



1
00:00:04,390 --> 00:00:02,629
we are coming to you live from here at

2
00:00:06,550 --> 00:00:04,400
the spacecraft assembly facility at

3
00:00:09,110 --> 00:00:06,560
nasa's jet propulsion laboratory

4
00:00:10,950 --> 00:00:09,120
now jpl is known for robotic exploration

5
00:00:12,789 --> 00:00:10,960
of the solar system and many of those

6
00:00:15,190 --> 00:00:12,799
robots were made right here

7
00:00:17,189 --> 00:00:15,200
in high bay one if you were with us last

8
00:00:18,550 --> 00:00:17,199
week you might have seen the nissar

9
00:00:22,390 --> 00:00:18,560
spacecraft this is a

10
00:00:25,589 --> 00:00:22,400
nasa indian space agency collaboration

11
00:00:28,230 --> 00:00:25,599
it's an earth science mission and it is

12
00:00:31,109 --> 00:00:28,240
not the only spacecraft that's in here

13
00:00:32,150 --> 00:00:31,119

just this past weekend we received much

14

00:00:35,270 --> 00:00:32,160
of the hardware

15

00:00:37,030 --> 00:00:35,280
for the psyche mission now psyche is

16

00:00:39,030 --> 00:00:37,040
going to be headed to an asteroid of the

17

00:00:40,630 --> 00:00:39,040
same name in the main belt

18

00:00:42,389 --> 00:00:40,640
and here to tell us more about the

19

00:00:44,470 --> 00:00:42,399
hardware that we're seeing today

20

00:00:45,510 --> 00:00:44,480
what the mission will do is project

21

00:00:48,549 --> 00:00:45,520
systems engineer

22

00:00:49,350 --> 00:00:48,559
david o hey david hi stephanie pleasure

23

00:00:51,750 --> 00:00:49,360
to be here

24

00:00:52,950 --> 00:00:51,760
all right so david is here to answer

25

00:00:54,869 --> 00:00:52,960
your questions

26
00:00:56,950 --> 00:00:54,879
so be sure to keep those coming in the

27
00:00:58,869 --> 00:00:56,960
chat wherever you're watching

28
00:01:00,229 --> 00:00:58,879
and we'll be answering live for the next

29
00:01:02,150 --> 00:01:00,239
half hour or so

30
00:01:03,750 --> 00:01:02,160
we'll also be answering in the comments

31
00:01:04,789 --> 00:01:03,760
later on if you're watching this on

32
00:01:07,350 --> 00:01:04,799
demand

33
00:01:08,789 --> 00:01:07,360
so i'm going to go ahead and start with

34
00:01:09,109 --> 00:01:08,799
some of the questions that have already

35
00:01:12,390 --> 00:01:09,119
come

36
00:01:13,910 --> 00:01:12,400
in tapaji raj you are all of us he's got

37
00:01:15,830 --> 00:01:13,920
some great questions here

38
00:01:17,670 --> 00:01:15,840

about what psyche is and what it's going

39

00:01:19,990 --> 00:01:17,680

to do so

40

00:01:21,109 --> 00:01:20,000

what instruments are there and what are

41

00:01:21,910 --> 00:01:21,119

they going to do what are their

42

00:01:23,830 --> 00:01:21,920

functions

43

00:01:25,910 --> 00:01:23,840

so the psyche spacecraft is going to go

44

00:01:27,429 --> 00:01:25,920

visit an asteroid called psyche which is

45

00:01:28,070 --> 00:01:27,439

the largest metal asteroid in the solar

46

00:01:29,749 --> 00:01:28,080

system

47

00:01:31,030 --> 00:01:29,759

and it's going to go try and figure out

48

00:01:31,830 --> 00:01:31,040

where it came from and how it was

49

00:01:33,830 --> 00:01:31,840

created

50

00:01:35,270 --> 00:01:33,840

and what it's doing there so in order to

51
00:01:36,789 --> 00:01:35,280
do that we have three different

52
00:01:38,390 --> 00:01:36,799
instruments on here we have a

53
00:01:39,990 --> 00:01:38,400
magnetometer

54
00:01:41,270 --> 00:01:40,000
which is a device that measures magnetic

55
00:01:42,630 --> 00:01:41,280
fields which will tell us if it has a

56
00:01:44,149 --> 00:01:42,640
magnetic field around it we have an

57
00:01:45,749 --> 00:01:44,159
imager which takes pictures of it which

58
00:01:46,550 --> 00:01:45,759
allows us to see what the surface looks

59
00:01:48,310 --> 00:01:46,560
like

60
00:01:49,670 --> 00:01:48,320
and we have a gamma ray neutron

61
00:01:51,350 --> 00:01:49,680
spectrometer which allows us to

62
00:01:52,230 --> 00:01:51,360
determine the elemental composition of

63
00:01:53,749 --> 00:01:52,240

the surface

64

00:01:55,670 --> 00:01:53,759

by looking at gamma-ray emissions from

65

00:01:57,510 --> 00:01:55,680

the surface which are caused by cosmic

66

00:01:59,429 --> 00:01:57,520

rays as they hit the surface

67

00:02:00,870 --> 00:01:59,439

all right so you anticipated one of his

68

00:02:03,429 --> 00:02:00,880

follow-up questions

69

00:02:04,950 --> 00:02:03,439

is will it take pictures of the asteroid

70

00:02:06,149 --> 00:02:04,960

yeah it's got an imager

71

00:02:08,070 --> 00:02:06,159

yes it will take pictures of the

72

00:02:09,510 --> 00:02:08,080

asteroid it's got an imager on there

73

00:02:11,270 --> 00:02:09,520

made by the same company that makes some

74

00:02:13,670 --> 00:02:11,280

of the the uh

75

00:02:15,110 --> 00:02:13,680

the imagers that are on the perseverance

76

00:02:17,430 --> 00:02:15,120

rover so we're using

77

00:02:18,949 --> 00:02:17,440

that same camera technology to go take

78

00:02:21,270 --> 00:02:18,959

pictures out at this asteroid

79

00:02:22,550 --> 00:02:21,280

okay and uh when is the spacecraft

80

00:02:26,309 --> 00:02:22,560

slated to launch

81

00:02:29,030 --> 00:02:26,319

so about a year and a half from now

82

00:02:29,430 --> 00:02:29,040

fantastic what needs to happen between

83

00:02:32,470 --> 00:02:29,440

now

84

00:02:34,949 --> 00:02:32,480

and then oh boy well we've got

85

00:02:36,710 --> 00:02:34,959

the basic body of the spacecraft here

86

00:02:38,150 --> 00:02:36,720

this contains the basic propulsion

87

00:02:40,150 --> 00:02:38,160

system and structure

88

00:02:42,070 --> 00:02:40,160

and we need to put on to this uh the

89

00:02:43,910 --> 00:02:42,080

brains of the of the spacecraft the

90

00:02:45,670 --> 00:02:43,920

computer is actually made here at jpl

91

00:02:46,550 --> 00:02:45,680

and the software is made at jpl so we're

92

00:02:48,229 --> 00:02:46,560

going to take

93

00:02:49,670 --> 00:02:48,239

that computer and that software put it

94

00:02:51,670 --> 00:02:49,680

on board the spacecraft

95

00:02:53,350 --> 00:02:51,680

and then we'll be able to test it with

96

00:02:54,390 --> 00:02:53,360

the in science instruments make sure it

97

00:02:55,830 --> 00:02:54,400

all works together

98

00:02:57,430 --> 00:02:55,840

and then put it through a full test

99

00:02:59,430 --> 00:02:57,440

program where we take it and we put it

100

00:03:01,589 --> 00:02:59,440

in environmental test chambers so we

101
00:03:02,710 --> 00:03:01,599
we shake it on a vibe table like it's

102
00:03:05,270 --> 00:03:02,720
launching we

103
00:03:07,190 --> 00:03:05,280
vibrate um we we bake it in a thermal

104
00:03:08,070 --> 00:03:07,200
chamber we expose it to liquid nitrogen

105
00:03:10,869 --> 00:03:08,080
level cold

106
00:03:11,350 --> 00:03:10,879
and to solar lamps which make it warm so

107
00:03:13,509 --> 00:03:11,360
it'll be

108
00:03:14,790 --> 00:03:13,519
exposed to the heat and the cold of

109
00:03:16,070 --> 00:03:14,800
space we want to put it through its

110
00:03:17,509 --> 00:03:16,080
paces here on earth

111
00:03:18,869 --> 00:03:17,519
to make sure it'll work when we actually

112
00:03:19,990 --> 00:03:18,879
get to space and after we're done with

113
00:03:21,509 --> 00:03:20,000

all that testing

114

00:03:23,350 --> 00:03:21,519

um we take it to launch base so we can

115

00:03:23,830 --> 00:03:23,360

launch it and where will we be launching

116

00:03:27,509 --> 00:03:23,840

from

117

00:03:29,030 --> 00:03:27,519

canaveral okay and do you know what kind

118

00:03:31,430 --> 00:03:29,040

of rocket it'll be going up on

119

00:03:32,789 --> 00:03:31,440

yes it'll be launching on a falcon heavy

120

00:03:34,710 --> 00:03:32,799

which is fantastic i think it's the

121

00:03:37,830 --> 00:03:34,720

first falcon heavy to go interplanetary

122

00:03:39,190 --> 00:03:37,840

is what i recall superlative okay well

123

00:03:40,710 --> 00:03:39,200

we don't have the rocket here today but

124

00:03:41,190 --> 00:03:40,720

we do have a lot of the spacecraft you

125

00:03:43,350 --> 00:03:41,200

want to just

126
00:03:45,589 --> 00:03:43,360
walk us through from left to right some

127
00:03:47,830 --> 00:03:45,599
of the the hardware that we can see

128
00:03:49,509 --> 00:03:47,840
sure what you see here is what we call

129
00:03:51,270 --> 00:03:49,519
the solar electric propulsion

130
00:03:53,270 --> 00:03:51,280
chassis it just like the chassis of a

131
00:03:56,309 --> 00:03:53,280
car it contains the structure

132
00:03:59,270 --> 00:03:56,319
and the propulsion system and

133
00:03:59,990 --> 00:03:59,280
and really the power that makes it go so

134
00:04:02,309 --> 00:04:00,000
if you look at it from

135
00:04:03,990 --> 00:04:02,319
left to right what you see over here on

136
00:04:05,509 --> 00:04:04,000
the left the big silver thing is the

137
00:04:07,030 --> 00:04:05,519
main antenna that's the high gain

138
00:04:07,830 --> 00:04:07,040

antenna that allows it to communicate

139

00:04:11,270 --> 00:04:07,840

with us

140

00:04:12,470 --> 00:04:11,280

from hundreds of millions of miles away

141

00:04:14,710 --> 00:04:12,480

there are two underneath it there are

142

00:04:16,629 --> 00:04:14,720

two booms one will support

143

00:04:18,150 --> 00:04:16,639

the gamma-ray spectrometer instrument

144

00:04:19,509 --> 00:04:18,160

the other will support the magnetometer

145

00:04:21,110 --> 00:04:19,519

we support those away from the

146

00:04:21,830 --> 00:04:21,120

spacecraft bodies so they get clean

147

00:04:23,990 --> 00:04:21,840

views

148

00:04:25,670 --> 00:04:24,000

of the asteroid and then as you move

149

00:04:26,310 --> 00:04:25,680

down from that what you see is the main

150

00:04:28,550 --> 00:04:26,320

body

151
00:04:30,310 --> 00:04:28,560
you can see a whole bunch of red boxes

152
00:04:31,510 --> 00:04:30,320
on there those are thermal louvers those

153
00:04:33,030 --> 00:04:31,520
red things are actually covers that

154
00:04:34,710 --> 00:04:33,040
we'll remove before we

155
00:04:36,150 --> 00:04:34,720
launch but those are louvers which open

156
00:04:37,350 --> 00:04:36,160
and close to control the temperature of

157
00:04:39,510 --> 00:04:37,360
the spacecraft

158
00:04:40,710 --> 00:04:39,520
and then on the side that round thing

159
00:04:41,990 --> 00:04:40,720
you see there that's where the solar

160
00:04:43,909 --> 00:04:42,000
rays plug in because there are

161
00:04:45,830 --> 00:04:43,919
two big solar arrays that go into this

162
00:04:47,030 --> 00:04:45,840
you're seeing just a small part of what

163
00:04:48,310 --> 00:04:47,040

this thing looks like when it's fully

164

00:04:50,230 --> 00:04:48,320

deployed you've got

165

00:04:52,550 --> 00:04:50,240

five big panels of solar arrays on each

166

00:04:53,030 --> 00:04:52,560

side generating 20 kilowatts of power

167

00:04:55,030 --> 00:04:53,040

total

168

00:04:57,030 --> 00:04:55,040

near earth and that's what provides the

169

00:04:59,909 --> 00:04:57,040

power that goes with it

170

00:05:01,430 --> 00:04:59,919

so this spacecraft will use solar

171

00:05:03,990 --> 00:05:01,440

electric propulsion

172

00:05:04,790 --> 00:05:04,000

can you explain what that means and

173

00:05:07,350 --> 00:05:04,800

what's so

174

00:05:08,230 --> 00:05:07,360

innovative about it sure solar electric

175

00:05:12,790 --> 00:05:08,240

propulsion

176
00:05:14,390 --> 00:05:12,800
into orbit around psyche

177
00:05:16,550 --> 00:05:14,400
and it's a type of system that takes

178
00:05:17,909 --> 00:05:16,560
solar power converted into

179
00:05:19,830 --> 00:05:17,919
which is converting to electricity and

180
00:05:20,710 --> 00:05:19,840
takes that electricity and converts it

181
00:05:22,629 --> 00:05:20,720
into thrust

182
00:05:24,070 --> 00:05:22,639
it does that by using electricity to

183
00:05:26,390 --> 00:05:24,080
ionize xenon gas

184
00:05:28,070 --> 00:05:26,400
which is our propellant that xenon gas

185
00:05:29,350 --> 00:05:28,080
is ionized which charges it

186
00:05:30,790 --> 00:05:29,360
and then it's put through a magnetic

187
00:05:31,990 --> 00:05:30,800
field and an electric field which

188
00:05:32,950 --> 00:05:32,000

accelerated out the back of the

189

00:05:35,270 --> 00:05:32,960

spacecraft

190

00:05:37,590 --> 00:05:35,280

and by doing that we can generate thrust

191

00:05:39,430 --> 00:05:37,600

so that we can operate the spacecraft

192

00:05:40,790 --> 00:05:39,440

in space and get it accelerated get it

193

00:05:41,749 --> 00:05:40,800

to go to psyche which is where we want

194

00:05:44,950 --> 00:05:41,759

it to end up

195

00:05:45,430 --> 00:05:44,960

so this is the same kind of propulsion

196

00:05:47,909 --> 00:05:45,440

system

197

00:05:49,749 --> 00:05:47,919

that we saw in the dawn spacecraft it's

198

00:05:51,110 --> 00:05:49,759

similar to it it's in the same general

199

00:05:52,870 --> 00:05:51,120

family it's electric propulsion

200

00:05:55,110 --> 00:05:52,880

okay the dawn spacecraft used what we

201
00:05:56,870 --> 00:05:55,120
call ion thrusters gridded ion thrusters

202
00:05:58,950 --> 00:05:56,880
which is one way of doing this

203
00:06:00,550 --> 00:05:58,960
electric propulsion this spacecraft uses

204
00:06:01,909 --> 00:06:00,560
a different type of technology it uses

205
00:06:03,590 --> 00:06:01,919
hall effect thrusters

206
00:06:05,270 --> 00:06:03,600
gridless devices that use magnetic

207
00:06:07,110 --> 00:06:05,280
fields to hold electrons

208
00:06:08,710 --> 00:06:07,120
and uh this will actually be the first

209
00:06:10,469 --> 00:06:08,720
the first time we've flown

210
00:06:11,510 --> 00:06:10,479
the hull thrusters beyond lunar orbits

211
00:06:12,629 --> 00:06:11,520
these are going to be the first time

212
00:06:14,230 --> 00:06:12,639
hull thrusters have gone

213
00:06:15,670 --> 00:06:14,240

interplanetary in human history

214

00:06:17,909 --> 00:06:15,680

fantastic

215

00:06:19,270 --> 00:06:17,919

okay well once you've launched how long

216

00:06:21,909 --> 00:06:19,280

does it take you to get

217

00:06:22,390 --> 00:06:21,919

out to the main belt and get to 16

218

00:06:23,909 --> 00:06:22,400

psyche

219

00:06:25,430 --> 00:06:23,919

it takes about three and a half years

220

00:06:26,629 --> 00:06:25,440

for us to get out there so we launch in

221

00:06:28,469 --> 00:06:26,639

2022

222

00:06:29,990 --> 00:06:28,479

do a three and a half year cruise then

223

00:06:33,350 --> 00:06:30,000

we take about 20

224

00:06:34,950 --> 00:06:33,360

21 22 months at psyche orbiting

225

00:06:37,110 --> 00:06:34,960

the asteroid itself to collect our

226
00:06:40,309 --> 00:06:37,120
science data

227
00:06:40,790 --> 00:06:40,319
all right so this is not your first

228
00:06:42,629 --> 00:06:40,800
mission

229
00:06:44,390 --> 00:06:42,639
here at jpl and i think you're in a

230
00:06:46,870 --> 00:06:44,400
unique position to be able to help

231
00:06:47,909 --> 00:06:46,880
adrian out with his question adrian on

232
00:06:50,710 --> 00:06:47,919
facebook asks

233
00:06:52,150 --> 00:06:50,720
can you explain more of what's in this

234
00:06:54,870 --> 00:06:52,160
room

235
00:06:57,350 --> 00:06:54,880
the attributes of high bay one here so

236
00:06:59,270 --> 00:06:57,360
high bay one is one of jpl's historic

237
00:07:01,350 --> 00:06:59,280
facilities where they've manufactured

238
00:07:02,629 --> 00:07:01,360

spacecraft for uh decades certainly as

239

00:07:04,070 --> 00:07:02,639

long as i've been here

240

00:07:05,510 --> 00:07:04,080

and you can see on the back there are

241

00:07:07,029 --> 00:07:05,520

series of badges showing the various

242

00:07:09,029 --> 00:07:07,039

spacecraft which have been

243

00:07:10,550 --> 00:07:09,039

manufactured here at jpl in this high

244

00:07:11,430 --> 00:07:10,560

bay which will go all the way back to

245

00:07:14,469 --> 00:07:11,440

ranger

246

00:07:15,909 --> 00:07:14,479

i think the year on that is 1961 is that

247

00:07:17,270 --> 00:07:15,919

the year on there it goes back to the

248

00:07:19,189 --> 00:07:17,280

beginning of the space age when the

249

00:07:21,670 --> 00:07:19,199

first space probes were being built

250

00:07:23,350 --> 00:07:21,680

this is a big clean room facility it

251
00:07:25,830 --> 00:07:23,360
keeps the spacecraft clean keeps them

252
00:07:27,909 --> 00:07:25,840
from being contaminated as we build them

253
00:07:29,430 --> 00:07:27,919
i've i was here when the curiosity rover

254
00:07:30,870 --> 00:07:29,440
was built here i think the perseverance

255
00:07:32,390 --> 00:07:30,880
rover was built here

256
00:07:34,150 --> 00:07:32,400
last year before it launched and now

257
00:07:36,390 --> 00:07:34,160
we're building psyche here

258
00:07:37,270 --> 00:07:36,400
in this facility and uh this is where

259
00:07:39,670 --> 00:07:37,280
spacecrafter

260
00:07:40,870 --> 00:07:39,680
are born and where they're built

261
00:07:43,510 --> 00:07:40,880
absolutely

262
00:07:45,350 --> 00:07:43,520
so if as gabby's been panning here

263
00:07:47,029 --> 00:07:45,360

across all of those

264

00:07:48,629 --> 00:07:47,039

icons there in the back those mission

265

00:07:51,749 --> 00:07:48,639

patches in the back

266

00:07:55,029 --> 00:07:51,759

they also include the voyager spacecraft

267

00:07:58,469 --> 00:07:55,039

all the mars rovers were made here

268

00:08:01,029 --> 00:07:58,479

so perseverance and curiosity

269

00:08:02,950 --> 00:08:01,039

spirit opportunity sojourner this is

270

00:08:05,189 --> 00:08:02,960

this is a hallowed hall

271

00:08:06,950 --> 00:08:05,199

and uh and we've got a little bit more

272

00:08:09,510 --> 00:08:06,960

room so

273

00:08:10,710 --> 00:08:09,520

we're still awaiting the installation of

274

00:08:13,029 --> 00:08:10,720

the perseverance

275

00:08:14,869 --> 00:08:13,039

patch and then next to that will be

276

00:08:18,710 --> 00:08:14,879

nicer and then psyche

277

00:08:20,869 --> 00:08:18,720

yep we'll be in good company fantastic

278

00:08:22,950 --> 00:08:20,879

okay so moving on to more questions

279

00:08:25,830 --> 00:08:22,960

everybody keep those questions coming

280

00:08:26,710 --> 00:08:25,840

jessica on facebook wants to know how do

281

00:08:30,309 --> 00:08:26,720

we know

282

00:08:32,469 --> 00:08:30,319

what psyche is made of

283

00:08:33,350 --> 00:08:32,479

um do we mean now or when we get there

284

00:08:34,070 --> 00:08:33,360

because those are two different

285

00:08:35,750 --> 00:08:34,080

questions

286

00:08:37,670 --> 00:08:35,760

all right well let's let's let's talk

287

00:08:38,310 --> 00:08:37,680

about what we know and what we don't

288

00:08:40,230 --> 00:08:38,320

know

289

00:08:41,670 --> 00:08:40,240

and if we if we knew everything there

290

00:08:41,909 --> 00:08:41,680

would be no point in going to explore

291

00:08:46,870 --> 00:08:41,919

right

292

00:08:48,630 --> 00:08:46,880

know about psyche well what we believe

293

00:08:50,150 --> 00:08:48,640

about psyche is that it's made about 40

294

00:08:52,230 --> 00:08:50,160

to 60 percent metal

295

00:08:53,990 --> 00:08:52,240

and we deduce that from estimates that

296

00:08:55,590 --> 00:08:54,000

we've made of its mass how much it

297

00:08:57,670 --> 00:08:55,600

weighs and how big it is

298

00:08:59,190 --> 00:08:57,680

and from that we can deduce its density

299

00:09:00,230 --> 00:08:59,200

and from its density we can look at it

300

00:09:02,550 --> 00:09:00,240

and go well that thing

301
00:09:04,310 --> 00:09:02,560
that thing seems pretty dense so we can

302
00:09:06,710 --> 00:09:04,320
back out from that that it's in the m

303
00:09:08,070 --> 00:09:06,720
class it's a metallic class asteroid

304
00:09:10,230 --> 00:09:08,080
exactly how much metal there is of

305
00:09:13,030 --> 00:09:10,240
course we won't know until we get there

306
00:09:14,150 --> 00:09:13,040
and so it's when we get there first of

307
00:09:15,509 --> 00:09:14,160
all when we get there it'll be the first

308
00:09:17,110 --> 00:09:15,519
time that it ever looks to us

309
00:09:18,230 --> 00:09:17,120
more than just like a speck of light

310
00:09:18,870 --> 00:09:18,240
right now when you look at it in a

311
00:09:21,910 --> 00:09:18,880
telescope

312
00:09:23,910 --> 00:09:21,920
it's it's fun to look at but it's really

313
00:09:25,350 --> 00:09:23,920

just a tiny pinpoint of light there

314

00:09:26,949 --> 00:09:25,360

when we get there we'll be able to take

315

00:09:28,150 --> 00:09:26,959

pictures of the surface that

316

00:09:30,070 --> 00:09:28,160

magnetometer

317

00:09:32,230 --> 00:09:30,080

if we detect a magnetic field coming

318

00:09:33,670 --> 00:09:32,240

from psyche that will be a sign that it

319

00:09:34,150 --> 00:09:33,680

used to be part of the inside of a

320

00:09:35,670 --> 00:09:34,160

planet

321

00:09:38,150 --> 00:09:35,680

because well the earth has a magnetic

322

00:09:40,150 --> 00:09:38,160

field but that magnetic field comes from

323

00:09:41,670 --> 00:09:40,160

the molten core that sits inside of the

324

00:09:43,990 --> 00:09:41,680

earth the iron core

325

00:09:45,750 --> 00:09:44,000

and so if psyche was once part of the

326

00:09:47,509 --> 00:09:45,760

inside of a forming planet that it may

327

00:09:49,110 --> 00:09:47,519

have picked up those magnetic fields

328

00:09:51,350 --> 00:09:49,120

have remnants of those magnetic fields

329

00:09:52,389 --> 00:09:51,360

that we can detect now even billions of

330

00:09:53,829 --> 00:09:52,399

years later

331

00:09:55,269 --> 00:09:53,839

um what the gamma-ray neutron

332

00:09:56,150 --> 00:09:55,279

spectrometer will let us look at it and

333

00:09:57,750 --> 00:09:56,160

determine

334

00:09:59,430 --> 00:09:57,760

exactly what's in that metal whether

335

00:10:01,269 --> 00:09:59,440

there's nickel in there whether there's

336

00:10:02,710 --> 00:10:01,279

gold whether there's other materials

337

00:10:04,389 --> 00:10:02,720

and from that we can determine how it

338

00:10:05,670 --> 00:10:04,399

was created and what's in there and then

339

00:10:07,590 --> 00:10:05,680

the imager of course shows us the

340

00:10:08,470 --> 00:10:07,600

surface and by filtering those images we

341

00:10:10,630 --> 00:10:08,480

can tell some of the

342

00:10:11,990 --> 00:10:10,640

surface composition of the surface by

343

00:10:14,230 --> 00:10:12,000

looking at the colors and the

344

00:10:15,829 --> 00:10:14,240

frequencies coming off of it

345

00:10:17,750 --> 00:10:15,839

so everything you've described with the

346

00:10:18,949 --> 00:10:17,760

instrumentation this is all remote

347

00:10:21,509 --> 00:10:18,959

science there's no

348

00:10:23,829 --> 00:10:21,519

actual contact that happens right not

349

00:10:26,790 --> 00:10:23,839

this one we're not landing this time

350

00:10:27,750 --> 00:10:26,800

well thomas wants to know is it a

351
00:10:30,630 --> 00:10:27,760
one-way trip

352
00:10:31,509 --> 00:10:30,640
and why not try to take a sample it is a

353
00:10:33,430 --> 00:10:31,519
one-way trip

354
00:10:34,870 --> 00:10:33,440
uh we don't have the propellant on board

355
00:10:36,630 --> 00:10:34,880
to be able to come back

356
00:10:38,389 --> 00:10:36,640
the fuel in essence to be able to come

357
00:10:39,910 --> 00:10:38,399
back and um

358
00:10:41,590 --> 00:10:39,920
we're not going to be trying to land and

359
00:10:43,110 --> 00:10:41,600
sample it because

360
00:10:44,870 --> 00:10:43,120
quite frankly we don't know what the

361
00:10:47,990 --> 00:10:44,880
surface looks like we have never

362
00:10:48,630 --> 00:10:48,000
been to a metal asteroid before now

363
00:10:50,550 --> 00:10:48,640

we've been to

364

00:10:52,230 --> 00:10:50,560

asteroids that are made of rock and

365

00:10:53,990 --> 00:10:52,240

we've seen worlds like pluto that have a

366

00:10:54,949 --> 00:10:54,000

lot of ice and we've been to gas giants

367

00:10:56,630 --> 00:10:54,959

like jupiter

368

00:10:58,949 --> 00:10:56,640

but this is really our first time

369

00:11:00,630 --> 00:10:58,959

visiting a large metal body

370

00:11:02,230 --> 00:11:00,640

so we don't know if we can land on the

371

00:11:03,750 --> 00:11:02,240

surface we don't know if it's

372

00:11:05,670 --> 00:11:03,760

if it's rocky we don't know if they're

373

00:11:07,350 --> 00:11:05,680

craters so we need to really

374

00:11:08,310 --> 00:11:07,360

consider this the first survey mission

375

00:11:09,990 --> 00:11:08,320

we're going to go out and we're going to

376

00:11:10,550 --> 00:11:10,000

see what this thing is see what it looks

377

00:11:11,990 --> 00:11:10,560

like

378

00:11:13,509 --> 00:11:12,000

and then once we know more about it

379

00:11:15,269 --> 00:11:13,519

we'll be able to send out a spacecraft

380

00:11:16,389 --> 00:11:15,279

that can land on it or take samples and

381

00:11:17,910 --> 00:11:16,399

do things like that

382

00:11:19,750 --> 00:11:17,920

but this is really our first time seeing

383

00:11:21,990 --> 00:11:19,760

a brand new body so it's a little early

384

00:11:24,550 --> 00:11:22,000

for us to try and land on it

385

00:11:27,030 --> 00:11:24,560

well okay so when we get there we go

386

00:11:29,269 --> 00:11:27,040

into orbit around psyche

387

00:11:30,870 --> 00:11:29,279

how long will we stay there and will we

388

00:11:32,069 --> 00:11:30,880

stay at the same altitude will we stay

389

00:11:33,190 --> 00:11:32,079

at the same angle are you going to

390

00:11:36,550 --> 00:11:33,200

change things up

391

00:11:38,630 --> 00:11:36,560

we will be there for about 21 months

392

00:11:40,389 --> 00:11:38,640

and we will be in a series of four

393

00:11:42,790 --> 00:11:40,399

different orbits starting way up high

394

00:11:43,910 --> 00:11:42,800

going down low the lowest orbit will be

395

00:11:46,470 --> 00:11:43,920

within about one

396

00:11:49,829 --> 00:11:46,480

planetary diameter so it'll be within

397

00:11:51,670 --> 00:11:49,839

about 150 kilometers of the surface 150

398

00:11:53,190 --> 00:11:51,680

miles of the surface i guess about 200

399

00:11:54,790 --> 00:11:53,200

kilometers of the surface

400

00:11:56,629 --> 00:11:54,800

and it's in that lowest orbit that the

401
00:11:57,350 --> 00:11:56,639
gamma-ray spectrometer can operate and

402
00:11:59,509 --> 00:11:57,360
take its

403
00:12:01,670 --> 00:11:59,519
elemental data but before we can go

404
00:12:03,430 --> 00:12:01,680
there we start in these higher orbits

405
00:12:05,110 --> 00:12:03,440
because we actually have to go and as i

406
00:12:07,030 --> 00:12:05,120
said we've never been to an asteroid

407
00:12:07,910 --> 00:12:07,040
like this before we have to survey it so

408
00:12:09,750 --> 00:12:07,920
we start up

409
00:12:11,190 --> 00:12:09,760
in a high orbit where we can determine

410
00:12:12,949 --> 00:12:11,200
what the gravity field looks like and

411
00:12:14,710 --> 00:12:12,959
determine what the stable orbits are

412
00:12:16,150 --> 00:12:14,720
present in the asteroid and then after

413
00:12:17,190 --> 00:12:16,160

as we learn that we move to lower and

414

00:12:18,790 --> 00:12:17,200

lower orbits

415

00:12:20,150 --> 00:12:18,800

making sure we can get safely to the

416

00:12:20,710 --> 00:12:20,160

lowest orbit that we need to do the

417

00:12:22,550 --> 00:12:20,720

science

418

00:12:24,310 --> 00:12:22,560

one thing we haven't talked about is how

419

00:12:28,230 --> 00:12:24,320

big is psyche

420

00:12:29,030 --> 00:12:28,240

psyche is about let's call it 125 miles

421

00:12:30,550 --> 00:12:29,040

in diameter

422

00:12:32,870 --> 00:12:30,560

it's a little over 200 kilometers in

423

00:12:35,990 --> 00:12:32,880

diameter it's about the size of

424

00:12:37,750 --> 00:12:36,000

massachusetts i think it's the distance

425

00:12:39,110 --> 00:12:37,760

between tucson and phoenix you know a

426

00:12:40,470 --> 00:12:39,120

decent part of the size of southern

427

00:12:42,870 --> 00:12:40,480

california it's big

428

00:12:44,150 --> 00:12:42,880

it's a big one so imagine something that

429

00:12:48,310 --> 00:12:44,160

big that's made of

430

00:12:50,150 --> 00:12:48,320

40 60 percent metal it's just huge

431

00:12:51,590 --> 00:12:50,160

okay all right keep those questions

432

00:12:53,750 --> 00:12:51,600

coming in everybody

433

00:12:55,509 --> 00:12:53,760

moon to mars quest on facebook we've got

434

00:12:58,389 --> 00:12:55,519

your question right here

435

00:12:59,590 --> 00:12:58,399

um will available light at that distance

436

00:13:02,790 --> 00:12:59,600

be a restrictive

437

00:13:04,710 --> 00:13:02,800

factor for the imaging cameras on board

438

00:13:06,150 --> 00:13:04,720

and what resolution will you be working

439

00:13:09,269 --> 00:13:06,160

with on those cameras

440

00:13:11,030 --> 00:13:09,279

um the the pres the light is a big

441

00:13:13,190 --> 00:13:11,040

design factor in the cameras but we

442

00:13:14,949 --> 00:13:13,200

design the cameras with big lenses

443

00:13:16,790 --> 00:13:14,959

so that they can operate in that

444

00:13:18,550 --> 00:13:16,800

lighting condition um of course we can

445

00:13:20,150 --> 00:13:18,560

only take pictures when it's light at

446

00:13:21,030 --> 00:13:20,160

psyche we can't take pictures when it's

447

00:13:22,629 --> 00:13:21,040

dark

448

00:13:24,470 --> 00:13:22,639

an interesting thing about psyche is

449

00:13:25,910 --> 00:13:24,480

that you know the earth rotates and it

450

00:13:27,509 --> 00:13:25,920

has a night and a day

451

00:13:29,110 --> 00:13:27,519

well psyche rotates but it's actually

452

00:13:31,110 --> 00:13:29,120

turned over on its side

453

00:13:32,710 --> 00:13:31,120

so um there are parts of its orbit where

454

00:13:34,150 --> 00:13:32,720

like one half is lit up and the other

455

00:13:35,670 --> 00:13:34,160

half is not lit up because it's kind of

456

00:13:36,710 --> 00:13:35,680

spinning like this and the sun is over

457

00:13:37,750 --> 00:13:36,720

there and there are other parts where it

458

00:13:40,069 --> 00:13:37,760

has a normal

459

00:13:40,949 --> 00:13:40,079

night and day type cycle so we have to

460

00:13:42,949 --> 00:13:40,959

sync up

461

00:13:44,470 --> 00:13:42,959

our spacecraft to arrive in such a way

462

00:13:45,670 --> 00:13:44,480

that we can get pictures of the whole

463

00:13:47,509 --> 00:13:45,680

surface so that we

464

00:13:49,509 --> 00:13:47,519

know that there'll be light covering the

465

00:13:51,110 --> 00:13:49,519

whole surface as it rotates

466

00:13:53,030 --> 00:13:51,120

otherwise we end up with just half of

467

00:13:54,069 --> 00:13:53,040

psyche and that's much less fun than

468

00:13:56,470 --> 00:13:54,079

having all of it

469

00:13:57,269 --> 00:13:56,480

exactly yeah i'm looking forward already

470

00:14:00,310 --> 00:13:57,279

to you know

471

00:14:01,110 --> 00:14:00,320

3d models made with the data that that

472

00:14:02,389 --> 00:14:01,120

you'll have

473

00:14:04,629 --> 00:14:02,399

that's right we build our own shape

474

00:14:06,470 --> 00:14:04,639

models off of that 3d 3d models that we

475

00:14:07,670 --> 00:14:06,480

then use to estimate the gravity

476
00:14:09,269 --> 00:14:07,680
and we can figure out some things about

477
00:14:11,110 --> 00:14:09,279
what the inside of the asteroid looks

478
00:14:12,870 --> 00:14:11,120
like from that gravity field so

479
00:14:14,389 --> 00:14:12,880
these are all important parts for the

480
00:14:16,150 --> 00:14:14,399
scientist in learning learning what

481
00:14:17,030 --> 00:14:16,160
psyche is made of today and how it came

482
00:14:19,350 --> 00:14:17,040
to be

483
00:14:20,790 --> 00:14:19,360
all right so uh at the top of the show i

484
00:14:21,750 --> 00:14:20,800
mentioned that your project systems

485
00:14:24,470 --> 00:14:21,760
engineer

486
00:14:25,269 --> 00:14:24,480
can you tell us more what does that mean

487
00:14:29,110 --> 00:14:25,279
in

488
00:14:31,990 --> 00:14:29,120

your days on the mission

489

00:14:33,590 --> 00:14:32,000

sure the project systems engineer uh

490

00:14:35,110 --> 00:14:33,600

well i'm the project systems engineer

491

00:14:36,629 --> 00:14:35,120

what they call the engineering technical

492

00:14:38,470 --> 00:14:36,639

authority um

493

00:14:39,750 --> 00:14:38,480

i and the team that i lead are a team of

494

00:14:41,030 --> 00:14:39,760

engineers that are in charge of making

495

00:14:42,069 --> 00:14:41,040

sure all the different pieces of the

496

00:14:43,829 --> 00:14:42,079

mission the

497

00:14:45,350 --> 00:14:43,839

instruments and the spacecraft and the

498

00:14:46,310 --> 00:14:45,360

ground system and the rocket will all

499

00:14:47,829 --> 00:14:46,320

work together

500

00:14:49,910 --> 00:14:47,839

to be able to accomplish the mission's

501
00:14:51,750 --> 00:14:49,920
goals so we're in charge of eventually

502
00:14:54,389 --> 00:14:51,760
making sure that it all comes together

503
00:14:55,110 --> 00:14:54,399
and works together um systems engineers

504
00:14:56,790 --> 00:14:55,120
are

505
00:14:57,990 --> 00:14:56,800
generalists you know they tend to

506
00:14:59,269 --> 00:14:58,000
operate in a whole bunch of different

507
00:15:00,870 --> 00:14:59,279
areas because you're pulling together

508
00:15:03,350 --> 00:15:00,880
all these different pieces

509
00:15:05,189 --> 00:15:03,360
it's a lot of fun work we get to

510
00:15:07,430 --> 00:15:05,199
interact with a lot of different people

511
00:15:11,189 --> 00:15:07,440
now right now under kovid my time is

512
00:15:14,710 --> 00:15:13,350
i think normally we get to interact with

513
00:15:16,389 --> 00:15:14,720

a lot of different people and go down

514

00:15:16,870 --> 00:15:16,399

and see the fun hardware and things like

515

00:15:18,949 --> 00:15:16,880

that

516

00:15:20,710 --> 00:15:18,959

in trying to interact with everybody we

517

00:15:22,470 --> 00:15:20,720

what we do is we build teams we build

518

00:15:24,790 --> 00:15:22,480

collaborative teams of engineers that

519

00:15:27,670 --> 00:15:24,800

work together to make the mission work

520

00:15:28,069 --> 00:15:27,680

and what uh what was the path that you

521

00:15:31,350 --> 00:15:28,079

took

522

00:15:35,030 --> 00:15:31,360

to get where you are today oh um

523

00:15:37,670 --> 00:15:35,040

well i uh i grew up in alabama

524

00:15:39,509 --> 00:15:37,680

actually and i went to high school there

525

00:15:40,230 --> 00:15:39,519

and i was good at science and math but

526
00:15:41,509 --> 00:15:40,240
to be honest

527
00:15:43,269 --> 00:15:41,519
i didn't even really know what

528
00:15:45,189 --> 00:15:43,279
engineering was when i graduated because

529
00:15:47,509 --> 00:15:45,199
i hadn't really met any engineers

530
00:15:48,629 --> 00:15:47,519
i didn't really know much about it but i

531
00:15:51,910 --> 00:15:48,639
did uh

532
00:15:54,389 --> 00:15:51,920
i did go to get into mit and so i went

533
00:15:56,870 --> 00:15:54,399
there thinking i might be a scientist or

534
00:15:58,310 --> 00:15:56,880
a physicist or something and then i

535
00:16:01,110 --> 00:15:58,320
discovered what engineering was

536
00:16:02,790 --> 00:16:01,120
and so when the time just came to pick

537
00:16:04,629 --> 00:16:02,800
my major i thought well i think

538
00:16:05,910 --> 00:16:04,639

space is something cool that maybe i

539

00:16:07,910 --> 00:16:05,920

could go work on

540

00:16:09,829 --> 00:16:07,920

and uh and building spacecraft would be

541

00:16:11,430 --> 00:16:09,839

neat and i've been fortunate enough that

542

00:16:14,790 --> 00:16:11,440

i've been able to stay in the field

543

00:16:16,310 --> 00:16:14,800

since then i got my phd there and then

544

00:16:17,749 --> 00:16:16,320

went and worked in commercial industry

545

00:16:18,310 --> 00:16:17,759

worked on commercial satellites for

546

00:16:20,629 --> 00:16:18,320

maxar

547

00:16:21,910 --> 00:16:20,639

the company that makes this chassis

548

00:16:22,870 --> 00:16:21,920

building the types of satellites that

549

00:16:24,310 --> 00:16:22,880

carry direct tv

550

00:16:26,389 --> 00:16:24,320

and serious satellite radio all the

551

00:16:27,590 --> 00:16:26,399

commercial stuff and then uh

552

00:16:30,150 --> 00:16:27,600

worked there for seven years and then

553

00:16:31,749 --> 00:16:30,160

came to jpl and here i've been a system

554

00:16:33,430 --> 00:16:31,759

engineer working on the curiosity mars

555

00:16:35,430 --> 00:16:33,440

rover and i helped

556

00:16:37,350 --> 00:16:35,440

i work on mission proposals to help

557

00:16:38,790 --> 00:16:37,360

helping create missions like psyche

558

00:16:41,110 --> 00:16:38,800

um which is one of the fun things that

559

00:16:44,150 --> 00:16:41,120

we do here so you've been on psyche

560

00:16:45,590 --> 00:16:44,160

almost from the get-go right uh yes i

561

00:16:48,069 --> 00:16:45,600

think that's right i think i was the

562

00:16:50,069 --> 00:16:48,079

12th or 13th person to join the project

563

00:16:52,230 --> 00:16:50,079

was it just a cocktail napkin sketch at

564

00:16:54,790 --> 00:16:52,240

that point or a whiteboard sketch or

565

00:16:56,389 --> 00:16:54,800

oh i wish we had a cocktail napkin

566

00:16:58,550 --> 00:16:56,399

sketch or a whiteboard sketch no

567

00:16:59,749 --> 00:16:58,560

it started it was an idea it was a set

568

00:17:02,069 --> 00:16:59,759

of goals

569

00:17:03,430 --> 00:17:02,079

it was a destination it was a set of

570

00:17:05,029 --> 00:17:03,440

science goals

571

00:17:06,630 --> 00:17:05,039

but we had to go through all the work of

572

00:17:08,470 --> 00:17:06,640

figuring out what kind of instruments do

573

00:17:10,150 --> 00:17:08,480

we want to put on board to do this

574

00:17:12,230 --> 00:17:10,160

how do we want to get there chemical or

575

00:17:13,990 --> 00:17:12,240

electric propulsion

576
00:17:15,909 --> 00:17:14,000
what should our spacecraft look like how

577
00:17:17,990 --> 00:17:15,919
much power do we need these are all

578
00:17:19,829 --> 00:17:18,000
things that we um

579
00:17:21,829 --> 00:17:19,839
that we had to develop ourselves i mean

580
00:17:23,750 --> 00:17:21,839
i can remember this design here which

581
00:17:25,510 --> 00:17:23,760
has the two towers and the big

582
00:17:27,350 --> 00:17:25,520
and the big antenna up on top i can

583
00:17:30,070 --> 00:17:27,360
remember when i

584
00:17:31,270 --> 00:17:30,080
and peter lord who's one of the deputy

585
00:17:33,430 --> 00:17:31,280
not one of the deputy

586
00:17:34,789 --> 00:17:33,440
project managers at maxar and dan gobel

587
00:17:36,150 --> 00:17:34,799
who's the chief engineer

588
00:17:38,310 --> 00:17:36,160

the three of us were sitting in my

589

00:17:39,270 --> 00:17:38,320

office at a white board trying to figure

590

00:17:41,190 --> 00:17:39,280

out okay

591

00:17:42,390 --> 00:17:41,200

we need to tell the configuration

592

00:17:42,870 --> 00:17:42,400

engineers what should this thing look

593

00:17:44,470 --> 00:17:42,880

like

594

00:17:45,669 --> 00:17:44,480

right and we were just drawing on the

595

00:17:46,950 --> 00:17:45,679

whiteboard trying to figure out where we

596

00:17:48,470 --> 00:17:46,960

should put the instruments and where we

597

00:17:50,710 --> 00:17:48,480

should put the antenna

598

00:17:52,230 --> 00:17:50,720

and this is actually pretty close to

599

00:17:54,150 --> 00:17:52,240

what we put on the whiteboard in terms

600

00:17:56,390 --> 00:17:54,160

of its basic configuration they did a

601
00:17:58,789 --> 00:17:56,400
pretty good job

602
00:18:00,390 --> 00:17:58,799
all right well on that note ganza on

603
00:18:03,190 --> 00:18:00,400
facebook wants to know what

604
00:18:06,070 --> 00:18:03,200
is the main challenge that you faced in

605
00:18:08,070 --> 00:18:06,080
the development of the seiki spacecraft

606
00:18:09,750 --> 00:18:08,080
we've had a lot of challenges in the

607
00:18:10,950 --> 00:18:09,760
development of the psyche spacecraft and

608
00:18:12,830 --> 00:18:10,960
there's so many different ways i can

609
00:18:15,270 --> 00:18:12,840
talk about that

610
00:18:16,630 --> 00:18:15,280
um you know what we're doing here with

611
00:18:18,390 --> 00:18:16,640
this design

612
00:18:20,070 --> 00:18:18,400
in a technical sense is we're bringing

613
00:18:21,750 --> 00:18:20,080

together this

614

00:18:23,909 --> 00:18:21,760

propulsion and power system which is

615

00:18:25,270 --> 00:18:23,919

built by maxar and then putting the jpl

616

00:18:28,150 --> 00:18:25,280

computer on top of that and that

617

00:18:30,630 --> 00:18:28,160

requires a high degree of coordination

618

00:18:32,870 --> 00:18:30,640

and really close work between the two

619

00:18:34,870 --> 00:18:32,880

teams so we spent a lot of time

620

00:18:36,549 --> 00:18:34,880

trying to build that team understand all

621

00:18:37,909 --> 00:18:36,559

the technical requirements but also

622

00:18:39,029 --> 00:18:37,919

understand the cultures of each of the

623

00:18:41,110 --> 00:18:39,039

organizations

624

00:18:42,070 --> 00:18:41,120

and bring them together and then on top

625

00:18:44,470 --> 00:18:42,080

of that you stack on

626
00:18:45,110 --> 00:18:44,480
kovid which hit us a year ago and the

627
00:18:46,630 --> 00:18:45,120
fact that we

628
00:18:47,990 --> 00:18:46,640
mostly can no longer meet with each

629
00:18:49,029 --> 00:18:48,000
other in person the folks working on

630
00:18:50,630 --> 00:18:49,039
this hardware

631
00:18:52,070 --> 00:18:50,640
get to go down on the floor but most of

632
00:18:52,870 --> 00:18:52,080
us are working from home and in zoom

633
00:18:55,029 --> 00:18:52,880
meetings

634
00:18:57,430 --> 00:18:55,039
it's been a it's been a real challenge

635
00:18:59,430 --> 00:18:57,440
trying to maintain that but fortunately

636
00:19:01,190 --> 00:18:59,440
the pi lindy believes in building strong

637
00:19:01,830 --> 00:19:01,200
teams strong collaborative teams and

638
00:19:06,070 --> 00:19:01,840

that

639

00:19:07,830 --> 00:19:06,080

been key i think to working effectively

640

00:19:10,870 --> 00:19:07,840

through this whole coven

641

00:19:14,150 --> 00:19:10,880

pandemic thing so on the note

642

00:19:16,310 --> 00:19:14,160

of covid jessica wants to know how long

643

00:19:18,710 --> 00:19:16,320

will say he be at jpl

644

00:19:19,669 --> 00:19:18,720

and do you think visitors might be able

645

00:19:22,070 --> 00:19:19,679

to see it

646

00:19:24,150 --> 00:19:22,080

post coveted restrictions it will be

647

00:19:25,909 --> 00:19:24,160

here a little bit over a year and

648

00:19:27,190 --> 00:19:25,919

i hope i think visitors will be able to

649

00:19:28,870 --> 00:19:27,200

see it you can come up in the viewing

650

00:19:30,710 --> 00:19:28,880

gallery here or in the sister

651
00:19:33,029 --> 00:19:30,720
high bay high bay 2 where it will also

652
00:19:34,789 --> 00:19:33,039
be and i get to see it

653
00:19:36,549 --> 00:19:34,799
you can't just walk up got to have a

654
00:19:37,270 --> 00:19:36,559
tour guide and all of that but yeah it

655
00:19:38,870 --> 00:19:37,280
should be here

656
00:19:40,549 --> 00:19:38,880
a little over a year and then we'll

657
00:19:41,909 --> 00:19:40,559
it'll ship off to launch base

658
00:19:43,909 --> 00:19:41,919
all right well i'll take that

659
00:19:47,270 --> 00:19:43,919
opportunity to say jessica make sure you

660
00:19:49,909 --> 00:19:47,280
go to jpl.nasa.gov

661
00:19:50,549 --> 00:19:49,919
you can take a virtual tour right now

662
00:19:53,430 --> 00:19:50,559
then go

663
00:19:54,390 --> 00:19:53,440

on the floor of the clean rooms to get

664

00:19:57,029 --> 00:19:54,400

up close

665

00:19:58,070 --> 00:19:57,039

with nysar we took some pictures 360

666

00:19:59,669 --> 00:19:58,080

degree pictures

667

00:20:02,070 --> 00:19:59,679

with nysar down there and you'll get to

668

00:20:04,149 --> 00:20:02,080

see everybody in their their gowns

669

00:20:05,909 --> 00:20:04,159

their cleanroom attire their personal

670

00:20:08,950 --> 00:20:05,919

protective equipment

671

00:20:09,830 --> 00:20:08,960

and in the after times when restrictions

672

00:20:12,070 --> 00:20:09,840

have lifted

673

00:20:13,510 --> 00:20:12,080

we will be taking tours again but for

674

00:20:15,710 --> 00:20:13,520

now everything's virtual

675

00:20:16,870 --> 00:20:15,720

and you can find it there on our website

676
00:20:20,070 --> 00:20:16,880
jpl.nasa.gov

677
00:20:23,190 --> 00:20:20,080
okay back to the questions um

678
00:20:25,350 --> 00:20:23,200
let's see oh jessica

679
00:20:26,950 --> 00:20:25,360
also wants to know is it difficult was

680
00:20:29,190 --> 00:20:26,960
it difficult for you to transition

681
00:20:30,950 --> 00:20:29,200
from a mars project to an asteroid

682
00:20:32,630 --> 00:20:30,960
project oh was it difficult to

683
00:20:34,230 --> 00:20:32,640
transition from a mars project to an

684
00:20:36,149 --> 00:20:34,240
asteroid project well i

685
00:20:37,430 --> 00:20:36,159
so before i worked on mars i worked on

686
00:20:39,830 --> 00:20:37,440
commercial spacecraft

687
00:20:41,830 --> 00:20:39,840
right um communication spacecraft that

688
00:20:43,350 --> 00:20:41,840

go to geostationary orbit at earth

689

00:20:45,669 --> 00:20:43,360

and then went to mars and then went to

690

00:20:47,510 --> 00:20:45,679

this i'd say yes and no

691

00:20:49,029 --> 00:20:47,520

they're different they do very different

692

00:20:52,390 --> 00:20:49,039

things um

693

00:20:55,190 --> 00:20:52,400

but the the physics

694

00:20:55,830 --> 00:20:55,200

is the same when you're in flight and

695

00:20:57,190 --> 00:20:55,840

the

696

00:20:58,710 --> 00:20:57,200

engineers that you work with a lot of

697

00:21:00,070 --> 00:20:58,720

them are the same people not always you

698

00:21:00,950 --> 00:21:00,080

know you're switching people around and

699

00:21:02,950 --> 00:21:00,960

whatnot

700

00:21:04,470 --> 00:21:02,960

the uh and the teams the experience that

701
00:21:05,750 --> 00:21:04,480
you get building one spacecraft does

702
00:21:06,630 --> 00:21:05,760
translate to the building of another

703
00:21:08,950 --> 00:21:06,640
spacecraft

704
00:21:10,230 --> 00:21:08,960
so i it's not as different i think as

705
00:21:12,310 --> 00:21:10,240
you'd think

706
00:21:13,430 --> 00:21:12,320
do you find cultural differences at all

707
00:21:15,029 --> 00:21:13,440
between uh

708
00:21:17,350 --> 00:21:15,039
teams working in different parts of

709
00:21:18,310 --> 00:21:17,360
planetary exploration oh sure there are

710
00:21:20,950 --> 00:21:18,320
strong

711
00:21:22,390 --> 00:21:20,960
cultural differences even within um even

712
00:21:24,149 --> 00:21:22,400
within the project right when you're

713
00:21:25,669 --> 00:21:24,159

working we have a team that's in denmark

714

00:21:27,590 --> 00:21:25,679

for instance right they have cultural

715

00:21:28,870 --> 00:21:27,600

differences and distances and language

716

00:21:30,230 --> 00:21:28,880

and things like that but they still work

717

00:21:32,149 --> 00:21:30,240

with us closely

718

00:21:34,070 --> 00:21:32,159

um early in my career you know i worked

719

00:21:34,950 --> 00:21:34,080

with i worked with russian vendors who

720

00:21:36,470 --> 00:21:34,960

were building

721

00:21:38,070 --> 00:21:36,480

building rockets and stuff like that

722

00:21:39,990 --> 00:21:38,080

they have a very different culture and

723

00:21:41,590 --> 00:21:40,000

how they do things there

724

00:21:43,669 --> 00:21:41,600

worked with the french also when i was

725

00:21:45,590 --> 00:21:43,679

working on communication satellites

726

00:21:46,710 --> 00:21:45,600

all of these different people all these

727

00:21:48,149 --> 00:21:46,720

different cultures

728

00:21:50,149 --> 00:21:48,159

coming together to build these things

729

00:21:52,870 --> 00:21:50,159

collaborative

730

00:21:54,070 --> 00:21:52,880

fantastic well you know it we were

731

00:21:56,390 --> 00:21:54,080

chatting earlier

732

00:21:57,750 --> 00:21:56,400

about you being a fan of the expanse and

733

00:21:58,549 --> 00:21:57,760

i just think it's hilarious that you

734

00:22:01,270 --> 00:21:58,559

started as

735

00:22:02,470 --> 00:22:01,280

an earther you became a martian and now

736

00:22:04,710 --> 00:22:02,480

you're going to go be a belter

737

00:22:05,990 --> 00:22:04,720

oh i did all three ah i thought you're

738

00:22:07,669 --> 00:22:06,000

the first person to point that out

739

00:22:10,789 --> 00:22:07,679

that's fun

740

00:22:11,990 --> 00:22:10,799

all right bus man okay back to the

741

00:22:15,190 --> 00:22:12,000

questions enough of my

742

00:22:15,909 --> 00:22:15,200

jibber-jabber um do you know uh

743

00:22:18,230 --> 00:22:15,919

commander

744

00:22:19,190 --> 00:22:18,240

uh galaga champ that guy's playing

745

00:22:21,750 --> 00:22:19,200

galaga

746

00:22:23,510 --> 00:22:21,760

um wants to know uh if any decisions

747

00:22:24,390 --> 00:22:23,520

have been made about potential public

748

00:22:27,110 --> 00:22:24,400

engagement

749

00:22:27,990 --> 00:22:27,120

ways that people could uh participate in

750

00:22:30,549 --> 00:22:28,000

the mission

751
00:22:31,190 --> 00:22:30,559
uh we'll you know we'll be sending names

752
00:22:33,190 --> 00:22:31,200
along

753
00:22:34,870 --> 00:22:33,200
to ride on the spacecraft or is there

754
00:22:36,789 --> 00:22:34,880
anything you can talk about like that

755
00:22:38,070 --> 00:22:36,799
yeah there's quite a few outreach

756
00:22:40,630 --> 00:22:38,080
programs i think that

757
00:22:41,909 --> 00:22:40,640
have been going for psyche since we uh

758
00:22:43,350 --> 00:22:41,919
since we were selected

759
00:22:45,270 --> 00:22:43,360
as a mission uh there's a psyche

760
00:22:46,149 --> 00:22:45,280
inspired program that people can sign up

761
00:22:47,350 --> 00:22:46,159
for where

762
00:22:49,430 --> 00:22:47,360
you don't have to be an engineer for

763
00:22:50,390 --> 00:22:49,440

that one um people contribute artwork

764

00:22:53,430 --> 00:22:50,400

people contribute have

765

00:22:55,350 --> 00:22:53,440

contributed music it's all part of a the

766

00:22:57,029 --> 00:22:55,360

work that's being done by asu as part of

767

00:22:58,710 --> 00:22:57,039

public outreach

768

00:23:00,070 --> 00:22:58,720

there are i think there is going to be a

769

00:23:01,590 --> 00:23:00,080

program where people can

770

00:23:03,669 --> 00:23:01,600

sign their name and get that put on

771

00:23:06,070 --> 00:23:03,679

psyche as well on a little microchip

772

00:23:07,190 --> 00:23:06,080

and just keep an eye out for all the

773

00:23:08,950 --> 00:23:07,200

different things oh they're also

774

00:23:10,710 --> 00:23:08,960

psychic capstone projects which are out

775

00:23:13,350 --> 00:23:10,720

there if you're at a university

776

00:23:14,870 --> 00:23:13,360

um the psyche project working through i

777

00:23:16,549 --> 00:23:14,880

think it's asu

778

00:23:17,990 --> 00:23:16,559

has signed up different universities

779

00:23:19,110 --> 00:23:18,000

which are able to do little design

780

00:23:21,110 --> 00:23:19,120

projects that are

781

00:23:23,830 --> 00:23:21,120

engineering design projects associated

782

00:23:27,029 --> 00:23:23,840

with psyche so google psyche inspired

783

00:23:28,310 --> 00:23:27,039

um google psyche capstone projects and

784

00:23:29,909 --> 00:23:28,320

you'll see plenty of stuff on there go

785

00:23:31,190 --> 00:23:29,919

to the psyche website there's there's

786

00:23:33,590 --> 00:23:31,200

plenty of stuff on there

787

00:23:35,350 --> 00:23:33,600

fantastic well i can't think of a better

788

00:23:36,870 --> 00:23:35,360

or more collaborative note to end on

789

00:23:37,909 --> 00:23:36,880

than that you talk about your strong and

790

00:23:40,390 --> 00:23:37,919

collaborative team

791

00:23:42,149 --> 00:23:40,400

which includes the members of the public

792

00:23:43,990 --> 00:23:42,159

so everybody stay tuned

793

00:23:46,710 --> 00:23:44,000

there's a lot more to come for psyche

794

00:23:49,750 --> 00:23:46,720

we're just getting going

795

00:23:51,110 --> 00:23:49,760

watch us here at nasa jpl wherever you

796

00:23:53,029 --> 00:23:51,120

get your social media

797

00:23:55,350 --> 00:23:53,039

to find out more about what's happening

798

00:23:59,190 --> 00:23:55,360

at the lab and for the latest

799

00:24:02,070 --> 00:23:59,200

on psyche follow at nasa solar system

800

00:24:04,070 --> 00:24:02,080

on facebook twitter and instagram thanks

