
NASA
On Phone
Question from Media

1
00:00:09,430 --> 00:00:07,190
good afternoon my name is duane brown

2
00:00:12,070 --> 00:00:09,440
with the office of communications and

3
00:00:15,190 --> 00:00:12,080
welcome to nasa headquarters

4
00:00:17,189 --> 00:00:15,200
nasa continues its journey to mars and

5
00:00:21,109 --> 00:00:17,199
today you will hear the payload that

6
00:00:23,670 --> 00:00:21,119
will fly aboard nasa's mars 2020 rover

7
00:00:26,630 --> 00:00:23,680
a roving laboratory that will study the

8
00:00:28,230 --> 00:00:26,640
red planet as never before

9
00:00:30,550 --> 00:00:28,240
we will have brief presentations from

10
00:00:32,389 --> 00:00:30,560
our participants then we will open up

11
00:00:34,150 --> 00:00:32,399
with questions starting here in the nasa

12
00:00:35,670 --> 00:00:34,160
tv studio

13
00:00:37,270 --> 00:00:35,680

our phone lines

14
00:00:40,389 --> 00:00:37,280
and nasa centers

15
00:00:43,350 --> 00:00:40,399
and of course social media

16
00:00:44,950 --> 00:00:43,360
get your questions in at hashtag

17
00:00:46,790 --> 00:00:44,960
ask nasa

18
00:00:48,790 --> 00:00:46,800
and join the conversation and there will

19
00:00:49,750 --> 00:00:48,800
be a lot of talk about the journey to

20
00:01:03,270 --> 00:00:49,760
mars

21
00:01:06,870 --> 00:01:03,280
public and everyone is a part of you can

22
00:01:08,390 --> 00:01:06,880
learn about that at www.nasa.gov

23
00:01:11,190 --> 00:01:08,400
mars

24
00:01:13,350 --> 00:01:11,200
a note that at 3 pm today eastern we

25
00:01:16,149 --> 00:01:13,360
will have a media telecon

26
00:01:18,950 --> 00:01:16,159
for the media to hear firsthand from the

27
00:01:21,749 --> 00:01:18,960
principal investigators that will be

28
00:01:24,070 --> 00:01:21,759
a part of the mars 2020 mission and an

29
00:01:26,149 --> 00:01:24,080
announcement will be going out shortly

30
00:01:28,390 --> 00:01:26,159
for the details for that call again for

31
00:01:30,789 --> 00:01:28,400
the principal investigators on the mars

32
00:01:32,230 --> 00:01:30,799
2020 mission of media telecom today at 3

33
00:01:33,749 --> 00:01:32,240
p.m eastern

34
00:01:36,149 --> 00:01:33,759
before we get started let me introduce

35
00:01:37,990 --> 00:01:36,159
you to today's panelists

36
00:01:40,469 --> 00:01:38,000
first up

37
00:01:41,590 --> 00:01:40,479
will be john grunsfeld

38
00:01:43,590 --> 00:01:41,600

astronaut

39
00:01:45,190 --> 00:01:43,600
and associate administrator for the nasa

40
00:01:46,310 --> 00:01:45,200
science mission directorate nasa

41
00:01:49,910 --> 00:01:46,320
headquarters

42
00:01:53,830 --> 00:01:52,069
bill gerstenmaier

43
00:01:56,230 --> 00:01:53,840
associate administrator for the nasa

44
00:02:01,510 --> 00:01:56,240
human exploration and operations mission

45
00:02:05,190 --> 00:02:03,109
michael meyer

46
00:02:07,350 --> 00:02:05,200
lead scientist

47
00:02:11,510 --> 00:02:07,360
from the mars exploration program

48
00:02:15,270 --> 00:02:13,270
alan stofan

49
00:02:16,710 --> 00:02:15,280
nasa chief scientist

50
00:02:19,030 --> 00:02:16,720
headquarters

51
00:02:20,630 --> 00:02:19,040
and joining us on the phone

52
00:02:23,910 --> 00:02:20,640
the deputy associate administrator for

53
00:02:25,910 --> 00:02:23,920
the space technology mission directorate

54
00:02:28,150 --> 00:02:25,920
is james reuter

55
00:02:29,910 --> 00:02:28,160
and with that i'll toss it to you john

56
00:02:32,150 --> 00:02:29,920
thank you very much duane this is a

57
00:02:35,270 --> 00:02:32,160
really exciting day for us

58
00:02:37,990 --> 00:02:35,280
we are exploring mars right now with our

59
00:02:39,190 --> 00:02:38,000
curiosity and opportunity rovers and

60
00:02:40,550 --> 00:02:39,200
today we're going to announce the

61
00:02:43,030 --> 00:02:40,560
complement of instruments that are going

62
00:02:45,509 --> 00:02:43,040
to fly on our next big leap

63
00:02:47,350 --> 00:02:45,519

in the exploration of mars the mars 2020

64
00:02:51,430 --> 00:02:47,360
rover

65
00:02:53,509 --> 00:02:51,440
build on the science and the exploration

66
00:02:56,229 --> 00:02:53,519
we've learned from the curiosity rover

67
00:02:58,309 --> 00:02:56,239
and all the other activity at mars

68
00:03:00,229 --> 00:02:58,319
and i think it's just amazing to think

69
00:03:01,750 --> 00:03:00,239
about the fact that curiosity has

70
00:03:03,670 --> 00:03:01,760
determined that mars once had a

71
00:03:05,750 --> 00:03:03,680
habitable environment

72
00:03:07,270 --> 00:03:05,760
and the science behind the mars 2020

73
00:03:09,350 --> 00:03:07,280
rover is really going to extend that and

74
00:03:11,030 --> 00:03:09,360
michael meyer will talk more about it

75
00:03:13,270 --> 00:03:11,040
in our exploration of looking for

76
00:03:15,430 --> 00:03:13,280
potential biosignatures of answering

77
00:03:17,509 --> 00:03:15,440
that big question

78
00:03:19,190 --> 00:03:17,519
was there everlife on mars as part of

79
00:03:20,630 --> 00:03:19,200
our quest to understand if we're alone

80
00:03:22,309 --> 00:03:20,640
in the universe

81
00:03:24,070 --> 00:03:22,319
this rover is going to carry new

82
00:03:26,309 --> 00:03:24,080
innovative instruments like we've never

83
00:03:27,830 --> 00:03:26,319
seen before on mars to conduct

84
00:03:30,149 --> 00:03:27,840
geological

85
00:03:32,229 --> 00:03:30,159
investigations on the surface of mars to

86
00:03:35,509 --> 00:03:32,239
determine potential habitability but

87
00:03:38,309 --> 00:03:35,519
also to look for potential signs of past

88
00:03:39,990 --> 00:03:38,319

life in the geological record

89
00:03:41,990 --> 00:03:40,000
these advanced instruments however carry

90
00:03:44,229 --> 00:03:42,000
a little bit of risk and i think that's

91
00:03:47,110 --> 00:03:44,239
just part of the

92
00:03:48,630 --> 00:03:47,120
activity at nasa that unless we try hard

93
00:03:51,350 --> 00:03:48,640
things you know we're not really going

94
00:03:53,830 --> 00:03:51,360
to get the really great science that we

95
00:03:55,509 --> 00:03:53,840
need to get from the surface

96
00:03:58,070 --> 00:03:55,519
it's even possible that with the mars

97
00:04:00,869 --> 00:03:58,080
2020 rover some of the rocks that we

98
00:04:02,630 --> 00:04:00,879
interrogate look so intriguing

99
00:04:04,710 --> 00:04:02,640
that we will just absolutely have to

100
00:04:07,350 --> 00:04:04,720
bring them back to earth someday to use

101
00:04:08,710 --> 00:04:07,360
the best instruments available on earth

102
00:04:11,030 --> 00:04:08,720
to determine whether these are

103
00:04:13,670 --> 00:04:11,040
signatures of life and so in the rover

104
00:04:15,670 --> 00:04:13,680
will be a small caching system to enable

105
00:04:16,629 --> 00:04:15,680
either future explorers or future

106
00:04:19,749 --> 00:04:16,639
missions

107
00:04:21,670 --> 00:04:19,759
to bring back those samples

108
00:04:23,430 --> 00:04:21,680
another great thing about the mars 2020

109
00:04:25,110 --> 00:04:23,440
selections that we'll talk about is it's

110
00:04:27,189 --> 00:04:25,120
a very international partnership and

111
00:04:29,430 --> 00:04:27,199
we're really thrilled to have those

112
00:04:31,909 --> 00:04:29,440
partners on board

113
00:04:34,390 --> 00:04:31,919

this mars 2020 rover is a big step for

114
00:04:35,830 --> 00:04:34,400
nasa significantly expanding our

115
00:04:37,110 --> 00:04:35,840
partnership between the mission

116
00:04:40,390 --> 00:04:37,120
directorates

117
00:04:43,350 --> 00:04:40,400
and with a part of the rover including

118
00:04:45,030 --> 00:04:43,360
uh something that gerst can describe

119
00:04:47,830 --> 00:04:45,040
between the human exploration mission

120
00:04:49,749 --> 00:04:47,840
directorate science and technology and

121
00:04:53,510 --> 00:04:49,759
it's really that glue between all of our

122
00:04:55,909 --> 00:04:53,520
activities that are making this our next

123
00:04:58,230 --> 00:04:55,919
big leap to mars and with that i'll hand

124
00:05:00,629 --> 00:04:58,240
it over to bill gerstenmaier

125
00:05:02,710 --> 00:05:00,639
thanks john it's my pleasure to be here

126
00:05:04,469 --> 00:05:02,720
it's it's great to see the mission

127
00:05:06,310 --> 00:05:04,479
directors really work together to see

128
00:05:07,830 --> 00:05:06,320
space technology mission directorate to

129
00:05:09,749 --> 00:05:07,840
see the science mission directorate and

130
00:05:11,670 --> 00:05:09,759
our own directorate really work together

131
00:05:13,670 --> 00:05:11,680
on this mission and it's neat to see

132
00:05:15,749 --> 00:05:13,680
that the synergies and the activities

133
00:05:17,110 --> 00:05:15,759
come together and work together as john

134
00:05:19,590 --> 00:05:17,120
described they're very interested in

135
00:05:21,430 --> 00:05:19,600
looking at at mars as a scientific

136
00:05:23,110 --> 00:05:21,440
investigation and trying to answer those

137
00:05:24,710 --> 00:05:23,120
hard questions you know is there life on

138
00:05:26,950 --> 00:05:24,720

mars those kind of things and building

139
00:05:28,790 --> 00:05:26,960
off of the other robotic activities but

140
00:05:31,350 --> 00:05:28,800
then to let us on the human side come

141
00:05:33,830 --> 00:05:31,360
alongside them on mars 2020 and and

142
00:05:35,510 --> 00:05:33,840
bring some new technology to us from the

143
00:05:37,430 --> 00:05:35,520
technology mission director that'll help

144
00:05:39,510 --> 00:05:37,440
us with our plans to take humans to mars

145
00:05:41,430 --> 00:05:39,520
someday in the future so we get a chance

146
00:05:43,670 --> 00:05:41,440
to look at things like in situ resource

147
00:05:45,830 --> 00:05:43,680
utilization we look at the ability to

148
00:05:47,830 --> 00:05:45,840
use some of the resources on mars to see

149
00:05:49,749 --> 00:05:47,840
if they actually have applications for

150
00:05:51,510 --> 00:05:49,759
human missions in the future and those

151
00:05:53,670 --> 00:05:51,520
will dramatically change how we plan and

152
00:05:55,189 --> 00:05:53,680
get ready for those missions we also get

153
00:05:57,670 --> 00:05:55,199
a chance to look at the environment of

154
00:05:59,830 --> 00:05:57,680
mars kind of from a dust standpoint and

155
00:06:01,430 --> 00:05:59,840
from a weather standpoint and understand

156
00:06:02,790 --> 00:06:01,440
again are there implications for that

157
00:06:04,950 --> 00:06:02,800
that we ought to be putting into our

158
00:06:06,230 --> 00:06:04,960
plans now as we begin

159
00:06:08,070 --> 00:06:06,240
starting to think about how we would

160
00:06:10,070 --> 00:06:08,080
actually move humans to the surface of

161
00:06:12,150 --> 00:06:10,080
mars so what a great time to see all

162
00:06:14,390 --> 00:06:12,160
these mission directors come together to

163
00:06:16,469 --> 00:06:14,400

work on the new technology we need to

164
00:06:18,390 --> 00:06:16,479
actually provide information for us on

165
00:06:20,550 --> 00:06:18,400
the human directorate side that that we

166
00:06:22,230 --> 00:06:20,560
can use for for mars it builds off of

167
00:06:24,150 --> 00:06:22,240
what we've done with curiosity rover

168
00:06:25,830 --> 00:06:24,160
with the with the entry descent landing

169
00:06:27,909 --> 00:06:25,840
activity we did and the radiation

170
00:06:29,430 --> 00:06:27,919
monitor on mars we've kind of taken that

171
00:06:31,430 --> 00:06:29,440
to the next step and we're actually

172
00:06:33,670 --> 00:06:31,440
moving together even with a broader

173
00:06:36,150 --> 00:06:33,680
cooperation and more activities together

174
00:06:37,430 --> 00:06:36,160
so as we move forward i can't think of a

175
00:06:39,029 --> 00:06:37,440
better way to keep working with these

176
00:06:40,710 --> 00:06:39,039
guys and really

177
00:06:42,870 --> 00:06:40,720
really we're really on this journey to

178
00:06:44,550 --> 00:06:42,880
mars so with that i'll be quiet and i'll

179
00:06:46,309 --> 00:06:44,560
turn it over to mike and he can give us

180
00:06:47,830 --> 00:06:46,319
the details of what's exactly on the

181
00:06:50,150 --> 00:06:47,840
rover and what's coming forward so

182
00:06:51,510 --> 00:06:50,160
thanks so much bill um actually before

183
00:06:53,830 --> 00:06:51,520
we start what i'd like to do is some of

184
00:06:56,870 --> 00:06:53,840
the project is represented here we have

185
00:06:59,110 --> 00:06:56,880
the project manager john mcnamee

186
00:07:00,150 --> 00:06:59,120
we also have the project scientists ken

187
00:07:02,790 --> 00:07:00,160
farley

188
00:07:04,790 --> 00:07:02,800

and also the program scientists mitch

189
00:07:06,790 --> 00:07:04,800
schulte so

190
00:07:09,430 --> 00:07:06,800
any questions i can't answer i'm sure

191
00:07:10,390 --> 00:07:09,440
they will be able to

192
00:07:13,189 --> 00:07:10,400
um

193
00:07:15,350 --> 00:07:13,199
this has been an interesting process 13

194
00:07:17,430 --> 00:07:15,360
months ago we received a report from the

195
00:07:19,589 --> 00:07:17,440
science definition team

196
00:07:21,830 --> 00:07:19,599
that basically said

197
00:07:23,830 --> 00:07:21,840
the next mission to mars ought to do

198
00:07:26,390 --> 00:07:23,840
these things and it had four major

199
00:07:29,110 --> 00:07:26,400
objectives to go to a region look at the

200
00:07:31,350 --> 00:07:29,120
geology understand the environment

201
00:07:33,990 --> 00:07:31,360
look for bio signatures since there's a

202
00:07:36,790 --> 00:07:34,000
potential for life

203
00:07:38,870 --> 00:07:36,800
cash samples for potential return and

204
00:07:40,629 --> 00:07:38,880
make progress towards human exploration

205
00:07:43,909 --> 00:07:40,639
on mars

206
00:07:45,430 --> 00:07:43,919
it was kind of a tall order and and a

207
00:07:47,749 --> 00:07:45,440
quite a list of measurements that need

208
00:07:50,309 --> 00:07:47,759
to be made and i don't want to say now

209
00:07:52,790 --> 00:07:50,319
that through the open competitive

210
00:07:55,830 --> 00:07:52,800
process we've been able to put together

211
00:07:57,670 --> 00:07:55,840
a great payload that actually meets or

212
00:07:58,950 --> 00:07:57,680
exceeds all their measurement

213
00:08:00,710 --> 00:07:58,960

requirements

214
00:08:02,390 --> 00:08:00,720
that this science definition team laid

215
00:08:04,150 --> 00:08:02,400
out 13 months ago

216
00:08:09,110 --> 00:08:04,160
so

217
00:08:10,629 --> 00:08:09,120
let's get down to it and talk about the

218
00:08:12,950 --> 00:08:10,639
instruments themselves so if i can have

219
00:08:15,029 --> 00:08:12,960
the first graphic one of the constraints

220
00:08:17,110 --> 00:08:15,039
of doing this mission is that we have

221
00:08:19,510 --> 00:08:17,120
this fantastic rover

222
00:08:21,430 --> 00:08:19,520
that's already designed and so the

223
00:08:23,589 --> 00:08:21,440
instruments that go on the rover have to

224
00:08:27,029 --> 00:08:23,599
be able to fit within

225
00:08:29,189 --> 00:08:27,039
the uh the spacecraft itself and so

226
00:08:31,029 --> 00:08:29,199
there are volume constraints mass

227
00:08:32,550 --> 00:08:31,039
constraints and that sort of thing and

228
00:08:34,469 --> 00:08:32,560
the good news is that we're able to

229
00:08:36,709 --> 00:08:34,479
select seven instruments that address

230
00:08:38,790 --> 00:08:36,719
the four goals i mentioned and so what

231
00:08:41,909 --> 00:08:38,800
i'll do is i'll go through them and kind

232
00:08:43,269 --> 00:08:41,919
of a counterclockwise way starting with

233
00:08:44,630 --> 00:08:43,279
instruments that are on the mast of the

234
00:08:46,630 --> 00:08:44,640
rover

235
00:08:48,230 --> 00:08:46,640
there's two of those and then there's

236
00:08:49,190 --> 00:08:48,240
three instruments in the body of the

237
00:08:52,630 --> 00:08:49,200
rover

238
00:08:54,949 --> 00:08:52,640

and then out on the arm are two more uh

239
00:08:57,350 --> 00:08:54,959
scientific instruments so

240
00:08:59,990 --> 00:08:57,360
let's uh start going through them on the

241
00:09:02,150 --> 00:09:00,000
mast next graphic

242
00:09:04,470 --> 00:09:02,160
we have mass cam z

243
00:09:06,790 --> 00:09:04,480
this is a multi-spectral

244
00:09:07,590 --> 00:09:06,800
binocular imager

245
00:09:10,949 --> 00:09:07,600
that

246
00:09:12,870 --> 00:09:10,959
has fantastic zoom capabilities and so

247
00:09:15,190 --> 00:09:12,880
this will be on the rover uh 12

248
00:09:16,550 --> 00:09:15,200
different wavelengths or filter wheels

249
00:09:20,310 --> 00:09:16,560
on it to

250
00:09:22,630 --> 00:09:20,320
to do multi spectral multi-color

251
00:09:24,389 --> 00:09:22,640
the zoom capability is what's new to

252
00:09:26,710 --> 00:09:24,399
this camera

253
00:09:28,790 --> 00:09:26,720
and the zoom capability what it does it

254
00:09:32,230 --> 00:09:28,800
makes it possible

255
00:09:35,190 --> 00:09:32,240
to rapidly develop terrain models so

256
00:09:37,030 --> 00:09:35,200
that you can plot your path

257
00:09:40,150 --> 00:09:37,040
and efficiently

258
00:09:41,670 --> 00:09:40,160
travel a longer safer distance on mars

259
00:09:43,670 --> 00:09:41,680
so this will really help with mission

260
00:09:46,470 --> 00:09:43,680
operability besides just being a

261
00:09:48,150 --> 00:09:46,480
fantastic camera for giving us panoramas

262
00:09:51,430 --> 00:09:48,160
and close-ups

263
00:09:54,949 --> 00:09:51,440

uh the next graphic the other mass

264
00:09:58,389 --> 00:09:54,959
instrument is super cam

265
00:10:00,389 --> 00:09:58,399
um it's actually a proper name for uh

266
00:10:02,790 --> 00:10:00,399
this amazing instrument

267
00:10:06,069 --> 00:10:02,800
on curiosity right now we have an

268
00:10:08,870 --> 00:10:06,079
instrument that's um does that's called

269
00:10:11,110 --> 00:10:08,880
chemcam that does laser induced mass

270
00:10:13,350 --> 00:10:11,120
spectroscopy what it does is it ionizes

271
00:10:15,350 --> 00:10:13,360
a little bit of rock and you can tell by

272
00:10:17,509 --> 00:10:15,360
looking at the plasma what the elemental

273
00:10:20,150 --> 00:10:17,519
composition is

274
00:10:22,710 --> 00:10:20,160
this instrument takes that capability

275
00:10:24,550 --> 00:10:22,720
and goes it goes much further and then

276
00:10:27,910 --> 00:10:24,560
it's also incorporated a raman

277
00:10:31,030 --> 00:10:27,920
spectrometer which can identify minerals

278
00:10:33,829 --> 00:10:31,040
and also a visible and near ir

279
00:10:37,990 --> 00:10:33,839
spectrometer which also can do minerals

280
00:10:40,470 --> 00:10:38,000
so it now has a added capability besides

281
00:10:42,470 --> 00:10:40,480
um having sort of a telescope on it that

282
00:10:44,870 --> 00:10:42,480
it can look up close to materials that

283
00:10:47,190 --> 00:10:44,880
it's zotted with its laser

284
00:10:49,910 --> 00:10:47,200
so this gives this makes it a

285
00:10:53,269 --> 00:10:49,920
tremendously useful remote sensing

286
00:10:55,910 --> 00:10:53,279
instrument where you can now look at

287
00:10:56,870 --> 00:10:55,920
things before you rocks before you

288
00:11:05,430 --> 00:10:56,880

and

289
00:11:07,190 --> 00:11:05,440
informed decisions about

290
00:11:08,069 --> 00:11:07,200
whether or not a particular rock is

291
00:11:10,710 --> 00:11:08,079
important

292
00:11:11,670 --> 00:11:10,720
and added to that is also the capability

293
00:11:14,949 --> 00:11:11,680
to

294
00:11:17,110 --> 00:11:14,959
detect organics so this is tremendous

295
00:11:19,269 --> 00:11:17,120
for going forward to helping the mission

296
00:11:20,870 --> 00:11:19,279
plan on where to take the real samples

297
00:11:23,190 --> 00:11:20,880
that sort of thing okay so now we're

298
00:11:25,910 --> 00:11:23,200
going to move to the body of the rover

299
00:11:28,710 --> 00:11:25,920
then if we show the next graphic

300
00:11:30,150 --> 00:11:28,720
this is moxie this is the um human

301
00:11:33,590 --> 00:11:30,160
exploration operation mission

302
00:11:35,509 --> 00:11:33,600
directorate and this um space technology

303
00:11:38,230 --> 00:11:35,519
mission directorate

304
00:11:39,990 --> 00:11:38,240
contribution of being able to take mars

305
00:11:43,269 --> 00:11:40,000
atmosphere take co2 out of the

306
00:11:45,829 --> 00:11:43,279
atmosphere break it apart and

307
00:11:48,069 --> 00:11:45,839
produce pure oxygen so this is going to

308
00:11:51,110 --> 00:11:48,079
be extremely useful for

309
00:11:52,949 --> 00:11:51,120
future rocket fuel from from mars or

310
00:11:55,190 --> 00:11:52,959
when we have humans exploring mars they

311
00:11:57,829 --> 00:11:55,200
can also make great use of that oxygen

312
00:12:00,629 --> 00:11:57,839
we all love that stuff

313
00:12:02,790 --> 00:12:00,639

so this is a real step forward in in

314
00:12:05,910 --> 00:12:02,800
helping future human exploration of mars

315
00:12:07,910 --> 00:12:05,920
by by being able to produce your oxygen

316
00:12:10,949 --> 00:12:07,920
on the surface of mars

317
00:12:13,269 --> 00:12:10,959
uh the next graphic this is the spanish

318
00:12:15,030 --> 00:12:13,279
contribution of a weather station

319
00:12:16,629 --> 00:12:15,040
and it has

320
00:12:20,069 --> 00:12:16,639
things that you would expect such as

321
00:12:22,389 --> 00:12:20,079
temperature humidity wind speed

322
00:12:24,550 --> 00:12:22,399
but what's some other

323
00:12:26,710 --> 00:12:24,560
and pressure but also it's going to be

324
00:12:29,509 --> 00:12:26,720
able to characterize the dust

325
00:12:30,790 --> 00:12:29,519
and also look at the environment the

326
00:12:32,790 --> 00:12:30,800
temperature of the surrounding

327
00:12:34,949 --> 00:12:32,800
environment and so this gives us a very

328
00:12:36,870 --> 00:12:34,959
good idea of what's going on in

329
00:12:38,949 --> 00:12:36,880
weather-wise on mars and it helps for

330
00:12:41,110 --> 00:12:38,959
future exploration but also it'll be

331
00:12:43,829 --> 00:12:41,120
important to understanding how well

332
00:12:46,150 --> 00:12:43,839
our mars oxidant experiment is doing

333
00:12:48,150 --> 00:12:46,160
moxie how well it's working by

334
00:12:51,269 --> 00:12:48,160
also making atmospheric measurements

335
00:12:53,590 --> 00:12:51,279
that help inform that efficiency

336
00:12:54,470 --> 00:12:53,600
okay so in the third instrument next

337
00:12:57,430 --> 00:12:54,480
slide

338
00:12:59,990 --> 00:12:57,440

showing um what's on the rover body this

339
00:13:02,230 --> 00:13:00,000
is rimfax this is a

340
00:13:04,629 --> 00:13:02,240
ground penetrating radar

341
00:13:06,470 --> 00:13:04,639
uh this has a very interesting

342
00:13:08,710 --> 00:13:06,480
capability of being able to penetrate

343
00:13:11,430 --> 00:13:08,720
maybe down to half a kilometer beneath

344
00:13:14,629 --> 00:13:11,440
the surface with a resolution anywhere

345
00:13:15,829 --> 00:13:14,639
from 5 to 20 centimeters so

346
00:13:17,430 --> 00:13:15,839
we're going to get

347
00:13:20,150 --> 00:13:17,440
a look for the first time in the

348
00:13:21,829 --> 00:13:20,160
subsurface with a rover of the areas

349
00:13:23,750 --> 00:13:21,839
that we're traveling over with this

350
00:13:26,949 --> 00:13:23,760
instrument and one of the interesting

351
00:13:29,030 --> 00:13:26,959
things is is that then you'll be able to

352
00:13:30,790 --> 00:13:29,040
connect different outcrops that you see

353
00:13:32,870 --> 00:13:30,800
to see whether or not something that

354
00:13:34,870 --> 00:13:32,880
looks similar on one

355
00:13:36,710 --> 00:13:34,880
end of a basin versus another whether or

356
00:13:38,870 --> 00:13:36,720
not it's actually the same geological

357
00:13:41,350 --> 00:13:38,880
unit by being able to trace it with your

358
00:13:43,430 --> 00:13:41,360
ground penetrating radar okay so now

359
00:13:46,150 --> 00:13:43,440
let's move to the rover arm where we

360
00:13:50,389 --> 00:13:46,160
have two instruments one is pixel

361
00:13:52,069 --> 00:13:50,399
we see here an image of the sensor head

362
00:13:54,150 --> 00:13:52,079
that's in a box fits on the rover head

363
00:13:57,269 --> 00:13:54,160

if we go to the next image

364
00:14:04,470 --> 00:14:01,269
by doing the x-ray lithochemistry

365
00:14:06,470 --> 00:14:04,480
it can map out the element distribution

366
00:14:08,629 --> 00:14:06,480
of any of the image that it's looking at

367
00:14:10,790 --> 00:14:08,639
the rock that's looking at and put it on

368
00:14:13,189 --> 00:14:10,800
an image so what this does is give you

369
00:14:15,350 --> 00:14:13,199
the interfaces gives you the fine scale

370
00:14:19,110 --> 00:14:15,360
mineralogy it tells you where the action

371
00:14:21,509 --> 00:14:19,120
is on on the smaller scale this is the

372
00:14:24,069 --> 00:14:21,519
the scale at which actually life is

373
00:14:26,310 --> 00:14:24,079
microbial life is concerned

374
00:14:27,670 --> 00:14:26,320
and then the last instrument

375
00:14:31,590 --> 00:14:27,680
is sherlock

376
00:14:33,509 --> 00:14:31,600
this is a deep uv raman luminescent

377
00:14:35,910 --> 00:14:33,519
instrument and so

378
00:14:37,670 --> 00:14:35,920
using this you can get fine scale

379
00:14:41,509 --> 00:14:37,680
mineralogy tells you what the minerals

380
00:14:43,990 --> 00:14:41,519
are and also detect organics

381
00:14:45,670 --> 00:14:44,000
so if we go to the last slide we have a

382
00:14:47,910 --> 00:14:45,680
fantastic

383
00:14:50,230 --> 00:14:47,920
grouping of instruments where

384
00:14:52,550 --> 00:14:50,240
the selection of the instruments were to

385
00:14:54,790 --> 00:14:52,560
maximize the science capability of the

386
00:14:56,870 --> 00:14:54,800
rover itself not necessarily any one

387
00:14:59,670 --> 00:14:56,880
instrument is

388
00:15:02,790 --> 00:14:59,680

it's great but uh it's how they play

389
00:15:05,030 --> 00:15:02,800
well together so one of the interesting

390
00:15:06,310 --> 00:15:05,040
situations how this is set up

391
00:15:08,230 --> 00:15:06,320
is

392
00:15:10,550 --> 00:15:08,240
no

393
00:15:13,350 --> 00:15:10,560
measurement such as elemental chemistry

394
00:15:16,230 --> 00:15:13,360
is done by only one instrument

395
00:15:19,030 --> 00:15:16,240
no measurement of mineralogy

396
00:15:20,470 --> 00:15:19,040
is done by only one instrument

397
00:15:22,629 --> 00:15:20,480
and no

398
00:15:24,550 --> 00:15:22,639
detection of organics is only done by

399
00:15:26,790 --> 00:15:24,560
one instrument

400
00:15:29,030 --> 00:15:26,800
they overlap and they complement each

401
00:15:31,189 --> 00:15:29,040
other they look at the measurements in

402
00:15:33,350 --> 00:15:31,199
slightly different ways so you'll have a

403
00:15:36,150 --> 00:15:33,360
great

404
00:15:38,629 --> 00:15:36,160
confluence of what we see on mars with

405
00:15:40,389 --> 00:15:38,639
this rover when we're looking at

406
00:15:42,150 --> 00:15:40,399
what's in the distance and when we get

407
00:15:43,990 --> 00:15:42,160
up close and look at the fine scale of

408
00:15:46,710 --> 00:15:44,000
the rocks that we're collecting and all

409
00:15:50,230 --> 00:15:46,720
of this leads to picking out those rocks

410
00:15:54,150 --> 00:15:50,240
that we want to core and cash and bring

411
00:15:57,749 --> 00:15:54,160
potentially bring back to earth

412
00:16:00,230 --> 00:15:57,759
this has been a very involved process

413
00:16:02,550 --> 00:16:00,240

lots of proposals came in we have a

414
00:16:04,069 --> 00:16:02,560
payload that has a great international

415
00:16:08,790 --> 00:16:04,079
representation

416
00:16:11,430 --> 00:16:08,800
and well over 50 institutions worldwide

417
00:16:13,350 --> 00:16:11,440
involved and i think it's going to be a

418
00:16:14,550 --> 00:16:13,360
fantastic mission we're going to learn

419
00:16:17,030 --> 00:16:14,560
so much

420
00:16:18,150 --> 00:16:17,040
and can't wait to really get going on

421
00:16:19,990 --> 00:16:18,160
the whole thing

422
00:16:23,030 --> 00:16:20,000
and to put that on the context i would

423
00:16:24,230 --> 00:16:23,040
like to turn it over to ellen stofan

424
00:16:26,870 --> 00:16:24,240
thanks mike

425
00:16:28,389 --> 00:16:26,880
mike's really just described an amazing

426
00:16:30,949 --> 00:16:28,399
set of instruments that are really going

427
00:16:32,870 --> 00:16:30,959
to take our understanding of mars to the

428
00:16:33,910 --> 00:16:32,880
next level and we're really excited

429
00:16:35,590 --> 00:16:33,920
about that if you think of our

430
00:16:37,350 --> 00:16:35,600
exploration of mars going all the way

431
00:16:39,590 --> 00:16:37,360
back to mariner through viking the

432
00:16:41,670 --> 00:16:39,600
orbiters the landers that we've had

433
00:16:44,790 --> 00:16:41,680
we've built up this incredible portrait

434
00:16:47,670 --> 00:16:44,800
of mars as this potentially habitable

435
00:16:49,670 --> 00:16:47,680
world 2020 will take us the next step

436
00:16:52,069 --> 00:16:49,680
making more sophisticated measurements

437
00:16:53,910 --> 00:16:52,079
to really try to understand this

438
00:16:56,870 --> 00:16:53,920

fundamental question that drives so much

439
00:16:59,590 --> 00:16:56,880
of what we do at nasa are we alone in

440
00:17:01,269 --> 00:16:59,600
our solar system in our universe

441
00:17:03,990 --> 00:17:01,279
the other reason we're so excited about

442
00:17:06,630 --> 00:17:04,000
this payload is because it includes

443
00:17:08,309 --> 00:17:06,640
elements from human space flight from

444
00:17:10,150 --> 00:17:08,319
space technology that are going to help

445
00:17:12,789 --> 00:17:10,160
us take those next steps towards getting

446
00:17:14,630 --> 00:17:12,799
that astrobiologist that geologist down

447
00:17:17,510 --> 00:17:14,640
onto the surface of mars

448
00:17:20,470 --> 00:17:17,520
so i can't wait 2020 can't get here soon

449
00:17:22,710 --> 00:17:20,480
enough thank you

450
00:17:25,350 --> 00:17:22,720
thank you all okay so let's transition

451
00:17:27,829 --> 00:17:25,360
into the q a here and i know we have a

452
00:17:29,430 --> 00:17:27,839
number of media on the phone and i'm

453
00:17:30,470 --> 00:17:29,440
sure social media is above us but we're

454
00:17:32,870 --> 00:17:30,480
going to

455
00:17:35,190 --> 00:17:32,880
take a question here in the studio first

456
00:17:37,190 --> 00:17:35,200
uh with frank moore uh from aviation

457
00:17:40,150 --> 00:17:37,200
week right

458
00:17:41,270 --> 00:17:40,160
thank you and sounds interesting uh

459
00:17:44,070 --> 00:17:41,280
an interesting

460
00:17:47,029 --> 00:17:44,080
set of instruments for the scientists on

461
00:17:48,630 --> 00:17:47,039
on the panel i'm interested in

462
00:17:50,390 --> 00:17:48,640
how the

463
00:17:52,390 --> 00:17:50,400

curiosity rover

464
00:17:54,710 --> 00:17:52,400
findings will shape

465
00:17:55,669 --> 00:17:54,720
where you decide to land how they shaped

466
00:17:58,150 --> 00:17:55,679
also

467
00:17:59,830 --> 00:17:58,160
the the instrument selection

468
00:18:01,590 --> 00:17:59,840
and i'm not really clear based on what

469
00:18:03,270 --> 00:18:01,600
y'all said are you looking for when you

470
00:18:05,990 --> 00:18:03,280
say signatures of life are you looking

471
00:18:07,830 --> 00:18:06,000
for past life or any life including

472
00:18:09,190 --> 00:18:07,840
current life

473
00:18:11,590 --> 00:18:09,200
okay so

474
00:18:14,310 --> 00:18:11,600
the first part of the question is has a

475
00:18:15,669 --> 00:18:14,320
curiosity informing uh this 20 20

476
00:18:17,830 --> 00:18:15,679
mission well certainly you might

477
00:18:20,470 --> 00:18:17,840
recognize that there are two instruments

478
00:18:22,950 --> 00:18:20,480
that look similar that are on curiosity

479
00:18:24,230 --> 00:18:22,960
and they're they're improved and super

480
00:18:25,669 --> 00:18:24,240
improved

481
00:18:27,909 --> 00:18:25,679
um

482
00:18:29,669 --> 00:18:27,919
and so part of that is yes this

483
00:18:31,430 --> 00:18:29,679
instrument has actually been very useful

484
00:18:33,510 --> 00:18:31,440
and it's great that we get a proposal

485
00:18:36,150 --> 00:18:33,520
that we can um

486
00:18:37,750 --> 00:18:36,160
use a more you know better

487
00:18:39,190 --> 00:18:37,760
uh instrument for

488
00:18:41,110 --> 00:18:39,200

2020.

489
00:18:42,710 --> 00:18:41,120
so we're in the process of exploring now

490
00:18:44,950 --> 00:18:42,720
of understanding

491
00:18:46,470 --> 00:18:44,960
not only whether or not the different

492
00:18:49,510 --> 00:18:46,480
environments that we're exploring could

493
00:18:51,350 --> 00:18:49,520
have supported microbial life but an a

494
00:18:53,590 --> 00:18:51,360
step further and understanding the

495
00:18:56,710 --> 00:18:53,600
environments that might be able to

496
00:18:58,549 --> 00:18:56,720
preserve a biosignature this is actually

497
00:18:59,750 --> 00:18:58,559
a much harder problem

498
00:19:01,270 --> 00:18:59,760
and

499
00:19:03,830 --> 00:19:01,280
we're going through that process we're

500
00:19:05,990 --> 00:19:03,840
able to detect organics with the sam

501
00:19:07,909 --> 00:19:06,000
payload on curiosity and that's going to

502
00:19:09,750 --> 00:19:07,919
inform us

503
00:19:12,950 --> 00:19:09,760
what would be really interesting places

504
00:19:15,110 --> 00:19:12,960
to go to in the future what might be um

505
00:19:16,950 --> 00:19:15,120
what mineralogy can we see from orbit

506
00:19:19,350 --> 00:19:16,960
that might tell us this would be a great

507
00:19:21,350 --> 00:19:19,360
place to go and look and so that's being

508
00:19:22,870 --> 00:19:21,360
fed into the whole process of the

509
00:19:24,789 --> 00:19:22,880
science community involved in landing

510
00:19:27,110 --> 00:19:24,799
site selection that sort of thing

511
00:19:29,350 --> 00:19:27,120
and the next meeting will be

512
00:19:31,270 --> 00:19:29,360
sometime in may i think

513
00:19:33,110 --> 00:19:31,280

so

514
00:19:35,590 --> 00:19:33,120
all that is an iterative process and

515
00:19:38,710 --> 00:19:35,600
that's going to help us very much

516
00:19:40,310 --> 00:19:38,720
i forget what the second part that

517
00:19:42,950 --> 00:19:40,320
i think you've addressed it but if i if

518
00:19:44,630 --> 00:19:42,960
i could do a question for um bill

519
00:19:46,710 --> 00:19:44,640
gerstenmaier could you elaborate a

520
00:19:48,070 --> 00:19:46,720
little bit on how the isru is going to

521
00:19:49,270 --> 00:19:48,080
work and

522
00:19:52,549 --> 00:19:49,280
particularly what's going to happen to

523
00:19:54,470 --> 00:19:52,559
the oxygen after you generate it

524
00:19:56,630 --> 00:19:54,480
yeah and this point what we're really

525
00:19:58,070 --> 00:19:56,640
interested in is is operating a device

526
00:20:00,070 --> 00:19:58,080
on mars

527
00:20:02,950 --> 00:20:00,080
to go ahead and pull

528
00:20:04,390 --> 00:20:02,960
the oxygen out of the the atmosphere and

529
00:20:06,870 --> 00:20:04,400
and you know we can do that we do that

530
00:20:08,870 --> 00:20:06,880
on board space station today where we we

531
00:20:10,870 --> 00:20:08,880
can pull some some oxygen out of carbon

532
00:20:13,029 --> 00:20:10,880
dioxide through a body a reaction this

533
00:20:14,870 --> 00:20:13,039
is a slightly different reaction but the

534
00:20:17,350 --> 00:20:14,880
idea is are there unique things on the

535
00:20:19,270 --> 00:20:17,360
on mars that drive us a different way is

536
00:20:20,870 --> 00:20:19,280
the does the atmosphere interact at all

537
00:20:22,950 --> 00:20:20,880
with the equipment that we need to

538
00:20:24,870 --> 00:20:22,960

understand does the partial gravity

539
00:20:27,029 --> 00:20:24,880
environment change ways we want to look

540
00:20:28,950 --> 00:20:27,039
at oxygen production oxygen production

541
00:20:30,950 --> 00:20:28,960
production rates understand those kind

542
00:20:32,710 --> 00:20:30,960
of things and and so it's not so much

543
00:20:34,710 --> 00:20:32,720
we're going to actually use the oxygen

544
00:20:36,310 --> 00:20:34,720
but can we actually generate the oxygen

545
00:20:38,390 --> 00:20:36,320
what kind of rates can we generate it at

546
00:20:40,310 --> 00:20:38,400
what kind of efficiency can we do and

547
00:20:41,830 --> 00:20:40,320
then that affects mission design so

548
00:20:43,510 --> 00:20:41,840
those are the general kind of things

549
00:20:45,430 --> 00:20:43,520
that we're trying to look at with this

550
00:20:47,430 --> 00:20:45,440
with this in-situ resource utilization

551
00:20:49,510 --> 00:20:47,440
device because it really changes the

552
00:20:52,070 --> 00:20:49,520
dynamics if you can get propellant or

553
00:20:53,909 --> 00:20:52,080
get oxidizer rather to to be your for

554
00:20:55,190 --> 00:20:53,919
your ascent stage to come off of mars

555
00:20:56,870 --> 00:20:55,200
and you don't have to carry that with

556
00:20:59,190 --> 00:20:56,880
you that really changes your mission

557
00:21:01,350 --> 00:20:59,200
design if you can actually cache and put

558
00:21:03,110 --> 00:21:01,360
oxygen in storage tanks before the crew

559
00:21:05,190 --> 00:21:03,120
even arrives and you know they have a

560
00:21:06,630 --> 00:21:05,200
habitable environment and and place to

561
00:21:08,549 --> 00:21:06,640
go when they get there that's

562
00:21:10,070 --> 00:21:08,559
tremendously important to us so what

563
00:21:11,909 --> 00:21:10,080

this will do is this will buy down the

564
00:21:13,830 --> 00:21:11,919
uncertainty of that it'll make sure that

565
00:21:15,750 --> 00:21:13,840
we understand the risks associated with

566
00:21:17,350 --> 00:21:15,760
that and we can do the appropriate plan

567
00:21:21,110 --> 00:21:17,360
planning as we look forward for human

568
00:21:25,990 --> 00:21:23,350
okay let's uh head to the phone lines

569
00:21:27,990 --> 00:21:26,000
and uh first question i believe is from

570
00:21:30,950 --> 00:21:28,000
seth bornstein from

571
00:21:32,630 --> 00:21:30,960
associated press seth yes thank you and

572
00:21:34,070 --> 00:21:32,640
and this is just to follow up on frank's

573
00:21:35,430 --> 00:21:34,080
question to gerst

574
00:21:38,710 --> 00:21:35,440
um

575
00:21:40,870 --> 00:21:38,720
you're looking at the in the oxygen uh

576
00:21:43,350 --> 00:21:40,880
creation for when you're talking about

577
00:21:45,590 --> 00:21:43,360
rocket fuel that's only you know half

578
00:21:48,230 --> 00:21:45,600
half the battle here

579
00:21:49,669 --> 00:21:48,240
in terms of what are you looking at for

580
00:21:52,549 --> 00:21:49,679
the other

581
00:21:54,789 --> 00:21:52,559
part in term especially in situ for pro

582
00:21:56,950 --> 00:21:54,799
you know kerosene liquid hydrating

583
00:21:59,350 --> 00:21:56,960
hydrogen what are you looking at when

584
00:22:01,510 --> 00:21:59,360
would you be testing this and how far

585
00:22:03,029 --> 00:22:01,520
off are you talking about for an actual

586
00:22:05,590 --> 00:22:03,039
in-situ

587
00:22:07,830 --> 00:22:05,600
fuel if everything goes right i mean are

588
00:22:10,149 --> 00:22:07,840

we still talking 2030s

589
00:22:11,669 --> 00:22:10,159
and a secondary question i guess more

590
00:22:12,950 --> 00:22:11,679
for mike meyer

591
00:22:14,950 --> 00:22:12,960
is

592
00:22:17,190 --> 00:22:14,960
i want to make sure i'm right you're not

593
00:22:19,590 --> 00:22:17,200
cashing the rocks at all in this i mean

594
00:22:23,110 --> 00:22:19,600
none of the nothing is stored with 20

595
00:22:25,270 --> 00:22:23,120
20. you may cash later but not now right

596
00:22:26,789 --> 00:22:25,280
okay so so i'll answer go ahead i'll

597
00:22:28,549 --> 00:22:26,799
answer the first piece and then mike can

598
00:22:29,750 --> 00:22:28,559
pick up the second piece

599
00:22:31,750 --> 00:22:29,760
uh

600
00:22:33,830 --> 00:22:31,760
i guess where we are is this is kind of

601
00:22:35,029 --> 00:22:33,840
the first step to go look at oxygen we'd

602
00:22:36,549 --> 00:22:35,039
have to look at other things you know

603
00:22:38,390 --> 00:22:36,559
we've also seen

604
00:22:40,230 --> 00:22:38,400
you know water on mars so you can

605
00:22:42,310 --> 00:22:40,240
clearly electrolyze water and make

606
00:22:43,350 --> 00:22:42,320
hydrogen and oxygen out of the water so

607
00:22:45,669 --> 00:22:43,360
that's a resource and you can

608
00:22:47,270 --> 00:22:45,679
potentially even use the water itself

609
00:22:49,430 --> 00:22:47,280
and we also know there's nitrogen

610
00:22:51,350 --> 00:22:49,440
available in the martian environment so

611
00:22:52,870 --> 00:22:51,360
again nitrogen can be a source for

612
00:22:54,630 --> 00:22:52,880
plants and other things that you may

613
00:22:56,070 --> 00:22:54,640

want to grow in the vicinity of mars so

614
00:22:57,909 --> 00:22:56,080
the first step was let's take a look at

615
00:23:00,070 --> 00:22:57,919
oxygen we'll think about these other

616
00:23:00,870 --> 00:23:00,080
things as we go forward again what we

617
00:23:03,350 --> 00:23:00,880
can do

618
00:23:04,950 --> 00:23:03,360
through a more sophisticated reaction is

619
00:23:06,950 --> 00:23:04,960
it's another it does it happens on

620
00:23:08,710 --> 00:23:06,960
station we take the hydrogen and the

621
00:23:10,470 --> 00:23:08,720
waste carbon dioxide on board space

622
00:23:12,630 --> 00:23:10,480
station we combine those we generate

623
00:23:14,470 --> 00:23:12,640
actually more water and then the waste

624
00:23:16,870 --> 00:23:14,480
product of that is methane well turns

625
00:23:18,950 --> 00:23:16,880
out methane is a nice fuel for for

626
00:23:20,549 --> 00:23:18,960
rocket propellant so there's another

627
00:23:22,470 --> 00:23:20,559
chemical reaction we could look at in

628
00:23:24,630 --> 00:23:22,480
the future to do the fuel side to be

629
00:23:26,950 --> 00:23:24,640
compatible with the oxygen side but the

630
00:23:28,149 --> 00:23:26,960
first step was before we go pursue all

631
00:23:29,590 --> 00:23:28,159
these things let's take one that's

632
00:23:31,669 --> 00:23:29,600
fairly simple that can fit on this

633
00:23:33,750 --> 00:23:31,679
package can fit on the rover let's see

634
00:23:35,110 --> 00:23:33,760
what the efficiency are let's understand

635
00:23:36,390 --> 00:23:35,120
is there something we're really missing

636
00:23:37,909 --> 00:23:36,400
in the martian environment that drives

637
00:23:39,430 --> 00:23:37,919
us a different way let's see what we can

638
00:23:41,029 --> 00:23:39,440

do with oxygen first and then we'll do

639
00:23:43,190 --> 00:23:41,039
the plans for the other pieces as they

640
00:23:45,350 --> 00:23:43,200
fit together and then i'll turn it over

641
00:23:48,630 --> 00:23:45,360
to mike to answer the second piece seth

642
00:23:49,350 --> 00:23:48,640
we are definitely cashing samples um

643
00:23:59,590 --> 00:23:49,360
in

644
00:24:01,990 --> 00:23:59,600
would be most important to cash the only

645
00:24:04,310 --> 00:24:02,000
reason i said for potential return is

646
00:24:05,669 --> 00:24:04,320
because we're not committed to returning

647
00:24:08,070 --> 00:24:05,679
those samples

648
00:24:10,390 --> 00:24:08,080
at this time but it's definitely

649
00:24:12,789 --> 00:24:10,400
catching a sample part of it is it's a

650
00:24:13,750 --> 00:24:12,799
small delta to the cost of doing the

651
00:24:15,350 --> 00:24:13,760
mission

652
00:24:17,990 --> 00:24:15,360
and it also

653
00:24:19,350 --> 00:24:18,000
helps us work through all the vagaries

654
00:24:21,830 --> 00:24:19,360
of

655
00:24:23,750 --> 00:24:21,840
how to catch a sample how to seal it how

656
00:24:25,669 --> 00:24:23,760
to do it properly

657
00:24:28,870 --> 00:24:25,679
how to meet the plantar protection

658
00:24:32,470 --> 00:24:28,880
requirements all those things that are

659
00:24:34,630 --> 00:24:32,480
some we haven't done before and so we

660
00:24:36,950 --> 00:24:34,640
have the opportunity we can cache these

661
00:24:38,630 --> 00:24:36,960
samples and then a later time decide

662
00:24:42,549 --> 00:24:38,640
whether or not those are the samples

663
00:24:46,390 --> 00:24:43,990

okay we're going to take another call

664
00:24:50,029 --> 00:24:46,400
and then we're going to see what's up on

665
00:24:56,870 --> 00:24:50,039
social media uh mike wahl from

666
00:24:59,510 --> 00:24:58,230
hi guys thanks for taking this call i

667
00:25:01,430 --> 00:24:59,520
think i would just follow up and i think

668
00:25:03,750 --> 00:25:01,440
suck some kind of blooded this out when

669
00:25:05,269 --> 00:25:03,760
he was when it was moving on to me where

670
00:25:05,909 --> 00:25:05,279
are you guys going to put the samples do

671
00:25:09,350 --> 00:25:05,919
you

672
00:25:11,029 --> 00:25:09,360
is there some

673
00:25:12,710 --> 00:25:11,039
spot where you're going to put them and

674
00:25:14,230 --> 00:25:12,720
and i guess like as a secondary question

675
00:25:15,990 --> 00:25:14,240
could you just go into a little bit of

676
00:25:17,830 --> 00:25:16,000
detail about how you're going to

677
00:25:19,590 --> 00:25:17,840
actually look for

678
00:25:21,909 --> 00:25:19,600
like for biosignature like i mean could

679
00:25:23,590 --> 00:25:21,919
you detail which of the instruments

680
00:25:26,230 --> 00:25:23,600
would would potentially be actually

681
00:25:29,269 --> 00:25:26,240
finding evidence of past life and kind

682
00:25:31,350 --> 00:25:29,279
of how that would be done

683
00:25:32,950 --> 00:25:31,360
yeah actually uh that's an interesting

684
00:25:34,549 --> 00:25:32,960
set of questions you know the first one

685
00:25:36,149 --> 00:25:34,559
uh the caching

686
00:25:37,830 --> 00:25:36,159
uh

687
00:25:40,789 --> 00:25:37,840
as you might imagine we're still kind of

688
00:25:43,909 --> 00:25:40,799

early on in the mission design and how

689
00:25:45,269 --> 00:25:43,919
exactly the cash is going to be is still

690
00:25:47,269 --> 00:25:45,279
being worked out

691
00:25:49,510 --> 00:25:47,279
the expectation is is that it is going

692
00:25:51,750 --> 00:25:49,520
to be on the rover the samples will be

693
00:25:54,390 --> 00:25:51,760
cashed and then there is some debate

694
00:25:56,149 --> 00:25:54,400
whether or not we drop the cash

695
00:25:57,750 --> 00:25:56,159
and the rover goes off and does its own

696
00:25:59,590 --> 00:25:57,760
thing somewhere else

697
00:26:01,750 --> 00:25:59,600
or whether or not it just stays with the

698
00:26:03,190 --> 00:26:01,760
rover the whole time there's even

699
00:26:04,230 --> 00:26:03,200
discussion of whether or not there's

700
00:26:07,590 --> 00:26:04,240
actually

701
00:26:09,830 --> 00:26:07,600
um like two two sets of caches where one

702
00:26:11,830 --> 00:26:09,840
is dropped off early in the and the

703
00:26:15,029 --> 00:26:11,840
mission continues while

704
00:26:17,110 --> 00:26:15,039
um the 2020 rover is looking at a

705
00:26:17,990 --> 00:26:17,120
different region or different area of

706
00:26:19,750 --> 00:26:18,000
the

707
00:26:23,110 --> 00:26:19,760
where it landed

708
00:26:24,870 --> 00:26:23,120
so that still in flux i think obviously

709
00:26:28,070 --> 00:26:24,880
uh soon we're going to be setting the

710
00:26:31,269 --> 00:26:28,080
requirements for the mission and within

711
00:26:32,789 --> 00:26:31,279
a little bit over a year we'll have our

712
00:26:34,470 --> 00:26:32,799
you know basically

713
00:26:36,630 --> 00:26:34,480

review of okay

714
00:26:38,310 --> 00:26:36,640
here's the mission design this is

715
00:26:39,110 --> 00:26:38,320
exactly how we're going to do it and

716
00:26:44,630 --> 00:26:39,120
then

717
00:26:45,830 --> 00:26:44,640
really down to the nuts and bolts

718
00:26:48,630 --> 00:26:45,840
okay so

719
00:26:50,549 --> 00:26:48,640
how do you look for bio signatures

720
00:26:53,430 --> 00:26:50,559
that's that's not so easy

721
00:26:55,430 --> 00:26:53,440
um it's difficult here on this planet

722
00:26:57,669 --> 00:26:55,440
and uh we know a lot more about it than

723
00:26:58,710 --> 00:26:57,679
we do mars

724
00:26:59,669 --> 00:26:58,720
so

725
00:27:01,830 --> 00:26:59,679
part of

726
00:27:03,990 --> 00:27:01,840
biosignatures in fact we kind of picked

727
00:27:06,470 --> 00:27:04,000
that word because there are

728
00:27:08,149 --> 00:27:06,480
different things that can clue you in

729
00:27:10,149 --> 00:27:08,159
that you might have something that is

730
00:27:14,149 --> 00:27:10,159
evidence for past life

731
00:27:15,830 --> 00:27:14,159
uh and a good example is a stromatolite

732
00:27:16,870 --> 00:27:15,840
you may look at a rock and see this

733
00:27:17,830 --> 00:27:16,880
layering

734
00:27:22,070 --> 00:27:17,840
that

735
00:27:22,870 --> 00:27:22,080
is suspicious looking and it could be

736
00:28:18,950 --> 00:27:22,880
a

737
00:28:20,710 --> 00:28:18,960
different

738
00:28:23,029 --> 00:28:20,720

minerals within the same rock whether or

739
00:28:26,710 --> 00:28:23,039
not you have interfaces that might be

740
00:28:29,190 --> 00:28:26,720
particularly attractive for

741
00:28:30,549 --> 00:28:29,200
microorganisms or you know representing

742
00:28:32,950 --> 00:28:30,559
a past environment that could have

743
00:28:34,470 --> 00:28:32,960
supported microbial growth and that's

744
00:28:36,710 --> 00:28:34,480
when it gets kind of interesting because

745
00:28:38,870 --> 00:28:36,720
then on the fine scale you can actually

746
00:28:42,070 --> 00:28:38,880
tell a lot about the history of the rock

747
00:28:44,630 --> 00:28:42,080
and whether or not it shows promise of

748
00:28:46,149 --> 00:28:44,640
being a place that uh could have

749
00:28:47,830 --> 00:28:46,159
supported life

750
00:28:50,230 --> 00:28:47,840
once upon a time

751
00:28:52,070 --> 00:28:50,240
or something that even preserved some

752
00:28:54,070 --> 00:28:52,080
signature of that life

753
00:28:55,350 --> 00:28:54,080
and then it's at that point where you

754
00:28:56,549 --> 00:28:55,360
would decide whether or not you want to

755
00:28:59,269 --> 00:28:56,559
drill that

756
00:29:01,510 --> 00:28:59,279
rock take a core and cash that sample

757
00:29:02,470 --> 00:29:01,520
for posterity

758
00:29:03,590 --> 00:29:02,480
um

759
00:29:06,710 --> 00:29:03,600
and that's

760
00:29:09,190 --> 00:29:06,720
how you go about it it's not a

761
00:29:11,350 --> 00:29:09,200
you don't have boxes to check

762
00:29:13,669 --> 00:29:11,360
it is actually a real science debate in

763
00:29:15,750 --> 00:29:13,679

terms of when you look at something

764
00:29:17,750 --> 00:29:15,760
trying to decide what it is you you

765
00:29:19,190 --> 00:29:17,760
really do see and so

766
00:29:22,070 --> 00:29:19,200
one of the fun things about these

767
00:29:24,630 --> 00:29:22,080
missions is the weekly science getting

768
00:29:26,389 --> 00:29:24,640
together and debating

769
00:29:28,310 --> 00:29:26,399
what is it that you think you found and

770
00:29:30,310 --> 00:29:28,320
sometimes you know not always of the

771
00:29:32,389 --> 00:29:30,320
same opinion and that makes the

772
00:29:35,029 --> 00:29:32,399
discussions even more interesting

773
00:29:38,070 --> 00:29:35,039
let me just add that because it's so

774
00:29:39,350 --> 00:29:38,080
hard even on earth to figure out whether

775
00:29:40,950 --> 00:29:39,360
you know

776
00:29:43,669 --> 00:29:40,960
a rock a mineral

777
00:29:46,149 --> 00:29:43,679
is a signature of ancient life on earth

778
00:29:47,750 --> 00:29:46,159
and of course the earth has processes

779
00:29:49,110 --> 00:29:47,760
that bury most of the interesting rocks

780
00:29:51,029 --> 00:29:49,120
but we have a few examples because

781
00:29:52,630 --> 00:29:51,039
that's so hard you know the suite of

782
00:29:56,870 --> 00:29:52,640
instruments we've put together are our

783
00:29:59,350 --> 00:29:56,880
best shot at trying to identify those

784
00:30:01,750 --> 00:29:59,360
places on mars those little bits of rock

785
00:30:03,510 --> 00:30:01,760
that look the most promising

786
00:30:06,070 --> 00:30:03,520
and it's also the reason why we have the

787
00:30:08,230 --> 00:30:06,080
cache so that we can then take a core of

788
00:30:10,710 --> 00:30:08,240

that rock put it into a little sample

789
00:30:12,470 --> 00:30:10,720
jar store it and then someday get it

790
00:30:15,029 --> 00:30:12,480
back to earth where the best instruments

791
00:30:16,950 --> 00:30:15,039
on earth that scientists have are really

792
00:30:19,110 --> 00:30:16,960
going to be able to confirm it because

793
00:30:20,830 --> 00:30:19,120
as as you know carl sagan said

794
00:30:22,870 --> 00:30:20,840
extraordinary claims require

795
00:30:24,070 --> 00:30:22,880
extraordinary evidence

796
00:30:26,149 --> 00:30:24,080
it's really going to be when we have the

797
00:30:27,669 --> 00:30:26,159
best analytical analytical instruments

798
00:30:30,230 --> 00:30:27,679
in our ability to interrogate these

799
00:30:32,149 --> 00:30:30,240
samples the smallest scales with the

800
00:30:34,149 --> 00:30:32,159
best instruments that we may really then

801
00:30:36,870 --> 00:30:34,159
be able to say for sure whether or not

802
00:30:38,789 --> 00:30:36,880
mars once had life now if we see

803
00:30:40,070 --> 00:30:38,799
you know trilobite on mars or fossil

804
00:30:42,310 --> 00:30:40,080
that we recognize that's going to be

805
00:30:43,750 --> 00:30:42,320
really phenomenal but uh and for that we

806
00:30:46,389 --> 00:30:43,760
have imaging instruments but that we're

807
00:30:48,789 --> 00:30:46,399
not expecting that

808
00:30:51,029 --> 00:30:48,799
yeah and and just to add to it is you

809
00:30:53,190 --> 00:30:51,039
know there we have multiple ways of

810
00:30:54,230 --> 00:30:53,200
actually detecting organics and so

811
00:30:56,230 --> 00:30:54,240
finding

812
00:30:58,710 --> 00:30:56,240
organics associated with a particular

813
00:31:00,950 --> 00:30:58,720

mineral can be very exciting and that's

814
00:31:05,750 --> 00:31:00,960
where you you figure you really you

815
00:31:07,750 --> 00:31:05,760
really hit the payload on on that one so

816
00:31:09,750 --> 00:31:07,760
the capability is there now that we have

817
00:31:11,750 --> 00:31:09,760
the suite of instruments

818
00:31:13,990 --> 00:31:11,760
the project team can actually go and

819
00:31:15,830 --> 00:31:14,000
design the caching system until then you

820
00:31:17,590 --> 00:31:15,840
know we just had various designs that

821
00:31:19,590 --> 00:31:17,600
were notional

822
00:31:21,830 --> 00:31:19,600
but with this complement of instruments

823
00:31:24,230 --> 00:31:21,840
one of the good news stories is that a

824
00:31:25,590 --> 00:31:24,240
relatively straightforward simple cache

825
00:31:27,669 --> 00:31:25,600
is likely

826
00:31:28,630 --> 00:31:27,679
where we'll go because that's the right

827
00:31:30,870 --> 00:31:28,640
answer

828
00:31:32,230 --> 00:31:30,880
and that also allows us to have this

829
00:31:34,710 --> 00:31:32,240
great suite of instruments that we

830
00:31:36,710 --> 00:31:34,720
selected

831
00:31:38,630 --> 00:31:36,720
okay before we go back to the phones

832
00:31:41,909 --> 00:31:38,640
we're gonna go to social media and keep

833
00:31:43,909 --> 00:31:41,919
those questions coming at hashtag ask

834
00:31:46,389 --> 00:31:43,919
nasa and join the conversation

835
00:31:48,470 --> 00:31:46,399
at hashtag journey to mars uh we're

836
00:31:49,909 --> 00:31:48,480
gonna go to jason townsend and uh just

837
00:31:51,029 --> 00:31:49,919
to note that we obviously will not be

838
00:31:52,950 --> 00:31:51,039

able to get to all your questions but

839
00:31:54,230 --> 00:31:52,960
we'll have some of our senior scientists

840
00:31:56,389 --> 00:31:54,240
answering your questions throughout the

841
00:31:58,389 --> 00:31:56,399
day following this press conference so

842
00:32:00,389 --> 00:31:58,399
keep those questions coming in a lot of

843
00:32:02,230 --> 00:32:00,399
conversation on mars jason what we got

844
00:32:04,870 --> 00:32:02,240
going sure there's a lot of interest

845
00:32:07,750 --> 00:32:04,880
here uh online about how this rover the

846
00:32:10,310 --> 00:32:07,760
2021 compares to curiosity so a couple

847
00:32:12,149 --> 00:32:10,320
of related questions to that jamie asks

848
00:32:13,669 --> 00:32:12,159
is the 2020 rover the same size as

849
00:32:16,310 --> 00:32:13,679
curiosity

850
00:32:18,710 --> 00:32:16,320
matt asks will the 2020 rover be landing

851
00:32:21,029 --> 00:32:18,720
in the same manner as curiosity

852
00:32:25,430 --> 00:32:21,039
and then joe asks what kind of speeds is

853
00:32:30,789 --> 00:32:27,909
so the answer is it's the same

854
00:32:32,870 --> 00:32:30,799
architecture so the rover is about the

855
00:32:34,310 --> 00:32:32,880
same size obviously since there's

856
00:32:35,830 --> 00:32:34,320
different instruments on it there'll be

857
00:32:37,350 --> 00:32:35,840
a little bit of a variation but

858
00:32:39,509 --> 00:32:37,360
essentially

859
00:32:42,789 --> 00:32:39,519
the payload the

860
00:32:47,590 --> 00:32:42,799
the landed mass is going to be less than

861
00:32:51,590 --> 00:32:49,669
it's going to land in the same manner

862
00:32:53,190 --> 00:32:51,600
using the sky crane that sort of thing

863
00:32:55,350 --> 00:32:53,200

and in fact the

864
00:32:57,669 --> 00:32:55,360
for my understand the limit to the mass

865
00:33:00,870 --> 00:32:57,679
that can be landed is in fact the the

866
00:33:01,830 --> 00:33:00,880
wheels and the structure itself

867
00:33:04,310 --> 00:33:01,840
and so

868
00:33:05,750 --> 00:33:04,320
that's set so we don't have to debate

869
00:33:08,630 --> 00:33:05,760
that we just have to fit within those

870
00:33:13,269 --> 00:33:11,269
the speed interesting question it's not

871
00:33:15,669 --> 00:33:13,279
very fast and one of the things that

872
00:33:18,149 --> 00:33:15,679
slows us down now

873
00:33:20,310 --> 00:33:18,159
is after covering a

874
00:33:21,750 --> 00:33:20,320
distance on the order of something like

875
00:33:23,909 --> 00:33:21,760
30 meters

876
00:33:25,590 --> 00:33:23,919
the rover has to stop and re-image

877
00:33:28,070 --> 00:33:25,600
everything and see whether or not there

878
00:33:30,630 --> 00:33:28,080
are hazards in its way and compute a

879
00:33:33,190 --> 00:33:30,640
safe path and then go another 10 meters

880
00:33:34,310 --> 00:33:33,200
and do the same thing

881
00:33:36,710 --> 00:33:34,320
but the first

882
00:33:38,870 --> 00:33:36,720
30 meters is determined

883
00:33:41,430 --> 00:33:38,880
basically back on the ground of looking

884
00:33:44,149 --> 00:33:41,440
at the your terrain and where you can go

885
00:33:45,029 --> 00:33:44,159
so one of the advantages that we'll have

886
00:33:46,789 --> 00:33:45,039
with

887
00:33:48,870 --> 00:33:46,799
mass cam z

888
00:33:50,310 --> 00:33:48,880

by being able to zoom you

889
00:33:52,630 --> 00:33:50,320
and

890
00:33:54,230 --> 00:33:52,640
looking binocularly is we'll be able to

891
00:33:56,710 --> 00:33:54,240
plot out

892
00:33:58,630 --> 00:33:56,720
a greater distance for the rover to go

893
00:33:59,909 --> 00:33:58,640
initially before it has to then start

894
00:34:01,509 --> 00:33:59,919
calculating

895
00:34:03,509 --> 00:34:01,519
um

896
00:34:05,509 --> 00:34:03,519
how to take the next 10 meters type of

897
00:34:06,789 --> 00:34:05,519
thing

898
00:34:08,790 --> 00:34:06,799
all right we have a couple of questions

899
00:34:12,069 --> 00:34:08,800
that have come in from uh our ustream

900
00:34:18,230 --> 00:34:12,079
feed here that uh one of them asks um

901
00:34:21,349 --> 00:34:20,389
finding minerals

902
00:34:23,829 --> 00:34:21,359
um

903
00:34:26,149 --> 00:34:23,839
that is the rock that tells you how the

904
00:34:27,909 --> 00:34:26,159
rock was made

905
00:34:30,629 --> 00:34:27,919
knowing that the rock has certain

906
00:34:33,270 --> 00:34:30,639
elements in it or

907
00:34:36,629 --> 00:34:33,280
um helps you understand what the rock is

908
00:34:39,109 --> 00:34:36,639
but the mineralogy is

909
00:34:41,190 --> 00:34:39,119
how the rock was made a good example is

910
00:34:44,950 --> 00:34:41,200
if you're getting engaged and you're

911
00:34:46,950 --> 00:34:44,960
going to buy your fiance a ring

912
00:34:49,750 --> 00:34:46,960
giving her a lump of coal versus a

913
00:34:51,510 --> 00:34:49,760

diamond makes a big difference

914
00:34:52,790 --> 00:34:51,520
they both have the same elemental

915
00:34:55,750 --> 00:34:52,800
chemistry

916
00:34:57,510 --> 00:34:55,760
but one is a rock and one is coal one is

917
00:35:00,150 --> 00:34:57,520
a diamond and all that is is the

918
00:35:01,990 --> 00:35:00,160
environment that that piece of carbon

919
00:35:03,109 --> 00:35:02,000
went through

920
00:35:05,030 --> 00:35:03,119
and so

921
00:35:06,710 --> 00:35:05,040
that tells you something very important

922
00:35:09,750 --> 00:35:06,720
about the history of that rock knowing

923
00:35:11,190 --> 00:35:09,760
its mineralogy essentially let me answer

924
00:35:13,670 --> 00:35:11,200
i was just going to say some minerals

925
00:35:15,349 --> 00:35:13,680
for example um require the presence of

926
00:35:17,349 --> 00:35:15,359
water to form and obviously we think

927
00:35:19,910 --> 00:35:17,359
water is really critical for life and so

928
00:35:21,670 --> 00:35:19,920
mineralogy really gets you at not just

929
00:35:23,750 --> 00:35:21,680
the history of the rock but the history

930
00:35:25,270 --> 00:35:23,760
of the region the rock was formed in and

931
00:35:27,109 --> 00:35:25,280
water is certainly something that we're

932
00:35:30,069 --> 00:35:27,119
really focused on

933
00:35:32,230 --> 00:35:30,079
so those are the geologists answers but

934
00:35:34,630 --> 00:35:32,240
the bottom line is finding minerals is

935
00:35:37,349 --> 00:35:34,640
not really what it's about and what this

936
00:35:40,710 --> 00:35:37,359
rover is going to do it wants to look at

937
00:35:43,109 --> 00:35:40,720
the rocks on mars and the rocks on mars

938
00:35:45,109 --> 00:35:43,119

tell a story and they tell a story about

939
00:35:47,190 --> 00:35:45,119
the history of mars they tell a story

940
00:35:49,829 --> 00:35:47,200
about whether mars was once habitable

941
00:35:52,390 --> 00:35:49,839
and whether mars once had life

942
00:35:53,750 --> 00:35:52,400
and the words in the story are written

943
00:35:55,190 --> 00:35:53,760
in minerals

944
00:35:56,950 --> 00:35:55,200
and that's what this

945
00:35:58,470 --> 00:35:56,960
rover will do is it's going to tell us

946
00:36:00,470 --> 00:35:58,480
what the words mean

947
00:36:02,390 --> 00:36:00,480
of the history of mars in the story of

948
00:36:05,829 --> 00:36:02,400
mars

949
00:36:08,310 --> 00:36:05,839
one more jason wonderful um alexandra on

950
00:36:12,550 --> 00:36:08,320
twitter asks what wavelength is being

951
00:36:13,589 --> 00:36:12,560
used for the ramen on supercam

952
00:36:17,829 --> 00:36:13,599
um

953
00:36:19,030 --> 00:36:17,839
the laser is i think a 532

954
00:36:21,270 --> 00:36:19,040
so it's

955
00:36:23,190 --> 00:36:21,280
kind of greenish

956
00:36:25,109 --> 00:36:23,200
all right okay

957
00:36:27,270 --> 00:36:25,119
uh keep those calls coming in uh

958
00:36:29,270 --> 00:36:27,280
questions coming in at uh hashtag s nasa

959
00:36:31,829 --> 00:36:29,280
we're gonna go back to the phones now

960
00:36:35,030 --> 00:36:31,839
and i believe we have up next uh eric

961
00:36:36,950 --> 00:36:35,040
hand from science magazine eric hi yeah

962
00:36:39,270 --> 00:36:36,960
can you hear me yes sir

963
00:36:41,270 --> 00:36:39,280

thanks for taking the call um

964
00:36:47,750 --> 00:36:41,280
quick specific question then a follow-up

965
00:36:51,190 --> 00:36:48,950
well this is really one of the most

966
00:36:52,550 --> 00:36:51,200
amazing things to me

967
00:36:55,030 --> 00:36:52,560
is that the

968
00:36:57,990 --> 00:36:55,040
curiosity rover

969
00:36:59,390 --> 00:36:58,000
is about a metric ton

970
00:37:02,310 --> 00:36:59,400
i think it's close to

971
00:37:03,270 --> 00:37:02,320
950 kilograms or so to the surface of

972
00:37:05,990 --> 00:37:03,280
mars

973
00:37:08,150 --> 00:37:06,000
and this rover is as a rebuilt of the

974
00:37:10,150 --> 00:37:08,160
rover chassis with new instruments will

975
00:37:11,589 --> 00:37:10,160
have about the same mass to mars about a

976
00:37:13,430 --> 00:37:11,599
metric ton

977
00:37:14,390 --> 00:37:13,440
and this just gets back to it's really

978
00:37:17,990 --> 00:37:14,400
hard

979
00:37:18,870 --> 00:37:18,000
to get to the surface of mars at all

980
00:37:21,190 --> 00:37:18,880
and

981
00:37:23,750 --> 00:37:21,200
just the infrastructure what you need to

982
00:37:25,030 --> 00:37:23,760
support a rover to have a radioisotope

983
00:37:27,670 --> 00:37:25,040
power source

984
00:37:29,510 --> 00:37:27,680
to have wheels and an arm

985
00:37:31,030 --> 00:37:29,520
takes up a lot of that mass and so in

986
00:37:33,510 --> 00:37:31,040
the end we're looking at somewhere

987
00:37:36,630 --> 00:37:33,520
around 40 kilograms

988
00:37:40,230 --> 00:37:36,640

of science instruments to the surface of

989
00:37:42,950 --> 00:37:40,240
mars and it sounded to me crazy at first

990
00:37:44,390 --> 00:37:42,960
turns out that's a lot of science mass

991
00:37:46,950 --> 00:37:44,400
to the surface of mars and we're very

992
00:37:49,190 --> 00:37:46,960
excited about that

993
00:37:51,510 --> 00:37:49,200
the total cost of the mission you know

994
00:37:53,190 --> 00:37:51,520
we're working towards

995
00:37:55,270 --> 00:37:53,200
a target that's

996
00:37:56,950 --> 00:37:55,280
around 1.9 billion dollars which is

997
00:37:59,670 --> 00:37:56,960
substantially better

998
00:38:01,589 --> 00:37:59,680
than we did on curiosity because that

999
00:38:03,510 --> 00:38:01,599
was the first time we built it and so

1000
00:38:04,470 --> 00:38:03,520
now we've done the systems engineering

1001
00:38:06,710 --> 00:38:04,480
already

1002
00:38:08,950 --> 00:38:06,720
to be able to reproduce the rover plus

1003
00:38:11,270 --> 00:38:08,960
we have spare parts left over and as a

1004
00:38:13,270 --> 00:38:11,280
result and and our our

1005
00:38:14,950 --> 00:38:13,280
we don't have to do development

1006
00:38:16,790 --> 00:38:14,960
engineering on some of the parts that we

1007
00:38:19,190 --> 00:38:16,800
do have to procure and so that that's

1008
00:38:21,190 --> 00:38:19,200
allowed us to streamline the process so

1009
00:38:23,589 --> 00:38:21,200
uh that's the target we're looking for

1010
00:38:26,310 --> 00:38:23,599
for the instruments and the institute

1011
00:38:31,510 --> 00:38:26,320
resource utilization our u.s investment

1012
00:38:35,829 --> 00:38:33,829
i believe we have on the call next uh

1013
00:38:37,589 --> 00:38:35,839

eric did you have a follow-up yeah

1014
00:38:40,069 --> 00:38:37,599
please uh let me work up to a question i

1015
00:38:43,030 --> 00:38:40,079
guess my comment is so the payload mass

1016
00:38:45,910 --> 00:38:43,040
is 40 kilograms and curiosities with 75

1017
00:38:48,390 --> 00:38:45,920
so you know i guess i wouldn't describe

1018
00:38:50,069 --> 00:38:48,400
2020 rover as an amped up

1019
00:38:51,510 --> 00:38:50,079
version of curiosity but rather a

1020
00:38:53,270 --> 00:38:51,520
stripped-down

1021
00:38:54,870 --> 00:38:53,280
version of curiosity and and i

1022
00:38:57,430 --> 00:38:54,880
understand the reason for that and and

1023
00:38:58,710 --> 00:38:57,440
that is the need for a cache

1024
00:39:00,550 --> 00:38:58,720
um

1025
00:39:03,670 --> 00:39:00,560
and i also understand that that that the

1026
00:39:05,670 --> 00:39:03,680
real search for biosignatures would one

1027
00:39:07,750 --> 00:39:05,680
day happen on earth

1028
00:39:09,910 --> 00:39:07,760
but you know i guess i wonder if you

1029
00:39:11,670 --> 00:39:09,920
have a comment you know without a mass

1030
00:39:13,190 --> 00:39:11,680
spectrometer and oven like you have on

1031
00:39:15,190 --> 00:39:13,200
curiosity which is what takes up the

1032
00:39:17,510 --> 00:39:15,200
bulk of that payload mass

1033
00:39:18,550 --> 00:39:17,520
how can you describe this as

1034
00:39:20,950 --> 00:39:18,560
um

1035
00:39:22,310 --> 00:39:20,960
a mission that searches for organics and

1036
00:39:23,430 --> 00:39:22,320
biosignatures

1037
00:39:25,670 --> 00:39:23,440
let me start and then i'm going to hand

1038
00:39:27,589 --> 00:39:25,680

it over to michael uh

1039
00:39:29,750 --> 00:39:27,599
there are actually a number we didn't

1040
00:39:31,990 --> 00:39:29,760
describe is the overall changes to the

1041
00:39:33,990 --> 00:39:32,000
rover and for instance we have two

1042
00:39:35,750 --> 00:39:34,000
instruments on the arm of this rover but

1043
00:39:38,230 --> 00:39:35,760
we're also going to have a rock abrasion

1044
00:39:39,910 --> 00:39:38,240
tool that we don't have on curiosity so

1045
00:39:41,589 --> 00:39:39,920
we've changed some of the infrastructure

1046
00:39:43,750 --> 00:39:41,599
and as you mentioned

1047
00:39:45,829 --> 00:39:43,760
the cache but from a measurement

1048
00:39:47,670 --> 00:39:45,839
perspective it's true we don't have a

1049
00:39:49,829 --> 00:39:47,680
mass spectrometer in the ovens and the

1050
00:39:51,750 --> 00:39:49,839
sample handling system and those kind of

1051
00:39:53,829 --> 00:39:51,760
things associated with the sample

1052
00:39:56,630 --> 00:39:53,839
analysis at mars instrument that's doing

1053
00:39:58,470 --> 00:39:56,640
just amazing work on mars today but from

1054
00:40:00,630 --> 00:39:58,480
a measurement standpoint with these new

1055
00:40:02,390 --> 00:40:00,640
measurements you know the two lasers the

1056
00:40:04,470 --> 00:40:02,400
ramen the enhanced mineralogy the

1057
00:40:06,470 --> 00:40:04,480
enhanced imaging this really is a

1058
00:40:09,270 --> 00:40:06,480
souped-up instrument suite

1059
00:40:11,750 --> 00:40:09,280
compared to to curiosity

1060
00:40:12,870 --> 00:40:11,760
and and the two together and especially

1061
00:40:15,670 --> 00:40:12,880
if we get to look at two different

1062
00:40:17,430 --> 00:40:15,680
diverse sites on mars you know maybe com

1063
00:40:19,270 --> 00:40:17,440

completely transformative but i'll i'll

1064
00:40:22,470 --> 00:40:19,280
hand it over to michael

1065
00:40:24,790 --> 00:40:22,480
yeah every single instrument is uh

1066
00:40:26,470 --> 00:40:24,800
either improved or we haven't sent it to

1067
00:40:28,069 --> 00:40:26,480
mars before

1068
00:40:30,790 --> 00:40:28,079
and the real

1069
00:40:33,349 --> 00:40:30,800
trick to this payload is that we get to

1070
00:40:35,990 --> 00:40:33,359
look at the fine scale spatial

1071
00:40:38,150 --> 00:40:36,000
distribution of these things one of the

1072
00:40:41,910 --> 00:40:38,160
unsatisfying things about having the

1073
00:40:43,589 --> 00:40:41,920
analytical lab on curiosity is

1074
00:40:46,069 --> 00:40:43,599
you take your sample

1075
00:40:48,790 --> 00:40:46,079
and you grind it up and you basically

1076
00:40:50,870 --> 00:40:48,800
get a bulk number

1077
00:40:52,390 --> 00:40:50,880
it doesn't tell you the relationship in

1078
00:40:55,430 --> 00:40:52,400
each of the minerals that are in that

1079
00:40:57,510 --> 00:40:55,440
sample or or if the organics that you

1080
00:40:59,190 --> 00:40:57,520
measure are associated with one mineral

1081
00:41:02,069 --> 00:40:59,200
versus another

1082
00:41:04,630 --> 00:41:02,079
so in many ways we do a trade-off of

1083
00:41:06,630 --> 00:41:04,640
looking at the fine scale mineralogy and

1084
00:41:08,870 --> 00:41:06,640
elemental composition seeing that how

1085
00:41:11,349 --> 00:41:08,880
that's done spatially knowing whether or

1086
00:41:12,550 --> 00:41:11,359
not the sample is really interesting and

1087
00:41:14,790 --> 00:41:12,560
then

1088
00:41:17,030 --> 00:41:14,800

when we bring it back if and when we

1089
00:41:19,270 --> 00:41:17,040
bring it back to earth then we could

1090
00:41:21,349 --> 00:41:19,280
look at the spatial relationship of all

1091
00:41:23,270 --> 00:41:21,359
these things at an extremely fine scale

1092
00:41:25,430 --> 00:41:23,280
because we have the instrumentation and

1093
00:41:26,950 --> 00:41:25,440
the sample handling capabilities back

1094
00:41:27,829 --> 00:41:26,960
here on earth

1095
00:41:29,589 --> 00:41:27,839
so

1096
00:41:31,430 --> 00:41:29,599
i consider this a real improvement in

1097
00:41:32,950 --> 00:41:31,440
all the instruments that are on board

1098
00:41:36,309 --> 00:41:32,960
and also

1099
00:41:38,950 --> 00:41:36,319
what potential science this rover can do

1100
00:41:41,270 --> 00:41:38,960
is certainly more than what curiosity

1101
00:41:42,870 --> 00:41:41,280
can do right now

1102
00:41:44,470 --> 00:41:42,880
okay we've got about

1103
00:41:46,150 --> 00:41:44,480
10 minutes to go here so we're going to

1104
00:41:48,390 --> 00:41:46,160
try to get in as many questions as we

1105
00:41:54,309 --> 00:41:48,400
can on the phone next up i believe we

1106
00:41:58,550 --> 00:41:56,550
really interesting discussion i'm

1107
00:42:01,750 --> 00:41:58,560
curious

1108
00:42:03,030 --> 00:42:01,760
when are you going to do

1109
00:42:05,109 --> 00:42:03,040
when are you going to settle on the

1110
00:42:08,150 --> 00:42:05,119
requirements for the rover

1111
00:42:10,309 --> 00:42:08,160
and is it possible that sample caching

1112
00:42:14,230 --> 00:42:10,319
could be excluded as a requirement for

1113
00:42:16,390 --> 00:42:14,950

so

1114
00:42:18,710 --> 00:42:16,400
about a year from now

1115
00:42:19,910 --> 00:42:18,720
we'll we'll have the final requirements

1116
00:42:21,589 --> 00:42:19,920
uh now that we have the suite of

1117
00:42:23,990 --> 00:42:21,599
instruments and and we can define the

1118
00:42:25,829 --> 00:42:24,000
caching system and and the continuing

1119
00:42:29,030 --> 00:42:25,839
work that's been going on by the project

1120
00:42:29,910 --> 00:42:29,040
to to get the rover going uh

1121
00:42:31,430 --> 00:42:29,920
you know we'll have all those

1122
00:42:33,829 --> 00:42:31,440
requirements there's always the

1123
00:42:36,069 --> 00:42:33,839
possibility that the caching system gets

1124
00:42:38,069 --> 00:42:36,079
de-scoped if we run into trouble

1125
00:42:40,870 --> 00:42:38,079
uh you know we're hopeful that's not the

1126
00:42:42,390 --> 00:42:40,880
case um i guess i should say from the

1127
00:42:43,910 --> 00:42:42,400
start though your opening comment i'm

1128
00:42:45,670 --> 00:42:43,920
really glad that you're curious about

1129
00:42:49,109 --> 00:42:45,680
this

1130
00:42:51,829 --> 00:42:49,119
greatest things that that we're doing

1131
00:42:58,309 --> 00:42:51,839
right now in planetary science uh and

1132
00:42:58,319 --> 00:43:02,950
dan did you have a follow-up

1133
00:43:06,550 --> 00:43:04,470
okay

1134
00:43:08,950 --> 00:43:06,560
let's go to the next caller leo enright

1135
00:43:11,109 --> 00:43:08,960
from irish tv

1136
00:43:13,670 --> 00:43:11,119
thanks dwayne um i'm sorry for lowering

1137
00:43:15,190 --> 00:43:13,680
the tone of this conversation but i'm a

1138
00:43:18,230 --> 00:43:15,200

a pictures guy

1139
00:43:20,390 --> 00:43:18,240
and i'm just wondering how the imagery

1140
00:43:22,230 --> 00:43:20,400
will compare with what the extraordinary

1141
00:43:24,309 --> 00:43:22,240
uh pictures that we're getting back from

1142
00:43:26,790 --> 00:43:24,319
the mass cam uh on

1143
00:43:29,030 --> 00:43:26,800
curiosity and in particular

1144
00:43:31,589 --> 00:43:29,040
there was a lot of talk before curiosity

1145
00:43:34,470 --> 00:43:31,599
was launched about a 3d

1146
00:43:37,910 --> 00:43:34,480
movie camera flying on that mission uh

1147
00:43:39,990 --> 00:43:37,920
which james cameron and mike malen uh

1148
00:43:41,190 --> 00:43:40,000
were working on it were the was that

1149
00:43:42,069 --> 00:43:41,200
considered

1150
00:43:43,589 --> 00:43:42,079
uh

1151
00:43:46,790 --> 00:43:43,599
or not

1152
00:43:49,589 --> 00:43:46,800
um you know this the mastercam zoom

1153
00:43:51,670 --> 00:43:49,599
is a stereo camera and with the zoom

1154
00:43:53,750 --> 00:43:51,680
is just going to knock our socks off

1155
00:43:55,829 --> 00:43:53,760
with our views of mars this is going to

1156
00:43:56,630 --> 00:43:55,839
get so much closer

1157
00:44:01,030 --> 00:43:56,640
to

1158
00:44:03,750 --> 00:44:01,040
human with two eyeballs separated by

1159
00:44:05,109 --> 00:44:03,760
about six centimeters uh when we look at

1160
00:44:07,510 --> 00:44:05,119
the images that are going to come from

1161
00:44:09,750 --> 00:44:07,520
the mars 2020 rover especially if you

1162
00:44:12,150 --> 00:44:09,760
take a sequence of stills and put them

1163
00:44:14,470 --> 00:44:12,160

together into a motion video

1164
00:44:16,870 --> 00:44:14,480
you're going to feel like you're on mars

1165
00:44:19,190 --> 00:44:16,880
it's going to be fantastic

1166
00:44:21,589 --> 00:44:19,200
so just to add to that if if you look at

1167
00:44:24,470 --> 00:44:21,599
the graphic of mass cam over on the left

1168
00:44:25,190 --> 00:44:24,480
hand side are the two cameras that are

1169
00:44:29,990 --> 00:44:25,200
on

1170
00:44:32,309 --> 00:44:30,000
focal length and the other is 100

1171
00:44:34,790 --> 00:44:32,319
millimeter focal length

1172
00:44:37,750 --> 00:44:34,800
the idea is that you don't have to have

1173
00:44:39,750 --> 00:44:37,760
those focal lengths if you have a zoom

1174
00:44:40,630 --> 00:44:39,760
and so you'll have still have binocular

1175
00:44:42,550 --> 00:44:40,640
vision

1176
00:44:44,790 --> 00:44:42,560
and you'll still have the capabilities

1177
00:44:46,630 --> 00:44:44,800
of both those cameras except for it's

1178
00:44:48,230 --> 00:44:46,640
incorporated into

1179
00:44:51,030 --> 00:44:48,240
they'll both be able to see the same

1180
00:44:51,829 --> 00:44:51,040
thing either up close or far away

1181
00:44:54,710 --> 00:44:51,839
so

1182
00:44:57,430 --> 00:44:54,720
the basic answer is you'll still get

1183
00:44:59,270 --> 00:44:57,440
spectacular panoramic views

1184
00:45:00,950 --> 00:44:59,280
of the same resolution that we're

1185
00:45:03,670 --> 00:45:00,960
getting with

1186
00:45:06,309 --> 00:45:03,680
curiosity now with mastcam

1187
00:45:09,750 --> 00:45:06,319
but with the zoom capability is going to

1188
00:45:11,990 --> 00:45:09,760

be give you a much different feel of

1189
00:45:14,230 --> 00:45:12,000
being there in place and be able to

1190
00:45:17,270 --> 00:45:14,240
go up close and personal to something at

1191
00:45:21,349 --> 00:45:19,510
okay we're gonna uh take one more

1192
00:45:22,950 --> 00:45:21,359
question from the phone we're gonna come

1193
00:45:25,430 --> 00:45:22,960
back here and one more question on

1194
00:45:27,750 --> 00:45:25,440
social media and a reminder to the media

1195
00:45:29,510 --> 00:45:27,760
and the social media also at 3 pm

1196
00:45:31,109 --> 00:45:29,520
eastern you'll have an opportunity to

1197
00:45:33,750 --> 00:45:31,119
talk to the principal investigators

1198
00:45:35,990 --> 00:45:33,760
there will also be mars senior managers

1199
00:45:39,030 --> 00:45:36,000
there to answer the questions we don't

1200
00:45:40,390 --> 00:45:39,040
have time for here so again 3 pm eastern

1201
00:45:42,230 --> 00:45:40,400
there will be an announcement shortly

1202
00:45:44,870 --> 00:45:42,240
coming out from headquarters with

1203
00:45:46,550 --> 00:45:44,880
information on that so on the phone we

1204
00:45:47,990 --> 00:45:46,560
have uh lisa grossman from new

1205
00:45:49,670 --> 00:45:48,000
scientists lisa

1206
00:45:51,910 --> 00:45:49,680
hi thanks for taking my question um i

1207
00:45:53,589 --> 00:45:51,920
was wondering if there's any uh more

1208
00:45:55,990 --> 00:45:53,599
development on how we're going to get

1209
00:45:58,150 --> 00:45:56,000
the samples back and also

1210
00:46:00,390 --> 00:45:58,160
if we have to send something later to

1211
00:46:02,710 --> 00:46:00,400
you know to go pick it up what's the

1212
00:46:05,750 --> 00:46:02,720
usefulness of caching something now and

1213
00:46:08,710 --> 00:46:05,760

of storing samples ahead of time um

1214
00:46:10,630 --> 00:46:08,720
instead of having the the next thing go

1215
00:46:13,030 --> 00:46:10,640
pick up samples immediately and then

1216
00:46:14,470 --> 00:46:13,040
bring them home in one go

1217
00:46:16,470 --> 00:46:14,480
well what we're announcing today is

1218
00:46:19,670 --> 00:46:16,480
really our next big leap in the

1219
00:46:22,069 --> 00:46:19,680
exploration uh in our journey to mars

1220
00:46:24,069 --> 00:46:22,079
and that journey doesn't end with one

1221
00:46:26,390 --> 00:46:24,079
rover and that's why we're sending a

1222
00:46:28,870 --> 00:46:26,400
second rover mars 2020. it's a big

1223
00:46:30,790 --> 00:46:28,880
planet a lot to explore and so this is

1224
00:46:31,990 --> 00:46:30,800
really just the first step

1225
00:46:37,990 --> 00:46:32,000
in

1226
00:46:39,589 --> 00:46:38,000
astrobiologists and planetary science to

1227
00:46:41,750 --> 00:46:39,599
the surface

1228
00:46:43,910 --> 00:46:41,760
and i wouldn't rule out the possibility

1229
00:46:45,510 --> 00:46:43,920
that it's you know a future astronaut

1230
00:46:47,510 --> 00:46:45,520
that picks up the sample and brings it

1231
00:46:50,230 --> 00:46:47,520
back to earth but that's forward work we

1232
00:46:51,990 --> 00:46:50,240
haven't defined that the first most

1233
00:46:53,750 --> 00:46:52,000
important step though

1234
00:46:54,950 --> 00:46:53,760
is to find samples that are so

1235
00:46:57,109 --> 00:46:54,960
compelling

1236
00:46:58,950 --> 00:46:57,119
that we need to get them back and that's

1237
00:47:00,870 --> 00:46:58,960
the purpose of this rover is to be able

1238
00:47:03,109 --> 00:47:00,880

to to read that story of mars and

1239
00:47:04,790 --> 00:47:03,119
identify are there some samples that are

1240
00:47:07,030 --> 00:47:04,800
so compelling that we would want to get

1241
00:47:08,150 --> 00:47:07,040
them back to earth and

1242
00:47:09,510 --> 00:47:08,160
it may not have been clear in the

1243
00:47:11,510 --> 00:47:09,520
discussion i just realized that how are

1244
00:47:12,950 --> 00:47:11,520
we going to get those samples and so on

1245
00:47:15,270 --> 00:47:12,960
the end of the arm

1246
00:47:17,270 --> 00:47:15,280
is a drill very different from curiosity

1247
00:47:19,829 --> 00:47:17,280
michael meyer described it the drill on

1248
00:47:21,829 --> 00:47:19,839
curiosity grinds up the rock puts it

1249
00:47:24,230 --> 00:47:21,839
into the rover analyzes it

1250
00:47:26,549 --> 00:47:24,240
for mars 2020 we have a coring system

1251
00:47:28,870 --> 00:47:26,559
like taking a core oven out of an apple

1252
00:47:30,470 --> 00:47:28,880
it's going to core into the rock

1253
00:47:32,790 --> 00:47:30,480
preserving

1254
00:47:35,670 --> 00:47:32,800
a little cylinder of rock just as it is

1255
00:47:38,150 --> 00:47:35,680
on mars and it's that preserved you know

1256
00:47:40,390 --> 00:47:38,160
pristine sample that we might eventually

1257
00:47:41,109 --> 00:47:40,400
bring back to earth

1258
00:47:42,870 --> 00:47:41,119
and

1259
00:47:44,390 --> 00:47:42,880
to follow up on

1260
00:47:45,990 --> 00:47:44,400
well

1261
00:47:48,150 --> 00:47:46,000
are you worried about the cash sitting

1262
00:47:49,750 --> 00:47:48,160
there with the samples in it and and

1263
00:47:51,750 --> 00:47:49,760

we've had some science teams looking at

1264
00:47:53,670 --> 00:47:51,760
this and it's actually as long as it's

1265
00:47:55,670 --> 00:47:53,680
sealed it's not a problem and we think

1266
00:47:57,190 --> 00:47:55,680
that the sample can be very stable for

1267
00:47:58,870 --> 00:47:57,200
at least 20 years

1268
00:48:01,990 --> 00:47:58,880
so

1269
00:48:03,670 --> 00:48:02,000
taking the a core out of the rock and

1270
00:48:06,710 --> 00:48:03,680
putting it into something else in which

1271
00:48:09,589 --> 00:48:06,720
you protect it from the environment is

1272
00:48:12,950 --> 00:48:09,599
fine and it'll be stable there until we

1273
00:48:14,549 --> 00:48:12,960
go and decide to go and get it

1274
00:48:15,829 --> 00:48:14,559
okay so jason you're going to take us

1275
00:48:17,510 --> 00:48:15,839
out here with a question and then we're

1276
00:48:19,270 --> 00:48:17,520
going to see if we have any closing

1277
00:48:20,950 --> 00:48:19,280
remarks and i'll give some housekeeping

1278
00:48:23,270 --> 00:48:20,960
notes so jason

1279
00:48:25,510 --> 00:48:23,280
wonderful um several people have asked

1280
00:48:27,349 --> 00:48:25,520
on both twitter and on our ustream feed

1281
00:48:30,150 --> 00:48:27,359
and other platforms here

1282
00:48:32,069 --> 00:48:30,160
regarding the wheels um so corey here

1283
00:48:34,309 --> 00:48:32,079
specifically asks what improvements to

1284
00:48:36,230 --> 00:48:34,319
the 2020 rover wheels if any will be

1285
00:48:37,990 --> 00:48:36,240
made on how curiosity's wheels have

1286
00:48:39,190 --> 00:48:38,000
managed

1287
00:48:41,190 --> 00:48:39,200
well this is one of the great things

1288
00:48:43,829 --> 00:48:41,200

about operating curiosity on the surface

1289
00:48:46,470 --> 00:48:43,839
now is we're learning how to drive on

1290
00:48:49,190 --> 00:48:46,480
mars and that the driving team is doing

1291
00:48:50,710 --> 00:48:49,200
a great job and the team that spotted

1292
00:48:52,390 --> 00:48:50,720
that the wheels were cracking you know

1293
00:48:53,910 --> 00:48:52,400
was also really important and having

1294
00:48:55,589 --> 00:48:53,920
imaging that can look at the wheels is

1295
00:48:57,670 --> 00:48:55,599
an important part of that

1296
00:48:58,950 --> 00:48:57,680
and so we've been driving over really

1297
00:49:00,870 --> 00:48:58,960
rough terrain

1298
00:49:02,790 --> 00:49:00,880
and it's causing these cracks we believe

1299
00:49:04,549 --> 00:49:02,800
and there's a rover in the mars yard at

1300
00:49:06,710 --> 00:49:04,559
jet propulsion lab that's practicing and

1301
00:49:08,790 --> 00:49:06,720
trying to reproduce these things

1302
00:49:10,710 --> 00:49:08,800
and if you look at the treads on the

1303
00:49:12,630 --> 00:49:10,720
curiosity rover they were designed to

1304
00:49:14,790 --> 00:49:12,640
provide traction but also to prevent

1305
00:49:16,950 --> 00:49:14,800
cracks from growing in a certain

1306
00:49:19,670 --> 00:49:16,960
direction and so the team's now actively

1307
00:49:22,390 --> 00:49:19,680
working at redesign of the wheels uh in

1308
00:49:23,589 --> 00:49:22,400
part to look at can we choose alloys or

1309
00:49:26,309 --> 00:49:23,599
structures that are still lightweight

1310
00:49:27,829 --> 00:49:26,319
but wouldn't crack as easily but also

1311
00:49:29,750 --> 00:49:27,839
new structures that would prevent those

1312
00:49:31,670 --> 00:49:29,760
cracks from growing so that's a very

1313
00:49:33,430 --> 00:49:31,680

active area and we you know we could ask

1314
00:49:34,870 --> 00:49:33,440
the project folks here if you know if

1315
00:49:36,470 --> 00:49:34,880
they wanted to elaborate but you know

1316
00:49:39,349 --> 00:49:36,480
that's something that we're going to fix

1317
00:49:41,109 --> 00:49:39,359
and also we're going to try and uh plan

1318
00:49:42,790 --> 00:49:41,119
when we get to the site we first have to

1319
00:49:44,549 --> 00:49:42,800
pick the landing site we're going to try

1320
00:49:48,870 --> 00:49:44,559
and be a little more careful about where

1321
00:49:54,150 --> 00:49:51,430
okay um

1322
00:49:55,910 --> 00:49:54,160
did you have okay so before we i'm gonna

1323
00:49:57,349 --> 00:49:55,920
ask if anyone has any closing remarks

1324
00:49:59,510 --> 00:49:57,359
for the media they're still on the phone

1325
00:50:02,309 --> 00:49:59,520
again uh we can get your current

1326
00:50:03,750 --> 00:50:02,319
questions answered at 3 p.m the media

1327
00:50:04,870 --> 00:50:03,760
teleconference where you can hear

1328
00:50:06,710 --> 00:50:04,880
firsthand from the principal

1329
00:50:09,510 --> 00:50:06,720
investigators and some of the senior

1330
00:50:12,150 --> 00:50:09,520
nasa officials and our jpl officials are

1331
00:50:13,510 --> 00:50:12,160
associated with the mars 2020 rover 3 pm

1332
00:50:15,030 --> 00:50:13,520
and look out for that announcement and

1333
00:50:17,589 --> 00:50:15,040
for the social media keep those

1334
00:50:18,870 --> 00:50:17,599
questions coming i will have scientists

1335
00:50:19,670 --> 00:50:18,880
answering your questions throughout the

1336
00:50:21,190 --> 00:50:19,680
day

1337
00:50:22,790 --> 00:50:21,200
send them in

1338
00:50:25,589 --> 00:50:22,800

ask nasa

1339
00:50:29,670 --> 00:50:25,599
join the conversation hashtag journey to

1340
00:50:30,390 --> 00:50:29,680
mars any closing comments from anyone

1341
00:50:31,750 --> 00:50:30,400
well

1342
00:50:34,470 --> 00:50:31,760
you know obviously we're all very

1343
00:50:36,309 --> 00:50:34,480
excited about this and the mars 2020

1344
00:50:37,990 --> 00:50:36,319
rover instruments are going to start

1345
00:50:39,510 --> 00:50:38,000
making progress now the teams are going

1346
00:50:41,349 --> 00:50:39,520
to come together

1347
00:50:43,430 --> 00:50:41,359
and in the end

1348
00:50:45,510 --> 00:50:43,440
i predict the mars 2020 rover will

1349
00:50:47,349 --> 00:50:45,520
discover nothing on mars

1350
00:50:48,870 --> 00:50:47,359
but it's going to be the scientists and

1351
00:50:50,710 --> 00:50:48,880
the community on earth and the human

1352
00:50:52,309 --> 00:50:50,720
space flight folks on earth they're

1353
00:50:55,430 --> 00:50:52,319
going to make wonderful discoveries with

1354
00:50:57,349 --> 00:50:55,440
mars 2020. and will lead

1355
00:50:58,870 --> 00:50:57,359
to getting humans to mars in the future

1356
00:51:00,470 --> 00:50:58,880
very exciting

1357
00:51:01,990 --> 00:51:00,480
thank you well that'll do it here from

1358
00:51:03,030 --> 00:51:02,000
nasa headquarters ladies and gentlemen

1359
00:51:04,270 --> 00:51:03,040
again

1360
00:51:05,910 --> 00:51:04,280
go to

1361
00:51:08,309 --> 00:51:05,920
www.nasa.gov

1362
00:51:10,150 --> 00:51:08,319
mars for more information

1363
00:51:12,710 --> 00:51:10,160

you heard it here today

1364
00:51:14,790 --> 00:51:12,720
mars 2020 rover has a payload seven

1365
00:51:16,470 --> 00:51:14,800
carefully selected instruments

1366
00:51:18,630 --> 00:51:16,480
our congratulations

1367
00:51:21,829 --> 00:51:18,640
and a thank you to the public

1368
00:51:23,750 --> 00:51:21,839
for your enthusiastic