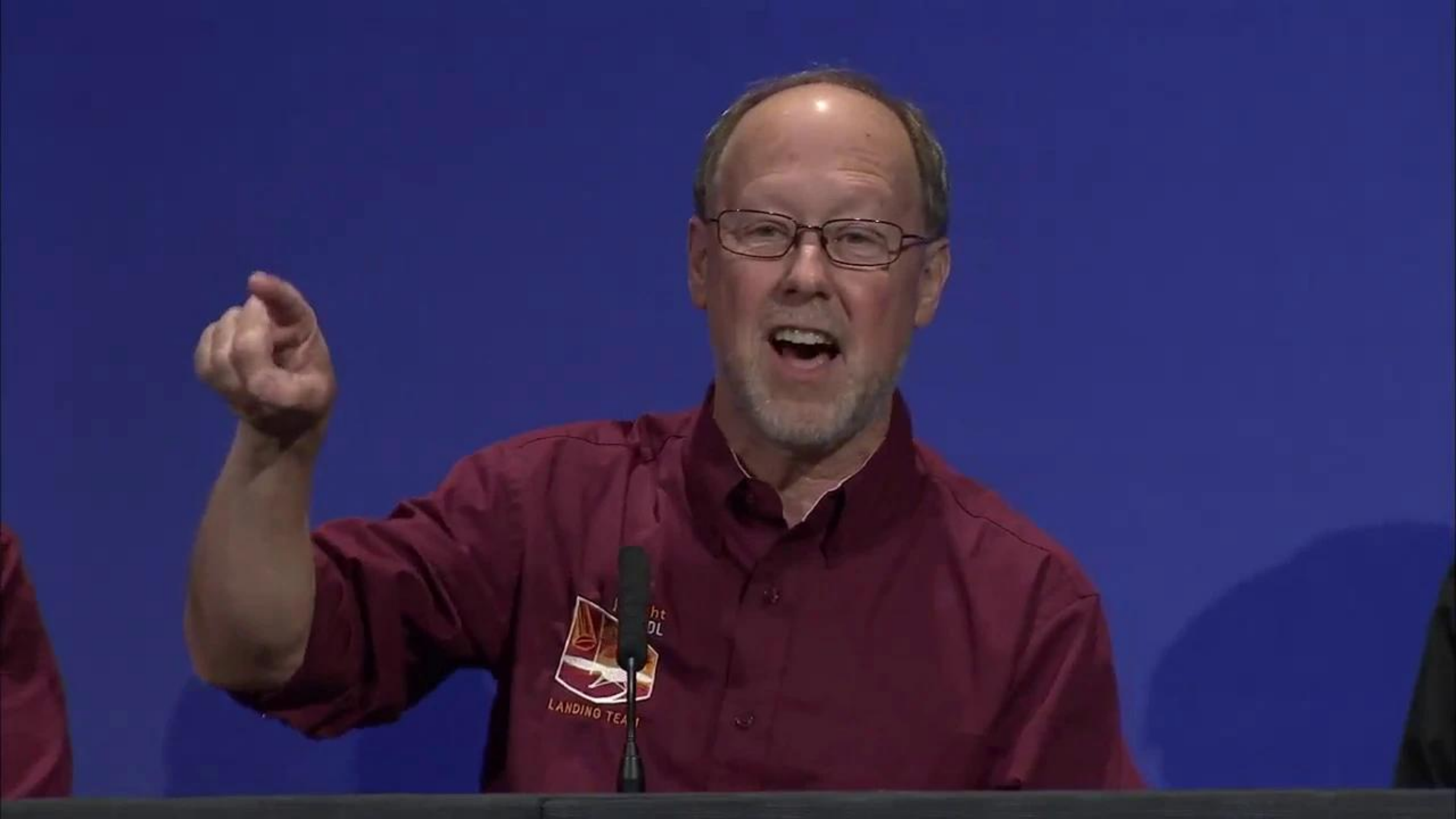
LANDING TEAM

1
00:00:10,109 --> 00:00:12,846
[exciting music]

2
00:00:32,198 --> 00:00:35,468
- Welcome to NASA's Jet
Propulsion Laboratory

3
00:00:35,501 --> 00:00:36,869
in Pasadena, California.

4
00:00:36,902 --> 00:00:39,939
It has been an extremely
exciting day today.

5
00:00:39,972 --> 00:00:42,975
And I want to bring on stage
the very successful team

6
00:00:43,008 --> 00:00:45,178
for the InSight Mars landing.

7
00:00:45,211 --> 00:00:46,546
Let's welcome them now.

8
00:00:46,579 --> 00:00:49,416
NASA Administrator
Jim Bridenstine,

9
00:00:50,416 --> 00:00:52,919
JPL Director Mike Watkins,

10
00:00:52,952 --> 00:00:56,255
InSight Project
Manager Tom Hoffman,

11
00:00:56,288 --> 00:01:00,059
InSight Principal
Investigator Bruce Banerdt,

12
00:01:00,092 --> 00:01:03,563
MarCO team member Andy Klesh,

13
00:01:04,396 --> 00:01:05,531
and Elizabeth Barrett,

14
00:01:05,564 --> 00:01:08,701
the InSight instrument
operations lead.

15
00:01:08,734 --> 00:01:11,004
[applause]

16
00:01:21,714 --> 00:01:23,950
Go ahead and have a seat.

17
00:01:23,983 --> 00:01:25,585
I'd also like to
acknowledge here

18
00:01:25,618 --> 00:01:28,454
all of the InSight team members
and the MarCO team members

19
00:01:28,487 --> 00:01:30,556
who have joined us for
the press conference.

20
00:01:30,589 --> 00:01:33,793
And all of your amazing
work for these two missions.

21
00:01:33,826 --> 00:01:34,694
We're gonna.

22
00:01:34,727 --> 00:01:36,930
[applause]

23

00:01:56,182 --> 00:01:57,283
Okay, we're gonna start now

24
00:01:57,316 --> 00:01:59,319
with NASA Administrator
Jim Bridenstine.

25
00:02:01,153 --> 00:02:02,388
- Well, thank you.

26
00:02:02,421 --> 00:02:03,790
What an amazing day.

27
00:02:05,124 --> 00:02:07,994
To start, I want everybody
here to know that

28
00:02:08,027 --> 00:02:10,163
I've been on the phone recently

29
00:02:10,196 --> 00:02:13,032
with both the president
and the vice-president.

30
00:02:13,065 --> 00:02:15,801
And they are
overwhelmingly proud

31
00:02:15,834 --> 00:02:18,471
of everything that has
gone on here today.

32
00:02:18,504 --> 00:02:20,706
They watched the entire thing.

33
00:02:20,739 --> 00:02:22,074
Of course, they
were very anxious.

34

00:02:22,107 --> 00:02:24,977
And were anticipating greatness.

35
00:02:25,010 --> 00:02:26,913
Which, ultimately, we had today.

36
00:02:26,946 --> 00:02:28,648
But what an amazing day.

37
00:02:28,681 --> 00:02:30,750
And they are so grateful
for all of the hard work

38
00:02:30,783 --> 00:02:32,051
of everybody in this room.

39
00:02:32,084 --> 00:02:34,353
So, I wanna start by
saying a few thank yous.

40
00:02:34,386 --> 00:02:37,623
Number one, thank
you to the NASA team

41
00:02:37,656 --> 00:02:39,759
and the NASA JPL team.

42
00:02:39,792 --> 00:02:43,529
Thank you to the MarCO
team and the InSight team.

43
00:02:43,562 --> 00:02:47,166
We also want to thank our
international partners.

44
00:02:47,199 --> 00:02:50,102
Today was a great day for
the United States of America.

45

00:02:50,135 --> 00:02:53,139
It was also a great day for
our international partners.

46
00:02:53,172 --> 00:02:55,508
Germany, of course, is
involved in this mission.

47
00:02:55,541 --> 00:02:57,610
DLR has been a great partner.

48
00:02:57,643 --> 00:02:59,045
As France has.

49
00:02:59,078 --> 00:03:01,814
CNES has been a great partner
on this mission as well.

50
00:03:01,847 --> 00:03:04,784
I also want to make sure
I thank Lockheed Martin,

51
00:03:04,817 --> 00:03:06,385
the prime contractor.

52
00:03:06,418 --> 00:03:08,521
And we want to thank
United Launch Alliance

53
00:03:08,554 --> 00:03:11,457
who actually launched this
mission almost seven months ago

54
00:03:11,490 --> 00:03:12,925
from the west coast,

55
00:03:12,958 --> 00:03:15,127
which has never been done
before for a mission to Mars.

56
00:03:15,160 --> 00:03:18,798
And this is an
amazing, amazing day.

57
00:03:18,831 --> 00:03:20,099
As the NASA administrator,

58
00:03:20,132 --> 00:03:22,568
this was my first
time to be in the room

59
00:03:22,601 --> 00:03:25,905
when something
like this happened.

60
00:03:25,938 --> 00:03:27,807
I've watched it on TV.

61
00:03:27,840 --> 00:03:30,343
But, really, for the first
time to be in the room

62
00:03:30,376 --> 00:03:35,381
when the data stops and
to know how quiet it gets.

63
00:03:36,482 --> 00:03:39,485
I mean, it gets
really, really quiet.

64
00:03:39,518 --> 00:03:42,321
You can't do justice
on television

65
00:03:42,354 --> 00:03:44,257
with that degree of quietness.

66
00:03:44,290 --> 00:03:47,360
And then, of course,

once the data comes back,

67
00:03:47,393 --> 00:03:48,628
the elation.

68
00:03:48,661 --> 00:03:50,096
What an amazing day
for me and, of course,

69
00:03:50,129 --> 00:03:51,197
the entire NASA teamwork.

70
00:03:51,230 --> 00:03:52,498
Extremely grateful.

71
00:03:52,531 --> 00:03:55,234
This was seen all
around the world.

72
00:03:55,267 --> 00:03:59,138
It wasn't just the American
leadership that saw it.

73
00:03:59,171 --> 00:04:01,574
Leaders from all around
the world saw it.

74
00:04:01,607 --> 00:04:04,343
And, of course, populations
from all around the world

75
00:04:04,376 --> 00:04:06,312
will see it in the
newspapers tomorrow morning

76
00:04:06,345 --> 00:04:09,448
and, of course, in social
media today, online,

77

00:04:09,481 --> 00:04:11,017
in the newspapers.

78
00:04:11,050 --> 00:04:14,186
So, what an amazing
day for our country.

79
00:04:14,219 --> 00:04:15,388
But it's not just people

80
00:04:15,421 --> 00:04:16,922
all around the world
that will see it.

81
00:04:16,955 --> 00:04:20,960
In fact, people off
the world have seen it.

82
00:04:20,993 --> 00:04:23,229
And they have some things
they'd like to say.

83
00:04:28,500 --> 00:04:29,902
- [Astronaut] The International
Space Station crew

84
00:04:29,935 --> 00:04:31,337
would like to.

85
00:04:31,370 --> 00:04:34,240
To the inside of Mars itself.

86
00:04:34,273 --> 00:04:37,443
And it being a really important
step on the way there.

87
00:04:37,476 --> 00:04:39,278
Also for human explorations.

88

00:04:39,311 --> 00:04:42,281
So, kudos for
pulling that one off.

89
00:04:42,314 --> 00:04:45,584
And we are looking
forward to what the data

90
00:04:45,617 --> 00:04:46,919
comes out of this mission.

91
00:04:50,155 --> 00:04:53,426
- [Man] Houston copies all and
extends our congratulations

92
00:04:53,459 --> 00:04:55,895
as well to our partners
and friends at JPL.

93
00:04:56,962 --> 00:04:58,397
It was really something.

94
00:04:58,430 --> 00:05:00,066
Got some goosebumps down
here watching the coverage.

95
00:05:00,099 --> 00:05:00,933
[laughter]

96
00:05:00,966 --> 00:05:02,101
- [Astronaut] Same here.

97
00:05:03,469 --> 00:05:05,738
[applause]

98
00:05:17,316 --> 00:05:20,453
- So, ultimately,
the day is coming

99

00:05:20,486 --> 00:05:22,154
where we land humans on Mars.

100
00:05:22,187 --> 00:05:23,823
We're very excited about that.

101
00:05:23,856 --> 00:05:26,125
I think that's why
our astronauts are
so excited about it

102
00:05:26,158 --> 00:05:28,627
and why they wanted to
congratulate everybody here.

103
00:05:28,660 --> 00:05:32,898
With that, I'll introduce the
director of JPL Mike Watkins.

104
00:05:32,931 --> 00:05:37,036
Who has been kind of the
leader of this organization

105
00:05:37,069 --> 00:05:38,537
for a while now.

106
00:05:38,570 --> 00:05:40,773
I've known him ever since
I was a member of Congress.

107
00:05:40,806 --> 00:05:42,308
And I'll tell you.

108
00:05:42,341 --> 00:05:45,010
He is an amazing advocate for
what you guys do here at JPL.

109
00:05:45,043 --> 00:05:46,946
And we're grateful
for his leadership.

110
00:05:48,213 --> 00:05:49,682
- Thanks very much, Jim.

111
00:05:49,715 --> 00:05:52,918
So, you guys were lucky
enough to be here with us

112
00:05:52,951 --> 00:05:56,021
and to share the 8th
successful Mars landing

113
00:05:56,054 --> 00:05:58,824
in the history of
the planet Earth.

114
00:05:58,857 --> 00:06:01,127
[applause]

115
00:06:07,699 --> 00:06:10,069
And I'm very proud, as
the director of JPL,

116
00:06:10,102 --> 00:06:11,904
to say that all eight of those

117
00:06:11,937 --> 00:06:14,373
had the press conference right
here in this room afterwards.

118
00:06:14,406 --> 00:06:15,841
[laughter]

119
00:06:15,874 --> 00:06:17,610
And we never get tired
of watching these.

120
00:06:17,643 --> 00:06:20,012
So, if you don't remember

what it was like,

121
00:06:20,045 --> 00:06:23,349
we have a little memento here.

122
00:06:23,382 --> 00:06:25,017
- InSight is now
traveling at a velocity

123
00:06:25,050 --> 00:06:26,853
of 2,000 meters per second.

124
00:06:28,353 --> 00:06:29,255
17 meters.

125
00:06:29,288 --> 00:06:30,990
Standing by for touchdown.

126
00:06:31,023 --> 00:06:33,760
[dramatic music]

127
00:06:39,231 --> 00:06:40,800
Touchdown confirmed.

128
00:06:40,833 --> 00:06:44,003
[cheers and applause]

129
00:07:02,321 --> 00:07:05,057
- So, obviously,
the InSight team,

130
00:07:05,090 --> 00:07:07,560
the international InSight team,

131
00:07:07,593 --> 00:07:09,128
put a tremendous
amount of effort in.

132

00:07:09,161 --> 00:07:11,363
Not just working
over Thanksgiving
holiday here nonstop.

133
00:07:11,396 --> 00:07:14,099
But over the past few years.

134
00:07:14,132 --> 00:07:16,969
And, you know, all the
credit goes, really, to them.

135
00:07:17,002 --> 00:07:18,671
I'd like to give a
special shout out

136
00:07:18,704 --> 00:07:20,739
to our colleagues at
Lockheed Martin in Denver.

137
00:07:20,772 --> 00:07:22,174
And we have Lisa Callahan here

138
00:07:22,207 --> 00:07:24,610
as the head of Civil
Space for Lockheed Martin.

139
00:07:24,643 --> 00:07:26,913
[applause]

140
00:07:32,851 --> 00:07:34,720
Been our longtime partners
going back to Viking days

141
00:07:34,753 --> 00:07:35,988
in the very beginning.

142
00:07:36,021 --> 00:07:38,491
Also, I'd like to thank,
as was mentioned by Jim,

143
00:07:38,524 --> 00:07:40,125
our international colleagues.

144
00:07:40,158 --> 00:07:42,761
The incredible scientific
payload on this mission

145
00:07:42,794 --> 00:07:46,265
could not have been done by
any one country in the world.

146
00:07:46,298 --> 00:07:48,334
It took the entire country,
the entire world rather

147
00:07:48,367 --> 00:07:50,736
to build the kind of
scientific breakthrough payload

148
00:07:50,769 --> 00:07:51,670
that we have on this mission.

149
00:07:51,703 --> 00:07:52,972
You'll hear more about it

150
00:07:53,005 --> 00:07:55,207
from our PI Bruce
Banerdt later on.

151
00:07:55,240 --> 00:07:58,244
But, you know, it is
critical to our future

152
00:07:58,277 --> 00:07:59,812
to have that kind
of partnership.

153
00:07:59,845 --> 00:08:02,515

And it really means a lot to us.

154
00:08:02,548 --> 00:08:05,451
And, of course, in the coming
months and years, even,

155
00:08:05,484 --> 00:08:07,786
the history books
will be rewritten

156
00:08:07,819 --> 00:08:09,822
about the interior of Mars.

157
00:08:09,855 --> 00:08:14,226
I personally have to say the
first day, the landing day,

158
00:08:14,259 --> 00:08:15,661
and these first
couple of pictures

159
00:08:15,694 --> 00:08:18,364
of a place no human
has ever seen before

160
00:08:18,397 --> 00:08:20,833
also remind us that,
in order to do science,

161
00:08:20,866 --> 00:08:23,335
we have to be bold and
we have to be explorers.

162
00:08:23,368 --> 00:08:25,404
And that combination of
science and exploration

163
00:08:25,437 --> 00:08:28,874
is something that exists
entirely at NASA and at JPL.

164
00:08:28,907 --> 00:08:30,843
And we're very proud
to be part of it.

165
00:08:30,876 --> 00:08:32,545
So, thank you very much.

166
00:08:32,578 --> 00:08:34,847
[applause]

167
00:08:39,217 --> 00:08:41,353
So, now, I'd like
to turn this over

168
00:08:41,386 --> 00:08:43,589
to the team that
actually did this work.

169
00:08:43,622 --> 00:08:45,024
Many of whom are out there.

170
00:08:45,057 --> 00:08:47,526
But, up here, the project
manager Tom Hoffman.

171
00:08:47,559 --> 00:08:49,795
[applause]

172
00:09:02,140 --> 00:09:03,542
- Thank you, Mike.

173
00:09:03,575 --> 00:09:06,879
I'm actually truly humbled
by this experience.

174
00:09:06,912 --> 00:09:10,149
Having the opportunity to
work with the amazing team

175
00:09:10,182 --> 00:09:12,318
that I've had the
opportunity to work with,

176
00:09:12,351 --> 00:09:14,053
the team that actually made us

177
00:09:14,086 --> 00:09:17,089
successfully land on
the surface of Mars,

178
00:09:17,122 --> 00:09:19,592
which is never something
we should take for granted.

179
00:09:19,625 --> 00:09:22,428
It's been a humbling and an
amazing experience for me.

180
00:09:22,461 --> 00:09:24,730
All the people that are
wearing the red shirts

181
00:09:24,763 --> 00:09:27,333
and the black shirts today
really are the people

182
00:09:27,366 --> 00:09:28,567
who made this a success.

183
00:09:28,600 --> 00:09:30,636
So, I just want to say
thank you very much

184
00:09:30,669 --> 00:09:32,104
for all the hard
work that you put in

185

00:09:32,137 --> 00:09:34,440
and especially all
the hard work that

186
00:09:34,473 --> 00:09:37,543
your spouses and significant
others and loved ones

187
00:09:37,576 --> 00:09:38,777
let you put in.

188
00:09:38,810 --> 00:09:41,046
'Cause I know you were
working on Thanksgiving.

189
00:09:41,079 --> 00:09:42,414
But not just Thanksgiving.

190
00:09:42,447 --> 00:09:44,049
You've missed a lot
of different holidays

191
00:09:44,082 --> 00:09:46,619
and important events
to make this a success.

192
00:09:46,652 --> 00:09:48,954
And, today, it was all worth it.

193
00:09:48,987 --> 00:09:50,656
Thank you, guys.

194
00:09:50,689 --> 00:09:52,959
[applause]

195
00:10:01,199 --> 00:10:03,102
So, our JPL navigation team

196
00:10:03,135 --> 00:10:08,140

and our JPL/Lockheed Martin/NASA
Ames/NASA Langley team.

197
00:10:09,007 --> 00:10:10,376
You guys are now all fired.

198
00:10:10,409 --> 00:10:11,510
Your job's over.

199
00:10:11,543 --> 00:10:12,778
[laughter]

200
00:10:12,811 --> 00:10:14,346
Thank you for getting us
to the surface of Mars.

201
00:10:14,379 --> 00:10:15,447
We're gonna turn it over now

202
00:10:15,480 --> 00:10:17,416
to the Surface Operations folks.

203
00:10:17,449 --> 00:10:21,754
Surface Operations folks,
your job has just begun.

204
00:10:21,787 --> 00:10:23,656
So, you better get some rest.

205
00:10:23,689 --> 00:10:25,124
It's gonna be a
little bit of time

206
00:10:25,157 --> 00:10:26,925
before we get the instruments
onto the surface of Mars

207
00:10:26,958 --> 00:10:29,728
and start getting back

this groundbreaking science

208
00:10:29,761 --> 00:10:31,130
that we expect to get.

209
00:10:31,163 --> 00:10:32,431
But I know,

210
00:10:32,464 --> 00:10:35,034
just like the navigation
EDL team was successful,

211
00:10:35,067 --> 00:10:36,535
I know our surface
operations team

212
00:10:36,568 --> 00:10:38,570
is gonna be equally successful

213
00:10:38,603 --> 00:10:40,272
with the support of our
international partners.

214
00:10:40,305 --> 00:10:41,540
It's gonna be awesome.

215
00:10:41,573 --> 00:10:43,609
I can't wait to start
seeing marsquakes.

216
00:10:43,642 --> 00:10:46,045
Start getting
temperature flux data

217
00:10:46,078 --> 00:10:47,312
coming out of our HP cubed.

218
00:10:47,345 --> 00:10:49,948
That's gonna be truly amazing.

219
00:10:49,981 --> 00:10:53,185
This is really the first time
I've sat down since we landed.

220
00:10:53,218 --> 00:10:54,420
[laughter]

221
00:10:54,453 --> 00:10:56,188
I probably can't sit
down much longer.

222
00:10:56,221 --> 00:10:57,589
So, I'm gonna stop talking.

223
00:10:57,622 --> 00:10:59,258
Or I'm gonna start
jumping up and down again.

224
00:10:59,291 --> 00:11:02,995
So, Bruce Banerdt is our
principal investigator.

225
00:11:03,028 --> 00:11:05,798
We have been working together
for the last seven years

226
00:11:05,831 --> 00:11:07,232
to make this a reality.

227
00:11:07,265 --> 00:11:09,034
Bruce has been
working for decades.

228
00:11:09,067 --> 00:11:11,103
And I'm so excited for him that

229
00:11:11,136 --> 00:11:13,205
he's finally gonna start

getting his science back

230
00:11:13,238 --> 00:11:15,841
that he's been working
so long and so hard for.

231
00:11:15,874 --> 00:11:16,742
So, Bruce.

232
00:11:18,009 --> 00:11:19,011
- Thanks, Tom.

233
00:11:19,044 --> 00:11:21,313
[applause]

234
00:11:36,294 --> 00:11:38,363
Well, I can't tell you
what a privilege it is

235
00:11:38,396 --> 00:11:39,932
to be up here today.

236
00:11:39,965 --> 00:11:43,869
People keep talking about
my science and my mission.

237
00:11:43,902 --> 00:11:46,972
But this is really
something that

238
00:11:47,005 --> 00:11:50,442
we're doing as a science
team for the world.

239
00:11:50,475 --> 00:11:52,911
The science that we're
doing belongs to everybody.

240
00:11:52,944 --> 00:11:54,379

And the knowledge that
we're gonna bring back

241
00:11:54,412 --> 00:11:56,415
is gonna belong to everybody.

242
00:11:56,448 --> 00:12:00,786
So, we actually have a little
bit of science already.

243
00:12:00,819 --> 00:12:03,622
Thanks to our friends at MarCO

244
00:12:03,655 --> 00:12:05,724
who sent down this first image.

245
00:12:05,757 --> 00:12:07,025
It's nice and dirty.

246
00:12:07,058 --> 00:12:08,060
I like.

247
00:12:08,093 --> 00:12:08,894
[laughter]

248
00:12:08,927 --> 00:12:10,129
Nice and dirty image.

249
00:12:10,162 --> 00:12:13,465
So, we can see the
surface of Mars.

250
00:12:13,498 --> 00:12:18,504
And I'm just taken back to 1976.

251
00:12:19,604 --> 00:12:21,707
I was actually a student
intern here at JPL

252
00:12:21,740 --> 00:12:23,776
in the summer of 1976.

253
00:12:23,809 --> 00:12:27,146
And so, I never actually
got to come into this room

254
00:12:27,179 --> 00:12:29,381
while the press
conferences were going on.

255
00:12:29,414 --> 00:12:30,849
But I was just outside.

256
00:12:30,882 --> 00:12:33,018
And I would sneak
in here in between

257
00:12:33,051 --> 00:12:36,054
and just look at the place

258
00:12:36,087 --> 00:12:39,558
and just wonder at the
history being made.

259
00:12:39,591 --> 00:12:42,694
And that first image
from the Viking lander.

260
00:12:42,727 --> 00:12:44,196
That bright red image.

261
00:12:44,229 --> 00:12:45,464
We had seen all these

262
00:12:45,497 --> 00:12:46,431
nice black and white
images from the moon.

263
00:12:46,464 --> 00:12:47,666
And they were amazing.

264
00:12:47,699 --> 00:12:49,902
But this bright red
image from Mars.

265
00:12:49,935 --> 00:12:52,204
And the first image
from another planet.

266
00:12:52,237 --> 00:12:55,073
And now I'm looking at
this image from InSight.

267
00:12:55,106 --> 00:13:00,112
And it's like a full
circle of a whole career

268
00:13:02,314 --> 00:13:05,584
working towards
understanding Mars better.

269
00:13:07,018 --> 00:13:09,154
We have a little bit of
some things in this image

270
00:13:09,187 --> 00:13:10,088
that you can see.

271
00:13:10,121 --> 00:13:11,490
You can see a rock in the front.

272
00:13:11,523 --> 00:13:15,060
If we can go to the next image,

273
00:13:15,093 --> 00:13:16,495
there's actually a
couple other things.

274
00:13:16,528 --> 00:13:18,063
We can actually
see the bolts that

275
00:13:18,096 --> 00:13:19,965
are holding this dust cover on.

276
00:13:19,998 --> 00:13:25,004
This image is actually
a very good argument

277
00:13:26,137 --> 00:13:27,739
for why you put a
dust cover on a camera

278
00:13:27,772 --> 00:13:28,674
[laughter]

279
00:13:28,707 --> 00:13:29,808
when you're landing on Mars.

280
00:13:29,841 --> 00:13:32,611
Good choice, right?

281
00:13:32,644 --> 00:13:34,346
So, all those black specks
are gonna disappear.

282
00:13:34,379 --> 00:13:35,547
And, when that goes away,

283
00:13:35,580 --> 00:13:37,282
you're not gonna see
those little cover bolts

284
00:13:37,315 --> 00:13:40,185
down there in the
bottom right and left.

285
00:13:40,218 --> 00:13:42,554
But you will see
the lander footpad.

286
00:13:42,587 --> 00:13:45,524
And we'll be studying that
in the next couple of days.

287
00:13:45,557 --> 00:13:46,792
Looking at the
amount of dirt on it.

288
00:13:46,825 --> 00:13:48,360
Looking at the kind of dust.

289
00:13:48,393 --> 00:13:51,129
Trying to figure out what the
distribution of particle sizes

290
00:13:51,162 --> 00:13:54,499
and all this kind of stuff
that's really critical

291
00:13:54,532 --> 00:13:56,168
to putting our instruments
down on the surface.

292
00:13:56,201 --> 00:13:58,270
And, up there in
the upper corner.

293
00:13:58,303 --> 00:13:59,538
You can't even see
it in this picture.

294
00:13:59,571 --> 00:14:01,006
It's so dusty on the edge.

295

00:14:01,039 --> 00:14:03,575
But that's the storage
box that holds the tether,

296
00:14:03,608 --> 00:14:06,078
the cable that's gonna
connect our seismometer

297
00:14:06,111 --> 00:14:08,180
from the ground of Mars
up to the spacecraft

298
00:14:08,213 --> 00:14:10,349
where it can beam the
data back to Earth.

299
00:14:10,382 --> 00:14:13,886
And so, if you've
been paying attention,

300
00:14:13,919 --> 00:14:16,321
you know that you're not
supposed to be expecting

301
00:14:16,354 --> 00:14:19,958
any seismology to come out
of us any time real soon.

302
00:14:19,991 --> 00:14:22,461
But we're gonna be spending
the next couple of weeks

303
00:14:22,494 --> 00:14:25,030
looking at that ground and
finding exactly the best place

304
00:14:25,063 --> 00:14:26,632
to put our seismometers down.

305
00:14:26,665 --> 00:14:29,034

It's a very, very
nice looking picture.

306
00:14:29,067 --> 00:14:30,068
It looks pretty flat.

307
00:14:30,101 --> 00:14:31,570
We're very level.

308
00:14:31,603 --> 00:14:34,506
I think we're less than
two degrees of tilt.

309
00:14:34,539 --> 00:14:37,876
Which makes our job
very easy to do.

310
00:14:37,909 --> 00:14:42,014
And it's time to get going.

311
00:14:42,047 --> 00:14:44,616
[laughter]

312
00:14:44,649 --> 00:14:48,120
So, you all saw the excitement
in the control room,

313
00:14:48,153 --> 00:14:49,988
but, actually, there's been
excitement all over the world.

314
00:14:50,021 --> 00:14:52,758
And we got some images back.

315
00:14:52,791 --> 00:14:54,626
We can roll some of
those images now.

316
00:14:54,659 --> 00:14:56,528

We've had people watching
all over the world.

317
00:14:56,561 --> 00:14:59,564
All across the United
States, Europe, Asia.

318
00:14:59,597 --> 00:15:01,366
They said that we're gonna
roll some pictures behind me.

319
00:15:01,399 --> 00:15:02,801
I'm not seeing
anything coming up.

320
00:15:02,834 --> 00:15:04,636
[laughter]

321
00:15:04,669 --> 00:15:06,104
But take my word for it.

322
00:15:06,137 --> 00:15:07,706
There's a lot of people
cheering all over the place.

323
00:15:07,739 --> 00:15:08,540
Here we go.

324
00:15:08,573 --> 00:15:09,374
There we go.

325
00:15:09,407 --> 00:15:10,642
Some of the pictures.

326
00:15:10,675 --> 00:15:13,645
I really wasn't paying
that much attention

327
00:15:13,678 --> 00:15:14,947

what was going on
after we landed,

328
00:15:14,980 --> 00:15:16,982
because it was
such a crazy time.

329
00:15:17,015 --> 00:15:21,186
But we've got people and
animals all over the place.

330
00:15:21,219 --> 00:15:22,487
[laughter]

331
00:15:22,520 --> 00:15:23,956
We've got hundreds of people.

332
00:15:23,989 --> 00:15:26,591
There have been museums that
opened up their doors for this.

333
00:15:26,624 --> 00:15:29,194
Auditoriums and Time Square.

334
00:15:29,227 --> 00:15:32,030
The Nasdaq screen on
Time Square was there.

335
00:15:32,063 --> 00:15:35,200
An amazing number
of people out there

336
00:15:35,233 --> 00:15:38,470
in the snow and cold
watching InSight land.

337
00:15:38,503 --> 00:15:40,939
And, even at the air
and space museum,

338
00:15:40,972 --> 00:15:43,208
or the science museum
here in Los Angeles.

339
00:15:43,241 --> 00:15:46,545
And so, it's just
been a wonderful event

340
00:15:46,578 --> 00:15:47,746
all across the world.

341
00:15:47,779 --> 00:15:51,483
And I'm just so proud
and so privileged

342
00:15:51,516 --> 00:15:53,185
to have been part of it.

343
00:15:53,218 --> 00:15:57,222
And, with that, I'm gonna turn
it over to Andy Klesh here

344
00:15:57,255 --> 00:15:59,024
who was on the MarCO team

345
00:15:59,057 --> 00:16:01,126
who brought back that
wonderful image for us.

346
00:16:01,159 --> 00:16:03,195
- Thank you very much.

347
00:16:03,228 --> 00:16:05,464
[applause]

348
00:16:13,905 --> 00:16:15,540
So, this has been
a fantastic day

349
00:16:15,573 --> 00:16:18,176
for spacecraft great
and small on the way.

350
00:16:18,209 --> 00:16:21,146
And our spacecraft
are very small.

351
00:16:21,179 --> 00:16:24,383
Only the size of a briefcase
or really carryon luggage.

352
00:16:24,416 --> 00:16:26,618
We were able to
take two spacecraft,

353
00:16:26,651 --> 00:16:29,654
have them transit
301 million miles

354
00:16:29,687 --> 00:16:31,023
over the last six
and a half months

355
00:16:31,056 --> 00:16:33,058
and have them fly by Mars.

356
00:16:33,091 --> 00:16:35,527
Now, this was not only
a very small spacecraft.

357
00:16:35,560 --> 00:16:38,764
But it was built by a very small
team that we actually have.

358
00:16:38,797 --> 00:16:41,400
You can see them over
here on the side.

359

00:16:41,433 --> 00:16:43,669
[applause]

360
00:16:55,180 --> 00:16:58,517
This team of really mostly
part timers on the project

361
00:16:58,550 --> 00:17:00,585
has proven the technology that

362
00:17:00,618 --> 00:17:03,321
we were trying to demonstrate
with this mission on here.

363
00:17:03,354 --> 00:17:06,591
Being able to support a
large craft like InSight

364
00:17:06,624 --> 00:17:09,127
in order for it to perform
its fantastic science.

365
00:17:09,160 --> 00:17:10,462
Being able to show
that we can take

366
00:17:10,495 --> 00:17:13,498
a smaller focused,
more riskier mission

367
00:17:13,531 --> 00:17:15,067
out into the solar system

368
00:17:15,100 --> 00:17:17,169
and try and perform
new opportunities

369
00:17:17,202 --> 00:17:20,272
or take advantage of new
opportunities that we have.

370
00:17:20,305 --> 00:17:22,207
And try and bring the
community that we have built

371
00:17:22,240 --> 00:17:25,143
for these small
spacecraft along with us.

372
00:17:25,176 --> 00:17:26,378
Early on in the mission,

373
00:17:26,411 --> 00:17:28,280
we had interns from the
University of Michigan

374
00:17:28,313 --> 00:17:31,216
actually build parts that are
flying in MarCO right now.

375
00:17:31,249 --> 00:17:33,385
The primary flight
computer that's flying

376
00:17:33,418 --> 00:17:34,920
that was built from the
University of Michigan.

377
00:17:34,953 --> 00:17:37,889
We had students from
Moorehead State University

378
00:17:37,922 --> 00:17:41,259
actually receive some of the
first data back from MarCO

379
00:17:41,292 --> 00:17:43,662
back in the May
and June timeframe.

380
00:17:43,695 --> 00:17:45,831
And we have two interns here
representing their school

381
00:17:45,864 --> 00:17:47,399
from Cal Poly, San Luis Obispo

382
00:17:47,432 --> 00:17:49,935
that were serving on the
operations panel there

383
00:17:49,968 --> 00:17:52,537
and bringing back the
data for InSight today.

384
00:17:52,570 --> 00:17:54,539
And it's all of these
different schools.

385
00:17:54,572 --> 00:17:55,941
It's the broad community
that we have that

386
00:17:55,974 --> 00:17:58,043
really made MarCO
such a success.

387
00:17:58,076 --> 00:18:01,313
Now, MarCO was there
to relay information

388
00:18:01,346 --> 00:18:03,181
back from InSight in realtime.

389
00:18:03,214 --> 00:18:05,150
And we did that
extraordinarily well.

390
00:18:05,183 --> 00:18:08,153

We had no dropped frames, no
dropped data along the way.

391
00:18:08,186 --> 00:18:10,655
And we tried to bring
back the image you had

392
00:18:10,688 --> 00:18:12,457
to kick off your science.

393
00:18:12,490 --> 00:18:15,093
But onboard MarCO itself
we have one more gift

394
00:18:15,126 --> 00:18:16,495
that we can give the
InSight community.

395
00:18:16,528 --> 00:18:18,697
And if you can bring
up the next image here.

396
00:18:18,730 --> 00:18:21,133
This image was taken from MarCO.

397
00:18:21,166 --> 00:18:23,402
[applause]

398
00:18:37,048 --> 00:18:39,651
Having successfully brought
all the data back from InSight

399
00:18:39,684 --> 00:18:42,888
during its exciting entry,
descent, and landing sequence,

400
00:18:42,921 --> 00:18:44,723
what you see before
you is an image taken

401
00:18:44,756 --> 00:18:47,692
roughly 4700 miles from Mars.

402
00:18:47,725 --> 00:18:50,529
And about 12:10
PM, 10, 15 minutes

403
00:18:50,562 --> 00:18:52,864
after EDL itself happened.

404
00:18:52,897 --> 00:18:55,333
And this image is really
our farewell to InSight,

405
00:18:55,366 --> 00:18:57,903
our wish for good luck, and
our farewell to Mars itself

406
00:18:57,936 --> 00:19:00,605
as we continue on to
complete our primary mission

407
00:19:00,638 --> 00:19:02,140
as part of MarCO.

408
00:19:02,173 --> 00:19:03,708
So, we thank you for
all of your excitement.

409
00:19:03,741 --> 00:19:05,677
We thank everybody who helped
out on the MarCO project.

410
00:19:05,710 --> 00:19:07,979
And we look forward to all
the science yet to come.

411
00:19:08,012 --> 00:19:09,614
To tell you a little bit

more about what's next

412
00:19:09,647 --> 00:19:11,583
is Elizabeth Barrett.

413
00:19:11,616 --> 00:19:13,852
[applause]

414
00:19:26,130 --> 00:19:27,365
- Thank you.

415
00:19:27,398 --> 00:19:29,434
I had the privilege
to watch the landing

416
00:19:29,467 --> 00:19:32,103
with our science and
instrument teams on InSight.

417
00:19:32,136 --> 00:19:35,307
So, it was amazing watching
with the scientists

418
00:19:35,340 --> 00:19:36,875
and the engineers
that have devoted

419
00:19:36,908 --> 00:19:39,878
many years of their life
to watching InSight land

420
00:19:39,911 --> 00:19:41,746
and see it actually
land successfully.

421
00:19:41,779 --> 00:19:43,515
And now that we're on
the surface of Mars,

422

00:19:43,548 --> 00:19:45,283
we have a lot of work to go.

423
00:19:45,316 --> 00:19:46,551
So, now that we've landed,

424
00:19:46,584 --> 00:19:48,453
we start an initial
assessment phase.

425
00:19:48,486 --> 00:19:49,688
So, the first thing we'll do

426
00:19:49,721 --> 00:19:51,389
is assess the health
of our spacecraft

427
00:19:51,422 --> 00:19:53,858
and then the health of the
instruments that went with us.

428
00:19:53,891 --> 00:19:55,427
And then look at
our landing site.

429
00:19:55,460 --> 00:19:56,561
We've got the first picture down

430
00:19:56,594 --> 00:19:57,963
very much thanks to MarCO.

431
00:19:57,996 --> 00:20:00,098
And now we want to look
at it in more detail

432
00:20:00,131 --> 00:20:01,967
and understand
where can we place

433

00:20:02,000 --> 00:20:03,101
the instruments on the surface

434
00:20:03,134 --> 00:20:05,070
to get the best science return.

435
00:20:05,103 --> 00:20:06,271
Once we make that assessment,

436
00:20:06,304 --> 00:20:07,572
we start our deployment phase.

437
00:20:07,605 --> 00:20:09,874
And I believe we have a
video to accompany that.

438
00:20:09,907 --> 00:20:11,343
So, the first thing we do is

439
00:20:11,376 --> 00:20:13,712
we're going to deploy
our seismometer, or SEIS,

440
00:20:13,745 --> 00:20:14,980
to the surface.

441
00:20:15,013 --> 00:20:17,549
Once that seismometer
is down on the ground,

442
00:20:17,582 --> 00:20:19,584
we make sure it's
in a good location,

443
00:20:19,617 --> 00:20:22,487
that it's working well,
that we like its placement.

444
00:20:22,520 --> 00:20:25,257

And, after that, we
will return to the deck

445
00:20:25,290 --> 00:20:28,860
to grab our wind and
thermal shield or WTS

446
00:20:28,893 --> 00:20:31,630
that goes on top
of the seismometer

447
00:20:31,663 --> 00:20:33,398
to protect it from
the environment.

448
00:20:33,431 --> 00:20:34,933
So, the wind and thermal shield

449
00:20:34,966 --> 00:20:37,802
is deployed directly on
top of SEIS to protect it.

450
00:20:37,835 --> 00:20:40,372
And you can see here
we're lifting it up.

451
00:20:40,405 --> 00:20:41,940
You can see the skirt drop down.

452
00:20:41,973 --> 00:20:44,175
That's gonna help protect
SEIS from the environment.

453
00:20:44,208 --> 00:20:46,611
And being placed
directly on top.

454
00:20:46,644 --> 00:20:49,681
Once we've deployed WTS
successfully to the surface,

455
00:20:49,714 --> 00:20:53,218
then we return and we pick up
our heat probe or HP cubed.

456
00:20:53,251 --> 00:20:56,154
And we're gonna deploy HP
cubed to the surface as well.

457
00:20:56,187 --> 00:20:58,123
And, after we finish
the deployment

458
00:20:58,156 --> 00:20:59,324
of all of our instruments,

459
00:20:59,357 --> 00:21:00,792
making sure they're
all in a good location,

460
00:21:00,825 --> 00:21:02,027
all in a good state,

461
00:21:02,060 --> 00:21:03,795
then it begins the last
portion of the mission

462
00:21:03,828 --> 00:21:06,264
before we can actually do
the full science return.

463
00:21:06,297 --> 00:21:08,566
We've got to do the penetration

464
00:21:08,599 --> 00:21:10,735
of the mole of HP
cubed underground.

465
00:21:10,768 --> 00:21:12,771

Going up to 16 feet underground.

466
00:21:12,804 --> 00:21:14,906
And then we also
do commissioning
of our seismometer.

467
00:21:14,939 --> 00:21:17,575
Fine tuning it so that
it can detect all those

468
00:21:17,608 --> 00:21:19,944
very subtle vibrations on Mars

469
00:21:19,977 --> 00:21:22,013
to get that great
science return.

470
00:21:22,046 --> 00:21:23,381
This entire process,

471
00:21:23,414 --> 00:21:24,749
just getting the
instruments to the ground,

472
00:21:24,782 --> 00:21:26,484
takes approximately
two to three months.

473
00:21:26,517 --> 00:21:27,852
So, it's gonna take
a little bit of time

474
00:21:27,885 --> 00:21:28,787
to get to that point.

475
00:21:28,820 --> 00:21:30,188
And then another couple months

476

00:21:30,221 --> 00:21:31,890
for the mole to penetrate
through the ground

477
00:21:31,923 --> 00:21:33,758
and to do the fine tuning
of the seismometer.

478
00:21:33,791 --> 00:21:35,760
And, at that point,
we'll be sitting back

479
00:21:35,793 --> 00:21:37,228
and listening for
those marsquakes

480
00:21:37,261 --> 00:21:38,863
and measuring the
vital signs of Mars.

481
00:21:38,896 --> 00:21:40,198
Getting all that
great science return.

482
00:21:40,231 --> 00:21:42,067
We're really looking
forward to that.

483
00:21:42,100 --> 00:21:43,435
And back to you.

484
00:21:43,468 --> 00:21:45,704
[applause]

485
00:21:52,210 --> 00:21:54,946
- Okay, we're gonna open
it up now to questions.

486
00:21:54,979 --> 00:21:57,115
We're gonna be taking

questions from the phone line.

487
00:21:57,148 --> 00:21:58,350
If you are on the phone line,

488
00:21:58,383 --> 00:22:00,685
you need to hit star one
to get into the queue.

489
00:22:00,718 --> 00:22:02,487
We will take some questions
from here in the room

490
00:22:02,520 --> 00:22:04,456
and also from social media.

491
00:22:04,489 --> 00:22:05,890
Just submit your question.

492
00:22:05,923 --> 00:22:07,993
Post your question
with #asknasa.

493
00:22:09,260 --> 00:22:10,829
I will start with a
question on the phone

494
00:22:10,862 --> 00:22:11,830
and then we'll go to the room.

495
00:22:11,863 --> 00:22:14,132
On the phone we have NBC.

496
00:22:14,165 --> 00:22:15,067
Please go ahead.

497
00:22:21,839 --> 00:22:22,707
- [Denise] Hi, this is Denise.

498
00:22:22,740 --> 00:22:23,775
Can you hear me?

499
00:22:23,808 --> 00:22:25,510
- Yes, we can.

500
00:22:25,543 --> 00:22:26,444
- [Denise] I was wondering.

501
00:22:26,477 --> 00:22:27,712
This is a question for Andy.

502
00:22:27,745 --> 00:22:29,047
I was wondering if
you could explain

503
00:22:29,080 --> 00:22:31,516
what happens to the
two MarCO spacecraft

504
00:22:31,549 --> 00:22:35,019
and also whether this
technology concept

505
00:22:35,052 --> 00:22:37,522
could be used on future
missions and how?

506
00:22:37,555 --> 00:22:39,124
Thank you.

507
00:22:39,157 --> 00:22:40,091
- Sure.

508
00:22:40,124 --> 00:22:41,359
We're looking forward to seeing

509
00:22:41,392 --> 00:22:43,027

the end of MarCO's
primary mission.

510
00:22:43,060 --> 00:22:44,329
We have roughly two more weeks

511
00:22:44,362 --> 00:22:46,531
to bring the rest of
the data down from MarCO

512
00:22:46,564 --> 00:22:48,933
covering the entry, descent,
and landing sequence.

513
00:22:48,966 --> 00:22:50,201
And all the lessons
that we've learned

514
00:22:50,234 --> 00:22:51,870
from the voyage thus far.

515
00:22:51,903 --> 00:22:53,304
At the end of those two weeks,

516
00:22:53,337 --> 00:22:55,707
the two MarCOs will continue
on an elliptical orbit

517
00:22:55,740 --> 00:22:57,242
around the sun on here.

518
00:22:57,275 --> 00:23:00,044
And that is really the
end of our initial period.

519
00:23:00,077 --> 00:23:02,247
Though, because of the success
of the MarCOs thus far,

520

00:23:02,280 --> 00:23:04,182
we are discussing
with headquarters

521
00:23:04,215 --> 00:23:05,617
on what we might
do with them next.

522
00:23:05,650 --> 00:23:07,719
Including evaluating
their survivability

523
00:23:07,752 --> 00:23:10,321
and seeing what other
great science and lessons

524
00:23:10,354 --> 00:23:12,290
that we can pull
from those craft.

525
00:23:12,323 --> 00:23:14,159
We do look forward to
these lessons being used

526
00:23:14,192 --> 00:23:15,393
on future missions.

527
00:23:15,426 --> 00:23:17,495
There are many future
small sats and cube sats

528
00:23:17,528 --> 00:23:20,498
that are in work and funded
by NASA at this point.

529
00:23:20,531 --> 00:23:23,101
And we look forward to more
concepts into the future.

530
00:23:24,535 --> 00:23:25,637

- Okay, I'm going to go to
a question here in the room.

531
00:23:25,670 --> 00:23:27,238
Steve Hutterman, go ahead.

532
00:23:27,271 --> 00:23:28,873
- Congratulations all of you.

533
00:23:28,906 --> 00:23:31,075
I want to ask a question
to Tom and to Bruce.

534
00:23:31,108 --> 00:23:34,312
Tom, we've talked to people
in this situation before.

535
00:23:34,345 --> 00:23:36,881
The last few moments and
immediately afterwards

536
00:23:36,914 --> 00:23:38,349
can be very, very emotional.

537
00:23:38,382 --> 00:23:39,751
I'm wondering if
you could talk about

538
00:23:39,784 --> 00:23:40,852
what was going through
your heart and mind,

539
00:23:40,885 --> 00:23:42,754
how emotional it was for you?

540
00:23:42,787 --> 00:23:44,722
And then I'll have
one for Bruce.

541

00:23:44,755 --> 00:23:46,458
- It was an incredible
emotional experience.

542
00:23:46,491 --> 00:23:50,562
To think about working
for seven years,

543
00:23:50,595 --> 00:23:53,198
as many of the people here
in the room have done,

544
00:23:53,231 --> 00:23:56,668
to get to the point where
you have seven more minutes

545
00:23:56,701 --> 00:23:59,704
to survive, literally survive,

546
00:23:59,737 --> 00:24:03,608
is incredibly hard to describe.

547
00:24:03,641 --> 00:24:05,043
My heart was.

548
00:24:05,076 --> 00:24:07,779
Basically, I think just stopped
beating for seven minutes.

549
00:24:07,812 --> 00:24:09,347
I don't know if
that's healthy or not.

550
00:24:09,380 --> 00:24:11,549
[laughter]

551
00:24:11,582 --> 00:24:13,685
But then, when we
got the indication

552
00:24:13,718 --> 00:24:15,053
of parachute deployment,

553
00:24:15,086 --> 00:24:17,188
which was absolutely terrifying
thing to think about.

554
00:24:17,221 --> 00:24:18,756
We got that positive.

555
00:24:18,789 --> 00:24:20,325
And then listening
to Christine Solay

556
00:24:20,358 --> 00:24:23,661
call out as we got closer
and closer to the surface.

557
00:24:23,694 --> 00:24:25,730
Every time she made a call out,

558
00:24:25,763 --> 00:24:27,532
you know, the hairs
on the back of my neck

559
00:24:27,565 --> 00:24:29,100
would start rising
a little bit higher

560
00:24:29,133 --> 00:24:30,602
and a little bit higher.

561
00:24:30,635 --> 00:24:32,937
And, when we finally got the
confirmation of touchdown,

562
00:24:32,970 --> 00:24:34,772
it was completely amazing.

563
00:24:34,805 --> 00:24:36,274
The whole room went crazy.

564
00:24:36,307 --> 00:24:38,176
My inner four year old came out.

565
00:24:38,209 --> 00:24:39,477
But it was not bad.

566
00:24:39,510 --> 00:24:40,678
[laughter]

567
00:24:40,711 --> 00:24:41,880
Some of the people on the team

568
00:24:41,913 --> 00:24:43,948
had made a time out area
for me just in case.

569
00:24:43,981 --> 00:24:44,883
[laughter]

570
00:24:44,916 --> 00:24:46,551
I didn't have to use it.

571
00:24:46,584 --> 00:24:49,854
But it was an incredible,
incredible experience.

572
00:24:49,887 --> 00:24:51,489
And it was amazing.

573
00:24:51,522 --> 00:24:52,757
- And, Bruce, I'd
like to ask you.

574
00:24:52,790 --> 00:24:55,593
Can you give us an idea

of one or two questions

575
00:24:55,626 --> 00:24:57,362
you'd like to see?

576
00:24:57,395 --> 00:24:58,830
I'm sure there are
lots of questions.

577
00:24:58,863 --> 00:25:00,632
But one or two at
the forefront that

578
00:25:00,665 --> 00:25:02,267
you would like to
see this mission

579
00:25:02,300 --> 00:25:07,171
maybe answer or give
you hints to the answer.

580
00:25:07,204 --> 00:25:09,541
- Okay, so, this is
gonna get kind of nerdy.

581
00:25:09,574 --> 00:25:11,442
[laughter]

582
00:25:11,475 --> 00:25:16,481
But, when I was here in '76
and in the next summer in '77,

583
00:25:17,348 --> 00:25:19,083
I was working on a project that

584
00:25:19,116 --> 00:25:22,854
was looking at the deformation
of the Martian surface

585

00:25:22,887 --> 00:25:26,157
and how the surface was
pushed down under volcanoes

586
00:25:26,190 --> 00:25:28,159
and volcanic provinces on Mars.

587
00:25:28,192 --> 00:25:31,229
And I kept on running
against the problem

588
00:25:31,262 --> 00:25:33,531
that I needed to know the
thickness of the crust,

589
00:25:33,564 --> 00:25:35,300
because that affected
the gravity field.

590
00:25:35,333 --> 00:25:38,136
And the gravity field was one
of our basic measurements.

591
00:25:38,169 --> 00:25:40,104
And so, we just kind
of had to fake it,

592
00:25:40,137 --> 00:25:41,506
because we had no idea.

593
00:25:41,539 --> 00:25:43,541
So, we kind of had to
say, well, it has to be

594
00:25:43,574 --> 00:25:44,909
at least this thick and that.

595
00:25:44,942 --> 00:25:47,345
But it was just a bunch
of blah blah blah.

596
00:25:47,378 --> 00:25:48,680
[laughter]

597
00:25:48,713 --> 00:25:49,614
Honestly.

598
00:25:49,647 --> 00:25:50,982
And I thought "Gosh I really."

599
00:25:51,015 --> 00:25:52,183
- [Tom] That's a scientific
term, by the way.

600
00:25:52,216 --> 00:25:53,051
- That is, yes.

601
00:25:53,084 --> 00:25:55,386
Only three blahs.

602
00:25:55,419 --> 00:26:00,291
So, it's like I just needed
the thickness of the crust.

603
00:26:00,324 --> 00:26:01,859
If we only had a
seismometer there,

604
00:26:01,892 --> 00:26:04,162
it would be a snap to get
the thickness of the crust.

605
00:26:04,195 --> 00:26:06,531
And so, that's one
measurement that

606
00:26:06,564 --> 00:26:09,233
I would like to go back,
get that old paper,

607
00:26:09,266 --> 00:26:11,202
plug it in to see
how close I was.

608
00:26:11,235 --> 00:26:14,305
So, that's one that, personally,

609
00:26:14,338 --> 00:26:16,841
I'm really, really attached to.

610
00:26:16,874 --> 00:26:21,312
And then the other thing that
really kind of interests me,

611
00:26:21,345 --> 00:26:22,480
even though it's not really

612
00:26:22,513 --> 00:26:24,415
my particular
field of expertise,

613
00:26:24,448 --> 00:26:26,417
is the properties of the core.

614
00:26:26,450 --> 00:26:30,822
I mean, the core of Mars is
a really fascinating object.

615
00:26:30,855 --> 00:26:34,192
And it has tendrils
into so many aspects

616
00:26:34,225 --> 00:26:36,961
of the Martian evolution.

617
00:26:36,994 --> 00:26:40,064
And even the evolution of the
habitability of the surface

618
00:26:40,097 --> 00:26:41,733
in terms of the magnetic field.

619
00:26:41,766 --> 00:26:42,667
In terms of the amount of heat

620
00:26:42,700 --> 00:26:43,668
coming out of the interior.

621
00:26:43,701 --> 00:26:45,303
And so, when we start getting

622
00:26:45,336 --> 00:26:47,372
some information about the core,

623
00:26:47,405 --> 00:26:51,275
which, obviously, is the
hardest thing you can do

624
00:26:51,308 --> 00:26:53,878
is actually go down to the
very center of the planet

625
00:26:53,911 --> 00:26:57,181
through 1000 miles of rock

626
00:26:57,214 --> 00:27:00,218
and actually figure out
what's this made out of

627
00:27:00,251 --> 00:27:01,419
or how big is that.

628
00:27:01,452 --> 00:27:03,955
That's the other
piece of information

629

00:27:03,988 --> 00:27:06,825
I'm really looking forward
to understanding better.

630
00:27:08,225 --> 00:27:09,761
- Okay, we're gonna take
one more from the phone line

631
00:27:09,794 --> 00:27:11,129
and then I'll come
back to the room.

632
00:27:11,162 --> 00:27:12,363
We're gonna go to the AP next.

633
00:27:12,396 --> 00:27:14,232
Go ahead.

634
00:27:14,265 --> 00:27:15,166
- [Woman] Yes, hi.

635
00:27:15,199 --> 00:27:16,000
Can you hear me?

636
00:27:16,033 --> 00:27:16,868
- Yes.

637
00:27:18,235 --> 00:27:20,171
- [Woman] I'm wondering
how close to a bullseye

638
00:27:20,204 --> 00:27:22,340
did you get on the landing site

639
00:27:22,373 --> 00:27:24,409
and is there any
way to gauge how big

640
00:27:24,442 --> 00:27:26,911

that rock is in the foreground
of the first picture?

641
00:27:26,944 --> 00:27:28,513
[laughter]

642
00:27:28,546 --> 00:27:32,650
- Yeah, so, we got very,
very close to the bullseye.

643
00:27:32,683 --> 00:27:33,818
I don't have the final numbers,

644
00:27:33,851 --> 00:27:36,054
but we are very close
to the bullseye.

645
00:27:36,087 --> 00:27:37,255
That rock.

646
00:27:37,288 --> 00:27:39,023
Actually I'm really
happy about where it is.

647
00:27:39,056 --> 00:27:42,593
Because it's not where we
intend to place the instruments.

648
00:27:42,626 --> 00:27:43,761
So, that's great.

649
00:27:43,794 --> 00:27:44,996
And, if you look at it closely,

650
00:27:45,029 --> 00:27:47,098
it looks like there's
a little bit of sand

651
00:27:47,131 --> 00:27:48,332

that's been moved away from it.

652
00:27:48,365 --> 00:27:49,767
Either by the
descent engines maybe

653
00:27:49,800 --> 00:27:51,636
or by wind over time.

654
00:27:51,669 --> 00:27:53,705
Either of those is great.

655
00:27:53,738 --> 00:27:56,240
Because what that
means is the area

656
00:27:56,273 --> 00:27:59,343
in front of the lander is
likely mostly sandy soil.

657
00:27:59,376 --> 00:28:02,280
Which is gonna be great for
the HP cubed instrument.

658
00:28:04,682 --> 00:28:06,551
- Okay, we're gonna
go back into the room.

659
00:28:06,584 --> 00:28:08,653
Let's go on this side.

660
00:28:08,686 --> 00:28:11,689
Emily, if we can get a
microphone right there.

661
00:28:11,722 --> 00:28:12,557
Thanks.

662
00:28:14,959 --> 00:28:16,627

- Hi, Emily Lakdawalla
with the Planetary Society.

663
00:28:16,660 --> 00:28:19,197
A detailed question.

664
00:28:19,230 --> 00:28:22,100
Do you know how
large the pebbles are

665
00:28:22,133 --> 00:28:23,735
that you can see
in front of you?

666
00:28:23,768 --> 00:28:25,303
And then a question
that I keep getting

667
00:28:25,336 --> 00:28:26,804
asked by people online is

668
00:28:26,837 --> 00:28:29,507
how many impacts do you
hope to be able to detect

669
00:28:29,540 --> 00:28:33,344
during InSight's mission now
that you're on the surface?

670
00:28:33,377 --> 00:28:35,446
- Okay, I haven't really had
a chance to look at this image

671
00:28:35,479 --> 00:28:36,948
in any detail.

672
00:28:36,981 --> 00:28:39,784
And it's kind of difficult
to judge the size of things.

673
00:28:39,817 --> 00:28:42,186
Because this is
a fisheye camera.

674
00:28:42,219 --> 00:28:43,688
So, it's a very distorted view.

675
00:28:43,721 --> 00:28:46,524
It's actually showing
almost the entire area

676
00:28:46,557 --> 00:28:48,960
in front of the lander
kind of compressed

677
00:28:48,993 --> 00:28:51,562
into a narrower image.

678
00:28:51,595 --> 00:28:54,298
And so, we have
experts on the team

679
00:28:54,331 --> 00:28:56,134
I'm sure are already
poring over this.

680
00:28:56,167 --> 00:28:58,102
And, in the next day or so,

681
00:28:58,135 --> 00:29:00,404
we'll have some measurement
of the dimensions

682
00:29:00,437 --> 00:29:01,739
of some of these rocks.

683
00:29:01,772 --> 00:29:04,275
And what was the
second question again?

684
00:29:04,308 --> 00:29:05,176
- [Emily] How many impacts?

685
00:29:05,209 --> 00:29:06,677
- How many impacts?

686
00:29:06,710 --> 00:29:09,380
Of course, that's one of the
things we want to measure.

687
00:29:09,413 --> 00:29:12,917
Our estimate is we should
probably see something like

688
00:29:12,950 --> 00:29:14,886
maybe a half a dozen impacts.

689
00:29:14,919 --> 00:29:16,521
Maybe twice as many as that.

690
00:29:16,554 --> 00:29:17,588
Maybe half as many as that.

691
00:29:17,621 --> 00:29:18,756
But somewhere in the order of

692
00:29:18,789 --> 00:29:21,593
half a dozen to a dozen, I hope.

693
00:29:23,527 --> 00:29:25,797
- Okay, we're gonna take
a question on this side.

694
00:29:28,566 --> 00:29:29,834
- Thank you very much.

695
00:29:29,867 --> 00:29:31,803

Tariq Malik with space.com.

696
00:29:31,836 --> 00:29:34,205
I think my question's
for Bruce or for Tom.

697
00:29:34,238 --> 00:29:35,973
We see a lot of excited
people here in the room

698
00:29:36,006 --> 00:29:37,208
that worked on the mission.

699
00:29:37,241 --> 00:29:39,010
I'm wondering kind
of what comes next.

700
00:29:39,043 --> 00:29:39,844
Is there a party?

701
00:29:39,877 --> 00:29:40,778
If so, when?

702
00:29:40,811 --> 00:29:42,246
[laughter]

703
00:29:42,279 --> 00:29:43,948
And does everyone
get the night off

704
00:29:43,981 --> 00:29:47,018
or when do they hit
Mars time for InSight?

705
00:29:47,051 --> 00:29:47,952
Thank you.

706
00:29:47,985 --> 00:29:49,821
- Yeah, so, for the folks that

707
00:29:49,854 --> 00:29:51,055
I just fired a little bit ago,

708
00:29:51,088 --> 00:29:53,224
the nav team and the EDL team,

709
00:29:53,257 --> 00:29:56,360
they're welcome to go off
and have a celebration.

710
00:29:56,393 --> 00:29:57,728
But the surface operations team,

711
00:29:57,761 --> 00:30:00,298
actually, their work is
just gonna get started

712
00:30:00,331 --> 00:30:02,266
when we get the Odyssey pass

713
00:30:02,299 --> 00:30:03,835
a little later this evening.

714
00:30:03,868 --> 00:30:06,571
That's when we're gonna start
planning for the next sol.

715
00:30:06,604 --> 00:30:07,405
The next day.

716
00:30:07,438 --> 00:30:08,239
Sols on Mars.

717
00:30:08,272 --> 00:30:09,473
Days on Earth.

718
00:30:09,506 --> 00:30:10,975

We'll start planning
for that next sol.

719
00:30:11,008 --> 00:30:13,010
And maybe, Elizabeth, you
can tell a little about

720
00:30:13,043 --> 00:30:14,412
some of the things
we're gonna be doing

721
00:30:14,445 --> 00:30:16,380
the first coupe sols.

722
00:30:16,413 --> 00:30:17,915
- Yeah, so, the
first couple sols

723
00:30:17,948 --> 00:30:20,685
we are going to assess the
health of the robotic arm.

724
00:30:20,718 --> 00:30:23,321
And then, tomorrow,
we uplink checkouts

725
00:30:23,354 --> 00:30:24,789
for the actual
instruments themselves

726
00:30:24,822 --> 00:30:26,991
to check them out and assess
their health, as well.

727
00:30:27,024 --> 00:30:29,594
So, in addition to obviously
monitoring the lander

728
00:30:29,627 --> 00:30:31,996
and making sure those

solar arrays have deployed,

729
00:30:32,029 --> 00:30:33,497
we want to check out
all the instruments that

730
00:30:33,530 --> 00:30:34,765
have gone with us.

731
00:30:34,798 --> 00:30:36,067
To be prepared to put
them on the surface

732
00:30:36,100 --> 00:30:37,768
and to collect all
that science data.

733
00:30:37,801 --> 00:30:39,070
Over the rest of the week,

734
00:30:39,103 --> 00:30:41,272
we also will open the
covers on the cameras

735
00:30:41,305 --> 00:30:42,974
and do a more detailed survey

736
00:30:43,007 --> 00:30:44,976
of the work space in
front of the lander

737
00:30:45,009 --> 00:30:46,477
where we want to
put the instruments

738
00:30:46,510 --> 00:30:48,880
so we can choose the best
places for them to go.

739

00:30:52,149 --> 00:30:54,585
- Okay, right there in
the center aisle there.

740
00:30:54,618 --> 00:30:55,519
- Hi there.

741
00:30:55,552 --> 00:30:56,454
Margaret Crow, Mechanics Radio.

742
00:30:56,487 --> 00:30:57,288
Very exciting to be here.

743
00:30:57,321 --> 00:30:58,422
It was my first time.

744
00:30:58,455 --> 00:31:00,424
And we talk a lot about.

745
00:31:00,457 --> 00:31:02,260
This is for Tom
and Bruce, as well.

746
00:31:02,293 --> 00:31:05,563
Looking into the
interior of Mars.

747
00:31:05,596 --> 00:31:07,298
Why should we all
care about this?

748
00:31:07,331 --> 00:31:08,633
I know it's exciting.

749
00:31:08,666 --> 00:31:10,134
But why should we all care?

750
00:31:10,167 --> 00:31:14,672
What do we expect to get

out of digging into Mars?

751
00:31:16,106 --> 00:31:17,975
- Okay, so, the reason why
we're digging into Mars

752
00:31:18,008 --> 00:31:20,511
is really just to better
understand not just Mars,

753
00:31:20,544 --> 00:31:21,979
but the Earth itself.

754
00:31:22,012 --> 00:31:24,515
And so, one of the
things, I think,

755
00:31:24,548 --> 00:31:29,554
that is a source of
our natural curiosity

756
00:31:30,754 --> 00:31:32,290
is how did we get to
where we are today?

757
00:31:32,323 --> 00:31:34,692
How does this planet
that's under our feet.

758
00:31:34,725 --> 00:31:36,227
How did it form?

759
00:31:36,260 --> 00:31:38,896
How did it get to be a place
with mountains and oceans

760
00:31:38,929 --> 00:31:41,565
and breathable air
and things like that?

761
00:31:41,598 --> 00:31:44,101
And we're trying
to go back in time

762
00:31:44,134 --> 00:31:45,069
to the very earliest stages

763
00:31:45,102 --> 00:31:47,772
of the formation of our planet.

764
00:31:47,805 --> 00:31:50,107
And we're looking for evidence

765
00:31:50,140 --> 00:31:52,510
which is no longer
available on the Earth.

766
00:31:52,543 --> 00:31:55,012
It's all been erased
by plate tectonics,

767
00:31:55,045 --> 00:31:59,417
by mantle convection, by our
active geological processes

768
00:31:59,450 --> 00:32:00,918
that are eroding everything.

769
00:32:00,951 --> 00:32:05,022
And so, sort of the fingerprints
of those early processes

770
00:32:05,055 --> 00:32:06,490
just aren't there on the Earth.

771
00:32:06,523 --> 00:32:07,858
We can go back to Mars.

772

00:32:07,891 --> 00:32:12,897
On Mars, all those
things that were formed

773
00:32:14,431 --> 00:32:15,399
in the first few
tens of millions of
years after formation

774
00:32:15,432 --> 00:32:16,901
are still frozen in place.

775
00:32:16,934 --> 00:32:19,437
And so, we can basically
use Mars as a time machine

776
00:32:19,470 --> 00:32:21,739
to go back and look at what
the Earth must have looked like

777
00:32:21,772 --> 00:32:24,608
a few tens of millions
of years after it formed.

778
00:32:24,641 --> 00:32:29,013
And, by doing that, we can then
look at our physical models,

779
00:32:29,046 --> 00:32:31,849
our theories of how
the Earth evolved,

780
00:32:31,882 --> 00:32:34,719
and understand why the
Earth became the way it is.

781
00:32:34,752 --> 00:32:37,388
If you look at
Earth's twin, Venus,

782

00:32:37,421 --> 00:32:38,956
it's almost the same size.

783
00:32:38,989 --> 00:32:41,892
But it's an extremely
different surface environment.

784
00:32:41,925 --> 00:32:43,160
It's very hot.

785
00:32:43,193 --> 00:32:44,962
The atmosphere is
very sulfurous.

786
00:32:44,995 --> 00:32:47,565
There's not much oxygen.

787
00:32:47,598 --> 00:32:49,567
And yet why is it
different than the Earth?

788
00:32:49,600 --> 00:32:52,403
And we've had some
theories about that.

789
00:32:52,436 --> 00:32:53,771
And they generally
have to do with

790
00:32:53,804 --> 00:32:56,507
very small
differences in the way

791
00:32:56,540 --> 00:32:58,642
the planets evolve from
that initial state.

792
00:32:58,675 --> 00:33:00,978
And so, Mars will help
us refine our models,

793
00:33:01,011 --> 00:33:04,181
understand why a planet
might go one way like Venus

794
00:33:04,214 --> 00:33:05,649
or the other way like the Earth.

795
00:33:05,682 --> 00:33:07,585
And, finally, when
we actually look at

796
00:33:07,618 --> 00:33:09,587
the planets around
other stars, even,

797
00:33:09,620 --> 00:33:12,656
we can actually
begin to estimate

798
00:33:12,689 --> 00:33:14,025
which ones might be habitable

799
00:33:14,058 --> 00:33:16,193
and which ones may
be not habitable

800
00:33:16,226 --> 00:33:18,662
based on some of the
geophysical understanding

801
00:33:18,695 --> 00:33:20,999
that we'll get just
by looking at Mars.

802
00:33:22,800 --> 00:33:24,268
- Okay, I'm gonna go
to the phone line now

803

00:33:24,301 --> 00:33:26,504
and then I'll come back in and
check in with social media.

804
00:33:26,537 --> 00:33:28,005
Okay, let's go to
the phone line.

805
00:33:28,038 --> 00:33:30,041
Irish TV, go ahead.

806
00:33:31,275 --> 00:33:32,309
- [Man] Thanks very
much, Veronica.

807
00:33:32,342 --> 00:33:33,778
I'm actually in France.

808
00:33:33,811 --> 00:33:35,746
[laughter]

809
00:33:35,779 --> 00:33:39,683
The Cite de l'espace in Toulouse

810
00:33:39,716 --> 00:33:42,720
where there was a huge
crowd watching this event

811
00:33:42,753 --> 00:33:44,288
for obvious reasons.

812
00:33:44,321 --> 00:33:46,424
And, when the first
picture popped up,

813
00:33:46,457 --> 00:33:49,060
a couple of questions
came to mind.

814

00:33:49,093 --> 00:33:50,728
I mean, one for Tom.

815
00:33:50,761 --> 00:33:53,297
I mean, are you proud
of yourself that

816
00:33:53,330 --> 00:33:57,268
you have managed to land
in the most boring place

817
00:33:57,301 --> 00:34:00,671
that anyone has landed
on Mars in history?

818
00:34:01,872 --> 00:34:05,309
And, for Elizabeth, are
you embarrassed that

819
00:34:05,342 --> 00:34:08,579
it's going to be, apparently
from these pictures,

820
00:34:08,612 --> 00:34:13,618
so incredibly easy to place
the seismometer on the surface?

821
00:34:14,218 --> 00:34:16,153
[laughter]

822
00:34:16,186 --> 00:34:19,156
- Well, I'm very,
very happy that

823
00:34:19,189 --> 00:34:21,225
it looks like we have
an incredibly safe

824
00:34:21,258 --> 00:34:23,494
and boring looking

landing location.

825
00:34:23,527 --> 00:34:24,728
[laughter]

826
00:34:24,761 --> 00:34:26,197
That's exactly what
we were going for.

827
00:34:26,230 --> 00:34:29,333
It's what the landing site
selection people promised me.

828
00:34:29,366 --> 00:34:32,169
They promised me
sandy with no rocks.

829
00:34:32,202 --> 00:34:33,637
There's one rock.

830
00:34:33,670 --> 00:34:34,338
So, I'm gonna have to
talk to them a little bit.

831
00:34:34,371 --> 00:34:35,639
[laughter]

832
00:34:35,672 --> 00:34:37,141
And there are certainly
some small rocks.

833
00:34:37,174 --> 00:34:38,676
But those look
pretty manageable.

834
00:34:38,709 --> 00:34:40,244
It's hard to tell in
this picture, though,

835

00:34:40,277 --> 00:34:42,379
how easy it will necessarily be.

836
00:34:42,412 --> 00:34:44,181
You can't tell if there's
any slopes or anything.

837
00:34:44,214 --> 00:34:46,383
We expect to get that later.

838
00:34:46,416 --> 00:34:48,319
But it does indeed look to be

839
00:34:48,352 --> 00:34:50,421
pretty much like a parking lot.

840
00:34:50,454 --> 00:34:51,655
I think Elizabeth's still gonna

841
00:34:51,688 --> 00:34:53,924
have her job cut out for her,

842
00:34:53,957 --> 00:34:56,060
but I'll let you answer
that question yourself.

843
00:34:56,093 --> 00:34:58,562
- Yeah, it was actually great
when the image popped up

844
00:34:58,595 --> 00:35:00,064
in the room with all the science

845
00:35:00,097 --> 00:35:01,265
and instrument experts there.

846
00:35:01,298 --> 00:35:02,833
Everyone gathered
around the very front

847
00:35:02,866 --> 00:35:05,236
and was immediately deciding
where can we place instruments.

848
00:35:05,269 --> 00:35:06,904
Where were there
rocks in the way.

849
00:35:06,937 --> 00:35:09,540
And it's amazing that
it's actually so nice.

850
00:35:09,573 --> 00:35:11,275
And it appears to
be quite empty.

851
00:35:11,308 --> 00:35:13,711
As Tom said, we have some
more assessments still to do

852
00:35:13,744 --> 00:35:15,246
to make sure it meets
the requirements

853
00:35:15,279 --> 00:35:16,780
for where we can
put the instruments

854
00:35:16,813 --> 00:35:19,517
at our default locations or
any changes we have to make

855
00:35:19,550 --> 00:35:20,985
to go to a new location.

856
00:35:21,018 --> 00:35:22,920
But this is a great indication.

857

00:35:22,953 --> 00:35:24,555
We were all certain
that that first image

858
00:35:24,588 --> 00:35:26,790
would help us determine
how difficult of a job

859
00:35:26,823 --> 00:35:28,259
we would have in
placing the instruments.

860
00:35:28,292 --> 00:35:29,793
And I'm very happy
that it looks like

861
00:35:29,826 --> 00:35:32,530
we'll be able to do it
quite easily we hope.

862
00:35:34,097 --> 00:35:35,499
- [Veronica] Okay, let's
go to social media.

863
00:35:35,532 --> 00:35:36,734
Do you have some good
questions there, Stephanie?

864
00:35:36,767 --> 00:35:38,536
- Absolutely, the
Internet is exploding

865
00:35:38,569 --> 00:35:39,937
with questions and joy.

866
00:35:39,970 --> 00:35:41,839
They're almost as
excited about the landing

867
00:35:41,872 --> 00:35:44,642

as they are about the epic
handshake in mission control.

868
00:35:44,675 --> 00:35:46,844
[laughter]

869
00:35:46,877 --> 00:35:48,412
So, we are getting
a lot of questions

870
00:35:48,445 --> 00:35:51,715
about the cameras and the
lens covers in particular.

871
00:35:51,748 --> 00:35:52,950
In particular.

872
00:35:52,983 --> 00:35:56,887
So, how long till we
remove the lens cover?

873
00:35:56,920 --> 00:35:59,490
And will it be
permanently removed

874
00:35:59,523 --> 00:36:02,960
or will it be able to go
back on during a dust storm?

875
00:36:02,993 --> 00:36:04,195
- I think you probably.

876
00:36:04,228 --> 00:36:05,796
- Yeah, so, the lens
covers, once removed,

877
00:36:05,829 --> 00:36:06,830
are permanently removed.

878

00:36:06,863 --> 00:36:08,332
They cannot be put back on.

879
00:36:08,365 --> 00:36:10,601
So, once we pop them, they
are popped off entirely.

880
00:36:10,634 --> 00:36:13,671
I believe the first
cover we open on sol two.

881
00:36:13,704 --> 00:36:15,005
So, right now, we're sol zero.

882
00:36:15,038 --> 00:36:16,640
And a Martian day
is called a sol.

883
00:36:16,673 --> 00:36:18,576
So, on sol two, we should
open the first cover.

884
00:36:18,609 --> 00:36:21,178
And, on sol three, the
cover for the second camera.

885
00:36:21,211 --> 00:36:22,012
So, this week.

886
00:36:22,045 --> 00:36:23,280
- Fantastic.

887
00:36:23,313 --> 00:36:25,583
And Denise Winston would
like to thank all of you

888
00:36:25,616 --> 00:36:27,851
for making her birthday
a very exciting day.

889
00:36:27,884 --> 00:36:29,086
[laughter]

890
00:36:29,119 --> 00:36:31,288
And, for the administrator,

891
00:36:31,321 --> 00:36:33,424
she asks how long
do you estimate

892
00:36:33,457 --> 00:36:36,193
it will be before we
land a person on Mars?

893
00:36:36,226 --> 00:36:37,061
- Oh wow.

894
00:36:39,663 --> 00:36:41,465
I'm going with the mid 2030s.

895
00:36:42,699 --> 00:36:43,701
That's very aggressive.

896
00:36:43,734 --> 00:36:44,635
But here's what we're doing.

897
00:36:44,668 --> 00:36:47,137
We're going to the Moon.

898
00:36:47,170 --> 00:36:49,707
That's part of the president's
first space policy directive.

899
00:36:49,740 --> 00:36:51,208
To go to the Moon.

900
00:36:51,241 --> 00:36:53,244
But he wants to go in a way

that we've never done before.

901
00:36:53,277 --> 00:36:55,512
This time, we're
gonna go to stay.

902
00:36:55,545 --> 00:36:57,681
So, we're gonna build a
sustainable architecture.

903
00:36:57,714 --> 00:37:00,551
In other words, we can go
back and forth again and again

904
00:37:00,584 --> 00:37:03,854
with landers, with
robots, with rovers,

905
00:37:03,887 --> 00:37:05,990
and even with humans.

906
00:37:06,023 --> 00:37:07,858
It's gonna be an
open architecture.

907
00:37:07,891 --> 00:37:10,561
So, we know what happens
with reusability.

908
00:37:10,594 --> 00:37:12,263
We've seen that with
the cost of launch

909
00:37:12,296 --> 00:37:14,164
and the access to
space with reusability.

910
00:37:14,197 --> 00:37:15,032
Cost goes down.

911
00:37:15,065 --> 00:37:16,467
Access goes up.

912
00:37:16,500 --> 00:37:18,102
Well, we want the
entire architecture

913
00:37:18,135 --> 00:37:20,070
between the Earth and
the Moon to be reusable.

914
00:37:20,103 --> 00:37:21,939
We want launches to be reusable.

915
00:37:21,972 --> 00:37:24,375
We want tugs from Earth
orbit to lunar orbit

916
00:37:24,408 --> 00:37:25,809
to be reusable.

917
00:37:25,842 --> 00:37:28,779
We want a reusable command
module in orbit around the Moon.

918
00:37:28,812 --> 00:37:30,180
We call it Gateway.

919
00:37:30,213 --> 00:37:32,583
And we want reusable
landers going back and forth

920
00:37:32,616 --> 00:37:35,085
to the surface of the
Moon over and over again.

921
00:37:35,118 --> 00:37:37,755
The entire architecture
needs to be reusable.

922
00:37:37,788 --> 00:37:38,989
It needs to be open.

923
00:37:39,022 --> 00:37:40,924
In other words,
the way we do data,

924
00:37:40,957 --> 00:37:43,627
the way we do communications,
the way we do docking,

925
00:37:43,660 --> 00:37:45,596
all of it is open and
available to the public.

926
00:37:45,629 --> 00:37:47,264
Once we achieve that,

927
00:37:47,297 --> 00:37:49,099
then we can have
international partners

928
00:37:49,132 --> 00:37:50,901
and commercial partners join us.

929
00:37:50,934 --> 00:37:54,405
And, ultimately, we can build
an international coalition

930
00:37:54,438 --> 00:37:58,008
of nations to have a
sustainable return to the Moon

931
00:37:58,041 --> 00:37:59,243
for the long term.

932
00:37:59,276 --> 00:38:01,045
Now, the reason

that's important.

933
00:38:01,078 --> 00:38:03,047
Here's what we know
about the Moon.

934
00:38:03,080 --> 00:38:05,282
It's a three day journey home.

935
00:38:05,315 --> 00:38:07,351
Which means, if
something goes wrong,

936
00:38:07,384 --> 00:38:08,852
we can still come home.

937
00:38:08,885 --> 00:38:10,821
We've seen that with Apollo 13.

938
00:38:10,854 --> 00:38:13,190
So, we have a perfect
proving ground

939
00:38:13,223 --> 00:38:15,359
that is part of the
Earth-Moon system.

940
00:38:15,392 --> 00:38:17,261
The Moon never leaves the Earth.

941
00:38:17,294 --> 00:38:19,596
Mars is a whole
different ballgame.

942
00:38:19,629 --> 00:38:22,700
But what we can do is
we can prove technology.

943
00:38:22,733 --> 00:38:24,401

We can retire risk.

944
00:38:24,434 --> 00:38:27,471
And ultimately prove
human physiology,

945
00:38:27,504 --> 00:38:29,807
which is a whole 'nother
dynamic that we're working on

946
00:38:29,840 --> 00:38:32,176
on the International
Space Station right now.

947
00:38:32,209 --> 00:38:34,478
And then take all of
that and replicate

948
00:38:34,511 --> 00:38:36,747
all of those capabilities
and technologies

949
00:38:36,780 --> 00:38:41,518
as much as possible
for a trip to Mars.

950
00:38:41,551 --> 00:38:43,253
Now, we talk about the Gateway

951
00:38:43,286 --> 00:38:46,023
being that reusable
command module.

952
00:38:46,056 --> 00:38:47,358
We think back to Apollo.

953
00:38:47,391 --> 00:38:49,593
We're all so proud of Apollo.

954

00:38:49,626 --> 00:38:51,995
What an amazing
accomplishment Apollo was.

955
00:38:52,028 --> 00:38:54,298
The entire thing was thrown away

956
00:38:54,331 --> 00:38:56,900
except for that tiny
capsule at the top.

957
00:38:56,933 --> 00:38:58,635
So, what we want to do
now is we don't wanna

958
00:38:58,668 --> 00:38:59,870
throw away the whole thing.

959
00:38:59,903 --> 00:39:01,171
We want everything
to be reusable.

960
00:39:01,204 --> 00:39:02,940
Or at least as much as possible.

961
00:39:02,973 --> 00:39:06,043
So that the mission is
ultimately sustainable.

962
00:39:06,076 --> 00:39:09,913
If we can achieve that
and we can replicate

963
00:39:09,946 --> 00:39:13,217
as much of it as possible
for a trip to Mars.

964
00:39:13,250 --> 00:39:16,520
We talk about Gateway being
a reusable command module

965
00:39:16,553 --> 00:39:19,857
in orbit around the
Moon for 15 years.

966
00:39:19,890 --> 00:39:22,292
The first Gateway is
all about discovering

967
00:39:22,325 --> 00:39:24,395
more about the Moon than
we've ever discovered before.

968
00:39:24,428 --> 00:39:27,097
Solar electric propulsion,
it can go to the L1 point.

969
00:39:27,130 --> 00:39:28,332
It can go to the L2 point.

970
00:39:28,365 --> 00:39:30,167
It can get us to more
parts of the Moon

971
00:39:30,200 --> 00:39:31,301
than we've ever been to before.

972
00:39:31,334 --> 00:39:32,302
Think about the Moon.

973
00:39:32,335 --> 00:39:34,872
2008, India made
a discovery that

974
00:39:34,905 --> 00:39:36,874
there's potentially
a lot of water ice

975
00:39:36,907 --> 00:39:38,142

on the surface of the Moon.

976
00:39:38,175 --> 00:39:40,043
2009, we definitively know that

977
00:39:40,076 --> 00:39:42,880
there's potentially
hundreds of billions of tons

978
00:39:42,913 --> 00:39:44,648
of water ice on the
surface of the Moon.

979
00:39:44,681 --> 00:39:47,284
Water ice represents
life support.

980
00:39:47,317 --> 00:39:48,118
Air to breathe.

981
00:39:48,151 --> 00:39:49,286
Water to drink.

982
00:39:49,319 --> 00:39:50,587
But it's also
hydrogen and oxygen.

983
00:39:50,620 --> 00:39:52,222
Which is rocket propulsion.

984
00:39:52,255 --> 00:39:54,925
On the surface of the Moon in
hundreds of billions of tons.

985
00:39:54,958 --> 00:39:56,493
So, we talk about in situ

986
00:39:56,526 --> 00:39:59,463
resource utilization

capabilities on the Moon.

987
00:39:59,496 --> 00:40:01,665
We can prove a ton
of stuff on the Moon.

988
00:40:01,698 --> 00:40:05,068
And accelerate, once
we've done that,

989
00:40:05,101 --> 00:40:07,171
accelerate the trip to Mars.

990
00:40:07,204 --> 00:40:09,673
The first command module,
we call it Gateway,

991
00:40:09,706 --> 00:40:11,475
is a reusable command
module around the Moon

992
00:40:11,508 --> 00:40:12,609
to get us to more
parts of the Moon

993
00:40:12,642 --> 00:40:14,445
than we've ever gone to before.

994
00:40:14,478 --> 00:40:17,481
Remember, definitively, we
learned in 2008 and 2009

995
00:40:17,514 --> 00:40:20,083
that there was hundreds of
billions of tons of water ice

996
00:40:20,116 --> 00:40:21,618
on the surface of the Moon.

997

00:40:21,651 --> 00:40:25,055
We need to be able to get
to more parts of the Moon

998
00:40:25,088 --> 00:40:26,623
than we've ever been
able to get to before

999
00:40:26,656 --> 00:40:29,226
to learn what we don't
already know about the Moon.

1000
00:40:29,259 --> 00:40:30,360
But, while we do this,

1001
00:40:30,393 --> 00:40:31,929
we're proving capability
and technology

1002
00:40:31,962 --> 00:40:34,465
to go to Mars even
faster than we could go

1003
00:40:34,498 --> 00:40:36,166
if we didn't use
the Moon as a tool.

1004
00:40:36,199 --> 00:40:41,071
So, the reality is, yes,
your nation right now

1005
00:40:41,104 --> 00:40:43,140
is extremely committed
to getting to Mars

1006
00:40:43,173 --> 00:40:46,176
and using the Moon as a tool
to achieve that objective

1007
00:40:46,209 --> 00:40:47,578

as fast as possible.

1008
00:40:50,313 --> 00:40:53,016
- Okay, we're gonna take
another question here.

1009
00:40:53,049 --> 00:40:54,351
Stand by with social media.

1010
00:40:54,384 --> 00:40:55,586
Let's go back here.

1011
00:40:55,619 --> 00:40:56,921
Can we get the microphone?

1012
00:41:01,825 --> 00:41:02,726
- Thank you.

1013
00:41:02,759 --> 00:41:04,361
Irene Klotz with Aviation Week.

1014
00:41:04,394 --> 00:41:06,196
I think it's for Andy.

1015
00:41:06,229 --> 00:41:08,232
Can you describe
a little bit about

1016
00:41:08,265 --> 00:41:10,334
what other data's
gonna be coming back

1017
00:41:10,367 --> 00:41:13,804
from the MarCO satellites that
you didn't get back already?

1018
00:41:13,837 --> 00:41:16,573
And is there any consideration

1019
00:41:16,606 --> 00:41:20,478
to putting MarCO-type
satellites on Mars 2020?

1020
00:41:21,611 --> 00:41:23,080
- The data that's
coming back from MarCO

1021
00:41:23,113 --> 00:41:26,950
really does a deeper dive
into what we recorded onboard

1022
00:41:26,983 --> 00:41:29,786
in terms of the health
of the spacecraft itself.

1023
00:41:29,819 --> 00:41:31,622
During ETL, we were focused on

1024
00:41:31,655 --> 00:41:32,890
getting that InSight data down.

1025
00:41:32,923 --> 00:41:34,992
So, we had just a
very narrow pipe that

1026
00:41:35,025 --> 00:41:37,294
we could put a little bit
of information about MarCO,

1027
00:41:37,327 --> 00:41:38,729
about its temperatures onboard,

1028
00:41:38,762 --> 00:41:40,297
about the energy
that it was using,

1029
00:41:40,330 --> 00:41:41,565
how well it was oriented,

1030
00:41:41,598 --> 00:41:43,000
and how well it could
support the data

1031
00:41:43,033 --> 00:41:45,002
coming from InSight there.

1032
00:41:45,035 --> 00:41:47,204
We'll be collecting more
in depth information

1033
00:41:47,237 --> 00:41:48,739
about the spacecraft itself.

1034
00:41:48,772 --> 00:41:50,407
We'll look at the trajectory
that it actually flew by.

1035
00:41:50,440 --> 00:41:51,775
How stable it was.

1036
00:41:51,808 --> 00:41:53,510
Actually, the
orbit determination

1037
00:41:53,543 --> 00:41:54,878
was quite good on
MarCO in there.

1038
00:41:54,911 --> 00:41:56,380
So, that tells us
how well we were able

1039
00:41:56,413 --> 00:41:58,448
to fly by Mars and prepare
for that journey there.

1040
00:41:58,481 --> 00:42:00,951

And all of this is
really stored in

1041
00:42:00,984 --> 00:42:03,053
onboard memory that we'll
be slowly bringing down.

1042
00:42:03,086 --> 00:42:05,789
As well as, possible,
more images that we took

1043
00:42:05,822 --> 00:42:08,225
during today's events on here.

1044
00:42:08,258 --> 00:42:11,295
Now, on top of that,
MarCO was set to support

1045
00:42:11,328 --> 00:42:12,829
the InSight lander.

1046
00:42:12,862 --> 00:42:14,965
MarCO A passed through a very
unique trajectory behind Mars.

1047
00:42:14,998 --> 00:42:16,900
So, we actually were
occluded, or blocked,

1048
00:42:16,933 --> 00:42:18,769
by the planet in
respect to Earth.

1049
00:42:18,802 --> 00:42:21,271
And so, with that,
we're actually doing
atmospheric science

1050
00:42:21,304 --> 00:42:23,106
as we're passing by Mars.

1051
00:42:23,139 --> 00:42:24,841
And we'll be digging
into that data as well

1052
00:42:24,874 --> 00:42:27,110
over the upcoming weeks.

1053
00:42:27,143 --> 00:42:29,046
So, not only did we do
technology demonstration.

1054
00:42:29,079 --> 00:42:30,914
Not only were we able
to get images back.

1055
00:42:30,947 --> 00:42:32,649
But we are able to do some
science there, as well.

1056
00:42:32,682 --> 00:42:34,851
As for things into the future,

1057
00:42:34,884 --> 00:42:36,654
we've shown that
this type of craft

1058
00:42:37,787 --> 00:42:38,722
can support these types
of missions on here.

1059
00:42:38,755 --> 00:42:40,023
Should that mission need it.

1060
00:42:40,056 --> 00:42:41,858
And we'll be looking at
opportunities as we go

1061
00:42:41,891 --> 00:42:43,360

to see where they're necessary

1062
00:42:43,393 --> 00:42:45,462
and how well we can
support in the future.

1063
00:42:46,930 --> 00:42:49,533
- Okay, going to this side of
the room, right in the back.

1064
00:42:49,566 --> 00:42:51,034
- Hi, Sophie Sanchez.

1065
00:42:51,067 --> 00:42:52,970
Cosmic Chicago with Chicago Now.

1066
00:42:53,003 --> 00:42:54,404
My question's for Jim.

1067
00:42:54,437 --> 00:42:55,806
The last time we spoke,

1068
00:42:55,839 --> 00:42:58,442
you mentioned that
NASA was prioritizing

1069
00:42:58,475 --> 00:43:03,347
human spaceflight programs
to avoid any gaps.

1070
00:43:03,380 --> 00:43:05,482
Like we're experiencing now.

1071
00:43:05,515 --> 00:43:07,150
My question is what
is the agency doing

1072
00:43:07,183 --> 00:43:10,287
to avoid any gaps in

planetary missions?

1073
00:43:10,320 --> 00:43:13,323
- So, that's a great question.

1074
00:43:13,356 --> 00:43:14,725
What we have to do as a country

1075
00:43:14,758 --> 00:43:17,461
is we have to look at a
portfolio of planetary missions.

1076
00:43:17,494 --> 00:43:20,230
And, of course, some missions
are what we would call

1077
00:43:20,263 --> 00:43:21,665
flagship missions.

1078
00:43:21,698 --> 00:43:23,667
Very big, large,
expensive missions.

1079
00:43:23,700 --> 00:43:25,869
And other missions
are not so expensive,

1080
00:43:25,902 --> 00:43:27,304
but very capable.

1081
00:43:27,337 --> 00:43:29,373
And so, what we're trying
to do is figure out

1082
00:43:29,406 --> 00:43:31,875
what the right balance
of portfolio is.

1083
00:43:31,908 --> 00:43:33,677

You know, if every mission

1084
00:43:33,710 --> 00:43:36,814
is a flagship mission
and they fail,

1085
00:43:37,981 --> 00:43:40,183
then that's a lot of
money and a lot of time

1086
00:43:40,216 --> 00:43:42,953
that ultimately we
don't want to put

1087
00:43:42,986 --> 00:43:44,588
all of our eggs into one basket.

1088
00:43:44,621 --> 00:43:48,525
So, we're looking at creating
the most balanced portfolio

1089
00:43:48,558 --> 00:43:50,560
that includes small
missions and large missions.

1090
00:43:50,593 --> 00:43:55,165
I think a perfect
example is New Horizons.

1091
00:43:55,198 --> 00:43:56,933
Which, of course,
we're all familiar with

1092
00:43:56,966 --> 00:43:59,803
the 2014 flyby of Pluto.

1093
00:43:59,836 --> 00:44:03,974
And now it's, no kidding,
in the Kuiper Belt.

1094
00:44:04,007 --> 00:44:08,345
And it's gonna be taking
pictures Ultima Thule

1095
00:44:08,378 --> 00:44:12,149
here in just a matter of a
month from very close range.

1096
00:44:12,182 --> 00:44:14,051
Which has never
been done before.

1097
00:44:14,084 --> 00:44:16,720
And that was a mission that was.

1098
00:44:16,753 --> 00:44:17,954
You look at return
on investment.

1099
00:44:17,987 --> 00:44:21,491
It was a tremendously
inexpensive mission

1100
00:44:21,524 --> 00:44:23,460
for the amount of
science and data

1101
00:44:23,493 --> 00:44:24,928
that we're getting from it.

1102
00:44:24,961 --> 00:44:28,198
So, I think we need a
good balance of portfolio

1103
00:44:28,231 --> 00:44:31,101
that includes high
end kind of missions

1104
00:44:31,134 --> 00:44:33,036

that are what we call
flagship missions

1105
00:44:33,069 --> 00:44:35,939
and others that are smaller to
keep that balanced portfolio.

1106
00:44:35,972 --> 00:44:38,809
To be clear, we want
to make sure that

1107
00:44:38,842 --> 00:44:43,847
the planetary science missions,
the heliophysics missions,

1108
00:44:45,014 --> 00:44:46,483
astrophysics missions,
Earth science missions,

1109
00:44:46,516 --> 00:44:50,053
all of those, are balanced
across the entire portfolio.

1110
00:44:50,086 --> 00:44:52,789
And balance those missions
with human missions.

1111
00:44:52,822 --> 00:44:55,158
The key is to create
a balanced portfolio

1112
00:44:55,191 --> 00:44:59,329
to get as much science as
we can from our agency.

1113
00:45:00,463 --> 00:45:01,832
- If I could just add
one thing to that.

1114
00:45:01,865 --> 00:45:04,935

You're all invited
back in about 26 months

1115
00:45:04,968 --> 00:45:07,137
for the landing of Mars 2020.

1116
00:45:07,170 --> 00:45:08,839
[applause]

1117
00:45:08,872 --> 00:45:11,108
So, we are avoiding a gap.

1118
00:45:11,141 --> 00:45:13,410
[applause]

1119
00:45:18,748 --> 00:45:22,052
- Fred Wesse for Fred
Wesse YouTuber channel.

1120
00:45:22,085 --> 00:45:24,354
My question is for Elizabeth.

1121
00:45:24,387 --> 00:45:26,223
You've demonstrated
how the instruments

1122
00:45:26,256 --> 00:45:27,958
are gonna pan out with a video.

1123
00:45:27,991 --> 00:45:30,360
You'll spend a lot
of time on this

1124
00:45:30,393 --> 00:45:32,362
in the next few days and weeks.

1125
00:45:32,395 --> 00:45:35,665
Exactly how long is deploying
all the instruments gonna take

1126
00:45:35,698 --> 00:45:39,202
and what are the biggest
risk of that process?

1127
00:45:39,235 --> 00:45:41,104
- So, the first couple weeks

1128
00:45:41,137 --> 00:45:43,140
we actually just are
doing initial assessment

1129
00:45:43,173 --> 00:45:44,341
of our deployment area.

1130
00:45:44,374 --> 00:45:46,409
And then we begin the
deployment itself.

1131
00:45:46,442 --> 00:45:48,178
To get all the
instruments on the ground

1132
00:45:48,211 --> 00:45:50,413
is expected to take
approximately two
to three months

1133
00:45:50,446 --> 00:45:51,782
for final deployment.

1134
00:45:51,815 --> 00:45:53,250
At which point we can then start

1135
00:45:53,283 --> 00:45:55,085
the penetration with the
mole and the commissioning.

1136
00:45:55,118 --> 00:45:57,554

So, we expect approximately
two to three months.

1137
00:45:57,587 --> 00:46:01,792
I liken it to a game of
playing that claw game

1138
00:46:01,825 --> 00:46:03,260
at a carnival.

1139
00:46:03,293 --> 00:46:05,796
But you're doing it with a
really, really valuable prize.

1140
00:46:05,829 --> 00:46:07,864
And you're doing it blindfolded

1141
00:46:07,897 --> 00:46:10,167
where you can only take
occasional pictures.

1142
00:46:10,200 --> 00:46:12,002
And then you're doing
it via remote control

1143
00:46:12,035 --> 00:46:13,270
on another planet.

1144
00:46:13,303 --> 00:46:15,105
So, it makes it a
little bit longer.

1145
00:46:15,138 --> 00:46:16,673
You need to take more
pauses to make sure

1146
00:46:16,706 --> 00:46:18,942
you actually have the
grapple on the payload

1147
00:46:18,975 --> 00:46:20,410
before you lift it up.

1148
00:46:20,443 --> 00:46:22,813
And it's actually on the
ground before you let it go.

1149
00:46:22,846 --> 00:46:24,681
So, you want to take
those pauses along the way

1150
00:46:24,714 --> 00:46:26,416
to make sure
everything's going well.

1151
00:46:26,449 --> 00:46:28,518
So, it's expected to
take that duration

1152
00:46:28,551 --> 00:46:31,288
to allow us to have those
breaks in the process.

1153
00:46:31,321 --> 00:46:33,356
In terms of what we need to do,

1154
00:46:33,389 --> 00:46:34,591
I think the biggest
thing is choosing

1155
00:46:34,624 --> 00:46:36,560
our final deployment locations.

1156
00:46:36,593 --> 00:46:38,695
And just making sure
we practice that a lot.

1157
00:46:38,728 --> 00:46:39,963
We have a test bed here that

1158
00:46:39,996 --> 00:46:41,531
we actually will
terraform to look

1159
00:46:41,564 --> 00:46:44,000
very much like the
Martian area we've landed.

1160
00:46:44,033 --> 00:46:45,569
And we'll practice
deploying to make sure

1161
00:46:45,602 --> 00:46:47,137
everything's gonna go smoothly.

1162
00:46:48,938 --> 00:46:50,140
- Any more questions
in the room?

1163
00:46:50,173 --> 00:46:50,974
Yes.

1164
00:46:56,279 --> 00:46:58,415
- Sorry, with apologies
to the InSight team,

1165
00:46:58,448 --> 00:46:59,883
I'm gonna take advantage
of the opportunity

1166
00:46:59,916 --> 00:47:01,451
to ask Mister Bridenstine
another question

1167
00:47:01,484 --> 00:47:03,687
about the future of
Mars exploration.

1168

00:47:03,720 --> 00:47:04,921
There isn't another Mars mission

1169
00:47:04,954 --> 00:47:06,957
on the books after Mars 2020.

1170
00:47:06,990 --> 00:47:09,893
What are NASA's plans to get
started on Mars sample return

1171
00:47:09,926 --> 00:47:13,129
and maybe to replace our aging
telecommunications orbiters

1172
00:47:13,162 --> 00:47:14,364
that are up there?

1173
00:47:14,397 --> 00:47:17,067
Or not replace,
but improve upon.

1174
00:47:17,100 --> 00:47:19,202
- No, the two critical issues.

1175
00:47:19,235 --> 00:47:20,604
Sample return.

1176
00:47:20,637 --> 00:47:24,674
Mars 2020 is gonna cache
samples on the surface of Mars.

1177
00:47:24,707 --> 00:47:26,443
That would be silly
to cache those samples

1178
00:47:26,476 --> 00:47:27,878
and not return them.

1179
00:47:27,911 --> 00:47:29,346

That's the goal.

1180
00:47:29,379 --> 00:47:31,715
So, after Mars 2020, we need
a sample return mission.

1181
00:47:31,748 --> 00:47:32,949
But you're absolutely right.

1182
00:47:32,982 --> 00:47:36,086
With all of these very
successful missions

1183
00:47:36,119 --> 00:47:37,220
on the surface of Mars,

1184
00:47:37,253 --> 00:47:39,322
to include not just Mars 2020,

1185
00:47:39,355 --> 00:47:42,292
but one thing that I know
Chairman John Culverson

1186
00:47:42,325 --> 00:47:44,494
has been so committed to
is the Mars helicopter.

1187
00:47:44,527 --> 00:47:46,529
Which has a lot of
people so excited.

1188
00:47:46,562 --> 00:47:47,998
The idea that we're
gonna fly a helicopter

1189
00:47:48,031 --> 00:47:50,934
on another world for the
first time in human history

1190

00:47:50,967 --> 00:47:52,636
with the Mars 2020 mission.

1191
00:47:52,669 --> 00:47:55,405
With all of these
activities, you're right,

1192
00:47:55,438 --> 00:47:57,440
we're gonna need more
communication architecture

1193
00:47:57,473 --> 00:47:58,675
around Mars.

1194
00:47:58,708 --> 00:48:01,444
So, the answer is
we're putting together

1195
00:48:01,477 --> 00:48:03,981
budget requests right now

1196
00:48:05,381 --> 00:48:07,384
and presenting them
to people within OMB

1197
00:48:08,584 --> 00:48:10,854
and within the White
House to be prepared

1198
00:48:10,887 --> 00:48:13,657
for the day when
we can go to Mars

1199
00:48:13,690 --> 00:48:15,358
with even more missions.

1200
00:48:15,391 --> 00:48:17,294
It's a high priority for us.

1201

00:48:17,327 --> 00:48:18,728
We don't.

1202
00:48:18,761 --> 00:48:22,999
NASA has a long history of
building upon the last success.

1203
00:48:23,032 --> 00:48:25,235
And that's ultimately
what we wanna do here.

1204
00:48:26,769 --> 00:48:28,638
- Okay, we're gonna
check in on social media.

1205
00:48:28,671 --> 00:48:31,007
Stephanie, do you have
any more good questions?

1206
00:48:31,040 --> 00:48:32,676
- Absolutely.

1207
00:48:32,709 --> 00:48:33,610
So, a simple one.

1208
00:48:33,643 --> 00:48:35,045
Ethan Plant would like to know

1209
00:48:35,078 --> 00:48:37,981
how much time was spent
planning the InSight mission?

1210
00:48:38,014 --> 00:48:40,817
[laughter]

1211
00:48:40,850 --> 00:48:43,687
- Wow, well, you may or
may not be able to see

1212

00:48:43,720 --> 00:48:46,456
the number of people that
are around in this room.

1213
00:48:46,489 --> 00:48:48,024
And this is probably
only half or so

1214
00:48:48,057 --> 00:48:49,693
of the people that
have worked on it

1215
00:48:49,726 --> 00:48:52,862
probably on average
for four or more years.

1216
00:48:52,895 --> 00:48:54,597
And so, you multiply
that all out

1217
00:48:54,630 --> 00:48:57,067
really quickly in your
head, which I can't do.

1218
00:48:57,100 --> 00:48:59,369
One of our navigators
already did it.

1219
00:48:59,402 --> 00:49:01,638
And probably did the
14th decimal point.

1220
00:49:01,671 --> 00:49:03,940
[laughter]

1221
00:49:03,973 --> 00:49:05,442
But it's a huge,
huge amount of work

1222
00:49:05,475 --> 00:49:08,044

that's gone on both at JPL
and all of our partners

1223
00:49:08,077 --> 00:49:12,148
and our international partners
to make this a success.

1224
00:49:12,181 --> 00:49:14,217
And there's still a
lot more work to do.

1225
00:49:14,250 --> 00:49:15,719
As Elizabeth pointed out,

1226
00:49:15,752 --> 00:49:18,488
we've gotten just part of the
way done with this mission.

1227
00:49:18,521 --> 00:49:19,923
We maybe got the hard part out.

1228
00:49:19,956 --> 00:49:22,025
But there might be
some challenges still

1229
00:49:22,058 --> 00:49:23,526
in getting the deployment done.

1230
00:49:23,559 --> 00:49:26,129
So, there's a lot more time
to go and work to be done.

1231
00:49:26,162 --> 00:49:28,865
- Yeah, in terms of planning
this particular mission,

1232
00:49:28,898 --> 00:49:31,434
I would say we were probably
sitting down in a room

1233
00:49:31,467 --> 00:49:34,170
and sketching it out
about 10 years ago.

1234
00:49:34,203 --> 00:49:36,473
Trying to get together the ideas

1235
00:49:36,506 --> 00:49:38,541
for the proposal that
had finally became

1236
00:49:38,574 --> 00:49:40,010
this mission eventually.

1237
00:49:40,043 --> 00:49:42,679
So, I would say about 10 years
we've been planning this.

1238
00:49:42,712 --> 00:49:46,983
On some level, I've
been planning this
for almost 30 years.

1239
00:49:47,016 --> 00:49:50,620
Because, back in 1988 or so,

1240
00:49:50,653 --> 00:49:53,323
I started working with
some engineers here at JPL

1241
00:49:53,356 --> 00:49:55,992
to try to develop a
seismometer to go to Mars

1242
00:49:56,025 --> 00:49:57,827
and trying to figure
out the kind of mission

1243
00:49:57,860 --> 00:49:59,529

that would carry it.

1244
00:49:59,562 --> 00:50:03,466
And so, depending on how
you want to calculate it,

1245
00:50:03,499 --> 00:50:04,434
it could be 30 years.

1246
00:50:04,467 --> 00:50:05,602
It could be five years.

1247
00:50:05,635 --> 00:50:07,037
Or it could be a
couple thousand years,

1248
00:50:07,070 --> 00:50:09,139
as Tom was gonna do it.

1249
00:50:09,172 --> 00:50:11,775
- And, for Mike Watkins,

1250
00:50:11,808 --> 00:50:14,644
Cool American Adventurers
from our YouTube chat

1251
00:50:14,677 --> 00:50:15,912
would like to know if you had

1252
00:50:15,945 --> 00:50:18,448
one dream takeaway
from this mission,

1253
00:50:18,481 --> 00:50:19,883
what would it be?

1254
00:50:21,451 --> 00:50:23,353
- You know, my dream
takeaway, I think,

1255
00:50:23,386 --> 00:50:26,523
of all of these missions is
just to remind us to be bold

1256
00:50:26,556 --> 00:50:28,758
and remind us to keep
taking challenges

1257
00:50:28,791 --> 00:50:30,326
and keep moving forward.

1258
00:50:30,359 --> 00:50:32,929
And never to be scared of
these kind of challenges.

1259
00:50:32,962 --> 00:50:34,230
I mean, it's what we do.

1260
00:50:34,263 --> 00:50:35,665
You have to take these
chances to go forward.

1261
00:50:35,698 --> 00:50:38,134
We've been lucky enough
recently to be very successful.

1262
00:50:38,167 --> 00:50:39,936
But it's still a risky business.

1263
00:50:39,969 --> 00:50:41,237
But you have to
keep moving forward

1264
00:50:41,270 --> 00:50:42,939
and you have to keep
trying these things.

1265
00:50:42,972 --> 00:50:43,873

We try them on Mars.

1266
00:50:43,906 --> 00:50:45,108
We try them on Europa.

1267
00:50:45,141 --> 00:50:47,277
And we try them all
around the Solar System.

1268
00:50:47,310 --> 00:50:49,679
And it's something that I
think is part of human nature.

1269
00:50:49,712 --> 00:50:53,650
And it's a challenge
we have to keep taking.

1270
00:50:55,618 --> 00:50:56,920
- Alright and, with that,

1271
00:50:56,953 --> 00:50:58,721
I think that's an
outstanding closing statement

1272
00:50:58,754 --> 00:50:59,889
for today's news conference.

1273
00:50:59,922 --> 00:51:01,124
Now, before.

1274
00:51:01,157 --> 00:51:02,392
We're gonna do a
replay of images.

1275
00:51:02,425 --> 00:51:03,860
For media, if you want
the replay of images,

1276
00:51:03,893 --> 00:51:05,228

we'll do that in just
a couple of minutes

1277
00:51:05,261 --> 00:51:06,463
before we close out.

1278
00:51:06,496 --> 00:51:07,964
But I know there are
some team members here

1279
00:51:07,997 --> 00:51:10,300
who wanted to come through
and do their high fives.

1280
00:51:10,333 --> 00:51:11,801
So, come on through, gang.

1281
00:51:11,834 --> 00:51:12,669
And this is.

1282
00:51:13,569 --> 00:51:15,806
[applause]

1283
00:51:53,476 --> 00:51:55,645
[chatter]

1284
00:54:08,210 --> 00:54:10,447
[applause]

1285
00:55:28,057 --> 00:55:29,625
- InSight is now
traveling at a velocity

1286
00:55:29,658 --> 00:55:31,795
of 2000 meters per second.

1287
00:55:32,928 --> 00:55:33,830
17 meters.

1288
00:55:33,863 --> 00:55:35,832
Standing by for touchdown.

1289
00:55:35,865 --> 00:55:38,635
[dramatic music]