
NASA
MARS
EXPLORATION

1
00:00:06,390 --> 00:00:04,309
good afternoon my name is dwayne brown

2
00:00:08,710 --> 00:00:06,400
with the office of communications and

3
00:00:10,790 --> 00:00:08,720
welcome to nasa headquarters

4
00:00:13,350 --> 00:00:10,800
today you will hear about the

5
00:00:14,629 --> 00:00:13,360
preparations challenges science and much

6
00:00:16,870 --> 00:00:14,639
much more

7
00:00:19,750 --> 00:00:16,880
of the upcoming august landing on the

8
00:00:22,630 --> 00:00:19,760
martian service of the most advanced

9
00:00:24,390 --> 00:00:22,640
rover designed by humankind

10
00:00:27,990 --> 00:00:24,400
we also have the debut of one of the

11
00:00:29,589 --> 00:00:28,000
many education and public outreach tools

12
00:00:33,270 --> 00:00:29,599
for the public to experience the

13
00:00:35,510 --> 00:00:33,280

adventure of mars exploration

14
00:00:38,470 --> 00:00:35,520
to officially kick us off

15
00:00:40,150 --> 00:00:38,480
and set the stage for today's event

16
00:00:43,430 --> 00:00:40,160
to provide opening remarks this

17
00:00:45,190 --> 00:00:43,440
five-time flown space shuttle astronaut

18
00:00:46,549 --> 00:00:45,200
astrophysicist

19
00:00:49,190 --> 00:00:46,559
and the associate administrator for

20
00:01:01,110 --> 00:00:49,200
nasa's science mission directorate

21
00:01:08,149 --> 00:01:03,270
well i'm just incredibly excited to be

22
00:01:13,590 --> 00:01:08,159
here we are 20 days 12 hours 29 minutes

23
00:01:15,830 --> 00:01:13,600
and 47 seconds from landing on mars

24
00:01:18,550 --> 00:01:15,840
msl holds the potential to look for

25
00:01:19,990 --> 00:01:18,560
evidence of habitable environments if

26
00:01:22,149 --> 00:01:20,000
they existed

27
00:01:23,990 --> 00:01:22,159
on mars in the distant past

28
00:01:25,830 --> 00:01:24,000
the curiosity rover has the potential to

29
00:01:29,190 --> 00:01:25,840
discover the building blocks of life on

30
00:01:32,069 --> 00:01:29,200
mars if life ever existed on mars this

31
00:01:34,789 --> 00:01:32,079
is just phenomenal that we have a rover

32
00:01:36,469 --> 00:01:34,799
that's this close to landing and over

33
00:01:38,870 --> 00:01:36,479
the next two years helping us to answer

34
00:01:41,030 --> 00:01:38,880
these questions

35
00:01:43,429 --> 00:01:41,040
however

36
00:01:46,550 --> 00:01:43,439
the curiosity landing is the hardest

37
00:01:47,830 --> 00:01:46,560
nasa robotic mission ever attempted

38
00:01:50,389 --> 00:01:47,840

in the history

39
00:01:52,550 --> 00:01:50,399
of exploration of mars or any of our

40
00:01:53,749 --> 00:01:52,560
robotic exploration

41
00:01:56,789 --> 00:01:53,759
this

42
00:01:59,190 --> 00:01:56,799
is risky business

43
00:02:01,109 --> 00:01:59,200
given that we are in the heart of summer

44
00:02:04,230 --> 00:02:01,119
there's a real opportunity to achieve

45
00:02:07,510 --> 00:02:04,240
tremendous broad public engagement

46
00:02:09,510 --> 00:02:07,520
on this adventure on mars

47
00:02:11,910 --> 00:02:09,520
we're going to engage summer camps

48
00:02:13,990 --> 00:02:11,920
science centers our nasa centers in fact

49
00:02:15,190 --> 00:02:14,000
all around the world people will be

50
00:02:17,990 --> 00:02:15,200
following

51
00:02:19,270 --> 00:02:18,000
the mars science laboratory landing and

52
00:02:21,830 --> 00:02:19,280
the subsequent adventures of the

53
00:02:24,550 --> 00:02:21,840
curiosity

54
00:02:26,790 --> 00:02:24,560
43 years ago today

55
00:02:28,630 --> 00:02:26,800
the apollo 11 mission launched to the

56
00:02:31,510 --> 00:02:28,640
moon

57
00:02:33,670 --> 00:02:31,520
i hope the msl curiosity landing will be

58
00:02:36,470 --> 00:02:33,680
as memorable as an exciting for kids

59
00:02:39,750 --> 00:02:36,480
today as the apollo 11 landing was when

60
00:02:42,470 --> 00:02:39,760
i was in summer camp 43 years ago and i

61
00:02:44,390 --> 00:02:42,480
remember it well and it put me on a path

62
00:02:46,710 --> 00:02:44,400
that i've found very exciting leading to

63
00:02:49,030 --> 00:02:46,720

me here at nasa headquarters in front of

64
00:02:51,750 --> 00:02:49,040
this distinguished panel the best of the

65
00:02:54,630 --> 00:02:51,760
best and i'm sure you're going to hear

66
00:02:56,229 --> 00:02:54,640
about the difficulties the great science

67
00:02:57,830 --> 00:02:56,239
we expect

68
00:03:00,710 --> 00:02:57,840
and the harrowing ride through the

69
00:03:05,509 --> 00:03:00,720
martian atmosphere that is now 20 days

70
00:03:06,630 --> 00:03:05,519
12 hours 27 minutes and 53 seconds from

71
00:03:09,910 --> 00:03:06,640
landing

72
00:03:16,869 --> 00:03:09,920
welcome and uh i'll hand it over to doug

73
00:03:23,030 --> 00:03:20,470
okay before we hand it over to doug uh

74
00:03:24,710 --> 00:03:23,040
a few housekeeping notes for the folks

75
00:03:26,869 --> 00:03:24,720
and the many folks out there watching us

76
00:03:27,830 --> 00:03:26,879
on television and elsewhere you can

77
00:03:29,910 --> 00:03:27,840
follow

78
00:03:32,390 --> 00:03:29,920
the mars mission the mars exploration

79
00:03:35,750 --> 00:03:32,400
program and a host of other information

80
00:03:43,030 --> 00:03:39,350
mars and www.nasa.gov

81
00:03:46,470 --> 00:03:43,040
msl and yes twitter facebook youtube

82
00:03:49,190 --> 00:03:46,480
social media and the like follow us at

83
00:03:51,670 --> 00:03:49,200
mars curiosity join the conversation

84
00:03:53,589 --> 00:03:51,680
there will be a lot of it starting today

85
00:03:55,190 --> 00:03:53,599
and beyond the excitement is building

86
00:03:56,789 --> 00:03:55,200
not just here in the united states but

87
00:03:58,789 --> 00:03:56,799
all over the world

88
00:04:02,070 --> 00:03:58,799

now let's get started let me introduce

89
00:04:04,949 --> 00:04:02,080
you to today's speakers

90
00:04:06,229 --> 00:04:04,959
first up will be doug mcchristian

91
00:04:08,229 --> 00:04:06,239
director

92
00:04:13,350 --> 00:04:08,239
mars exploration program nasa

93
00:04:18,310 --> 00:04:15,350
michael meyer

94
00:04:19,349 --> 00:04:18,320
lead scientist for the moss exploration

95
00:04:25,110 --> 00:04:19,359
program

96
00:04:30,390 --> 00:04:27,830
john kratzinger

97
00:04:32,790 --> 00:04:30,400
science lab project scientist

98
00:04:37,110 --> 00:04:32,800
california institute of technology

99
00:04:41,350 --> 00:04:39,189
pete singer

100
00:04:43,590 --> 00:04:41,360
my science laboratory project manager

101
00:04:47,350 --> 00:04:43,600
from the jet propulsion laboratory in

102
00:04:52,469 --> 00:04:50,150
and jeff norris manager planning and

103
00:04:54,870 --> 00:04:52,479
execution systems also at the jet

104
00:04:56,629 --> 00:04:54,880
propulsion laboratory so hang on to your

105
00:04:58,870 --> 00:04:56,639
hat strap on and i'll toss it over to

106
00:05:01,110 --> 00:04:58,880
doug all right thanks dwayne

107
00:05:02,070 --> 00:05:01,120
well just in case you missed it we're 20

108
00:05:03,670 --> 00:05:02,080
days

109
00:05:05,590 --> 00:05:03,680
from uh

110
00:05:07,110 --> 00:05:05,600
what could arguably be the most

111
00:05:09,270 --> 00:05:07,120
important event

112
00:05:11,110 --> 00:05:09,280
most significant event in the history of

113
00:05:13,350 --> 00:05:11,120

planetary exploration

114
00:05:15,270 --> 00:05:13,360
what's fun what's going to be fun is we

115
00:05:16,310 --> 00:05:15,280
also have something at the end of this

116
00:05:17,990 --> 00:05:16,320
press conference that i think you'll

117
00:05:20,230 --> 00:05:18,000
like it's a little unique twist we'll do

118
00:05:21,990 --> 00:05:20,240
here i think you'll enjoy it

119
00:05:23,270 --> 00:05:22,000
mars science lab most challenging

120
00:05:24,310 --> 00:05:23,280
mission we've ever sent to another

121
00:05:26,629 --> 00:05:24,320
planet and certainly the most

122
00:05:28,230 --> 00:05:26,639
challenging we've sent to mars it truly

123
00:05:30,710 --> 00:05:28,240
is a major step forward both in

124
00:05:33,189 --> 00:05:30,720
technology and in science potential

125
00:05:36,070 --> 00:05:33,199
science return and science capability to

126
00:05:37,909 --> 00:05:36,080
unlock the mysteries of mars in places

127
00:05:40,469 --> 00:05:37,919
that have never been

128
00:05:42,310 --> 00:05:40,479
accessible to humankind in the past

129
00:05:43,670 --> 00:05:42,320
could i have the first graphics up thank

130
00:05:45,350 --> 00:05:43,680
you

131
00:05:48,150 --> 00:05:45,360
this program the mars exploration

132
00:05:49,430 --> 00:05:48,160
program was designed to create steady

133
00:05:51,990 --> 00:05:49,440
progress

134
00:05:54,390 --> 00:05:52,000
in both technology and scientific

135
00:05:56,710 --> 00:05:54,400
capabilities at other planets

136
00:05:59,590 --> 00:05:56,720
spirit and opportunity to msl we've

137
00:06:01,510 --> 00:05:59,600
changed and significantly reduced

138
00:06:03,749 --> 00:06:01,520

the landing ellipses so our landing

139
00:06:04,950 --> 00:06:03,759
accuracy is much higher we've extended

140
00:06:07,990 --> 00:06:04,960
mission life

141
00:06:09,670 --> 00:06:08,000
we've extended roving distances

142
00:06:11,029 --> 00:06:09,680
we've made great strides in the

143
00:06:13,110 --> 00:06:11,039
potential science we can do with the

144
00:06:14,790 --> 00:06:13,120
instrument suite that's aboard our

145
00:06:17,510 --> 00:06:14,800
orbiters are no less important and

146
00:06:19,830 --> 00:06:17,520
interesting we've gone from odyssey to

147
00:06:22,230 --> 00:06:19,840
mars reconnaissance orbiter imaging

148
00:06:25,029 --> 00:06:22,240
capabilities dramatically enhanced as

149
00:06:26,950 --> 00:06:25,039
well as the capability to return larger

150
00:06:28,870 --> 00:06:26,960
and larger volumes of data from the

151
00:06:30,070 --> 00:06:28,880
planet both surface missions and orbital

152
00:06:31,830 --> 00:06:30,080
missions

153
00:06:33,990 --> 00:06:31,840
these are very important

154
00:06:35,830 --> 00:06:34,000
tools to expand science and greater

155
00:06:37,909 --> 00:06:35,840
capability for the united states as well

156
00:06:40,629 --> 00:06:37,919
as the world in science but with that

157
00:06:42,390 --> 00:06:40,639
capability expansion comes a need to

158
00:06:44,390 --> 00:06:42,400
land in a new way

159
00:06:47,189 --> 00:06:44,400
so this is no airbag bounce that we're

160
00:06:49,670 --> 00:06:47,199
going to get here this is a viking like

161
00:06:52,309 --> 00:06:49,680
landing but with a twist the engines are

162
00:06:54,550 --> 00:06:52,319
on top of this system instead of

163
00:06:56,469 --> 00:06:54,560

underneath it so that it's easier to

164
00:06:59,029 --> 00:06:56,479
rove when we get there

165
00:07:01,430 --> 00:06:59,039
in a technique called the sky crane

166
00:07:03,510 --> 00:07:01,440
is it crazy well not so much once you

167
00:07:05,909 --> 00:07:03,520
get comfortable once you understand it

168
00:07:08,710 --> 00:07:05,919
it's not a crazy concept it works

169
00:07:11,189 --> 00:07:08,720
is it risky landing on mars is always

170
00:07:13,350 --> 00:07:11,199
risky there are hundreds of discrete

171
00:07:15,589 --> 00:07:13,360
events that occur from

172
00:07:18,390 --> 00:07:15,599
release of the cruise stage to parachute

173
00:07:20,150 --> 00:07:18,400
deployments to heat shield deployments

174
00:07:23,029 --> 00:07:20,160
all of these are unique and anyone could

175
00:07:26,070 --> 00:07:23,039
cause problems we go from 13 000 miles

176
00:07:29,110 --> 00:07:26,080
an hour to zero in seven minutes that's

177
00:07:30,390 --> 00:07:29,120
uh that's quite a challenge in itself

178
00:07:32,629 --> 00:07:30,400
and then there's the unknown there's

179
00:07:35,830 --> 00:07:32,639
mars mars throws things at you dust

180
00:07:37,589 --> 00:07:35,840
storms atmospheric density changes wind

181
00:07:38,870 --> 00:07:37,599
so it's a very unique and a very

182
00:07:40,390 --> 00:07:38,880
challenging environment you're going to

183
00:07:41,830 --> 00:07:40,400
hear a lot more about the details of

184
00:07:42,830 --> 00:07:41,840
entry descent and landing from pete in

185
00:07:44,870 --> 00:07:42,840
just a few

186
00:07:45,990 --> 00:07:44,880
minutes but what i want to do is

187
00:07:47,830 --> 00:07:46,000
describe

188
00:07:50,070 --> 00:07:47,840

what it feels like

189
00:07:51,749 --> 00:07:50,080
edl entry descent and landing is like a

190
00:07:53,670 --> 00:07:51,759
game of dominoes

191
00:07:55,189 --> 00:07:53,680
with the release of that that cruise

192
00:07:57,029 --> 00:07:55,199
stage about 10 minutes before we hit the

193
00:07:59,350 --> 00:07:57,039
top of the atmosphere that's the first

194
00:08:01,430 --> 00:07:59,360
domino that's been flicked

195
00:08:03,029 --> 00:08:01,440
the long string of dominoes that follows

196
00:08:05,350 --> 00:08:03,039
that are supposed to fall in sequential

197
00:08:07,589 --> 00:08:05,360
order are all done autonomously

198
00:08:09,749 --> 00:08:07,599
just like in entry descent and landing

199
00:08:11,270 --> 00:08:09,759
if one of them is out of place

200
00:08:13,670 --> 00:08:11,280
it's very likely

201
00:08:16,550 --> 00:08:13,680
that the last domino won't fall which

202
00:08:18,150 --> 00:08:16,560
means mars science lab curiosity rover

203
00:08:19,110 --> 00:08:18,160
may hit the ground harder than we want

204
00:08:21,670 --> 00:08:19,120
it to

205
00:08:22,629 --> 00:08:21,680
remember every landing is unique every

206
00:08:24,550 --> 00:08:22,639
landing

207
00:08:26,070 --> 00:08:24,560
is like a first

208
00:08:27,990 --> 00:08:26,080
i'm incredibly proud of the team that's

209
00:08:29,589 --> 00:08:28,000
done this they are they have done a

210
00:08:30,550 --> 00:08:29,599
fantastic job

211
00:08:32,389 --> 00:08:30,560
of

212
00:08:33,509 --> 00:08:32,399
testing systems designing systems

213
00:08:35,509 --> 00:08:33,519

obviously and building them but

214
00:08:37,750 --> 00:08:35,519
analyzing them and testing them

215
00:08:39,190 --> 00:08:37,760
understanding the edges of the envelope

216
00:08:41,269 --> 00:08:39,200
pushing them to their limits they've

217
00:08:43,110 --> 00:08:41,279
done everything possible to ensure the

218
00:08:44,710 --> 00:08:43,120
success of this mission

219
00:08:46,150 --> 00:08:44,720
there's always a few last-minute game

220
00:08:47,910 --> 00:08:46,160
changers

221
00:08:50,230 --> 00:08:47,920
as an example

222
00:08:51,590 --> 00:08:50,240
odyssey lost a reaction wheel a few

223
00:08:53,829 --> 00:08:51,600
weeks ago

224
00:08:56,230 --> 00:08:53,839
that was totally unexpected reaction

225
00:08:58,150 --> 00:08:56,240
wheels are utilized to help manage

226
00:08:59,509 --> 00:08:58,160
spacecraft attitude and momentum in

227
00:09:01,350 --> 00:08:59,519
space

228
00:09:03,269 --> 00:09:01,360
we haven't fully worked out the issues

229
00:09:05,590 --> 00:09:03,279
related to that loss yet

230
00:09:06,949 --> 00:09:05,600
but we have plenty of backup systems

231
00:09:08,710 --> 00:09:06,959
mars reconnaissance orbital will be

232
00:09:10,630 --> 00:09:08,720
collecting communications data he says

233
00:09:12,949 --> 00:09:10,640
mars express will help us with that of

234
00:09:15,190 --> 00:09:12,959
course there's a deep space network

235
00:09:17,110 --> 00:09:15,200
odyssey right now looks like it may not

236
00:09:19,430 --> 00:09:17,120
be in the same spot that we'd expected

237
00:09:21,350 --> 00:09:19,440
it to be so there may be some changes in

238
00:09:22,949 --> 00:09:21,360

real-time communication we'll let you

239
00:09:24,550 --> 00:09:22,959
know as this develops we still have more

240
00:09:26,790 --> 00:09:24,560
work to do

241
00:09:28,550 --> 00:09:26,800
but keep in mind there is no risk to msl

242
00:09:30,070 --> 00:09:28,560
landing it does not have an effect on

243
00:09:32,550 --> 00:09:30,080
that it's important to keep in mind the

244
00:09:34,870 --> 00:09:32,560
communication

245
00:09:36,790 --> 00:09:34,880
so in summary nasa was created to take

246
00:09:37,750 --> 00:09:36,800
on big challenges and that's what this

247
00:09:39,750 --> 00:09:37,760
one is

248
00:09:41,670 --> 00:09:39,760
msl is forging ahead

249
00:09:44,310 --> 00:09:41,680
in greater and greater ways for science

250
00:09:46,470 --> 00:09:44,320
and for technology robert kennedy said

251
00:09:49,430 --> 00:09:46,480
only those who dare to fail greatly can

252
00:09:50,630 --> 00:09:49,440
ever achieve greatly msl is poised to do

253
00:09:52,389 --> 00:09:50,640
great things

254
00:09:54,070 --> 00:09:52,399
come with us follow us with the rest of

255
00:09:56,630 --> 00:09:54,080
the journey meet us on the surface of

256
00:09:58,230 --> 00:09:56,640
mars on the 6th of august

257
00:10:00,949 --> 00:09:58,240
i'll let you hear the details from my

258
00:10:02,310 --> 00:10:00,959
colleagues michael well thank you doug

259
00:10:06,470 --> 00:10:02,320
and for those who are having problems

260
00:10:08,630 --> 00:10:06,480
with the math august 6 1 31 in the

261
00:10:10,630 --> 00:10:08,640
morning on the east coast

262
00:10:13,190 --> 00:10:10,640
the mars science laboratory will deliver

263
00:10:16,069 --> 00:10:13,200

curiosity to the surface of mars

264
00:10:19,670 --> 00:10:16,079
and it's to answer the big question

265
00:10:21,030 --> 00:10:19,680
has mars ever been able to support life

266
00:10:23,750 --> 00:10:21,040
starting with the landing of mars

267
00:10:25,590 --> 00:10:23,760
pathfinder in 1997 our understanding of

268
00:10:27,030 --> 00:10:25,600
mars has

269
00:10:29,030 --> 00:10:27,040
basically

270
00:10:31,509 --> 00:10:29,040
boosted our concept

271
00:10:32,790 --> 00:10:31,519
that mars has had the energy the

272
00:10:34,550 --> 00:10:32,800
ingredients

273
00:10:36,389 --> 00:10:34,560
and the liquid water that could have

274
00:10:37,990 --> 00:10:36,399
supported life

275
00:10:39,829 --> 00:10:38,000
over the last decade and a half of

276
00:10:42,230 --> 00:10:39,839
exploration we have found more water

277
00:10:44,550 --> 00:10:42,240
than expected we found planes of water

278
00:10:46,470 --> 00:10:44,560
ice surrounding the poles on mars

279
00:10:49,190 --> 00:10:46,480
we have found the equivalent

280
00:10:51,590 --> 00:10:49,200
of buried glaciers at mid-latitudes we

281
00:10:54,150 --> 00:10:51,600
have found modern-day reoccurring flow

282
00:10:56,150 --> 00:10:54,160
features that suggest brine

283
00:10:57,829 --> 00:10:56,160
and we have found the minerals that have

284
00:11:00,550 --> 00:10:57,839
formed in water

285
00:11:02,150 --> 00:11:00,560
associated with specific periods of mars

286
00:11:04,310 --> 00:11:02,160
history

287
00:11:06,710 --> 00:11:04,320
we have revealed

288
00:11:07,590 --> 00:11:06,720

the planet with the resources to support

289
00:11:09,750 --> 00:11:07,600
life

290
00:11:12,870 --> 00:11:09,760
and which has undergone

291
00:11:14,949 --> 00:11:12,880
a huge transition from a warm wet

292
00:11:17,110 --> 00:11:14,959
relatively neutral planet

293
00:11:18,630 --> 00:11:17,120
than losing most of its atmosphere and

294
00:11:21,269 --> 00:11:18,640
magnetic field

295
00:11:23,829 --> 00:11:21,279
to a cold and dry

296
00:11:25,990 --> 00:11:23,839
acidic planet that we see today

297
00:11:28,949 --> 00:11:26,000
with the landing of curiosity the

298
00:11:31,670 --> 00:11:28,959
adventure begins as we explore the past

299
00:11:34,230 --> 00:11:31,680
and present environments at gale crater

300
00:11:35,990 --> 00:11:34,240
and to tell us more about gale crater

301
00:11:37,750 --> 00:11:36,000
turn it over to john

302
00:11:39,269 --> 00:11:37,760
thanks very much michael uh it's my

303
00:11:41,269 --> 00:11:39,279
pleasure to tell you today a little bit

304
00:11:42,630 --> 00:11:41,279
about the landing site that we're going

305
00:11:44,949 --> 00:11:42,640
to explore

306
00:11:46,630 --> 00:11:44,959
in the past i've i've discussed all the

307
00:11:49,750 --> 00:11:46,640
exciting science instruments that we

308
00:11:51,990 --> 00:11:49,760
have on on curiosity uh but today as we

309
00:11:53,910 --> 00:11:52,000
get ready for landing i i'd like to say

310
00:11:55,910 --> 00:11:53,920
a little bit to remind you about what

311
00:11:58,230 --> 00:11:55,920
we're going to be doing on our mission

312
00:12:00,230 --> 00:11:58,240
for habitable environments

313
00:12:01,829 --> 00:12:00,240

now just so that everybody is aware of

314
00:12:04,630 --> 00:12:01,839
that what we mean by a habitable

315
00:12:06,710 --> 00:12:04,640
environment is a place that has water

316
00:12:08,710 --> 00:12:06,720
because all life as we know it depends

317
00:12:11,430 --> 00:12:08,720
on on water

318
00:12:13,509 --> 00:12:11,440
we need a source of energy because all

319
00:12:15,509 --> 00:12:13,519
microorganisms require

320
00:12:16,550 --> 00:12:15,519
some source of energy in order to to

321
00:12:18,790 --> 00:12:16,560
live

322
00:12:21,829 --> 00:12:18,800
and in addition to that we need to

323
00:12:23,509 --> 00:12:21,839
identify a source of carbon uh which may

324
00:12:25,190 --> 00:12:23,519
be the most difficult search that we

325
00:12:27,110 --> 00:12:25,200
have on this mission

326
00:12:29,269 --> 00:12:27,120
all organisms as we know it are

327
00:12:31,509 --> 00:12:29,279
constructed of carbon so that's what we

328
00:12:33,350 --> 00:12:31,519
mean by a habitable environment so it's

329
00:12:36,230 --> 00:12:33,360
not just one thing we're after it's

330
00:12:38,870 --> 00:12:36,240
several things and and we may find one

331
00:12:40,710 --> 00:12:38,880
here and one there so this is going to

332
00:12:43,910 --> 00:12:40,720
be a mission that requires a lot of

333
00:12:46,790 --> 00:12:43,920
patience and the as a scientist this is

334
00:12:49,430 --> 00:12:46,800
not something for which there is a slam

335
00:12:51,269 --> 00:12:49,440
dunk discovery but but many bits of

336
00:12:53,269 --> 00:12:51,279
information come together to build this

337
00:12:55,750 --> 00:12:53,279
and it's going to take us a while

338
00:12:57,509 --> 00:12:55,760

to get there however we have a great

339
00:12:59,910 --> 00:12:57,519
place to do this so if i can go to the

340
00:13:01,670 --> 00:12:59,920
first graphic please

341
00:13:04,550 --> 00:13:01,680
what we see here

342
00:13:06,629 --> 00:13:04,560
is the location of gale crater

343
00:13:08,470 --> 00:13:06,639
on a very important transitional

344
00:13:10,870 --> 00:13:08,480
boundary on the surface of mars where we

345
00:13:13,030 --> 00:13:10,880
go from the southern highlands which are

346
00:13:15,190 --> 00:13:13,040
colored there in sort of the hot colors

347
00:13:17,990 --> 00:13:15,200
going from reds down into yellows and

348
00:13:19,509 --> 00:13:18,000
then passing into blues they give way to

349
00:13:21,670 --> 00:13:19,519
the part of mars called the northern

350
00:13:23,670 --> 00:13:21,680
lowlands and across that boundary we

351
00:13:25,670 --> 00:13:23,680
think billions of years ago

352
00:13:28,790 --> 00:13:25,680
water flowed across that surface and was

353
00:13:31,910 --> 00:13:28,800
present and there's gale crater sort of

354
00:13:34,230 --> 00:13:31,920
like a little bowl capturing uh any

355
00:13:36,710 --> 00:13:34,240
water that may have been present there

356
00:13:38,550 --> 00:13:36,720
gale is one of the lowest places on mars

357
00:13:40,550 --> 00:13:38,560
and if you don't know anything else in

358
00:13:42,470 --> 00:13:40,560
advance that's where you want to go to

359
00:13:45,030 --> 00:13:42,480
find evidence of water water flows

360
00:13:48,150 --> 00:13:45,040
downhill and that's where we're going

361
00:13:50,310 --> 00:13:48,160
okay in the middle of of that bowl gale

362
00:13:52,069 --> 00:13:50,320
crater which to give you a sense of the

363
00:13:54,230 --> 00:13:52,079

size of the crater it's about the width

364
00:13:55,990 --> 00:13:54,240
of the los angeles basin and in the

365
00:13:58,550 --> 00:13:56,000
middle of it we have a mountain that the

366
00:14:00,470 --> 00:13:58,560
science team has called mount sharp

367
00:14:02,949 --> 00:14:00,480
and that mountain in the middle notice

368
00:14:05,509 --> 00:14:02,959
again the color and the color scale that

369
00:14:07,990 --> 00:14:05,519
mountain has five kilometers of relief

370
00:14:10,870 --> 00:14:08,000
on it that's taller than any mountain in

371
00:14:13,189 --> 00:14:10,880
the lower 48 states in the us so that's

372
00:14:14,949 --> 00:14:13,199
our primary exploration target as we as

373
00:14:16,389 --> 00:14:14,959
we head into the crater

374
00:14:19,110 --> 00:14:16,399
okay so if i can have the next one

375
00:14:21,750 --> 00:14:19,120
please here's a blow up now of gale

376
00:14:23,670 --> 00:14:21,760
crater and you can see mount sharp there

377
00:14:25,670 --> 00:14:23,680
in the middle of the crater and there's

378
00:14:27,829 --> 00:14:25,680
our little landing ellipse

379
00:14:30,470 --> 00:14:27,839
and and i say little because pete will

380
00:14:33,590 --> 00:14:30,480
show this in a minute but one of the

381
00:14:35,750 --> 00:14:33,600
great science uh accomplishments already

382
00:14:37,910 --> 00:14:35,760
has been given to us by engineering

383
00:14:39,750 --> 00:14:37,920
which is being able to get a landing

384
00:14:41,670 --> 00:14:39,760
ellipse so small that we can get into

385
00:14:42,550 --> 00:14:41,680
the very best places on the surface of

386
00:14:44,790 --> 00:14:42,560
mars

387
00:14:47,189 --> 00:14:44,800
our final four landing sites were all

388
00:14:48,550 --> 00:14:47,199

top choices by the science community

389
00:14:50,629 --> 00:14:48,560
none of them were excluded by

390
00:14:52,310 --> 00:14:50,639
engineering and in the end we had this

391
00:14:53,829 --> 00:14:52,320
very high class problem of having to

392
00:14:55,670 --> 00:14:53,839
pick one of them and we wound up with

393
00:14:57,590 --> 00:14:55,680
gail that's because of this small

394
00:14:59,829 --> 00:14:57,600
landing ellipse so this is a tremendous

395
00:15:01,910 --> 00:14:59,839
advance for science already

396
00:15:04,389 --> 00:15:01,920
so when we get down onto that ellipse we

397
00:15:07,110 --> 00:15:04,399
check out the instruments uh check out

398
00:15:08,790 --> 00:15:07,120
the the systems the engineering systems

399
00:15:11,030 --> 00:15:08,800
and then hopefully in a couple of months

400
00:15:13,829 --> 00:15:11,040
we'll be on the road uh to the base of

401
00:15:15,750 --> 00:15:13,839
mount sharp however when we picked this

402
00:15:17,750 --> 00:15:15,760
landing site we also wanted to make sure

403
00:15:19,430 --> 00:15:17,760
that there was something really good

404
00:15:21,110 --> 00:15:19,440
right in the ellipse and the science

405
00:15:23,269 --> 00:15:21,120
team has been rolling up their sleeves

406
00:15:25,269 --> 00:15:23,279
in the last couple of months and now i'd

407
00:15:27,590 --> 00:15:25,279
like to go to the next graphic

408
00:15:29,990 --> 00:15:27,600
which shows the landing ellipse now it's

409
00:15:31,910 --> 00:15:30,000
in that yellow outline

410
00:15:33,910 --> 00:15:31,920
and what you see in in sort of the

411
00:15:36,150 --> 00:15:33,920
colors that are present there

412
00:15:37,509 --> 00:15:36,160
is this bright red patch that's very

413
00:15:39,990 --> 00:15:37,519

close to the center of the landing

414
00:15:42,550 --> 00:15:40,000
ellipse that's the good stuff if you

415
00:15:44,949 --> 00:15:42,560
have to pick a place to land on the on

416
00:15:47,269 --> 00:15:44,959
the surface at gale crater that's where

417
00:15:49,189 --> 00:15:47,279
you'd want to go and so again

418
00:15:51,350 --> 00:15:49,199
the engineers in the last couple months

419
00:15:53,749 --> 00:15:51,360
were able to make the ellipse even

420
00:15:56,069 --> 00:15:53,759
smaller and squeeze it down closer to

421
00:15:58,790 --> 00:15:56,079
mount sharp so we have a shorter drive

422
00:16:01,110 --> 00:15:58,800
to get to the mountain but we also land

423
00:16:03,110 --> 00:16:01,120
right on some really exciting materials

424
00:16:04,790 --> 00:16:03,120
that we think may have formed in an

425
00:16:07,509 --> 00:16:04,800
aqueous environment

426
00:16:09,749 --> 00:16:07,519
so if you look above the ellipse

427
00:16:12,069 --> 00:16:09,759
you can see a feature in in blue that's

428
00:16:14,710 --> 00:16:12,079
above the ellipse and it kind of has a

429
00:16:17,749 --> 00:16:14,720
fan shape to it that's a feature that

430
00:16:19,829 --> 00:16:17,759
geologists call an alluvial fan a kind

431
00:16:22,069 --> 00:16:19,839
of a feature that we believe was formed

432
00:16:24,470 --> 00:16:22,079
by flowing water and since we know that

433
00:16:26,550 --> 00:16:24,480
water flows downhill that downhill

434
00:16:28,470 --> 00:16:26,560
direction is right where we're landing

435
00:16:30,710 --> 00:16:28,480
so we believe that even where we land

436
00:16:32,150 --> 00:16:30,720
when we have this long process that

437
00:16:34,150 --> 00:16:32,160
we'll have to go through to get ready to

438
00:16:36,790 --> 00:16:34,160

roll we're already going to be able to

439
00:16:38,389 --> 00:16:36,800
explore some exciting science targets

440
00:16:39,829 --> 00:16:38,399
so that's where we're headed and we're

441
00:16:41,590 --> 00:16:39,839
excited about it and i'll turn it over

442
00:16:42,870 --> 00:16:41,600
to pete

443
00:16:45,110 --> 00:16:42,880
thank you john

444
00:16:47,030 --> 00:16:45,120
um well it's been a little over about

445
00:16:48,829 --> 00:16:47,040
eight months since we launched curiosity

446
00:16:51,110 --> 00:16:48,839
on its way to mars on the 26th of

447
00:16:52,629 --> 00:16:51,120
november and in that time the cruise

448
00:16:54,550 --> 00:16:52,639
performance of the vehicle has been

449
00:16:56,710 --> 00:16:54,560
outstanding we've really had no

450
00:16:58,389 --> 00:16:56,720
significant issues with the vehicle

451
00:16:59,509 --> 00:16:58,399
we've been doing routine maintenance and

452
00:17:01,670 --> 00:16:59,519
checkouts

453
00:17:03,829 --> 00:17:01,680
we've had no real equipment failures and

454
00:17:05,510 --> 00:17:03,839
so we're in top-notch shape as we

455
00:17:08,230 --> 00:17:05,520
approach the planet

456
00:17:10,470 --> 00:17:08,240
but but now the payoff comes uh the next

457
00:17:12,630 --> 00:17:10,480
major step uh to get to the science that

458
00:17:14,789 --> 00:17:12,640
john has described the risk is part of

459
00:17:18,069 --> 00:17:14,799
the mission is entry descent and landing

460
00:17:19,750 --> 00:17:18,079
and if i can show the video please

461
00:17:22,150 --> 00:17:19,760
so 10 minutes out

462
00:17:23,750 --> 00:17:22,160
we uh we deploy the cruise stage and

463
00:17:25,270 --> 00:17:23,760

turn the spacecraft into the correct

464
00:17:27,870 --> 00:17:25,280
attitude to enter into the martian

465
00:17:30,950 --> 00:17:27,880
atmosphere the entry interface is about

466
00:17:33,270 --> 00:17:30,960
125 kilometers above mars

467
00:17:35,029 --> 00:17:33,280
we tossed a couple masses away so we

468
00:17:37,990 --> 00:17:35,039
unbalanced the vehicle

469
00:17:39,350 --> 00:17:38,000
that allows us to uh to turn the vehicle

470
00:17:40,549 --> 00:17:39,360
uh

471
00:17:42,470 --> 00:17:40,559
with a slight

472
00:17:43,430 --> 00:17:42,480
can't to its approach a slight angle of

473
00:17:45,909 --> 00:17:43,440
attack

474
00:17:48,549 --> 00:17:45,919
which gives us lift and and that goes

475
00:17:50,470 --> 00:17:48,559
into the uh into the ability to this to

476
00:17:51,990 --> 00:17:50,480
have the small line landing ellipse that

477
00:17:54,230 --> 00:17:52,000
john referred to

478
00:17:57,029 --> 00:17:54,240
we lose about 98 of our energy during

479
00:17:59,270 --> 00:17:57,039
the hypersonic entry off the as we

480
00:18:01,669 --> 00:17:59,280
dissipate energy against the heat shield

481
00:18:04,150 --> 00:18:01,679
and then at about mach 2 or a little bit

482
00:18:05,750 --> 00:18:04,160
below we will deploy our supersonic

483
00:18:10,549 --> 00:18:05,760
parachute

484
00:18:11,350 --> 00:18:10,559
slightly larger than was used

485
00:18:14,150 --> 00:18:11,360
for

486
00:18:15,750 --> 00:18:14,160
myrrh and phoenix uh and pathfinder

487
00:18:17,830 --> 00:18:15,760
before

488
00:18:19,830 --> 00:18:17,840

uh that deploys as i said at about mach

489
00:18:22,630 --> 00:18:19,840
2 and then when the spacecraft becomes

490
00:18:24,630 --> 00:18:22,640
subsonic it drops off the heat shield at

491
00:18:26,070 --> 00:18:24,640
about eight kilometers and the radar

492
00:18:28,630 --> 00:18:26,080
turns on and begins to look for the

493
00:18:30,950 --> 00:18:28,640
martian surface

494
00:18:32,710 --> 00:18:30,960
spacecraft continues to descend until

495
00:18:34,390 --> 00:18:32,720
about two kilometers up

496
00:18:36,549 --> 00:18:34,400
when the descent vehicle drops out of

497
00:18:38,710 --> 00:18:36,559
the back shell lining its eight mars

498
00:18:40,150 --> 00:18:38,720
landing engines and propulsively sends

499
00:18:41,909 --> 00:18:40,160
to the planet

500
00:18:44,150 --> 00:18:41,919
when it gets down to about 100 meters or

501
00:18:45,830 --> 00:18:44,160
150 meters above the surface it will

502
00:18:47,590 --> 00:18:45,840
deploy the sky crane maneuver where the

503
00:18:50,470 --> 00:18:47,600
rover separates from the propulsive

504
00:18:52,950 --> 00:18:50,480
descent vehicle uh deploys its wheels

505
00:18:58,390 --> 00:18:52,960
and the entire two bodies descend slowly

506
00:19:01,350 --> 00:19:00,390
the vehicle also contains a descent

507
00:19:03,430 --> 00:19:01,360
imager

508
00:19:06,070 --> 00:19:03,440
which can uh which will take high

509
00:19:08,789 --> 00:19:06,080
resolution eight frames per second

510
00:19:10,870 --> 00:19:08,799
high definition quality uh pictures of

511
00:19:12,950 --> 00:19:10,880
the planet all the way from the time

512
00:19:14,870 --> 00:19:12,960
when the heat shield comes off until

513
00:19:17,350 --> 00:19:14,880

landing here you see the sky crane

514
00:19:19,430 --> 00:19:17,360
maneuver with the mobility deployed and

515
00:19:21,110 --> 00:19:19,440
we then landed about a meter per second

516
00:19:25,990 --> 00:19:21,120
vertical and a little bit less than a

517
00:19:30,950 --> 00:19:27,909
when the spacecraft touches down the

518
00:19:32,470 --> 00:19:30,960
descent stage senses the loss of weight

519
00:19:35,029 --> 00:19:32,480
cuts the umbilicals what we call the

520
00:19:36,950 --> 00:19:35,039
bridles and the descent stage flies away

521
00:19:39,510 --> 00:19:36,960
in a controlled manner about half a

522
00:19:41,909 --> 00:19:39,520
kilometer where it is uh

523
00:19:44,150 --> 00:19:41,919
crashed somewhat gently into the surface

524
00:19:46,230 --> 00:19:44,160
we did not burn the engines to depletion

525
00:19:48,789 --> 00:19:46,240
and that leaves curiosity on the surface

526
00:19:50,870 --> 00:19:48,799
of mars early in the morning of august

527
00:19:55,350 --> 00:19:50,880
the sixth here in washington ready to

528
00:19:55,360 --> 00:19:59,110
if i could see the next graphic please

529
00:20:04,310 --> 00:20:01,510
this shows the ability

530
00:20:05,350 --> 00:20:04,320
the the capability that guided entry has

531
00:20:07,430 --> 00:20:05,360
given us

532
00:20:10,390 --> 00:20:07,440
a guided entry has allowed us to reduce

533
00:20:12,150 --> 00:20:10,400
the landing ellipse

534
00:20:14,870 --> 00:20:12,160
to make it much smaller than it has been

535
00:20:16,549 --> 00:20:14,880
uh milan ellipses for pathfinder myrrh

536
00:20:18,549 --> 00:20:16,559
and even phoenix

537
00:20:20,710 --> 00:20:18,559
the previous missions went into the

538
00:20:23,590 --> 00:20:20,720

planet ballistically they entered the

539
00:20:25,830 --> 00:20:23,600
martian atmosphere they fell like a rock

540
00:20:28,230 --> 00:20:25,840
and the landing site was determined by

541
00:20:30,870 --> 00:20:28,240
errors in the navigation and density

542
00:20:33,510 --> 00:20:30,880
profile changes in the atmosphere

543
00:20:36,310 --> 00:20:33,520
that were not modelable not predictable

544
00:20:38,710 --> 00:20:36,320
ahead of time what msl does is it flies

545
00:20:40,549 --> 00:20:38,720
out those atmospheric density variations

546
00:20:41,750 --> 00:20:40,559
and so gives it a much smaller landing

547
00:20:42,630 --> 00:20:41,760
ellipse

548
00:20:44,710 --> 00:20:42,640
than

549
00:20:48,390 --> 00:20:44,720
previous missions the mirror lips you

550
00:20:50,310 --> 00:20:48,400
see just barely fit inside yusef crater

551
00:20:52,870 --> 00:20:50,320
where spirit landed and would have no

552
00:20:55,029 --> 00:20:52,880
chance of fitting an inside gale crater

553
00:20:56,789 --> 00:20:55,039
but with msl we're able to land not only

554
00:20:59,029 --> 00:20:56,799
on high quality science material at the

555
00:21:00,830 --> 00:20:59,039
greater floor but also close to mount

556
00:21:03,669 --> 00:21:00,840
sharp where the science mission can

557
00:21:06,070 --> 00:21:03,679
begin the science mission is going to

558
00:21:06,870 --> 00:21:06,080
proceed relatively slowly

559
00:21:09,510 --> 00:21:06,880
um

560
00:21:11,669 --> 00:21:09,520
this mission is extremely complex the

561
00:21:13,190 --> 00:21:11,679
vehicle goes through a major set of

562
00:21:15,350 --> 00:21:13,200
configuration changes through entry

563
00:21:17,510 --> 00:21:15,360

descent and landing and as a result it

564
00:21:19,510 --> 00:21:17,520
will take some time for the engineers to

565
00:21:21,430 --> 00:21:19,520
characterize the mission characterize

566
00:21:22,870 --> 00:21:21,440
the integrity of the vehicle at the

567
00:21:24,390 --> 00:21:22,880
beginning of the mission

568
00:21:27,270 --> 00:21:24,400
we expect to get black and white

569
00:21:29,990 --> 00:21:27,280
photography um in in not our best

570
00:21:32,230 --> 00:21:30,000
resolution but certainly good resolution

571
00:21:34,630 --> 00:21:32,240
on the first two first second and third

572
00:21:36,390 --> 00:21:34,640
days of the mission and then thereafter

573
00:21:38,789 --> 00:21:36,400
we expect to see

574
00:21:41,270 --> 00:21:38,799
scientific color photography starting

575
00:21:43,350 --> 00:21:41,280
about day three day four of the mission

576
00:21:44,950 --> 00:21:43,360
and we should be getting some thumbnails

577
00:21:46,789 --> 00:21:44,960
from the descent imager

578
00:21:50,870 --> 00:21:46,799
looking at the descent starting about

579
00:21:55,350 --> 00:21:52,470
i think back to you doug

580
00:21:58,870 --> 00:21:57,029
well just like landing is a bold

581
00:22:02,070 --> 00:21:58,880
endeavor nasa is pushing the edges of

582
00:22:04,470 --> 00:22:02,080
the envelope for public engagement with

583
00:22:05,669 --> 00:22:04,480
the mike mars science laboratory landing

584
00:22:07,830 --> 00:22:05,679
as well

585
00:22:10,070 --> 00:22:07,840
so we've got museum sleepovers planned

586
00:22:13,029 --> 00:22:10,080
we've got obviously tv broadcast through

587
00:22:15,510 --> 00:22:13,039
nasa tv plan public events at virtually

588
00:22:16,870 --> 00:22:15,520

all the nasa centers thousands of people

589
00:22:18,390 --> 00:22:16,880
on facebook and twitter that are

590
00:22:21,190 --> 00:22:18,400
following us

591
00:22:23,190 --> 00:22:21,200
even a mars as art display that's going

592
00:22:25,430 --> 00:22:23,200
to begin its journey around starting at

593
00:22:27,990 --> 00:22:25,440
the delaware house which is a rest stop

594
00:22:29,590 --> 00:22:28,000
on the interstate 95 turnpike which will

595
00:22:31,909 --> 00:22:29,600
be kind of interesting

596
00:22:33,830 --> 00:22:31,919
we also have a lot of uh educational

597
00:22:36,549 --> 00:22:33,840
materials one that we're particularly

598
00:22:39,190 --> 00:22:36,559
proud of is the first publication of a

599
00:22:41,669 --> 00:22:39,200
mars specific braille book for the blind

600
00:22:43,110 --> 00:22:41,679
we've produced 1500 of these and they're

601
00:22:45,430 --> 00:22:43,120
going out to organizations and

602
00:22:48,390 --> 00:22:45,440
associations for the blind around the

603
00:22:50,070 --> 00:22:48,400
country to utilize these

604
00:22:51,669 --> 00:22:50,080
in addition to these types of things and

605
00:22:53,110 --> 00:22:51,679
websites in general

606
00:22:54,549 --> 00:22:53,120
we've got a number of interactive

607
00:22:56,950 --> 00:22:54,559
experiences we've been working on to

608
00:22:59,350 --> 00:22:56,960
help you explore mars whether it's a new

609
00:23:02,310 --> 00:22:59,360
ipad app that just came out recently

610
00:23:04,070 --> 00:23:02,320
which is a 3d app to the be a martian

611
00:23:05,990 --> 00:23:04,080
app which now applies to cell phones

612
00:23:08,230 --> 00:23:06,000
virtually all of the operating systems

613
00:23:10,470 --> 00:23:08,240

on cell phones you can get right in the

614
00:23:13,270 --> 00:23:10,480
action with the mission as it unfolds

615
00:23:14,870 --> 00:23:13,280
also with the 3d interactive experiences

616
00:23:18,310 --> 00:23:14,880
developed through the unity engine which

617
00:23:20,310 --> 00:23:18,320
uses real gale crater terrain as well as

618
00:23:22,870 --> 00:23:20,320
a very realistic three-dimensional rover

619
00:23:25,350 --> 00:23:22,880
in in the setup of this

620
00:23:27,029 --> 00:23:25,360
there's a website that's a one-stop shop

621
00:23:29,430 --> 00:23:27,039
for information and entry points for

622
00:23:31,590 --> 00:23:29,440
these types of things games or uh

623
00:23:33,990 --> 00:23:31,600
information on the on the mission and

624
00:23:37,909 --> 00:23:34,000
that's on the screen for some but

625
00:23:40,950 --> 00:23:39,669
slash msl

626
00:23:43,029 --> 00:23:40,960
participate

627
00:23:46,390 --> 00:23:43,039
i encourage you all to go there and

628
00:23:48,390 --> 00:23:46,400
fiddle around explore and enjoy

629
00:23:50,149 --> 00:23:48,400
before i get to the main purpose of this

630
00:23:52,149 --> 00:23:50,159
part of the press conference i just want

631
00:23:53,909 --> 00:23:52,159
to bring your attention to a couple of

632
00:23:54,789 --> 00:23:53,919
round things sitting over there next to

633
00:23:58,630 --> 00:23:54,799
jeff

634
00:24:00,789 --> 00:23:58,640
that's an msl scarecrow wheel and a

635
00:24:01,510 --> 00:24:00,799
spirit opportunity wheel

636
00:24:09,270 --> 00:24:01,520
the

637
00:24:11,990 --> 00:24:09,280
was used out at jpl crawling over

638
00:24:14,070 --> 00:24:12,000

terrain and testing out how well the msl

639
00:24:16,710 --> 00:24:14,080
system the curiosity system would work

640
00:24:18,230 --> 00:24:16,720
on the surface so please take a look at

641
00:24:19,830 --> 00:24:18,240
those as you go out and you get an idea

642
00:24:21,510 --> 00:24:19,840
of the expansion of capability and

643
00:24:23,510 --> 00:24:21,520
complexity we've been able to accomplish

644
00:24:26,149 --> 00:24:23,520
through a program designed like the mars

645
00:24:27,990 --> 00:24:26,159
exploration program

646
00:24:30,230 --> 00:24:28,000
so we have the pleasure to debut a new

647
00:24:32,230 --> 00:24:30,240
interactive experience with cooperation

648
00:24:34,950 --> 00:24:32,240
for microsoft which is working with us

649
00:24:37,029 --> 00:24:34,960
at nasa for new educational products the

650
00:24:39,110 --> 00:24:37,039
next generation of learning experiences

651
00:24:40,789 --> 00:24:39,120
is actually arriving

652
00:24:43,269 --> 00:24:40,799
bringing the challenge of landing

653
00:24:45,669 --> 00:24:43,279
curiosity to every living room that

654
00:24:48,149 --> 00:24:45,679
would like to play in this game

655
00:24:50,470 --> 00:24:48,159
families can get a taste of the daring

656
00:24:52,070 --> 00:24:50,480
that's involved in this just landing

657
00:24:53,590 --> 00:24:52,080
this mission on the surface it's going

658
00:24:56,310 --> 00:24:53,600
to be very similar to the way the team

659
00:24:58,710 --> 00:24:56,320
actually is going to do that

660
00:25:00,390 --> 00:24:58,720
in a way

661
00:25:03,110 --> 00:25:00,400
so i'd like to turn this over to jeff

662
00:25:05,430 --> 00:25:03,120
norris to explain this and describe it

663
00:25:07,510 --> 00:25:05,440

jeff thank you doug so i'm very excited

664
00:25:09,269 --> 00:25:07,520
to announce a groundbreaking partnership

665
00:25:11,669 --> 00:25:09,279
between nasa the jet propulsion

666
00:25:13,990 --> 00:25:11,679
laboratory and microsoft to inspire the

667
00:25:16,149 --> 00:25:14,000
next generation of explorers and

668
00:25:18,950 --> 00:25:16,159
scientists and technologists

669
00:25:20,789 --> 00:25:18,960
mars rover landing is the agency's first

670
00:25:22,710 --> 00:25:20,799
experience for a home entertainment

671
00:25:24,710 --> 00:25:22,720
console and through it we're bringing

672
00:25:27,190 --> 00:25:24,720
some of the excitement and a few of the

673
00:25:29,350 --> 00:25:27,200
challenges of landing curiosity on mars

674
00:25:31,750 --> 00:25:29,360
to living rooms around the world

675
00:25:33,990 --> 00:25:31,760
as we're demonstrating live here today

676
00:25:36,470 --> 00:25:34,000
people take control of their very own

677
00:25:38,149 --> 00:25:36,480
spacecraft using the kinect and move

678
00:25:41,669 --> 00:25:38,159
their body to steer the rover through

679
00:25:43,430 --> 00:25:41,679
the stages of entry descent and landing

680
00:25:45,190 --> 00:25:43,440
right now danielle is playing the first

681
00:25:47,110 --> 00:25:45,200
phase of the game she's doing her best

682
00:25:49,750 --> 00:25:47,120
to burn off some speed while staying on

683
00:25:51,430 --> 00:25:49,760
target and inside the entry corridor

684
00:25:53,830 --> 00:25:51,440
in the next phase she'll have to react

685
00:25:56,230 --> 00:25:53,840
quickly in order to deploy the parachute

686
00:25:57,909 --> 00:25:56,240
separate the heat shield and then

687
00:25:59,110 --> 00:25:57,919
release the descent stage at the perfect

688
00:26:01,029 --> 00:25:59,120

moment

689
00:26:02,950 --> 00:26:01,039
it's not easy but we think families are

690
00:26:06,230 --> 00:26:02,960
going to enjoy facing the challenges of

691
00:26:08,070 --> 00:26:06,240
landing on mars first hand

692
00:26:10,630 --> 00:26:08,080
by the way i'll mention that danielle is

693
00:26:13,029 --> 00:26:10,640
the granddaughter of apollo 14 astronaut

694
00:26:14,870 --> 00:26:13,039
stuart russa and quite literally an

695
00:26:16,549 --> 00:26:14,880
example of the next generation of

696
00:26:18,149 --> 00:26:16,559
explorer

697
00:26:22,470 --> 00:26:18,159
we'll check back in just a moment to see

698
00:26:28,549 --> 00:26:25,110
the mars rover landing game is free and

699
00:26:30,470 --> 00:26:28,559
available now on xbox live marketplace

700
00:26:32,230 --> 00:26:30,480
we have demonstration systems set up

701
00:26:33,830 --> 00:26:32,240
here at nasa headquarters and at the jet

702
00:26:36,149 --> 00:26:33,840
propulsion laboratory for you all to try

703
00:26:38,230 --> 00:26:36,159
it out firsthand

704
00:26:40,070 --> 00:26:38,240
it's exciting challenging and a whole

705
00:26:41,990 --> 00:26:40,080
lot of fun

706
00:26:43,350 --> 00:26:42,000
doug mentioned many ways that people can

707
00:26:45,110 --> 00:26:43,360
watch curiosity's landing and get

708
00:26:46,789 --> 00:26:45,120
involved with the mission

709
00:26:49,190 --> 00:26:46,799
in our mutual commitment to inspiring

710
00:26:51,430 --> 00:26:49,200
the next generation in science and math

711
00:26:53,750 --> 00:26:51,440
nasa and microsoft will also soon unveil

712
00:26:55,669 --> 00:26:53,760
a special destination on the xbox live

713
00:26:56,630 --> 00:26:55,679

dashboard dedicated to the curiosity

714
00:26:58,950 --> 00:26:56,640
mission

715
00:27:00,710 --> 00:26:58,960
in it people will find pictures videos

716
00:27:03,350 --> 00:27:00,720
and more facts about the mission and

717
00:27:05,590 --> 00:27:03,360
then on august 5th nasa tv's live

718
00:27:08,149 --> 00:27:05,600
coverage of curiosity's landing will be

719
00:27:10,470 --> 00:27:08,159
broadcast there too

720
00:27:12,710 --> 00:27:10,480
also also coming soon is an educational

721
00:27:14,470 --> 00:27:12,720
experience based on microsoft kodu in

722
00:27:16,470 --> 00:27:14,480
which students can program their very

723
00:27:18,149 --> 00:27:16,480
own mars rover and make some discoveries

724
00:27:20,549 --> 00:27:18,159
of their own

725
00:27:22,230 --> 00:27:20,559
let's check back in with danielle

726
00:27:23,830 --> 00:27:22,240
she's finishing up the second stage of

727
00:27:25,669 --> 00:27:23,840
the experience now

728
00:27:29,029 --> 00:27:25,679
she's deployed the descent stage and in

729
00:27:30,710 --> 00:27:29,039
the third phase she's going to have to

730
00:27:32,630 --> 00:27:30,720
perform the sky crane maneuver and then

731
00:27:34,549 --> 00:27:32,640
carefully manage the retro rockets in

732
00:27:37,190 --> 00:27:34,559
order to bring curiosity down for a safe

733
00:27:39,350 --> 00:27:37,200
landing this is a tricky balancing act

734
00:27:41,269 --> 00:27:39,360
and we didn't give her a lot of fuel so

735
00:27:43,909 --> 00:27:41,279
let's give her a minute

736
00:27:50,630 --> 00:27:43,919
to concentrate and see if she can land

737
00:27:50,640 --> 00:28:19,750
we have rover separation

738
00:28:19,760 --> 00:28:38,070

a touchdown on mars

739
00:28:42,830 --> 00:28:39,909
again ladies and gentlemen

740
00:28:46,310 --> 00:28:42,840
come with us experience tomorrow's

741
00:28:48,710 --> 00:28:46,320
expiration activity and adventure

742
00:28:51,029 --> 00:28:48,720
now let's take some questions

743
00:28:52,950 --> 00:28:51,039
uh we have questions starting here in

744
00:28:54,950 --> 00:28:52,960
washington

745
00:28:56,630 --> 00:28:54,960
on our phone bridge and we'll see if we

746
00:28:58,630 --> 00:28:56,640
have any questions before we come back

747
00:29:00,230 --> 00:28:58,640
here at our nasa center so you can

748
00:29:02,070 --> 00:29:00,240
please wait for the mic give your name

749
00:29:03,430 --> 00:29:02,080
and affiliation please

750
00:29:08,310 --> 00:29:03,440
denise

751
00:29:10,389 --> 00:29:08,320
not actually sure who this is directed

752
00:29:11,669 --> 00:29:10,399
to but anyone who wants to answer um i

753
00:29:12,470 --> 00:29:11,679
was wondering if you could talk a bit

754
00:29:15,269 --> 00:29:12,480
about

755
00:29:16,630 --> 00:29:15,279
what the mood is of the the team you've

756
00:29:18,870 --> 00:29:16,640
mentioned that this is a very tense

757
00:29:21,269 --> 00:29:18,880
seven minutes but is it excitement is it

758
00:29:23,430 --> 00:29:21,279
nerves is it a combination of both

759
00:29:26,549 --> 00:29:23,440
pete you want to take that

760
00:29:27,750 --> 00:29:26,559
well i think the team is very excited um

761
00:29:29,190 --> 00:29:27,760
they've come to the end of a long

762
00:29:32,950 --> 00:29:29,200
journey many of them have worked on this

763
00:29:34,870 --> 00:29:32,960

mission for uh for six seven eight years

764
00:29:36,149 --> 00:29:34,880
i think the team feels that they've got

765
00:29:38,389 --> 00:29:36,159
they've done everything they could do to

766
00:29:40,230 --> 00:29:38,399
make this successful

767
00:29:41,269 --> 00:29:40,240
that being said the success is not

768
00:29:43,350 --> 00:29:41,279
assured

769
00:29:46,230 --> 00:29:43,360
um we could have uh

770
00:29:48,230 --> 00:29:46,240
any one of a different kinds of of of

771
00:29:50,950 --> 00:29:48,240
problems that could uh they could end up

772
00:29:53,269 --> 00:29:50,960
in a uh end of mission

773
00:29:56,870 --> 00:29:53,279
but i think the team is is very positive

774
00:29:58,310 --> 00:29:56,880
uh is is morale is good uh they've been

775
00:29:59,669 --> 00:29:58,320
working hard but i think we'll be able

776
00:30:02,230 --> 00:29:59,679
to give them some time off before

777
00:30:05,590 --> 00:30:02,240
landing so i i think that the team is uh

778
00:30:07,990 --> 00:30:05,600
is really up for this um i think this is

779
00:30:09,990 --> 00:30:08,000
very much the mood of the team before a

780
00:30:12,230 --> 00:30:10,000
spirit and opportunity landed i think

781
00:30:13,590 --> 00:30:12,240
same kind of uh same kind of anxious

782
00:30:16,950 --> 00:30:13,600
anticipation

783
00:30:20,549 --> 00:30:18,389
any other questions here from washington

784
00:30:21,909 --> 00:30:20,559
before we go to the centers oh denise go

785
00:30:23,990 --> 00:30:21,919
ahead you got to follow up and then we

786
00:30:26,630 --> 00:30:24,000
head to the kennedy space center just

787
00:30:29,590 --> 00:30:26,640
for john um what kinds of

788
00:30:32,630 --> 00:30:29,600

um experiments or or science will be

789
00:30:34,870 --> 00:30:32,640
done before the rover starts um moving

790
00:30:37,190 --> 00:30:34,880
towards mount sharp you mentioned that

791
00:30:39,110 --> 00:30:37,200
there's some very interesting materials

792
00:30:41,430 --> 00:30:39,120
there

793
00:30:43,110 --> 00:30:41,440
yeah i think uh we

794
00:30:44,070 --> 00:30:43,120
you know we'll see when we get there but

795
00:30:45,830 --> 00:30:44,080
um

796
00:30:47,430 --> 00:30:45,840
with all this great data that the mars

797
00:30:49,350 --> 00:30:47,440
program gets these days we can do a

798
00:30:51,669 --> 00:30:49,360
better job in advance of sort of

799
00:30:52,870 --> 00:30:51,679
guesstimating what we might encounter

800
00:30:55,350 --> 00:30:52,880
and uh

801
00:30:57,510 --> 00:30:55,360
we're hoping to find materials that that

802
00:31:00,070 --> 00:30:57,520
interacted with water maybe even were

803
00:31:01,909 --> 00:31:00,080
transported by water and so as we check

804
00:31:05,110 --> 00:31:01,919
out the instruments we'll be able to

805
00:31:07,510 --> 00:31:05,120
take a full color high resolution

806
00:31:10,630 --> 00:31:07,520
panoramas and a level of detail

807
00:31:12,710 --> 00:31:10,640
unprecedented in previous missions

808
00:31:15,110 --> 00:31:12,720
we'll be able to use the the chemcam

809
00:31:17,029 --> 00:31:15,120
laser very early on to get a sense for

810
00:31:18,630 --> 00:31:17,039
the composition of

811
00:31:20,789 --> 00:31:18,640
of what's there we'll be able to turn

812
00:31:22,630 --> 00:31:20,799
the dan instrument on and and look for

813
00:31:25,029 --> 00:31:22,640

water that might be in the subsurface

814
00:31:26,070 --> 00:31:25,039
materials or including the rocks and

815
00:31:26,950 --> 00:31:26,080
minerals

816
00:31:28,950 --> 00:31:26,960
so

817
00:31:32,549 --> 00:31:28,960
even though we have this this long

818
00:31:33,669 --> 00:31:32,559
period of of checkout it is punctuated

819
00:31:35,590 --> 00:31:33,679
by

820
00:31:37,110 --> 00:31:35,600
what we call intermission

821
00:31:39,750 --> 00:31:37,120
where the science team has an

822
00:31:41,830 --> 00:31:39,760
opportunity to drive the rover uh some

823
00:31:42,789 --> 00:31:41,840
short relatively short distance to move

824
00:31:44,549 --> 00:31:42,799
up to

825
00:31:47,110 --> 00:31:44,559
materials that we think are are

826
00:31:49,190 --> 00:31:47,120
promising so that when we do the second

827
00:31:52,070 --> 00:31:49,200
half of the commissioning activity

828
00:31:54,630 --> 00:31:52,080
period and we deploy the arm and and and

829
00:31:56,230 --> 00:31:54,640
reach out and start to touch things uh

830
00:31:58,230 --> 00:31:56,240
we're doing it in a place that we we

831
00:32:00,789 --> 00:31:58,240
think will have a lot of excitement

832
00:32:03,430 --> 00:32:00,799
so it all sounds like a long time to

833
00:32:05,350 --> 00:32:03,440
check out and it is and we need to do it

834
00:32:08,710 --> 00:32:05,360
but we will be getting a lot of science

835
00:32:12,389 --> 00:32:10,630
okay we're going to transition down to

836
00:32:17,190 --> 00:32:12,399
the space coast at the kennedy space

837
00:32:21,750 --> 00:32:19,830
hi it's uh irene klotz with reuters um i

838
00:32:22,950 --> 00:32:21,760

have two questions the first is for john

839
00:32:25,190 --> 00:32:22,960
grotzinger

840
00:32:27,590 --> 00:32:25,200
the the red stuff at the base of mount

841
00:32:30,230 --> 00:32:27,600
sharp in the landing ellipse

842
00:32:33,110 --> 00:32:30,240
is that signify some mineralogical or

843
00:32:34,549 --> 00:32:33,120
some compositional or is it uh what what

844
00:32:36,389 --> 00:32:34,559
what is that what does that red stuff

845
00:32:39,669 --> 00:32:36,399
symbolize

846
00:32:41,750 --> 00:32:39,679
yeah so the the red stuff is is present

847
00:32:44,230 --> 00:32:41,760
where we land and it's also at the at

848
00:32:47,029 --> 00:32:44,240
the base of mount sharp and we don't

849
00:32:48,789 --> 00:32:47,039
really know uh what that material is the

850
00:32:50,870 --> 00:32:48,799
the property that's being mapped there

851
00:32:53,509 --> 00:32:50,880
is something called thermal inertia

852
00:32:55,909 --> 00:32:53,519
which is its ability to retain heat and

853
00:32:58,710 --> 00:32:55,919
so at night when that's imaged you you

854
00:33:00,870 --> 00:32:58,720
can see the ground sort of of glowing

855
00:33:03,909 --> 00:33:00,880
and and what that tells us is that

856
00:33:06,950 --> 00:33:03,919
there's probably harder material there

857
00:33:09,110 --> 00:33:06,960
and the harder materials suggest maybe

858
00:33:11,190 --> 00:33:09,120
uh that there could have been water uh

859
00:33:13,269 --> 00:33:11,200
that interacted and and maybe

860
00:33:15,830 --> 00:33:13,279
precipitated minerals there

861
00:33:17,909 --> 00:33:15,840
so we we can't guarantee that of course

862
00:33:19,990 --> 00:33:17,919
but that's one of our hypotheses going

863
00:33:22,630 --> 00:33:20,000

into it it could be other things as well

864
00:33:24,870 --> 00:33:22,640
it might be lava flows but uh based on

865
00:33:26,549 --> 00:33:24,880
the whole geological context we're

866
00:33:34,470 --> 00:33:26,559
pretty optimistic to find something that

867
00:33:40,310 --> 00:33:37,190
another question from kennedy

868
00:33:42,789 --> 00:33:40,320
um the communications at all as far as

869
00:33:48,149 --> 00:33:42,799
the um the time delay or when you all

870
00:33:48,159 --> 00:33:52,870
could you repeat the question

871
00:33:56,710 --> 00:33:54,230
i'm sorry do you need me to repeat the

872
00:33:58,950 --> 00:33:56,720
question yes

873
00:34:02,070 --> 00:33:58,960
um thanks i uh was you mentioned about

874
00:34:03,909 --> 00:34:02,080
the mars about the mars odyssey uh

875
00:34:06,230 --> 00:34:03,919
glitch and you said it's been impact

876
00:34:09,349 --> 00:34:06,240
landing but will it have any impact on

877
00:34:11,430 --> 00:34:09,359
the communications plan for

878
00:34:12,950 --> 00:34:11,440
understanding what what's happened

879
00:34:15,349 --> 00:34:12,960
during landing

880
00:34:17,589 --> 00:34:15,359
i can do that

881
00:34:20,149 --> 00:34:17,599
so to be clear it won't have any impact

882
00:34:21,109 --> 00:34:20,159
on landing it's all a communications

883
00:34:23,669 --> 00:34:21,119
issue

884
00:34:26,069 --> 00:34:23,679
so there are a number of assets there

885
00:34:29,030 --> 00:34:26,079
mars reconnaissance orbital orbiter will

886
00:34:30,950 --> 00:34:29,040
be recording the entire event from entry

887
00:34:32,950 --> 00:34:30,960
in the atmosphere all the way past the

888
00:34:34,550 --> 00:34:32,960

landing time itself so it will collect

889
00:34:36,629 --> 00:34:34,560
all that information

890
00:34:38,149 --> 00:34:36,639
it is a store and forward so it will

891
00:34:40,550 --> 00:34:38,159
record it and send it back to us

892
00:34:43,669 --> 00:34:40,560
sometime later a few hours later

893
00:34:46,790 --> 00:34:43,679
odyssey uh was going to see

894
00:34:49,990 --> 00:34:46,800
all of the landing uh to the end

895
00:34:53,190 --> 00:34:50,000
and it is essentially a bent pipe so it

896
00:34:55,589 --> 00:34:53,200
just sends that data back

897
00:34:57,910 --> 00:34:55,599
it has moved in the orbit

898
00:35:00,310 --> 00:34:57,920
from where it was originally and so we

899
00:35:02,150 --> 00:35:00,320
are assessing what the issues are there

900
00:35:03,990 --> 00:35:02,160
how much it's moved and whether we want

901
00:35:06,069 --> 00:35:04,000
to try to move it back there's a

902
00:35:07,990 --> 00:35:06,079
potential it won't see

903
00:35:09,670 --> 00:35:08,000
all of that landing area from a

904
00:35:11,670 --> 00:35:09,680
communications perspective it won't

905
00:35:13,270 --> 00:35:11,680
cover the entire landing event at this

906
00:35:15,430 --> 00:35:13,280
point and it may not cover any of that

907
00:35:16,870 --> 00:35:15,440
landing event we just need to find out

908
00:35:19,270 --> 00:35:16,880
once the team is finished with their

909
00:35:21,270 --> 00:35:19,280
analysis deep space network will cover

910
00:35:22,470 --> 00:35:21,280
it mars express

911
00:35:26,150 --> 00:35:22,480
that belongs to the european space

912
00:35:29,670 --> 00:35:26,160
agency will also cover it but those both

913
00:35:31,430 --> 00:35:29,680

lose coverage due to orbital geometries

914
00:35:33,829 --> 00:35:31,440
about a minute to two minutes before

915
00:35:35,349 --> 00:35:33,839
landing itself so there's no impact to

916
00:35:37,190 --> 00:35:35,359
landing itself

917
00:35:39,030 --> 00:35:37,200
no effect on msl it's simply how the

918
00:35:42,150 --> 00:35:39,040
data gets returned to us and how timely

919
00:35:46,470 --> 00:35:44,390
another question from kennedy not know

920
00:35:48,790 --> 00:35:46,480
um beyond the 14 minutes whether it

921
00:35:52,710 --> 00:35:48,800
landed safely or not

922
00:35:57,510 --> 00:35:55,030
if if i could if i could expand on that

923
00:36:00,310 --> 00:35:57,520
a little bit though sure um

924
00:36:02,790 --> 00:36:00,320
so the the spacecraft will uh transmit

925
00:36:04,630 --> 00:36:02,800
uh what we call x-band tones if those of

926
00:36:06,069 --> 00:36:04,640
you familiar with spirit and opportunity

927
00:36:08,470 --> 00:36:06,079
is exactly what was used on spirit and

928
00:36:10,310 --> 00:36:08,480
opportunity and as doug pointed out

929
00:36:11,990 --> 00:36:10,320
uh the landing site's not visible from

930
00:36:13,670 --> 00:36:12,000
earth at the time of landing and so

931
00:36:15,430 --> 00:36:13,680
those tones will

932
00:36:17,030 --> 00:36:15,440
cease to be received at earth sometime

933
00:36:18,790 --> 00:36:17,040
between the time the parachute deploys

934
00:36:20,950 --> 00:36:18,800
and the heat shield separates

935
00:36:23,270 --> 00:36:20,960
so at that point we will know

936
00:36:26,230 --> 00:36:23,280
carrier that it's there and we should

937
00:36:29,430 --> 00:36:26,240
see doppler from the parachute deploy

938
00:36:32,550 --> 00:36:29,440

mro will get the full extent of of the

939
00:36:34,470 --> 00:36:32,560
edl coverage from uh before entry until

940
00:36:36,630 --> 00:36:34,480
after landing but as doug mentioned

941
00:36:38,150 --> 00:36:36,640
that's a store and forward system

942
00:36:40,310 --> 00:36:38,160
and so the data will be returned to

943
00:36:41,910 --> 00:36:40,320
earth about three four hours later and

944
00:36:43,589 --> 00:36:41,920
and made available to the project at

945
00:36:45,990 --> 00:36:43,599
that time

946
00:36:49,270 --> 00:36:46,000
the odyssey the the the mars express

947
00:36:50,950 --> 00:36:49,280
data will very much like the x-band be

948
00:36:53,190 --> 00:36:50,960
kind of a carrier signal and it will

949
00:36:55,030 --> 00:36:53,200
disappear about a minute uh before we

950
00:36:56,150 --> 00:36:55,040
land because it also goes over the

951
00:36:57,910 --> 00:36:56,160
horizon

952
00:37:00,310 --> 00:36:57,920
uh odyssey will depend on what happens

953
00:37:02,230 --> 00:37:00,320
to the odyssey orbit as a result of the

954
00:37:03,349 --> 00:37:02,240
decisions that the program and nasa will

955
00:37:05,670 --> 00:37:03,359
make

956
00:37:07,829 --> 00:37:05,680
in the baseline it was to continue

957
00:37:08,790 --> 00:37:07,839
to receive data and and forward it to

958
00:37:11,750 --> 00:37:08,800
earth

959
00:37:14,390 --> 00:37:11,760
uh to a few minutes after landing and uh

960
00:37:16,310 --> 00:37:14,400
and um and in the modified system we

961
00:37:18,550 --> 00:37:16,320
will see what we will see

962
00:37:20,150 --> 00:37:18,560
we should see confirmation of odyssey

963
00:37:22,150 --> 00:37:20,160

comes back about an hour and a half to

964
00:37:23,030 --> 00:37:22,160
two hours later overflying the landing

965
00:37:25,750 --> 00:37:23,040
site

966
00:37:27,349 --> 00:37:25,760
and so we should see at that over flight

967
00:37:28,710 --> 00:37:27,359
we should get telemetry from the lander

968
00:37:33,750 --> 00:37:28,720
that indicates the lander state and

969
00:37:38,630 --> 00:37:35,910
next question from kennedy we're in

970
00:37:40,230 --> 00:37:38,640
florida today uh just uh repeat to

971
00:37:41,190 --> 00:37:40,240
clarify if

972
00:37:45,430 --> 00:37:41,200
if

973
00:37:48,150 --> 00:37:45,440
msl is landing at 1 31 a.m eastern time

974
00:37:50,630 --> 00:37:48,160
on august the 6th given your current

975
00:37:54,230 --> 00:37:50,640
communications uh

976
00:37:57,030 --> 00:37:54,240
issues can you tell me what the first

977
00:37:59,270 --> 00:37:57,040
time eastern would be that you would

978
00:38:02,950 --> 00:37:59,280
expect to know whether this spacecraft

979
00:38:08,390 --> 00:38:05,829
that depends on whether or not

980
00:38:10,870 --> 00:38:08,400
odyssey is moved in its orbit if it is

981
00:38:13,829 --> 00:38:10,880
if this is if the program decides to to

982
00:38:17,589 --> 00:38:13,839
to position odyssey back to its uh

983
00:38:19,829 --> 00:38:17,599
uh it is correct or uh or uh position

984
00:38:21,910 --> 00:38:19,839
and that is successful

985
00:38:24,550 --> 00:38:21,920
and msl transmits

986
00:38:26,150 --> 00:38:24,560
uhf successfully and obviously receives

987
00:38:26,950 --> 00:38:26,160
it successfully then we would expect to

988
00:38:30,829 --> 00:38:26,960

hear

989
00:38:34,150 --> 00:38:30,839
at 1031 pacific that we i mean 10 30

990
00:38:35,349 --> 00:38:34,160
131 on the six eastern daylight time

991
00:38:36,710 --> 00:38:35,359
that we have landed successfully the

992
00:38:39,750 --> 00:38:36,720
times we give you are earth receive

993
00:38:41,589 --> 00:38:39,760
times the the one-way lifetime is 13 uh

994
00:38:43,990 --> 00:38:41,599
13 and a half minutes

995
00:38:46,950 --> 00:38:44,000
if if odyssey is not able

996
00:38:47,990 --> 00:38:46,960
to uh to be moved and it still remains

997
00:38:50,310 --> 00:38:48,000
late

998
00:38:52,069 --> 00:38:50,320
uh that means that it will fly over the

999
00:38:53,109 --> 00:38:52,079
spacecraft after the spacecraft has

1000
00:38:55,430 --> 00:38:53,119
landed

1001
00:38:57,910 --> 00:38:55,440
and we presumably will be able to see

1002
00:39:00,230 --> 00:38:57,920
transmissions from it um

1003
00:39:01,750 --> 00:39:00,240
it's uh and and and that once again

1004
00:39:03,829 --> 00:39:01,760
depends on what the program decides to

1005
00:39:10,710 --> 00:39:03,839
do and the ability of msl

1006
00:39:14,150 --> 00:39:11,829
um

1007
00:39:16,550 --> 00:39:14,160
it would be somewhere between 10 35 and

1008
00:39:18,069 --> 00:39:16,560
10 40. i would i mean excuse me 135 on

1009
00:39:19,910 --> 00:39:18,079
140.

1010
00:39:21,750 --> 00:39:19,920
todd did you have a follow-up nation

1011
00:39:23,990 --> 00:39:21,760
that kind of laid out the

1012
00:39:25,829 --> 00:39:24,000
history this century of mars exploration

1013
00:39:27,510 --> 00:39:25,839

and and what's coming in the future i

1014
00:39:30,630 --> 00:39:27,520
know that you're in the middle of the

1015
00:39:33,829 --> 00:39:30,640
rephase of the mars exploration program

1016
00:39:37,990 --> 00:39:33,839
as a result of budget issues could uh

1017
00:39:39,349 --> 00:39:38,000
one of you guys give us an idea of um

1018
00:39:42,470 --> 00:39:39,359
of what

1019
00:39:43,510 --> 00:39:42,480
future missions might be out beyond

1020
00:39:45,109 --> 00:39:43,520
maven

1021
00:39:47,990 --> 00:39:45,119
and when

1022
00:39:51,990 --> 00:39:48,000
uh the next time that you wouldn't the

1023
00:39:55,349 --> 00:39:52,000
u.s might land another lander beyond msl

1024
00:39:57,349 --> 00:39:55,359
on the surface of mars thanks

1025
00:40:00,310 --> 00:39:57,359
todd we're going to toss it over to uh

1026
00:40:03,430 --> 00:40:00,320
dr john guernsville to start and um doug

1027
00:40:05,190 --> 00:40:03,440
may uh have a follow-up john

1028
00:40:07,190 --> 00:40:05,200
thanks for the question we're in the

1029
00:40:08,870 --> 00:40:07,200
process of replanting the mars program

1030
00:40:11,750 --> 00:40:08,880
beyond maven

1031
00:40:13,109 --> 00:40:11,760
with our mars program planning group

1032
00:40:14,950 --> 00:40:13,119
that's something that's run out of the

1033
00:40:17,430 --> 00:40:14,960
mars exploration program orlando

1034
00:40:18,630 --> 00:40:17,440
figueroa is helping us

1035
00:40:20,150 --> 00:40:18,640
with a

1036
00:40:21,430 --> 00:40:20,160
community-based science community

1037
00:40:22,550 --> 00:40:21,440
engineering community in the general

1038
00:40:24,550 --> 00:40:22,560

public

1039
00:40:26,150 --> 00:40:24,560
to look at many different options and

1040
00:40:27,750 --> 00:40:26,160
they will present us with those options

1041
00:40:30,390 --> 00:40:27,760
and we will work that then through our

1042
00:40:31,670 --> 00:40:30,400
nasa planning program process

1043
00:40:33,430 --> 00:40:31,680
so we're very hopeful we'll be able to

1044
00:40:35,030 --> 00:40:33,440
recapture the mars program starting in

1045
00:40:36,870 --> 00:40:35,040
2018

1046
00:40:39,750 --> 00:40:36,880
and with many exciting missions in the

1047
00:40:42,470 --> 00:40:39,760
future

1048
00:40:45,030 --> 00:40:42,480
okay we're going to uh now go to the

1049
00:40:47,270 --> 00:40:45,040
center that uh it's all happening uh

1050
00:40:50,230 --> 00:40:47,280
they designed built the rover manage

1051
00:40:52,710 --> 00:40:50,240
this mission and uh they're going to get

1052
00:40:53,990 --> 00:40:52,720
a lot of folks coming to this location

1053
00:40:56,630 --> 00:40:54,000
the jet propulsion laboratory in

1054
00:41:01,750 --> 00:40:56,640
pasadena california we have questions

1055
00:41:06,630 --> 00:41:03,430
hi this is sally whale with the

1056
00:41:09,190 --> 00:41:06,640
planetary society and a question for you

1057
00:41:11,510 --> 00:41:09,200
i've learned from the last nine years of

1058
00:41:12,710 --> 00:41:11,520
covering they are that planning is

1059
00:41:14,950 --> 00:41:12,720
essential

1060
00:41:17,670 --> 00:41:14,960
but planning is also useless that's why

1061
00:41:19,109 --> 00:41:17,680
eisenhower said and i wonder given that

1062
00:41:20,790 --> 00:41:19,119
caveat

1063
00:41:23,109 --> 00:41:20,800

if you can talk a little bit more about

1064
00:41:24,390 --> 00:41:23,119
the immediate plan going forward once

1065
00:41:26,710 --> 00:41:24,400
wheels turn

1066
00:41:28,550 --> 00:41:26,720
and if you can get a little more into

1067
00:41:30,630 --> 00:41:28,560
the specifics about what minerals you're

1068
00:41:34,950 --> 00:41:30,640
going to be looking for given orbital

1069
00:41:39,030 --> 00:41:36,069
yeah i

1070
00:41:41,829 --> 00:41:39,040
we do uh we do exactly what you say that

1071
00:41:43,910 --> 00:41:41,839
that's uh that's our whole basis uh this

1072
00:41:45,829 --> 00:41:43,920
is a mission of discovery

1073
00:41:47,910 --> 00:41:45,839
uh but i think it also

1074
00:41:49,990 --> 00:41:47,920
uh puts us into the new era of mars

1075
00:41:51,829 --> 00:41:50,000
exploration where we step on the

1076
00:41:53,030 --> 00:41:51,839
shoulders of all this data that came

1077
00:41:55,670 --> 00:41:53,040
before us

1078
00:41:58,630 --> 00:41:55,680
and it would be a crime to not postulate

1079
00:42:00,230 --> 00:41:58,640
and propose hypotheses in advance of our

1080
00:42:02,470 --> 00:42:00,240
exploration that could help guide our

1081
00:42:03,430 --> 00:42:02,480
exploration and we're going to do that

1082
00:42:06,309 --> 00:42:03,440
so

1083
00:42:09,109 --> 00:42:06,319
we we see this this image with this this

1084
00:42:10,870 --> 00:42:09,119
red feature in it that uh is our first

1085
00:42:11,910 --> 00:42:10,880
indicator of what's in the landing

1086
00:42:14,309 --> 00:42:11,920
ellipse

1087
00:42:17,270 --> 00:42:14,319
so far all the other orbiters that have

1088
00:42:19,190 --> 00:42:17,280

looked for hydrated minerals

1089
00:42:20,950 --> 00:42:19,200
of the type that occur in mount sharp

1090
00:42:23,030 --> 00:42:20,960
those would be sulfates those would be

1091
00:42:24,790 --> 00:42:23,040
clay clay minerals

1092
00:42:26,710 --> 00:42:24,800
those are the primary

1093
00:42:28,790 --> 00:42:26,720
targets for our mission

1094
00:42:31,190 --> 00:42:28,800
but what's really interesting about this

1095
00:42:34,470 --> 00:42:31,200
this feature that we're going to land on

1096
00:42:36,150 --> 00:42:34,480
is that uh it it does have a different

1097
00:42:37,670 --> 00:42:36,160
look to it than what's around it we

1098
00:42:39,190 --> 00:42:37,680
don't know exactly what it means but to

1099
00:42:41,430 --> 00:42:39,200
give you an intuitive sense for it it's

1100
00:42:43,030 --> 00:42:41,440
kind of like when you walk by a building

1101
00:42:44,550 --> 00:42:43,040
early in the evening and you notice that

1102
00:42:46,710 --> 00:42:44,560
it's kind of warm next to the building

1103
00:42:48,870 --> 00:42:46,720
that that's what this is telling us that

1104
00:42:51,510 --> 00:42:48,880
relative to adjacent areas this place

1105
00:42:53,270 --> 00:42:51,520
just stays warmer later at night

1106
00:42:55,510 --> 00:42:53,280
and and so there are a number of

1107
00:42:58,230 --> 00:42:55,520
different options there and and one of

1108
00:43:01,030 --> 00:42:58,240
them is is that the rock uh retains a

1109
00:43:02,550 --> 00:43:01,040
lot of heat uh because it's very dense

1110
00:43:04,710 --> 00:43:02,560
and there could be a couple of ways that

1111
00:43:07,030 --> 00:43:04,720
that would work out our our most

1112
00:43:08,069 --> 00:43:07,040
attractive exciting hypothesis is that

1113
00:43:10,309 --> 00:43:08,079

maybe

1114
00:43:12,790 --> 00:43:10,319
water flowed through the materials there

1115
00:43:14,150 --> 00:43:12,800
and and precipitated minerals

1116
00:43:15,670 --> 00:43:14,160
if it did we don't know what those

1117
00:43:17,589 --> 00:43:15,680
minerals are

1118
00:43:19,270 --> 00:43:17,599
but that's a great thing about curiosity

1119
00:43:21,750 --> 00:43:19,280
is that we'll be able to to figure that

1120
00:43:25,349 --> 00:43:21,760
out while we're actually checking out

1121
00:43:27,750 --> 00:43:25,359
the instrument so after about a month or

1122
00:43:29,030 --> 00:43:27,760
two depending on how things go

1123
00:43:30,309 --> 00:43:29,040
we're going to approach one of these

1124
00:43:32,470 --> 00:43:30,319
features and the first thing we're going

1125
00:43:35,030 --> 00:43:32,480
to do is sample the soil

1126
00:43:36,710 --> 00:43:35,040
and and and the soil is important

1127
00:43:39,589 --> 00:43:36,720
because from every mission beginning

1128
00:43:42,069 --> 00:43:39,599
with viking it is a feature that is

1129
00:43:44,470 --> 00:43:42,079
globally distributed around mars and it

1130
00:43:46,790 --> 00:43:44,480
has about the same composition you look

1131
00:43:49,349 --> 00:43:46,800
at a viking chemical analysis compared

1132
00:43:51,190 --> 00:43:49,359
to pathfinder compared to mer we knew

1133
00:43:53,190 --> 00:43:51,200
there were sulfur in those soils going

1134
00:43:54,390 --> 00:43:53,200
all the way back decades ago

1135
00:43:56,230 --> 00:43:54,400
but this time around we're going to

1136
00:43:57,670 --> 00:43:56,240
figure out what minerals are actually in

1137
00:44:00,069 --> 00:43:57,680
that soil and it should be really

1138
00:44:01,910 --> 00:44:00,079

exciting because it'll be our one really

1139
00:44:03,510 --> 00:44:01,920
global sample of mars that we'll get

1140
00:44:05,910 --> 00:44:03,520
with curiosity

1141
00:44:08,470 --> 00:44:05,920
then after that we're going to approach

1142
00:44:10,550 --> 00:44:08,480
an outcrop a rock outcrop

1143
00:44:11,750 --> 00:44:10,560
and uh and try to drill it and when we

1144
00:44:14,470 --> 00:44:11,760
drill it we're going to pass the

1145
00:44:16,470 --> 00:44:14,480
materials into the chemin instrument and

1146
00:44:18,470 --> 00:44:16,480
into the sam instrument and as we check

1147
00:44:20,470 --> 00:44:18,480
out those instruments we're also going

1148
00:44:22,870 --> 00:44:20,480
to be getting back science data that

1149
00:44:24,710 --> 00:44:22,880
will tell us what's there this to me is

1150
00:44:26,390 --> 00:44:24,720
the really cool thing is because from

1151
00:44:28,630 --> 00:44:26,400
orbit we don't really know exactly

1152
00:44:31,270 --> 00:44:28,640
what's there and so we have a chance

1153
00:44:33,670 --> 00:44:31,280
for a discovery of of material that

1154
00:44:34,790 --> 00:44:33,680
nobody can really put their finger on uh

1155
00:44:36,309 --> 00:44:34,800
right now

1156
00:44:38,630 --> 00:44:36,319
and then after we're done with that we

1157
00:44:40,950 --> 00:44:38,640
we will hit the road and work our way

1158
00:44:43,030 --> 00:44:40,960
towards the lower reaches of mount sharp

1159
00:44:45,349 --> 00:44:43,040
where we'll begin to explore

1160
00:44:47,349 --> 00:44:45,359
these clay minerals and sulfate minerals

1161
00:44:49,750 --> 00:44:47,359
and the other geomorphic features there

1162
00:44:52,470 --> 00:44:49,760
that suggest the presence of water and

1163
00:44:55,349 --> 00:44:52,480

from that advance our hypotheses beyond

1164
00:44:57,510 --> 00:44:55,359
just saying sulfates and clays equals

1165
00:44:59,829 --> 00:44:57,520
water will actually figure out the

1166
00:45:01,750 --> 00:44:59,839
environment in which they formed and

1167
00:45:02,630 --> 00:45:01,760
then from that we'll ask if this was the

1168
00:45:03,829 --> 00:45:02,640
kind of

1169
00:45:06,150 --> 00:45:03,839
environment that might have also

1170
00:45:10,069 --> 00:45:06,160
supported microbial life that's the way

1171
00:45:10,079 --> 00:45:14,790
one more question from jpl

1172
00:45:18,390 --> 00:45:17,750
yes gordon tokumatsu at nbc 4 in los

1173
00:45:20,390 --> 00:45:18,400
angeles

1174
00:45:22,230 --> 00:45:20,400
um

1175
00:45:23,589 --> 00:45:22,240
scientists send engineers and even

1176
00:45:26,950 --> 00:45:23,599
journalists sometimes

1177
00:45:29,910 --> 00:45:26,960
speak in the abstract about

1178
00:45:31,270 --> 00:45:29,920
the discovery of water and life on mars

1179
00:45:33,510 --> 00:45:31,280
i was wondering if any of you gentlemen

1180
00:45:36,069 --> 00:45:33,520
can talk about the real implications of

1181
00:45:37,990 --> 00:45:36,079
this in terms of future ex

1182
00:45:40,150 --> 00:45:38,000
space exploration

1183
00:45:43,990 --> 00:45:40,160
and even indeed the the future of the

1184
00:45:48,150 --> 00:45:45,430
that's a

1185
00:45:50,710 --> 00:45:48,160
pretty big question and it's hard to

1186
00:45:52,150 --> 00:45:50,720
predict how everybody will react and

1187
00:45:54,470 --> 00:45:52,160
certainly

1188
00:45:56,309 --> 00:45:54,480

going to mars one of the main reasons

1189
00:45:58,630 --> 00:45:56,319
for going there is to figure out whether

1190
00:46:01,829 --> 00:45:58,640
or not life ever started there

1191
00:46:03,829 --> 00:46:01,839
and the one big implication would be

1192
00:46:05,430 --> 00:46:03,839
if in the second place in our solar

1193
00:46:07,829 --> 00:46:05,440
system that we think

1194
00:46:09,670 --> 00:46:07,839
life has a possibility and it actually

1195
00:46:12,150 --> 00:46:09,680
did start there

1196
00:46:14,790 --> 00:46:12,160
my conclusion would be that life life is

1197
00:46:16,710 --> 00:46:14,800
easy it's a natural process and that

1198
00:46:18,870 --> 00:46:16,720
the universe is just littered with

1199
00:46:24,390 --> 00:46:18,880
places that have life and i think that

1200
00:46:24,400 --> 00:46:29,750
to follow up

1201
00:46:34,950 --> 00:46:32,390
okay let's now go to san francisco to

1202
00:46:37,030 --> 00:46:34,960
the ames research center for questions

1203
00:46:38,550 --> 00:46:37,040
ames

1204
00:46:40,710 --> 00:46:38,560
good morning gents wayne friedman here

1205
00:46:43,990 --> 00:46:40,720
with abc 7 news in san francisco this is

1206
00:46:45,750 --> 00:46:44,000
really a three-part question for you

1207
00:46:47,270 --> 00:46:45,760
what is your batting average for mars

1208
00:46:49,109 --> 00:46:47,280
landings

1209
00:46:51,430 --> 00:46:49,119
then it'd like you to elaborate on what

1210
00:46:53,030 --> 00:46:51,440
necessitated the use of the sky crane in

1211
00:46:54,710 --> 00:46:53,040
this incident

1212
00:46:59,910 --> 00:46:54,720
and would this be a method you might

1213
00:47:03,990 --> 00:47:01,589

well i'll start and you probably may

1214
00:47:05,670 --> 00:47:04,000
help here okay

1215
00:47:07,750 --> 00:47:05,680
see batting average for land admissions

1216
00:47:08,790 --> 00:47:07,760
i don't have off the top of my head as

1217
00:47:18,230 --> 00:47:08,800
uh

1218
00:47:19,750 --> 00:47:18,240
around 40 35 40 percent so mars wins

1219
00:47:22,550 --> 00:47:19,760
most of the time

1220
00:47:25,670 --> 00:47:22,560
which is why this is a tough business

1221
00:47:28,230 --> 00:47:25,680
sky crane why do we need the sky crane

1222
00:47:30,069 --> 00:47:28,240
the airbags for spirit and opportunity

1223
00:47:30,870 --> 00:47:30,079
now i'm in your territory here pete but

1224
00:47:35,750 --> 00:47:30,880
uh

1225
00:47:37,589 --> 00:47:35,760
of spirit or opportunity with this

1226
00:47:40,230 --> 00:47:37,599
landing equipment was just about at the

1227
00:47:41,589 --> 00:47:40,240
limit of what that airbag design system

1228
00:47:43,510 --> 00:47:41,599
could handle

1229
00:47:46,470 --> 00:47:43,520
this mission was always conceived of

1230
00:47:48,710 --> 00:47:46,480
being a more capable system

1231
00:47:50,790 --> 00:47:48,720
and to be able to do that

1232
00:47:52,390 --> 00:47:50,800
more instrumentation is required and as

1233
00:47:54,790 --> 00:47:52,400
an example we have

1234
00:47:56,950 --> 00:47:54,800
about 75 kilograms worth of instruments

1235
00:47:59,510 --> 00:47:56,960
and 10 of those instruments whereas

1236
00:48:01,589 --> 00:47:59,520
spirit and opportunity have about uh

1237
00:48:03,990 --> 00:48:01,599
10 or 15 kilograms

1238
00:48:06,710 --> 00:48:04,000

i'm sorry five five instruments in about

1239
00:48:08,390 --> 00:48:06,720
10 or 15 kilograms worth total so that

1240
00:48:10,069 --> 00:48:08,400
kind of capability moved us out of the

1241
00:48:12,309 --> 00:48:10,079
airbag arena and we had to come up with

1242
00:48:15,510 --> 00:48:12,319
another method of doing this

1243
00:48:17,030 --> 00:48:15,520
uh skycrane made sense because if you

1244
00:48:18,950 --> 00:48:17,040
put the engines

1245
00:48:20,470 --> 00:48:18,960
and landing systems underneath it and

1246
00:48:22,069 --> 00:48:20,480
you want a rove

1247
00:48:23,510 --> 00:48:22,079
that becomes a problem you also don't

1248
00:48:26,549 --> 00:48:23,520
want to drive around the surface with

1249
00:48:27,990 --> 00:48:26,559
all that excess weight so so those were

1250
00:48:29,750 --> 00:48:28,000
some of the concepts we needed a

1251
00:48:32,069 --> 00:48:29,760
different system because we were really

1252
00:48:33,109 --> 00:48:32,079
at the maximum of the previous landed

1253
00:48:34,950 --> 00:48:33,119
systems

1254
00:48:37,670 --> 00:48:34,960
and would you repeat your third one for

1255
00:48:39,270 --> 00:48:37,680
me oh humans never mind i got it human

1256
00:48:40,790 --> 00:48:39,280
capabilities

1257
00:48:43,030 --> 00:48:40,800
we are

1258
00:48:45,270 --> 00:48:43,040
just scratching the surface with msl at

1259
00:48:48,470 --> 00:48:45,280
a metric ton when we talk about humans

1260
00:48:51,190 --> 00:48:48,480
to the surface we're talking 10 metric

1261
00:48:53,030 --> 00:48:51,200
tons and above the sky crane system

1262
00:48:55,270 --> 00:48:53,040
while from a technique perspective may

1263
00:48:57,109 --> 00:48:55,280

have some promise this system cannot put

1264
00:48:58,630 --> 00:48:57,119
humans on the surface we're pretty close

1265
00:49:00,230 --> 00:48:58,640
to the metric ton capabilities about

1266
00:49:02,630 --> 00:49:00,240
what we'll get could it be a great

1267
00:49:04,309 --> 00:49:02,640
system for landing supplies whether it's

1268
00:49:06,390 --> 00:49:04,319
food or water medical supplies things

1269
00:49:08,069 --> 00:49:06,400
like that in a pinpoint or high

1270
00:49:10,309 --> 00:49:08,079
precision fashion it certainly could be

1271
00:49:11,829 --> 00:49:10,319
a workhorse like that but for the human

1272
00:49:14,470 --> 00:49:11,839
systems of cells i don't think it's

1273
00:49:19,829 --> 00:49:16,790
okay before we go to the phone lines uh

1274
00:49:21,349 --> 00:49:19,839
we have a number of media uh not only in

1275
00:49:23,750 --> 00:49:21,359
a phone line but at the centers and

1276
00:49:25,670 --> 00:49:23,760
various social locations uh i doubt very

1277
00:49:27,589 --> 00:49:25,680
seriously if we will have the time to

1278
00:49:30,790 --> 00:49:27,599
get all of the questions we'll try to

1279
00:49:32,309 --> 00:49:30,800
extend for a little while but please if

1280
00:49:34,549 --> 00:49:32,319
we don't get to your question please

1281
00:49:36,069 --> 00:49:34,559
call my office or any of the folks at

1282
00:49:38,390 --> 00:49:36,079
the jet propulsion laboratory and we

1283
00:49:39,910 --> 00:49:38,400
will get you folks on the phone as

1284
00:49:41,430 --> 00:49:39,920
quickly as possible today for any

1285
00:49:43,670 --> 00:49:41,440
followers but we'll try to get as many

1286
00:49:45,510 --> 00:49:43,680
as we can before we have to sign off

1287
00:49:48,150 --> 00:49:45,520
so going to the phone line is dave

1288
00:49:50,470 --> 00:49:48,160

perlman from the san francisco chronicle

1289
00:49:52,069 --> 00:49:50,480
dave

1290
00:49:54,790 --> 00:49:52,079
oh yeah hi

1291
00:49:55,670 --> 00:49:54,800
a little difficult here but that's okay

1292
00:50:00,630 --> 00:49:55,680
uh

1293
00:50:02,950 --> 00:50:00,640
mount sharp

1294
00:50:04,390 --> 00:50:02,960
or within the landing ellipse wherever

1295
00:50:08,470 --> 00:50:04,400
you land

1296
00:50:10,470 --> 00:50:08,480
what do you anticipate being the maximum

1297
00:50:12,390 --> 00:50:10,480
elevate maximum

1298
00:50:14,790 --> 00:50:12,400
degree

1299
00:50:19,670 --> 00:50:14,800
that msl will

1300
00:50:22,710 --> 00:50:19,680
be able to climb if it climbs at all

1301
00:50:25,270 --> 00:50:22,720
the spacecraft is capable of climbing up

1302
00:50:27,510 --> 00:50:25,280
pretty much close to 30 degrees

1303
00:50:30,309 --> 00:50:27,520
it depends on the surface it's on it

1304
00:50:33,030 --> 00:50:30,319
does uh worst in sand than it does on on

1305
00:50:35,829 --> 00:50:33,040
rock uh that's certainly uh there's

1306
00:50:37,750 --> 00:50:35,839
there's very few places very very very

1307
00:50:39,910 --> 00:50:37,760
very few places inside the landing

1308
00:50:41,829 --> 00:50:39,920
ellipse that have those kind of slopes

1309
00:50:43,270 --> 00:50:41,839
uh as tomorrow sharp i'll let john

1310
00:50:45,510 --> 00:50:43,280
answer

1311
00:50:48,309 --> 00:50:45,520
yeah i'll just uh add to that that uh

1312
00:50:51,349 --> 00:50:48,319
when uh when gale crater first began to

1313
00:50:52,950 --> 00:50:51,359

float as a as a viable landing site i i

1314
00:50:54,069 --> 00:50:52,960
looked at it and said you know how in

1315
00:50:55,109 --> 00:50:54,079
the world are we going to climb up the

1316
00:50:57,910 --> 00:50:55,119
mountain

1317
00:51:00,390 --> 00:50:57,920
and uh and so we got a task force uh set

1318
00:51:02,470 --> 00:51:00,400
up to look at exactly at that question

1319
00:51:04,630 --> 00:51:02,480
and we did a series of simulations with

1320
00:51:06,790 --> 00:51:04,640
the engineering team

1321
00:51:09,349 --> 00:51:06,800
the guys in mobility

1322
00:51:11,030 --> 00:51:09,359
to to find paths that we could feel very

1323
00:51:12,950 --> 00:51:11,040
secure and comfortable and would would

1324
00:51:13,910 --> 00:51:12,960
get us up to to where we need to be

1325
00:51:16,230 --> 00:51:13,920
going

1326
00:51:17,829 --> 00:51:16,240
and uh and we've got multiple routes up

1327
00:51:19,190 --> 00:51:17,839
there that keep us on the kinds of

1328
00:51:21,270 --> 00:51:19,200
slopes uh

1329
00:51:23,190 --> 00:51:21,280
well below the margins that

1330
00:51:25,349 --> 00:51:23,200
limits that pete was just talking about

1331
00:51:26,790 --> 00:51:25,359
so we're we're excited to get there and

1332
00:51:28,470 --> 00:51:26,800
explore these routes and if one doesn't

1333
00:51:33,990 --> 00:51:28,480
work scientifically the great thing is

1334
00:51:37,589 --> 00:51:36,230
next caller is kelly beede from sky and

1335
00:51:39,349 --> 00:51:37,599
telescope

1336
00:51:41,589 --> 00:51:39,359
kelly

1337
00:51:44,230 --> 00:51:41,599
hey hey thanks uh this is a question

1338
00:51:46,069 --> 00:51:44,240

about marty the descent imager um

1339
00:51:48,710 --> 00:51:46,079
apart from the thumbnails how long will

1340
00:51:50,870 --> 00:51:48,720
it be before you get the full blown

1341
00:51:54,309 --> 00:51:50,880
all the high-res back and how will those

1342
00:51:56,549 --> 00:51:54,319
images uh inform your early scientific

1343
00:51:59,109 --> 00:51:56,559
and uh uh

1344
00:52:01,270 --> 00:51:59,119
movement decisions

1345
00:52:03,430 --> 00:52:01,280
let's see if we we will play the images

1346
00:52:07,270 --> 00:52:03,440
back uh starting from the bottom up and

1347
00:52:10,150 --> 00:52:07,280
then key segments of the of the descent

1348
00:52:11,510 --> 00:52:10,160
and um i think it will probably take us

1349
00:52:13,750 --> 00:52:11,520
a few weeks

1350
00:52:16,549 --> 00:52:13,760
to get back all of the images at high

1351
00:52:19,109 --> 00:52:17,990
i think that's probably about what it

1352
00:52:20,150 --> 00:52:19,119
will be

1353
00:52:22,390 --> 00:52:20,160
um

1354
00:52:24,150 --> 00:52:22,400
i i'll let john decide uh to talk about

1355
00:52:25,829 --> 00:52:24,160
how it will inform the roving decision

1356
00:52:27,990 --> 00:52:25,839
but i would like to point out that we

1357
00:52:29,750 --> 00:52:28,000
actually have already tremendous

1358
00:52:31,589 --> 00:52:29,760
photography coverage of the entire

1359
00:52:34,549 --> 00:52:31,599
landing ellipse because of high rise on

1360
00:52:37,430 --> 00:52:34,559
mro and so john

1361
00:52:39,430 --> 00:52:37,440
yeah i'll i'll just say that uh to there

1362
00:52:42,549 --> 00:52:39,440
is there is some redundancy between

1363
00:52:43,510 --> 00:52:42,559

marty at a distance and uh and and high

1364
00:52:45,829 --> 00:52:43,520
rise

1365
00:52:48,150 --> 00:52:45,839
um i i think the part that will be most

1366
00:52:50,630 --> 00:52:48,160
valuable scientifically is are the

1367
00:52:53,270 --> 00:52:50,640
images that are required uh just a few

1368
00:52:55,109 --> 00:52:53,280
meters above the surface 10 meters five

1369
00:52:57,910 --> 00:52:55,119
meters because those will give us a

1370
00:52:59,750 --> 00:52:57,920
perspective of the surface at a level of

1371
00:53:02,390 --> 00:52:59,760
resolution we will not get from any

1372
00:53:04,309 --> 00:53:02,400
other instrument high-rise and and and

1373
00:53:06,549 --> 00:53:04,319
the science cameras included just

1374
00:53:07,910 --> 00:53:06,559
because of the elevation that you get

1375
00:53:10,230 --> 00:53:07,920
so what what they're really going to

1376
00:53:12,470 --> 00:53:10,240
give us in addition to the the thrilling

1377
00:53:13,349 --> 00:53:12,480
movie that i'm sure it's going to be

1378
00:53:17,589 --> 00:53:13,359
is

1379
00:53:22,069 --> 00:53:17,599
initial observations and that's

1380
00:53:33,349 --> 00:53:24,470
next we have craig kobalt from aerospace

1381
00:53:39,190 --> 00:53:35,829
hi this is uh craig cavall can i ask you

1382
00:53:42,470 --> 00:53:39,200
a question of john grossinger

1383
00:53:44,470 --> 00:53:42,480
go ahead craig

1384
00:53:46,710 --> 00:53:44,480
uh john

1385
00:53:50,309 --> 00:53:46,720
please don't be shy about answering this

1386
00:53:53,430 --> 00:53:51,349
but

1387
00:53:56,470 --> 00:53:53,440
everyone pretty much agreement that the

1388
00:53:57,990 --> 00:53:56,480

u.s space program needs needs help needs

1389
00:54:00,390 --> 00:53:58,000
a boost

1390
00:54:05,589 --> 00:54:00,400
how will a success help the u.s space

1391
00:54:05,599 --> 00:54:09,430
geez no pressure craig

1392
00:54:15,829 --> 00:54:12,150
yeah i i think we all feel feel this

1393
00:54:17,990 --> 00:54:15,839
incredible uh sense of of pressure on on

1394
00:54:19,190 --> 00:54:18,000
msl to to do something grand and

1395
00:54:21,190 --> 00:54:19,200
profound

1396
00:54:23,030 --> 00:54:21,200
and and my feeling about that is it's

1397
00:54:25,750 --> 00:54:23,040
going to be what it's going to be we we

1398
00:54:28,390 --> 00:54:25,760
have done everything possible

1399
00:54:30,230 --> 00:54:28,400
to pick the best sites

1400
00:54:32,710 --> 00:54:30,240
this was a process that was led by the

1401
00:54:34,710 --> 00:54:32,720
community that went on for five or six

1402
00:54:36,309 --> 00:54:34,720
years we started with almost 100

1403
00:54:38,390 --> 00:54:36,319
candidates we whittled it down to a

1404
00:54:40,309 --> 00:54:38,400
final four we picked one of those

1405
00:54:42,950 --> 00:54:40,319
that we think is a good mate for our our

1406
00:54:44,230 --> 00:54:42,960
instruments uh on this mission

1407
00:54:45,510 --> 00:54:44,240
and uh

1408
00:54:47,750 --> 00:54:45,520
i think it's going to be thrilling

1409
00:54:50,069 --> 00:54:47,760
personally i i just can't imagine being

1410
00:54:52,950 --> 00:54:50,079
disappointed scientifically

1411
00:54:56,150 --> 00:54:52,960
even if we don't find carbon uh even if

1412
00:54:58,390 --> 00:54:56,160
we don't find you know some some feature

1413
00:55:00,870 --> 00:54:58,400

that that somebody might choose to

1414
00:55:02,710 --> 00:55:00,880
uh to to represent a strong indication

1415
00:55:04,710 --> 00:55:02,720
that not only was it habitable but there

1416
00:55:06,950 --> 00:55:04,720
may have been life there

1417
00:55:09,589 --> 00:55:06,960
and ascending mount sharp we're going to

1418
00:55:11,910 --> 00:55:09,599
go through the major eras in the

1419
00:55:14,069 --> 00:55:11,920
environmental history of mars

1420
00:55:15,910 --> 00:55:14,079
that give us the basis for comparison to

1421
00:55:16,950 --> 00:55:15,920
our own planet and if you ask the

1422
00:55:19,510 --> 00:55:16,960
question

1423
00:55:21,030 --> 00:55:19,520
about how life got started on earth how

1424
00:55:23,270 --> 00:55:21,040
it evolved on earth what were the

1425
00:55:24,790 --> 00:55:23,280
trigger points that bring us to

1426
00:55:27,190 --> 00:55:24,800
to the evolution of animals and

1427
00:55:28,710 --> 00:55:27,200
eventually humans you always ask well

1428
00:55:30,470 --> 00:55:28,720
what happened if those events didn't

1429
00:55:32,710 --> 00:55:30,480
occur is there some place that you can

1430
00:55:35,030 --> 00:55:32,720
compare to where that didn't happen

1431
00:55:37,750 --> 00:55:35,040
that's mars so even in the case that

1432
00:55:38,950 --> 00:55:37,760
life was never present on mars i i still

1433
00:55:40,549 --> 00:55:38,960
see it as an

1434
00:55:44,309 --> 00:55:40,559
extraordinary opportunity to get a

1435
00:55:46,950 --> 00:55:44,319
bearing on our own existence on earth

1436
00:55:51,589 --> 00:55:46,960
the next call is from john mangles from

1437
00:55:55,270 --> 00:55:53,670
yes hi this probably is from michael

1438
00:55:56,630 --> 00:55:55,280

meyer but anyone on the panel could take

1439
00:55:57,670 --> 00:55:56,640
it i'm wondering

1440
00:55:59,510 --> 00:55:57,680
um

1441
00:56:03,670 --> 00:55:59,520
given what we know about the penetrating

1442
00:56:05,510 --> 00:56:03,680
depths of cosmic radiation on mars

1443
00:56:07,510 --> 00:56:05,520
what's the likelihood

1444
00:56:08,870 --> 00:56:07,520
that you're going to find complex

1445
00:56:10,870 --> 00:56:08,880
organics

1446
00:56:12,630 --> 00:56:10,880
when in the mission would you begin to

1447
00:56:15,270 --> 00:56:12,640
do that and

1448
00:56:16,630 --> 00:56:15,280
are there any unambiguous

1449
00:56:18,870 --> 00:56:16,640
signatures of life anything that would

1450
00:56:20,069 --> 00:56:18,880
compel you to say that you definitely

1451
00:56:22,309 --> 00:56:20,079
got

1452
00:56:24,549 --> 00:56:22,319
ancient life expect life on mars or do

1453
00:56:27,030 --> 00:56:24,559
you expect you would be more cautious

1454
00:56:28,470 --> 00:56:27,040
assuming you found complex organics

1455
00:56:30,470 --> 00:56:28,480
okay

1456
00:56:33,510 --> 00:56:30,480
yeah the radiation environment on mars

1457
00:56:35,430 --> 00:56:33,520
is pretty severe and um so one thing you

1458
00:56:37,589 --> 00:56:35,440
have to worry about is ultraviolet but

1459
00:56:39,430 --> 00:56:37,599
that only goes kind of skin deep so in

1460
00:56:41,430 --> 00:56:39,440
terms of preserving organics it's not a

1461
00:56:44,150 --> 00:56:41,440
real problem uh what you're really

1462
00:56:46,150 --> 00:56:44,160
worried about are galactic cosmic rays

1463
00:56:47,190 --> 00:56:46,160

and those will penetrate beneath the

1464
00:56:50,870 --> 00:56:47,200
surface

1465
00:56:52,230 --> 00:56:50,880
and you do have a problem with those

1466
00:56:54,870 --> 00:56:52,240
breaking down

1467
00:56:56,950 --> 00:56:54,880
complex compounds into simpler ones and

1468
00:56:59,030 --> 00:56:56,960
eventually you end up with something

1469
00:57:01,270 --> 00:56:59,040
that's not recognizable

1470
00:57:03,750 --> 00:57:01,280
so the trick is is what you do is you

1471
00:57:05,349 --> 00:57:03,760
find a rock surface that's fresh

1472
00:57:07,750 --> 00:57:05,359
and that way

1473
00:57:09,349 --> 00:57:07,760
what is exposed or near the surface that

1474
00:57:11,910 --> 00:57:09,359
you can reach with a drill

1475
00:57:13,910 --> 00:57:11,920
has only been exposed for a shorter

1476
00:57:16,309 --> 00:57:13,920
period of time compared to when the rock

1477
00:57:17,990 --> 00:57:16,319
was actually formed so there is some

1478
00:57:19,910 --> 00:57:18,000
hope of finding

1479
00:57:21,109 --> 00:57:19,920
complex organic compounds if they're

1480
00:57:23,829 --> 00:57:21,119
there

1481
00:57:26,549 --> 00:57:23,839
the other part is is that some compounds

1482
00:57:28,789 --> 00:57:26,559
as they quote get weathered by

1483
00:57:31,270 --> 00:57:28,799
these you will end up with something

1484
00:57:33,349 --> 00:57:31,280
that is a organic compound it's just

1485
00:57:35,510 --> 00:57:33,359
that you're not able to decipher what it

1486
00:57:37,829 --> 00:57:35,520
used to be but it still tells you that

1487
00:57:39,030 --> 00:57:37,839
that the compound or compounds used to

1488
00:57:40,789 --> 00:57:39,040

be there

1489
00:57:42,309 --> 00:57:40,799
um

1490
00:57:44,150 --> 00:57:42,319
i think i

1491
00:57:46,470 --> 00:57:44,160
i've forgotten the latter part of the

1492
00:57:49,349 --> 00:57:46,480
question but uh if you want to repeat

1493
00:57:51,430 --> 00:57:49,359
that unless uh i already answered it oh

1494
00:57:54,470 --> 00:57:51,440
undisputable biomarker

1495
00:57:57,589 --> 00:57:54,480
that is an extremely difficult one

1496
00:57:59,910 --> 00:57:57,599
for one thing the scientific community

1497
00:58:02,069 --> 00:57:59,920
by nature will in fact have to dispute

1498
00:58:03,349 --> 00:58:02,079
any organic compound that's found and

1499
00:58:05,270 --> 00:58:03,359
argue whether or not it is a

1500
00:58:07,190 --> 00:58:05,280
biosignature

1501
00:58:09,829 --> 00:58:07,200
but the other part is it's

1502
00:58:11,510 --> 00:58:09,839
you can get many organic compounds

1503
00:58:12,870 --> 00:58:11,520
formed naturally

1504
00:58:14,870 --> 00:58:12,880
and

1505
00:58:16,549 --> 00:58:14,880
so the hard part would be not

1506
00:58:18,390 --> 00:58:16,559
well finding the organic compound would

1507
00:58:19,829 --> 00:58:18,400
be difficult but then trying to decipher

1508
00:58:21,190 --> 00:58:19,839
whether or not it's from biology or

1509
00:58:23,430 --> 00:58:21,200
whether or not it's a product of

1510
00:58:26,630 --> 00:58:23,440
physical chemical processes will be a

1511
00:58:30,390 --> 00:58:26,640
debate and we saw a good example of that

1512
00:58:32,789 --> 00:58:30,400
in the mars meteorite alh 84001 where we

1513
00:58:34,630 --> 00:58:32,799

found reduced organic compounds and then

1514
00:58:37,589 --> 00:58:34,640
the debate was how were they formed

1515
00:58:39,829 --> 00:58:37,599
because you can make organics

1516
00:58:41,430 --> 00:58:39,839
without life

1517
00:58:43,270 --> 00:58:41,440
okay we're going to take a couple more

1518
00:58:45,710 --> 00:58:43,280
questions before we close it out here

1519
00:58:48,069 --> 00:58:45,720
we're going to now go to brian

1520
00:58:50,470 --> 00:58:48,079
berkstein i hope i got that last name

1521
00:58:52,870 --> 00:58:50,480
right from techno technology review

1522
00:58:55,190 --> 00:58:52,880
brian

1523
00:58:56,950 --> 00:58:55,200
yes you got it right thanks dorian um

1524
00:58:58,950 --> 00:58:56,960
this question came up a little bit ago

1525
00:59:01,349 --> 00:58:58,960
about um

1526
00:59:03,190 --> 00:59:01,359
for example whether you could use this

1527
00:59:05,430 --> 00:59:03,200
landing method

1528
00:59:07,510 --> 00:59:05,440
uh for a manned mission to mars and the

1529
00:59:09,829 --> 00:59:07,520
answer was that you know for example

1530
00:59:11,750 --> 00:59:09,839
that you couldn't maybe you could use it

1531
00:59:14,470 --> 00:59:11,760
for supplies things like that more

1532
00:59:16,710 --> 00:59:14,480
broadly could someone sum up how much

1533
00:59:18,390 --> 00:59:16,720
this mission will advance

1534
00:59:19,589 --> 00:59:18,400
the knowledge

1535
00:59:21,430 --> 00:59:19,599
that

1536
00:59:23,270 --> 00:59:21,440
nasa feels we

1537
00:59:30,230 --> 00:59:23,280
we have or need to have in order to get

1538
00:59:34,069 --> 00:59:32,230

so there's two pieces of this we can

1539
00:59:35,670 --> 00:59:34,079
address that i think are uh directly

1540
00:59:37,030 --> 00:59:35,680
applicable one of them is scientific and

1541
00:59:39,589 --> 00:59:37,040
i'll let michael talk about that but

1542
00:59:41,270 --> 00:59:39,599
i'll talk about a uh a

1543
00:59:42,870 --> 00:59:41,280
a technical issue we have with it's not

1544
00:59:45,510 --> 00:59:42,880
an issue but a technical capability we

1545
00:59:46,549 --> 00:59:45,520
have with this we have uh in partnership

1546
00:59:48,390 --> 00:59:46,559
with the

1547
00:59:50,710 --> 00:59:48,400
human exploration organization here at

1548
00:59:52,309 --> 00:59:50,720
nasa actually fully instrumented this

1549
00:59:54,870 --> 00:59:52,319
heat shield back shell

1550
00:59:55,829 --> 00:59:54,880
so we'll be collecting probably the most

1551
00:59:57,750 --> 00:59:55,839
uh

1552
01:00:00,150 --> 00:59:57,760
high fidelity information we've had on

1553
01:00:01,750 --> 01:00:00,160
entry systems to date so we'll be able

1554
01:00:04,789 --> 01:00:01,760
to tell exactly how much of the heat

1555
01:00:06,470 --> 01:00:04,799
shield is ablated away as we enter we'll

1556
01:00:08,150 --> 01:00:06,480
understand what the pressures are and

1557
01:00:10,470 --> 01:00:08,160
temperatures are

1558
01:00:12,390 --> 01:00:10,480
and since it's guided entry the angle of

1559
01:00:13,589 --> 01:00:12,400
attack changes and so we'll understand

1560
01:00:15,109 --> 01:00:13,599
how that

1561
01:00:16,789 --> 01:00:15,119
applies across the front of this heat

1562
01:00:18,470 --> 01:00:16,799
shield not just a single temperature or

1563
01:00:19,270 --> 01:00:18,480

single pressure and there's some back

1564
01:00:20,789 --> 01:00:19,280
shell

1565
01:00:23,190 --> 01:00:20,799
measurements as well that help us with

1566
01:00:25,510 --> 01:00:23,200
pressure these kinds of

1567
01:00:27,430 --> 01:00:25,520
data sets are extremely important in

1568
01:00:30,069 --> 01:00:27,440
constructing entry descent and landing

1569
01:00:32,230 --> 01:00:30,079
profiles it'll apply to building larger

1570
01:00:33,910 --> 01:00:32,240
systems that are capable to send humans

1571
01:00:35,190 --> 01:00:33,920
uh i'll let michael talk about an

1572
01:00:37,670 --> 01:00:35,200
instrument that we have a board that was

1573
01:00:40,470 --> 01:00:37,680
also supplied by the human exploration

1574
01:00:42,710 --> 01:00:40,480
group yeah thanks doug the instrument is

1575
01:00:45,990 --> 01:00:42,720
rad it's a radiation detector and it's a

1576
01:00:48,230 --> 01:00:46,000
broad range sensing instrument that is

1577
01:00:50,549 --> 01:00:48,240
specifically designed to get a handle on

1578
01:00:52,710 --> 01:00:50,559
what kind of damaging radiation would be

1579
01:00:54,230 --> 01:00:52,720
at the surface of mars and the reason

1580
01:00:56,230 --> 01:00:54,240
why you wanted an instrument like this

1581
01:00:59,190 --> 01:00:56,240
is that although you have a good idea of

1582
01:01:01,430 --> 01:00:59,200
what the radiation is in space

1583
01:01:02,870 --> 01:01:01,440
what happens to is that as the radiation

1584
01:01:04,789 --> 01:01:02,880
goes to the atmosphere is that you

1585
01:01:06,309 --> 01:01:04,799
generate what they call secondary so you

1586
01:01:09,750 --> 01:01:06,319
can in fact

1587
01:01:11,349 --> 01:01:09,760
generate other high energy particles

1588
01:01:13,349 --> 01:01:11,359

that are actually more damaging the

1589
01:01:15,829 --> 01:01:13,359
original radiation itself

1590
01:01:18,309 --> 01:01:15,839
so rad the radiation detector will in

1591
01:01:19,670 --> 01:01:18,319
fact give you a good idea of what

1592
01:01:21,589 --> 01:01:19,680
species are generating what the

1593
01:01:24,069 --> 01:01:21,599
radiation environment at the surface of

1594
01:01:26,470 --> 01:01:24,079
mars and with that knowledge then you

1595
01:01:29,829 --> 01:01:26,480
can go about figuring out how to protect

1596
01:01:32,069 --> 01:01:29,839
astronauts when they go to the surface

1597
01:01:33,190 --> 01:01:32,079
our final question comes from leo ant

1598
01:01:38,069 --> 01:01:33,200
wright

1599
01:01:42,230 --> 01:01:40,870
very much uh dwayne i i as a tv man i'm

1600
01:01:44,710 --> 01:01:42,240
interested in

1601
01:01:47,030 --> 01:01:44,720
the pictures and uh i just wondered i

1602
01:01:49,829 --> 01:01:47,040
mean i heard pete talk about uh black

1603
01:01:52,230 --> 01:01:49,839
and white in days one to three

1604
01:01:54,870 --> 01:01:52,240
is that worst case could we expect to

1605
01:01:57,430 --> 01:01:54,880
see color pictures earlier

1606
01:01:59,109 --> 01:01:57,440
and more specifically i'm being asked by

1607
01:02:02,309 --> 01:01:59,119
editors all the time you know what are

1608
01:02:04,789 --> 01:02:02,319
we going to see this mountain is bigger

1609
01:02:06,789 --> 01:02:04,799
than the tallest mountain in europe

1610
01:02:09,510 --> 01:02:06,799
uh you know can you describe for us in

1611
01:02:10,950 --> 01:02:09,520
more detail what television we can

1612
01:02:13,109 --> 01:02:10,960
expect i mean what what are these

1613
01:02:15,829 --> 01:02:13,119

cameras going to produce are we it's got

1614
01:02:18,950 --> 01:02:15,839
is it going to be like the the rover on

1615
01:02:20,870 --> 01:02:18,960
the moon landings where uh captain video

1616
01:02:22,630 --> 01:02:20,880
was able to move the camera around and

1617
01:02:26,870 --> 01:02:22,640
look at things or is it going to be more

1618
01:02:30,150 --> 01:02:26,880
like uh the ms the uh the the mars uh

1619
01:02:31,990 --> 01:02:30,160
the earlier mars rovers

1620
01:02:34,150 --> 01:02:32,000
well it'll be much it'll be much like

1621
01:02:35,270 --> 01:02:34,160
the earlier mars rovers i mean the uh

1622
01:02:39,829 --> 01:02:35,280
the

1623
01:02:41,430 --> 01:02:39,839
sequences so we'll be doing panoramas so

1624
01:02:43,750 --> 01:02:41,440
you'll see basically that kind of

1625
01:02:45,270 --> 01:02:43,760
panorama like you've seen from uh spirit

1626
01:02:49,430 --> 01:02:45,280
and opportunity

1627
01:02:51,829 --> 01:02:49,440
um they're very high resolution uh uh

1628
01:02:54,309 --> 01:02:51,839
cameras uh they certainly are better

1629
01:02:56,150 --> 01:02:54,319
than high definition at least the the uh

1630
01:02:58,549 --> 01:02:56,160
sounds cameras are

1631
01:03:01,750 --> 01:02:58,559
with uh with basically full and natural

1632
01:03:04,069 --> 01:03:01,760
color this time i think that uh

1633
01:03:05,829 --> 01:03:04,079
the cameras i'm not i'm not that that

1634
01:03:07,510 --> 01:03:05,839
conversant with uh with the optics of

1635
01:03:08,870 --> 01:03:07,520
them but i think that they'll they'll be

1636
01:03:10,150 --> 01:03:08,880
they'll be very good

1637
01:03:12,150 --> 01:03:10,160
um

1638
01:03:14,870 --> 01:03:12,160

the frame rate for the descent imager is

1639
01:03:16,069 --> 01:03:14,880
certainly capable of doing uh a movie if

1640
01:03:18,230 --> 01:03:16,079
you want to do a movie an eight frame

1641
01:03:19,829 --> 01:03:18,240
per second movie uh the black and white

1642
01:03:21,349 --> 01:03:19,839
photographs will be

1643
01:03:23,349 --> 01:03:21,359
very good resolution i don't think

1644
01:03:24,950 --> 01:03:23,359
you'll uh you'll see them as as low

1645
01:03:25,750 --> 01:03:24,960
resolution but they will be black and

1646
01:03:27,910 --> 01:03:25,760
white

1647
01:03:29,270 --> 01:03:27,920
um the first color image will be taken

1648
01:03:31,589 --> 01:03:29,280
from the molly

1649
01:03:33,430 --> 01:03:31,599
the uh the camera that's on the arm that

1650
01:03:34,950 --> 01:03:33,440
that basically is designed to look at

1651
01:03:38,630 --> 01:03:34,960
rocks in a

1652
01:03:40,950 --> 01:03:38,640
in a very close high resolution setting

1653
01:03:43,270 --> 01:03:40,960
that camera does have uh excellent

1654
01:03:45,430 --> 01:03:43,280
optics uh features at infinity and it

1655
01:03:46,950 --> 01:03:45,440
looks out the side of the arm the one

1656
01:03:49,670 --> 01:03:46,960
thing we can't control is the

1657
01:03:51,349 --> 01:03:49,680
orientation that the rover lands in

1658
01:03:52,710 --> 01:03:51,359
so if that that's your first color

1659
01:03:53,829 --> 01:03:52,720
picture and if it happens you point it

1660
01:03:54,950 --> 01:03:53,839
at the mountain

1661
01:03:56,549 --> 01:03:54,960
we'll get a great picture of the

1662
01:03:57,990 --> 01:03:56,559
mountain and if it happens to be pointed

1663
01:04:02,789 --> 01:03:58,000

the other way we'll get a great picture

1664
01:04:06,630 --> 01:04:04,870
okay we are going to wrap up here and

1665
01:04:08,710 --> 01:04:06,640
before i toss it to someone who really

1666
01:04:10,870 --> 01:04:08,720
knows about countdown clocks dr john

1667
01:04:13,990 --> 01:04:10,880
grunsfeld to give us the latest on the

1668
01:04:16,630 --> 01:04:14,000
count um i i want to rhyme folks

1669
01:04:18,309 --> 01:04:16,640
come take this journey with us follow us

1670
01:04:19,270 --> 01:04:18,319
on social media

1671
01:04:22,950 --> 01:04:19,280
twitter

1672
01:04:25,270 --> 01:04:22,960
at mars curiosity facebook youtube

1673
01:04:27,510 --> 01:04:25,280
all the social media out there it will

1674
01:04:29,910 --> 01:04:27,520
be an incredible conversation incredible

1675
01:04:32,710 --> 01:04:29,920
products also for more information

1676
01:04:41,589 --> 01:04:32,720
www.nasa.gov

1677
01:04:42,950 --> 01:04:41,599
msl we've seen

1678
01:04:44,870 --> 01:04:42,960
the

1679
01:04:46,470 --> 01:04:44,880
education and public outreach products

1680
01:04:48,630 --> 01:04:46,480
but make no mistake ladies and gentlemen

1681
01:04:50,150 --> 01:04:48,640
this is serious business

1682
01:04:51,990 --> 01:04:50,160
if there's one thing to take away from

1683
01:04:53,029 --> 01:04:52,000
this this is the hardest mission ever

1684
01:04:55,670 --> 01:04:53,039
attempted

1685
01:04:57,270 --> 01:04:55,680
the history of planetary robotic

1686
01:04:59,829 --> 01:04:57,280
exploration

1687
01:05:01,910 --> 01:04:59,839
it is real

1688
01:05:04,150 --> 01:05:01,920

come go with us the team is ready and

1689
01:05:05,990 --> 01:05:04,160
now the latest on the countdown to john

1690
01:05:07,589 --> 01:05:06,000
gunsfield

1691
01:05:11,109 --> 01:05:07,599
so if you want to know how long until

1692
01:05:16,150 --> 01:05:11,119
landing go to worldwideweb.nasa.gov