
AIRBUS
SOLAR ORBITER MGSE MPT
S/C INTEGRATION TROLLEY MPT

1
00:00:46,170 --> 00:00:31,780
[Music]

2
00:00:47,940 --> 00:00:46,180
[Applause]

3
00:00:51,720 --> 00:00:47,950
[Music]

4
00:00:55,800 --> 00:00:51,730
[Applause]

5
00:01:05,920 --> 00:00:55,810
[Music]

6
00:01:11,060 --> 00:01:09,050
welcome to NASA at home spaceport series

7
00:01:13,160 --> 00:01:11,070
I'm your host Madison Tuttle coming to

8
00:01:15,410 --> 00:01:13,170
you live from the vicinity of Kennedy

9
00:01:17,030 --> 00:01:15,420
Space Center today we have two flight

10
00:01:19,010 --> 00:01:17,040
design analysts from NASA's launch

11
00:01:21,050 --> 00:01:19,020
services program based here at Kennedy

12
00:01:22,910 --> 00:01:21,060
Space Center in Florida NASA's launch

13
00:01:25,039 --> 00:01:22,920

services program has been launching NASA

14
00:01:27,230 --> 00:01:25,049
science missions to study our planet and

15
00:01:29,840 --> 00:01:27,240
the universe for twenty-one years

16
00:01:31,310 --> 00:01:29,850
LSP continues to support the scientific

17
00:01:33,410 --> 00:01:31,320
community by launching robotic

18
00:01:35,029 --> 00:01:33,420
spacecraft to observe the earth visit

19
00:01:37,670 --> 00:01:35,039
other planets and explore the universe

20
00:01:39,740 --> 00:01:37,680
from weather satellites to telescopes to

21
00:01:41,660 --> 00:01:39,750
Mars rovers such as the Mars 2020

22
00:01:42,020 --> 00:01:41,670
perseverance Rover launched in this

23
00:01:45,139 --> 00:01:42,030
summer

24
00:01:47,330 --> 00:01:45,149
and more but with these super complex

25
00:01:49,010 --> 00:01:47,340
science missions how does LSP choose the

26
00:01:50,899 --> 00:01:49,020
right rocket for each space exploring

27
00:01:53,749 --> 00:01:50,909
robot they launch to orbit I have a

28
00:01:56,450 --> 00:01:53,759
short video to show that will explain

29
00:01:59,450 --> 00:01:56,460
just that what's the right rocket to

30
00:02:04,039 --> 00:01:59,460
launch a robot find out more right now

31
00:02:06,740 --> 00:02:04,049
on space shorts rockets come in lots of

32
00:02:09,310 --> 00:02:06,750
shapes and sizes so what's the right

33
00:02:11,420 --> 00:02:09,320
rocket for a space exploring robot

34
00:02:15,650 --> 00:02:11,430
choosing a rocket depends on three

35
00:02:18,350 --> 00:02:15,660
things how much the robot weighs how far

36
00:02:20,300 --> 00:02:18,360
away it's going and what it's going to

37
00:02:22,940 --> 00:02:20,310
do

38
00:02:25,309 --> 00:02:22,950

when the robot is small and light and

39
00:02:26,890 --> 00:02:25,319
stays close to study earth a small

40
00:02:30,050 --> 00:02:26,900
rocket is a-ok

41
00:02:32,660 --> 00:02:30,060
when the robot is large and heavy lots

42
00:02:35,210 --> 00:02:32,670
and lots of gear and travels far away in

43
00:02:38,180 --> 00:02:35,220
the solar system a big powerful rocket

44
00:02:40,280 --> 00:02:38,190
is what will do the job it's hard to

45
00:02:42,140 --> 00:02:40,290
find the perfect match but that's the

46
00:02:45,410 --> 00:02:42,150
mission of all the dedicated people in

47
00:02:47,660 --> 00:02:45,420
NASA's launch services program they've

48
00:02:50,780 --> 00:02:47,670
launched more than 200 rocket robot

49
00:02:57,199 --> 00:02:50,790
combos connecting us all to Discovery in

50
00:02:59,360 --> 00:02:57,209
the universe now once LSP matches the

51
00:03:01,280 --> 00:02:59,370
right rocket to a robot they turn to

52
00:03:02,990 --> 00:03:01,290
their flight design analyst to make sure

53
00:03:05,660 --> 00:03:03,000
that the robot gets to its intended

54
00:03:08,000 --> 00:03:05,670
orbit with us today on the show r2 of

55
00:03:10,520 --> 00:03:08,010
LSPs very own flight design analyst

56
00:03:12,289 --> 00:03:10,530
Callie Burke and Jeremy Anderson Callie

57
00:03:15,380 --> 00:03:12,299
and Jeremy thank you so much for joining

58
00:03:18,559 --> 00:03:15,390
us today thank you for having us yeah

59
00:03:20,360 --> 00:03:18,569
that's great so I know that you were

60
00:03:23,030 --> 00:03:20,370
both flight design analyst but can you

61
00:03:24,410 --> 00:03:23,040
expand on that and tell us exactly what

62
00:03:26,780 --> 00:03:24,420
is your role within the launch services

63
00:03:35,360 --> 00:03:26,790

program or even what a flight design

64
00:03:36,819 --> 00:03:35,370
analyst is and does yes and we'd like to

65
00:03:39,979 --> 00:03:36,829
see ourselves as the space drive

66
00:03:42,199 --> 00:03:39,989
spacecraft's customer to space we are

67
00:03:44,449 --> 00:03:42,209
their guide along the way and we form

68
00:03:46,280 --> 00:03:44,459
these trajectories that the rocket that

69
00:03:48,680 --> 00:03:46,290
takes the rocket from the ground through

70
00:03:50,930 --> 00:03:48,690
the Earth's atmosphere and safely into

71
00:03:51,949 --> 00:03:50,940
space now once you're in space the

72
00:03:54,170 --> 00:03:51,959
rocket does most of the heavy lifting

73
00:03:55,640 --> 00:03:54,180
and ensures that the payload gets to the

74
00:03:58,039 --> 00:03:55,650
right orbit depending on the mission

75
00:03:59,509 --> 00:03:58,049
this could be the final orbit or it

76
00:04:03,470 --> 00:03:59,519
could be a transfer orbit for the robot

77
00:04:05,809 --> 00:04:03,480
or the spacecraft some some missions

78
00:04:07,370 --> 00:04:05,819
this could be coast of a few hours and

79
00:04:09,740 --> 00:04:07,380
the spacecraft could then use its own

80
00:04:13,280 --> 00:04:09,750
onboard propulsion to insert it into its

81
00:04:15,379 --> 00:04:13,290
final orbit or in some missions this

82
00:04:16,670 --> 00:04:15,389
Coast eration can be up two months or

83
00:04:20,569 --> 00:04:16,680
years depending on how far away the

84
00:04:23,330 --> 00:04:20,579
robot is going so yeah and a big thing

85
00:04:24,590 --> 00:04:23,340
is you know as that video showed those

86
00:04:26,090 --> 00:04:24,600
are different rockets and those are all

87
00:04:27,680 --> 00:04:26,100
owned by companies they're not owned by

88
00:04:29,390 --> 00:04:27,690

NASA that's what will we do when we work

89
00:04:32,779 --> 00:04:29,400
with the launch services program for our

90
00:04:33,950 --> 00:04:32,789
primary missions and so you know they're

91
00:04:36,110 --> 00:04:33,960
developing the fine

92
00:04:37,219 --> 00:04:36,120
RUP conductor is there gonna fly in that

93
00:04:37,969 --> 00:04:37,229
rocket they're gonna tell the software

94
00:04:40,400 --> 00:04:37,979
cow

95
00:04:42,290 --> 00:04:40,410
but we're there along the way you know

96
00:04:43,999 --> 00:04:42,300
years before we slept a rocket we

97
00:04:45,290 --> 00:04:44,009
actually will get involved before you

98
00:04:48,020 --> 00:04:45,300
know before that right rocket video

99
00:04:49,370 --> 00:04:48,030
occurs because spacecraft are still in

100
00:04:50,960 --> 00:04:49,380
the proposal they're still working to

101
00:04:53,570 --> 00:04:50,970
become a real spacecraft and they need

102
00:04:55,610 --> 00:04:53,580
to make sure if they say hey now so we

103
00:04:57,200 --> 00:04:55,620
think we can do some great science we're

104
00:04:58,939 --> 00:04:57,210
there to help them figure out yes there

105
00:05:01,219 --> 00:04:58,949
is a rocket can actually fly them to

106
00:05:02,930 --> 00:05:01,229
their destination so and just see you

107
00:05:06,170 --> 00:05:02,940
guys know this is ruffles I have here

108
00:05:08,779 --> 00:05:06,180
with me so yes I'm very sorry for not

109
00:05:10,430 --> 00:05:08,789
giving ruffles a proper introduction but

110
00:05:13,010 --> 00:05:10,440
thank you for introducing yourselves

111
00:05:15,140 --> 00:05:13,020
Callie's going to tell us maybe about a

112
00:05:16,879 --> 00:05:15,150
recent mission you worked on or one that

113
00:05:18,860 --> 00:05:16,889

you're working on now or is there a

114
00:05:23,150 --> 00:05:18,870
mission in particular that really sticks

115
00:05:24,740 --> 00:05:23,160
out to you so yes I mean what am i the

116
00:05:26,689 --> 00:05:24,750
ones that sticks out for me a lot is the

117
00:05:28,999 --> 00:05:26,699
Curiosity rover that launched in 2011

118
00:05:31,430 --> 00:05:29,009
that was my first mission I started out

119
00:05:32,809 --> 00:05:31,440
as a backup and then and what the

120
00:05:35,510 --> 00:05:32,819
mission I was we actually got to launch

121
00:05:37,550 --> 00:05:35,520
day but that one you know I came in

122
00:05:39,170 --> 00:05:37,560
partway through but the insight Mars

123
00:05:42,499 --> 00:05:39,180
Lander because curiosity has been

124
00:05:44,960 --> 00:05:42,509
weaving the surface since 2012 it

125
00:05:45,800 --> 00:05:44,970
launched in 2018 and landed on the

126
00:05:48,800 --> 00:05:45,810
surface of Mars

127
00:05:50,570 --> 00:05:48,810
and so that one I really worked it kind

128
00:05:52,040 --> 00:05:50,580
of from the beginning you know I worked

129
00:05:53,930 --> 00:05:52,050
it and was looking at different

130
00:05:55,580 --> 00:05:53,940
trajectories on multiple Rockets before

131
00:05:57,200 --> 00:05:55,590
we pick one out I helped I was a part of

132
00:05:58,760 --> 00:05:57,210
the process where we slept in a rocket

133
00:06:01,070 --> 00:05:58,770
and then worked it all the way through

134
00:06:04,129 --> 00:06:01,080
launch and was on console and even got

135
00:06:06,950 --> 00:06:04,139
to go out to JPL for the landing so I'm

136
00:06:09,170 --> 00:06:06,960
very excited for the upcoming Mars 2020

137
00:06:10,670 --> 00:06:09,180
Rover this summer but we want to make

138
00:06:12,529 --> 00:06:10,680

sure we don't have just one person the

139
00:06:13,999 --> 00:06:12,539
group knows how to do Mars lady missions

140
00:06:17,330 --> 00:06:14,009
so other analysts are working that right

141
00:06:19,610 --> 00:06:17,340
now awesome and Jeremy I know that

142
00:06:21,230 --> 00:06:19,620
you've been here about eight months I

143
00:06:22,939 --> 00:06:21,240
think so you're a bit newer at this um

144
00:06:25,790 --> 00:06:22,949
can you tell us maybe about a mission

145
00:06:27,620 --> 00:06:25,800
you're working on right now yeah so as

146
00:06:29,300 --> 00:06:27,630
Callie mentioned she started as backup

147
00:06:31,399 --> 00:06:29,310
and I said I'm currently doing right now

148
00:06:32,480 --> 00:06:31,409
on a mission called dart now not too

149
00:06:34,100 --> 00:06:32,490
long ago we would have thought this

150
00:06:35,810 --> 00:06:34,110
would be science fiction but thanks to

151
00:06:38,300 --> 00:06:35,820
the amazing joint efforts between NASA

152
00:06:40,279 --> 00:06:38,310
and the Applied Physics Laboratory dart

153
00:06:43,339 --> 00:06:40,289
is a mission that I launch into 2021

154
00:06:45,379 --> 00:06:43,349
2022 timeframe and that will impact an

155
00:06:46,610 --> 00:06:45,389
app near-earth asteroid that's

156
00:06:47,719 --> 00:06:46,620
approximately one and a half football

157
00:06:50,689 --> 00:06:47,729
fields large

158
00:06:54,320 --> 00:06:50,699
13,000 miles an hour and this will slow

159
00:06:56,480 --> 00:06:54,330
down the asteroid enough to be so that

160
00:06:58,760 --> 00:06:56,490
the change in the time of the orbit of

161
00:07:01,159 --> 00:06:58,770
the asteroid will be visible by to earth

162
00:07:03,279 --> 00:07:01,169
and this is a study to show for

163
00:07:05,839 --> 00:07:03,289

planetary perfect planetary protection

164
00:07:08,510 --> 00:07:05,849
that we that we need service that we can

165
00:07:10,339 --> 00:07:08,520
provide wow that sounds pretty

166
00:07:12,649 --> 00:07:10,349
incredible really looking forward to

167
00:07:15,110 --> 00:07:12,659
seeing that mission of fly countless

168
00:07:17,179 --> 00:07:15,120
questions for you how many Rockets are

169
00:07:21,529 --> 00:07:17,189
victories do you work on it once and how

170
00:07:22,249 --> 00:07:21,539
many are you working on right now so so

171
00:07:24,799 --> 00:07:22,259
I actually

172
00:07:26,869 --> 00:07:24,809
so for me personally I just I did a

173
00:07:29,360 --> 00:07:26,879
detail where we go into another group

174
00:07:31,010 --> 00:07:29,370
and work I work and Commercial Crew for

175
00:07:32,420 --> 00:07:31,020
about eight months and then came back so

176
00:07:35,269 --> 00:07:32,430
I'm actually not on a mission right now

177
00:07:37,040 --> 00:07:35,279
because of the transition but at any

178
00:07:39,350 --> 00:07:37,050
time we could be balancing two to five

179
00:07:41,779 --> 00:07:39,360
missions and so that doesn't always mean

180
00:07:43,100 --> 00:07:41,789
we're actively developing trajectories

181
00:07:44,869 --> 00:07:43,110
that means that we're working them in

182
00:07:46,909 --> 00:07:44,879
various stages but for our flight design

183
00:07:48,529 --> 00:07:46,919
experts in particular and our lead it

184
00:07:49,969 --> 00:07:48,539
can be quite a few you know when you

185
00:07:51,829 --> 00:07:49,979
talk about advanced missions you might

186
00:07:53,510 --> 00:07:51,839
have something come in they need it to

187
00:07:55,100 --> 00:07:53,520
have something look at so you know the

188
00:07:57,199 --> 00:07:55,110

two to five or once are like launch

189
00:07:59,389 --> 00:07:57,209
services ones that are you know in the

190
00:08:00,589 --> 00:07:59,399
stages before we pick out the rocket but

191
00:08:02,209 --> 00:08:00,599
if you start talking anything that

192
00:08:04,670 --> 00:08:02,219
you're given in a year can be it can be

193
00:08:07,879 --> 00:08:04,680
a lot and there's even ones we advise on

194
00:08:09,619 --> 00:08:07,889
so it makes it fun because you get a

195
00:08:13,010 --> 00:08:09,629
variety of missions and a variety of

196
00:08:15,320 --> 00:08:13,020
rockets you're looking at dr. Liz so

197
00:08:17,480 --> 00:08:15,330
Jeremy this question is for you when

198
00:08:19,579 --> 00:08:17,490
you're actually mapping out a launch

199
00:08:21,969 --> 00:08:19,589
vehicle trajectory are you doing any of

200
00:08:26,239 --> 00:08:21,979
that by hand or is it all with

201
00:08:27,589 --> 00:08:26,249
computer-aided design systems so as

202
00:08:30,739 --> 00:08:27,599
we've all seen from hidden figures it

203
00:08:32,300 --> 00:08:30,749
can and was done by hand but now there

204
00:08:34,759 --> 00:08:32,310
are a lot of computer programs that we

205
00:08:36,050 --> 00:08:34,769
use on a daily basis to help us now that

206
00:08:38,300 --> 00:08:36,060
doesn't go to say that we do not use

207
00:08:39,829 --> 00:08:38,310
hand calculations on a daily basis to

208
00:08:41,540 --> 00:08:39,839
double-check the computer simulations

209
00:08:44,629 --> 00:08:41,550
and I will say that a lot of theory you

210
00:08:47,360 --> 00:08:44,639
learn at school is applicable in the

211
00:08:49,780 --> 00:08:47,370
daily work environment so just it's just

212
00:08:52,759 --> 00:08:49,790
a serve as a check on the computer

213
00:08:55,059 --> 00:08:52,769

gotcha and how many people make up the

214
00:08:59,240 --> 00:08:55,069
flight design team for LSP

215
00:09:01,220 --> 00:08:59,250
so there's 11 of us right now and it

216
00:09:02,600 --> 00:09:01,230
basically you know thanks I said

217
00:09:05,480 --> 00:09:02,610
working you know those multiple missions

218
00:09:09,350 --> 00:09:05,490
at a time but at any point we're coming

219
00:09:12,830 --> 00:09:09,360
in bringing our review process so I will

220
00:09:13,820 --> 00:09:12,840
look you know help will be our medians

221
00:09:15,500 --> 00:09:13,830
we'll talk about all the different

222
00:09:16,670 --> 00:09:15,510
missions so it's not just the one that

223
00:09:19,040 --> 00:09:16,680
you're working on which is something I

224
00:09:20,540 --> 00:09:19,050
really like about working with it but

225
00:09:22,250 --> 00:09:20,550
also you know I talked about I had a lot

226
00:09:24,050 --> 00:09:22,260
of Mars experience so you know somebody

227
00:09:26,570 --> 00:09:24,060
who may have more experience may come to

228
00:09:28,460 --> 00:09:26,580
me or even you know Jeremy be working on

229
00:09:30,350 --> 00:09:28,470
a tool and all come over and talk with

230
00:09:31,940 --> 00:09:30,360
with him about something he's developing

231
00:09:35,270 --> 00:09:31,950
even though he's been here you know just

232
00:09:37,820 --> 00:09:35,280
came recently and yeah I also grew up I

233
00:09:39,590 --> 00:09:37,830
came here in 2002 and then my full-time

234
00:09:40,730 --> 00:09:39,600
career has really been with the analysis

235
00:09:43,100 --> 00:09:40,740
group at launch services program I

236
00:09:44,840 --> 00:09:43,110
really enjoyed that process and how we

237
00:09:46,220 --> 00:09:44,850
work together as a team if you want to

238
00:09:50,360 --> 00:09:46,230

talk a little bit about your experience

239
00:09:51,590 --> 00:09:50,370
this year Jeremy yeah nothing but the

240
00:09:53,630 --> 00:09:51,600
same thing to say about Callie I mean

241
00:09:55,760 --> 00:09:53,640
every it is truly a team effort when we

242
00:09:57,710 --> 00:09:55,770
put any sort of data analysis product

243
00:09:59,240 --> 00:09:57,720
out the door and not only that when I

244
00:10:01,790 --> 00:09:59,250
first started with the launch services

245
00:10:04,730 --> 00:10:01,800
program each and every person in that

246
00:10:08,000 --> 00:10:04,740
team took time to kind of groom me and

247
00:10:09,050 --> 00:10:08,010
mentor me along the way it just little

248
00:10:12,050 --> 00:10:09,060
stuff here and there and then of course

249
00:10:15,470 --> 00:10:12,060
I had my full time mentor who who really

250
00:10:17,690 --> 00:10:15,480
guided me in the right direction awesome

251
00:10:20,240 --> 00:10:17,700
all right Callie can you give us kind of

252
00:10:22,990 --> 00:10:20,250
a step-by-step guide on flight design

253
00:10:26,690 --> 00:10:23,000
like a beginner's guide to building a

254
00:10:28,700 --> 00:10:26,700
vehicle trajectory yeah well one of the

255
00:10:29,900 --> 00:10:28,710
first things we to do is step one is

256
00:10:32,060 --> 00:10:29,910
really to gather information about the

257
00:10:34,670 --> 00:10:32,070
spacecraft mission and so this is you

258
00:10:36,260 --> 00:10:34,680
know can be just emails but really also

259
00:10:37,580 --> 00:10:36,270
sometimes good conversations about

260
00:10:39,230 --> 00:10:37,590
what's going on with the spacecraft so

261
00:10:40,910 --> 00:10:39,240
big thing is to figure out what size it

262
00:10:43,280 --> 00:10:40,920
is you know I have ruffles she's a

263
00:10:46,340 --> 00:10:43,290

really hang-up sweet she's this really

264
00:10:47,960 --> 00:10:46,350
small dog and um and we have but we have

265
00:10:50,360 --> 00:10:47,970
another flight design analyst fan his

266
00:10:53,180 --> 00:10:50,370
dog Astro named after the dog from the

267
00:10:55,910 --> 00:10:53,190
Jetsons you know even when he was a

268
00:10:57,860 --> 00:10:55,920
puppy he was you know two and a half

269
00:10:59,630 --> 00:10:57,870
times size of ruffle size but now that

270
00:11:01,640 --> 00:10:59,640
he's full grown he's over 15 times your

271
00:11:04,070 --> 00:11:01,650
size but they're both dogs just like all

272
00:11:06,110 --> 00:11:04,080
our spacecraft are all spacecraft doing

273
00:11:07,700 --> 00:11:06,120
science and so they have different needs

274
00:11:09,500 --> 00:11:07,710
we have to consider ruffles does not

275
00:11:11,660 --> 00:11:09,510
need as much food she'd be very

276
00:11:13,830 --> 00:11:11,670
unhealthy lupus even my food is Astro

277
00:11:16,260 --> 00:11:13,840
you know if we traveled and she

278
00:11:17,880 --> 00:11:16,270
the same crazy as Astro you know she

279
00:11:19,380 --> 00:11:17,890
would get thrown around a car and that

280
00:11:20,730 --> 00:11:19,390
wouldn't be good for her and asked her

281
00:11:22,410 --> 00:11:20,740
just plain old would not fit in her

282
00:11:23,970 --> 00:11:22,420
crate and he would it would not do well

283
00:11:27,120 --> 00:11:23,980
on ruffles died either but they're both

284
00:11:27,690 --> 00:11:27,130
dogs that we love and it also makes a

285
00:11:29,940 --> 00:11:27,700
difference you know

286
00:11:31,410 --> 00:11:29,950
we show the picture of where all all the

287
00:11:33,210 --> 00:11:31,420
spacecraft can go around our solar

288
00:11:34,830 --> 00:11:33,220

system that makes another big difference

289
00:11:36,540 --> 00:11:34,840
so these are the steps we also they have

290
00:11:37,380 --> 00:11:36,550
sensitivities so that's we're really

291
00:11:39,540 --> 00:11:37,390
trying to figure out a lot of

292
00:11:41,550 --> 00:11:39,550
information with them early on and then

293
00:11:43,140 --> 00:11:41,560
if it's an advanced mission then we'll

294
00:11:44,940 --> 00:11:43,150
determine which launch vehicles in our

295
00:11:47,700 --> 00:11:44,950
fleet could launch the spacecraft and

296
00:11:50,070 --> 00:11:47,710
depending we might use different launch

297
00:11:52,740 --> 00:11:50,080
vehicles and do it multiple models then

298
00:11:55,470 --> 00:11:52,750
step three will develop your model we'll

299
00:11:57,180 --> 00:11:55,480
look you know it figure out which

300
00:12:00,240 --> 00:11:57,190
program is the best kind of what outputs

301
00:12:01,620 --> 00:12:00,250
we want to look at and we'll often start

302
00:12:04,380 --> 00:12:01,630
with a template or a previous mission

303
00:12:07,650 --> 00:12:04,390
that's very similar and then go through

304
00:12:10,800 --> 00:12:07,660
and make updates and kind of break or

305
00:12:14,100 --> 00:12:10,810
and fix the model so we get a good look

306
00:12:15,900 --> 00:12:14,110
at it and then step four kind of check

307
00:12:18,120 --> 00:12:15,910
how optimal it is make sure it meets all

308
00:12:20,220 --> 00:12:18,130
the requirements and and there's lots of

309
00:12:21,570 --> 00:12:20,230
going back and forth through these we'll

310
00:12:23,220 --> 00:12:21,580
go talk to people will talk to the

311
00:12:25,680 --> 00:12:23,230
launch vehicle contractors because again

312
00:12:28,560 --> 00:12:25,690
they're the experts on their rocket that

313
00:12:30,240 --> 00:12:28,570

we're trying to model and then Step five

314
00:12:31,950 --> 00:12:30,250
will give a presentation to our group

315
00:12:34,730 --> 00:12:31,960
we'll do one of those peer reviews and

316
00:12:36,780 --> 00:12:34,740
they'll look at it they'll ask questions

317
00:12:38,790 --> 00:12:36,790
make sure that we've really probed

318
00:12:40,500 --> 00:12:38,800
everything we should be be looking at

319
00:12:42,780 --> 00:12:40,510
and often we'll go back and make changes

320
00:12:44,130 --> 00:12:42,790
based on that discussion and then the

321
00:12:46,140 --> 00:12:44,140
last step is we'll go back to whoever

322
00:12:49,680 --> 00:12:46,150
asked us a question and let them know

323
00:12:51,780 --> 00:12:49,690
the answer and give them some data gosh

324
00:12:53,070 --> 00:12:51,790
yeah awesome I think that is all the

325
00:12:55,350 --> 00:12:53,080
time that we have today

326
00:13:02,190 --> 00:12:55,360
Kelly Jeremy thanks so much for joining

327
00:13:07,440 --> 00:13:02,200
us thank you medicine budget by

328
00:13:09,840 --> 00:13:07,450
Russell's suite we're really looking

329
00:13:12,600 --> 00:13:09,850
forward to LSPs two upcoming missions

330
00:13:14,880 --> 00:13:12,610
later this year including the Mars 2020

331
00:13:17,250 --> 00:13:14,890
perseverance Rover launching the summer

332
00:13:19,530 --> 00:13:17,260
and Sentinel six Michael Freilich

333
00:13:20,760 --> 00:13:19,540
launching later this year if you're

334
00:13:23,300 --> 00:13:20,770
looking for more nests at home

335
00:13:26,250 --> 00:13:23,310
activities you can head to nasa.gov

336
00:13:27,390 --> 00:13:26,260
backslash NASA at home thanks for again