320
00:50:39,770 --> 00:50:37,770
there for two years because they're only

1321
00:50:42,620 --> 00:50:39,780
Mars is aligned on the same side of the

1322
00:50:44,840 --> 00:50:42,630
Sun as the earth once every 26 months

1323
00:50:47,180 --> 00:50:44,850
which means we have to when we go there

1324
00:50:51,080 --> 00:50:47,190
be ready to live and work there for a

1325
00:50:53,960 --> 00:50:51,090
period of time of two years so that puts

1326
00:50:55,940 --> 00:50:53,970
us in a position to utilize the moon as

1327
00:50:59,300 --> 00:50:55,950
this proving ground for an eventual

1328
00:51:00,470 --> 00:50:59,310
human spaceflight capability to Mars but

1329
00:51:03,460 --> 00:51:00,480
between now and then we need to

1330
00:51:06,680 --> 00:51:03,470
characterize the water ice and

1331
00:51:08,660 --> 00:51:06,690
ultimately achieve the the technology

1332
00:51:11,330 --> 00:51:08,670
demonstration and the establishment of

1333
00:51:13,460 --> 00:51:11,340
presence at the valuable port of the

1334
00:51:15,440 --> 00:51:13,470
valuable parts of the South Pole of the

1335
00:51:17,440 --> 00:51:15,450
moon you think about what what does that

1336
00:51:19,460 --> 00:51:17,450
mean establish presence there are key

1337
00:51:20,750 --> 00:51:19,470
areas of the South Pole of the moon that

1338
00:51:22,880 --> 00:51:20,760

are tremendously valuable those key

1339
00:51:25,340 --> 00:51:22,890
areas or where the volatiles are it's

1340
00:51:28,640 --> 00:51:25,350
where the water is but also the peaks of

1341
00:51:30,980 --> 00:51:28,650
eternal light areas where the Sun really

1342
00:51:33,200 --> 00:51:30,990
doesn't set because of the the craters

1343
00:51:35,059 --> 00:51:33,210
at the South Pole maybe it does set but

1344
00:51:36,620 --> 00:51:35,069
it sets for a very short period of time

1345
00:51:39,079 --> 00:51:36,630
it comes back up in other words you've

1346
00:51:41,630 --> 00:51:39,089
got solar power available for long

1347
00:51:43,219 --> 00:51:41,640
periods of time if not indefinitely so

1348
00:51:46,039 --> 00:51:43,229
you've got those cold traps that are the

1349
00:51:47,839 --> 00:51:46,049
craters with water ice and at the poles

1350
00:51:49,489 --> 00:51:47,849
those cold traps also have almost

1351
00:51:51,199 --> 00:51:49,499
permanent sunlight those are the

1352
00:51:52,699 --> 00:51:51,209
valuable regions of the Moon that we

1353
00:51:54,229 --> 00:51:52,709
need to get to and ultimately

1354
00:51:58,640 --> 00:51:54,239
establishing a presence there is a part

1355
00:52:00,469 --> 00:51:58,650
of this mission well I I know we've got

1356
00:52:04,099 --> 00:52:00,479
about a couple minutes left I just I

1357
00:52:07,339 --> 00:52:04,109
want to reiterate this is a big charge

1358
00:52:08,569 --> 00:52:07,349
and it comes straight from the top and

1359
00:52:11,420 --> 00:52:08,579
it's a once-in-a-lifetime opportunity

1360
00:52:12,979 --> 00:52:11,430
for all of us to achieve this and if we

1361
00:52:14,329 --> 00:52:12,989
can pull it off and I'm not saying if

1362
00:52:16,279 --> 00:52:14,339
when we pull it off it's gonna be

1363
00:52:18,140 --> 00:52:16,289

something that all of us can share with

1364
00:52:20,299 --> 00:52:18,150
our children and our grandchildren and

1365
00:52:21,890 --> 00:52:20,309
our great-grandchildren just like today

1366
00:52:23,599 --> 00:52:21,900
you don't know how many people I talked

1367
00:52:26,359 --> 00:52:23,609
to who are involved in the Apollo era in

1368
00:52:33,849 --> 00:52:26,369
fact some people even still here today

1369
00:52:36,259 --> 00:52:33,859
Kirsten Mayer just kidding just kidding

1370
00:52:40,160 --> 00:52:36,269
he's not gonna be happy with me after

1371
00:52:42,469 --> 00:52:40,170
this but but but this is this is a big

1372
00:52:44,569 --> 00:52:42,479
moment I think we need to embrace it we

1373
00:52:47,390 --> 00:52:44,579
need to go full force after this

1374
00:52:50,029 --> 00:52:47,400
objective with everything we have make

1375
00:52:52,999 --> 00:52:50,039
it a reality and and at the end I think

1376
00:52:54,319 --> 00:52:53,009
all of us are going to have an amazing

1377
00:52:56,449 --> 00:52:54,329
story to tell our children and our

1378
00:52:58,309 --> 00:52:56,459
grandchildren so thank you for all your

1379
00:52:59,930 --> 00:52:58,319
time today and I look forward to more

1380
00:53:01,390 --> 00:52:59,940
dialogue if you have more questions of

1381
00:53:03,799 --> 00:53:01,400
course you can send them to the

1382
00:53:05,539 --> 00:53:03,809
communications staff and we'll do what

1383
00:53:06,560 --> 00:53:05,549
we can to answer them so thank you so

1384
00:53:19,290 --> 00:53:06,570
much

1385
00:54:13,590 --> 00:54:11,960
[Music]