



1
00:00:07,269 --> 00:00:05,190
good afternoon i'm tabitha thompson from

2
00:00:09,430 --> 00:00:07,279
nasa's office of communications we're at

3
00:00:11,430 --> 00:00:09,440
the kennedy space center in florida to

4
00:00:13,589 --> 00:00:11,440
discuss important research launching

5
00:00:14,629 --> 00:00:13,599
this week to the international space

6
00:00:18,230 --> 00:00:14,639
station

7
00:00:20,710 --> 00:00:18,240
tomorrow at 5 55 pm eastern time orbital

8
00:00:22,470 --> 00:00:20,720
atk will launch its fourth commercial

9
00:00:24,310 --> 00:00:22,480
resupply services mission to the

10
00:00:26,710 --> 00:00:24,320
international space station

11
00:00:29,070 --> 00:00:26,720
cygnus will deliver critical materials

12
00:00:31,990 --> 00:00:29,080
to directly support dozens of more than

13
00:00:34,069 --> 00:00:32,000

250 science and research investigations

14

00:00:37,590 --> 00:00:34,079

that will take place during the space

15

00:00:39,670 --> 00:00:37,600

station's expeditions 45 and 46.

16

00:00:42,150 --> 00:00:39,680

joining us today to discuss a few of

17

00:00:44,470 --> 00:00:42,160

those science investigations are dr kurt

18

00:00:45,590 --> 00:00:44,480

costello deputy chief scientist for the

19

00:00:47,510 --> 00:00:45,600

international

20

00:00:50,389 --> 00:00:47,520

space station program science office at

21

00:00:52,950 --> 00:00:50,399

nasa's johnson space center in houston

22

00:00:54,950 --> 00:00:52,960

dr brian modell principal investigator

23

00:00:56,950 --> 00:00:54,960

for the packed bed reactor experiment

24

00:00:59,830 --> 00:00:56,960

from nasa's glenn research center in

25

00:01:01,990 --> 00:00:59,840

cleveland ken shields director of

26
00:01:03,430 --> 00:01:02,000
operations and education outreach for

27
00:01:06,149 --> 00:01:03,440
the center for the advancement of

28
00:01:08,390 --> 00:01:06,159
science in space or cases

29
00:01:10,310 --> 00:01:08,400
eleanor mccormick who is principal of st

30
00:01:14,230 --> 00:01:10,320
thomas moore cathedral school which

31
00:01:16,469 --> 00:01:14,240
built the st thomas moore stmsat one

32
00:01:18,310 --> 00:01:16,479
next to her pat coleman a third grade

33
00:01:20,070 --> 00:01:18,320
teacher at st thomas moore cathedral

34
00:01:22,550 --> 00:01:20,080
school which built the st thomas more

35
00:01:24,950 --> 00:01:22,560
stm sat one

36
00:01:26,950 --> 00:01:24,960
andrew petro program executive for the

37
00:01:28,550 --> 00:01:26,960
small spacecraft technology program at

38
00:01:30,710 --> 00:01:28,560

nasa headquarters

39

00:01:32,950 --> 00:01:30,720

and finally talbot jaeger chief

40

00:01:35,109 --> 00:01:32,960

technology officer for nova works and

41

00:01:36,630 --> 00:01:35,119

principal investigator for the nanoracks

42

00:01:37,990 --> 00:01:36,640

microsat

43

00:01:39,590 --> 00:01:38,000

simple

44

00:01:41,830 --> 00:01:39,600

we'll begin today by asking each of our

45

00:01:44,230 --> 00:01:41,840

guests to provide a brief overview and

46

00:01:45,990 --> 00:01:44,240

then begin questions and answers and if

47

00:01:47,510 --> 00:01:46,000

you're following along on nasa's social

48

00:01:50,630 --> 00:01:47,520

channels we invite you to post your

49

00:01:52,950 --> 00:01:50,640

questions with the ask nasa hashtag

50

00:01:54,710 --> 00:01:52,960

we'll start today with dr costello thank

51
00:01:57,590 --> 00:01:54,720
you tabitha

52
00:02:00,630 --> 00:01:57,600
the iss program is really excited about

53
00:02:02,469 --> 00:02:00,640
tomorrow's launch of crs4 and the cygnus

54
00:02:03,910 --> 00:02:02,479
carrying new science payloads to the

55
00:02:08,469 --> 00:02:03,920
space station

56
00:02:10,550 --> 00:02:08,479
national laboratory and as such it

57
00:02:13,350 --> 00:02:10,560
offers access to the low earth

58
00:02:16,470 --> 00:02:13,360
environment and special characteristics

59
00:02:19,350 --> 00:02:16,480
there like microgravity and the access

60
00:02:21,910 --> 00:02:19,360
to the low earth environment for

61
00:02:23,750 --> 00:02:21,920
spaceflight for microsats and cubesats

62
00:02:24,949 --> 00:02:23,760
which we'll be launching

63
00:02:26,869 --> 00:02:24,959

there

64

00:02:29,589 --> 00:02:26,879

are a lot of reasons why we want to do

65

00:02:32,229 --> 00:02:29,599

science in microgravity particularly we

66

00:02:35,350 --> 00:02:32,239

when we take gravity out of the equation

67

00:02:38,309 --> 00:02:35,360

we expose other forces and changes in

68

00:02:40,710 --> 00:02:38,319

behavior that we don't get to see in a

69

00:02:43,190 --> 00:02:40,720

1g field on earth

70

00:02:45,270 --> 00:02:43,200

it becomes more evident what those

71

00:02:46,070 --> 00:02:45,280

changes can be and how they might affect

72

00:02:47,910 --> 00:02:46,080

us

73

00:02:50,229 --> 00:02:47,920

our lives here on earth and our

74

00:02:51,509 --> 00:02:50,239

exploration goals as we move further out

75

00:02:53,270 --> 00:02:51,519

into space

76

00:02:55,350 --> 00:02:53,280

so we're really excited about having a

77

00:02:56,630 --> 00:02:55,360

whole new set of investigations to take

78

00:02:57,910 --> 00:02:56,640

forward

79

00:02:59,830 --> 00:02:57,920

dr model

80

00:03:02,229 --> 00:02:59,840

okay thank you tampa

81

00:03:04,470 --> 00:03:02,239

um i am the principal investigator for

82

00:03:06,390 --> 00:03:04,480

the packed bed reactor experiment and i

83

00:03:08,229 --> 00:03:06,400

work at nasa glenn research center in

84

00:03:10,309 --> 00:03:08,239

cleveland ohio

85

00:03:12,229 --> 00:03:10,319

the experiment i'd like to show here

86

00:03:14,710 --> 00:03:12,239

will be the first to specifically study

87

00:03:17,030 --> 00:03:14,720

the effects of gravity on gas liquid

88

00:03:19,670 --> 00:03:17,040

flow through fixed bed

89

00:03:21,350 --> 00:03:19,680

beds and more generally through full

90

00:03:23,430 --> 00:03:21,360

through porous media

91

00:03:25,430 --> 00:03:23,440

pack beds are the most common type of

92

00:03:27,670 --> 00:03:25,440

reactor bed used in industry and are

93

00:03:30,229 --> 00:03:27,680

very important in space as well

94

00:03:32,710 --> 00:03:30,239

in particular for water reclamation air

95

00:03:33,990 --> 00:03:32,720

revitalization and even wicking water up

96

00:03:36,229 --> 00:03:34,000

through porous media to provide

97

00:03:38,390 --> 00:03:36,239

nutrients to plants

98

00:03:40,229 --> 00:03:38,400

the pac-man reactor will not conduct an

99

00:03:41,750 --> 00:03:40,239

actual reaction but we'll look at many

100

00:03:44,229 --> 00:03:41,760

of the critical parameters needed to

101
00:03:47,509 --> 00:03:44,239
design and operate this type of system

102
00:03:49,110 --> 00:03:47,519
in space in fact our hope and goal is to

103
00:03:51,190 --> 00:03:49,120
be able to design the next generation

104
00:03:53,350 --> 00:03:51,200
reactor to actually take advantage of

105
00:03:57,509 --> 00:03:53,360
the lack of gravity reducing the overall

106
00:04:00,710 --> 00:03:57,519
system mass by increasing reliability

107
00:04:02,309 --> 00:04:00,720
thank you dr model ken hi tabitha thank

108
00:04:04,710 --> 00:04:02,319
you and my name is ken shiels i'm

109
00:04:05,910 --> 00:04:04,720
director of operations and education for

110
00:04:08,470 --> 00:04:05,920
the center for the advancement of

111
00:04:10,149 --> 00:04:08,480
science and space also known as cases

112
00:04:12,550 --> 00:04:10,159
we're the managers of the international

113
00:04:14,550 --> 00:04:12,560

space station's national laboratory and

114

00:04:17,110 --> 00:04:14,560

as managers of the national laboratory

115

00:04:19,590 --> 00:04:17,120

it's really our purpose to promote and

116

00:04:21,590 --> 00:04:19,600

enable access to the national lab and

117

00:04:24,310 --> 00:04:21,600

the environment of low earth orbit for

118

00:04:26,710 --> 00:04:24,320

non-traditional or non-nasa uses

119

00:04:28,629 --> 00:04:26,720

now basically what that means is the the

120

00:04:30,870 --> 00:04:28,639

objective of most of our projects really

121

00:04:32,550 --> 00:04:30,880

of all of our projects is to conduct

122

00:04:34,870 --> 00:04:32,560

science and space for the benefit of

123

00:04:37,030 --> 00:04:34,880

life on earth as opposed to nasa's

124

00:04:39,030 --> 00:04:37,040

primary mission which is conducting

125

00:04:40,950 --> 00:04:39,040

science in space for exploration and

126
00:04:43,749 --> 00:04:40,960
living living in space for longer

127
00:04:46,310 --> 00:04:43,759
lengths of time a broad cross-section of

128
00:04:49,270 --> 00:04:46,320
users of the national lab include

129
00:04:51,749 --> 00:04:49,280
private sector in industry and

130
00:04:53,430 --> 00:04:51,759
commercial uses spanning all sorts of

131
00:04:55,350 --> 00:04:53,440
applications we've got other government

132
00:04:56,710 --> 00:04:55,360
agencies that are utilizing national

133
00:04:59,270 --> 00:04:56,720
laboratory

134
00:05:00,950 --> 00:04:59,280
students and teachers in stem programs

135
00:05:03,430 --> 00:05:00,960
and of course traditional and

136
00:05:05,990 --> 00:05:03,440
institutional researchers

137
00:05:08,070 --> 00:05:06,000
very broad spectrum of of research that

138
00:05:10,310 --> 00:05:08,080

we're sponsoring on station

139

00:05:11,590 --> 00:05:10,320

includes really every science topic that

140

00:05:13,670 --> 00:05:11,600

you could think of every science

141

00:05:15,350 --> 00:05:13,680

discipline that there is uh both

142

00:05:17,909 --> 00:05:15,360

fundamental and applied

143

00:05:20,150 --> 00:05:17,919

uh we utilize the internal and external

144

00:05:22,310 --> 00:05:20,160

capabilities of space station

145

00:05:24,390 --> 00:05:22,320

and i'm looking forward to learning a

146

00:05:25,909 --> 00:05:24,400

lot about the other panelists and what

147

00:05:27,990 --> 00:05:25,919

what they're flying on on the launch

148

00:05:29,510 --> 00:05:28,000

tomorrow oa4 and certainly looking

149

00:05:31,430 --> 00:05:29,520

forward to sharing with everyone in the

150

00:05:32,950 --> 00:05:31,440

audience and out in

151
00:05:34,870 --> 00:05:32,960
the virtual world today what we're doing

152
00:05:37,189 --> 00:05:34,880
on the national lab so thank you

153
00:05:39,670 --> 00:05:37,199
thank you ken eleanor

154
00:05:42,070 --> 00:05:39,680
good afternoon thank you tabitha my name

155
00:05:43,670 --> 00:05:42,080
is eleanor mccormack and the reason that

156
00:05:46,310 --> 00:05:43,680
i'm here today

157
00:05:48,710 --> 00:05:46,320
is to share with you i am principal at

158
00:05:50,790 --> 00:05:48,720
st thomas moore cathedral school an

159
00:05:53,670 --> 00:05:50,800
elementary school located in the

160
00:05:57,029 --> 00:05:53,680
arlington diocese up in virginia

161
00:05:58,469 --> 00:05:57,039
god willing and weather holding and the

162
00:06:01,670 --> 00:05:58,479
launch goes

163
00:06:04,950 --> 00:06:01,680

stm is poised to become the first

164

00:06:09,189 --> 00:06:04,960

elementary school in the world to have

165

00:06:11,029 --> 00:06:09,199

built tested and launched a satellite

166

00:06:12,309 --> 00:06:11,039

with a lot of generous help from our

167

00:06:15,510 --> 00:06:12,319

community

168

00:06:18,070 --> 00:06:15,520

this is a historical moment for stm and

169

00:06:21,909 --> 00:06:18,080

for the education field and i'm here

170

00:06:23,430 --> 00:06:21,919

today to share our story about cubesat

171

00:06:24,950 --> 00:06:23,440

thank you eleanor pat could you give

172

00:06:27,510 --> 00:06:24,960

your perspective

173

00:06:30,390 --> 00:06:27,520

uh yes i'm pat coleman i teach third

174

00:06:32,830 --> 00:06:30,400

grade at st thomas more cathedral school

175

00:06:35,350 --> 00:06:32,840

and i teach the future scientists

176

00:06:38,950 --> 00:06:35,360

mathematicians engineers

177

00:06:40,469 --> 00:06:38,960

astronauts for nasa and for the

178

00:06:43,830 --> 00:06:40,479

surrounding

179

00:06:47,430 --> 00:06:43,840

businesses that support that

180

00:06:50,309 --> 00:06:47,440

trip hopefully to mars in the future

181

00:06:52,390 --> 00:06:50,319

thank you andrew hi i'm andrew petro i

182

00:06:53,749 --> 00:06:52,400

oversee nasa's small spacecraft

183

00:06:55,909 --> 00:06:53,759

technology

184

00:06:58,390 --> 00:06:55,919

program which is part of nasa's space

185

00:07:00,309 --> 00:06:58,400

technology organization at headquarters

186

00:07:02,230 --> 00:07:00,319

in washington tomorrow we'll be

187

00:07:04,950 --> 00:07:02,240

launching one of our technology

188

00:07:07,189 --> 00:07:04,960

demonstration missions called nodes

189

00:07:08,309 --> 00:07:07,199

composed of two cubesats like this one

190

00:07:10,070 --> 00:07:08,319

here

191

00:07:12,309 --> 00:07:10,080

it will be launched at the space station

192

00:07:14,629 --> 00:07:12,319

and then later deployed into orbit the

193

00:07:17,510 --> 00:07:14,639

satellites were designed by engineers at

194

00:07:19,270 --> 00:07:17,520

the nasa ames research center

195

00:07:21,670 --> 00:07:19,280

the purpose is to test out the potential

196

00:07:23,670 --> 00:07:21,680

for using multiple small

197

00:07:26,309 --> 00:07:23,680

low-cost satellites to perform complex

198

00:07:29,270 --> 00:07:26,319

science missions in this case measuring

199

00:07:31,189 --> 00:07:29,280

high energy particle fields in space

200

00:07:34,070 --> 00:07:31,199

each satellite has an instrument

201
00:07:35,990 --> 00:07:34,080
provided by montana state university

202
00:07:37,430 --> 00:07:36,000
located inside

203
00:07:40,550 --> 00:07:37,440
they'll each be taking measurements

204
00:07:43,110 --> 00:07:40,560
simultaneously sharing that data among

205
00:07:44,710 --> 00:07:43,120
them and then any either one of the two

206
00:07:46,710 --> 00:07:44,720
can be the relay

207
00:07:47,990 --> 00:07:46,720
for all of that information back to the

208
00:07:50,950 --> 00:07:48,000
ground

209
00:07:52,309 --> 00:07:50,960
this concept could be extended to

210
00:07:54,469 --> 00:07:52,319
very large

211
00:07:56,629 --> 00:07:54,479
collections of satellites in orbit

212
00:07:58,790 --> 00:07:56,639
allowing us to do

213
00:08:00,550 --> 00:07:58,800

missions with with a large

214

00:08:02,950 --> 00:08:00,560

number of satellites but only needing to

215

00:08:04,550 --> 00:08:02,960

communicate with one at a time

216

00:08:06,629 --> 00:08:04,560

nodes is one of

217

00:08:09,350 --> 00:08:06,639

many small spacecraft missions that we

218

00:08:11,350 --> 00:08:09,360

are launching this year and we have more

219

00:08:12,710 --> 00:08:11,360

in development our goal is to advance

220

00:08:15,110 --> 00:08:12,720

technology

221

00:08:17,029 --> 00:08:15,120

for small spacecraft especially in the

222

00:08:18,309 --> 00:08:17,039

areas of communication control and

223

00:08:20,550 --> 00:08:18,319

propulsion

224

00:08:23,189 --> 00:08:20,560

so we can create new capabilities for

225

00:08:25,670 --> 00:08:23,199

nasa's missions in science exploration

226

00:08:28,469 --> 00:08:25,680

and space operations

227

00:08:31,110 --> 00:08:28,479

thank you andrew talbot

228

00:08:33,750 --> 00:08:31,120

thank you hello i'm talbott jager i'm

229

00:08:36,469 --> 00:08:33,760

chief technologist at nova works

230

00:08:38,790 --> 00:08:36,479

and we are so excited small satellites

231

00:08:41,350 --> 00:08:38,800

are an exciting technology in this space

232

00:08:43,990 --> 00:08:41,360

industry today while small sats can

233

00:08:45,590 --> 00:08:44,000

provide advantages over traditional

234

00:08:47,430 --> 00:08:45,600

large satellites

235

00:08:49,750 --> 00:08:47,440

satellites assembled from building

236

00:08:52,070 --> 00:08:49,760

blocks which is what we're working with

237

00:08:54,630 --> 00:08:52,080

these cells called satellites could add

238

00:08:57,430 --> 00:08:54,640

to those advantages through funding from

239

00:08:59,750 --> 00:08:57,440

the phoenix program at the darpa defense

240

00:09:02,630 --> 00:08:59,760

advanced research projects agency nova

241

00:09:05,110 --> 00:09:02,640

works has developed the cellularization

242

00:09:07,190 --> 00:09:05,120

of satellite technology basically these

243

00:09:09,590 --> 00:09:07,200

building blocks are satellites for

244

00:09:12,150 --> 00:09:09,600

assembling a fully functional salad

245

00:09:14,630 --> 00:09:12,160

satellite that's analogous to

246

00:09:16,310 --> 00:09:14,640

the cells of your body forming an

247

00:09:17,430 --> 00:09:16,320

organism

248

00:09:19,509 --> 00:09:17,440

this

249

00:09:21,670 --> 00:09:19,519

new

250

00:09:23,030 --> 00:09:21,680

cell-like structure nova works is

251
00:09:25,190 --> 00:09:23,040
developed

252
00:09:26,550 --> 00:09:25,200
like an embryonic cell and we call them

253
00:09:28,870 --> 00:09:26,560
hisats

254
00:09:31,750 --> 00:09:28,880
designed to be configured and aggregated

255
00:09:33,829 --> 00:09:31,760
as reliable and flexible satellites that

256
00:09:35,509 --> 00:09:33,839
can do a variety of missions

257
00:09:37,670 --> 00:09:35,519
an initial set of high set set-based

258
00:09:39,509 --> 00:09:37,680
experimental missions are underway and

259
00:09:41,350 --> 00:09:39,519
others are planned for the near future

260
00:09:42,550 --> 00:09:41,360
the first of these

261
00:09:43,990 --> 00:09:42,560
is called

262
00:09:46,470 --> 00:09:44,000
simple a

263
00:09:49,269 --> 00:09:46,480

satellite initial mission

264

00:09:52,070 --> 00:09:49,279

proofs and lessons and i believe we have

265

00:09:53,990 --> 00:09:52,080

a picture of the way it flies this is

266

00:09:56,070 --> 00:09:54,000

how it flies out of the station and it's

267

00:09:58,310 --> 00:09:56,080

supported by an amazing team from nasa

268

00:10:01,110 --> 00:09:58,320

who supports us with the iss program

269

00:10:04,470 --> 00:10:01,120

through cass's supporting through safety

270

00:10:05,990 --> 00:10:04,480

and iss ops nanoracks is a iss

271

00:10:08,150 --> 00:10:06,000

integrator and they're working with us

272

00:10:09,910 --> 00:10:08,160

with jaxa and their cable deployment

273

00:10:12,389 --> 00:10:09,920

it's a very broad team we're really

274

00:10:15,990 --> 00:10:12,399

excited about all the support but simple

275

00:10:19,350 --> 00:10:16,000

consists of eight fundamental pieces six

276

00:10:21,350 --> 00:10:19,360

hisats cells cellular

277

00:10:24,710 --> 00:10:21,360

pieces of the puzzle and two solar

278

00:10:26,710 --> 00:10:24,720

arrays that also assemble with it

279

00:10:29,590 --> 00:10:26,720

the the entire satellite will be

280

00:10:31,430 --> 00:10:29,600

assembled on board the iss and then be

281

00:10:34,150 --> 00:10:31,440

deployed as a fully

282

00:10:35,990 --> 00:10:34,160

operational newly built spacecraft it

283

00:10:38,150 --> 00:10:36,000

will be another first for the space

284

00:10:39,750 --> 00:10:38,160

industry

285

00:10:41,590 --> 00:10:39,760

thank you talbot uh we'll begin

286

00:10:42,949 --> 00:10:41,600

questions uh first we'll we'll start

287

00:10:44,150 --> 00:10:42,959

with a few questions that we collected

288

00:10:46,470 --> 00:10:44,160

ahead of time and then we'll go to the

289

00:10:48,230 --> 00:10:46,480

people in the room and as a reminder if

290

00:10:49,829 --> 00:10:48,240

you are following along on social

291

00:10:53,190 --> 00:10:49,839

channels and would like to submit a

292

00:10:55,509 --> 00:10:53,200

question please use the ask nasa

293

00:10:57,910 --> 00:10:55,519

first question for dr costello we

294

00:10:59,670 --> 00:10:57,920

recently celebrated 15 years of humans

295

00:11:01,670 --> 00:10:59,680

living continuously on the international

296

00:11:03,590 --> 00:11:01,680

space station and we've learned quite a

297

00:11:05,750 --> 00:11:03,600

bit during that time how do the

298

00:11:07,509 --> 00:11:05,760

experiments going up on this mission

299

00:11:09,190 --> 00:11:07,519

help further prepare us for our journey

300

00:11:11,030 --> 00:11:09,200

to mars

301

00:11:13,990 --> 00:11:11,040

sure that's a that's a great question

302

00:11:16,470 --> 00:11:14,000

back in november we actually celebrated

303

00:11:18,870 --> 00:11:16,480

15 years of continuous human presence in

304

00:11:21,350 --> 00:11:18,880

low earth orbit which is an amazing feat

305

00:11:23,750 --> 00:11:21,360

all by itself but so far we've been

306

00:11:24,790 --> 00:11:23,760

living that experience six months at a

307

00:11:27,670 --> 00:11:24,800

time

308

00:11:30,630 --> 00:11:27,680

we have data on what the what happens to

309

00:11:32,470 --> 00:11:30,640

the human body in microgravity over six

310

00:11:33,590 --> 00:11:32,480

months but there are a lot of questions

311

00:11:36,069 --> 00:11:33,600

as we move

312

00:11:38,710 --> 00:11:36,079

to further uh further out in the solar

313

00:11:40,630 --> 00:11:38,720

system and destinations like mars what's

314

00:11:42,470 --> 00:11:40,640

going to happen on a trip that lasts

315

00:11:44,550 --> 00:11:42,480

more than six months

316

00:11:45,990 --> 00:11:44,560

maybe up to eight to nine months to get

317

00:11:48,069 --> 00:11:46,000

there in eight to nine months to get

318

00:11:50,629 --> 00:11:48,079

back what happens to the human body in

319

00:11:53,910 --> 00:11:50,639

microgravity then a lot of the human

320

00:11:57,829 --> 00:11:53,920

research going on right now is related

321

00:11:59,350 --> 00:11:57,839

to our year in space which is commander

322

00:12:02,310 --> 00:11:59,360

scott kelly's

323

00:12:05,509 --> 00:12:02,320

year-long increment and our first u.s

324

00:12:06,389 --> 00:12:05,519

data point on what happens to the human

325

00:12:08,470 --> 00:12:06,399

body

326

00:12:10,949 --> 00:12:08,480

with these mechanisms that change in

327

00:12:13,190 --> 00:12:10,959

microgravity do they continue to

328

00:12:15,110 --> 00:12:13,200

deteriorate or do they stabilize over

329

00:12:17,910 --> 00:12:15,120

time that's going to help our human

330

00:12:19,670 --> 00:12:17,920

research program really understand where

331

00:12:22,389 --> 00:12:19,680

we still have risks that we need to

332

00:12:23,430 --> 00:12:22,399

address for future exploration

333

00:12:27,910 --> 00:12:23,440

thank you

334

00:12:29,590 --> 00:12:27,920

again for the overview of the packed bed

335

00:12:32,069 --> 00:12:29,600

reactor experiment

336

00:12:34,389 --> 00:12:32,079

how is this particular technology

337

00:12:38,150 --> 00:12:34,399

important to nasa and how do you see it

338

00:12:40,150 --> 00:12:38,160

being applied uh down the road

339

00:12:42,069 --> 00:12:40,160

okay as i mentioned this is very

340

00:12:44,870 --> 00:12:42,079

important technology particularly to

341

00:12:47,350 --> 00:12:44,880

water reclamation and air revitalization

342

00:12:50,150 --> 00:12:47,360

as well as delivering nutrients to plant

343

00:12:53,430 --> 00:12:50,160

systems i'd like to pull up a slide

344

00:12:54,389 --> 00:12:53,440

which shows a sort of a schematic of how

345

00:12:58,069 --> 00:12:54,399

a

346

00:13:00,550 --> 00:12:58,079

flows

347

00:13:01,670 --> 00:13:00,560

and um interestingly in almost every one

348

00:13:03,829 --> 00:13:01,680

of these

349

00:13:06,230 --> 00:13:03,839

these components these boxes

350

00:13:08,069 --> 00:13:06,240

there is at least one type of fixed

351
00:13:09,670 --> 00:13:08,079
packed bed reactor

352
00:13:13,350 --> 00:13:09,680
used

353
00:13:16,150 --> 00:13:13,360
in the early pre-treatment areas we use

354
00:13:17,990 --> 00:13:16,160
for example biological reactors and then

355
00:13:19,509 --> 00:13:18,000
as we go to the post

356
00:13:21,670 --> 00:13:19,519
processing we use high temperature

357
00:13:26,230 --> 00:13:21,680
catalytic react reactors there are also

358
00:13:29,110 --> 00:13:26,240
beds used to remove iodine and calcium

359
00:13:30,870 --> 00:13:29,120
for the polishing treatment

360
00:13:32,310 --> 00:13:30,880
thank you dr model

361
00:13:34,230 --> 00:13:32,320
for ken

362
00:13:35,910 --> 00:13:34,240
one of the projects intended for the

363
00:13:38,230 --> 00:13:35,920

station through this launch is focused

364

00:13:40,949 --> 00:13:38,240

on flame retardant textiles could you

365

00:13:42,629 --> 00:13:40,959

explain why that's important to us

366

00:13:45,189 --> 00:13:42,639

yeah sure uh tabitha that's a great

367

00:13:47,269 --> 00:13:45,199

question um milliken and company is is

368

00:13:49,829 --> 00:13:47,279

actually the company that is involved in

369

00:13:52,150 --> 00:13:49,839

this uh flame retardant uh experiment on

370

00:13:55,509 --> 00:13:52,160

space station the experiment is entitled

371

00:13:56,710 --> 00:13:55,519

uh basim and basically what millikin is

372

00:13:57,990 --> 00:13:56,720

attempting to do here what they're

373

00:13:59,750 --> 00:13:58,000

planning to do

374

00:14:01,030 --> 00:13:59,760

is to

375

00:14:04,310 --> 00:14:01,040

test the

376

00:14:06,949 --> 00:14:04,320

propagation of flames in microgravity on

377

00:14:09,590 --> 00:14:06,959

flame retardant textiles and materials

378

00:14:11,750 --> 00:14:09,600

and the anticipation is that the

379

00:14:13,350 --> 00:14:11,760

observations in in the lack of gravity

380

00:14:15,030 --> 00:14:13,360

and lack of convection will be different

381

00:14:16,629 --> 00:14:15,040

than what they observe here on earth and

382

00:14:18,470 --> 00:14:16,639

from that they're hoping that they will

383

00:14:20,310 --> 00:14:18,480

be able to make improvements or

384

00:14:23,110 --> 00:14:20,320

enhancements to these materials in these

385

00:14:25,030 --> 00:14:23,120

textiles now to me what's a very unique

386

00:14:27,430 --> 00:14:25,040

and very tangible application of this

387

00:14:29,110 --> 00:14:27,440

experiment is these enhancements and

388

00:14:30,550 --> 00:14:29,120

improvements to these materials could

389

00:14:32,310 --> 00:14:30,560

actually be used

390

00:14:34,230 --> 00:14:32,320

to save lives

391

00:14:35,350 --> 00:14:34,240

those are first responders electrical

392

00:14:38,069 --> 00:14:35,360

workers

393

00:14:39,829 --> 00:14:38,079

and and firefighters in general so this

394

00:14:41,829 --> 00:14:39,839

is a great example once again of how

395

00:14:43,430 --> 00:14:41,839

industry and the private sector can can

396

00:14:45,430 --> 00:14:43,440

exploit the international space

397

00:14:47,430 --> 00:14:45,440

station's national laboratory and

398

00:14:48,870 --> 00:14:47,440

microgravity in general we've got a

399

00:14:50,870 --> 00:14:48,880

video that we'd like to queue up right

400

00:14:52,470 --> 00:14:50,880

now that i think is a terrific way of

401
00:14:56,230 --> 00:14:52,480
explaining exactly what they're they're

402
00:14:59,030 --> 00:14:57,269
we go around

403
00:15:01,030 --> 00:14:59,040
many industries all over the country

404
00:15:03,110 --> 00:15:01,040
we're in in front of some of the top r d

405
00:15:04,870 --> 00:15:03,120
people the biggest companies uh in the

406
00:15:06,310 --> 00:15:04,880
world and these folks once they see

407
00:15:08,230 --> 00:15:06,320
about what they can do in microgravity

408
00:15:09,430 --> 00:15:08,240
they get a ton of project ideas like the

409
00:15:11,910 --> 00:15:09,440
folks here at milliken they're

410
00:15:14,550 --> 00:15:11,920
developing a flame retardant textile for

411
00:15:17,990 --> 00:15:14,560
clothing that a lot of people will wear

412
00:15:19,829 --> 00:15:18,000
we're trying to design and engineer put

413
00:15:23,350 --> 00:15:19,839

on the right chemicals such that the

414

00:15:25,990 --> 00:15:23,360

textiles don't burn so this is think of

415

00:15:28,069 --> 00:15:26,000

for the military and ied think of a

416

00:15:29,990 --> 00:15:28,079

firefighter when they're going into a

417

00:15:32,069 --> 00:15:30,000

burning building and it's really again

418

00:15:33,990 --> 00:15:32,079

trying to protect the person so they

419

00:15:35,910 --> 00:15:34,000

don't get second and third degree burns

420

00:15:38,150 --> 00:15:35,920

we try to use unique insights and

421

00:15:40,870 --> 00:15:38,160

meaningful design and deep science to

422

00:15:42,870 --> 00:15:40,880

deliver a good to the world and to our

423

00:15:44,790 --> 00:15:42,880

customer so they're flame retardant

424

00:15:47,509 --> 00:15:44,800

textiles that they're trying to develop

425

00:15:49,670 --> 00:15:47,519

uh seeing what happens when they burn

426

00:15:51,670 --> 00:15:49,680

without gravity is very important

427

00:15:53,670 --> 00:15:51,680

because gravity gets in the way of a lot

428

00:15:55,189 --> 00:15:53,680

of other phenomena so when they see that

429

00:15:56,949 --> 00:15:55,199

they can really understand what's going

430

00:15:59,670 --> 00:15:56,959

on and apply that

431

00:16:01,350 --> 00:15:59,680

back down to their processing on earth

432

00:16:03,829 --> 00:16:01,360

it's really nice to have a lot of camera

433

00:16:05,350 --> 00:16:03,839

and digital work up there so we can look

434

00:16:06,710 --> 00:16:05,360

how it burns and then we're going to get

435

00:16:07,990 --> 00:16:06,720

the samples back

436

00:16:10,230 --> 00:16:08,000

bring them here and then take them

437

00:16:12,550 --> 00:16:10,240

through a litany of analysis methods so

438

00:16:14,870 --> 00:16:12,560

we can find out how hot

439

00:16:16,710 --> 00:16:14,880

the flame was all kinds of good nerdy

440

00:16:18,230 --> 00:16:16,720

stuff

441

00:16:20,550 --> 00:16:18,240

ultimately we want to deliver an

442

00:16:22,790 --> 00:16:20,560

innovative solution to the market

443

00:16:24,230 --> 00:16:22,800

we want to protect people and we want to

444

00:16:26,790 --> 00:16:24,240

have the best product out there that

445

00:16:29,749 --> 00:16:26,800

last the longest

446

00:16:32,150 --> 00:16:29,759

so this can really save lives and that

447

00:16:33,749 --> 00:16:32,160

touches home to everyone so that's why

448

00:16:36,150 --> 00:16:33,759

it's a great partnership to work with

449

00:16:38,069 --> 00:16:36,160

milliken because the goals of their

450

00:16:48,069 --> 00:16:38,079

project and the goals of our mission

451
00:16:52,470 --> 00:16:50,389
thank you ken eleanor when you

452
00:16:54,389 --> 00:16:52,480
introduced the discussion about the

453
00:16:56,389 --> 00:16:54,399
students and you do have a large

454
00:16:57,990 --> 00:16:56,399
contingency of students and parents here

455
00:17:00,069 --> 00:16:58,000
for the launch which is pretty exciting

456
00:17:02,150 --> 00:17:00,079
you talked about the kids being involved

457
00:17:04,390 --> 00:17:02,160
in every aspect of the design and

458
00:17:05,990 --> 00:17:04,400
construction of your satellite

459
00:17:07,909 --> 00:17:06,000
could you talk a little bit about how

460
00:17:09,429 --> 00:17:07,919
you involved the students in building

461
00:17:12,150 --> 00:17:09,439
stm1

462
00:17:14,789 --> 00:17:12,160
sure thank you tabitha

463
00:17:16,870 --> 00:17:14,799

our whole experiment in building the

464

00:17:20,789 --> 00:17:16,880

satellite started the day that the

465

00:17:22,470 --> 00:17:20,799

discovery shuttle flew over d.c

466

00:17:24,789 --> 00:17:22,480

if you could just queue up that picture

467

00:17:27,510 --> 00:17:24,799

our students were

468

00:17:29,510 --> 00:17:27,520

able to form up the shuttle

469

00:17:31,350 --> 00:17:29,520

we figured if we did this out in our

470

00:17:32,470 --> 00:17:31,360

parking lot you can see our school in

471

00:17:35,430 --> 00:17:32,480

the background

472

00:17:37,510 --> 00:17:35,440

we have a playground as our parking lot

473

00:17:39,909 --> 00:17:37,520

and we figured if we did this maybe they

474

00:17:41,909 --> 00:17:39,919

would see us from space so the children

475

00:17:43,990 --> 00:17:41,919

were very excited

476
00:17:48,470 --> 00:17:44,000
we formed up the shuttle we're able to

477
00:17:50,549 --> 00:17:48,480
take a picture and it began our story

478
00:17:52,710 --> 00:17:50,559
but actually after we did this we

479
00:17:56,310 --> 00:17:52,720
realized we have children that are pre-k

480
00:17:58,870 --> 00:17:56,320
four to 13 years of age and what did

481
00:18:01,909 --> 00:17:58,880
they really know about space and split

482
00:18:04,150 --> 00:18:01,919
the space exploration so we took hold of

483
00:18:04,950 --> 00:18:04,160
a book called team moon

484
00:18:07,750 --> 00:18:04,960
which

485
00:18:09,990 --> 00:18:07,760
was written and tells the story of how

486
00:18:13,510 --> 00:18:10,000
400 000 people

487
00:18:15,750 --> 00:18:13,520
got the apollo 11 to the moon we all

488
00:18:18,230 --> 00:18:15,760

know of the famous and the first but we

489

00:18:21,190 --> 00:18:18,240

do we really know who those 400 000

490

00:18:23,110 --> 00:18:21,200

people were and we felt it was important

491

00:18:26,150 --> 00:18:23,120

for the children to know

492

00:18:29,190 --> 00:18:26,160

that many hands do make the shuttle go

493

00:18:31,909 --> 00:18:29,200

up and they learned about not only the

494

00:18:34,549 --> 00:18:31,919

astronauts and but about the technicians

495

00:18:36,870 --> 00:18:34,559

the camera people the

496

00:18:39,909 --> 00:18:36,880

scientists behind the scene

497

00:18:43,270 --> 00:18:39,919

and even down to the seamstress who

498

00:18:45,590 --> 00:18:43,280

sewed the astronaut suits maybe with the

499

00:18:46,710 --> 00:18:45,600

fabric that we will see in the future

500

00:18:48,950 --> 00:18:46,720

but

501
00:18:51,510 --> 00:18:48,960
this is what they did and the children

502
00:18:54,230 --> 00:18:51,520
came to understand it takes many people

503
00:18:57,029 --> 00:18:54,240
so we started with the book

504
00:18:58,789 --> 00:18:57,039
we took the information from the book

505
00:19:01,029 --> 00:18:58,799
and from that and many others if we

506
00:19:03,350 --> 00:19:01,039
could have our next slide we involved

507
00:19:05,510 --> 00:19:03,360
the students in every aspect here you

508
00:19:08,950 --> 00:19:05,520
see their students are building our

509
00:19:11,750 --> 00:19:08,960
antenna um that will receive the images

510
00:19:13,669 --> 00:19:11,760
from the camera that's on the cubesat if

511
00:19:16,230 --> 00:19:13,679
our next slide could also show the

512
00:19:19,510 --> 00:19:16,240
children were highly involved in the

513
00:19:22,150 --> 00:19:19,520

building of the antenna they're

514

00:19:25,350 --> 00:19:22,160

every student touched or turned a screw

515

00:19:27,190 --> 00:19:25,360

or in some way put it together took it

516

00:19:30,549 --> 00:19:27,200

apart put it together so that we would

517

00:19:33,669 --> 00:19:30,559

gain an understanding of what this piece

518

00:19:36,870 --> 00:19:33,679

was that eventually now sits on top of

519

00:19:39,190 --> 00:19:36,880

the school and has the receiver for

520

00:19:42,150 --> 00:19:39,200

the images to come through and if we

521

00:19:46,470 --> 00:19:42,160

could go to our next one

522

00:19:52,870 --> 00:19:49,350

it's a small one it's a four by four by

523

00:19:55,270 --> 00:19:52,880

four and the payload on it you can see

524

00:19:59,270 --> 00:19:55,280

right there is a cross very indicative

525

00:20:02,070 --> 00:19:59,280

of our school and who we are a medal

526

00:20:04,950 --> 00:20:02,080

blessed by the pope and the container

527

00:20:07,510 --> 00:20:04,960

that has some artifacts that

528

00:20:09,430 --> 00:20:07,520

a family was able to set up a send up

529

00:20:12,549 --> 00:20:09,440

into the

530

00:20:15,110 --> 00:20:12,559

when we launch our cube

531

00:20:16,149 --> 00:20:15,120

and there's a camera on board

532

00:20:18,470 --> 00:20:16,159

those are

533

00:20:20,870 --> 00:20:18,480

main components

534

00:20:24,630 --> 00:20:20,880

for what we have on the camera on the

535

00:20:27,430 --> 00:20:24,640

cube itself and pat will speak towards

536

00:20:28,789 --> 00:20:27,440

our testing that we did

537

00:20:30,710 --> 00:20:28,799

okay

538

00:20:32,549 --> 00:20:30,720

our cubesat which we called mission

539

00:20:34,390 --> 00:20:32,559

possible

540

00:20:36,390 --> 00:20:34,400

the children were obviously very

541

00:20:39,190 --> 00:20:36,400

involved in it one of the if you could

542

00:20:41,909 --> 00:20:39,200

pull up that next slide they we had to

543

00:20:44,630 --> 00:20:41,919

do some aerial testing high altitude

544

00:20:47,110 --> 00:20:44,640

testing of our cubesat we had to make

545

00:20:49,990 --> 00:20:47,120

sure that the camera was working we got

546

00:20:52,390 --> 00:20:50,000

it up to over 800 feet

547

00:20:54,870 --> 00:20:52,400

and it was very successful as it was the

548

00:20:56,549 --> 00:20:54,880

pictures were downloaded they were clear

549

00:20:59,510 --> 00:20:56,559

and we that was our

550

00:21:01,430 --> 00:20:59,520

we did two tests a high altitude test to

551
00:21:03,110 --> 00:21:01,440
make sure that everything would function

552
00:21:05,990 --> 00:21:03,120
it was really important for the kids to

553
00:21:08,870 --> 00:21:06,000
understand that you test and test and

554
00:21:10,789 --> 00:21:08,880
retest and in order to have a successful

555
00:21:12,310 --> 00:21:10,799
launch you don't just put it together

556
00:21:16,390 --> 00:21:12,320
and send it up

557
00:21:19,350 --> 00:21:16,400
the next slide will show um we had to do

558
00:21:20,870 --> 00:21:19,360
a fitness test a fit test and we had to

559
00:21:24,390 --> 00:21:20,880
make sure that that

560
00:21:27,750 --> 00:21:24,400
cube would actually fit into the the pod

561
00:21:30,870 --> 00:21:27,760
the deployment container and connor from

562
00:21:32,870 --> 00:21:30,880
nanorex came out there were over 400

563
00:21:36,149 --> 00:21:32,880

students in the auditorium you couldn't

564

00:21:38,070 --> 00:21:36,159

hear a sound they were so quiet because

565

00:21:40,470 --> 00:21:38,080

then he was speaking very softly telling

566

00:21:43,190 --> 00:21:40,480

them exactly what he was doing why he

567

00:21:45,270 --> 00:21:43,200

was doing it and and it was successful

568

00:21:46,470 --> 00:21:45,280

it fed and the kids were very excited

569

00:21:47,990 --> 00:21:46,480

about that

570

00:21:49,270 --> 00:21:48,000

from that if you could show the next

571

00:21:50,070 --> 00:21:49,280

slide

572

00:21:52,630 --> 00:21:50,080

um

573

00:21:55,750 --> 00:21:52,640

we've gone on quite a few field trips my

574

00:21:59,990 --> 00:21:55,760

third graders did went to air and space

575

00:22:02,230 --> 00:22:00,000

in chantilly and saw the video about the

576

00:22:04,470 --> 00:22:02,240

next step for nasa

577

00:22:07,029 --> 00:22:04,480

making sure that the astronauts can be

578

00:22:09,750 --> 00:22:07,039

out in space for long periods of time in

579

00:22:12,630 --> 00:22:09,760

order to get to mars it would be

580

00:22:15,110 --> 00:22:12,640

over nine months to get there a year

581

00:22:16,789 --> 00:22:15,120

there and nine months to come back so

582

00:22:19,830 --> 00:22:16,799

they're very excited about the

583

00:22:21,430 --> 00:22:19,840

possibility because in 20 years they are

584

00:22:23,190 --> 00:22:21,440

going to be at that point where they

585

00:22:25,430 --> 00:22:23,200

will be the scientists and the

586

00:22:28,470 --> 00:22:25,440

mathematicians and the engineers that

587

00:22:30,710 --> 00:22:28,480

will help make that a successful project

588

00:22:33,430 --> 00:22:30,720

so um this

589

00:22:35,990 --> 00:22:33,440

slide shows us the fourth grade students

590

00:22:38,950 --> 00:22:36,000

at the orbital atx

591

00:22:41,350 --> 00:22:38,960

and they are that's where the our

592

00:22:44,070 --> 00:22:41,360

cubesat is going to be packaged and put

593

00:22:45,350 --> 00:22:44,080

on so that it will be launched

594

00:22:46,230 --> 00:22:45,360

tomorrow

595

00:22:48,470 --> 00:22:46,240

and

596

00:22:50,470 --> 00:22:48,480

that was another preparation for them to

597

00:22:51,990 --> 00:22:50,480

understand that it's many hands that put

598

00:22:53,750 --> 00:22:52,000

all of this together

599

00:22:56,310 --> 00:22:53,760

our last slide

600

00:22:58,310 --> 00:22:56,320

is our signature slide and on there we

601
00:23:00,310 --> 00:22:58,320
involve the whole community all the

602
00:23:02,149 --> 00:23:00,320
students from pre-k to eighth grade have

603
00:23:05,830 --> 00:23:02,159
signed it the faculty

604
00:23:09,350 --> 00:23:05,840
the um parish we have alums have come in

605
00:23:11,270 --> 00:23:09,360
and signed it and we also had um

606
00:23:13,430 --> 00:23:11,280
community members anyone who was

607
00:23:15,350 --> 00:23:13,440
interested was involved with a project

608
00:23:17,430 --> 00:23:15,360
they were able to sign their signature

609
00:23:20,470 --> 00:23:17,440
and then we compressed it down to that

610
00:23:23,029 --> 00:23:20,480
one little metal plate that will go up

611
00:23:24,310 --> 00:23:23,039
with the cubesat

612
00:23:26,070 --> 00:23:24,320
thank you pat

613
00:23:28,230 --> 00:23:26,080

i think you guys have done a great job

614

00:23:30,710 --> 00:23:28,240

to prepare a group of students who might

615

00:23:32,470 --> 00:23:30,720

someday work for andrew

616

00:23:34,149 --> 00:23:32,480

andrew we've talked

617

00:23:37,029 --> 00:23:34,159

quite a bit over the past couple of days

618

00:23:39,190 --> 00:23:37,039

about how cubesats are so popular and

619

00:23:42,070 --> 00:23:39,200

one reason is the affordability aspect

620

00:23:43,350 --> 00:23:42,080

could you talk uh somewhat about why

621

00:23:44,630 --> 00:23:43,360

they're so affordable or what

622

00:23:46,390 --> 00:23:44,640

technologies have enabled that

623

00:23:48,630 --> 00:23:46,400

affordability

624

00:23:50,470 --> 00:23:48,640

yeah there's a couple of things one one

625

00:23:52,710 --> 00:23:50,480

is has just to do with the fact that you

626
00:23:55,110 --> 00:23:52,720
have a standard size and shape and that

627
00:23:57,350 --> 00:23:55,120
allows you to package these uh to ride

628
00:23:59,430 --> 00:23:57,360
along with other payloads in a way

629
00:24:01,110 --> 00:23:59,440
that's simpler and then therefore less

630
00:24:04,070 --> 00:24:01,120
expensive because it doesn't take a lot

631
00:24:05,990 --> 00:24:04,080
of unique engineering work to figure out

632
00:24:07,029 --> 00:24:06,000
how to package this with with the other

633
00:24:08,470 --> 00:24:07,039
payloads

634
00:24:09,990 --> 00:24:08,480
that's one thing

635
00:24:11,430 --> 00:24:10,000
in particular though with this

636
00:24:13,750 --> 00:24:11,440
particular satellite

637
00:24:15,590 --> 00:24:13,760
it's probably one of the lowest cost

638
00:24:17,350 --> 00:24:15,600

satellites uh that have been used for

639

00:24:18,549 --> 00:24:17,360

any kind of science or technology

640

00:24:21,190 --> 00:24:18,559

mission

641

00:24:22,950 --> 00:24:21,200

and i'll pull out another visual aid to

642

00:24:23,990 --> 00:24:22,960

illustrate that

643

00:24:25,430 --> 00:24:24,000

the

644

00:24:27,750 --> 00:24:25,440

computer in this

645

00:24:29,750 --> 00:24:27,760

satellite is just a smartphone it's a

646

00:24:32,549 --> 00:24:29,760

commercial off the shelf

647

00:24:34,710 --> 00:24:32,559

smartphone that's been uh programmed to

648

00:24:35,590 --> 00:24:34,720

control the satellite you know for its

649

00:24:36,710 --> 00:24:35,600

mission

650

00:24:38,470 --> 00:24:36,720

and

651
00:24:40,310 --> 00:24:38,480
this was tested a couple years ago with

652
00:24:42,950 --> 00:24:40,320
our series of phonesat missions worked

653
00:24:43,990 --> 00:24:42,960
very well uh and it's incorporated into

654
00:24:45,830 --> 00:24:44,000
this

655
00:24:47,750 --> 00:24:45,840
and a number of other satellites uh

656
00:24:48,789 --> 00:24:47,760
cubesat satellites that we're we've

657
00:24:51,990 --> 00:24:48,799
developed

658
00:24:53,350 --> 00:24:52,000
and the investment that was made uh

659
00:24:56,310 --> 00:24:53,360
decades ago

660
00:24:58,549 --> 00:24:56,320
uh in the kind of technology that

661
00:25:00,630 --> 00:24:58,559
enables the consumer products that we

662
00:25:03,029 --> 00:25:00,640
all use now

663
00:25:06,710 --> 00:25:03,039

it was considered a spin-off from um

664

00:25:08,230 --> 00:25:06,720

from all of that that r d work years ago

665

00:25:11,510 --> 00:25:08,240

we can now turn around and use that

666

00:25:13,590 --> 00:25:11,520

spin-off in the products um that we're

667

00:25:15,669 --> 00:25:13,600

you know we're developing and now we're

668

00:25:17,510 --> 00:25:15,679

able to do

669

00:25:18,950 --> 00:25:17,520

complex science missions

670

00:25:21,750 --> 00:25:18,960

using that

671

00:25:23,110 --> 00:25:21,760

type of technology and benefit

672

00:25:25,029 --> 00:25:23,120

just like everybody else does on the

673

00:25:27,029 --> 00:25:25,039

planet

674

00:25:29,590 --> 00:25:27,039

thank you andrew and i think we're all

675

00:25:31,269 --> 00:25:29,600

eyeing what you have next to you talbot

676
00:25:33,350 --> 00:25:31,279
could you talk a little bit about this

677
00:25:35,830 --> 00:25:33,360
and and also you mentioned when you did

678
00:25:37,430 --> 00:25:35,840
your overview that it has eight pieces

679
00:25:38,870 --> 00:25:37,440
only so

680
00:25:41,510 --> 00:25:38,880
yes the astronauts will be dealing with

681
00:25:43,510 --> 00:25:41,520
eight pieces all launched separately

682
00:25:45,110 --> 00:25:43,520
six of those i brought

683
00:25:48,390 --> 00:25:45,120
in their model form

684
00:25:50,070 --> 00:25:48,400
and at the risk of a live demo

685
00:25:55,830 --> 00:25:50,080
i'd like to

686
00:25:58,549 --> 00:25:55,840
will be doing they will be one by one

687
00:26:00,710 --> 00:25:58,559
assembling the the satellites at the end

688
00:26:02,549 --> 00:26:00,720

adding two solar arrays

689

00:26:04,630 --> 00:26:02,559

at this step

690

00:26:07,269 --> 00:26:04,640

this is a single cell

691

00:26:09,750 --> 00:26:07,279

of the of the satellite

692

00:26:14,470 --> 00:26:09,760

and if i can

693

00:26:18,789 --> 00:26:16,710

basically uh

694

00:26:22,710 --> 00:26:18,799

we have the astronauts

695

00:26:31,430 --> 00:26:22,720

use a mechanism to lock in

696

00:26:37,029 --> 00:26:33,750

and that's the they do that one by one

697

00:26:39,430 --> 00:26:37,039

and do the same thing for the solar rays

698

00:26:41,590 --> 00:26:39,440

and then they have a

699

00:26:43,909 --> 00:26:41,600

fully functional satellite

700

00:26:46,310 --> 00:26:43,919

that as assembled

701
00:26:49,590 --> 00:26:46,320
once it's deployed from the iss it will

702
00:26:51,909 --> 00:26:49,600
be understand that it has been assembled

703
00:26:53,669 --> 00:26:51,919
understand its components and fly just

704
00:26:55,510 --> 00:26:53,679
as a traditional satellite

705
00:26:58,230 --> 00:26:55,520
so it would be a

706
00:27:01,430 --> 00:26:58,240
unique experience to actually assemble

707
00:27:04,230 --> 00:27:01,440
a satellite in orbit this is a precursor

708
00:27:06,789 --> 00:27:04,240
to assembling them with robotics

709
00:27:09,190 --> 00:27:06,799
to assembling large larger craft than we

710
00:27:10,710 --> 00:27:09,200
have today preparing for explorations

711
00:27:12,789 --> 00:27:10,720
out into the universe

712
00:27:15,350 --> 00:27:12,799
but once we've broken down satellites

713
00:27:18,389 --> 00:27:15,360

into their basic fundamental cells

714

00:27:21,350 --> 00:27:18,399

sort of in an embryonic cellular way

715

00:27:22,950 --> 00:27:21,360

we can grow to any size not just small

716

00:27:24,470 --> 00:27:22,960

and that's where this is

717

00:27:26,470 --> 00:27:24,480

really going to come in handy as we go

718

00:27:28,230 --> 00:27:26,480

forward in space

719

00:27:30,070 --> 00:27:28,240

thank you talbot we're going to go to

720

00:27:31,909 --> 00:27:30,080

questions now in the room just a

721

00:27:33,750 --> 00:27:31,919

reminder if you're following along on

722

00:27:34,870 --> 00:27:33,760

nasa's social channels you can submit a

723

00:27:37,909 --> 00:27:34,880

question

724

00:27:40,149 --> 00:27:37,919

using the ask nasa hashtag do we have

725

00:27:42,870 --> 00:27:40,159

any questions in the room

726

00:27:44,789 --> 00:27:42,880

for any of our panelists okay

727

00:27:47,430 --> 00:27:44,799

i want to congratulate the people from

728

00:27:49,190 --> 00:27:47,440

st thomas more school on the really

729

00:27:50,149 --> 00:27:49,200

remarkable work that you seem to have

730

00:27:52,630 --> 00:27:50,159

done

731

00:27:54,710 --> 00:27:52,640

and so if we had other principals from

732

00:27:56,870 --> 00:27:54,720

other schools or other educators here in

733

00:27:58,549 --> 00:27:56,880

the room with us and they were

734

00:28:00,230 --> 00:27:58,559

interested in getting started in

735

00:28:01,830 --> 00:28:00,240

something like this what would you

736

00:28:03,510 --> 00:28:01,840

suggest that they do how do they get

737

00:28:06,149 --> 00:28:03,520

started

738

00:28:08,149 --> 00:28:06,159

well i think as with any project you

739

00:28:10,710 --> 00:28:08,159

have to really take a passion

740

00:28:12,389 --> 00:28:10,720

pull that passion into

741

00:28:14,870 --> 00:28:12,399

whether or not this is something that

742

00:28:16,870 --> 00:28:14,880

you really would take hold of and build

743

00:28:20,310 --> 00:28:16,880

into a curriculum it's not just a

744

00:28:21,510 --> 00:28:20,320

one-step idea but you have to be willing

745

00:28:23,669 --> 00:28:21,520

to

746

00:28:26,230 --> 00:28:23,679

take risks

747

00:28:27,190 --> 00:28:26,240

be willing to really come up with a plan

748

00:28:30,710 --> 00:28:27,200

that

749

00:28:34,549 --> 00:28:30,720

you believe your community would support

750

00:28:36,789 --> 00:28:34,559

and really just make it take hold and

751

00:28:39,430 --> 00:28:36,799

i guess pull together we started with a

752

00:28:41,909 --> 00:28:39,440

think tank this is how we actually began

753

00:28:44,070 --> 00:28:41,919

our project and those teachers that were

754

00:28:45,830 --> 00:28:44,080

interested in staying after school

755

00:28:47,590 --> 00:28:45,840

stayed after school and we kind of

756

00:28:50,549 --> 00:28:47,600

pulled together what do you think we

757

00:28:53,669 --> 00:28:50,559

could do the flyover was wonderful it

758

00:28:55,190 --> 00:28:53,679

brought such excitement to the school

759

00:28:56,950 --> 00:28:55,200

you felt like you could just reach up

760

00:28:59,430 --> 00:28:56,960

and touch that

761

00:29:00,789 --> 00:28:59,440

satellite i mean i'm sorry the shuttle

762

00:29:02,389 --> 00:29:00,799

and

763

00:29:04,789 --> 00:29:02,399

so what are we going to do with it how

764

00:29:07,029 --> 00:29:04,799

do we harness that excitement and we

765

00:29:09,110 --> 00:29:07,039

looked at every student being involved

766

00:29:10,870 --> 00:29:09,120

much as i had spoken of when i talked of

767

00:29:12,070 --> 00:29:10,880

team moon

768

00:29:13,669 --> 00:29:12,080

you have to make sure that you're

769

00:29:15,750 --> 00:29:13,679

reaching out to all the students and

770

00:29:18,310 --> 00:29:15,760

then how do you do that within the

771

00:29:20,950 --> 00:29:18,320

school curriculum so we brought our

772

00:29:23,830 --> 00:29:20,960

teachers along and we took hold of the

773

00:29:25,590 --> 00:29:23,840

guidelines and the standards and what's

774

00:29:28,070 --> 00:29:25,600

asked like in third grade they're to

775

00:29:31,590 --> 00:29:28,080

study gears and pulleys well how does

776

00:29:33,830 --> 00:29:31,600

that fit into a project so

777

00:29:35,909 --> 00:29:33,840

i think a principal or any person that

778

00:29:37,909 --> 00:29:35,919

was guiding the project would need to

779

00:29:40,230 --> 00:29:37,919

know what the requirement is that needs

780

00:29:43,110 --> 00:29:40,240

to be met within the school curriculum

781

00:29:45,750 --> 00:29:43,120

and then how do you embed it into that

782

00:29:47,990 --> 00:29:45,760

everyday lesson and it starts with an

783

00:29:51,590 --> 00:29:48,000

idea of one project what's your project

784

00:29:54,630 --> 00:29:51,600

going to be we chose the cubesat because

785

00:29:58,230 --> 00:29:54,640

nasa does have a program that involves

786

00:30:00,950 --> 00:29:58,240

schools in cubesats and it was available

787

00:30:03,269 --> 00:30:00,960

we're so lucky to be in washington dc

788

00:30:06,549 --> 00:30:03,279

we have all of the museums we have such

789

00:30:08,870 --> 00:30:06,559

a community willing to support us and

790

00:30:10,950 --> 00:30:08,880

that's how we chose the cubesat but you

791

00:30:13,110 --> 00:30:10,960

could do that with whatever your passion

792

00:30:15,190 --> 00:30:13,120

is maybe they have other community

793

00:30:17,750 --> 00:30:15,200

resources available

794

00:30:20,630 --> 00:30:17,760

so i would suggest you look around and

795

00:30:23,269 --> 00:30:20,640

see who's out there to help you

796

00:30:24,630 --> 00:30:23,279

and really know your guidelines and know

797

00:30:26,789 --> 00:30:24,640

where you're going down the road it

798

00:30:29,430 --> 00:30:26,799

starts with a great lesson plan and

799

00:30:31,909 --> 00:30:29,440

taking that plan forward but you have to

800

00:30:34,630 --> 00:30:31,919

have that little core of stem people

801
00:30:38,870 --> 00:30:34,640
that will stick along with you so that's

802
00:30:44,470 --> 00:30:39,590
so

803
00:30:46,230 --> 00:30:44,480
nanoracks or

804
00:30:48,470 --> 00:30:46,240
cubesat or whatever

805
00:30:51,269 --> 00:30:48,480
where do they come in at one point

806
00:30:53,590 --> 00:30:51,279
well once we knew what we wanted to do

807
00:30:55,669 --> 00:30:53,600
that we would try to build a satellite

808
00:30:56,950 --> 00:30:55,679
of course i'm admiring the others down

809
00:31:00,310 --> 00:30:56,960
the road here

810
00:31:03,990 --> 00:31:00,320
um and we did try that same antenna

811
00:31:06,310 --> 00:31:04,000
display so we we didn't make that work

812
00:31:07,990 --> 00:31:06,320
but we found another way so you look

813
00:31:10,950 --> 00:31:08,000

towards you look out and see what the

814

00:31:14,549 --> 00:31:10,960

community has so we selected the

815

00:31:17,029 --> 00:31:14,559

nano um the cubesat and we went online

816

00:31:19,029 --> 00:31:17,039

we googled it what would a cubesat be

817

00:31:21,110 --> 00:31:19,039

what would be the advantages to teaching

818

00:31:23,590 --> 00:31:21,120

about it how would it inspire the

819

00:31:25,750 --> 00:31:23,600

students what's its use

820

00:31:27,990 --> 00:31:25,760

um what would you do with it after the

821

00:31:30,870 --> 00:31:28,000

fact where would you go with it so we

822

00:31:32,470 --> 00:31:30,880

tried we chose cubesat because it was

823

00:31:34,710 --> 00:31:32,480

doable

824

00:31:37,110 --> 00:31:34,720

affordable we're a catholic school with

825

00:31:39,990 --> 00:31:37,120

limited budget

826

00:31:44,070 --> 00:31:40,000

so we went ahead and just developed from

827

00:31:46,310 --> 00:31:44,080

there all of the pieces that built the

828

00:31:48,149 --> 00:31:46,320

cube so you have testing that you have

829

00:31:50,870 --> 00:31:48,159

to pay for you saw the

830

00:31:53,590 --> 00:31:50,880

high altitude test we were fortunate

831

00:31:55,909 --> 00:31:53,600

that the company who came to perform the

832

00:31:59,590 --> 00:31:55,919

test for us charged us only for the

833

00:32:01,430 --> 00:31:59,600

helium so you work a few deals and

834

00:32:04,230 --> 00:32:01,440

and then

835

00:32:07,029 --> 00:32:04,240

nanorack came into being because they

836

00:32:09,029 --> 00:32:07,039

were the ones that would support us came

837

00:32:11,269 --> 00:32:09,039

out to see us we have a

838

00:32:13,590 --> 00:32:11,279

mission operations center built into the

839

00:32:16,070 --> 00:32:13,600

library at the school with an

840

00:32:17,590 --> 00:32:16,080

countdown clock that's ticking

841

00:32:22,870 --> 00:32:17,600

and

842

00:32:26,310 --> 00:32:22,880

children different lessons of what would

843

00:32:28,389 --> 00:32:26,320

be done and what we could do as a school

844

00:32:30,950 --> 00:32:28,399

and we just reached out to the community

845

00:32:33,509 --> 00:32:30,960

for that support nasa has been wonderful

846

00:32:35,269 --> 00:32:33,519

obviously um

847

00:32:37,909 --> 00:32:35,279

one of the very first points that we

848

00:32:39,110 --> 00:32:37,919

started with was taking the teachers to

849

00:32:40,549 --> 00:32:39,120

goddard

850

00:32:43,669 --> 00:32:40,559

because we

851
00:32:46,710 --> 00:32:43,679
aren't scientists we did a teacher field

852
00:32:50,310 --> 00:32:46,720
trip first and educate the educators and

853
00:32:55,110 --> 00:32:51,350
ken

854
00:32:56,630 --> 00:32:55,120
forum and universe today i have two

855
00:32:58,149 --> 00:32:56,640
questions one for the elementary

856
00:33:00,149 --> 00:32:58,159
teachers um i guess you're going to be

857
00:33:01,909 --> 00:33:00,159
getting images back could you talk a

858
00:33:03,909 --> 00:33:01,919
little bit about uh what you're planning

859
00:33:05,830 --> 00:33:03,919
how many you're going to get and how

860
00:33:07,909 --> 00:33:05,840
will you get those images and for for

861
00:33:10,070 --> 00:33:07,919
andy i think on the insight mission

862
00:33:11,990 --> 00:33:10,080
coming up you've got two cubesats going

863
00:33:13,909 --> 00:33:12,000

to mars i wonder if you could talk a

864

00:33:15,909 --> 00:33:13,919

little bit about that and how you've

865

00:33:17,669 --> 00:33:15,919

evolved from earth orbiting now to

866

00:33:18,470 --> 00:33:17,679

interplanetary thanks

867

00:33:20,630 --> 00:33:18,480

um

868

00:33:22,950 --> 00:33:20,640

well what we hope the cube will do we

869

00:33:26,310 --> 00:33:22,960

have a camera on board and the way the

870

00:33:28,389 --> 00:33:26,320

images should be received

871

00:33:31,029 --> 00:33:28,399

with a lot of hope

872

00:33:35,830 --> 00:33:31,039

the we have a ham radio we bought a ham

873

00:33:39,509 --> 00:33:35,840

radio and we have slow scan tv connected

874

00:33:42,230 --> 00:33:39,519

and the images once sent to us and

875

00:33:44,149 --> 00:33:42,240

goes to the ham radio

876

00:33:46,870 --> 00:33:44,159

with the software we've installed on the

877

00:33:49,350 --> 00:33:46,880

computers they should be able to produce

878

00:33:52,230 --> 00:33:49,360

the images that we're uh hoping the

879

00:33:54,070 --> 00:33:52,240

camera will take we actually did do a

880

00:33:56,549 --> 00:33:54,080

check on

881

00:33:57,750 --> 00:33:56,559

images sent and received via the ham

882

00:34:00,789 --> 00:33:57,760

radio

883

00:34:02,710 --> 00:34:00,799

and oh by the way we did not know when

884

00:34:06,549 --> 00:34:02,720

we started this whole project you had to

885

00:34:09,270 --> 00:34:06,559

be licensed as a ham radio operator so

886

00:34:12,069 --> 00:34:09,280

we learned a lot and what you do when

887

00:34:14,710 --> 00:34:12,079

you find out on a sunday that your fit

888

00:34:17,430 --> 00:34:14,720

chat your high altitude test is on that

889

00:34:20,230 --> 00:34:17,440

wednesday and you're hoping that the ham

890

00:34:22,230 --> 00:34:20,240

radio will receive and we found out we

891

00:34:23,750 --> 00:34:22,240

had to be licensed we borrowed a

892

00:34:26,710 --> 00:34:23,760

community member

893

00:34:29,510 --> 00:34:26,720

who had his license who we give space to

894

00:34:32,710 --> 00:34:29,520

to use in the school and he agreed to

895

00:34:34,950 --> 00:34:32,720

come and be the licensed operator so

896

00:34:37,589 --> 00:34:34,960

that's how we hope to receive them we

897

00:34:39,669 --> 00:34:37,599

have two backup systems

898

00:34:41,430 --> 00:34:39,679

in case the ham radio doesn't work we

899

00:34:44,629 --> 00:34:41,440

have a portable antenna we have the

900

00:34:47,030 --> 00:34:44,639

antenna i described and

901
00:34:49,909 --> 00:34:47,040
that should hopefully produce an image

902
00:34:51,750 --> 00:34:49,919
and then we do have our mocks of remote

903
00:34:53,270 --> 00:34:51,760
mission operation centers around the

904
00:34:56,869 --> 00:34:53,280
world

905
00:34:59,750 --> 00:34:56,879
and other ham radio operators that

906
00:35:01,190 --> 00:34:59,760
hopefully will collect something as the

907
00:35:04,069 --> 00:35:01,200
cameras

908
00:35:06,310 --> 00:35:04,079
producing some images and send those

909
00:35:08,069 --> 00:35:06,320
along to us so the students project

910
00:35:10,950 --> 00:35:08,079
doesn't end with the launch though we'll

911
00:35:13,349 --> 00:35:10,960
be very grateful when it does go um

912
00:35:14,829 --> 00:35:13,359
and it will just then evolve into

913
00:35:17,829 --> 00:35:14,839

lessons about

914

00:35:19,670 --> 00:35:17,839

um cameras pictures

915

00:35:23,109 --> 00:35:19,680

what would be the reason you take them

916

00:35:25,910 --> 00:35:24,470

okay on the question i'm glad you

917

00:35:28,870 --> 00:35:25,920

brought up you're talking about the

918

00:35:30,470 --> 00:35:28,880

marco cubesats

919

00:35:32,870 --> 00:35:30,480

and going back

920

00:35:34,870 --> 00:35:32,880

the our program has a project called

921

00:35:37,190 --> 00:35:34,880

asara which is a jpl

922

00:35:39,829 --> 00:35:37,200

aerospace corporation

923

00:35:42,710 --> 00:35:39,839

project to demonstrate a high gain

924

00:35:45,589 --> 00:35:42,720

antenna on a cubesat it uses the back of

925

00:35:46,310 --> 00:35:45,599

a deployable solar panel as a reflector

926

00:35:58,710 --> 00:35:46,320

a

927

00:36:02,630 --> 00:35:58,720

uh

928

00:36:05,510 --> 00:36:02,640

others at jpl have taken that idea and

929

00:36:08,470 --> 00:36:05,520

applied it for the marco cubesats which

930

00:36:11,270 --> 00:36:08,480

are two 6u cubesats that will fly along

931

00:36:13,910 --> 00:36:11,280

with the insight mission to mars

932

00:36:15,430 --> 00:36:13,920

they'll separate from the the main

933

00:36:18,390 --> 00:36:15,440

spacecraft that's going to land on mars

934

00:36:21,190 --> 00:36:18,400

and and serve as a communications relay

935

00:36:23,190 --> 00:36:21,200

during the descent and landing

936

00:36:25,349 --> 00:36:23,200

so for us this is a great success

937

00:36:27,430 --> 00:36:25,359

because it's a technology we invested in

938

00:36:28,710 --> 00:36:27,440

a couple of years ago that project's

939

00:36:31,910 --> 00:36:28,720

coming along to demonstrate the

940

00:36:35,510 --> 00:36:31,920

technology but the concept has already

941

00:36:37,030 --> 00:36:35,520

been applied for another mission that's

942

00:36:38,470 --> 00:36:37,040

not an earth orbit it's going all the

943

00:36:40,150 --> 00:36:38,480

way to mars so

944

00:36:42,230 --> 00:36:40,160

i think it's probably one of the first

945

00:36:44,710 --> 00:36:42,240

examples of anything like that

946

00:36:48,069 --> 00:36:44,720

in terms of using cubesat scale

947

00:36:50,470 --> 00:36:48,079

spacecraft on a interplanetary mission

948

00:36:53,670 --> 00:36:50,480

and it's also a great success

949

00:36:55,190 --> 00:36:53,680

to see a technology that we invested in

950

00:36:57,990 --> 00:36:55,200

being so quickly

951
00:36:59,910 --> 00:36:58,000
applied in a real mission

952
00:37:02,230 --> 00:36:59,920
thank you andrew and i believe we have

953
00:37:09,670 --> 00:37:02,240
now a question from fox news on the

954
00:37:13,190 --> 00:37:11,510
hello this is phil keating thank you

955
00:37:17,109 --> 00:37:13,200
very much and i'd like to address my

956
00:37:21,349 --> 00:37:18,630
you know children as you all know are

957
00:37:22,790 --> 00:37:21,359
the dreamers and

958
00:37:25,349 --> 00:37:22,800
your kids have put in a whole lot of

959
00:37:26,630 --> 00:37:25,359
heart and soul and time and energy into

960
00:37:29,349 --> 00:37:26,640
this mission

961
00:37:31,430 --> 00:37:29,359
uh unfortunately uh occasionally as we

962
00:37:34,150 --> 00:37:31,440
have learned over the past year as the

963
00:37:36,710 --> 00:37:34,160

past two u.s commercial

964

00:37:39,030 --> 00:37:36,720

space companies had disasters trying to

965

00:37:40,550 --> 00:37:39,040

launch satellites and science

966

00:37:43,430 --> 00:37:40,560

experiments

967

00:37:45,910 --> 00:37:43,440

um for all of the

968

00:37:47,430 --> 00:37:45,920

scientists of all ages who have invested

969

00:37:48,950 --> 00:37:47,440

so much time you know it's absolutely

970

00:37:50,790 --> 00:37:48,960

devastating so

971

00:37:53,750 --> 00:37:50,800

i'm wondering

972

00:37:56,230 --> 00:37:53,760

how much devotion and dedication and

973

00:37:57,430 --> 00:37:56,240

time have your students put into this

974

00:37:59,750 --> 00:37:57,440

and what are they

975

00:38:02,870 --> 00:37:59,760

doing to ensure this is going to be a

976
00:38:04,630 --> 00:38:02,880
flawless delivery to the space station

977
00:38:07,670 --> 00:38:04,640
lots of prayers

978
00:38:10,550 --> 00:38:07,680
that's what we start with um but it has

979
00:38:14,230 --> 00:38:10,560
been about a three-year process

980
00:38:16,710 --> 00:38:14,240
the flyover really was the point that

981
00:38:21,030 --> 00:38:16,720
solidified where we were going

982
00:38:24,790 --> 00:38:21,040
um prior to that we had robotic clubs uh

983
00:38:27,750 --> 00:38:24,800
built into our curriculum and we also

984
00:38:31,109 --> 00:38:27,760
had a program that comes out of mit and

985
00:38:34,230 --> 00:38:31,119
now is with the navy um the sea perch

986
00:38:37,270 --> 00:38:34,240
program so our students had a lot of

987
00:38:39,349 --> 00:38:37,280
time invested before the cubesat in the

988
00:38:41,190 --> 00:38:39,359

robotic field and in electrical

989

00:38:43,430 --> 00:38:41,200

components as they

990

00:38:44,790 --> 00:38:43,440

built their underwater rovers

991

00:38:47,109 --> 00:38:44,800

and

992

00:38:49,910 --> 00:38:47,119

then the cubesats sort of solidified

993

00:38:50,710 --> 00:38:49,920

into three years but we spoke along the

994

00:38:53,349 --> 00:38:50,720

way

995

00:38:56,390 --> 00:38:53,359

um it's a process

996

00:38:57,430 --> 00:38:56,400

if the cube never was to launch it was a

997

00:39:01,670 --> 00:38:57,440

process

998

00:39:03,829 --> 00:39:01,680

the learning that takes place was key

999

00:39:05,990 --> 00:39:03,839

and we wanted the students to be able to

1000

00:39:08,710 --> 00:39:06,000

see that things that are worthwhile

1001
00:39:10,710 --> 00:39:08,720
sometimes take a long time

1002
00:39:13,430 --> 00:39:10,720
and it takes many people to be involved

1003
00:39:16,150 --> 00:39:13,440
and we did have failure to some degree

1004
00:39:19,589 --> 00:39:16,160
with our antenna we tried the

1005
00:39:21,790 --> 00:39:19,599
um to use the tape measure so to speak

1006
00:39:24,630 --> 00:39:21,800
and the children went through a lot of

1007
00:39:28,390 --> 00:39:24,640
experimentation and what adhesive would

1008
00:39:30,310 --> 00:39:28,400
hold etc and we never could get it to

1009
00:39:32,550 --> 00:39:30,320
the point that it was approved by nasa

1010
00:39:34,550 --> 00:39:32,560
so we went to a different method so the

1011
00:39:36,950 --> 00:39:34,560
children have known some failures along

1012
00:39:39,990 --> 00:39:36,960
the way but we simply look at them as

1013
00:39:42,069 --> 00:39:40,000

opportunities for growth

1014

00:39:45,430 --> 00:39:42,079

thinking outside the box what other way

1015

00:39:48,310 --> 00:39:45,440

can we do it so

1016

00:39:51,589 --> 00:39:48,320

i believe the children have gained a ton

1017

00:39:54,150 --> 00:39:51,599

of information just to know that there

1018

00:39:56,790 --> 00:39:54,160

takes many little pieces and parts to

1019

00:39:58,950 --> 00:39:56,800

make the bigger ones work they'll be

1020

00:40:00,870 --> 00:39:58,960

quite fascinated to know that they can

1021

00:40:03,270 --> 00:40:00,880

build to that but i think they're really

1022

00:40:05,190 --> 00:40:03,280

going to be fascinated knowing that

1023

00:40:06,550 --> 00:40:05,200

another school

1024

00:40:08,950 --> 00:40:06,560

entity

1025

00:40:12,309 --> 00:40:08,960

was able to make the tape measure work

1026

00:40:15,430 --> 00:40:12,319

so we'll continue to explore and

1027

00:40:17,670 --> 00:40:15,440

use some of those prior failures so to

1028

00:40:19,670 --> 00:40:17,680

speak as those opportunities for where

1029

00:40:21,510 --> 00:40:19,680

we'll go in the future

1030

00:40:23,030 --> 00:40:21,520

yeah tabitha i'd like to expand on that

1031

00:40:25,349 --> 00:40:23,040

answer and eleanor that was great and

1032

00:40:27,430 --> 00:40:25,359

and to also address phil's uh question

1033

00:40:29,430 --> 00:40:27,440

about failures and how students and

1034

00:40:30,950 --> 00:40:29,440

educators respond and i think that's one

1035

00:40:32,790 --> 00:40:30,960

of the greatest

1036

00:40:35,190 --> 00:40:32,800

lessons that that our kids learn from

1037

00:40:37,109 --> 00:40:35,200

these project based

1038

00:40:38,470 --> 00:40:37,119

stem opportunities number one they're

1039

00:40:40,150 --> 00:40:38,480

learning to collaborate they're learning

1040

00:40:41,910 --> 00:40:40,160

the true meaning of teamwork and they're

1041

00:40:44,150 --> 00:40:41,920

learning about failure they're actually

1042

00:40:47,270 --> 00:40:44,160

learning hands-on the tangible meaning

1043

00:40:49,349 --> 00:40:47,280

of how failure is a step towards success

1044

00:40:51,430 --> 00:40:49,359

on this launch oa4 i think it's a great

1045

00:40:53,109 --> 00:40:51,440

opportunity we've got oa4

1046

00:40:55,829 --> 00:40:53,119

represents the return to flight of our

1047

00:40:57,910 --> 00:40:55,839

commercial resupply missions it also

1048

00:41:00,150 --> 00:40:57,920

signifies and represents the return to

1049

00:41:01,829 --> 00:41:00,160

flight of no less than five stem

1050

00:41:04,550 --> 00:41:01,839

experiments that were lost on those

1051

00:41:06,950 --> 00:41:04,560

launch anomalies that phil from fox

1052

00:41:08,710 --> 00:41:06,960

alluded to so i can tell you from

1053

00:41:09,990 --> 00:41:08,720

personal experience in our stem world at

1054

00:41:12,150 --> 00:41:10,000

the national laboratory we were

1055

00:41:13,990 --> 00:41:12,160

certainly impacted by those anomalies we

1056

00:41:16,309 --> 00:41:14,000

had several schools that lost those

1057

00:41:18,390 --> 00:41:16,319

payloads and not a single one of them

1058

00:41:19,190 --> 00:41:18,400

even hesitated for the chance to re-fly

1059

00:41:20,630 --> 00:41:19,200

again

1060

00:41:22,950 --> 00:41:20,640

we're looking forward to re-flying a lot

1061

00:41:25,670 --> 00:41:22,960

of those missions in 2016 but tomorrow

1062

00:41:28,309 --> 00:41:25,680

represents uh five schools coming back

1063

00:41:30,150 --> 00:41:28,319

to flight who lost it so that's a great

1064

00:41:31,430 --> 00:41:30,160

example of of a life lesson and

1065

00:41:33,190 --> 00:41:31,440

something that i think these kids and

1066

00:41:35,190 --> 00:41:33,200

even educators will carry with them for

1067

00:41:37,030 --> 00:41:35,200

their entire life

1068

00:41:41,750 --> 00:41:37,040

thank you ken we had a question from

1069

00:41:47,030 --> 00:41:44,069

hi thanks so james in florida today

1070

00:41:49,430 --> 00:41:47,040

mr costello you had uh talked about the

1071

00:41:51,190 --> 00:41:49,440

year-long mission and and obviously the

1072

00:41:53,829 --> 00:41:51,200

longer trips to come to mars i was just

1073

00:41:55,990 --> 00:41:53,839

curious um what is the status of

1074

00:41:57,829 --> 00:41:56,000

assigning another year-long mission

1075

00:41:59,670 --> 00:41:57,839

and you know beyond this one data point

1076

00:42:02,230 --> 00:41:59,680

how many more of those do you expect to

1077

00:42:04,870 --> 00:42:02,240

to collect in the in the coming years

1078

00:42:06,470 --> 00:42:04,880

that's a good question um

1079

00:42:08,470 --> 00:42:06,480

of course the science you can do with

1080

00:42:09,430 --> 00:42:08,480

one data point is kind of limited we

1081

00:42:11,829 --> 00:42:09,440

were

1082

00:42:13,750 --> 00:42:11,839

literally blessed in in this occurrence

1083

00:42:17,430 --> 00:42:13,760

to to find that we had

1084

00:42:19,589 --> 00:42:17,440

uh an identical twin in uh and mark

1085

00:42:21,670 --> 00:42:19,599

kelly on the ground so that actually

1086

00:42:24,230 --> 00:42:21,680

gives us uh

1087

00:42:27,510 --> 00:42:24,240

another identical uh twin to compare

1088

00:42:29,430 --> 00:42:27,520

genetics studies with we also have

1089

00:42:31,270 --> 00:42:29,440

the data from the russian crew member

1090

00:42:33,589 --> 00:42:31,280

who's participating so we have an n of

1091

00:42:35,349 --> 00:42:33,599

two already additional one-year studies

1092

00:42:37,589 --> 00:42:35,359

are under review right now and we're in

1093

00:42:39,670 --> 00:42:37,599

negotiations with

1094

00:42:42,710 --> 00:42:39,680

the the human research program and

1095

00:42:44,870 --> 00:42:42,720

russia to determine when and if those

1096

00:42:47,349 --> 00:42:44,880

would happen in the future but there is

1097

00:42:50,470 --> 00:42:47,359

a a plan to try and generate this data

1098

00:42:52,870 --> 00:42:50,480

particularly if we see anything

1099

00:42:53,829 --> 00:42:52,880

coincidental come back in these first

1100

00:42:57,510 --> 00:42:53,839

studies

1101
00:42:59,750 --> 00:42:57,520
again we have limited data up to the the

1102
00:43:02,150 --> 00:42:59,760
one year mark some of that com going

1103
00:43:04,230 --> 00:43:02,160
back to the old russian mir missions but

1104
00:43:06,470 --> 00:43:04,240
they haven't used the same controls that

1105
00:43:08,870 --> 00:43:06,480
our studies have so we're trying to

1106
00:43:10,710 --> 00:43:08,880
expand on that use the same studies that

1107
00:43:12,790 --> 00:43:10,720
we've already laid out for six months to

1108
00:43:14,870 --> 00:43:12,800
see if we run into any anomalies past

1109
00:43:16,710 --> 00:43:14,880
six months

1110
00:43:18,470 --> 00:43:16,720
it's difficult to tell with just a

1111
00:43:21,510 --> 00:43:18,480
couple data points but certainly if you

1112
00:43:26,150 --> 00:43:21,520
see a big change in one area that's an

1113
00:43:33,430 --> 00:43:29,190

obviously a little ways to go for uh

1114

00:43:35,270 --> 00:43:33,440

scott and mikhail but um does anything

1115

00:43:37,430 --> 00:43:35,280

generally kind of stand out so far at

1116

00:43:39,750 --> 00:43:37,440

this point as you push beyond that sort

1117

00:43:42,230 --> 00:43:39,760

of typical six-month

1118

00:43:44,950 --> 00:43:42,240

increment uh

1119

00:43:46,870 --> 00:43:44,960

anything interesting or is it more as

1120

00:43:47,910 --> 00:43:46,880

we might expect like sort of the mental

1121

00:43:51,910 --> 00:43:47,920

um

1122

00:43:56,550 --> 00:43:53,829

scott's doing great

1123

00:43:59,349 --> 00:43:56,560

and he'll be back soon his his one year

1124

00:44:00,950 --> 00:43:59,359

increment is almost up and

1125

00:44:03,109 --> 00:44:00,960

some of the interesting things about our

1126

00:44:06,069 --> 00:44:03,119

human research is that most of it

1127

00:44:07,430 --> 00:44:06,079

contains a pre and post measurement

1128

00:44:09,510 --> 00:44:07,440

factor to it

1129

00:44:11,589 --> 00:44:09,520

where that data is collected before they

1130

00:44:14,630 --> 00:44:11,599

fly and then once they return to the

1131

00:44:16,550 --> 00:44:14,640

ground so in order to process a lot of

1132

00:44:19,109 --> 00:44:16,560

these investigations you have to have

1133

00:44:21,109 --> 00:44:19,119

both the pre and post data first and so

1134

00:44:24,069 --> 00:44:21,119

most of the results will come after we

1135

00:44:26,470 --> 00:44:25,430

thank you we had another question in the

1136

00:44:28,230 --> 00:44:26,480

audience

1137

00:44:30,630 --> 00:44:28,240

yeah hi bill howard with cbs news two

1138

00:44:32,309 --> 00:44:30,640

quick ones one for uh the principal um

1139

00:44:34,069 --> 00:44:32,319

how much did this cost you guys and and

1140

00:44:35,589 --> 00:44:34,079

how did you raise the money

1141

00:44:37,510 --> 00:44:35,599

and then have a follow-up

1142

00:44:42,790 --> 00:44:37,520

um

1143

00:44:45,030 --> 00:44:42,800

somewhere in the area of about thirty

1144

00:44:45,910 --> 00:44:45,040

thousand dollars is where we are right

1145

00:44:46,790 --> 00:44:45,920

now

1146

00:44:48,390 --> 00:44:46,800

um

1147

00:44:52,069 --> 00:44:48,400

we were able to

1148

00:44:54,550 --> 00:44:52,079

ask for grants that were made available

1149

00:44:56,230 --> 00:44:54,560

if you really look out there for

1150

00:44:59,430 --> 00:44:56,240

monies that follow

1151
00:45:01,430 --> 00:44:59,440
stem research and stem in education

1152
00:45:05,109 --> 00:45:01,440
there are grants to be had and that's

1153
00:45:07,589 --> 00:45:05,119
what we did we also had some community

1154
00:45:10,150 --> 00:45:07,599
parents who came forward

1155
00:45:12,550 --> 00:45:10,160
and supported the program and as

1156
00:45:14,950 --> 00:45:12,560
individuals and our pto our

1157
00:45:16,230 --> 00:45:14,960
parent-teacher organization has an

1158
00:45:19,030 --> 00:45:16,240
auction

1159
00:45:20,950 --> 00:45:19,040
fundraiser and some of the funding came

1160
00:45:22,150 --> 00:45:20,960
from that area so

1161
00:45:24,870 --> 00:45:22,160
in the

1162
00:45:27,990 --> 00:45:24,880
total of what we've spent maybe around

1163
00:45:29,990 --> 00:45:28,000

fifty thousand dollars but the monies

1164

00:45:33,190 --> 00:45:30,000

actually come

1165

00:45:36,309 --> 00:45:33,200

through grants and donations

1166

00:45:38,550 --> 00:45:36,319

and had not tapped the school budget

1167

00:45:39,829 --> 00:45:38,560

so that was an important factor for us

1168

00:45:41,190 --> 00:45:39,839

but um

1169

00:45:43,430 --> 00:45:41,200

and i believe that that would be

1170

00:45:46,870 --> 00:45:43,440

available for most people

1171

00:45:48,390 --> 00:45:46,880

for a tablet on the end um i'm a little

1172

00:45:50,950 --> 00:45:48,400

trying to visualize the usage you're

1173

00:45:52,550 --> 00:45:50,960

envisioning for this this assembled

1174

00:45:54,069 --> 00:45:52,560

satellite in other words how you said

1175

00:45:55,750 --> 00:45:54,079

you can you know it's expandable

1176
00:45:57,109 --> 00:45:55,760
obviously but what does that mean how

1177
00:45:59,589 --> 00:45:57,119
big would this thing

1178
00:46:01,670 --> 00:45:59,599
could you make one or or how small i

1179
00:46:04,069 --> 00:46:01,680
mean i'm just curious as to

1180
00:46:06,870 --> 00:46:04,079
i'm not sure understand the architecture

1181
00:46:09,829 --> 00:46:06,880
so the architecture is focusing on two

1182
00:46:12,069 --> 00:46:09,839
real aspects the the first is because

1183
00:46:15,430 --> 00:46:12,079
it's made from a

1184
00:46:17,430 --> 00:46:15,440
a fairly simple cell and it gets its

1185
00:46:18,470 --> 00:46:17,440
nature from the multiplicity of those

1186
00:46:20,710 --> 00:46:18,480
cells

1187
00:46:22,630 --> 00:46:20,720
you get the first advantage that we were

1188
00:46:24,790 --> 00:46:22,640

going after and that is a mass

1189

00:46:26,390 --> 00:46:24,800

producible item the cost of this can

1190

00:46:27,589 --> 00:46:26,400

come way down from traditional

1191

00:46:32,870 --> 00:46:27,599

satellites

1192

00:46:34,390 --> 00:46:32,880

size at a lower cost so the first

1193

00:46:36,950 --> 00:46:34,400

thing we're going for is just simply

1194

00:46:38,790 --> 00:46:36,960

cost reduction this is a way to build at

1195

00:46:41,990 --> 00:46:38,800

a cost level that we haven't been able

1196

00:46:43,829 --> 00:46:42,000

to do in space other than in cubesats

1197

00:46:45,829 --> 00:46:43,839

where there's a lot of subsidy for the

1198

00:46:48,309 --> 00:46:45,839

launch

1199

00:46:52,150 --> 00:46:48,319

this brings up a whole capability of

1200

00:46:54,069 --> 00:46:52,160

more sizes so that's step one

1201

00:46:56,230 --> 00:46:54,079

what you would what would you do and how

1202

00:46:59,750 --> 00:46:56,240

large it would get we currently have

1203

00:47:01,270 --> 00:46:59,760

designed it to go up to 3000 pounds so

1204

00:47:06,390 --> 00:47:01,280

where the next one we're launching

1205

00:47:07,430 --> 00:47:06,400

actually is going to be a 330 pound

1206

00:47:09,750 --> 00:47:07,440

launch

1207

00:47:11,190 --> 00:47:09,760

and they just get bigger so we've tested

1208

00:47:13,109 --> 00:47:11,200

and analyzed

1209

00:47:15,670 --> 00:47:13,119

very large satellites

1210

00:47:19,589 --> 00:47:15,680

this should be able to

1211

00:47:21,829 --> 00:47:19,599

not only provide rapid research

1212

00:47:23,589 --> 00:47:21,839

just like you saw me assemble this like

1213

00:47:26,470 --> 00:47:23,599

an astronauts would

1214

00:47:28,870 --> 00:47:26,480

we have a high school and colleges

1215

00:47:30,549 --> 00:47:28,880

working we have the

1216

00:47:34,150 --> 00:47:30,559

the navy

1217

00:47:35,589 --> 00:47:34,160

academy we have stanford who have built

1218

00:47:38,390 --> 00:47:35,599

some of the payloads and they just plug

1219

00:47:41,270 --> 00:47:38,400

them on so it allows a lot of the next

1220

00:47:43,190 --> 00:47:41,280

generation of engineers to rapidly do

1221

00:47:44,069 --> 00:47:43,200

things they can't quickly do today they

1222

00:47:45,670 --> 00:47:44,079

can

1223

00:47:48,470 --> 00:47:45,680

assemble it the same way you see so

1224

00:47:51,670 --> 00:47:48,480

that's another thing we're looking for

1225

00:47:54,630 --> 00:47:51,680

flexibility speed low cost

1226
00:47:57,589 --> 00:47:54,640
and and going to the next size up we're

1227
00:47:59,270 --> 00:47:57,599
really now figuring out how to work

1228
00:48:01,030 --> 00:47:59,280
with the small

1229
00:48:02,630 --> 00:48:01,040
and now we need to go to the next level

1230
00:48:04,950 --> 00:48:02,640
and figure out how to get back the

1231
00:48:06,390 --> 00:48:04,960
capabilities that we that we need in

1232
00:48:07,829 --> 00:48:06,400
some science

1233
00:48:09,829 --> 00:48:07,839
with aperture

1234
00:48:11,910 --> 00:48:09,839
some science is still very restricted by

1235
00:48:13,030 --> 00:48:11,920
aperture it needs size

1236
00:48:14,069 --> 00:48:13,040
uh

1237
00:48:17,589 --> 00:48:14,079
and

1238
00:48:20,150 --> 00:48:17,599

do need to get large sometimes in space

1239

00:48:21,270 --> 00:48:20,160

as you get farther from the earth so

1240

00:48:23,270 --> 00:48:21,280

this is where we're headed we're trying

1241

00:48:26,069 --> 00:48:23,280

to give that capability back to the

1242

00:48:26,079 --> 00:48:30,390

thank you bill other questions hurry

1243

00:48:34,230 --> 00:48:32,710

um irene klotz with reuters so what's

1244

00:48:36,549 --> 00:48:34,240

going to happen to that satellite after

1245

00:48:38,870 --> 00:48:36,559

the astronauts put it together and is

1246

00:48:41,430 --> 00:48:38,880

there any possibility or any plans in

1247

00:48:42,870 --> 00:48:41,440

the future to actually deploy anything

1248

00:48:43,829 --> 00:48:42,880

like that from the space from the

1249

00:48:45,750 --> 00:48:43,839

station

1250

00:48:47,589 --> 00:48:45,760

so after the after the astronauts put

1251

00:48:51,030 --> 00:48:47,599

this together they will actually deploy

1252

00:48:52,950 --> 00:48:51,040

it they will nanorax is

1253

00:48:54,230 --> 00:48:52,960

is putting together a deployment system

1254

00:48:56,150 --> 00:48:54,240

called caber

1255

00:49:00,069 --> 00:48:56,160

this will be attached to it and it will

1256

00:49:01,190 --> 00:49:00,079

be launched from the iss it currently in

1257

00:49:04,150 --> 00:49:01,200

its

1258

00:49:06,710 --> 00:49:04,160

first mission here carries

1259

00:49:08,150 --> 00:49:06,720

three payloads three

1260

00:49:08,950 --> 00:49:08,160

uh payloads that have been attached to

1261

00:49:11,430 --> 00:49:08,960

it

1262

00:49:14,710 --> 00:49:11,440

one is as i mentioned is a stanford

1263

00:49:16,549 --> 00:49:14,720

university camera called snaps

1264

00:49:18,790 --> 00:49:16,559

it's a more than a camera it's a really

1265

00:49:20,390 --> 00:49:18,800

a camcorder it's a video recorder it's

1266

00:49:22,470 --> 00:49:20,400

going to record the deployment of the

1267

00:49:24,230 --> 00:49:22,480

solar arrays since this is the very

1268

00:49:26,470 --> 00:49:24,240

first time we've used this technology we

1269

00:49:28,390 --> 00:49:26,480

want to look at how it deploys and how

1270

00:49:30,790 --> 00:49:28,400

it comes alive

1271

00:49:32,710 --> 00:49:30,800

we're also carrying a

1272

00:49:33,990 --> 00:49:32,720

uh

1273

00:49:36,470 --> 00:49:34,000

usna

1274

00:49:38,710 --> 00:49:36,480

united states naval academy

1275

00:49:41,190 --> 00:49:38,720

quickcom1 it's called it's an amateur

1276

00:49:45,109 --> 00:49:41,200

payload the students have built it as an

1277

00:49:46,870 --> 00:49:45,119

amateur radio and this is actually

1278

00:49:49,030 --> 00:49:46,880

officially designated as an oscar

1279

00:49:50,630 --> 00:49:49,040

satellite an orbital satellite

1280

00:49:53,750 --> 00:49:50,640

carrying amateur radio they call them

1281

00:49:55,670 --> 00:49:53,760

oscars and that will come alive

1282

00:49:58,309 --> 00:49:55,680

and beacon around the world when it

1283

00:50:00,390 --> 00:49:58,319

comes over the u.s it will actually

1284

00:50:03,109 --> 00:50:00,400

notify amateur radio

1285

00:50:06,069 --> 00:50:03,119

hams and kids and stem all around the

1286

00:50:07,190 --> 00:50:06,079

world to contact it and use what's

1287

00:50:09,510 --> 00:50:07,200

called an

1288

00:50:11,990 --> 00:50:09,520

automated packet reporting system

1289

00:50:14,870 --> 00:50:12,000

and it will tell them where it is it

1290

00:50:16,470 --> 00:50:14,880

will be able to relay messages from

1291

00:50:17,829 --> 00:50:16,480

locations that are disadvantaged in

1292

00:50:19,670 --> 00:50:17,839

their com

1293

00:50:22,470 --> 00:50:19,680

it's a wonderful

1294

00:50:24,549 --> 00:50:22,480

student a university-based package we've

1295

00:50:27,750 --> 00:50:24,559

applied and it has a third payload which

1296

00:50:31,030 --> 00:50:27,760

is a darpa payload which was provided to

1297

00:50:34,069 --> 00:50:31,040

test out a new type of radio it's a

1298

00:50:35,910 --> 00:50:34,079

wonderful system that changes the comms

1299

00:50:38,230 --> 00:50:35,920

that we have in space we currently use a

1300

00:50:40,230 --> 00:50:38,240

very

1301
00:50:41,990 --> 00:50:40,240
dated technology we're in the world of

1302
00:50:44,230 --> 00:50:42,000
the internet this is an internet

1303
00:50:46,390 --> 00:50:44,240
communication system it actually pulls

1304
00:50:49,030 --> 00:50:46,400
web pages down from the from the

1305
00:50:51,430 --> 00:50:49,040
distributed system so you act it acts as

1306
00:50:53,190 --> 00:50:51,440
a web client and no longer as a command

1307
00:50:56,230 --> 00:50:53,200
and telemetry system so we have some

1308
00:50:58,069 --> 00:50:56,240
amazing first payloads going on here uh

1309
00:51:00,069 --> 00:50:58,079
that were that we're trying to to

1310
00:51:01,670 --> 00:51:00,079
demonstrate

1311
00:51:04,230 --> 00:51:01,680
um and then i also have a question for

1312
00:51:07,030 --> 00:51:04,240
kirk could you just uh maybe touch on

1313
00:51:09,589 --> 00:51:07,040

some of the research programs that were

1314

00:51:11,030 --> 00:51:09,599

most affected by this five-month delay

1315

00:51:13,270 --> 00:51:11,040

in having

1316

00:51:14,790 --> 00:51:13,280

commercial cargo from flying from the

1317

00:51:15,750 --> 00:51:14,800

u.s

1318

00:51:18,150 --> 00:51:15,760

sure

1319

00:51:20,150 --> 00:51:18,160

a lot of the

1320

00:51:23,349 --> 00:51:20,160

payloads going scientific payloads going

1321

00:51:26,870 --> 00:51:23,359

up on the oa4 mission are related to

1322

00:51:29,270 --> 00:51:26,880

materials processing so we've been

1323

00:51:32,470 --> 00:51:29,280

waiting for new materials to process in

1324

00:51:34,470 --> 00:51:32,480

microgravity and also new physical

1325

00:51:39,030 --> 00:51:34,480

phenomena to look at in microgravity

1326

00:51:41,270 --> 00:51:39,040

like brian's investigation the pbre

1327

00:51:43,109 --> 00:51:41,280

we're hoping to get those on orbit so we

1328

00:51:45,750 --> 00:51:43,119

can enable that type of research it's

1329

00:51:48,309 --> 00:51:45,760

great research it's the research that

1330

00:51:50,069 --> 00:51:48,319

once we have it on orbit we can operate

1331

00:51:51,990 --> 00:51:50,079

it pretty much at any time because there

1332

00:51:54,470 --> 00:51:52,000

are very there are no issues with shelf

1333

00:51:58,710 --> 00:51:54,480

life or having a human subject for only

1334

00:52:00,549 --> 00:51:58,720

a small time so those are the types of

1335

00:52:01,829 --> 00:52:00,559

investigations we've been working

1336

00:52:04,950 --> 00:52:01,839

through

1337

00:52:07,190 --> 00:52:04,960

as reserve science during the time when

1338

00:52:08,390 --> 00:52:07,200

we didn't have other scientific payloads

1339

00:52:10,069 --> 00:52:08,400

arrive

1340

00:52:11,270 --> 00:52:10,079

we're starting to run low on that end

1341

00:52:14,470 --> 00:52:11,280

because we're going through all that

1342

00:52:16,790 --> 00:52:14,480

reserve so this brings forward an entire

1343

00:52:19,510 --> 00:52:16,800

new category of those payloads that

1344

00:52:21,670 --> 00:52:19,520

we'll have on orbit ready to run at a

1345

00:52:22,950 --> 00:52:21,680

moment's notice

1346

00:52:27,750 --> 00:52:22,960

we have time for about two more

1347

00:52:31,430 --> 00:52:29,510

all right daddy cesar with the utica

1348

00:52:33,109 --> 00:52:31,440

phoenix with these satellites or

1349

00:52:35,589 --> 00:52:33,119

satellites i should say do you foresee

1350

00:52:37,829 --> 00:52:35,599

any possible applications of 3d printing

1351
00:52:39,190 --> 00:52:37,839
technology being applied to further cost

1352
00:52:40,390 --> 00:52:39,200
reduce

1353
00:52:46,069 --> 00:52:40,400
so

1354
00:52:47,910 --> 00:52:46,079
once you can create a system that isn't

1355
00:52:50,470 --> 00:52:47,920
always custom designed and the system

1356
00:52:53,430 --> 00:52:50,480
engineering is has to be done

1357
00:52:55,349 --> 00:52:53,440
and you can make a unit cell to produce

1358
00:52:58,309 --> 00:52:55,359
yes then you want to apply

1359
00:53:00,150 --> 00:52:58,319
all the technology you can at it so

1360
00:53:02,470 --> 00:53:00,160
the next stage would be to improve it

1361
00:53:04,950 --> 00:53:02,480
the next stage would be to assemble it

1362
00:53:07,510 --> 00:53:04,960
by 3d printing you could do 3d printing

1363
00:53:09,910 --> 00:53:07,520

on orbit you just keep going it's it's

1364

00:53:12,390 --> 00:53:09,920

now in a manufacturing

1365

00:53:14,710 --> 00:53:12,400

world and not a custom design every

1366

00:53:15,910 --> 00:53:14,720

satellite world so yes that's that's

1367

00:53:19,270 --> 00:53:15,920

exactly where you want to go with this

1368

00:53:21,349 --> 00:53:20,390

construction

1369

00:53:22,950 --> 00:53:21,359

of these

1370

00:53:24,790 --> 00:53:22,960

we've already put in proposals to do

1371

00:53:33,589 --> 00:53:24,800

that

1372

00:53:37,190 --> 00:53:35,510

mine was just a quick one and i hope i

1373

00:53:38,710 --> 00:53:37,200

didn't miss it but approximately how

1374

00:53:40,829 --> 00:53:38,720

many components will astronauts be

1375

00:53:43,349 --> 00:53:40,839

putting together for that three thousand

1376
00:53:45,589 --> 00:53:43,359
pounds one that you've been testing so

1377
00:53:47,829 --> 00:53:45,599
modeling so that one actually the three

1378
00:53:50,870 --> 00:53:47,839
three thousand is is currently a ground

1379
00:53:51,990 --> 00:53:50,880
demo only uh the next one that comes out

1380
00:53:53,030 --> 00:53:52,000
next

1381
00:53:57,109 --> 00:53:53,040
should be

1382
00:53:58,870 --> 00:53:57,119
uh 330 pounds 150 kilograms roughly 160

1383
00:54:00,549 --> 00:53:58,880
kilograms

1384
00:54:01,750 --> 00:54:00,559
that will have

1385
00:54:03,109 --> 00:54:01,760
uh

1386
00:54:05,190 --> 00:54:03,119
wow

1387
00:54:07,349 --> 00:54:05,200
it's it's pieces i'll say about 18

1388
00:54:08,549 --> 00:54:07,359

pieces 20 pieces and that won't be

1389

00:54:09,750 --> 00:54:08,559

assembled by

1390

00:54:11,430 --> 00:54:09,760

astronauts

1391

00:54:12,710 --> 00:54:11,440

that will actually be fitted to the side

1392

00:54:14,630 --> 00:54:12,720

of a

1393

00:54:17,510 --> 00:54:14,640

an esparing

1394

00:54:19,030 --> 00:54:17,520

and launched as a secondary on a main

1395

00:54:21,270 --> 00:54:19,040

falcon rocket

1396

00:54:23,510 --> 00:54:21,280

and again the the only difference is

1397

00:54:25,349 --> 00:54:23,520

instead of astronauts doing it in space

1398

00:54:26,630 --> 00:54:25,359

they'll do it on the ground and they'll

1399

00:54:29,589 --> 00:54:26,640

plug it together

1400

00:54:32,630 --> 00:54:29,599

and lock it down and it will ride so

1401

00:54:35,430 --> 00:54:33,589

okay

1402

00:54:37,270 --> 00:54:35,440

thank you to everyone who joined us this

1403

00:54:39,349 --> 00:54:37,280

afternoon for the science and technology

1404

00:54:43,030 --> 00:54:39,359

discussion up next we'll have the