1
00:00:06,079 --> 00:00:04,370
good afternoon and thank you for joining

2
00:00:07,760 --> 00:00:06,089
us here at nasa's kennedy space center

3
00:00:09,290 --> 00:00:07,770
in florida for today's discussion on

4
00:00:11,150 --> 00:00:09,300
kennedy and the future of human space

5
00:00:12,830 --> 00:00:11,160
flight now that the space shuttles are

6
00:00:14,600 --> 00:00:12,840
taking their places in locations across

7
00:00:16,730 --> 00:00:14,610
the country joining us for the

8
00:00:20,230 --> 00:00:16,740
discussion today are Bob Cabana director

9
00:00:22,550 --> 00:00:20,240
of Kennedy Space Center bill Hill

10
00:00:25,390 --> 00:00:22,560
assistant deputy associate administrator

11
00:00:28,400 --> 00:00:25,400
for exploration systems development and

12
00:00:32,780 --> 00:00:28,410
Ed mango NASA's Commercial Crew program

13
00:00:34,850 --> 00:00:32,790

manager I'll turn it over to mr. Cuban

14
00:00:37,040 --> 00:00:34,860
thanks kendriya hey it's a real pleasure

15
00:00:38,660 --> 00:00:37,050
to be here today to talk about que SES

16
00:00:41,389 --> 00:00:38,670
future tomorrow we got a big event going

17
00:00:44,150 --> 00:00:41,399
on we're going to move Atlantis out of

18
00:00:47,090 --> 00:00:44,160
the VA be on it's a little over nine

19
00:00:48,410 --> 00:00:47,100
mile journey to its new facility at our

20
00:00:50,119 --> 00:00:48,420
visitor center and that is going to

21
00:00:52,220 --> 00:00:50,129
really be special we've got a number of

22
00:00:55,490 --> 00:00:52,230
events planned throughout the day but it

23
00:00:58,580 --> 00:00:55,500
finally brings finality to our shuttle

24
00:01:01,369 --> 00:00:58,590
program phenomenal 30-year history in

25
00:01:04,009 --> 00:01:01,379
that program and it accomplished a great

26
00:01:06,679 --> 00:01:04,019
deal but we have not been standing still

27
00:01:08,660 --> 00:01:06,689
for the last year and I think with the

28
00:01:10,820 --> 00:01:08,670
end of the shuttle program now being

29
00:01:14,000 --> 00:01:10,830
marked with Atlantis moving it to its

30
00:01:16,460 --> 00:01:14,010
new facility we have been focused on the

31
00:01:18,649 --> 00:01:16,470
future for more than a year we've gotten

32
00:01:21,469 --> 00:01:18,659
commercial cargo to the International

33
00:01:24,530 --> 00:01:21,479
Space Station and we have focused on

34
00:01:26,420 --> 00:01:24,540
what it takes to explore beyond our home

35
00:01:29,060 --> 00:01:26,430
planet once again and prepare these

36
00:01:30,859 --> 00:01:29,070
facilities to truly be that that multi

37
00:01:33,530 --> 00:01:30,869
user space board of the future what was

38
00:01:36,859 --> 00:01:33,540

once science fiction making it reality

39
00:01:38,929 --> 00:01:36,869
for both Commercial Crew and cargo and

40
00:01:41,810 --> 00:01:38,939
government crew and cargo to low-earth

41
00:01:43,160 --> 00:01:41,820
orbit and Beyond so I think it'll be fun

42
00:01:44,749 --> 00:01:43,170
this afternoon to talk a little bit

43
00:01:47,480 --> 00:01:44,759
about that talk about where we're going

44
00:01:49,910 --> 00:01:47,490
and the great strides that we've made in

45
00:01:52,789 --> 00:01:49,920
this last year with that I'm going to

46
00:01:54,050 --> 00:01:52,799
turn it over to Bill hill and he can

47
00:01:55,940 --> 00:01:54,060
talk a little bit about NASA

48
00:01:58,370 --> 00:01:55,950
headquarters perspective on all of this

49
00:02:01,760 --> 00:01:58,380
yeah thank you I appreciate being here

50
00:02:04,190 --> 00:02:01,770
this afternoon we had a really good Evie

51
00:02:05,780 --> 00:02:04,200
aid this morning just to let you know

52
00:02:09,229 --> 00:02:05,790
that the station is still up and running

53
00:02:12,680 --> 00:02:09,239
we're doing 35 hours plus research a

54
00:02:13,430 --> 00:02:12,690
week which is which is our gold standard

55
00:02:18,490 --> 00:02:13,440
for

56
00:02:21,860 --> 00:02:18,500
really well on station we're back up to

57
00:02:25,490 --> 00:02:21,870
krula six we occasionally go to three

58
00:02:28,880 --> 00:02:25,500
but we're planning you know obviously to

59
00:02:31,250 --> 00:02:28,890
keep the station going for another eight

60
00:02:34,250 --> 00:02:31,260
years or so and hopefully well beyond

61
00:02:35,570 --> 00:02:34,260
that we'll see how we do there we're

62
00:02:39,470 --> 00:02:35,580
working the exploration systems

63
00:02:41,150 --> 00:02:39,480

development programs ground systems

64
00:02:44,480 --> 00:02:41,160
development and operations down here

65
00:02:47,510 --> 00:02:44,490
making great progress in in preparing

66
00:02:50,300 --> 00:02:47,520
this facility to launch the exploration

67
00:02:53,210 --> 00:02:50,310
our lunch the Space Launch System and

68
00:02:56,630 --> 00:02:53,220
Orion which we're shooting for in

69
00:02:59,780 --> 00:02:56,640
December of 2017 that's our target

70
00:03:06,440 --> 00:02:59,790
launch we're going to do a flight test

71
00:03:09,290 --> 00:03:06,450
of Orion in 2014 off of LC 30 or I'm

72
00:03:12,290 --> 00:03:09,300
sorry LC 41 over here on a Delta Phi

73
00:03:13,880 --> 00:03:12,300
Delta for heavy we're going to test out

74
00:03:16,700 --> 00:03:13,890
the heat shield there and we're making

75
00:03:20,660 --> 00:03:16,710
progress there in the ONC that vehicle

76
00:03:22,990 --> 00:03:20,670
is being assembled today we should be

77
00:03:26,030 --> 00:03:23,000
proof presser proof pressure testing the

78
00:03:27,800 --> 00:03:26,040
the command module sometime this week if

79
00:03:29,690 --> 00:03:27,810
we haven't done it already so we're

80
00:03:32,570 --> 00:03:29,700
making a lot of progress there and we're

81
00:03:36,050 --> 00:03:32,580
getting ready to go into the preliminary

82
00:03:37,910 --> 00:03:36,060
design review for the SLS later this

83
00:03:40,699 --> 00:03:37,920
year and have that complete by the end

84
00:03:42,290 --> 00:03:40,709
of the calendar year we're doing other

85
00:03:44,780 --> 00:03:42,300
things it's going to talk about

86
00:03:46,250 --> 00:03:44,790
Commercial Crew and cargo we're making

87
00:03:49,640 --> 00:03:46,260
great strides there and bringing those

88
00:03:54,190 --> 00:03:49,650

partners on onboard we also have our

89
00:03:57,850 --> 00:03:54,200
launch services who are planning the

90
00:04:01,070 --> 00:03:57,860
launch of science payloads and

91
00:04:03,500 --> 00:04:01,080
spacecraft so we're really doing well

92
00:04:05,600 --> 00:04:03,510
the biggest message is human spaceflight

93
00:04:07,490 --> 00:04:05,610
is not dead with rolling Atlantis to the

94
00:04:08,660 --> 00:04:07,500
visitor center we're doing a lot of

95
00:04:13,160 --> 00:04:08,670
things we're planning for the future

96
00:04:14,810 --> 00:04:13,170
we're flying every day up on station and

97
00:04:17,320 --> 00:04:14,820
making a lot of good progress air and

98
00:04:20,150 --> 00:04:17,330
with that I'll turn it over to add

99
00:04:22,760 --> 00:04:20,160
thinks I'm glad that a station is doing

100
00:04:24,230 --> 00:04:22,770
well we are going to build a with our

101
00:04:25,670 --> 00:04:24,240
partners in industry we're going to

102
00:04:26,310 --> 00:04:25,680
build a capability to get that

103
00:04:28,860 --> 00:04:26,320
international

104
00:04:31,020 --> 00:04:28,870
Space Station and hopefully we'll do

105
00:04:33,150 --> 00:04:31,030
that in the next couple years The

106
00:04:37,290 --> 00:04:33,160
Commercial Crew program is is between

107
00:04:39,750 --> 00:04:37,300
here and JSC and it's really our NASA

108
00:04:43,530 --> 00:04:39,760
efforts in order to develop a u.s.

109
00:04:45,150 --> 00:04:43,540
capability that's safe reliable and

110
00:04:48,120 --> 00:04:45,160
cost-effective for access to low-earth

111
00:04:51,360 --> 00:04:48,130
orbit and annoying and doing so we

112
00:04:53,490 --> 00:04:51,370
really are creating two capabilities one

113
00:04:55,620 --> 00:04:53,500

is a public purpose in which we're

114
00:04:58,140 --> 00:04:55,630
trying to help industry create a

115
00:04:59,910 --> 00:04:58,150
capability so that it go anywhere on the

116
00:05:01,650 --> 00:04:59,920
earth orbit and really create business

117
00:05:03,810 --> 00:05:01,660
in low-earth orbit for the entire planet

118
00:05:06,480 --> 00:05:03,820
to use that is led by the United States

119
00:05:08,130 --> 00:05:06,490
the second is a NASA purpose we need to

120
00:05:10,230 --> 00:05:08,140
come visit the space station as often as

121
00:05:12,060 --> 00:05:10,240
possible bring our scientists than our

122
00:05:14,430 --> 00:05:12,070
astronauts and engineers up to the space

123
00:05:15,960 --> 00:05:14,440
station and get them home safely and so

124
00:05:17,660 --> 00:05:15,970
that's the second part of our overall

125
00:05:20,970 --> 00:05:17,670
purpose of the Commercial Crew program

126
00:05:23,880 --> 00:05:20,980
as you know we awarded I cap we called

127
00:05:25,560 --> 00:05:23,890
CCI cap back in August all three

128
00:05:27,240 --> 00:05:25,570
partners we have an I Kapoor doing

129
00:05:30,900 --> 00:05:27,250
outstanding their meeting our milestones

130
00:05:32,850 --> 00:05:30,910
really on time this past week there

131
00:05:34,770 --> 00:05:32,860
isn't anything slow about Commercial

132
00:05:36,960 --> 00:05:34,780
Crew this past week we really had three

133
00:05:38,580 --> 00:05:36,970
milestones with each of the partners so

134
00:05:40,260 --> 00:05:38,590
my team was spread out throughout the

135
00:05:42,630 --> 00:05:40,270
country and I would have to say that

136
00:05:44,670 --> 00:05:42,640
there's a program that is working all

137
00:05:48,390 --> 00:05:44,680
corners of the nation its commercial

138
00:05:50,490 --> 00:05:48,400

crew right now we did a made a review in

139
00:05:52,890 --> 00:05:50,500
space X out in LA just a few days ago

140
00:05:55,350 --> 00:05:52,900
which was their requirements review for

141
00:05:56,910 --> 00:05:55,360
their integrated system an outstanding

142
00:05:58,830 --> 00:05:56,920
review and we're following on with a

143
00:06:00,740 --> 00:05:58,840
number of meetings with an engineer's

144
00:06:04,050 --> 00:06:00,750
both this weekend or next couple weeks

145
00:06:05,970 --> 00:06:04,060
Sierra Nevada out in Colorado also had

146
00:06:07,950 --> 00:06:05,980
their review on her baseline design for

147
00:06:09,840 --> 00:06:07,960
an integrated system not just their

148
00:06:12,050 --> 00:06:09,850
dream chaser but also how they plan to

149
00:06:14,250 --> 00:06:12,060
use that with our atlas 5 vehicle

150
00:06:15,930 --> 00:06:14,260
outstanding effort there a three day

151
00:06:17,460 --> 00:06:15,940
review that went into great details

152
00:06:20,310 --> 00:06:17,470
about how they're moving forward with

153
00:06:22,530 --> 00:06:20,320
their design and boeing had a production

154
00:06:24,150 --> 00:06:22,540
design review not too long ago and this

155
00:06:26,160 --> 00:06:24,160
week they finished out that review and

156
00:06:28,590 --> 00:06:26,170
completed that milestone of how they

157
00:06:30,060 --> 00:06:28,600
plan to build their vehicle the steps it

158
00:06:31,050 --> 00:06:30,070
is going to take to build their vehicle

159
00:06:32,640 --> 00:06:31,060
and the steps is going to take to

160
00:06:35,340 --> 00:06:32,650
integrate it with their launch vehicle

161
00:06:36,600 --> 00:06:35,350
which is also an ALICE right now Boeing

162
00:06:38,170 --> 00:06:36,610
plans to build that vehicle right here

163
00:06:39,370 --> 00:06:38,180

at Kennedy Space Center

164
00:06:41,050 --> 00:06:39,380
and plans to build a couple of those

165
00:06:44,379 --> 00:06:41,060
vehicles not just for the NASA business

166
00:06:47,590 --> 00:06:44,389
but like I said also for capability to

167
00:06:50,529 --> 00:06:47,600
move other folks into low-earth orbit

168
00:06:51,999 --> 00:06:50,539
and do other science so space is moving

169
00:06:54,520 --> 00:06:52,009
forward human spaceflights moving

170
00:06:56,439 --> 00:06:54,530
forward with all those activities we

171
00:06:58,480 --> 00:06:56,449
also have a contract under solicitation

172
00:07:00,310 --> 00:06:58,490
today and we plan a war data in February

173
00:07:02,140 --> 00:07:00,320
of next year and that is really to get

174
00:07:04,629 --> 00:07:02,150
into the details of what it takes to fly

175
00:07:06,760 --> 00:07:04,639
NASA astronauts on any vehicle that

176
00:07:11,230 --> 00:07:06,770
might want to be designed in order to

177
00:07:13,960 --> 00:07:11,240
carry crew to the ISS capability overall

178
00:07:16,510 --> 00:07:13,970
we plan to start flight testing in 2014

179
00:07:19,270 --> 00:07:16,520
timeframe in fact under I cap one of our

180
00:07:20,860 --> 00:07:19,280
partners is going to fly to vehicle two

181
00:07:22,779 --> 00:07:20,870
launches right from here at the cape and

182
00:07:24,960 --> 00:07:22,789
when other partners are going to fly

183
00:07:27,070 --> 00:07:24,970
sierra de is going to fly a number of

184
00:07:29,710 --> 00:07:27,080
test flights out of Edwards Air Force

185
00:07:33,100 --> 00:07:29,720
bases landing as a landing capability to

186
00:07:37,330 --> 00:07:33,110
prove their their their vehicle command

187
00:07:38,890 --> 00:07:37,340
safely and all that will begin over the

188
00:07:40,870 --> 00:07:38,900

next couple years and we'll do real

189
00:07:42,370 --> 00:07:40,880
flight testing of complete systems in

190
00:07:44,620 --> 00:07:42,380
the twenty fourteen to twenty sixteen

191
00:07:47,740 --> 00:07:44,630
timeframe and then hopefully flight crew

192
00:07:50,170 --> 00:07:47,750
certified by NASA the flight crew in the

193
00:07:52,149 --> 00:07:50,180
middle of 2017 that's our plan and we

194
00:07:54,689 --> 00:07:52,159
are really on track to to meet that

195
00:07:57,580 --> 00:07:54,699
planners to go forward so even with

196
00:08:00,189 --> 00:07:57,590
Atlantis now rolling over to its new

197
00:08:02,589 --> 00:08:00,199
location it is certainly not the end of

198
00:08:04,390 --> 00:08:02,599
human spaceflight it is a change in

199
00:08:06,670 --> 00:08:04,400
chapter of which Commercial Crew is just

200
00:08:09,010 --> 00:08:06,680
a piece of the overall change the United

201
00:08:11,980 --> 00:08:09,020
States is making towards exploration and

202
00:08:14,409 --> 00:08:11,990
low Earth orbit and far beyond thank you

203
00:08:16,659 --> 00:08:14,419
first questions for Bob can you tell us

204
00:08:18,580 --> 00:08:16,669
a little bit about the changes that have

205
00:08:20,439 --> 00:08:18,590
been taking place here at Kennedy and to

206
00:08:23,379 --> 00:08:20,449
support future launches I think the most

207
00:08:26,140 --> 00:08:23,389
visible changes here at launch complex

208
00:08:27,850 --> 00:08:26,150
39 if you look out at the pads pad B is

209
00:08:29,980 --> 00:08:27,860
totally different from patty all the

210
00:08:32,800 --> 00:08:29,990
shuttle infrastructure is gone we've

211
00:08:36,069 --> 00:08:32,810
been working diligently to bring it up

212
00:08:38,409 --> 00:08:36,079
to speed to support a new clean pad

213
00:08:40,360 --> 00:08:38,419

concept with a mobile launcher that is

214
00:08:41,649 --> 00:08:40,370
specific to a rocket where you could

215
00:08:43,959 --> 00:08:41,659
have multiple mobile launchers for

216
00:08:45,400 --> 00:08:43,969
different Rockets rolling out there now

217
00:08:48,370 --> 00:08:45,410
that that's a long ways down the road

218
00:08:50,470 --> 00:08:48,380
but right now we're making it suitable

219
00:08:51,870 --> 00:08:50,480
for the Space Launch System and I've

220
00:08:53,520 --> 00:08:51,880
promised

221
00:08:57,360 --> 00:08:53,530
mr. Hill here and and bill Gerstenmaier

222
00:08:59,550 --> 00:08:57,370
that KSC will not be the reason that we

223
00:09:01,980 --> 00:08:59,560
don't launch on time in 2017 will have a

224
00:09:03,870 --> 00:09:01,990
quality product on time and within

225
00:09:06,060 --> 00:09:03,880
budget and we've made huge progress

226
00:09:07,470 --> 00:09:06,070
towards that out there at the pad

227
00:09:09,510 --> 00:09:07,480
there's a state-of-the-art lightning

228
00:09:12,480 --> 00:09:09,520
protection system refurbished propellant

229
00:09:15,240 --> 00:09:12,490
distribution systems digital controls

230
00:09:18,860 --> 00:09:15,250
that the pad fiber optics going back to

231
00:09:21,930 --> 00:09:18,870
a newly refurbished firing control room

232
00:09:25,230 --> 00:09:21,940
firing control room one totally updated

233
00:09:27,810 --> 00:09:25,240
and it can be modified again to support

234
00:09:30,510 --> 00:09:27,820
multiple customers much more efficiently

235
00:09:32,730 --> 00:09:30,520
and I think of all the things you know

236
00:09:34,290 --> 00:09:32,740
we've seen this transition coming since

237
00:09:36,180 --> 00:09:34,300
the day I got here four years ago we

238
00:09:38,100 --> 00:09:36,190

have been focused on what do we need to

239
00:09:40,530 --> 00:09:38,110
do to take care of the workforce as best

240
00:09:42,840 --> 00:09:40,540
we can and to put NASA and our nation in

241
00:09:46,020 --> 00:09:42,850
the best position to support the future

242
00:09:48,660 --> 00:09:46,030
and future exploration I think it's

243
00:09:50,790 --> 00:09:48,670
right to turn low-earth orbit over to

244
00:09:53,640 --> 00:09:50,800
commercial operations and his team are

245
00:09:55,980 --> 00:09:53,650
doing a fantastic job working through

246
00:09:59,400 --> 00:09:55,990
the space act agreement process and

247
00:10:01,770 --> 00:09:59,410
eventually to a contract to get someone

248
00:10:04,770 --> 00:10:01,780
that can fly us to the space station and

249
00:10:06,990 --> 00:10:04,780
then we are focusing on exploring beyond

250
00:10:08,670 --> 00:10:07,000
our home planet and it really is hard

251
00:10:11,820 --> 00:10:08,680
it's a huge challenge when you consider

252
00:10:13,800 --> 00:10:11,830
what's required to make that happen but

253
00:10:16,320 --> 00:10:13,810
the team has made tremendous progress

254
00:10:19,320 --> 00:10:16,330
for and I I mean we've turned the corner

255
00:10:22,590 --> 00:10:19,330
we are focused on the future in what it

256
00:10:25,830 --> 00:10:22,600
takes to make that happen in two really

257
00:10:27,990 --> 00:10:25,840
modify KSC you know more than just for

258
00:10:30,240 --> 00:10:28,000
heavy lift but to make it support

259
00:10:32,730 --> 00:10:30,250
multiple users both commercial and

260
00:10:35,760 --> 00:10:32,740
governments it would make great progress

261
00:10:37,710 --> 00:10:35,770
I gotta back up to Atlantis just one

262
00:10:39,600 --> 00:10:37,720
quick thing I think it's a you know I

263
00:10:41,090 --> 00:10:39,610

we've all followed where the shuttles

264
00:10:44,640 --> 00:10:41,100
have gone I mean it's gotten tremendous

265
00:10:46,350 --> 00:10:44,650
public interest and if you look at each

266
00:10:48,150 --> 00:10:46,360
one of them I mean each is being

267
00:10:50,070 --> 00:10:48,160
displayed in a unique way and I think

268
00:10:52,620 --> 00:10:50,080
it's really cool you got discovery that

269
00:10:54,840 --> 00:10:52,630
looks like it just rolled in to the

270
00:10:57,270 --> 00:10:54,850
hangar after coming off the runway and

271
00:10:58,950 --> 00:10:57,280
endeavour and its final configuration is

272
00:11:01,500 --> 00:10:58,960
going to look like it's ready ready to

273
00:11:04,790 --> 00:11:01,510
launch on a stack with a launch

274
00:11:06,079 --> 00:11:04,800
structure around it but Atlantis and I

275
00:11:08,480 --> 00:11:06,089
partial I think it's going to be the

276
00:11:09,889 --> 00:11:08,490
coolest here at KSC it's actually going

277
00:11:11,840 --> 00:11:09,899
to be mounted on a pedestal with the

278
00:11:14,600 --> 00:11:11,850
payload bay doors open so it looks like

279
00:11:19,579 --> 00:11:14,610
it's actually flying in space and I want

280
00:11:21,620 --> 00:11:19,589
to commend the the team here at KSC and

281
00:11:24,230 --> 00:11:21,630
our contractor civil service team in

282
00:11:26,600 --> 00:11:24,240
transition on the shuttles the care

283
00:11:29,090 --> 00:11:26,610
which they have shown those orbiters

284
00:11:32,150 --> 00:11:29,100
even in transition preparing them for

285
00:11:33,800 --> 00:11:32,160
the millions of people that are going to

286
00:11:35,980 --> 00:11:33,810
see him it was just like they were

287
00:11:40,100 --> 00:11:35,990
getting them ready to go fly in space a

288
00:11:42,680 --> 00:11:40,110

great care great concern doing the out

289
00:11:46,000 --> 00:11:42,690
scanning job that they do right up until

290
00:11:48,650 --> 00:11:46,010
the very end and you know even though

291
00:11:50,449 --> 00:11:48,660
we're not flying them anymore they're

292
00:11:52,160 --> 00:11:50,459
going to continue to tell their story

293
00:11:53,930 --> 00:11:52,170
there are millions of people that are

294
00:11:55,280 --> 00:11:53,940
going to be able to share in what we

295
00:11:56,990 --> 00:11:55,290
have accomplished and see them up close

296
00:11:59,000 --> 00:11:57,000
and personal I think that's really cool

297
00:12:00,800 --> 00:11:59,010
that is great and with the after 30

298
00:12:03,050 --> 00:12:00,810
years of shuttle experience and with

299
00:12:05,240 --> 00:12:03,060
Kennedy being ready for multicenter or

300
00:12:07,100 --> 00:12:05,250
multi users bill can you tell us a

301
00:12:09,380 --> 00:12:07,110
little bit about how Commercial Crew

302
00:12:11,780 --> 00:12:09,390
Orion and SLS kind of fit in the big or

303
00:12:13,850 --> 00:12:11,790
larger NASA exploration picture but

304
00:12:15,560 --> 00:12:13,860
we're looking at one of the activities

305
00:12:18,829 --> 00:12:15,570
we have under ground systems development

306
00:12:20,990 --> 00:12:18,839
operations is a activity called 21st

307
00:12:24,139 --> 00:12:21,000
century launch complex initiative and

308
00:12:26,389 --> 00:12:24,149
we're used applying those funds and

309
00:12:28,730 --> 00:12:26,399
those activities to try to make sure

310
00:12:32,510 --> 00:12:28,740
that we can have a multi-use facility

311
00:12:34,790 --> 00:12:32,520
here so we can do other commercial

312
00:12:36,290 --> 00:12:34,800
entities or even the Air Force is

313
00:12:39,260 --> 00:12:36,300

talking about coming here to do some

314
00:12:41,060 --> 00:12:39,270
launching strata launchers is looking at

315
00:12:42,980 --> 00:12:41,070
a potential of coming here so we're

316
00:12:46,400 --> 00:12:42,990
looking at a myriad of different launch

317
00:12:49,040 --> 00:12:46,410
capabilities launch processing

318
00:12:52,189 --> 00:12:49,050
capabilities and this will be the focal

319
00:12:54,380 --> 00:12:52,199
point I think for the distant future for

320
00:12:56,900 --> 00:12:54,390
human spaceflight both commercial and

321
00:13:00,079 --> 00:12:56,910
government sponsored or NASA sponsor

322
00:13:02,300 --> 00:13:00,089
absolutely i mean real estate just says

323
00:13:05,060 --> 00:13:02,310
yeah this is the place to come I mean

324
00:13:06,889 --> 00:13:05,070
we've got the real estate and we have

325
00:13:09,620 --> 00:13:06,899
the facilities and the technical

326
00:13:11,780 --> 00:13:09,630
expertise it makes que hacia a natural

327
00:13:13,370 --> 00:13:11,790
choice along those lines on 21st launch

328
00:13:14,689 --> 00:13:13,380
century we're also working with the Air

329
00:13:16,850 --> 00:13:14,699
Force in the range in the last two years

330
00:13:18,170 --> 00:13:16,860
we spent ten million dollars a year

331
00:13:23,360 --> 00:13:18,180
helping to improve

332
00:13:25,220 --> 00:13:23,370
the range that's great so with with the

333
00:13:26,389 --> 00:13:25,230
tooth prove the program's here we've got

334
00:13:28,639 --> 00:13:26,399
SLS and Orion it would obviously

335
00:13:29,930 --> 00:13:28,649
launched from kennedy ed could you tell

336
00:13:31,519 --> 00:13:29,940
us a little bit about what the launch

337
00:13:34,430 --> 00:13:31,529
services from commercial providers would

338
00:13:36,170 --> 00:13:34,440

be yeah oh yes it's very good for the

339
00:13:37,610 --> 00:13:36,180
Space Coast all three of our providers

340
00:13:42,320 --> 00:13:37,620
today are going to fly right here from

341
00:13:44,600 --> 00:13:42,330
the Space Coast either using today if

342
00:13:47,540 --> 00:13:44,610
these three partners continue either

343
00:13:51,139 --> 00:13:47,550
using a falcon 9 rocket of LC 40 or an

344
00:13:52,670 --> 00:13:51,149
atlas 5 today out of out of LC 41 and

345
00:13:55,280 --> 00:13:52,680
that's really for the early portion of

346
00:13:56,810 --> 00:13:55,290
the program as time goes on there might

347
00:13:58,699 --> 00:13:56,820
be other launch vehicles I want to get

348
00:14:00,889 --> 00:13:58,709
into the mix to try to launch crew as

349
00:14:02,540 --> 00:14:00,899
well and we'll work that with our

350
00:14:04,699 --> 00:14:02,550
partnerships so the good news is all

351
00:14:08,060 --> 00:14:04,709
three will be watching from here I

352
00:14:10,430 --> 00:14:08,070
believe that like I said if blowing

353
00:14:11,720 --> 00:14:10,440
continues all the way through they're

354
00:14:14,630 --> 00:14:11,730
going to end up building their vehicles

355
00:14:16,699 --> 00:14:14,640
here and I believe that both Sarah and

356
00:14:18,470 --> 00:14:16,709
SpaceX will be new in significant work

357
00:14:20,570 --> 00:14:18,480
here just like to do with the cargo

358
00:14:22,490 --> 00:14:20,580
version of Dragon there's a lot of

359
00:14:24,650 --> 00:14:22,500
experiments that could put together and

360
00:14:26,960 --> 00:14:24,660
get put in the dragon vehicle bore fort

361
00:14:29,240 --> 00:14:26,970
flies all that is done here and then of

362
00:14:30,590 --> 00:14:29,250
course the vehicle is is getting ready

363
00:14:32,980 --> 00:14:30,600

for launch and launched out of here too

364
00:14:35,240 --> 00:14:32,990
so that the launch business for

365
00:14:37,370 --> 00:14:35,250
commercial and for human space flight

366
00:14:40,340 --> 00:14:37,380
will be quite active over the next

367
00:14:42,050 --> 00:14:40,350
couple years I won't be as routine every

368
00:14:44,240 --> 00:14:42,060
three or four months as shuttle but it'd

369
00:14:47,750 --> 00:14:44,250
be different we'll have cargo missions

370
00:14:50,210 --> 00:14:47,760
flying every once in a while now out of

371
00:14:52,970 --> 00:14:50,220
alcy 40 with time we're going to have a

372
00:14:55,699 --> 00:14:52,980
test flight of Orion flying off a delta

373
00:14:58,370 --> 00:14:55,709
and we'll have some test flights in 2014

374
00:15:00,590 --> 00:14:58,380
for SpaceX for commercial crew program

375
00:15:02,630 --> 00:15:00,600
and then with time we'll be doing all

376
00:15:05,300 --> 00:15:02,640
kinds of flights in the 14 15 and 16

377
00:15:06,680 --> 00:15:05,310
time frame as test flights for for

378
00:15:09,470 --> 00:15:06,690
commercial crew so it's going to be an

379
00:15:11,120 --> 00:15:09,480
exciting time and we're at the right now

380
00:15:12,769 --> 00:15:11,130
in the middle of that design phase in

381
00:15:14,870 --> 00:15:12,779
2012 and two years from now are we

382
00:15:17,030 --> 00:15:14,880
flying ports portions of those vehicles

383
00:15:18,680 --> 00:15:17,040
it'll be great opportunity and you

384
00:15:20,930 --> 00:15:18,690
mentioned Boeing coming here and you

385
00:15:23,150 --> 00:15:20,940
know I would be remiss if I didn't

386
00:15:25,010 --> 00:15:23,160
mention the outstanding partnership that

387
00:15:26,810 --> 00:15:25,020
we have with the the state of Florida

388
00:15:28,970 --> 00:15:26,820

through space Florida and the agreements

389
00:15:31,929 --> 00:15:28,980
that we put in place to get opf Bay 3

390
00:15:34,239 --> 00:15:31,939
turned over to space Florida so that it

391
00:15:36,339 --> 00:15:34,249
they made it available for Boeing to

392
00:15:38,439 --> 00:15:36,349
utilize that facility and we're

393
00:15:40,869 --> 00:15:38,449
continuing to work with space Florida on

394
00:15:42,579 --> 00:15:40,879
other facilities hopefully attracting

395
00:15:44,499 --> 00:15:42,589
more work here into the excess capacity

396
00:15:45,939 --> 00:15:44,509
that we have it only makes sense that

397
00:15:49,269 --> 00:15:45,949
you know if we have something that we

398
00:15:52,179 --> 00:15:49,279
have absolutely no use for in the Space

399
00:15:55,269 --> 00:15:52,189
Launch System our exploration beyond

400
00:15:57,129 --> 00:15:55,279
Earth program you know we ought to be

401
00:15:59,469 --> 00:15:57,139
able to find a way to bring other work

402
00:16:01,329 --> 00:15:59,479
into those facilities and we've got a

403
00:16:04,059 --> 00:16:01,339
number of agreements and work and more

404
00:16:05,919 --> 00:16:04,069
coming this whole industry government

405
00:16:08,349 --> 00:16:05,929
partnership is a new way of doing

406
00:16:10,210 --> 00:16:08,359
business not only with the state but

407
00:16:11,710 --> 00:16:10,220
also even in Commercial Crew all these

408
00:16:13,259 --> 00:16:11,720
partners are bringing their own funds to

409
00:16:14,919 --> 00:16:13,269
the table to bring in our own

410
00:16:16,899 --> 00:16:14,929
capabilities to the table from

411
00:16:19,419 --> 00:16:16,909
throughout the country to work with NASA

412
00:16:22,449 --> 00:16:19,429
and together we do this this is not a

413
00:16:23,859 --> 00:16:22,459

standard government and then we we have

414
00:16:26,049 --> 00:16:23,869
a contract and we tell them what the go

415
00:16:27,789 --> 00:16:26,059
do it's very much a partnership I think

416
00:16:31,059 --> 00:16:27,799
the work that space Florida is doing

417
00:16:33,759 --> 00:16:31,069
here certainly adds help or adds to the

418
00:16:35,769 --> 00:16:33,769
overall idea of it's a it's a national

419
00:16:38,319 --> 00:16:35,779
partnership in order to go continue to

420
00:16:39,960 --> 00:16:38,329
be number one in space one of the things

421
00:16:43,479 --> 00:16:39,970
we're doing is we're building up for

422
00:16:46,659 --> 00:16:43,489
supportive SLS and Orion especially in

423
00:16:48,789 --> 00:16:46,669
the vab is one example where we're

424
00:16:50,759 --> 00:16:48,799
putting together platforms that are

425
00:16:53,439 --> 00:16:50,769
going to be vertically adjustable

426
00:16:55,929 --> 00:16:53,449
they're going to have a section in the

427
00:16:59,859 --> 00:16:55,939
center will be able to drop in an insert

428
00:17:03,429 --> 00:16:59,869
to match up either the SLS or another

429
00:17:05,889 --> 00:17:03,439
launch vehicle as those folks come so

430
00:17:07,720 --> 00:17:05,899
we're keeping in mind that we want to be

431
00:17:10,419 --> 00:17:07,730
flexible we're keeping in mind that we

432
00:17:12,879 --> 00:17:10,429
want to be a multi-user facility here at

433
00:17:14,439 --> 00:17:12,889
Kennedy so we're we're doing things the

434
00:17:17,619 --> 00:17:14,449
right way I think getting away from the

435
00:17:20,559 --> 00:17:17,629
vehicle centric infrastructure that

436
00:17:22,480 --> 00:17:20,569
we've had for four decades and we have

437
00:17:24,069 --> 00:17:22,490
taken it into great consideration in all

438
00:17:25,569 --> 00:17:24,079

the designs that we've done so far i

439
00:17:27,309 --> 00:17:25,579
mean the the foresight that the Apollo

440
00:17:30,249 --> 00:17:27,319
guys had when they built the vab the

441
00:17:32,830 --> 00:17:30,259
ability to modify it it transitioned

442
00:17:35,529 --> 00:17:32,840
from Apollo to shuttle and now we're

443
00:17:37,180 --> 00:17:35,539
making it an even better transition to

444
00:17:39,369 --> 00:17:37,190
the future ensuring that it is not

445
00:17:42,070 --> 00:17:39,379
vehicle specific that accommodates that

446
00:17:44,289 --> 00:17:42,080
vehicle but as well as others I've been

447
00:17:44,580 --> 00:17:44,299
following what's going on in the high

448
00:17:49,289 --> 00:17:44,590
bay

449
00:17:51,419 --> 00:17:49,299
three and they said yeah we're taking

450
00:17:52,799 --> 00:17:51,429
you know one of the shuttle platforms on

451
00:17:54,570 --> 00:17:52,809
you think of a platform it's just

452
00:17:56,519 --> 00:17:54,580
something you stand on and the ec

453
00:17:58,019 --> 00:17:56,529
picture of it I mean it's bigger than a

454
00:17:59,370 --> 00:17:58,029
house and it's you know they've lifted

455
00:18:01,380 --> 00:17:59,380
it out of there and are moving out of

456
00:18:03,630 --> 00:18:01,390
there so again another area where we've

457
00:18:07,169 --> 00:18:03,640
made great progress in refurbishing the

458
00:18:10,019 --> 00:18:07,179
VAB and also the the mobile transporter

459
00:18:11,909 --> 00:18:10,029
you know that's being empty to as being

460
00:18:13,830 --> 00:18:11,919
totally redone it's got new diesel

461
00:18:15,720 --> 00:18:13,840
engines all kinds of great stuff and

462
00:18:17,190 --> 00:18:15,730
we're going to be running a test here in

463
00:18:20,190 --> 00:18:17,200

the next couple weeks actually run it

464
00:18:21,870 --> 00:18:20,200
out to the pate and pick up the mobile

465
00:18:23,940 --> 00:18:21,880
launch platform that's out there and

466
00:18:25,560 --> 00:18:23,950
check out all the systems that we've

467
00:18:28,080 --> 00:18:25,570
modified on it then I'll come back and

468
00:18:29,850 --> 00:18:28,090
the barnum will replace the bearings on

469
00:18:31,590 --> 00:18:29,860
it next but it's going to be able to

470
00:18:33,510 --> 00:18:31,600
handle that that new heavy-lift rocket

471
00:18:37,710 --> 00:18:33,520
it's going to be a great the mobile

472
00:18:40,529 --> 00:18:37,720
transporter for years to come so along

473
00:18:42,269 --> 00:18:40,539
with SLS and Orion we've got to a lot of

474
00:18:44,130 --> 00:18:42,279
things going on for our partners that we

475
00:18:45,750 --> 00:18:44,140
we want to come to Kennedy but along

476
00:18:47,820 --> 00:18:45,760
with the partnerships we also have

477
00:18:49,440 --> 00:18:47,830
competitions so ed could you explain a

478
00:18:51,659 --> 00:18:49,450
little bit about the competition in your

479
00:18:55,200 --> 00:18:51,669
program and how that benefits the agency

480
00:18:57,450 --> 00:18:55,210
um sure absolutely you know one of the

481
00:19:00,120 --> 00:18:57,460
best things about competition is overall

482
00:19:01,620 --> 00:19:00,130
it lowers the price of the service when

483
00:19:04,980 --> 00:19:01,630
you're looking for the service at the

484
00:19:07,080 --> 00:19:04,990
end today we have two partners under

485
00:19:08,360 --> 00:19:07,090
cargo that has orbital and SpaceX and

486
00:19:11,730 --> 00:19:08,370
they both have different approaches

487
00:19:13,590 --> 00:19:11,740
SpaceX brings cargo to the space station

488
00:19:15,210 --> 00:19:13,600

and then we'll retrieve cargo and we

489
00:19:18,659 --> 00:19:15,220
just saw that very successfully in last

490
00:19:19,919 --> 00:19:18,669
few days orbital is just about to fly

491
00:19:22,380 --> 00:19:19,929
their first mission in the next couple

492
00:19:25,380 --> 00:19:22,390
months and and they will be able to

493
00:19:27,810 --> 00:19:25,390
supply additional cargo to space station

494
00:19:29,820 --> 00:19:27,820
and then bring whatever needs to be done

495
00:19:31,019 --> 00:19:29,830
terms of trash and that kind of thing

496
00:19:33,539 --> 00:19:31,029
and bring that back into the atmosphere

497
00:19:36,060 --> 00:19:33,549
this way station can remain as efficient

498
00:19:38,460 --> 00:19:36,070
as possible competition is key if for

499
00:19:40,230 --> 00:19:38,470
commercial crew we had seven partners

500
00:19:42,870 --> 00:19:40,240
under our commercial crew to development

501
00:19:46,620 --> 00:19:42,880
we now have three partners on there CCI

502
00:19:48,720 --> 00:19:46,630
cap I sometimes we refer to the team is

503
00:19:51,850 --> 00:19:48,730
if you look at what we do or what we all

504
00:19:54,610 --> 00:19:51,860
go out and buy from iPads and nooks and

505
00:19:57,340 --> 00:19:54,620
and kindle fires that competition is is

506
00:19:58,750 --> 00:19:57,350
key to what you want to go by if you

507
00:20:00,070 --> 00:19:58,760
want something a certain size or

508
00:20:01,720 --> 00:20:00,080
something made by a certain manufacture

509
00:20:03,580 --> 00:20:01,730
you go do that but that competition

510
00:20:06,100 --> 00:20:03,590
keeps that price down and I think that's

511
00:20:09,250 --> 00:20:06,110
one reason why there's a new apple mini

512
00:20:10,840 --> 00:20:09,260
pad or whatever they call it in order to

513
00:20:12,460 --> 00:20:10,850

go compete and I think that's what you

514
00:20:14,740 --> 00:20:12,470
get when you have competition you get

515
00:20:16,360 --> 00:20:14,750
all of our partners wanting to meet our

516
00:20:18,460 --> 00:20:16,370
requirements wanting to transport NASA

517
00:20:20,320 --> 00:20:18,470
crew they want to do it for the least

518
00:20:21,610 --> 00:20:20,330
amount of cost and they want to try to

519
00:20:25,120 --> 00:20:21,620
meet our requirements if we had one

520
00:20:27,039 --> 00:20:25,130
partner one contractor then we would pay

521
00:20:28,510 --> 00:20:27,049
whatever that contractor required us to

522
00:20:30,039 --> 00:20:28,520
pay and therefore the price would

523
00:20:32,169 --> 00:20:30,049
probably overall higher in fact all of

524
00:20:35,440 --> 00:20:32,179
our analysis we've done indicates that

525
00:20:37,090 --> 00:20:35,450
would be about twice the price and wippa

526
00:20:38,560 --> 00:20:37,100
daba have a lot more discussion about

527
00:20:40,840 --> 00:20:38,570
requirements because of the cannot meet

528
00:20:42,130 --> 00:20:40,850
a requirement or they had to do design

529
00:20:43,539 --> 00:20:42,140
changes mean a requirement they would

530
00:20:45,789 --> 00:20:43,549
come with a bill and then we would have

531
00:20:47,919 --> 00:20:45,799
to talk about what that cost versus the

532
00:20:50,020 --> 00:20:47,929
requirement itself and you have at least

533
00:20:52,030 --> 00:20:50,030
two three four companies all in

534
00:20:53,950 --> 00:20:52,040
competition with each other they want to

535
00:20:56,860 --> 00:20:53,960
meet your requirements just again like

536
00:20:58,720 --> 00:20:56,870
Airbus and Boeing trying to buy or sell

537
00:21:00,070 --> 00:20:58,730
commercial aircraft they want to meet

538
00:21:01,900 --> 00:21:00,080

the customer demand they want to meet

539
00:21:03,400 --> 00:21:01,910
the customers requirements and they try

540
00:21:05,140 --> 00:21:03,410
to do it the best way they can for the

541
00:21:06,370 --> 00:21:05,150
best price and that's exactly what we

542
00:21:08,260 --> 00:21:06,380
have going on with commercial crew today

543
00:21:10,120 --> 00:21:08,270
excellent so while the commercial folks

544
00:21:13,000 --> 00:21:10,130
focus on getting to the station NASA

545
00:21:13,990 --> 00:21:13,010
will focus on going deeper into space so

546
00:21:15,490 --> 00:21:14,000
bill could you tell me a little bit

547
00:21:17,950 --> 00:21:15,500
about some of the advancements that you

548
00:21:20,470 --> 00:21:17,960
expect on deep space exploration well

549
00:21:23,890 --> 00:21:20,480
we're working right now at capability

550
00:21:27,280 --> 00:21:23,900
and we're working and evolvable system

551
00:21:28,810 --> 00:21:27,290
with the Space Launch System where we're

552
00:21:32,350 --> 00:21:28,820
going to start out with a 70 metric ton

553
00:21:35,020 --> 00:21:32,360
capability evolved to about 100 510

554
00:21:37,930 --> 00:21:35,030
metric ton and then go to ultimately to

555
00:21:39,880 --> 00:21:37,940
130 what we're finding is there's only

556
00:21:43,000 --> 00:21:39,890
handful of missions that we can conceive

557
00:21:44,919 --> 00:21:43,010
that will need 130 metric ton and that's

558
00:21:47,820 --> 00:21:44,929
primarily going to Mars which is our

559
00:21:50,500 --> 00:21:47,830
ultimate destination we're looking at

560
00:21:52,840 --> 00:21:50,510
destinations now we're looking at what

561
00:21:57,280 --> 00:21:52,850
we might do with the capabilities that

562
00:21:59,530 --> 00:21:57,290
we have and progressing that way it's a

563
00:22:01,740 --> 00:21:59,540

little bit different than saying Apollo

564
00:22:03,590 --> 00:22:01,750
or or even shuttle where we had a

565
00:22:06,049 --> 00:22:03,600
destination or

566
00:22:07,730 --> 00:22:06,059
it's actually more like shuttle where we

567
00:22:10,520 --> 00:22:07,740
had a capability to do multiple

568
00:22:12,020 --> 00:22:10,530
different things in low-earth orbit our

569
00:22:14,360 --> 00:22:12,030
goal is to do things beyond low-earth

570
00:22:16,190 --> 00:22:14,370
orbit and that's where we're going and I

571
00:22:19,820 --> 00:22:16,200
think the key there is it's a capability

572
00:22:21,980 --> 00:22:19,830
driven sustainable architecture that can

573
00:22:24,590 --> 00:22:21,990
evolve to what we need it to be and

574
00:22:27,710 --> 00:22:24,600
we're utilizing a lot of the existing

575
00:22:29,360 --> 00:22:27,720
hardware and technology that is required

576
00:22:31,850 --> 00:22:29,370
to make it successful I was over at

577
00:22:33,500 --> 00:22:31,860
Stennis a couple weeks ago for an engine

578
00:22:35,659 --> 00:22:33,510
test I actually got to see George and

579
00:22:37,880 --> 00:22:35,669
fire their rocket engine over there but

580
00:22:39,620 --> 00:22:37,890
a one over from some other meetings on

581
00:22:43,100 --> 00:22:39,630
some collaboration between the center's

582
00:22:44,810 --> 00:22:43,110
and I saw those 15's SMEs all packaged

583
00:22:49,430 --> 00:22:44,820
up there at the rocketdyne facility

584
00:22:52,010 --> 00:22:49,440
waiting for use on sls so I think you

585
00:22:53,299 --> 00:22:52,020
know that's important too yeah and

586
00:22:56,330 --> 00:22:53,309
that's one thing we're doing with this

587
00:22:58,159 --> 00:22:56,340
approach we're trying to be as

588
00:23:00,140 --> 00:22:58,169

affordable as we can because we're in a

589
00:23:03,049 --> 00:23:00,150
constrained fiscal environment we're

590
00:23:07,159 --> 00:23:03,059
trying to stay within a budget so we're

591
00:23:09,740 --> 00:23:07,169
using 15 16 s SMEs for the first few

592
00:23:11,990 --> 00:23:09,750
missions we're going to throw them all

593
00:23:17,210 --> 00:23:12,000
the way anyway after that will evolve

594
00:23:19,039 --> 00:23:17,220
into a disposable ssme basically where

595
00:23:20,779 --> 00:23:19,049
we're looking at new manufacturing

596
00:23:22,370 --> 00:23:20,789
techniques that are lower the cost of

597
00:23:23,930 --> 00:23:22,380
each of those since we are going to

598
00:23:26,659 --> 00:23:23,940
throw them away we don't need to

599
00:23:28,549 --> 00:23:26,669
necessarily the robustness of multiple

600
00:23:32,000 --> 00:23:28,559
engine starts with those because we're

601
00:23:33,200 --> 00:23:32,010
just to test them once at Stennis excuse

602
00:23:36,799 --> 00:23:33,210
me and then bring them over here and do

603
00:23:41,090 --> 00:23:36,809
the do the launch we're looking at now

604
00:23:44,899 --> 00:23:41,100
using solid rocket motors like we had

605
00:23:47,360 --> 00:23:44,909
planned for for Ares one there an

606
00:23:48,529 --> 00:23:47,370
evolution from the shuttle solid rocket

607
00:23:50,360 --> 00:23:48,539
motors were going to use those for the

608
00:23:51,980 --> 00:23:50,370
first two launches and we're in the

609
00:23:57,230 --> 00:23:51,990
process of taking a look at advanced

610
00:23:59,510 --> 00:23:57,240
boosters and we've got four for small

611
00:24:03,520 --> 00:23:59,520
contracts out there now for the next 30

612
00:24:06,440 --> 00:24:03,530
months to take a look at various aspects

613
00:24:10,340 --> 00:24:06,450

manufacturing capabilities looking at a

614
00:24:12,230 --> 00:24:10,350
LOX RP engine and looking at other

615
00:24:14,210 --> 00:24:12,240
capabilities so we're trying to be as

616
00:24:15,950 --> 00:24:14,220
affordable as we can we're trying to

617
00:24:17,299 --> 00:24:15,960
make advantech Nicole advancements in

618
00:24:21,470 --> 00:24:17,309
the meantime

619
00:24:22,999 --> 00:24:21,480
and I neglecting to talk to this when I

620
00:24:28,279 --> 00:24:23,009
in my opening remarks but in the

621
00:24:32,230 --> 00:24:28,289
meantime we're using a lot of NASA civil

622
00:24:34,369 --> 00:24:32,240
servants to take a look at technology

623
00:24:35,450 --> 00:24:34,379
developments capability developments

624
00:24:37,159 --> 00:24:35,460
that aren't necessarily on the critical

625
00:24:39,259 --> 00:24:37,169
path for the first two missions and

626
00:24:41,450 --> 00:24:39,269
these are advanced exploration systems

627
00:24:43,820 --> 00:24:41,460
and we're we're developing those around

628
00:24:46,009 --> 00:24:43,830
the country at the various centers some

629
00:24:48,320 --> 00:24:46,019
here at kennedy's summit Johnson summit

630
00:24:50,930 --> 00:24:48,330
Marshall and other centers so we're

631
00:24:53,320 --> 00:24:50,940
doing that to you know utilize the

632
00:24:56,989 --> 00:24:53,330
knowledge and capability that nASA has

633
00:24:59,720 --> 00:24:56,999
with a very small amount of procurement

634
00:25:02,659 --> 00:24:59,730
dollars do mostly in-house hands-on

635
00:25:05,570 --> 00:25:02,669
capability to build that capability and

636
00:25:06,889 --> 00:25:05,580
sustain that that knowledge base so

637
00:25:08,539 --> 00:25:06,899
we're doing that in parallel with us

638
00:25:11,450 --> 00:25:08,549

yeah one of the great examples is

639
00:25:12,710 --> 00:25:11,460
resolved here at KSC our folks that were

640
00:25:16,430 --> 00:25:12,720
looking at institute resource

641
00:25:19,159 --> 00:25:16,440
utilization for lunar missions building

642
00:25:20,749 --> 00:25:19,169
a package to go on a rover in

643
00:25:22,909 --> 00:25:20,759
conjunction with canada to launch to

644
00:25:25,249 --> 00:25:22,919
eventually go to the moon and you know

645
00:25:27,259 --> 00:25:25,259
seek out water on the moon and look at

646
00:25:29,960 --> 00:25:27,269
the moon just like we're much smaller

647
00:25:32,299 --> 00:25:29,970
than the curiosity but getting some

648
00:25:35,180 --> 00:25:32,309
great hands-on work and doing some neat

649
00:25:38,529 --> 00:25:35,190
stuff here at KSC for that we had a

650
00:25:40,909 --> 00:25:38,539
question in the audience so right here

651
00:25:42,830 --> 00:25:40,919
mark r Adam of the talking space I've

652
00:25:45,350 --> 00:25:42,840
got a question about the current NASA

653
00:25:48,999 --> 00:25:45,360
astronauts for ed how are they involved

654
00:25:52,310 --> 00:25:49,009
with the Commercial Crew program

655
00:25:53,930 --> 00:25:52,320
participants what are they providing to

656
00:25:56,480 --> 00:25:53,940
that effort what's their involvement a

657
00:25:58,480 --> 00:25:56,490
very good question first of all the

658
00:26:02,169 --> 00:25:58,490
deputy for the program is Brent Jett

659
00:26:04,759 --> 00:26:02,179
very good astronaut 44 times and I want

660
00:26:06,470 --> 00:26:04,769
crew members astronauts to be very much

661
00:26:08,029 --> 00:26:06,480
a part of the program because in the end

662
00:26:10,570 --> 00:26:08,039
they're the ones are gonna have to put

663
00:26:13,700 --> 00:26:10,580

and getting a seat and go fly the thing

664
00:26:16,190 --> 00:26:13,710
and so get them involved earlier helps

665
00:26:18,230 --> 00:26:16,200
everybody from the overall program

666
00:26:20,649 --> 00:26:18,240
standpoint we have a number of crew

667
00:26:23,299 --> 00:26:20,659
members that are assigned to the program

668
00:26:24,950 --> 00:26:23,309
they work still through the

669
00:26:26,509 --> 00:26:24,960
through national office they're not

670
00:26:28,549 --> 00:26:26,519
really assigned to the program but their

671
00:26:30,080 --> 00:26:28,559
tasks are assigned to the program and so

672
00:26:32,180 --> 00:26:30,090
for each of our partners there is at

673
00:26:35,749 --> 00:26:32,190
least a prime astronaut that supports

674
00:26:37,639 --> 00:26:35,759
all of our milestones with with usually

675
00:26:39,320 --> 00:26:37,649
one or two backup folks from the

676
00:26:42,379 --> 00:26:39,330
astronaut corps that are also with them

677
00:26:43,820 --> 00:26:42,389
and they're they they basically sit and

678
00:26:45,440 --> 00:26:43,830
review all the same things that the rest

679
00:26:48,529 --> 00:26:45,450
of the engineering team is of course

680
00:26:50,480 --> 00:26:48,539
their focus is how does how does it fit

681
00:26:52,820 --> 00:26:50,490
for them how do the handling

682
00:26:55,249 --> 00:26:52,830
characteristics for example in the

683
00:26:56,330 --> 00:26:55,259
Sierra Nevada vehicle very interested in

684
00:26:57,950 --> 00:26:56,340
how we're going to be able to do

685
00:27:00,739 --> 00:26:57,960
handling characteristics on the vehicle

686
00:27:02,930 --> 00:27:00,749
itself also how do the display is going

687
00:27:06,080 --> 00:27:02,940
to work you know most of the astronauts

688
00:27:08,480 --> 00:27:06,090

that we have assigned to SF loan and so

689
00:27:11,359 --> 00:27:08,490
they they have experience of what was

690
00:27:13,940 --> 00:27:11,369
like in shuttle or from Soyuz and so now

691
00:27:15,680 --> 00:27:13,950
they're taking an expertise in that and

692
00:27:17,359 --> 00:27:15,690
and helping each of the partners with

693
00:27:18,649 --> 00:27:17,369
you might want to put this place here

694
00:27:19,820 --> 00:27:18,659
you might really want to have these kind

695
00:27:20,899 --> 00:27:19,830
of instruments right in front of you and

696
00:27:22,820 --> 00:27:20,909
these other ones could be more on the

697
00:27:24,649 --> 00:27:22,830
side that kind of thing so they're

698
00:27:27,350 --> 00:27:24,659
providing the human interface part of

699
00:27:29,889 --> 00:27:27,360
the discussion as time goes on we are

700
00:27:31,669 --> 00:27:29,899
going to move as we move into

701
00:27:33,680 --> 00:27:31,679
certification of a couple of these

702
00:27:35,659 --> 00:27:33,690
vehicles we're going to end up having a

703
00:27:37,220 --> 00:27:35,669
joint team very much like the military

704
00:27:39,950 --> 00:27:37,230
would and which have a team of engineers

705
00:27:42,499 --> 00:27:39,960
and a team of astronauts flight crew

706
00:27:44,180 --> 00:27:42,509
members as well as a team from the

707
00:27:46,039 --> 00:27:44,190
company who might represent their flight

708
00:27:47,989 --> 00:27:46,049
crew and represent their engineering

709
00:27:51,109 --> 00:27:47,999
staff and all put them together to go

710
00:27:53,419 --> 00:27:51,119
work through the flight test activities

711
00:27:56,149 --> 00:27:53,429
at all I going to happen in order to get

712
00:27:59,299 --> 00:27:56,159
to a final certification and so as time

713
00:28:01,129 --> 00:27:59,309

goes on I expect this team will it's a

714
00:28:02,779 --> 00:28:01,139
partnership today but i expect the lines

715
00:28:04,850 --> 00:28:02,789
of the partnership to even get blurrier

716
00:28:07,249 --> 00:28:04,860
between whether or not they're wearing a

717
00:28:10,460 --> 00:28:07,259
blue suit with a nasa emblem on it or a

718
00:28:12,859 --> 00:28:10,470
company emblem on it very similar to way

719
00:28:16,399 --> 00:28:12,869
that fighters today are developed in the

720
00:28:17,869 --> 00:28:16,409
military you know along those lines when

721
00:28:19,609 --> 00:28:17,879
you talk about astronauts and their

722
00:28:22,430 --> 00:28:19,619
involvement I mean we always get asked

723
00:28:24,440 --> 00:28:22,440
is this how you're going to think this

724
00:28:25,909 --> 00:28:24,450
is safe you know would you what about

725
00:28:27,889 --> 00:28:25,919
their design and how they're doing all

726
00:28:29,060 --> 00:28:27,899
this and stuff and cheetah I know the

727
00:28:30,139 --> 00:28:29,070
guys that are working there that are

728
00:28:31,639 --> 00:28:30,149
designing it when you talk about

729
00:28:33,259 --> 00:28:31,649
astronaut involvement i mean sierra

730
00:28:34,820 --> 00:28:33,269
nevada you got steve lindsey former

731
00:28:36,840 --> 00:28:34,830
chief the astronaut office great test

732
00:28:40,370 --> 00:28:36,850
pilot jim boss

733
00:28:44,640 --> 00:28:40,380
you got fergie work in there out at the

734
00:28:47,340 --> 00:28:44,650
SpaceX you know you oh shoot it just

735
00:28:50,550 --> 00:28:47,350
went brain dead yeah hey garrett reisman

736
00:28:52,080 --> 00:28:50,560
is out there i mean these guys they're

737
00:28:54,720 --> 00:28:52,090
not going to do something or build

738
00:28:56,940 --> 00:28:54,730

something we're all it's kind of a

739
00:28:58,680 --> 00:28:56,950
closed community we all kind of know

740
00:29:00,630 --> 00:28:58,690
each other and you're not going to put

741
00:29:02,300 --> 00:29:00,640
your friends at risk you're going to do

742
00:29:05,280 --> 00:29:02,310
your very best to build something that

743
00:29:07,560 --> 00:29:05,290
that they want to use know how to use

744
00:29:09,060 --> 00:29:07,570
and its safety is i would i would

745
00:29:11,220 --> 00:29:09,070
definitely agree and same thing with the

746
00:29:13,770 --> 00:29:11,230
engineers you know each of our companies

747
00:29:16,290 --> 00:29:13,780
are very a very different personality

748
00:29:18,690 --> 00:29:16,300
that is between SpaceX Sierra Nevada and

749
00:29:20,700 --> 00:29:18,700
Boeing very different personalities but

750
00:29:22,740 --> 00:29:20,710
all of them have the same core they want

751
00:29:24,180 --> 00:29:22,750
to build a vehicle that works they want

752
00:29:27,840 --> 00:29:24,190
to be in a vehicle that is safe enough

753
00:29:29,750 --> 00:29:27,850
for not just a customer might be NASA

754
00:29:32,520 --> 00:29:29,760
someday but also for their crew to fly

755
00:29:34,910 --> 00:29:32,530
and I think that's extremely important

756
00:29:38,610 --> 00:29:34,920
like like Bob said you know and when

757
00:29:40,290 --> 00:29:38,620
Steve Lindsey or Fergie is told while

758
00:29:42,240 --> 00:29:40,300
you're the guy who might be flying it

759
00:29:43,920 --> 00:29:42,250
and all the people working around you

760
00:29:45,330 --> 00:29:43,930
are from your company they're going to

761
00:29:47,730 --> 00:29:45,340
make sure you're going to have a safe

762
00:29:49,290 --> 00:29:47,740
flight and so I think safety yellow we

763
00:29:51,210 --> 00:29:49,300

put it in our requirements is really a

764
00:29:53,700 --> 00:29:51,220
culture that each of these companies is

765
00:29:55,830 --> 00:29:53,710
embracing and and in the end they're

766
00:29:57,000 --> 00:29:55,840
going to be as safe as they possibly can

767
00:29:59,550 --> 00:29:57,010
be there are going to take different

768
00:30:01,260 --> 00:29:59,560
approaches to get to the same point but

769
00:30:03,390 --> 00:30:01,270
in the end they all want to be as safe

770
00:30:05,490 --> 00:30:03,400
as possible and meaning our requirements

771
00:30:08,010 --> 00:30:05,500
is definitely required it's mandatory

772
00:30:10,110 --> 00:30:08,020
but but in the end it's a culture that's

773
00:30:11,910 --> 00:30:10,120
going to be more important in order to

774
00:30:13,680 --> 00:30:11,920
say that are we safe enough to go fly

775
00:30:15,690 --> 00:30:13,690
and I think all three companies with

776
00:30:19,500 --> 00:30:15,700
their crews as well as their engineers

777
00:30:21,450 --> 00:30:19,510
are going to go make sure it happens and

778
00:30:22,800 --> 00:30:21,460
we're talking space thinking about the

779
00:30:25,290 --> 00:30:22,810
astronauts that are going to take these

780
00:30:28,110 --> 00:30:25,300
first flights who will it be would be a

781
00:30:32,010 --> 00:30:28,120
company astronaut or a NASA astronaut or

782
00:30:34,000 --> 00:30:32,020
a combination and ce4 for commercial

783
00:30:36,580 --> 00:30:34,010
crew I'll speak and

784
00:30:39,370 --> 00:30:36,590
bill can speak from a for the other

785
00:30:41,040 --> 00:30:39,380
missions I think when I was trying to

786
00:30:43,870 --> 00:30:41,050
explain earlier I think it'll be a mix I

787
00:30:47,140 --> 00:30:43,880
think as we move into our flight test

788
00:30:49,960 --> 00:30:47,150

phases of certification there will be

789
00:30:52,090 --> 00:30:49,970
company astronauts and NASA astronauts

790
00:30:53,980 --> 00:30:52,100
working side by side and when the first

791
00:30:56,350 --> 00:30:53,990
vehicle gets ready to go fly and we

792
00:30:59,470 --> 00:30:56,360
announced the crew I think it might end

793
00:31:01,720 --> 00:30:59,480
up being a joint joint crew now that

794
00:31:03,970 --> 00:31:01,730
isn't in concrete yet in any regard but

795
00:31:05,410 --> 00:31:03,980
the idea is it's this partnership that's

796
00:31:07,540 --> 00:31:05,420
got to go make this happen whether we're

797
00:31:09,550 --> 00:31:07,550
in an essay or in a contract it's still

798
00:31:12,070 --> 00:31:09,560
partnership that says together we're

799
00:31:14,200 --> 00:31:12,080
going to go to create a u.s. capability

800
00:31:16,330 --> 00:31:14,210
and so that it's blue suiters as well as

801
00:31:18,430 --> 00:31:16,340
folks from companies that are either X

802
00:31:20,860 --> 00:31:18,440
astronauts no longer with the astronaut

803
00:31:23,050 --> 00:31:20,870
corps or have come up through some other

804
00:31:29,980 --> 00:31:23,060
system in order to go be an astronaut on

805
00:31:32,670 --> 00:31:29,990
industry side James Dean with floor

806
00:31:34,900 --> 00:31:32,680
today mr. Cabana referencing your

807
00:31:38,170 --> 00:31:34,910
successful partnership today with space

808
00:31:39,700 --> 00:31:38,180
Florida the state recently asked you and

809
00:31:42,970 --> 00:31:39,710
NASA for some property at the north end

810
00:31:45,250 --> 00:31:42,980
of the center what's your opinion of

811
00:31:47,680 --> 00:31:45,260
whether that's a good idea yeah well

812
00:31:50,710 --> 00:31:47,690
we're evaluating that request I'm

813
00:31:54,040 --> 00:31:50,720

drafting a proposal now to help NASA

814
00:31:56,830 --> 00:31:54,050
headquarters respond to the lieutenant

815
00:31:58,990 --> 00:31:56,840
governor's letter and you know we are

816
00:32:01,990 --> 00:31:59,000
going to take a close look at it and

817
00:32:05,140 --> 00:32:02,000
provide a response that I think will be

818
00:32:06,820 --> 00:32:05,150
the right answer for for this area and

819
00:32:09,130 --> 00:32:06,830
for the state and for what we want to go

820
00:32:11,410 --> 00:32:09,140
do so it's under evaluation right now

821
00:32:15,760 --> 00:32:11,420
and you know we'll see how it all works

822
00:32:18,340 --> 00:32:15,770
out but I mean definitely the shuttle

823
00:32:21,610 --> 00:32:18,350
landing facility portion of that we have

824
00:32:24,670 --> 00:32:21,620
put out an RFI requesting folks to

825
00:32:26,890 --> 00:32:24,680
provide us proposals for operating the

826
00:32:29,260 --> 00:32:26,900
shuttle landing facility as a commercial

827
00:32:32,620 --> 00:32:29,270
spaceport and we're in the process of

828
00:32:35,350 --> 00:32:32,630
evaluating that so I think that portion

829
00:32:37,450 --> 00:32:35,360
of the letter we're handling under an

830
00:32:39,820 --> 00:32:37,460
RFI and space Florida has responded to

831
00:32:42,760 --> 00:32:39,830
that RFI and I have a team much like a

832
00:32:45,430 --> 00:32:42,770
source evaluation board evaluating this

833
00:32:47,200 --> 00:32:45,440
proposals independently to choose which

834
00:32:48,970 --> 00:32:47,210
one is the best to

835
00:32:50,320 --> 00:32:48,980
who we would go into negotiations with

836
00:32:53,529 --> 00:32:50,330
to take a look at that but there is

837
00:32:56,230 --> 00:32:53,539
commercial interest in operating the SLF

838
00:32:59,169 --> 00:32:56,240

as a spaceport as we move forward in the

839
00:33:00,639 --> 00:32:59,179
future just just to follow up can you

840
00:33:02,380 --> 00:33:00,649
speak it all to this idea of a

841
00:33:05,169 --> 00:33:02,390
commercial pad a state-run commercial

842
00:33:09,549 --> 00:33:05,179
pad and obviously what they proposed is

843
00:33:12,840 --> 00:33:09,559
something that's outside your current

844
00:33:15,880 --> 00:33:12,850
operational area does that fit your

845
00:33:17,529 --> 00:33:15,890
concept of a multi-user kennedy space

846
00:33:19,419 --> 00:33:17,539
center or does it indicate that there's

847
00:33:21,159 --> 00:33:19,429
a problem that a company that wants to

848
00:33:25,600 --> 00:33:21,169
launch in this area does not want to do

849
00:33:27,880 --> 00:33:25,610
it in here at 39 again James there's a

850
00:33:29,560 --> 00:33:27,890
lot that has to be looked at before I

851
00:33:31,360 --> 00:33:29,570
wouldn't give you a specific answer to

852
00:33:34,360 --> 00:33:31,370
that right now I mean this is a

853
00:33:36,600 --> 00:33:34,370
combination obviously for commercial

854
00:33:39,220 --> 00:33:36,610
launches the FAA has to certify them

855
00:33:41,680 --> 00:33:39,230
safe to launch for government launches

856
00:33:44,799 --> 00:33:41,690
we work in conjunction with the 45th

857
00:33:47,529 --> 00:33:44,809
Space Wing in the range it all gets into

858
00:33:48,880 --> 00:33:47,539
you know who owns the airspace and a lot

859
00:33:50,230 --> 00:33:48,890
of other things so there's a number of

860
00:33:53,139 --> 00:33:50,240
issues that we have to work through to

861
00:33:54,909 --> 00:33:53,149
get to a final answer and I honestly

862
00:33:57,039 --> 00:33:54,919
don't think that the the state of

863
00:33:59,289 --> 00:33:57,049

Florida expects an immediate answer on

864
00:34:01,180 --> 00:33:59,299
what the final you know solution is

865
00:34:02,529 --> 00:34:01,190
going to be we're going to take a look

866
00:34:04,090 --> 00:34:02,539
at it and we'll move forward after a

867
00:34:08,409 --> 00:34:04,100
proper evaluation and come up with the

868
00:34:10,750 --> 00:34:08,419
right solution I Stephen Clark with

869
00:34:13,329 --> 00:34:10,760
spaceflight now first a question for

870
00:34:15,010 --> 00:34:13,339
bill regarding advanced propulsion

871
00:34:16,930 --> 00:34:15,020
development that you're looking at for

872
00:34:19,690 --> 00:34:16,940
SLS particularly the advanced booster

873
00:34:21,430 --> 00:34:19,700
are you seeing much interest from the

874
00:34:24,250 --> 00:34:21,440
air force in that and are there any

875
00:34:26,919 --> 00:34:24,260
negotiations or could you describe them

876
00:34:29,050 --> 00:34:26,929
for cost-sharing yeah I'm not sure if I

877
00:34:33,310 --> 00:34:29,060
can give you the details but we are the

878
00:34:36,940 --> 00:34:33,320
last or the fourth package we are in

879
00:34:40,000 --> 00:34:36,950
negotiations with and the Air Force is a

880
00:34:41,280 --> 00:34:40,010
partner in that one and I apologize i

881
00:34:43,599 --> 00:34:41,290
don't remember off top my head which

882
00:34:46,180 --> 00:34:43,609
technology development that is but we're

883
00:34:51,430 --> 00:34:46,190
in the process of working with the Air

884
00:34:53,169 --> 00:34:51,440
Force working with the industry to to

885
00:34:56,800 --> 00:34:53,179
come up with one of those booster all

886
00:35:03,110 --> 00:34:59,690
one more question for ED did you update

887
00:35:05,390 --> 00:35:03,120
me on CC to which partners have finished

888
00:35:07,790 --> 00:35:05,400

up that round and which are still to go

889
00:35:12,350 --> 00:35:07,800
when you expect them to finish okay well

890
00:35:14,660 --> 00:35:12,360
let's see for cc deaf to the only two

891
00:35:18,200 --> 00:35:14,670
that are still have anything left to do

892
00:35:20,030 --> 00:35:18,210
on CC of 2 is a blue origin on a Seattle

893
00:35:22,400 --> 00:35:20,040
in fact there are actual milestones are

894
00:35:26,060 --> 00:35:22,410
not completed we have to do a review of

895
00:35:28,760 --> 00:35:26,070
the data they did a pusher pad xscape

896
00:35:31,430 --> 00:35:28,770
test a few weeks ago out at their test

897
00:35:34,070 --> 00:35:31,440
site in West Texas it was an outstanding

898
00:35:36,290 --> 00:35:34,080
test of that team has a really come

899
00:35:38,180 --> 00:35:36,300
together on some technology that we were

900
00:35:40,820 --> 00:35:38,190
working with them on on up on a pusher

901
00:35:43,280 --> 00:35:40,830
xscape motor they work with their vendor

902
00:35:45,650 --> 00:35:43,290
who is a very good vendor who can help a

903
00:35:47,750 --> 00:35:45,660
number of different companies and and

904
00:35:50,660 --> 00:35:47,760
help them put together a system that

905
00:35:53,240 --> 00:35:50,670
would work in a that's what we that's

906
00:35:55,010 --> 00:35:53,250
what we were a part of durin CCF to the

907
00:35:56,690 --> 00:35:55,020
actual mission itself was extremely

908
00:36:01,820 --> 00:35:56,700
successful it was showing that you can

909
00:36:04,010 --> 00:36:01,830
abort off of basically a pad in a case

910
00:36:06,050 --> 00:36:04,020
and get high enough to where you can use

911
00:36:09,590 --> 00:36:06,060
parachutes to come back down and land

912
00:36:12,380 --> 00:36:09,600
safely and softly on the ground so the

913
00:36:14,480 --> 00:36:12,390

Blue Origin work is the test is work is

914
00:36:17,750 --> 00:36:14,490
behind us now we're reviewing data and

915
00:36:19,160 --> 00:36:17,760
we'll close out that that partnership

916
00:36:20,710 --> 00:36:19,170
with them probably the next month or two

917
00:36:22,820 --> 00:36:20,720
shortly before the end of the year

918
00:36:25,880 --> 00:36:22,830
anyway although no one we have left is a

919
00:36:28,790 --> 00:36:25,890
Boeing milestone that is portion of

920
00:36:30,380 --> 00:36:28,800
their ground systems design at their

921
00:36:32,420 --> 00:36:30,390
preliminary design review for the ground

922
00:36:34,340 --> 00:36:32,430
systems that is their communication

923
00:36:37,700 --> 00:36:34,350
systems with the network and how they

924
00:36:39,320 --> 00:36:37,710
communicate between their control center

925
00:36:42,350 --> 00:36:39,330
and their vehicle and that kind of thing

926
00:36:44,330 --> 00:36:42,360
and what we did there is they had a PDR

927
00:36:46,820 --> 00:36:44,340
or preliminary design review for the

928
00:36:49,370 --> 00:36:46,830
entire system of their other spacecraft

929
00:36:51,110 --> 00:36:49,380
the number of months ago normally the

930
00:36:52,829 --> 00:36:51,120
process would be you have that for the

931
00:36:55,920 --> 00:36:52,839
spacecraft and then you have

932
00:36:57,599 --> 00:36:55,930
you're PDRs for all your other support

933
00:37:00,029 --> 00:36:57,609
systems that would be supporting that

934
00:37:01,200 --> 00:37:00,039
spacecraft and so what we did is we

935
00:37:02,759 --> 00:37:01,210
split that out because there really

936
00:37:03,779 --> 00:37:02,769
weren't ready yet to talk about the

937
00:37:04,979 --> 00:37:03,789
ground stuff because we're just

938
00:37:07,259 --> 00:37:04,989

finishing what to do with the flight

939
00:37:09,089 --> 00:37:07,269
stuff once they got done then they came

940
00:37:10,589 --> 00:37:09,099
turned around and started supporting on

941
00:37:12,959 --> 00:37:10,599
the ground and we'll have that milestone

942
00:37:14,249 --> 00:37:12,969
with them in a couple weeks and so they

943
00:37:17,700 --> 00:37:14,259
should also be done before they in the

944
00:37:19,920 --> 00:37:17,710
year all the other partners for CC dev

945
00:37:22,410 --> 00:37:19,930
two are pretty much wrapped up except

946
00:37:24,299 --> 00:37:22,420
Sierra Nevada now Sierra Nevada you know

947
00:37:26,180 --> 00:37:24,309
they really took a bold step and they're

948
00:37:29,190 --> 00:37:26,190
building an engineering test article

949
00:37:31,680 --> 00:37:29,200
that is right now and work at their

950
00:37:33,359 --> 00:37:31,690
plant in Boulder Colorado they'll be

951
00:37:35,640 --> 00:37:33,369
shipping that to Edwards in the next

952
00:37:37,559 --> 00:37:35,650
month or two and then it'll go through

953
00:37:40,049 --> 00:37:37,569
some testing there and begin a free

954
00:37:42,630 --> 00:37:40,059
flight test really i think in january

955
00:37:44,759 --> 00:37:42,640
for wear it next year so those are the

956
00:37:46,349 --> 00:37:44,769
milestones are left to be done in terms

957
00:37:48,420 --> 00:37:46,359
of testing the only one that really has

958
00:37:49,859 --> 00:37:48,430
some big tests left is sierra nevada and

959
00:37:51,450 --> 00:37:49,869
we're looking forward to what they want

960
00:37:53,519 --> 00:37:51,460
to go do with their engineering test

961
00:37:58,680 --> 00:37:53,529
article of their dream chaser at

962
00:38:00,989 --> 00:37:58,690
january-february time frame i'm an

963
00:38:04,440 --> 00:38:00,999

alayhi lofty ambitions blog and chapman

964
00:38:06,299 --> 00:38:04,450
magazine during the shuttle development

965
00:38:08,999 --> 00:38:06,309
reusability was equated with

966
00:38:11,400 --> 00:38:09,009
affordability now you're talking about

967
00:38:13,859 --> 00:38:11,410
new manufacturing because the expensive

968
00:38:15,870 --> 00:38:13,869
robustness required for reuse is no

969
00:38:17,849 --> 00:38:15,880
longer necessary can you talk a little

970
00:38:20,759 --> 00:38:17,859
bit more about that shift in thinking

971
00:38:24,029 --> 00:38:20,769
and maybe how the budget shapes some of

972
00:38:27,359 --> 00:38:24,039
your decisions or your timelines we seem

973
00:38:30,599 --> 00:38:27,369
to go through cycles to history of do we

974
00:38:32,789 --> 00:38:30,609
use reusable like shuttle or do we you

975
00:38:37,259 --> 00:38:32,799
know go with the throwaway expendable

976
00:38:40,349 --> 00:38:37,269
stuff oddly enough the Russians are

977
00:38:42,269 --> 00:38:40,359
looking at a reusable activity the Air

978
00:38:44,309 --> 00:38:42,279
Force is looking at a reusable activity

979
00:38:47,299 --> 00:38:44,319
right now and we're kind of out of phase

980
00:38:49,589 --> 00:38:47,309
with the looking at expendable is it's

981
00:38:52,890 --> 00:38:49,599
we're looking at the most affordable way

982
00:38:55,829 --> 00:38:52,900
to get the capabilities we we need to

983
00:38:57,450 --> 00:38:55,839
get beyond low-earth orbit and and

984
00:38:59,099 --> 00:38:57,460
that's kind of what we're doing we've

985
00:39:03,059 --> 00:38:59,109
chosen the architecture basically

986
00:39:05,570 --> 00:39:03,069
because of the ability to use existing

987
00:39:09,410 --> 00:39:05,580
hardware to offset some of the cost

988
00:39:11,630 --> 00:39:09,420

in the early years of development we're

989
00:39:15,710 --> 00:39:11,640
in a flatline budget so we're trying to

990
00:39:19,490 --> 00:39:15,720
kind of tamp down the natural

991
00:39:20,780 --> 00:39:19,500
development curve that you get so we're

992
00:39:21,770 --> 00:39:20,790
looking at different ways of doing

993
00:39:26,780 --> 00:39:21,780
things we're looking at different ways

994
00:39:28,520 --> 00:39:26,790
of doing insight with contractors data

995
00:39:30,710 --> 00:39:28,530
you know that we're asking for from the

996
00:39:34,490 --> 00:39:30,720
contractors were we're asking for a lot

997
00:39:35,930 --> 00:39:34,500
less data now so that's that's the kind

998
00:39:40,550 --> 00:39:35,940
of thing we're doing in affordability

999
00:39:43,370 --> 00:39:40,560
aspects and billing also comes down then

1000
00:39:45,290 --> 00:39:43,380
you know reusable versus expandable it

1001
00:39:47,570 --> 00:39:45,300
depends on what your flight rate is too

1002
00:39:49,490 --> 00:39:47,580
for example you know if you're flying a

1003
00:39:51,080 --> 00:39:49,500
lot of the solid rocket motors we're

1004
00:39:54,470 --> 00:39:51,090
going to initially use five segments

1005
00:39:56,120 --> 00:39:54,480
solid rocket boosters on the SLS system

1006
00:39:58,220 --> 00:39:56,130
if you're only launching once a year

1007
00:40:00,170 --> 00:39:58,230
once every two years the whole

1008
00:40:02,930 --> 00:40:00,180
infrastructure that you need to recover

1009
00:40:05,900 --> 00:40:02,940
those rocket motors and refurbish them

1010
00:40:08,390 --> 00:40:05,910
is so expensive it's much less expensive

1011
00:40:10,700 --> 00:40:08,400
just to utilize the existing casings

1012
00:40:12,050 --> 00:40:10,710
that we have and not recover them plus

1013
00:40:13,670 --> 00:40:12,060

you don't have to have the parachute

1014
00:40:17,020 --> 00:40:13,680
recovery system on it so you get more

1015
00:40:20,330 --> 00:40:17,030
mass to to orbit more payload orbit so

1016
00:40:23,600 --> 00:40:20,340
again it depends on the system the Orion

1017
00:40:25,940 --> 00:40:23,610
capsule is designed to be reusable you

1018
00:40:28,700 --> 00:40:25,950
know portions are refurbished ball so

1019
00:40:31,550 --> 00:40:28,710
yeah obviously if you had something that

1020
00:40:33,710 --> 00:40:31,560
was easily recoverable and could be

1021
00:40:36,200 --> 00:40:33,720
reusable that would be less expensive

1022
00:40:38,720 --> 00:40:36,210
than building new each time but again

1023
00:40:40,610 --> 00:40:38,730
when you build for reusability there's a

1024
00:40:42,680 --> 00:40:40,620
lot that goes into the reliability and

1025
00:40:44,690 --> 00:40:42,690
the increased cost to do that as opposed

1026
00:40:47,480 --> 00:40:44,700
to something that you can just use once

1027
00:40:51,310 --> 00:40:47,490
and so there are numerous costs

1028
00:40:53,330 --> 00:40:51,320
trade-off that have to be made I

1029
00:40:55,220 --> 00:40:53,340
actually had a question you know nASA

1030
00:40:57,530 --> 00:40:55,230
has done a very good job lately of

1031
00:41:02,380 --> 00:40:57,540
sending robots into space so why the

1032
00:41:08,480 --> 00:41:06,140
you know first off robots are the

1033
00:41:10,820 --> 00:41:08,490
precursors for humans and robots are

1034
00:41:12,710 --> 00:41:10,830
integral to all that we do in space

1035
00:41:15,770 --> 00:41:12,720
exploration maybe we use robots all the

1036
00:41:17,700 --> 00:41:15,780
time robotic arms you name it and and so

1037
00:41:21,089 --> 00:41:17,710
you know having

1038
00:41:23,760 --> 00:41:21,099

the robots is key but in the end I mean

1039
00:41:25,770 --> 00:41:23,770
we've still yet to design a robot that

1040
00:41:29,240 --> 00:41:25,780
can think as well as a human that can

1041
00:41:32,460 --> 00:41:29,250
adapt as well that responds as well and

1042
00:41:35,160 --> 00:41:32,470
truthfully from my point of view until a

1043
00:41:37,260 --> 00:41:35,170
human has set foot somewhere you really

1044
00:41:39,420 --> 00:41:37,270
haven't been there and you know that

1045
00:41:41,700 --> 00:41:39,430
that's exploration that's that's our DNA

1046
00:41:43,560 --> 00:41:41,710
hour drive to explore to go beyond what

1047
00:41:45,839 --> 00:41:43,570
we know to learn and we're constantly

1048
00:41:48,089 --> 00:41:45,849
learning and you know we're going to get

1049
00:41:49,890 --> 00:41:48,099
there eventually you know we are going

1050
00:41:54,000 --> 00:41:49,900
to have to learn how to live off planet

1051
00:41:56,099 --> 00:41:54,010
Earth and someday and we're we're at

1052
00:41:59,040 --> 00:41:56,109
toehold in the universe right now to be

1053
00:42:02,160 --> 00:41:59,050
able to do that to expand in and go

1054
00:42:05,190 --> 00:42:02,170
beyond our known limits and i think i

1055
00:42:07,560 --> 00:42:05,200
think the the entire planet lives

1056
00:42:11,820 --> 00:42:07,570
vicariously through our astronauts you

1057
00:42:14,370 --> 00:42:11,830
know they can live through and and get

1058
00:42:17,550 --> 00:42:14,380
immediate feedback from from astronauts

1059
00:42:21,030 --> 00:42:17,560
on on what they're experiencing and and

1060
00:42:22,890 --> 00:42:21,040
you know what they're seeing which yeah

1061
00:42:24,770 --> 00:42:22,900
you can send video back and forth and

1062
00:42:26,820 --> 00:42:24,780
that kind of thing with robots but

1063
00:42:29,280 --> 00:42:26,830

there's nothing like the the

1064
00:42:31,349 --> 00:42:29,290
adaptability as Bob said of a human you

1065
00:42:34,200 --> 00:42:31,359
look at what we've done on station at

1066
00:42:35,930 --> 00:42:34,210
one time when we tour the tour the solar

1067
00:42:38,670 --> 00:42:35,940
array and we went out there and weaved a

1068
00:42:40,349 --> 00:42:38,680
repair so we could we could use it I

1069
00:42:44,579 --> 00:42:40,359
mean you couldn't do that with

1070
00:42:46,890 --> 00:42:44,589
necessarily with a with a robot in real

1071
00:42:49,530 --> 00:42:46,900
time and we did that in real time and

1072
00:42:51,900 --> 00:42:49,540
that's the kind of thing that you know

1073
00:42:53,130 --> 00:42:51,910
as we go forward we're going to take a

1074
00:42:54,900 --> 00:42:53,140
different approach to training our

1075
00:42:57,240 --> 00:42:54,910
astronauts wouldn't you know trained in

1076
00:42:59,430 --> 00:42:57,250
skills and capabilities we're going to

1077
00:43:04,770 --> 00:42:59,440
have to find something for them to do in

1078
00:43:09,109 --> 00:43:04,780
a long trip to to to Mars but ultimately

1079
00:43:13,530 --> 00:43:09,119
I just think we need the human the human

1080
00:43:15,810 --> 00:43:13,540
presence on site to to talk about what's

1081
00:43:17,760 --> 00:43:15,820
what we're experiencing but having said

1082
00:43:19,800 --> 00:43:17,770
that that was pretty darn cool that Mars

1083
00:43:22,470 --> 00:43:19,810
Curiosity rotation now and that was

1084
00:43:24,210 --> 00:43:22,480
absolutely phenomenal you know one of

1085
00:43:27,079 --> 00:43:24,220
the things one of the things that we

1086
00:43:29,160 --> 00:43:27,089
know if we had if we tell robotically

1087
00:43:31,839 --> 00:43:29,170
ran the rover

1088
00:43:35,680 --> 00:43:31,849

you know Spirit and Opportunity from

1089
00:43:37,030 --> 00:43:35,690
Mars orbit we could achieve in three

1090
00:43:39,220 --> 00:43:37,040
weeks everything they've done over the

1091
00:43:40,870 --> 00:43:39,230
over the last several years and the

1092
00:43:42,670 --> 00:43:40,880
distance they've traveled you can

1093
00:43:43,630 --> 00:43:42,680
immediately do it as opposed to going a

1094
00:43:46,000 --> 00:43:43,640
little bit and stopping and

1095
00:43:49,420 --> 00:43:46,010
reprogramming and so forth you can do

1096
00:43:53,140 --> 00:43:49,430
more in real time did you have any

1097
00:43:55,030 --> 00:43:53,150
comments on them well we just I think

1098
00:43:56,410 --> 00:43:55,040
Bob said some great things and I would

1099
00:43:59,740 --> 00:43:56,420
say you know we all can look at great

1100
00:44:02,349 --> 00:43:59,750
pictures of the Grand Canyon but until

1101
00:44:03,820 --> 00:44:02,359
you go and see the Grand Canyon it

1102
00:44:06,609 --> 00:44:03,830
doesn't have the same impact there's a

1103
00:44:08,440 --> 00:44:06,619
picture you can say that you're going to

1104
00:44:09,880 --> 00:44:08,450
get from point A to point B and when you

1105
00:44:11,650 --> 00:44:09,890
have trouble with your car going from

1106
00:44:13,330 --> 00:44:11,660
point A to point B it's always good to

1107
00:44:15,940 --> 00:44:13,340
have some knowledge about how to fix the

1108
00:44:18,330 --> 00:44:15,950
car on the way so I think I addressed

1109
00:44:20,520 --> 00:44:18,340
both of their thoughts about why

1110
00:44:22,839 --> 00:44:20,530
exploration is important with people

1111
00:44:24,970 --> 00:44:22,849
getting pictures from some place is

1112
00:44:27,970 --> 00:44:24,980
great getting our astronauts that we

1113
00:44:29,349 --> 00:44:27,980

live vicariously through to come back

1114
00:44:31,960 --> 00:44:29,359
and tell us what that experience was

1115
00:44:33,280 --> 00:44:31,970
like and tell us would it what what it

1116
00:44:35,910 --> 00:44:33,290
means to be somewhere else and then

1117
00:44:40,960 --> 00:44:35,920
maybe to do science at those locations

1118
00:44:43,210 --> 00:44:40,970
helps I think human progress I don't see

1119
00:44:46,270 --> 00:44:43,220
any time in our in our history in which

1120
00:44:47,920 --> 00:44:46,280
we did not go exploring with people at

1121
00:44:50,380 --> 00:44:47,930
some point and yet you can say we got

1122
00:44:52,150 --> 00:44:50,390
smarter now we can send robots but the

1123
00:44:54,240 --> 00:44:52,160
human spirit wants to be there and I

1124
00:44:56,109 --> 00:44:54,250
think that's why we do human exploration

1125
00:44:59,050 --> 00:44:56,119
we have another question from the

1126
00:45:01,599 --> 00:44:59,060
audience I guess met i am john malkovich

1127
00:45:04,530 --> 00:45:01,609
and i'm from gog news and countdown Ted

1128
00:45:06,880 --> 00:45:04,540
this is directed towards director Cabana

1129
00:45:09,040 --> 00:45:06,890
the vehicle assembly building has a lot

1130
00:45:11,740 --> 00:45:09,050
of work going on and Atlantis is there

1131
00:45:13,120 --> 00:45:11,750
see just about whether to go to her new

1132
00:45:15,790 --> 00:45:13,130
home at the kennedy space center visitor

1133
00:45:18,220 --> 00:45:15,800
shadow and what are your feelings and

1134
00:45:21,250 --> 00:45:18,230
views both a former astronaut and

1135
00:45:26,260 --> 00:45:21,260
director of kennedy space center what am

1136
00:45:29,140 --> 00:45:26,270
I feeling well you know it's it's

1137
00:45:32,530 --> 00:45:29,150
bittersweet but I'm feeling great pride

1138
00:45:34,359 --> 00:45:32,540

I I feel great pride in what this team

1139
00:45:37,690 --> 00:45:34,369
has accomplished over the last 30 years

1140
00:45:39,700 --> 00:45:37,700
I feel great I've been I was there when

1141
00:45:41,890 --> 00:45:39,710
we're old atlanta side of the OPF i was

1142
00:45:42,609 --> 00:45:41,900
there when we closed the hatch for the

1143
00:45:44,650 --> 00:45:42,619
last four

1144
00:45:46,930 --> 00:45:44,660
discovery and endeavor to and I'll have

1145
00:45:48,700 --> 00:45:46,940
to admit it was a little more poignant

1146
00:45:50,859 --> 00:45:48,710
with discovery and endeavor because I

1147
00:45:55,029 --> 00:45:50,869
actually got to fly them I never got to

1148
00:45:56,529 --> 00:45:55,039
fly Atlantis but but still and I didn't

1149
00:45:59,920 --> 00:45:56,539
think it would be as emotional as it was

1150
00:46:03,009 --> 00:45:59,930
but it really is the team that has

1151
00:46:06,730 --> 00:46:03,019
processed these vehicles their family to

1152
00:46:09,670 --> 00:46:06,740
them and to be with them for this when

1153
00:46:12,249 --> 00:46:09,680
it happens that's special but again it's

1154
00:46:14,230 --> 00:46:12,259
taking great pride I really believe the

1155
00:46:17,140 --> 00:46:14,240
facility that we are going to have that

1156
00:46:20,410 --> 00:46:17,150
opens next year to display this vehicle

1157
00:46:22,599 --> 00:46:20,420
and tell the story of human space flight

1158
00:46:24,849 --> 00:46:22,609
in the shuttle program in the space

1159
00:46:27,279 --> 00:46:24,859
station program what we have done in the

1160
00:46:29,799 --> 00:46:27,289
last 30 years the Hubble Space Telescope

1161
00:46:31,960 --> 00:46:29,809
all of that is going to be encased in

1162
00:46:34,509 --> 00:46:31,970
this new facility it's going to be

1163
00:46:37,569 --> 00:46:34,519

phenomenal and to know that we are going

1164
00:46:40,269 --> 00:46:37,579
to be able to share that share that with

1165
00:46:42,940 --> 00:46:40,279
everybody that comes here that gives me

1166
00:46:45,609 --> 00:46:42,950
great pride that makes me happy so yeah

1167
00:46:47,890 --> 00:46:45,619
it you know it's kind of sad not to see

1168
00:46:49,720 --> 00:46:47,900
it going to fly in space but it really

1169
00:46:51,609 --> 00:46:49,730
makes me glad to know that we're going

1170
00:46:53,620 --> 00:46:51,619
to be able to share that with so many

1171
00:46:55,539 --> 00:46:53,630
millions of people to be able to tell

1172
00:46:58,660 --> 00:46:55,549
that story to let them share and what we

1173
00:47:00,880 --> 00:46:58,670
have experienced and see not only where

1174
00:47:04,779 --> 00:47:00,890
we've been but also the future where

1175
00:47:13,479 --> 00:47:04,789
we're going Julian you have a question

1176
00:47:15,519 --> 00:47:13,489
here Julian Lake America space Bob since

1177
00:47:17,499 --> 00:47:15,529
some boeing has taken opf number three

1178
00:47:19,420 --> 00:47:17,509
over how far along are they from turning

1179
00:47:22,450 --> 00:47:19,430
into a shuttle facility into a

1180
00:47:24,220 --> 00:47:22,460
production facility it's a ways off yet

1181
00:47:28,180 --> 00:47:24,230
space Florida has their contractor in

1182
00:47:29,920 --> 00:47:28,190
there removing all the shuttle hardware

1183
00:47:32,200 --> 00:47:29,930
the the metal that was left in their the

1184
00:47:33,970 --> 00:47:32,210
platforms and stuff so they're their

1185
00:47:35,799 --> 00:47:33,980
ways off before they actually turned

1186
00:47:38,559 --> 00:47:35,809
that into a production facility now

1187
00:47:41,229 --> 00:47:38,569
that's a better question for space

1188
00:47:43,599 --> 00:47:41,239

Florida and their team to know exactly

1189
00:47:45,279 --> 00:47:43,609
what their schedule is I would I know

1190
00:47:47,650 --> 00:47:45,289
roughly what it is but you could get

1191
00:47:55,870 --> 00:47:47,660
more specifics from them so it's a ways

1192
00:48:01,610 --> 00:47:59,000
James Dean floor today a Samana de the

1193
00:48:06,380 --> 00:48:01,620
it's not inexpensive to go see Atlantis

1194
00:48:08,060 --> 00:48:06,390
tomorrow and I assume moving forward is

1195
00:48:09,890 --> 00:48:08,070
there any concern about just how

1196
00:48:12,170 --> 00:48:09,900
accessible atlantis will be and and I

1197
00:48:13,700 --> 00:48:12,180
mean granted a obviously phenomenal

1198
00:48:17,600 --> 00:48:13,710
facility that it's going to wind up in

1199
00:48:19,180 --> 00:48:17,610
and display but it's not like some of

1200
00:48:22,060 --> 00:48:19,190
the other sites where it's you know

1201
00:48:28,300 --> 00:48:22,070
basically free to to go take a look at

1202
00:48:31,220 --> 00:48:28,310
it's free is I believe the Smithsonian

1203
00:48:33,200 --> 00:48:31,230
first off anybody that ever worked on

1204
00:48:35,120 --> 00:48:33,210
the shuttle program gets to come see it

1205
00:48:39,230 --> 00:48:35,130
for free tomorrow we're having a

1206
00:48:40,910 --> 00:48:39,240
celebration and a signing ceremony and I

1207
00:48:43,430 --> 00:48:40,920
have made it clear that anybody that

1208
00:48:45,230 --> 00:48:43,440
ever worked on the shuttle contract or

1209
00:48:49,330 --> 00:48:45,240
government whatever that's been part of

1210
00:48:53,930 --> 00:48:49,340
this program here at KSC gets in to see

1211
00:48:58,040 --> 00:48:53,940
Atlantis tomorrow our visitors complex

1212
00:49:00,380 --> 00:48:58,050
is run without a single taxpayer dollar

1213
00:49:03,350 --> 00:49:00,390

no appropriated funds goes into the

1214
00:49:07,580 --> 00:49:03,360
operation of that visitors complex and

1215
00:49:10,490 --> 00:49:07,590
to be able to display that vehicle in a

1216
00:49:12,140 --> 00:49:10,500
world-class museum facility it has to be

1217
00:49:15,740 --> 00:49:12,150
paid for the Smithsonian runs on

1218
00:49:18,560 --> 00:49:15,750
taxpayer dollars okay the Kennedy

1219
00:49:21,890 --> 00:49:18,570
visitor center does not Delaware North

1220
00:49:25,310 --> 00:49:21,900
is a contractor that operates it us it

1221
00:49:28,370 --> 00:49:25,320
for us but that's all paid for through

1222
00:49:31,880 --> 00:49:28,380
what our visitors pay to get in to see

1223
00:49:33,830 --> 00:49:31,890
it and i think it's a it's a very fine

1224
00:49:37,640 --> 00:49:33,840
facility and it's getting better every

1225
00:49:38,840 --> 00:49:37,650
day but it is wonderful that the

1226
00:49:39,950 --> 00:49:38,850
shuttles will be able to be viewable

1227
00:49:41,900 --> 00:49:39,960
with the gentleman in the back actually

1228
00:49:43,640 --> 00:49:41,910
said that atlantis was dead and I'd like

1229
00:49:45,680 --> 00:49:43,650
to know your thoughts on they are the

1230
00:49:48,200 --> 00:49:45,690
transition on one program to another I

1231
00:49:50,630 --> 00:49:48,210
didn't hear that no way is spaceflight

1232
00:49:53,060 --> 00:49:50,640
dead at the Kennedy Space Center we are

1233
00:49:55,160 --> 00:49:53,070
alive and well and charging forward into

1234
00:49:59,000 --> 00:49:55,170
the future and and I think we have an

1235
00:50:00,590 --> 00:49:59,010
absolutely outstanding future so I don't

1236
00:50:02,960 --> 00:50:00,600
think anything's dead around here even

1237
00:50:04,670 --> 00:50:02,970
the things that maybe aren't flying are

1238
00:50:05,570 --> 00:50:04,680

still alive and well and telling their

1239
00:50:08,510 --> 00:50:05,580
story

1240
00:50:13,550 --> 00:50:08,520
yeah and I would say you know none of

1241
00:50:16,280 --> 00:50:13,560
these vehicles are or dead they all have

1242
00:50:18,560 --> 00:50:16,290
a no new purpose because when you have

1243
00:50:20,810 --> 00:50:18,570
eight year olds go walk around the

1244
00:50:24,470 --> 00:50:20,820
shuttle whether it be a Smithsonian or

1245
00:50:26,810 --> 00:50:24,480
out in California or here and you have

1246
00:50:28,700 --> 00:50:26,820
them with their parents sometimes that

1247
00:50:30,500 --> 00:50:28,710
motivates them enough to go get into

1248
00:50:33,830 --> 00:50:30,510
engineering or go get into teaching or

1249
00:50:37,700 --> 00:50:33,840
go get into sciences when just like

1250
00:50:40,000 --> 00:50:37,710
today before shuttles were in museums

1251
00:50:43,760 --> 00:50:40,010
you went in a Smithsonian and you saw

1252
00:50:45,860 --> 00:50:43,770
Lindbergh's airplane or you saw the we

1253
00:50:49,250 --> 00:50:45,870
saw a capsule from a mercury or an

1254
00:50:50,930 --> 00:50:49,260
Apollo and that motivates kids and

1255
00:50:53,360 --> 00:50:50,940
motivates people to say well this is

1256
00:50:56,240 --> 00:50:53,370
what America can do first and second it

1257
00:50:57,980 --> 00:50:56,250
motivates kids to say hey maybe I can be

1258
00:50:59,600 --> 00:50:57,990
a part of that in the future so I think

1259
00:51:02,150 --> 00:50:59,610
that's the mission for all three of

1260
00:51:03,470 --> 00:51:02,160
these vehicles including enterprise all

1261
00:51:04,910 --> 00:51:03,480
four of these vehicles as they go

1262
00:51:07,970 --> 00:51:04,920
forward is really to go help the next

1263
00:51:09,980 --> 00:51:07,980

generation of astronauts and explorers

1264
00:51:12,740 --> 00:51:09,990
and engineers I couldn't agree more and

1265
00:51:14,840 --> 00:51:12,750
when I was five years old we took a

1266
00:51:17,570 --> 00:51:14,850
train trip from Minneapolis to Baltimore

1267
00:51:20,150 --> 00:51:17,580
Maryland to see my my aunt my mom's

1268
00:51:23,480 --> 00:51:20,160
sister and we went to the Smithsonian

1269
00:51:25,550 --> 00:51:23,490
and I'm not kidding I remember

1270
00:51:27,260 --> 00:51:25,560
distinctly looking up and seeing the

1271
00:51:30,530 --> 00:51:27,270
spirit of st. Louis and the Wright Flyer

1272
00:51:32,630 --> 00:51:30,540
hanging from the ceiling and I said I

1273
00:51:34,130 --> 00:51:32,640
want to fly and I mean Charles Lindbergh

1274
00:51:35,630 --> 00:51:34,140
became one of my heroes he grew up in

1275
00:51:37,190 --> 00:51:35,640
Little Falls Minnesota I remember

1276
00:51:40,010 --> 00:51:37,200
driving through seeing the statue of him

1277
00:51:42,500 --> 00:51:40,020
on the way to the family farm and you

1278
00:51:45,020 --> 00:51:42,510
know that that sparked that initial

1279
00:51:49,220 --> 00:51:45,030
interest in wanting to fly and it worked

1280
00:51:51,380 --> 00:51:49,230
out for me we have another question for

1281
00:51:53,570 --> 00:51:51,390
the audience Phillips lost with NASA

1282
00:51:56,180 --> 00:51:53,580
Space Flight calm I think this is where

1283
00:51:57,890 --> 00:51:56,190
mr. Cabana um can you talk about what's

1284
00:52:00,890 --> 00:51:57,900
going to happen to the other to order

1285
00:52:04,010 --> 00:52:00,900
processing facility bays and also

1286
00:52:05,090 --> 00:52:04,020
there's the other integration cell in

1287
00:52:06,650 --> 00:52:05,100
the vehicle something what's going to

1288
00:52:10,220 --> 00:52:06,660

happen with high bay one and I guess

1289
00:52:12,590 --> 00:52:10,230
sabe too used to be a safe haven or are

1290
00:52:14,480 --> 00:52:12,600
these already plans for those at the

1291
00:52:18,270 --> 00:52:14,490
moment we're working in agreement for

1292
00:52:20,850 --> 00:52:18,280
opf Bay's one and two and hopefully

1293
00:52:23,340 --> 00:52:20,860
I'll have something soon here that I can

1294
00:52:25,080 --> 00:52:23,350
share with everybody but I think I think

1295
00:52:27,750 --> 00:52:25,090
folks are going to be happy with how

1296
00:52:29,880 --> 00:52:27,760
that all works out high bay one is

1297
00:52:31,830 --> 00:52:29,890
available for a commercial operator if

1298
00:52:33,660 --> 00:52:31,840
we've made that known to folks if

1299
00:52:38,940 --> 00:52:33,670
somebody would want to move in there and

1300
00:52:41,070 --> 00:52:38,950
utilize that it's there you know i'm not

1301
00:52:43,920 --> 00:52:41,080
sure that there's enough of a business

1302
00:52:47,310 --> 00:52:43,930
to have high bay 2 available also but

1303
00:52:49,170 --> 00:52:47,320
you know we've we've been very clear on

1304
00:52:52,020 --> 00:52:49,180
the facilities that we have available

1305
00:52:54,900 --> 00:52:52,030
and working in partnership with the

1306
00:52:56,640 --> 00:52:54,910
commercial industry and in the state

1307
00:53:02,060 --> 00:52:56,650
we're moving forward to make some of

1308
00:53:04,380 --> 00:53:02,070
that happen in hobby one for instance

1309
00:53:06,840 --> 00:53:04,390
will the shuttle platforms and that high

1310
00:53:08,820 --> 00:53:06,850
bay then stay in place for the time

1311
00:53:10,800 --> 00:53:08,830
being I am NOT going to pay to remove

1312
00:53:13,950 --> 00:53:10,810
them I have no use for that if somebody

1313
00:53:16,290 --> 00:53:13,960

wanted to come in and modify that for

1314
00:53:17,670 --> 00:53:16,300
another commercial rocket it would be at

1315
00:53:20,850 --> 00:53:17,680
their expense not the government's

1316
00:53:22,950 --> 00:53:20,860
expense we can't we can't afford that we

1317
00:53:25,920 --> 00:53:22,960
are making high bay 3 is going to be our

1318
00:53:28,250 --> 00:53:25,930
heavy lift high bay right now based on

1319
00:53:33,510 --> 00:53:28,260
the manifest that we see looking forward

1320
00:53:35,280 --> 00:53:33,520
one bay is plenty for stacking a rocket

1321
00:53:39,150 --> 00:53:35,290
between launches to meet our commitments

1322
00:53:40,890 --> 00:53:39,160
if someday in the future you know things

1323
00:53:42,780 --> 00:53:40,900
are really picking up and we're

1324
00:53:48,330 --> 00:53:42,790
launching big rockets all the time then

1325
00:53:49,260 --> 00:53:48,340
we can invest in high bay one also are

1326
00:53:51,180 --> 00:53:49,270
there any other questions in the

1327
00:53:58,830 --> 00:53:51,190
audience James will give you the last

1328
00:54:02,610 --> 00:53:58,840
one so just of course with Election Day

1329
00:54:04,680 --> 00:54:02,620
coming up have to ask if you know last

1330
00:54:07,020 --> 00:54:04,690
go-around saw some pretty big changes

1331
00:54:08,970 --> 00:54:07,030
for NASA ed you know probably wouldn't

1332
00:54:10,950 --> 00:54:08,980
be sitting here in this position if it

1333
00:54:14,640 --> 00:54:10,960
weren't for that what are the feelings

1334
00:54:16,350 --> 00:54:14,650
about if there's a change next week and

1335
00:54:20,160 --> 00:54:16,360
what the impacts might be and

1336
00:54:23,670 --> 00:54:20,170
uncertainty that all creates well first

1337
00:54:25,710 --> 00:54:23,680
off I won't speculate anyway and on how

1338
00:54:28,080 --> 00:54:25,720

things turn out all I can say is that we

1339
00:54:30,750 --> 00:54:28,090
have worked extremely hard as an agency

1340
00:54:32,080 --> 00:54:30,760
to come up with an architecture that

1341
00:54:34,030 --> 00:54:32,090
meets

1342
00:54:36,460 --> 00:54:34,040
esses and our country's need for the

1343
00:54:39,250 --> 00:54:36,470
future it supplies a heavy lift platform

1344
00:54:42,670 --> 00:54:39,260
that allows us to explore it enables

1345
00:54:45,610 --> 00:54:42,680
commercial space it keeps our science

1346
00:54:47,080 --> 00:54:45,620
community viable with expendable

1347
00:54:51,580 --> 00:54:47,090
launches through our launch services

1348
00:54:53,560 --> 00:54:51,590
program it's doing research technology

1349
00:54:56,410 --> 00:54:53,570
and development that furthers our

1350
00:54:58,090 --> 00:54:56,420
nation's goals and we are going to

1351
00:54:59,580 --> 00:54:58,100
continue to do that that's what we've

1352
00:55:01,750 --> 00:54:59,590
always done through all many

1353
00:55:04,180 --> 00:55:01,760
administrations and I see NASA

1354
00:55:06,310 --> 00:55:04,190
continuing to persevere and lead the way

1355
00:55:10,210 --> 00:55:06,320
in science and technology and space

1356
00:55:11,710 --> 00:55:10,220
exploration with that we're starting to

1357
00:55:13,300 --> 00:55:11,720
run out of our time so I'll give each of

1358
00:55:15,880 --> 00:55:13,310
you an opportunity to have some closing

1359
00:55:19,120 --> 00:55:15,890
remarks I think I pretty much said it

1360
00:55:22,740 --> 00:55:19,130
all Kendra thanks for the opportunity to

1361
00:55:25,030 --> 00:55:22,750
come here and share with you today I

1362
00:55:29,200 --> 00:55:25,040
truly believe we have an outstanding

1363
00:55:31,330 --> 00:55:29,210

future we are moving forward at a great

1364
00:55:32,710 --> 00:55:31,340
pace great things are happening and

1365
00:55:35,560 --> 00:55:32,720
we're going to continue to do that here

1366
00:55:37,240 --> 00:55:35,570
on the Space Coast and I hope you've

1367
00:55:39,640 --> 00:55:37,250
seen that there is a future in human

1368
00:55:41,350 --> 00:55:39,650
space flight a lot of folks think that

1369
00:55:43,900 --> 00:55:41,360
since the shuttle is gone that human

1370
00:55:47,530 --> 00:55:43,910
spaceflights dead but it is far from

1371
00:55:50,980 --> 00:55:47,540
dead were we're alive and kicking we're

1372
00:55:52,540 --> 00:55:50,990
on orbit every day with with the

1373
00:55:54,940 --> 00:55:52,550
International Space Station with our

1374
00:55:56,470 --> 00:55:54,950
international partners we've got a great

1375
00:55:58,900 --> 00:55:56,480
coalition they're interested in

1376
00:56:02,250 --> 00:55:58,910
exploration and we're talking with our

1377
00:56:06,550 --> 00:56:02,260
partners about ways that they might

1378
00:56:08,170 --> 00:56:06,560
might join us in the exploration so I

1379
00:56:10,680 --> 00:56:08,180
think the future is bright and I

1380
00:56:13,090 --> 00:56:10,690
appreciate you all coming today and

1381
00:56:16,000 --> 00:56:13,100
absolutely the futures is very bright

1382
00:56:17,440 --> 00:56:16,010
and I do think that when industry and

1383
00:56:19,930 --> 00:56:17,450
business get together with the

1384
00:56:22,450 --> 00:56:19,940
government we can do great things and I

1385
00:56:24,520 --> 00:56:22,460
think that's where the future lies for

1386
00:56:26,560 --> 00:56:24,530
low Earth orbit the whole purpose of

1387
00:56:29,170 --> 00:56:26,570
what we're doing with Commercial Crew is

1388
00:56:31,570 --> 00:56:29,180

is not just for NASA it's really to go

1389
00:56:33,790 --> 00:56:31,580
create a capability for anybody to get

1390
00:56:36,460 --> 00:56:33,800
to low-earth orbit and go create a way

1391
00:56:38,350 --> 00:56:36,470
a for business to expand within the

1392
00:56:40,600 --> 00:56:38,360
earth orbit you know the airline

1393
00:56:42,250 --> 00:56:40,610
industry was started with airmail by the

1394
00:56:44,530 --> 00:56:42,260
government and and then eventually

1395
00:56:46,720 --> 00:56:44,540
became an industry thing and a private

1396
00:56:49,180 --> 00:56:46,730
company thing and eventually became very

1397
00:56:51,910 --> 00:56:49,190
commercial so I think the commercial

1398
00:56:53,530 --> 00:56:51,920
part of the NASA portfolio is all about

1399
00:56:55,480 --> 00:56:53,540
being on a threshold of starting that

1400
00:56:57,880 --> 00:56:55,490
business environment for low Earth orbit

1401
00:57:00,340 --> 00:56:57,890
and creating a transportation system to

1402
00:57:02,770 --> 00:57:00,350
really exploit that business capability

1403
00:57:04,150 --> 00:57:02,780
in low-earth orbit well with that will

1404
00:57:05,530 --> 00:57:04,160
conclude today's discussion gentlemen

1405
00:57:07,360 --> 00:57:05,540
thank you for your time in your thoughts