



1  
00:00:09,320 --> 00:00:07,340  
good afternoon ladies and gentlemen my

2  
00:00:12,080 --> 00:00:09,330  
name is Dwayne brown with NASA

3  
00:00:15,499 --> 00:00:12,090  
headquarters and we're here at the Jet

4  
00:00:19,550 --> 00:00:15,509  
Propulsion Laboratory awaiting one of

5  
00:00:24,679 --> 00:00:19,560  
the agencies biggest moments over the

6  
00:00:27,859 --> 00:00:24,689  
past few days you've heard about law

7  
00:00:29,960 --> 00:00:27,869  
Science Laboratory Curiosity and now

8  
00:00:36,080 --> 00:00:29,970  
we're going to flip the script a little

9  
00:00:40,670 --> 00:00:36,090  
bit no graphics no PowerPoint no

10  
00:00:44,389 --> 00:00:40,680  
animation just straight talk informal

11  
00:00:50,920 --> 00:00:44,399  
talk we roll up our sleeves and we hear

12  
00:00:55,670 --> 00:00:50,930  
from the personal thoughts wishes and

13  
00:01:00,670 --> 00:00:55,680

goals of two of the most accomplished

14

00:01:08,359 --> 00:01:04,520

they will not only talk about how they

15

00:01:12,710 --> 00:01:08,369

feel about tonight the big picture of

16

00:01:17,300 --> 00:01:12,720

the space program but also answer the

17

00:01:19,609 --> 00:01:17,310

what if question there provide a couple

18

00:01:22,810 --> 00:01:19,619

of opening remarks few minutes of

19

00:01:28,210 --> 00:01:22,820

remarks and then we'll open up for Q&A

20

00:01:31,700 --> 00:01:28,220

first up will be dr. John Grunsfeld

21

00:01:35,810 --> 00:01:31,710

associate administrator Vanessa science

22

00:01:40,219 --> 00:01:35,820

Mission Directorate and dr. Charles

23

00:01:45,350 --> 00:01:40,229

elachi the director to Jet Propulsion

24

00:01:47,569 --> 00:01:45,360

Laboratory dr. Granville thank you very

25

00:01:50,030 --> 00:01:47,579

much Duane so I I'd like this to be very

26  
00:01:51,800 --> 00:01:50,040  
informal this is your opportunity to ask

27  
00:01:55,940 --> 00:01:51,810  
us you know those questions kind of get

28  
00:01:58,190 --> 00:01:55,950  
into the spirit of the day here as I

29  
00:02:00,260 --> 00:01:58,200  
walked into on Carmen auditorium it was

30  
00:02:02,389 --> 00:02:00,270  
you know very quiet out on the mall I

31  
00:02:06,080 --> 00:02:02,399  
had a chance to walk by the model of the

32  
00:02:09,139 --> 00:02:06,090  
Curiosity rover and you know nothing was

33  
00:02:12,440 --> 00:02:09,149  
stirring at all and it's definitely

34  
00:02:13,820 --> 00:02:12,450  
quiet before the storm we this

35  
00:02:15,950 --> 00:02:13,830  
tremendous and

36  
00:02:18,400 --> 00:02:15,960  
patient for this mission obviously it's

37  
00:02:21,170 --> 00:02:18,410  
been in crews for four months

38  
00:02:24,380 --> 00:02:21,180

everything's been going great that

39

00:02:26,360 --> 00:02:24,390

spacecraft itself is doing well but

40

00:02:29,990 --> 00:02:26,370

we're about to do something that I think

41

00:02:32,870 --> 00:02:30,000

is you know just huge for for humankind

42

00:02:35,900 --> 00:02:32,880

to put this chemistry laboratory on the

43

00:02:37,760 --> 00:02:35,910

surface of Mars that can roll that can

44

00:02:41,330 --> 00:02:37,770

see and that's going to provide

45

00:02:43,730 --> 00:02:41,340

scientists on earth a glimpse into the

46

00:02:46,220 --> 00:02:43,740

past history of Mars but it's also about

47

00:02:47,840 --> 00:02:46,230

our own history and I think about John

48

00:02:49,700 --> 00:02:47,850

Wesley Powell that the American

49

00:02:52,280 --> 00:02:49,710

geologist exploring the American West

50

00:02:54,920 --> 00:02:52,290

going down into the Grand Canyon which

51  
00:02:56,960 --> 00:02:54,930  
gives us that rare peek of our Earth's

52  
00:02:59,900 --> 00:02:56,970  
history back a couple of billion years

53  
00:03:01,940 --> 00:02:59,910  
and with the Curiosity rover in Gale

54  
00:03:04,580 --> 00:03:01,950  
Crater we hope to get that same kind of

55  
00:03:07,670 --> 00:03:04,590  
picture of the history of Mars going

56  
00:03:11,990 --> 00:03:07,680  
back billions of years to the times when

57  
00:03:13,610 --> 00:03:12,000  
Mars what might have been wet and we

58  
00:03:15,350 --> 00:03:13,620  
think that from our orbital

59  
00:03:17,690 --> 00:03:15,360  
reconnaissance using the Mars

60  
00:03:21,050 --> 00:03:17,700  
Reconnaissance orbiters Odyssey and the

61  
00:03:23,080 --> 00:03:21,060  
Mars Express mission and all of our

62  
00:03:25,370 --> 00:03:23,090  
reconnaissance including the spirit not

63  
00:03:29,600 --> 00:03:25,380

opportunity rovers but particularly in

64

00:03:32,000 --> 00:03:29,610

in Gale Crater we have this this amazing

65

00:03:34,100 --> 00:03:32,010

chance to look back in the past and

66

00:03:37,400 --> 00:03:34,110

answer the fundamental question you know

67

00:03:39,620 --> 00:03:37,410

could Mars have had you know salty seas

68

00:03:41,540 --> 00:03:39,630

that might have been conducive to you

69

00:03:42,949 --> 00:03:41,550

know microbial life developing and are

70

00:03:44,840 --> 00:03:42,959

there any signs that that might have

71

00:03:47,330 --> 00:03:44,850

happened so that's that's all great but

72

00:03:51,560 --> 00:03:47,340

it's it's much bigger than that you know

73

00:03:53,650 --> 00:03:51,570

this is curiosity has captured the

74

00:03:56,570 --> 00:03:53,660

imagination of the nation in the world

75

00:03:58,280 --> 00:03:56,580

and the events that are going on just

76

00:04:00,259 --> 00:03:58,290

surrounding tonight which is the entry

77

00:04:02,000 --> 00:04:00,269

descent and landing the seven minutes

78

00:04:04,820 --> 00:04:02,010

the shortest part of this two-year

79

00:04:06,770 --> 00:04:04,830

mission is captured the fascination of

80

00:04:08,140 --> 00:04:06,780

the world for good reason and and

81

00:04:10,699 --> 00:04:08,150

Charles will probably talk about that

82

00:04:12,710 --> 00:04:10,709

but the huge leverage will be once

83

00:04:14,660 --> 00:04:12,720

curiosity is all checked out and starts

84

00:04:18,469 --> 00:04:14,670

roving and starts doing science I'm

85

00:04:21,080 --> 00:04:18,479

absolutely convinced that the kids who

86

00:04:22,730 --> 00:04:21,090

watch and the people who watch the entry

87

00:04:25,250 --> 00:04:22,740

descent and landing tonight will be

88

00:04:27,740 --> 00:04:25,260

engaged for the full mission part of

89

00:04:30,350 --> 00:04:27,750

that discovery vicarious discovery

90

00:04:33,170 --> 00:04:30,360

and we'll remember tonight in the way

91

00:04:35,450 --> 00:04:33,180

that I remember the Apollo 11 landing

92

00:04:37,130 --> 00:04:35,460

when I was in summer school in 1969 many

93

00:04:38,480 --> 00:04:37,140

of you have heard me say that as i'm

94

00:04:41,780 --> 00:04:38,490

saying it here on the stage i'm already

95

00:04:43,580 --> 00:04:41,790

getting chills about tonight I know from

96

00:04:44,930 --> 00:04:43,590

my own kids since they weren't alive

97

00:04:47,840 --> 00:04:44,940

then this will be one of the most

98

00:04:50,360 --> 00:04:47,850

significant nights of their lives as you

99

00:04:54,050 --> 00:04:50,370

know they watch the curiosity mission so

100

00:04:56,060 --> 00:04:54,060

I'm very excited about that but I I want

101  
00:04:58,220 --> 00:04:56,070  
before I hand it over to Charles I need

102  
00:05:02,330 --> 00:04:58,230  
to satisfy my own curiosity just for a

103  
00:05:05,480 --> 00:05:02,340  
minute so with your indulgence you know

104  
00:05:09,680 --> 00:05:05,490  
I have to ask Charles what's up with the

105  
00:05:13,010 --> 00:05:09,690  
peanuts well I'm sure that many of you

106  
00:05:15,050 --> 00:05:13,020  
who have been to previous events at JPL

107  
00:05:18,170 --> 00:05:15,060  
you will notice just before we go into

108  
00:05:21,170 --> 00:05:18,180  
orbit or before we land a bag of peanuts

109  
00:05:23,300 --> 00:05:21,180  
or it can openers get circulated from in

110  
00:05:25,370 --> 00:05:23,310  
front of everybody in the mission

111  
00:05:27,950 --> 00:05:25,380  
operation room where this goes back to

112  
00:05:30,380 --> 00:05:27,960  
almost 40 years ago when JPL started

113  
00:05:31,850 --> 00:05:30,390

doing planetary mission for some reason

114

00:05:34,760 --> 00:05:31,860

they got in the habit that this brings

115

00:05:37,250 --> 00:05:34,770

good luck yeah this is not advertising

116

00:05:39,170 --> 00:05:37,260

for anybody but it's a somehow it

117

00:05:40,580 --> 00:05:39,180

started that tradition and we carried it

118

00:05:42,560 --> 00:05:40,590

with us and it has always brought us

119

00:05:44,030 --> 00:05:42,570

good luck so if tonight you see as

120

00:05:46,340 --> 00:05:44,040

passing peanuts it's not because we are

121

00:05:47,659 --> 00:05:46,350

hungry but it's because you know that we

122

00:05:50,810 --> 00:05:47,669

think that will bring us good luck so

123

00:05:53,210 --> 00:05:50,820

that's that the story on this one let me

124

00:05:55,820 --> 00:05:53,220

add a little bit to what John was saying

125

00:05:59,000 --> 00:05:55,830

you know this morning I got up you know

126

00:06:01,130 --> 00:05:59,010

at eight o'clock and we had at our house

127

00:06:04,550 --> 00:06:01,140

I have our daughter and her husband and

128

00:06:06,620 --> 00:06:04,560

and my grandkids and my wife's brother

129

00:06:08,750 --> 00:06:06,630

and wife sister and wife mom or coming

130

00:06:09,710 --> 00:06:08,760

you know to see this event and my wife

131

00:06:11,780 --> 00:06:09,720

said well how are you feeling this

132

00:06:13,730 --> 00:06:11,790

morning you know I'm really feeling good

133

00:06:15,980 --> 00:06:13,740

you know I'm nervous but I'm really

134

00:06:17,780 --> 00:06:15,990

feeling good and I was supposed to come

135

00:06:20,659 --> 00:06:17,790

here at twelve o'clock but by ten

136

00:06:22,760 --> 00:06:20,669

o'clock i couldn't resist so i drove and

137

00:06:25,550 --> 00:06:22,770

went into the mission operation room sat

138

00:06:27,260 --> 00:06:25,560

in the back and it was kind of quiet and

139

00:06:28,969 --> 00:06:27,270

i sit down and really thought about what

140

00:06:30,800 --> 00:06:28,979

a great thing what they might think

141

00:06:32,960 --> 00:06:30,810

we're doing you know today so i took

142

00:06:36,310 --> 00:06:32,970

those five minutes of you know quiet

143

00:06:38,810 --> 00:06:36,320

think about it and one of my favorite

144

00:06:41,150 --> 00:06:38,820

quotes is from President Teddy Roosevelt

145

00:06:43,400 --> 00:06:41,160

which I'm going to kind of

146

00:06:45,940 --> 00:06:43,410

say it not exactly like he said that

147

00:06:47,990 --> 00:06:45,950

it's far better to dare mighty things

148

00:06:50,750 --> 00:06:48,000

even though there is a risk of failure

149

00:06:53,150 --> 00:06:50,760

than to sit in the Twilight and not know

150

00:06:55,640 --> 00:06:53,160

neither victory nor defeat and I think

151  
00:06:56,840 --> 00:06:55,650  
the team you know that is working today

152  
00:06:58,970 --> 00:06:56,850  
that is going to be landing the

153  
00:07:01,670 --> 00:06:58,980  
spacecraft the team that have done it

154  
00:07:03,260 --> 00:07:01,680  
from all across NASA from all across the

155  
00:07:05,900 --> 00:07:03,270  
nation from all across the world are

156  
00:07:08,720 --> 00:07:05,910  
really doing very mighty things on

157  
00:07:10,520 --> 00:07:08,730  
behalf of all of us and I think at

158  
00:07:13,190 --> 00:07:10,530  
ten-thirty to Mars is going to be

159  
00:07:14,990 --> 00:07:13,200  
different than a 1031 you know tonight

160  
00:07:17,390 --> 00:07:15,000  
because we will have an explorer

161  
00:07:20,690 --> 00:07:17,400  
hopefully successfully on that planet as

162  
00:07:24,110 --> 00:07:20,700  
John was saying exploring and giving us

163  
00:07:26,240 --> 00:07:24,120

more information how did Mars evolve why

164

00:07:28,610 --> 00:07:26,250

did Mars which have very similar

165

00:07:31,700 --> 00:07:28,620

features at Earth why is it different

166

00:07:33,680 --> 00:07:31,710

today why did life evolved here and did

167

00:07:35,900 --> 00:07:33,690

not evolve them Mars in in the same way

168

00:07:38,240 --> 00:07:35,910

so things are going to be different at

169

00:07:40,730 --> 00:07:38,250

ten-thirty to 10 33 and over the next

170

00:07:43,070 --> 00:07:40,740

weeks and months you know in years and

171

00:07:45,950 --> 00:07:43,080

to put it in a context we have to keep

172

00:07:47,870 --> 00:07:45,960

thinking that as we speak today we have

173

00:07:50,900 --> 00:07:47,880

dozens of spacecrafts across the solar

174

00:07:53,390 --> 00:07:50,910

system which have the NASA logo you know

175

00:07:55,730 --> 00:07:53,400

on them and the American flag and the

176

00:07:58,250 --> 00:07:55,740

NASA and the j.pierre logo on it and

177

00:07:59,780 --> 00:07:58,260

these are providing science in a way

178

00:08:02,659 --> 00:07:59,790

completely different than when I was

179

00:08:04,580 --> 00:08:02,669

young you know at school like John was

180

00:08:08,890 --> 00:08:04,590

saying before we used to have a mission

181

00:08:12,440 --> 00:08:08,900

and wait for 56 years so we can verify a

182

00:08:15,770 --> 00:08:12,450

hypothesis remember on Mars would have

183

00:08:17,570 --> 00:08:15,780

been now continuously for 15 years our

184

00:08:20,260 --> 00:08:17,580

nation had continuous presence on Mars

185

00:08:22,880 --> 00:08:20,270

on 15 years since the time we landed

186

00:08:24,740 --> 00:08:22,890

Pathfinder and then with the orbiters

187

00:08:26,330 --> 00:08:24,750

and the Landers and I challenge our team

188

00:08:28,790 --> 00:08:26,340

are working on opportunity I told them

189

00:08:31,340 --> 00:08:28,800

please make sure opportunity continue to

190

00:08:33,290 --> 00:08:31,350

work until after tonight so we can say

191

00:08:35,870 --> 00:08:33,300

we have continuous presence you know

192

00:08:37,610 --> 00:08:35,880

beyond that so anyway it is a great day

193

00:08:39,560 --> 00:08:37,620

it is a great moment and not only for us

194

00:08:41,750 --> 00:08:39,570

here for everybody you know it is a

195

00:08:44,029 --> 00:08:41,760

great day and and we wish the team

196

00:08:45,890 --> 00:08:44,039

success and I hope I'm sure you all will

197

00:08:50,690 --> 00:08:45,900

be cheering for us you know to achieve

198

00:08:53,000 --> 00:08:50,700

success tonight ok so again we want to

199

00:08:55,020 --> 00:08:53,010

keep this informal but we are going to

200

00:08:56,280 --> 00:08:55,030

have you wait for the mic and

201  
00:08:58,350 --> 00:08:56,290  
and give your name and affiliation and

202  
00:09:00,360 --> 00:08:58,360  
again this is straight talk everything's

203  
00:09:07,680 --> 00:09:00,370  
on the table can you raise your hand and

204  
00:09:11,250 --> 00:09:07,690  
we'll start here i'm alan boyle with NBC

205  
00:09:14,360 --> 00:09:11,260  
News and please tell us what's up with

206  
00:09:17,580 --> 00:09:14,370  
the Mars program besides the peanuts

207  
00:09:20,250 --> 00:09:17,590  
what's the latest on the planning for

208  
00:09:24,090 --> 00:09:20,260  
the next the next mars mission after

209  
00:09:26,160 --> 00:09:24,100  
maven so Ellen thank you the next

210  
00:09:29,310 --> 00:09:26,170  
mission is maven it launches next year

211  
00:09:31,470 --> 00:09:29,320  
it's an upper atmospheric mission beyond

212  
00:09:34,170 --> 00:09:31,480  
that we're in the planning stages of you

213  
00:09:36,810 --> 00:09:34,180

know what is the next not just the next

214

00:09:39,810 --> 00:09:36,820

mission but what is the framework for

215

00:09:41,820 --> 00:09:39,820

the next era of Mars exploration and I

216

00:09:44,730 --> 00:09:41,830

think the curiosity landing and roving

217

00:09:47,640 --> 00:09:44,740

will help to inform that but what we're

218

00:09:49,710 --> 00:09:47,650

specifically trying to do is build this

219

00:09:52,790 --> 00:09:49,720

framework with options and then try and

220

00:09:57,180 --> 00:09:52,800

isolate what is the the next best step

221

00:10:00,030 --> 00:09:57,190

for the 2018 opportunity and so until I

222

00:10:02,250 --> 00:10:00,040

get the report and the planning so the

223

00:10:04,440 --> 00:10:02,260

next step is the Mars program planning

224

00:10:05,990 --> 00:10:04,450

group which is something that Charlie

225

00:10:07,800 --> 00:10:06,000

Bolden asked me to spin up a team

226

00:10:09,390 --> 00:10:07,810

including human spaceflight and

227

00:10:11,520 --> 00:10:09,400

technology bill Gerstenmaier my

228

00:10:14,010 --> 00:10:11,530

counterpart in human space flight mason

229

00:10:15,630 --> 00:10:14,020

peck my counterpart in technology to

230

00:10:18,450 --> 00:10:15,640

come together and come up with a NASA

231

00:10:21,210 --> 00:10:18,460

plan not just a science plan but a mars

232

00:10:22,950 --> 00:10:21,220

exploration plan that incorporates of

233

00:10:25,200 --> 00:10:22,960

course the science objectives but also

234

00:10:27,750 --> 00:10:25,210

looks forward to a time when we'll send

235

00:10:30,540 --> 00:10:27,760

humans to Mars you know gals and guys to

236

00:10:33,150 --> 00:10:30,550

do astrobiology you know planetary

237

00:10:35,040 --> 00:10:33,160

science on the surface and enabled by

238

00:10:36,360 --> 00:10:35,050

technology and look at all the pieces

239

00:10:38,210 --> 00:10:36,370

look at how the International Space

240

00:10:40,530 --> 00:10:38,220

Station fits in the Space Launch System

241

00:10:42,660 --> 00:10:40,540

some of the technology in terms of

242

00:10:46,080 --> 00:10:42,670

things like atomic clocks optical calm

243

00:10:48,090 --> 00:10:46,090

new propulsion electric propulsion all

244

00:10:50,310 --> 00:10:48,100

these kind of things queue it up and see

245

00:10:52,500 --> 00:10:50,320

where the pieces fit to try and find you

246

00:10:55,740 --> 00:10:52,510

know those opportunities of synergy that

247

00:10:57,570 --> 00:10:55,750

leverage the whole NASA program you know

248

00:11:00,180 --> 00:10:57,580

so that's being queued up for this fall

249

00:11:01,800 --> 00:11:00,190

once we have the report from the Mars

250

00:11:04,110 --> 00:11:01,810

program planning group will then start

251  
00:11:06,990 --> 00:11:04,120  
to engage the community in additional

252  
00:11:08,400 --> 00:11:07,000  
studies hopefully leading to you know

253  
00:11:09,840 --> 00:11:08,410  
sometime early

254  
00:11:12,300 --> 00:11:09,850  
next year with the release of the

255  
00:11:14,430 --> 00:11:12,310  
President's budget you know some ideas

256  
00:11:17,550 --> 00:11:14,440  
of specifically you know what those

257  
00:11:19,769 --> 00:11:17,560  
plans will be some things are going to

258  
00:11:21,780 --> 00:11:19,779  
be on hold until that process is

259  
00:11:22,980 --> 00:11:21,790  
complete well I think there's good you

260  
00:11:26,220 --> 00:11:22,990  
know it's going to take a while you know

261  
00:11:28,439 --> 00:11:26,230  
if we decide whether the 2018 mission is

262  
00:11:30,030 --> 00:11:28,449  
an orbiter or a lander you know we may

263  
00:11:31,619 --> 00:11:30,040

spool up an instrument definition team

264

00:11:34,079 --> 00:11:31,629

but that's kind of a natural timeline

265

00:11:36,569 --> 00:11:34,089

you know so that so the release of the

266

00:11:39,720 --> 00:11:36,579

President's budget is you know not so

267

00:11:41,999 --> 00:11:39,730

much the motive force but a good a good

268

00:11:43,889 --> 00:11:42,009

time scale maybe one think that what

269

00:11:45,949 --> 00:11:43,899

John was saying I'm sure you all know

270

00:11:49,170 --> 00:11:45,959

that we can go to Mars every 26 months

271

00:11:51,360 --> 00:11:49,180

but also 18 is a pretty good opportunity

272

00:11:53,879 --> 00:11:51,370

you know from from celestial mechanics

273

00:11:55,530 --> 00:11:53,889

from the dynamic you know or celestial

274

00:11:58,019 --> 00:11:55,540

mechanics so it's an important

275

00:11:59,670 --> 00:11:58,029

opportunity to make sure we capitalize

276

00:12:02,970 --> 00:11:59,680

on in addition to keeping the momentum

277

00:12:04,650 --> 00:12:02,980

you know the program all right thanks

278

00:12:08,730 --> 00:12:04,660

i'm irene klotz with Reuters and

279

00:12:11,639 --> 00:12:08,740

discovery news how much does curiosity

280

00:12:15,059 --> 00:12:11,649

um play a role is kind of a hinge in

281

00:12:17,009 --> 00:12:15,069

different alternatives to what might

282

00:12:20,309 --> 00:12:17,019

come next on Mars meaning that fits

283

00:12:22,860 --> 00:12:20,319

lands and successful how might that lead

284

00:12:27,900 --> 00:12:22,870

to group of missions versus if it's not

285

00:12:32,610 --> 00:12:27,910

successful where the Mars program might

286

00:12:34,319 --> 00:12:32,620

head well I mean I can clearly is a very

287

00:12:36,420 --> 00:12:34,329

important element of the overall program

288

00:12:38,610 --> 00:12:36,430

because it's addressing and very

289

00:12:41,429 --> 00:12:38,620

important scientific questions you know

290

00:12:42,689 --> 00:12:41,439

of understanding on the chemistry if you

291

00:12:44,790 --> 00:12:42,699

want of the sample that will be

292

00:12:47,220 --> 00:12:44,800

acquiring so it's clearly very important

293

00:12:48,900 --> 00:12:47,230

now like in any strategic planning you

294

00:12:50,819 --> 00:12:48,910

plan on success and sometimes then what

295

00:12:52,559 --> 00:12:50,829

if something doesn't work you know

296

00:12:54,870 --> 00:12:52,569

things have happened before you know and

297

00:12:57,689 --> 00:12:54,880

in the late about 10 years ago 12 years

298

00:12:59,970 --> 00:12:57,699

ago or we did have a failure but within

299

00:13:02,699 --> 00:12:59,980

four years after that we had the rover

300

00:13:04,829 --> 00:13:02,709

on the surface of Mars so that shows the

301

00:13:07,139 --> 00:13:04,839

commitment and I think was all the

302

00:13:08,579 --> 00:13:07,149

discussion with John and Charlie Bolden

303

00:13:09,929 --> 00:13:08,589

in the administration there is a strong

304

00:13:13,019 --> 00:13:09,939

commitment to continue the exploration

305

00:13:14,160 --> 00:13:13,029

of Mars and in like every exploration

306

00:13:17,280 --> 00:13:14,170

every once in a while you get the

307

00:13:18,990 --> 00:13:17,290

setback and the challenge is how do you

308

00:13:21,210 --> 00:13:19,000

recuperate from that setback and make

309

00:13:22,199 --> 00:13:21,220

sure you quickly learn from it and

310

00:13:23,519 --> 00:13:22,209

address

311

00:13:25,109 --> 00:13:23,529

you know the question which are still

312

00:13:27,389 --> 00:13:25,119

the same you know the astrobiological

313

00:13:30,119 --> 00:13:27,399

question the chemistry question and so

314

00:13:32,429 --> 00:13:30,129

on so we have to have a program which is

315

00:13:35,009 --> 00:13:32,439

pretty agile in adjusting and adapting

316

00:13:37,949 --> 00:13:35,019

depending on the new discoveries or lack

317

00:13:39,809 --> 00:13:37,959

of discoveries there's no doubt though

318

00:13:42,150 --> 00:13:39,819

that a roving curiosity is going to make

319

00:13:45,119 --> 00:13:42,160

discoveries and I think what Charles has

320

00:13:47,069 --> 00:13:45,129

said that I'm acutely sensitive to is

321

00:13:49,169 --> 00:13:47,079

what's the nature of those discoveries

322

00:13:51,319 --> 00:13:49,179

and we are going to find sedimentary

323

00:13:54,030 --> 00:13:51,329

rocks because we can see them from orbit

324

00:13:56,340 --> 00:13:54,040

finding out how they were laid down by

325

00:13:58,079 --> 00:13:56,350

what kind of wet process and what

326

00:14:01,350 --> 00:13:58,089

minerals there are you know that's what

327

00:14:04,530 --> 00:14:01,360

these chemistry laboratories will do so

328

00:14:06,119 --> 00:14:04,540

spectacularly and if we see you know

329

00:14:08,040 --> 00:14:06,129

something that looks really exciting you

330

00:14:10,079 --> 00:14:08,050

know that will guide what the future

331

00:14:12,629 --> 00:14:10,089

missions are if we see something that

332

00:14:14,429 --> 00:14:12,639

looks tantalizing but maybe isn't

333

00:14:17,429 --> 00:14:14,439

indicative that you know there was

334

00:14:19,109 --> 00:14:17,439

habitable conditions in Gale Crater you

335

00:14:20,280 --> 00:14:19,119

know billions of years ago you know that

336

00:14:23,129 --> 00:14:20,290

might take us in a different direction

337

00:14:25,530 --> 00:14:23,139

maybe we look for modern modern

338

00:14:27,929 --> 00:14:25,540

volatiles modern water rather than going

339

00:14:29,129 --> 00:14:27,939

back to ancient terrain and so no it's

340

00:14:30,449 --> 00:14:29,139

these kind of things that will guide us

341

00:14:32,309 --> 00:14:30,459

but the exciting thing is those

342

00:14:34,739 --> 00:14:32,319

discoveries are just in front of us

343

00:14:36,660 --> 00:14:34,749

thanks and here's a question I'm sure

344

00:14:39,239 --> 00:14:36,670

every astronaut wanders about at night

345

00:14:42,179 --> 00:14:39,249

is if there's um under continuing

346

00:14:44,639 --> 00:14:42,189

resolution and with the prospect of an

347

00:14:47,850 --> 00:14:44,649

election and Congress unlikely to take

348

00:14:54,090 --> 00:14:47,860

action on a budget is a 20-18 Mars

349

00:14:55,109 --> 00:14:54,100

mission still on a table for you know if

350

00:14:56,789 --> 00:14:55,119

we're looking at some kind of

351  
00:14:58,049 --> 00:14:56,799  
across-the-board cut you know we're not

352  
00:14:59,309 --> 00:14:58,059  
currently planning for that I'm

353  
00:15:01,079 --> 00:14:59,319  
confident that between the

354  
00:15:02,789 --> 00:15:01,089  
administration and the Congress they're

355  
00:15:05,189 --> 00:15:02,799  
going to work something out I think the

356  
00:15:07,439 --> 00:15:05,199  
great thing is that NASA and NASA

357  
00:15:09,689 --> 00:15:07,449  
science exploration has widespread

358  
00:15:11,939 --> 00:15:09,699  
support certainly in the administration

359  
00:15:13,679 --> 00:15:11,949  
but on both sides of the island Congress

360  
00:15:16,019 --> 00:15:13,689  
and the Senate in the house and the

361  
00:15:17,400 --> 00:15:16,029  
American people and so I think the 2018

362  
00:15:18,989 --> 00:15:17,410  
thing is something we're looking forward

363  
00:15:21,150 --> 00:15:18,999

to and that is something we're planning

364

00:15:24,569 --> 00:15:21,160

to yeah and it looked at one thing also

365

00:15:26,309 --> 00:15:24,579

to what what John is saying just looking

366

00:15:28,889 --> 00:15:26,319

at the excitement and the engagement

367

00:15:31,559 --> 00:15:28,899

that public had in this mission I mean

368

00:15:34,319 --> 00:15:31,569

millions of hits on the seven minutes of

369

00:15:36,000 --> 00:15:34,329

terror so my hope and and by the way

370

00:15:38,430 --> 00:15:36,010

this is across the whole country

371

00:15:41,370 --> 00:15:38,440

not only people are space cakes like

372

00:15:43,080 --> 00:15:41,380

some of us people from all walks of life

373

00:15:45,390 --> 00:15:43,090

think that this is one of the most

374

00:15:46,710 --> 00:15:45,400

exciting thing we do and at the end I

375

00:15:49,140 --> 00:15:46,720

will have to think that the people in

376

00:15:50,790 --> 00:15:49,150

Washington are our representatives they

377

00:15:53,430 --> 00:15:50,800

are represented what the public wants

378

00:15:56,160 --> 00:15:53,440

and this is I think one of the I'm so

379

00:15:58,200 --> 00:15:56,170

encouraged you know was a strong you

380

00:16:00,060 --> 00:15:58,210

know positive engagement that the public

381

00:16:02,310 --> 00:16:00,070

is doing and I'm sure people would

382

00:16:05,610 --> 00:16:02,320

realize that they are there to basically

383

00:16:09,840 --> 00:16:05,620

satisfy what the taxpayer want so so I'm

384

00:16:13,380 --> 00:16:09,850

hopeful sir yes ODB songy and Josh paste

385

00:16:15,540 --> 00:16:13,390

come from France perhaps a bit naive

386

00:16:17,940 --> 00:16:15,550

question but I remember that for Viking

387

00:16:19,320 --> 00:16:17,950

that was picking one and two was mass

388

00:16:23,490 --> 00:16:19,330

exploration rovers spirit and

389

00:16:25,830 --> 00:16:23,500

opportunity curiosity got no twin was it

390

00:16:28,680 --> 00:16:25,840

only a budget question or was it a

391

00:16:32,100 --> 00:16:28,690

confidence in the system or just a

392

00:16:35,040 --> 00:16:32,110

logistic problem why we had only one you

393

00:16:37,230 --> 00:16:35,050

mean yeah well I mean they always you do

394

00:16:40,320 --> 00:16:37,240

a trade in these things you do always do

395

00:16:42,870 --> 00:16:40,330

a trade between cost and risk on doing

396

00:16:45,270 --> 00:16:42,880

these things so in the case of Spirit

397

00:16:47,910 --> 00:16:45,280

and Opportunity remember we were it was

398

00:16:50,340 --> 00:16:47,920

the first time we put a large size rover

399

00:16:52,260 --> 00:16:50,350

on Mars I mean we had Pathfinder which

400

00:16:55,410 --> 00:16:52,270

we learned a little bit you know from it

401  
00:16:58,320 --> 00:16:55,420  
so it made sense at that time you know

402  
00:17:00,330 --> 00:16:58,330  
to do a dual system you know forever now

403  
00:17:02,250 --> 00:17:00,340  
we feel a little bit more confident it's

404  
00:17:04,500 --> 00:17:02,260  
not hundred percent sure it will never

405  
00:17:06,600 --> 00:17:04,510  
be hundred percent sure but feel a lot

406  
00:17:08,280 --> 00:17:06,610  
more confident about how do we enter the

407  
00:17:09,990 --> 00:17:08,290  
scent and land you know on another

408  
00:17:11,790 --> 00:17:10,000  
planet even that it's a little bit

409  
00:17:13,439 --> 00:17:11,800  
different you know where by using the

410  
00:17:15,210 --> 00:17:13,449  
skytrain but the first steps are very

411  
00:17:17,819 --> 00:17:15,220  
similar you know the heat shield the

412  
00:17:19,620 --> 00:17:17,829  
retrorocket the parachute they are very

413  
00:17:21,569 --> 00:17:19,630

similar so it's a little bit of gain of

414

00:17:23,640 --> 00:17:21,579

confidence now of course you always

415

00:17:25,410 --> 00:17:23,650

would like to have redundancy in

416

00:17:26,970 --> 00:17:25,420

everything but you have to create the

417

00:17:29,010 --> 00:17:26,980

balance between the risk and the cost

418

00:17:32,040 --> 00:17:29,020

and we elected to do it that way now

419

00:17:35,910 --> 00:17:32,050

that that said the and correct me if I'm

420

00:17:37,440 --> 00:17:35,920

wrong but the curiosity bus you know the

421

00:17:39,870 --> 00:17:37,450

system not the instruments themselves

422

00:17:42,210 --> 00:17:39,880

with the bus was designed to be somewhat

423

00:17:44,220 --> 00:17:42,220

modular so that if in the future we want

424

00:17:45,900 --> 00:17:44,230

to replicate it with a different suite I

425

00:17:47,970 --> 00:17:45,910

think it would be more straightforward

426

00:17:49,289 --> 00:17:47,980

all the drawings are now in electronic

427

00:17:50,789 --> 00:17:49,299

karen's

428

00:17:53,369 --> 00:17:50,799

nearing has been done you could in

429

00:17:55,350 --> 00:17:53,379

principle build another one much more

430

00:17:56,609 --> 00:17:55,360

easily than we could have as the case of

431

00:18:01,560 --> 00:17:56,619

Viking or some of the other missions

432

00:18:03,330 --> 00:18:01,570

yeah that's good you would certainly

433

00:18:06,350 --> 00:18:03,340

save a lot of the non-recurring

434

00:18:08,609 --> 00:18:06,360

engineering costs as we say thank you

435

00:18:10,440 --> 00:18:08,619

Frank roaring with aviation week to

436

00:18:12,600 --> 00:18:10,450

continue the budget discussion just a

437

00:18:16,220 --> 00:18:12,610

little bit with you John as a telescope

438

00:18:19,769 --> 00:18:16,230

guy arm across your larger portfolio I

439

00:18:24,119 --> 00:18:19,779

know you're tracking web very closely is

440

00:18:29,759 --> 00:18:24,129

it holding holding course or is that a

441

00:18:31,979 --> 00:18:29,769

threat against future Mars programs and

442

00:18:33,299 --> 00:18:31,989

also you've gotten a couple of big

443

00:18:36,810 --> 00:18:33,309

mirrors from the National Reconnaissance

444

00:18:38,310 --> 00:18:36,820

Office which someone described to me is

445

00:18:43,470 --> 00:18:38,320

sort of like having your rich uncle give

446

00:18:45,149 --> 00:18:43,480

you a Ferrari engine what are you going

447

00:18:48,720 --> 00:18:45,159

to do with with with that opportunity

448

00:18:51,690 --> 00:18:48,730

this the larger science portfolio and

449

00:18:53,519 --> 00:18:51,700

the and the other calls on that limited

450

00:18:56,430 --> 00:18:53,529

budget well let me start with the James

451  
00:18:59,129 --> 00:18:56,440  
Webb Space Telescope it's doing great on

452  
00:19:00,899 --> 00:18:59,139  
schedule budget we've got mid-infrared

453  
00:19:02,159 --> 00:19:00,909  
instrument already delivered to Goddard

454  
00:19:04,229 --> 00:19:02,169  
and it's going through integration and

455  
00:19:06,779 --> 00:19:04,239  
test the fine guidance sensor which is

456  
00:19:08,159 --> 00:19:06,789  
which are the eyes if you will of and a

457  
00:19:10,710 --> 00:19:08,169  
scientific instrument for James Webb

458  
00:19:12,810 --> 00:19:10,720  
from Canada the Canadian Space Agency

459  
00:19:15,210 --> 00:19:12,820  
that's just been delivered to Goddard so

460  
00:19:16,979 --> 00:19:15,220  
the backplane is completed the mirrors

461  
00:19:18,749 --> 00:19:16,989  
are completed it's actually coming

462  
00:19:20,399 --> 00:19:18,759  
together as a telescope now that said

463  
00:19:22,019 --> 00:19:20,409

you know once we put all the pieces

464

00:19:24,149 --> 00:19:22,029

together and start testing it at

465

00:19:26,669 --> 00:19:24,159

cryogenic temperatures we're going to

466

00:19:29,310 --> 00:19:26,679

find problems that's why we take build

467

00:19:30,570 --> 00:19:29,320

and test and the same was true of the

468

00:19:32,310 --> 00:19:30,580

Mars Science Lab it's true of everything

469

00:19:34,200 --> 00:19:32,320

we do so you're going to hear about some

470

00:19:37,739 --> 00:19:34,210

of those issues coming up and so in

471

00:19:39,930 --> 00:19:37,749

order to make sure that the project goes

472

00:19:42,690 --> 00:19:39,940

forward on schedule and on budget we

473

00:19:43,799 --> 00:19:42,700

actually plan for those problems to

474

00:19:45,659 --> 00:19:43,809

occur I can't tell you what they'll be

475

00:19:47,729 --> 00:19:45,669

now because if I knew it they were we'd

476  
00:19:49,200 --> 00:19:47,739  
fix them before we get to test but we're

477  
00:19:52,470 --> 00:19:49,210  
going into the really interesting and

478  
00:19:54,299 --> 00:19:52,480  
difficult phase but the project is doing

479  
00:19:56,009 --> 00:19:54,309  
really well they're actually ahead on

480  
00:19:58,190 --> 00:19:56,019  
some milestones meeting the rest of the

481  
00:20:00,629 --> 00:19:58,200  
milestones meeting the budget targets

482  
00:20:02,700 --> 00:20:00,639  
and moving forward into that integration

483  
00:20:03,100 --> 00:20:02,710  
and test phase and we are watching it

484  
00:20:04,630 --> 00:20:03,110  
very

485  
00:20:06,400 --> 00:20:04,640  
ously work you know making good

486  
00:20:09,070 --> 00:20:06,410  
management decisions and that's the key

487  
00:20:11,380 --> 00:20:09,080  
make you know make decisions and timely

488  
00:20:13,330 --> 00:20:11,390

basis catch the bad decisions quickly

489

00:20:14,410 --> 00:20:13,340

move on and the team is doing just a

490

00:20:17,860 --> 00:20:14,420

great job doing that so I'm very

491

00:20:19,990 --> 00:20:17,870

confident James Webb the two optic

492

00:20:22,180 --> 00:20:20,000

systems that we got you know parts of

493

00:20:24,310 --> 00:20:22,190

telescopes from the National

494

00:20:25,990 --> 00:20:24,320

Reconnaissance Office you know we're

495

00:20:28,750 --> 00:20:26,000

currently storing those we have folks

496

00:20:30,910 --> 00:20:28,760

looking at the data but we haven't yet

497

00:20:32,950 --> 00:20:30,920

decided what the path forward is and

498

00:20:34,270 --> 00:20:32,960

their various paths you know certainly

499

00:20:36,070 --> 00:20:34,280

they could be interesting as an

500

00:20:38,110 --> 00:20:36,080

astronomical telescope but we haven't

501  
00:20:39,490 --> 00:20:38,120  
done the work yet to say you know what

502  
00:20:41,500 --> 00:20:39,500  
exactly can they do what kind of

503  
00:20:43,930 --> 00:20:41,510  
performance and how would we go forward

504  
00:20:45,520 --> 00:20:43,940  
but i think you know in the coming

505  
00:20:48,640 --> 00:20:45,530  
months we'll be able to talk about that

506  
00:20:53,650 --> 00:20:48,650  
some more i think we had to focus on on

507  
00:20:56,260 --> 00:20:53,660  
Mars today Eric hi John Eric Han with

508  
00:20:58,930 --> 00:20:56,270  
nature Eric I'm last month you were due

509  
00:21:01,150 --> 00:20:58,940  
to make a decision in discovery that

510  
00:21:04,270 --> 00:21:01,160  
decision was was delayed to mid-august

511  
00:21:06,310 --> 00:21:04,280  
now one of the three candidates is a

512  
00:21:09,700 --> 00:21:06,320  
Mars Lander that could potentially

513  
00:21:11,230 --> 00:21:09,710

launch in 2016 did you delay the

514

00:21:13,750 --> 00:21:11,240

decision in order to see the results of

515

00:21:15,610 --> 00:21:13,760

the curiosity landing and if so how

516

00:21:17,560 --> 00:21:15,620

would that have a success or failure

517

00:21:22,090 --> 00:21:17,570

affect your your decision in discovery

518

00:21:24,640 --> 00:21:22,100

Thanks yes I've been working pretty much

519

00:21:26,020 --> 00:21:24,650

non-stop so the days are blurring into

520

00:21:28,299 --> 00:21:26,030

each other when you when you work over a

521

00:21:31,450 --> 00:21:28,309

weekend you know suddenly the weeks

522

00:21:33,880 --> 00:21:31,460

don't have nights natural boundaries but

523

00:21:37,930 --> 00:21:33,890

it I actually got the discovery

524

00:21:40,390 --> 00:21:37,940

briefings friday or monday i don't

525

00:21:43,240 --> 00:21:40,400

remember exactly so I've just gotten the

526  
00:21:46,360 --> 00:21:43,250  
briefings on the three missions that are

527  
00:21:49,120 --> 00:21:46,370  
in competition and so we're now kind of

528  
00:21:52,090 --> 00:21:49,130  
in the now that I have all the data and

529  
00:21:55,210 --> 00:21:52,100  
the executive team in science Mission

530  
00:21:57,220 --> 00:21:55,220  
Directorate the voting team has seen all

531  
00:21:59,110 --> 00:21:57,230  
of the actual data recommendation has

532  
00:22:01,120 --> 00:21:59,120  
been made you know we're within a week

533  
00:22:02,770 --> 00:22:01,130  
or so of making a decision and then

534  
00:22:04,990 --> 00:22:02,780  
it'll make its way through the through

535  
00:22:07,780 --> 00:22:05,000  
the chain so as far as I know there was

536  
00:22:09,700 --> 00:22:07,790  
no delay for any reason other than you

537  
00:22:12,490 --> 00:22:09,710  
know possibly what day of last week was

538  
00:22:14,020 --> 00:22:12,500

was I going to get briefed so this is

539

00:22:15,340 --> 00:22:14,030

one of the exciting things about the job

540

00:22:16,549 --> 00:22:15,350

is that I'm actually the selection

541

00:22:18,619 --> 00:22:16,559

official for these important

542

00:22:21,080 --> 00:22:18,629

it's also the hard part of the job

543

00:22:24,169 --> 00:22:21,090

simply because I can tell you that I was

544

00:22:26,899 --> 00:22:24,179

presented three missions and you know

545

00:22:28,190 --> 00:22:26,909

the best answer is fun to mail but

546

00:22:30,259 --> 00:22:28,200

unfortunately don't have the money to do

547

00:22:31,909 --> 00:22:30,269

that so now we have to decide you know

548

00:22:35,659 --> 00:22:31,919

what the path forward is so within a

549

00:22:38,869 --> 00:22:35,669

week or two Leonard hi Leonard David

550

00:22:42,529 --> 00:22:38,879

with the aerospace America magazine if

551  
00:22:46,450 --> 00:22:42,539  
indeed you have a bad day at Mars what's

552  
00:22:48,919 --> 00:22:46,460  
the message you do want to relay to the

553  
00:22:51,950 --> 00:22:48,929  
space community and in the public

554  
00:22:54,259 --> 00:22:51,960  
community well I tell you I kind of

555  
00:22:56,330 --> 00:22:54,269  
touched on it earlier when you are doing

556  
00:22:58,909 --> 00:22:56,340  
exploration you are not guaranteed of

557  
00:23:01,789 --> 00:22:58,919  
success even gold medalist in the

558  
00:23:04,489 --> 00:23:01,799  
Olympics are not guaranteed you know of

559  
00:23:06,320 --> 00:23:04,499  
getting gold medal again so that's

560  
00:23:08,629 --> 00:23:06,330  
what's important about human exploration

561  
00:23:10,999 --> 00:23:08,639  
when we explore we know that there is a

562  
00:23:13,850 --> 00:23:11,009  
risk and if you don't take bold moves

563  
00:23:16,249 --> 00:23:13,860

and you don't take bold missions you'll

564

00:23:18,489 --> 00:23:16,259

never make the progress that that it's

565

00:23:20,989 --> 00:23:18,499

we are expecting you know from it

566

00:23:23,060 --> 00:23:20,999

hopefully we have done everything we can

567

00:23:25,340 --> 00:23:23,070

and i know we have done everything we

568

00:23:27,409 --> 00:23:25,350

can you know to be successful but there

569

00:23:30,049 --> 00:23:27,419

is always there is a risk of something

570

00:23:32,419 --> 00:23:30,059

will fail and if that happens i hope it

571

00:23:34,850 --> 00:23:32,429

doesn't but if that happens i think we

572

00:23:36,919 --> 00:23:34,860

will quickly learn why it happened you

573

00:23:38,869 --> 00:23:36,929

know get back on our feet and continue

574

00:23:41,450 --> 00:23:38,879

our exploration and that's what happened

575

00:23:42,889 --> 00:23:41,460

you know 15 years ago that's what

576

00:23:44,570 --> 00:23:42,899

happened when we did Rangers and

577

00:23:47,389 --> 00:23:44,580

surveyors you know some of you remember

578

00:23:49,100 --> 00:23:47,399

that we'd have to try six times before

579

00:23:51,859 --> 00:23:49,110

we able to get them you know to hit the

580

00:23:54,560 --> 00:23:51,869

moon and then a few years later we had

581

00:23:56,200 --> 00:23:54,570

the footprints of Neil Armstrong on the

582

00:23:59,509 --> 00:23:56,210

surface of the more we didn't shy away

583

00:24:01,070 --> 00:23:59,519

because we had a setback so I hope that

584

00:24:03,649 --> 00:24:01,080

that's what will happen now of course I

585

00:24:05,210 --> 00:24:03,659

hope more that it will be successful and

586

00:24:09,320 --> 00:24:05,220

apparently the difference between Ranger

587

00:24:13,879 --> 00:24:09,330

six and seven maybe I should I'll open

588

00:24:16,789 --> 00:24:13,889

it later just to follow on the really

589

00:24:18,200 --> 00:24:16,799

hard work to get curiosity you know to

590

00:24:19,639 --> 00:24:18,210

the point where it's you know still

591

00:24:20,629 --> 00:24:19,649

encased about to hit the top of the

592

00:24:24,980 --> 00:24:20,639

atmosphere with the Mars Science

593

00:24:26,570 --> 00:24:24,990

Laboratory you know spacecraft is you

594

00:24:28,789 --> 00:24:26,580

know the investment that we've made in

595

00:24:29,960 --> 00:24:28,799

the people and the technology to get to

596

00:24:32,330 --> 00:24:29,970

this point

597

00:24:34,250 --> 00:24:32,340

and so that investment would not be lost

598

00:24:35,690 --> 00:24:34,260

on a bad day and we won't get the

599

00:24:38,210 --> 00:24:35,700

science the science is the end result

600

00:24:39,770 --> 00:24:38,220

that we all want to get cyan't into the

601  
00:24:41,990 --> 00:24:39,780  
hands of scientists around the country

602  
00:24:43,430 --> 00:24:42,000  
in the world to understand Mars but

603  
00:24:45,500 --> 00:24:43,440  
we're not going to give up on Mars if we

604  
00:24:50,360 --> 00:24:45,510  
have a bad day and in the technology

605  
00:24:53,480 --> 00:24:50,370  
that went into the power source for msl

606  
00:24:54,980 --> 00:24:53,490  
into the wheels into the titanium spokes

607  
00:24:57,650 --> 00:24:54,990  
of the wheels you know there are people

608  
00:25:02,480 --> 00:24:57,660  
in Chattanooga Tennessee who formed

609  
00:25:04,490 --> 00:25:02,490  
those particular titanium pieces the

610  
00:25:07,400 --> 00:25:04,500  
chemistry laboratory that would normally

611  
00:25:09,920 --> 00:25:07,410  
fill you know a series of lab racks in a

612  
00:25:12,080 --> 00:25:09,930  
chemistry laboratory with the team you

613  
00:25:14,240 --> 00:25:12,090

know ad from the French and the Germans

614

00:25:15,530 --> 00:25:14,250

and the folks at the Goddard Space

615

00:25:18,020 --> 00:25:15,540

Flight Center that took all of that

616

00:25:20,030 --> 00:25:18,030

equipment and here at JPL put it into

617

00:25:21,800 --> 00:25:20,040

the size of a microwave you know they

618

00:25:23,510 --> 00:25:21,810

now know how to do that and they're

619

00:25:26,330 --> 00:25:23,520

working on future instruments you know

620

00:25:28,760 --> 00:25:26,340

that's the investment we made 7,000

621

00:25:30,830 --> 00:25:28,770

people you know made in America to be

622

00:25:33,050 --> 00:25:30,840

able to get MSL to the point where we're

623

00:25:35,480 --> 00:25:33,060

just about to put curiosity on the

624

00:25:37,010 --> 00:25:35,490

surface and that's that's of great value

625

00:25:39,050 --> 00:25:37,020

we shouldn't underestimate that no

626

00:25:41,000 --> 00:25:39,060

matter how it turns out tonight which

627

00:25:43,340 --> 00:25:41,010

will turn out well I've to vomit every

628

00:25:44,810 --> 00:25:43,350

single dollar was spent here you know on

629

00:25:47,240 --> 00:25:44,820

the ground you know in very high-tech

630

00:25:49,280 --> 00:25:47,250

advances and technology development so

631

00:25:50,630 --> 00:25:49,290

all of that we have gained the science

632

00:25:54,500 --> 00:25:50,640

will be the one which would get delayed

633

00:25:56,740 --> 00:25:54,510

if if we have a bad day just a quick and

634

00:25:59,360 --> 00:25:56,750

you know we got used to the airbags and

635

00:26:01,940 --> 00:25:59,370

we're maybe we'll get used to the sky

636

00:26:06,440 --> 00:26:01,950

crane but what do you see is the future

637

00:26:08,300 --> 00:26:06,450

of those two entry systems playing and

638

00:26:09,740 --> 00:26:08,310

even some of these lower costs missions

639

00:26:13,040 --> 00:26:09,750

are that we're going to be seeing those

640

00:26:16,820 --> 00:26:13,050

again are we going to see something even

641

00:26:18,950 --> 00:26:16,830

more different than what is that there

642

00:26:20,780 --> 00:26:18,960

well I mean it's it's it really scales

643

00:26:22,340 --> 00:26:20,790

depend on what is the science and the

644

00:26:23,930 --> 00:26:22,350

size of the rover that you want to do as

645

00:26:26,000 --> 00:26:23,940

you probably know the reason we did not

646

00:26:28,730 --> 00:26:26,010

do airbag it's not because we don't like

647

00:26:30,680 --> 00:26:28,740

them we like them a lot but the rover is

648

00:26:32,900 --> 00:26:30,690

much bigger you know that we cannot

649

00:26:34,700 --> 00:26:32,910

handle it with airbags for this you know

650

00:26:36,440 --> 00:26:34,710

for this case and the size of the rover

651  
00:26:38,540 --> 00:26:36,450  
was driven by the scientific objective

652  
00:26:40,700 --> 00:26:38,550  
now you say what what if we want

653  
00:26:43,430 --> 00:26:40,710  
something well beyond the one time you

654  
00:26:44,110 --> 00:26:43,440  
know which which we landed we are

655  
00:26:47,020 --> 00:26:44,120  
actually the

656  
00:26:49,990 --> 00:26:47,030  
hoping as we speak inflatable you know

657  
00:26:53,200 --> 00:26:50,000  
heat shields and larger parachutes and

658  
00:26:54,790 --> 00:26:53,210  
these will be tested in a program about

659  
00:26:56,890 --> 00:26:54,800  
a year from now there have been some

660  
00:26:59,230 --> 00:26:56,900  
tests at Langley has done literally

661  
00:27:01,420 --> 00:26:59,240  
couple of weeks ago so there are new

662  
00:27:04,030 --> 00:27:01,430  
technology which will enable us to land

663  
00:27:05,290 --> 00:27:04,040

even larger platform and then after you

664

00:27:07,870 --> 00:27:05,300

have to size it depending on your

665

00:27:09,460 --> 00:27:07,880

experiment that you are doing so so you

666

00:27:11,440 --> 00:27:09,470

can drive a volkswagen or you need a

667

00:27:12,990 --> 00:27:11,450

trust depending what you're really your

668

00:27:15,130 --> 00:27:13,000

science objective for that mission

669

00:27:16,990 --> 00:27:15,140

you'll see that in this Mars program

670

00:27:19,660 --> 00:27:17,000

planning group output that they're

671

00:27:22,750 --> 00:27:19,670

looking at mixing this technology for

672

00:27:24,460 --> 00:27:22,760

increasing capability over time leading

673

00:27:26,560 --> 00:27:24,470

up to putting larger things on the

674

00:27:28,450 --> 00:27:26,570

surface in such resource utilization but

675

00:27:30,310 --> 00:27:28,460

specifically you know on the entry

676  
00:27:33,630 --> 00:27:30,320  
descent and landing phase on things like

677  
00:27:35,920 --> 00:27:33,640  
the hypersonic deceleration powered

678  
00:27:38,200 --> 00:27:35,930  
supersonic decelerator 'he's you know

679  
00:27:40,000 --> 00:27:38,210  
things that can get you beyond MSL but

680  
00:27:42,850 --> 00:27:40,010  
also to refine the medium scale so

681  
00:27:45,910 --> 00:27:42,860  
across the board and that's the power of

682  
00:27:47,560 --> 00:27:45,920  
combining our technology efforts with

683  
00:27:49,090 --> 00:27:47,570  
our science efforts with the human

684  
00:27:51,490 --> 00:27:49,100  
spaceflight efforts and to add to what

685  
00:27:53,590 --> 00:27:51,500  
John is saying like on future mission

686  
00:27:55,720 --> 00:27:53,600  
you also might see optical communication

687  
00:27:57,430 --> 00:27:55,730  
if we need higher data rates than what

688  
00:28:00,070 --> 00:27:57,440

we are doing now so vs. radio

689

00:28:01,900 --> 00:28:00,080

communication so so all of these new

690

00:28:03,610 --> 00:28:01,910

development that we are doing will have

691

00:28:06,130 --> 00:28:03,620

to match them depending what subjective

692

00:28:07,270 --> 00:28:06,140

that we're trying to accomplish okay few

693

00:28:08,380 --> 00:28:07,280

more questions over here then we're

694

00:28:10,090 --> 00:28:08,390

going to go over to our social media

695

00:28:12,220 --> 00:28:10,100

folks and then we'll come back to the

696

00:28:14,470 --> 00:28:12,230

media side of the house so sir thank you

697

00:28:15,580 --> 00:28:14,480

steve gorman with Reuters and I was but

698

00:28:17,320 --> 00:28:15,590

I was gonna ask you to serve a corollary

699

00:28:18,970 --> 00:28:17,330

to the last question which is for the

700

00:28:22,780 --> 00:28:18,980

other flip side which is if you could

701

00:28:25,030 --> 00:28:22,790

talk about how much in what way up how

702

00:28:27,850 --> 00:28:25,040

much NASA and the space agency in space

703

00:28:29,350 --> 00:28:27,860

program overall has riding on the

704

00:28:31,780 --> 00:28:29,360

successful outcome of this of the

705

00:28:32,740 --> 00:28:31,790

landing and I mean all landings and

706

00:28:34,180 --> 00:28:32,750

deployments of these things are

707

00:28:35,740 --> 00:28:34,190

important but if this one sort of comes

708

00:28:38,230 --> 00:28:35,750

at a particular time in NASA's history

709

00:28:39,850 --> 00:28:38,240

that makes it especially important for a

710

00:28:42,400 --> 00:28:39,860

success to occur and if you could talk

711

00:28:45,370 --> 00:28:42,410

about about that and whether this means

712

00:28:48,190 --> 00:28:45,380

something to NASA prestige and other

713

00:28:50,620 --> 00:28:48,200

other factors well certainly I think

714

00:28:52,750 --> 00:28:50,630

every mission that we fly and you know

715

00:28:55,330 --> 00:28:52,760

in just in science alone we have over 61

716

00:28:57,040 --> 00:28:55,340

missions currently flying we have a

717

00:28:58,120 --> 00:28:57,050

couple of dozen more that are in

718

00:28:59,590 --> 00:28:58,130

development

719

00:29:01,600 --> 00:28:59,600

for launch just in the next couple of

720

00:29:05,050 --> 00:29:01,610

years and you know as you look around I

721

00:29:06,310 --> 00:29:05,060

mean you know here at JPL and think

722

00:29:07,780 --> 00:29:06,320

about you know the fact that we have

723

00:29:10,060 --> 00:29:07,790

operating missions at Cassini we have

724

00:29:14,860 --> 00:29:10,070

Hubble Space Telescope we have you know

725

00:29:16,390 --> 00:29:14,870

a whole line of satellites we call the

726

00:29:18,460 --> 00:29:16,400

a-train observing the earth you know

727

00:29:20,770 --> 00:29:18,470

every mission whether it's you know

728

00:29:22,900 --> 00:29:20,780

about to land on Mars or its operating

729

00:29:25,480 --> 00:29:22,910

on orbit you know we consider as being

730

00:29:26,740 --> 00:29:25,490

very precious and special that said you

731

00:29:28,780 --> 00:29:26,750

know obviously there's a lot of risk in

732

00:29:31,450 --> 00:29:28,790

spaceflight it's it's much harder than

733

00:29:34,810 --> 00:29:31,460

just about anything we do here on earth

734

00:29:36,160 --> 00:29:34,820

and I think the event we're going to see

735

00:29:38,500 --> 00:29:36,170

tonight is probably the hardest thing

736

00:29:40,000 --> 00:29:38,510

we've tried certainly at Mars may be the

737

00:29:43,780 --> 00:29:40,010

hardest thing we've tried in any robotic

738

00:29:45,520 --> 00:29:43,790

spacecraft and you know so that means

739

00:29:48,100 --> 00:29:45,530

the outcome is uncertainty but that's

740

00:29:50,050 --> 00:29:48,110

what drives you know people to perform

741

00:29:52,060 --> 00:29:50,060

at much higher levels is that challenge

742

00:29:54,370 --> 00:29:52,070

the excitement of the challenge and the

743

00:29:56,560 --> 00:29:54,380

potential return and I think in that

744

00:29:58,960 --> 00:29:56,570

respect the potential return from

745

00:30:01,840 --> 00:29:58,970

understanding that the planetary history

746

00:30:03,940 --> 00:30:01,850

of Mars is really huge and will

747

00:30:06,550 --> 00:30:03,950

certainly affect our plans going forward

748

00:30:08,430 --> 00:30:06,560

for other science missions to Mars other

749

00:30:12,300 --> 00:30:08,440

missions to other planetary bodies

750

00:30:16,240 --> 00:30:12,310

Europa and sell Kinsella dists tighten

751

00:30:18,100 --> 00:30:16,250

the outer planets depending upon what we

752

00:30:19,840 --> 00:30:18,110

find and so I mean that's the exciting

753

00:30:21,880 --> 00:30:19,850

part the flip side is if we have a

754

00:30:23,170 --> 00:30:21,890

failure you know we're going to have to

755

00:30:25,990 --> 00:30:23,180

take some time and figure out what went

756

00:30:28,390 --> 00:30:26,000

wrong but in the sense of exploration

757

00:30:31,120 --> 00:30:28,400

and this is true you know throughout

758

00:30:32,620 --> 00:30:31,130

history you know will dust ourselves off

759

00:30:34,840 --> 00:30:32,630

pick ourselves up and we'll move forward

760

00:30:37,060 --> 00:30:34,850

and we'll be back on Mars and if you

761

00:30:39,220 --> 00:30:37,070

want to think about you know a tough

762

00:30:41,620 --> 00:30:39,230

story you know think about Shackleton

763

00:30:43,630 --> 00:30:41,630

and his men you know trying to get to

764

00:30:45,070 --> 00:30:43,640

the Antarctic and you know they all

765

00:30:50,230 --> 00:30:45,080

survived and they went out to explore

766

00:30:53,170 --> 00:30:50,240

further okay hi this yeah this is mike

767

00:30:54,190 --> 00:30:53,180

wall from space com um just just yet

768

00:30:56,410 --> 00:30:54,200

John I mean a quick question obviously

769

00:30:59,610 --> 00:30:56,420

sample return is there's something

770

00:31:02,410 --> 00:30:59,620

that's very high on that that sort of

771

00:31:04,060 --> 00:31:02,420

and a list of priorities for scientists

772

00:31:06,040 --> 00:31:04,070

around the world NASA to I'm just

773

00:31:08,110 --> 00:31:06,050

wondering if you can just maybe talk for

774

00:31:09,310 --> 00:31:08,120

a few minutes about I mean is that still

775

00:31:10,510 --> 00:31:09,320

feasible under the current budget

776

00:31:11,830 --> 00:31:10,520

situation is that something that you're

777

00:31:14,200 --> 00:31:11,840

still shooting for

778

00:31:16,630 --> 00:31:14,210

if and if so I mean when do you think

779

00:31:18,880 --> 00:31:16,640

that that that could be pulled off one

780

00:31:20,760 --> 00:31:18,890

of the marching orders for the Mars

781

00:31:23,710 --> 00:31:20,770

program planning group was to maintain

782

00:31:25,870 --> 00:31:23,720

the science drivers from Mars

783

00:31:27,970 --> 00:31:25,880

exploration as they look forward at this

784

00:31:30,940 --> 00:31:27,980

framework and so my sample return is

785

00:31:32,740 --> 00:31:30,950

still a crucial element of that you know

786

00:31:36,580 --> 00:31:32,750

keeping in mind that you know we were

787

00:31:39,130 --> 00:31:36,590

forced to back out of the planning

788

00:31:42,250 --> 00:31:39,140

stages of the 2016 and 2018

789

00:31:43,779 --> 00:31:42,260

collaboration with the Europeans because

790

00:31:46,000 --> 00:31:43,789

of the fiscal climate in the constrained

791

00:31:47,919 --> 00:31:46,010

environment but that was not a sample

792

00:31:50,019 --> 00:31:47,929

return mission now that was a sign that

793

00:31:51,850 --> 00:31:50,029

was primarily an exploration mission to

794

00:31:53,440 --> 00:31:51,860

test out technology and one of the

795

00:31:56,350 --> 00:31:53,450

technologies that was going to be tested

796

00:31:58,149 --> 00:31:56,360

out was to cash some samples but the

797

00:31:59,980 --> 00:31:58,159

plan to actually go launch those samples

798

00:32:01,450 --> 00:31:59,990

to orbit bring them back to earth you

799

00:32:06,610 --> 00:32:01,460

know was very far out in the future and

800

00:32:09,190 --> 00:32:06,620

not really funded or clear the tough

801  
00:32:12,370 --> 00:32:09,200  
part of sample return is not getting to

802  
00:32:14,200 --> 00:32:12,380  
the surface well everything is tough but

803  
00:32:16,539 --> 00:32:14,210  
getting to the surface and finding

804  
00:32:18,450 --> 00:32:16,549  
interested interesting places is what we

805  
00:32:20,529 --> 00:32:18,460  
pioneered with Spirit and Opportunity

806  
00:32:22,659 --> 00:32:20,539  
with the Mars Science Laboratory

807  
00:32:24,789 --> 00:32:22,669  
Curiosity rover we're going the next

808  
00:32:28,419 --> 00:32:24,799  
step which is to be able to go to the

809  
00:32:29,680 --> 00:32:28,429  
most interesting places or place and we

810  
00:32:32,019 --> 00:32:29,690  
only got to go to one but there were

811  
00:32:33,940 --> 00:32:32,029  
many more interesting places based on

812  
00:32:35,740 --> 00:32:33,950  
orbital reconnaissance so the Mars

813  
00:32:37,740 --> 00:32:35,750

## Reconnaissance Orbiter Odyssey Mars

814

00:32:40,510 --> 00:32:37,750

Express identified Gale Crater

815

00:32:41,710 --> 00:32:40,520

prospecting from orbit as a place that

816

00:32:44,320 --> 00:32:41,720

we wanted to go now we're going to get

817

00:32:46,659 --> 00:32:44,330

the ground truth and actually go to the

818

00:32:49,950 --> 00:32:46,669

places that look the most interesting

819

00:32:52,470 --> 00:32:49,960

and do the science the cosmochemistry if

820

00:32:54,370 --> 00:32:52,480

we see something that looks just

821

00:32:55,810 --> 00:32:54,380

incredible but the Mars Science

822

00:32:58,269 --> 00:32:55,820

Laboratory can't answer all the

823

00:33:01,560 --> 00:32:58,279

questions then that identifies the kind

824

00:33:03,970 --> 00:33:01,570

of intelligently sampled intelligently

825

00:33:06,490 --> 00:33:03,980

discovered place we would want to get a

826

00:33:10,149 --> 00:33:06,500

sample with context you know that will

827

00:33:12,279 --> 00:33:10,159

have this route a graffiti record will

828

00:33:14,019 --> 00:33:12,289

have the reconnaissance from orbit so we

829

00:33:15,190 --> 00:33:14,029

can say you know this is a place we

830

00:33:18,399 --> 00:33:15,200

really would have wanted to get a sample

831

00:33:20,500 --> 00:33:18,409

if we could but MSO will pioneer cure

832

00:33:22,810 --> 00:33:20,510

ask you a pioneer that process what's

833

00:33:24,340 --> 00:33:22,820

next well we still have to prove that we

834

00:33:25,600 --> 00:33:24,350

can get something off of the surface to

835

00:33:28,600 --> 00:33:25,610

Mars orbit and from

836

00:33:31,330 --> 00:33:28,610

mars orbit back to earth and so as part

837

00:33:32,410 --> 00:33:31,340

of the Mars program planning group you

838

00:33:35,080 --> 00:33:32,420

know they're going to cue up those

839

00:33:36,820 --> 00:33:35,090

technologies and say well when can we

840

00:33:39,520 --> 00:33:36,830

demonstrate something called a mars

841

00:33:41,740 --> 00:33:39,530

ascent vehicle when can we demonstrate a

842

00:33:44,320 --> 00:33:41,750

return vehicle well how do all those

843

00:33:46,390 --> 00:33:44,330

puzzle pieces or chess pieces play out

844

00:33:48,520 --> 00:33:46,400

move after move to be able to show that

845

00:33:50,560 --> 00:33:48,530

we have the technology and the hope is

846

00:33:52,270 --> 00:33:50,570

that with a series of technology

847

00:33:55,799 --> 00:33:52,280

missions combined with science missions

848

00:33:57,909 --> 00:33:55,809

combined with precursor human missions

849

00:33:59,830 --> 00:33:57,919

evaluating the radiation environment the

850

00:34:01,539 --> 00:33:59,840

crews environment that we can put

851  
00:34:04,240 --> 00:34:01,549  
together a program where we'll actually

852  
00:34:06,190 --> 00:34:04,250  
get more samples back the right samples

853  
00:34:07,780 --> 00:34:06,200  
sooner than we would have under the old

854  
00:34:10,869 --> 00:34:07,790  
plan of trying to do it with a series of

855  
00:34:13,149 --> 00:34:10,879  
flagships let me add one point to what

856  
00:34:15,849 --> 00:34:13,159  
or emphasize one point that John made

857  
00:34:18,280 --> 00:34:15,859  
just remember how we got to msl we

858  
00:34:20,290 --> 00:34:18,290  
started with Pathfinder here over about

859  
00:34:22,149 --> 00:34:20,300  
this big barely knew how to drive it

860  
00:34:23,710 --> 00:34:22,159  
then we moved up the Spirit and

861  
00:34:25,659 --> 00:34:23,720  
Opportunity which significantly more

862  
00:34:27,820 --> 00:34:25,669  
capable and even there at the beginning

863  
00:34:29,830 --> 00:34:27,830

if you recall we had some challenges and

864

00:34:31,930 --> 00:34:29,840

we had to learn step by step of how you

865

00:34:33,869 --> 00:34:31,940

drive it over and how you assess the

866

00:34:36,580 --> 00:34:33,879

terrain it's on is that cut estoy MSL

867

00:34:39,040 --> 00:34:36,590

hopefully with a successful curiosity

868

00:34:41,530 --> 00:34:39,050

mission at least we would have learned

869

00:34:43,840 --> 00:34:41,540

how to land and drove very well you know

870

00:34:45,340 --> 00:34:43,850

on another planet so the key element is

871

00:34:47,590 --> 00:34:45,350

what John said is how do you take now a

872

00:34:48,940 --> 00:34:47,600

sample and put it in orbit and that's

873

00:34:51,159 --> 00:34:48,950

something that we need to figure out the

874

00:34:53,859 --> 00:34:51,169

way how do we do it stepwise so we have

875

00:34:56,560 --> 00:34:53,869

all the pieces that then we can build a

876

00:34:58,120 --> 00:34:56,570

sample return mission one more question

877

00:34:59,980 --> 00:34:58,130

here we'll go over to our social media

878

00:35:02,170 --> 00:34:59,990

folks and then we wrap up with so few

879

00:35:05,500 --> 00:35:02,180

more questions from our media yes genus

880

00:35:07,390 --> 00:35:05,510

and Sara ABC News John as an astronaut /

881

00:35:13,900 --> 00:35:07,400

astronomer where would you rather go an

882

00:35:19,050 --> 00:35:13,910

asteroid or Mars and why I'd rather go

883

00:35:21,870 --> 00:35:19,060

to Mars you know Mars we we live in a

884

00:35:25,390 --> 00:35:21,880

solar system filled with diversity and

885

00:35:28,030 --> 00:35:25,400

there you know fantastic places you know

886

00:35:30,099 --> 00:35:28,040

Jupiter over 60 moons of Jupiter some of

887

00:35:32,590 --> 00:35:30,109

which are very tantalizing you know they

888

00:35:34,870 --> 00:35:32,600

may have signs you know of ocean

889

00:35:36,940 --> 00:35:34,880

subsurface ocean salty oceans that could

890

00:35:39,160 --> 00:35:36,950

be you no could Harbor life you know

891

00:35:39,570 --> 00:35:39,170

Europa however we don't want to go

892

00:35:40,830 --> 00:35:39,580

anywhere

893

00:35:42,420 --> 00:35:40,840

your astronauts don't want to go

894

00:35:44,100 --> 00:35:42,430

anywhere near Jupiter the radiation

895

00:35:46,680 --> 00:35:44,110

environment I'll kill you literally you

896

00:35:49,710 --> 00:35:46,690

know Saturn would be awesome to go see

897

00:35:51,690 --> 00:35:49,720

Saturn but Mars is uniquely a planet

898

00:35:54,300 --> 00:35:51,700

being so similar to earth with an

899

00:35:56,130 --> 00:35:54,310

atmosphere with you know a surface that

900

00:35:57,690 --> 00:35:56,140

we can walk on in the same kind of

901  
00:36:00,030 --> 00:35:57,700  
spacesuits that we used on the moon or

902  
00:36:02,400 --> 00:36:00,040  
similar and that humans might one day

903  
00:36:05,250 --> 00:36:02,410  
live on you know it's that human element

904  
00:36:07,260 --> 00:36:05,260  
that makes it so compelling versus you

905  
00:36:09,180 --> 00:36:07,270  
know going you know out and Duke going

906  
00:36:10,680 --> 00:36:09,190  
somewhere that would be fascinating

907  
00:36:13,410 --> 00:36:10,690  
going to an asteroid would be

908  
00:36:15,630 --> 00:36:13,420  
fascinating to explore but it's really

909  
00:36:17,820 --> 00:36:15,640  
not a potential human destination for

910  
00:36:19,590 --> 00:36:17,830  
resource utilization for understanding

911  
00:36:21,840 --> 00:36:19,600  
the history of the formation of the

912  
00:36:24,120 --> 00:36:21,850  
solar system these are all valid reasons

913  
00:36:27,810 --> 00:36:24,130

but as far as you know that the sheer

914

00:36:29,250 --> 00:36:27,820

adventure you know Mars is the place

915

00:36:31,410 --> 00:36:29,260

that I think astronauts current

916

00:36:33,810 --> 00:36:31,420

generation astronauts aspire to someday

917

00:36:35,490 --> 00:36:33,820

it's going to be a planet around a

918

00:36:39,390 --> 00:36:35,500

nearby star when we discover some

919

00:36:41,330 --> 00:36:39,400

earth-twin give your name I'm

920

00:36:43,920 --> 00:36:41,340

rachelsanders from the NASA social group

921

00:36:47,640 --> 00:36:43,930

we've talked a lot about about bad days

922

00:36:53,010 --> 00:36:47,650

but on a good day the rover's landed um

923

00:36:54,270 --> 00:36:53,020

can you go tonight yeah yeah exactly can

924

00:36:55,140 --> 00:36:54,280

you go over some of the science and some

925

00:36:56,970 --> 00:36:55,150

the experiments that you're really

926

00:37:02,340 --> 00:36:56,980

excited to do and to see and coming up

927

00:37:04,500 --> 00:37:02,350

coming months okay you mean not not

928

00:37:06,420 --> 00:37:04,510

today but over the next few months yeah

929

00:37:08,130 --> 00:37:06,430

I mean clearly the first thing which

930

00:37:09,420 --> 00:37:08,140

going to be done in the science is to

931

00:37:12,120 --> 00:37:09,430

look at the scene around you and to

932

00:37:14,340 --> 00:37:12,130

explore you know from as a Jew

933

00:37:15,870 --> 00:37:14,350

morphologies I mean not me but a dream

934

00:37:17,790 --> 00:37:15,880

of I would look at the scene in front of

935

00:37:19,530 --> 00:37:17,800

them look at the detail in front of them

936

00:37:21,750 --> 00:37:19,540

and they can learn a lot on the you know

937

00:37:23,310 --> 00:37:21,760

on the processes which happen there but

938

00:37:25,050 --> 00:37:23,320

for me that probably the most exciting

939

00:37:28,080 --> 00:37:25,060

thing is going to be when we actually we

940

00:37:30,420 --> 00:37:28,090

take samples first you know by zapping

941

00:37:32,160 --> 00:37:30,430

the rock was a laser see what kind of

942

00:37:34,140 --> 00:37:32,170

material come out from and then you take

943

00:37:36,570 --> 00:37:34,150

those samples and actually put them in

944

00:37:37,980 --> 00:37:36,580

the inn sam you know one one of the

945

00:37:40,500 --> 00:37:37,990

instrument which review a mass

946

00:37:42,540 --> 00:37:40,510

spectroscopy and determine if there is

947

00:37:44,970 --> 00:37:42,550

any methane if there is any carbon

948

00:37:47,430 --> 00:37:44,980

material in it I think that in-depth

949

00:37:49,050 --> 00:37:47,440

understanding you know of the different

950

00:37:50,850 --> 00:37:49,060

layers that John was talking about in

951  
00:37:52,290 --> 00:37:50,860  
their composition I think that's going

952  
00:37:52,930 --> 00:37:52,300  
to be one of the most exciting things

953  
00:37:54,309 --> 00:37:52,940  
and

954  
00:37:58,210 --> 00:37:54,319  
when you talk with somebody like John

955  
00:37:59,349 --> 00:37:58,220  
grotzinger the project scientist as John

956  
00:38:01,030 --> 00:37:59,359  
was saying earlier it's like in the

957  
00:38:03,370 --> 00:38:01,040  
early days of learning the history of

958  
00:38:04,480 --> 00:38:03,380  
earth now we are going to be in the days

959  
00:38:08,140 --> 00:38:04,490  
where we're going to learn the history

960  
00:38:11,800 --> 00:38:08,150  
of Mars as we are driving up that he'll

961  
00:38:13,510 --> 00:38:11,810  
now ultimately not being a scientist at

962  
00:38:15,430 --> 00:38:13,520  
geologists I'd like to get up to the top

963  
00:38:17,670 --> 00:38:15,440

of that mountain it take a scenic view

964

00:38:20,680 --> 00:38:17,680

that's probably what it is a highlight

965

00:38:22,720 --> 00:38:20,690

now I'll say and it could happen

966

00:38:25,150 --> 00:38:22,730

relatively early early meaning over the

967

00:38:27,520 --> 00:38:25,160

next few months but but we'll start

968

00:38:29,559 --> 00:38:27,530

sniffing right relatively right away I

969

00:38:31,930 --> 00:38:29,569

think this question is there methane and

970

00:38:34,599 --> 00:38:31,940

the Mars atmosphere we have hints from

971

00:38:38,170 --> 00:38:34,609

ground-based observations you know it

972

00:38:39,730 --> 00:38:38,180

could be due to geologic processes but

973

00:38:41,770 --> 00:38:39,740

methane doesn't last very long in the

974

00:38:45,339 --> 00:38:41,780

atmosphere a couple hundred years and it

975

00:38:47,079 --> 00:38:45,349

breaks down it reacts and so whatever is

976

00:38:48,130 --> 00:38:47,089

causing if there's methane to be in the

977

00:38:51,430 --> 00:38:48,140

Martian atmosphere it has to be

978

00:38:55,120 --> 00:38:51,440

replenished the Mars Reconnaissance

979

00:38:56,680 --> 00:38:55,130

Orbiter actually has the resolution that

980

00:38:59,890 --> 00:38:56,690

if there's cows on Mars it would have

981

00:39:02,260 --> 00:38:59,900

seen them so we know it's not cows but

982

00:39:04,569 --> 00:39:02,270

what is it we we have no idea what's

983

00:39:07,660 --> 00:39:04,579

causing the methane to come out on Mars

984

00:39:10,329 --> 00:39:07,670

we think Mars is geologically you know

985

00:39:12,190 --> 00:39:10,339

past its age of volcanism of volcanoes

986

00:39:14,200 --> 00:39:12,200

but that doesn't rule out some

987

00:39:17,740 --> 00:39:14,210

geochemical process that would release

988

00:39:22,230 --> 00:39:17,750

methane considered exists is informal I

989

00:39:28,930 --> 00:39:26,260

and make my day okay and even if we

990

00:39:31,660 --> 00:39:28,940

don't see fossils if we see the

991

00:39:34,359 --> 00:39:31,670

molecular fossil evidence of broken-down

992

00:39:36,760 --> 00:39:34,369

bits that would be just the methane one

993

00:39:38,050 --> 00:39:36,770

I think will be an early excitement just

994

00:39:40,030 --> 00:39:38,060

to find out if it's there won't tell us

995

00:39:42,760 --> 00:39:40,040

what it's coming from but it would be

996

00:39:45,730 --> 00:39:42,770

the first hint that the seasonal methane

997

00:39:48,309 --> 00:39:45,740

actually exists but you know that the

998

00:39:51,579 --> 00:39:48,319

fossils is a great one I can tell you

999

00:39:54,069 --> 00:39:51,589

now that the most exciting thing that

1000

00:39:56,859 --> 00:39:54,079

the Curiosity rover will provide

1001  
00:39:58,660 --> 00:39:56,869  
scientist data to discover is going to

1002  
00:40:00,970 --> 00:39:58,670  
be something we've never we our

1003  
00:40:02,380 --> 00:40:00,980  
imagination hasn't figured out yet it's

1004  
00:40:04,000 --> 00:40:02,390  
going to be some big discovery and

1005  
00:40:04,790 --> 00:40:04,010  
that's what happened with spirit that's

1006  
00:40:06,800 --> 00:40:04,800  
what happened with care

1007  
00:40:09,170 --> 00:40:06,810  
reality is we just didn't have a clue

1008  
00:40:10,490 --> 00:40:09,180  
how interesting it was going to be here

1009  
00:40:12,110 --> 00:40:10,500  
going to take one more question from the

1010  
00:40:13,700 --> 00:40:12,120  
social media side of house come back

1011  
00:40:16,730 --> 00:40:13,710  
here for few more questions from media

1012  
00:40:18,260 --> 00:40:16,740  
we'll see if these accomplished

1013  
00:40:22,130 --> 00:40:18,270

gentleman won't have any final remarks

1014

00:40:24,800 --> 00:40:22,140

and we'll wrap up hi Kimberly of plum

1015

00:40:27,110 --> 00:40:24,810

NASA social and Space Camp if there is

1016

00:40:29,200 --> 00:40:27,120

something particular that you could tell

1017

00:40:32,000 --> 00:40:29,210

the kids that are watching this tonight

1018

00:40:35,020 --> 00:40:32,010

for an inspiration or something message

1019

00:40:37,450 --> 00:40:35,030

you want to deliver what would it be

1020

00:40:40,030 --> 00:40:37,460

well there's a bunch of things and

1021

00:40:43,250 --> 00:40:40,040

Charles mentioned one of them which is

1022

00:40:45,520 --> 00:40:43,260

you know if you love space and you love

1023

00:40:48,200 --> 00:40:45,530

robots this is the mission for you and

1024

00:40:51,470 --> 00:40:48,210

and when I was growing up it was

1025

00:40:53,210 --> 00:40:51,480

dinosaurs and space that's what you know

1026  
00:40:55,100 --> 00:40:53,220  
that's what my friends love that's what

1027  
00:40:57,710 --> 00:40:55,110  
I loved you know that's what kids of

1028  
00:40:59,120 --> 00:40:57,720  
many generations have loved kids today

1029  
00:41:01,970 --> 00:40:59,130  
are a lot more sophisticated and I think

1030  
00:41:04,130 --> 00:41:01,980  
it's robots in space robots and space

1031  
00:41:06,950 --> 00:41:04,140  
and a robot with a laser that can zap

1032  
00:41:12,440 --> 00:41:06,960  
rocks it doesn't get any better than

1033  
00:41:15,020 --> 00:41:12,450  
that now I tell you one thing I am my

1034  
00:41:17,420 --> 00:41:15,030  
grandson he's 40 years old and he loves

1035  
00:41:20,300 --> 00:41:17,430  
dinosaurs so somehow he found recently

1036  
00:41:23,450 --> 00:41:20,310  
that the dinosaur was hit by an asteroid

1037  
00:41:24,980 --> 00:41:23,460  
and that extinct dinosaur so when I went

1038  
00:41:27,050 --> 00:41:24,990

to see him recently came running to me

1039

00:41:28,700 --> 00:41:27,060

said grandpa grandpa tell me about the

1040

00:41:30,830 --> 00:41:28,710

asteroid are they going to are you going

1041

00:41:31,910 --> 00:41:30,840

to protect us from those asteroids of so

1042

00:41:34,220 --> 00:41:31,920

it doesn't happen like what the

1043

00:41:36,020 --> 00:41:34,230

dinosaurs have I think kids are

1044

00:41:39,770 --> 00:41:36,030

fascinated by what's happening in space

1045

00:41:41,540 --> 00:41:39,780

you know and and as John said I mean the

1046

00:41:43,340 --> 00:41:41,550

rover's you know we got him a little toy

1047

00:41:45,320 --> 00:41:43,350

you know Rover of this thing I mean

1048

00:41:48,110 --> 00:41:45,330

that's one of his favorite you know toys

1049

00:41:49,940 --> 00:41:48,120

on doing that so oh yeah that's it's

1050

00:41:51,650 --> 00:41:49,950

going to be a cool mission no question

1051

00:41:53,090 --> 00:41:51,660

about that now let me add one other

1052

00:41:55,600 --> 00:41:53,100

thing I think I mentioned it yesterday

1053

00:41:59,450 --> 00:41:55,610

to you guys but maybe for the group here

1054

00:42:01,730 --> 00:41:59,460

tonight at about 9 15 if you go out and

1055

00:42:03,710 --> 00:42:01,740

look toward the west and you will see

1056

00:42:05,720 --> 00:42:03,720

Mars setting down next to Saturn and

1057

00:42:07,970 --> 00:42:05,730

then few minutes later you're gonna see

1058

00:42:10,460 --> 00:42:07,980

the space station coming up in this

1059

00:42:12,740 --> 00:42:10,470

thing for me that reflect the greatness

1060

00:42:14,600 --> 00:42:12,750

of what our agency is doing so you'll

1061

00:42:17,120 --> 00:42:14,610

have a rover heading to that planet and

1062

00:42:18,470 --> 00:42:17,130

the space station rising up you know

1063

00:42:20,390 --> 00:42:18,480

next to it I think

1064

00:42:22,340 --> 00:42:20,400

that will be an iconic thing that

1065

00:42:24,170 --> 00:42:22,350

hopefully any young person that will

1066

00:42:26,450 --> 00:42:24,180

inspire them about what to do in the

1067

00:42:30,080 --> 00:42:26,460

future and and I'll just point out it's

1068

00:42:32,180 --> 00:42:30,090

at 9 15 is when it rises it'll be

1069

00:42:34,160 --> 00:42:32,190

visited with the south west to east

1070

00:42:36,140 --> 00:42:34,170

northeast it'll set at nine nineteen

1071

00:42:39,680 --> 00:42:36,150

sixty three degrees above the horizon

1072

00:42:42,410 --> 00:42:39,690

which is quite high and it'll be the

1073

00:42:44,360 --> 00:42:42,420

second brightest object in the sky only

1074

00:42:49,000 --> 00:42:44,370

an astronaut who knows that detail yeah

1075

00:42:53,660 --> 00:42:49,010

so okay two more questions here and then

1076

00:42:57,170 --> 00:42:53,670

it wasn't be a good witch of a role or

1077

00:42:59,210 --> 00:42:57,180

how significant was the early success of

1078

00:43:01,880 --> 00:42:59,220

em ER in terms of the number of

1079

00:43:04,610 --> 00:43:01,890

instruments and especially cameras that

1080

00:43:06,890 --> 00:43:04,620

ended up on MSL and the second part of

1081

00:43:09,950 --> 00:43:06,900

that question is how significant has em

1082

00:43:13,850 --> 00:43:09,960

er's success and longevity over the long

1083

00:43:17,060 --> 00:43:13,860

term had on the agency-wide success that

1084

00:43:19,310 --> 00:43:17,070

MSL now enjoys yeah no question I mean

1085

00:43:21,800 --> 00:43:19,320

Spirit and Opportunity were great great

1086

00:43:24,590 --> 00:43:21,810

advance but no question Porter I mean

1087

00:43:26,410 --> 00:43:24,600

curiosity is a signal quantum jump you

1088

00:43:30,020 --> 00:43:26,420

know that just gives you simple numbers

1089

00:43:31,910 --> 00:43:30,030

the payload on spirit or opportunities

1090

00:43:34,190 --> 00:43:31,920

about ten kilograms a payload here is

1091

00:43:36,440 --> 00:43:34,200

about a hundred kilogram now it's not

1092

00:43:38,720 --> 00:43:36,450

only the number but also there is a

1093

00:43:41,090 --> 00:43:38,730

dozen instruments which are flying very

1094

00:43:43,250 --> 00:43:41,100

sophisticated instrument so think of

1095

00:43:45,080 --> 00:43:43,260

spirit and opportunity as a geologist

1096

00:43:47,360 --> 00:43:45,090

for the first time they go in the field

1097

00:43:49,670 --> 00:43:47,370

and they just look with their lands and

1098

00:43:51,200 --> 00:43:49,680

was there hammer and then curiosity

1099

00:43:53,300 --> 00:43:51,210

comes in it's like bringing a sample

1100

00:43:55,220 --> 00:43:53,310

back to their chemistry lab you know

1101

00:43:56,980 --> 00:43:55,230

what that their university or the

1102

00:44:00,230 --> 00:43:56,990

research lab and doing the detail

1103

00:44:02,150 --> 00:44:00,240

analysis now having said that what we

1104

00:44:04,220 --> 00:44:02,160

did on mer allowed us to learn a lot

1105

00:44:07,190 --> 00:44:04,230

more about how to navigate and how to

1106

00:44:09,020 --> 00:44:07,200

land you know on the surface so now in

1107

00:44:11,600 --> 00:44:09,030

curiosity were almost an order of

1108

00:44:13,190 --> 00:44:11,610

magnitude more accurate you know in our

1109

00:44:15,500 --> 00:44:13,200

landing you heard the Charlie Bolden

1110

00:44:17,150 --> 00:44:15,510

saying earlier the accuracy of the

1111

00:44:19,310 --> 00:44:17,160

landing that we are doing now that is

1112

00:44:21,980 --> 00:44:19,320

being demonstrated because we eliminated

1113

00:44:23,630 --> 00:44:21,990

the correction maneuver is like you are

1114

00:44:26,750 --> 00:44:23,640

launching from the Cape toward the Rose

1115

00:44:28,130 --> 00:44:26,760

Bowl and you land on a specific seat you

1116

00:44:30,170 --> 00:44:28,140

know in the Rose Bowl that's how

1117

00:44:32,270 --> 00:44:30,180

accurate were coming and that's coming

1118

00:44:34,280 --> 00:44:32,280

because of the experience Wii game

1119

00:44:36,020 --> 00:44:34,290

you know in navigating and entering you

1120

00:44:38,000 --> 00:44:36,030

know on Spirit and Opportunity and I'm

1121

00:44:39,620 --> 00:44:38,010

sure on future mission we probably would

1122

00:44:41,300 --> 00:44:39,630

be I don't know what smaller than a seat

1123

00:44:43,880 --> 00:44:41,310

in the Rose Bowl that we can really land

1124

00:44:45,650 --> 00:44:43,890

on let me add one other element to that

1125

00:44:48,380 --> 00:44:45,660

which you know you can reflect on the

1126  
00:44:50,710 --> 00:44:48,390  
hubble space telescope the hubble space

1127  
00:44:53,570 --> 00:44:50,720  
telescope has been in orbit for 23 years

1128  
00:44:55,310 --> 00:44:53,580  
it's an icon of science around the world

1129  
00:44:56,780 --> 00:44:55,320  
not just for NASA but you know wherever

1130  
00:44:59,720 --> 00:44:56,790  
you go in the world people know the

1131  
00:45:01,840 --> 00:44:59,730  
Hubble the imagery the science maybe

1132  
00:45:04,250 --> 00:45:01,850  
some of the scientists that are involved

1133  
00:45:06,350 --> 00:45:04,260  
you know we have fallen in love with the

1134  
00:45:10,760 --> 00:45:06,360  
Hubble Space Telescope as you know a

1135  
00:45:14,180 --> 00:45:10,770  
tool for science and you know that's in

1136  
00:45:15,890 --> 00:45:14,190  
part due to its longevity the Mars

1137  
00:45:17,660 --> 00:45:15,900  
exploration Rovers were designed for a

1138  
00:45:19,430 --> 00:45:17,670

90-day mission and I think if they'd

1139

00:45:22,070 --> 00:45:19,440

only lasted 90 days the science would

1140

00:45:24,620 --> 00:45:22,080

have been great but we wouldn't have you

1141

00:45:26,300 --> 00:45:24,630

know develop this relationship with the

1142

00:45:28,520 --> 00:45:26,310

rover's returning science back to earth

1143

00:45:30,860 --> 00:45:28,530

you know views coming out of winter you

1144

00:45:33,950 --> 00:45:30,870

know did did opportunity survive yes it

1145

00:45:35,240 --> 00:45:33,960

survived you know and people cheer you

1146

00:45:38,660 --> 00:45:35,250

know and we've developed that

1147

00:45:40,820 --> 00:45:38,670

relationship and the Curiosity rover

1148

00:45:43,670 --> 00:45:40,830

first we have to get it down safely this

1149

00:45:45,610 --> 00:45:43,680

evening which I'm confident we will has

1150

00:45:47,600 --> 00:45:45,620

a two-year mission lifetime nominally

1151

00:45:50,050 --> 00:45:47,610

but hopefully if everything keeps

1152

00:45:57,260 --> 00:45:50,060

running with this RTG radioisotope

1153

00:45:59,060 --> 00:45:57,270

thermal to stay warm at night and and to

1154

00:46:02,690 --> 00:45:59,070

keep operating for long periods of time

1155

00:46:04,610 --> 00:46:02,700

and to move long distances if we can you

1156

00:46:06,890 --> 00:46:04,620

know keep it running for for many years

1157

00:46:08,540 --> 00:46:06,900

doing great science I think the public

1158

00:46:11,060 --> 00:46:08,550

will fall in love with curiosity the way

1159

00:46:13,910 --> 00:46:11,070

they have with Hubble and in spirit an

1160

00:46:18,320 --> 00:46:13,920

opportunity so the and and you all are a

1161

00:46:20,870 --> 00:46:18,330

part of this the opportunity we have is

1162

00:46:22,850 --> 00:46:20,880

to engage the public in science and

1163

00:46:25,280 --> 00:46:22,860

exploration in a way that we've never

1164

00:46:26,860 --> 00:46:25,290

been able to do before and that's that's

1165

00:46:29,030 --> 00:46:26,870

a future that I'm looking forward to

1166

00:46:32,590 --> 00:46:29,040

that's why should get to the top of that

1167

00:46:36,140 --> 00:46:32,600

mountain so we have survived many years

1168

00:46:37,580 --> 00:46:36,150

last question this is for John you

1169

00:46:40,070 --> 00:46:37,590

touched on this a little bit oh I'm Lisa

1170

00:46:41,960 --> 00:46:40,080

Grossman from New Scientist she touched

1171

00:46:43,010 --> 00:46:41,970

on this a little bit before but if sorry

1172

00:46:46,220 --> 00:46:43,020

the end on a downer but if the mission

1173

00:46:46,540 --> 00:46:46,230

fails and will NASA look away from Mars

1174

00:46:49,540 --> 00:46:46,550

tour

1175

00:46:52,000 --> 00:46:49,550

other planets instead and if so where do

1176

00:46:54,220 --> 00:46:52,010

we go first well regardless we're not

1177

00:46:56,490 --> 00:46:54,230

going to look away from Mars we're

1178

00:46:59,800 --> 00:46:56,500

committed to a Mars exploration program

1179

00:47:02,770 --> 00:46:59,810

and as I said you know if we have a bad

1180

00:47:06,450 --> 00:47:02,780

day tonight that day tonight if if

1181

00:47:09,340 --> 00:47:06,460

curiosity doesn't land successfully

1182

00:47:10,570 --> 00:47:09,350

tonight you know we're we'll use that in

1183

00:47:11,980 --> 00:47:10,580

our forward planning will dust ourselves

1184

00:47:13,870 --> 00:47:11,990

off there's going to be a period of

1185

00:47:15,820 --> 00:47:13,880

mourning and great disappointment you

1186

00:47:17,020 --> 00:47:15,830

know people have you know those 7,000

1187

00:47:19,150 --> 00:47:17,030

people have spent you know the better

1188

00:47:21,250 --> 00:47:19,160

part of you know half a decade or more

1189

00:47:22,960 --> 00:47:21,260

working on these technologies and they

1190

00:47:24,970 --> 00:47:22,970

all want to see you know curiosity

1191

00:47:26,650 --> 00:47:24,980

roving and doing science and there's

1192

00:47:28,270 --> 00:47:26,660

going to be great disappointment but we

1193

00:47:30,460 --> 00:47:28,280

you know we will persevere we will be

1194

00:47:31,960 --> 00:47:30,470

back at Mars will be back on the surface

1195

00:47:33,520 --> 00:47:31,970

of Mars because that's where the most

1196

00:47:35,950 --> 00:47:33,530

interesting science is the most

1197

00:47:37,060 --> 00:47:35,960

interesting exploration but in the

1198

00:47:39,160 --> 00:47:37,070

meantime we're going to continue to

1199

00:47:41,740 --> 00:47:39,170

explore the other planets we have Juno

1200

00:47:44,800 --> 00:47:41,750

on its way to Jupiter you know we have

1201  
00:47:47,200 --> 00:47:44,810  
done that as we speak is leaving Vesta

1202  
00:47:49,660 --> 00:47:47,210  
on its way to series you know these two

1203  
00:47:51,580 --> 00:47:49,670  
large asteroids and you know they're

1204  
00:47:53,770 --> 00:47:51,590  
doing amazing science so we're

1205  
00:47:56,470 --> 00:47:53,780  
continuing to explore Saturn you know

1206  
00:47:57,760 --> 00:47:56,480  
lots and lots of missions now we're

1207  
00:47:59,800 --> 00:47:57,770  
about to launch radiation belt storm

1208  
00:48:01,600 --> 00:47:59,810  
probes to help study their sionis fear

1209  
00:48:04,150 --> 00:48:01,610  
we have stereo Solar Dynamics

1210  
00:48:07,060 --> 00:48:04,160  
Observatory exploring the Sun or earth

1211  
00:48:08,680 --> 00:48:07,070  
science instruments you know it's we

1212  
00:48:10,780 --> 00:48:08,690  
have a great program it's all it's all

1213  
00:48:16,480 --> 00:48:10,790

exciting but tonight is going to be

1214

00:48:18,370 --> 00:48:16,490

curiosities night with that any closing

1215

00:48:21,520 --> 00:48:18,380

remarks on the next time we see these

1216

00:48:23,620 --> 00:48:21,530

folks it would be a gametime well Duane

1217

00:48:26,310 --> 00:48:23,630

Duane flash me a sign to remind me in

1218

00:48:29,560 --> 00:48:26,320

and actually i will i will mention it

1219

00:48:31,390 --> 00:48:29,570

you know you've heard Charles say this

1220

00:48:33,700 --> 00:48:31,400

myself say this NASA said it through

1221

00:48:36,120 --> 00:48:33,710

numerous releases you know this entry

1222

00:48:39,550 --> 00:48:36,130

descent and landing with a guided entry

1223

00:48:42,850 --> 00:48:39,560

with a supersonic parachute with the sky

1224

00:48:45,400 --> 00:48:42,860

crane both as a decelerator and as you

1225

00:48:47,260 --> 00:48:45,410

know hopefully to put curiosity down

1226

00:48:49,990 --> 00:48:47,270

relatively gently you know all these

1227

00:48:51,850 --> 00:48:50,000

complex maneuvers the 76 Pyro's I mean

1228

00:48:53,620 --> 00:48:51,860

this is going to be hard you know I'm on

1229

00:48:55,660 --> 00:48:53,630

the edge of my seat right now in fact

1230

00:48:59,740 --> 00:48:55,670

and there's there's lots of

1231

00:49:00,460 --> 00:48:59,750

uncertainties in nineteen-sixty-nine

1232

00:49:04,180 --> 00:49:00,470

when

1233

00:49:05,740 --> 00:49:04,190

Neil Armstrong and Buzz Aldrin you know

1234

00:49:08,530 --> 00:49:05,750

we're descending towards the lunar

1235

00:49:09,580 --> 00:49:08,540

surface we didn't have all this great

1236

00:49:11,800 --> 00:49:09,590

reconnaissance we had good

1237

00:49:14,170 --> 00:49:11,810

reconnaissance we didn't have sample

1238

00:49:16,750 --> 00:49:14,180

return first you know we were really

1239

00:49:19,270 --> 00:49:16,760

hanging it out there and in the end it

1240

00:49:22,510 --> 00:49:19,280

didn't look good in the final seconds

1241

00:49:24,820 --> 00:49:22,520

and you know some of you weren't born

1242

00:49:26,650 --> 00:49:24,830

yet some of you remember you know Neil

1243

00:49:28,480 --> 00:49:26,660

was controlling the vehicle we had a

1244

00:49:30,430 --> 00:49:28,490

human brain with that closed loop

1245

00:49:32,830 --> 00:49:30,440

control or one of our nation's most

1246

00:49:35,109 --> 00:49:32,840

experienced test pilots who was there at

1247

00:49:37,330 --> 00:49:35,119

the last minute so that ego could fly

1248

00:49:40,750 --> 00:49:37,340

over a boulder field and set down gently

1249

00:49:46,630 --> 00:49:40,760

somewhere safe curiosity doesn't have

1250

00:49:49,480 --> 00:49:46,640

Neil Armstrong aboard however however it

1251

00:49:51,370 --> 00:49:49,490

has this fantastic team at the Jet

1252

00:49:54,099 --> 00:49:51,380

Propulsion lab at NASA centers around

1253

00:49:56,410 --> 00:49:54,109

the country and in fact today is Neil

1254

00:49:58,300 --> 00:49:56,420

Armstrong's birthday so for Neil we're

1255

00:50:01,330 --> 00:49:58,310

going to put curiosity successfully on

1256

00:50:02,710 --> 00:50:01,340

the surface so with that adding to what

1257

00:50:04,300 --> 00:50:02,720

John saying I mean if I want to leave

1258

00:50:06,190 --> 00:50:04,310

you with something is the quote i

1259

00:50:08,430 --> 00:50:06,200

mentioned earlier from Teddy Roosevelt

1260

00:50:12,250 --> 00:50:08,440

this is a message to the whole world

1261

00:50:14,620 --> 00:50:12,260

that sometime it's but it's not a good

1262

00:50:16,300 --> 00:50:14,630

let's say that's how to put to phrase it

1263

00:50:18,010 --> 00:50:16,310

that we ought to dare mighty things

1264

00:50:20,670 --> 00:50:18,020

particularly for the young people that's

1265

00:50:23,560 --> 00:50:20,680

what I tell my daughters and my students

1266

00:50:26,500 --> 00:50:23,570

you need to dare mighty things even that

1267

00:50:27,970 --> 00:50:26,510

you might fail and sometimes failure you

1268

00:50:30,220 --> 00:50:27,980

know you learn a lesson from it and you

1269

00:50:32,109 --> 00:50:30,230

become a better person now see the same

1270

00:50:34,300 --> 00:50:32,119

thing happens here and we have had our

1271

00:50:37,089 --> 00:50:34,310

failures and we have had our successes

1272

00:50:38,859 --> 00:50:37,099

and let me tell you the success is a lot

1273

00:50:40,750 --> 00:50:38,869

better when you have had a failure and

1274

00:50:43,300 --> 00:50:40,760

you learn from it and that take you to

1275

00:50:45,670 --> 00:50:43,310

the next step you know in in your

1276  
00:50:47,670 --> 00:50:45,680  
exploration every Explorer I'm a big fan

1277  
00:50:50,740 --> 00:50:47,680  
of reading the notebooks of explorers

1278  
00:50:54,160 --> 00:50:50,750  
every Explorer had tough days it was

1279  
00:50:56,710 --> 00:50:54,170  
never easy you know and and hopefully

1280  
00:50:59,050 --> 00:50:56,720  
the explorers of this generation also if

1281  
00:51:01,420 --> 00:50:59,060  
we have a setback tonight will rise up

1282  
00:51:03,430 --> 00:51:01,430  
learn our lessons I move on and now the

1283  
00:51:06,040 --> 00:51:03,440  
reason we're leaving here is that in

1284  
00:51:08,980 --> 00:51:06,050  
five minutes the next shift shift which

1285  
00:51:10,420 --> 00:51:08,990  
will be here during edl will be starting

1286  
00:51:13,030 --> 00:51:10,430  
so John and I are going to wish them

1287  
00:51:14,140 --> 00:51:13,040  
good luck and was Charlie Bolden we're

1288  
00:51:16,930 --> 00:51:14,150

going to go in with some good