
Google+
NASA

1
00:00:30,520 --> 00:00:28,930
okay we are oh okay just they're doing a

2
00:00:31,570 --> 00:00:30,530
quick test there hello I'm John yeah

3
00:00:34,030 --> 00:00:31,580
Burke with NASA's Office of

4
00:00:36,430 --> 00:00:34,040
Communications this Sunday SpaceX is

5
00:00:37,690 --> 00:00:36,440
scheduled to launch its Dragon

6
00:00:39,760 --> 00:00:37,700
spacecraft to the International Space

7
00:00:41,320 --> 00:00:39,770
Station marking the official start of

8
00:00:43,630 --> 00:00:41,330
commercial resupply missions to the

9
00:00:46,030 --> 00:00:43,640
station by American companies operating

10
00:00:47,650 --> 00:00:46,040
out of US bases joining us here on the

11
00:00:51,400 --> 00:00:47,660
Hangout is NASA Administrator Charlie

12
00:00:52,810 --> 00:00:51,410
Bolden and SpaceX CEO Elon Musk we're

13
00:00:55,000 --> 00:00:52,820

gonna have opening remarks from Charlie

14
00:00:57,910 --> 00:00:55,010
Neil on and then take questions charlie

15
00:00:59,620 --> 00:00:57,920
hey John thanks very much and thanks for

16
00:01:01,479 --> 00:00:59,630
everybody joining us this morning or

17
00:01:03,880 --> 00:01:01,489
afternoon wherever you happen to be in

18
00:01:06,010 --> 00:01:03,890
the world this is a really exciting time

19
00:01:09,639 --> 00:01:06,020
for all of us at NASA and across the

20
00:01:11,800 --> 00:01:09,649
nation tomorrow's launch is or Sunday's

21
00:01:14,320 --> 00:01:11,810
launch should be spectacular it is

22
00:01:17,080 --> 00:01:14,330
actually marks the beginning of true

23
00:01:18,700 --> 00:01:17,090
commercial spaceflight to take cargo to

24
00:01:21,790 --> 00:01:18,710
the International Space Station for us

25
00:01:24,310 --> 00:01:21,800
and it actually kind of piggybacks with

26
00:01:27,190 --> 00:01:24,320
our recent selection of spacex along

27
00:01:28,600 --> 00:01:27,200
with boeing and sierra nevada to contend

28
00:01:30,160 --> 00:01:28,610
to make the first vehicle that will be

29
00:01:31,660 --> 00:01:30,170
able to carry American astronauts and

30
00:01:32,920 --> 00:01:31,670
our partner astronauts to the

31
00:01:34,359 --> 00:01:32,930
International Space Station and

32
00:01:37,030 --> 00:01:34,369
low-earth orbit destinations from

33
00:01:40,870 --> 00:01:37,040
American soil President Obama's got us

34
00:01:43,600 --> 00:01:40,880
engaged in a very very I think ambitious

35
00:01:45,340 --> 00:01:43,610
program of exploration but everything

36
00:01:47,980 --> 00:01:45,350
really hinges on the success of folk

37
00:01:49,750 --> 00:01:47,990
like Elon and his team at SpaceX and I'm

38
00:01:54,719 --> 00:01:49,760

excited about being there with him on on

39
00:01:59,760 --> 00:01:54,729
Sunday night Frank

40
00:02:02,830 --> 00:01:59,770
Ilana all right well I the same

41
00:02:06,640 --> 00:02:02,840
sentiments we're really excited about

42
00:02:09,490 --> 00:02:06,650
the launch on Sunday although I'm

43
00:02:12,750 --> 00:02:09,500
hopefully it's unhelpful it's nothing

44
00:02:16,750 --> 00:02:12,760
new and that it goes really smoothly and

45
00:02:18,340 --> 00:02:16,760
I would like to remind people that this

46
00:02:20,410 --> 00:02:18,350
is only the second time we're going to

47
00:02:22,960 --> 00:02:20,420
try to go the space station so there's

48
00:02:25,259 --> 00:02:22,970
certainly a possibility that the mission

49
00:02:27,310 --> 00:02:25,269
football or something you go wrong

50
00:02:30,100 --> 00:02:27,320
although we've done everything we can to

51
00:02:32,259 --> 00:02:30,110
try to minimize that it's it should

52
00:02:35,979 --> 00:02:32,269
still be viewed as you know an early

53
00:02:38,630 --> 00:02:35,989
mission which is what it is and have a

54
00:02:42,740 --> 00:02:38,640
good we hope good many more means and

55
00:02:44,900 --> 00:02:42,750
the dick you provided to to NASA for

56
00:02:47,810 --> 00:02:44,910
servicing education so you can get back

57
00:02:51,140 --> 00:02:47,820
and forth and then and then in a few

58
00:02:53,600 --> 00:02:51,150
years transporting astronauts and the

59
00:02:57,670 --> 00:02:53,610
transferring that responsibly from the

60
00:03:00,410 --> 00:02:57,680
Russian Soyuz to an American spacecraft

61
00:03:02,990 --> 00:03:00,420
thanks well now take questions from

62
00:03:04,670 --> 00:03:03,000
YouTube Google+ and Twitter we have

63
00:03:06,680 --> 00:03:04,680

about 30 minutes so we'll try to get as

64
00:03:08,360 --> 00:03:06,690
many of your questions as possible the

65
00:03:11,840 --> 00:03:08,370
first questions is for both of you and

66
00:03:14,449 --> 00:03:11,850
it's from at km mcg EA on twitter who

67
00:03:16,550 --> 00:03:14,459
asks isn't it an outdated at NASA goal

68
00:03:19,660 --> 00:03:16,560
to send half shots to deadly Mars when

69
00:03:23,960 --> 00:03:19,670
robots like curiosity carry less risk

70
00:03:28,460 --> 00:03:23,970
John I think it's quite an appropriate

71
00:03:31,370 --> 00:03:28,470
goal robots are robots in to date every

72
00:03:34,640 --> 00:03:31,380
exploration discovery that's been made

73
00:03:35,960 --> 00:03:34,650
has been made by humans even today the

74
00:03:38,510 --> 00:03:35,970
discoveries that are coming through

75
00:03:39,949 --> 00:03:38,520
curiosity on the surface of Mars are

76
00:03:41,860 --> 00:03:39,959
actually being made by the people in the

77
00:03:43,820 --> 00:03:41,870
control center or across the world

78
00:03:45,740 --> 00:03:43,830
looking at the data that's coming

79
00:03:48,800 --> 00:03:45,750
through curiosity so it it's the human

80
00:03:54,080 --> 00:03:48,810
specie that does the exploring not not

81
00:03:55,610 --> 00:03:54,090
the robot yeah you on you you've

82
00:03:57,229 --> 00:03:55,620
addressed that as well you've talked

83
00:03:59,390 --> 00:03:57,239
about a potentially going to Mars in the

84
00:04:01,820 --> 00:03:59,400
future you you want to talk about that

85
00:04:03,410 --> 00:04:01,830
with the what the goal is and why it's

86
00:04:09,160 --> 00:04:03,420
better than that official to go into

87
00:04:11,720 --> 00:04:09,170
Mars sure I think what's really

88
00:04:13,670 --> 00:04:11,730

important is that ultimately humanity

89
00:04:16,580 --> 00:04:13,680
the out-of-class rewards establishing a

90
00:04:18,530 --> 00:04:16,590
self-sustaining civilization on Mars so

91
00:04:20,259 --> 00:04:18,540
you know this there's the question of

92
00:04:24,170 --> 00:04:20,269
exploring and learning from simple and

93
00:04:26,150 --> 00:04:24,180
robust none of that but that's good

94
00:04:29,480 --> 00:04:26,160
point you need to have people there and

95
00:04:32,480 --> 00:04:29,490
have a laboratory and have a station and

96
00:04:34,070 --> 00:04:32,490
and and and so just in terms of learning

97
00:04:35,870 --> 00:04:34,080
things I think you still want to send

98
00:04:38,210 --> 00:04:35,880
people there but but I do think there's

99
00:04:41,900 --> 00:04:38,220
there's a much greater goal which is to

100
00:04:43,360 --> 00:04:41,910
make life multiplanetary and the only

101
00:04:46,070 --> 00:04:43,370
way that's gonna happen is if there are

102
00:04:49,490 --> 00:04:46,080
steady advancements in rocket technology

103
00:04:52,820 --> 00:04:49,500
that ultimately enable the transport

104
00:04:55,610 --> 00:04:52,830
prowess and adventure

105
00:04:58,160 --> 00:04:55,620
a billions of people through tomorrow's

106
00:05:00,230 --> 00:04:58,170
millions times of equipment and and my

107
00:05:02,960 --> 00:05:00,240
hope is that Mars will become the new

108
00:05:04,310 --> 00:05:02,970
world just as the United States who was

109
00:05:07,340 --> 00:05:04,320
the new world in the old days they used

110
00:05:10,310 --> 00:05:07,350
to pull American colonies in the world

111
00:05:12,350 --> 00:05:10,320
and and marsh be the realtor new world

112
00:05:14,900 --> 00:05:12,360
and I think that would be incredibly

113
00:05:16,790 --> 00:05:14,910

exciting adventure and of course we've

114
00:05:19,370 --> 00:05:16,800
learned a great deal and we protect

115
00:05:23,720 --> 00:05:19,380
humanity against the potential for a

116
00:05:26,810 --> 00:05:23,730
clan with a great the next question is

117
00:05:29,840 --> 00:05:26,820
from Rama nadir and this is for Elon

118
00:05:31,550 --> 00:05:29,850
are there any notice this dragon as a

119
00:05:36,770 --> 00:05:31,560
result of data collected from the first

120
00:05:39,560 --> 00:05:36,780
dragon test mission yet there are some

121
00:05:42,440 --> 00:05:39,570
changes mostly on the software side that

122
00:05:46,460 --> 00:05:42,450
we've we improved the software of dragon

123
00:05:48,890 --> 00:05:46,470
chemical smarter and course to that you

124
00:05:50,630 --> 00:05:48,900
addressed the slight issue we saw on the

125
00:05:53,390 --> 00:05:50,640
last mission where we had to tweak the

126
00:05:56,260 --> 00:05:53,400
software in the light arts and obviously

127
00:05:58,670 --> 00:05:56,270
that that's been adjusted and we will

128
00:06:01,220 --> 00:05:58,680
improve the software and the thermal

129
00:06:03,020 --> 00:06:01,230
imager and work with NASA just a whole

130
00:06:06,350 --> 00:06:03,030
bunch Francis there can happen we milk

131
00:06:08,300 --> 00:06:06,360
was better and NASA's been it's been

132
00:06:11,720 --> 00:06:08,310
great working with NASA to refine the

133
00:06:16,040 --> 00:06:11,730
approach and I just we want to try to

134
00:06:18,620 --> 00:06:16,050
make a little bit better each time the

135
00:06:20,960 --> 00:06:18,630
next question is from at Alex F Gloria

136
00:06:23,420 --> 00:06:20,970
with the commercialization space is

137
00:06:25,610 --> 00:06:23,430
there potential to harness resources on

138
00:06:27,640 --> 00:06:25,620

planets like the moon Mars and bring

139
00:06:34,490 --> 00:06:27,650
them back to earth

140
00:06:36,050 --> 00:06:34,500
yeah well III don't I'm not getting

141
00:06:37,190 --> 00:06:36,060
resources for the memory-wise and

142
00:06:38,870 --> 00:06:37,200
bringing it back to earth because the

143
00:06:41,390 --> 00:06:38,880
cost of transportation is so high even

144
00:06:43,250 --> 00:06:41,400
if it was massively improved it would

145
00:06:47,450 --> 00:06:43,260
snow buddy probably expensive to

146
00:06:50,180 --> 00:06:47,460
transport resources from other heavenly

147
00:06:53,810 --> 00:06:50,190
bodies to - I think that would be very

148
00:06:57,170 --> 00:06:53,820
very much for Hitler however if there

149
00:06:59,270 --> 00:06:57,180
was say a base on Mars that one could

150
00:07:01,880 --> 00:06:59,280
could imagine in circumstances where

151
00:07:05,870 --> 00:07:01,890
having a recruiting station on the moon

152
00:07:09,620 --> 00:07:05,880
or harvesting Europe asteroids it may

153
00:07:12,740 --> 00:07:09,630
since general I had one other thing I

154
00:07:15,230 --> 00:07:12,750
don't think it's important as important

155
00:07:17,210 --> 00:07:15,240
to bring resources back back here to

156
00:07:20,750 --> 00:07:17,220
earth as it is to find the types of

157
00:07:24,170 --> 00:07:20,760
resources that we need to enhance the

158
00:07:26,150 --> 00:07:24,180
survival of humanity on Mars or the moon

159
00:07:29,030 --> 00:07:26,160
or wherever we go we we've currently

160
00:07:31,070 --> 00:07:29,040
spend a lot of time looking at at what

161
00:07:33,890 --> 00:07:31,080
we hope will prove to be microbes on

162
00:07:37,460 --> 00:07:33,900
Mars from which we can produce materials

163
00:07:40,040 --> 00:07:37,470

like concrete foods and the like so that

164
00:07:42,950 --> 00:07:40,050
we don't you know so that we don't have

165
00:07:45,740 --> 00:07:42,960
to pay the price of lifting tons of

166
00:07:47,930 --> 00:07:45,750
equipment and material from earth to

167
00:07:50,090 --> 00:07:47,940
that destination but that we we do it

168
00:07:52,220 --> 00:07:50,100
there on on the Martian surface fuels

169
00:07:55,280 --> 00:07:52,230
like methane and other things so I think

170
00:07:57,470 --> 00:07:55,290
that's the hope in our case of since

171
00:07:59,300 --> 00:07:57,480
since we're hopeful of long-term stays

172
00:08:01,310 --> 00:07:59,310
there finding the resources you need

173
00:08:05,270 --> 00:08:01,320
there so that all you have to pay is the

174
00:08:08,360 --> 00:08:05,280
price of transporting the humans okay

175
00:08:11,990 --> 00:08:08,370
the next question is from on Twitter at

176
00:08:14,380 --> 00:08:12,000
CT underscore LA what's the timeline for

177
00:08:17,390 --> 00:08:14,390
the first man dragon flight to the ISS

178
00:08:28,040 --> 00:08:17,400
how are NASA and SpaceX collaborating in

179
00:08:29,840 --> 00:08:28,050
that area SpaceX NASA collaborate really

180
00:08:32,450 --> 00:08:29,850
every every day

181
00:08:37,339 --> 00:08:32,460
their third s purpose now at SpaceX in

182
00:08:39,409 --> 00:08:37,349
space which was not NASA so and it's I

183
00:08:45,590 --> 00:08:39,419
mean it's really really great we're

184
00:08:48,710 --> 00:08:45,600
working with with with NASA and so from

185
00:08:50,900 --> 00:08:48,720
a timing standpoint we're aiming to to

186
00:08:53,540 --> 00:08:50,910
do probably initially an orbital flight

187
00:08:55,550 --> 00:08:53,550
that that just just goes to orbit and

188
00:08:59,090 --> 00:08:55,560

then returns to Earth with with you on

189
00:09:00,680 --> 00:08:59,100
board and and we're hopeful that

190
00:09:02,020 --> 00:09:00,690
something like that could occur in about

191
00:09:04,430 --> 00:09:02,030
three years

192
00:09:06,110 --> 00:09:04,440
you know maybe out of year or Europe

193
00:09:07,730 --> 00:09:06,120
margin on that so maybe three to four

194
00:09:12,650 --> 00:09:07,740
years but our goal is to do it in three

195
00:09:14,180 --> 00:09:12,660
years and then to to actually take

196
00:09:20,079 --> 00:09:14,190
Astros all the way to the space station

197
00:09:24,710 --> 00:09:22,190
okay thank you

198
00:09:25,550 --> 00:09:24,720
the next questions per Ilan its from

199
00:09:28,819 --> 00:09:25,560
Twitter

200
00:09:30,590 --> 00:09:28,829
Tommy be one two three do you plan on

201
00:09:32,600 --> 00:09:30,600
using the Dragon vehicle for space

202
00:09:38,449 --> 00:09:32,610
tourism in the future because that would

203
00:09:41,660 --> 00:09:38,459
be awesome well yeah you know right now

204
00:09:46,069 --> 00:09:41,670
there are a lot of people that that I

205
00:09:47,540 --> 00:09:46,079
see on the Russian studies and and

206
00:09:51,079 --> 00:09:47,550
obviously that's an impact a lot of

207
00:09:53,630 --> 00:09:51,089
Americans on that and it'll be great to

208
00:09:56,000 --> 00:09:53,640
have an American option where in you

209
00:09:59,990 --> 00:09:56,010
know we could bring some that revenue

210
00:10:03,650 --> 00:10:00,000
back back to back the US and so yeah we

211
00:10:06,290 --> 00:10:03,660
would have to do base tourism flights

212
00:10:08,480 --> 00:10:06,300
the first point you're doing and maybe

213
00:10:10,600 --> 00:10:08,490

if we can offer them at a lower Hawks

214
00:10:13,280 --> 00:10:10,610
take that you could expand the market

215
00:10:16,340 --> 00:10:13,290
and and of course I mean anything that

216
00:10:20,389 --> 00:10:16,350
went to the space station will be you

217
00:10:23,240 --> 00:10:20,399
know on a massive level but you know

218
00:10:25,699 --> 00:10:23,250
there's just possibly a private space

219
00:10:27,620 --> 00:10:25,709
station with a glow and that that could

220
00:10:29,630 --> 00:10:27,630
be something that would help offset that

221
00:10:31,819 --> 00:10:29,640
the operational cost of manned

222
00:10:34,009 --> 00:10:31,829
spaceflight so it's hard to say where

223
00:10:36,079 --> 00:10:34,019
things will go in the future but our

224
00:10:37,939 --> 00:10:36,089
focus right now just on development of

225
00:10:42,050 --> 00:10:37,949
technology and making that capability

226
00:10:43,490 --> 00:10:42,060
available and then just and with each

227
00:10:45,560 --> 00:10:43,500
year that goes by I try to figure out

228
00:10:49,130 --> 00:10:45,570
how can we how can we do good for the

229
00:10:51,949 --> 00:10:49,140
cause of space John I think I would add

230
00:10:53,480 --> 00:10:51,959
to what he wants is he mentioned one

231
00:10:56,329 --> 00:10:53,490
other company Bigelow for example

232
00:11:00,019 --> 00:10:56,339
Bigelow Aerospace you know NASA's role

233
00:11:02,030 --> 00:11:00,029
is is not to develop the Commerce the

234
00:11:04,759 --> 00:11:02,040
the space industry but to facilitate the

235
00:11:08,000 --> 00:11:04,769
success of a viable commercial space

236
00:11:10,009 --> 00:11:08,010
industry and from our point of view

237
00:11:12,319 --> 00:11:10,019
while it's critical they have

238
00:11:14,240 --> 00:11:12,329

transportation systems it's equally

239
00:11:17,420 --> 00:11:14,250
critical that the commercial sector

240
00:11:19,790 --> 00:11:17,430
develop destinations where those where

241
00:11:21,620 --> 00:11:19,800
those transportation systems can go it's

242
00:11:24,259 --> 00:11:21,630
very encouraging for me to see Elon and

243
00:11:26,180 --> 00:11:24,269
others working with with Bob Bigelow and

244
00:11:29,059 --> 00:11:26,190
Bigelow industries because they are

245
00:11:30,559 --> 00:11:29,069
creating alternative destinations it

246
00:11:32,060 --> 00:11:30,569
would be very it would be very

247
00:11:35,000 --> 00:11:32,070
interesting to see

248
00:11:36,500 --> 00:11:35,010
the commercial sector expand the use of

249
00:11:39,440 --> 00:11:36,510
low Earth orbit for things like

250
00:11:41,210 --> 00:11:39,450
materials processing pharmaceuticals

251
00:11:43,010 --> 00:11:41,220
research and the like that are done

252
00:11:45,470 --> 00:11:43,020
places other than the International

253
00:11:48,170 --> 00:11:45,480
Space Station and I am encouraged when I

254
00:11:50,630 --> 00:11:48,180
look at Ian's manifest in that for the

255
00:11:53,210 --> 00:11:50,640
cargo side anyway the vast majority of

256
00:11:54,890 --> 00:11:53,220
his items on his manifesto non NASA and

257
00:11:57,680 --> 00:11:54,900
and that's what we're trying to do is

258
00:11:59,720 --> 00:11:57,690
facilitate the true development of a

259
00:12:01,220 --> 00:11:59,730
real commercial industry where the

260
00:12:06,110 --> 00:12:01,230
government is an anchor tenant but not

261
00:12:08,780 --> 00:12:06,120
the primary source of income thank you

262
00:12:10,880 --> 00:12:08,790
the next question is from the YouTube

263
00:12:12,860 --> 00:12:10,890

stream and it's from land of dreams the

264
00:12:14,870 --> 00:12:12,870
questions for Charlie Bolden an Elon

265
00:12:17,210 --> 00:12:14,880
what are your thoughts on making the

266
00:12:20,960 --> 00:12:17,220
transition from chemical systems to new

267
00:12:23,450 --> 00:12:20,970
propulsion methods such as solar I think

268
00:12:26,840 --> 00:12:23,460
it's absolutely essential if we really

269
00:12:30,770 --> 00:12:26,850
want to to develop the capability of

270
00:12:33,290 --> 00:12:30,780
routine interplanetary travel for humans

271
00:12:35,000 --> 00:12:33,300
we've got to revolutionize the speed

272
00:12:38,360 --> 00:12:35,010
with which we make that travel and that

273
00:12:41,810 --> 00:12:38,370
can't be done on today's chemical based

274
00:12:45,980 --> 00:12:41,820
engine so whether it's solar electric or

275
00:12:47,300 --> 00:12:45,990
nuclear or other plasma fusion it we've

276
00:12:54,140 --> 00:12:47,310
got a we've got to make some progress

277
00:12:56,060 --> 00:12:54,150
there Yeah right I think you know a

278
00:12:58,220 --> 00:12:56,070
chemical is good for getting out of

279
00:12:59,810 --> 00:12:58,230
Earth's gravity willow and there are a

280
00:13:00,710 --> 00:12:59,820
lot of improvements that can be made in

281
00:13:03,500 --> 00:13:00,720
chemical propulsion

282
00:13:05,990 --> 00:13:03,510
I think this they weren't gonna take

283
00:13:07,310 --> 00:13:06,000
take rockets rough technology quite a

284
00:13:13,550 --> 00:13:07,320
bit further than it's been taking the

285
00:13:17,090 --> 00:13:13,560
best bar for interplanetary travel that

286
00:13:19,400 --> 00:13:17,100
that's where we take propulsion there's

287
00:13:22,700 --> 00:13:19,410
a really sort of ion drive at one level

288
00:13:24,440 --> 00:13:22,710

I can be quite helpful I mean you can't

289
00:13:26,240 --> 00:13:24,450
use them to get off the planet but you

290
00:13:28,580 --> 00:13:26,250
can't generate enough thrust but once

291
00:13:30,230 --> 00:13:28,590
you're in in orbit

292
00:13:33,260 --> 00:13:30,240
I think they can be very helpful for

293
00:13:34,580 --> 00:13:33,270
smoking the journey between the air Mars

294
00:13:39,230 --> 00:13:34,590
and other destinations in the solar

295
00:13:42,410 --> 00:13:39,240
system the next question is from Heath

296
00:13:44,420 --> 00:13:42,420
Reza back on Google+ who asks have NASA

297
00:13:45,440 --> 00:13:44,430
and SpaceX ever discussed further in

298
00:13:48,350 --> 00:13:45,450
their collaboration

299
00:13:51,200 --> 00:13:48,360
into the realm of future speculative

300
00:13:54,880 --> 00:13:51,210
efforts example the potential EML to

301
00:13:57,740 --> 00:13:54,890
lunar far side station concept others I

302
00:14:00,410 --> 00:13:57,750
know I will say from our standpoint

303
00:14:02,300 --> 00:14:00,420
there is a zeal on said much earlier in

304
00:14:05,240 --> 00:14:02,310
the conversation there is daily

305
00:14:06,920 --> 00:14:05,250
conversation among our people we we live

306
00:14:09,290 --> 00:14:06,930
and work together now you know we've got

307
00:14:12,800 --> 00:14:09,300
a NASA team that's that's out here in

308
00:14:14,960 --> 00:14:12,810
Hawthorne and folk visit McGregor

309
00:14:17,390 --> 00:14:14,970
periodically and I think anytime you

310
00:14:19,070 --> 00:14:17,400
have people of like minds explorers

311
00:14:20,690 --> 00:14:19,080
getting together then things come up

312
00:14:22,340 --> 00:14:20,700
that that you're not working on

313
00:14:25,360 --> 00:14:22,350

immediately but but that you're looking

314
00:14:27,590 --> 00:14:25,370
to the future to do so we do talk about

315
00:14:30,830 --> 00:14:27,600
collaboration between companies like

316
00:14:33,290 --> 00:14:30,840
SpaceX and NASA in going beyond

317
00:14:36,020 --> 00:14:33,300
low-earth orbit we you know right now

318
00:14:39,110 --> 00:14:36,030
the thing that I think Elon and I have

319
00:14:40,790 --> 00:14:39,120
both focused on is making getting

320
00:14:44,690 --> 00:14:40,800
getting us successfully to low-earth

321
00:14:46,340 --> 00:14:44,700
orbit repeatedly because the more we we

322
00:14:49,130 --> 00:14:46,350
demonstrate the capability to do that

323
00:14:52,010 --> 00:14:49,140
then the more confident we become and we

324
00:14:56,360 --> 00:14:52,020
can then turn our vision to to flight

325
00:14:58,310 --> 00:14:56,370
beyond low-earth orbit yeah I completely

326
00:15:00,740 --> 00:14:58,320
agree with Chuck with Charlie it's a

327
00:15:05,210 --> 00:15:00,750
it's really we're gonna make sure that

328
00:15:08,750 --> 00:15:05,220
we we were able to do routine flight to

329
00:15:12,650 --> 00:15:08,760
low-earth orbit and and do it and do so

330
00:15:14,090 --> 00:15:12,660
you know really efficiently just to make

331
00:15:17,300 --> 00:15:14,100
just make sure that basically legal

332
00:15:19,760 --> 00:15:17,310
we've got a good foundation before going

333
00:15:21,410 --> 00:15:19,770
too far beyond that that foundation so

334
00:15:24,100 --> 00:15:21,420
we're gonna make sure you know things

335
00:15:26,720 --> 00:15:24,110
were really really good and then grow

336
00:15:28,400 --> 00:15:26,730
our conversations that that are

337
00:15:30,410 --> 00:15:28,410
occurring about potentially levering

338
00:15:35,120 --> 00:15:30,420

leveraging their the Dragon spacecraft

339
00:15:37,280 --> 00:15:35,130
as as a science instrument delivery

340
00:15:40,220 --> 00:15:37,290
platform to other parts of the solar

341
00:15:42,920 --> 00:15:40,230
system it seems like you know not

342
00:15:45,050 --> 00:15:42,930
necessarily has made an investment in

343
00:15:49,370 --> 00:15:45,060
Dragon and maybe there ways to leverage

344
00:15:51,650 --> 00:15:49,380
that investment in another direction and

345
00:15:53,570 --> 00:15:51,660
so I suspect that there probably will be

346
00:15:57,470 --> 00:15:53,580
things that come out in the future but

347
00:15:59,269 --> 00:15:57,480
right now we're just getting getting to

348
00:16:03,439 --> 00:15:59,279
the PlayStation on a routine basis

349
00:16:07,999 --> 00:16:03,449
a thank you another one from YouTube

350
00:16:13,550 --> 00:16:08,009
Ilan when are you going into space some

351
00:16:15,949 --> 00:16:13,560
people think I'm already there I think

352
00:16:19,790 --> 00:16:15,959
what we great would be for for Elon and

353
00:16:22,189 --> 00:16:19,800
me to take a trip maybe just to check

354
00:16:27,019 --> 00:16:22,199
out the operations on station that would

355
00:16:28,489 --> 00:16:27,029
be awesome I would love to go to the

356
00:16:30,530 --> 00:16:28,499
Space Station with Charlie I was really

357
00:16:33,499 --> 00:16:30,540
cool

358
00:16:35,749 --> 00:16:33,509
beside I definitely like to go up you

359
00:16:38,329 --> 00:16:35,759
know it's I got to resist the temptation

360
00:16:40,489 --> 00:16:38,339
to you know be the CEO and the test

361
00:16:42,110 --> 00:16:40,499
pilot which would probably be yeah but

362
00:16:47,299 --> 00:16:42,120
the wise decisions but I really want to

363
00:16:49,730 --> 00:16:47,309

go so yeah okay another one from the

364
00:16:51,949 --> 00:16:49,740
stream is out from Alan Lowe

365
00:16:57,829 --> 00:16:51,959
is there anything fun or special aboard

366
00:17:00,829 --> 00:16:57,839
dragon think this special but I don't

367
00:17:02,090 --> 00:17:00,839
know and and probably fun but there's no

368
00:17:07,010 --> 00:17:02,100
big wheel of cheese if that's what

369
00:17:08,899 --> 00:17:07,020
you're wondering I will say what special

370
00:17:12,230 --> 00:17:08,909
award aboard dragon this time at least I

371
00:17:14,510 --> 00:17:12,240
understand I and I don't have to help me

372
00:17:17,270 --> 00:17:14,520
on the count but I think we've got 23

373
00:17:18,590 --> 00:17:17,280
student experiments that's special you

374
00:17:21,980 --> 00:17:18,600
know some of them are making repeat

375
00:17:24,319 --> 00:17:21,990
flights and you know it's SpaceX meeting

376
00:17:26,779 --> 00:17:24,329
an obligation to students that we're we

377
00:17:29,060 --> 00:17:26,789
didn't we didn't get around to doing all

378
00:17:30,470 --> 00:17:29,070
of them the first time and so you know

379
00:17:31,940 --> 00:17:30,480
he'll on and the folk at SpaceX have

380
00:17:34,310 --> 00:17:31,950
agreed to put them back on there but but

381
00:17:36,590 --> 00:17:34,320
23 student experiments going to space is

382
00:17:40,970 --> 00:17:36,600
really really really special

383
00:17:42,950 --> 00:17:40,980
in my estimation yeah thanks I apologize

384
00:17:46,549 --> 00:17:42,960
if I misspelled his name but Laura do

385
00:17:50,360 --> 00:17:46,559
cell from Google+ ass how long did it

386
00:17:53,180 --> 00:17:50,370
take to assemble the Falcon 9 well it's

387
00:17:56,450 --> 00:17:53,190
from such finish assuming the raw

388
00:17:59,270 --> 00:17:56,460

material is there it takes right now it

389
00:18:02,930 --> 00:17:59,280
takes about a year maybe a little longer

390
00:18:05,840 --> 00:18:02,940
than that so Oh 12 to 18 months right

391
00:18:07,909 --> 00:18:05,850
now but what we are trying to accelerate

392
00:18:12,200 --> 00:18:07,919
that timing particularly given the

393
00:18:13,100 --> 00:18:12,210
upcoming launch manifest because the you

394
00:18:15,800 --> 00:18:13,110
know if you look at

395
00:18:18,590 --> 00:18:15,810
lingerie this year we will do two

396
00:18:21,440 --> 00:18:18,600
launches next year we'll arrange two

397
00:18:23,210 --> 00:18:21,450
probably four to six launches and then

398
00:18:25,580 --> 00:18:23,220
double it again the year thereafter

399
00:18:28,720 --> 00:18:25,590
which i think is very important to keep

400
00:18:30,410 --> 00:18:28,730
increasing the tempo of spaceflight

401
00:18:31,850 --> 00:18:30,420
because I think I think that the

402
00:18:34,490 --> 00:18:31,860
elephant thing is to try to get

403
00:18:37,010 --> 00:18:34,500
spaceflight as routine as air flight I

404
00:18:39,260 --> 00:18:37,020
don't think it quite yet but it can get

405
00:18:41,480 --> 00:18:39,270
a lot closer than it's been in the past

406
00:18:46,040 --> 00:18:41,490
and that's my best really important for

407
00:18:49,370 --> 00:18:46,050
the Advancement of us big base okay

408
00:18:51,440 --> 00:18:49,380
another one this is from at Jeremy mbar

409
00:18:56,510 --> 00:18:51,450
is the weather looking favorable for

410
00:18:59,570 --> 00:18:56,520
Sunday's SpaceX launch the latest yep

411
00:19:03,410 --> 00:18:59,580
yet I got who is that it's it's about

412
00:19:06,080 --> 00:19:03,420
60% likely so we were treetops Lee 40%

413
00:19:07,670 --> 00:19:06,090

potentially 40% chance of potentially

414
00:19:09,920 --> 00:19:07,680
having to scrub due to weather

415
00:19:12,560 --> 00:19:09,930
so hopefully that those odds will prove

416
00:19:13,730 --> 00:19:12,570
in the in the next day or so but but

417
00:19:17,450 --> 00:19:13,740
there is certainly a chance that we

418
00:19:19,820 --> 00:19:17,460
could have to go for weather okay this

419
00:19:24,700 --> 00:19:19,830
is from Chris James on Google+ he asks

420
00:19:32,000 --> 00:19:28,490
well it's it's basically chosen when you

421
00:19:34,310 --> 00:19:32,010
when you win one counts the time it's

422
00:19:37,610 --> 00:19:34,320
what winter which would quite close to

423
00:19:40,820 --> 00:19:37,620
the space station it's it's it's several

424
00:19:44,540 --> 00:19:40,830
hours but then it takes us about a day

425
00:19:45,770 --> 00:19:44,550
to get close to the space station and

426
00:19:48,320 --> 00:19:45,780
then over time again we were working

427
00:19:49,970 --> 00:19:48,330
with NASA to try to tighten that that

428
00:19:53,840 --> 00:19:49,980
time had enough I think we could get it

429
00:19:56,180 --> 00:19:53,850
to a lot faster but in the beginning

430
00:19:58,970 --> 00:19:56,190
we're taking things very slowly and

431
00:20:02,360 --> 00:19:58,980
deliberately in John Holly had you know

432
00:20:03,890 --> 00:20:02,370
trying to help Elon out we've the last I

433
00:20:06,580 --> 00:20:03,900
want to say the last progress mission

434
00:20:10,010 --> 00:20:06,590
that we flew with the Russians we

435
00:20:12,770 --> 00:20:10,020
executed a one-day or same-day

436
00:20:14,840 --> 00:20:12,780
rendezvous and docking and that's

437
00:20:16,370 --> 00:20:14,850
ideally what you know where we would

438
00:20:18,800 --> 00:20:16,380

like to get for our commercial flights

439
00:20:21,170 --> 00:20:18,810
because much of the cargo that we hope

440
00:20:24,410 --> 00:20:21,180
to carry that Elon hopes to carry in the

441
00:20:25,970 --> 00:20:24,420
future are biological samples or other

442
00:20:27,230 --> 00:20:25,980
kinds of things and the quicker we can

443
00:20:30,440 --> 00:20:27,240
get them to stay

444
00:20:33,320 --> 00:20:30,450
the better so I would say our target is

445
00:20:37,090 --> 00:20:33,330
coincident with with elands and that's

446
00:20:39,320 --> 00:20:37,100
to try to get there on the same day yeah

447
00:20:43,039 --> 00:20:39,330
okay thank you looks like we have time

448
00:20:45,379 --> 00:20:43,049
for a few more questions at dmg 0:03 on

449
00:20:46,970 --> 00:20:45,389
twitter asks for mister bolden what are

450
00:20:50,749 --> 00:20:46,980
some of the things that SpaceX brought

451
00:20:53,360 --> 00:20:50,759
to the table that surprised NASA you

452
00:20:56,779 --> 00:20:53,370
know I to be quite honest I don't think

453
00:20:58,399 --> 00:20:56,789
anything surprised us because we

454
00:21:00,470 --> 00:20:58,409
expected that everything almost

455
00:21:04,340 --> 00:21:00,480
everything we would see from space X

456
00:21:09,350 --> 00:21:04,350
would be revolutionary and different

457
00:21:12,320 --> 00:21:09,360
game changing so the the rapidity of the

458
00:21:13,909 --> 00:21:12,330
process that they do the way that

459
00:21:18,320 --> 00:21:13,919
they've managed to streamline their

460
00:21:21,110 --> 00:21:18,330
process cost is it is something that is

461
00:21:22,850 --> 00:21:21,120
critical and as Elon has implied before

462
00:21:26,029 --> 00:21:22,860
for all of us

463
00:21:29,149 --> 00:21:26,039

the secret is big numbers so the more

464
00:21:31,580 --> 00:21:29,159
the the more rapidly we can get to the

465
00:21:34,249 --> 00:21:31,590
point where he and others are able to

466
00:21:37,460 --> 00:21:34,259
reliably launch to space and get big

467
00:21:44,090 --> 00:21:37,470
numbers in a year means more profit and

468
00:21:47,360 --> 00:21:44,100
also less cost ok this is from Twitter

469
00:21:49,220 --> 00:21:47,370
at Allen curl in dragon Orion are small

470
00:21:52,159 --> 00:21:49,230
how could three people live in it for

471
00:21:54,110 --> 00:21:52,169
months to Mars and batch add on living

472
00:21:58,399 --> 00:21:54,120
capsules question mark two launches

473
00:21:59,749 --> 00:21:58,409
question mark well I mean III really I

474
00:22:01,519 --> 00:21:59,759
would not have a cake that's somebody

475
00:22:03,680 --> 00:22:01,529
travel to Mars and Dragon because that

476
00:22:05,480 --> 00:22:03,690
would be very comfortable yeah we like

477
00:22:10,009 --> 00:22:05,490
it we like taking I mean it would be

478
00:22:10,940 --> 00:22:10,019
ridiculous actually I think eliminating

479
00:22:12,680 --> 00:22:10,950
down I don't think somebody should

480
00:22:15,019 --> 00:22:12,690
travel to Mars in dragon that would be

481
00:22:16,369 --> 00:22:15,029
you know six months there and then you

482
00:22:17,720 --> 00:22:16,379
might have stay as long as they eating

483
00:22:19,669 --> 00:22:17,730
mostly servers in six months back so

484
00:22:25,070 --> 00:22:19,679
it'd be like living in a minivan two and

485
00:22:30,259 --> 00:22:25,080
a half years okay nice for you much much

486
00:22:33,200 --> 00:22:30,269
bigger spacecraft or needed okay and the

487
00:22:37,279 --> 00:22:33,210
next one is from app on Twitter at one

488
00:22:39,139 --> 00:22:37,289

t-s will one how cheap can space travel

489
00:22:40,400 --> 00:22:39,149
become will it ever be as affordable and

490
00:22:45,740 --> 00:22:40,410
ubiquitous

491
00:22:47,840 --> 00:22:45,750
as air travel I sure hope so I mean it's

492
00:22:49,550 --> 00:22:47,850
fundamentally more expensive to go to

493
00:22:51,380 --> 00:22:49,560
space I mean energy requirements are

494
00:22:52,670 --> 00:22:51,390
much greater than everything so so there

495
00:22:56,990 --> 00:22:52,680
is there's certainly a difference but

496
00:22:58,520 --> 00:22:57,000
today's different students well I mean

497
00:23:00,500 --> 00:22:58,530
it's like a thousand small more

498
00:23:06,380 --> 00:23:00,510
expensive if not more to go to space

499
00:23:08,630 --> 00:23:06,390
then to take a an era trip and a

500
00:23:10,940 --> 00:23:08,640
thousand is a huge difference I mean

501
00:23:13,430 --> 00:23:10,950
perhaps it can be brought down to being

502
00:23:14,900 --> 00:23:13,440
only ten times more expensive I think

503
00:23:16,190 --> 00:23:14,910
that that should be achievable but that

504
00:23:18,020 --> 00:23:16,200
of course would require to order of

505
00:23:20,660 --> 00:23:18,030
magnitude improvement in space transport

506
00:23:22,190 --> 00:23:20,670
but but that's what I think that that

507
00:23:26,210 --> 00:23:22,200
means to have long and I think it can

508
00:23:34,160 --> 00:23:26,220
happen if we can make rapidly and fully

509
00:23:35,750 --> 00:23:34,170
reusable spacecraft and rolling ok this

510
00:23:37,580 --> 00:23:35,760
is for both of you what's the most

511
00:23:39,910 --> 00:23:37,590
interesting new technologies you see in

512
00:23:43,810 --> 00:23:39,920
the near future into the space industry

513
00:23:47,180 --> 00:23:43,820

you wanna take the first shot yeah sure

514
00:23:48,590 --> 00:23:47,190
well you know the big thing that I'm

515
00:23:52,280 --> 00:23:48,600
always clapping on this thing I just

516
00:23:55,850 --> 00:23:52,290
mentioned which is we have to have rapid

517
00:23:58,010 --> 00:23:55,860
and complete or reusability for rocketry

518
00:24:00,950 --> 00:23:58,020
that's that's really the little

519
00:24:03,560 --> 00:24:00,960
breakthrough that's needed and and in

520
00:24:05,480 --> 00:24:03,570
order to that you have to make Rockets

521
00:24:07,040 --> 00:24:05,490
very light much lighter than they've

522
00:24:09,230 --> 00:24:07,050
ever been before I Rockets are pretty

523
00:24:15,290 --> 00:24:09,240
like to begin with and then you have to

524
00:24:17,240 --> 00:24:15,300
have really efficient engines and I mean

525
00:24:19,400 --> 00:24:17,250
now this is a extremely hard problem

526
00:24:22,790 --> 00:24:19,410
yeah but it's the one that really needs

527
00:24:25,090 --> 00:24:22,800
to be so we were hoping to make some

528
00:24:28,490 --> 00:24:25,100
heartless in that direction

529
00:24:31,760 --> 00:24:28,500
you know maybe in academic next next few

530
00:24:33,800 --> 00:24:31,770
years but but whether its face x or

531
00:24:35,300 --> 00:24:33,810
someone else or if that's the best

532
00:24:38,900 --> 00:24:35,310
really the crutch that's the thing

533
00:24:39,800 --> 00:24:38,910
that's most important to solve and then

534
00:24:42,050 --> 00:24:39,810
there are other things like the

535
00:24:44,720 --> 00:24:42,060
interface propulsion or whatnot but I

536
00:24:47,120 --> 00:24:44,730
think without fully regal rocketry fully

537
00:24:50,300 --> 00:24:47,130
and clearly reusable rocket free base

538
00:24:53,330 --> 00:24:50,310

will always be very constrained and as

539
00:24:54,320 --> 00:24:53,340
possible I think the only thing I only a

540
00:24:58,090 --> 00:24:54,330
few things I would add

541
00:25:02,480 --> 00:24:58,100
would be you know game-changing

542
00:25:05,299 --> 00:25:02,490
communications technology optical

543
00:25:07,490 --> 00:25:05,309
communications l-band communications

544
00:25:09,470 --> 00:25:07,500
things like that but but sort of

545
00:25:13,159 --> 00:25:09,480
supporting what Elon said about a weed

546
00:25:15,470 --> 00:25:13,169
of the vehicle becoming becoming more

547
00:25:18,649 --> 00:25:15,480
reliant on composites and other

548
00:25:21,950 --> 00:25:18,659
non-traditional materials for for

549
00:25:26,120 --> 00:25:21,960
spaceships also improving the process

550
00:25:28,549 --> 00:25:26,130
for determining the criteria for for you

551
00:25:30,320 --> 00:25:28,559
know for a for strength of a vehicle we

552
00:25:32,029 --> 00:25:30,330
we did something called the shell

553
00:25:34,039 --> 00:25:32,039
buckling experiments up at Marshall

554
00:25:36,200 --> 00:25:34,049
Space Flight Center this passed over the

555
00:25:39,470 --> 00:25:36,210
past couple of years that demonstrated

556
00:25:43,430 --> 00:25:39,480
that the margin that we were using for

557
00:25:45,590 --> 00:25:43,440
our spacecraft was was much in excess of

558
00:25:47,990 --> 00:25:45,600
what we really needed that that's a huge

559
00:25:49,700 --> 00:25:48,000
difference in weight and if we can get

560
00:25:52,610 --> 00:25:49,710
that information to industry and have

561
00:25:54,769 --> 00:25:52,620
them bill much lighter but but but

562
00:25:56,560 --> 00:25:54,779
equally strong vehicles then I think

563
00:26:00,889 --> 00:25:56,570

that's a that's a big technological leap

564
00:26:02,600 --> 00:26:00,899
yeah thank see I'm gonna ask one more

565
00:26:03,860 --> 00:26:02,610
question and then we'll see if you guys

566
00:26:06,440 --> 00:26:03,870
have any closing remarks

567
00:26:07,600 --> 00:26:06,450
it's me Heather not 88 on Twitter she's

568
00:26:09,950 --> 00:26:07,610
asking Elon how do you balance

569
00:26:22,629 --> 00:26:09,960
maintaining all of your businesses while

570
00:26:29,509 --> 00:26:25,940
well I don't know I might I'm really

571
00:26:32,419 --> 00:26:29,519
between SpaceX and Tesla and and then

572
00:26:35,269 --> 00:26:32,429
depending upon with the situation it may

573
00:26:36,950 --> 00:26:35,279
be that waiting they changed I leave but

574
00:26:42,580 --> 00:26:36,960
obviously with the launch coming up we

575
00:26:49,190 --> 00:26:42,590
focused on on SpaceX activity and and

576
00:26:52,009 --> 00:26:49,200
then but I don't really have I sort of

577
00:26:54,440 --> 00:26:52,019
I'm chairman of Solar City that's been a

578
00:26:57,799 --> 00:26:54,450
half a day a month that's a relatively

579
00:27:00,529 --> 00:26:57,809
low part of why I'm so my business times

580
00:27:02,600 --> 00:27:00,539
really SpaceX and Tesla and and then

581
00:27:07,299 --> 00:27:02,610
depending on with Mike words actually

582
00:27:08,320 --> 00:27:07,309
think laughter great

583
00:27:10,119 --> 00:27:08,330
unfortunately we're out of time just

584
00:27:12,220 --> 00:27:10,129
wanted to see if there's any additional

585
00:27:14,409 --> 00:27:12,230
closing remarks either you have about

586
00:27:15,669 --> 00:27:14,419
Sunday's dragonflights International

587
00:27:18,610 --> 00:27:15,679
Space Station why don't we start with

588
00:27:21,009 --> 00:27:18,620

Charlie I would just say you know I wish

589
00:27:23,560 --> 00:27:21,019
Yellen and the team the entire team that

590
00:27:24,879 --> 00:27:23,570
includes the NASA part of it the best of

591
00:27:27,489 --> 00:27:24,889
luck on Sunday night we're looking

592
00:27:29,409 --> 00:27:27,499
forward to a successful launch and I

593
00:27:32,379 --> 00:27:29,419
would encourage any and everyone who can

594
00:27:34,690 --> 00:27:32,389
get to a television or a online or

595
00:27:36,399 --> 00:27:34,700
anything to help experience this it's

596
00:27:37,840 --> 00:27:36,409
absolutely incredible to see something

597
00:27:39,489 --> 00:27:37,850
leave the planet no matter what it is

598
00:27:42,359 --> 00:27:39,499
and and hopefully everybody will take

599
00:27:46,480 --> 00:27:42,369
advantage of the opportunity to do that

600
00:27:48,249 --> 00:27:46,490
thanks Eli your faith you want to know I

601
00:27:52,779 --> 00:27:48,259
think just that yeah it's gonna be very

602
00:27:54,909 --> 00:27:52,789
exciting and I don't someday and we're

603
00:27:57,789 --> 00:27:54,919
gonna be you know I'm always I just get

604
00:27:59,230 --> 00:27:57,799
kind of nervous before these people

605
00:28:02,549 --> 00:27:59,240
these flights thinking like what what

606
00:28:05,889 --> 00:28:02,559
have we missed you know busy that I

607
00:28:07,779 --> 00:28:05,899
think I think Bob working faster that

608
00:28:10,029 --> 00:28:07,789
we're done the best we can so it's as

609
00:28:11,889 --> 00:28:10,039
possible but something goes wrong on on

610
00:28:14,289 --> 00:28:11,899
Sunday that's always a possibility but I

611
00:28:16,269 --> 00:28:14,299
I feel like we've done that everything

612
00:28:18,759 --> 00:28:16,279
we can to make the exhibition as

613
00:28:22,840 --> 00:28:18,769

accessible as possible and I hope people

614
00:28:25,119 --> 00:28:22,850
enjoy one great thanks Charlie thanks

615
00:28:27,369 --> 00:28:25,129
Elon for joining us this hangouts

616
00:28:28,720 --> 00:28:27,379
officially concludes and thanks everyone

617
00:28:31,359 --> 00:28:28,730
online for all your great questions