Coming up:

MARS 2020 PERSEVERANCE

COUNTDOWN TO MARS

Wednesday, June 17 at 2pm EDT, 11am PDT

1
00:00:14,950 --> 00:00:12,310
after a decade in the making nasa is

2
00:00:17,430 --> 00:00:14,960
just weeks away from launching its next

3
00:00:19,990 --> 00:00:17,440
mission to mars we are here today to

4
00:00:23,029 --> 00:00:20,000
talk about the mars 2020 perseverance

5
00:00:25,109 --> 00:00:23,039
rover and mars helicopter i'm raquel

6
00:00:27,589 --> 00:00:25,119
villanueva from nasa's jet propulsion

7
00:00:29,589 --> 00:00:27,599
laboratory in southern california i'm

8
00:00:32,470 --> 00:00:29,599
going to be your host today as we are

9
00:00:34,549 --> 00:00:32,480
getting closer to the countdown to mars

10
00:00:36,389 --> 00:00:34,559
since we're social distancing i'll

11
00:00:38,549 --> 00:00:36,399
introduce you virtually to the people

12
00:00:39,670 --> 00:00:38,559
who are working to get the rover to the

13
00:00:41,750 --> 00:00:39,680

launch pad

14
00:00:44,630 --> 00:00:41,760
on our panel today we have

15
00:00:46,310 --> 00:00:44,640
nasa administrator jim bridesenstein he

16
00:00:48,630 --> 00:00:46,320
will talk about how this mission will

17
00:00:49,990 --> 00:00:48,640
help pave the way for future human

18
00:00:52,229 --> 00:00:50,000
exploration

19
00:00:55,510 --> 00:00:52,239
planetary science division director lori

20
00:00:57,350 --> 00:00:55,520
glaze will discuss nasa's strategy for

21
00:00:59,590 --> 00:00:57,360
exploring mars

22
00:01:01,990 --> 00:00:59,600
deputy project scientist katie stack

23
00:01:04,630 --> 00:01:02,000
morgan will tell us why we have chosen

24
00:01:05,910 --> 00:01:04,640
our landing site and what we hope to

25
00:01:08,310 --> 00:01:05,920
find there

26
00:01:10,950 --> 00:01:08,320
deputy project manager matt wallace will

27
00:01:12,950 --> 00:01:10,960
go over what makes this rover different

28
00:01:15,910 --> 00:01:12,960
from the previous rovers

29
00:01:18,230 --> 00:01:15,920
deputy electrical lead luis dominguez

30
00:01:20,390 --> 00:01:18,240
has an update on what we are doing on

31
00:01:22,950 --> 00:01:20,400
the spacecraft right now

32
00:01:25,910 --> 00:01:22,960
and finally nasa launch director omar

33
00:01:27,270 --> 00:01:25,920
bias will give us an update about launch

34
00:01:29,350 --> 00:01:27,280
preparations

35
00:01:32,149 --> 00:01:29,360
we will start with nasa administrator

36
00:01:35,990 --> 00:01:32,159
jim bridenstine jim can you believe we

37
00:01:38,789 --> 00:01:36,000
are only a month away from launch

38
00:01:41,350 --> 00:01:38,799

it is uh it's pretty amazing and uh what

39
00:01:42,950 --> 00:01:41,360
a great what a great time to be at nasa

40
00:01:44,389 --> 00:01:42,960
what a great time to watch all of the

41
00:01:46,149 --> 00:01:44,399
exciting things

42
00:01:48,870 --> 00:01:46,159
that nasa is doing

43
00:01:51,510 --> 00:01:48,880
um and i'll tell you you know we

44
00:01:53,270 --> 00:01:51,520
we have to remember um that nasa has an

45
00:01:55,510 --> 00:01:53,280
amazing ability to do

46
00:01:58,310 --> 00:01:55,520
stunning achievements even in the midst

47
00:02:00,709 --> 00:01:58,320
of difficult times and you can see

48
00:02:03,350 --> 00:02:00,719
i'm in my living room uh in the midst of

49
00:02:04,789 --> 00:02:03,360
the coronavirus pandemic i know all of

50
00:02:05,990 --> 00:02:04,799
us have been working

51
00:02:08,389 --> 00:02:06,000
overtime

52
00:02:11,510 --> 00:02:08,399
working from home working with our

53
00:02:13,990 --> 00:02:11,520
children in many cases out of school

54
00:02:16,550 --> 00:02:14,000
and and it's been a challenge and and we

55
00:02:18,630 --> 00:02:16,560
all know that um but this mission was

56
00:02:20,070 --> 00:02:18,640
one of two missions that we protected to

57
00:02:21,430 --> 00:02:20,080
make sure that we were going to be able

58
00:02:24,309 --> 00:02:21,440
to launch

59
00:02:26,229 --> 00:02:24,319
in july and the reason that's important

60
00:02:28,710 --> 00:02:26,239
is because of the alignment

61
00:02:30,470 --> 00:02:28,720
when you talk about earth and mars being

62
00:02:32,790 --> 00:02:30,480
on the same side of the sun that that

63
00:02:35,509 --> 00:02:32,800

happens once over 26 months

64
00:02:36,390 --> 00:02:35,519
so it's it's very expensive if we have

65
00:02:38,790 --> 00:02:36,400
to take

66
00:02:41,110 --> 00:02:38,800
perseverance and put it back into

67
00:02:43,670 --> 00:02:41,120
storage for a period of two years it

68
00:02:45,430 --> 00:02:43,680
could cost half a billion dollars and so

69
00:02:47,589 --> 00:02:45,440
this is an important mission for a whole

70
00:02:50,309 --> 00:02:47,599
host of reasons but what i really hope

71
00:02:52,550 --> 00:02:50,319
is that people watch this mission and

72
00:02:55,030 --> 00:02:52,560
that they are inspired

73
00:02:57,270 --> 00:02:55,040
that we know that we can strive and

74
00:02:59,190 --> 00:02:57,280
achieve even in the midst of very

75
00:03:01,910 --> 00:02:59,200
challenging times

76
00:03:04,550 --> 00:03:01,920
and so i think that's that's important

77
00:03:06,869 --> 00:03:04,560
alex mather a seventh grader in northern

78
00:03:08,070 --> 00:03:06,879
virginia actually named this little

79
00:03:12,630 --> 00:03:08,080
robot

80
00:03:15,509 --> 00:03:12,640
about something the size of an suv

81
00:03:17,430 --> 00:03:15,519
but he named it perseverance and i think

82
00:03:19,990 --> 00:03:17,440
right now more than ever

83
00:03:22,309 --> 00:03:20,000
that name is so important and i just

84
00:03:23,509 --> 00:03:22,319
want to thank alex for giving us that

85
00:03:26,070 --> 00:03:23,519
name

86
00:03:28,229 --> 00:03:26,080
because we are persevering and we are

87
00:03:30,070 --> 00:03:28,239
achieving even in the midst of these

88
00:03:32,470 --> 00:03:30,080

very challenging times

89
00:03:34,789 --> 00:03:32,480
um and i also want to say that you know

90
00:03:36,949 --> 00:03:34,799
we're talking about mars today

91
00:03:39,670 --> 00:03:36,959
we have a big agenda we have been given

92
00:03:41,670 --> 00:03:39,680
a directive to go to mars with humans

93
00:03:44,149 --> 00:03:41,680
and in order to achieve that we're doing

94
00:03:46,550 --> 00:03:44,159
two things number one we're building an

95
00:03:48,470 --> 00:03:46,560
architecture at the moon where humans

96
00:03:50,630 --> 00:03:48,480
are going to be able to sustain for long

97
00:03:53,429 --> 00:03:50,640
periods of time and we're doing that

98
00:03:54,789 --> 00:03:53,439
under our program called artemis the

99
00:03:57,030 --> 00:03:54,799
other thing that we're doing is we're

100
00:03:58,070 --> 00:03:57,040
moving forward rapidly with these very

101
00:04:01,270 --> 00:03:58,080
important

102
00:04:03,509 --> 00:04:01,280
mars robotic precursor missions so that

103
00:04:05,190 --> 00:04:03,519
one day when we send humans to mars

104
00:04:07,509 --> 00:04:05,200
we're going to know where to go to get

105
00:04:08,630 --> 00:04:07,519
the absolute best science and data that

106
00:04:11,910 --> 00:04:08,640
we can get

107
00:04:15,190 --> 00:04:11,920
um and it it's it's not lost on me that

108
00:04:18,870 --> 00:04:15,200
51 years ago on july 20th i mean this is

109
00:04:20,949 --> 00:04:18,880
important 51 years ago on july 20th

110
00:04:22,629 --> 00:04:20,959
neil armstrong and buzz aldrin were

111
00:04:25,510 --> 00:04:22,639
walking on the moon for the first time

112
00:04:28,710 --> 00:04:25,520
in history and during that time they did

113
00:04:31,670 --> 00:04:28,720

the first ever lunar return mission and

114
00:04:33,270 --> 00:04:31,680
here we are with mars perseverance 51

115
00:04:34,469 --> 00:04:33,280
years later getting ready to do the

116
00:04:38,150 --> 00:04:34,479
first ever

117
00:04:39,990 --> 00:04:38,160
martian i should say mars return mission

118
00:04:41,909 --> 00:04:40,000
so these i think are

119
00:04:43,350 --> 00:04:41,919
important milestones

120
00:04:45,030 --> 00:04:43,360
we've done it with the moon now we're

121
00:04:47,030 --> 00:04:45,040
going to do it with mars

122
00:04:50,070 --> 00:04:47,040
perseverance is the first step in an

123
00:04:51,590 --> 00:04:50,080
eventual return of those samples

124
00:04:53,909 --> 00:04:51,600
but i'll tell you the thing that has me

125
00:04:56,150 --> 00:04:53,919
the most excited as the nasa

126
00:04:58,950 --> 00:04:56,160
administrator is getting ready to watch

127
00:05:00,629 --> 00:04:58,960
a helicopter fly on another world that's

128
00:05:02,629 --> 00:05:00,639
something that's never been done before

129
00:05:03,909 --> 00:05:02,639
in human history and here we are

130
00:05:06,390 --> 00:05:03,919
getting ready to launch mars

131
00:05:07,749 --> 00:05:06,400
perseverance with ingenuity it's little

132
00:05:11,029 --> 00:05:07,759
helicopter

133
00:05:12,950 --> 00:05:11,039
strapped to it i am very excited about

134
00:05:14,550 --> 00:05:12,960
watching a helicopter fly in another

135
00:05:15,749 --> 00:05:14,560
world for the first time in human

136
00:05:16,950 --> 00:05:15,759
history and i know

137
00:05:18,870 --> 00:05:16,960
there's a great panel you're going to

138
00:05:20,710 --> 00:05:18,880

hear great things about all of these

139
00:05:23,510 --> 00:05:20,720
different experiments and technology

140
00:05:25,189 --> 00:05:23,520
demonstrations that we have upcoming but

141
00:05:27,830 --> 00:05:25,199
but we're very excited about mars

142
00:05:29,830 --> 00:05:27,840
perseverance and um and it's a great

143
00:05:31,749 --> 00:05:29,840
time to to be at nasa and i hope it's a

144
00:05:33,749 --> 00:05:31,759
great time for everybody to watch the

145
00:05:35,909 --> 00:05:33,759
stunning things that nasa is capable of

146
00:05:38,310 --> 00:05:35,919
doing so with that raquel i'll turn it

147
00:05:40,629 --> 00:05:38,320
back to you thanks jim it really is an

148
00:05:41,990 --> 00:05:40,639
exciting first step and for anyone

149
00:05:44,469 --> 00:05:42,000
watching who would like to submit a

150
00:05:47,670 --> 00:05:44,479
question you can do so now by using the

151
00:05:49,670 --> 00:05:47,680
ask nasa hashtag our phone lines are now

152
00:05:52,390 --> 00:05:49,680
open to the media and you can ask a

153
00:05:54,550 --> 00:05:52,400
question by pressing star one

154
00:05:56,870 --> 00:05:54,560
and up next planetary science division

155
00:05:59,510 --> 00:05:56,880
director lori glaze will talk about how

156
00:06:06,230 --> 00:05:59,520
the perseverance rover advances nasa's

157
00:06:11,670 --> 00:06:09,029
thanks raquel it is my pleasure to be

158
00:06:13,990 --> 00:06:11,680
here today as we begin our countdown to

159
00:06:15,110 --> 00:06:14,000
mars and the launch of the perseverance

160
00:06:17,990 --> 00:06:15,120
rover

161
00:06:20,469 --> 00:06:18,000
at nasa our vision for science is to

162
00:06:23,830 --> 00:06:20,479
lead a globally interconnected program

163
00:06:26,629 --> 00:06:23,840

of discovery that encourages innovation

164
00:06:29,590 --> 00:06:26,639
positively impacts people's lives and is

165
00:06:31,510 --> 00:06:29,600
a source of inspiration and this mission

166
00:06:33,670 --> 00:06:31,520
does all of that

167
00:06:35,510 --> 00:06:33,680
perseverance is the most sophisticated

168
00:06:37,110 --> 00:06:35,520
mission we've ever sent to the red

169
00:06:40,309 --> 00:06:37,120
planet's surface

170
00:06:42,469 --> 00:06:40,319
it's the next step in our historic mars

171
00:06:45,110 --> 00:06:42,479
exploration program which has been

172
00:06:46,550 --> 00:06:45,120
exploring mars and unlocking its secrets

173
00:06:49,029 --> 00:06:46,560
for decades

174
00:06:51,589 --> 00:06:49,039
and we couldn't be more excited about it

175
00:06:53,670 --> 00:06:51,599
some of perseverance's main activities

176
00:06:55,990 --> 00:06:53,680
will be in astrobiology

177
00:06:58,390 --> 00:06:56,000
which is the study of how life comes to

178
00:07:00,710 --> 00:06:58,400
be the environments that can support

179
00:07:04,390 --> 00:07:00,720
life and the search to see if life

180
00:07:07,110 --> 00:07:04,400
exists anywhere else beyond earth

181
00:07:10,790 --> 00:07:07,120
this is the first rover mission designed

182
00:07:11,749 --> 00:07:10,800
to seek signs of past microbial life by

183
00:07:15,029 --> 00:07:11,759
context

184
00:07:17,029 --> 00:07:15,039
by collecting and cashing rock and soil

185
00:07:18,870 --> 00:07:17,039
samples that will be returned to earth

186
00:07:21,670 --> 00:07:18,880
by future missions

187
00:07:23,830 --> 00:07:21,680
the rover's instruments will also look

188
00:07:26,230 --> 00:07:23,840

for evidence of ancient habitable

189
00:07:28,309 --> 00:07:26,240
environments and monitor environmental

190
00:07:30,390 --> 00:07:28,319
conditions which will help us better

191
00:07:32,150 --> 00:07:30,400
understand how to protect future human

192
00:07:34,150 --> 00:07:32,160
explorers

193
00:07:36,390 --> 00:07:34,160
the rover will study the record that is

194
00:07:38,950 --> 00:07:36,400
preserved in the layers of rock on the

195
00:07:41,270 --> 00:07:38,960
surface of mars looking for those rocks

196
00:07:43,029 --> 00:07:41,280
that formed in water and could have

197
00:07:45,270 --> 00:07:43,039
preserved evidence of the chemical

198
00:07:47,510 --> 00:07:45,280
building blocks of life

199
00:07:49,990 --> 00:07:47,520
the rover will also demonstrate a key

200
00:07:51,510 --> 00:07:50,000
technology for using natural resources

201
00:07:52,869 --> 00:07:51,520
in the martian environment for life

202
00:07:54,790 --> 00:07:52,879
support and fuel

203
00:07:57,589 --> 00:07:54,800
like producing oxygen from the carbon

204
00:07:59,589 --> 00:07:57,599
dioxide in the martian atmosphere

205
00:08:02,150 --> 00:07:59,599
its landing technology and environmental

206
00:08:04,230 --> 00:08:02,160
sensors will also help inform future

207
00:08:06,950 --> 00:08:04,240
human missions to mars

208
00:08:10,150 --> 00:08:06,960
and just as perseverance builds on past

209
00:08:13,430 --> 00:08:10,160
missions it's also the first step in the

210
00:08:15,909 --> 00:08:13,440
first ever round-trip mission to another

211
00:08:17,990 --> 00:08:15,919
planet in our solar system

212
00:08:20,230 --> 00:08:18,000
scientists have wanted a sample of mars

213
00:08:22,309 --> 00:08:20,240

to study for generations

214
00:08:24,070 --> 00:08:22,319
we have meteorites on earth that came

215
00:08:26,150 --> 00:08:24,080
from mars but it's not the same as

216
00:08:28,629 --> 00:08:26,160
getting an actual sample of pristine

217
00:08:29,749 --> 00:08:28,639
mars rocks and soil to study

218
00:08:31,830 --> 00:08:29,759
and now

219
00:08:34,790 --> 00:08:31,840
we're at a point where we can begin to

220
00:08:36,870 --> 00:08:34,800
attempt this amazing feat

221
00:08:39,430 --> 00:08:36,880
samples from mars have the potential to

222
00:08:42,230 --> 00:08:39,440
profoundly change our understanding of

223
00:08:44,710 --> 00:08:42,240
the origin evolution and distribution of

224
00:08:46,310 --> 00:08:44,720
life on earth and elsewhere in the solar

225
00:08:49,350 --> 00:08:46,320
system

226
00:08:51,350 --> 00:08:49,360
even now nasa continues to study moon

227
00:08:54,470 --> 00:08:51,360
samples brought back by the apollo

228
00:08:56,630 --> 00:08:54,480
program more than 50 years ago we expect

229
00:08:59,430 --> 00:08:56,640
samples of the red planet to provide new

230
00:09:00,949 --> 00:08:59,440
knowledge for decades to come as we

231
00:09:02,630 --> 00:09:00,959
study them with state-of-the-art

232
00:09:05,509 --> 00:09:02,640
laboratory equipment we couldn't

233
00:09:08,070 --> 00:09:05,519
possibly take to mars right now

234
00:09:10,870 --> 00:09:08,080
the plan for mars sample return is

235
00:09:13,110 --> 00:09:10,880
multi-faceted and complex

236
00:09:15,269 --> 00:09:13,120
this historic feat requires multiple

237
00:09:17,190 --> 00:09:15,279
spacecraft and our partners at the

238
00:09:19,509 --> 00:09:17,200

european space agency

239
00:09:20,630 --> 00:09:19,519
working together in a synchronized

240
00:09:23,430 --> 00:09:20,640
manner

241
00:09:24,550 --> 00:09:23,440
let me show you how

242
00:09:26,550 --> 00:09:24,560
first

243
00:09:29,430 --> 00:09:26,560
perseverance is going to drill and

244
00:09:32,630 --> 00:09:29,440
prepare samples for return and cash them

245
00:09:35,670 --> 00:09:32,640
on the surface of mars

246
00:09:37,990 --> 00:09:35,680
in 2026 a fetch rover will be launched

247
00:09:40,310 --> 00:09:38,000
to collect those samples and bring them

248
00:09:42,550 --> 00:09:40,320
to a rocket that will launch them into

249
00:09:45,190 --> 00:09:42,560
orbit around mars

250
00:09:48,470 --> 00:09:45,200
another orbiter will rendezvous and

251
00:09:51,910 --> 00:09:48,480
capture those samples for safe delivery

252
00:09:53,269 --> 00:09:51,920
to earth if it sounds complicated

253
00:09:55,269 --> 00:09:53,279
it is

254
00:09:57,990 --> 00:09:55,279
the technology to return the samples

255
00:10:00,230 --> 00:09:58,000
that perseverance collects is maturing

256
00:10:02,790 --> 00:10:00,240
but nasa's investments in developing

257
00:10:04,870 --> 00:10:02,800
autonomous robots and landing large

258
00:10:06,790 --> 00:10:04,880
payloads on mars have laid the

259
00:10:09,030 --> 00:10:06,800
groundwork for a successful sample

260
00:10:10,710 --> 00:10:09,040
return campaign

261
00:10:13,030 --> 00:10:10,720
we are thrilled to be working with the

262
00:10:13,990 --> 00:10:13,040
european space agency on mars sample

263
00:10:16,150 --> 00:10:14,000

return

264
00:10:18,630 --> 00:10:16,160
and partners from spain norway and

265
00:10:20,949 --> 00:10:18,640
france on perseverance science as we

266
00:10:22,949 --> 00:10:20,959
take our next steps in exploring the

267
00:10:23,750 --> 00:10:22,959
solar system

268
00:10:25,509 --> 00:10:23,760
so

269
00:10:27,269 --> 00:10:25,519
you probably want to know more about how

270
00:10:29,910 --> 00:10:27,279
perseverance is going to accomplish its

271
00:10:31,990 --> 00:10:29,920
mission and for that katie stack morgan

272
00:10:33,990 --> 00:10:32,000
from nasa's jet propulsion laboratory is

273
00:10:37,190 --> 00:10:34,000
going to talk about our landing site

274
00:10:39,269 --> 00:10:37,200
which is a really special place on mars

275
00:10:41,430 --> 00:10:39,279
thanks so much lori so in just one

276
00:10:44,150 --> 00:10:41,440
month's time perseverance will begin its

277
00:10:46,150 --> 00:10:44,160
journey to mars specifically jezreel a

278
00:10:48,470 --> 00:10:46,160
crater located on the inner rim of one

279
00:10:49,990 --> 00:10:48,480
of the largest and oldest impact basins

280
00:10:51,509 --> 00:10:50,000
on the surface of mars which you can see

281
00:10:53,509 --> 00:10:51,519
in this inset here

282
00:10:55,590 --> 00:10:53,519
at jezra we'll have access to some of

283
00:10:57,030 --> 00:10:55,600
the oldest rocks in the solar system

284
00:10:59,350 --> 00:10:57,040
between three and a half and four

285
00:11:01,670 --> 00:10:59,360
billion years old as well as a record of

286
00:11:04,150 --> 00:11:01,680
diverse geologic processes including

287
00:11:06,069 --> 00:11:04,160
volcanism impact cratering as well as

288
00:11:08,150 --> 00:11:06,079

processes associated with water both at

289
00:11:09,750 --> 00:11:08,160
the surface and subsurface that can tell

290
00:11:13,110 --> 00:11:09,760
us about how the planet evolved over

291
00:11:15,190 --> 00:11:13,120
time we also think that jezero was home

292
00:11:16,710 --> 00:11:15,200
to a variety of different potential

293
00:11:19,110 --> 00:11:16,720
habitable environments where

294
00:11:21,509 --> 00:11:19,120
perseverance can begin its search for

295
00:11:24,069 --> 00:11:21,519
the signs of ancient life on mars

296
00:11:26,230 --> 00:11:24,079
specifically jezreel is host to one of

297
00:11:28,949 --> 00:11:26,240
the best preserved deltas on the surface

298
00:11:31,509 --> 00:11:28,959
of mars deltas form when rivers enter

299
00:11:33,590 --> 00:11:31,519
open bodies of water and deposit rocks

300
00:11:35,910 --> 00:11:33,600
sand and potentially organic carbon in

301
00:11:37,509 --> 00:11:35,920
the layers of that delta those layers

302
00:11:39,829 --> 00:11:37,519
are one of the prime astrobiology

303
00:11:41,750 --> 00:11:39,839
targets for the perseverance mission

304
00:11:43,269 --> 00:11:41,760
also in jezreel we see carbonate

305
00:11:45,590 --> 00:11:43,279
minerals around the inner rim of the

306
00:11:47,590 --> 00:11:45,600
crater carbonates can form in shallow

307
00:11:49,110 --> 00:11:47,600
lake margin environments and based on

308
00:11:51,350 --> 00:11:49,120
what we know about carbonates here on

309
00:11:53,269 --> 00:11:51,360
earth we think those are another really

310
00:11:55,269 --> 00:11:53,279
important potential astrobiology target

311
00:11:57,509 --> 00:11:55,279
for the mission we'll also have a chance

312
00:11:59,430 --> 00:11:57,519
to explore the crater rim which exposes

313
00:12:01,350 --> 00:11:59,440

some of those oldest rocks in the field

314
00:12:03,030 --> 00:12:01,360
site as well as some potential habitable

315
00:12:06,230 --> 00:12:03,040
environments that might have formed as a

316
00:12:07,750 --> 00:12:06,240
result of that impact event itself

317
00:12:09,430 --> 00:12:07,760
at each one of these locations that

318
00:12:12,069 --> 00:12:09,440
perseverance will explore we'll be

319
00:12:14,470 --> 00:12:12,079
searching for bio signatures patterns

320
00:12:16,550 --> 00:12:14,480
textures or substances that require the

321
00:12:18,870 --> 00:12:16,560
influence of life to form now we don't

322
00:12:20,550 --> 00:12:18,880
know for sure what biosignatures on mars

323
00:12:22,230 --> 00:12:20,560
are going to look like but we can look

324
00:12:23,910 --> 00:12:22,240
to our own earth rock record to give us

325
00:12:26,949 --> 00:12:23,920
an example of what we might expect to

326
00:12:29,269 --> 00:12:26,959
find what you see here is a 3.4 billion

327
00:12:31,509 --> 00:12:29,279
year old rock from australia called a

328
00:12:33,910 --> 00:12:31,519
stromatolite which is a fossilized

329
00:12:35,509 --> 00:12:33,920
microbial mat each one of these layers

330
00:12:37,829 --> 00:12:35,519
that you see in the rock represents the

331
00:12:39,750 --> 00:12:37,839
growth of that mat over time now if you

332
00:12:40,949 --> 00:12:39,760
look at that rock you wouldn't know for

333
00:12:43,030 --> 00:12:40,959
sure that it was a potential

334
00:12:45,110 --> 00:12:43,040
biosignature but when you couple the

335
00:12:47,430 --> 00:12:45,120
textures as well as the chemical

336
00:12:49,430 --> 00:12:47,440
composition the mineralogy and the

337
00:12:51,269 --> 00:12:49,440
distribution of organic carbon you can

338
00:12:53,030 --> 00:12:51,279

start to build a case that that rock

339
00:12:55,110 --> 00:12:53,040
could only have formed under the

340
00:12:56,629 --> 00:12:55,120
influence of life now this is exactly

341
00:12:58,310 --> 00:12:56,639
the type of thing that we do here on

342
00:13:00,310 --> 00:12:58,320
earth to make a case for biosignatures

343
00:13:02,069 --> 00:13:00,320
in our own rock record and for the very

344
00:13:04,310 --> 00:13:02,079
first time using our instruments we can

345
00:13:06,230 --> 00:13:04,320
do that on the surface of mars so using

346
00:13:08,550 --> 00:13:06,240
that fine scale detail coupled with the

347
00:13:12,230 --> 00:13:08,560
geologic context we're going to do our

348
00:13:14,310 --> 00:13:12,240
best to identify collect and document

349
00:13:16,470 --> 00:13:14,320
the most compelling scientific cache of

350
00:13:18,710 --> 00:13:16,480
samples that we possibly can to address

351
00:13:21,030 --> 00:13:18,720
some big picture questions fundamental

352
00:13:23,350 --> 00:13:21,040
questions including you know how did the

353
00:13:26,150 --> 00:13:23,360
the surface and and climate of mars

354
00:13:28,310 --> 00:13:26,160
evolve over time uh how did how do rocky

355
00:13:31,269 --> 00:13:28,320
planets form and differentiate and of

356
00:13:32,550 --> 00:13:31,279
course was life ever present on mars to

357
00:13:35,110 --> 00:13:32,560
accomplish this we're going to use a

358
00:13:36,470 --> 00:13:35,120
scientific payload of seven instruments

359
00:13:38,150 --> 00:13:36,480
some of those instruments like the

360
00:13:39,110 --> 00:13:38,160
sherlock and pixel instruments on the

361
00:13:40,870 --> 00:13:39,120
end of the

362
00:13:43,110 --> 00:13:40,880
rover's arm which provide those mapping

363
00:13:45,110 --> 00:13:43,120

capabilities as well as rimfacts in the

364
00:13:46,949 --> 00:13:45,120
body of the rover that uses radar to

365
00:13:49,110 --> 00:13:46,959
study the subsurface of mars are brand

366
00:13:51,189 --> 00:13:49,120
new we've never sent them to mars before

367
00:13:53,189 --> 00:13:51,199
other instruments like the super cam

368
00:13:55,269 --> 00:13:53,199
instrument and mass cam z up on the mast

369
00:13:57,670 --> 00:13:55,279
of the rover are updated versions of

370
00:13:59,030 --> 00:13:57,680
instruments that we flew on curiosity

371
00:14:00,870 --> 00:13:59,040
these instruments represent

372
00:14:03,590 --> 00:14:00,880
contributions from the us and our

373
00:14:05,590 --> 00:14:03,600
international collaborators and are

374
00:14:08,150 --> 00:14:05,600
uniquely well suited for helping mars

375
00:14:09,590 --> 00:14:08,160
2020 accomplish its science objectives

376
00:14:11,110 --> 00:14:09,600
as a part of that

377
00:14:13,110 --> 00:14:11,120
we're preparing for future human

378
00:14:14,629 --> 00:14:13,120
exploration of mars and to do that we're

379
00:14:16,629 --> 00:14:14,639
using instruments like the moxie

380
00:14:19,269 --> 00:14:16,639
instrument which takes co2 from the

381
00:14:21,110 --> 00:14:19,279
martian atmosphere converts it to oxygen

382
00:14:22,949 --> 00:14:21,120
which is relevant for life support and

383
00:14:25,030 --> 00:14:22,959
potential creation of a fuel that could

384
00:14:27,110 --> 00:14:25,040
get those those astronauts back home to

385
00:14:29,030 --> 00:14:27,120
earth we also have the meta instrument

386
00:14:30,790 --> 00:14:29,040
which is our weather weather package

387
00:14:32,949 --> 00:14:30,800
that measures pressure temperature and

388
00:14:34,550 --> 00:14:32,959

humidity which are pieces of information

389
00:14:36,470 --> 00:14:34,560
that astronauts would want to know if

390
00:14:37,509 --> 00:14:36,480
they wanted to work and live safely on

391
00:14:39,269 --> 00:14:37,519
mars

392
00:14:41,030 --> 00:14:39,279
so we're still eight months away from

393
00:14:43,110 --> 00:14:41,040
perseverance landing on the surface of

394
00:14:45,829 --> 00:14:43,120
mars but our science team is busy at

395
00:14:47,910 --> 00:14:45,839
work prioritizing our our most important

396
00:14:49,509 --> 00:14:47,920
science questions trying to figure out

397
00:14:51,430 --> 00:14:49,519
where we would go with perseverance to

398
00:14:53,430 --> 00:14:51,440
answer those questions and thinking

399
00:14:56,069 --> 00:14:53,440
about what samples we want to put in our

400
00:14:58,069 --> 00:14:56,079
on our sample cache and we can't wait to

401
00:14:59,590 --> 00:14:58,079
get perseverance to the surface of mars

402
00:15:01,509 --> 00:14:59,600
and so with that i'll hand things over

403
00:15:03,189 --> 00:15:01,519
to our deputy project manager matt

404
00:15:04,470 --> 00:15:03,199
wallace he'll tell us a little bit more

405
00:15:06,230 --> 00:15:04,480
about the engineering side of

406
00:15:07,829 --> 00:15:06,240
perseverance and share with you some of

407
00:15:11,430 --> 00:15:07,839
the challenges that our team has had to

408
00:15:17,110 --> 00:15:13,910
thanks very much katie uh yeah

409
00:15:19,189 --> 00:15:17,120
uh perseverance is a big one metric ton

410
00:15:21,030 --> 00:15:19,199
vehicle as administrator said it's a

411
00:15:22,629 --> 00:15:21,040
very capable system

412
00:15:25,269 --> 00:15:22,639
at first glance it looks a little bit

413
00:15:26,870 --> 00:15:25,279

like the curiosity vehicle and in fact

414
00:15:29,350 --> 00:15:26,880
we have been able to leverage a lot of

415
00:15:31,509 --> 00:15:29,360
the investment that was made

416
00:15:33,269 --> 00:15:31,519
to bring curiosity to the surface in

417
00:15:34,790 --> 00:15:33,279
particular the entry descent landing

418
00:15:36,870 --> 00:15:34,800
system

419
00:15:39,670 --> 00:15:36,880
has some commonality

420
00:15:41,430 --> 00:15:39,680
however this vehicle is in fact a new

421
00:15:42,870 --> 00:15:41,440
mission a new vehicle with new

422
00:15:44,230 --> 00:15:42,880
capabilities

423
00:15:46,470 --> 00:15:44,240
katie talked about some of these

424
00:15:48,790 --> 00:15:46,480
enhanced instrumentation which we're

425
00:15:49,990 --> 00:15:48,800
taking with us in technology

426
00:15:51,509 --> 00:15:50,000
experiments

427
00:15:52,870 --> 00:15:51,519
i'll mention a couple of the engineering

428
00:15:55,030 --> 00:15:52,880
systems

429
00:15:57,350 --> 00:15:55,040
starting with the uh the wheels at the

430
00:15:59,910 --> 00:15:57,360
bottom of the vehicle there's six wheels

431
00:16:01,670 --> 00:15:59,920
and they're they've been uh ruggedized

432
00:16:02,710 --> 00:16:01,680
so that they're more capable of dealing

433
00:16:04,470 --> 00:16:02,720
with the

434
00:16:07,030 --> 00:16:04,480
uh the surface of mars and pretty much

435
00:16:10,310 --> 00:16:07,040
anything that uh jezreel crater can can

436
00:16:11,670 --> 00:16:10,320
throw at us also we have a new powerful

437
00:16:13,670 --> 00:16:11,680
computer

438
00:16:14,949 --> 00:16:13,680

that we've added it's doing double duty

439
00:16:17,509 --> 00:16:14,959
in fact

440
00:16:19,910 --> 00:16:17,519
its first task is to help us get safely

441
00:16:21,590 --> 00:16:19,920
down up to the surface of the planet

442
00:16:24,310 --> 00:16:21,600
it's taking imagery

443
00:16:26,629 --> 00:16:24,320
of the of the uh surface

444
00:16:29,430 --> 00:16:26,639
during the descent activity uh and

445
00:16:31,110 --> 00:16:29,440
processing that imagery uh and figuring

446
00:16:33,030 --> 00:16:31,120
out where we are

447
00:16:36,150 --> 00:16:33,040
in jezreel understanding

448
00:16:37,990 --> 00:16:36,160
relative to the different hazards in the

449
00:16:40,389 --> 00:16:38,000
in the crater and it will divert the

450
00:16:43,749 --> 00:16:40,399
spacecraft away from those hazards now

451
00:16:46,310 --> 00:16:43,759
jezreel is a very interesting scientific

452
00:16:48,230 --> 00:16:46,320
target it's got a lot of

453
00:16:50,230 --> 00:16:48,240
relief rocks

454
00:16:52,790 --> 00:16:50,240
cliffs you know hills things like that

455
00:16:54,710 --> 00:16:52,800
which are great for science uh but they

456
00:16:57,189 --> 00:16:54,720
are also challenging for landing a

457
00:16:59,030 --> 00:16:57,199
spacecraft on mars and so this new

458
00:16:59,829 --> 00:16:59,040
system will keep us safe and going to

459
00:17:01,990 --> 00:16:59,839
this

460
00:17:03,110 --> 00:17:02,000
uh exciting new science target jezreel

461
00:17:04,949 --> 00:17:03,120
crater

462
00:17:07,590 --> 00:17:04,959
we also use this computer to help us

463
00:17:08,470 --> 00:17:07,600

process imagery on the surface

464
00:17:11,029 --> 00:17:08,480
more

465
00:17:12,630 --> 00:17:11,039
rapidly and by doing that we can look

466
00:17:15,189 --> 00:17:12,640
for hazards and we can avoid those

467
00:17:17,350 --> 00:17:15,199
hazards as we're traversing

468
00:17:19,270 --> 00:17:17,360
doing our science mission that allows us

469
00:17:23,270 --> 00:17:19,280
to drive at about twice the speed that

470
00:17:27,669 --> 00:17:25,350
in addition to the computer we have

471
00:17:29,270 --> 00:17:27,679
some new cameras now now our all our

472
00:17:31,669 --> 00:17:29,280
missions carry a lot of science and

473
00:17:33,350 --> 00:17:31,679
engineering cameras to begin with

474
00:17:35,350 --> 00:17:33,360
but we have something new this time

475
00:17:37,190 --> 00:17:35,360
we've taken some ruggedized commercial

476
00:17:39,669 --> 00:17:37,200
cameras and we've

477
00:17:40,549 --> 00:17:39,679
dispensed them around the spacecraft and

478
00:17:45,270 --> 00:17:40,559
those

479
00:17:47,430 --> 00:17:45,280
definition video of the spacecraft

480
00:17:49,270 --> 00:17:47,440
during the entry descent and landing

481
00:17:51,350 --> 00:17:49,280
activity so we should be able to watch

482
00:17:53,029 --> 00:17:51,360
this big parachute inflate

483
00:17:54,549 --> 00:17:53,039
supersonically we should be able to

484
00:17:57,430 --> 00:17:54,559
watch the rover

485
00:17:59,110 --> 00:17:57,440
deploy and touch down on the surface

486
00:18:00,710 --> 00:17:59,120
and this is going to be very exciting is

487
00:18:03,350 --> 00:18:00,720
the first time

488
00:18:05,430 --> 00:18:03,360

that we have ever been able to see a

489
00:18:07,510 --> 00:18:05,440
spacecraft land on another planet and

490
00:18:08,870 --> 00:18:07,520
we're looking forward to that imagery

491
00:18:10,549 --> 00:18:08,880
obviously

492
00:18:12,310 --> 00:18:10,559
you know we take a lot of cameras with

493
00:18:14,470 --> 00:18:12,320
us to the surface of mars and we have

494
00:18:17,270 --> 00:18:14,480
again on previous missions

495
00:18:19,350 --> 00:18:17,280
a lot of eyes but we've never taken ears

496
00:18:21,990 --> 00:18:19,360
and so this time we're also taking a

497
00:18:23,590 --> 00:18:22,000
microphone a couple microphones actually

498
00:18:25,270 --> 00:18:23,600
and again those microphones will be

499
00:18:27,430 --> 00:18:25,280
active during the entry descent and

500
00:18:29,190 --> 00:18:27,440
landing activity we should be able to

501
00:18:31,350 --> 00:18:29,200
hear this system as it's going through

502
00:18:33,510 --> 00:18:31,360
the process of actually landing on mars

503
00:18:35,750 --> 00:18:33,520
and then when we get on mars we'll also

504
00:18:38,230 --> 00:18:35,760
be able to turn on the microphone listen

505
00:18:40,390 --> 00:18:38,240
to the wheels turn over the surface uh

506
00:18:43,029 --> 00:18:40,400
on the on the rocks listen to our big

507
00:18:45,990 --> 00:18:43,039
rotary percussive drill out on the end

508
00:18:46,930 --> 00:18:46,000
of the robot arm sample those rocks

509
00:18:48,549 --> 00:18:46,940
as well as

510
00:18:51,510 --> 00:18:48,559
[Music]

511
00:18:53,430 --> 00:18:51,520
as well as wind and other things and so

512
00:18:55,270 --> 00:18:53,440
those are all exciting new capabilities

513
00:18:57,350 --> 00:18:55,280

that we have on the vehicle

514
00:18:59,110 --> 00:18:57,360
now you don't get through a development

515
00:19:02,470 --> 00:18:59,120
of this complexity without a few

516
00:19:05,430 --> 00:19:02,480
problems and i'll just mention a couple

517
00:19:07,510 --> 00:19:05,440
i'll start with a couple years ago

518
00:19:11,029 --> 00:19:07,520
due to an anomaly

519
00:19:11,830 --> 00:19:11,039
on a parachute test program

520
00:19:13,350 --> 00:19:11,840
we

521
00:19:15,830 --> 00:19:13,360
had to take a second look at our own

522
00:19:18,390 --> 00:19:15,840
parachute and the design that we had for

523
00:19:20,230 --> 00:19:18,400
that parachute and we made the difficult

524
00:19:22,950 --> 00:19:20,240
decision to actually modify that

525
00:19:25,350 --> 00:19:22,960
parachute to strengthen the canopy

526
00:19:27,350 --> 00:19:25,360
to give us more robustness during that

527
00:19:29,830 --> 00:19:27,360
supersonic entry

528
00:19:31,990 --> 00:19:29,840
activity and that is not an easy thing

529
00:19:33,750 --> 00:19:32,000
to do in part because

530
00:19:35,750 --> 00:19:33,760
you have to test this parachute and

531
00:19:37,590 --> 00:19:35,760
testing parachutes

532
00:19:39,750 --> 00:19:37,600
on earth is difficult you have to put it

533
00:19:40,789 --> 00:19:39,760
on a sounding rocket which we did out of

534
00:19:42,710 --> 00:19:40,799
wallops

535
00:19:44,870 --> 00:19:42,720
facility down in southern virginia you

536
00:19:46,870 --> 00:19:44,880
take them up to the upper atmosphere and

537
00:19:48,549 --> 00:19:46,880
then you deploy these parachutes in the

538
00:19:49,990 --> 00:19:48,559

thin upper atmosphere to simulate the

539
00:19:54,070 --> 00:19:50,000
martian environment and what you're

540
00:19:55,990 --> 00:19:54,080
seeing here is a slow motion

541
00:19:57,190 --> 00:19:56,000
video of one of those parachutes

542
00:19:58,549 --> 00:19:57,200
inflating

543
00:20:00,870 --> 00:19:58,559
and in fact

544
00:20:03,110 --> 00:20:00,880
these are difficult tests to do this is

545
00:20:04,630 --> 00:20:03,120
the first supersonic planetary parachute

546
00:20:06,870 --> 00:20:04,640
test that we've done

547
00:20:08,630 --> 00:20:06,880
in about 40 years

548
00:20:10,470 --> 00:20:08,640
for the agency

549
00:20:12,390 --> 00:20:10,480
and and the project was fortunate and

550
00:20:14,950 --> 00:20:12,400
able to pull off three pretty much

551
00:20:16,070 --> 00:20:14,960
perfect tests

552
00:20:18,710 --> 00:20:16,080
and so

553
00:20:20,710 --> 00:20:18,720
had

554
00:20:22,390 --> 00:20:20,720
and katie mentioned and others mentioned

555
00:20:24,950 --> 00:20:22,400
the sampling system that we have on the

556
00:20:26,310 --> 00:20:24,960
vehicle our sampling system is of course

557
00:20:28,710 --> 00:20:26,320
composed of a lot of different

558
00:20:29,430 --> 00:20:28,720
mechanisms that we use to move the robot

559
00:20:31,190 --> 00:20:29,440
arm

560
00:20:34,470 --> 00:20:31,200
to core the sample and then to

561
00:20:37,110 --> 00:20:34,480
manipulate and seal the sample

562
00:20:39,669 --> 00:20:37,120
after we've after we've collected it and

563
00:20:42,149 --> 00:20:39,679

it's very difficult to build

564
00:20:44,789 --> 00:20:42,159
mechanisms for a rover that has to

565
00:20:45,909 --> 00:20:44,799
operate flawlessly 100 million miles

566
00:20:48,310 --> 00:20:45,919
away

567
00:20:50,950 --> 00:20:48,320
with no human intervention and so

568
00:20:52,789 --> 00:20:50,960
building those gearboxes and those uh

569
00:20:54,950 --> 00:20:52,799
and those motors

570
00:20:57,430 --> 00:20:54,960
in an environment that that drops down

571
00:21:00,070 --> 00:20:57,440
to minus 200 degrees fahrenheit pretty

572
00:21:02,789 --> 00:21:00,080
much uh every night

573
00:21:05,190 --> 00:21:02,799
that's exposed to this very fine

574
00:21:07,270 --> 00:21:05,200
martian dust and has to deal with other

575
00:21:08,470 --> 00:21:07,280
adverse environments is always a

576
00:21:10,870 --> 00:21:08,480
challenge

577
00:21:12,950 --> 00:21:10,880
our sampling system was particularly

578
00:21:14,950 --> 00:21:12,960
challenging in that we also had to keep

579
00:21:17,190 --> 00:21:14,960
it very very clean in fact this is

580
00:21:18,789 --> 00:21:17,200
probably the cleanest system that we've

581
00:21:20,470 --> 00:21:18,799
ever launched

582
00:21:22,789 --> 00:21:20,480
to to mars

583
00:21:24,549 --> 00:21:22,799
and the reason we needed to do that

584
00:21:26,870 --> 00:21:24,559
is that the science community as you

585
00:21:29,190 --> 00:21:26,880
just heard is looking for

586
00:21:32,070 --> 00:21:29,200
trace signatures from billions of years

587
00:21:34,070 --> 00:21:32,080
ago trace chemical signatures we don't

588
00:21:35,830 --> 00:21:34,080

want to confuse the search for those

589
00:21:37,830 --> 00:21:35,840
ancient signs of life

590
00:21:40,310 --> 00:21:37,840
with terrestrial contamination that we

591
00:21:41,669 --> 00:21:40,320
took with us to mars and then of course

592
00:21:44,310 --> 00:21:41,679
brought back

593
00:21:46,789 --> 00:21:44,320
and so that required a lot of effort to

594
00:21:49,190 --> 00:21:46,799
understand how to get this system

595
00:21:51,669 --> 00:21:49,200
both biologically and chemically as

596
00:21:53,830 --> 00:21:51,679
clean as we need it needed it so those

597
00:21:55,110 --> 00:21:53,840
are some of the challenges uh

598
00:21:57,110 --> 00:21:55,120
some of those kind of come along with

599
00:21:58,789 --> 00:21:57,120
the territory but i will say a few

600
00:22:00,149 --> 00:21:58,799
months ago we were faced with something

601
00:22:02,549 --> 00:22:00,159
we really

602
00:22:04,310 --> 00:22:02,559
never expected as was the rest of our

603
00:22:05,669 --> 00:22:04,320
community and the rest of the country in

604
00:22:07,830 --> 00:22:05,679
the world

605
00:22:08,710 --> 00:22:07,840
and and that's the pandemic

606
00:22:12,390 --> 00:22:08,720
it

607
00:22:14,149 --> 00:22:12,400
began to affect us in mid-march we were

608
00:22:15,830 --> 00:22:14,159
at a critical time in the processing for

609
00:22:17,510 --> 00:22:15,840
the spacecraft

610
00:22:20,070 --> 00:22:17,520
all the elements were down at kennedy

611
00:22:22,230 --> 00:22:20,080
space center and we had to

612
00:22:23,830 --> 00:22:22,240
fully assemble and do the final testing

613
00:22:26,149 --> 00:22:23,840

of the spacecraft it had to be done

614
00:22:27,270 --> 00:22:26,159
right you can't make a mistake at that

615
00:22:29,909 --> 00:22:27,280
point

616
00:22:32,149 --> 00:22:29,919
and uh and and of course the environment

617
00:22:33,750 --> 00:22:32,159
made that a lot more difficult so i

618
00:22:35,110 --> 00:22:33,760
think we have a short video here to talk

619
00:22:36,310 --> 00:22:35,120
a little bit about some of that final

620
00:22:38,789 --> 00:22:36,320
processing

621
00:22:40,870 --> 00:22:38,799
and uh how we approach those those

622
00:22:47,590 --> 00:22:40,880
challenges relative to the covet 19

623
00:22:52,310 --> 00:22:49,430
this new rover will search for signs of

624
00:22:54,070 --> 00:22:52,320
ancient life test new technologies and

625
00:22:55,830 --> 00:22:54,080
gather rock samples which may someday

626
00:22:57,350 --> 00:22:55,840
become the first pieces of the red

627
00:22:59,990 --> 00:22:57,360
planet ever returned to earth for

628
00:23:01,750 --> 00:23:00,000
analysis today we are naming

629
00:23:03,830 --> 00:23:01,760
a spacecraft

630
00:23:09,190 --> 00:23:03,840
that will go to mars

631
00:23:15,260 --> 00:23:11,590
when perseverance was first selected you

632
00:23:20,549 --> 00:23:15,270
know i wasn't sure about it to be honest

633
00:23:25,350 --> 00:23:23,190
when the pandemic struck

634
00:23:27,590 --> 00:23:25,360
the future was certainly unknown it was

635
00:23:29,110 --> 00:23:27,600
like walking into a blind dark alley you

636
00:23:30,549 --> 00:23:29,120
didn't know what was there what was in

637
00:23:33,270 --> 00:23:30,559
front of you what you were going to have

638
00:23:37,270 --> 00:23:35,350

it's something that nobody expected it's

639
00:23:39,350 --> 00:23:37,280
something nobody could plan for rather

640
00:23:41,110 --> 00:23:39,360
than your first priority being mission

641
00:23:43,269 --> 00:23:41,120
success and

642
00:23:45,350 --> 00:23:43,279
and getting to the launch pad your first

643
00:23:47,750 --> 00:23:45,360
priority immediately gets displaced and

644
00:23:49,430 --> 00:23:47,760
it's now the safety of the people and it

645
00:23:52,149 --> 00:23:49,440
took a lot of work to put stuff together

646
00:23:54,390 --> 00:23:52,159
in order to keep momentum going to keep

647
00:23:56,070 --> 00:23:54,400
people working safely keep them healthy

648
00:23:58,070 --> 00:23:56,080
and to keep the project

649
00:24:01,029 --> 00:23:58,080
on schedule we called the effort mars

650
00:24:04,870 --> 00:24:01,039
2020 safe at work and the objective

651
00:24:06,549 --> 00:24:04,880
was to keep the team as safe or safer

652
00:24:08,549 --> 00:24:06,559
than they would be if they were not

653
00:24:10,549 --> 00:24:08,559
working you know putting a spacecraft

654
00:24:12,870 --> 00:24:10,559
together that's going to mars

655
00:24:14,310 --> 00:24:12,880
and not making a mistake it's hard no

656
00:24:15,590 --> 00:24:14,320
matter what

657
00:24:18,710 --> 00:24:15,600
trying to do it during the middle of the

658
00:24:21,909 --> 00:24:18,720
pandemic it's it's a lot harder

659
00:24:23,830 --> 00:24:21,919
there's no doubt that working

660
00:24:26,710 --> 00:24:23,840
in isolation

661
00:24:28,549 --> 00:24:26,720
not virtual isolation but in physical

662
00:24:29,830 --> 00:24:28,559
isolation from everyone else

663
00:24:32,710 --> 00:24:29,840

is a challenge

664
00:24:35,750 --> 00:24:32,720
it's hard for me i have two young kids

665
00:24:37,990 --> 00:24:35,760
and sometimes i'm not able to focus or

666
00:24:40,149 --> 00:24:38,000
listen probably as well as i would want

667
00:24:42,549 --> 00:24:40,159
to a lot of our work was occurring in a

668
00:24:44,789 --> 00:24:42,559
clean room anyways but that meant that

669
00:24:48,789 --> 00:24:44,799
even before we entered the clean room

670
00:24:50,549 --> 00:24:48,799
we had that find ways of ensuring that

671
00:24:51,669 --> 00:24:50,559
we were not putting ourselves or others

672
00:24:52,789 --> 00:24:51,679
at risk

673
00:24:55,430 --> 00:24:52,799
we're really

674
00:24:57,190 --> 00:24:55,440
doing something that's transformative

675
00:24:59,350 --> 00:24:57,200
and trying to understand whether or not

676
00:25:01,190 --> 00:24:59,360
life evolved on another planet that's

677
00:25:02,230 --> 00:25:01,200
the fundamental objective of this

678
00:25:03,990 --> 00:25:02,240
mission

679
00:25:07,750 --> 00:25:04,000
we are explorers

680
00:25:10,549 --> 00:25:07,760
our job is to go into the unknown and

681
00:25:11,990 --> 00:25:10,559
this is just another example of

682
00:25:14,710 --> 00:25:12,000
the unknown

683
00:25:16,310 --> 00:25:14,720
how to make this job happen when you're

684
00:25:18,230 --> 00:25:16,320
doing it largely through a computer

685
00:25:20,230 --> 00:25:18,240
screen pretty much everybody that i've

686
00:25:22,630 --> 00:25:20,240
talked to that's associated with the

687
00:25:24,470 --> 00:25:22,640
mission has has said the same thing

688
00:25:26,950 --> 00:25:24,480

which is you could not have come up with

689
00:25:28,710 --> 00:25:26,960
a better name than perseverance you know

690
00:25:30,149 --> 00:25:28,720
i'm a convert now

691
00:25:31,269 --> 00:25:30,159
perseverance is the right name for the

692
00:25:33,430 --> 00:25:31,279
rover

693
00:25:35,909 --> 00:25:33,440
it's an amazing serendipity that we

694
00:25:38,470 --> 00:25:35,919
get to persevere through working on

695
00:25:40,310 --> 00:25:38,480
perseverance i think it now is it's a

696
00:25:43,110 --> 00:25:40,320
really important symbol of

697
00:25:44,870 --> 00:25:43,120
humanity hopefully persevering through

698
00:25:47,230 --> 00:25:44,880
this great challenging time that we have

699
00:25:50,789 --> 00:25:47,240
right now

700
00:25:52,549 --> 00:25:50,799
[Music]

701
00:25:54,870 --> 00:25:52,559
so you can see it was a challenge for us

702
00:25:58,149 --> 00:25:54,880
to overcome this and we understand that

703
00:25:59,590 --> 00:25:58,159
that the mars 2020 community uh was not

704
00:26:01,430 --> 00:25:59,600
the only

705
00:26:03,510 --> 00:26:01,440
group facing this as i said the

706
00:26:05,590 --> 00:26:03,520
community and and the country and around

707
00:26:06,390 --> 00:26:05,600
the globe everybody had to deal with

708
00:26:08,310 --> 00:26:06,400
this

709
00:26:11,110 --> 00:26:08,320
i asked the team a couple months ago if

710
00:26:13,350 --> 00:26:11,120
they would like to do something to

711
00:26:15,830 --> 00:26:13,360
kind of symbolize and mark

712
00:26:17,510 --> 00:26:15,840
these these challenges that we faced

713
00:26:20,149 --> 00:26:17,520

and they designed

714
00:26:22,549 --> 00:26:20,159
something that we called a covid 19

715
00:26:25,029 --> 00:26:22,559
perseverance plate this is a plate

716
00:26:28,149 --> 00:26:25,039
that's now fixed to the port side of the

717
00:26:29,830 --> 00:26:28,159
rover it has some a symbol

718
00:26:31,909 --> 00:26:29,840
of a

719
00:26:32,950 --> 00:26:31,919
a globe representing

720
00:26:34,950 --> 00:26:32,960
all of us

721
00:26:37,510 --> 00:26:34,960
that face this challenge together the

722
00:26:38,630 --> 00:26:37,520
spacecraft leaving the earth on its way

723
00:26:41,029 --> 00:26:38,640
to mars

724
00:26:43,590 --> 00:26:41,039
and all of this supported by the now

725
00:26:45,350 --> 00:26:43,600
familiar staff and serpent of the

726
00:26:47,110 --> 00:26:45,360
medical community

727
00:26:49,110 --> 00:26:47,120
the community that was really on the

728
00:26:50,830 --> 00:26:49,120
front lines

729
00:26:53,350 --> 00:26:50,840
keeping keeping us

730
00:26:54,950 --> 00:26:53,360
safe and you know they

731
00:26:57,990 --> 00:26:54,960
they really inspired us i think through

732
00:27:00,710 --> 00:26:58,000
this period and um and we hope that this

733
00:27:03,909 --> 00:27:00,720
plate and we hope that this mission

734
00:27:06,549 --> 00:27:03,919
uh in some in some small way can inspire

735
00:27:07,590 --> 00:27:06,559
it can inspire them in return

736
00:27:10,070 --> 00:27:07,600
um

737
00:27:11,669 --> 00:27:10,080
you know this is uh this has been a team

738
00:27:14,310 --> 00:27:11,679

effort all along

739
00:27:17,110 --> 00:27:14,320
it's a big group of people um

740
00:27:18,230 --> 00:27:17,120
that's required to do this type of

741
00:27:20,230 --> 00:27:18,240
mission

742
00:27:22,230 --> 00:27:20,240
and uh it's not just the people on the

743
00:27:24,389 --> 00:27:22,240
team but it is the

744
00:27:25,430 --> 00:27:24,399
uh the the people that support us from

745
00:27:28,710 --> 00:27:25,440
the public

746
00:27:31,909 --> 00:27:28,720
and uh and to mark that we are carrying

747
00:27:34,710 --> 00:27:31,919
um this plate that you see here it has

748
00:27:37,590 --> 00:27:34,720
three micro fish and those microfish

749
00:27:39,110 --> 00:27:37,600
hold the 11 million names of the people

750
00:27:41,110 --> 00:27:39,120
that signed up

751
00:27:43,190 --> 00:27:41,120
to take their name along with this

752
00:27:45,510 --> 00:27:43,200
spacecraft to mars

753
00:27:47,590 --> 00:27:45,520
we're very appreciative of of that

754
00:27:50,230 --> 00:27:47,600
interest and the support that we have

755
00:27:52,310 --> 00:27:50,240
and that's part of what makes this job

756
00:27:54,310 --> 00:27:52,320
so exciting

757
00:27:56,070 --> 00:27:54,320
i mentioned the team as i said it's it's

758
00:27:56,870 --> 00:27:56,080
a big team and this is just the team

759
00:27:58,710 --> 00:27:56,880
here

760
00:28:00,149 --> 00:27:58,720
at jpl

761
00:28:01,430 --> 00:28:00,159
that we're part was part of this

762
00:28:02,710 --> 00:28:01,440
development

763
00:28:05,269 --> 00:28:02,720

in fact

764
00:28:08,070 --> 00:28:05,279
the the team spans every

765
00:28:10,230 --> 00:28:08,080
uh center in the agency pretty much uh

766
00:28:11,510 --> 00:28:10,240
as well as our international

767
00:28:14,070 --> 00:28:11,520
contributors

768
00:28:16,710 --> 00:28:14,080
and our tremendous industry partners

769
00:28:18,310 --> 00:28:16,720
that have been part of this everybody

770
00:28:21,510 --> 00:28:18,320
has worked together a lot of days a lot

771
00:28:23,750 --> 00:28:21,520
of nights a lot of weekends and holidays

772
00:28:25,029 --> 00:28:23,760
to get us to the point where we're at

773
00:28:27,269 --> 00:28:25,039
and to kind of tell you a little bit

774
00:28:28,710 --> 00:28:27,279
more about the integration test activity

775
00:28:30,630 --> 00:28:28,720
that's been happening down at kennedy

776
00:28:31,430 --> 00:28:30,640
space center

777
00:28:33,909 --> 00:28:31,440
and

778
00:28:35,590 --> 00:28:33,919
in the final steps to get us to the pad

779
00:28:39,510 --> 00:28:35,600
i'm going to hand it off to luis

780
00:28:43,110 --> 00:28:41,669
great thanks matt

781
00:28:45,350 --> 00:28:43,120
so the assembly test and launch

782
00:28:48,230 --> 00:28:45,360
operations team also known as the atlo

783
00:28:51,269 --> 00:28:48,240
team started assembly of the spacecraft

784
00:28:54,070 --> 00:28:51,279
back at jpl in january of 2018.

785
00:28:56,070 --> 00:28:54,080
the atlo team is the team on the project

786
00:28:57,750 --> 00:28:56,080
that's entrusted with

787
00:28:59,590 --> 00:28:57,760
with putting together the final flight

788
00:29:02,230 --> 00:28:59,600

vehicle and we take

789
00:29:03,190 --> 00:29:02,240
components from across jpl the us and

790
00:29:05,350 --> 00:29:03,200
the world

791
00:29:07,190 --> 00:29:05,360
and we start populating that onto the

792
00:29:09,110 --> 00:29:07,200
spacecraft and testing them to make sure

793
00:29:10,870 --> 00:29:09,120
that everything works properly

794
00:29:13,750 --> 00:29:10,880
we're talking about the radio the flight

795
00:29:15,510 --> 00:29:13,760
computer control boxes antennas lasers

796
00:29:17,350 --> 00:29:15,520
all the different instruments that

797
00:29:19,909 --> 00:29:17,360
allow the spacecraft to uh to do its

798
00:29:22,230 --> 00:29:19,919
mission once it gets to mars

799
00:29:24,470 --> 00:29:22,240
when we initially shipped to ksc the

800
00:29:26,950 --> 00:29:24,480
spacecraft was actually shipped in

801
00:29:27,990 --> 00:29:26,960
pieces so all the individual stages of

802
00:29:30,789 --> 00:29:28,000
the spacecraft were shipped

803
00:29:33,269 --> 00:29:30,799
independently the crew stage the descent

804
00:29:34,470 --> 00:29:33,279
stage the rover stage the back shell and

805
00:29:36,710 --> 00:29:34,480
the heat shield

806
00:29:38,870 --> 00:29:36,720
and when we arrived we did a lot a lot

807
00:29:40,630 --> 00:29:38,880
of testing to make sure that nothing was

808
00:29:42,950 --> 00:29:40,640
damaged into transportation and that

809
00:29:45,029 --> 00:29:42,960
everything was working appropriately

810
00:29:47,510 --> 00:29:45,039
and then we began to assemble the

811
00:29:49,430 --> 00:29:47,520
spacecraft for the last time

812
00:29:51,750 --> 00:29:49,440
as the deputy electrical and integration

813
00:29:53,190 --> 00:29:51,760

and test lead for the team my main focus

814
00:29:54,669 --> 00:29:53,200
is on

815
00:29:56,310 --> 00:29:54,679
integrating all the electrical and

816
00:29:58,230 --> 00:29:56,320
electromechanical components of the

817
00:29:59,830 --> 00:29:58,240
spacecraft while making sure that the

818
00:30:01,590 --> 00:29:59,840
personnel and the hardware is kept are

819
00:30:03,990 --> 00:30:01,600
kept as safe as possible during that

820
00:30:05,750 --> 00:30:04,000
integration process

821
00:30:08,389 --> 00:30:05,760
also you know it's a it's a highly

822
00:30:10,149 --> 00:30:08,399
stressful highly demanding environment

823
00:30:11,830 --> 00:30:10,159
but it's also extremely rewarding to to

824
00:30:13,430 --> 00:30:11,840
see the spacecraft put together like

825
00:30:14,950 --> 00:30:13,440
that

826
00:30:17,190 --> 00:30:14,960
at the moment we're currently in the

827
00:30:19,430 --> 00:30:17,200
process of electrically integrating the

828
00:30:21,750 --> 00:30:19,440
harness that connects the spacecraft to

829
00:30:23,590 --> 00:30:21,760
the last stage of the launch vehicle uh

830
00:30:24,470 --> 00:30:23,600
which was just installed last night

831
00:30:26,470 --> 00:30:24,480
actually

832
00:30:29,110 --> 00:30:26,480
and as soon as i'm done here i'm gonna

833
00:30:31,510 --> 00:30:29,120
head into the uh into the uh high bay to

834
00:30:33,269 --> 00:30:31,520
start checking that out and uh after

835
00:30:35,430 --> 00:30:33,279
that's complete we will begin uh

836
00:30:39,990 --> 00:30:35,440
encapsulation of the spacecraft

837
00:30:41,830 --> 00:30:40,000
is where we actually clamshell the

838
00:30:43,750 --> 00:30:41,840

spacecraft in between its two

839
00:30:46,070 --> 00:30:43,760
payload fairings which will protect it

840
00:30:48,149 --> 00:30:46,080
while it's exiting earth's orbit and on

841
00:30:50,310 --> 00:30:48,159
its way to mars as you can see the

842
00:30:51,430 --> 00:30:50,320
spacecraft is a very small part of this

843
00:30:53,350 --> 00:30:51,440
uh of this

844
00:30:55,350 --> 00:30:53,360
launch vehicle but

845
00:30:58,389 --> 00:30:55,360
it's the most important part and

846
00:31:00,630 --> 00:30:58,399
we're hoping she gets her safe

847
00:31:02,549 --> 00:31:00,640
thanks luis and i actually have a couple

848
00:31:03,990 --> 00:31:02,559
questions for you what else is left for

849
00:31:07,029 --> 00:31:04,000
your team to complete on the

850
00:31:09,350 --> 00:31:07,039
perseverance rover

851
00:31:11,350 --> 00:31:09,360
so uh once the spacecraft is

852
00:31:13,750 --> 00:31:11,360
encapsulated we will actually lift the

853
00:31:15,430 --> 00:31:13,760
spacecraft onto a transport vehicle and

854
00:31:17,590 --> 00:31:15,440
then that transport vehicle will take it

855
00:31:18,710 --> 00:31:17,600
to the vertical integration fixture

856
00:31:20,230 --> 00:31:18,720
facility

857
00:31:22,470 --> 00:31:20,240
where it'll get crane to the top of the

858
00:31:25,110 --> 00:31:22,480
rocket and mechanically integrated and

859
00:31:27,590 --> 00:31:25,120
we'll do some final electrical closeouts

860
00:31:29,750 --> 00:31:27,600
before we light the candle

861
00:31:31,909 --> 00:31:29,760
that's great and i also heard you

862
00:31:34,789 --> 00:31:31,919
started as an intern for the curiosity

863
00:31:37,190 --> 00:31:34,799

rover so what's it like to see your work

864
00:31:39,830 --> 00:31:37,200
on this next generation rover as it gets

865
00:31:41,669 --> 00:31:39,840
to the launch pad

866
00:31:43,669 --> 00:31:41,679
it's been an amazing adventure here at

867
00:31:45,909 --> 00:31:43,679
nasa um i started as an intern on the

868
00:31:47,830 --> 00:31:45,919
atlo team actually for the mars science

869
00:31:49,990 --> 00:31:47,840
laboratory project and

870
00:31:52,710 --> 00:31:50,000
it was interesting moving from more

871
00:31:54,549 --> 00:31:52,720
smaller day-to-day week to week tasks

872
00:31:55,269 --> 00:31:54,559
when i was a student

873
00:31:58,310 --> 00:31:55,279
to

874
00:31:59,190 --> 00:31:58,320
being a lead on this very important

875
00:32:01,430 --> 00:31:59,200
mission

876
00:32:03,750 --> 00:32:01,440
and and taking a much more strategic big

877
00:32:05,830 --> 00:32:03,760
pitch review of integrating a spacecraft

878
00:32:07,350 --> 00:32:05,840
um i can actually say i've touched and

879
00:32:09,990 --> 00:32:07,360
tested in some form every piece of

880
00:32:11,590 --> 00:32:10,000
hardware on this spacecraft

881
00:32:14,549 --> 00:32:11,600
and i truly appreciate the work nasa

882
00:32:16,149 --> 00:32:14,559
does to provide internships to students

883
00:32:17,509 --> 00:32:16,159
around the country

884
00:32:19,430 --> 00:32:17,519
and thankful every day for having been

885
00:32:21,269 --> 00:32:19,440
given that opportunity

886
00:32:23,110 --> 00:32:21,279
having grown up in south central los

887
00:32:25,430 --> 00:32:23,120
angeles i never thought i would be where

888
00:32:27,029 --> 00:32:25,440

i'm at today and it's an honor and a

889
00:32:28,870 --> 00:32:27,039
privilege to work with all the brilliant

890
00:32:31,509 --> 00:32:28,880
people on this team

891
00:32:34,070 --> 00:32:31,519
at jpl and at nasa

892
00:32:35,590 --> 00:32:34,080
i'm really looking forward to launch day

893
00:32:38,870 --> 00:32:35,600
thank you luis thank you for answering

894
00:32:40,830 --> 00:32:38,880
my questions and hitching a ride on the

895
00:32:43,350 --> 00:32:40,840
perseverance rover is the mars

896
00:32:45,909 --> 00:32:43,360
helicopter which now has a new name

897
00:32:47,909 --> 00:32:45,919
ingenuity ingenuity will attempt to be

898
00:32:48,950 --> 00:32:47,919
the first powered flight on another

899
00:32:51,830 --> 00:32:48,960
planet

900
00:32:54,149 --> 00:32:51,840
mars helicopter project manager mimi ung

901
00:32:57,350 --> 00:32:54,159
has an update on this exciting new

902
00:33:00,230 --> 00:32:57,360
technology experiment at this time mars

903
00:33:03,029 --> 00:33:00,240
helicopter ingenuity is fully integrated

904
00:33:05,509 --> 00:33:03,039
on the rover the helicopter is stowed

905
00:33:07,509 --> 00:33:05,519
under the belly pin of the rover and has

906
00:33:09,269 --> 00:33:07,519
been checked out to be fully operational

907
00:33:11,750 --> 00:33:09,279
in the configuration that is going to be

908
00:33:14,710 --> 00:33:11,760
launched and operated in space

909
00:33:17,509 --> 00:33:14,720
our team is now preparing for operation

910
00:33:19,509 --> 00:33:17,519
after launch updating our simulations

911
00:33:21,190 --> 00:33:19,519
and rehearsing for the scenarios that

912
00:33:23,190 --> 00:33:21,200
we're going to encounter

913
00:33:25,269 --> 00:33:23,200

starting with monitoring the health of

914
00:33:27,509 --> 00:33:25,279
the vehicle through the cruise to mars

915
00:33:29,590 --> 00:33:27,519
when the rover deploys the helicopter

916
00:33:32,549 --> 00:33:29,600
and commissioning of the helicopter all

917
00:33:34,310 --> 00:33:32,559
the way to our very first rotorcraft

918
00:33:36,870 --> 00:33:34,320
flight attempt at mars

919
00:33:38,789 --> 00:33:36,880
seeing our helicopter get launched is to

920
00:33:41,190 --> 00:33:38,799
start up everything our team has worked

921
00:33:42,950 --> 00:33:41,200
for and after it lands it's going to be

922
00:33:45,190 --> 00:33:42,960
extraordinary

923
00:33:47,110 --> 00:33:45,200
after all of us working really hard for

924
00:33:50,789 --> 00:33:47,120
over six years it's going to be

925
00:33:53,509 --> 00:33:50,799
outstanding to get to attend the very

926
00:33:54,710 --> 00:33:53,519
first rotograph flight test

927
00:33:56,310 --> 00:33:54,720
at mars

928
00:33:58,630 --> 00:33:56,320
and in fact

929
00:34:02,870 --> 00:33:58,640
first time on any other planet outside

930
00:34:06,389 --> 00:34:04,950
both perseverance and ingenuity are

931
00:34:07,909 --> 00:34:06,399
riding on the same

932
00:34:10,389 --> 00:34:07,919
rocket to mars

933
00:34:14,710 --> 00:34:10,399
right now nasa launch director omar baez

934
00:34:20,389 --> 00:34:17,589
hello there hello from florida so

935
00:34:23,190 --> 00:34:20,399
um we're 34 days from launch

936
00:34:25,589 --> 00:34:23,200
and the things that are going on

937
00:34:27,750 --> 00:34:25,599
uh have been touched on here

938
00:34:29,750 --> 00:34:27,760

um the spacecraft will go undergo

939
00:34:33,109 --> 00:34:29,760
encapsulation as louis says into the

940
00:34:34,629 --> 00:34:33,119
clam shell or the fairing halves uh in

941
00:34:38,069 --> 00:34:34,639
the coming weeks

942
00:34:42,869 --> 00:34:38,079
the launch vehicle if

943
00:34:49,669 --> 00:34:46,310
this is actually the rover coming in

944
00:34:51,909 --> 00:34:49,679
and this is misleading because um that

945
00:34:54,790 --> 00:34:51,919
rover that's one piece of it there was

946
00:34:56,790 --> 00:34:54,800
16 tractor trailers that came in with

947
00:34:58,630 --> 00:34:56,800
other equipment there was another flight

948
00:35:00,310 --> 00:34:58,640
for other pieces

949
00:35:03,190 --> 00:35:00,320
so uh

950
00:35:05,349 --> 00:35:03,200
it just it did not just fit in that box

951
00:35:06,630 --> 00:35:05,359
there's a lot more that went into this

952
00:35:09,190 --> 00:35:06,640
uh mission

953
00:35:10,069 --> 00:35:09,200
and the assembly started in january back

954
00:35:12,230 --> 00:35:10,079
here

955
00:35:16,230 --> 00:35:12,240
this is actually the

956
00:35:18,150 --> 00:35:16,240
atlas booster being offloaded from uh

957
00:35:20,150 --> 00:35:18,160
the antonov airplane that brings it in

958
00:35:23,109 --> 00:35:20,160
from decatur alabama

959
00:35:25,109 --> 00:35:23,119
where the booster is built

960
00:35:27,829 --> 00:35:25,119
the booster

961
00:35:28,950 --> 00:35:27,839
provides the first four minutes and 20

962
00:35:31,990 --> 00:35:28,960
seconds

963
00:35:35,030 --> 00:35:32,000

of power for the flight before the uh

964
00:35:36,069 --> 00:35:35,040
centaur this the upper stage

965
00:35:37,589 --> 00:35:36,079
um

966
00:35:41,030 --> 00:35:37,599
it takes over

967
00:35:43,990 --> 00:35:41,040
and uh and puts us into its final

968
00:35:44,790 --> 00:35:44,000
uh escape orbit from the

969
00:35:47,910 --> 00:35:44,800
earth

970
00:35:53,190 --> 00:35:50,230
along with the

971
00:35:55,829 --> 00:35:53,200
the first stage booster

972
00:35:58,950 --> 00:35:55,839
are four solid rocket motors which you

973
00:36:01,030 --> 00:35:58,960
see being assembled here those will burn

974
00:36:03,990 --> 00:36:01,040
for approximately a minute and 50

975
00:36:05,990 --> 00:36:04,000
seconds providing the initial boost to

976
00:36:08,950 --> 00:36:06,000
get that complete stack

977
00:36:11,670 --> 00:36:08,960
of the first stage the upper stage

978
00:36:14,550 --> 00:36:11,680
curiosity the payload fairing

979
00:36:18,150 --> 00:36:14,560
to its uh c3 velocity the escape

980
00:36:19,750 --> 00:36:18,160
velocity of 14.4 kilometers square

981
00:36:23,030 --> 00:36:19,760
seconds square

982
00:36:25,829 --> 00:36:23,040
for those that need preciseness

983
00:36:29,750 --> 00:36:25,839
that'll get us on its way

984
00:36:33,109 --> 00:36:29,760
we're looking forward to july 20th

985
00:36:35,990 --> 00:36:33,119
for that 9 15 time to get them going

986
00:36:37,829 --> 00:36:36,000
and so that the booster can do its

987
00:36:39,030 --> 00:36:37,839
descent and landing

988
00:36:41,750 --> 00:36:39,040

into

989
00:36:44,310 --> 00:36:41,760
mars in february

990
00:36:46,870 --> 00:36:44,320
uh from behalf of the lawn services

991
00:36:49,349 --> 00:36:46,880
program here at ksc we look forward to

992
00:36:51,910 --> 00:36:49,359
it we're looking forward to

993
00:36:55,589 --> 00:36:51,920
fueling the vehicle this coming monday

994
00:36:56,630 --> 00:36:55,599
as part of our wet dress rehearsal

995
00:36:59,349 --> 00:36:56,640
and

996
00:37:01,589 --> 00:36:59,359
after that we will be

997
00:37:04,710 --> 00:37:01,599
putting that encapsulated assembly of

998
00:37:05,510 --> 00:37:04,720
the spacecraft and the fairing on top of

999
00:37:07,829 --> 00:37:05,520
the

1000
00:37:10,390 --> 00:37:07,839
booster

1001
00:37:12,950 --> 00:37:10,400
doing the final preparations for

1002
00:37:15,510 --> 00:37:12,960
installation of the power source

1003
00:37:16,790 --> 00:37:15,520
uh that'll power the rover up for years

1004
00:37:17,910 --> 00:37:16,800
to come

1005
00:37:19,430 --> 00:37:17,920
so

1006
00:37:22,390 --> 00:37:19,440
from behalf of nasa and the launch

1007
00:37:26,390 --> 00:37:22,400
services program it's a pleasure

1008
00:37:29,670 --> 00:37:26,400
to do this launch and 34 days from now

1009
00:37:31,270 --> 00:37:29,680
we'll have some happy faces here

1010
00:37:33,910 --> 00:37:31,280
thanks for the update omar we're looking

1011
00:37:36,630 --> 00:37:33,920
forward to the happy faces now we are

1012
00:37:38,470 --> 00:37:36,640
ready to take media questions remember

1013
00:37:40,790 --> 00:37:38,480

to press star one to get put in the

1014
00:37:43,109 --> 00:37:40,800
queue and please direct your questions

1015
00:37:45,990 --> 00:37:43,119
to one of the panelists we're also going

1016
00:37:47,910 --> 00:37:46,000
to take questions through the ask nasa

1017
00:37:51,030 --> 00:37:47,920
but first on the phone line is bill

1018
00:37:52,630 --> 00:37:51,040
harwood from cbs news

1019
00:37:54,069 --> 00:37:52,640
oh thank you very much and i appreciate

1020
00:37:55,829 --> 00:37:54,079
this guys for taking the time to chat

1021
00:37:57,829 --> 00:37:55,839
with us um

1022
00:38:00,150 --> 00:37:57,839
two very quick questions one is just to

1023
00:38:02,069 --> 00:38:00,160
have an update maybe for lori what's the

1024
00:38:04,390 --> 00:38:02,079
what is the total cost of this mission

1025
00:38:07,349 --> 00:38:04,400
or what number should we be using

1026
00:38:09,349 --> 00:38:07,359
and and maybe for omar how much uh and

1027
00:38:10,950 --> 00:38:09,359
and for matt well it's how much reserve

1028
00:38:12,950 --> 00:38:10,960
is left in the schedule to handle

1029
00:38:14,230 --> 00:38:12,960
anything that goes out of the ordinary

1030
00:38:15,990 --> 00:38:14,240
are you right now to the wire or have

1031
00:38:21,270 --> 00:38:16,000
you got some time to handle

1032
00:38:25,829 --> 00:38:24,069
great so thanks for the question um so i

1033
00:38:27,190 --> 00:38:25,839
can tell you that the cost for the

1034
00:38:29,910 --> 00:38:27,200
development

1035
00:38:32,790 --> 00:38:29,920
of the perseverance rover all the way up

1036
00:38:35,030 --> 00:38:32,800
through launch is about 2.4 billion

1037
00:38:37,109 --> 00:38:35,040
dollars and there's another 300 million

1038
00:38:39,109 --> 00:38:37,119

uh that will spend to to operate

1039
00:38:40,630 --> 00:38:39,119
perseverance uh once it's after its

1040
00:38:42,710 --> 00:38:40,640
launch and it's on its way and then once

1041
00:38:44,829 --> 00:38:42,720
it lands and to do all the surface

1042
00:38:47,190 --> 00:38:44,839
science uh once it gets to

1043
00:38:48,710 --> 00:38:47,200
mars i'll toss it back over to omar and

1044
00:38:51,510 --> 00:38:48,720
to matt

1045
00:38:56,550 --> 00:38:55,109
relative to the spacecraft um the the uh

1046
00:38:59,109 --> 00:38:56,560
the key margin that we have is in the

1047
00:39:01,190 --> 00:38:59,119
launch window itself um we're targeting

1048
00:39:03,990 --> 00:39:01,200
the first launch launch day

1049
00:39:06,710 --> 00:39:04,000
as uh july 20th as omar said but the

1050
00:39:10,069 --> 00:39:06,720
window in fact uh uh lasts

1051
00:39:12,230 --> 00:39:10,079
until uh uh august 11th and so

1052
00:39:14,630 --> 00:39:12,240
and and even during those single days we

1053
00:39:16,790 --> 00:39:14,640
have multiple uh opportunities to

1054
00:39:19,190 --> 00:39:16,800
recycle if there are some issues and so

1055
00:39:20,790 --> 00:39:19,200
we think we have some robustness there

1056
00:39:22,069 --> 00:39:20,800
we have good robustness there in the

1057
00:39:23,910 --> 00:39:22,079
launch window

1058
00:39:25,670 --> 00:39:23,920
relative to the launch vehicle

1059
00:39:31,349 --> 00:39:25,680
processing i'll turn it back over to

1060
00:39:35,190 --> 00:39:33,270
relative to schedule we are a green

1061
00:39:36,390 --> 00:39:35,200
light schedule from here on out in other

1062
00:39:38,550 --> 00:39:36,400
words any

1063
00:39:40,550 --> 00:39:38,560

any major perturbation could affect the

1064
00:39:42,790 --> 00:39:40,560
launch date but as matt said we got

1065
00:39:45,510 --> 00:39:42,800
plenty of window

1066
00:39:47,829 --> 00:39:45,520
or runway ahead of us and we're not

1067
00:39:51,030 --> 00:39:47,839
worried about it i'm sure

1068
00:39:52,470 --> 00:39:51,040
you know florida weather as it is uh you

1069
00:39:53,670 --> 00:39:52,480
know it's been perfect the last couple

1070
00:39:55,430 --> 00:39:53,680
of days but

1071
00:39:57,990 --> 00:39:55,440
we'll probably run into some not so

1072
00:40:01,030 --> 00:39:58,000
perfect days that could set us back

1073
00:40:03,030 --> 00:40:01,040
and the team is flexible enough um

1074
00:40:05,910 --> 00:40:03,040
to to be able to handle

1075
00:40:07,109 --> 00:40:05,920
uh a three-week window

1076
00:40:09,670 --> 00:40:07,119
i would say

1077
00:40:11,990 --> 00:40:09,680
um and and we have analyzed that to the

1078
00:40:15,030 --> 00:40:12,000
11th of august

1079
00:40:17,430 --> 00:40:15,040
and if need be and the analysis

1080
00:40:21,030 --> 00:40:17,440
provides this additional margin we might

1081
00:40:25,030 --> 00:40:21,040
even get out to the 15th of august so

1082
00:40:27,109 --> 00:40:25,040
no concerns from our part

1083
00:40:31,510 --> 00:40:27,119
great and now the next question is from

1084
00:40:35,829 --> 00:40:33,829
hi everyone uh this question is for

1085
00:40:37,589 --> 00:40:35,839
whoever would like to take it um there

1086
00:40:39,270 --> 00:40:37,599
are some scientists and other space fans

1087
00:40:41,270 --> 00:40:39,280
out there who think that nasa has given

1088
00:40:43,349 --> 00:40:41,280

a lot of attention to robotic missions

1089
00:40:45,270 --> 00:40:43,359
to mars over the years and they want to

1090
00:40:46,950 --> 00:40:45,280
see spacecraft visit other spots in the

1091
00:40:48,630 --> 00:40:46,960
solar system especially moons where

1092
00:40:51,589 --> 00:40:48,640
there might be evidence of life right

1093
00:40:53,349 --> 00:40:51,599
now rather than ancient signs so i'm

1094
00:40:55,109 --> 00:40:53,359
wondering what you would say to those

1095
00:40:57,109 --> 00:40:55,119
people who believe that mars is a little

1096
00:40:59,109 --> 00:40:57,119
bit overstudied and that we should be

1097
00:41:03,270 --> 00:40:59,119
focusing elsewhere in the solar system

1098
00:41:08,630 --> 00:41:04,710
i'll be happy to take that question

1099
00:41:14,069 --> 00:41:11,109
i'll take it

1100
00:41:16,069 --> 00:41:14,079
yeah i i for one am a fan of our entire

1101
00:41:17,750 --> 00:41:16,079
solar system i love every every

1102
00:41:19,990 --> 00:41:17,760
destination that we have there's

1103
00:41:23,829 --> 00:41:20,000
incredible science across as you know

1104
00:41:26,790 --> 00:41:23,839
the entire solar system mars has been a

1105
00:41:28,710 --> 00:41:26,800
really fantastic place to

1106
00:41:30,470 --> 00:41:28,720
to really explore in depth and so our

1107
00:41:32,630 --> 00:41:30,480
mars exploration program has really done

1108
00:41:34,870 --> 00:41:32,640
an amazing job at mars and we there's

1109
00:41:36,790 --> 00:41:34,880
still a lot of work to be done there

1110
00:41:38,309 --> 00:41:36,800
but i absolutely agree with you that

1111
00:41:41,589 --> 00:41:38,319
there are other places in the solar

1112
00:41:43,670 --> 00:41:41,599
system that might actually be uh

1113
00:41:45,910 --> 00:41:43,680

maybe even better places to be looking

1114
00:41:48,870 --> 00:41:45,920
for actual extant life that might be

1115
00:41:52,230 --> 00:41:48,880
present today and of course the moons of

1116
00:41:55,349 --> 00:41:52,240
uh of jupiter and saturn uh you know for

1117
00:41:58,150 --> 00:41:55,359
europa or enceladus or maybe even titan

1118
00:41:59,190 --> 00:41:58,160
are places where we feel like there may

1119
00:42:01,349 --> 00:41:59,200
actually

1120
00:42:03,510 --> 00:42:01,359
be environments that could be conducive

1121
00:42:05,829 --> 00:42:03,520
to having life today for example on

1122
00:42:07,750 --> 00:42:05,839
europa enceladus that are covered in ice

1123
00:42:09,589 --> 00:42:07,760
certainly there is probably low

1124
00:42:12,069 --> 00:42:09,599
probability of life on the surface but

1125
00:42:15,030 --> 00:42:12,079
beneath that ice we believe there are

1126
00:42:17,510 --> 00:42:15,040
these deep oceans that may have

1127
00:42:19,349 --> 00:42:17,520
thermal sources at the at the base of

1128
00:42:21,910 --> 00:42:19,359
those that are driven by geologic

1129
00:42:23,750 --> 00:42:21,920
processes that recycle the oceans and

1130
00:42:24,870 --> 00:42:23,760
recycle the nutrients within those

1131
00:42:26,790 --> 00:42:24,880
waters

1132
00:42:28,150 --> 00:42:26,800
and could actually be sites where we

1133
00:42:30,710 --> 00:42:28,160
think you have all the ingredients

1134
00:42:32,790 --> 00:42:30,720
necessary for life and so we are looking

1135
00:42:34,550 --> 00:42:32,800
for uh great ideas to send other

1136
00:42:38,790 --> 00:42:34,560
missions we've got europa clipper that's

1137
00:42:40,630 --> 00:42:38,800
going to be uh going to europa to uh map

1138
00:42:42,309 --> 00:42:40,640

the surface it's an orbiting mission

1139
00:42:43,270 --> 00:42:42,319
that'll orbit jupiter and make several

1140
00:42:44,950 --> 00:42:43,280
passes

1141
00:42:47,030 --> 00:42:44,960
of europa

1142
00:42:48,470 --> 00:42:47,040
that will launch later in this decade

1143
00:42:51,750 --> 00:42:48,480
and now we're also developing the

1144
00:42:55,190 --> 00:42:51,760
mission dragonfly uh which will launch

1145
00:42:56,710 --> 00:42:55,200
in 2026 to go to uh to titan

1146
00:42:58,550 --> 00:42:56,720
and to explore the environments there on

1147
00:43:00,550 --> 00:42:58,560
the surface that's actually the next

1148
00:43:02,390 --> 00:43:00,560
rotorcraft that will fly in a planetary

1149
00:43:04,550 --> 00:43:02,400
atmosphere is an octocopter that will

1150
00:43:06,870 --> 00:43:04,560
land on the surface of titan

1151
00:43:08,390 --> 00:43:06,880
so those are also excellent destinations

1152
00:43:10,230 --> 00:43:08,400
and we're very interested in them and

1153
00:43:13,030 --> 00:43:10,240
pursuing a variety of different ways to

1154
00:43:15,349 --> 00:43:13,040
get there

1155
00:43:19,030 --> 00:43:15,359
thanks laurie and up next on the phone

1156
00:43:21,670 --> 00:43:19,040
lines is marcia dunn with ap

1157
00:43:24,630 --> 00:43:21,680
yes hello thank you um i have some

1158
00:43:26,790 --> 00:43:24,640
questions about the return samples the

1159
00:43:29,109 --> 00:43:26,800
animation almost makes it look like the

1160
00:43:31,589 --> 00:43:29,119
cylinders with samples are just sort of

1161
00:43:34,390 --> 00:43:31,599
dropped on the surface of mars

1162
00:43:35,510 --> 00:43:34,400
sort of scattered how are you going to

1163
00:43:37,910 --> 00:43:35,520

um

1164
00:43:40,630 --> 00:43:37,920
leave these samples for pickup do they

1165
00:43:44,150 --> 00:43:40,640
have beacons in case there's a dust

1166
00:43:45,829 --> 00:43:44,160
storm of some sort and also maybe for dr

1167
00:43:48,470 --> 00:43:45,839
glaze

1168
00:43:50,069 --> 00:43:48,480
why 10 years to get the samples back i

1169
00:43:51,829 --> 00:43:50,079
would think i know you want them as soon

1170
00:43:53,990 --> 00:43:51,839
as possible and waiting a decade just

1171
00:43:59,110 --> 00:43:54,000
seems like a long time so um if you

1172
00:44:02,150 --> 00:44:01,030
[Applause]

1173
00:44:04,069 --> 00:44:02,160
so much you're gonna suggest that

1174
00:44:06,390 --> 00:44:04,079
perhaps katie take the first

1175
00:44:08,790 --> 00:44:06,400
part or or bat yeah i could start off

1176
00:44:11,510 --> 00:44:08,800
and katie can can jump in here just just

1177
00:44:13,190 --> 00:44:11,520
to understand how the the samples are uh

1178
00:44:15,510 --> 00:44:13,200
collected and and then left on the

1179
00:44:16,470 --> 00:44:15,520
surface we do collect them as individual

1180
00:44:18,069 --> 00:44:16,480
tubes

1181
00:44:21,030 --> 00:44:18,079
and we have the ability to drop those

1182
00:44:23,349 --> 00:44:21,040
tubes either in ones and twos or in in

1183
00:44:26,710 --> 00:44:23,359
groups our our current intent

1184
00:44:28,950 --> 00:44:26,720
is is to drop them in in a grouping

1185
00:44:31,430 --> 00:44:28,960
so that the fetch rover which you saw in

1186
00:44:33,349 --> 00:44:31,440
the animation would not have to go to

1187
00:44:34,710 --> 00:44:33,359
many locations to actually pick those

1188
00:44:36,790 --> 00:44:34,720

tubes up

1189
00:44:39,109 --> 00:44:36,800
and so we have complete flexibility but

1190
00:44:41,589 --> 00:44:39,119
that that would be the uh the intent as

1191
00:44:43,990 --> 00:44:41,599
far as the dust storms go

1192
00:44:46,870 --> 00:44:44,000
uh we know how we know how the sand and

1193
00:44:49,270 --> 00:44:46,880
the dust uh moves on mars and we know

1194
00:44:52,230 --> 00:44:49,280
what locations to select to make sure

1195
00:44:55,109 --> 00:44:52,240
these these uh are not affected by

1196
00:44:56,309 --> 00:44:55,119
uh by those types of uh issues uh and so

1197
00:44:58,390 --> 00:44:56,319
we don't think there's gonna be any

1198
00:45:00,390 --> 00:44:58,400
issue with respect to uh covering up the

1199
00:45:02,710 --> 00:45:00,400
tubes over the period of time that we're

1200
00:45:05,109 --> 00:45:02,720
talking about or finding the tubes on

1201
00:45:06,950 --> 00:45:05,119
the surface and katie can say a word or

1202
00:45:08,950 --> 00:45:06,960
two maybe about the the sort of science

1203
00:45:10,790 --> 00:45:08,960
strategy associated with that yeah

1204
00:45:12,309 --> 00:45:10,800
that's something that we are still very

1205
00:45:14,870 --> 00:45:12,319
much thinking about and will be guided

1206
00:45:18,309 --> 00:45:14,880
by our exploration on the surface as we

1207
00:45:19,990 --> 00:45:18,319
you know decide where and how to sample

1208
00:45:21,990 --> 00:45:20,000
and where we'd like to leave that sample

1209
00:45:24,390 --> 00:45:22,000
cache you know i think it's important to

1210
00:45:26,630 --> 00:45:24,400
to to think about what samples go in

1211
00:45:28,630 --> 00:45:26,640
what cache and where uh as as the the

1212
00:45:30,230 --> 00:45:28,640
fetch rover capabilities develop and nmr

1213
00:45:31,910 --> 00:45:30,240

sample return architecture develops as

1214
00:45:33,750 --> 00:45:31,920
well so we'll be thinking about that and

1215
00:45:35,910 --> 00:45:33,760
that'll probably be an active iterative

1216
00:45:37,670 --> 00:45:35,920
conversation that we have with the bars

1217
00:45:43,510 --> 00:45:37,680
2020 project as well as the mars sample

1218
00:45:47,670 --> 00:45:45,910
great yeah so i'll try to take the next

1219
00:45:49,589 --> 00:45:47,680
part of that question which is you know

1220
00:45:51,589 --> 00:45:49,599
why does it take so long to actually get

1221
00:45:52,950 --> 00:45:51,599
the samples back and you're absolutely

1222
00:45:54,470 --> 00:45:52,960
right we definitely want to try and get

1223
00:45:56,630 --> 00:45:54,480
those samples back here they're very

1224
00:45:58,309 --> 00:45:56,640
precious we want to uh to get them back

1225
00:46:00,790 --> 00:45:58,319
here so that we can start the analysis

1226
00:46:03,430 --> 00:46:00,800
and and learn from from the samples but

1227
00:46:05,190 --> 00:46:03,440
this is a really complex uh

1228
00:46:06,790 --> 00:46:05,200
concept to try and bring those samples

1229
00:46:08,230 --> 00:46:06,800
back and in fact we've always known from

1230
00:46:09,829 --> 00:46:08,240
the very beginning that this was not

1231
00:46:11,750 --> 00:46:09,839
going to be a simple

1232
00:46:13,190 --> 00:46:11,760
a simple mission where we simply fly to

1233
00:46:14,710 --> 00:46:13,200
mars collect the samples and bring them

1234
00:46:17,829 --> 00:46:14,720
back we've always known it was going to

1235
00:46:20,069 --> 00:46:17,839
require multiple steps and multiple

1236
00:46:22,230 --> 00:46:20,079
launches in order to actually get the

1237
00:46:24,790 --> 00:46:22,240
the samples back not only because of the

1238
00:46:27,109 --> 00:46:24,800

time required but the cost as well so we

1239
00:46:29,589 --> 00:46:27,119
need to pace that out we're really in a

1240
00:46:31,670 --> 00:46:29,599
great position right now where we have

1241
00:46:33,510 --> 00:46:31,680
developed a fantastic partnership with

1242
00:46:35,109 --> 00:46:33,520
european space agency which actually

1243
00:46:36,710 --> 00:46:35,119
allows us to get those samples back a

1244
00:46:38,630 --> 00:46:36,720
little bit earlier than had originally

1245
00:46:39,990 --> 00:46:38,640
been planned if we were trying to do it

1246
00:46:42,710 --> 00:46:40,000
all on our own

1247
00:46:44,790 --> 00:46:42,720
by collaborating with eset allows us to

1248
00:46:46,950 --> 00:46:44,800
have two launchers from earth a new

1249
00:46:49,109 --> 00:46:46,960
european launch and a nasa launch that

1250
00:46:51,270 --> 00:46:49,119
will send them our sample return mission

1251
00:46:52,790 --> 00:46:51,280
out to mars collect the samples and

1252
00:46:54,790 --> 00:46:52,800
bring them back like the animation that

1253
00:46:56,390 --> 00:46:54,800
you saw allows us to do that in a

1254
00:46:57,670 --> 00:46:56,400
shorter time period

1255
00:46:59,670 --> 00:46:57,680
right now we're working on and

1256
00:47:01,589 --> 00:46:59,680
developing uh the plans for that mars

1257
00:47:04,390 --> 00:47:01,599
sample return mission we're planning

1258
00:47:07,190 --> 00:47:04,400
towards a launch around 2026 which would

1259
00:47:08,630 --> 00:47:07,200
then bring those samples back in 2031.

1260
00:47:10,470 --> 00:47:08,640
it takes a little time to get out there

1261
00:47:12,470 --> 00:47:10,480
it takes time to pick up the samples on

1262
00:47:13,910 --> 00:47:12,480
the surface then it takes time to

1263
00:47:15,670 --> 00:47:13,920

actually get out of orbit at mars and

1264
00:47:17,190 --> 00:47:15,680
bring them back so it's a long and

1265
00:47:18,870 --> 00:47:17,200
involved process but it's one we're

1266
00:47:20,870 --> 00:47:18,880
absolutely dedicated to and we're going

1267
00:47:22,150 --> 00:47:20,880
to make it happen

1268
00:47:23,990 --> 00:47:22,160
great that was some great teamwork

1269
00:47:26,630 --> 00:47:24,000
getting that question answered thank you

1270
00:47:30,150 --> 00:47:26,640
and on the line now we have keith cohen

1271
00:47:34,230 --> 00:47:32,230
hi i have a question for jim bridenstine

1272
00:47:37,270 --> 00:47:34,240
it's a branding question uh you just

1273
00:47:39,510 --> 00:47:37,280
brought back the worm logo so

1274
00:47:41,349 --> 00:47:39,520
bobby brown was recently on 60 minutes

1275
00:47:43,990 --> 00:47:41,359
and he referred to this mission as

1276
00:47:45,750 --> 00:47:44,000
nasa's first astrobiology mission now of

1277
00:47:47,109 --> 00:47:45,760
course the vikings were but i'll let

1278
00:47:48,950 --> 00:47:47,119
bobby have that

1279
00:47:51,030 --> 00:47:48,960
but nasa has a program that's been going

1280
00:47:52,870 --> 00:47:51,040
on for 20 years it's called astrobiology

1281
00:47:54,790 --> 00:47:52,880
yet if you go to the website for this

1282
00:47:56,630 --> 00:47:54,800
mission unless you know where the one

1283
00:47:59,109 --> 00:47:56,640
page is where it mentions astrobiology

1284
00:48:01,190 --> 00:47:59,119
there's no links no nothing you go to

1285
00:48:02,870 --> 00:48:01,200
the astrobiology page

1286
00:48:04,150 --> 00:48:02,880
they don't even know this this thing is

1287
00:48:06,309 --> 00:48:04,160
happening today they don't even mention

1288
00:48:07,190 --> 00:48:06,319

the rover and so i'm kind of wondering

1289
00:48:09,589 --> 00:48:07,200
you know there's sort of they're going

1290
00:48:12,069 --> 00:48:09,599
to be four rovers on mars soon all doing

1291
00:48:14,069 --> 00:48:12,079
astrobiology it's going to be a big deal

1292
00:48:15,510 --> 00:48:14,079
so maybe you could explain a little bit

1293
00:48:17,510 --> 00:48:15,520
on the branding of the marketing here

1294
00:48:20,069 --> 00:48:17,520
why nasa can't get their act together

1295
00:48:21,349 --> 00:48:20,079
and maybe you know hoping to hear that

1296
00:48:24,390 --> 00:48:21,359
you're going to get this all figured out

1297
00:48:26,150 --> 00:48:24,400
by the time the thing lands

1298
00:48:28,230 --> 00:48:26,160
no that's

1299
00:48:30,390 --> 00:48:28,240
keith that's a great a great question

1300
00:48:32,790 --> 00:48:30,400
and a great point um

1301
00:48:34,549 --> 00:48:32,800
i'll tell you astrobiology is is really

1302
00:48:36,230 --> 00:48:34,559
something that

1303
00:48:37,990 --> 00:48:36,240
it depends how you define it whether or

1304
00:48:40,230 --> 00:48:38,000
not this is the first mission or not if

1305
00:48:42,549 --> 00:48:40,240
you look at what we did with spirit and

1306
00:48:43,910 --> 00:48:42,559
opportunity we made discoveries we

1307
00:48:46,549 --> 00:48:43,920
discovered that on the northern

1308
00:48:48,390 --> 00:48:46,559
hemisphere of mars it was two-thirds

1309
00:48:50,230 --> 00:48:48,400
covered with water

1310
00:48:52,390 --> 00:48:50,240
that indicates that it had a very thick

1311
00:48:54,069 --> 00:48:52,400
atmosphere that it had maybe even a

1312
00:48:55,750 --> 00:48:54,079
strong magnetosphere which would

1313
00:48:57,270 --> 00:48:55,760

indicate that mars at one time had a

1314
00:48:58,630 --> 00:48:57,280
molten core

1315
00:49:00,630 --> 00:48:58,640
when we think about having a thick

1316
00:49:03,670 --> 00:49:00,640
atmosphere in liquid water on the

1317
00:49:06,150 --> 00:49:03,680
surface in a magnetosphere all of that

1318
00:49:08,950 --> 00:49:06,160
indicates that mars was maybe at one

1319
00:49:11,030 --> 00:49:08,960
time habitable in other words

1320
00:49:12,950 --> 00:49:11,040
it could have supported life so you

1321
00:49:15,190 --> 00:49:12,960
could argue that even when we were doing

1322
00:49:17,270 --> 00:49:15,200
spirit and opportunity that those

1323
00:49:18,950 --> 00:49:17,280
missions were astrobiology missions and

1324
00:49:20,470 --> 00:49:18,960
of course with curiosity and now

1325
00:49:22,790 --> 00:49:20,480
perseverance

1326
00:49:25,910 --> 00:49:22,800
we're building on that base of knowledge

1327
00:49:29,030 --> 00:49:25,920
so all of that is so important we are in

1328
00:49:30,950 --> 00:49:29,040
fact trying to find signatures of life

1329
00:49:33,750 --> 00:49:30,960
and of course we're interested in

1330
00:49:35,670 --> 00:49:33,760
finding life itself now um that's not

1331
00:49:37,589 --> 00:49:35,680
what this mission specifically is all

1332
00:49:39,750 --> 00:49:37,599
about but i can tell you

1333
00:49:41,670 --> 00:49:39,760
in the last couple of years you know

1334
00:49:42,870 --> 00:49:41,680
nasa has made some significant

1335
00:49:45,190 --> 00:49:42,880
discoveries

1336
00:49:47,910 --> 00:49:45,200
complex organic compounds on the surface

1337
00:49:49,750 --> 00:49:47,920
of mars methane cycles that match the

1338
00:49:52,470 --> 00:49:49,760

seasons of mars

1339
00:49:54,230 --> 00:49:52,480
liquid water 12 kilometers under the

1340
00:49:56,150 --> 00:49:54,240
surface of mars

1341
00:49:56,950 --> 00:49:56,160
so there's there's so many things that

1342
00:49:58,790 --> 00:49:56,960
are

1343
00:50:01,670 --> 00:49:58,800
kind of building up here to say that

1344
00:50:03,990 --> 00:50:01,680
look the probability of finding life on

1345
00:50:05,589 --> 00:50:04,000
another world is going up we're not

1346
00:50:07,589 --> 00:50:05,599
saying it's there i don't know that it's

1347
00:50:09,829 --> 00:50:07,599
there nobody else knows either

1348
00:50:11,990 --> 00:50:09,839
but that's really what astrobiology is

1349
00:50:13,990 --> 00:50:12,000
all about and mars really gives us the

1350
00:50:16,309 --> 00:50:14,000
best opportunity i think in the short

1351
00:50:18,150 --> 00:50:16,319
term to make a significant discovery

1352
00:50:20,870 --> 00:50:18,160
that will forever change how we think of

1353
00:50:22,790 --> 00:50:20,880
ourselves and forever change

1354
00:50:25,109 --> 00:50:22,800
how we think of space exploration in

1355
00:50:27,270 --> 00:50:25,119
general look we can find life on another

1356
00:50:29,030 --> 00:50:27,280
world it i think

1357
00:50:32,230 --> 00:50:29,040
people are going to be so excited about

1358
00:50:33,510 --> 00:50:32,240
the discovery and what comes next

1359
00:50:35,190 --> 00:50:33,520
that that we're going to be doing

1360
00:50:36,950 --> 00:50:35,200
missions throughout the solar system i

1361
00:50:38,549 --> 00:50:36,960
know that the question earlier about why

1362
00:50:39,510 --> 00:50:38,559
are we going to mars and not these other

1363
00:50:40,950 --> 00:50:39,520

places

1364
00:50:42,710 --> 00:50:40,960
certainly we want to go to all those

1365
00:50:44,710 --> 00:50:42,720
places and we have plans to go to all

1366
00:50:47,750 --> 00:50:44,720
those places um

1367
00:50:49,990 --> 00:50:47,760
but but it's also true that um that you

1368
00:50:51,910 --> 00:50:50,000
know the highest probability of maybe

1369
00:50:53,990 --> 00:50:51,920
finding life at this point is gonna is

1370
00:50:55,829 --> 00:50:54,000
gonna be ours there are there are people

1371
00:50:58,710 --> 00:50:55,839
out there who would say

1372
00:51:02,470 --> 00:50:58,720
that europa or enceladus provide

1373
00:51:04,630 --> 00:51:02,480
biologically a higher probability um

1374
00:51:06,790 --> 00:51:04,640
but technologically that's going to take

1375
00:51:08,870 --> 00:51:06,800
some time and of course working on that

1376
00:51:11,349 --> 00:51:08,880
jpl i want to give

1377
00:51:13,829 --> 00:51:11,359
a lot of kudos a lot of compliments to

1378
00:51:17,030 --> 00:51:13,839
jpl which is you know a partner with

1379
00:51:19,910 --> 00:51:17,040
nasa we call it one of nasa's centers of

1380
00:51:22,150 --> 00:51:19,920
course it's affiliated with caltech

1381
00:51:24,069 --> 00:51:22,160
but what an amazing job by that team and

1382
00:51:25,990 --> 00:51:24,079
of course they're building the the plans

1383
00:51:28,630 --> 00:51:26,000
and and and the hardware that's going to

1384
00:51:31,430 --> 00:51:28,640
help us get to europa that of jupiter

1385
00:51:33,670 --> 00:51:31,440
where where we believe there's um the

1386
00:51:35,829 --> 00:51:33,680
the um the ingredients that could

1387
00:51:37,750 --> 00:51:35,839
potentially have life

1388
00:51:39,670 --> 00:51:37,760

so there's a lot of exciting things in

1389
00:51:42,230 --> 00:51:39,680
the field of astrobiology

1390
00:51:43,349 --> 00:51:42,240
and you know 15 years ago even 10 years

1391
00:51:44,630 --> 00:51:43,359
ago

1392
00:51:45,670 --> 00:51:44,640
if you would have said these things

1393
00:51:47,270 --> 00:51:45,680
people would have looked at you like

1394
00:51:48,870 --> 00:51:47,280
you're crazy and now

1395
00:51:50,950 --> 00:51:48,880
it's starting to become

1396
00:51:52,630 --> 00:51:50,960
more and more real so it's a great

1397
00:51:54,390 --> 00:51:52,640
question it's a great point and it's

1398
00:51:56,710 --> 00:51:54,400
it's something nasa thinks about all the

1399
00:52:00,309 --> 00:51:58,630
thanks jim and we've been getting some

1400
00:52:01,990 --> 00:52:00,319
questions coming in through the ask nasa

1401
00:52:05,349 --> 00:52:02,000
hashtag i'm going to read one of them

1402
00:52:07,829 --> 00:52:05,359
now everyone on twitter is asking apart

1403
00:52:12,950 --> 00:52:07,839
from entry descent and landing what is

1404
00:52:17,990 --> 00:52:16,069
well i can uh i can answer try to answer

1405
00:52:18,870 --> 00:52:18,000
that question there's a lot to choose

1406
00:52:20,870 --> 00:52:18,880
from

1407
00:52:22,870 --> 00:52:20,880
these these missions are very very

1408
00:52:25,270 --> 00:52:22,880
difficult you know we talked about the

1409
00:52:27,750 --> 00:52:25,280
challenge just in the last few months

1410
00:52:29,670 --> 00:52:27,760
um dealing with the pandemic obviously

1411
00:52:31,670 --> 00:52:29,680
but i think from a

1412
00:52:33,589 --> 00:52:31,680
basic mission perspective the most

1413
00:52:35,190 --> 00:52:33,599

difficult part

1414
00:52:37,349 --> 00:52:35,200
has has been

1415
00:52:38,309 --> 00:52:37,359
building and testing the the sampling

1416
00:52:39,829 --> 00:52:38,319
system

1417
00:52:42,069 --> 00:52:39,839
that we referred to

1418
00:52:43,190 --> 00:52:42,079
as i said before it's composed of a lot

1419
00:52:44,950 --> 00:52:43,200
of different

1420
00:52:47,829 --> 00:52:44,960
mechanisms

1421
00:52:50,870 --> 00:52:47,839
these are systems that have to operate a

1422
00:52:53,670 --> 00:52:50,880
very high level of reliability

1423
00:52:55,430 --> 00:52:53,680
they have to operate autonomously

1424
00:52:57,990 --> 00:52:55,440
there's a lot of control

1425
00:52:59,670 --> 00:52:58,000
and autonomy in our software systems

1426
00:53:01,990 --> 00:52:59,680
that go along with them

1427
00:53:03,190 --> 00:53:02,000
they require extensive uh test

1428
00:53:04,950 --> 00:53:03,200
facilities

1429
00:53:06,950 --> 00:53:04,960
uh so that we can simulate the martian

1430
00:53:08,630 --> 00:53:06,960
environment and and the right set of

1431
00:53:11,430 --> 00:53:08,640
rocks and targets

1432
00:53:13,829 --> 00:53:11,440
uh and then of course um you know on

1433
00:53:17,270 --> 00:53:13,839
this mission in particular

1434
00:53:18,150 --> 00:53:17,280
because of the the search for for those

1435
00:53:20,150 --> 00:53:18,160
uh

1436
00:53:22,710 --> 00:53:20,160
those very faint bio signatures which

1437
00:53:24,230 --> 00:53:22,720
katie and other people talked about

1438
00:53:26,390 --> 00:53:24,240

we had to keep them

1439
00:53:27,990 --> 00:53:26,400
essentially sterile from a biological

1440
00:53:29,829 --> 00:53:28,000
perspective

1441
00:53:31,750 --> 00:53:29,839
and exceptionally clean

1442
00:53:33,510 --> 00:53:31,760
especially organically clean which are

1443
00:53:35,750 --> 00:53:33,520
the signatures the chemical signatures

1444
00:53:38,309 --> 00:53:35,760
we're most interested in so

1445
00:53:40,710 --> 00:53:38,319
that's a difficult thing to do

1446
00:53:44,390 --> 00:53:40,720
when the rest of your spacecraft

1447
00:53:47,030 --> 00:53:44,400
is uh is is uh really

1448
00:53:49,430 --> 00:53:47,040
uh designed and inherited from the

1449
00:53:52,870 --> 00:53:49,440
systems that we have to use in the

1450
00:53:55,430 --> 00:53:52,880
aerospace industry and in civil space

1451
00:53:57,109 --> 00:53:55,440
so we had to isolate a lot of the key

1452
00:53:58,950 --> 00:53:57,119
critical components

1453
00:54:01,109 --> 00:53:58,960
uh from from the other parts of the

1454
00:54:03,430 --> 00:54:01,119
spacecraft from a contamination

1455
00:54:06,710 --> 00:54:03,440
perspective and that was i think the

1456
00:54:08,069 --> 00:54:06,720
biggest challenge for for this mission

1457
00:54:10,950 --> 00:54:08,079
you know once we get on the surface of

1458
00:54:13,430 --> 00:54:10,960
mars we have a responsibility to put

1459
00:54:15,030 --> 00:54:13,440
together a cache of samples that is

1460
00:54:17,589 --> 00:54:15,040
compelling enough and worthy enough to

1461
00:54:19,750 --> 00:54:17,599
return to earth and you know interesting

1462
00:54:22,230 --> 00:54:19,760
enough that it will propel and drive

1463
00:54:23,910 --> 00:54:22,240

future generations of mars science and

1464
00:54:25,510 --> 00:54:23,920
planetary science and we take that

1465
00:54:27,190 --> 00:54:25,520
responsibility very seriously and we

1466
00:54:29,030 --> 00:54:27,200
know that we have a tough job to do on

1467
00:54:30,309 --> 00:54:29,040
the surface to put that sample cache

1468
00:54:32,150 --> 00:54:30,319
together and so i think that's going to

1469
00:54:33,910 --> 00:54:32,160
be a challenge that we have to put

1470
00:54:35,910 --> 00:54:33,920
together diverse samples those that have

1471
00:54:38,150 --> 00:54:35,920
potential bio signatures and enough

1472
00:54:39,750 --> 00:54:38,160
samples that we cover cover the ground

1473
00:54:41,430 --> 00:54:39,760
to get that job done so we take that

1474
00:54:43,190 --> 00:54:41,440
very seriously and i think that's going

1475
00:54:46,630 --> 00:54:43,200
to be a big challenge for our our team

1476
00:54:50,950 --> 00:54:48,390
thanks katie and matt you kind of

1477
00:54:53,510 --> 00:54:50,960
touched on this nas on twitter is asking

1478
00:54:56,150 --> 00:54:53,520
is there any level of autonomy included

1479
00:54:58,390 --> 00:54:56,160
on this mars rover

1480
00:54:59,829 --> 00:54:58,400
there's a lot of autonomy

1481
00:55:02,789 --> 00:54:59,839
again just starting with the entry

1482
00:55:05,109 --> 00:55:02,799
descent and landing activity you know uh

1483
00:55:07,349 --> 00:55:05,119
one-way light time to mars is about 10

1484
00:55:10,870 --> 00:55:07,359
minutes and from the time we hit the

1485
00:55:13,109 --> 00:55:10,880
outer atmosphere of mars to the time

1486
00:55:14,470 --> 00:55:13,119
we're safely on the ground it's about

1487
00:55:18,470 --> 00:55:14,480
seven minutes

1488
00:55:20,390 --> 00:55:18,480

terror there is absolutely no

1489
00:55:22,549 --> 00:55:20,400
interaction with the spacecraft during

1490
00:55:25,190 --> 00:55:22,559
that period of time it has to do that

1491
00:55:26,870 --> 00:55:25,200
entire process uh itself

1492
00:55:28,630 --> 00:55:26,880
yes to understand

1493
00:55:30,710 --> 00:55:28,640
you know where it is from a navigation

1494
00:55:32,230 --> 00:55:30,720
perspective it has to know

1495
00:55:33,990 --> 00:55:32,240
when to jettison the cruise stage and

1496
00:55:35,750 --> 00:55:34,000
deploy the parachute and has to

1497
00:55:37,990 --> 00:55:35,760
understand

1498
00:55:40,950 --> 00:55:38,000
where it is in jezreel i talked about

1499
00:55:42,870 --> 00:55:40,960
this terrain relative navigation system

1500
00:55:45,270 --> 00:55:42,880
this is really again another level of

1501
00:55:46,789 --> 00:55:45,280
autonomy that we're laying on top of our

1502
00:55:48,789 --> 00:55:46,799
historical

1503
00:55:50,789 --> 00:55:48,799
autonomy on these missions and this is a

1504
00:55:52,150 --> 00:55:50,799
feed forward capability that these

1505
00:55:53,910 --> 00:55:52,160
future human

1506
00:55:55,829 --> 00:55:53,920
missions as well as the sample return

1507
00:55:57,990 --> 00:55:55,839
mission which lori talked about will

1508
00:55:59,829 --> 00:55:58,000
need and will want to use

1509
00:56:02,150 --> 00:55:59,839
trying to understand where those hazards

1510
00:56:04,230 --> 00:56:02,160
are and divert away from them all of

1511
00:56:07,829 --> 00:56:04,240
that requires uh the spacecraft to

1512
00:56:09,270 --> 00:56:07,839
understand to do those things on its own

1513
00:56:10,789 --> 00:56:09,280

and that's before we even get to the

1514
00:56:12,549 --> 00:56:10,799
surface you know once we're on the

1515
00:56:15,270 --> 00:56:12,559
surface we really are only able to

1516
00:56:17,829 --> 00:56:15,280
command the vehicle once a day

1517
00:56:20,710 --> 00:56:17,839
and so it it'll sleep and conserve power

1518
00:56:22,549 --> 00:56:20,720
overnight it'll wake up in the morning

1519
00:56:25,670 --> 00:56:22,559
we'll send a sequence of commands give

1520
00:56:27,270 --> 00:56:25,680
it its daily set of activities to do

1521
00:56:29,910 --> 00:56:27,280
and then it has to carry them out pretty

1522
00:56:32,069 --> 00:56:29,920
much by itself you know it has to it has

1523
00:56:33,190 --> 00:56:32,079
to make the decisions on how to drive to

1524
00:56:34,789 --> 00:56:33,200
the target

1525
00:56:36,309 --> 00:56:34,799
and how to do a lot of that sampling

1526
00:56:38,069 --> 00:56:36,319
work that we talked about as well as

1527
00:56:39,990 --> 00:56:38,079
keeping it safe under

1528
00:56:42,230 --> 00:56:40,000
keeping itself safe under adverse

1529
00:56:43,829 --> 00:56:42,240
anomalous conditions and so

1530
00:56:45,030 --> 00:56:43,839
there's a tremendous amount of autonomy

1531
00:56:48,710 --> 00:56:45,040
in the vehicles and it's one of the

1532
00:56:49,990 --> 00:56:48,720
things that makes the system so complex

1533
00:56:53,349 --> 00:56:50,000
thanks matt i'm going to head back to

1534
00:56:56,630 --> 00:56:53,359
the phone lines now we have gina sunsuri

1535
00:56:59,910 --> 00:56:58,069
my question question's been asked and

1536
00:57:02,549 --> 00:56:59,920
answered thank you

1537
00:57:07,510 --> 00:57:02,559
thanks gina all right we'll go next to

1538
00:57:11,589 --> 00:57:09,589

thank you all for doing this um

1539
00:57:13,430 --> 00:57:11,599
this one's probably for actually matt

1540
00:57:15,510 --> 00:57:13,440
and it's just about the helicopter and

1541
00:57:17,190 --> 00:57:15,520
that but i guess like a few details

1542
00:57:19,190 --> 00:57:17,200
maybe about what you would consider

1543
00:57:21,030 --> 00:57:19,200
mission success for the helicopter like

1544
00:57:23,109 --> 00:57:21,040
how many flights do you hope to make how

1545
00:57:24,950 --> 00:57:23,119
far will this place be

1546
00:57:27,750 --> 00:57:24,960
and also is there a possibility that

1547
00:57:29,670 --> 00:57:27,760
we'll get kind of perseverant eye views

1548
00:57:31,349 --> 00:57:29,680
of the helicopter going up and and

1549
00:57:33,109 --> 00:57:31,359
exploring our skies because that would

1550
00:57:33,829 --> 00:57:33,119
be pretty fantastic if you can pull that

1551
00:57:35,510 --> 00:57:33,839
off

1552
00:57:37,349 --> 00:57:35,520
thank you

1553
00:57:40,309 --> 00:57:37,359
sure i'll say a few words about the

1554
00:57:42,309 --> 00:57:40,319
helicopter and that this this is really

1555
00:57:43,510 --> 00:57:42,319
uh something that's cutting edge you

1556
00:57:45,030 --> 00:57:43,520
know this is

1557
00:57:47,510 --> 00:57:45,040
as the administrator said something

1558
00:57:49,430 --> 00:57:47,520
that's never been attempted before

1559
00:57:52,230 --> 00:57:49,440
and flying in martian atmospheric

1560
00:57:54,069 --> 00:57:52,240
conditions um which you know the the

1561
00:57:55,589 --> 00:57:54,079
atmosphere on mars is only one percent

1562
00:57:56,870 --> 00:57:55,599
the density

1563
00:57:58,710 --> 00:57:56,880

that we have here on the earth and

1564
00:58:01,270 --> 00:57:58,720
trying to control a system like this

1565
00:58:02,549 --> 00:58:01,280
under those um those conditions is is

1566
00:58:04,390 --> 00:58:02,559
not easy

1567
00:58:07,270 --> 00:58:04,400
uh in flight and then you have to land

1568
00:58:09,430 --> 00:58:07,280
it safely in an unknown terrain you know

1569
00:58:11,510 --> 00:58:09,440
these are all big challenges and that's

1570
00:58:13,510 --> 00:58:11,520
why this is a this is a technology

1571
00:58:14,309 --> 00:58:13,520
demonstration payload this is something

1572
00:58:20,150 --> 00:58:14,319
that

1573
00:58:21,270 --> 00:58:20,160
future missions

1574
00:58:22,789 --> 00:58:21,280
um

1575
00:58:24,710 --> 00:58:22,799
and so uh

1576
00:58:27,349 --> 00:58:24,720
you know that that's really that's

1577
00:58:28,710 --> 00:58:27,359
really the objective is is to get get

1578
00:58:30,710 --> 00:58:28,720
the helicopter

1579
00:58:33,030 --> 00:58:30,720
just to be able to accommodate it on the

1580
00:58:35,910 --> 00:58:33,040
vehicle was a big step getting it to

1581
00:58:37,670 --> 00:58:35,920
mars getting it safely off the vehicle

1582
00:58:39,510 --> 00:58:37,680
we're going to learn a lot and really

1583
00:58:41,510 --> 00:58:39,520
just the very first flight

1584
00:58:42,309 --> 00:58:41,520
where this helicopter spins its rotors

1585
00:58:45,030 --> 00:58:42,319
and

1586
00:58:47,190 --> 00:58:45,040
lifts up off the ground

1587
00:58:48,789 --> 00:58:47,200
it's going to be both historic and we're

1588
00:58:50,470 --> 00:58:48,799

going to learn a lot

1589
00:58:53,349 --> 00:58:50,480
and so we are not

1590
00:58:55,270 --> 00:58:53,359
uh you know we we are not looking for an

1591
00:58:57,270 --> 00:58:55,280
extensive and ambitious

1592
00:58:59,430 --> 00:58:57,280
uh return from this technology we're

1593
00:59:01,109 --> 00:58:59,440
looking to learn those first few things

1594
00:59:02,789 --> 00:59:01,119
that we need to learn with the

1595
00:59:04,630 --> 00:59:02,799
technology

1596
00:59:07,270 --> 00:59:04,640
we should be able to image the

1597
00:59:08,870 --> 00:59:07,280
helicopter while it's flying uh from

1598
00:59:11,349 --> 00:59:08,880
from the rover uh we're gonna have a

1599
00:59:13,510 --> 00:59:11,359
safe standoff distance you know 50 to

1600
00:59:15,190 --> 00:59:13,520
100 meters or so

1601
00:59:17,349 --> 00:59:15,200
but we have pretty powerful cameras we

1602
00:59:19,990 --> 00:59:17,359
should be able to zoom in and and we're

1603
00:59:21,829 --> 00:59:20,000
hoping to be able to catch uh catch that

1604
00:59:24,630 --> 00:59:21,839
uh catch that flight whether or not the

1605
00:59:26,549 --> 00:59:24,640
helicopter will actually see the vehicle

1606
00:59:27,990 --> 00:59:26,559
the perseverance rover

1607
00:59:30,309 --> 00:59:28,000
uh will depend a little bit on

1608
00:59:33,910 --> 00:59:30,319
orientation and and how high it goes and

1609
00:59:41,030 --> 00:59:36,069
great thanks matt and now on the line we

1610
00:59:45,190 --> 00:59:42,630
hi thank you so much for taking my

1611
00:59:47,910 --> 00:59:45,200
question i think this is for katie

1612
00:59:50,549 --> 00:59:47,920
possibly seen as how perseverance is all

1613
00:59:53,030 --> 00:59:50,559

about deciding whether or not mars has

1614
00:59:56,150 --> 00:59:53,040
had past life i'm curious to know what

1615
00:59:58,150 --> 00:59:56,160
you are considering a biosignature and

1616
01:00:00,150 --> 00:59:58,160
how you will make the distinction

1617
01:00:02,870 --> 01:00:00,160
whether or not you have actually found

1618
01:00:04,870 --> 01:00:02,880
evidence of past life on mars thanks yes

1619
01:00:06,549 --> 01:00:04,880
thank you that's a great question and

1620
01:00:08,390 --> 01:00:06,559
it's one that we think a lot about on

1621
01:00:10,630 --> 01:00:08,400
the science team you know i think our

1622
01:00:12,390 --> 01:00:10,640
our bar is is high for the

1623
01:00:14,390 --> 01:00:12,400
identification of a sign of life on

1624
01:00:15,589 --> 01:00:14,400
another planet as it should be

1625
01:00:19,109 --> 01:00:15,599
because we don't want to make that

1626
01:00:21,030 --> 01:00:19,119
discovery uh lightly um but at the same

1627
01:00:22,870 --> 01:00:21,040
time with with perseverance and its goal

1628
01:00:24,789 --> 01:00:22,880
of seeking signs of ancient life i think

1629
01:00:26,710 --> 01:00:24,799
we also have to to open our minds to the

1630
01:00:28,549 --> 01:00:26,720
the possibilities of what life could

1631
01:00:30,789 --> 01:00:28,559
look like on another planet and and

1632
01:00:32,230 --> 01:00:30,799
looking for you know examples of you

1633
01:00:34,549 --> 01:00:32,240
know of something that is similar to

1634
01:00:36,309 --> 01:00:34,559
what we we see in biosignatures in our

1635
01:00:37,990 --> 01:00:36,319
own earth record and so i think what

1636
01:00:39,829 --> 01:00:38,000
we're looking for are are really the

1637
01:00:41,589 --> 01:00:39,839
patterns and textures where we have a

1638
01:00:43,510 --> 01:00:41,599

hard time explaining how that could have

1639
01:00:45,510 --> 01:00:43,520
formed without the influence of life and

1640
01:00:47,270 --> 01:00:45,520
i think every time we see something on

1641
01:00:48,710 --> 01:00:47,280
the surface of mars that kind of gets us

1642
01:00:50,549 --> 01:00:48,720
asking those questions we go through the

1643
01:00:52,950 --> 01:00:50,559
list of of possibilities you know could

1644
01:00:55,030 --> 01:00:52,960
it have formed in an abiotic way and i

1645
01:00:57,670 --> 01:00:55,040
think if we get to the point where we

1646
01:00:59,990 --> 01:00:57,680
are really struggling to explain a

1647
01:01:01,750 --> 01:01:00,000
phenomenon or something that we see

1648
01:01:03,030 --> 01:01:01,760
with abiotic processes i think that's

1649
01:01:05,030 --> 01:01:03,040
when we start to say you know i think

1650
01:01:06,630 --> 01:01:05,040
this could be a potential biosignature

1651
01:01:07,829 --> 01:01:06,640
but i think it's also important to to

1652
01:01:09,270 --> 01:01:07,839
realize that

1653
01:01:10,870 --> 01:01:09,280
very likely

1654
01:01:12,789 --> 01:01:10,880
we'll have to return those samples to

1655
01:01:14,549 --> 01:01:12,799
earth to make that definitive conclusion

1656
01:01:16,710 --> 01:01:14,559
about whether these samples contain life

1657
01:01:18,630 --> 01:01:16,720
in them so i think on the perseverant

1658
01:01:21,109 --> 01:01:18,640
side we see it as our our job to

1659
01:01:22,870 --> 01:01:21,119
identify potential biosignatures things

1660
01:01:24,390 --> 01:01:22,880
that are worthy of additional study here

1661
01:01:25,910 --> 01:01:24,400
on earth with the full arsenal of

1662
01:01:27,670 --> 01:01:25,920
analytical capabilities that we have

1663
01:01:28,870 --> 01:01:27,680

here in our own laboratories and i think

1664
01:01:32,549 --> 01:01:28,880
that's how we're going to approach that

1665
01:01:39,030 --> 01:01:35,030
great and up next we have antonia had

1666
01:01:41,510 --> 01:01:39,040
emilio with florida today

1667
01:01:43,990 --> 01:01:41,520
hi thanks for taking my question i was

1668
01:01:46,309 --> 01:01:44,000
just wondering as cases of corona buyers

1669
01:01:48,230 --> 01:01:46,319
in florida continue to rise will nasa be

1670
01:01:50,470 --> 01:01:48,240
asking the public again to watch this

1671
01:01:52,549 --> 01:01:50,480
launch from home and if so will it also

1672
01:01:57,510 --> 01:01:52,559
provide a virtual experience show like

1673
01:02:02,470 --> 01:01:59,910
so for this particular mission uh we're

1674
01:02:05,589 --> 01:02:02,480
asking people to follow

1675
01:02:06,390 --> 01:02:05,599
the guidelines of the the governor of

1676
01:02:08,390 --> 01:02:06,400
florida

1677
01:02:09,829 --> 01:02:08,400
we want everybody to practice social

1678
01:02:12,309 --> 01:02:09,839
distancing and

1679
01:02:13,829 --> 01:02:12,319
um and if if uh if you're within six

1680
01:02:15,349 --> 01:02:13,839
feet make sure you're wearing a mask

1681
01:02:16,150 --> 01:02:15,359
those kind of things

1682
01:02:18,870 --> 01:02:16,160
um

1683
01:02:20,950 --> 01:02:18,880
but we're you know we we uh

1684
01:02:22,710 --> 01:02:20,960
we're not telling people not to not to

1685
01:02:23,829 --> 01:02:22,720
visit for this launch we're not saying

1686
01:02:25,670 --> 01:02:23,839
that um

1687
01:02:27,349 --> 01:02:25,680
what we do have to make sure we do is we

1688
01:02:28,789 --> 01:02:27,359

protect the workforce at the kennedy

1689
01:02:31,430 --> 01:02:28,799
space center because we have a lot of

1690
01:02:34,309 --> 01:02:31,440
work ahead of us especially the summer

1691
01:02:36,870 --> 01:02:34,319
we've got the entry descent landing of

1692
01:02:39,589 --> 01:02:36,880
the crew dragon that took our astronauts

1693
01:02:40,630 --> 01:02:39,599
to the international space station

1694
01:02:44,309 --> 01:02:40,640
we have

1695
01:02:46,710 --> 01:02:44,319
to make sure so we're not going to open

1696
01:02:49,029 --> 01:02:46,720
up the kennedy space center

1697
01:02:50,549 --> 01:02:49,039
but certainly uh people are people are

1698
01:02:51,670 --> 01:02:50,559
gonna travel we asked people not to

1699
01:02:53,349 --> 01:02:51,680
travel for

1700
01:02:55,270 --> 01:02:53,359
for dm2

1701
01:02:57,990 --> 01:02:55,280
uh which was of course the the launch of

1702
01:02:58,710 --> 01:02:58,000
the falcon 9 rocket with the crew dragon

1703
01:03:02,950 --> 01:02:58,720
and

1704
01:03:04,309 --> 01:03:02,960
the capsule

1705
01:03:06,390 --> 01:03:04,319
and

1706
01:03:07,349 --> 01:03:06,400
it appears they didn't listen to us

1707
01:03:09,589 --> 01:03:07,359
so

1708
01:03:11,589 --> 01:03:09,599
we're asking people to follow

1709
01:03:17,750 --> 01:03:11,599
all of the necessary guidelines to to

1710
01:03:23,829 --> 01:03:20,950
thanks jim up next is dave moser with

1711
01:03:25,510 --> 01:03:23,839
business insider

1712
01:03:27,430 --> 01:03:25,520
uh thank you for taking my question and

1713
01:03:29,109 --> 01:03:27,440

good luck with the launch um matt you

1714
01:03:30,630 --> 01:03:29,119
mentioned the edl video cameras i'd like

1715
01:03:32,950 --> 01:03:30,640
to know more about those uh what

1716
01:03:35,190 --> 01:03:32,960
resolution will they film in when might

1717
01:03:37,750 --> 01:03:35,200
we expect that seven minutes of terror

1718
01:03:39,670 --> 01:03:37,760
footage to get back to earth and uh will

1719
01:03:41,190 --> 01:03:39,680
you have any use for them after landing

1720
01:03:43,270 --> 01:03:41,200
and then um i also understand that this

1721
01:03:44,710 --> 01:03:43,280
is a discretionary payload

1722
01:03:48,950 --> 01:03:44,720
did these cameras sort of beat out any

1723
01:03:53,190 --> 01:03:50,470
uh yeah those are all good questions

1724
01:03:56,710 --> 01:03:53,200
i'll try to answer them in some sort of

1725
01:04:01,510 --> 01:03:59,109
just to start with your last uh question

1726
01:04:03,349 --> 01:04:01,520
uh these were not uh

1727
01:04:05,029 --> 01:04:03,359
um these were not in competition with

1728
01:04:07,510 --> 01:04:05,039
any other payload on this on the

1729
01:04:11,029 --> 01:04:07,520
spacecraft our payloads were selected

1730
01:04:13,589 --> 01:04:11,039
uh via the normal process and um and as

1731
01:04:15,829 --> 01:04:13,599
we got further down the road and got

1732
01:04:18,069 --> 01:04:15,839
more mature um we realized we you know

1733
01:04:19,589 --> 01:04:18,079
that we had an opportunity we had some

1734
01:04:22,950 --> 01:04:19,599
uh residual

1735
01:04:25,829 --> 01:04:22,960
uh some residual capability to to to

1736
01:04:28,309 --> 01:04:25,839
install these they take very very little

1737
01:04:30,789 --> 01:04:28,319
uh mass and volume i don't have the

1738
01:04:32,069 --> 01:04:30,799

numbers exactly but um they're they're

1739
01:04:34,710 --> 01:04:32,079
essentially

1740
01:04:37,109 --> 01:04:34,720
uh you know uh unnoticeable at the

1741
01:04:40,309 --> 01:04:37,119
spacecraft level as far as resource

1742
01:04:41,990 --> 01:04:40,319
requirements go uh and that's because um

1743
01:04:44,630 --> 01:04:42,000
we didn't build something new we didn't

1744
01:04:46,549 --> 01:04:44,640
build something uh you know that was

1745
01:04:49,670 --> 01:04:46,559
particularly sophisticated we were able

1746
01:04:53,029 --> 01:04:49,680
to go out and use uh commercial uh

1747
01:04:54,789 --> 01:04:53,039
off-the-shelf uh available uh products

1748
01:04:56,870 --> 01:04:54,799
and um

1749
01:04:59,349 --> 01:04:56,880
and so uh

1750
01:05:02,470 --> 01:04:59,359
and so that that made it a lot easier to

1751
01:05:04,390 --> 01:05:02,480
to uh go both develop them uh quickly at

1752
01:05:05,670 --> 01:05:04,400
low cost and and to

1753
01:05:08,789 --> 01:05:05,680
accommodate them

1754
01:05:10,870 --> 01:05:08,799
uh resolution wise i'll have to check i

1755
01:05:14,789 --> 01:05:10,880
believe there are 10 megapixel uh

1756
01:05:17,109 --> 01:05:14,799
cameras um frame rates as high as uh 40

1757
01:05:19,109 --> 01:05:17,119
i think frames per second

1758
01:05:21,029 --> 01:05:19,119
um but uh

1759
01:05:24,230 --> 01:05:21,039
we can get the exact we can get the

1760
01:05:25,589 --> 01:05:24,240
exact numbers they produce a lot of data

1761
01:05:27,109 --> 01:05:25,599
the data is not going to come back in

1762
01:05:29,510 --> 01:05:27,119
real time during entry descent and

1763
01:05:31,349 --> 01:05:29,520

landing we have very limited

1764
01:05:33,829 --> 01:05:31,359
telemetry during that period and so

1765
01:05:35,589 --> 01:05:33,839
we'll bring that that imagery back

1766
01:05:38,309 --> 01:05:35,599
over the first couple weeks on the

1767
01:05:43,829 --> 01:05:40,630
thanks matt up next is paul brinkman

1768
01:05:49,750 --> 01:05:46,789
uh yes hello thanks for doing this

1769
01:05:51,029 --> 01:05:49,760
obviously the mars rovers have surprised

1770
01:05:53,270 --> 01:05:51,039
in the past

1771
01:05:55,589 --> 01:05:53,280
in terms of how long

1772
01:05:58,470 --> 01:05:55,599
they've stayed operational i'm wondering

1773
01:06:00,470 --> 01:05:58,480
you know what is the outside

1774
01:06:01,670 --> 01:06:00,480
length of time that that

1775
01:06:03,750 --> 01:06:01,680
both

1776
01:06:07,670 --> 01:06:03,760
for severance ends

1777
01:06:09,349 --> 01:06:07,680
ingenuity could be operational and also

1778
01:06:11,510 --> 01:06:09,359
regarding the uh

1779
01:06:13,990 --> 01:06:11,520
the helicopter um to what extent have

1780
01:06:15,990 --> 01:06:14,000
have do you know like how many flights

1781
01:06:19,109 --> 01:06:16,000
there might be for that

1782
01:06:26,390 --> 01:06:22,950
uh so i can uh i can uh respond to the

1783
01:06:28,710 --> 01:06:26,400
longevity question um we we have a

1784
01:06:32,549 --> 01:06:28,720
primary mission defined for the vehicle

1785
01:06:35,190 --> 01:06:32,559
of one mars year which is is roughly uh

1786
01:06:38,950 --> 01:06:35,200
you know two earth years and that's

1787
01:06:41,510 --> 01:06:38,960
similar to the design requirement for

1788
01:06:43,109 --> 01:06:41,520

uh for curiosity um as you know

1789
01:06:45,589 --> 01:06:43,119
curiosity is

1790
01:06:48,630 --> 01:06:45,599
is uh is still operating on the surface

1791
01:06:49,670 --> 01:06:48,640
here about eight years or so since we we

1792
01:06:50,549 --> 01:06:49,680
landed

1793
01:06:52,870 --> 01:06:50,559
um

1794
01:06:54,630 --> 01:06:52,880
the good news about these systems is

1795
01:06:56,230 --> 01:06:54,640
that although they're

1796
01:06:58,150 --> 01:06:56,240
they have to operate in a harsh

1797
01:07:01,510 --> 01:06:58,160
environment that environment is

1798
01:07:03,510 --> 01:07:01,520
relatively repeatable and stable and so

1799
01:07:05,589 --> 01:07:03,520
once you get past

1800
01:07:08,549 --> 01:07:05,599
those those initial

1801
01:07:11,910 --> 01:07:08,559
issues those infant mortality issues

1802
01:07:14,309 --> 01:07:11,920
it's not unusual for our spacecraft

1803
01:07:17,349 --> 01:07:14,319
to continue on for uh

1804
01:07:19,750 --> 01:07:17,359
well beyond their design design lifetime

1805
01:07:22,230 --> 01:07:19,760
uh voyager one of two are the best

1806
01:07:23,109 --> 01:07:22,240
examples i can think of you know

1807
01:07:27,349 --> 01:07:23,119
but

1808
01:07:29,589 --> 01:07:27,359
to operate the system under the

1809
01:07:31,430 --> 01:07:29,599
assumption that

1810
01:07:33,589 --> 01:07:31,440
you know that we'll only have so much

1811
01:07:34,950 --> 01:07:33,599
time to get the work done

1812
01:07:37,270 --> 01:07:34,960
and uh

1813
01:07:40,829 --> 01:07:37,280

and build it robustly and and hope that

1814
01:07:46,789 --> 01:07:43,750
time great does anyone want to take on

1815
01:07:49,990 --> 01:07:46,799
the ingenuity question

1816
01:07:50,950 --> 01:07:50,000
on uh ingenuity we have um

1817
01:07:53,750 --> 01:07:50,960
three

1818
01:07:56,710 --> 01:07:53,760
flights uh designed for for the surface

1819
01:07:58,309 --> 01:07:56,720
i think uh you know kind of nominally

1820
01:07:59,829 --> 01:07:58,319
however as i said

1821
01:08:03,109 --> 01:07:59,839
we're we're going to take them one

1822
01:08:05,589 --> 01:08:03,119
flight at a time so

1823
01:08:09,349 --> 01:08:05,599
and then up next is tony rice with

1824
01:08:13,670 --> 01:08:11,109
thanks for taking my question as this is

1825
01:08:15,190 --> 01:08:13,680
from matt wallace uh one of the few

1826
01:08:17,110 --> 01:08:15,200
disappointments from the curiosity

1827
01:08:19,189 --> 01:08:17,120
introduced that landing was the damage

1828
01:08:21,189 --> 01:08:19,199
that occurred to the wind sensor on the

1829
01:08:24,149 --> 01:08:21,199
rims instrument have there been any

1830
01:08:25,749 --> 01:08:24,159
changes in the edl procedure or in the

1831
01:08:27,590 --> 01:08:25,759
media instrument itself to prevent

1832
01:08:29,189 --> 01:08:27,600
something similar from happening again

1833
01:08:31,590 --> 01:08:29,199
based on what you learned nearly eight

1834
01:08:32,789 --> 01:08:31,600
years ago

1835
01:08:34,470 --> 01:08:32,799
you know one of one of the things we

1836
01:08:36,870 --> 01:08:34,480
learned with our sky crane system is

1837
01:08:39,110 --> 01:08:36,880
that we have the ability to kick up some

1838
01:08:40,950 --> 01:08:39,120

debris from the engines on the descent

1839
01:08:42,470 --> 01:08:40,960
stage and

1840
01:08:44,870 --> 01:08:42,480
and we have taken

1841
01:08:46,709 --> 01:08:44,880
we had may have made some changes on

1842
01:08:48,309 --> 01:08:46,719
this project to protect things that are

1843
01:08:49,749 --> 01:08:48,319
sensitive to that or potentially

1844
01:08:52,870 --> 01:08:49,759
sensitive to that

1845
01:08:54,550 --> 01:08:52,880
optics when sensors are good examples

1846
01:08:56,229 --> 01:08:54,560
we have a debris shield for instance

1847
01:08:57,749 --> 01:08:56,239
around the helicopter on the bottom of

1848
01:08:59,669 --> 01:08:57,759
the vehicle

1849
01:09:01,030 --> 01:08:59,679
so the answer is yes we've we've tried

1850
01:09:03,910 --> 01:09:01,040
to adjust for

1851
01:09:05,430 --> 01:09:03,920
for that environment

1852
01:09:07,510 --> 01:09:05,440
thanks again matt we have a lot of

1853
01:09:11,990 --> 01:09:07,520
people on the lines right now up next is

1854
01:09:15,749 --> 01:09:14,789
hi uh thank you very much for taking a

1855
01:09:17,910 --> 01:09:15,759
question

1856
01:09:20,550 --> 01:09:17,920
for the administrator if i may

1857
01:09:23,030 --> 01:09:20,560
nasa is not alone in voyaging to mars

1858
01:09:25,749 --> 01:09:23,040
this summer china expects to launch its

1859
01:09:27,829 --> 01:09:25,759
first mars lander i guess the united

1860
01:09:29,510 --> 01:09:27,839
arab emirates is launching its first

1861
01:09:31,349 --> 01:09:29,520
interplanetary mission

1862
01:09:35,030 --> 01:09:31,359
destination mars

1863
01:09:36,470 --> 01:09:35,040

uh european space agency and russia are

1864
01:09:39,990 --> 01:09:36,480
putting their

1865
01:09:41,669 --> 01:09:40,000
lander together for 2022 now i guess and

1866
01:09:44,709 --> 01:09:41,679
of course spacex keeps talking about

1867
01:09:47,110 --> 01:09:44,719
starting the cash supplies for future

1868
01:09:49,990 --> 01:09:47,120
colonists i mean this is very busy

1869
01:09:51,910 --> 01:09:50,000
i wonder if you'd reflect for us on the

1870
01:09:54,310 --> 01:09:51,920
changing nature of interplanetary

1871
01:09:56,709 --> 01:09:54,320
exploration in this

1872
01:09:59,910 --> 01:09:56,719
age of internationalization what are the

1873
01:10:04,229 --> 01:09:59,920
operational and diplomatic

1874
01:10:06,390 --> 01:10:04,239
effects from your advantage thank you

1875
01:10:07,910 --> 01:10:06,400
that's a another very important question

1876
01:10:10,390 --> 01:10:07,920
the first thing that we're going to need

1877
01:10:12,310 --> 01:10:10,400
is additional communication throughput

1878
01:10:14,229 --> 01:10:12,320
that's the number one thing that that

1879
01:10:17,669 --> 01:10:14,239
we're going to need and um

1880
01:10:20,229 --> 01:10:17,679
we're already um at the limits of of of

1881
01:10:22,229 --> 01:10:20,239
our communication capabilities for for

1882
01:10:23,910 --> 01:10:22,239
deep space so we're going to need to

1883
01:10:25,750 --> 01:10:23,920
really plus up the architecture for that

1884
01:10:28,149 --> 01:10:25,760
but to your point a lot of these

1885
01:10:30,310 --> 01:10:28,159
countries that do these activities they

1886
01:10:32,630 --> 01:10:30,320
they um they want to use the deep space

1887
01:10:34,470 --> 01:10:32,640
network that uh that nasa has

1888
01:10:35,910 --> 01:10:34,480

established and

1889
01:10:38,870 --> 01:10:35,920
we're very

1890
01:10:41,270 --> 01:10:38,880
willing uh to support uh in that effort

1891
01:10:43,830 --> 01:10:41,280
this is about science and discovery

1892
01:10:45,910 --> 01:10:43,840
exploration and

1893
01:10:48,709 --> 01:10:45,920
i think when people see countries doing

1894
01:10:51,350 --> 01:10:48,719
these stunning things on other worlds um

1895
01:10:53,590 --> 01:10:51,360
it inspires all of us and so

1896
01:10:55,030 --> 01:10:53,600
certainly we are we are supportive of of

1897
01:10:56,070 --> 01:10:55,040
these activities

1898
01:10:57,910 --> 01:10:56,080
um

1899
01:10:59,270 --> 01:10:57,920
and and ultimately you know remember

1900
01:11:01,669 --> 01:10:59,280
what we're trying to do we're trying to

1901
01:11:04,630 --> 01:11:01,679
get humans to mars that's that's the

1902
01:11:06,070 --> 01:11:04,640
objective um and these robotic precursor

1903
01:11:08,709 --> 01:11:06,080
missions i think

1904
01:11:10,310 --> 01:11:08,719
kind of uh open the eyes of of the

1905
01:11:11,990 --> 01:11:10,320
american people and people all around

1906
01:11:14,630 --> 01:11:12,000
the world as to what the possibilities

1907
01:11:15,830 --> 01:11:14,640
are and it helps inspire that that next

1908
01:11:19,110 --> 01:11:15,840
generation

1909
01:11:21,669 --> 01:11:19,120
we see

1910
01:11:23,510 --> 01:11:21,679
uh humans uh living and working on the

1911
01:11:25,510 --> 01:11:23,520
surface of mars

1912
01:11:27,110 --> 01:11:25,520
so there's there's uh

1913
01:11:27,830 --> 01:11:27,120

there's a lot that goes into this you

1914
01:11:30,149 --> 01:11:27,840
know

1915
01:11:32,709 --> 01:11:30,159
i'm very excited about the united arab

1916
01:11:35,590 --> 01:11:32,719
emirates and their their hope mission

1917
01:11:36,630 --> 01:11:35,600
um we have done a lot uh to support them

1918
01:11:38,790 --> 01:11:36,640
and

1919
01:11:41,270 --> 01:11:38,800
they want to be big supporters of ours

1920
01:11:44,070 --> 01:11:41,280
in the artemis program

1921
01:11:45,189 --> 01:11:44,080
and of course they're very involved in

1922
01:11:47,590 --> 01:11:45,199
you know they're going to be launching

1923
01:11:50,709 --> 01:11:47,600
in a few short years their own

1924
01:11:52,709 --> 01:11:50,719
rover to the surface of the moon so

1925
01:11:55,510 --> 01:11:52,719
a lot of countries are stepping up in a

1926
01:11:57,350 --> 01:11:55,520
big way countries that historically have

1927
01:11:59,189 --> 01:11:57,360
not been uh you know

1928
01:12:01,910 --> 01:11:59,199
exploration countries are stepping up

1929
01:12:04,229 --> 01:12:01,920
and not just not just uh talking about

1930
01:12:05,830 --> 01:12:04,239
it but backing it up with budgets and so

1931
01:12:09,270 --> 01:12:05,840
all of this is going to be very helpful

1932
01:12:11,669 --> 01:12:09,280
for us as we move forward uh nasa is an

1933
01:12:13,830 --> 01:12:11,679
is an institution that is a tool of

1934
01:12:17,030 --> 01:12:13,840
diplomacy and there is no better

1935
01:12:19,830 --> 01:12:17,040
diplomacy than exploring our own solar

1936
01:12:24,229 --> 01:12:19,840
system together and eventually uh the

1937
01:12:31,430 --> 01:12:27,510
great thanks jim and now we have chris

1938
01:12:33,110 --> 01:12:31,440

and carlo with kfi news

1939
01:12:35,590 --> 01:12:33,120
yeah thanks guys for taking my question

1940
01:12:37,510 --> 01:12:35,600
um just going back to kobe here real

1941
01:12:39,910 --> 01:12:37,520
quick some specific challenges you guys

1942
01:12:41,910 --> 01:12:39,920
obviously faced in working remotely nasa

1943
01:12:43,669 --> 01:12:41,920
and jpl are a bit famous for adapting

1944
01:12:45,830 --> 01:12:43,679
and building out new systems for those

1945
01:12:48,470 --> 01:12:45,840
adaptations and i'm just curious about

1946
01:12:49,910 --> 01:12:48,480
what adaptations to workflow may be

1947
01:12:51,350 --> 01:12:49,920
carried forward in the future what

1948
01:12:55,110 --> 01:12:51,360
lessons did you learn during the

1949
01:12:58,390 --> 01:12:56,630
i'll start there's there's so many

1950
01:13:01,030 --> 01:12:58,400
different things

1951
01:13:02,790 --> 01:13:01,040
you know as right now most of nasa is

1952
01:13:05,270 --> 01:13:02,800
working remotely

1953
01:13:07,030 --> 01:13:05,280
nasa has been for a long time very

1954
01:13:09,270 --> 01:13:07,040
forward leaning on

1955
01:13:11,350 --> 01:13:09,280
uh teleworking and so it was really easy

1956
01:13:13,430 --> 01:13:11,360
for us to actually go to

1957
01:13:16,229 --> 01:13:13,440
uh you know a profile where most of us

1958
01:13:17,189 --> 01:13:16,239
are working remotely so that that really

1959
01:13:19,350 --> 01:13:17,199
was not

1960
01:13:21,270 --> 01:13:19,360
terribly problematic

1961
01:13:23,510 --> 01:13:21,280
at the same time we still have to build

1962
01:13:24,870 --> 01:13:23,520
hardware and our contractors still have

1963
01:13:26,870 --> 01:13:24,880

to build hardware so we have to make

1964
01:13:29,590 --> 01:13:26,880
sure that you know we're we're doing

1965
01:13:31,510 --> 01:13:29,600
what we can for social distancing um you

1966
01:13:34,229 --> 01:13:31,520
know changing shifts so that instead of

1967
01:13:35,910 --> 01:13:34,239
having you know 12 people working on a

1968
01:13:37,030 --> 01:13:35,920
vehicle at the same time we could divide

1969
01:13:38,870 --> 01:13:37,040
it up

1970
01:13:40,550 --> 01:13:38,880
and instead have eight hour shifts where

1971
01:13:43,030 --> 01:13:40,560
you've got you know three shifts of four

1972
01:13:44,550 --> 01:13:43,040
people working on a vehicle

1973
01:13:46,229 --> 01:13:44,560
and of course making sure everybody has

1974
01:13:47,590 --> 01:13:46,239
their personal protective equipment and

1975
01:13:50,229 --> 01:13:47,600
those kind of things

1976
01:13:51,750 --> 01:13:50,239
um you know as we move forward as we as

1977
01:13:53,350 --> 01:13:51,760
we start going you know we went all the

1978
01:13:55,669 --> 01:13:53,360
way to stage four at a lot of our

1979
01:13:57,910 --> 01:13:55,679
centers which meant basically nobody can

1980
01:13:59,750 --> 01:13:57,920
come to work because um you look at some

1981
01:14:02,070 --> 01:13:59,760
of our centers there was some

1982
01:14:04,149 --> 01:14:02,080
some outbreaks of coronavirus in the

1983
01:14:06,070 --> 01:14:04,159
regions where those centers are

1984
01:14:07,830 --> 01:14:06,080
but now we're getting to a point where

1985
01:14:10,310 --> 01:14:07,840
we can go to stage three where we have

1986
01:14:12,870 --> 01:14:10,320
mission critical not mission essential

1987
01:14:15,510 --> 01:14:12,880
which is what mars 2020 is but mission

1988
01:14:17,510 --> 01:14:15,520

critical functions which um are still

1989
01:14:19,750 --> 01:14:17,520
very important missions that we need to

1990
01:14:21,510 --> 01:14:19,760
start getting back underway

1991
01:14:23,270 --> 01:14:21,520
um and and eventually we want to get

1992
01:14:25,189 --> 01:14:23,280
back to stage two and eventually back to

1993
01:14:26,390 --> 01:14:25,199
normal working a normal working

1994
01:14:28,149 --> 01:14:26,400
environment but i think one of the

1995
01:14:29,750 --> 01:14:28,159
things that we've taken away is how much

1996
01:14:31,750 --> 01:14:29,760
work you can actually do when you're

1997
01:14:33,270 --> 01:14:31,760
still at home um

1998
01:14:35,189 --> 01:14:33,280
and and

1999
01:14:37,270 --> 01:14:35,199
so there's different types of work that

2000
01:14:39,030 --> 01:14:37,280
you're able to do from home and i'll

2001
01:14:41,030 --> 01:14:39,040
tell you when i'm at home i'm doing a

2002
01:14:42,790 --> 01:14:41,040
lot more outreach than i've ever been

2003
01:14:44,630 --> 01:14:42,800
able to do before because everybody is

2004
01:14:45,910 --> 01:14:44,640
either a phone call or a teleconference

2005
01:14:47,590 --> 01:14:45,920
away

2006
01:14:48,790 --> 01:14:47,600
we're not having to organize schedules

2007
01:14:50,950 --> 01:14:48,800
to get everybody's schedules to

2008
01:14:52,310 --> 01:14:50,960
perfectly patch and and travel and

2009
01:14:53,510 --> 01:14:52,320
everything else so there's there's

2010
01:14:55,669 --> 01:14:53,520
certain areas where you're more

2011
01:14:57,430 --> 01:14:55,679
productive in other areas where you're

2012
01:14:59,270 --> 01:14:57,440
less productive

2013
01:15:01,030 --> 01:14:59,280

and i think when we get back to a more

2014
01:15:03,750 --> 01:15:01,040
normalized work environment we're going

2015
01:15:05,189 --> 01:15:03,760
to have to take what the lessons learned

2016
01:15:07,350 --> 01:15:05,199
and apply them

2017
01:15:08,950 --> 01:15:07,360
and i know i know jpl

2018
01:15:10,630 --> 01:15:08,960
has been thinking about these things as

2019
01:15:12,229 --> 01:15:10,640
well um

2020
01:15:15,510 --> 01:15:12,239
so i don't know if anybody else has

2021
01:15:19,669 --> 01:15:18,149
yeah i mean we're i'll just uh uh agree

2022
01:15:20,950 --> 01:15:19,679
with the administrator completely you

2023
01:15:22,870 --> 01:15:20,960
know we're carrying these lessons

2024
01:15:25,189 --> 01:15:22,880
forward we're starting to look as well

2025
01:15:27,669 --> 01:15:25,199
into the at least relative just relative

2026
01:15:29,350 --> 01:15:27,679
to 2020 we're we're pulling the lessons

2027
01:15:30,870 --> 01:15:29,360
learned that we've uh

2028
01:15:32,709 --> 01:15:30,880
acquired over the last several months

2029
01:15:35,110 --> 01:15:32,719
into our operations we're thinking about

2030
01:15:36,550 --> 01:15:35,120
what it means with respect to critical

2031
01:15:38,070 --> 01:15:36,560
activities like entry descent and

2032
01:15:40,229 --> 01:15:38,080
landing

2033
01:15:41,910 --> 01:15:40,239
and and we're we're getting a lot better

2034
01:15:43,830 --> 01:15:41,920
at uh

2035
01:15:46,149 --> 01:15:43,840
every day really i think at operating

2036
01:15:49,350 --> 01:15:46,159
remotely and understanding how to safely

2037
01:15:53,990 --> 01:15:49,360
bring people in to get the work done

2038
01:16:01,430 --> 01:15:56,070

thank you and next on the line is

2039
01:16:05,430 --> 01:16:03,830
hi um thank you so much for taking

2040
01:16:07,350 --> 01:16:05,440
these questions

2041
01:16:09,910 --> 01:16:07,360
a quick question for

2042
01:16:11,990 --> 01:16:09,920
maybe either matt or katie

2043
01:16:13,910 --> 01:16:12,000
what do you hope to learn by recording

2044
01:16:15,590 --> 01:16:13,920
sound during the mission and then katie

2045
01:16:17,270 --> 01:16:15,600
actually another very quick question you

2046
01:16:19,030 --> 01:16:17,280
mentioned that you had you were a little

2047
01:16:20,950 --> 01:16:19,040
bit iffy about the name perseverance was

2048
01:16:23,910 --> 01:16:20,960
there another name that you also

2049
01:16:26,070 --> 01:16:23,920
uh favored perhaps um thank you again

2050
01:16:27,510 --> 01:16:26,080
yeah maybe i'll maybe i'll start off and

2051
01:16:28,870 --> 01:16:27,520
to your first question you know what we

2052
01:16:31,030 --> 01:16:28,880
hope to use the microphones for you know

2053
01:16:33,350 --> 01:16:31,040
i think we're really excited to

2054
01:16:35,270 --> 01:16:33,360
hear the sounds of mars and and the

2055
01:16:36,550 --> 01:16:35,280
sounds of the rover interacting with its

2056
01:16:40,229 --> 01:16:36,560
environment you know we'll hear the

2057
01:16:41,910 --> 01:16:40,239
wheels were and the gears turning um and

2058
01:16:44,470 --> 01:16:41,920
we have a microphone on the supercam

2059
01:16:46,070 --> 01:16:44,480
instrument so when we uh basically zap

2060
01:16:47,830 --> 01:16:46,080
the rocks with the supercam laser we'll

2061
01:16:49,270 --> 01:16:47,840
hear that zip sound

2062
01:16:50,550 --> 01:16:49,280
and that may tell us some something

2063
01:16:51,990 --> 01:16:50,560

about the properties of the rocks

2064
01:16:53,830 --> 01:16:52,000
themselves so there may be some science

2065
01:16:56,390 --> 01:16:53,840
to glean from that as well so we're

2066
01:16:58,470 --> 01:16:56,400
excited to to use the rover's ears to do

2067
01:17:00,229 --> 01:16:58,480
that um in terms of the the rover names

2068
01:17:01,830 --> 01:17:00,239
you know i

2069
01:17:03,990 --> 01:17:01,840
there were nine candidates there and i

2070
01:17:05,910 --> 01:17:04,000
think everybody had their favorite um i

2071
01:17:08,070 --> 01:17:05,920
don't know that i had i had a particular

2072
01:17:10,149 --> 01:17:08,080
favorite there um

2073
01:17:11,830 --> 01:17:10,159
but you know in the end uh the rover

2074
01:17:13,990 --> 01:17:11,840
name just when the rover name is

2075
01:17:16,229 --> 01:17:14,000
selected uh it just really becomes part

2076
01:17:17,830 --> 01:17:16,239
of the rover and once that name is

2077
01:17:19,590 --> 01:17:17,840
selected you can't separate the rover

2078
01:17:20,630 --> 01:17:19,600
from its name and so you know i think

2079
01:17:22,149 --> 01:17:20,640
those of us who've worked on some

2080
01:17:23,669 --> 01:17:22,159
previous rover missions it just happens

2081
01:17:25,590 --> 01:17:23,679
and and once the name is selected it

2082
01:17:26,870 --> 01:17:25,600
just becomes and so i think that's very

2083
01:17:28,550 --> 01:17:26,880
much what's happened uh with

2084
01:17:29,910 --> 01:17:28,560
perseverance for me personally and i

2085
01:17:32,070 --> 01:17:29,920
think i know that that's true for

2086
01:17:35,990 --> 01:17:32,080
everyone else too so it is perseverance

2087
01:17:42,790 --> 01:17:39,110
great thank you and up next is leo

2088
01:17:45,430 --> 01:17:42,800

enright with irish television

2089
01:17:48,070 --> 01:17:45,440
uh thanks raquel i think this is

2090
01:17:50,709 --> 01:17:48,080
probably for katie who talked about the

2091
01:17:51,910 --> 01:17:50,719
complexity of uh collecting samples on

2092
01:17:54,790 --> 01:17:51,920
the surface

2093
01:17:58,550 --> 01:17:54,800
the the actor matt damon famously

2094
01:18:00,149 --> 01:17:58,560
scienced the you know what out of mars

2095
01:18:02,630 --> 01:18:00,159
and we can certainly say that the

2096
01:18:04,229 --> 01:18:02,640
curiosity rover has done that

2097
01:18:06,790 --> 01:18:04,239
at gale crater

2098
01:18:09,510 --> 01:18:06,800
but it does seem like

2099
01:18:10,630 --> 01:18:09,520
the traverse there has been far far

2100
01:18:13,030 --> 01:18:10,640
slower

2101
01:18:15,750 --> 01:18:13,040
than most people would have expected for

2102
01:18:16,790 --> 01:18:15,760
for very good reasons uh yellowknife

2103
01:18:19,189 --> 01:18:16,800
alone

2104
01:18:21,030 --> 01:18:19,199
would delay you for months um but i'm

2105
01:18:22,790 --> 01:18:21,040
just wondering will there be different

2106
01:18:24,390 --> 01:18:22,800
time pressures

2107
01:18:26,470 --> 01:18:24,400
on this mission

2108
01:18:28,950 --> 01:18:26,480
at each sample site just to get the

2109
01:18:31,510 --> 01:18:28,960
sample and move on to the next to

2110
01:18:33,110 --> 01:18:31,520
collect enough for the return cash will

2111
01:18:35,910 --> 01:18:33,120
it be more of a

2112
01:18:37,669 --> 01:18:35,920
shoot and scoot mission

2113
01:18:39,830 --> 01:18:37,679

yeah so that's that's a great question

2114
01:18:41,510 --> 01:18:39,840
and one that we are thinking a lot about

2115
01:18:42,790 --> 01:18:41,520
um as we we come up with notional

2116
01:18:44,550 --> 01:18:42,800
scenarios for the mission and what our

2117
01:18:45,990 --> 01:18:44,560
sample cache might look like one thing

2118
01:18:47,910 --> 01:18:46,000
that we know about that sample cache is

2119
01:18:50,149 --> 01:18:47,920
that we wanted to have diversity uh and

2120
01:18:51,510 --> 01:18:50,159
we wanted to cover the interval of time

2121
01:18:53,350 --> 01:18:51,520
that we think the rocks in jezreel

2122
01:18:54,950 --> 01:18:53,360
represent and that does require us

2123
01:18:57,350 --> 01:18:54,960
covering substantial

2124
01:18:58,229 --> 01:18:57,360
ground uh to put a cache together like

2125
01:18:59,910 --> 01:18:58,239
that

2126
01:19:01,590 --> 01:18:59,920
but i think we have a couple of

2127
01:19:03,030 --> 01:19:01,600
advantages on our side particularly in

2128
01:19:05,110 --> 01:19:03,040
comparison to

2129
01:19:06,790 --> 01:19:05,120
curiosity and gale crater part of the

2130
01:19:08,550 --> 01:19:06,800
reason we picked jezreel crater as a

2131
01:19:10,470 --> 01:19:08,560
landing site was because it had such a

2132
01:19:12,390 --> 01:19:10,480
well understood environment that we

2133
01:19:15,030 --> 01:19:12,400
could see and understand from orbital

2134
01:19:17,270 --> 01:19:15,040
images alone and so in in curiosity

2135
01:19:19,030 --> 01:19:17,280
curiosity's case in gale crater

2136
01:19:20,550 --> 01:19:19,040
you know you have a five kilometer thick

2137
01:19:22,229 --> 01:19:20,560
mound and an

2138
01:19:23,910 --> 01:19:22,239

uncertainty of what that mound actually

2139
01:19:26,790 --> 01:19:23,920
represents geologically so we've had to

2140
01:19:28,709 --> 01:19:26,800
spend a lot of time with that mission uh

2141
01:19:30,870 --> 01:19:28,719
doing the the science to understand what

2142
01:19:32,950 --> 01:19:30,880
rocks we're even looking at with jezreel

2143
01:19:34,310 --> 01:19:32,960
we know already that we have a delta we

2144
01:19:36,870 --> 01:19:34,320
know that we had a lake in jezreel

2145
01:19:38,550 --> 01:19:36,880
crater and we know that this crater is

2146
01:19:41,590 --> 01:19:38,560
perched on the the

2147
01:19:43,910 --> 01:19:41,600
the rim of a giant impact basin uh so we

2148
01:19:45,590 --> 01:19:43,920
expect things like impact mega breccia

2149
01:19:47,510 --> 01:19:45,600
sampling some of that ancient milwaukee

2150
01:19:49,030 --> 01:19:47,520
and crust on mars so i think the fact

2151
01:19:50,870 --> 01:19:49,040
that we have such a good understanding

2152
01:19:52,950 --> 01:19:50,880
of this landing site already

2153
01:19:55,510 --> 01:19:52,960
really helps us plan and plot out the

2154
01:19:57,110 --> 01:19:55,520
course of our sampling exploration so i

2155
01:19:59,110 --> 01:19:57,120
think that really helps us and so i

2156
01:20:00,630 --> 01:19:59,120
think we will feel some pressure to to

2157
01:20:02,390 --> 01:20:00,640
cover that ground simply because we want

2158
01:20:04,550 --> 01:20:02,400
to put together the best cache of

2159
01:20:06,070 --> 01:20:04,560
samples that we can but but we have some

2160
01:20:08,070 --> 01:20:06,080
advantages i think over some previous

2161
01:20:11,350 --> 01:20:08,080
missions in terms of how well we

2162
01:20:12,229 --> 01:20:11,360
understand our landing site already

2163
01:20:14,870 --> 01:20:12,239

great

2164
01:20:19,189 --> 01:20:14,880
one more question from akloja from the

2165
01:20:23,189 --> 01:20:21,990
hi there um can you hear me and i've got

2166
01:20:24,550 --> 01:20:23,199
a really quick question for the

2167
01:20:27,990 --> 01:20:24,560
scientists um

2168
01:20:32,629 --> 01:20:30,470
another one as well but the first one

2169
01:20:35,510 --> 01:20:32,639
you talk about how um this mission is

2170
01:20:36,870 --> 01:20:35,520
the very latest in to sort of the long

2171
01:20:38,709 --> 01:20:36,880
quest to try and answer the question of

2172
01:20:39,590 --> 01:20:38,719
whether there is life at one point on

2173
01:20:41,990 --> 01:20:39,600
mars

2174
01:20:45,590 --> 01:20:42,000
um i wonder if you could describe just

2175
01:20:47,430 --> 01:20:45,600
briefly um what is about perseverance

2176
01:20:49,350 --> 01:20:47,440
that what won't it be able to do the

2177
01:20:51,270 --> 01:20:49,360
previous missions possibly haven't to

2178
01:20:53,110 --> 01:20:51,280
get us closer to answering that question

2179
01:20:54,870 --> 01:20:53,120
and because from my understanding if

2180
01:20:56,790 --> 01:20:54,880
life is there it's not that this will

2181
01:20:59,750 --> 01:20:56,800
detect it but they'll be able to get

2182
01:21:01,669 --> 01:20:59,760
much much closer to that answer

2183
01:21:02,470 --> 01:21:01,679
another question i just had quickly for

2184
01:21:06,870 --> 01:21:02,480
um

2185
01:21:09,669 --> 01:21:06,880
plenty of issues going to mars and the

2186
01:21:11,590 --> 01:21:09,679
uae one as we've heard and and

2187
01:21:13,110 --> 01:21:11,600
the european space agency eventually can

2188
01:21:15,030 --> 01:21:13,120

you just talk a little bit about how

2189
01:21:16,629 --> 01:21:15,040
your science

2190
01:21:18,229 --> 01:21:16,639
on this mission will complement the

2191
01:21:19,830 --> 01:21:18,239
science going on elsewhere i know you're

2192
01:21:21,910 --> 01:21:19,840
talking but it'd be interesting to know

2193
01:21:23,750 --> 01:21:21,920
how you're complementing each other

2194
01:21:25,189 --> 01:21:23,760
yeah so i'll tackle your first question

2195
01:21:26,870 --> 01:21:25,199
and and that's where i think we really

2196
01:21:28,310 --> 01:21:26,880
get to some of the instruments and the

2197
01:21:30,629 --> 01:21:28,320
scientific payload that we have on

2198
01:21:32,149 --> 01:21:30,639
perseverance and those those instruments

2199
01:21:35,830 --> 01:21:32,159
on the end of the rover's arm that have

2200
01:21:38,310 --> 01:21:35,840
the ability to map in very fine detail

2201
01:21:40,629 --> 01:21:38,320
chemical composition mineralogy and the

2202
01:21:42,950 --> 01:21:40,639
presence of organic carbon in a way that

2203
01:21:44,709 --> 01:21:42,960
that we've never been able to do before

2204
01:21:46,790 --> 01:21:44,719
as you may know curiosity has the

2205
01:21:48,550 --> 01:21:46,800
ability to detect organic carbon and it

2206
01:21:50,070 --> 01:21:48,560
has detected organic carbon but we

2207
01:21:52,790 --> 01:21:50,080
haven't been able to necessarily link

2208
01:21:54,550 --> 01:21:52,800
the presence of that carbon uh organic

2209
01:21:56,790 --> 01:21:54,560
organic carbon and organics to a

2210
01:21:58,390 --> 01:21:56,800
particular textures or or patterns that

2211
01:22:00,470 --> 01:21:58,400
we see in the rock that we think could

2212
01:22:03,030 --> 01:22:00,480
have been left behind by life and so

2213
01:22:05,350 --> 01:22:03,040

it's really that connection of the

2214
01:22:07,510 --> 01:22:05,360
textures and the composition that allow

2215
01:22:09,350 --> 01:22:07,520
us to to make a compelling case for a

2216
01:22:11,189 --> 01:22:09,360
biosignature and the instruments on

2217
01:22:12,550 --> 01:22:11,199
perseverance allow us to do that really

2218
01:22:15,270 --> 01:22:12,560
for the first time on the surface of

2219
01:22:16,550 --> 01:22:15,280
mars in in a non-destructive way

2220
01:22:18,149 --> 01:22:16,560
also in the way that we collect our

2221
01:22:19,990 --> 01:22:18,159
samples instead of grinding the rocks

2222
01:22:22,070 --> 01:22:20,000
into powders we're actually collecting

2223
01:22:23,910 --> 01:22:22,080
preserved cores of rock that we can

2224
01:22:25,430 --> 01:22:23,920
bring back to earth and study so i think

2225
01:22:28,070 --> 01:22:25,440
that's really how we distinguish

2226
01:22:30,310 --> 01:22:28,080
ourselves in advancing uh the search for

2227
01:22:33,270 --> 01:22:30,320
potential bias signatures on on on the

2228
01:22:35,110 --> 01:22:33,280
planet mars and maybe um i'll toss it to

2229
01:22:39,669 --> 01:22:35,120
lori or someone else

2230
01:22:43,990 --> 01:22:41,510
yeah i'm happy to take the second part

2231
01:22:46,070 --> 01:22:44,000
of that question thanks uh so yes as you

2232
01:22:47,830 --> 01:22:46,080
mentioned uh there will be several

2233
01:22:49,189 --> 01:22:47,840
missions headed to mars

2234
01:22:50,950 --> 01:22:49,199
several this summer and then of course

2235
01:22:53,350 --> 01:22:50,960
european space agency in two years as

2236
01:22:54,390 --> 01:22:53,360
they postponed the launch of the exomars

2237
01:22:56,709 --> 01:22:54,400
rover

2238
01:22:59,910 --> 01:22:56,719

but this summer of course china is going

2239
01:23:01,350 --> 01:22:59,920
to be sending their first lander to mars

2240
01:23:03,030 --> 01:23:01,360
we're all going to be watching that very

2241
01:23:05,030 --> 01:23:03,040
very carefully this is an incredibly

2242
01:23:06,950 --> 01:23:05,040
difficult thing to do to land safely on

2243
01:23:09,110 --> 01:23:06,960
mars we know how challenging it is we've

2244
01:23:11,030 --> 01:23:09,120
had our own struggles in the past uh

2245
01:23:13,590 --> 01:23:11,040
we've been very lucky and been and

2246
01:23:15,110 --> 01:23:13,600
learned a lot from those uh and and are

2247
01:23:17,030 --> 01:23:15,120
you know we've been successful the last

2248
01:23:18,310 --> 01:23:17,040
several times so you know i've full

2249
01:23:20,149 --> 01:23:18,320
confidence in our team this year but

2250
01:23:22,790 --> 01:23:20,159
it'll be interesting to watch as china

2251
01:23:24,950 --> 01:23:22,800
attempts this as well um so that that'll

2252
01:23:27,270 --> 01:23:24,960
be an interesting thing to watch uh the

2253
01:23:29,510 --> 01:23:27,280
united arab emirates of course are

2254
01:23:31,430 --> 01:23:29,520
sending their orbiter the hope orbiter

2255
01:23:33,350 --> 01:23:31,440
uh this will be their first foray really

2256
01:23:35,189 --> 01:23:33,360
into this interplanetary flight so

2257
01:23:37,189 --> 01:23:35,199
trying to build something that can do

2258
01:23:38,709 --> 01:23:37,199
science in orbit around mars i think

2259
01:23:40,629 --> 01:23:38,719
will be very complementary to the other

2260
01:23:42,229 --> 01:23:40,639
orbital missions that we already have at

2261
01:23:44,550 --> 01:23:42,239
mars as well to complement those

2262
01:23:47,510 --> 01:23:44,560
activities and then of course the

2263
01:23:49,830 --> 01:23:47,520

european exomars rover when it arrives

2264
01:23:51,430 --> 01:23:49,840
is very complementary to

2265
01:23:52,709 --> 01:23:51,440
to what perseverance will be doing on

2266
01:23:55,270 --> 01:23:52,719
the surface

2267
01:23:57,350 --> 01:23:55,280
one of the things that the exomars rover

2268
01:23:58,550 --> 01:23:57,360
will be doing that is is a little

2269
01:23:59,990 --> 01:23:58,560
different than what we're doing with

2270
01:24:02,470 --> 01:24:00,000
with perseverance is it has the

2271
01:24:04,149 --> 01:24:02,480
capability to actually drill

2272
01:24:06,229 --> 01:24:04,159
a couple meters below the surface to

2273
01:24:08,550 --> 01:24:06,239
pull up a sample and this is really

2274
01:24:10,149 --> 01:24:08,560
important because

2275
01:24:12,709 --> 01:24:10,159
the samples at the surface have been

2276
01:24:15,270 --> 01:24:12,719
exposed to radiation and if there were

2277
01:24:16,950 --> 01:24:15,280
actually life present on mars at the

2278
01:24:19,030 --> 01:24:16,960
surface it may not it may have been

2279
01:24:21,270 --> 01:24:19,040
destroyed through that radiation but

2280
01:24:23,430 --> 01:24:21,280
samples beneath the surface may actually

2281
01:24:25,910 --> 01:24:23,440
still have a potential uh to contain

2282
01:24:27,910 --> 01:24:25,920
some actual extant life so they're going

2283
01:24:29,270 --> 01:24:27,920
to be a very interesting complementary

2284
01:24:33,189 --> 01:24:29,280
complementarity there between the

2285
01:24:35,750 --> 01:24:33,199
exomars rover and and perseverance

2286
01:24:37,590 --> 01:24:35,760
great thank you lori and unfortunately

2287
01:24:39,750 --> 01:24:37,600
we can't answer all the media questions

2288
01:24:42,870 --> 01:24:39,760

on air for those of you with additional

2289
01:24:45,510 --> 01:24:42,880
questions please call jpl's digital news

2290
01:24:47,590 --> 01:24:45,520
and media office and we'll also continue

2291
01:24:49,910 --> 01:24:47,600
to answer questions of social media

2292
01:24:52,390 --> 01:24:49,920
online right now so thank you for your

2293
01:24:54,790 --> 01:24:52,400
questions and thank you to our panelists

2294
01:24:56,790 --> 01:24:54,800
for joining us today perseverance is

2295
01:24:59,590 --> 01:24:56,800
targeted to launch from cape canaveral

2296
01:25:02,629 --> 01:24:59,600
florida on july 20th it will land on

2297
01:25:05,590 --> 01:25:02,639
mars in february of 2021

2298
01:25:07,669 --> 01:25:05,600
you can follow at nasa persevere to keep

2299
01:25:10,310 --> 01:25:07,679
up with its launch and journey to the

2300
01:25:13,830 --> 01:25:10,320
red planet and join our conversation by

2301
01:25:16,470 --> 01:25:13,840
using the hashtag countdown to mars you

2302
01:25:18,350 --> 01:25:16,480
can also visit nasa.gov

2303
01:25:19,910 --> 01:25:18,360
perseverance and

2304
01:25:22,629 --> 01:25:19,920
mars.nasa.gov

2305
01:25:25,750 --> 01:25:22,639
perseverance for all of those interested

2306
01:25:28,310 --> 01:25:25,760
in a deeper dive we also have a new

2307
01:25:29,750 --> 01:25:28,320
press kit available online and it is

2308
01:25:31,830 --> 01:25:29,760
filled with information and graphics

2309
01:25:34,149 --> 01:25:31,840
describing the rover and mission and can

2310
01:25:36,470 --> 01:25:34,159
help ask answer any questions you might

2311
01:25:38,950 --> 01:25:36,480
have all the images you saw today will