



# ETA Assembly



☛ The Engineering Test Article (ETA) was assembled and tested in Colorado



1  
00:00:18,230 --> 00:00:16,470  
good afternoon and welcome everybody to

2  
00:00:21,120 --> 00:00:18,240  
NASA's Kennedy Space Center in Florida

3  
00:00:24,240 --> 00:00:21,130  
we wanted to take this opportunity now

4  
00:00:25,769 --> 00:00:24,250  
that the calendar has turned to 2013 to

5  
00:00:28,830 --> 00:00:25,779  
give you an update on the status of

6  
00:00:31,500 --> 00:00:28,840  
NASA's Commercial Crew program reviewing

7  
00:00:33,479 --> 00:00:31,510  
the accomplishments of 2012 and also

8  
00:00:36,360 --> 00:00:33,489  
providing a look ahead to what's to come

9  
00:00:37,950 --> 00:00:36,370  
in 2013 we've assembled a panel of

10  
00:00:40,049 --> 00:00:37,960  
experts here to provide this update

11  
00:00:41,790 --> 00:00:40,059  
today and after they give you an update

12  
00:00:44,430 --> 00:00:41,800  
will be happy to take questions from

13  
00:00:46,920 --> 00:00:44,440

Kennedy Space Center as well as the

14  
00:00:50,490 --> 00:00:46,930  
Johnson Space Center phone bridge and on

15  
00:00:52,410 --> 00:00:50,500  
twitter with the hashtag ask nasa so

16  
00:00:54,719 --> 00:00:52,420  
we'll go ahead and get things underway

17  
00:00:57,960 --> 00:00:54,729  
I'd like to introduce our panel to my

18  
00:01:03,180 --> 00:00:57,970  
left ed mango NASA's Commercial Crew

19  
00:01:07,770 --> 00:01:03,190  
program manager and to Ed's left Phil

20  
00:01:09,300 --> 00:01:07,780  
McAllister NASA Commercial Crew or NASA

21  
00:01:14,219 --> 00:01:09,310  
commercial spaceflight development

22  
00:01:20,220 --> 00:01:14,229  
director next is Rob Myerson Blue Origin

23  
00:01:22,500 --> 00:01:20,230  
president and program manager John

24  
00:01:24,450 --> 00:01:22,510  
Mulholland The Boeing Company commercial

25  
00:01:30,780 --> 00:01:24,460  
programs space exploration vice

26  
00:01:33,300 --> 00:01:30,790  
president and program manager Mark sir

27  
00:01:39,660 --> 00:01:33,310  
angelo sierra nevada corporation vice

28  
00:01:46,289 --> 00:01:43,020  
and garrett reisman SpaceX Commercial

29  
00:01:47,940 --> 00:01:46,299  
Crew project manager thank you all for

30  
00:01:50,850 --> 00:01:47,950  
joining us and we'll get underway with

31  
00:01:53,070 --> 00:01:50,860  
mr. mango I good afternoon everyone and

32  
00:01:55,320 --> 00:01:53,080  
thank you for taking the opportunity to

33  
00:01:57,060 --> 00:01:55,330  
let us tell you about our Commercial

34  
00:01:59,430 --> 00:01:57,070  
Crew activities over the last year and

35  
00:02:00,840 --> 00:01:59,440  
what we'll be doing in the future see we

36  
00:02:02,520 --> 00:02:00,850  
have a few things you do want to talk

37  
00:02:04,200 --> 00:02:02,530  
about we want to update you and where

38  
00:02:06,600 --> 00:02:04,210

the program is at today and our

39

00:02:09,419 --> 00:02:06,610

commercial crew program Phil is going to

40

00:02:11,280 --> 00:02:09,429

be doing a lot of that also we asked all

41

00:02:12,809 --> 00:02:11,290

the partners to come and join us today

42

00:02:14,790 --> 00:02:12,819

to talk about what they have

43

00:02:16,170 --> 00:02:14,800

accomplished in 2012 it has been an

44

00:02:18,150 --> 00:02:16,180

unbelievable year for the Commercial

45

00:02:20,580 --> 00:02:18,160

Crew program and what they expect to

46

00:02:23,030 --> 00:02:20,590

accomplish in 2013 as we continue to

47

00:02:24,780 --> 00:02:23,040

progress towards human spaceflight

48

00:02:27,330 --> 00:02:24,790

transportation from the United States

49

00:02:29,340 --> 00:02:27,340

and then I'll come back and talk about a

50

00:02:30,960 --> 00:02:29,350

new initiative that is going to be

51  
00:02:35,130 --> 00:02:30,970  
kicking off here in a few weeks called

52  
00:02:36,630 --> 00:02:35,140  
the certification products contract we

53  
00:02:38,009 --> 00:02:36,640  
awarded that back in December and we'll

54  
00:02:40,050 --> 00:02:38,019  
be picking that up here in a few weeks

55  
00:02:42,840 --> 00:02:40,060  
I'll talk about that and also talk about

56  
00:02:44,580 --> 00:02:42,850  
our planning our final are planning for

57  
00:02:47,250 --> 00:02:44,590  
our final development and certification

58  
00:02:49,440 --> 00:02:47,260  
effort so first are coming over to fill

59  
00:02:52,500 --> 00:02:49,450  
and you can talk about where r at as an

60  
00:02:54,750 --> 00:02:52,510  
overall initiative okay thanks said it's

61  
00:02:57,030 --> 00:02:54,760  
good to be back in florida and i'm going

62  
00:03:00,330 --> 00:02:57,040  
to be talking mostly about sort of the

63  
00:03:01,620 --> 00:03:00,340

strategic aspect of our partnership the

64

00:03:03,509 --> 00:03:01,630

partners down in my left they're going

65

00:03:05,160 --> 00:03:03,519

to be talking you to you more tactically

66

00:03:06,900 --> 00:03:05,170

about the things specifically that

67

00:03:07,830 --> 00:03:06,910

happened on their technical programs and

68

00:03:10,860 --> 00:03:07,840

i'm sure that's what you're most

69

00:03:13,199 --> 00:03:10,870

interested in but partnerships are very

70

00:03:15,150 --> 00:03:13,209

difficult there are even difficult when

71

00:03:16,680 --> 00:03:15,160

you have to private sector entities but

72

00:03:18,539 --> 00:03:16,690

in this case we have a public-private

73

00:03:21,330 --> 00:03:18,549

partnership which mutant makes the

74

00:03:23,789 --> 00:03:21,340

challenges even greater in some cases so

75

00:03:28,080 --> 00:03:23,799

nASA has put in place several strategies

76

00:03:30,690 --> 00:03:28,090

to ensure or to at least help ensure

77

00:03:32,460 --> 00:03:30,700

that the partnership would be successful

78

00:03:35,670 --> 00:03:32,470

and I want to touch on several of those

79

00:03:37,289 --> 00:03:35,680

before i do i do want to stress the goal

80

00:03:38,759 --> 00:03:37,299

of the program everything kind of flows

81

00:03:40,860 --> 00:03:38,769

from that so almost all of my

82

00:03:42,809 --> 00:03:40,870

presentations start with the goal which

83

00:03:44,190 --> 00:03:42,819

for NASA is to facilitate the

84

00:03:46,710 --> 00:03:44,200

development of a crew transportation

85

00:03:48,930 --> 00:03:46,720

system capable of flying too low Earth

86

00:03:51,240 --> 00:03:48,940

orbit into the international space

87

00:03:53,040 --> 00:03:51,250

station for a variety customer so we

88

00:03:54,960 --> 00:03:53,050

aren't doing the development

89

00:03:56,340 --> 00:03:54,970

we are facilitating that development and

90

00:03:58,440 --> 00:03:56,350

that's where the partnership comes into

91

00:04:01,230 --> 00:03:58,450

place because nASA has some unique

92

00:04:02,640 --> 00:04:01,240

capabilities to help and the partners

93

00:04:03,990 --> 00:04:02,650

bring their unique capabilities and

94

00:04:06,300 --> 00:04:04,000

through the combination we hope to do

95

00:04:08,910 --> 00:04:06,310

this very quickly very cost-effectively

96

00:04:10,020 --> 00:04:08,920

and very safely so the the aspects of

97

00:04:11,490 --> 00:04:10,030

the partnership that I'm going to touch

98

00:04:13,260 --> 00:04:11,500

on very quickly so we can get to the

99

00:04:15,750 --> 00:04:13,270

good stuff are the settlement items you

100

00:04:18,030 --> 00:04:15,760

see you see listed financial investments

101  
00:04:20,220 --> 00:04:18,040  
the quarterly reviews and milestones the

102  
00:04:21,840 --> 00:04:20,230  
partner integration teams technical

103  
00:04:23,630 --> 00:04:21,850  
interchange meetings reimbursable Space

104  
00:04:26,190 --> 00:04:23,640  
Act agreements data sharing and

105  
00:04:29,610 --> 00:04:26,200  
requirements application so let's go to

106  
00:04:31,260 --> 00:04:29,620  
the next slide obviously the financial

107  
00:04:34,080 --> 00:04:31,270  
investment is the thing that gets the

108  
00:04:36,840 --> 00:04:34,090  
most attention them and the money is

109  
00:04:38,790 --> 00:04:36,850  
critical obviously to date through four

110  
00:04:40,700 --> 00:04:38,800  
different through four different

111  
00:04:44,640 --> 00:04:40,710  
activities we have awarded approximately

112  
00:04:47,640 --> 00:04:44,650  
1.5 billion dollars to help get us to a

113  
00:04:49,410 --> 00:04:47,650

## US commercial crew transportation system

114

00:04:51,030 --> 00:04:49,420

not all of this has been paid out as you

115

00:04:53,310 --> 00:04:51,040

can see a good portion of that is in the

116

00:04:57,720 --> 00:04:53,320

icap awards which are going on for about

117

00:04:59,220 --> 00:04:57,730

another year and some change and most

118

00:05:00,750 --> 00:04:59,230

recently you can see we made a small

119

00:05:02,580 --> 00:05:00,760

award for the certification products

120

00:05:04,440 --> 00:05:02,590

contract that's a key one that Ed is

121

00:05:07,200 --> 00:05:04,450

going to talk about there but through

122

00:05:09,540 --> 00:05:07,210

these series of investments quite a lot

123

00:05:11,340 --> 00:05:09,550

of money to start off with still got

124

00:05:12,960 --> 00:05:11,350

some more to go but this represents a

125

00:05:16,409 --> 00:05:12,970

pretty sizable investment that we hope

126

00:05:19,290 --> 00:05:16,419

will will enable our partners to bring

127

00:05:21,270 --> 00:05:19,300

these to bear more quickly so the next

128

00:05:24,060 --> 00:05:21,280

the next area the partnership is

129

00:05:26,340 --> 00:05:24,070

obviously the milestones next slide the

130

00:05:28,770 --> 00:05:26,350

milestones are the formal mechanisms in

131

00:05:30,420 --> 00:05:28,780

the Space Act agreements themselves that

132

00:05:32,580 --> 00:05:30,430

allow NASA to assess our partner

133

00:05:34,020 --> 00:05:32,590

progress you do not need to read the

134

00:05:35,580 --> 00:05:34,030

graphic that's really just a

135

00:05:38,040 --> 00:05:35,590

representation of the schedule for the

136

00:05:39,150 --> 00:05:38,050

next year and a half and you can see

137

00:05:40,200 --> 00:05:39,160

there's a lot of tick marks you

138

00:05:41,850 --> 00:05:40,210

obviously don't need to read the tick

139

00:05:43,440 --> 00:05:41,860

marks but there's a lot of them those

140

00:05:47,700 --> 00:05:43,450

tick marks represent either a milestone

141

00:05:49,710 --> 00:05:47,710

or a quarterly review and the the

142

00:05:51,630 --> 00:05:49,720

milestones are key because that's where

143

00:05:54,090 --> 00:05:51,640

the money gets paid out right with these

144

00:05:56,550 --> 00:05:54,100

these agreements they're not grants they

145

00:05:58,200 --> 00:05:56,560

are not loans they are paid for

146

00:05:59,850 --> 00:05:58,210

performance milestones so the partners

147

00:06:02,490 --> 00:05:59,860

only get paid when they show

148

00:06:03,930 --> 00:06:02,500

demonstrative progress towards

149

00:06:06,420 --> 00:06:03,940

developing their crew transportation

150

00:06:09,720 --> 00:06:06,430

system and that's what's important for

151  
00:06:12,120 --> 00:06:09,730  
so so this is a key a key area where the

152  
00:06:13,680 --> 00:06:12,130  
milestones allow us to ensure that the

153  
00:06:17,460 --> 00:06:13,690  
partners are making good progress are

154  
00:06:19,110 --> 00:06:17,470  
making good use of our money and that is

155  
00:06:21,180 --> 00:06:19,120  
the formal mechanism by which they are

156  
00:06:22,920 --> 00:06:21,190  
paid in addition we also have quarterly

157  
00:06:25,980 --> 00:06:22,930  
reviews and that's more of a management

158  
00:06:27,600 --> 00:06:25,990  
activity that allows us and the

159  
00:06:29,550 --> 00:06:27,610  
Commercial Crew program management team

160  
00:06:32,730 --> 00:06:29,560  
to assess again the partnership as a

161  
00:06:34,260 --> 00:06:32,740  
whole it's great to get these individual

162  
00:06:37,170 --> 00:06:34,270  
milestones and see how they're going but

163  
00:06:38,880 --> 00:06:37,180

we also we need to take care and feed

164

00:06:40,260 --> 00:06:38,890

the partnership and that's what the

165

00:06:42,210 --> 00:06:40,270

Quarterly's allow us to do we get

166

00:06:44,340 --> 00:06:42,220

together every three months talk about

167

00:06:46,590 --> 00:06:44,350

their overall progress has there been

168

00:06:48,540 --> 00:06:46,600

any changes any problems that have

169

00:06:50,220 --> 00:06:48,550

cropped up and allow us to really talk

170

00:06:51,750 --> 00:06:50,230

about the overall effort for each one of

171

00:06:55,590 --> 00:06:51,760

our partners so that turns out to be a

172

00:06:57,180 --> 00:06:55,600

good activity as well next slide you

173

00:06:59,430 --> 00:06:57,190

know a lot of people I believe think

174

00:07:01,410 --> 00:06:59,440

partnerships are really just about

175

00:07:02,790 --> 00:07:01,420

mission statements and core competencies

176  
00:07:04,800 --> 00:07:02,800  
they really aren't there really about

177  
00:07:06,150 --> 00:07:04,810  
relationships and the partner

178  
00:07:08,100 --> 00:07:06,160  
integration teams are where those

179  
00:07:11,160 --> 00:07:08,110  
relationships really take hold they're

180  
00:07:12,780 --> 00:07:11,170  
the face of the agreements they are the

181  
00:07:14,970 --> 00:07:12,790  
ones sort of on the ground floor with

182  
00:07:18,930 --> 00:07:14,980  
our partners work in day-to-day on their

183  
00:07:20,640 --> 00:07:18,940  
efforts we have partner or part of the

184  
00:07:22,410 --> 00:07:20,650  
partner integration teams represent a

185  
00:07:24,120 --> 00:07:22,420  
multitude of discipline so that's what

186  
00:07:25,740 --> 00:07:24,130  
you see in the right-hand graphic they

187  
00:07:28,770 --> 00:07:25,750  
represent engineering health and medical

188  
00:07:31,580 --> 00:07:28,780

safety ground system launch systems crew

189

00:07:34,980 --> 00:07:31,590

crew office all those capabilities are

190

00:07:38,610 --> 00:07:34,990

available and accessible to the partners

191

00:07:40,380 --> 00:07:38,620

and on a more regular basis they don't

192

00:07:42,600 --> 00:07:40,390

provide direction but they are very

193

00:07:44,550 --> 00:07:42,610

available to provide lessons learned in

194

00:07:46,620 --> 00:07:44,560

history and experience with our partners

195

00:07:48,990 --> 00:07:46,630

on a day-to-day basis and the partners

196

00:07:51,390 --> 00:07:49,000

help us gain the insight that NASA field

197

00:07:53,340 --> 00:07:51,400

it needs to in order in order to assess

198

00:07:54,690 --> 00:07:53,350

how the partners are really doing so

199

00:07:57,390 --> 00:07:54,700

they're kind of an independent check for

200

00:07:59,760 --> 00:07:57,400

us to really understand the nature of

201

00:08:01,200 --> 00:07:59,770

the system how well these tests are

202

00:08:03,630 --> 00:08:01,210

being performed how well our partners

203

00:08:05,490 --> 00:08:03,640

are progressing so it's really a two-way

204

00:08:06,960 --> 00:08:05,500

street that the partners help the help

205

00:08:08,970 --> 00:08:06,970

I'm sorry the partner integration teams

206

00:08:13,740 --> 00:08:08,980

help our companies but also help NASA

207

00:08:16,500 --> 00:08:13,750

next slide you know when we need to do a

208

00:08:18,420 --> 00:08:16,510

deep dive on certain technical areas or

209

00:08:19,830 --> 00:08:18,430

issues that's where we use technical

210

00:08:20,340 --> 00:08:19,840

interchange meetings and these have

211

00:08:25,800 --> 00:08:20,350

turned out

212

00:08:28,650 --> 00:08:25,810

be very very productive very positive

213

00:08:30,660 --> 00:08:28,660

aspects of the partnership it's always

214

00:08:32,700 --> 00:08:30,670

good to exchange information on a day to

215

00:08:35,930 --> 00:08:32,710

day days basis but some of these issues

216

00:08:38,219 --> 00:08:35,940

that crop up can be very challenging

217

00:08:39,630 --> 00:08:38,229

complicated and for those you might want

218

00:08:41,250 --> 00:08:39,640

to get a bunch of people together the

219

00:08:42,839 --> 00:08:41,260

partners come with their people NASA

220

00:08:46,380 --> 00:08:42,849

bring some technical experts that are

221

00:08:48,270 --> 00:08:46,390

outside of the regular pit teams but may

222

00:08:50,250 --> 00:08:48,280

have specific information into a

223

00:08:52,080 --> 00:08:50,260

specific subject matter and you can

224

00:08:54,420 --> 00:08:52,090

really make a lot of progress in one or

225

00:08:56,430 --> 00:08:54,430

two days we have had dozens of these

226

00:08:57,450 --> 00:08:56,440

Timbs with our various partners and

227

00:09:01,370 --> 00:08:57,460

they've covered everything from

228

00:09:04,560 --> 00:09:01,380

propulsion to avionics to ground systems

229

00:09:06,240 --> 00:09:04,570

just about anything that is really can

230

00:09:07,950 --> 00:09:06,250

be difficult we've probably had a Tim on

231

00:09:09,960 --> 00:09:07,960

or maybe multiple Tim's on so that's

232

00:09:13,400 --> 00:09:09,970

turned out to be again a good positive

233

00:09:17,490 --> 00:09:13,410

face-to-face exchange of information

234

00:09:19,710 --> 00:09:17,500

next slide reimbursable Space Act

235

00:09:23,480 --> 00:09:19,720

agreements this is a real win-win in my

236

00:09:26,070 --> 00:09:23,490

opinion where NASA has unique

237

00:09:27,990 --> 00:09:26,080

underutilized infrastructure whether

238

00:09:29,910 --> 00:09:28,000

that be facilities or personnel or

239

00:09:31,920 --> 00:09:29,920

equipment we can make them available to

240

00:09:34,200 --> 00:09:31,930

our partners on a cost reimbursable

241

00:09:36,960 --> 00:09:34,210

basis so the partners actually reimburse

242

00:09:39,120 --> 00:09:36,970

us for their direct costs associated

243

00:09:40,860 --> 00:09:39,130

with using our equipment maybe it's a

244

00:09:42,570 --> 00:09:40,870

test and maybe it's a wind tunnel or

245

00:09:44,820 --> 00:09:42,580

something like that or maybe it's even

246

00:09:47,820 --> 00:09:44,830

our technology or our people who have a

247

00:09:50,640 --> 00:09:47,830

unique expertise and may not be fully

248

00:09:51,810 --> 00:09:50,650

utilized at that point nASA has a lot of

249

00:09:53,760 --> 00:09:51,820

infrastructure that's something that's

250

00:09:56,160 --> 00:09:53,770

got a lot of press these days and this

251  
00:09:57,930 --> 00:09:56,170  
is a great way for our partners to not

252  
00:10:01,400 --> 00:09:57,940  
have to recreate all that infrastructure

253  
00:10:03,660 --> 00:10:01,410  
and also allows us to more fully

254  
00:10:06,600 --> 00:10:03,670  
leverage some of the infrastructure that

255  
00:10:08,400 --> 00:10:06,610  
may not be used one hundred percent so

256  
00:10:09,930 --> 00:10:08,410  
this has been a real win-win you can see

257  
00:10:12,600 --> 00:10:09,940  
as of this is right this is just a

258  
00:10:13,860 --> 00:10:12,610  
snapshot of the number of agreements we

259  
00:10:15,900 --> 00:10:13,870  
have with all of our partners at the

260  
00:10:18,060 --> 00:10:15,910  
various centers there's 28 now there's

261  
00:10:21,240 --> 00:10:18,070  
been more that have that we've had and

262  
00:10:23,340 --> 00:10:21,250  
have been completed so probably close to

263  
00:10:24,990 --> 00:10:23,350

50 agreements just among our Commercial

264

00:10:26,940 --> 00:10:25,000

Crew partners that have allowed them to

265

00:10:28,770 --> 00:10:26,950

leverage our capability and allowed NASA

266

00:10:31,740 --> 00:10:28,780

to make those capabilities and and

267

00:10:33,090 --> 00:10:31,750

equipment available so that's been a

268

00:10:36,590 --> 00:10:33,100

real positive

269

00:10:40,080 --> 00:10:36,600

like I said win-win in my opinion

270

00:10:41,790 --> 00:10:40,090

next-to-last next slide is data sharing

271

00:10:44,190 --> 00:10:41,800

data when I that's sort of a catch-all

272

00:10:47,190 --> 00:10:44,200

term it means reports it means analyses

273

00:10:50,070 --> 00:10:47,200

maybe a test result we have a lot of

274

00:10:51,420 --> 00:10:50,080

data at NASA from Apollo all the way

275

00:10:53,520 --> 00:10:51,430

through shuttle all the way to

276

00:10:54,810 --> 00:10:53,530

constellation a lot of data on human

277

00:10:56,850 --> 00:10:54,820

spaceflight and we can make that

278

00:10:59,550 --> 00:10:56,860

available upon request from our partners

279

00:11:02,690 --> 00:10:59,560

to date our for partners either through

280

00:11:05,730 --> 00:11:02,700

CC dev or CC icap have made over a

281

00:11:09,150 --> 00:11:05,740

thousand requests for data and we are

282

00:11:11,220 --> 00:11:09,160

accommodating those as best we can it

283

00:11:12,570 --> 00:11:11,230

really helps the partners obviously

284

00:11:14,130 --> 00:11:12,580

because then they don't have to reinvent

285

00:11:16,590 --> 00:11:14,140

the wheel they don't have to redo a test

286

00:11:18,510 --> 00:11:16,600

it helps NASA because it saves us money

287

00:11:21,450 --> 00:11:18,520

if our partners who don't have to redo

288

00:11:23,700 --> 00:11:21,460

the test it saves them money it saves us

289

00:11:25,770 --> 00:11:23,710

money it also helps the nation the

290

00:11:27,720 --> 00:11:25,780

nation gets the benefit of NASA's

291

00:11:30,000 --> 00:11:27,730

investment multiple times not just from

292

00:11:32,220 --> 00:11:30,010

what its original purpose was but we get

293

00:11:33,960 --> 00:11:32,230

to sort of repurpose that information

294

00:11:35,730 --> 00:11:33,970

for our partners again so they don't

295

00:11:38,010 --> 00:11:35,740

have to reinvent the wheel and we can do

296

00:11:41,160 --> 00:11:38,020

this in a more cost-effective fashion I

297

00:11:44,310 --> 00:11:41,170

see this again as a real super win-win

298

00:11:45,900 --> 00:11:44,320

for both NASA and our partners and then

299

00:11:48,060 --> 00:11:45,910

lastly I won't go into too much detail

300

00:11:50,760 --> 00:11:48,070

because this is where Ed's going to talk

301  
00:11:53,580 --> 00:11:50,770  
mostly is a requirements application we

302  
00:11:55,320 --> 00:11:53,590  
just a awarded the certification

303  
00:11:56,970 --> 00:11:55,330  
products contracting for the first time

304  
00:11:58,760 --> 00:11:56,980  
it gives us a formal mechanism by which

305  
00:12:00,840 --> 00:11:58,770  
we can apply these requirements

306  
00:12:03,540 --> 00:12:00,850  
disposition them and give feedback to

307  
00:12:05,730 --> 00:12:03,550  
our partners about how well their design

308  
00:12:07,470 --> 00:12:05,740  
meets our requirements so that we can be

309  
00:12:11,160 --> 00:12:07,480  
ensured that we get what we want at the

310  
00:12:13,350 --> 00:12:11,170  
end of this partnership phase and then

311  
00:12:15,210 --> 00:12:13,360  
just to wrap up I hope I made it within

312  
00:12:17,370 --> 00:12:15,220  
10 minutes I didn't get the hook yet so

313  
00:12:19,590 --> 00:12:17,380

i guess i'm good just to wrap up i do

314

00:12:21,180 --> 00:12:19,600

need to stress that the Commercial Crew

315

00:12:22,830 --> 00:12:21,190

program and our efforts to low-earth

316

00:12:24,630 --> 00:12:22,840

orbit including the International Space

317

00:12:27,120 --> 00:12:24,640

Station are just one part of NASA's

318

00:12:30,330 --> 00:12:27,130

overall strategy we obviously have a

319

00:12:31,860 --> 00:12:30,340

deep space exploration strategy that the

320

00:12:33,690 --> 00:12:31,870

programs that are supporting those are

321

00:12:35,820 --> 00:12:33,700

the Space Launch System and the Orion

322

00:12:37,940 --> 00:12:35,830

multi-purpose crew vehicle so we have a

323

00:12:40,110 --> 00:12:37,950

complimentary dual strategy at NASA

324

00:12:41,880 --> 00:12:40,120

letting the private sector take a little

325

00:12:43,740 --> 00:12:41,890

bit more responsibility for low Earth

326  
00:12:46,620 --> 00:12:43,750  
orbit and International Space Station

327  
00:12:48,240 --> 00:12:46,630  
cargo and crew resupply while still

328  
00:12:50,850 --> 00:12:48,250  
NASA sort of retains its more

329  
00:12:52,920 --> 00:12:50,860  
traditional role in the deep space

330  
00:12:54,780 --> 00:12:52,930  
exploration part and again these are

331  
00:12:56,250 --> 00:12:54,790  
very complimentary strategies we

332  
00:12:59,220 --> 00:12:56,260  
couldn't do one without the other in my

333  
00:13:00,660 --> 00:12:59,230  
opinion and what we're talking about

334  
00:13:03,750 --> 00:13:00,670  
today is really just the low Earth orbit

335  
00:13:07,020 --> 00:13:03,760  
piece so thank you and I'm gonna turn it

336  
00:13:09,060 --> 00:13:07,030  
over to rob okay Thank You pill before I

337  
00:13:10,440 --> 00:13:09,070  
start I wanted to thank man go for for

338  
00:13:13,260 --> 00:13:10,450

the invitation to participate here and

339

00:13:15,390 --> 00:13:13,270

also thank our our integration team or

340

00:13:17,820 --> 00:13:15,400

pit team led by misty snoop Kowski and

341

00:13:20,190 --> 00:13:17,830

Bill hill they've been an outstanding

342

00:13:21,810 --> 00:13:20,200

group of partners and helped lead us

343

00:13:23,670 --> 00:13:21,820

through our CC dip to after so thank you

344

00:13:25,200 --> 00:13:23,680

to them I'm going to talk about Blue

345

00:13:28,940 --> 00:13:25,210

Origin and our accomplishments under CC

346

00:13:32,940 --> 00:13:30,870

you know a little bit about Blue Origin

347

00:13:34,740 --> 00:13:32,950

we've been around since the year 2000 we

348

00:13:37,440 --> 00:13:34,750

were founded by Jeff Bezos the founder

349

00:13:39,240 --> 00:13:37,450

and CEO of amazon.com we've got a long

350

00:13:40,680 --> 00:13:39,250

term vision of increasing the number of

351

00:13:42,600 --> 00:13:40,690

people who can fly into space and and

352

00:13:45,300 --> 00:13:42,610

with that long term goal of making space

353

00:13:48,480 --> 00:13:45,310

safe and affordable for more people than

354

00:13:49,800 --> 00:13:48,490

it has been in the past we you'll hear

355

00:13:51,420 --> 00:13:49,810

about incremental development today our

356

00:13:53,640 --> 00:13:51,430

incremental development plan includes a

357

00:13:55,050 --> 00:13:53,650

focus on reusability we believe

358

00:13:58,950 --> 00:13:55,060

reusability is that is the best way to

359

00:14:01,200 --> 00:13:58,960

get to low cost access to space and can

360

00:14:03,270 --> 00:14:01,210

allow you to gain the practice that you

361

00:14:05,100 --> 00:14:03,280

need with your vehicles in your fleet to

362

00:14:07,770 --> 00:14:05,110

roll those lessons learn from practice

363

00:14:10,290 --> 00:14:07,780

into improving your design and lowering

364

00:14:11,970 --> 00:14:10,300

the costs even further we've we baseline

365

00:14:13,410 --> 00:14:11,980

vertical landing because we believe

366

00:14:15,450 --> 00:14:13,420

that's a very scalable approach for

367

00:14:16,980 --> 00:14:15,460

we're going to orbital orbital

368

00:14:19,110 --> 00:14:16,990

operations and vertical landing allows

369

00:14:21,540 --> 00:14:19,120

us to recover and reuse our vehicles and

370

00:14:22,920 --> 00:14:21,550

we're starting with suborbital again

371

00:14:25,290 --> 00:14:22,930

getting to these incremental development

372

00:14:27,060 --> 00:14:25,300

fashion starting with suborbital to

373

00:14:28,350 --> 00:14:27,070

prove out the technologies for orbital

374

00:14:30,840 --> 00:14:28,360

flight and then moving on to orbital

375

00:14:32,370 --> 00:14:30,850

we've made significant investment in to

376

00:14:34,020 --> 00:14:32,380

date there are some photos on the right

377

00:14:36,210 --> 00:14:34,030

hand side of the chart of our facilities

378

00:14:38,010 --> 00:14:36,220

in Kent Washington and out in Far West

379

00:14:40,410 --> 00:14:38,020

Texas that we use for engineering

380

00:14:42,000 --> 00:14:40,420

manufacturing and development tests we

381

00:14:44,370 --> 00:14:42,010

operate the only a privately owned

382

00:14:45,780 --> 00:14:44,380

launch site in in the world and we've

383

00:14:49,440 --> 00:14:45,790

used that for all of our flight

384

00:14:50,730 --> 00:14:49,450

demonstration to date we have if you see

385

00:14:53,400 --> 00:14:50,740

in the upper right photo we have our own

386

00:14:55,800 --> 00:14:53,410

engine test stand in in Kent where we

387

00:14:58,170 --> 00:14:55,810

did development on on our own rocket

388

00:15:00,020 --> 00:14:58,180

engine as well as test stands in west

389

00:15:01,890 --> 00:15:00,030

texas that we've used for developed

390

00:15:04,800 --> 00:15:01,900

the engine that I'm going to talk about

391

00:15:06,890 --> 00:15:04,810

a little bit later today also in Kent we

392

00:15:09,840 --> 00:15:06,900

have vehicle manufacturing and

393

00:15:11,340 --> 00:15:09,850

capabilities in in the Kent facility I

394

00:15:12,780 --> 00:15:11,350

want to leave you with on this chart

395

00:15:15,360 --> 00:15:12,790

where a strong and growing company we're

396

00:15:18,590 --> 00:15:15,370

hiring we are adding on manufacturing

397

00:15:20,670 --> 00:15:18,600

capability and and it's it's been a

398

00:15:22,410 --> 00:15:20,680

significant growth over the last last

399

00:15:25,770 --> 00:15:22,420

several years let's go to the next chart

400

00:15:27,030 --> 00:15:25,780

please again this chart title

401  
00:15:28,560 --> 00:15:27,040  
incremental development and that's

402  
00:15:31,620 --> 00:15:28,570  
that's the core of our development

403  
00:15:34,110 --> 00:15:31,630  
philosophy our suborbital program is in

404  
00:15:36,720 --> 00:15:34,120  
the in the flight testing stage we first

405  
00:15:38,400 --> 00:15:36,730  
flew short hop flight tests of a

406  
00:15:41,070 --> 00:15:38,410  
reusable vehicle called Goddard back in

407  
00:15:43,290 --> 00:15:41,080  
2006 there's a picture on the lower left

408  
00:15:45,180 --> 00:15:43,300  
and there's videos on our website and

409  
00:15:48,360 --> 00:15:45,190  
then in two thousand eleven and twelve

410  
00:15:50,100 --> 00:15:48,370  
we we started flying our new Shepherd

411  
00:15:53,070 --> 00:15:50,110  
vehicle starting with our vehicle we

412  
00:15:55,410 --> 00:15:53,080  
call p.m. to which which we flew in

413  
00:15:57,450 --> 00:15:55,420

several flights got that up to Mach 1.2

414

00:16:00,810 --> 00:15:57,460

and the development of our next vehicle

415

00:16:03,300 --> 00:16:00,820

in that series of in that program is

416

00:16:05,010 --> 00:16:03,310

under development right now in our crew

417

00:16:06,840 --> 00:16:05,020

capsule which is part of the new

418

00:16:09,120 --> 00:16:06,850

Shepherd program we did our successful

419

00:16:11,280 --> 00:16:09,130

pad escape tests in October that's part

420

00:16:12,750 --> 00:16:11,290

of our CC up to agreement and that's

421

00:16:15,770 --> 00:16:12,760

something I'll show you a video about in

422

00:16:18,720 --> 00:16:15,780

a later chart these this program is

423

00:16:20,940 --> 00:16:18,730

providing lessons learned and practice

424

00:16:22,620 --> 00:16:20,950

so that we can develop the low-cost safe

425

00:16:24,990 --> 00:16:22,630

and affordable orbital spaceflight

426

00:16:28,020 --> 00:16:25,000

system and we began development of that

427

00:16:30,420 --> 00:16:28,030

on our cc'd up to contract with our

428

00:16:32,520 --> 00:16:30,430

agreement with the system requirements

429

00:16:34,950 --> 00:16:32,530

review for the orbital space vehicle and

430

00:16:37,890 --> 00:16:34,960

that that review took place in May of

431

00:16:40,820 --> 00:16:37,900

this past year of 2012 the vehicle is AB

432

00:16:43,290 --> 00:16:40,830

iconic it's designed to transport

433

00:16:45,870 --> 00:16:43,300

between four and seven astronauts up to

434

00:16:47,970 --> 00:16:45,880

the International Space Station and it

435

00:16:50,190 --> 00:16:47,980

weighs about 22,000 pounds with the crew

436

00:16:52,260 --> 00:16:50,200

on board at launch it's designed to fly

437

00:16:53,850 --> 00:16:52,270

on multiple launch vehicles including

438

00:16:57,360 --> 00:16:53,860

our own orbital reusable launch vehicle

439

00:16:59,280 --> 00:16:57,370

as well as the Atlas 5 and United Launch

440

00:17:00,420 --> 00:16:59,290

Alliance was a partner with us under CC

441

00:17:02,670 --> 00:17:00,430

to have to we work very closely with

442

00:17:04,410 --> 00:17:02,680

them our two-stage orbital launch

443

00:17:07,350 --> 00:17:04,420

vehicle has an expendable upper stage

444

00:17:08,880 --> 00:17:07,360

and a reusable first stage and pictures

445

00:17:11,190 --> 00:17:08,890

of that are shown on the right hand side

446

00:17:12,720 --> 00:17:11,200

of the chart and shows a little bit to

447

00:17:13,500 --> 00:17:12,730

scale to give you an idea we believe

448

00:17:16,199 --> 00:17:13,510

that the new chef

449

00:17:18,090 --> 00:17:16,209

system is a subscale version of what

450

00:17:19,230 --> 00:17:18,100

we're eventually what we've got under

451  
00:17:21,329 --> 00:17:19,240  
development for our orbital launch

452  
00:17:25,410 --> 00:17:21,339  
system and that reusable first stage is

453  
00:17:29,460 --> 00:17:25,420  
a key part of that technology the as

454  
00:17:32,100 --> 00:17:29,470  
we've gone into CC to the decision to

455  
00:17:33,720 --> 00:17:32,110  
get into CC double one and two was

456  
00:17:35,760 --> 00:17:33,730  
combined with the significant private

457  
00:17:38,820 --> 00:17:35,770  
investment that came from mr. Bezos and

458  
00:17:40,830 --> 00:17:38,830  
the NASA co-funding we felt looking at

459  
00:17:42,660 --> 00:17:40,840  
this this program that was rolling out

460  
00:17:44,460 --> 00:17:42,670  
and a few years ago was a way to

461  
00:17:47,130 --> 00:17:44,470  
significantly accelerate our efforts so

462  
00:17:48,420 --> 00:17:47,140  
on the next chart please talk a little

463  
00:17:51,150 --> 00:17:48,430

bit about our CC dev one and two

464

00:17:53,340 --> 00:17:51,160

activities our CC double 11 agreement

465

00:17:56,780 --> 00:17:53,350

was a total of three point seven million

466

00:17:59,400 --> 00:17:56,790

dollars in that in that period we

467

00:18:01,320 --> 00:17:59,410

developed and demonstrated a composite

468

00:18:03,390 --> 00:18:01,330

pressure vessel we did structural

469

00:18:05,940 --> 00:18:03,400

testing both pressure testing and drop

470

00:18:07,170 --> 00:18:05,950

testing of that vehicle and then we also

471

00:18:08,700 --> 00:18:07,180

did some development of our thrust

472

00:18:10,770 --> 00:18:08,710

vector control system for our escape

473

00:18:15,000 --> 00:18:10,780

system which was later demonstrated

474

00:18:16,650 --> 00:18:15,010

under CC to under CC to our space act

475

00:18:18,810 --> 00:18:16,660

agreement was for a total of 22 million

476

00:18:21,450 --> 00:18:18,820

dollars there was three projects there

477

00:18:24,060 --> 00:18:21,460

the space vehicle design maturation was

478

00:18:26,340 --> 00:18:24,070

was to basically refine and develop the

479

00:18:28,920 --> 00:18:26,350

design for this by conic vehicle that

480

00:18:30,570 --> 00:18:28,930

will fly on top of multiple orbital

481

00:18:32,460 --> 00:18:30,580

launch vehicles we did wind tunnel

482

00:18:35,790 --> 00:18:32,470

testing we did aerodynamic analysis we

483

00:18:37,290 --> 00:18:35,800

did propulsion definition a lot of

484

00:18:39,720 --> 00:18:37,300

requirements will work with that and his

485

00:18:41,520 --> 00:18:39,730

team a very very good partnership on

486

00:18:43,340 --> 00:18:41,530

that that refine that that vehicle so we

487

00:18:47,010 --> 00:18:43,350

can take it further to the next steps

488

00:18:48,390 --> 00:18:47,020

the the pad escape test was the final

489

00:18:50,250 --> 00:18:48,400

milestone in our escape system

490

00:18:51,990 --> 00:18:50,260

development project pusher escape risk

491

00:18:53,580 --> 00:18:52,000

reduction project and I'll talk about

492

00:18:55,140 --> 00:18:53,590

that on a separate chart and then our

493

00:18:57,660 --> 00:18:55,150

reusable booster system engine risk

494

00:18:59,790 --> 00:18:57,670

reduction reduction test resulted in a

495

00:19:01,800 --> 00:18:59,800

full power level test one hundred

496

00:19:04,680 --> 00:19:01,810

percent power level test of a an all-new

497

00:19:07,290 --> 00:19:04,690

American rocket engine that that uses

498

00:19:10,170 --> 00:19:07,300

liquid hydrogen as a fuel so let's go to

499

00:19:12,030 --> 00:19:10,180

the next chart please this will talk

500

00:19:15,930 --> 00:19:12,040

about this engine this rocket engine

501  
00:19:17,850 --> 00:19:15,940  
development we call it the b III it's a

502  
00:19:20,340 --> 00:19:17,860  
hundred thousand pound thrust engine it

503  
00:19:23,040 --> 00:19:20,350  
fits in between where the RL 10 and the

504  
00:19:25,290 --> 00:19:23,050  
j-2x are uses liquid oxygen liquid

505  
00:19:26,549 --> 00:19:25,300  
hydrogen as its fuels and like i said

506  
00:19:28,230 --> 00:19:26,559  
this is the

507  
00:19:29,669 --> 00:19:28,240  
the first all new American engine that

508  
00:19:34,379 --> 00:19:29,679  
uses liquid hydrogen as a fuel since

509  
00:19:35,879 --> 00:19:34,389  
since the RS 68 development it is deep

510  
00:19:38,669 --> 00:19:35,889  
throttling its restartable and it's

511  
00:19:41,399 --> 00:19:38,679  
fully reusable and under CC to we did

512  
00:19:44,759 --> 00:19:41,409  
testing of the thrust chamber at NASA

513  
00:19:47,009 --> 00:19:44,769

Stennis Space Center you on complex the

514

00:19:49,619 --> 00:19:47,019

Stennis team has been fantastic partner

515

00:19:51,659 --> 00:19:49,629

on this and and we always intended to

516

00:19:54,539 --> 00:19:51,669

continue working with Dennis after the

517

00:19:56,730 --> 00:19:54,549

CC to agreement ended and we and we plan

518

00:19:58,580 --> 00:19:56,740

and we are our next entry into Stennis

519

00:20:01,259 --> 00:19:58,590

is going to be in the middle of february

520

00:20:04,139 --> 00:20:01,269

we ran multiple tests over the full

521

00:20:06,810 --> 00:20:04,149

throttle range going into the teens in

522

00:20:07,980 --> 00:20:06,820

terms of percent and on up to full

523

00:20:10,230 --> 00:20:07,990

throttle which is a hundred thousand

524

00:20:11,999 --> 00:20:10,240

pounds and and the results of this

525

00:20:13,590 --> 00:20:12,009

partnership was that we accelerated the

526  
00:20:14,970 --> 00:20:13,600  
development of that be-3 engine by more

527  
00:20:16,980 --> 00:20:14,980  
than a year because the facilities we've

528  
00:20:18,690 --> 00:20:16,990  
developed under under private funding at

529  
00:20:20,759 --> 00:20:18,700  
our West Texas site are not set up to do

530  
00:20:22,879 --> 00:20:20,769  
these types of high pressure testing the

531  
00:20:24,960 --> 00:20:22,889  
facility at Stennis is a unique

532  
00:20:26,879 --> 00:20:24,970  
government asset so getting back to what

533  
00:20:28,529 --> 00:20:26,889  
phil was saying access to these unique

534  
00:20:30,239 --> 00:20:28,539  
assets and these expertise is a

535  
00:20:32,399 --> 00:20:30,249  
significant benefit to companies like

536  
00:20:34,139 --> 00:20:32,409  
Blue Origin while we were doing the

537  
00:20:36,450 --> 00:20:34,149  
testing on the TCA at Stennis we were

538  
00:20:37,859 --> 00:20:36,460

also testing the turbo pumps the liquid

539

00:20:40,109 --> 00:20:37,869

oxygen and liquid hydrogen turbo pumps

540

00:20:41,970 --> 00:20:40,119

at our facility in West Texas and now we

541

00:20:43,529 --> 00:20:41,980

have the engine fully put together and

542

00:20:45,180 --> 00:20:43,539

the testing of that engine is underway

543

00:20:47,430 --> 00:20:45,190

at our at our facility in West Texas

544

00:20:49,139 --> 00:20:47,440

this engine I want to point out is fully

545

00:20:51,269 --> 00:20:49,149

developed design and developed in-house

546

00:20:54,080 --> 00:20:51,279

at Blue Origin we do the analysis we do

547

00:20:56,070 --> 00:20:54,090

the design work a lot of the fabrication

548

00:20:57,149 --> 00:20:56,080

component testing in an engine testing

549

00:20:59,129 --> 00:20:57,159

of course and I've talked a little bit

550

00:21:00,570 --> 00:20:59,139

about the development plan but there's a

551  
00:21:02,489 --> 00:21:00,580  
pretty complex system and there's

552  
00:21:06,090 --> 00:21:02,499  
there's quite a few other components to

553  
00:21:07,680 --> 00:21:06,100  
the the engine development program we're

554  
00:21:09,149 --> 00:21:07,690  
going to show a video of our of our

555  
00:21:10,830 --> 00:21:09,159  
tests at Stennis before we roll the

556  
00:21:12,629 --> 00:21:10,840  
video i just want to give you an idea of

557  
00:21:15,210 --> 00:21:12,639  
what you're going to see you're going to

558  
00:21:18,480 --> 00:21:15,220  
see the engine the thrust chamber fire

559  
00:21:21,299 --> 00:21:18,490  
from the side the when it when it

560  
00:21:22,859 --> 00:21:21,309  
ignites the it will start out at the low

561  
00:21:24,299 --> 00:21:22,869  
throttle setting that will step up in a

562  
00:21:26,340 --> 00:21:24,309  
variety of throttle settings up to full

563  
00:21:28,230 --> 00:21:26,350

power the total test duration is about

564

00:21:54,890 --> 00:21:28,240

45 seconds so if we can go roll the

565

00:22:00,380 --> 00:21:57,350

again we call this engine to be III it's

566

00:22:04,190 --> 00:22:00,390

a it's a liquid oxygen liquid hydrogen

567

00:22:05,780 --> 00:22:04,200

engine thrust chamber and full power

568

00:22:08,210 --> 00:22:05,790

setting is a hundred thousand pounds so

569

00:22:09,710 --> 00:22:08,220

and it's it's turbo pump fed in its

570

00:22:11,600 --> 00:22:09,720

final configuration but of course in

571

00:22:14,780 --> 00:22:11,610

these tests it's being run using the

572

00:22:15,920 --> 00:22:14,790

pressure of the ground facility I got it

573

00:22:17,810 --> 00:22:15,930

I gotta hand it to the Stennis team

574

00:22:20,030 --> 00:22:17,820

again they've done a terrific job and I

575

00:22:21,680 --> 00:22:20,040

think if you had them in the room here I

576

00:22:23,420 --> 00:22:21,690

think what we learned from them and what

577

00:22:25,040 --> 00:22:23,430

they learn from us is how to work in a

578

00:22:27,500 --> 00:22:25,050

commercial manner how to speed up

579

00:22:29,920 --> 00:22:27,510

development how to look at at those

580

00:22:31,970 --> 00:22:29,930

those assumptions that you you've made

581

00:22:34,190 --> 00:22:31,980

when doing things one way and then

582

00:22:35,540 --> 00:22:34,200

looking at when another company comes in

583

00:22:37,940 --> 00:22:35,550

and how you can accelerate your progress

584

00:22:39,410 --> 00:22:37,950

we we significantly rammed up ramped up

585

00:22:42,170 --> 00:22:39,420

our rate of testing over the period of

586

00:22:43,850 --> 00:22:42,180

this this test program and now it's

587

00:22:46,490 --> 00:22:43,860

getting getting multiple tests a day has

588

00:22:49,100 --> 00:22:46,500

been a significant benefit to us so we

589

00:22:50,150 --> 00:22:49,110

can go to the next chart please I'm

590

00:22:55,280 --> 00:22:50,160

going to talk about our crew capsule

591

00:22:58,010 --> 00:22:55,290

escape system risk reduction project in

592

00:22:59,200 --> 00:22:58,020

October October 19th of 2012 we

593

00:23:02,600 --> 00:22:59,210

conducted a full end-to-end

594

00:23:05,350 --> 00:23:02,610

demonstration of a pad escape system

595

00:23:07,370 --> 00:23:05,360

that will be used on our new Shepherd

596

00:23:09,020 --> 00:23:07,380

suborbital vehicle but it demonstrates

597

00:23:12,080 --> 00:23:09,030

the technologies and integration

598

00:23:14,990 --> 00:23:12,090

required for an orbital system the the

599

00:23:18,260 --> 00:23:15,000

escape system is a pusher and it pushes

600

00:23:20,090 --> 00:23:18,270

the crew capsule from the back to a safe

601  
00:23:21,200 --> 00:23:20,100  
distance away from the vehicle in the

602  
00:23:25,460 --> 00:23:21,210  
event that you have a mishap on the

603  
00:23:26,900 --> 00:23:25,470  
launch pad we liken or we think this

604  
00:23:29,330 --> 00:23:26,910  
escape system is analogous to the air

605  
00:23:31,220 --> 00:23:29,340  
bag in your car it's always there it's

606  
00:23:32,930 --> 00:23:31,230  
lightweight it's simple and reliable and

607  
00:23:34,520 --> 00:23:32,940  
it's something that if you don't use it

608  
00:23:36,470 --> 00:23:34,530  
on a mission you can you can just turn

609  
00:23:38,720 --> 00:23:36,480  
around and fly your vehicle again and

610  
00:23:42,680 --> 00:23:38,730  
again with the minimum of inspection the

611  
00:23:44,900 --> 00:23:42,690  
the demonstration here demonstrated it

612  
00:23:46,040 --> 00:23:44,910  
showed the escape motor firing it

613  
00:23:48,320 --> 00:23:46,050

demonstrated our thrust vector control

614

00:23:51,980 --> 00:23:48,330

system which was developed in-house at

615

00:23:53,390 --> 00:23:51,990

Blue Origin we really we the Aerojet

616

00:23:54,770 --> 00:23:53,400

provides a solid rocket motor we

617

00:23:56,600 --> 00:23:54,780

developed the thrust vector control

618

00:23:59,180 --> 00:23:56,610

system in the aft closure for the motor

619

00:24:01,390 --> 00:23:59,190

the guidance and control the parachute

620

00:24:03,470 --> 00:24:01,400

deployment the landing in the recovery

621

00:24:05,570 --> 00:24:03,480

like I mentioned this test was conducted

622

00:24:07,160 --> 00:24:05,580

with our with our NASA partners on site

623

00:24:08,240 --> 00:24:07,170

at our West Texas launch site on October

624

00:24:10,700 --> 00:24:08,250

19th

625

00:24:12,470 --> 00:24:10,710

and and it was the only powered flight

626  
00:24:13,880 --> 00:24:12,480  
test under CC too so we're very proud of

627  
00:24:15,110 --> 00:24:13,890  
that accomplishment there's a few

628  
00:24:17,510 --> 00:24:15,120  
pictures at the bottom of the chart but

629  
00:24:19,280 --> 00:24:17,520  
I want to pull up the video and before

630  
00:24:21,590 --> 00:24:19,290  
we start the video i want to just kind

631  
00:24:23,750 --> 00:24:21,600  
of explain what you're going to see the

632  
00:24:26,540 --> 00:24:23,760  
vehicle is mounted on top of what we

633  
00:24:28,580 --> 00:24:26,550  
call the booster simulator so it's

634  
00:24:31,100 --> 00:24:28,590  
sitting on top of a a structure that

635  
00:24:32,420 --> 00:24:31,110  
represents the upper end of the the

636  
00:24:34,520 --> 00:24:32,430  
booster that it's going to be escaping

637  
00:24:36,830 --> 00:24:34,530  
from that that booster simulator is

638  
00:24:39,140 --> 00:24:36,840

fully instrumented it's with load cells

639

00:24:41,210 --> 00:24:39,150

pressure and thermal sensors so that

640

00:24:43,670 --> 00:24:41,220

post-flight we could reconstruct the

641

00:24:45,170 --> 00:24:43,680

environments that the booster vehicle

642

00:24:48,920 --> 00:24:45,180

will see in an escape in an in-flight

643

00:24:50,270 --> 00:24:48,930

escape or a pad escape the vehicle

644

00:24:51,710 --> 00:24:50,280

itself of course was instrumented this

645

00:24:53,240 --> 00:24:51,720

is a flight structure you'll notice it

646

00:24:55,190 --> 00:24:53,250

doesn't have windows it also doesn't

647

00:24:56,840 --> 00:24:55,200

have seats or life-support systems and

648

00:24:58,190 --> 00:24:56,850

and that's part of our incremental

649

00:25:01,640 --> 00:24:58,200

development program we wanted have a

650

00:25:03,770 --> 00:25:01,650

flight structure in place but we wanted

651  
00:25:06,590 --> 00:25:03,780  
to fly this this vehicle in this pad

652  
00:25:08,060 --> 00:25:06,600  
escape environment measure the loads in

653  
00:25:09,440 --> 00:25:08,070  
performance and then use what we've

654  
00:25:12,200 --> 00:25:09,450  
learned from that to roll into our next

655  
00:25:13,250 --> 00:25:12,210  
version of the design so that's let's go

656  
00:25:15,170 --> 00:25:13,260  
ahead and roll the video and you'll see

657  
00:25:23,350 --> 00:25:15,180  
see what we did and this video is

658  
00:25:29,090 --> 00:25:26,419  
now the vehicles pull significant

659  
00:25:31,430 --> 00:25:29,100  
accelerations on on the escape it

660  
00:25:34,039 --> 00:25:31,440  
reaches about 2,300 feet altitude above

661  
00:25:36,380 --> 00:25:34,049  
ground the parachutes deploy and it

662  
00:25:38,090 --> 00:25:36,390  
comes back it landed within seven feet

663  
00:25:40,280 --> 00:25:38,100

of our predicted touchdown point the

664

00:25:42,230 --> 00:25:40,290

winds were light that day but we still

665

00:25:45,730 --> 00:25:42,240

are proud of the the accuracy of the

666

00:25:51,470 --> 00:25:48,710

following some stabilization that the

667

00:25:53,659 --> 00:25:51,480

main parachutes dis reef and the vehicle

668

00:25:55,789 --> 00:25:53,669

to send slowly under under the 33 main

669

00:26:09,840 --> 00:25:55,799

parachutes and touches down in the

670

00:26:09,850 --> 00:26:20,580

it was a beautiful day I might have

671

00:26:24,970 --> 00:26:23,590

so I want to close up with the point

672

00:26:27,490 --> 00:26:24,980

this this has been a great commercial

673

00:26:29,680 --> 00:26:27,500

partnership we brought money to the

674

00:26:30,820 --> 00:26:29,690

table NASA brought many of the table and

675

00:26:32,919 --> 00:26:30,830

we were able to do some things that are

676

00:26:36,029 --> 00:26:32,929

that are very useful very effective and

677

00:26:38,680 --> 00:26:36,039

helped blue to accelerate our progress

678

00:26:40,539 --> 00:26:38,690

we're very it's been a great

679

00:26:43,389 --> 00:26:40,549

relationship and I'm happy to announce

680

00:26:45,310 --> 00:26:43,399

that we're working with NASA to extend

681

00:26:48,100 --> 00:26:45,320

our space act agreement in an unfunded

682

00:26:50,169 --> 00:26:48,110

manner so that we can continue the

683

00:26:52,899 --> 00:26:50,179

relationship continue to learn what we

684

00:26:55,419 --> 00:26:52,909

have from NASA continue to allow them to

685

00:26:56,769 --> 00:26:55,429

learn from us and that's something that

686

00:26:58,509 --> 00:26:56,779

we'll be working with them here in the

687

00:27:03,250 --> 00:26:58,519

next in the coming weeks and I'm very

688

00:27:04,629 --> 00:27:03,260

very pleased about that so thank you all

689

00:27:06,460 --> 00:27:04,639

right thank you and thank you phil

690

00:27:08,769 --> 00:27:06,470

annette and in your entire team it's an

691

00:27:10,720 --> 00:27:08,779

honor and certainly exciting to be part

692

00:27:13,269 --> 00:27:10,730

of this important new development effort

693

00:27:16,600 --> 00:27:13,279

if we could go to my first slide they

694

00:27:19,330 --> 00:27:16,610

are focus on identifying and mitigating

695

00:27:21,549 --> 00:27:19,340

risks early in CC def to really ensured

696

00:27:23,769 --> 00:27:21,559

we could mature the design to the point

697

00:27:26,889 --> 00:27:23,779

that we could accomplish a successful

698

00:27:30,490 --> 00:27:26,899

PDR and transition strongly into into

699

00:27:32,950 --> 00:27:30,500

CCI cap our focus was across all of our

700

00:27:35,740 --> 00:27:32,960

subsystems to make sure we identified

701  
00:27:37,810 --> 00:27:35,750  
key design and risk drivers and then and

702  
00:27:39,639 --> 00:27:37,820  
then perform the analysis and risk

703  
00:27:42,460 --> 00:27:39,649  
demonstration Risk Reduction

704  
00:27:45,220 --> 00:27:42,470  
demonstration testing that we needed to

705  
00:27:48,070 --> 00:27:45,230  
successfully mature that design if we're

706  
00:27:50,230 --> 00:27:48,080  
looking at structures and mechanisms we

707  
00:27:52,810 --> 00:27:50,240  
we manufactured two iterations of our

708  
00:27:54,909 --> 00:27:52,820  
pressurized pressurized crew module and

709  
00:27:57,190 --> 00:27:54,919  
we're able to do proof and leak tests on

710  
00:28:00,220 --> 00:27:57,200  
it and also material testing to make

711  
00:28:02,649 --> 00:28:00,230  
sure that that the design properties on

712  
00:28:06,370 --> 00:28:02,659  
the as foreign material met all of our

713  
00:28:08,289 --> 00:28:06,380

requirements we conducted a number of

714

00:28:10,000 --> 00:28:08,299

composite material tests at higher

715

00:28:11,440 --> 00:28:10,010

temperatures just to make sure that the

716

00:28:14,409 --> 00:28:11,450

the material would satisfy our

717

00:28:17,019 --> 00:28:14,419

requirements and early micrometeoroid

718

00:28:19,000 --> 00:28:17,029

debris testing to help ensure that our

719

00:28:20,620 --> 00:28:19,010

thermal protection system design would

720

00:28:23,019 --> 00:28:20,630

would satisfy all of our safety

721

00:28:25,180 --> 00:28:23,029

requirements on the landing system which

722

00:28:27,700 --> 00:28:25,190

is a combination of parachutes and

723

00:28:31,080 --> 00:28:27,710

landing airbags we ran a number of

724

00:28:33,780 --> 00:28:31,090

parachute or to parachute drops

725

00:28:36,270 --> 00:28:33,790

and a large number of landing airbag

726

00:28:39,360 --> 00:28:36,280

drop tests just to make sure that that

727

00:28:42,830 --> 00:28:39,370

that design was was safe and robust in

728

00:28:45,060 --> 00:28:42,840

all types of landing environments

729

00:28:47,430 --> 00:28:45,070

propulsion system we ran a number of

730

00:28:50,490 --> 00:28:47,440

single-engine propulsion tests the

731

00:28:52,920 --> 00:28:50,500

service module that we have is is a

732

00:28:54,900 --> 00:28:52,930

disposable service module that handles

733

00:28:57,840 --> 00:28:54,910

not only the the launch abort propulsion

734

00:29:00,240 --> 00:28:57,850

but also the the on-orbit and an entry

735

00:29:03,180 --> 00:29:00,250

propulsion and ensuring that that this

736

00:29:04,920 --> 00:29:03,190

these legacy engines modify to our

737

00:29:07,140 --> 00:29:04,930

requirements would perform all the tasks

738

00:29:10,140 --> 00:29:07,150

early in the design cycle really helped

739

00:29:12,030 --> 00:29:10,150

by down some development risks and we

740

00:29:13,950 --> 00:29:12,040

also went out to Ames and the wind

741

00:29:16,140 --> 00:29:13,960

tunnel tests and and had a large number

742

00:29:18,840 --> 00:29:16,150

of runs and and helped us build up our

743

00:29:20,910 --> 00:29:18,850

aerodynamic database to make sure the

744

00:29:22,500 --> 00:29:20,920

vehicle the word designing could

745

00:29:25,770 --> 00:29:22,510

withstand the loads and was also

746

00:29:29,250 --> 00:29:25,780

controllable in in all flight regimes on

747

00:29:33,210 --> 00:29:29,260

to the next test another big focus on on

748

00:29:35,490 --> 00:29:33,220

our effort to integrate integrate with

749

00:29:37,650 --> 00:29:35,500

with the launch vehicle one of the

750

00:29:39,990 --> 00:29:37,660

things we did early on to the next page

751

00:29:42,630 --> 00:29:40,000

was was to bring in the emergency

752

00:29:44,910 --> 00:29:42,640

detection system that's being designed

753

00:29:46,620 --> 00:29:44,920

and built by united launch alliance from

754

00:29:49,800 --> 00:29:46,630

corporation into the Atlas 5 launch

755

00:29:52,530 --> 00:29:49,810

vehicle and and run early testing on an

756

00:29:54,690 --> 00:29:52,540

EDS emulator integrated with our with

757

00:29:57,000 --> 00:29:54,700

our software and our flight computer to

758

00:29:58,950 --> 00:29:57,010

make sure verily very early in the

759

00:30:01,110 --> 00:29:58,960

software development process that the

760

00:30:03,060 --> 00:30:01,120

two systems were compatible or could

761

00:30:06,380 --> 00:30:03,070

talk to each other and with satisfy all

762

00:30:09,600 --> 00:30:06,390

requirements we also ran a number of

763

00:30:12,000 --> 00:30:09,610

never integrated test between between

764

00:30:13,860 --> 00:30:12,010

our flight software system and our

765

00:30:15,540 --> 00:30:13,870

autonomous rendezvous and docking system

766

00:30:18,090 --> 00:30:15,550

which obviously is a critical piece of

767

00:30:20,640 --> 00:30:18,100

this development effort to make sure

768

00:30:23,610 --> 00:30:20,650

that that those systems were compatible

769

00:30:26,070 --> 00:30:23,620

and would meet our requirements and a

770

00:30:28,620 --> 00:30:26,080

large effort on unidentified different

771

00:30:31,050 --> 00:30:28,630

different options for our cockpit and

772

00:30:33,240 --> 00:30:31,060

then moving moving quickly at the end of

773

00:30:38,000 --> 00:30:33,250

CCDF tudi to finalize that cockpit

774

00:30:40,890 --> 00:30:38,010

design with the number of human factors

775

00:30:42,600 --> 00:30:40,900

tests in the cockpit to make sure that

776

00:30:44,520 --> 00:30:42,610

that all of the panels were laid out

777

00:30:46,410 --> 00:30:44,530

correctly we could satisfy

778

00:30:48,660 --> 00:30:46,420

not only normal mission operations but

779

00:30:51,240 --> 00:30:48,670

but also anomalies that that the crew

780

00:30:54,120 --> 00:30:51,250

could could expect to encounter so a lot

781

00:30:56,910 --> 00:30:54,130

of work just making sure we identified

782

00:31:00,330 --> 00:30:56,920

those risks and we're comfortable moving

783

00:31:04,500 --> 00:31:00,340

into into CCI cap going to the next

784

00:31:07,230 --> 00:31:04,510

chart you know the real focus of CTI cap

785

00:31:09,510 --> 00:31:07,240

is final design maturation and moving

786

00:31:12,030 --> 00:31:09,520

into to a quality critical design review

787

00:31:15,510 --> 00:31:12,040

and and so our focus was laying out a

788

00:31:17,700 --> 00:31:15,520

plan that integrated key milestones

789

00:31:20,580 --> 00:31:17,710

across all of the different development

790

00:31:22,290 --> 00:31:20,590

segments both spacecraft the launch

791

00:31:24,840 --> 00:31:22,300

vehicle obviously which is which is

792

00:31:27,690 --> 00:31:24,850

critical to us but also production and

793

00:31:32,630 --> 00:31:27,700

operations so across this entire plan

794

00:31:35,340 --> 00:31:32,640

we've got a number of very important and

795

00:31:37,530 --> 00:31:35,350

milestones that that we have that our

796

00:31:39,540 --> 00:31:37,540

team is working on to accomplish in

797

00:31:43,380 --> 00:31:39,550

January of this year we've got we've got

798

00:31:44,940 --> 00:31:43,390

two milestones actually in the next

799

00:31:47,670 --> 00:31:44,950

couple of weeks we'll be we'll be

800

00:31:50,130 --> 00:31:47,680

releasing our first flight software

801  
00:31:52,200 --> 00:31:50,140  
iteration of our on-orbit configuration

802  
00:31:54,180 --> 00:31:52,210  
and and the team is in the lab now

803  
00:31:57,240 --> 00:31:54,190  
running tests on that and it looks like

804  
00:31:59,490 --> 00:31:57,250  
that is a is moving along real well and

805  
00:32:01,470 --> 00:31:59,500  
then later on this month will also be

806  
00:32:02,700 --> 00:32:01,480  
conducting actually next week our

807  
00:32:05,070 --> 00:32:02,710  
landing in recovery and ground

808  
00:32:06,960 --> 00:32:05,080  
communication design review just to make

809  
00:32:08,970 --> 00:32:06,970  
sure we have the plans and the equipment

810  
00:32:10,620 --> 00:32:08,980  
and and the infrastructure we're going

811  
00:32:12,390 --> 00:32:10,630  
to need not only to communicate from the

812  
00:32:16,080 --> 00:32:12,400  
ground but also to recover safely

813  
00:32:18,410 --> 00:32:16,090

recover and and transport transport the

814

00:32:20,760 --> 00:32:18,420

capsule after its after its landed

815

00:32:22,620 --> 00:32:20,770

looking at some of the others will move

816

00:32:24,740 --> 00:32:22,630

very quickly into a preliminary design

817

00:32:27,690 --> 00:32:24,750

review with with United Launch Alliance

818

00:32:29,880 --> 00:32:27,700

one of our key partners on on the launch

819

00:32:31,500 --> 00:32:29,890

vehicle adapter that'll be the adapter

820

00:32:34,710 --> 00:32:31,510

plate between their launch vehicle and

821

00:32:36,840 --> 00:32:34,720

our and our capsule will be going back

822

00:32:38,370 --> 00:32:36,850

and doing more wind tunnel tests in fact

823

00:32:40,740 --> 00:32:38,380

we've got five different wind tunnel

824

00:32:42,870 --> 00:32:40,750

test series between march and august of

825

00:32:45,180 --> 00:32:42,880

this year just so that we make sure we

826  
00:32:47,490 --> 00:32:45,190  
have a healthy and robust aerodynamic

827  
00:32:51,360 --> 00:32:47,500  
database so that we can finalize all of

828  
00:32:53,370 --> 00:32:51,370  
our designs we've got a dual engine

829  
00:32:55,890 --> 00:32:53,380  
centaur duck tests that we've got

830  
00:32:57,880 --> 00:32:55,900  
scheduled later this year the dual

831  
00:33:00,160 --> 00:32:57,890  
engine centaur actually is flown 104

832  
00:33:02,620 --> 00:33:00,170  
successful missions but but not on the

833  
00:33:05,100 --> 00:33:02,630  
Atlas 5 previous versions of the Atlas

834  
00:33:08,050 --> 00:33:05,110  
and so we are going to do a number of

835  
00:33:10,090 --> 00:33:08,060  
component updates and so that work is

836  
00:33:11,530 --> 00:33:10,100  
understood understood but but it's

837  
00:33:14,740 --> 00:33:11,540  
something that we want to go demonstrate

838  
00:33:17,380 --> 00:33:14,750

I will have a number of engine test runs

839

00:33:19,630 --> 00:33:17,390

again with the with pratt whitney

840

00:33:21,460 --> 00:33:19,640

rocketdyne designed service module

841

00:33:23,620 --> 00:33:21,470

propulsion system just to make sure that

842

00:33:25,950 --> 00:33:23,630

that the final design configuration of

843

00:33:29,290 --> 00:33:25,960

those engines will meet all requirements

844

00:33:31,510 --> 00:33:29,300

will move in and with our partnership

845

00:33:33,700 --> 00:33:31,520

with Mission Operations Director to JSC

846

00:33:35,890 --> 00:33:33,710

who is very integral to our team and

847

00:33:37,900 --> 00:33:35,900

adds a tremendous amount of expertise

848

00:33:41,170 --> 00:33:37,910

will be doing a Mission Control Center

849

00:33:42,990 --> 00:33:41,180

interface demonstration tests moving on

850

00:33:47,110 --> 00:33:43,000

with some more production demonstrations

851  
00:33:48,940 --> 00:33:47,120  
and then in December of this year our

852  
00:33:50,830 --> 00:33:48,950  
multi stirring demonstration of our

853  
00:33:53,770 --> 00:33:50,840  
flight software which which will be a

854  
00:33:56,110 --> 00:33:53,780  
very important milestone all focused on

855  
00:33:58,420 --> 00:33:56,120  
you know in this phase early on right

856  
00:34:01,330 --> 00:33:58,430  
now we're really focusing on component

857  
00:34:04,570 --> 00:34:01,340  
PDRs moving very quickly later this year

858  
00:34:07,480 --> 00:34:04,580  
into component CDRs and and then into

859  
00:34:09,550 --> 00:34:07,490  
subsystem cd-rs everything focused on

860  
00:34:11,409 --> 00:34:09,560  
making sure we we properly and

861  
00:34:14,710 --> 00:34:11,419  
aggressively mature the design so that

862  
00:34:16,149 --> 00:34:14,720  
we can have a very robust critical

863  
00:34:19,090 --> 00:34:16,159

design review at the end of this face

864

00:34:20,950 --> 00:34:19,100

give us confidence that we can we can

865

00:34:23,230 --> 00:34:20,960

move in with very low risk into the

866

00:34:26,080 --> 00:34:23,240

qualification and flight demonstration

867

00:34:28,570 --> 00:34:26,090

face a lot a lot of good work teams

868

00:34:30,610 --> 00:34:28,580

really excited and and in the first

869

00:34:33,280 --> 00:34:30,620

three milestones we we have accomplished

870

00:34:35,470 --> 00:34:33,290

moving on to the next page on schedule

871

00:34:38,169 --> 00:34:35,480

which is which is very good the first

872

00:34:40,990 --> 00:34:38,179

one coming into into CCI cap was the

873

00:34:43,360 --> 00:34:41,000

integrated system review we had a number

874

00:34:44,919 --> 00:34:43,370

of systems that we had some open trades

875

00:34:46,470 --> 00:34:44,929

on that we needed to complete going

876  
00:34:49,389 --> 00:34:46,480  
through the preliminary design review

877  
00:34:51,310 --> 00:34:49,399  
and it was really important to to burn

878  
00:34:54,820 --> 00:34:51,320  
down all of those design trades well

879  
00:34:56,649 --> 00:34:54,830  
before we moved into CCI cap our team

880  
00:34:59,920 --> 00:34:56,659  
was able to do that and that really led

881  
00:35:02,830 --> 00:34:59,930  
us snap that baseline design and move

882  
00:35:05,110 --> 00:35:02,840  
into the final design release and start

883  
00:35:07,690 --> 00:35:05,120  
producing those products that we need

884  
00:35:10,000 --> 00:35:07,700  
the next thing we did the next milestone

885  
00:35:11,320 --> 00:35:10,010  
was a production design review it was

886  
00:35:13,180 --> 00:35:11,330  
important for us

887  
00:35:15,610 --> 00:35:13,190  
early to make sure that we had the right

888  
00:35:17,920 --> 00:35:15,620

plans equipment and infrastructure so

889

00:35:19,840 --> 00:35:17,930

that we could efficiently produce the

890

00:35:22,060 --> 00:35:19,850

design that that we were coming up with

891

00:35:24,550 --> 00:35:22,070

and and so getting that that early

892

00:35:26,380 --> 00:35:24,560

design review and that focus making sure

893

00:35:28,410 --> 00:35:26,390

that that the design that we were

894

00:35:32,080 --> 00:35:28,420

producing would be manufactured

895

00:35:34,240 --> 00:35:32,090

manufacturable officially was was a real

896

00:35:36,730 --> 00:35:34,250

benefit along with bringing in a lot of

897

00:35:39,820 --> 00:35:36,740

expertise from across Boeing both the

898

00:35:41,470 --> 00:35:39,830

commercial the commercial airplane side

899

00:35:43,150 --> 00:35:41,480

and also some of the military and

900

00:35:44,860 --> 00:35:43,160

defense that have a lot of production

901  
00:35:46,420 --> 00:35:44,870  
experience and making sure we're

902  
00:35:51,100 --> 00:35:46,430  
bringing in those best practices was

903  
00:35:52,960 --> 00:35:51,110  
good huge focus on safety obviously and

904  
00:35:54,580 --> 00:35:52,970  
and having that phase one safety review

905  
00:35:58,120 --> 00:35:54,590  
completed early in the design process

906  
00:35:59,980 --> 00:35:58,130  
again so that you can use the safety

907  
00:36:02,260 --> 00:35:59,990  
analysis to make sure you help inform

908  
00:36:03,760 --> 00:36:02,270  
the design I was really important in the

909  
00:36:06,790 --> 00:36:03,770  
phase one safety review helped us

910  
00:36:08,920 --> 00:36:06,800  
identify all the hazards the causes and

911  
00:36:11,290 --> 00:36:08,930  
the controls just to make sure that we

912  
00:36:13,750 --> 00:36:11,300  
were appropriately embedding safety in

913  
00:36:15,520 --> 00:36:13,760

all of our designs and then a lot of

914

00:36:16,750 --> 00:36:15,530

work as I mentioned before about making

915

00:36:18,490 --> 00:36:16,760

sure that we were addressing human

916

00:36:20,260 --> 00:36:18,500

factors and that our cockpit was laid

917

00:36:23,020 --> 00:36:20,270

out it's really important to do that

918

00:36:25,900 --> 00:36:23,030

early so that we can snap that snap that

919

00:36:28,150 --> 00:36:25,910

baseline design and move forward and so

920

00:36:32,560 --> 00:36:28,160

the team was able to do that under the

921

00:36:35,380 --> 00:36:32,570

next chart as I mentioned a lot of focus

922

00:36:38,470 --> 00:36:35,390

is faizan making sure we we get to final

923

00:36:40,450 --> 00:36:38,480

design release and mature the design the

924

00:36:43,030 --> 00:36:40,460

teams as they're heading to to see dr

925

00:36:44,740 --> 00:36:43,040

have a number of again risk reduction

926  
00:36:46,780 --> 00:36:44,750  
demonstration test that they're going to

927  
00:36:49,660 --> 00:36:46,790  
need to get through their design cycle

928  
00:36:51,700 --> 00:36:49,670  
with high confidence a real focus on

929  
00:36:53,560 --> 00:36:51,710  
making sure we're bringing an integrated

930  
00:36:55,270 --> 00:36:53,570  
system to the table and so our

931  
00:36:58,720 --> 00:36:55,280  
partnership with you with some of our

932  
00:37:00,130 --> 00:36:58,730  
really important partners like ula pratt

933  
00:37:03,190 --> 00:37:00,140  
whitney rocketdyne on the propulsion

934  
00:37:05,410 --> 00:37:03,200  
Aerojet on crew module propulsion an

935  
00:37:08,020 --> 00:37:05,420  
integrated team focus making sure we're

936  
00:37:10,000 --> 00:37:08,030  
moving forward again our partnership

937  
00:37:12,190 --> 00:37:10,010  
with with Mission Operations I can't

938  
00:37:15,010 --> 00:37:12,200

understate that that bringing in that

939

00:37:17,470 --> 00:37:15,020

that legacy experience really helped

940

00:37:19,690 --> 00:37:17,480

drive down a significant amount of risk

941

00:37:21,190 --> 00:37:19,700

that you would have trying to stand up

942

00:37:23,840 --> 00:37:21,200

that capability so getting that

943

00:37:27,110 --> 00:37:23,850

expertise in was was critical

944

00:37:29,360 --> 00:37:27,120

and then you know one of our real

945

00:37:30,950 --> 00:37:29,370

focuses and run of the real benefits has

946

00:37:34,460 --> 00:37:30,960

been our partnership with space Florida

947

00:37:36,470 --> 00:37:34,470

and the ability to to partner with them

948

00:37:40,190 --> 00:37:36,480

on the use of the old orbiter processing

949

00:37:42,980 --> 00:37:40,200

facility three here at here at KSC that

950

00:37:45,140 --> 00:37:42,990

partnership has been outstanding and and

951  
00:37:46,820 --> 00:37:45,150  
they've actually as you can see and some

952  
00:37:49,550 --> 00:37:46,830  
of the pictures on the bottom left have

953  
00:37:51,710 --> 00:37:49,560  
that have that building cleaned out now

954  
00:37:53,800 --> 00:37:51,720  
and and they're they're starting in on

955  
00:37:56,180 --> 00:37:53,810  
the modification process right now and

956  
00:37:57,920 --> 00:37:56,190  
we'll be ready to hand over the keys to

957  
00:38:00,200 --> 00:37:57,930  
us this summer so that's been

958  
00:38:01,940 --> 00:38:00,210  
outstanding to be able to make sure

959  
00:38:04,940 --> 00:38:01,950  
we're able to use not only the skilled

960  
00:38:06,590 --> 00:38:04,950  
resources here in Florida but also some

961  
00:38:09,080 --> 00:38:06,600  
outstanding infrastructure so that's

962  
00:38:11,330 --> 00:38:09,090  
been a real bonus for us and the team's

963  
00:38:14,000 --> 00:38:11,340

really excited to to get in there and

964

00:38:17,260 --> 00:38:14,010

start using that so I'd say you know our

965

00:38:19,880 --> 00:38:17,270

team has has really ramped seamlessly

966

00:38:21,830 --> 00:38:19,890

from the preliminary design phase into

967

00:38:24,350 --> 00:38:21,840

this final design phase we're really

968

00:38:26,210 --> 00:38:24,360

excited about the work we've got on our

969

00:38:33,530 --> 00:38:26,220

plate and the progress we've made to

970

00:38:35,900 --> 00:38:33,540

date thank you Mark sorry likes you to

971

00:38:37,970 --> 00:38:35,910

finish didn't have a video hi everyone

972

00:38:39,860 --> 00:38:37,980

I'm marks or Angela from Sierra Nevada

973

00:38:41,510 --> 00:38:39,870

and I'm really thrilled to be here today

974

00:38:43,970 --> 00:38:41,520

to give you an update on what we've been

975

00:38:45,830 --> 00:38:43,980

doing with our program and we have had a

976  
00:38:47,450 --> 00:38:45,840  
major amount of success over the last

977  
00:38:49,430 --> 00:38:47,460  
couple of years and we're very fortunate

978  
00:38:51,200 --> 00:38:49,440  
to be part of this program and be part

979  
00:38:53,210 --> 00:38:51,210  
of the activity that's going on it's I

980  
00:38:55,220 --> 00:38:53,220  
think it's one of the best sled programs

981  
00:38:56,960 --> 00:38:55,230  
that we've been involved with through

982  
00:38:58,970 --> 00:38:56,970  
our history we're celebrating our 25th

983  
00:39:02,060 --> 00:38:58,980  
anniversary in space this year and have

984  
00:39:04,880 --> 00:39:02,070  
now over 70 missions with NASA and over

985  
00:39:06,500 --> 00:39:04,890  
420 missions to space in total and I

986  
00:39:08,630 --> 00:39:06,510  
have to say that the development of this

987  
00:39:10,790 --> 00:39:08,640  
program really has been extraordinary

988  
00:39:12,770 --> 00:39:10,800

because not only is it been well run but

989

00:39:15,320 --> 00:39:12,780

the new ground that we've been trying to

990

00:39:17,750 --> 00:39:15,330

cover and put together has been amazing

991

00:39:19,310 --> 00:39:17,760

how much how much activity has to go on

992

00:39:21,350 --> 00:39:19,320

to get this program to be where it is

993

00:39:23,840 --> 00:39:21,360

and I think as you heard from all of us

994

00:39:26,120 --> 00:39:23,850

and you will hear from space X in a few

995

00:39:27,830 --> 00:39:26,130

minutes we are we are moving forward

996

00:39:29,090 --> 00:39:27,840

very rapidly and I think it's a

997

00:39:32,450 --> 00:39:29,100

testament to where we are with the

998

00:39:35,030 --> 00:39:32,460

program our 2012 has been a wonderful

999

00:39:36,740 --> 00:39:35,040

year and I think part of what we we like

1000

00:39:37,499 --> 00:39:36,750

to talk about here besides the hardware

1001  
00:39:39,239 --> 00:39:37,509  
is the passion

1002  
00:39:41,339 --> 00:39:39,249  
involved with this we've been involved

1003  
00:39:43,829 --> 00:39:41,349  
with developing our dream chaser vehicle

1004  
00:39:45,599 --> 00:39:43,839  
now for over ten years and when you come

1005  
00:39:47,249 --> 00:39:45,609  
see us and when you come be part of our

1006  
00:39:48,929 --> 00:39:47,259  
experience you can see the amount of

1007  
00:39:50,669 --> 00:39:48,939  
people who are amazingly passionate and

1008  
00:39:52,949 --> 00:39:50,679  
I have them I believe the best team in

1009  
00:39:54,989 --> 00:39:52,959  
the industry behind this coming from all

1010  
00:39:57,389 --> 00:39:54,999  
over the country to come part of the

1011  
00:39:59,669 --> 00:39:57,399  
become part of this journey in we've

1012  
00:40:01,499 --> 00:39:59,679  
completed now over 20 mile stones across

1013  
00:40:03,929 --> 00:40:01,509

our programs we've been part of this

1014

00:40:05,819 --> 00:40:03,939

from the very beginning with NASA and

1015

00:40:08,699 --> 00:40:05,829

those those milestones have been a

1016

00:40:10,889 --> 00:40:08,709

mixture of very technical and program

1017

00:40:12,599 --> 00:40:10,899

element milestones with a lot of

1018

00:40:14,969 --> 00:40:12,609

hardware and it's part of our belief

1019

00:40:17,279 --> 00:40:14,979

that hardware development can go side by

1020

00:40:19,529 --> 00:40:17,289

side behind technical development and

1021

00:40:21,149 --> 00:40:19,539

program management to make sure that

1022

00:40:23,519 --> 00:40:21,159

that everything gets moved along at the

1023

00:40:26,189 --> 00:40:23,529

same kind of pace during this past year

1024

00:40:28,019 --> 00:40:26,199

with many milestones have been completed

1025

00:40:29,789 --> 00:40:28,029

and I'll go through a few of those but I

1026

00:40:32,309 --> 00:40:29,799

think as you see them that really what

1027

00:40:34,229 --> 00:40:32,319

stands out is that we've gone from being

1028

00:40:35,639 --> 00:40:34,239

something that is conceptual to being

1029

00:40:38,249 --> 00:40:35,649

something that is now a full flight

1030

00:40:40,379 --> 00:40:38,259

sighs vehicle ready to start its flight

1031

00:40:42,809 --> 00:40:40,389

tests and in a very short period of time

1032

00:40:44,699 --> 00:40:42,819

that's in my view that's one of the

1033

00:40:48,719 --> 00:40:44,709

greatest accomplishments we can do if we

1034

00:40:50,639 --> 00:40:48,729

go to next slide please this these

1035

00:40:52,529 --> 00:40:50,649

accomplishments come from a number of

1036

00:40:53,759 --> 00:40:52,539

different places and I want to point out

1037

00:40:55,229 --> 00:40:53,769

a couple of them not just because of

1038

00:40:57,479 --> 00:40:55,239

what they are but because of what they

1039

00:40:59,309 --> 00:40:57,489

represent our wind tunnel testing was

1040

00:41:03,059 --> 00:40:59,319

done through the partnership and

1041

00:41:05,459 --> 00:41:03,069

cooperation of both university we did

1042

00:41:07,049 --> 00:41:05,469

some work at Texas A&M as well as NASA

1043

00:41:09,149 --> 00:41:07,059

centers where we did work both at

1044

00:41:10,469 --> 00:41:09,159

Langley and Marshall and it's our

1045

00:41:12,479 --> 00:41:10,479

philosophy and it's been from the very

1046

00:41:14,129 --> 00:41:12,489

beginning that this is a team effort we

1047

00:41:15,509 --> 00:41:14,139

now have over a dozen industrial

1048

00:41:17,789 --> 00:41:15,519

companies involved three universities

1049

00:41:20,039 --> 00:41:17,799

and seven NASA centers who are part of

1050

00:41:22,109 --> 00:41:20,049

our program and it's this collective

1051  
00:41:24,269 --> 00:41:22,119  
group of very talented people who have

1052  
00:41:26,370 --> 00:41:24,279  
the same kind of passion around moving

1053  
00:41:28,379 --> 00:41:26,380  
forward a vehicle that really has made

1054  
00:41:29,939 --> 00:41:28,389  
this very special for us and the wind

1055  
00:41:32,159 --> 00:41:29,949  
tunnel testing that we've done in both

1056  
00:41:34,259 --> 00:41:32,169  
in all three of the area's really move

1057  
00:41:35,609 --> 00:41:34,269  
the design forward at a pace that we

1058  
00:41:37,109 --> 00:41:35,619  
could never have done on our own and

1059  
00:41:38,819 --> 00:41:37,119  
we're very thankful for all our partners

1060  
00:41:42,389 --> 00:41:38,829  
and the way that they've interacted with

1061  
00:41:44,249 --> 00:41:42,399  
us next slide please I think when you do

1062  
00:41:45,899 --> 00:41:44,259  
something like this there's certainly a

1063  
00:41:47,699 --> 00:41:45,909

lot of excitement that comes in but

1064

00:41:49,259 --> 00:41:47,709

nothing more exciting than when you're

1065

00:41:51,029 --> 00:41:49,269

actually starting to build the actual

1066

00:41:51,530 --> 00:41:51,039

vehicle and when you can put your hands

1067

00:41:52,850 --> 00:41:51,540

on in

1068

00:41:54,230 --> 00:41:52,860

you can see how it comes and gets

1069

00:41:56,060 --> 00:41:54,240

developed and you can see it start

1070

00:41:58,100 --> 00:41:56,070

flying and this past year sauce

1071

00:41:59,930 --> 00:41:58,110

developing what we call our ETA or

1072

00:42:01,700 --> 00:41:59,940

engineering test article where we've

1073

00:42:03,530 --> 00:42:01,710

been able to put it together and the

1074

00:42:05,600 --> 00:42:03,540

first vehicle was done to do structural

1075

00:42:07,880 --> 00:42:05,610

tests and loads tests on the vehicle and

1076  
00:42:09,740 --> 00:42:07,890  
the second vehicle was built to actually

1077  
00:42:12,620 --> 00:42:09,750  
start its flight regime next slide

1078  
00:42:14,150 --> 00:42:12,630  
please and we're very pleased to say

1079  
00:42:16,970 --> 00:42:14,160  
that that structure was completed during

1080  
00:42:19,940 --> 00:42:16,980  
the course of this year and began its

1081  
00:42:23,030 --> 00:42:19,950  
early stage testing with a captive carry

1082  
00:42:25,160 --> 00:42:23,040  
done in in Colorado over Memorial Day

1083  
00:42:27,860 --> 00:42:25,170  
weekend of this past year this is the

1084  
00:42:29,930 --> 00:42:27,870  
full size vehicle full full regime of

1085  
00:42:32,450 --> 00:42:29,940  
the vehicle it's not fully outfitted for

1086  
00:42:34,850 --> 00:42:32,460  
orbital flight but to be able to go from

1087  
00:42:37,070 --> 00:42:34,860  
from concept to go back into the

1088  
00:42:39,290 --> 00:42:37,080

assembly hangar and see something being

1089

00:42:41,060 --> 00:42:39,300

built is is really extraordinary from my

1090

00:42:44,600 --> 00:42:41,070

from my point of view next slide please

1091

00:42:45,890 --> 00:42:44,610

and you can see pictures of this we were

1092

00:42:49,670 --> 00:42:45,900

very fortunate in Colorado I'll have

1093

00:42:51,410 --> 00:42:49,680

some very good backdrops and we get take

1094

00:42:52,760 --> 00:42:51,420

advantage of them and it was really

1095

00:42:54,890 --> 00:42:52,770

pretty special because we actually did

1096

00:42:57,080 --> 00:42:54,900

it over Memorial Day weekend and what

1097

00:42:58,910 --> 00:42:57,090

you see below this is is the University

1098

00:43:00,920 --> 00:42:58,920

of Colorado in Boulder where scott

1099

00:43:02,930 --> 00:43:00,930

Carpenter lives and happened to also be

1100

00:43:04,940 --> 00:43:02,940

the 50th anniversary of his flight so we

1101  
00:43:06,350 --> 00:43:04,950  
were able to to really have a nice

1102  
00:43:08,630 --> 00:43:06,360  
tie-in for what we were trying to

1103  
00:43:10,670 --> 00:43:08,640  
accomplish next slide please other

1104  
00:43:13,520 --> 00:43:10,680  
highlights from the year we we did above

1105  
00:43:15,920 --> 00:43:13,530  
a test model we developed and started

1106  
00:43:18,260 --> 00:43:15,930  
advancing our ecosystems we started

1107  
00:43:20,840 --> 00:43:18,270  
doing our simulating simulated for

1108  
00:43:22,400 --> 00:43:20,850  
docking and have now have a simulator up

1109  
00:43:24,410 --> 00:43:22,410  
and running and soon to have a more

1110  
00:43:26,180 --> 00:43:24,420  
advanced simulator completed and we've

1111  
00:43:29,410 --> 00:43:26,190  
did some very structural and important

1112  
00:43:34,010 --> 00:43:29,420  
elements like landing gear and testing

1113  
00:43:35,690 --> 00:43:34,020

next slide one of the I think one of the

1114

00:43:37,430 --> 00:43:35,700

things that gets lost in this program is

1115

00:43:40,100 --> 00:43:37,440

how important it is to our country and

1116

00:43:42,410 --> 00:43:40,110

how important it is to our industry we

1117

00:43:44,690 --> 00:43:42,420

were participants in the rollout of

1118

00:43:47,270 --> 00:43:44,700

Atlantis here as it as it went through

1119

00:43:49,040 --> 00:43:47,280

the center in Kennedy and because in

1120

00:43:51,230 --> 00:43:49,050

many ways we feel where the emotional

1121

00:43:53,390 --> 00:43:51,240

successor to what has gone on with the

1122

00:43:55,250 --> 00:43:53,400

shuttle we thank the program leadership

1123

00:43:56,840 --> 00:43:55,260

a lot we think our partnerships a lot

1124

00:43:58,790 --> 00:43:56,850

but sometimes what we don't do is thank

1125

00:43:59,460 --> 00:43:58,800

all the thousands of people in NASA who

1126

00:44:01,290 --> 00:43:59,470

have

1127

00:44:03,690 --> 00:44:01,300

worked tirelessly over the years

1128

00:44:05,070 --> 00:44:03,700

throughout the the moon programs and

1129

00:44:06,270 --> 00:44:05,080

before that and certainly through the

1130

00:44:08,400 --> 00:44:06,280

hundred and thirty-five Shuttle missions

1131

00:44:10,460 --> 00:44:08,410

and we wanted to say thank you to that

1132

00:44:12,870 --> 00:44:10,470

and because we feel we've picked up that

1133

00:44:14,370 --> 00:44:12,880

not only the the knowledge from that

1134

00:44:16,770 --> 00:44:14,380

program but the emotion behind that

1135

00:44:19,980 --> 00:44:16,780

program and one of the things we saw as

1136

00:44:22,500 --> 00:44:19,990

we came through for the Atlantis is how

1137

00:44:24,990 --> 00:44:22,510

many people came up to us and how many

1138

00:44:26,700 --> 00:44:25,000

people we had lines going on people just

1139

00:44:28,920 --> 00:44:26,710

waited in line to sit and just talk to

1140

00:44:30,359 --> 00:44:28,930

us and and we feel certainly special

1141

00:44:32,160 --> 00:44:30,369

about that but I think what that says is

1142

00:44:34,500 --> 00:44:32,170

how important this program is to our

1143

00:44:36,870 --> 00:44:34,510

country into our industry people want to

1144

00:44:39,750 --> 00:44:36,880

believe they want to feel the expiration

1145

00:44:42,570 --> 00:44:39,760

means something and I think as we all

1146

00:44:44,520 --> 00:44:42,580

have seen that we feel that that emotion

1147

00:44:46,410 --> 00:44:44,530

is important to this country the the

1148

00:44:47,580 --> 00:44:46,420

number of students and kids that came up

1149

00:44:49,050 --> 00:44:47,590

to us who are going to be the next

1150

00:44:51,210 --> 00:44:49,060

generation of people sitting on the

1151

00:44:53,520 --> 00:44:51,220

podium like this they get inspired by

1152

00:44:55,170 --> 00:44:53,530

this as we got inspired by it and and I

1153

00:44:57,330 --> 00:44:55,180

can't say how important that is to our

1154

00:45:00,660 --> 00:44:57,340

country into our program next slide

1155

00:45:03,810 --> 00:45:00,670

please our growth has been significant

1156

00:45:05,910 --> 00:45:03,820

we've we've hired many many people from

1157

00:45:08,010 --> 00:45:05,920

all over the industry people were really

1158

00:45:09,270 --> 00:45:08,020

talented people we we are expanding our

1159

00:45:11,370 --> 00:45:09,280

facilities we're putting on a new

1160

00:45:13,230 --> 00:45:11,380

dedicated assembly and design and

1161

00:45:15,540 --> 00:45:13,240

engineering center that will be standing

1162

00:45:17,910 --> 00:45:15,550

up in the next couple of months we'll be

1163

00:45:20,099 --> 00:45:17,920

adding probably up towards 100 new

1164

00:45:23,130 --> 00:45:20,109

people throughout the country in this

1165

00:45:24,930 --> 00:45:23,140

next year in 2013 where we have seven

1166

00:45:26,670 --> 00:45:24,940

NASA centers who are engaged with us as

1167

00:45:28,650 --> 00:45:26,680

an ascend multiple universities and a

1168

00:45:33,410 --> 00:45:28,660

number of very significant partners that

1169

00:45:35,970 --> 00:45:33,420

are part of the program next slide in

1170

00:45:37,589 --> 00:45:35,980

2013 we're going to see some we think

1171

00:45:39,720 --> 00:45:37,599

some very major advances we're going to

1172

00:45:41,339 --> 00:45:39,730

complete our integrated system in design

1173

00:45:43,890 --> 00:45:41,349

review we've completed that it's one

1174

00:45:45,150 --> 00:45:43,900

part of the CCI cap milestone actually

1175

00:45:48,060 --> 00:45:45,160

have completed first two milestones

1176  
00:45:49,650 --> 00:45:48,070  
under the CCI cap program and are about

1177  
00:45:51,270 --> 00:45:49,660  
to in the next two weeks to complete our

1178  
00:45:54,180 --> 00:45:51,280  
third so that program is moving very

1179  
00:45:57,420 --> 00:45:54,190  
quickly and very positively forward I

1180  
00:45:58,560 --> 00:45:57,430  
think most most evident and will be the

1181  
00:46:01,140 --> 00:45:58,570  
fact that we're going to start our

1182  
00:46:03,089 --> 00:46:01,150  
actual flight test program this year our

1183  
00:46:04,950 --> 00:46:03,099  
vehicle our flight vehicle is now being

1184  
00:46:07,920 --> 00:46:04,960  
finally assembled and will be moved out

1185  
00:46:10,290 --> 00:46:07,930  
to Edwards Air Force Base where the

1186  
00:46:12,059 --> 00:46:10,300  
Dryden Flight Center nasan Dryden will

1187  
00:46:13,680 --> 00:46:12,069  
be helping us do the work and

1188  
00:46:15,329 --> 00:46:13,690

and we think that's just the right thing

1189

00:46:17,549 --> 00:46:15,339

to do in many ways that the facility

1190

00:46:19,559 --> 00:46:17,559

there has been the home of so many tests

1191

00:46:21,150 --> 00:46:19,569

including the shuttle test and we're

1192

00:46:23,309 --> 00:46:21,160

going to be picking that mantle up and

1193

00:46:24,749 --> 00:46:23,319

starting our first flight tests here in

1194

00:46:26,459 --> 00:46:24,759

the first quarter of this year with the

1195

00:46:29,069 --> 00:46:26,469

vehicle autonomous flight tests will

1196

00:46:31,079 --> 00:46:29,079

happen and that will be a drop full drop

1197

00:46:33,029 --> 00:46:31,089

in a full autonomous flight so things

1198

00:46:36,390 --> 00:46:33,039

are moving very rapidly our motor

1199

00:46:38,390 --> 00:46:36,400

testing is going on in our California

1200

00:46:41,189 --> 00:46:38,400

facility and we'll be doing continued

1201  
00:46:42,989 --> 00:46:41,199  
rocket motor testing there and we'll be

1202  
00:46:45,059 --> 00:46:42,999  
doing things like our reaction control

1203  
00:46:46,529 --> 00:46:45,069  
system and many other hardware

1204  
00:46:48,839 --> 00:46:46,539  
activities so it's going to be a very

1205  
00:46:50,969 --> 00:46:48,849  
full year full of milestones and full

1206  
00:46:54,839 --> 00:46:50,979  
very visible hardware milestones as well

1207  
00:46:56,849 --> 00:46:54,849  
next and as I close out in the last

1208  
00:46:58,920 --> 00:46:56,859  
minute we have a very short video but I

1209  
00:47:00,410 --> 00:46:58,930  
wanted to express our appreciation to

1210  
00:47:02,459 --> 00:47:00,420  
the press as well we talked a lot about

1211  
00:47:03,959 --> 00:47:02,469  
what's going on you guys put a lot of

1212  
00:47:06,089 --> 00:47:03,969  
effort in here but it's important that

1213  
00:47:07,890 --> 00:47:06,099

you get the story out that the human

1214

00:47:09,870 --> 00:47:07,900

spaceflight is not dead in America there

1215

00:47:11,489 --> 00:47:09,880

is a there are at least four companies

1216

00:47:13,319 --> 00:47:11,499

represented here who are working very

1217

00:47:15,059 --> 00:47:13,329

hard to make that happen in partnership

1218

00:47:16,680 --> 00:47:15,069

with NASA and as we go through our

1219

00:47:18,059 --> 00:47:16,690

budget cycles it's really important to

1220

00:47:20,120 --> 00:47:18,069

be able to say for not a lot of money

1221

00:47:22,019 --> 00:47:20,130

we've made tremendous progress and

1222

00:47:23,279 --> 00:47:22,029

continuing to make tremendous progress

1223

00:47:40,290 --> 00:47:23,289

and I thank you for that if you could

1224

00:47:40,300 --> 00:48:48,370

you

1225

00:49:00,249 --> 00:48:55,990

I like to turn it over to Garrett now

1226  
00:49:03,160 --> 00:49:00,259  
from SpaceX nice work mm-hmm Thanks so

1227  
00:49:04,870 --> 00:49:03,170  
if I can start with my first slide so

1228  
00:49:07,180 --> 00:49:04,880  
about a year and a half ago SpaceX

1229  
00:49:09,279 --> 00:49:07,190  
started partnering with NASA to work on

1230  
00:49:11,230 --> 00:49:09,289  
crew and this was really really

1231  
00:49:13,870 --> 00:49:11,240  
important to SpaceX for a number of

1232  
00:49:16,059 --> 00:49:13,880  
reasons first being that the company was

1233  
00:49:18,490 --> 00:49:16,069  
founded with the sole intent or sole

1234  
00:49:20,650 --> 00:49:18,500  
purpose of advancing the cause of human

1235  
00:49:22,089 --> 00:49:20,660  
space flight and so this is really what

1236  
00:49:23,529 --> 00:49:22,099  
we're all about and so having this

1237  
00:49:26,220 --> 00:49:23,539  
opportunity to be part of the Commercial

1238  
00:49:29,680 --> 00:49:26,230

Crew program is very special to us

1239

00:49:32,049 --> 00:49:29,690

second reason is is that you know for

1240

00:49:33,999 --> 00:49:32,059

well over a year now since atlantis came

1241

00:49:36,700 --> 00:49:34,009

to wheel stop the United States of

1242

00:49:39,519 --> 00:49:36,710

America no longer has the capability to

1243

00:49:41,980 --> 00:49:39,529

launch people into space and that's

1244

00:49:43,990 --> 00:49:41,990

something that that we are not happy

1245

00:49:46,930 --> 00:49:44,000

about venture so far as I said and

1246

00:49:49,960 --> 00:49:46,940

nobody's sitting up here on this panel

1247

00:49:51,940 --> 00:49:49,970

is happy about that but we're very very

1248

00:49:53,230 --> 00:49:51,950

proud to be part of the group The

1249

00:49:54,640 --> 00:49:53,240

Commercial Crew program that's going to

1250

00:49:57,670 --> 00:49:54,650

do something about that and get

1251  
00:49:59,259 --> 00:49:57,680  
Americans back into space and its basics

1252  
00:50:01,749 --> 00:49:59,269  
we feel a sense of urgency to get

1253  
00:50:04,690 --> 00:50:01,759  
Americans back into space on safe and

1254  
00:50:07,569 --> 00:50:04,700  
reliable transportation on american-made

1255  
00:50:10,960 --> 00:50:07,579  
rockets and so I'm very happy for that

1256  
00:50:14,230 --> 00:50:10,970  
reason to be here today so during the

1257  
00:50:15,789 --> 00:50:14,240  
first program since we were in a

1258  
00:50:17,920 --> 00:50:15,799  
bit of a unique position in space that's

1259  
00:50:19,960 --> 00:50:17,930  
because we already have a rocket in a

1260  
00:50:21,279 --> 00:50:19,970  
spacecraft that is traveling to the

1261  
00:50:22,749 --> 00:50:21,289  
space station in fact we've gone back

1262  
00:50:25,210 --> 00:50:22,759  
and forth to the space station out twice

1263  
00:50:27,670 --> 00:50:25,220

on cargo missions so we took the

1264

00:50:29,140 --> 00:50:27,680

approach in CC dev to figuring out well

1265

00:50:32,470 --> 00:50:29,150

what do we have to do to modify this

1266

00:50:34,569 --> 00:50:32,480

rocket and this spacecraft to not only

1267

00:50:35,829 --> 00:50:34,579

carry cargo but to carry people now this

1268

00:50:38,529 --> 00:50:35,839

wasn't that hard because from the very

1269

00:50:40,809 --> 00:50:38,539

beginning we intended to do this and on

1270

00:50:43,150 --> 00:50:40,819

our first cargo flight that vehicle had

1271

00:50:45,970 --> 00:50:43,160

windows for example that's a superficial

1272

00:50:48,700 --> 00:50:45,980

example but technically we had built

1273

00:50:50,319 --> 00:50:48,710

into this vehicle the capability to meet

1274

00:50:52,299 --> 00:50:50,329

human rating requirements from the very

1275

00:50:54,849 --> 00:50:52,309

beginning and so there were still some

1276

00:50:56,769 --> 00:50:54,859

things we needed to do technol technical

1277

00:50:58,990 --> 00:50:56,779

challenges that we needed to overcome to

1278

00:51:01,150 --> 00:50:59,000

get ready to carry people so that's what

1279

00:51:01,900 --> 00:51:01,160

we focused on the CCF to is primarily

1280

00:51:03,490 --> 00:51:01,910

the law

1281

00:51:05,500 --> 00:51:03,500

shibaura system so we built a new engine

1282

00:51:08,319 --> 00:51:05,510

which we call the super Draco it's a

1283

00:51:10,299 --> 00:51:08,329

seventeen thousand pound thrust hyper

1284

00:51:13,390 --> 00:51:10,309

collagen and that we're going to use

1285

00:51:16,059 --> 00:51:13,400

eight of those to provide basically an

1286

00:51:17,319 --> 00:51:16,069

injection capability for the crew for to

1287

00:51:18,940 --> 00:51:17,329

take from the safety and event that the

1288

00:51:21,130 --> 00:51:18,950

Falcon 9 rocket is having a bad day so

1289

00:51:24,039 --> 00:51:21,140

we developed engine we developed a test

1290

00:51:26,109 --> 00:51:24,049

stand to test the engine and we

1291

00:51:30,010 --> 00:51:26,119

developed all the related components we

1292

00:51:31,390 --> 00:51:30,020

also um we also worked on all the other

1293

00:51:32,620 --> 00:51:31,400

things you need to do for that people

1294

00:51:35,170 --> 00:51:32,630

need that cargo doesn't need so we

1295

00:51:37,089 --> 00:51:35,180

worked on seats on spacesuits on life

1296

00:51:38,770 --> 00:51:37,099

control systems how we're going to

1297

00:51:40,180 --> 00:51:38,780

modify our launch pad all those

1298

00:51:41,799 --> 00:51:40,190

different things that we need to do for

1299

00:51:44,020 --> 00:51:41,809

crew and finally we did a bunch of

1300

00:51:45,579 --> 00:51:44,030

homework a bunch of analyses to make

1301  
00:51:47,980 --> 00:51:45,589  
sure that our designs were heading in

1302  
00:51:49,210 --> 00:51:47,990  
the right way and last we did a couple

1303  
00:51:50,880 --> 00:51:49,220  
crew trials where we brought NASA

1304  
00:51:54,240 --> 00:51:50,890  
astronauts and had them sit in a

1305  
00:51:56,799 --> 00:51:54,250  
prototype of the cabin of the Dragon and

1306  
00:51:59,380 --> 00:51:56,809  
evaluated for ergonomics and human

1307  
00:52:01,870 --> 00:51:59,390  
factors so we did all that in that one

1308  
00:52:04,990 --> 00:52:01,880  
year and we completed everything back in

1309  
00:52:07,750 --> 00:52:05,000  
June of last year so that's all done and

1310  
00:52:10,240 --> 00:52:07,760  
then we moved on and I'm sorry in the

1311  
00:52:11,980 --> 00:52:10,250  
next slide there's some pretty pictures

1312  
00:52:14,740 --> 00:52:11,990  
of some of those things that we did you

1313  
00:52:15,730 --> 00:52:14,750

see a depiction of the interior of the

1314

00:52:18,010 --> 00:52:15,740

cabin what that's going to look like

1315

00:52:20,019 --> 00:52:18,020

we're going to have two rows of sittings

1316

00:52:22,960 --> 00:52:20,029

will be stadium seating upper row there

1317

00:52:27,789 --> 00:52:22,970

is first class the bomb low is that's

1318

00:52:28,900 --> 00:52:27,799

the coach I guess so but that's what's

1319

00:52:30,640 --> 00:52:28,910

going to look like any inside the

1320

00:52:32,829 --> 00:52:30,650

pitcher the rocket engine there is our

1321

00:52:34,299 --> 00:52:32,839

super Draco engine firing on our test n

1322

00:52:37,329 --> 00:52:34,309

that we built in just a few months in

1323

00:52:38,740 --> 00:52:37,339

our facility in Texas you see some of

1324

00:52:40,450 --> 00:52:38,750

the modifications we had planned for the

1325

00:52:43,269 --> 00:52:40,460

tower in the middle picture on the

1326

00:52:45,670 --> 00:52:43,279

bottom is some testing we were doing of

1327

00:52:47,440 --> 00:52:45,680

our carbon dioxide scrubbing for the

1328

00:52:49,599 --> 00:52:47,450

life support system and finally see a

1329

00:52:51,880 --> 00:52:49,609

picture of prototype spacesuit that we

1330

00:52:54,579 --> 00:52:51,890

worked on so that was all done and

1331

00:52:57,279 --> 00:52:54,589

finished back in June of last year so

1332

00:53:00,849 --> 00:52:57,289

moving on into cci cap which we're very

1333

00:53:04,839 --> 00:53:00,859

proud to be a part of we basically have

1334

00:53:05,799 --> 00:53:04,849

four main focus areas for CCI cap and

1335

00:53:09,160 --> 00:53:05,809

this is what we're going to be working

1336

00:53:10,690 --> 00:53:09,170

on for over another year and that is the

1337

00:53:12,039 --> 00:53:10,700

completely integrated design to complete

1338

00:53:13,420 --> 00:53:12,049

the design of both the rocket the

1339

00:53:16,030 --> 00:53:13,430

spacecraft that

1340

00:53:20,380 --> 00:53:16,040

ground systems the Mission Control all

1341

00:53:21,370 --> 00:53:20,390

that 2222 a critical design level

1342

00:53:25,299 --> 00:53:21,380

meaning that we're ready to start

1343

00:53:27,040 --> 00:53:25,309

building and and pretty soon flying so

1344

00:53:29,829 --> 00:53:27,050

completing through a critical design

1345

00:53:31,420 --> 00:53:29,839

review is the first goal second thing is

1346

00:53:33,760 --> 00:53:31,430

we can do a lot of hardware testing to

1347

00:53:36,040 --> 00:53:33,770

reduce risk we believe in testing

1348

00:53:37,450 --> 00:53:36,050

hardware early and often at SpaceX and

1349

00:53:39,460 --> 00:53:37,460

we've we've already done a bunch of this

1350

00:53:41,530 --> 00:53:39,470

so we're going to do even more in the

1351

00:53:43,930 --> 00:53:41,540

near future we're focused during this

1352

00:53:47,319 --> 00:53:43,940

whole period on crew safety we know this

1353

00:53:49,780 --> 00:53:47,329

is very very stress how important that

1354

00:53:51,839 --> 00:53:49,790

is having strapped into a rocket before

1355

00:53:55,120 --> 00:53:51,849

I could tell you that I have a personal

1356

00:53:57,040 --> 00:53:55,130

emotional reason why I wanted sir I want

1357

00:53:59,950 --> 00:53:57,050

to build a vehicle that is safer than

1358

00:54:02,230 --> 00:53:59,960

anything that's flown before by an order

1359

00:54:03,460 --> 00:54:02,240

of magnitude and finally preparing for

1360

00:54:05,200 --> 00:54:03,470

an ounce of certification making sure

1361

00:54:06,760 --> 00:54:05,210

that we're building a vehicle that is

1362

00:54:08,589 --> 00:54:06,770

going to meet NASA's needs so those are

1363

00:54:10,329 --> 00:54:08,599

the four areas that we're focused on the

1364

00:54:13,089 --> 00:54:10,339

next slide I think I could tell you a

1365

00:54:15,280 --> 00:54:13,099

little bit more about the detail this is

1366

00:54:16,450 --> 00:54:15,290

a whole bunch of different milestones up

1367

00:54:18,520 --> 00:54:16,460

there but these are all of our

1368

00:54:20,099 --> 00:54:18,530

milestones in this base period that do

1369

00:54:22,510 --> 00:54:20,109

that accomplish those four objectives

1370

00:54:24,910 --> 00:54:22,520

and we've already completed the first

1371

00:54:28,900 --> 00:54:24,920

four and we're moving on the fifth one

1372

00:54:30,970 --> 00:54:28,910

is coming up in March our plan is to get

1373

00:54:34,000 --> 00:54:30,980

to the point where we can fly to the ISS

1374

00:54:36,490 --> 00:54:34,010

with a non NASA crew by the end of 2015

1375

00:54:37,870 --> 00:54:36,500

now that is if we successfully execute

1376

00:54:39,760 --> 00:54:37,880

all of our base period milestones and

1377

00:54:41,549 --> 00:54:39,770

our optional period milestones on

1378

00:54:47,859 --> 00:54:41,559

schedule and so far we're on schedule

1379

00:54:49,660 --> 00:54:47,869

next slide so in 2012 what we've done so

1380

00:54:52,030 --> 00:54:49,670

far in ccr cap we've completed these

1381

00:54:54,720 --> 00:54:52,040

four milestones a technical baseline

1382

00:54:57,190 --> 00:54:54,730

review a financial and business review

1383

00:54:59,620 --> 00:54:57,200

system requirements review and then what

1384

00:55:00,940 --> 00:54:59,630

our most recent one just before the

1385

00:55:03,370 --> 00:55:00,950

holidays we completed our preliminary

1386

00:55:06,460 --> 00:55:03,380

design review for the ground systems and

1387

00:55:07,930 --> 00:55:06,470

the asset part of the flight regimes so

1388

00:55:08,740 --> 00:55:07,940

you see some pictures in there some of

1389

00:55:10,630 --> 00:55:08,750

those things that went into that

1390

00:55:12,400 --> 00:55:10,640

preliminary design review you see a

1391

00:55:15,609 --> 00:55:12,410

picture of the new engines were

1392

00:55:17,170 --> 00:55:15,619

upgrading the Falcon 9 rocket and a big

1393

00:55:18,940 --> 00:55:17,180

part of that upgrade is to be ready to

1394

00:55:21,520 --> 00:55:18,950

carry crew one of those things are new

1395

00:55:23,980 --> 00:55:21,530

engines that's a Merlin 1d it finished

1396

00:55:26,380 --> 00:55:23,990

his qualification testing and where

1397

00:55:28,569 --> 00:55:26,390

we're moving ahead with that

1398

00:55:32,019 --> 00:55:28,579

next step is that is a test nine of them

1399

00:55:33,160 --> 00:55:32,029

together in a stage to the right the

1400

00:55:34,930 --> 00:55:33,170

picture you see there to the right is

1401

00:55:36,819 --> 00:55:34,940

wind tunnel testing that we did at

1402

00:55:38,289 --> 00:55:36,829

Langley NASA Langley and partnership

1403

00:55:41,980 --> 00:55:38,299

with one is reimbursable Space Act

1404

00:55:43,660 --> 00:55:41,990

agreements and we tested a new shape of

1405

00:55:46,329 --> 00:55:43,670

the of the capsule to make sure that our

1406

00:55:48,460 --> 00:55:46,339

modifications will will work well as

1407

00:55:50,109 --> 00:55:48,470

well as a cargo dragon does for coming

1408

00:55:52,000 --> 00:55:50,119

back through the atmosphere for entry

1409

00:55:55,539 --> 00:55:52,010

and it helped ultimately for landing

1410

00:55:58,660 --> 00:55:55,549

finally see some conceptual ideas of how

1411

00:56:01,630 --> 00:55:58,670

we might do displays for the crew how we

1412

00:56:03,880 --> 00:56:01,640

would overlay data and video for in this

1413

00:56:07,180 --> 00:56:03,890

case for proximity operations and

1414

00:56:09,730 --> 00:56:07,190

docking next slide so what we have

1415

00:56:11,880 --> 00:56:09,740

coming up in 2013 we have a lot on our

1416

00:56:14,799 --> 00:56:11,890

plate we're going to be very very busy

1417

00:56:16,569 --> 00:56:14,809

we have a pad abort test review we're

1418

00:56:18,880 --> 00:56:16,579

going to go through the test plan in

1419

00:56:20,740 --> 00:56:18,890

detail for the pad abort test that we

1420

00:56:22,509 --> 00:56:20,750

are doing at the end of the year we're

1421

00:56:24,160 --> 00:56:22,519

going to do a human certification review

1422

00:56:26,259 --> 00:56:24,170

to make sure that we have a plan in

1423

00:56:28,329 --> 00:56:26,269

place that will get us to a certified

1424

00:56:30,490 --> 00:56:28,339

vehicle ready for NASA astronauts to

1425

00:56:32,529 --> 00:56:30,500

take to the space station we're doing an

1426

00:56:33,970 --> 00:56:32,539

on-orbit and entry preliminary design

1427

00:56:36,730 --> 00:56:33,980

review so we did already the ground

1428

00:56:38,200 --> 00:56:36,740

systems in a cent next step we have a

1429

00:56:41,380 --> 00:56:38,210

second preliminary design review to

1430

00:56:43,779 --> 00:56:41,390

focus on on orbit and entry that's

1431

00:56:45,849 --> 00:56:43,789

coming up this summer then we move on to

1432

00:56:48,730 --> 00:56:45,859

the in-flight abort test review that's

1433

00:56:50,200 --> 00:56:48,740

the next big hardware test and then we

1434

00:56:52,089 --> 00:56:50,210

have a safety review focused on all

1435

00:56:53,650 --> 00:56:52,099

those all those products that will go

1436

00:56:54,999 --> 00:56:53,660

into detail about how we're going to

1437

00:56:57,069 --> 00:56:55,009

accomplish that order of magnitude

1438

00:56:59,289 --> 00:56:57,079

safety improvement over any previous

1439

00:57:01,329 --> 00:56:59,299

vehicle and then a flight review of our

1440

00:57:03,970 --> 00:57:01,339

new upgraded Falcon 9 comes in November

1441

00:57:06,519 --> 00:57:03,980

and finally we end the year on a really

1442

00:57:09,940 --> 00:57:06,529

big high note which is by doing a pad

1443

00:57:12,519 --> 00:57:09,950

abort test right here behind us at KSC

1444

00:57:14,049 --> 00:57:12,529

where we're going to take there's not a

1445

00:57:17,609 --> 00:57:14,059

demonstration test this is a flight like

1446

00:57:19,930 --> 00:57:17,619

full-scale pad abort test for

1447

00:57:22,960 --> 00:57:19,940

certification as well as risk mitigation

1448

00:57:25,269 --> 00:57:22,970

we're going to take a dragon as fight

1449

00:57:28,019 --> 00:57:25,279

like as possible take it from our pad

1450

00:57:31,029 --> 00:57:28,029

over to Cape Canaveral Air Force Station

1451  
00:57:33,279 --> 00:57:31,039  
and demonstrate our ability to get away

1452  
00:57:35,230 --> 00:57:33,289  
from the Falcon 9 on the pad from zero

1453  
00:57:37,390 --> 00:57:35,240  
altitude and zero airspeed if we are

1454  
00:57:38,980 --> 00:57:37,400  
having a bad day on the pad so that's

1455  
00:57:39,960 --> 00:57:38,990  
what we have come up in the next year I

1456  
00:57:42,870 --> 00:57:39,970  
want to give you a sneak

1457  
00:57:47,220 --> 00:57:42,880  
peek into 2014 if we can show the next

1458  
00:57:50,670 --> 00:57:47,230  
slide so 2014 we have three milestones

1459  
00:57:52,440 --> 00:57:50,680  
that wrap up CCI cap base period and in

1460  
00:57:54,690 --> 00:57:52,450  
that period of time we're going to do a

1461  
00:57:57,510 --> 00:57:54,700  
qualification testing of the primary

1462  
00:57:59,220 --> 00:57:57,520  
structure we're going to stress it and

1463  
00:58:00,540 --> 00:57:59,230

bend it and hopefully not break it but

1464

00:58:03,839 --> 00:58:00,550

make sure it can take anything that

1465

00:58:06,000 --> 00:58:03,849

might that might get dissed at it in

1466

00:58:07,890 --> 00:58:06,010

flight we're going to do the final

1467

00:58:09,540 --> 00:58:07,900

critical design review and prove that

1468

00:58:12,060 --> 00:58:09,550

we're ready to start manufacturing and

1469

00:58:14,670 --> 00:58:12,070

finally we're going to end this program

1470

00:58:16,890 --> 00:58:14,680

by doing an in-flight abort test meaning

1471

00:58:18,210 --> 00:58:16,900

that we're going to take a dragon again

1472

00:58:20,609 --> 00:58:18,220

a flight like dragon full Scott

1473

00:58:22,230 --> 00:58:20,619

full-size sticking on top of a falcon 9

1474

00:58:24,030 --> 00:58:22,240

launch it out of our launch pad right

1475

00:58:27,000 --> 00:58:24,040

here and at the worst possible moment

1476  
00:58:28,740 --> 00:58:27,010  
we're going to have that dragon light up

1477  
00:58:30,960 --> 00:58:28,750  
it's super Draco's and fly away and

1478  
00:58:32,520 --> 00:58:30,970  
safely splash down into the Atlantic

1479  
00:58:35,490 --> 00:58:32,530  
demonstrating the capability to deliver

1480  
00:58:39,120 --> 00:58:35,500  
the crew safely should-should the Falcon

1481  
00:58:41,849 --> 00:58:39,130  
9 be having a bad day so in a nutshell

1482  
00:58:45,060 --> 00:58:41,859  
that's what we have planned for CCI cap

1483  
00:58:47,010 --> 00:58:45,070  
again we're very happy with this

1484  
00:58:49,260 --> 00:58:47,020  
partnership that we have with NASA we

1485  
00:58:51,990 --> 00:58:49,270  
want to see it continue all way so that

1486  
00:58:58,230 --> 00:58:52,000  
in near future we can get Americans back

1487  
00:59:01,230 --> 00:58:58,240  
into space on American rockets ed thinks

1488  
00:59:03,420 --> 00:59:01,240

as you can tell from our partners they

1489

00:59:06,270 --> 00:59:03,430

have been extremely busy and I think the

1490

00:59:09,150 --> 00:59:06,280

partnership between NASA and each of

1491

00:59:11,670 --> 00:59:09,160

these companies clearly shows that we

1492

00:59:13,500 --> 00:59:11,680

have a very vibrant space industry in

1493

00:59:15,870 --> 00:59:13,510

the United States and the space industry

1494

00:59:18,000 --> 00:59:15,880

wants to meet the goal of getting us

1495

00:59:20,190 --> 00:59:18,010

capability back into low-earth orbit I

1496

00:59:21,900 --> 00:59:20,200

have a few charts to talk about the big

1497

00:59:23,490 --> 00:59:21,910

picture from the program standpoint and

1498

00:59:25,290 --> 00:59:23,500

where we're headed we're right now where

1499

00:59:27,750 --> 00:59:25,300

we're headed so if I go to my first

1500

00:59:30,030 --> 00:59:27,760

chart this is a chart that kind of shows

1501  
00:59:32,820 --> 00:59:30,040  
our program lifecycle and you can think

1502  
00:59:34,920 --> 00:59:32,830  
about or what's a lifecycle from from us

1503  
00:59:36,720 --> 00:59:34,930  
program guys we look at a lifecycle from

1504  
00:59:38,400 --> 00:59:36,730  
the time we begin a new thought to the

1505  
00:59:40,770 --> 00:59:38,410  
time that we are actually executing the

1506  
00:59:43,140 --> 00:59:40,780  
mission and in this case we really have

1507  
00:59:44,910 --> 00:59:43,150  
two purposes of the Commercial Crew

1508  
00:59:47,790 --> 00:59:44,920  
lifecycle one is for a public purpose

1509  
00:59:50,310 --> 00:59:47,800  
and one is also for a specific massive

1510  
00:59:51,900 --> 00:59:50,320  
purpose to get to ISS you can see that

1511  
00:59:53,789 --> 00:59:51,910  
in the yellow lie

1512  
00:59:56,670 --> 00:59:53,799  
cycle all of our partners all four of

1513  
00:59:58,559 --> 00:59:56,680

the folks here today I've all been part

1514

01:00:02,670 --> 00:59:58,569

of this public purpose either through CC

1515

01:00:04,559 --> 01:00:02,680

dev 1 CC deaf too and now into I cap you

1516

01:00:06,839 --> 01:00:04,569

can see that a couple than three of them

1517

01:00:09,539 --> 01:00:06,849

are now continuing on into I cap and

1518

01:00:11,819 --> 01:00:09,549

then we'll and then some of those will

1519

01:00:14,250 --> 01:00:11,829

then transition into the blue line which

1520

01:00:17,099 --> 01:00:14,260

is our NASA purpose which is

1521

01:00:19,020 --> 01:00:17,109

certification and services so by doing

1522

01:00:22,349 --> 01:00:19,030

this we really are creating a capability

1523

01:00:24,270 --> 01:00:22,359

for the nation to use and and as we

1524

01:00:27,660 --> 01:00:24,280

create that capability than NASA will be

1525

01:00:29,789 --> 01:00:27,670

become a customer of that service so

1526

01:00:31,380 --> 01:00:29,799

that we can use this capability to move

1527

01:00:33,660 --> 01:00:31,390

our flight crew and our astronauts

1528

01:00:35,220 --> 01:00:33,670

International Space Station and continue

1529

01:00:37,400 --> 01:00:35,230

on with the science of the International

1530

01:00:39,510 --> 01:00:37,410

Space Station well that's a nice

1531

01:00:42,210 --> 01:00:39,520

pictorial now how do we actually make it

1532

01:00:44,609 --> 01:00:42,220

work and that's the next chart we showed

1533

01:00:46,230 --> 01:00:44,619

this chart back in August of last year

1534

01:00:48,450 --> 01:00:46,240

and what you said here is our

1535

01:00:50,089 --> 01:00:48,460

acquisition strategy overall for the

1536

01:00:53,370 --> 01:00:50,099

program for the Commercial Crew program

1537

01:00:55,589 --> 01:00:53,380

you can see all the partners here today

1538

01:00:58,769 --> 01:00:55,599

talked about the CC dev one and two and

1539

01:01:00,690 --> 01:00:58,779

I cap and that's the top portion we also

1540

01:01:02,789 --> 01:01:00,700

talked back in August and I we highlight

1541

01:01:04,470 --> 01:01:02,799

again that we have two phases under the

1542

01:01:06,000 --> 01:01:04,480

certification phase on Anna

1543

01:01:08,400 --> 01:01:06,010

certification effort for our

1544

01:01:10,829 --> 01:01:08,410

international for an ISS crew

1545

01:01:12,420 --> 01:01:10,839

transportation phase one which I'll talk

1546

01:01:13,710 --> 01:01:12,430

about that in much more detail here in a

1547

01:01:15,690 --> 01:01:13,720

minute is the phase that we're just

1548

01:01:18,089 --> 01:01:15,700

starting and we started in about two

1549

01:01:21,210 --> 01:01:18,099

weeks well then transition to phase two

1550

01:01:22,799 --> 01:01:21,220

in the spring late spring of 2014 and

1551

01:01:24,660 --> 01:01:22,809

that second phase also talked about

1552

01:01:26,640 --> 01:01:24,670

briefly today and how that phase is

1553

01:01:28,140 --> 01:01:26,650

really going to take us from all the

1554

01:01:30,809 --> 01:01:28,150

work that has been done through the

1555

01:01:33,359 --> 01:01:30,819

development in a partnership with our

1556

01:01:34,890 --> 01:01:33,369

partners today and with any other new

1557

01:01:37,260 --> 01:01:34,900

industry partners I would like to come

1558

01:01:39,599 --> 01:01:37,270

join us to compete for the capability to

1559

01:01:41,670 --> 01:01:39,609

go get certified for a NASA mission to

1560

01:01:44,069 --> 01:01:41,680

the international space station and that

1561

01:01:47,220 --> 01:01:44,079

should be concluded sometime between

1562

01:01:48,809 --> 01:01:47,230

2015 and 2017 from an overall schedule

1563

01:01:51,539 --> 01:01:48,819

standpoint of when we think you can get

1564

01:01:53,309 --> 01:01:51,549

crew and a capability for services and

1565

01:01:56,180 --> 01:01:53,319

then well of course transition in the

1566

01:01:58,440 --> 01:01:56,190

services once we have a certified system

1567

01:01:59,609 --> 01:01:58,450

today I want to talk a little bit about

1568

01:02:02,640 --> 01:01:59,619

the next chart which is our

1569

01:02:05,460 --> 01:02:02,650

certification products contract when we

1570

01:02:08,310 --> 01:02:05,470

awarded icap in August we

1571

01:02:10,530 --> 01:02:08,320

quickly turned around and said that that

1572

01:02:12,359 --> 01:02:10,540

we need a contract mechanism by which we

1573

01:02:13,830 --> 01:02:12,369

can talk about requirements our

1574

01:02:15,720 --> 01:02:13,840

requirements to get our crew to

1575

01:02:17,400 --> 01:02:15,730

international space station our safety

1576

01:02:19,710 --> 01:02:17,410

requirements as well as our performance

1577

01:02:21,420 --> 01:02:19,720

requirements and so the first step of

1578

01:02:23,849 --> 01:02:21,430

that was this certification product

1579

01:02:25,680 --> 01:02:23,859

contract and is really part of a phase

1580

01:02:29,550 --> 01:02:25,690

acquisition to get to that certified

1581

01:02:31,290 --> 01:02:29,560

system the primary objective of the CPC

1582

01:02:35,040 --> 01:02:31,300

is we like to call it awesome to like

1583

01:02:37,859 --> 01:02:35,050

acronyms is to begin the early critical

1584

01:02:40,020 --> 01:02:37,869

certification work to meet our set of

1585

01:02:42,750 --> 01:02:40,030

requirements that we have laid out it's

1586

01:02:44,940 --> 01:02:42,760

really maturing key certification

1587

01:02:47,700 --> 01:02:44,950

products and phase one that's what we're

1588

01:02:49,980 --> 01:02:47,710

talking about in CPC those products get

1589

01:02:52,740 --> 01:02:49,990

matured then it brings industry and NASA

1590

01:02:54,750 --> 01:02:52,750

all together to be ready to move into

1591

01:02:57,060 --> 01:02:54,760

Phase two which is the actual

1592

01:03:00,690 --> 01:02:57,070

verification activity and then eventual

1593

01:03:03,060 --> 01:03:00,700

certification of the system we're very

1594

01:03:05,040 --> 01:03:03,070

happy and we did award these back in

1595

01:03:06,650 --> 01:03:05,050

December 10th and I like to congratulate

1596

01:03:09,690 --> 01:03:06,660

the three companies that were awarded

1597

01:03:11,490 --> 01:03:09,700

Boeing Sierra Nevada and SpaceX they

1598

01:03:14,339 --> 01:03:11,500

were all awarded contracts for the

1599

01:03:17,040 --> 01:03:14,349

commercial for the certification

1600

01:03:20,310 --> 01:03:17,050

products contract each of these is a

1601  
01:03:23,099 --> 01:03:20,320  
fixed price contract all for 10 million

1602  
01:03:24,900 --> 01:03:23,109  
dollars or less there's really two sets

1603  
01:03:27,780 --> 01:03:24,910  
of products that we will look for in

1604  
01:03:29,730 --> 01:03:27,790  
this fixed price arrangement the first

1605  
01:03:31,740 --> 01:03:29,740  
set of products is the initial products

1606  
01:03:33,690 --> 01:03:31,750  
of four different types i'll talk about

1607  
01:03:35,370 --> 01:03:33,700  
here in a minute and then we'll begin to

1608  
01:03:37,410 --> 01:03:35,380  
have a number of technical interchanges

1609  
01:03:38,910 --> 01:03:37,420  
with each of the companies to mature

1610  
01:03:42,570 --> 01:03:38,920  
louis products so they're ready for the

1611  
01:03:44,670 --> 01:03:42,580  
final set of of products as we move

1612  
01:03:46,680 --> 01:03:44,680  
forward from an overall cost standpoint

1613  
01:03:49,560 --> 01:03:46,690

for the taxpayer we're going to pay

1614

01:03:51,810 --> 01:03:49,570

about forty percent of the total costs

1615

01:03:54,359 --> 01:03:51,820

of the contracts in in the initial

1616

01:03:57,150 --> 01:03:54,369

products which would be due here towards

1617

01:03:58,740 --> 01:03:57,160

the late spring of 2013 and then we'll

1618

01:04:02,130 --> 01:03:58,750

pay the rest when the final products are

1619

01:04:04,250 --> 01:04:02,140

due towards the spring of 2014 this way

1620

01:04:06,329 --> 01:04:04,260

we continue to work as a

1621

01:04:09,030 --> 01:04:06,339

performance-based kind of arrangement

1622

01:04:10,770 --> 01:04:09,040

where work is done we look at the work

1623

01:04:13,170 --> 01:04:10,780

we talk with the partners about the work

1624

01:04:14,880 --> 01:04:13,180

and then based on competency of that

1625

01:04:17,250 --> 01:04:14,890

work we then go ahead and

1626

01:04:20,009 --> 01:04:17,260

will help make payment to our to our

1627

01:04:22,019 --> 01:04:20,019

partners and our contractors the next

1628

01:04:24,059 --> 01:04:22,029

page talks a little bit more about the

1629

01:04:26,910 --> 01:04:24,069

details of this certification products

1630

01:04:28,950 --> 01:04:26,920

contract which there are four scope

1631

01:04:31,980 --> 01:04:28,960

products in the end we want to get to

1632

01:04:34,589 --> 01:04:31,990

the end of CPC with a certification plan

1633

01:04:36,450 --> 01:04:34,599

that's what we need in order to get to

1634

01:04:38,910 --> 01:04:36,460

that end state of a certification plan

1635

01:04:41,269 --> 01:04:38,920

that both us and our partners can sign

1636

01:04:44,160 --> 01:04:41,279

up to we need to have the other three

1637

01:04:46,319 --> 01:04:44,170

products developed and agree to those

1638

01:04:48,299 --> 01:04:46,329

are alternate standards we look at those

1639

01:04:50,940 --> 01:04:48,309

as nASA has to find a series of

1640

01:04:52,769 --> 01:04:50,950

standards we'd like them to use and all

1641

01:04:54,509 --> 01:04:52,779

of our standards we say we are willing

1642

01:04:56,220 --> 01:04:54,519

to talk about and figure out how you

1643

01:04:57,870 --> 01:04:56,230

would like to meet that intent of those

1644

01:04:59,970 --> 01:04:57,880

standards because there's always more

1645

01:05:01,529 --> 01:04:59,980

than one way to do a job and we have

1646

01:05:03,299 --> 01:05:01,539

noticed as you can see from today's

1647

01:05:05,220 --> 01:05:03,309

briefing that each of these have come

1648

01:05:07,680 --> 01:05:05,230

varied from very different approaches

1649

01:05:09,000 --> 01:05:07,690

towards trying to create a capability so

1650

01:05:11,089 --> 01:05:09,010

we want to talk about those alternate

1651  
01:05:13,319 --> 01:05:11,099  
standards with our contractor partners

1652  
01:05:15,329 --> 01:05:13,329  
we also want to talk about the hazard

1653  
01:05:17,670 --> 01:05:15,339  
analysis from a design standpoint you

1654  
01:05:19,829 --> 01:05:17,680  
design from what what can hurt you and

1655  
01:05:21,480 --> 01:05:19,839  
they need to design systems to mitigate

1656  
01:05:24,150 --> 01:05:21,490  
what can hurt you and that's called the

1657  
01:05:26,630 --> 01:05:24,160  
hazard analysis and has reports and

1658  
01:05:29,370 --> 01:05:26,640  
we'll work through iterations of those

1659  
01:05:31,620 --> 01:05:29,380  
products as we work from us the initial

1660  
01:05:33,509 --> 01:05:31,630  
phase to the final phase and finally

1661  
01:05:35,849 --> 01:05:33,519  
it's our verifications and a validation

1662  
01:05:38,609 --> 01:05:35,859  
plan those verifications are the actual

1663  
01:05:40,049 --> 01:05:38,619

tests you're going to run and on all of

1664

01:05:41,099 --> 01:05:40,059

our partners talk about the testing

1665

01:05:43,170 --> 01:05:41,109

they're going to do in the next couple

1666

01:05:44,759 --> 01:05:43,180

years which someday they may say we

1667

01:05:47,579 --> 01:05:44,769

would like to use those tests as part of

1668

01:05:49,440 --> 01:05:47,589

their overall verification effort it is

1669

01:05:52,079 --> 01:05:49,450

it will also include additional test

1670

01:05:53,700 --> 01:05:52,089

test down to the component tests at the

1671

01:05:56,400 --> 01:05:53,710

subsystem level tests at the system

1672

01:05:58,230 --> 01:05:56,410

level and test at the complete vehicle

1673

01:06:00,329 --> 01:05:58,240

level and that's what our verification

1674

01:06:02,490 --> 01:06:00,339

plan that we will work with each of the

1675

01:06:03,660 --> 01:06:02,500

contractors with and buy into that and

1676

01:06:06,359 --> 01:06:03,670

all that comes together to meet a

1677

01:06:09,180 --> 01:06:06,369

certification plan that's how that's the

1678

01:06:10,980 --> 01:06:09,190

products will do under CPC once we are

1679

01:06:12,450 --> 01:06:10,990

comfortable with those and our partner

1680

01:06:14,609 --> 01:06:12,460

contractors are comfortable with that

1681

01:06:16,710 --> 01:06:14,619

then we're really ready to go into Phase

1682

01:06:19,680 --> 01:06:16,720

two and that's how we a plan to approach

1683

01:06:21,779 --> 01:06:19,690

phase two from our requirements you know

1684

01:06:23,759 --> 01:06:21,789

you also got to look at requirements

1685

01:06:25,440 --> 01:06:23,769

vary inch process and we have a number

1686

01:06:26,320 --> 01:06:25,450

of requirements see all you can read

1687

01:06:29,200 --> 01:06:26,330

them online

1688

01:06:30,610 --> 01:06:29,210

about 300 of them that are our design

1689

01:06:31,990 --> 01:06:30,620

requirements there are performance

1690

01:06:34,180 --> 01:06:32,000

requirements as well as our safety

1691

01:06:37,000 --> 01:06:34,190

requirements if you were to actually try

1692

01:06:39,360 --> 01:06:37,010

to build a vehicle to every word and

1693

01:06:42,190 --> 01:06:39,370

every eye and every T in that

1694

01:06:43,900 --> 01:06:42,200

requirement set it probably would be

1695

01:06:45,420 --> 01:06:43,910

extremely expensive and there probably

1696

01:06:47,770 --> 01:06:45,430

will never be able to get off the ground

1697

01:06:49,600 --> 01:06:47,780

because a weight or power or whatever

1698

01:06:50,980 --> 01:06:49,610

the issues might being so what we want

1699

01:06:53,110 --> 01:06:50,990

to do is you want to talk to each of

1700

01:06:54,910 --> 01:06:53,120

these contractor partners about if

1701

01:06:56,800 --> 01:06:54,920

there's anything we need to do to our

1702

01:06:59,650 --> 01:06:56,810

requirements and variances tavares

1703

01:07:01,840 --> 01:06:59,660

requirements that look at risk really

1704

01:07:05,410 --> 01:07:01,850

variances are dealing with risk to the

1705

01:07:07,840 --> 01:07:05,420

safety side and risk due to the cost

1706

01:07:09,310 --> 01:07:07,850

side and risk due to performance I'd we

1707

01:07:11,410 --> 01:07:09,320

want to look at all three of those

1708

01:07:13,120 --> 01:07:11,420

components from a variant standpoint and

1709

01:07:15,310 --> 01:07:13,130

talk to the partners and say do you have

1710

01:07:17,260 --> 01:07:15,320

other ways of meeting our requirements

1711

01:07:19,120 --> 01:07:17,270

do you have other ways that say we can

1712

01:07:21,280 --> 01:07:19,130

mitigate the risk and therefore the

1713

01:07:23,800 --> 01:07:21,290

requirement the idea of the requirement

1714

01:07:25,300 --> 01:07:23,810

is still the same but the way we want to

1715

01:07:26,740 --> 01:07:25,310

meet it the way we want to try to deal

1716

01:07:28,270 --> 01:07:26,750

with that requirement for Marisa Tiant

1717

01:07:31,150 --> 01:07:28,280

point might be different and we call

1718

01:07:33,250 --> 01:07:31,160

those variances and that is really very

1719

01:07:34,390 --> 01:07:33,260

important that we encourage industry to

1720

01:07:37,300 --> 01:07:34,400

look at different ways of doing business

1721

01:07:39,760 --> 01:07:37,310

as you can see from today's briefing by

1722

01:07:41,710 --> 01:07:39,770

all three partners under I cap and all

1723

01:07:43,120 --> 01:07:41,720

four partners we have today that they

1724

01:07:45,760 --> 01:07:43,130

are looking at this very differently

1725

01:07:47,680 --> 01:07:45,770

than anything that human spaceflight has

1726  
01:07:49,540 --> 01:07:47,690  
done before and that is good they also

1727  
01:07:50,830 --> 01:07:49,550  
taken the experiences from human

1728  
01:07:52,690 --> 01:07:50,840  
spaceflight that NASA brings to the

1729  
01:07:55,630 --> 01:07:52,700  
table and that their teams bring to the

1730  
01:07:57,310 --> 01:07:55,640  
table to show that it isn't a new sheet

1731  
01:08:00,010 --> 01:07:57,320  
of paper it's a sheet of paper that has

1732  
01:08:01,690 --> 01:08:00,020  
history behind it to see what is good

1733  
01:08:03,490 --> 01:08:01,700  
and what is bad about our past and try

1734  
01:08:05,440 --> 01:08:03,500  
to improve on that and that's what we

1735  
01:08:08,880 --> 01:08:05,450  
encourage our partners to bring forward

1736  
01:08:11,950 --> 01:08:08,890  
in these variances as as we move forward

1737  
01:08:14,020 --> 01:08:11,960  
alright so that's see at CPC and that

1738  
01:08:17,079 --> 01:08:14,030

will start again january twenty second

1739

01:08:19,210 --> 01:08:17,089

and goes until the spring of 2014 and

1740

01:08:21,250 --> 01:08:19,220

then we talk about our next phase and

1741

01:08:23,770 --> 01:08:21,260

the next phase is what we call our

1742

01:08:26,230 --> 01:08:23,780

certification phase two it will cover

1743

01:08:27,880 --> 01:08:26,240

all aspects of the final development and

1744

01:08:30,849 --> 01:08:27,890

certification of the crew transportation

1745

01:08:33,849 --> 01:08:30,859

system that is to include final design

1746

01:08:36,430 --> 01:08:33,859

final manufacturing capabilities final

1747

01:08:37,690 --> 01:08:36,440

testing final qualification final

1748

01:08:40,120 --> 01:08:37,700

production and getting into that

1749

01:08:42,189 --> 01:08:40,130

production and actual operations

1750

01:08:43,959 --> 01:08:42,199

so that's a pretty big deal and we need

1751  
01:08:46,539 --> 01:08:43,969  
to make sure that we continue to partner

1752  
01:08:48,459 --> 01:08:46,549  
with our industry with our industry

1753  
01:08:52,660 --> 01:08:48,469  
partners to move forward so we're ready

1754  
01:08:55,269 --> 01:08:52,670  
for Phase two we intend to not do this

1755  
01:08:56,800 --> 01:08:55,279  
we intend for NASA my team not to do

1756  
01:08:58,419 --> 01:08:56,810  
this in a vacuum and come up with a plan

1757  
01:09:00,789 --> 01:08:58,429  
and roll it out and say here's your plan

1758  
01:09:03,370 --> 01:09:00,799  
go try to meet it we want to engage

1759  
01:09:06,309 --> 01:09:03,380  
industry and how to involve how to

1760  
01:09:07,570 --> 01:09:06,319  
evolve getting into phase 2 because

1761  
01:09:10,240 --> 01:09:07,580  
phase two is something very different

1762  
01:09:11,860 --> 01:09:10,250  
than NASA has done before it includes we

1763  
01:09:13,809 --> 01:09:11,870

want to look at different ways of doing

1764

01:09:16,570 --> 01:09:13,819

business we want to finalize our plans

1765

01:09:18,189 --> 01:09:16,580

and encourage involvement from industry

1766

01:09:21,760 --> 01:09:18,199

so we're going to be putting out a

1767

01:09:23,289 --> 01:09:21,770

request for information or an RFI about

1768

01:09:24,849 --> 01:09:23,299

certain questions that we'd like to get

1769

01:09:27,550 --> 01:09:24,859

some feedback from industry on really

1770

01:09:29,439 --> 01:09:27,560

within the next week and we'll be

1771

01:09:31,660 --> 01:09:29,449

looking for some feedback on that so

1772

01:09:34,660 --> 01:09:31,670

that helps us understand how we want to

1773

01:09:37,990 --> 01:09:34,670

go into phase 2 phase two will be a far

1774

01:09:39,910 --> 01:09:38,000

based contract but that's a big picture

1775

01:09:41,289 --> 01:09:39,920

now how do you go do all the details of

1776

01:09:43,329 --> 01:09:41,299

that is some of the questions you want

1777

01:09:45,340 --> 01:09:43,339

to ask about for example what type of

1778

01:09:47,829 --> 01:09:45,350

contract structure will come one type of

1779

01:09:49,269 --> 01:09:47,839

contract type we want we have some

1780

01:09:51,399 --> 01:09:49,279

questions you want to ask industry about

1781

01:09:52,629 --> 01:09:51,409

and see what kind of feedback we get we

1782

01:09:55,750 --> 01:09:52,639

want to talk about how do we approach

1783

01:09:57,310 --> 01:09:55,760

ISS missions in the end for the CPC and

1784

01:09:59,470 --> 01:09:57,320

for Phase two it's all about getting to

1785

01:10:01,870 --> 01:09:59,480

ISS and so we need to figure out how we

1786

01:10:04,450 --> 01:10:01,880

incorporate ISS missions into that

1787

01:10:06,399 --> 01:10:04,460

overall philosophy and of course we all

1788

01:10:08,260 --> 01:10:06,409

want to talk about FAA licensing because

1789

01:10:10,810 --> 01:10:08,270

we're in a commercial environment the

1790

01:10:12,939 --> 01:10:10,820

idea is is ISS is one destination not

1791

01:10:15,700 --> 01:10:12,949

the only destination if that's the case

1792

01:10:18,370 --> 01:10:15,710

we need to talk about how we bring the

1793

01:10:20,979 --> 01:10:18,380

FAA and regulatory agencies into

1794

01:10:22,570 --> 01:10:20,989

practice with us so that there's an

1795

01:10:24,520 --> 01:10:22,580

industry out there that isn't just for

1796

01:10:26,560 --> 01:10:24,530

NASA it's an industry that's really for

1797

01:10:27,939 --> 01:10:26,570

the entire planet and if they're

1798

01:10:29,470 --> 01:10:27,949

launched out of United States then we

1799

01:10:31,060 --> 01:10:29,480

think the FA has a very important role

1800

01:10:33,189 --> 01:10:31,070

in that and so we have some questions

1801  
01:10:35,820 --> 01:10:33,199  
about FAA licensing on how to go do that

1802  
01:10:37,899 --> 01:10:35,830  
in enough detail to enter into Phase two

1803  
01:10:39,430 --> 01:10:37,909  
we're going to have a number of Industry

1804  
01:10:41,500 --> 01:10:39,440  
touch points the next one will probably

1805  
01:10:44,200 --> 01:10:41,510  
be after this f RF I will be in March of

1806  
01:10:45,729 --> 01:10:44,210  
this year exact dates are still to be

1807  
01:10:47,800 --> 01:10:45,739  
determined and then we're going to come

1808  
01:10:50,170 --> 01:10:47,810  
out with a draft RFP probably in the

1809  
01:10:51,580 --> 01:10:50,180  
early summer the mid summer time frame

1810  
01:10:53,170 --> 01:10:51,590  
and that's really important to our

1811  
01:10:55,330 --> 01:10:53,180  
industry partners here and anybody else

1812  
01:10:57,070 --> 01:10:55,340  
in industry want to participate so they

1813  
01:10:58,540 --> 01:10:57,080

can give us feedback on how we think

1814

01:11:01,810 --> 01:10:58,550

we're going to go do this and we'll take

1815

01:11:04,300 --> 01:11:01,820

that feedback and see what is best from

1816

01:11:06,490 --> 01:11:04,310

a government incorporation again it's

1817

01:11:08,140 --> 01:11:06,500

our request for proposal and incorporate

1818

01:11:11,200 --> 01:11:08,150

that into our final RFP which should be

1819

01:11:13,120 --> 01:11:11,210

coming out in early fall of 2013 the

1820

01:11:16,540 --> 01:11:13,130

goal there is to have a contract awarded

1821

01:11:18,460 --> 01:11:16,550

by may of 2014 so you can see that as we

1822

01:11:20,620 --> 01:11:18,470

get through the base period of icap as

1823

01:11:22,960 --> 01:11:20,630

we get through CPC we're now ready to

1824

01:11:25,420 --> 01:11:22,970

move into this next phase of phase 2

1825

01:11:27,910 --> 01:11:25,430

with a contract award so that's a lot of

1826

01:11:31,000 --> 01:11:27,920

details about where how we're trying to

1827

01:11:32,740 --> 01:11:31,010

make the activity happen of course a lot

1828

01:11:34,690 --> 01:11:32,750

of that is based on the fact that there

1829

01:11:37,390 --> 01:11:34,700

has to be an overall national initiative

1830

01:11:39,520 --> 01:11:37,400

so this final chart i have is talking

1831

01:11:41,950 --> 01:11:39,530

about how the Commercial Crew program is

1832

01:11:43,600 --> 01:11:41,960

really a national involvement I think

1833

01:11:45,880 --> 01:11:43,610

all of our partners talked about that I

1834

01:11:47,730 --> 01:11:45,890

like the passion that led to each had

1835

01:11:50,440 --> 01:11:47,740

towards trying to create a capability

1836

01:11:52,930 --> 01:11:50,450

not just for NASA but also for the

1837

01:11:54,580 --> 01:11:52,940

nation it's a national initiative it's

1838

01:11:56,620 --> 01:11:54,590

not just here at Kennedy although the

1839

01:11:59,410 --> 01:11:56,630

program headquarters is here at Kennedy

1840

01:12:01,840 --> 01:11:59,420

it's not just a Johnson where the deputy

1841

01:12:03,610 --> 01:12:01,850

program is deputy program manager is at

1842

01:12:05,500 --> 01:12:03,620

and also I have a lot of capability at

1843

01:12:07,360 --> 01:12:05,510

Johnson that's helping the program it's

1844

01:12:10,030 --> 01:12:07,370

not just a NASA thing it's really a

1845

01:12:12,610 --> 01:12:10,040

national interest it's a national human

1846

01:12:14,080 --> 01:12:12,620

space flight activity for the nation in

1847

01:12:16,240 --> 01:12:14,090

fact you can see from this chart that

1848

01:12:18,130 --> 01:12:16,250

there's really 26 states that have

1849

01:12:20,500 --> 01:12:18,140

activity dealing with the Commercial

1850

01:12:24,460 --> 01:12:20,510

Crew program today all of those 26

1851

01:12:27,520 --> 01:12:24,470

states or 56 districts 56 electoral

1852

01:12:30,370 --> 01:12:27,530

districts that are part of our activity

1853

01:12:31,870 --> 01:12:30,380

that we're doing today and there's 63

1854

01:12:34,540 --> 01:12:31,880

aerospace companies that are involved

1855

01:12:36,940 --> 01:12:34,550

today and that's really at the prime and

1856

01:12:39,580 --> 01:12:36,950

the sub and going down a little bit down

1857

01:12:41,410 --> 01:12:39,590

the tier of subs and and that kind of

1858

01:12:44,230 --> 01:12:41,420

thing not every sub is listed in these

1859

01:12:45,940 --> 01:12:44,240

63 companies but this shows that is this

1860

01:12:48,730 --> 01:12:45,950

is a national involvement the Commercial

1861

01:12:50,710 --> 01:12:48,740

Crew program is not a single thing it's

1862

01:12:53,290 --> 01:12:50,720

a national interest it's a national

1863

01:12:55,150 --> 01:12:53,300

thing to get America having a capability

1864

01:12:57,130 --> 01:12:55,160

to get back to low-earth orbit that's

1865

01:12:59,590 --> 01:12:57,140

what we're trying to do that's what all

1866

01:13:01,450 --> 01:12:59,600

these companies are trying to do we I

1867

01:13:02,810 --> 01:13:01,460

applaud each of them for their very

1868

01:13:07,280 --> 01:13:02,820

unique ways of doing that

1869

01:13:09,200 --> 01:13:07,290

my team is extremely energized by the

1870

01:13:10,700 --> 01:13:09,210

activities that happen last year and

1871

01:13:13,069 --> 01:13:10,710

even more of the activities are going to

1872

01:13:15,859 --> 01:13:13,079

happen this year the team is extremely

1873

01:13:17,180 --> 01:13:15,869

we do a lot of travel and but I have

1874

01:13:19,129 --> 01:13:17,190

known here very many complaints about

1875

01:13:20,870 --> 01:13:19,139

the travel we have to do because we're

1876

01:13:23,120 --> 01:13:20,880

seeing growth in the American

1877

01:13:24,550 --> 01:13:23,130

spaceflight industry so that's what I

1878

01:13:27,560 --> 01:13:24,560

like to edit and I'll turn back over to

1879

01:13:29,149 --> 01:13:27,570

all right Thank You Eddie all right we

1880

01:13:30,770 --> 01:13:29,159

have a lot of folks lined up for

1881

01:13:32,330 --> 01:13:30,780

questions today so I'd like to please

1882

01:13:35,089 --> 01:13:32,340

ask everyone to limit it to one question

1883

01:13:36,770 --> 01:13:35,099

and a follow-up also we have social

1884

01:13:39,410 --> 01:13:36,780

media followers if you have a question

1885

01:13:42,620 --> 01:13:39,420

you can ask your question on twitter

1886

01:13:44,510 --> 01:13:42,630

with the hashtag ask nasa and we'll

1887

01:13:46,129 --> 01:13:44,520

begin here in florida please wait for

1888

01:13:48,560 --> 01:13:46,139

the microphone state your name and

1889

01:13:50,560 --> 01:13:48,570

affiliation and to whom you're asking

1890

01:13:53,899 --> 01:13:50,570

your question we'll start off with James

1891

01:13:56,359 --> 01:13:53,909

thank you James Dean floor today Phil I

1892

01:13:59,689 --> 01:13:56,369

think budget has consistently been

1893

01:14:02,510 --> 01:13:59,699

stated as the the top program risk in

1894

01:14:05,030 --> 01:14:02,520

its infancy now that you have the icap

1895

01:14:08,390 --> 01:14:05,040

plans and milestones and costs all laid

1896

01:14:10,689 --> 01:14:08,400

out do you have a better handle now and

1897

01:14:13,930 --> 01:14:10,699

what the actual costs are to get you to

1898

01:14:16,339 --> 01:14:13,940

you know an operational flight by 2017

1899

01:14:18,709 --> 01:14:16,349

can you just give us an update on what

1900

01:14:21,649 --> 01:14:18,719

budget you anticipate needing after this

1901

01:14:24,430 --> 01:14:21,659

year to stay on track or is there still

1902

01:14:26,839 --> 01:14:24,440

a risk of slipping if you don't get a

1903

01:14:29,600 --> 01:14:26,849

significant bump from from where you're

1904

01:14:32,780 --> 01:14:29,610

at now yeah you know the budget is going

1905

01:14:34,729 --> 01:14:32,790

to be an extremely challenging topic I

1906

01:14:36,770 --> 01:14:34,739

think not only for this program but for

1907

01:14:38,359 --> 01:14:36,780

all NASA programs I I work up at NASA

1908

01:14:40,100 --> 01:14:38,369

headquarters and just a couple doors

1909

01:14:41,930 --> 01:14:40,110

down for me as a director of the ISS

1910

01:14:44,300 --> 01:14:41,940

program and a couple more two doors down

1911

01:14:47,000 --> 01:14:44,310

as director of SLS and MPCV and we all

1912

01:14:49,910 --> 01:14:47,010

have the same issue right we're all we

1913

01:14:52,700 --> 01:14:49,920

all feel like we could use and need more

1914

01:14:54,169 --> 01:14:52,710

money to go forward but we're in a very

1915

01:14:56,300 --> 01:14:54,179

constrained environment we're going to

1916

01:14:57,319 --> 01:14:56,310

have to get what we get I think to

1917

01:14:59,330 --> 01:14:57,329

answer your one question about our

1918

01:15:02,510 --> 01:14:59,340

understanding of the cost that gets

1919

01:15:05,750 --> 01:15:02,520

better every every month now that we

1920

01:15:08,120 --> 01:15:05,760

have entered into I cap and CPC we are

1921

01:15:10,160 --> 01:15:08,130

seeing a better understanding of higher

1922

01:15:11,629 --> 01:15:10,170

fidelity estimates of these crew

1923

01:15:14,030 --> 01:15:11,639

transportation systems and that will

1924

01:15:15,170 --> 01:15:14,040

feed into our budget we hope to have a

1925

01:15:18,380 --> 01:15:15,180

budget

1926

01:15:19,580 --> 01:15:18,390

come out fairly soon not sure exactly

1927

01:15:23,960 --> 01:15:19,590

when that's going to be the president's

1928

01:15:26,600 --> 01:15:23,970

budget request for fy14 should be coming

1929

01:15:29,420 --> 01:15:26,610

out within the next I don't know when

1930

01:15:32,030 --> 01:15:29,430

but several weeks and of course there's

1931

01:15:34,250 --> 01:15:32,040

a lot of activity at in Washington DC

1932

01:15:35,840 --> 01:15:34,260

about that budget so I can't really say

1933

01:15:37,550 --> 01:15:35,850

about the budget but I can say that we

1934

01:15:39,050 --> 01:15:37,560

are getting smarter every day as all our

1935

01:15:40,730 --> 01:15:39,060

partners about what we really think the

1936

01:15:46,060 --> 01:15:40,740

costs are going to be and that is an

1937

01:15:48,080 --> 01:15:46,070

important factor and for the partners a

1938

01:15:49,970 --> 01:15:48,090

garret identified a couple of flight

1939

01:15:53,300 --> 01:15:49,980

tests coming up in the near term could

1940

01:15:57,920 --> 01:15:53,310

you just again update us on your plans

1941

01:15:59,810 --> 01:15:57,930

for any tests of of that nature or and

1942

01:16:02,030 --> 01:15:59,820

ultimately you know the first crude

1943

01:16:08,450 --> 01:16:02,040

flight test if you know budgets and

1944

01:16:10,250 --> 01:16:08,460

schedules stay on the track my

1945

01:16:12,260 --> 01:16:10,260

presentation we are expecting to start

1946

01:16:14,330 --> 01:16:12,270

our appt atmospheric flight tests here

1947

01:16:15,950 --> 01:16:14,340

in the first quarter of 2013 and that

1948

01:16:18,290 --> 01:16:15,960

will be the beginning of a flight test

1949

01:16:19,820 --> 01:16:18,300

program regime that will continue on

1950

01:16:24,320 --> 01:16:19,830

through this year and into next year

1951

01:16:26,270 --> 01:16:24,330

both autonomous as well as piloted yeah

1952

01:16:28,270 --> 01:16:26,280

when you look at our plan you are our

1953

01:16:32,840 --> 01:16:28,280

plan would have first crude flight in

1954

01:16:35,960 --> 01:16:32,850

2016 and when we went and laid out our

1955

01:16:39,740 --> 01:16:35,970

CC icap plan it was very important to us

1956

01:16:41,900 --> 01:16:39,750

that you you follow the mantra of tests

1957

01:16:44,900 --> 01:16:41,910

like you fly and fly like a test and and

1958

01:16:49,340 --> 01:16:44,910

for us you're the big integrated test

1959

01:16:51,320 --> 01:16:49,350

such as as pad abort we decided to that

1960

01:16:53,870 --> 01:16:51,330

we needed to incorporate those in our

1961

01:16:55,880 --> 01:16:53,880

qualification series so that it would be

1962

01:16:57,800 --> 01:16:55,890

flight design hardware a large scale

1963

01:17:00,320 --> 01:16:57,810

integrated test that's naturally where

1964

01:17:02,690 --> 01:17:00,330

they would fit and so those would be in

1965

01:17:06,020 --> 01:17:02,700

our next phase following CDR so that you

1966

01:17:07,310 --> 01:17:06,030

can ensure that those those larger tests

1967

01:17:08,780 --> 01:17:07,320

would be would be done at the flight

1968

01:17:12,260 --> 01:17:08,790

configuration so those would be done

1969

01:17:17,660 --> 01:17:12,270

early but into the into the optional

1970

01:17:25,209 --> 01:17:20,120

Darryl nail with fox in Orlando I'm

1971

01:17:30,350 --> 01:17:28,820

okay go ahead door how many this

1972

01:17:32,479 --> 01:17:30,360

question in NASA how many of the

1973

01:17:34,630 --> 01:17:32,489

companies up here today will be

1974

01:17:42,439 --> 01:17:34,640

commercially feasible as you see it

1975

01:17:45,500 --> 01:17:42,449

awarding contracts in 2014 I see all the

1976

01:17:47,780 --> 01:17:45,510

companies here today are commercially

1977

01:17:51,680 --> 01:17:47,790

viable as commercial spaceflight

1978

01:17:54,530 --> 01:17:51,690

companies I no doubt in my mind now who

1979

01:17:57,350 --> 01:17:54,540

will be ready to compete for what we

1980

01:17:59,090 --> 01:17:57,360

need in Phase two I believe that need

1981

01:18:00,770 --> 01:17:59,100

astok companies from a NASA standpoint

1982

01:18:02,630 --> 01:18:00,780

we believe that industry will be ready

1983

01:18:05,300 --> 01:18:02,640

we believe that there'll be more than

1984

01:18:07,189 --> 01:18:05,310

one probably two three maybe maybe

1985

01:18:10,100 --> 01:18:07,199

others that will be ready to compete for

1986

01:18:13,430 --> 01:18:10,110

Phase two but all all four companies

1987

01:18:15,260 --> 01:18:13,440

here today are capable and are the

1988

01:18:18,890 --> 01:18:15,270

leading edge of what it takes to get

1989

01:18:21,860 --> 01:18:18,900

folks back into low-earth orbit over

1990

01:18:25,669 --> 01:18:21,870

time and follow-up questions the

1991

01:18:27,830 --> 01:18:25,679

partners how does rush Russians flying

1992

01:18:31,450 --> 01:18:27,840

american astronauts motivate your

1993

01:18:34,280 --> 01:18:31,460

company or provide any type of

1994

01:18:37,850 --> 01:18:34,290

motivation to what you're doing I think

1995

01:18:40,340 --> 01:18:37,860

SpaceX answer did not specifically about

1996

01:18:41,810 --> 01:18:40,350

the Russians the lack of a u.s.

1997

01:18:45,350 --> 01:18:41,820

capability is something obviously that

1998

01:18:47,000 --> 01:18:45,360

we're not happy about I fluid I had

1999

01:18:49,760 --> 01:18:47,010

Russian partners with me up on the space

2000

01:18:52,700 --> 01:18:49,770

station and I really the partnership is

2001

01:18:54,800 --> 01:18:52,710

very strong on the ISS side but I think

2002

01:18:56,750 --> 01:18:54,810

to be a true partner in the space

2003

01:18:57,860 --> 01:18:56,760

station to be an equal partner we need

2004

01:18:59,689 --> 01:18:57,870

to come to the table with our own

2005

01:19:01,520 --> 01:18:59,699

ability to get there and we don't we

2006

01:19:03,110 --> 01:19:01,530

don't have that right now and in fact

2007

01:19:05,600 --> 01:19:03,120

we're paying a lot of money a lot of

2008

01:19:07,610 --> 01:19:05,610

taxpayer money to the Russians to to do

2009

01:19:09,590 --> 01:19:07,620

that I think it's 63 million dollars a

2010

01:19:11,150 --> 01:19:09,600

seat is what we're paying right now to

2011

01:19:13,760 --> 01:19:11,160

fly us astronauts up to the space

2012

01:19:15,320 --> 01:19:13,770

station on the Soyuz when we could be

2013

01:19:19,370 --> 01:19:15,330

spending that money here in the US yeah

2014

01:19:21,590 --> 01:19:19,380

that that motivates us I think from our

2015

01:19:23,660 --> 01:19:21,600

perspective that was the original

2016

01:19:27,110 --> 01:19:23,670

motivation for us getting into this was

2017

01:19:29,900 --> 01:19:27,120

that our belief was that we need not

2018

01:19:30,760 --> 01:19:29,910

only need a US Space Flight Program but

2019

01:19:33,190 --> 01:19:30,770

from our

2020

01:19:35,170 --> 01:19:33,200

perspective that the idea of creating

2021

01:19:37,300 --> 01:19:35,180

American jobs in American industry and

2022

01:19:38,860 --> 01:19:37,310

moving forward not just the hardware and

2023

01:19:41,110 --> 01:19:38,870

the people but the future of our

2024

01:19:42,550 --> 01:19:41,120

children who are looking towards what

2025

01:19:45,100 --> 01:19:42,560

they want to do with their future and

2026

01:19:47,380 --> 01:19:45,110

and how they want to educate we believe

2027

01:19:50,320 --> 01:19:47,390

that that's a strong motivation for what

2028

01:19:52,480 --> 01:19:50,330

we wanted to accomplish our target was

2029

01:19:54,250 --> 01:19:52,490

never other NASA programs or other

2030

01:19:56,380 --> 01:19:54,260

programs in the United States our target

2031

01:19:58,240 --> 01:19:56,390

was to repatriate that industry back

2032

01:20:02,080 --> 01:19:58,250

here to the United States and that's

2033

01:20:03,790 --> 01:20:02,090

what we're doing yeah I did reiterate

2034

01:20:05,770 --> 01:20:03,800

you know I think it's it's really

2035

01:20:07,690 --> 01:20:05,780

emotionally and also strategically

2036

01:20:10,180 --> 01:20:07,700

important that this country is a

2037

01:20:14,380 --> 01:20:10,190

spacefaring nation and and we're excited

2038

01:20:16,150 --> 01:20:14,390

to get back to that point i'll just add

2039

01:20:18,700 --> 01:20:16,160

I think I assess is a great example of

2040

01:20:20,860 --> 01:20:18,710

international cooperation so working

2041

01:20:22,480 --> 01:20:20,870

with countries all over the world is a

2042

01:20:24,520 --> 01:20:22,490

positive vote but if we want to explore

2043

01:20:26,590 --> 01:20:24,530

the frontier we have to have a way to

2044

01:20:29,110 --> 01:20:26,600

get there and we've gotta drive our own

2045

01:20:31,780 --> 01:20:29,120

vehicle so to speak so having that

2046

01:20:32,770 --> 01:20:31,790

capability for America and for several

2047

01:20:36,940 --> 01:20:32,780

commercial companies that are real

2048

01:20:38,800 --> 01:20:36,950

positive so all right we're going to go

2049

01:20:41,440 --> 01:20:38,810

to the Johnson Space Center phone bridge

2050

01:20:48,020 --> 01:20:41,450

now for questions and begin with Irene

2051  
01:20:53,600 --> 01:20:51,260  
yeah some can hear me right yeah we hear

2052  
01:20:56,210 --> 01:20:53,610  
you find Irene go ahead thanks very much

2053  
01:20:59,480 --> 01:20:56,220  
I have three quick questions the first

2054  
01:21:01,730 --> 01:20:59,490  
four at mango do you anticipate multiple

2055  
01:21:04,970 --> 01:21:01,740  
awards for the phase two of the program

2056  
01:21:06,500 --> 01:21:04,980  
with flight tests and for Garrett if you

2057  
01:21:09,710 --> 01:21:06,510  
could give us any update on the root

2058  
01:21:12,770 --> 01:21:09,720  
cause of the Falcon 9 engine out and for

2059  
01:21:14,960 --> 01:21:12,780  
mr. Myerson do you see any future on

2060  
01:21:19,070 --> 01:21:14,970  
road back to NASA funding for your

2061  
01:21:22,130 --> 01:21:19,080  
company's efforts thank you see I think

2062  
01:21:25,760 --> 01:21:22,140  
I was first in their competition is key

2063  
01:21:27,650 --> 01:21:25,770

for anything that we do in the United

2064

01:21:29,870 --> 01:21:27,660

States that's how you get the best price

2065

01:21:32,450 --> 01:21:29,880

at I to get the most innovation so to

2066

01:21:34,880 --> 01:21:32,460

answer your question I very much want

2067

01:21:37,640 --> 01:21:34,890

more than one company involved in Phase

2068

01:21:41,330 --> 01:21:37,650

two because I think it's a competition

2069

01:21:43,550 --> 01:21:41,340

and that innovation that helps drive all

2070

01:21:48,250 --> 01:21:43,560

of industry in the right direction and

2071

01:21:53,270 --> 01:21:51,200

because the product was Part B the

2072

01:21:55,730 --> 01:21:53,280

engine thing okay so we did have an

2073

01:21:57,410 --> 01:21:55,740

engine anomaly on the last Falcon 9

2074

01:22:01,100 --> 01:21:57,420

flight we had to shut down one of the

2075

01:22:03,830 --> 01:22:01,110

nine engines in the first stage and is

2076

01:22:05,720 --> 01:22:03,840

it right after the flight we convened a

2077

01:22:08,000 --> 01:22:05,730

an investigation group to look at this

2078

01:22:09,350 --> 01:22:08,010

in flight anomaly and that group

2079

01:22:12,080 --> 01:22:09,360

consistent not only with SpaceX

2080

01:22:14,780 --> 01:22:12,090

engineers but also NASA engineers it was

2081

01:22:16,850 --> 01:22:14,790

a NASA mission and so we had NASA

2082

01:22:18,470 --> 01:22:16,860

participation on the investigation team

2083

01:22:21,320 --> 01:22:18,480

that team has worked really really hard

2084

01:22:23,990 --> 01:22:21,330

at at looking at all the day we had tons

2085

01:22:27,620 --> 01:22:24,000

of data all the sensors kept working

2086

01:22:29,900 --> 01:22:27,630

after the the the anomaly occurred so we

2087

01:22:32,180 --> 01:22:29,910

had a real plethora of data to sort

2088

01:22:35,420 --> 01:22:32,190

through and NASA helped us out with that

2089

01:22:37,700 --> 01:22:35,430

and we've gotten to root cause and we

2090

01:22:40,220 --> 01:22:37,710

briefed that just before the holidays to

2091

01:22:42,500 --> 01:22:40,230

our customer which is mr. suffer Dini

2092

01:22:46,190 --> 01:22:42,510

the ISS program manager and and to build

2093

01:22:49,790 --> 01:22:46,200

Gerstenmaier at the head of human space

2094

01:22:51,530 --> 01:22:49,800

flight at NASA and that were right now

2095

01:22:53,300 --> 01:22:51,540

we're just making sure that they're

2096

01:22:55,850 --> 01:22:53,310

happy that all of our i's are dotted and

2097

01:22:57,920 --> 01:22:55,860

t's across but we do intend to make that

2098

01:23:00,850 --> 01:22:57,930

information more widely disseminated in

2099

01:23:02,320 --> 01:23:00,860

very very soon so I'm sorry I'm

2100

01:23:04,270 --> 01:23:02,330

leaving it with a bit of a cliffhanger

2101  
01:23:07,270 --> 01:23:04,280  
but I promise you were going to get you

2102  
01:23:08,439 --> 01:23:07,280  
more information on that soon and the

2103  
01:23:10,330 --> 01:23:08,449  
third question was whether there's a

2104  
01:23:11,560 --> 01:23:10,340  
future on-ramp for for NASA funding in

2105  
01:23:14,620 --> 01:23:11,570  
the future for a company like Blue

2106  
01:23:17,260 --> 01:23:14,630  
Origin I believe there is a I think

2107  
01:23:18,850 --> 01:23:17,270  
during cc2 and CC type 1 we we proved

2108  
01:23:20,020 --> 01:23:18,860  
that we're a very innovative company

2109  
01:23:21,879 --> 01:23:20,030  
that can provide a lot of value to the

2110  
01:23:24,340 --> 01:23:21,889  
government I think ed and Phil have seen

2111  
01:23:26,290 --> 01:23:24,350  
that firsthand and and and the

2112  
01:23:27,700 --> 01:23:26,300  
Commercial Crew team whether it's with

2113  
01:23:29,669 --> 01:23:27,710

commercial crew or other programs within

2114

01:23:31,359 --> 01:23:29,679

NASA we always are looking for

2115

01:23:32,770 --> 01:23:31,369

activities where we can work with the

2116

01:23:34,240 --> 01:23:32,780

government and help us to accelerate

2117

01:23:36,910 --> 01:23:34,250

what we're trying to do commercially and

2118

01:23:40,990 --> 01:23:36,920

will continue to do that so I'm

2119

01:23:43,000 --> 01:23:41,000

optimistic ok back to the phone bridge

2120

01:23:47,800 --> 01:23:43,010

and we have questions I believe from

2121

01:23:52,209 --> 01:23:47,810

alan Boyle from NBC Allen hi can you

2122

01:23:54,189 --> 01:23:52,219

hear me we hear you ok great I was

2123

01:23:57,000 --> 01:23:54,199

hoping to get more details from SpaceX

2124

01:23:59,919 --> 01:23:57,010

about the and garrett about the plans to

2125

01:24:03,550 --> 01:23:59,929

fly i think you said an on nasa crew by

2126  
01:24:05,740 --> 01:24:03,560  
the end of 2015 could you lay out what

2127  
01:24:09,250 --> 01:24:05,750  
that plan would entail are these people

2128  
01:24:10,570 --> 01:24:09,260  
who would be buying flights or if you

2129  
01:24:13,870 --> 01:24:10,580  
could provide a little more detail I

2130  
01:24:16,600 --> 01:24:13,880  
appreciate it sure I'd be happy to that

2131  
01:24:18,250 --> 01:24:16,610  
that is part of our optional so CCI cap

2132  
01:24:20,229 --> 01:24:18,260  
has a base period but we were also asked

2133  
01:24:22,689 --> 01:24:20,239  
to produce a bunch of optional

2134  
01:24:25,540 --> 01:24:22,699  
milestones so all of us all the partners

2135  
01:24:27,939 --> 01:24:25,550  
up here went ahead and submitted a

2136  
01:24:31,030 --> 01:24:27,949  
proposal that was you know assigned into

2137  
01:24:34,359 --> 01:24:31,040  
a space act agreement that contained not

2138  
01:24:35,830 --> 01:24:34,369

only up to me 2014 but what we would do

2139

01:24:38,080 --> 01:24:35,840

beyond that getting all the way to the

2140

01:24:41,410 --> 01:24:38,090

point of finding people to the space

2141

01:24:43,240 --> 01:24:41,420

station and so we laid out a plan with

2142

01:24:44,770 --> 01:24:43,250

those milestones that gets us to flying

2143

01:24:48,070 --> 01:24:44,780

the first test flight in the middle of

2144

01:24:50,410 --> 01:24:48,080

2015 and flying to the space station at

2145

01:24:53,169 --> 01:24:50,420

the end of 2015 that would be done with

2146

01:24:54,970 --> 01:24:53,179

a test pilot crew we were told that

2147

01:24:56,260 --> 01:24:54,980

because this would be part of the

2148

01:24:58,510 --> 01:24:56,270

development and prior to final

2149

01:25:01,689 --> 01:24:58,520

certification that we were not allowed

2150

01:25:04,689 --> 01:25:01,699

to legally to use NASA astronauts to be

2151

01:25:06,550 --> 01:25:04,699

part of that test pilot crew so SpaceX

2152

01:25:08,530 --> 01:25:06,560

we're gonna have to have company test

2153

01:25:10,589 --> 01:25:08,540

pilots that would fly those missions but

2154

01:25:12,669 --> 01:25:10,599

be a minimum crew for these test flights

2155

01:25:14,049 --> 01:25:12,679

it would not be we're not selling

2156

01:25:15,909 --> 01:25:14,059

tickets

2157

01:25:19,329 --> 01:25:15,919

don't don't call that our toll-free

2158

01:25:21,279 --> 01:25:19,339

number it's those are going to be test

2159

01:25:24,219 --> 01:25:21,289

flights as part of the the final

2160

01:25:33,520 --> 01:25:24,229

development and test and certification

2161

01:25:36,159 --> 01:25:33,530

process calendar you have Apollo Allen

2162

01:25:38,649 --> 01:25:36,169

did you have a follow-up no I didn't go

2163

01:25:42,599 --> 01:25:38,659

ahead thank you Frank mooring from

2164

01:25:45,790 --> 01:25:42,609

aviation week thank you I have a

2165

01:25:52,259 --> 01:25:45,800

two-part question first part for the for

2166

01:25:55,119 --> 01:25:52,269

the NASA guys if you give me a son of a

2167

01:26:00,189 --> 01:25:55,129

sort of total figure for the percentage

2168

01:26:02,079 --> 01:26:00,199

of support that nASA has given to the

2169

01:26:05,379 --> 01:26:02,089

development of these three vehicles I'll

2170

01:26:07,689 --> 01:26:05,389

say versus the amount of private funds

2171

01:26:09,399 --> 01:26:07,699

that have gone in there and then are for

2172

01:26:13,569 --> 01:26:09,409

the for the company guys if you could

2173

01:26:14,859 --> 01:26:13,579

say whether given the tight budget

2174

01:26:18,369 --> 01:26:14,869

environment that we're seeing here in

2175

01:26:19,959 --> 01:26:18,379

Washington whether or how much your

2176  
01:26:24,849 --> 01:26:19,969  
companies would be able to take up any

2177  
01:26:26,949 --> 01:26:24,859  
slack in case on the roughly 850 million

2178  
01:26:31,239 --> 01:26:26,959  
a year isn't forthcoming from Congress

2179  
01:26:33,219 --> 01:26:31,249  
thank you yeah Frank generally that is a

2180  
01:26:35,109 --> 01:26:33,229  
proprietary information it's fairly

2181  
01:26:37,419 --> 01:26:35,119  
sensitive how much the companies are

2182  
01:26:39,520 --> 01:26:37,429  
putting in so we don't we don't

2183  
01:26:42,459 --> 01:26:39,530  
publicize the percentage that the

2184  
01:26:43,989 --> 01:26:42,469  
partners have contributed we haven't in

2185  
01:26:47,829 --> 01:26:43,999  
the past and we're going to continue to

2186  
01:26:50,259 --> 01:26:47,839  
maintain that policy going forward and I

2187  
01:26:52,479 --> 01:26:50,269  
but i would add not from a percentage

2188  
01:26:54,669 --> 01:26:52,489

standpoint but every dollar that a

2189

01:26:56,649 --> 01:26:54,679

company puts on the table in this

2190

01:26:59,129 --> 01:26:56,659

partnership is one less dollar that the

2191

01:27:01,540 --> 01:26:59,139

taxpayers need to put on the table so

2192

01:27:03,099 --> 01:27:01,550

you know i'm not going to jump up and

2193

01:27:04,929 --> 01:27:03,109

down about percentages as much as i

2194

01:27:06,549 --> 01:27:04,939

would say the fact that it's a

2195

01:27:09,189 --> 01:27:06,559

partnership and we both bring money to

2196

01:27:10,899 --> 01:27:09,199

the table allows the taxpayer to get

2197

01:27:12,549 --> 01:27:10,909

more for their dollar and allows the

2198

01:27:13,899 --> 01:27:12,559

company to get more for their dollar and

2199

01:27:16,540 --> 01:27:13,909

that's what the partnerships all about

2200

01:27:18,879 --> 01:27:16,550

yeah that really does provide what we've

2201  
01:27:20,500 --> 01:27:18,889  
called skin in the game and it is a key

2202  
01:27:23,349 --> 01:27:20,510  
aspect of the partnership again the

2203  
01:27:26,259 --> 01:27:23,359  
percentage is is interesting but it's

2204  
01:27:27,880 --> 01:27:26,269  
not it's more of what the the money

2205  
01:27:29,470 --> 01:27:27,890  
represents it represents

2206  
01:27:31,690 --> 01:27:29,480  
a commitment on the part of the

2207  
01:27:34,330 --> 01:27:31,700  
companies to bring forward some of their

2208  
01:27:35,800 --> 01:27:34,340  
own financial resources for the

2209  
01:27:37,860 --> 01:27:35,810  
development of these vehicles and that

2210  
01:27:40,060 --> 01:27:37,870  
is critical because we'd only anticipate

2211  
01:27:41,860 --> 01:27:40,070  
maintaining ownership of these vehicles

2212  
01:27:42,970 --> 01:27:41,870  
the companies are going to maintain the

2213  
01:27:44,560 --> 01:27:42,980

intellectual property they're going to

2214

01:27:46,030 --> 01:27:44,570

own and operate these systems and we

2215

01:27:48,340 --> 01:27:46,040

think it's appropriate in that kind of

2216

01:27:50,830 --> 01:27:48,350

situation for them to bring money to the

2217

01:27:52,330 --> 01:27:50,840

table which all of them are doing in

2218

01:27:58,030 --> 01:27:52,340

pretty substantial fashion even though

2219

01:27:59,140 --> 01:27:58,040

we don't quote percentages and let's see

2220

01:28:02,110 --> 01:27:59,150

yeah you know the second part of your

2221

01:28:05,770 --> 01:28:02,120

question Frank I think asked about

2222

01:28:07,960 --> 01:28:05,780

whether we companies would would be

2223

01:28:10,540 --> 01:28:07,970

willing to commit more if if the NASA

2224

01:28:13,480 --> 01:28:10,550

funding was was lower than the 850

2225

01:28:15,820 --> 01:28:13,490

million dollar a requester plan you know

2226

01:28:18,010 --> 01:28:15,830

I'd say you know when we look at our

2227

01:28:23,200 --> 01:28:18,020

plan I think we've put together a robust

2228

01:28:24,940 --> 01:28:23,210

but affordable and aggressive and and

2229

01:28:27,130 --> 01:28:24,950

whether the company really could

2230

01:28:29,920 --> 01:28:27,140

contribute more I think you you have to

2231

01:28:32,170 --> 01:28:29,930

wait and look at the at the true market

2232

01:28:35,260 --> 01:28:32,180

assessment at that time and see how how

2233

01:28:38,890 --> 01:28:35,270

much the market has matured and then and

2234

01:28:41,800 --> 01:28:38,900

then look at the ability of your company

2235

01:28:43,270 --> 01:28:41,810

to invest more and whether you could you

2236

01:28:44,740 --> 01:28:43,280

could get a return so I think you just

2237

01:28:48,730 --> 01:28:44,750

really have to wait and look at the

2238

01:28:50,260 --> 01:28:48,740

market emerging at that point I think

2239

01:28:51,760 --> 01:28:50,270

our from our perspective we are

2240

01:28:53,530 --> 01:28:51,770

contributing significantly to the

2241

01:28:55,390 --> 01:28:53,540

program and one of the things that a

2242

01:28:57,310 --> 01:28:55,400

reduced budget would do is affect

2243

01:29:00,040 --> 01:28:57,320

schedule probably for all of us and

2244

01:29:01,690 --> 01:29:00,050

schedule is is highly important here

2245

01:29:04,270 --> 01:29:01,700

because we are targeting to get the most

2246

01:29:06,430 --> 01:29:04,280

utilization out of the ISS as possible I

2247

01:29:08,140 --> 01:29:06,440

think that the downside of this would be

2248

01:29:10,330 --> 01:29:08,150

that while the program might maintain

2249

01:29:11,500 --> 01:29:10,340

itself and we can continue to do the

2250

01:29:13,360 --> 01:29:11,510

work that we're doing it might take

2251

01:29:16,120 --> 01:29:13,370

longer to get there and that's going to

2252

01:29:19,960 --> 01:29:16,130

have an effect on on the really valuable

2253

01:29:22,240 --> 01:29:19,970

work that's being done on the station so

2254

01:29:24,820 --> 01:29:22,250

just to follow up I guess this is kind

2255

01:29:26,500 --> 01:29:24,830

of the same thing to try to speculate

2256

01:29:30,130 --> 01:29:26,510

about what would happen should funding

2257

01:29:33,010 --> 01:29:30,140

be less or you know different things

2258

01:29:35,020 --> 01:29:33,020

occur with the federal budget you know

2259

01:29:37,450 --> 01:29:35,030

life is vexing enough without

2260

01:29:39,700 --> 01:29:37,460

entertaining hypotheticals so I don't

2261

01:29:41,650 --> 01:29:39,710

want to go out on a limb and try to

2262

01:29:43,180 --> 01:29:41,660

cover all the possible permutations of

2263

01:29:45,490 --> 01:29:43,190

might happen but I can tell you that

2264

01:29:47,470 --> 01:29:45,500

SpaceX weird like I said it human

2265

01:29:48,880 --> 01:29:47,480

spaceflight is our reason for being we

2266

01:29:51,640 --> 01:29:48,890

are in this for the long haul that will

2267

01:29:54,280 --> 01:29:51,650

be impacts to cost and schedule it

2268

01:29:55,780 --> 01:29:54,290

should should funding dry up but you

2269

01:29:59,770 --> 01:29:55,790

know what we're we're going to get there

2270

01:30:05,470 --> 01:29:59,780

eventually okay next up is Dan Leone

2271

01:30:07,930 --> 01:30:05,480

from space news I a question for a slew

2272

01:30:10,660 --> 01:30:07,940

origin ray with Blue Origin be

2273

01:30:13,360 --> 01:30:10,670

interested in trying to get a speech he

2274

01:30:16,480 --> 01:30:13,370

faced to contract because those I've

2275

01:30:19,020 --> 01:30:16,490

been very clearly those are full and

2276

01:30:21,520 --> 01:30:19,030

open competition and anybody who has a

2277

01:30:24,100 --> 01:30:21,530

transportation system that meets the

2278

01:30:25,900 --> 01:30:24,110

requirements is welcome to apply and of

2279

01:30:28,600 --> 01:30:25,910

those who haven't gotten one already our

2280

01:30:30,670 --> 01:30:28,610

stuff has been a few origin probably the

2281

01:30:32,680 --> 01:30:30,680

furthest along is that work that the

2282

01:30:37,630 --> 01:30:32,690

company is interested in in or would you

2283

01:30:39,910 --> 01:30:37,640

give that a pass I can't really say

2284

01:30:42,550 --> 01:30:39,920

until I see see the draft RFP and that

2285

01:30:45,940 --> 01:30:42,560

hasn't come out yet so what I know about

2286

01:30:50,860 --> 01:30:45,950

is what I what I've seen today so it's a

2287

01:30:56,140 --> 01:30:50,870

little too early to say dan and you

2288

01:30:58,210 --> 01:30:56,150

follow up down okay let's move on to

2289

01:31:06,610 --> 01:30:58,220

mark Matthews from the Orlando Sentinel

2290

01:31:08,530 --> 01:31:06,620

mark yes we hear you mark all right this

2291

01:31:10,420 --> 01:31:08,540

questions for John similar to one that

2292

01:31:14,440 --> 01:31:10,430

was posed to Garrett a little bit

2293

01:31:18,160 --> 01:31:14,450

earlier today talking about that 2016

2294

01:31:20,800 --> 01:31:18,170

test flight would this also be a non

2295

01:31:23,620 --> 01:31:20,810

NASA crew would it be a NASA crew what

2296

01:31:25,360 --> 01:31:23,630

type of crew size are we looking at

2297

01:31:27,400 --> 01:31:25,370

where would it go I get some more

2298

01:31:31,090 --> 01:31:27,410

details about what you guys are planning

2299

01:31:33,970 --> 01:31:31,100

their thanks you're part of the

2300

01:31:35,650 --> 01:31:33,980

requirements of cci cap was was to

2301

01:31:38,440 --> 01:31:35,660

culminate with a crew flight test that

2302

01:31:41,200 --> 01:31:38,450

had non nasa crew so like garrett we

2303

01:31:45,100 --> 01:31:41,210

have a crude flight test planned ours is

2304

01:31:50,070 --> 01:31:45,110

in 2016 with boeing crew there would be

2305

01:31:59,620 --> 01:31:53,920

okay next on the line is tarick Malik

2306

01:32:03,280 --> 01:31:59,630

from space com tart thank you I also had

2307

01:32:05,800 --> 01:32:03,290

a crew related question for these these

2308

01:32:08,860 --> 01:32:05,810

new space cats I was I'm just curious if

2309

01:32:13,570 --> 01:32:08,870

if each of the members of the panel

2310

01:32:16,630 --> 01:32:13,580

could give us a quick glimpse into your

2311

01:32:18,939 --> 01:32:16,640

test pilot selection process have maybe

2312

01:32:20,560 --> 01:32:18,949

you have test pilots on staff Garrett I

2313

01:32:24,160 --> 01:32:20,570

would I would imagine you'd be on that

2314

01:32:25,870 --> 01:32:24,170

list for SpaceX you know how how are you

2315

01:32:27,970 --> 01:32:25,880

training and merging that with the

2316

01:32:31,350 --> 01:32:27,980

experiences you get from the astronauts

2317

01:32:33,580 --> 01:32:31,360

that you work with as well thank you

2318

01:32:35,439 --> 01:32:33,590

well well I'll start I mean we have two

2319

01:32:36,760 --> 01:32:35,449

former NASA astronauts on staff and they

2320

01:32:39,970 --> 01:32:36,770

helped us in a lot of different areas

2321

01:32:42,189 --> 01:32:39,980

bring a very unique perspective but i

2322

01:32:44,050 --> 01:32:42,199

think the the incremental development

2323

01:32:47,020 --> 01:32:44,060

starting with suborbital allows you to

2324

01:32:50,020 --> 01:32:47,030

really approach this in a different way

2325

01:32:53,890 --> 01:32:50,030

in terms of training your flight crew

2326  
01:32:55,630 --> 01:32:53,900  
and in a a space space like environment

2327  
01:32:58,900 --> 01:32:55,640  
but not not a fully orbital environment

2328  
01:33:01,000 --> 01:32:58,910  
and not unlike you know what NASA does

2329  
01:33:03,910 --> 01:33:01,010  
with high-performance aircraft so this

2330  
01:33:05,530 --> 01:33:03,920  
is a an approach will take to our

2331  
01:33:08,260 --> 01:33:05,540  
development and preparation for orbital

2332  
01:33:10,540 --> 01:33:08,270  
flight sure when one of our key

2333  
01:33:12,610 --> 01:33:10,550  
acquisitions was was Chris Ferguson who

2334  
01:33:15,220 --> 01:33:12,620  
is the less space shuttle commander so

2335  
01:33:18,010 --> 01:33:15,230  
he is he is on our team and responsible

2336  
01:33:20,020 --> 01:33:18,020  
for crew and mission operations and he

2337  
01:33:21,700 --> 01:33:20,030  
is defining you know not only the crew

2338  
01:33:25,240 --> 01:33:21,710

requirements but also the selection

2339

01:33:27,430 --> 01:33:25,250

process from our perspective we are

2340

01:33:29,620 --> 01:33:27,440

flight program is being run by Steve

2341

01:33:31,330 --> 01:33:29,630

Lindsey steve is a five-time shuttle

2342

01:33:33,340 --> 01:33:31,340

pilot and former chief of the astronaut

2343

01:33:35,530 --> 01:33:33,350

office and because our vehicle is a

2344

01:33:38,290 --> 01:33:35,540

lifting body piloted vehicle that has

2345

01:33:40,240 --> 01:33:38,300

very direct similarities to the shuttle

2346

01:33:42,010 --> 01:33:40,250

there is a significant pool of people

2347

01:33:46,780 --> 01:33:42,020

who have experience in that regard that

2348

01:33:49,000 --> 01:33:46,790

we can draw on it SpaceX we're just

2349

01:33:50,350 --> 01:33:49,010

starting internal discussions about how

2350

01:33:52,170 --> 01:33:50,360

we're going to select crews for those

2351

01:33:54,459 --> 01:33:52,180

first couple flights I don't have a

2352

01:33:56,560 --> 01:33:54,469

definite answer for you but I could tell

2353

01:34:00,560 --> 01:33:56,570

you that since you made it personal i

2354

01:34:01,970 --> 01:34:00,570

did not come to SpaceX specifically

2355

01:34:03,589 --> 01:34:01,980

with the number one party of going back

2356

01:34:05,240 --> 01:34:03,599

into space if that was my number one

2357

01:34:07,580 --> 01:34:05,250

goal I would have stayed at NASA in the

2358

01:34:08,930 --> 01:34:07,590

astronaut office and had a had

2359

01:34:11,810 --> 01:34:08,940

opportunity fly again to the space

2360

01:34:14,930 --> 01:34:11,820

station so what's important to me is not

2361

01:34:16,399 --> 01:34:14,940

that I get to be the guy that flies on

2362

01:34:18,680 --> 01:34:16,409

this vehicle what's important to me is

2363

01:34:21,319 --> 01:34:18,690

that I can look myself in a mirror look

2364

01:34:25,040 --> 01:34:21,329

at my wife and my and my son and say to

2365

01:34:26,689 --> 01:34:25,050

them that the risk is acceptable for me

2366

01:34:28,910 --> 01:34:26,699

to fly so that that is not important

2367

01:34:31,129 --> 01:34:28,920

that I'm that I go but I have to be

2368

01:34:32,660 --> 01:34:31,139

willing to go because I'm not strapping

2369

01:34:36,979 --> 01:34:32,670

somebody else into it if I'm not willing

2370

01:34:39,500 --> 01:34:36,989

to strap into it myself I think everyone

2371

01:34:41,510 --> 01:34:39,510

here I know the people that come to work

2372

01:34:43,160 --> 01:34:41,520

at commercial space companies I I think

2373

01:34:45,290 --> 01:34:43,170

there's probably no shortage of people

2374

01:34:46,910 --> 01:34:45,300

that will want to sign up and fly on on

2375

01:34:51,319 --> 01:34:46,920

any of our vehicles in the in those

2376

01:34:54,709 --> 01:34:51,329

early flights so so okay next on line

2377

01:35:03,310 --> 01:34:54,719

and I apologize if I get your name wrong

2378

01:35:12,109 --> 01:35:06,500

sounds like somebody is not muted on the

2379

01:35:14,479 --> 01:35:12,119

phone bridge Veronique are you there ok

2380

01:35:22,700 --> 01:35:14,489

let's move on to you ed Roseburg from

2381

01:35:28,470 --> 01:35:26,310

however I go what is it this time okay

2382

01:35:30,180 --> 01:35:28,480

I'm sorry who was that this is Veronique

2383

01:35:32,790 --> 01:35:30,190

and I have no questions at this time

2384

01:35:35,510 --> 01:35:32,800

okay thank you very nice how about Ed

2385

01:35:37,740 --> 01:35:35,520

Roz Roz Berg from flight international

2386

01:35:39,540 --> 01:35:37,750

there's no it'd but there is a Zach I

2387

01:35:45,240 --> 01:35:39,550

have no questions at the time oh okay

2388

01:35:48,360 --> 01:35:45,250

Zach welcome go ahead no no questions

2389

01:35:59,189 --> 01:35:48,370

okay Michael Bell fari from Popular

2390

01:36:03,300 --> 01:35:59,199

Mechanics how about Ken Kramer thank you

2391

01:36:05,160 --> 01:36:03,310

yes here up to everyone in getting

2392

01:36:08,280 --> 01:36:05,170

American astronaut since back in space

2393

01:36:11,760 --> 01:36:08,290

as soon as possible I have two quick

2394

01:36:14,010 --> 01:36:11,770

questions for mark and for Garrett

2395

01:36:16,050 --> 01:36:14,020

Garrett please can you tell us them you

2396

01:36:17,550 --> 01:36:16,060

talk a little bit about the resolving

2397

01:36:20,760 --> 01:36:17,560

the engine problem hopefully are you

2398

01:36:23,280 --> 01:36:20,770

aiming for a march first flight of the

2399

01:36:26,729 --> 01:36:23,290

next door mission or what is the target

2400

01:36:29,060 --> 01:36:26,739

and 44 marks around load talk a little

2401

01:36:33,060 --> 01:36:29,070

bit more about that flight test article

2402

01:36:35,280 --> 01:36:33,070

that would do you tend to launch that on

2403

01:36:39,840 --> 01:36:35,290

an adolescent how close would it be to

2404

01:36:42,240 --> 01:36:39,850

the actual vehicle thank you so yes I'll

2405

01:36:44,250 --> 01:36:42,250

go ahead first and say as far as our

2406

01:36:45,840 --> 01:36:44,260

next launch of the cargo dragging to the

2407

01:36:48,840 --> 01:36:45,850

space station that yes it's on on

2408

01:36:51,120 --> 01:36:48,850

schedule for an early early March lunch

2409

01:36:53,220 --> 01:36:51,130

here out of Cape Canaveral and we don't

2410

01:36:57,240 --> 01:36:53,230

see right now any issues that would do

2411

01:36:59,189 --> 01:36:57,250

it hold that up thanks for the question

2412

01:37:01,979 --> 01:36:59,199

our flight test vehicle is a full size

2413

01:37:04,410 --> 01:37:01,989

vehicle the outer mold line in the

2414

01:37:06,240 --> 01:37:04,420

perimeter of the vehicle is exactly what

2415

01:37:08,189 --> 01:37:06,250

we would be sending to orbit it's not

2416

01:37:10,650 --> 01:37:08,199

outfitted for orbital flight it is at

2417

01:37:13,229 --> 01:37:10,660

outfitted for atmospheric flight tests

2418

01:37:15,570 --> 01:37:13,239

and the best way to provide analogy it's

2419

01:37:16,919 --> 01:37:15,580

very similar to what NASA did in the

2420

01:37:19,050 --> 01:37:16,929

shuttle program with that with the

2421

01:37:21,270 --> 01:37:19,060

enterprise creating a vehicle that would

2422

01:37:24,990 --> 01:37:21,280

allow it to do significant flight tests

2423

01:37:34,939 --> 01:37:25,000

that whose design then would filter into

2424

01:37:41,479 --> 01:37:39,439

can anything else asking a question if

2425

01:37:46,219 --> 01:37:41,489

there is time um how close are you

2426

01:37:49,489 --> 01:37:46,229

actually to confirm go why why on earth

2427

01:37:54,049 --> 01:37:49,499

astronauts um let alone on these test

2428

01:37:55,489 --> 01:37:54,059

flights thanks she was the first

2429

01:37:57,799 --> 01:37:55,499

question about when we're gonna cut

2430

01:37:59,629 --> 01:37:57,809

metal who I think I think that was that

2431

01:38:01,580 --> 01:37:59,639

was for Boeing first question we were

2432

01:38:04,819 --> 01:38:01,590

cut metal I think our our first piece of

2433

01:38:08,419 --> 01:38:04,829

flight design hardware will be delivered

2434

01:38:13,750 --> 01:38:08,429

to to KSC and the old opf three within

2435

01:38:17,810 --> 01:38:13,760

five months see your other question was

2436

01:38:21,770 --> 01:38:17,820

about NASA crew and so at this point

2437

01:38:24,169 --> 01:38:21,780

what I'll say is under I cap if you

2438

01:38:26,899 --> 01:38:24,179

remember a chart I had I had the two

2439

01:38:30,199 --> 01:38:26,909

circles one was public purpose one was a

2440

01:38:31,879 --> 01:38:30,209

NASA mission purpose under I cap that is

2441

01:38:34,489 --> 01:38:31,889

really the transition that is really

2442

01:38:36,529 --> 01:38:34,499

mostly a public purpose and because we

2443

01:38:38,560 --> 01:38:36,539

want our industry partners to develop a

2444

01:38:41,419 --> 01:38:38,570

capability that they can use to go to

2445

01:38:43,640 --> 01:38:41,429

destinations in low-earth orbit we would

2446

01:38:45,739 --> 01:38:43,650

like them to get to a point where

2447

01:38:49,370 --> 01:38:45,749

they're ready to put their crew on their

2448

01:38:52,000 --> 01:38:49,380

vehicle at their risk at their risk and

2449

01:38:55,489 --> 01:38:52,010

so it changes the dynamic little bit

2450

01:38:57,680 --> 01:38:55,499

when normally under a contract the

2451  
01:38:59,449 --> 01:38:57,690  
contract contractor comes forward and

2452  
01:39:01,399 --> 01:38:59,459  
says he's ready to go fly but it's a

2453  
01:39:04,040 --> 01:39:01,409  
NASA individual that's going to sit on a

2454  
01:39:05,750 --> 01:39:04,050  
rocket so it becomes a NASA risk what we

2455  
01:39:06,859 --> 01:39:05,760  
did is we flipped it around under I cap

2456  
01:39:08,540 --> 01:39:06,869  
that's not what we're going to do

2457  
01:39:10,609 --> 01:39:08,550  
long-term under Phase two but we flip

2458  
01:39:12,529 --> 01:39:10,619  
that around under I cap and said we want

2459  
01:39:15,620 --> 01:39:12,539  
to know when you're ready to fly your

2460  
01:39:17,270 --> 01:39:15,630  
crew and put your people at risk and

2461  
01:39:20,270 --> 01:39:17,280  
that then becomes something that we were

2462  
01:39:22,549 --> 01:39:20,280  
able to evaluate under i cap so I would

2463  
01:39:25,279 --> 01:39:22,559

say also i think garrett center very

2464

01:39:27,919 --> 01:39:25,289

well in the end all of our partners want

2465

01:39:29,810 --> 01:39:27,929

to fly safe they're not going to take

2466

01:39:31,279 --> 01:39:29,820

any shortcuts on flying safe they are

2467

01:39:33,949 --> 01:39:31,289

going to try to figure out how to go do

2468

01:39:35,989 --> 01:39:33,959

that the best way they can and so all of

2469

01:39:37,790 --> 01:39:35,999

us have the same initiative and it

2470

01:39:40,310 --> 01:39:37,800

doesn't matter who's sitting on top of

2471

01:39:42,709 --> 01:39:40,320

the vehicle it's a person and that

2472

01:39:44,270 --> 01:39:42,719

person needs to fly safely and get back

2473

01:39:47,000 --> 01:39:44,280

home to their family so that's the

2474

01:39:47,450 --> 01:39:47,010

mission of all our folks on this panel

2475

01:39:49,729 --> 01:39:47,460

and all

2476

01:39:51,170 --> 01:39:49,739

all of our industry partners is to

2477

01:39:52,400 --> 01:39:51,180

figure out how to get someone to fly

2478

01:39:54,620 --> 01:39:52,410

doesn't matter if they're wearing a blue

2479

01:39:58,209 --> 01:39:54,630

suit or a company suit how they get back

2480

01:40:00,290 --> 01:39:58,219

to landing and go back to see the family

2481

01:40:02,810 --> 01:40:00,300

okay and I believe we have one more on

2482

01:40:12,470 --> 01:40:02,820

the phone bridge from Eric good Eric are

2483

01:40:15,229 --> 01:40:12,480

you there Eric okay well we're back here

2484

01:40:17,300 --> 01:40:15,239

before we pick up any follow-up

2485

01:40:20,780 --> 01:40:17,310

questions we do have one that we

2486

01:40:23,360 --> 01:40:20,790

received via Twitter on ask NASA and

2487

01:40:25,280 --> 01:40:23,370

it's from Pat host with defense daily

2488

01:40:27,410 --> 01:40:25,290

what are the specific safety

2489

01:40:32,060 --> 01:40:27,420

requirements and standards that have to

2490

01:40:34,640 --> 01:40:32,070

be reached for certification I'll see ya

2491

01:40:38,360 --> 01:40:34,650

mrs. and mango how an answer that is if

2492

01:40:41,540 --> 01:40:38,370

you look at our web page and we can get

2493

01:40:43,820 --> 01:40:41,550

you that afterwards it has all of our

2494

01:40:46,220 --> 01:40:43,830

requirements listed there's roughly

2495

01:40:49,700 --> 01:40:46,230

about 300 of them they are safety

2496

01:40:52,520 --> 01:40:49,710

requirements examples would be we have

2497

01:40:54,740 --> 01:40:52,530

to be able to fly with a fault-tolerant

2498

01:40:56,390 --> 01:40:54,750

scenario that says if you were to lose a

2499

01:40:58,280 --> 01:40:56,400

particular system you have a backup

2500

01:41:00,500 --> 01:40:58,290

system in order to get the crew arm

2501

01:41:02,300 --> 01:41:00,510

through the rest of the mission safely

2502

01:41:04,490 --> 01:41:02,310

that would be the kind of requirements

2503

01:41:06,830 --> 01:41:04,500

we have another one would be that during

2504

01:41:09,860 --> 01:41:06,840

and abort we have to be able to get the

2505

01:41:11,930 --> 01:41:09,870

crew back to the surface safely I think

2506

01:41:13,490 --> 01:41:11,940

in the video that Sierra Nevada showed

2507

01:41:15,440 --> 01:41:13,500

they said no black zone that's what we

2508

01:41:17,120 --> 01:41:15,450

like to call it I guess in vernacular

2509

01:41:18,800 --> 01:41:17,130

but in reality it's want to make sure

2510

01:41:20,990 --> 01:41:18,810

that we can get the crew back to the

2511

01:41:23,870 --> 01:41:21,000

surface and survive that all the way

2512

01:41:26,120 --> 01:41:23,880

down to the surface on any abort

2513

01:41:28,070 --> 01:41:26,130

scenario we also have other performance

2514

01:41:30,380 --> 01:41:28,080

requirements which is we need to get the

2515

01:41:32,930 --> 01:41:30,390

ISS for our mission we need to provide

2516

01:41:34,550 --> 01:41:32,940

for crew to International Space Station

2517

01:41:36,290 --> 01:41:34,560

the vehicle needs to be docked to the

2518

01:41:38,120 --> 01:41:36,300

International Space Station for up to

2519

01:41:39,770 --> 01:41:38,130

two inch in 10 days and be able to leave

2520

01:41:42,080 --> 01:41:39,780

at any time in order to get back home

2521

01:41:43,490 --> 01:41:42,090

either for an emergency to get back home

2522

01:41:45,560 --> 01:41:43,500

or at the end of that particular mission

2523

01:41:47,150 --> 01:41:45,570

so those are the kind of requirements

2524

01:41:49,040 --> 01:41:47,160

now again there's a couple hundred of

2525

01:41:51,830 --> 01:41:49,050

them and you can go online and get all

2526

01:41:53,890 --> 01:41:51,840

those that are at our website and all

2527

01:41:56,240 --> 01:41:53,900

those have been defined noggin baselined

2528

01:41:58,720 --> 01:41:56,250

all the companies have them they've had

2529

01:42:00,610 --> 01:41:58,730

them since August and so

2530

01:42:02,470 --> 01:42:00,620

everyone is working towards the same set

2531

01:42:04,510 --> 01:42:02,480

of requirements and we don't expect to

2532

01:42:05,920 --> 01:42:04,520

change them we went through a great

2533

01:42:08,770 --> 01:42:05,930

extent of trying to make sure we

2534

01:42:09,850 --> 01:42:08,780

understood them and and we gave them out

2535

01:42:12,820 --> 01:42:09,860

the industry and now we're moving

2536

01:42:14,470 --> 01:42:12,830

forward and so that's what we expect the

2537

01:42:16,060 --> 01:42:14,480

company is to try to meet and when when

2538

01:42:17,560 --> 01:42:16,070

they have a better way of doing it then

2539

01:42:20,560 --> 01:42:17,570

they'll bring forward their variances

2540

01:42:22,479 --> 01:42:20,570

and we'll talk about those okay and we

2541

01:42:24,580 --> 01:42:22,489

also just received a Twitter question

2542

01:42:25,900 --> 01:42:24,590

from alan Boyle from NBC who was with us

2543

01:42:28,960 --> 01:42:25,910

on the phone bridge he wants to know

2544

01:42:31,030 --> 01:42:28,970

does sierra nevada have a crude flight

2545

01:42:35,979 --> 01:42:31,040

plan they're planning suborbital flights

2546

01:42:37,450 --> 01:42:35,989

first ? yes we do we we are vehicle is

2547

01:42:39,460 --> 01:42:37,460

what we like to call optionally piloted

2548

01:42:42,430 --> 01:42:39,470

which means it's fully autonomous and

2549

01:42:45,430 --> 01:42:42,440

fully piloted from its design and so too

2550

01:42:47,110 --> 01:42:45,440

does the flight test program alternate

2551  
01:42:49,000 --> 01:42:47,120  
between autonomous flights and crude

2552  
01:42:50,770 --> 01:42:49,010  
flights and we will be going through the

2553  
01:42:52,720 --> 01:42:50,780  
suborbital regime to get to orbital

2554  
01:42:56,200 --> 01:42:52,730  
flight and we will be doing that in both

2555  
01:42:58,210 --> 01:42:56,210  
autonomous as well as crude versions ok

2556  
01:42:59,470 --> 01:42:58,220  
thank you alright we're back here at

2557  
01:43:05,140 --> 01:42:59,480  
Kennedy do we have any follow-up

2558  
01:43:07,450 --> 01:43:05,150  
questions seeing none I want to thank

2559  
01:43:10,000 --> 01:43:07,460  
you all very much and turn it over to

2560  
01:43:12,760 --> 01:43:10,010  
mr. mango force closing remarks ok

2561  
01:43:14,890 --> 01:43:12,770  
thanks and I definitely I think everyone

2562  
01:43:16,780 --> 01:43:14,900  
for coming out to Florida it's probably

2563  
01:43:18,760 --> 01:43:16,790

warmest day I've ever seen in January so

2564

01:43:22,030 --> 01:43:18,770

thanks for coming to Chamber of Commerce

2565

01:43:24,070 --> 01:43:22,040

floor today I would say that you know

2566

01:43:25,900 --> 01:43:24,080

the couple questions about cruise and

2567

01:43:28,750 --> 01:43:25,910

who they are and I think I tried to

2568

01:43:31,479 --> 01:43:28,760

answer earlier about you know to to us

2569

01:43:33,340 --> 01:43:31,489

it doesn't it does matter who's on top

2570

01:43:35,380 --> 01:43:33,350

of the vehicle for a particular mission

2571

01:43:37,300 --> 01:43:35,390

when we're in our test flight phase

2572

01:43:40,750 --> 01:43:37,310

whether it's under icap there will be

2573

01:43:43,000 --> 01:43:40,760

crews from the companies under Phase two

2574

01:43:45,520 --> 01:43:43,010

it will be probably a combined cruise

2575

01:43:47,050 --> 01:43:45,530

between what NASA needs as well as what

2576  
01:43:48,370 --> 01:43:47,060  
the company might want to do and we'll

2577  
01:43:50,680 --> 01:43:48,380  
have to go talk about all those details

2578  
01:43:53,229 --> 01:43:50,690  
but in the end this is a joint effort

2579  
01:43:55,740 --> 01:43:53,239  
between our astronaut corps and the

2580  
01:43:58,300 --> 01:43:55,750  
astronauts or the crew members at the

2581  
01:44:01,570 --> 01:43:58,310  
individual companies might be hiring and

2582  
01:44:03,670 --> 01:44:01,580  
it's that joint test plan that would get

2583  
01:44:07,000 --> 01:44:03,680  
us to an end state it isn't just one or

2584  
01:44:08,950 --> 01:44:07,010  
the other if anyone has developed

2585  
01:44:11,560 --> 01:44:08,960  
aircraft in the past you know that it's

2586  
01:44:13,810 --> 01:44:11,570  
it's military pilots as well as pilots

2587  
01:44:16,180 --> 01:44:13,820  
from from the companies that do the

2588  
01:44:17,770 --> 01:44:16,190

flight testing and so we expect that

2589

01:44:19,750 --> 01:44:17,780

same kind of approach as we move through

2590

01:44:22,720 --> 01:44:19,760

this overall process of trying to get

2591

01:44:25,360 --> 01:44:22,730

developed I'd also say it is important

2592

01:44:27,520 --> 01:44:25,370

to talk about the those blue suiters or

2593

01:44:30,250 --> 01:44:27,530

company pilots are flying the vehicles

2594

01:44:32,620 --> 01:44:30,260

but I would also say just like in sts-1

2595

01:44:34,600 --> 01:44:32,630

in 1981 there were two pilots flying a

2596

01:44:36,040 --> 01:44:34,610

vehicle to test pilots they took an

2597

01:44:38,320 --> 01:44:36,050

awful lot of risk on that particular

2598

01:44:40,390 --> 01:44:38,330

mission but there were thousands if not

2599

01:44:41,709 --> 01:44:40,400

tens of thousands of people behind their

2600

01:44:43,690 --> 01:44:41,719

to make sure the vehicle is going to fly

2601  
01:44:45,760 --> 01:44:43,700  
safe and the first test flight was going

2602  
01:44:47,830 --> 01:44:45,770  
to be successful it's no different than

2603  
01:44:49,450 --> 01:44:47,840  
in this generation of human space flight

2604  
01:44:51,130 --> 01:44:49,460  
endeavour that we're proceeding with

2605  
01:44:53,020 --> 01:44:51,140  
there'll be a couple people that are

2606  
01:44:54,670 --> 01:44:53,030  
sitting on top of the vehicle ready to

2607  
01:44:57,010 --> 01:44:54,680  
fly the vehicle but there'll be hundreds

2608  
01:44:59,860 --> 01:44:57,020  
if not thousands of people that are

2609  
01:45:01,660 --> 01:44:59,870  
engineers technicians mechanics quality

2610  
01:45:03,550 --> 01:45:01,670  
folks that are behind the two people are

2611  
01:45:05,140 --> 01:45:03,560  
for people that are sitting on top of

2612  
01:45:06,790 --> 01:45:05,150  
the vehicle to go fly that are going to

2613  
01:45:09,700 --> 01:45:06,800

make sure that the vehicle is as safe as

2614

01:45:11,860 --> 01:45:09,710

possible to go fly that is an American

2615

01:45:13,900 --> 01:45:11,870

endeavor that is a national interest

2616

01:45:15,640 --> 01:45:13,910

that is a national involvement to go

2617

01:45:17,530 --> 01:45:15,650

make this happen it's not just about the

2618

01:45:19,420 --> 01:45:17,540

two it's about the hundreds of people

2619

01:45:20,950 --> 01:45:19,430

that want to see America get back into

2620

01:45:23,229 --> 01:45:20,960

space and have a transportation system

2621

01:45:24,760 --> 01:45:23,239

to do so to low Earth orbit thanks for

2622

01:45:27,760 --> 01:45:24,770

coming today and thanks for listening

2623

01:45:30,280 --> 01:45:27,770

and you all have a good day all right

2624

01:45:32,050 --> 01:45:30,290

thank you and a reminder you can stay up

2625

01:45:33,880 --> 01:45:32,060

to date on the exciting progress of the

2626

01:45:39,330 --> 01:45:33,890

Commercial Crew program in several ways

2627

01:45:43,360 --> 01:45:39,340

on the web at WWDC gov / Commercial Crew

2628

01:45:46,450 --> 01:45:43,370

on twitter at Commercial Crew and on