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1
00:00:11,780 --> 00:00:09,650
I've been well and explores both with

2
00:00:15,099 --> 00:00:11,790
NASA and with commercial companies

3
00:00:17,390 --> 00:00:15,109
through private space astronauts

4
00:00:19,939 --> 00:00:17,400
yesterday here at the Museum of Flight

5
00:00:21,800 --> 00:00:19,949
Cheryl simoni and Richard Garriott we're

6
00:00:25,189 --> 00:00:21,810
both here to people who have flown to

7
00:00:27,170 --> 00:00:25,199
space as private citizens our reminder

8
00:00:30,160 --> 00:00:27,180
for today's program if you're watching

9
00:00:32,930 --> 00:00:30,170
on NASA TV or if you're just joining us

10
00:00:35,540 --> 00:00:32,940
today's panels will be replayed and

11
00:00:38,540 --> 00:00:35,550
available on YouTube at the nasa

12
00:00:40,490 --> 00:00:38,550
television youtube site if you go to

13
00:00:42,740 --> 00:00:40,500

youtube and search on nasa television

14
00:00:46,940 --> 00:00:42,750
all of our panel discussions should be

15
00:00:49,220 --> 00:00:46,950
uploaded this afternoon also if you have

16
00:00:51,529 --> 00:00:49,230
a communications device with you here

17
00:00:55,459 --> 00:00:51,539
today you can follow us on twitter at

18
00:00:57,830 --> 00:00:55,469
pound nasa future we'll also be taking

19
00:01:00,250 --> 00:00:57,840
questions from Twitter followers at

20
00:01:03,979 --> 00:01:00,260
throughout the panel discussion today

21
00:01:07,570 --> 00:01:03,989
our next panel this afternoon is or this

22
00:01:09,969 --> 00:01:07,580
morning I believe is going to be on

23
00:01:13,250 --> 00:01:09,979
commercial space investments and

24
00:01:16,640 --> 00:01:13,260
benefits for the nation we have here

25
00:01:19,910 --> 00:01:16,650
today a gathering of some truly

26
00:01:23,090 --> 00:01:19,920
extraordinary people people who are

27
00:01:26,539 --> 00:01:23,100
leading the businesses that are opening

28
00:01:29,749 --> 00:01:26,549
up low-earth orbit and access to the

29
00:01:34,340 --> 00:01:29,759
space station through a truly innovative

30
00:01:35,990 --> 00:01:34,350
and new spacecraft to lead the panel

31
00:01:37,999 --> 00:01:36,000
discussion today is once again our

32
00:01:40,580 --> 00:01:38,009
friend from the museum of flight Doug

33
00:01:42,380 --> 00:01:40,590
King I've enjoyed getting know Doug and

34
00:01:44,569 --> 00:01:42,390
I know he's passionate both about the

35
00:01:47,030 --> 00:01:44,579
past and the present but also very much

36
00:01:50,630 --> 00:01:47,040
about the future so I'll turned over to

37
00:01:52,210 --> 00:01:50,640
Doug X David really appreciate it thanks

38
00:01:54,410 --> 00:01:52,220

to all of you we worried a lot about

39
00:01:56,240 --> 00:01:54,420
developing questions ahead of time it

40
00:01:58,639 --> 00:01:56,250
looks from that first panel that that

41
00:02:00,469 --> 00:01:58,649
won't be necessary that you're very

42
00:02:02,060 --> 00:02:00,479
willing to participate in the discussion

43
00:02:04,639 --> 00:02:02,070
and that's exactly what we would like to

44
00:02:07,240 --> 00:02:04,649
do up here since we have limited time

45
00:02:09,740 --> 00:02:07,250
I'm going to dispense with individual

46
00:02:11,869 --> 00:02:09,750
introductions of our esteemed panel

47
00:02:12,440 --> 00:02:11,879
there are great BIOS in the folder that

48
00:02:17,780 --> 00:02:12,450
you got

49
00:02:19,369 --> 00:02:17,790
to introduce them as a group with lori

50
00:02:21,440 --> 00:02:19,379
garver spoke this morning she talked

51
00:02:23,240 --> 00:02:21,450
about the analogy between what's

52
00:02:25,130 --> 00:02:23,250
happening now in commercial space and

53
00:02:26,509 --> 00:02:25,140
the personal computer world well I've

54
00:02:28,970 --> 00:02:26,519
worked in Silicon Valley in the late

55
00:02:31,040 --> 00:02:28,980
1970s and I saw some of those

56
00:02:33,830 --> 00:02:31,050
conversations with people like steve

57
00:02:37,040 --> 00:02:33,840
jobs and bill gates and others and she's

58
00:02:39,680 --> 00:02:37,050
right this is more feel to that than

59
00:02:40,970 --> 00:02:39,690
anything that I've seen since we

60
00:02:43,369 --> 00:02:40,980
speculated what would it have been like

61
00:02:45,410 --> 00:02:43,379
to be able to sit in a bar and listen to

62
00:02:46,820 --> 00:02:45,420
him maybe in palo alto california after

63
00:02:48,440 --> 00:02:46,830

somebody went over to heal with packard

64
00:02:50,809 --> 00:02:48,450
installed some parts to build an apple

65
00:02:52,670 --> 00:02:50,819
one or two and listen to those folks

66
00:02:53,780 --> 00:02:52,680
talk to each other back then about what

67
00:02:55,789 --> 00:02:53,790
they thought the world was going to be

68
00:02:59,180 --> 00:02:55,799
like well that's what we're doing here

69
00:03:00,979 --> 00:02:59,190
this morning there's no beer with but

70
00:03:03,460 --> 00:03:00,989
we're going to react our panelists to

71
00:03:06,979 --> 00:03:03,470
act as if all the rest of us were

72
00:03:08,780 --> 00:03:06,989
listening in on them and their vision of

73
00:03:12,979 --> 00:03:08,790
where they're going why is their company

74
00:03:15,500 --> 00:03:12,989
their endeavor worth spending the time

75
00:03:18,110 --> 00:03:15,510
and energy and career that they're each

76
00:03:20,000 --> 00:03:18,120
investing in it because we have to get

77
00:03:21,559 --> 00:03:20,010
that across to the public that this

78
00:03:23,300 --> 00:03:21,569
isn't something that's going to happen

79
00:03:25,370 --> 00:03:23,310
maybe someday in the future it's

80
00:03:27,410 --> 00:03:25,380
something that's happening today right

81
00:03:29,569 --> 00:03:27,420
around us we went outside a few minutes

82
00:03:31,220 --> 00:03:29,579
ago and meant some of the Washington

83
00:03:32,590 --> 00:03:31,230
aerospace Scholars students right behind

84
00:03:35,180 --> 00:03:32,600
them were a bunch of eight-year-olds

85
00:03:37,400 --> 00:03:35,190
from a girls school here looking at

86
00:03:39,229 --> 00:03:37,410
those high school kids saying gee I hope

87
00:03:40,819 --> 00:03:39,239
I can be them someday and those high

88
00:03:43,340 --> 00:03:40,829

school kids looking at this panel saying

89
00:03:44,750 --> 00:03:43,350
I hope I can be them someday so I'm

90
00:03:46,309 --> 00:03:44,760
going to get out of the way and just let

91
00:03:49,360 --> 00:03:46,319
them introduce themselves with a brief

92
00:03:51,440 --> 00:03:49,370
introduction discussion about what their

93
00:03:53,750 --> 00:03:51,450
passion is what their companies or

94
00:03:55,849 --> 00:03:53,760
organization is doing and then open it

95
00:03:57,979 --> 00:03:55,859
up to a conversation among them that we

96
00:03:59,870 --> 00:03:57,989
can all listen in to and participate in

97
00:04:01,490 --> 00:03:59,880
so let's start right next to me here

98
00:04:03,979 --> 00:04:01,500
with Phil McAllister from NASA Phil

99
00:04:06,259 --> 00:04:03,989
thanks Doug I'm very happy to be here

100
00:04:08,539 --> 00:04:06,269
and I worked at NASA headquarters where

101
00:04:10,699 --> 00:04:08,549
I oversee the Commercial Crew and cargo

102
00:04:13,309 --> 00:04:10,709
programs the development piece of that

103
00:04:14,750 --> 00:04:13,319
and I want to thank you Doug for

104
00:04:18,349 --> 00:04:14,760
inviting us here this is a beautiful

105
00:04:19,789 --> 00:04:18,359
facility it obviously provides a lot of

106
00:04:21,270 --> 00:04:19,799
information about space flight but also

107
00:04:22,890 --> 00:04:21,280
inspiration

108
00:04:26,310 --> 00:04:22,900
I think that's really important as we go

109
00:04:28,680 --> 00:04:26,320
forward and I'm sort of a testament to

110
00:04:31,770 --> 00:04:28,690
that inspiration in my opinion I vividly

111
00:04:33,810 --> 00:04:31,780
remember being a high school senior and

112
00:04:36,600 --> 00:04:33,820
when people asked me what do you want to

113
00:04:38,790 --> 00:04:36,610

do as a career Phil it was very simple I

114
00:04:40,470 --> 00:04:38,800
knew it right away I want to be

115
00:04:42,840 --> 00:04:40,480
shortstop for the Mets I mean come on

116
00:04:44,760 --> 00:04:42,850
that's I was at high school as a senior

117
00:04:46,560 --> 00:04:44,770
that's what I wanted to do and that was

118
00:04:49,140 --> 00:04:46,570
my answer right up until the time I saw

119
00:04:51,330 --> 00:04:49,150
a story about the Space Shuttle on my

120
00:04:54,690 --> 00:04:51,340
hometown newspaper with a big picture of

121
00:04:56,010 --> 00:04:54,700
the shuttle this was in 1981 and I

122
00:04:58,950 --> 00:04:56,020
thought that was the coolest thing I had

123
00:05:02,040 --> 00:04:58,960
ever seen a spaceship landing on a

124
00:05:05,030 --> 00:05:02,050
runway that's when I decided to be an

125
00:05:08,490 --> 00:05:05,040
aerospace engineer and here i am at NASA

126
00:05:10,260 --> 00:05:08,500
helping to bring about the systems that

127
00:05:13,740 --> 00:05:10,270
are going to follow on the space shuttle

128
00:05:15,840 --> 00:05:13,750
and at NASA we're very much following a

129
00:05:18,540 --> 00:05:15,850
dual course today for space

130
00:05:20,550 --> 00:05:18,550
transportation for deep space missions

131
00:05:22,110 --> 00:05:20,560
we're going to be using the Space Launch

132
00:05:23,370 --> 00:05:22,120
System and the multi-purpose crew

133
00:05:25,100 --> 00:05:23,380
vehicle you've seen some of the videos

134
00:05:27,480 --> 00:05:25,110
about that those are going to be very

135
00:05:30,540 --> 00:05:27,490
more traditional programs and systems

136
00:05:32,190 --> 00:05:30,550
similar to the space shuttle but for low

137
00:05:34,170 --> 00:05:32,200
Earth orbit where the International

138
00:05:36,810 --> 00:05:34,180

Space Station travels that's a place

139
00:05:39,690 --> 00:05:36,820
that we've been many times over 150

140
00:05:42,810 --> 00:05:39,700
times over the last 40 years so we feel

141
00:05:44,940 --> 00:05:42,820
like it's time now to transition some of

142
00:05:47,730 --> 00:05:44,950
the responsibility for launching crew

143
00:05:50,909 --> 00:05:47,740
and cargo to low-earth orbit to the

144
00:05:54,029 --> 00:05:50,919
private sector and that brings me to my

145
00:05:55,860 --> 00:05:54,039
fellow panelists they represent some of

146
00:05:57,420 --> 00:05:55,870
the companies that are helping to do

147
00:05:59,940 --> 00:05:57,430
that and develop these systems and

148
00:06:02,100 --> 00:05:59,950
that's where I receive my inspiration

149
00:06:04,230 --> 00:06:02,110
today seeing these people and their

150
00:06:06,360 --> 00:06:04,240
co-workers coming up with new and

151
00:06:08,750 --> 00:06:06,370
innovative designs there's not a single

152
00:06:11,010 --> 00:06:08,760
solution there's multiple solutions

153
00:06:13,110 --> 00:06:11,020
they're very different some have

154
00:06:16,140 --> 00:06:13,120
capsules some have winged bodies there's

155
00:06:18,480 --> 00:06:16,150
new engines new support systems all

156
00:06:21,870 --> 00:06:18,490
designed to take people and cargo to

157
00:06:23,460 --> 00:06:21,880
low-earth orbit so that's that what

158
00:06:25,320 --> 00:06:23,470
that's what I find very exciting today

159
00:06:27,840 --> 00:06:25,330
and being a part of that I really liked

160
00:06:30,029 --> 00:06:27,850
so I remember I was very sad when the

161
00:06:32,130 --> 00:06:30,039
Space Shuttle was retired but I have

162
00:06:33,360 --> 00:06:32,140
been re-energized recently by seeing

163
00:06:35,070 --> 00:06:33,370

these new commercial system

164
00:06:36,300 --> 00:06:35,080
come into being along with the

165
00:06:39,840 --> 00:06:36,310
opportunities that they're going to

166
00:06:41,520 --> 00:06:39,850
represent honestly not everybody at NASA

167
00:06:44,129 --> 00:06:41,530
is comfortable with this new role of

168
00:06:46,250 --> 00:06:44,139
transitioning crew and cargo to

169
00:06:49,260 --> 00:06:46,260
low-earth orbit to the private sector

170
00:06:50,850 --> 00:06:49,270
but once again it's only for low Earth

171
00:06:52,320 --> 00:06:50,860
orbit and we think that that is

172
00:06:53,340 --> 00:06:52,330
appropriate beyond low-earth orbit we're

173
00:06:57,110 --> 00:06:53,350
going to follow in a more traditional

174
00:07:00,480 --> 00:06:57,120
path and I would say if not now when I

175
00:07:02,340 --> 00:07:00,490
really think this is inevitable the time

176
00:07:03,870 --> 00:07:02,350
is right these aerospace companies are

177
00:07:05,250 --> 00:07:03,880
mature they're ready to do this and

178
00:07:07,340 --> 00:07:05,260
again it's very exciting to see

179
00:07:09,390 --> 00:07:07,350
different designs come into being so

180
00:07:11,250 --> 00:07:09,400
consistent with this shift I'm also

181
00:07:13,290 --> 00:07:11,260
going to just take that much time and

182
00:07:16,010 --> 00:07:13,300
shift most of mine then it's over to the

183
00:07:23,310 --> 00:07:16,020
people actually doing the work thank you

184
00:07:24,800 --> 00:07:23,320
thanks Bill Gwynne Shotwell SpaceX you

185
00:07:28,980 --> 00:07:24,810
made a big announcement this morning

186
00:07:30,689 --> 00:07:28,990
yeah it was great news so we had some

187
00:07:34,260 --> 00:07:30,699
discussions with Mike suffered a knee

188
00:07:36,330 --> 00:07:34,270

yesterday to determine a launch date and

189
00:07:38,820 --> 00:07:36,340
we decided that februari seventh was the

190
00:07:40,800 --> 00:07:38,830
right day to shoot for and that really

191
00:07:42,990 --> 00:07:40,810
kind of focuses all the activities for

192
00:07:45,750 --> 00:07:43,000
the next 60 days were thrilled to get

193
00:07:49,409 --> 00:07:45,760
there we're thrilled that NASA is

194
00:07:51,600 --> 00:07:49,419
letting us get there so kudos to NASA

195
00:07:54,420 --> 00:07:51,610
and the teams we've been working with so

196
00:07:56,159 --> 00:07:54,430
I was asked to shortly and I'm always

197
00:07:58,409 --> 00:07:56,169
short for those of you that know me I

198
00:08:01,080 --> 00:07:58,419
much prefer to answer questions than

199
00:08:03,000 --> 00:08:01,090
blab on here answer two questions why is

200
00:08:07,230 --> 00:08:03,010
my company doing what it's doing and why

201
00:08:08,760 --> 00:08:07,240
am i doing it as well so SpaceX was

202
00:08:10,589 --> 00:08:08,770
founded by elon musk we are doing

203
00:08:13,110 --> 00:08:10,599
exactly what we're doing because of him

204
00:08:15,230 --> 00:08:13,120
and his vision he believes that it is

205
00:08:18,540 --> 00:08:15,240
absolutely essential to the human race

206
00:08:22,379 --> 00:08:18,550
to provide the capabilities to move

207
00:08:25,770 --> 00:08:22,389
beyond earth for humans it's it's a

208
00:08:28,520 --> 00:08:25,780
giant goal he's quite the visionary and

209
00:08:31,469 --> 00:08:28,530
every decision that we make at SpaceX is

210
00:08:35,070 --> 00:08:31,479
focused on that particular piece taking

211
00:08:36,959 --> 00:08:35,080
crew taking crew to space falcon one was

212
00:08:39,649 --> 00:08:36,969
a great pathfinder for the eventual

213
00:08:42,719 --> 00:08:39,659

Falcon 9 that can actually carry crew

214
00:08:45,630 --> 00:08:42,729
and as you see kind of in the evolution

215
00:08:46,410 --> 00:08:45,640
of our products dragon cargo is a nice

216
00:08:52,230 --> 00:08:46,420
foundation

217
00:08:54,449 --> 00:08:52,240
so I want to also talk a little bit

218
00:08:56,370 --> 00:08:54,459
about why space I get asked this

219
00:08:59,730 --> 00:08:56,380
question quite a bit I think there's two

220
00:09:02,100 --> 00:08:59,740
real reasons why people are how you talk

221
00:09:03,720 --> 00:09:02,110
about why we should go to space for

222
00:09:05,160 --> 00:09:03,730
policymakers you have to have some

223
00:09:07,740 --> 00:09:05,170
reason right you have to set up some

224
00:09:09,810 --> 00:09:07,750
kind of concrete rationale and Jack

225
00:09:12,269 --> 00:09:09,820
Marburger said it better than anyone

226
00:09:14,490 --> 00:09:12,279
that I've ever heard exploration of

227
00:09:16,680 --> 00:09:14,500
space comes down to deciding whether we

228
00:09:19,160 --> 00:09:16,690
want to bring the solar system within

229
00:09:23,370 --> 00:09:19,170
mankind sphere of economic influence

230
00:09:24,689 --> 00:09:23,380
great reason to to get to space but I

231
00:09:29,579 --> 00:09:24,699
think there's other reasons that are

232
00:09:34,079 --> 00:09:29,589
harder to explain humans explore for

233
00:09:36,600 --> 00:09:34,089
competition for curiosity and to take

234
00:09:38,699 --> 00:09:36,610
really great chances to improve their

235
00:09:40,259 --> 00:09:38,709
and more critically their families lives

236
00:09:42,480 --> 00:09:40,269
moving forward if you think about the

237
00:09:45,650 --> 00:09:42,490
great Explorer a the great exploration

238
00:09:48,300 --> 00:09:45,660

in fourteenth and fifteenth centuries

239
00:09:50,759 --> 00:09:48,310
people do it to improve lives and leave

240
00:09:52,259 --> 00:09:50,769
a mark and those are the harder things

241
00:09:53,699 --> 00:09:52,269
to talk about but that's founded in our

242
00:09:56,790 --> 00:09:53,709
genes it's hard to give rationale it

243
00:10:00,720 --> 00:09:56,800
just is okay so that's that's the piece

244
00:10:02,819 --> 00:10:00,730
on SpaceX and why SpaceX and for me I

245
00:10:05,069 --> 00:10:02,829
actually came into the space industry a

246
00:10:07,319 --> 00:10:05,079
little serendipitously I was actually

247
00:10:09,120 --> 00:10:07,329
very interested in cars as a kid

248
00:10:11,040 --> 00:10:09,130
remember reading and third grade about

249
00:10:15,600 --> 00:10:11,050
how an engine works which I thought was

250
00:10:17,750 --> 00:10:15,610
really fascinating at the time but so my

251
00:10:19,740 --> 00:10:17,760
my adventure into the space industry as

252
00:10:22,259 --> 00:10:19,750
serendipitous as it was I was

253
00:10:25,500 --> 00:10:22,269
immediately engaged I think for an

254
00:10:27,780 --> 00:10:25,510
engineer there is no greater chance or

255
00:10:29,370 --> 00:10:27,790
opportunity for solving really hard

256
00:10:31,980 --> 00:10:29,380
problems and the challenges that are

257
00:10:34,620 --> 00:10:31,990
there so it's a great it's a great venue

258
00:10:38,069 --> 00:10:34,630
to do really difficult but inspirational

259
00:10:40,759 --> 00:10:38,079
things another reason actually and a

260
00:10:43,319 --> 00:10:40,769
little bit more pragmatic is I think

261
00:10:45,449 --> 00:10:43,329
space is the best place to inspire

262
00:10:49,139 --> 00:10:45,459
children to do great things and study

263
00:10:51,820 --> 00:10:49,149

hard and and focus on changing the world

264
00:10:54,310 --> 00:10:51,830
I can't think of a better venue for that

265
00:10:57,550 --> 00:10:54,320
for kids and I'm going to leave the

266
00:11:02,100 --> 00:10:57,560
stage with one comment under the Chinese

267
00:11:12,190 --> 00:11:07,210
that's good we will all be rooting for

268
00:11:14,590 --> 00:11:12,200
you on februari seventh Gwen reminds me

269
00:11:19,360 --> 00:11:14,600
februari seventh is a test we will all

270
00:11:20,920 --> 00:11:19,370
be rooting for a successful test next

271
00:11:22,840 --> 00:11:20,930
down the way Peter McGrath the Boeing

272
00:11:24,490 --> 00:11:22,850
Company familiar name here in Seattle

273
00:11:25,990 --> 00:11:24,500
building a few airplanes we were so

274
00:11:28,660 --> 00:11:26,000
excited about the announcement how long

275
00:11:31,600 --> 00:11:28,670
ago five hundred new jobs at Kennedy

276
00:11:34,150 --> 00:11:31,610
Space Center Peter thank you yes i am

277
00:11:35,770 --> 00:11:34,160
the business development director for

278
00:11:38,020 --> 00:11:35,780
space exploration for bowing down in

279
00:11:39,820 --> 00:11:38,030
houston texas although i'd say i'm a

280
00:11:41,800 --> 00:11:39,830
native californian so i'm learning to

281
00:11:44,200 --> 00:11:41,810
deal with the weather in texas but it's

282
00:11:45,520 --> 00:11:44,210
been a good challenge you know when you

283
00:11:46,690 --> 00:11:45,530
think about bowing i was going to show

284
00:11:48,670 --> 00:11:46,700
this you know i get on the plane quite

285
00:11:50,230 --> 00:11:48,680
often and first question you start

286
00:11:52,570 --> 00:11:50,240
talking to somebody about is who do you

287
00:11:54,760 --> 00:11:52,580
work for I say Boeing and they said wow

288
00:11:56,650 --> 00:11:54,770

you work in the airplane business it's

289
00:11:58,930 --> 00:11:56,660
like well actually no I work on the NASA

290
00:12:00,220 --> 00:11:58,940
side and it's quite often you know when

291
00:12:02,110 --> 00:12:00,230
you talk to people about bowing they

292
00:12:04,210 --> 00:12:02,120
don't think about the fact that we've

293
00:12:06,790 --> 00:12:04,220
actually been in partnership with NASA

294
00:12:08,350 --> 00:12:06,800
for over 50 years so if you date back to

295
00:12:09,700 --> 00:12:08,360
all the programs we worked on in human

296
00:12:11,860 --> 00:12:09,710
spaceflight we've actually worked on

297
00:12:15,400 --> 00:12:11,870
every program with the exception of the

298
00:12:19,450 --> 00:12:15,410
LEM so that includes Gemini mercury

299
00:12:21,550 --> 00:12:19,460
Apollo space station Skylab as well as

300
00:12:23,640 --> 00:12:21,560
the shuttle so yeah we've worked every

301
00:12:26,410 --> 00:12:23,650
program and we really know how to

302
00:12:28,720 --> 00:12:26,420
deliver humans into space safely and

303
00:12:31,420 --> 00:12:28,730
operate in space so when you ask why

304
00:12:32,710 --> 00:12:31,430
boeing's pursuing Commercial Crew which

305
00:12:35,140 --> 00:12:32,720
is one of the questions we were asked to

306
00:12:36,850 --> 00:12:35,150
answer today it just seems like the

307
00:12:38,710 --> 00:12:36,860
natural next step when you look at our

308
00:12:40,990 --> 00:12:38,720
70 years of actually operating

309
00:12:42,910 --> 00:12:41,000
commercial airplanes and taking that

310
00:12:44,560 --> 00:12:42,920
applying those commercial practices into

311
00:12:46,990 --> 00:12:44,570
how we actually find humans into space

312
00:12:48,490 --> 00:12:47,000
it's a pretty easy transition especially

313
00:12:50,110 --> 00:12:48,500

anything about the technology that's

314
00:12:52,030 --> 00:12:50,120
already there and we're not really

315
00:12:53,740 --> 00:12:52,040
reinventing new technology to get the

316
00:12:55,900 --> 00:12:53,750
Leo it's something we've done as we said

317
00:12:58,890 --> 00:12:55,910
for 50 years so it's really about taking

318
00:13:01,060 --> 00:12:58,900
new innovation new commercial approaches

319
00:13:02,290 --> 00:13:01,070
partnering with NASA on new ways of

320
00:13:03,700 --> 00:13:02,300
doing business and it's been very

321
00:13:04,550 --> 00:13:03,710
successful if you look at the progress

322
00:13:05,990 --> 00:13:04,560
that

323
00:13:07,750 --> 00:13:06,000
everybody is made in the last two years

324
00:13:10,430 --> 00:13:07,760
on this program it's pretty impressive

325
00:13:14,440 --> 00:13:10,440
so when you ask the question about you

326
00:13:17,000 --> 00:13:14,450
know why am I in aerospace I'm probably

327
00:13:18,710 --> 00:13:17,010
more typical I think than some my father

328
00:13:21,110 --> 00:13:18,720
was an aerospace engineer I grew up in

329
00:13:23,510 --> 00:13:21,120
an aerospace house I actually was

330
00:13:26,690 --> 00:13:23,520
introduced to Rockets early on I was

331
00:13:28,579 --> 00:13:26,700
barely old enough to actually see humans

332
00:13:29,930 --> 00:13:28,589
walk on the moon which was an amazing

333
00:13:33,019 --> 00:13:29,940
feat to see I think was even a

334
00:13:34,970 --> 00:13:33,029
black-and-white TV at the time and then

335
00:13:36,950 --> 00:13:34,980
I remember sophomore year in high school

336
00:13:40,670 --> 00:13:36,960
I wasn't good enough to make the meds

337
00:13:42,380 --> 00:13:40,680
but yeah I somebody asked me what were

338
00:13:43,460 --> 00:13:42,390

you going to do when you get through

339
00:13:45,350 --> 00:13:43,470
with high school and I said well I'm

340
00:13:47,150 --> 00:13:45,360
going to go to college be an aerospace

341
00:13:49,970 --> 00:13:47,160
engineer and I'm going to work on Space

342
00:13:52,010 --> 00:13:49,980
Station six years later I graduated from

343
00:13:53,660 --> 00:13:52,020
USC with an aerospace engineering degree

344
00:13:56,240 --> 00:13:53,670
and I was working on Space Station five

345
00:13:58,400 --> 00:13:56,250
days later so I really fulfilled my

346
00:14:00,950 --> 00:13:58,410
dream and it I'd say my dad was my

347
00:14:02,780 --> 00:14:00,960
biggest inspiration but I'd also say you

348
00:14:04,280 --> 00:14:02,790
know seeing somebody walk on the moon so

349
00:14:05,870 --> 00:14:04,290
we need to create that next environment

350
00:14:07,310 --> 00:14:05,880
somebody walking on the moon to really

351
00:14:09,770 --> 00:14:07,320
energize the next generation of

352
00:14:16,009 --> 00:14:09,780
aerospace engineers so all you'll rest

353
00:14:21,780 --> 00:14:18,570
thank you Peter mark sir Angelo from

354
00:14:24,780 --> 00:14:21,790
Sierra Nevada good morning this is a

355
00:14:26,430 --> 00:14:24,790
really amazing event I think when when I

356
00:14:28,800 --> 00:14:26,440
was had the opportunity to walk around

357
00:14:30,780 --> 00:14:28,810
the buildings yesterday and today it may

358
00:14:34,620 --> 00:14:30,790
brought to mind the question of why are

359
00:14:36,810 --> 00:14:34,630
we here and why we're doing this we at

360
00:14:39,360 --> 00:14:36,820
Sierra Nevada I am fortunate to be the

361
00:14:41,550 --> 00:14:39,370
leading this group of amazing people who

362
00:14:43,410 --> 00:14:41,560
are developing an orbital vehicle called

363
00:14:45,720 --> 00:14:43,420

The Dream Chaser dreamchaser is a

364
00:14:47,160 --> 00:14:45,730
lifting body it means it's a winged

365
00:14:49,860 --> 00:14:47,170
vehicle that could be piloted or

366
00:14:53,160 --> 00:14:49,870
unpiloted and has a its legacy in a

367
00:14:55,530 --> 00:14:53,170
vehicle that NASA designed and took to a

368
00:14:57,780 --> 00:14:55,540
very serious level about 10 years ago

369
00:14:59,250 --> 00:14:57,790
and we picked it up and we began

370
00:15:01,740 --> 00:14:59,260
developing it and we did that for a

371
00:15:05,280 --> 00:15:01,750
reason we felt that the legacy of the

372
00:15:07,050 --> 00:15:05,290
space shuttle over 135 missions and the

373
00:15:09,199 --> 00:15:07,060
30 years that it was doing there was a

374
00:15:11,759 --> 00:15:09,209
spirit behind that program there was an

375
00:15:13,800 --> 00:15:11,769
inspiration behind what it did and how

376
00:15:15,569 --> 00:15:13,810
it did it and so many people were

377
00:15:17,910 --> 00:15:15,579
involved in that program and what we

378
00:15:19,620 --> 00:15:17,920
felt was that as we go to space to the

379
00:15:21,090 --> 00:15:19,630
next level that there is a need for

380
00:15:22,829 --> 00:15:21,100
different types of vehicles there are

381
00:15:25,079 --> 00:15:22,839
different missions in space like we do

382
00:15:26,490 --> 00:15:25,089
in our Navy and in our Air Force and

383
00:15:28,170 --> 00:15:26,500
other things that we do there's never

384
00:15:30,420 --> 00:15:28,180
really one way to go about doing

385
00:15:31,980 --> 00:15:30,430
something ours is a lifting body which

386
00:15:34,440 --> 00:15:31,990
means that it's piloted it can take

387
00:15:36,810 --> 00:15:34,450
seven crew and critical cargo to and

388
00:15:39,030 --> 00:15:36,820

from leo and return them to a runway

389
00:15:41,250 --> 00:15:39,040
landing and we felt that being able to

390
00:15:42,690 --> 00:15:41,260
do that to be able to return those those

391
00:15:44,639 --> 00:15:42,700
people have been on the station for a

392
00:15:46,380 --> 00:15:44,649
long time and return those critical work

393
00:15:48,000 --> 00:15:46,390
and many people look at the space

394
00:15:50,400 --> 00:15:48,010
station it's it's not an observatory

395
00:15:52,350 --> 00:15:50,410
it's not really there for people to take

396
00:15:54,329 --> 00:15:52,360
pictures out the window what it is it's

397
00:15:56,100 --> 00:15:54,339
a laboratory and there's an amazing

398
00:15:58,500 --> 00:15:56,110
amount of work that gets done on that

399
00:16:02,130 --> 00:15:58,510
station and we felt that the be able to

400
00:16:04,650 --> 00:16:02,140
do that and to enable that laboratory to

401
00:16:06,170 --> 00:16:04,660
be as productive as it possibly can it

402
00:16:08,550 --> 00:16:06,180
was something that was one of our goals

403
00:16:10,740 --> 00:16:08,560
but really what we were what we're after

404
00:16:11,880 --> 00:16:10,750
when we think of where we are in human

405
00:16:13,500 --> 00:16:11,890
space flight in the United States right

406
00:16:14,880 --> 00:16:13,510
now we don't have a vehicle in this

407
00:16:18,350 --> 00:16:14,890
country that can take humans to orbit

408
00:16:21,030 --> 00:16:18,360
for the first time in in 50 plus years

409
00:16:22,650 --> 00:16:21,040
right now we're reliant on our Russian

410
00:16:24,420 --> 00:16:22,660
partners to be able to do that in our

411
00:16:27,000 --> 00:16:24,430
view and I think collectively amongst

412
00:16:28,950 --> 00:16:27,010
many of us here that American knowledge

413
00:16:30,690 --> 00:16:28,960

American technology American workers

414
00:16:32,430 --> 00:16:30,700
can do the same thing we can build

415
00:16:34,530 --> 00:16:32,440
something like what we're talking about

416
00:16:36,030 --> 00:16:34,540
building take it to orbit and return

417
00:16:38,460 --> 00:16:36,040
that capability back here to the United

418
00:16:41,010 --> 00:16:38,470
States so we're very very pleased with

419
00:16:43,110 --> 00:16:41,020
with where we're going on our progress

420
00:16:45,030 --> 00:16:43,120
with our program we've just announced we

421
00:16:47,970 --> 00:16:45,040
finished our tenth milestone in a row on

422
00:16:49,800 --> 00:16:47,980
time and on budget and I think the the

423
00:16:51,420 --> 00:16:49,810
understanding that the industry that

424
00:16:53,040 --> 00:16:51,430
we've built in a team certainly that

425
00:16:55,410 --> 00:16:53,050
we've built at sierra nevada has the

426
00:16:56,970 --> 00:16:55,420
capability of making this happen but

427
00:16:59,670 --> 00:16:56,980
it's more than that it's it's also being

428
00:17:01,680 --> 00:16:59,680
able to to see something build and grow

429
00:17:03,960 --> 00:17:01,690
from from nothing from from an

430
00:17:05,820 --> 00:17:03,970
inspiration and one of the things that

431
00:17:07,230 --> 00:17:05,830
people forget as we walk around and see

432
00:17:08,699 --> 00:17:07,240
all the great things at boeing have done

433
00:17:11,070 --> 00:17:08,709
up here in Seattle that there was a

434
00:17:13,860 --> 00:17:11,080
Boeing and it was a family it was a

435
00:17:15,660 --> 00:17:13,870
person like we are where individuals who

436
00:17:17,430 --> 00:17:15,670
believe in something and believe that we

437
00:17:19,650 --> 00:17:17,440
can make a difference and be able to

438
00:17:20,880 --> 00:17:19,660

change something in the future and I

439
00:17:23,040 --> 00:17:20,890
think that's the personal inspiration

440
00:17:24,449 --> 00:17:23,050
for me is be able to to do something

441
00:17:27,930 --> 00:17:24,459
that hasn't been done in this way before

442
00:17:29,550 --> 00:17:27,940
to be able to fly something that that I

443
00:17:31,410 --> 00:17:29,560
hope to be able to fly in the next few

444
00:17:32,970 --> 00:17:31,420
years and be able to take it and

445
00:17:34,590 --> 00:17:32,980
understand that this is something that

446
00:17:37,440 --> 00:17:34,600
we've designed and built and developed

447
00:17:39,120 --> 00:17:37,450
and there's no better I think

448
00:17:40,530 --> 00:17:39,130
satisfaction than being able to take

449
00:17:43,350 --> 00:17:40,540
that dream and then make it a reality

450
00:17:45,750 --> 00:17:43,360
and then to look in the faces of all the

451
00:17:47,340 --> 00:17:45,760
kids that come by for everything people

452
00:17:49,020 --> 00:17:47,350
say about the space program not being

453
00:17:51,480 --> 00:17:49,030
moving forward I think we all

454
00:17:53,130 --> 00:17:51,490
collectively would disagree with that I

455
00:17:54,600 --> 00:17:53,140
went to the last shuttle launch and

456
00:17:56,700 --> 00:17:54,610
there were a million people who took

457
00:17:58,890 --> 00:17:56,710
their lives took time out of their lives

458
00:18:00,930 --> 00:17:58,900
to go down and see that it's just an

459
00:18:02,880 --> 00:18:00,940
amazing amount of spirit an amazing

460
00:18:04,470 --> 00:18:02,890
amount of energy and we're very happy to

461
00:18:07,140 --> 00:18:04,480
be part of that and very happy to be

462
00:18:08,910 --> 00:18:07,150
leading this working with NASA as a true

463
00:18:10,350 --> 00:18:08,920

partner in this program it's they've

464
00:18:12,480 --> 00:18:10,360
been an amazing partner for what we're

465
00:18:14,520 --> 00:18:12,490
doing and it's difficult for government

466
00:18:15,930 --> 00:18:14,530
to change and we're seeing that happen

467
00:18:17,850 --> 00:18:15,940
right now we're in a different world in

468
00:18:20,250 --> 00:18:17,860
a different environment and what we have

469
00:18:21,990 --> 00:18:20,260
here is a private public partnership to

470
00:18:23,250 --> 00:18:22,000
take something to the next level so

471
00:18:28,970 --> 00:18:23,260
we're very appreciative that thank you

472
00:18:33,420 --> 00:18:31,650
thank you Mark I saw a presentation on

473
00:18:36,120 --> 00:18:33,430
dreamchaser at a conference not long ago

474
00:18:37,590 --> 00:18:36,130
by Steve Lindsey who just happened to be

475
00:18:39,030 --> 00:18:37,600
the guy that landed discovery on its

476
00:18:41,220 --> 00:18:39,040
last mission and it really struck me

477
00:18:42,540 --> 00:18:41,230
that it's not a lot of new people in

478
00:18:43,950 --> 00:18:42,550
these fields it's people who have got

479
00:18:46,190 --> 00:18:43,960
their experience in other aerospace

480
00:18:49,740 --> 00:18:46,200
companies now taking it to the next step

481
00:18:52,110 --> 00:18:49,750
our next speaker is one of those Rob

482
00:18:53,700 --> 00:18:52,120
Myerson I talked about a local company

483
00:18:54,900 --> 00:18:53,710
here named Boeing there's another local

484
00:18:58,950 --> 00:18:54,910
company here that people don't know

485
00:19:00,570 --> 00:18:58,960
quite as well yet Blue Origin okay thank

486
00:19:02,100 --> 00:19:00,580
you Doug and thank you to the museum of

487
00:19:05,610 --> 00:19:02,110
flight and NASA for setting up this so

488
00:19:08,060 --> 00:19:05,620

this wonderful event the Blue Origin was

489
00:19:10,020 --> 00:19:08,070
created in the year 2000 specifically to

490
00:19:11,670 --> 00:19:10,030
enable enduring and during human

491
00:19:13,640 --> 00:19:11,680
presence in space so we are a human

492
00:19:15,930 --> 00:19:13,650
spaceflight company and we're creating

493
00:19:19,350 --> 00:19:15,940
safe and affordable human spaceflight

494
00:19:21,330 --> 00:19:19,360
and we have the founder jeff bezos the

495
00:19:24,180 --> 00:19:21,340
founder and CEO of amazon.com who has

496
00:19:25,710 --> 00:19:24,190
the the long-term long-term vision and

497
00:19:29,250 --> 00:19:25,720
the resources to carry that through to

498
00:19:32,070 --> 00:19:29,260
to fulfillment to a finish the like many

499
00:19:34,380 --> 00:19:32,080
here I grew up watching american

500
00:19:36,420 --> 00:19:34,390
astronauts land on the moon that's a not

501
00:19:38,130 --> 00:19:36,430
a new story for many of you it was very

502
00:19:40,530 --> 00:19:38,140
exciting for me i remember my fifth

503
00:19:41,940 --> 00:19:40,540
birthday playing in the cardboard lunar

504
00:19:43,980 --> 00:19:41,950
module that my parents had bought me and

505
00:19:46,620 --> 00:19:43,990
I just remember that day very very

506
00:19:48,120 --> 00:19:46,630
clearly I built a lot of model rockets

507
00:19:49,470 --> 00:19:48,130
as a kid flew him out of the front yard

508
00:19:51,810 --> 00:19:49,480
of our house probably not something

509
00:19:54,330 --> 00:19:51,820
you'd be allowed to do today but I

510
00:19:56,070 --> 00:19:54,340
graduated from that to making my own

511
00:19:59,790 --> 00:19:56,080
propellants with the chemistry set that

512
00:20:02,160 --> 00:19:59,800
I had and and then later graduating to

513
00:20:03,510 --> 00:20:02,170

using some of the propellants or some of

514
00:20:05,910 --> 00:20:03,520
the chemicals that weren't even in the

515
00:20:08,340 --> 00:20:05,920
set that my older brothers had handed

516
00:20:13,070 --> 00:20:08,350
down to me in a way that I might tell

517
00:20:17,700 --> 00:20:13,080
some people over a beer someday but the

518
00:20:19,170 --> 00:20:17,710
not today bill maybe yea after in high

519
00:20:22,040 --> 00:20:19,180
school I considered architecture for a

520
00:20:24,510 --> 00:20:22,050
little while and I really really enjoyed

521
00:20:26,660 --> 00:20:24,520
the vision of putting together a

522
00:20:29,280 --> 00:20:26,670
building or a house but lucky for me I

523
00:20:31,440 --> 00:20:29,290
moved on to engineering fairly quickly I

524
00:20:33,030 --> 00:20:31,450
went to the University of Michigan and I

525
00:20:34,320 --> 00:20:33,040
met one of my first mentors and there's

526
00:20:36,870 --> 00:20:34,330
two mentors I want to mention today

527
00:20:38,000 --> 00:20:36,880
because I think mentorship in an

528
00:20:39,590 --> 00:20:38,010
industry like ours it's very

529
00:20:42,290 --> 00:20:39,600
important to help young people guide

530
00:20:44,240 --> 00:20:42,300
helped to guide young people to see this

531
00:20:47,180 --> 00:20:44,250
to the finish because it's a it's not an

532
00:20:48,890 --> 00:20:47,190
easy path aerospace engineering it's not

533
00:20:51,050 --> 00:20:48,900
easy technically and it's not easy from

534
00:20:53,780 --> 00:20:51,060
a from a business standpoint because it

535
00:20:56,120 --> 00:20:53,790
is so cyclical professor harm Buena was

536
00:20:59,260 --> 00:20:56,130
a professor an expert in astrodynamics

537
00:21:02,870 --> 00:20:59,270
at the University of Michigan he had the

538
00:21:04,730 --> 00:21:02,880

the challenge of teaching the astronauts

539
00:21:07,370 --> 00:21:04,740
in the Apollo program he went to Houston

540
00:21:09,440 --> 00:21:07,380
for a summer during during the 60s taut

541
00:21:11,300 --> 00:21:09,450
taut the astronauts astrodynamics at

542
00:21:13,670 --> 00:21:11,310
that time he fell in love with Houston

543
00:21:16,850 --> 00:21:13,680
in the Johnson Space Center and as a

544
00:21:18,710 --> 00:21:16,860
professor and his passion for space for

545
00:21:20,930 --> 00:21:18,720
human space flight in aerospace that

546
00:21:24,350 --> 00:21:20,940
really really rubbed off on on people

547
00:21:27,230 --> 00:21:24,360
like me based on his contacts he made

548
00:21:29,120 --> 00:21:27,240
teaching at a great institution he

549
00:21:31,130 --> 00:21:29,130
developed a grassroots co-op program

550
00:21:32,900 --> 00:21:31,140
which he encouraged me to join and

551
00:21:34,700 --> 00:21:32,910
recommended me for a position at the

552
00:21:37,340 --> 00:21:34,710
Johnson Space Center after graduation or

553
00:21:40,370 --> 00:21:37,350
as a co-op and then I later went to work

554
00:21:42,320 --> 00:21:40,380
there after graduation once I went down

555
00:21:43,340 --> 00:21:42,330
there for that first first co-op tour

556
00:21:45,260 --> 00:21:43,350
and if you don't know what a co-op

557
00:21:47,570 --> 00:21:45,270
program is it's it's mixing in

558
00:21:50,810 --> 00:21:47,580
real-world experience with your your

559
00:21:52,670 --> 00:21:50,820
education so alternating semesters going

560
00:21:55,370 --> 00:21:52,680
leaving your school and going going to

561
00:21:57,080 --> 00:21:55,380
your place of employment I was hooked it

562
00:22:00,080 --> 00:21:57,090
was a it was amazing working with these

563
00:22:03,430 --> 00:22:00,090

people at NASA and I went there you know

564
00:22:06,110 --> 00:22:03,440
full time after college spent 12 years

565
00:22:08,780 --> 00:22:06,120
working on the space shuttle working on

566
00:22:10,310 --> 00:22:08,790
space station crew rescue vehicles and I

567
00:22:11,960 --> 00:22:10,320
was able to see firsthand the talent

568
00:22:13,850 --> 00:22:11,970
that that is their tremendous amount of

569
00:22:16,760 --> 00:22:13,860
talent within the agency within the

570
00:22:18,590 --> 00:22:16,770
industry and and how much dedication and

571
00:22:21,590 --> 00:22:18,600
effort it takes two to make human

572
00:22:24,230 --> 00:22:21,600
spaceflight work much later I came to

573
00:22:27,140 --> 00:22:24,240
learn that I was hired based solely on

574
00:22:29,210 --> 00:22:27,150
the recommendation of harm viewing not

575
00:22:31,580 --> 00:22:29,220
because of my application you know it

576
00:22:33,920 --> 00:22:31,590
was it was a professor Buena sent your

577
00:22:37,430 --> 00:22:33,930
application down I don't need to know

578
00:22:39,020 --> 00:22:37,440
any more this is this is it so my advice

579
00:22:42,260 --> 00:22:39,030
it doesn't happen to everybody but when

580
00:22:43,100 --> 00:22:42,270
you seek out a mentor understand you

581
00:22:44,390 --> 00:22:43,110
know what they're what they're going to

582
00:22:47,870 --> 00:22:44,400
do for you

583
00:22:49,760 --> 00:22:47,880
and don't let him down so while at JSC I

584
00:22:51,230 --> 00:22:49,770
also met a man named John kyker and John

585
00:22:53,870 --> 00:22:51,240
kyker is the man who came up with the

586
00:22:56,390 --> 00:22:53,880
idea to to ferry fly the orbiters on the

587
00:22:58,370 --> 00:22:56,400
back of a 747 because early in the

588
00:22:59,600 --> 00:22:58,380

shuttle program they had come up with

589
00:23:01,070 --> 00:22:59,610
the idea of putting air breathing

590
00:23:02,660 --> 00:23:01,080
engines on and they were going to fly

591
00:23:05,360 --> 00:23:02,670
these orbiters and the Russians actually

592
00:23:06,830 --> 00:23:05,370
did this with the Brawn John came up

593
00:23:08,090 --> 00:23:06,840
with that idea but before that he had

594
00:23:09,440 --> 00:23:08,100
worked at Wright Field on parachutes

595
00:23:11,870 --> 00:23:09,450
he'd worked with some of the Germans

596
00:23:14,120 --> 00:23:11,880
that came over from after world war two

597
00:23:15,560 --> 00:23:14,130
and then he came to JSC and he led the

598
00:23:19,160 --> 00:23:15,570
development of the parachute systems for

599
00:23:20,780 --> 00:23:19,170
mercury and Gemini and Apollo John's

600
00:23:23,660 --> 00:23:20,790
influence on me was really one of

601
00:23:25,160 --> 00:23:23,670
community and pushing me to join Aila

602
00:23:27,230 --> 00:23:25,170
and getting actively involved in the

603
00:23:28,580 --> 00:23:27,240
community at that time is a young

604
00:23:29,930 --> 00:23:28,590
engineer i was getting involved with the

605
00:23:31,670 --> 00:23:29,940
aerodynamic decelerator systems

606
00:23:33,740 --> 00:23:31,680
Technical Committee got involved with

607
00:23:36,080 --> 00:23:33,750
that group for a number of years working

608
00:23:40,040 --> 00:23:36,090
met people all over the industry people

609
00:23:41,660 --> 00:23:40,050
at sandia labs that are probably some of

610
00:23:44,210 --> 00:23:41,670
the best best in the world at what they

611
00:23:45,500 --> 00:23:44,220
do working with the nuclear stockpile

612
00:23:46,640 --> 00:23:45,510
and things like that so it was a little

613
00:23:50,090 --> 00:23:46,650

different from my human space flight

614
00:23:54,350 --> 00:23:50,100
experience but a highly talented group

615
00:23:55,850 --> 00:23:54,360
of people as well as my I wanted to get

616
00:23:57,440 --> 00:23:55,860
an industry perspective and so my wife

617
00:23:58,550 --> 00:23:57,450
and I moved to Seattle and I went to

618
00:24:00,890 --> 00:23:58,560
work for a company called kistler

619
00:24:02,330 --> 00:24:00,900
aerospace and a while at kistler there

620
00:24:03,740 --> 00:24:02,340
was a number of NASA veterans there we

621
00:24:09,470 --> 00:24:03,750
were developing the world's first fully

622
00:24:11,300 --> 00:24:09,480
reusable launch vehicle and it was a an

623
00:24:13,220 --> 00:24:11,310
industry team that was put together and

624
00:24:15,290 --> 00:24:13,230
unfortunately the economy downturn in

625
00:24:17,480 --> 00:24:15,300
the late 90s led to led to kiss leurs

626
00:24:19,340 --> 00:24:17,490
demise and I was looking for another

627
00:24:21,050 --> 00:24:19,350
another place to go and I heard about

628
00:24:23,780 --> 00:24:21,060
glue origin through some of the many

629
00:24:25,250 --> 00:24:23,790
contacts I had made and so once I'd

630
00:24:27,890 --> 00:24:25,260
heard about Blue Origin and met Jeff

631
00:24:29,600 --> 00:24:27,900
Bezos and learned of his vision I knew

632
00:24:31,670 --> 00:24:29,610
that this was an opportunity to get back

633
00:24:34,220 --> 00:24:31,680
into human spaceflight and build a build

634
00:24:37,000 --> 00:24:34,230
a company from the ground up so we're a

635
00:24:39,350 --> 00:24:37,010
company of about 150 people right now

636
00:24:41,480 --> 00:24:39,360
we've grown from about 10 people from

637
00:24:45,080 --> 00:24:41,490
when I started back back eight years ago

638
00:24:46,220 --> 00:24:45,090

and we're step by step incremental II

639
00:24:52,100 --> 00:24:46,230
developing human space flight

640
00:24:53,990 --> 00:24:52,110
capabilities the I was asked to speak

641
00:24:55,670 --> 00:24:54,000
about my views of the future and then

642
00:24:57,500 --> 00:24:55,680
how we can encourage young people to get

643
00:24:58,259 --> 00:24:57,510
into the industry and I do have a few

644
00:25:00,180 --> 00:24:58,269
opinions

645
00:25:01,799 --> 00:25:00,190
I personally believe we're a nation of

646
00:25:03,869 --> 00:25:01,809
explorers I think we all do here at the

647
00:25:06,119 --> 00:25:03,879
table space represents that next

648
00:25:07,440 --> 00:25:06,129
frontier and I believe that strong

649
00:25:10,739 --> 00:25:07,450
investments in science and technology

650
00:25:12,060 --> 00:25:10,749
will will make us stronger so so you

651
00:25:15,509 --> 00:25:12,070
know the beginning of my career mark

652
00:25:17,279 --> 00:25:15,519
probably the greatest contraction in the

653
00:25:20,039 --> 00:25:17,289
aerospace industry where companies

654
00:25:22,859 --> 00:25:20,049
merged together and I'm really glad to

655
00:25:24,449 --> 00:25:22,869
be on the forefront of the reversal of

656
00:25:26,279 --> 00:25:24,459
that trend where new companies like the

657
00:25:27,899 --> 00:25:26,289
you know the people sitting next to me

658
00:25:29,039 --> 00:25:27,909
today are starting or get at the

659
00:25:31,229 --> 00:25:29,049
forefront of starting these new

660
00:25:33,509 --> 00:25:31,239
companies to grow in aerospace industry

661
00:25:35,519 --> 00:25:33,519
that can that can be more creative more

662
00:25:38,159 --> 00:25:35,529
competitive and create a more vibrant

663
00:25:39,719 --> 00:25:38,169

industry for the future if you look in

664
00:25:41,789 --> 00:25:39,729
history and you look at the competitors

665
00:25:43,769 --> 00:25:41,799
for the space shuttle and look at the

666
00:25:44,819 --> 00:25:43,779
pre phase a studies that Dennis Jenkins

667
00:25:47,459 --> 00:25:44,829
wrote an excellent book on the history

668
00:25:49,829 --> 00:25:47,469
of the space shuttle it is amazing how

669
00:25:52,259 --> 00:25:49,839
many companies that don't exist today by

670
00:25:55,889 --> 00:25:52,269
name the culture in their their their

671
00:25:57,989 --> 00:25:55,899
parts exists somewhere deep in in the

672
00:26:01,139 --> 00:25:57,999
the larger organizations that absorb

673
00:26:03,060 --> 00:26:01,149
them but but it's fantastic what those

674
00:26:05,430 --> 00:26:03,070
those people what those teams came up

675
00:26:06,839 --> 00:26:05,440
with and and in the end the resulting

676
00:26:08,699 --> 00:26:06,849
Space Shuttle of course is a phenomenal

677
00:26:10,589 --> 00:26:08,709
machine but the all the ideas and the

678
00:26:12,299 --> 00:26:10,599
creativity that went into getting to

679
00:26:18,629 --> 00:26:12,309
where we where we got was a really

680
00:26:21,299 --> 00:26:18,639
amazing as well the final point here we

681
00:26:23,190 --> 00:26:21,309
go I'll lose my talk about kids and

682
00:26:24,810 --> 00:26:23,200
young people and getting them into into

683
00:26:28,079 --> 00:26:24,820
the aerospace industry I have three

684
00:26:29,789 --> 00:26:28,089
young kids 8 11 and 13 my daughter's

685
00:26:31,379 --> 00:26:29,799
looking to go to high school next year

686
00:26:34,199 --> 00:26:31,389
and took her to information night at

687
00:26:36,599 --> 00:26:34,209
aviation high school last month aviation

688
00:26:38,249 --> 00:26:36,609

high school is an amazing place here in

689
00:26:41,279 --> 00:26:38,259
Seattle we're lucky to have it here in

690
00:26:43,109 --> 00:26:41,289
Seattle kids today have opportunities

691
00:26:45,959 --> 00:26:43,119
that we didn't have and if you're if

692
00:26:49,169 --> 00:26:45,969
you're passionate about space follow

693
00:26:50,669 --> 00:26:49,179
that passion and in combine that passion

694
00:26:52,529 --> 00:26:50,679
with with the hands-on activities that

695
00:26:57,389 --> 00:26:52,539
we that are that our kids have today

696
00:26:58,949 --> 00:26:57,399
like first first robotics is a is you

697
00:27:01,489 --> 00:26:58,959
know like a rock concert for kids that

698
00:27:04,769 --> 00:27:01,499
are interested in science and technology

699
00:27:06,749 --> 00:27:04,779
design build fly an organ activity the

700
00:27:10,079 --> 00:27:06,759
Adelie puts on for college students

701
00:27:10,830 --> 00:27:10,089
solar car Formula SAE all these projects

702
00:27:17,100 --> 00:27:10,840
that

703
00:27:19,190 --> 00:27:17,110
our future of aerospace engineers so so

704
00:27:21,570 --> 00:27:19,200
I wanted to leave you at that point and

705
00:27:23,760 --> 00:27:21,580
if you're if you're looking to come into

706
00:27:25,170 --> 00:27:23,770
this industry please follow it through

707
00:27:34,110 --> 00:27:25,180
it's not going to be easy but follow

708
00:27:35,730 --> 00:27:34,120
through to the end so thank you thank

709
00:27:38,310 --> 00:27:35,740
you rob and last but certainly not least

710
00:27:41,010 --> 00:27:38,320
at the end of the table Steve Osaka wits

711
00:27:42,840 --> 00:27:41,020
from Virgin Galactic thank you very much

712
00:27:45,240 --> 00:27:42,850
Doug and I want to thank the sponsors

713
00:27:46,620 --> 00:27:45,250

for inviting me to be here I'm a little

714
00:27:47,900 --> 00:27:46,630
bit different than the panelists that

715
00:27:50,310 --> 00:27:47,910
are sitting to the right of me and that

716
00:27:52,740 --> 00:27:50,320
we're offering something different which

717
00:27:55,170 --> 00:27:52,750
is the opportunity to get into space and

718
00:27:56,790 --> 00:27:55,180
open up the frontier to all and if I

719
00:27:58,020 --> 00:27:56,800
could actually just see by a raise of

720
00:27:59,400 --> 00:27:58,030
hands how many people sitting the

721
00:28:04,950 --> 00:27:59,410
audience today we'd like to go to space

722
00:28:06,420 --> 00:28:04,960
someday all right it takes great that's

723
00:28:11,159 --> 00:28:06,430
a good customer base that we could build

724
00:28:15,249 --> 00:28:12,879
yesterday I had a chance to sit through

725
00:28:18,490 --> 00:28:15,259
the dedication of the wonderful Charles

726
00:28:20,409 --> 00:28:18,500
ammonia space gallery and and dug in his

727
00:28:22,119 --> 00:28:20,419
opening comments talked about in a way

728
00:28:23,889 --> 00:28:22,129
that actually I thought really really

729
00:28:25,749 --> 00:28:23,899
hit the mark he talked about the museum

730
00:28:28,720 --> 00:28:25,759
being a place not talking about history

731
00:28:32,200 --> 00:28:28,730
but to inspire for the future words that

732
00:28:35,110 --> 00:28:32,210
we use words like inspiration innovation

733
00:28:36,730 --> 00:28:35,120
and vision and I want to come back to

734
00:28:38,470 --> 00:28:36,740
those words when I when I have a chance

735
00:28:40,869 --> 00:28:38,480
to talk about where the future will take

736
00:28:42,669 --> 00:28:40,879
us a week from tomorrow is actually

737
00:28:43,930 --> 00:28:42,679
going to be the anniversary of the

738
00:28:46,960 --> 00:28:43,940

Wright brothers certainly a big event

739
00:28:49,029 --> 00:28:46,970
that's going to be 108 years since the

740
00:28:50,289 --> 00:28:49,039
Wright brothers first took off there's

741
00:28:52,119 --> 00:28:50,299
also another pretty interesting

742
00:28:54,159 --> 00:28:52,129
anniversary event that follows it three

743
00:28:56,289 --> 00:28:54,169
days after and that is actually the

744
00:28:59,320 --> 00:28:56,299
first production flight of the Boeing

745
00:29:01,379 --> 00:28:59,330
707 and it was really through the 707

746
00:29:04,539 --> 00:29:01,389
that really opened up for commercial

747
00:29:06,340 --> 00:29:04,549
application transportation for all of us

748
00:29:07,869 --> 00:29:06,350
and it wasn't just a military plane and

749
00:29:09,310 --> 00:29:07,879
it wasn't just a transport but it was

750
00:29:11,230 --> 00:29:09,320
something that we all could fly on and

751
00:29:16,899 --> 00:29:11,240
from that spurned a whole great family

752
00:29:18,639 --> 00:29:16,909
of vehicles that came from that in 1961

753
00:29:20,080 --> 00:29:18,649
alan shepard was the first American

754
00:29:22,899 --> 00:29:20,090
astronaut and he did it through a civil

755
00:29:24,999 --> 00:29:22,909
orbital launch and I'd like to think at

756
00:29:28,570 --> 00:29:25,009
54 years after that just like after like

757
00:29:30,490 --> 00:29:28,580
the 707 we will be busy at Virgin

758
00:29:32,710 --> 00:29:30,500
Galactic being the first provider of

759
00:29:35,799 --> 00:29:32,720
sabor de launches to all of you here in

760
00:29:37,180 --> 00:29:35,809
the audience so what are we doing at

761
00:29:39,399 --> 00:29:37,190
virgin well we have a design that's

762
00:29:42,940 --> 00:29:39,409
based upon the heritage of the vehicles

763
00:29:46,210 --> 00:29:42,950

that had won the X PRIZE spaceship 1 and

764
00:29:49,409 --> 00:29:46,220
white knight one under the vision of

765
00:29:52,930 --> 00:29:49,419
Richard Branson who is a person who has

766
00:29:55,389 --> 00:29:52,940
the wherewithal and the excitement to

767
00:29:57,669 --> 00:29:55,399
try to explore at the frontiers followed

768
00:30:00,220 --> 00:29:57,679
up from that event to make a major

769
00:30:01,629 --> 00:30:00,230
investment in the next generation of

770
00:30:04,360 --> 00:30:01,639
those vehicles which we call white

771
00:30:06,129 --> 00:30:04,370
knight to in spaceship to having the

772
00:30:07,899 --> 00:30:06,139
ability to have the white knight carry

773
00:30:10,659 --> 00:30:07,909
the spaceship to at an appropriate

774
00:30:12,490 --> 00:30:10,669
altitude at 50,000 feet dropping what is

775
00:30:15,460 --> 00:30:12,500
essentially a rocket plane empowering

776
00:30:19,990 --> 00:30:15,470
for a sub oral flight into space for six

777
00:30:21,940 --> 00:30:20,000
lucky individuals we have about almost

778
00:30:23,590 --> 00:30:21,950
approaching 500 people that are

779
00:30:25,509 --> 00:30:23,600
are signed up that would like to have

780
00:30:28,149 --> 00:30:25,519
that experience of a Silverado flight

781
00:30:29,860 --> 00:30:28,159
into space we've also more recently have

782
00:30:32,200 --> 00:30:29,870
opened it up to researchers and

783
00:30:34,570 --> 00:30:32,210
education we've had different

784
00:30:36,610 --> 00:30:34,580
universities and consortium who have

785
00:30:39,820 --> 00:30:36,620
come to us and actually have put down

786
00:30:42,070 --> 00:30:39,830
reservations to fly more recently NASA

787
00:30:43,389 --> 00:30:42,080
had a program that sometimes referred to

788
00:30:45,730 --> 00:30:43,399

as cruiser or the flight Opportunities

789
00:30:49,060 --> 00:30:45,740
program or in fact we're gonna be flying

790
00:30:54,399 --> 00:30:49,070
some some NASA sponsored experiments on

791
00:30:57,009 --> 00:30:54,409
our vehicles which brings it to me what

792
00:30:58,750 --> 00:30:57,019
brought me here I was inspired very

793
00:31:00,490 --> 00:30:58,760
early on to the Apollo program i mean

794
00:31:03,639 --> 00:31:00,500
frankly if any of you have seen the

795
00:31:05,320 --> 00:31:03,649
Saturn five there's no vehicle that

796
00:31:06,789 --> 00:31:05,330
really get your heart throbbing when you

797
00:31:10,389 --> 00:31:06,799
see something as tall as the Washington

798
00:31:11,409 --> 00:31:10,399
Monument being able to lift off and in

799
00:31:13,919 --> 00:31:11,419
fact I'm going to tell a story that

800
00:31:18,519 --> 00:31:13,929
hopefully my mom's not watching us

801
00:31:21,490 --> 00:31:18,529
twittering when I was a kid eight years

802
00:31:23,830 --> 00:31:21,500
old during the actual moon landing of

803
00:31:26,259 --> 00:31:23,840
Apollo 11 and Neil Armstrong went to

804
00:31:27,460 --> 00:31:26,269
step on the moon I remember I was kind

805
00:31:29,110 --> 00:31:27,470
of getting impatient because it actually

806
00:31:30,850 --> 00:31:29,120
took a while for NASA kind of clear him

807
00:31:33,850 --> 00:31:30,860
to go and step down and it was very late

808
00:31:35,649 --> 00:31:33,860
on the East Coast I had my sitters my

809
00:31:38,500 --> 00:31:35,659
sister sitting next to me and variably

810
00:31:39,970 --> 00:31:38,510
we got into a big fight my mom being a

811
00:31:42,279 --> 00:31:39,980
little upset with us she says you two

812
00:31:44,919 --> 00:31:42,289
need to go to bed so I actually never

813
00:31:48,519 --> 00:31:44,929

saw Neil Armstrong put his first step on

814
00:31:50,529 --> 00:31:48,529
the moon and I said from that day on I'm

815
00:31:52,210 --> 00:31:50,539
going to somehow be a part of a future

816
00:31:54,730 --> 00:31:52,220
effort that'll get us back to the mode

817
00:31:58,779 --> 00:31:54,740
so in part I could say my mom was

818
00:32:01,120 --> 00:31:58,789
helping to be my inspiration to want to

819
00:32:02,769 --> 00:32:01,130
explore into the future and let me just

820
00:32:04,269 --> 00:32:02,779
finish it on the three words that I had

821
00:32:07,779 --> 00:32:04,279
mentioned up front which was a

822
00:32:09,610 --> 00:32:07,789
innovation inspiration and vision you

823
00:32:12,009 --> 00:32:09,620
know with regards to innovation one of

824
00:32:13,990 --> 00:32:12,019
the things I I note in the space

825
00:32:15,310 --> 00:32:14,000
industry which I had been out of the

826
00:32:17,560 --> 00:32:15,320
last few years and only recently joined

827
00:32:20,019 --> 00:32:17,570
that virgin galactus as the chief

828
00:32:22,330 --> 00:32:20,029
technology officer is unlike other

829
00:32:24,700 --> 00:32:22,340
interests other industries that have you

830
00:32:26,889 --> 00:32:24,710
know like Moore's law for the computer

831
00:32:29,769 --> 00:32:26,899
industry with the speed of electronics

832
00:32:31,210 --> 00:32:29,779
doubling every couple years we don't

833
00:32:32,769 --> 00:32:31,220
really have the equivalent in the space

834
00:32:35,350 --> 00:32:32,779
industry in fact if you look at the

835
00:32:35,930 --> 00:32:35,360
economics of space travel really the

836
00:32:37,850 --> 00:32:35,940
cost

837
00:32:41,090 --> 00:32:37,860
either remain the same or maybe increase

838
00:32:43,039 --> 00:32:41,100

depending how you do the math I think

839
00:32:45,080 --> 00:32:43,049
the challenge to the panel here and what

840
00:32:47,840 --> 00:32:45,090
we're all trying to do is to change that

841
00:32:50,119 --> 00:32:47,850
to create our own law that perhaps maybe

842
00:32:52,039 --> 00:32:50,129
every five years the the price of space

843
00:32:53,330 --> 00:32:52,049
travel will be cut in half so that more

844
00:32:56,060 --> 00:32:53,340
and more people would have the

845
00:32:58,580 --> 00:32:56,070
opportunity to enjoy space travel and

846
00:33:01,570 --> 00:32:58,590
allow us to push the frontier of space

847
00:33:04,789 --> 00:33:01,580
exploration second with regards to

848
00:33:07,610 --> 00:33:04,799
inspiration when I first got this job I

849
00:33:09,440 --> 00:33:07,620
went back to my alma mater at MIT which

850
00:33:11,360 --> 00:33:09,450
I often do to give talks in terms of

851
00:33:13,700 --> 00:33:11,370
what's going on in various fields and

852
00:33:16,039 --> 00:33:13,710
one of the things I was really struck by

853
00:33:19,190 --> 00:33:16,049
I went back to my old apartment my

854
00:33:20,539 --> 00:33:19,200
aerospace department at MIT and usually

855
00:33:22,460 --> 00:33:20,549
when I go and give talks you know I

856
00:33:23,720 --> 00:33:22,470
maybe get ten fifteen twenty percent of

857
00:33:26,480 --> 00:33:23,730
the students that would be in attendance

858
00:33:28,039 --> 00:33:26,490
from from the whole department when I

859
00:33:30,320 --> 00:33:28,049
gave to talk about a month ago it was

860
00:33:32,149 --> 00:33:30,330
about sixty or seventy percent of the

861
00:33:33,529 --> 00:33:32,159
student population from the department

862
00:33:35,690 --> 00:33:33,539
it was actually sitting in on the talk I

863
00:33:37,879 --> 00:33:35,700

mean the room was filled and it's not

864
00:33:40,190 --> 00:33:37,889
because I'm a great storyteller or a

865
00:33:42,799 --> 00:33:40,200
great speaker but I really believe it's

866
00:33:44,180 --> 00:33:42,809
the subject matter i really believe that

867
00:33:45,560 --> 00:33:44,190
those of us here on the panel and

868
00:33:47,810 --> 00:33:45,570
hopefully those of you in the audience

869
00:33:49,430 --> 00:33:47,820
that won't be a part of it are really at

870
00:33:50,960 --> 00:33:49,440
the forefront of something really

871
00:33:52,909 --> 00:33:50,970
exciting and I think it's truly

872
00:33:55,310 --> 00:33:52,919
inspirational in a way that's capturing

873
00:33:57,440 --> 00:33:55,320
imagination which we haven't had in a

874
00:34:00,110 --> 00:33:57,450
number of years last point I want to

875
00:34:01,759 --> 00:34:00,120
make is just one of a vision one of the

876
00:34:04,399 --> 00:34:01,769
things that for me makes it exciting to

877
00:34:05,600 --> 00:34:04,409
be at Virgin Galactic is you know when

878
00:34:07,580 --> 00:34:05,610
you talk to people who've had the

879
00:34:09,470 --> 00:34:07,590
opportunity to be in space they talk

880
00:34:11,899 --> 00:34:09,480
about how transformative it is to

881
00:34:15,050 --> 00:34:11,909
actually see the beauty of our planet to

882
00:34:17,990 --> 00:34:15,060
see its curvatures to see the countries

883
00:34:20,089 --> 00:34:18,000
without borders and just to see this you

884
00:34:22,609 --> 00:34:20,099
know blue pale dot out there in the vast

885
00:34:24,770 --> 00:34:22,619
blackness of space is something that has

886
00:34:27,530 --> 00:34:24,780
transformed them you know in their lives

887
00:34:30,530 --> 00:34:27,540
and I want to sort of finish my opening

888
00:34:32,629 --> 00:34:30,540

comments by reading a quote of a one of

889
00:34:35,960 --> 00:34:32,639
our test pilots Brian Benny who flew

890
00:34:38,180 --> 00:34:35,970
during spaceship one when scaled

891
00:34:40,460 --> 00:34:38,190
composites won the X PRIZE competition

892
00:34:42,530 --> 00:34:40,470
which I think sort of summarizes the

893
00:34:45,260 --> 00:34:42,540
attitude of those of us that are

894
00:34:48,500 --> 00:34:45,270
venturing in this new area he wrote he

895
00:34:49,760 --> 00:34:48,510
said after he flew I wake up every

896
00:34:52,130 --> 00:34:49,770
morning and thank

897
00:34:54,500 --> 00:34:52,140
god I live in a country where all of

898
00:34:56,389 --> 00:34:54,510
this is possible where you have the

899
00:34:58,610 --> 00:34:56,399
Yankee ingenuity roll up your sleeves

900
00:35:00,890 --> 00:34:58,620
get a band of people who believe in

901
00:35:03,670 --> 00:35:00,900
something and go for it and make it

902
00:35:15,110 --> 00:35:03,680
happen it doesn't happen anywhere else

903
00:35:16,400 --> 00:35:15,120
thank you all right I'll lead this off

904
00:35:18,020 --> 00:35:16,410
with a question I've gotten from a lot

905
00:35:19,070 --> 00:35:18,030
of people and you're welcome to come up

906
00:35:20,900 --> 00:35:19,080
to the microphone we've got a couple

907
00:35:25,040 --> 00:35:20,910
questions on Twitter already and let's

908
00:35:27,140 --> 00:35:25,050
make this a discussion when we're not

909
00:35:28,220 --> 00:35:27,150
going to ask you proprietary we're not

910
00:35:31,340 --> 00:35:28,230
going to ask you for specific

911
00:35:33,170 --> 00:35:31,350
predictions but what you would how is

912
00:35:37,060 --> 00:35:33,180
this going to unfold over the next 5 10

913
00:35:39,380 --> 00:35:37,070

15 years wants to take a shot at that

914
00:35:42,770 --> 00:35:39,390
you see everybody's got their Gwen's got

915
00:35:44,870 --> 00:35:42,780
a launch in February 7 so so you're

916
00:35:47,060 --> 00:35:44,880
asking what's the future how's it going

917
00:35:49,400 --> 00:35:47,070
to evolve what's going to happen when in

918
00:35:51,650 --> 00:35:49,410
the next few years you can tell us

919
00:35:53,120 --> 00:35:51,660
specifically what your plan is or what

920
00:35:56,570 --> 00:35:53,130
you think other people are going to do

921
00:35:58,250 --> 00:35:56,580
when will this will the public be we can

922
00:36:00,800 --> 00:35:58,260
buy a ticket now in Virgin Galactic when

923
00:36:02,420 --> 00:36:00,810
you're going to fly Steve when can we do

924
00:36:04,970 --> 00:36:02,430
we think dreamchaser will be at the

925
00:36:06,620 --> 00:36:04,980
space station you know when we'll SpaceX

926
00:36:09,410 --> 00:36:06,630
be going back and forth regularly with

927
00:36:13,820 --> 00:36:09,420
commercial with the NASA astronauts so

928
00:36:17,080 --> 00:36:13,830
on we've been pretty public about about

929
00:36:24,920 --> 00:36:17,090
when we anticipate getting crew to Leo

930
00:36:27,920 --> 00:36:24,930
so we're shooting for 2014 one of the

931
00:36:29,450 --> 00:36:27,930
really wonderful things about being in

932
00:36:32,270 --> 00:36:29,460
this business is when you finally get

933
00:36:33,920 --> 00:36:32,280
the chance to touch real hardware that's

934
00:36:36,290 --> 00:36:33,930
going to go to space I know Gwyn feels

935
00:36:38,450 --> 00:36:36,300
that way and this weekend we're getting

936
00:36:41,120 --> 00:36:38,460
delivery of our first flight vehicle and

937
00:36:43,370 --> 00:36:41,130
we're expecting to start flying next

938
00:36:46,340 --> 00:36:43,380

summer on our first test flights so it's

939
00:36:49,020 --> 00:36:46,350
become really quite real for us and that

940
00:36:51,670 --> 00:36:49,030
makes us all smile

941
00:36:53,470 --> 00:36:51,680
I'll second that mark we just delivered

942
00:36:56,200 --> 00:36:53,480
our thrust chamber to a Stennis Space

943
00:36:59,230 --> 00:36:56,210
Center last month it was received and

944
00:37:00,880 --> 00:36:59,240
unpacked and the team at Stennis with

945
00:37:03,480 --> 00:37:00,890
blue origin is working to install that

946
00:37:06,310 --> 00:37:03,490
engine and test it early next year and

947
00:37:09,010 --> 00:37:06,320
when you when you it becomes a reality

948
00:37:10,720 --> 00:37:09,020
we're developing you know a LOX hydrogen

949
00:37:13,180 --> 00:37:10,730
booster engine that will power off a

950
00:37:15,010 --> 00:37:13,190
reusable a reusable launch vehicle here

951
00:37:18,040 --> 00:37:15,020
in the future that will carry people to

952
00:37:20,260 --> 00:37:18,050
and from space and and that is as a big

953
00:37:23,560 --> 00:37:20,270
bold bold vision and and we're excited

954
00:37:25,600 --> 00:37:23,570
about it so we've had a lot of activity

955
00:37:27,160 --> 00:37:25,610
already underway what makes our effort

956
00:37:29,260 --> 00:37:27,170
is unique is on every flight we have

957
00:37:31,450 --> 00:37:29,270
people on it so for us it's you know

958
00:37:34,090 --> 00:37:31,460
safety first and everything we do we've

959
00:37:37,090 --> 00:37:34,100
had 78 flights of the White Knight two

960
00:37:38,950 --> 00:37:37,100
of those flights we've had 16 where

961
00:37:41,560 --> 00:37:38,960
we've had glide flights of the spaceship

962
00:37:43,030 --> 00:37:41,570
to next year we're anticipating we're

963
00:37:44,710 --> 00:37:43,040

going to have the first week all powered

964
00:37:47,230 --> 00:37:44,720
flights with the rocket motor which we

965
00:37:49,600 --> 00:37:47,240
will do incrementals steps from there

966
00:37:51,520 --> 00:37:49,610
until we achieve safely being able to

967
00:37:53,800 --> 00:37:51,530
reach the altitude of being into space

968
00:37:55,510 --> 00:37:53,810
and then once we have a chance to prove

969
00:37:57,940 --> 00:37:55,520
that out and work in with the FAA we

970
00:38:01,510 --> 00:37:57,950
expect to have a open up for commercial

971
00:38:04,150 --> 00:38:01,520
operations soon thereafter they from the

972
00:38:06,010 --> 00:38:04,160
boeing perspective so we continue to do

973
00:38:08,440 --> 00:38:06,020
significant risk reduction and

974
00:38:10,090 --> 00:38:08,450
development efforts including we have a

975
00:38:12,460 --> 00:38:10,100
parachute drop test coming up which will

976
00:38:15,340 --> 00:38:12,470
validate our whole reentry approach and

977
00:38:18,340 --> 00:38:15,350
as well as doing some development of our

978
00:38:20,110 --> 00:38:18,350
actual booster or aboard engine booster

979
00:38:21,430 --> 00:38:20,120
at the flight configuration we're going

980
00:38:23,080 --> 00:38:21,440
to do some testing on that later this

981
00:38:25,660 --> 00:38:23,090
year and we're going to go into test

982
00:38:29,740 --> 00:38:25,670
flights in 14 and and hopefully be

983
00:38:32,050 --> 00:38:29,750
operational by 15 is our target so sue

984
00:38:33,550 --> 00:38:32,060
more longer term I'll just throw my two

985
00:38:35,350 --> 00:38:33,560
cents and I think next year we're going

986
00:38:36,790 --> 00:38:35,360
to start seeing regular cargo runs to

987
00:38:39,160 --> 00:38:36,800
and from the International Space Station

988
00:38:41,290 --> 00:38:39,170

from both SpaceX and Orbital Sciences I

989
00:38:43,480 --> 00:38:41,300
think in about five years we're going to

990
00:38:44,860 --> 00:38:43,490
see regular crew runs to and from the

991
00:38:47,550 --> 00:38:44,870
International Space Station and low

992
00:38:50,230 --> 00:38:47,560
Earth orbit I think in about ten years

993
00:38:51,760 --> 00:38:50,240
whatever administration is in office

994
00:38:53,020 --> 00:38:51,770
will make an announcement that they're

995
00:38:55,570 --> 00:38:53,030
going to extend the life of the space

996
00:38:57,010 --> 00:38:55,580
station for another 10 years I think we

997
00:38:58,720 --> 00:38:57,020
should fly the space station as long as

998
00:39:01,309 --> 00:38:58,730
it's safe and productive so I don't see

999
00:39:04,039 --> 00:39:01,319
2020 as a as a necessarily in

1000
00:39:05,329 --> 00:39:04,049
date and also right around that time ten

1001
00:39:07,039 --> 00:39:05,339
years from now we should probably be

1002
00:39:10,039 --> 00:39:07,049
having our first crude flight on our

1003
00:39:12,559 --> 00:39:10,049
space launch system and doing beyond

1004
00:39:14,269 --> 00:39:12,569
low-earth orbit exploration again i

1005
00:39:15,979 --> 00:39:14,279
would say for all the students one thing

1006
00:39:18,680 --> 00:39:15,989
is there's a lot of stuff happening near

1007
00:39:21,859 --> 00:39:18,690
term in general my experiences it never

1008
00:39:24,049 --> 00:39:21,869
happens as fast as we'd like so so

1009
00:39:26,449 --> 00:39:24,059
patients as well as the keep with it

1010
00:39:29,299 --> 00:39:26,459
attitude that Rob had mentioned which is

1011
00:39:31,130 --> 00:39:29,309
important is I think for those of us in

1012
00:39:32,479 --> 00:39:31,140
the aerospace industry we do need to

1013
00:39:34,670 --> 00:39:32,489

have patience sometimes these things

1014
00:39:37,069 --> 00:39:34,680
don't happen as fast as they as we would

1015
00:39:38,719 --> 00:39:37,079
like but we are moving forward and in a

1016
00:39:40,789 --> 00:39:38,729
direction that i think is positive

1017
00:39:42,289 --> 00:39:40,799
that's that's the key but the

1018
00:39:45,319 --> 00:39:42,299
interesting thing about all your answers

1019
00:39:47,599 --> 00:39:45,329
is that these private astronauts or

1020
00:39:49,309 --> 00:39:47,609
whatever we end up calling them aren't

1021
00:39:50,719 --> 00:39:49,319
in classrooms today they're already

1022
00:39:52,849 --> 00:39:50,729
working for you there are already people

1023
00:39:54,259 --> 00:39:52,859
that are out in industry and what

1024
00:39:56,329 --> 00:39:54,269
students can be thinking about is a

1025
00:39:58,819 --> 00:39:56,339
platform where this already exists what

1026
00:40:00,349 --> 00:39:58,829
what do i do what comes next which I'll

1027
00:40:02,479 --> 00:40:00,359
take the first Twitter question then

1028
00:40:03,650 --> 00:40:02,489
we'll go to our wives questioners here

1029
00:40:05,449 --> 00:40:03,660
because the first question was actually

1030
00:40:07,339 --> 00:40:05,459
from one of those people says I mean a

1031
00:40:09,589 --> 00:40:07,349
young engineer already in the aerospace

1032
00:40:17,610 --> 00:40:09,599
industry what are the opportunities for

1033
00:40:22,120 --> 00:40:20,050
notice that I didn't raise my hand yeah

1034
00:40:23,320 --> 00:40:22,130
that's a pretty gladdens this is where

1035
00:40:24,970 --> 00:40:23,330
the growth is and I think that's

1036
00:40:26,380 --> 00:40:24,980
important any suggestions for all those

1037
00:40:27,790 --> 00:40:26,390
engineers that are already out there and

1038
00:40:29,650 --> 00:40:27,800

think a boy this sounds like an exciting

1039
00:40:31,300 --> 00:40:29,660
place to head my career anything

1040
00:40:32,710 --> 00:40:31,310
specific they ought to be trying to pay

1041
00:40:35,740 --> 00:40:32,720
attention to places they ought to be

1042
00:40:37,990 --> 00:40:35,750
people to talk to I can tell you from

1043
00:40:39,760 --> 00:40:38,000
our perspective we part of our plan is

1044
00:40:43,360 --> 00:40:39,770
actually to have a significant part of

1045
00:40:45,550 --> 00:40:43,370
our team be University driven and we've

1046
00:40:47,320 --> 00:40:45,560
got relationships with a couple of

1047
00:40:49,570 --> 00:40:47,330
universities already and one the

1048
00:40:51,340 --> 00:40:49,580
University of Colorado was engaged with

1049
00:40:53,740 --> 00:40:51,350
graduate and undergraduate students who

1050
00:40:56,230 --> 00:40:53,750
are actually working with us on the

1051
00:40:58,030 --> 00:40:56,240
building of our dream chaser and I can't

1052
00:41:00,130 --> 00:40:58,040
tell you the excitement that's in on

1053
00:41:01,750 --> 00:41:00,140
their face when they see this this is

1054
00:41:03,370 --> 00:41:01,760
real hardware that's going to fly and

1055
00:41:05,770 --> 00:41:03,380
they're going to be part of potentially

1056
00:41:10,510 --> 00:41:05,780
what is America's next vehicle in space

1057
00:41:12,550 --> 00:41:10,520
and they helped design our but scale

1058
00:41:15,160 --> 00:41:12,560
model drop test vehicle which we flew

1059
00:41:16,690 --> 00:41:15,170
last year and the idea was that we were

1060
00:41:18,760 --> 00:41:16,700
helping out the students and they were

1061
00:41:20,080 --> 00:41:18,770
going to get this exciting involvement

1062
00:41:22,270 --> 00:41:20,090
and I have to tell you that it's turned

1063
00:41:24,850 --> 00:41:22,280

out the other way that the energy the

1064
00:41:26,950 --> 00:41:24,860
enthusiasm what they brought to to us

1065
00:41:28,450 --> 00:41:26,960
makes us all realize why we got in this

1066
00:41:30,520 --> 00:41:28,460
business and why we're still there and

1067
00:41:32,680 --> 00:41:30,530
it's just an amazing thing my only

1068
00:41:34,420 --> 00:41:32,690
concern is that my consumption of Red

1069
00:41:37,990 --> 00:41:34,430
Bull has gone up four times and safe

1070
00:41:40,150 --> 00:41:38,000
came on board I'd like to give some

1071
00:41:42,550 --> 00:41:40,160
advice to students it's absolutely

1072
00:41:45,030 --> 00:41:42,560
critical for you to work on real

1073
00:41:47,500 --> 00:41:45,040
projects hardware software projects

1074
00:41:49,960 --> 00:41:47,510
PowerPoint works in this industry only

1075
00:41:52,480 --> 00:41:49,970
to a certain extent and it the best

1076
00:41:53,920 --> 00:41:52,490
engineers that we find our students that

1077
00:41:56,800 --> 00:41:53,930
we hire are the ones that have done the

1078
00:41:59,170 --> 00:41:56,810
design-build fly the sae formula sae

1079
00:42:01,180 --> 00:41:59,180
those hands on projects make you much

1080
00:42:04,000 --> 00:42:01,190
better engineers because you get to make

1081
00:42:06,010 --> 00:42:04,010
your mistakes learn and re spin it and

1082
00:42:07,990 --> 00:42:06,020
if i could add to that I think summer

1083
00:42:09,340 --> 00:42:08,000
internships is a great opportunity while

1084
00:42:10,750 --> 00:42:09,350
you're in college they actually get the

1085
00:42:12,400 --> 00:42:10,760
kind of experience that thick ones

1086
00:42:13,630 --> 00:42:12,410
talking about it makes you much more

1087
00:42:15,130 --> 00:42:13,640
attractive to people that want to hire

1088
00:42:16,960 --> 00:42:15,140

you but I think it also gives you sort

1089
00:42:19,420 --> 00:42:16,970
of early experience of what it's going

1090
00:42:20,980 --> 00:42:19,430
to be like so Virgin Galactic we're

1091
00:42:23,200 --> 00:42:20,990
actually taking summer internships if

1092
00:42:25,030 --> 00:42:23,210
you're interested we have a summer

1093
00:42:27,790 --> 00:42:25,040
internship at Blue Origin as well we've

1094
00:42:28,570 --> 00:42:27,800
had one since 2002 we hire both college

1095
00:42:30,430 --> 00:42:28,580
and high school

1096
00:42:31,750 --> 00:42:30,440
students the high school students come

1097
00:42:35,590 --> 00:42:31,760
from aviation so I'll put a plug in

1098
00:42:37,570 --> 00:42:35,600
there as well so can't hire nationwide

1099
00:42:40,120 --> 00:42:37,580
for high school student internships but

1100
00:42:43,960 --> 00:42:40,130
I want to point out one thing we have a

1101
00:42:45,280 --> 00:42:43,970
pretty vibrant internship program in one

1102
00:42:47,140 --> 00:42:45,290
of our recent interns from last summer

1103
00:42:49,390 --> 00:42:47,150
just went to work for is coming to work

1104
00:42:50,860 --> 00:42:49,400
for mark and and I'll say while I while

1105
00:42:52,690 --> 00:42:50,870
I would have liked to have hired him you

1106
00:42:53,950 --> 00:42:52,700
know for blue I'm happy that he's going

1107
00:42:55,240 --> 00:42:53,960
into the industry in particular you know

1108
00:42:57,220 --> 00:42:55,250
the commercial industry because it makes

1109
00:42:59,830 --> 00:42:57,230
us all stronger these are brilliant kids

1110
00:43:01,600 --> 00:42:59,840
they're brilliant people and they're

1111
00:43:03,280 --> 00:43:01,610
going to be great engineers so we need

1112
00:43:08,500 --> 00:43:03,290
to keep those kinds of programs going so

1113
00:43:10,630 --> 00:43:08,510

thank you rob for training him so if I

1114
00:43:12,220 --> 00:43:10,640
could have one comment which was you

1115
00:43:13,690 --> 00:43:12,230
know we talked about the environment for

1116
00:43:15,880 --> 00:43:13,700
hiring you know I went through a couple

1117
00:43:18,310 --> 00:43:15,890
of cycles on station back in there in

1118
00:43:20,260 --> 00:43:18,320
the 8th late 80s Early 90s were dipped

1119
00:43:22,570 --> 00:43:20,270
pretty severely and I'd say we probably

1120
00:43:24,040 --> 00:43:22,580
have lived through that dip last year it

1121
00:43:27,010 --> 00:43:24,050
was it's been a tough year for the

1122
00:43:29,650 --> 00:43:27,020
reason primarily I think because of the

1123
00:43:31,690 --> 00:43:29,660
gap that caught that occurred with the

1124
00:43:33,460 --> 00:43:31,700
retirement of shuttle and then the

1125
00:43:35,530 --> 00:43:33,470
decisions made on all those future

1126
00:43:37,450 --> 00:43:35,540
generation exploration systems kind of

1127
00:43:38,770 --> 00:43:37,460
came a little bit later so that caused a

1128
00:43:40,540 --> 00:43:38,780
little ripple effect in the environment

1129
00:43:43,200 --> 00:43:40,550
for I think the industrial base but if

1130
00:43:47,140 --> 00:43:43,210
you look at where we are today with NASA

1131
00:43:49,240 --> 00:43:47,150
moving forward with SLS MPCV Commercial

1132
00:43:50,950 --> 00:43:49,250
Crew and you look at all the things that

1133
00:43:52,540 --> 00:43:50,960
they're putting in place for the future

1134
00:43:54,790 --> 00:43:52,550
of human space flight I think there is

1135
00:43:57,220 --> 00:43:54,800
opportunity out there as we look forward

1136
00:43:59,650 --> 00:43:57,230
in the next several years for jobs in

1137
00:44:01,150 --> 00:43:59,660
the market to grow and I'd say you know

1138
00:44:02,980 --> 00:44:01,160

if you look at the demographics in the

1139
00:44:05,290 --> 00:44:02,990
market there's a need to backfill with

1140
00:44:07,180 --> 00:44:05,300
younger engineers coming in and training

1141
00:44:09,640 --> 00:44:07,190
because there is a significant amount of

1142
00:44:11,380 --> 00:44:09,650
senior engineers that need to definitely

1143
00:44:13,720 --> 00:44:11,390
train so that they can at some day

1144
00:44:14,920 --> 00:44:13,730
retire hopefully so I think there's

1145
00:44:16,060 --> 00:44:14,930
definitely an opportunity I think we

1146
00:44:17,020 --> 00:44:16,070
kind of hit the low in the middle of

1147
00:44:18,340 --> 00:44:17,030
this year and I think we're going to

1148
00:44:20,980 --> 00:44:18,350
start seeing things hopefully get a

1149
00:44:22,270 --> 00:44:20,990
little better going forward thank you

1150
00:44:25,030 --> 00:44:22,280
let's go to our first question over here

1151
00:44:27,550 --> 00:44:25,040
thank you Joe Bruce solar system

1152
00:44:30,250 --> 00:44:27,560
ambassador and children have been

1153
00:44:33,400 --> 00:44:30,260
mentioned a lot today I want to focus a

1154
00:44:35,069 --> 00:44:33,410
little bit more on elementary kids math

1155
00:44:37,589 --> 00:44:35,079
and science

1156
00:44:39,959 --> 00:44:37,599
where you need to get our kids hooked on

1157
00:44:41,549 --> 00:44:39,969
math and science early because by the

1158
00:44:45,749 --> 00:44:41,559
time they get into junior high in high

1159
00:44:48,420 --> 00:44:45,759
school we may lose them what can your

1160
00:44:50,910 --> 00:44:48,430
companies do to help our elementary

1161
00:44:53,400 --> 00:44:50,920
school teachers get these kids hooked in

1162
00:44:56,719 --> 00:44:53,410
math and science so we can continue to

1163
00:44:58,920 --> 00:44:56,729

be world leaders and what you're doing

1164
00:45:00,749 --> 00:44:58,930
well I'm glad to start on that one

1165
00:45:02,699 --> 00:45:00,759
because I I want these people out there

1166
00:45:03,870 --> 00:45:02,709
building spaceships and thinking about

1167
00:45:05,459 --> 00:45:03,880
going to the future I think that's

1168
00:45:07,559 --> 00:45:05,469
really the job of people like us in the

1169
00:45:09,749 --> 00:45:07,569
museum world and educators it was great

1170
00:45:11,430 --> 00:45:09,759
I mentioned earlier today the great

1171
00:45:14,670 --> 00:45:11,440
meeting here yesterday afternoon of

1172
00:45:16,049 --> 00:45:14,680
museums and educators and media from

1173
00:45:17,999 --> 00:45:16,059
around the country talking about exactly

1174
00:45:19,529 --> 00:45:18,009
how we can do that these people being

1175
00:45:21,359 --> 00:45:19,539
here today and sharing their stories

1176
00:45:23,729 --> 00:45:21,369
with us is what helps if any of them

1177
00:45:25,380 --> 00:45:23,739
have a specific comment great but that's

1178
00:45:27,479 --> 00:45:25,390
really our job I'd like to answer that I

1179
00:45:29,670 --> 00:45:27,489
think what you have heard from all of us

1180
00:45:32,099 --> 00:45:29,680
and I'm no exception is that we were all

1181
00:45:33,839 --> 00:45:32,109
inspired when we were 10 years old or

1182
00:45:35,729 --> 00:45:33,849
below most of the people were in the

1183
00:45:38,279 --> 00:45:35,739
space industry most people who work for

1184
00:45:40,229 --> 00:45:38,289
me have that in common and we can't

1185
00:45:41,819 --> 00:45:40,239
forget how we came from where we are I

1186
00:45:45,449 --> 00:45:41,829
think one of the things that really does

1187
00:45:48,120 --> 00:45:45,459
opens that up is to bring those those

1188
00:45:49,979 --> 00:45:48,130

kids into seeing what we can do bring

1189
00:45:51,479 --> 00:45:49,989
them into the factory tours get it give

1190
00:45:55,499 --> 00:45:51,489
them a chance to see things that are

1191
00:45:57,719 --> 00:45:55,509
working live and in person and bringing

1192
00:45:59,489 --> 00:45:57,729
particularly having class visits which

1193
00:46:01,380 --> 00:45:59,499
we do in our company to have to have

1194
00:46:02,819 --> 00:46:01,390
students come by because you never know

1195
00:46:04,949 --> 00:46:02,829
what student you're going to be able to

1196
00:46:06,569 --> 00:46:04,959
spark just like all of us I think got

1197
00:46:08,279 --> 00:46:06,579
that spark when we were kids so it's

1198
00:46:10,559 --> 00:46:08,289
enough serious we think it's a serious

1199
00:46:11,910 --> 00:46:10,569
approach on our on our company's part

1200
00:46:14,039 --> 00:46:11,920
and I think all of us feel the same way

1201
00:46:16,170 --> 00:46:14,049
that we have to be able to reach out and

1202
00:46:17,819 --> 00:46:16,180
make sure that that next generation or

1203
00:46:20,489 --> 00:46:17,829
two generations from now it's going to

1204
00:46:22,439 --> 00:46:20,499
be there pick up the mantle we operate a

1205
00:46:24,930 --> 00:46:22,449
space launch facility in West Texas down

1206
00:46:26,759 --> 00:46:24,940
in the in Culberson County just a little

1207
00:46:28,949 --> 00:46:26,769
bit north of Van Horn Texas so it's

1208
00:46:30,900 --> 00:46:28,959
about 2,500 people in that community we

1209
00:46:32,880 --> 00:46:30,910
invite the fifth grade class from Eagle

1210
00:46:35,189 --> 00:46:32,890
elementary to come in and tore the tour

1211
00:46:37,289 --> 00:46:35,199
the site every year and it's a small

1212
00:46:38,489 --> 00:46:37,299
thing but it's a reaches out these these

1213
00:46:39,959 --> 00:46:38,499

kids are growing up in a community

1214
00:46:42,140 --> 00:46:39,969
that's that's not one of the wealthiest

1215
00:46:45,180 --> 00:46:42,150
communities in the country and and they

1216
00:46:46,499 --> 00:46:45,190
have a thriving space business in their

1217
00:46:48,480 --> 00:46:46,509
in their community and they're able to

1218
00:46:50,310 --> 00:46:48,490
what we hope is over the years

1219
00:46:51,720 --> 00:46:50,320
that they'll they'll look forward to

1220
00:46:54,240 --> 00:46:51,730
being in fifth grade so they can go tour

1221
00:46:56,280 --> 00:46:54,250
and go go go get a look at the site out

1222
00:46:57,960 --> 00:46:56,290
there so it's a small thing but it's a

1223
00:46:59,490 --> 00:46:57,970
one of one of many things it's going to

1224
00:47:02,580 --> 00:46:59,500
take a whole community of people to do

1225
00:47:05,220 --> 00:47:02,590
those kinds of things so I'll go back to

1226
00:47:06,570 --> 00:47:05,230
Steve's earlier comment that his mom did

1227
00:47:14,220 --> 00:47:06,580
tweeting I can't believe you told that

1228
00:47:15,930 --> 00:47:14,230
story but yeah but it gets to the role

1229
00:47:17,760 --> 00:47:15,940
of parents and all of us in the room in

1230
00:47:19,500 --> 00:47:17,770
the exactly the gentleman said of

1231
00:47:20,609 --> 00:47:19,510
talking to young people about these

1232
00:47:21,600 --> 00:47:20,619
things not when they're in high school

1233
00:47:23,070 --> 00:47:21,610
and that when they're in college when

1234
00:47:24,720 --> 00:47:23,080
they're about six or seven years old and

1235
00:47:26,850 --> 00:47:24,730
giving them the experiences that shape

1236
00:47:29,190 --> 00:47:26,860
their perception of what it's okay and

1237
00:47:31,530 --> 00:47:29,200
what it's cool to do yeah that's true

1238
00:47:33,540 --> 00:47:31,540

I'm starting around Peter but uh I i

1239
00:47:35,850 --> 00:47:33,550
would say that elementary school is not

1240
00:47:37,560 --> 00:47:35,860
the problem I I do career days with my

1241
00:47:40,050 --> 00:47:37,570
kids all through their elementary school

1242
00:47:41,820 --> 00:47:40,060
years and I can tell you for that day I

1243
00:47:44,250 --> 00:47:41,830
was the most popular guy in our

1244
00:47:48,030 --> 00:47:44,260
neighborhood uh except for the fireman

1245
00:47:50,240 --> 00:47:48,040
hate that guy baseball player yeah he

1246
00:47:52,560 --> 00:47:50,250
brings his truck that's not fair right

1247
00:47:54,420 --> 00:47:52,570
he's a neighbor of mine I think I would

1248
00:47:56,220 --> 00:47:54,430
get a every career today I'm gonna let

1249
00:47:58,050 --> 00:47:56,230
the air out of his tire so he can't make

1250
00:47:59,640 --> 00:47:58,060
it to the school but anyway they're

1251
00:48:01,950 --> 00:47:59,650
there they're hooked in elementary

1252
00:48:03,510 --> 00:48:01,960
school so let's to bring a dose of

1253
00:48:05,550 --> 00:48:03,520
reality where we lose them as when they

1254
00:48:06,980 --> 00:48:05,560
get older and they get more thinking

1255
00:48:09,000 --> 00:48:06,990
about their career and what kind of

1256
00:48:11,270 --> 00:48:09,010
opportunity they are going to have in

1257
00:48:13,740 --> 00:48:11,280
the future and that's when they may get

1258
00:48:17,099 --> 00:48:13,750
disenfranchised somewhat that's where we

1259
00:48:18,930 --> 00:48:17,109
need to make the connection and I think

1260
00:48:21,240 --> 00:48:18,940
what it has to do with is just what

1261
00:48:23,340 --> 00:48:21,250
Peter said is this law that we had most

1262
00:48:25,859 --> 00:48:23,350
recently we've seen a lot of those

1263
00:48:27,930 --> 00:48:25,869

cyclical happenings in our Bay in our

1264
00:48:29,670 --> 00:48:27,940
careers over the years and it's

1265
00:48:32,099 --> 00:48:29,680
primarily because of government spending

1266
00:48:33,870 --> 00:48:32,109
has fluctuated and when there's a

1267
00:48:36,720 --> 00:48:33,880
downturn we experience that downturn

1268
00:48:38,280 --> 00:48:36,730
that's why this activity is so important

1269
00:48:41,340 --> 00:48:38,290
because if this Commercial Crew and

1270
00:48:44,790 --> 00:48:41,350
cargo industry takes off we're no longer

1271
00:48:47,070 --> 00:48:44,800
dependent on just NASA's budget going up

1272
00:48:48,420 --> 00:48:47,080
and down the private market will spur

1273
00:48:50,370 --> 00:48:48,430
these innovations will spur these

1274
00:48:51,870 --> 00:48:50,380
opportunities so when kids get closer to

1275
00:48:53,700 --> 00:48:51,880
high school those are going to see those

1276
00:48:55,859 --> 00:48:53,710
opportunities and it won't just be about

1277
00:48:58,180 --> 00:48:55,869
NASA the pie will grow bigger and that's

1278
00:49:01,240 --> 00:48:58,190
why I believe this is right path now

1279
00:49:03,220 --> 00:49:01,250
for NASA but for the nation space has to

1280
00:49:04,990 --> 00:49:03,230
be cool it has to be cool to be

1281
00:49:06,580 --> 00:49:05,000
technical and enter into these kinds of

1282
00:49:09,130 --> 00:49:06,590
fields and that's something that SpaceX

1283
00:49:11,860 --> 00:49:09,140
definitely tries to to focus on we

1284
00:49:13,390 --> 00:49:11,870
publish videos on almost every aspect of

1285
00:49:16,690 --> 00:49:13,400
what we're doing we try to put great

1286
00:49:18,220 --> 00:49:16,700
music to those videos and I think

1287
00:49:21,010 --> 00:49:18,230
frankly the the Silicon Valley

1288
00:49:23,530 --> 00:49:21,020

entrepreneurs have made it ok to be

1289
00:49:25,420 --> 00:49:23,540
nerdy and I think that's you really need

1290
00:49:29,140 --> 00:49:25,430
to get kids over the over the hump of

1291
00:49:31,530 --> 00:49:29,150
it's ok to be a nerd so I was going to

1292
00:49:36,370 --> 00:49:31,540
add something and so now that I've

1293
00:49:38,530 --> 00:49:36,380
thinking of nerds now that I live about

1294
00:49:41,050 --> 00:49:38,540
two and a half miles from Johnson Space

1295
00:49:42,160 --> 00:49:41,060
Center and about you know and I live in

1296
00:49:44,200 --> 00:49:42,170
a community that's filled with

1297
00:49:46,720 --> 00:49:44,210
astronauts and people that work at JSC

1298
00:49:48,400 --> 00:49:46,730
you know I'd say my kids are extremely

1299
00:49:50,020 --> 00:49:48,410
privileged in an elementary school when

1300
00:49:51,730 --> 00:49:50,030
they go to school they were surrounded

1301
00:49:53,650 --> 00:49:51,740
by that environment you know parents are

1302
00:49:56,440 --> 00:49:53,660
all NASA employees or aerospace

1303
00:49:58,360 --> 00:49:56,450
employees you know you have a carnival

1304
00:50:00,700 --> 00:49:58,370
day and astronauts show up and sign

1305
00:50:03,160 --> 00:50:00,710
pictures and your kind of inundated with

1306
00:50:04,690 --> 00:50:03,170
it it's a great opportunity that I think

1307
00:50:06,970 --> 00:50:04,700
we benefit for being in such close

1308
00:50:08,470 --> 00:50:06,980
proximity question is how do we take

1309
00:50:10,120 --> 00:50:08,480
that and kind of replicate that when

1310
00:50:13,660 --> 00:50:10,130
you're not so close to a johnson space

1311
00:50:15,640 --> 00:50:13,670
center or something mr. Nye has been

1312
00:50:18,640 --> 00:50:15,650
waiting patiently well yeah I have a

1313
00:50:20,290 --> 00:50:18,650

question but first let me say the

1314
00:50:22,300 --> 00:50:20,300
Planetary Society the world's largest

1315
00:50:25,930 --> 00:50:22,310
non-governmental space organization has

1316
00:50:28,000 --> 00:50:25,940
just started a kids section because we

1317
00:50:29,650 --> 00:50:28,010
all got started before we were 10 part

1318
00:50:32,320 --> 00:50:29,660
of the reason the Science Guy show was

1319
00:50:34,060 --> 00:50:32,330
successful we had the benefit of very

1320
00:50:36,550 --> 00:50:34,070
good research you have to get people

1321
00:50:40,570 --> 00:50:36,560
before you're 10 years old and then the

1322
00:50:45,100 --> 00:50:40,580
big turning point is algebra we have to

1323
00:50:46,930 --> 00:50:45,110
make sure people learn algebra so Rob I

1324
00:50:49,090 --> 00:50:46,940
would say to you having kids come to

1325
00:50:51,700 --> 00:50:49,100
your facility once a year is not a small

1326
00:50:54,130 --> 00:50:51,710
thing that is a huge thing and if you

1327
00:50:57,100 --> 00:50:54,140
guys can manage to do to do that and

1328
00:51:00,520 --> 00:50:57,110
keep your what you do the proprietary

1329
00:51:02,770 --> 00:51:00,530
stuff to yourselves that is not a small

1330
00:51:06,120 --> 00:51:02,780
thing that could dare I say it change

1331
00:51:08,620 --> 00:51:06,130
the world now my question

1332
00:51:09,999 --> 00:51:08,630
we all love going into space who

1333
00:51:11,589 --> 00:51:10,009
wouldn't want to go into space jumping

1334
00:51:15,460 --> 00:51:11,599
around big fun but if we're going to go

1335
00:51:17,940 --> 00:51:15,470
farther and farther out humans after

1336
00:51:20,589 --> 00:51:17,950
about six months humans aren't that good

1337
00:51:23,529 --> 00:51:20,599
everybody has to work out four or five

1338
00:51:24,999 --> 00:51:23,539

hours a day and you lose a lot of time

1339
00:51:28,210 --> 00:51:25,009
when people come back they came and

1340
00:51:30,849 --> 00:51:28,220
walks away are you guys thinking big big

1341
00:51:35,170 --> 00:51:30,859
about some kind of spacecraft that would

1342
00:51:38,109 --> 00:51:35,180
spin so that we would have some level of

1343
00:51:39,609 --> 00:51:38,119
gravity so that we go way way out you

1344
00:51:42,279 --> 00:51:39,619
would have the advantage of not losing

1345
00:51:45,670 --> 00:51:42,289
your bones your bone density and you

1346
00:51:49,089 --> 00:51:45,680
also it may help people not be so crazy

1347
00:51:52,809 --> 00:51:49,099
that is to say help people get along

1348
00:51:55,539 --> 00:51:52,819
better the psychological problems if

1349
00:52:01,299 --> 00:51:55,549
their environment was more like where we

1350
00:52:03,640 --> 00:52:01,309
grew up Thank You 2001 a Space Odyssey

1351
00:52:08,170 --> 00:52:03,650
we've all remembered what that looked

1352
00:52:10,059 --> 00:52:08,180
like anybody thinking that way sorry I

1353
00:52:12,370 --> 00:52:10,069
think we should use our village of

1354
00:52:13,900 --> 00:52:12,380
elevating Tulio right now right yes is

1355
00:52:15,400 --> 00:52:13,910
supposed to be going beyond Leo right

1356
00:52:16,660 --> 00:52:15,410
yeah I know he's gonna come back you

1357
00:52:17,859 --> 00:52:16,670
gotta go I'm actually glad you guys

1358
00:52:19,480 --> 00:52:17,869
didn't answer that question cuz i do

1359
00:52:21,160 --> 00:52:19,490
want them focused on this near term

1360
00:52:23,230 --> 00:52:21,170
mission that's the one where the real

1361
00:52:25,299 --> 00:52:23,240
business opportunities lie i don't think

1362
00:52:27,099 --> 00:52:25,309
there's a lot of business opportunity in

1363
00:52:29,670 --> 00:52:27,109

that kind of deep space mission that's

1364
00:52:31,900 --> 00:52:29,680
still what NASA is very much about

1365
00:52:34,450 --> 00:52:31,910
hopefully at some point we can push the

1366
00:52:36,190 --> 00:52:34,460
boundaries out and turn that over there

1367
00:52:38,529 --> 00:52:36,200
are there have been over the years

1368
00:52:41,950 --> 00:52:38,539
different groups at NASA to sort of look

1369
00:52:43,900 --> 00:52:41,960
way way beyond bill and I think there's

1370
00:52:48,640 --> 00:52:43,910
a group right at NASA today that still

1371
00:52:50,589 --> 00:52:48,650
does some of that so yes I think there

1372
00:52:52,960 --> 00:52:50,599
are some some activities along those

1373
00:52:55,120 --> 00:52:52,970
lines looking at the deep-space mission

1374
00:52:57,999 --> 00:52:55,130
Mars now has become more into our sort

1375
00:53:00,069 --> 00:52:58,009
of trade space for human exploration

1376
00:53:01,509 --> 00:53:00,079
that kind of had a lull for a little bit

1377
00:53:03,819 --> 00:53:01,519
at NASA but now we're definitely talking

1378
00:53:05,829 --> 00:53:03,829
about going to asteroids as the next

1379
00:53:07,480 --> 00:53:05,839
mission and then going on to Mars those

1380
00:53:09,970 --> 00:53:07,490
are very long duration missions and we

1381
00:53:11,680 --> 00:53:09,980
definitely have to work the the human

1382
00:53:14,210 --> 00:53:11,690
countermeasure part of that very

1383
00:53:17,630 --> 00:53:14,220
strongly because right now today

1384
00:53:19,550 --> 00:53:17,640
I don't think we have confidence that we

1385
00:53:21,530 --> 00:53:19,560
could mount a Mars mission we definitely

1386
00:53:23,210 --> 00:53:21,540
need to do more more technology

1387
00:53:25,160 --> 00:53:23,220
development you heard the panel this

1388
00:53:26,900 --> 00:53:25,170

morning that's where those things are

1389
00:53:28,250 --> 00:53:26,910
going to come from I think for those far

1390
00:53:29,990 --> 00:53:28,260
far out thinkers and we're going to need

1391
00:53:34,010 --> 00:53:30,000
that if we want to take these deep-space

1392
00:53:36,109 --> 00:53:34,020
missions back to the said yes my name is

1393
00:53:39,770 --> 00:53:36,119
bud chasteen I'm a docent here at the

1394
00:53:42,980 --> 00:53:39,780
Museum of Flight a space enthusiasts but

1395
00:53:45,320 --> 00:53:42,990
also a concerned citizen I want to go

1396
00:53:47,420 --> 00:53:45,330
backwards in time a little bit and ask a

1397
00:53:50,750 --> 00:53:47,430
question I've been finding myself doing

1398
00:53:53,900 --> 00:53:50,760
that more and more at my age I was very

1399
00:53:57,140 --> 00:53:53,910
worried concerned and a little angry

1400
00:54:00,620 --> 00:53:57,150
that we decommissioned the shuttle

1401
00:54:03,920 --> 00:54:00,630
without having a replacement my main

1402
00:54:06,109 --> 00:54:03,930
question is this we all know what good

1403
00:54:09,170 --> 00:54:06,119
friends the Russians have been in the

1404
00:54:12,170 --> 00:54:09,180
past to the United States what is the

1405
00:54:15,620 --> 00:54:12,180
danger of some political turmoil

1406
00:54:19,300 --> 00:54:15,630
happening where they would refuse to

1407
00:54:22,339 --> 00:54:19,310
supply our astronauts a minor question I

1408
00:54:25,460 --> 00:54:22,349
noticed when they're sending astronauts

1409
00:54:27,800 --> 00:54:25,470
up there's usually three at a time maybe

1410
00:54:30,200 --> 00:54:27,810
it's my imagination but it seems like

1411
00:54:32,599 --> 00:54:30,210
two out of the three have been Russians

1412
00:54:34,820 --> 00:54:32,609
so that's the main question what is to

1413
00:54:41,900 --> 00:54:34,830

stop them from stopping to fly our

1414
00:54:43,160 --> 00:54:41,910
astronauts answer that one honestly you

1415
00:54:45,020 --> 00:54:43,170
know Lori talked about it a little bit

1416
00:54:46,609 --> 00:54:45,030
this morning we're focused here with

1417
00:54:48,920 --> 00:54:46,619
people that are in the in the short run

1418
00:54:52,190 --> 00:54:48,930
here concentrating on commercial flight

1419
00:54:54,170 --> 00:54:52,200
and I'd rather actually be glad to put

1420
00:54:55,400 --> 00:54:54,180
you in touch with lawyers office and the

1421
00:54:56,540 --> 00:54:55,410
right people at NASA they're really

1422
00:54:58,880 --> 00:54:56,550
thinking about those big political

1423
00:55:00,470 --> 00:54:58,890
issues and international trade issues

1424
00:55:02,410 --> 00:55:00,480
and let these folks really concentrate

1425
00:55:04,910 --> 00:55:02,420
on we've got really limited time here

1426
00:55:07,370 --> 00:55:04,920
questions on what are they doing that

1427
00:55:09,290 --> 00:55:07,380
the near future really in the commercial

1428
00:55:12,230 --> 00:55:09,300
world that's good I'll meanly ignore you

1429
00:55:14,390 --> 00:55:12,240
I was just looking to say I won't give

1430
00:55:16,640 --> 00:55:14,400
you a quick answer okay and that is I

1431
00:55:19,070 --> 00:55:16,650
think one of the things we can do is to

1432
00:55:21,589 --> 00:55:19,080
properly fund the US commercial space

1433
00:55:23,900 --> 00:55:21,599
program as we're doing so that the

1434
00:55:24,470 --> 00:55:23,910
biggest hedge to dealing with that issue

1435
00:55:26,390 --> 00:55:24,480
is

1436
00:55:29,000 --> 00:55:26,400
having a domestic capability that can

1437
00:55:30,770 --> 00:55:29,010
fly as soon as possible and if they know

1438
00:55:33,349 --> 00:55:30,780

that we do have that then it becomes

1439
00:55:35,780 --> 00:55:33,359
less a political chip for anyone to use

1440
00:55:37,670 --> 00:55:35,790
and it becomes more practical so I think

1441
00:55:39,170 --> 00:55:37,680
the message back to you and to all of

1442
00:55:41,359 --> 00:55:39,180
you and all of you are listening is

1443
00:55:43,250 --> 00:55:41,369
that's a very important question very

1444
00:55:45,650 --> 00:55:43,260
important issue the thing that we can do

1445
00:55:48,200 --> 00:55:45,660
is to make sure that we do our jobs and

1446
00:55:50,840 --> 00:55:48,210
the government sees this as a very vital

1447
00:55:52,849 --> 00:55:50,850
program for the United States and the

1448
00:55:55,340 --> 00:55:52,859
sooner they do that the sooner we get to

1449
00:56:00,320 --> 00:55:55,350
fly the less that is an issue for all of

1450
00:56:04,190 --> 00:56:00,330
us thank you great sir hi my name is

1451
00:56:06,859 --> 00:56:04,200
Dave Christey I have a one quick comment

1452
00:56:09,050 --> 00:56:06,869
which is that the idea that we are going

1453
00:56:11,810 --> 00:56:09,060
to shift towards the commercial sector

1454
00:56:14,270 --> 00:56:11,820
handling aspects that NASA used to

1455
00:56:16,190 --> 00:56:14,280
handle frankly we've always had the

1456
00:56:18,710 --> 00:56:16,200
private sector involved with NASA as the

1457
00:56:21,859 --> 00:56:18,720
former administrator Griffin said that

1458
00:56:24,980 --> 00:56:21,869
it's been NASA's insight and oversight

1459
00:56:27,080 --> 00:56:24,990
that has been the guiding role but we've

1460
00:56:29,840 --> 00:56:27,090
always brought this private sector in so

1461
00:56:31,820 --> 00:56:29,850
I just like to make this point that this

1462
00:56:33,740 --> 00:56:31,830
idea that we're going to shift gears and

1463
00:56:35,599 --> 00:56:33,750

away from what NASA is doing it's

1464
00:56:37,430 --> 00:56:35,609
actually we're just going to get rid of

1465
00:56:39,349 --> 00:56:37,440
the whole function all together that

1466
00:56:42,200 --> 00:56:39,359
that will be the long-term role because

1467
00:56:45,230 --> 00:56:42,210
the whole globalized financial system is

1468
00:56:47,170 --> 00:56:45,240
collapsing right now anyway but just one

1469
00:56:50,810 --> 00:56:47,180
quick question that I mentioned earlier

1470
00:56:53,320 --> 00:56:50,820
the Russians have proposed the Strategic

1471
00:56:55,580 --> 00:56:53,330
Defense of the earth policy which was a

1472
00:56:57,440 --> 00:56:55,590
revival of the old Strategic Defense

1473
00:57:01,010 --> 00:56:57,450
Initiative under Reagan which I know

1474
00:57:03,170 --> 00:57:01,020
Boeing played a role in to eliminate the

1475
00:57:04,849 --> 00:57:03,180
threat of nuclear warfare on the planet

1476
00:57:06,590 --> 00:57:04,859
but also to deal with the threats that

1477
00:57:10,400 --> 00:57:06,600
we face from space as we saw this

1478
00:57:13,210 --> 00:57:10,410
asteroid go through and and that would

1479
00:57:15,650 --> 00:57:13,220
be that was actually their proposal to

1480
00:57:17,540 --> 00:57:15,660
eliminate the threats they perceived

1481
00:57:19,220 --> 00:57:17,550
from Obama who refused to give them

1482
00:57:21,140 --> 00:57:19,230
assurances on the missile defense

1483
00:57:23,690 --> 00:57:21,150
systems in Eastern Europe not being

1484
00:57:25,790 --> 00:57:23,700
aimed at Russia which were now any the

1485
00:57:28,310 --> 00:57:25,800
middle of a thermonuclear showdown with

1486
00:57:30,560 --> 00:57:28,320
Asia but so my question would be would

1487
00:57:32,930 --> 00:57:30,570
you support the Strategic Defense of the

1488
00:57:35,660 --> 00:57:32,940

earth policy or support opening up a

1489
00:57:38,210 --> 00:57:35,670
dialogue with the Russians to

1490
00:57:40,430 --> 00:57:38,220
shift the emphasis away from this

1491
00:57:43,180 --> 00:57:40,440
insanity of nuclear war and towards

1492
00:57:45,680 --> 00:57:43,190
dealing with threats we face from space

1493
00:57:47,569 --> 00:57:45,690
you know again I don't want to cut you

1494
00:57:48,980 --> 00:57:47,579
off or prevent anybody wants to answer

1495
00:57:50,930 --> 00:57:48,990
but and Laurie addressed that this

1496
00:57:53,240 --> 00:57:50,940
morning and again these folks are very

1497
00:57:56,390 --> 00:57:53,250
focused on businesses today trying to

1498
00:57:59,359 --> 00:57:56,400
develop a business to can take people to

1499
00:58:01,280 --> 00:57:59,369
space soon and so leaving the big policy

1500
00:58:03,349 --> 00:58:01,290
issues to the policymakers in Washington

1501
00:58:04,970 --> 00:58:03,359
is fine with me and us anybody really

1502
00:58:06,349 --> 00:58:04,980
wants to way and I go back to another

1503
00:58:15,380 --> 00:58:06,359
question on this side see if we can get

1504
00:58:19,000 --> 00:58:15,390
the last two before we our time is up hi

1505
00:58:21,950 --> 00:58:19,010
Rachel Tillman I'm also daughter of a

1506
00:58:24,349 --> 00:58:21,960
space mission operations person with

1507
00:58:28,069 --> 00:58:24,359
Viking Lander so I follow the geek

1508
00:58:30,920 --> 00:58:28,079
family line and I'd like to ask like my

1509
00:58:33,410 --> 00:58:30,930
like him I'd like to ask as a business

1510
00:58:35,809 --> 00:58:33,420
person myself and an innovator with

1511
00:58:38,750 --> 00:58:35,819
patents who's experienced working in

1512
00:58:40,609 --> 00:58:38,760
startups and working at some of the

1513
00:58:43,490 --> 00:58:40,619

companies that have been influential in

1514
00:58:45,589 --> 00:58:43,500
all of the work done by Boeing Intel and

1515
00:58:46,940 --> 00:58:45,599
then moving on myself as a workforce

1516
00:58:49,099 --> 00:58:46,950
professional in developing those

1517
00:58:51,770 --> 00:58:49,109
programs that will sustain us as a

1518
00:58:53,780 --> 00:58:51,780
nation and a global nation as well what

1519
00:58:55,819 --> 00:58:53,790
kinds of investments and you've talked

1520
00:58:57,980 --> 00:58:55,829
about them to some extent what kinds of

1521
00:58:59,660 --> 00:58:57,990
fiscal investments are you going to do

1522
00:59:02,480 --> 00:58:59,670
to balance the need to grow your

1523
00:59:04,640 --> 00:59:02,490
business because we need to put reinvest

1524
00:59:07,970 --> 00:59:04,650
money in growth for companies to

1525
00:59:10,280 --> 00:59:07,980
continue reinvest in workforce

1526
00:59:12,109 --> 00:59:10,290
development and I'm looking at these not

1527
00:59:14,930 --> 00:59:12,119
as versus each other but a balance of

1528
00:59:16,910 --> 00:59:14,940
these types of investments so workforce

1529
00:59:19,970 --> 00:59:16,920
development growth for your own

1530
00:59:24,440 --> 00:59:19,980
companies through proprietary innovation

1531
00:59:27,960 --> 00:59:24,450
and open innovation with universities so

1532
00:59:31,380 --> 00:59:29,700
great question like to take that first

1533
00:59:33,180 --> 00:59:31,390
win i'm not i'm not sure i'm going to

1534
00:59:36,349 --> 00:59:33,190
hit all your points but i can tell you

1535
00:59:38,700 --> 00:59:36,359
that spacex plows pretty much all our

1536
00:59:41,910 --> 00:59:38,710
operating revenues back into our

1537
00:59:46,530 --> 00:59:41,920
operating rrd for future programs and

1538
00:59:49,770 --> 00:59:46,540

future capability yeah and i can't give

1539
00:59:51,270 --> 00:59:49,780
specific numbers either in the size of

1540
00:59:53,000 --> 00:59:51,280
the company that we are within boeing

1541
00:59:54,990 --> 00:59:53,010
there's a significant investment in

1542
00:59:56,910 --> 00:59:55,000
research development and always

1543
00:59:59,250 --> 00:59:56,920
advancing technology you can look at the

1544
01:00:01,109 --> 00:59:59,260
787 that just recently flew as a

1545
01:00:03,210 --> 01:00:01,119
significant investment from the boeing

1546
01:00:05,430 --> 01:00:03,220
company on the future technology for

1547
01:00:08,970 --> 01:00:05,440
commercial aircraft i can say that we

1548
01:00:14,190 --> 01:00:08,980
continually invest in the future for our

1549
01:00:16,410 --> 01:00:14,200
defense and space systems as well I'll

1550
01:00:18,089 --> 01:00:16,420
take a shot it said we were in a unique

1551
01:00:19,950 --> 01:00:18,099
position because we have steady funding

1552
01:00:22,410 --> 01:00:19,960
and we're going to be designing and

1553
01:00:26,370 --> 01:00:22,420
building and flying space vehicles 15 20

1554
01:00:30,240 --> 01:00:26,380
30 years from now regardless of how the

1555
01:00:31,530 --> 01:00:30,250
program changes over time so we do a lot

1556
01:00:33,420 --> 01:00:31,540
of things internally we have a

1557
01:00:34,560 --> 01:00:33,430
philosophy of Blue Origin we're not just

1558
01:00:36,420 --> 01:00:34,570
building a rocket we're building a

1559
01:00:37,650 --> 01:00:36,430
company that built rockets so we're

1560
01:00:40,250 --> 01:00:37,660
making those investments in our people

1561
01:00:42,960 --> 01:00:40,260
our tools are our policies procedures

1562
01:00:44,940 --> 01:00:42,970
facilities we have rocket engine tests

1563
01:00:46,470 --> 01:00:44,950

and labs all the equipment that we need

1564
01:00:48,270 --> 01:00:46,480
to do these things over the long haul I

1565
01:00:50,130 --> 01:00:48,280
mentioned mentorship that's an important

1566
01:00:51,990 --> 01:00:50,140
thing to me we have mentors within our

1567
01:00:53,400 --> 01:00:52,000
organization for our young engineers we

1568
01:00:56,240 --> 01:00:53,410
have a rotation program for young

1569
01:00:58,560 --> 01:00:56,250
engineers mention the internship as well

1570
01:01:00,480 --> 01:00:58,570
and then I'll leave it with you know

1571
01:01:03,660 --> 01:01:00,490
builders win by building you know you

1572
01:01:05,820 --> 01:01:03,670
learn through those experiences but

1573
01:01:07,079 --> 01:01:05,830
either success or failure you're going

1574
01:01:08,370 --> 01:01:07,089
to learn so you have to keep doing and

1575
01:01:16,110 --> 01:01:08,380
you have to keep persevering and moving

1576
01:01:16,120 --> 01:01:19,089
you

1577
01:01:23,120 --> 01:01:21,410
what's expected of each individual is

1578
01:01:24,739 --> 01:01:23,130
really a diversity of skills which they

1579
01:01:26,690 --> 01:01:24,749
learned on the job so really the best

1580
01:01:29,539 --> 01:01:26,700
training programs is just being part of

1581
01:01:31,849 --> 01:01:29,549
a small company and I will tell you we

1582
01:01:33,559 --> 01:01:31,859
hire the kind of people as many of our

1583
01:01:35,150 --> 01:01:33,569
panelists do who are people that are

1584
01:01:37,339 --> 01:01:35,160
absolutely passionate about their work

1585
01:01:38,749 --> 01:01:37,349
so even though the clocks made stop at

1586
01:01:40,160 --> 01:01:38,759
five o'clock in terms of where they're

1587
01:01:42,019 --> 01:01:40,170
getting paid these are the kind of

1588
01:01:43,160 --> 01:01:42,029

people that stay till midnight and we'll

1589
01:01:45,880 --> 01:01:43,170
work through the weekend just from the

1590
01:01:48,890 --> 01:01:45,890
sheer excitement of what we're doing oh

1591
01:01:51,109 --> 01:01:48,900
I think we all are that's what we do as

1592
01:01:52,039 --> 01:01:51,119
companies we reinvest heavily in what

1593
01:01:53,509 --> 01:01:52,049
we're doing so I'm going to take a

1594
01:01:55,789 --> 01:01:53,519
little bit of a different take on the

1595
01:01:57,769 --> 01:01:55,799
question and that is that once we are

1596
01:01:59,809 --> 01:01:57,779
flying the the vehicles that we're

1597
01:02:02,150 --> 01:01:59,819
building have the capability of acting

1598
01:02:04,459 --> 01:02:02,160
as the scientific test beds in space and

1599
01:02:06,410 --> 01:02:04,469
I think we we often time to look at the

1600
01:02:07,579 --> 01:02:06,420
near and the current activities that

1601
01:02:09,229 --> 01:02:07,589
we're doing we're building vehicles

1602
01:02:11,479 --> 01:02:09,239
we're going to go to Leo and we're going

1603
01:02:13,459 --> 01:02:11,489
to go to Space Station but this is an

1604
01:02:15,559 --> 01:02:13,469
industry that's being built to provide

1605
01:02:16,789 --> 01:02:15,569
access to low-earth orbit not just

1606
01:02:19,279 --> 01:02:16,799
access to the International Space

1607
01:02:22,209 --> 01:02:19,289
Station and it's very much in our plans

1608
01:02:24,829 --> 01:02:22,219
to have a very robust science platform

1609
01:02:27,229 --> 01:02:24,839
within our vehicle to allow for the

1610
01:02:28,400 --> 01:02:27,239
facilitation of testing because there

1611
01:02:29,959 --> 01:02:28,410
are many other people who have

1612
01:02:32,269 --> 01:02:29,969
innovations who want to find a way to

1613
01:02:33,890 --> 01:02:32,279

get those innovations tested in space

1614
01:02:36,199 --> 01:02:33,900
and that's a big problem right now it's

1615
01:02:37,459 --> 01:02:36,209
a very circular issue you need heritage

1616
01:02:39,589 --> 01:02:37,469
to get to space but you can't get

1617
01:02:41,329 --> 01:02:39,599
heritage until you get to space and we

1618
01:02:44,029 --> 01:02:41,339
just want to try to break that that

1619
01:02:46,249 --> 01:02:44,039
cycle by providing a way for many people

1620
01:02:47,870 --> 01:02:46,259
many researchers to do the research and

1621
01:02:52,260 --> 01:02:47,880
space that will enable the next levels

1622
01:02:56,850 --> 01:02:54,480
we've got two more questioners and those

1623
01:02:59,400 --> 01:02:56,860
will be the last two so let's go over to

1624
01:03:02,040 --> 01:02:59,410
her first thank you I'm Greg shirer from

1625
01:03:03,810 --> 01:03:02,050
Seattle astronomy com I was one of the

1626
01:03:05,730 --> 01:03:03,820
many people who raised their hand that

1627
01:03:09,360 --> 01:03:05,740
said yes I would I would travel into

1628
01:03:12,750 --> 01:03:09,370
space however my challenge is that my

1629
01:03:15,690 --> 01:03:12,760
wife who is very reasonable in most

1630
01:03:18,000 --> 01:03:15,700
things has this crazy notion that space

1631
01:03:20,280 --> 01:03:18,010
is a dangerous and hostile environment

1632
01:03:22,920 --> 01:03:20,290
and might exercise veto power about me

1633
01:03:24,900 --> 01:03:22,930
climbing on one of your vehicles so any

1634
01:03:26,910 --> 01:03:24,910
advice you might have for overcoming

1635
01:03:30,930 --> 01:03:26,920
that objection would be most helpful in

1636
01:03:33,870 --> 01:03:30,940
the future my main question is about how

1637
01:03:36,510 --> 01:03:33,880
you've gazed into the future about the

1638
01:03:38,460 --> 01:03:36,520

notion that it's a competitive industry

1639
01:03:39,990 --> 01:03:38,470
is it going to be like you know talking

1640
01:03:42,810 --> 01:03:40,000
about your old technology you know

1641
01:03:44,280 --> 01:03:42,820
Betamax and VHS is one going to win or

1642
01:03:46,740 --> 01:03:44,290
is there room for all of your different

1643
01:03:50,490 --> 01:03:46,750
approaches and technologies as this

1644
01:03:52,980 --> 01:03:50,500
industry goes forward thank you one of

1645
01:03:57,810 --> 01:03:52,990
the most important contributors to

1646
01:04:00,510 --> 01:03:57,820
safety is to fly your capability over

1647
01:04:04,590 --> 01:04:00,520
and over and over so SpaceX is designed

1648
01:04:08,070 --> 01:04:04,600
our our vehicles so that we can deliver

1649
01:04:09,990 --> 01:04:08,080
satellite to orbit to their operational

1650
01:04:12,420 --> 01:04:10,000
orbit with the Falcon 9 which is crew

1651
01:04:14,730 --> 01:04:12,430
rated we can deliver dragon to the

1652
01:04:18,650 --> 01:04:14,740
international space station which is

1653
01:04:21,990 --> 01:04:18,660
created we can so basically we've

1654
01:04:23,610 --> 01:04:22,000
formulated our strategy on on the

1655
01:04:25,170 --> 01:04:23,620
building blocks of our technology to

1656
01:04:27,180 --> 01:04:25,180
make sure that we were developing

1657
01:04:31,200 --> 01:04:27,190
systems that can be used for many

1658
01:04:32,850 --> 01:04:31,210
purposes so to let your give you some

1659
01:04:38,810 --> 01:04:32,860
advice with your wife I would fly with

1660
01:04:42,160 --> 01:04:38,820
SpaceX because way more than our friends

1661
01:04:45,610 --> 01:04:42,170
well so I guess I'll go after that

1662
01:04:50,880 --> 01:04:45,620
he's a brave man well I'll start by

1663
01:04:55,450 --> 01:04:53,620

yeah that's our brand you think about it

1664
01:04:57,280 --> 01:04:55,460
that the Boeing brand is probably more

1665
01:04:59,140 --> 01:04:57,290
important to our company while I'd say

1666
01:05:01,360 --> 01:04:59,150
people first but growing brand is an

1667
01:05:03,190 --> 01:05:01,370
important aspect and if you think about

1668
01:05:04,930 --> 01:05:03,200
the fact that you you know when we put

1669
01:05:06,670 --> 01:05:04,940
every time when we build an airplane the

1670
01:05:09,160 --> 01:05:06,680
idea is it's got a flying it's got to be

1671
01:05:10,660 --> 01:05:09,170
reliable when we build spacecraft it's

1672
01:05:13,030 --> 01:05:10,670
the same thing when you look at the

1673
01:05:14,920 --> 01:05:13,040
reliability that are the designs that we

1674
01:05:16,660 --> 01:05:14,930
put forward they're designed with the

1675
01:05:18,340 --> 01:05:16,670
reliability standards in place we've

1676
01:05:20,710 --> 01:05:18,350
worked with NASA on providing human

1677
01:05:22,420 --> 01:05:20,720
spacecraft for 50 years we understand

1678
01:05:26,380 --> 01:05:22,430
what's required to provide first time

1679
01:05:27,070 --> 01:05:26,390
quality and highly reliable systems so

1680
01:05:29,530 --> 01:05:27,080
when you look at it from that

1681
01:05:30,820 --> 01:05:29,540
perspective I say we've got a proven

1682
01:05:32,680 --> 01:05:30,830
track record of having reliable

1683
01:05:36,520 --> 01:05:32,690
capability and it's just like stepping

1684
01:05:40,030 --> 01:05:36,530
on an airplane it will be it needs to be

1685
01:05:42,160 --> 01:05:40,040
it needs to be yes from from our

1686
01:05:44,650 --> 01:05:42,170
perspective we just finished the launch

1687
01:05:46,510 --> 01:05:44,660
of our 410 space mission that we've

1688
01:05:48,700 --> 01:05:46,520

brought something in space and we've had

1689
01:05:50,800 --> 01:05:48,710
over 4,000 things that we've built go to

1690
01:05:53,710 --> 01:05:50,810
space and they've all operated without

1691
01:05:55,510 --> 01:05:53,720
any on-orbit problems and it becomes

1692
01:05:57,070 --> 01:05:55,520
part of the passion and inherent design

1693
01:05:59,440 --> 01:05:57,080
and I think in the companies here that

1694
01:06:01,330 --> 01:05:59,450
safety is the most important thing that

1695
01:06:03,790 --> 01:06:01,340
we have because we don't have an

1696
01:06:05,760 --> 01:06:03,800
industry unless we remain safe and we

1697
01:06:09,460 --> 01:06:05,770
understand those parameters quite well

1698
01:06:11,230 --> 01:06:09,470
it's really an amazing thing to see how

1699
01:06:13,450 --> 01:06:11,240
much technology is going into these

1700
01:06:15,460 --> 01:06:13,460
vehicles but how it's going to be tested

1701
01:06:18,100 --> 01:06:15,470
how many times how many flights is going

1702
01:06:20,320 --> 01:06:18,110
to be going up we believe that we are

1703
01:06:22,270 --> 01:06:20,330
safe and I think we all I think we all

1704
01:06:25,240 --> 01:06:22,280
believe that there's room for multiple

1705
01:06:27,430 --> 01:06:25,250
companies in this in this industry but I

1706
01:06:29,290 --> 01:06:27,440
will give you my advice for your for

1707
01:06:31,810 --> 01:06:29,300
your wife is that I had the pleasure of

1708
01:06:34,090 --> 01:06:31,820
meeting one of the people one of the

1709
01:06:35,980 --> 01:06:34,100
most fun people that I think I've ever

1710
01:06:39,920 --> 01:06:35,990
met and that is Richard Branson's mother

1711
01:06:42,960 --> 01:06:39,930
talking about Steve's Steve's mother and

1712
01:06:45,300 --> 01:06:42,970
richard branson's mother is now 91 and

1713
01:06:47,130 --> 01:06:45,310

she raised her hand is wanting to be one

1714
01:06:49,320 --> 01:06:47,140
of the first people to go to space I've

1715
01:06:51,360 --> 01:06:49,330
known her for a number of years and she

1716
01:06:52,920 --> 01:06:51,370
has that kind of attitude and I think

1717
01:06:54,510 --> 01:06:52,930
one of the things that we like to do is

1718
01:06:56,340 --> 01:06:54,520
to have people talk to people who have

1719
01:06:58,680 --> 01:06:56,350
that passion because they understand

1720
01:07:00,810 --> 01:06:58,690
that sometimes things that we want to do

1721
01:07:02,640 --> 01:07:00,820
do take a little bit more courage than

1722
01:07:05,910 --> 01:07:02,650
other things but that's what makes them

1723
01:07:08,100 --> 01:07:05,920
worth while I agree that over time there

1724
01:07:10,410 --> 01:07:08,110
will be markets in room for multiple

1725
01:07:12,390 --> 01:07:10,420
players in this industry and I believe

1726
01:07:14,400 --> 01:07:12,400
in that strongly I think NASA can help

1727
01:07:17,010 --> 01:07:14,410
to accelerate that by doing some things

1728
01:07:18,930 --> 01:07:17,020
by ceding control of earth to orbit

1729
01:07:21,300 --> 01:07:18,940
transportation to two companies like

1730
01:07:22,650 --> 01:07:21,310
like ours up on this panel and Lori

1731
01:07:24,660 --> 01:07:22,660
talked about that in her speech a little

1732
01:07:27,180 --> 01:07:24,670
bit but but it's a we need a space

1733
01:07:29,730 --> 01:07:27,190
economy we if NASA is controlling that

1734
01:07:31,380 --> 01:07:29,740
through detailed specifications and in

1735
01:07:35,850 --> 01:07:31,390
the way they procure spacecraft and

1736
01:07:38,640 --> 01:07:35,860
launch vehicles it's not going to be an

1737
01:07:39,960 --> 01:07:38,650
enable entrepreneurs that are out there

1738
01:07:42,840 --> 01:07:39,970

that haven't gotten into this business

1739
01:07:44,220 --> 01:07:42,850
just yet to to jump in and want to

1740
01:07:45,840 --> 01:07:44,230
compete on that on that kind of a ground

1741
01:07:49,200 --> 01:07:45,850
so NASA can help this in the long run

1742
01:07:50,550 --> 01:07:49,210
and I should strongly consider an only

1743
01:07:52,620 --> 01:07:50,560
I'll add to that is picking up actually

1744
01:07:54,390 --> 01:07:52,630
on Peters point although I talked about

1745
01:07:55,920 --> 01:07:54,400
Virgin Galactic today you know we're

1746
01:07:57,990 --> 01:07:55,930
part of the Virgin family of companies

1747
01:08:01,010 --> 01:07:58,000
and one of it is Virgin America which is

1748
01:08:03,720 --> 01:08:01,020
operator of Boeing planes and others

1749
01:08:05,940 --> 01:08:03,730
clearly it's it's safety first and we

1750
01:08:07,770 --> 01:08:05,950
have tried to imbue that culture and

1751
01:08:10,590 --> 01:08:07,780
what we're doing at Virgin Galactic

1752
01:08:13,890 --> 01:08:10,600
because we realize this is the business

1753
01:08:15,810 --> 01:08:13,900
and we can't afford to have a bad day so

1754
01:08:17,850 --> 01:08:15,820
that's why we have a very extensive test

1755
01:08:19,110 --> 01:08:17,860
program and sort of pick up on Mark's

1756
01:08:21,690 --> 01:08:19,120
point I thought he was going to go in

1757
01:08:23,970 --> 01:08:21,700
this direction which is a not only as a

1758
01:08:25,860 --> 01:08:23,980
Richard mother interested in flying but

1759
01:08:28,290 --> 01:08:25,870
actually on our very first commercial

1760
01:08:31,920 --> 01:08:28,300
flight Richard wants to fly with his

1761
01:08:34,230 --> 01:08:31,930
mother and two kids so we joke among

1762
01:08:35,490 --> 01:08:34,240
ourselves a galactic that we're probably

1763
01:08:37,560 --> 01:08:35,500

all going to have to be the guinea pigs

1764
01:08:38,970 --> 01:08:37,570
before he flies to make sure that it

1765
01:08:42,030 --> 01:08:38,980
truly is the safest vehicle in the world

1766
01:08:44,580 --> 01:08:42,040
I think just one other quick comment is

1767
01:08:45,120 --> 01:08:44,590
that NASA is our partner in this program

1768
01:08:48,269 --> 01:08:45,130
as

1769
01:08:50,039 --> 01:08:48,279
the FAA when we get when we get to fly

1770
01:08:52,260 --> 01:08:50,049
here in the next few years it's not like

1771
01:08:53,879 --> 01:08:52,270
we're doing this as standalone entities

1772
01:08:56,789 --> 01:08:53,889
we're doing it as part of a system that

1773
01:08:58,709 --> 01:08:56,799
has oversight regulation involvement and

1774
01:09:00,570 --> 01:08:58,719
those are the standards that we're all

1775
01:09:02,519 --> 01:09:00,580
going to have to meet or we don't fly no

1776
01:09:04,169 --> 01:09:02,529
different than the FAA certifies an

1777
01:09:05,729 --> 01:09:04,179
airplane and if if you don't get that

1778
01:09:07,709 --> 01:09:05,739
certification you don't put paying

1779
01:09:09,390 --> 01:09:07,719
passengers on that airplane we're going

1780
01:09:11,879 --> 01:09:09,400
to go through the same type of rigorous

1781
01:09:14,220 --> 01:09:11,889
oversight involvement regulation and

1782
01:09:21,019 --> 01:09:14,230
review of our programs before we do take

1783
01:09:24,709 --> 01:09:21,029
people one more question I would like to

1784
01:09:27,599 --> 01:09:24,719
make an acknowledgment not a question

1785
01:09:30,269 --> 01:09:27,609
I've been associated with a museum of

1786
01:09:33,419 --> 01:09:30,279
light I'm Jim Tillman the crusty old

1787
01:09:37,530 --> 01:09:33,429
Martian ever since the red barn was the

1788
01:09:40,410 --> 01:09:37,540

Museum of Flight Georgia Franklin once a

1789
01:09:44,519 --> 01:09:40,420
month would bring a school bus full of

1790
01:09:49,649 --> 01:09:44,529
kids and we're talk about space their

1791
01:09:53,550 --> 01:09:49,659
questions were really inspiring and just

1792
01:09:55,979 --> 01:09:53,560
help me keep on doing this stuff my

1793
01:10:00,899 --> 01:09:55,989
daughter Rachel who was just in front of

1794
01:10:02,820 --> 01:10:00,909
me I forgot to mention i found a

1795
01:10:06,870 --> 01:10:02,830
meteorology instrument that was surplus

1796
01:10:09,510 --> 01:10:06,880
i did not know it could be surplus and i

1797
01:10:12,209 --> 01:10:09,520
call Martin Marietta and said what else

1798
01:10:16,290 --> 01:10:12,219
do you have oh we've got the flights

1799
01:10:19,290 --> 01:10:16,300
pair of viking era shell the lander the

1800
01:10:21,629 --> 01:10:19,300
parachute what's going to happen to him

1801
01:10:25,500 --> 01:10:21,639
said he'll then probably sell for scrap

1802
01:10:30,450 --> 01:10:25,510
and melted down Rachel said my teacher

1803
01:10:33,570 --> 01:10:30,460
will want that and she bugged me and

1804
01:10:37,770 --> 01:10:33,580
bugged me and so the lander sis upstairs

1805
01:10:41,250 --> 01:10:37,780
now when children can get us to do

1806
01:10:44,129 --> 01:10:41,260
something useful maybe not what we think

1807
01:10:47,940 --> 01:10:44,139
is useful but that's been an inspiration

1808
01:10:52,980 --> 01:10:47,950
for me and to work with the young

1809
01:10:56,730 --> 01:10:52,990
it's in algebra math early on I try to

1810
01:10:59,910 --> 01:10:56,740
emphasize that too and thank you very

1811
01:11:11,850 --> 01:10:59,920
very much for this great presentation

1812
01:11:13,590 --> 01:11:11,860
well thank you I most inspiring people

1813
01:11:16,200 --> 01:11:13,600

that I've met since I've been here in

1814
01:11:19,370 --> 01:11:16,210
Seattle is bill Boeing Jr who cut the

1815
01:11:23,400 --> 01:11:19,380
ribbon on boeing field here in 1928 he's

1816
01:11:24,840 --> 01:11:23,410
turning 89 this month and sent a note

1817
01:11:27,420 --> 01:11:24,850
yesterday to Charles simoni on the

1818
01:11:29,880 --> 01:11:27,430
dedication this base gallery referring

1819
01:11:32,070 --> 01:11:29,890
to the change in the commercial aircraft

1820
01:11:35,610 --> 01:11:32,080
industry that he saw in the 20s and 30s

1821
01:11:37,920 --> 01:11:35,620
and likening this time till now and that

1822
01:11:40,350 --> 01:11:37,930
puts me in mind of a great closing quote

1823
01:11:41,940 --> 01:11:40,360
I think Peter Diamandis who founded the

1824
01:11:44,010 --> 01:11:41,950
XPrize and has been behind a lot of

1825
01:11:46,200 --> 01:11:44,020
these ideas over the years often says

1826
01:11:48,360 --> 01:11:46,210
that before Charles Lindbergh people who

1827
01:11:50,820 --> 01:11:48,370
flew in space were called excuse me flew

1828
01:11:55,320 --> 01:11:50,830
in aircraft were called Daredevils after

1829
01:11:56,850 --> 01:11:55,330
Lindbergh they were called passengers up

1830
01:11:58,320 --> 01:11:56,860
till now people who flew in space but

1831
01:12:00,240 --> 01:11:58,330
called astronauts the people at this

1832
01:12:03,240 --> 01:12:00,250
table are going to make it possible to

1833
01:12:04,830 --> 01:12:03,250
be the rest of us so we thank all of