1
00:00:17,029 --> 00:00:09,919
ignition sequence star we have taken

2
00:00:20,179 --> 00:00:17,039
tremendous steps we have achieved the

3
00:00:24,529 --> 00:00:20,189
Earth's shaking the breathtaking the

4
00:00:27,589 --> 00:00:24,539
groundbreaking have left a mark in the

5
00:00:29,680 --> 00:00:27,599
heavens our successes build one upon

6
00:00:32,519 --> 00:00:29,690
another

7
00:00:36,170 --> 00:00:32,529
what is possible

8
00:00:38,550 --> 00:00:36,180
it's time we take the next great leap

9
00:00:41,400 --> 00:00:38,560
we're building the next chapter of

10
00:00:45,960 --> 00:00:41,410
American exploration returning to the

11
00:00:49,170 --> 00:00:45,970
moon and to stay so we can go beyond to

12
00:00:53,520 --> 00:00:49,180
Mars to expand what's possible and

13
00:00:55,439 --> 00:00:53,530

further our understanding the

14
00:00:58,619 --> 00:00:55,449
architecture for these missions is

15
00:01:01,890 --> 00:00:58,629
already taking shape we will go with new

16
00:01:04,079 --> 00:01:01,900
systems bold designs and a sustainable

17
00:01:08,760 --> 00:01:04,089
mission

18
00:01:11,670 --> 00:01:08,770
and taste it touch it we are going we

19
00:01:14,300 --> 00:01:11,680
are training contested pressing our

20
00:01:17,660 --> 00:01:14,310
pioneering spirits into every component

21
00:01:20,750 --> 00:01:17,670
defining our resolve with every line of

22
00:01:23,280 --> 00:01:20,760
and securing our success with every

23
00:01:26,370 --> 00:01:23,290
welcomed partnership

24
00:01:29,940 --> 00:01:26,380
this is not hypothetical this is not

25
00:01:31,520 --> 00:01:29,950
about flags and footprints this is about

26
00:01:34,130 --> 00:01:31,530
sustainable

27
00:01:34,970 --> 00:01:34,140
and feeding forward the advance of the

28
00:01:36,560 --> 00:01:34,980
human spirit

29
00:01:39,860 --> 00:01:36,570
[Music]

30
00:01:41,630 --> 00:01:39,870
because we are the pioneers the star

31
00:01:44,940 --> 00:01:41,640
sailors

32
00:01:49,230 --> 00:01:46,950
as we stand on

33
00:01:53,800 --> 00:01:49,240
the chance to go farther

34
00:01:53,810 --> 00:01:59,640
of the greatest adventurers in history

35
00:02:08,449 --> 00:02:01,870
every mission

36
00:02:44,940 --> 00:02:11,430
and after sixty years we're just

37
00:02:44,950 --> 00:03:32,380
[Music]

38
00:03:32,390 --> 00:03:47,160

[Applause]

39
00:03:51,819 --> 00:03:49,050
all right

40
00:03:54,220 --> 00:03:51,829
man those videos are a tough act to

41
00:03:55,780 --> 00:03:54,230
follow they were outstanding well good

42
00:03:58,720 --> 00:03:55,790
afternoon and welcome to the Kennedy

43
00:04:01,449 --> 00:03:58,730
Space Center in the dawn of a new era in

44
00:04:03,729 --> 00:04:01,459
the exploration of the Moon and Mars I'm

45
00:04:06,369 --> 00:04:03,739
Bob cabana and I have the privilege of

46
00:04:09,610 --> 00:04:06,379
leading this amazing team at America's

47
00:04:11,770 --> 00:04:09,620
premier multi-user spaceport I'm pleased

48
00:04:14,020 --> 00:04:11,780
to welcome you all distinguished guests

49
00:04:16,420 --> 00:04:14,030
NASA's valued employees watching from

50
00:04:20,229 --> 00:04:16,430
across the nation and our media guests

51
00:04:25,180 --> 00:04:20,239
here and abroad I was 50 years ago this

52
00:04:28,120 --> 00:04:25,190
July that KSC was the launch site for

53
00:04:30,129 --> 00:04:28,130
that historic Apollo 11 mission when

54
00:04:32,800 --> 00:04:30,139
President Kennedy stood before a joint

55
00:04:35,560 --> 00:04:32,810
session of Congress and he announced his

56
00:04:38,050 --> 00:04:35,570
ambitious goal of sending humans to the

57
00:04:39,810 --> 00:04:38,060
moon and returning him safely we still

58
00:04:42,550 --> 00:04:39,820
had to figure out how to make that work

59
00:04:47,650 --> 00:04:42,560
we quickly ramped up operations here at

60
00:04:51,310 --> 00:04:47,660
KSC we had the mercury 7 crew here we

61
00:04:53,080 --> 00:04:51,320
hosted them we worked hard on Gemini

62
00:04:56,140 --> 00:04:53,090
learning everything that we needed to

63
00:04:57,909 --> 00:04:56,150

know to get humans to the moon to make

64
00:05:01,649 --> 00:04:57,919
those first steps on the lunar surface

65
00:05:04,300 --> 00:05:01,659
50 years ago we'll be making similar

66
00:05:07,149 --> 00:05:04,310
incremental steps as we build a

67
00:05:09,820 --> 00:05:07,159
sustainable architecture to reach our

68
00:05:11,350 --> 00:05:09,830
goals of the future the team here at the

69
00:05:14,110 --> 00:05:11,360
Kennedy Space Center is up to the

70
00:05:16,689 --> 00:05:14,120
challenge and we can't wait to see

71
00:05:19,000 --> 00:05:16,699
rockets on those launch pads taking

72
00:05:21,850 --> 00:05:19,010
humans back to the moon and eventually

73
00:05:24,610 --> 00:05:21,860
onto Mars it's my pleasure now to

74
00:05:27,820 --> 00:05:24,620
introduce our administrator Tim

75
00:05:29,950 --> 00:05:27,830
bridenstine now Jim came on board about

76
00:05:33,520 --> 00:05:29,960
the same time that the President signed

77
00:05:37,420 --> 00:05:33,530
space policy directive one that directed

78
00:05:40,200 --> 00:05:37,430
us to send humans to the moon for

79
00:05:42,480 --> 00:05:40,210
long-term exploration and utilization

80
00:05:45,580 --> 00:05:42,490
followed by missions to Mars

81
00:05:48,730 --> 00:05:45,590
his passion for flight and space

82
00:05:51,339 --> 00:05:48,740
exploration served him well on the Armed

83
00:05:53,879 --> 00:05:51,349
Forces Committee and the Science Space

84
00:05:58,450 --> 00:05:53,889
and Technology Committee in Congress and

85
00:06:01,330 --> 00:05:58,460
today that passion is inspiring the

86
00:06:03,999 --> 00:06:01,340
the workforce and the public on a new

87
00:06:08,110 --> 00:06:04,009
mission of exploration please welcome

88
00:06:22,220 --> 00:06:08,120

our 13th administrator Jim bridenstine

89
00:06:24,720 --> 00:06:22,230
[Applause]

90
00:06:26,760 --> 00:06:24,730
well Bob thank you for that great

91
00:06:28,830 --> 00:06:26,770
introduction and thank you all for being

92
00:06:31,860 --> 00:06:28,840
here on a day that I think is extremely

93
00:06:34,080 --> 00:06:31,870
exciting today we are rolling out the

94
00:06:37,560 --> 00:06:34,090
President's budget request for NASA and

95
00:06:39,240 --> 00:06:37,570
I am very happy to tell you that NASA's

96
00:06:41,280 --> 00:06:39,250
budget request from the President of the

97
00:06:43,800 --> 00:06:41,290
United States is strong and we have

98
00:06:47,890 --> 00:06:43,810
strong bipartisan support in both

99
00:06:55,670 --> 00:06:53,290
[Applause]

100
00:06:58,760 --> 00:06:55,680
now many of you know that I'm a Navy

101
00:07:00,469 --> 00:06:58,770
pilot by trade and I'm going to spend a

102
00:07:04,369 --> 00:07:00,479
few minutes talking about a mission that

103
00:07:07,279 --> 00:07:04,379
I think is a lot of fun very exciting

104
00:07:10,070 --> 00:07:07,289
and transformative as a matter of fact

105
00:07:13,490 --> 00:07:10,080
for the way we fly in the United States

106
00:07:17,300 --> 00:07:13,500
of America we have been plowing through

107
00:07:19,820 --> 00:07:17,310
the atmosphere at point six Mach for

108
00:07:23,749 --> 00:07:19,830
seventy years and I think it's time we

109
00:07:26,749 --> 00:07:23,759
change that and the ex-59 is our tool to

110
00:07:29,119 --> 00:07:26,759
do just that in this budget request the

111
00:07:31,580 --> 00:07:29,129
ex 59 and the Aeronautics research

112
00:07:34,219 --> 00:07:31,590
Mission Directorate is funded at a very

113
00:07:36,499 --> 00:07:34,229

strong level I want to talk for just a

114
00:07:39,469 --> 00:07:36,509
second about what this means last year

115
00:07:42,490 --> 00:07:39,479
we saw really for the first time a test

116
00:07:45,649 --> 00:07:42,500
over Galveston in a populated center

117
00:07:48,769 --> 00:07:45,659
what a sonic boom will do to communities

118
00:07:50,510 --> 00:07:48,779
both from just an annoyance perspective

119
00:07:52,999 --> 00:07:50,520
and maybe from an infrastructure

120
00:07:55,670 --> 00:07:53,009
perspective and when we saw that we were

121
00:07:57,800 --> 00:07:55,680
able to make determinations as to what

122
00:08:02,839 --> 00:07:57,810
the level of tolerance would be for a

123
00:08:05,300 --> 00:08:02,849
sonic boom it has been banned for a long

124
00:08:07,309 --> 00:08:05,310
time by the FAA to fly over the United

125
00:08:09,619 --> 00:08:07,319
States at supersonic air speeds because

126
00:08:12,189 --> 00:08:09,629
of the disturbance and the problems with

127
00:08:15,050 --> 00:08:12,199
infrastructure well we at NASA are

128
00:08:17,540 --> 00:08:15,060
working really hard to change that and

129
00:08:18,890 --> 00:08:17,550
the low boom flight demonstrator is the

130
00:08:21,800 --> 00:08:18,900
tool to make that happen in this

131
00:08:25,279 --> 00:08:21,810
particular case we are assessing what is

132
00:08:28,189 --> 00:08:25,289
the tolerance for a low boom and we're

133
00:08:31,579 --> 00:08:28,199
imaging it in fact just the other day we

134
00:08:34,880 --> 00:08:31,589
had a b200 Beechcraft King Air fly with

135
00:08:38,060 --> 00:08:34,890
a brand new camera and and look at two

136
00:08:40,430 --> 00:08:38,070
t-38s flying below it at super spon

137
00:08:43,219 --> 00:08:40,440
supersonic speeds and looking at that

138
00:08:45,380 --> 00:08:43,229

pressure wave not just at the bow but at

139
00:08:48,860 --> 00:08:45,390
all different parts of those t-38 and

140
00:08:50,449 --> 00:08:48,870
how those pressure waves combine because

141
00:08:53,180 --> 00:08:50,459
when they combine that's when we get

142
00:08:55,220 --> 00:08:53,190
that really loud supersonic boom that

143
00:08:57,740 --> 00:08:55,230
can be disturbing and in fact troubling

144
00:08:59,449 --> 00:08:57,750
for infrastructure so what we're doing

145
00:09:02,180 --> 00:08:59,459
now is we're going to take what we learn

146
00:09:05,000 --> 00:09:02,190
from these experiments and we're going

147
00:09:05,570 --> 00:09:05,010
to apply them to the ex-59 which is

148
00:09:08,570 --> 00:09:05,580
going to all

149
00:09:11,420 --> 00:09:08,580
be flown in the year 2021 so that for

150
00:09:12,890 --> 00:09:11,430
the first time we can get regulations on

151
00:09:15,200 --> 00:09:12,900
the books in the United States of

152
00:09:17,690 --> 00:09:15,210
America that that say you can fly

153
00:09:24,250 --> 00:09:17,700
supersonic and I'm but this is important

154
00:09:27,290 --> 00:09:24,260
the ex-59 is gonna fly at Mach 1.4 at

155
00:09:29,030 --> 00:09:27,300
55,000 feet we're gonna be able to go

156
00:09:31,400 --> 00:09:29,040
from one side of the United States the

157
00:09:33,530 --> 00:09:31,410
other side of the United States in a

158
00:09:35,420 --> 00:09:33,540
couple of hours rather than five and a

159
00:09:37,910 --> 00:09:35,430
half six hours depending on the winds

160
00:09:39,560 --> 00:09:37,920
this is transformative for how we are

161
00:09:41,240 --> 00:09:39,570
able to get from one side of the country

162
00:09:45,560 --> 00:09:41,250
to the other and travel within the

163
00:09:47,480 --> 00:09:45,570

country just as exciting is another

164
00:09:50,240 --> 00:09:47,490
mission within the Aeronautics research

165
00:09:54,640 --> 00:09:50,250
Mission Directorate this mission is the

166
00:09:57,710 --> 00:09:54,650
x57 Maxwell the first all-electric

167
00:10:01,220 --> 00:09:57,720
transport aircraft capable of carrying

168
00:10:03,560 --> 00:10:01,230
passengers and cargo all-electric what

169
00:10:07,190 --> 00:10:03,570
does that mean that means we can drive

170
00:10:09,770 --> 00:10:07,200
down the cost of transporting people and

171
00:10:14,570 --> 00:10:09,780
cargo from one place the other by up to

172
00:10:16,280 --> 00:10:14,580
and even in some cases over 60% well if

173
00:10:18,100 --> 00:10:16,290
we can drive down the cost by that

174
00:10:20,540 --> 00:10:18,110
amount that means we're gonna have

175
00:10:23,840 --> 00:10:20,550
potentially commercial flights going to

176
00:10:25,640 --> 00:10:23,850
more destinations than ever before we're

177
00:10:27,200 --> 00:10:25,650
gonna be able to serve communities with

178
00:10:30,320 --> 00:10:27,210
air travel that historically have not

179
00:10:33,830 --> 00:10:30,330
been served with air travel I want to be

180
00:10:36,410 --> 00:10:33,840
clear we are not there yet but the x57

181
00:10:38,890 --> 00:10:36,420
Maxwell is the tool by which we will be

182
00:10:41,630 --> 00:10:38,900
able to accomplish these objectives and

183
00:10:43,970 --> 00:10:41,640
driving down costs and increasing access

184
00:10:45,800 --> 00:10:43,980
to air travel is the way that we're

185
00:10:47,690 --> 00:10:45,810
going to be able to increase the

186
00:10:49,640 --> 00:10:47,700
standard of living for every American

187
00:10:52,220 --> 00:10:49,650
and that's really what NASA is all about

188
00:10:53,540 --> 00:10:52,230

elevating the human condition and the

189
00:10:56,330 --> 00:10:53,550
x57

190
00:10:58,550 --> 00:10:56,340
is a tool to accomplish that one other

191
00:11:00,080 --> 00:10:58,560
very exciting project within the

192
00:11:05,320 --> 00:11:00,090
Aeronautics research Mission Directorate

193
00:11:08,600 --> 00:11:05,330
that I'm really kind of intrigued by is

194
00:11:12,800 --> 00:11:08,610
urban air mobility the idea that you can

195
00:11:16,490 --> 00:11:12,810
fly on an unmanned I should say uncrewed

196
00:11:20,720 --> 00:11:16,500
craft I know pilot

197
00:11:22,250 --> 00:11:20,730
let's say that from from one side of the

198
00:11:24,650 --> 00:11:22,260
city to another side of the city just

199
00:11:26,720 --> 00:11:24,660
like you would drive a car now again

200
00:11:28,520 --> 00:11:26,730
we're not there yet but in order to

201
00:11:30,860 --> 00:11:28,530
achieve that day we first start with

202
00:11:33,050 --> 00:11:30,870
cargo and there is industry in the

203
00:11:35,000 --> 00:11:33,060
United States of America right now very

204
00:11:37,370 --> 00:11:35,010
excited about that eventualities why

205
00:11:40,010 --> 00:11:37,380
because it will help them get your

206
00:11:41,840 --> 00:11:40,020
packages to your doorstep faster and

207
00:11:44,690 --> 00:11:41,850
more efficiently than ever before and

208
00:11:46,910 --> 00:11:44,700
once that happens there is no limit to

209
00:11:48,560 --> 00:11:46,920
what we can do with humans in the future

210
00:11:50,480 --> 00:11:48,570
but in order to do that we have to be

211
00:11:52,760 --> 00:11:50,490
able to integrate uncrewed systems

212
00:11:55,070 --> 00:11:52,770
unmanned aerial systems into the air

213
00:11:56,570 --> 00:11:55,080

into the National Airspace System that's

214
00:11:58,490 --> 00:11:56,580
not an easy feat and when you're talking

215
00:12:00,320 --> 00:11:58,500
about doing it in urban environments

216
00:12:02,510 --> 00:12:00,330
there's a whole level of safety that has

217
00:12:04,550 --> 00:12:02,520
to come into play and so what NASA is

218
00:12:06,890 --> 00:12:04,560
doing within the Aeronautics research

219
00:12:11,660 --> 00:12:06,900
Mission Directorate is working on those

220
00:12:13,190 --> 00:12:11,670
very challenging problems one day we're

221
00:12:16,490 --> 00:12:13,200
gonna be able to deliver packages to

222
00:12:18,950 --> 00:12:16,500
your doorstep in a vehicle that flies in

223
00:12:21,140 --> 00:12:18,960
the sky over populated centers more

224
00:12:22,820 --> 00:12:21,150
efficiently and even one day fly humans

225
00:12:26,180 --> 00:12:22,830
from one side of the city to the other

226
00:12:28,280 --> 00:12:26,190
so these are all very exciting things

227
00:12:30,050 --> 00:12:28,290
within the Aeronautics mission direct

228
00:12:32,690 --> 00:12:30,060
Aeronautics research Mission Directorate

229
00:12:34,460 --> 00:12:32,700
and I wanted to make sure that I started

230
00:12:36,230 --> 00:12:34,470
the speech today talking about that part

231
00:12:39,050 --> 00:12:36,240
of the budget because as a Navy pilot I

232
00:12:41,750 --> 00:12:39,060
like the idea of everybody being able to

233
00:12:43,580 --> 00:12:41,760
fly supersonic and of course everybody

234
00:12:45,500 --> 00:12:43,590
being able to fly in general and

235
00:12:47,810 --> 00:12:45,510
eventually everybody being able to fly

236
00:12:50,840 --> 00:12:47,820
from one side of the city to another

237
00:12:55,700 --> 00:12:50,850
side of the city so let's take it up a

238
00:12:59,690 --> 00:12:55,710

notch from aeronautics to space we have

239
00:13:02,840 --> 00:12:59,700
seen what happens when we as NASA in

240
00:13:05,840 --> 00:13:02,850
low-earth orbit we become one customer

241
00:13:07,760 --> 00:13:05,850
of many customers in a robust commercial

242
00:13:12,140 --> 00:13:07,770
marketplace in low-earth orbit

243
00:13:14,050 --> 00:13:12,150
we just saw a SpaceX crew dragon dock

244
00:13:18,560 --> 00:13:14,060
with the International Space Station

245
00:13:22,750 --> 00:13:18,570
deliver some cargo namely a little earth

246
00:13:27,770 --> 00:13:22,760
humanoid ultimately do a lot of tests

247
00:13:30,980 --> 00:13:27,780
undock fly home and land safely

248
00:13:33,890 --> 00:13:30,990
that is a first step in a much longer

249
00:13:35,900 --> 00:13:33,900
mission for NASA to become one customer

250
00:13:38,180 --> 00:13:35,910
of many customers in low-earth orbit in

251
00:13:41,050 --> 00:13:38,190
a robust commercial marketplace and at

252
00:13:43,610 --> 00:13:41,060
the same time having numerous providers

253
00:13:46,130 --> 00:13:43,620
that are competing on cost and

254
00:13:49,040 --> 00:13:46,140
innovation why is that so important

255
00:13:51,560 --> 00:13:49,050
because we need to drive down costs we

256
00:13:53,330 --> 00:13:51,570
need to increase access we need to make

257
00:13:55,430 --> 00:13:53,340
spaceflight more available to more

258
00:13:57,170 --> 00:13:55,440
people that includes commercial

259
00:13:58,880 --> 00:13:57,180
activities we're talking about

260
00:14:00,580 --> 00:13:58,890
manufacturing we're talking about

261
00:14:01,760 --> 00:14:00,590
tourism we're talking about

262
00:14:04,460 --> 00:14:01,770
pharmaceuticals

263
00:14:06,980 --> 00:14:04,470

maybe fiber optics we need to develop

264
00:14:09,920 --> 00:14:06,990
that very robust commercial marketplace

265
00:14:12,500 --> 00:14:09,930
in low-earth orbit it starts with cargo

266
00:14:14,060 --> 00:14:12,510
it is now starting to get to the point

267
00:14:16,240 --> 00:14:14,070
where we're going to be launching crew

268
00:14:26,680 --> 00:14:16,250
and by the way we're going to do that in

269
00:14:32,749 --> 00:14:30,470
and eventually we're going to get to a

270
00:14:35,090 --> 00:14:32,759
day where low Earth orbit in general for

271
00:14:38,030 --> 00:14:35,100
habitation is going to be commercialized

272
00:14:39,499 --> 00:14:38,040
in other words NASA will be a customer

273
00:14:41,449 --> 00:14:39,509
of many customers with numerous

274
00:14:44,030 --> 00:14:41,459
providers competing on cost and

275
00:14:46,369 --> 00:14:44,040
innovation not just for resupply not

276
00:14:47,720 --> 00:14:46,379
just for crew but in fact for habitation

277
00:14:49,910 --> 00:14:47,730
for science

278
00:14:52,759 --> 00:14:49,920
for discovery for capability and low

279
00:14:54,199 --> 00:14:52,769
Earth orbit let's talk about why we want

280
00:14:56,749 --> 00:14:54,209
to do that why does NASA want to

281
00:14:58,699 --> 00:14:56,759
commercialize low-earth orbit it is in

282
00:15:00,230 --> 00:14:58,709
our interest to take advantage of

283
00:15:03,050 --> 00:15:00,240
commercial market places where they

284
00:15:05,629 --> 00:15:03,060
exist because the cost go down access

285
00:15:08,059 --> 00:15:05,639
goes up and then we can use the American

286
00:15:10,699 --> 00:15:08,069
tax dollars the resources that we are

287
00:15:12,710 --> 00:15:10,709
given by the American taxpayer to go

288
00:15:15,350 --> 00:15:12,720

further and do more than we've ever done

289
00:15:17,990 --> 00:15:15,360
before that's who we are and that's what

290
00:15:20,689 --> 00:15:18,000
we do the president has given us space

291
00:15:22,699 --> 00:15:20,699
policy directive 1 which says to go back

292
00:15:25,910 --> 00:15:22,709
to the moon and we're gonna do that in

293
00:15:28,759 --> 00:15:25,920
short order maybe even in 2019 but at

294
00:15:30,829 --> 00:15:28,769
least by 2020 with commercial lunar

295
00:15:32,569 --> 00:15:30,839
payload services that are going to be

296
00:15:34,490 --> 00:15:32,579
funded through the science Mission

297
00:15:36,170 --> 00:15:34,500
Directorate and all of this is going to

298
00:15:38,660 --> 00:15:36,180
be possible because we're looking at

299
00:15:40,309 --> 00:15:38,670
going fast there's two things when we

300
00:15:42,910 --> 00:15:40,319
talk about commercial lunar payload

301
00:15:46,730 --> 00:15:42,920
services that are important number one

302
00:15:49,480 --> 00:15:46,740
it's commercial we want competition on

303
00:15:53,449 --> 00:15:49,490
both costs and innovation and number two

304
00:15:55,309 --> 00:15:53,459
it's gonna be fast we we don't NASA is

305
00:15:55,639 --> 00:15:55,319
not going to be the long pole in the

306
00:15:57,949 --> 00:15:55,649
tent

307
00:15:59,809 --> 00:15:57,959
NASA is gonna we've already provided 10

308
00:16:02,420 --> 00:15:59,819
different payloads that are ready to go

309
00:16:04,249 --> 00:16:02,430
to the moon and very soon we're gonna be

310
00:16:05,780 --> 00:16:04,259
issuing contracts to companies to

311
00:16:08,120 --> 00:16:05,790
deliver those payloads we're talking

312
00:16:10,549 --> 00:16:08,130
about small scientific instruments to

313
00:16:11,840 --> 00:16:10,559

the surface of the Moon now space policy

314
00:16:14,329 --> 00:16:11,850
directive one is not just about

315
00:16:16,309 --> 00:16:14,339
delivering small payloads to the surface

316
00:16:19,220 --> 00:16:16,319
of the Moon it's about much more than

317
00:16:23,840 --> 00:16:19,230
that it's about having a sustainable

318
00:16:26,420 --> 00:16:23,850
human presence on and around the moon in

319
00:16:29,749 --> 00:16:26,430
order to achieve that objective we need

320
00:16:32,600 --> 00:16:29,759
a permanent command and service module

321
00:16:34,910 --> 00:16:32,610
in orbit around the moon we call it

322
00:16:47,610 --> 00:16:34,920
gateway and that's fully funded in this

323
00:16:54,150 --> 00:16:51,660
I hear people sometimes say well you

324
00:16:56,610 --> 00:16:54,160
know Gateway is not a Space Station it

325
00:16:59,820 --> 00:16:56,620
is not it is a command and a surface

326
00:17:02,340 --> 00:16:59,830
module but it will be it will have the

327
00:17:04,470 --> 00:17:02,350
opportunity to have crew the other thing

328
00:17:06,600 --> 00:17:04,480
that's important about Gateway is it's

329
00:17:09,660 --> 00:17:06,610
going to utilize solar electric

330
00:17:11,970 --> 00:17:09,670
propulsion to be maneuverable when we go

331
00:17:14,640 --> 00:17:11,980
back to Apollo we remember that we

332
00:17:17,900 --> 00:17:14,650
landed twelve astronauts on the surface

333
00:17:21,660 --> 00:17:17,910
of the Moon over a period of three years

334
00:17:23,939 --> 00:17:21,670
1969 to 1972 each one of those missions

335
00:17:27,090 --> 00:17:23,949
was to the equatorial regions of the

336
00:17:29,340 --> 00:17:27,100
Moon and because of that we never went

337
00:17:31,620 --> 00:17:29,350
to the polls well there's a lot of

338
00:17:35,160 --> 00:17:31,630

valuable material at the poles namely

339
00:17:37,170 --> 00:17:35,170
water ice we discovered it in 2009 and

340
00:17:39,330 --> 00:17:37,180
massive quantities hundreds of millions

341
00:17:41,850 --> 00:17:39,340
of tons of water ice at the poles of the

342
00:17:43,740 --> 00:17:41,860
Moon well what gateway represents is an

343
00:17:46,080 --> 00:17:43,750
opportunity not just to go to the moon

344
00:17:48,450 --> 00:17:46,090
over and over again in a sustainable

345
00:17:50,580 --> 00:17:48,460
architecture but it represents an

346
00:17:51,000 --> 00:17:50,590
opportunity to get to more parts of the

347
00:17:54,060 --> 00:17:51,010
moon

348
00:17:56,370 --> 00:17:54,070
than ever before our goal is not just to

349
00:17:58,590 --> 00:17:56,380
land in one spot of the moon and learn a

350
00:18:01,020 --> 00:17:58,600
whole lot about all of the things that

351
00:18:03,150 --> 00:18:01,030
are happening in one kilometer around

352
00:18:05,520 --> 00:18:03,160
that one spot what we're interested in

353
00:18:07,620 --> 00:18:05,530
doing is learning all about the entire

354
00:18:10,110 --> 00:18:07,630
moon friends there is a lot about the

355
00:18:12,210 --> 00:18:10,120
moon we don't yet know and Gateway is

356
00:18:14,669 --> 00:18:12,220
going to allow us with this reusable

357
00:18:16,800 --> 00:18:14,679
command and service module with solar

358
00:18:19,680 --> 00:18:16,810
electric propulsion it can be in that

359
00:18:21,960 --> 00:18:19,690
equatorial region that me rectilinear

360
00:18:23,460 --> 00:18:21,970
halo orbit I was told by my comms folks

361
00:18:26,040 --> 00:18:23,470
never say that word because nobody knows

362
00:18:27,300 --> 00:18:26,050
what it is but I just said it but it's

363
00:18:28,919 --> 00:18:27,310

also going to go to the poles of the

364
00:18:31,740 --> 00:18:28,929
moon it can go to the north it can go to

365
00:18:34,470 --> 00:18:31,750
the south l1 and l2 giving Landers

366
00:18:36,840 --> 00:18:34,480
rovers robots and humans more access to

367
00:18:39,330 --> 00:18:36,850
more parts of the moon than ever before

368
00:18:42,000 --> 00:18:39,340
we don't want to miss anything ever

369
00:18:44,940 --> 00:18:42,010
again there's a lot to learn and this is

370
00:18:47,580 --> 00:18:44,950
about sustainability when we talk about

371
00:18:49,500 --> 00:18:47,590
sustainability what does that mean that

372
00:18:52,620 --> 00:18:49,510
means we need to be able to launch mass

373
00:18:54,840 --> 00:18:52,630
payloads off the surface of the earth we

374
00:18:56,700 --> 00:18:54,850
need the SLS and we need the Orion crew

375
00:18:59,160 --> 00:18:56,710
capsule and we need the European service

376
00:19:01,730 --> 00:18:59,170
module all of the above and some people

377
00:19:04,490 --> 00:19:01,740
say because I have said quite regularly

378
00:19:08,190 --> 00:19:04,500
when the president says go to the moon

379
00:19:09,870 --> 00:19:08,200
and he says go sustainably in other

380
00:19:12,180 --> 00:19:09,880
words this time when you go you need to

381
00:19:13,890 --> 00:19:12,190
stay when the president says that what

382
00:19:17,040 --> 00:19:13,900
does it mean it means we need

383
00:19:19,020 --> 00:19:17,050
reusability we have seen what happens in

384
00:19:20,880 --> 00:19:19,030
low-earth orbit when we reuse rockets

385
00:19:22,860 --> 00:19:20,890
the cost go down and the access goes up

386
00:19:24,630 --> 00:19:22,870
we need reusability in the entire

387
00:19:27,270 --> 00:19:24,640
architecture between the earth and the

388
00:19:29,730 --> 00:19:27,280

moon reusable launched reusable tuggs

389
00:19:31,890 --> 00:19:29,740
reusable command and service modules in

390
00:19:35,790 --> 00:19:31,900
orbit around the moon reusable landers

391
00:19:36,930 --> 00:19:35,800
robots Rovers all going human Lander is

392
00:19:38,670 --> 00:19:36,940
going to the surface of the Moon

393
00:19:40,530 --> 00:19:38,680
everything needs to be reusable built

394
00:19:42,480 --> 00:19:40,540
into the architecture and that's really

395
00:19:46,400 --> 00:19:42,490
what space policy directive one is all

396
00:19:48,840 --> 00:19:46,410
about a sustainable return to the moon

397
00:19:50,790 --> 00:19:48,850
but I have heard criticism that maybe

398
00:19:53,750 --> 00:19:50,800
when we talk about sustainable and

399
00:19:58,080 --> 00:19:53,760
reusable why do we build SLS and Orion

400
00:20:00,060 --> 00:19:58,090
want to be clear Orion by em4 is going

401
00:20:02,280 --> 00:20:00,070
to have a lot of its components reusable

402
00:20:03,720 --> 00:20:02,290
and we're working hard with our partners

403
00:20:05,310 --> 00:20:03,730
over at Lockheed Martin to make sure

404
00:20:07,500 --> 00:20:05,320
that we're building as much reusability

405
00:20:10,800 --> 00:20:07,510
into those vehicles as possible and by

406
00:20:12,450 --> 00:20:10,810
em4 it's possible I'm not gonna put a

407
00:20:14,730 --> 00:20:12,460
probability on it but we could actually

408
00:20:18,360 --> 00:20:14,740
be reusing the Pressure Vessel

409
00:20:20,010 --> 00:20:18,370
of Orion in the near future that's going

410
00:20:22,850 --> 00:20:20,020
to help us build reusability and

411
00:20:26,430 --> 00:20:22,860
sustainability into the into the project

412
00:20:29,790 --> 00:20:26,440
when it comes to SLS and on this point I

413
00:20:33,390 --> 00:20:29,800

want to be crystal clear SLS is not

414
00:20:35,760 --> 00:20:33,400
reusable but it is a critical piece of

415
00:20:38,580 --> 00:20:35,770
the architecture that enables us that

416
00:20:40,680 --> 00:20:38,590
enables us to deliver reusability to the

417
00:20:43,470 --> 00:20:40,690
moon we're talking about launching

418
00:20:45,810 --> 00:20:43,480
Gateway and Orion and the European

419
00:20:48,720 --> 00:20:45,820
service module all of these things are

420
00:20:50,100 --> 00:20:48,730
part of a reusable architecture we're

421
00:20:52,110 --> 00:20:50,110
talking about a rocket that's bigger

422
00:20:54,960 --> 00:20:52,120
than any rocket that's ever been built

423
00:20:57,570 --> 00:20:54,970
in human history with a with a payload

424
00:20:58,800 --> 00:20:57,580
fairing capable of carrying volumes that

425
00:21:02,460 --> 00:20:58,810
we've never seen before

426
00:21:05,190 --> 00:21:02,470
taller than the Statue of Liberty to

427
00:21:07,740 --> 00:21:05,200
take our not just astronauts to the moon

428
00:21:10,310 --> 00:21:07,750
but at the same time Co manifested

429
00:21:12,690 --> 00:21:10,320
payloads at the same time this is a

430
00:21:15,149 --> 00:21:12,700
transformational strategic capability

431
00:21:17,739 --> 00:21:15,159
for the United States of America

432
00:21:21,159 --> 00:21:17,749
and I want to stop for just a second and

433
00:21:23,919 --> 00:21:21,169
let you know this SLS and Orion and

434
00:21:25,779 --> 00:21:23,929
Gateway and in low-earth orbit the

435
00:21:27,930 --> 00:21:25,789
International Space Station Commercial

436
00:21:29,889 --> 00:21:27,940
Crew commercial resupply and

437
00:21:33,159 --> 00:21:29,899
commercialization of low Earth orbit for

438
00:21:35,080 --> 00:21:33,169

habitation all of this is very strong in

439
00:21:36,940 --> 00:21:35,090
the President's budget request and we

440
00:21:39,070 --> 00:21:36,950
are thrilled as an agency that he is

441
00:21:41,200 --> 00:21:39,080
backing up not just with space policy

442
00:21:42,820 --> 00:21:41,210
directive one but with his budgets and

443
00:21:44,980 --> 00:21:42,830
this is going to help us build that

444
00:21:57,109 --> 00:21:44,990
sustainable return to the moon

445
00:21:59,669 --> 00:21:57,119
[Applause]

446
00:22:01,560 --> 00:21:59,679
there's one other very exciting thing I

447
00:22:04,139 --> 00:22:01,570
need to make sure everybody is aware of

448
00:22:08,039 --> 00:22:04,149
when we talk about our movement

449
00:22:08,779 --> 00:22:08,049
activities for the first time in over

450
00:22:13,769 --> 00:22:08,789
ten years

451
00:22:16,019 --> 00:22:13,779
we have money in this budget for a

452
00:22:18,979 --> 00:22:16,029
return to the moon with humans on

453
00:22:21,629 --> 00:22:18,989
talking about human-rated Landers

454
00:22:24,180 --> 00:22:21,639
compatible with Gateway that can go back

455
00:22:26,970 --> 00:22:24,190
and forth to the surface of the Moon we

456
00:22:28,739 --> 00:22:26,980
are funding human-rated Landers to go to

457
00:22:38,960 --> 00:22:28,749
the moon for the first time in over ten

458
00:22:44,910 --> 00:22:42,060
okay so we have a really special

459
00:22:47,160 --> 00:22:44,920
opportunity now I'd like to let

460
00:22:48,960 --> 00:22:47,170
everybody know that we're gonna go live

461
00:22:50,990 --> 00:22:48,970
from the Johnson Space Center where

462
00:22:53,430 --> 00:22:51,000
we're gonna meet astronaut Karen Nyberg

463
00:22:56,100 --> 00:22:53,440

Karen is going to take us through the

464
00:22:58,620 --> 00:22:56,110
inside of a mock-up of the Orion crew

465
00:23:05,190 --> 00:22:58,630
capsule that astronauts will use to fly

466
00:23:09,060 --> 00:23:07,320
Thank You administrator Bryan Stein I'm

467
00:23:10,590 --> 00:23:09,070
astronaut Karen Nyberg and I'm here at

468
00:23:12,780 --> 00:23:10,600
the Johnson Space Center as he said

469
00:23:16,740 --> 00:23:12,790
inside a test version of the Orion

470
00:23:18,510 --> 00:23:16,750
capsule over at KSC you of course are

471
00:23:21,600 --> 00:23:18,520
seeing the real hardware what was going

472
00:23:23,990 --> 00:23:21,610
to fly cruise to space to the vicinity

473
00:23:28,380 --> 00:23:24,000
of the moon this is actually a

474
00:23:31,530 --> 00:23:28,390
volumetric mock-up it's the same size

475
00:23:34,140 --> 00:23:31,540
what you would expect what the the Ryan

476
00:23:35,670 --> 00:23:34,150
is we've been using it quite extensively

477
00:23:38,160 --> 00:23:35,680
here at the Johnson Space Center for

478
00:23:40,770 --> 00:23:38,170
engineering and operational evaluations

479
00:23:42,270 --> 00:23:40,780
and you really get a sense when you're

480
00:23:44,040 --> 00:23:42,280
sitting in here when you get inside what

481
00:23:45,930 --> 00:23:44,050
its gonna be like for the crew when we

482
00:23:48,570 --> 00:23:45,940
actually start taking it to the vicinity

483
00:23:50,040 --> 00:23:48,580
of the moon I'm sitting here next to the

484
00:23:51,780 --> 00:23:50,050
commander seat the commander would be

485
00:23:55,440 --> 00:23:51,790
sitting here to my left and in front of

486
00:23:57,300 --> 00:23:55,450
us are the displays we have three three

487
00:23:58,980 --> 00:23:57,310
screens that we can switch depending on

488
00:24:00,750 --> 00:23:58,990

what phase the flight we're in we can

489
00:24:03,360 --> 00:24:00,760
pull up any number of displays here we

490
00:24:06,720 --> 00:24:03,370
monitor all of our systems communication

491
00:24:09,120 --> 00:24:06,730
prop our equalist or electrical system

492
00:24:11,610 --> 00:24:09,130
we can monitor our attitude in space and

493
00:24:13,800 --> 00:24:11,620
also our trajectories and also send

494
00:24:15,930 --> 00:24:13,810
commands from here as well it's quite

495
00:24:17,580 --> 00:24:15,940
slick above my head you'll see we have

496
00:24:20,130 --> 00:24:17,590
several windows which i think is what a

497
00:24:22,830 --> 00:24:20,140
key component for any any vehicle that

498
00:24:25,140 --> 00:24:22,840
is going to carry people and I'm sure

499
00:24:27,780 --> 00:24:25,150
this is going to provide a great view of

500
00:24:29,790 --> 00:24:27,790
the moon for folks as they're as they're

501
00:24:32,790 --> 00:24:29,800
getting near it's really an exciting

502
00:24:34,620 --> 00:24:32,800
time for everybody at NASA right now you

503
00:24:36,270 --> 00:24:34,630
know not only are we building a Ryan and

504
00:24:38,430 --> 00:24:36,280
SLS but at the same time we're

505
00:24:39,780 --> 00:24:38,440
continuing to do the work and you know

506
00:24:43,140 --> 00:24:39,790
living onboard the International Space

507
00:24:44,460 --> 00:24:43,150
Station doing research for investigators

508
00:24:46,770 --> 00:24:44,470
all over the world

509
00:24:49,520 --> 00:24:46,780
we're also demonstrating some hardware

510
00:24:51,990 --> 00:24:49,530
on the space station and of course

511
00:24:54,300 --> 00:24:52,000
fostering the commercial participation

512
00:24:56,070 --> 00:24:54,310
in space travel and at the same time

513
00:24:58,770 --> 00:24:56,080

getting ready in the development of

514
00:25:00,560 --> 00:24:58,780
Gateway and the lunar landers and all of

515
00:25:04,110 --> 00:25:00,570
the science payloads that are required

516
00:25:06,990 --> 00:25:04,120
to establish that presence there it's

517
00:25:11,070 --> 00:25:07,000
really really exciting for all of us I

518
00:25:13,620 --> 00:25:11,080
have with me here to show this is a

519
00:25:16,500 --> 00:25:13,630
lunar sample that was actually brought

520
00:25:17,700 --> 00:25:16,510
back from one of the Apollo missions and

521
00:25:19,080 --> 00:25:17,710
this one actually flew on a space

522
00:25:22,230 --> 00:25:19,090
shuttle to the space station

523
00:25:24,930 --> 00:25:22,240
and we're really excited as crew to be

524
00:25:27,800 --> 00:25:24,940
able to bring back samples like this for

525
00:25:32,790 --> 00:25:27,810
scientists to study again and eventually

526
00:25:34,590 --> 00:25:32,800
eventually samples from Mars back to you

527
00:25:36,780 --> 00:25:34,600
administrator Brian Stein well Karen

528
00:25:38,670 --> 00:25:36,790
thank you for that that brief and that

529
00:25:40,320 --> 00:25:38,680
update can you share with us as an

530
00:25:43,290 --> 00:25:40,330
astronaut and I know you're working with

531
00:25:45,060 --> 00:25:43,300
the astronaut corps all the time with

532
00:25:46,830 --> 00:25:45,070
all of these different capabilities that

533
00:25:50,610 --> 00:25:46,840
are under development right now and in

534
00:25:53,310 --> 00:25:50,620
fact now testing we of course we've got

535
00:25:57,360 --> 00:25:53,320
the dragon we've got the Starliner and

536
00:25:59,850 --> 00:25:57,370
now we've got Orion do the astronauts

537
00:26:04,260 --> 00:25:59,860
fight over who's gonna fly which vehicle

538
00:26:07,140 --> 00:26:04,270

I don't know if we fight over but I

539
00:26:08,700 --> 00:26:07,150
think everybody everybody has in there

540
00:26:10,650 --> 00:26:08,710
has in their mind they want to fly

541
00:26:12,290 --> 00:26:10,660
something it I think we're in a unique

542
00:26:15,120 --> 00:26:12,300
position now with so many different

543
00:26:16,320 --> 00:26:15,130
vehicles to fly on and I think I think

544
00:26:19,680 --> 00:26:16,330
most crews are just happy to get a

545
00:26:21,390 --> 00:26:19,690
spaceflight assignment well Karen I just

546
00:26:23,640 --> 00:26:21,400
want to say thank you for that I'm going

547
00:26:25,650 --> 00:26:23,650
to talk for just a second about that

548
00:26:27,480 --> 00:26:25,660
lunar sample that you have in your hand

549
00:26:30,330 --> 00:26:27,490
we have a very special announcement

550
00:26:33,180 --> 00:26:30,340
today we have three lunar samples that

551
00:26:35,160 --> 00:26:33,190
have come back from the moon that have

552
00:26:38,520 --> 00:26:35,170
never been opened we're going back to

553
00:26:41,610 --> 00:26:38,530
our missions from 1969 to 1972 six

554
00:26:44,610 --> 00:26:41,620
missions we have three samples that have

555
00:26:46,680 --> 00:26:44,620
never been opened and in this particular

556
00:26:49,490 --> 00:26:46,690
budget and in this particular year we

557
00:26:52,200 --> 00:26:49,500
are very much looking forward to

558
00:26:55,440 --> 00:26:52,210
contracting with nine different

559
00:26:58,020 --> 00:26:55,450
companies to have the opportunity to use

560
00:27:00,090 --> 00:26:58,030
the technology we have today to study

561
00:27:01,530 --> 00:27:00,100
those very pristine samples that have

562
00:27:04,380 --> 00:27:01,540
never been opened now I want to be clear

563
00:27:06,860 --> 00:27:04,390

here's a critically important piece of

564
00:27:10,460 --> 00:27:06,870
knowledge that we need to understand

565
00:27:13,170 --> 00:27:10,470
when the previous generations did Apollo

566
00:27:16,950 --> 00:27:13,180
they knew that the technology that they

567
00:27:20,040 --> 00:27:16,960
had in that day was not the technology

568
00:27:21,450 --> 00:27:20,050
that we would have in this day so they

569
00:27:24,780 --> 00:27:21,460
made a determination that they were

570
00:27:26,130 --> 00:27:24,790
going to preserve samples because they

571
00:27:27,810 --> 00:27:26,140
knew there would be a day when better

572
00:27:30,600 --> 00:27:27,820
technology would be able to better

573
00:27:33,060 --> 00:27:30,610
assess all of the different history the

574
00:27:35,460 --> 00:27:33,070
history of the moon from ultimately that

575
00:27:37,730 --> 00:27:35,470
technology that we have today so today

576
00:27:40,799 --> 00:27:37,740
we have this very special announcement

577
00:27:43,980 --> 00:27:40,809
that we have nine teams that will be

578
00:27:45,629 --> 00:27:43,990
examining nine unopened samples that

579
00:27:47,850 --> 00:27:45,639
have come back from the moon and we feel

580
00:27:50,999 --> 00:27:47,860
like we can do that because there are

581
00:27:51,899 --> 00:27:51,009
more lunar samples on the horizon where

582
00:27:54,629 --> 00:27:51,909
we're going to be able to learn more

583
00:27:58,009 --> 00:27:54,639
about we've ever learned about the moon

584
00:28:01,769 --> 00:27:58,019
before so I'd like to thank if it's okay

585
00:28:11,330 --> 00:28:01,779
the Apollo generation for preserving

586
00:28:16,340 --> 00:28:14,389
so that our generation could have this

587
00:28:20,269 --> 00:28:16,350
opportunity Karen thank you for your

588
00:28:21,470 --> 00:28:20,279

great great feedback on on what's

589
00:28:24,379 --> 00:28:21,480
happening there at the Johnson Space

590
00:28:33,150 --> 00:28:24,389
Center I want to talk for a second oh

591
00:28:36,630 --> 00:28:35,940
I want to talk for a second about the

592
00:28:39,090 --> 00:28:36,640
Gateway

593
00:28:41,580 --> 00:28:39,100
one of the valuable capabilities that

594
00:28:44,279 --> 00:28:41,590
the Gateway is going to bring is a plus

595
00:28:46,140 --> 00:28:44,289
up in solar electric propulsion we're

596
00:28:48,480 --> 00:28:46,150
talking about the ability to maneuver

597
00:28:50,370 --> 00:28:48,490
now the Gateway is not the International

598
00:28:52,590 --> 00:28:50,380
Space Station that's an important thing

599
00:28:54,840 --> 00:28:52,600
to remember because we want to be able

600
00:28:56,610 --> 00:28:54,850
to have it maneuverable around to go to

601
00:28:58,500 --> 00:28:56,620
all parts of the Moon and in order to do

602
00:29:00,330 --> 00:28:58,510
that it can't grow too big the mass has

603
00:29:02,190 --> 00:29:00,340
to be constrained so that we can use

604
00:29:04,200 --> 00:29:02,200
solar electric for patient propulsion

605
00:29:06,390 --> 00:29:04,210
which has a very high specific impulse

606
00:29:08,520 --> 00:29:06,400
in other words it can be used for a very

607
00:29:11,430 --> 00:29:08,530
long period of time for sustainability

608
00:29:13,289 --> 00:29:11,440
to be able to go again to the poles both

609
00:29:16,289 --> 00:29:13,299
the the North and the South Pole of the

610
00:29:21,450 --> 00:29:16,299
moon could we bring up a picture of the

611
00:29:24,360 --> 00:29:21,460
Gateway so when we think about the

612
00:29:26,640 --> 00:29:24,370
Gateway I just want to show you kinda

613
00:29:29,070 --> 00:29:26,650

this is an aspirational vision of the

614
00:29:31,470 --> 00:29:29,080
Gateway this is not what it is right now

615
00:29:34,169 --> 00:29:31,480
today but this is aspirational and I can

616
00:29:35,100 --> 00:29:34,179
tell you just this morning I got off the

617
00:29:38,580 --> 00:29:35,110
phone with all of our international

618
00:29:40,409 --> 00:29:38,590
partners on the ISS and others and they

619
00:29:41,940 --> 00:29:40,419
are very excited about partnering with

620
00:29:43,980 --> 00:29:41,950
us on going to the moon

621
00:29:47,370 --> 00:29:43,990
couple of weeks ago we announced that

622
00:29:50,130 --> 00:29:47,380
Canada is stepping up for the next 24

623
00:29:52,529 --> 00:29:50,140
years to partner with us on robotics on

624
00:29:55,710 --> 00:29:52,539
the gateway now the Gateway is not going

625
00:29:57,570 --> 00:29:55,720
to be crude 24/7 365 the way the

626
00:30:00,180 --> 00:29:57,580
International Space Station is which

627
00:30:02,430 --> 00:30:00,190
means robotics is a critical piece of it

628
00:30:04,500 --> 00:30:02,440
and of course with Canada coming on

629
00:30:06,659 --> 00:30:04,510
board which is the first official

630
00:30:09,149 --> 00:30:06,669
partner on the Gateway we're very

631
00:30:11,370 --> 00:30:09,159
excited and we know based on other

632
00:30:13,950 --> 00:30:11,380
conversations that we have other

633
00:30:15,330 --> 00:30:13,960
agencies all around the world excited

634
00:30:17,730 --> 00:30:15,340
about partnering with us on gateway

635
00:30:21,180 --> 00:30:17,740
here's why this is important NASA is

636
00:30:22,770 --> 00:30:21,190
very unique in all of the federal

637
00:30:24,570 --> 00:30:22,780
government we're able to have

638
00:30:26,310 --> 00:30:24,580

partnerships with countries that in some

639
00:30:28,350 --> 00:30:26,320
cases we wouldn't normally be able to

640
00:30:30,930 --> 00:30:28,360
partner with you can see on their roast

641
00:30:32,610 --> 00:30:30,940
cosmos the relationship between the

642
00:30:35,640 --> 00:30:32,620
United States and Russia of course is

643
00:30:37,770 --> 00:30:35,650
strained terrestrially but since 1975

644
00:30:40,070 --> 00:30:37,780
the height of the Cold War we have been

645
00:30:42,810 --> 00:30:40,080
able to live and work together in space

646
00:30:44,010 --> 00:30:42,820
1975 of course was the apollo-soyuz

647
00:30:45,720 --> 00:30:44,020
program

648
00:30:48,320 --> 00:30:45,730
of course when I went to Russia they

649
00:30:50,940 --> 00:30:48,330
called it the Soyuz Apollo program and

650
00:30:52,620 --> 00:30:50,950
and and then of course the shuttle-mir

651
00:30:54,210 --> 00:30:52,630
program or as they would say the MIR

652
00:30:55,830 --> 00:30:54,220
shuttle program and now the

653
00:30:58,410 --> 00:30:55,840
International Space Station and in the

654
00:31:00,480 --> 00:30:58,420
future on the gateway with other

655
00:31:02,130 --> 00:31:00,490
activities as well but it's not just

656
00:31:04,050 --> 00:31:02,140
about them it's also the European Space

657
00:31:06,120 --> 00:31:04,060
Agency it's the Japanese Space Agency

658
00:31:07,790 --> 00:31:06,130
and what we want to do with the moon

659
00:31:10,620 --> 00:31:07,800
when we think about this architecture

660
00:31:13,650 --> 00:31:10,630
the Gateway is not the end State the

661
00:31:14,760 --> 00:31:13,660
Gateway is a piece the end state is all

662
00:31:17,730 --> 00:31:14,770
of the above

663
00:31:20,100 --> 00:31:17,740

access to space not just low-earth orbit

664
00:31:22,770 --> 00:31:20,110
but deep space tugs that can go back and

665
00:31:24,960 --> 00:31:22,780
forth from low-earth orbit to lunar

666
00:31:26,880 --> 00:31:24,970
orbit the Gateway itself which of course

667
00:31:28,590 --> 00:31:26,890
is this reusable command and service

668
00:31:30,990 --> 00:31:28,600
module in orbit around the moon and

669
00:31:32,760 --> 00:31:31,000
reusable Landers as I've mentioned which

670
00:31:35,250 --> 00:31:32,770
are funded in this budget for the first

671
00:31:36,870 --> 00:31:35,260
time in 10 10 years that can take humans

672
00:31:39,690 --> 00:31:36,880
back and forth to the surface of the

673
00:31:41,820 --> 00:31:39,700
Moon reusable but also robots and

674
00:31:44,700 --> 00:31:41,830
Landers and Rovers when we think about

675
00:31:46,260 --> 00:31:44,710
this architecture in the future we don't

676
00:31:48,150 --> 00:31:46,270
want to constrain ourselves to the

677
00:31:50,310 --> 00:31:48,160
traditional International Space Station

678
00:31:52,020 --> 00:31:50,320
partners we love them and they're going

679
00:31:54,030 --> 00:31:52,030
to be with us and we are thrilled to

680
00:31:56,160 --> 00:31:54,040
have their support but there are other

681
00:31:58,560 --> 00:31:56,170
partners there are more space agencies

682
00:32:01,050 --> 00:31:58,570
all around the world than ever before in

683
00:32:03,420 --> 00:32:01,060
human history and of course as we are

684
00:32:05,880 --> 00:32:03,430
now starting to see in a more robust way

685
00:32:08,370 --> 00:32:05,890
we have commercial partners that are

686
00:32:10,920 --> 00:32:08,380
bringing capability to us as well so

687
00:32:12,930 --> 00:32:10,930
this is a just a snapshot of the future

688
00:32:14,100 --> 00:32:12,940

it's not where it is right now but I

689
00:32:15,090 --> 00:32:14,110
believe in the future it'll look

690
00:32:16,950 --> 00:32:15,100
something like this

691
00:32:19,110 --> 00:32:16,960
and in order to talk a little bit more

692
00:32:24,020 --> 00:32:19,120
about the Gateway I'd like to go to the

693
00:32:28,260 --> 00:32:24,030
Glenn Research Center where we have Deb

694
00:32:30,960 --> 00:32:28,270
waters and Dave Jacobson Dave is the the

695
00:32:33,030 --> 00:32:30,970
chief of electric propulsion systems

696
00:32:34,890 --> 00:32:33,040
which is a key capability and Deb as a

697
00:32:36,900 --> 00:32:34,900
facilities manager there at Glenn and

698
00:32:38,910 --> 00:32:36,910
I'd like you to share with us if you

699
00:32:44,090 --> 00:32:38,920
will just a few minutes about what's

700
00:32:48,630 --> 00:32:47,280
hi I'm standing here in the high bay of

701
00:32:51,150 --> 00:32:48,640
the electric propulsion and power

702
00:32:53,130 --> 00:32:51,160
laboratory where we're getting ready to

703
00:32:55,560 --> 00:32:53,140
perform technology development that will

704
00:32:57,260 --> 00:32:55,570
take us forward to the moon here at

705
00:32:59,720 --> 00:32:57,270
Glenn we have a rich history and

706
00:33:03,080 --> 00:32:59,730
propulsion testing we've been conducting

707
00:33:05,630 --> 00:33:03,090
research development and experimental

708
00:33:08,090 --> 00:33:05,640
testing in our facilities for over 60

709
00:33:10,220 --> 00:33:08,100
years right now we're getting ready to

710
00:33:13,430 --> 00:33:10,230
test the type of system that will take

711
00:33:15,170 --> 00:33:13,440
us forward with the Gateway the new

712
00:33:18,680 --> 00:33:15,180
spacecraft that will be in orbit around

713
00:33:21,320 --> 00:33:18,690

the moon my colleague Dave here is an

714
00:33:24,410 --> 00:33:21,330
expert in electric propulsion Dave we'll

715
00:33:26,000 --> 00:33:24,420
take it from here thanks Deb a team here

716
00:33:27,620 --> 00:33:26,010
at NASA's Glenn Research Center is

717
00:33:28,610 --> 00:33:27,630
working in collaboration with our

718
00:33:30,860 --> 00:33:28,620
colleagues at the Jet Propulsion

719
00:33:32,270 --> 00:33:30,870
Laboratory on the development of a

720
00:33:34,520 --> 00:33:32,280
high-power solar electric propulsion

721
00:33:36,980 --> 00:33:34,530
system in support of deep-space

722
00:33:38,780 --> 00:33:36,990
exploration missions the Intendant

723
00:33:40,040 --> 00:33:38,790
application for this technology is the

724
00:33:42,710 --> 00:33:40,050
gateway that Deb and others have

725
00:33:44,510 --> 00:33:42,720
referred to today the gateway will

726
00:33:46,640 --> 00:33:44,520
enable crew to live and work in deep

727
00:33:48,230 --> 00:33:46,650
space for months at a time and serve as

728
00:33:50,420 --> 00:33:48,240
an outpost for human missions to the

729
00:33:52,160 --> 00:33:50,430
lunar surface the power and propulsion

730
00:33:54,380 --> 00:33:52,170
element will be the first part of the

731
00:33:56,930 --> 00:33:54,390
Gateway and it will provide power

732
00:33:59,150 --> 00:33:56,940
propulsion and communications during the

733
00:34:01,340 --> 00:33:59,160
assembly and operational phases of the

734
00:34:03,020 --> 00:34:01,350
Gateway gateway will utilize solar

735
00:34:05,330 --> 00:34:03,030
electric propulsion to maintain its

736
00:34:08,870 --> 00:34:05,340
position and also move between lunar

737
00:34:10,970 --> 00:34:08,880
orbits back in 2012 we began working on

738
00:34:12,470 --> 00:34:10,980

high-power Hall thruster system

739
00:34:14,780 --> 00:34:12,480
technologies in support of and

740
00:34:16,790 --> 00:34:14,790
affordable beyond low-earth orbit human

741
00:34:18,380 --> 00:34:16,800
exploration architecture the hardware

742
00:34:20,360 --> 00:34:18,390
that you see here in front of me

743
00:34:23,630 --> 00:34:20,370
resulted from that Prout from that

744
00:34:25,909 --> 00:34:23,640
project a hall thruster ionizes neutral

745
00:34:28,010 --> 00:34:25,919
xenon gas and accelerates ions at high

746
00:34:30,440 --> 00:34:28,020
exhaust velocities to create fuel

747
00:34:32,480 --> 00:34:30,450
efficient thrust the power processing

748
00:34:34,190 --> 00:34:32,490
unit takes power from the solar array

749
00:34:36,139 --> 00:34:34,200
and it converts it to the currents and

750
00:34:38,570 --> 00:34:36,149
voltages necessary to operate the

751
00:34:40,430 --> 00:34:38,580
thruster today we're preparing to test

752
00:34:42,380 --> 00:34:40,440
an advanced electric propulsion system

753
00:34:44,120 --> 00:34:42,390
that operates at a power level three

754
00:34:46,520 --> 00:34:44,130
times greater than systems that are

755
00:34:48,350 --> 00:34:46,530
currently used on orbit it also operates

756
00:34:50,840 --> 00:34:48,360
with greater fuel efficiency and for

757
00:34:52,790 --> 00:34:50,850
longer life times than than those types

758
00:34:54,980 --> 00:34:52,800
of systems this is very important for

759
00:34:58,310 --> 00:34:54,990
Gateway let's go inside the vacuum

760
00:34:59,630 --> 00:34:58,320
chamber now with Deb right now we're

761
00:35:02,210 --> 00:34:59,640
inside vf6

762
00:35:03,950 --> 00:35:02,220
this is actually the largest chamber at

763
00:35:06,260 --> 00:35:03,960

Lewis Field vacuum chamber at Lewis

764
00:35:08,000 --> 00:35:06,270
field behind me is the third is a

765
00:35:10,660 --> 00:35:08,010
thruster it's an engineering model

766
00:35:12,190 --> 00:35:10,670
around it is a thermal shroud

767
00:35:13,630 --> 00:35:12,200
this thruster is getting ready to test

768
00:35:16,359 --> 00:35:13,640
actually next week we're gonna be

769
00:35:18,900 --> 00:35:16,369
working on the various probes before the

770
00:35:21,220 --> 00:35:18,910
flight model comes some time in May our

771
00:35:23,140 --> 00:35:21,230
facility before we can actually run the

772
00:35:24,940 --> 00:35:23,150
thruster we have to button up our

773
00:35:27,609 --> 00:35:24,950
facility and we actually have to pump

774
00:35:29,620 --> 00:35:27,619
out all of the air we do that with very

775
00:35:32,500 --> 00:35:29,630
large vacuum pumps both inside the

776
00:35:34,599 --> 00:35:32,510
chamber and outside the chamber but the

777
00:35:37,779 --> 00:35:34,609
chamber walls can be actually chilled

778
00:35:39,819 --> 00:35:37,789
down to minus 320 degrees Fahrenheit and

779
00:35:42,880 --> 00:35:39,829
you can see that the chamber is actually

780
00:35:44,019 --> 00:35:42,890
lined in graphite the reason for that is

781
00:35:46,960 --> 00:35:44,029
that this is an electric propulsion

782
00:35:48,849 --> 00:35:46,970
chamber the thruster plume is energetic

783
00:35:52,089 --> 00:35:48,859
enough to actually erode the walls of

784
00:35:54,849 --> 00:35:52,099
the chamber and that graphite minimizes

785
00:35:56,589 --> 00:35:54,859
both the damage done to the chamber as

786
00:35:59,349 --> 00:35:56,599
well as that chamber of material coming

787
00:36:02,970 --> 00:35:59,359
back and landing on the the thruster

788
00:36:05,289 --> 00:36:02,980

itself so it minimizes the damage done

789
00:36:08,230 --> 00:36:05,299
to in order to create a space

790
00:36:09,609 --> 00:36:08,240
environment such as this we try to do

791
00:36:12,309 --> 00:36:09,619
all of these things that make the

792
00:36:14,200 --> 00:36:12,319
facility more like a space environment

793
00:36:15,069 --> 00:36:14,210
that you would see at moon Mars and

794
00:36:18,730 --> 00:36:15,079
beyond

795
00:36:20,680 --> 00:36:18,740
the f6 is just one of 27 chambers we

796
00:36:23,349 --> 00:36:20,690
have here space simulation facilities we

797
00:36:25,509 --> 00:36:23,359
have here at Glenn and vf6 actually is

798
00:36:28,839 --> 00:36:25,519
the largest electric propulsion capable

799
00:36:30,490 --> 00:36:28,849
chamber in the world right now we're

800
00:36:32,620 --> 00:36:30,500
very fortunate and we get to test these

801
00:36:35,019 --> 00:36:32,630
different types of power and propulsion

802
00:36:37,720 --> 00:36:35,029
systems as we're getting them ready to

803
00:36:39,940 --> 00:36:37,730
fly it'll be it'll be great to be able

804
00:36:43,089 --> 00:36:39,950
to see this this running next week right

805
00:36:45,490 --> 00:36:43,099
Dave that's right at NASA we like to say

806
00:36:46,990 --> 00:36:45,500
that technology drives exploration here

807
00:36:48,910 --> 00:36:47,000
at the Glenn Research Center we're very

808
00:36:50,499 --> 00:36:48,920
excited that electric propulsion is a

809
00:36:52,809 --> 00:36:50,509
part of our sustainable deep-space

810
00:36:54,670 --> 00:36:52,819
exploration missions we look forward to

811
00:36:56,980 --> 00:36:54,680
applying our expertise in solar electric

812
00:37:00,390 --> 00:36:56,990
propulsion to human and robotic missions

813
00:37:06,860 --> 00:37:04,870

nice work Dave and Deb thank you you're

814
00:37:13,610 --> 00:37:06,870
getting applause if you can't hear it

815
00:37:15,020 --> 00:37:13,620
I got a question for you guys just real

816
00:37:16,880 --> 00:37:15,030
quick before you leave what's the next

817
00:37:20,480 --> 00:37:16,890
major milestone in this propulsion

818
00:37:22,640 --> 00:37:20,490
development sure so the hardware that I

819
00:37:25,220 --> 00:37:22,650
showed you earlier was designed and

820
00:37:26,660 --> 00:37:25,230
built by the Glenn and JPL team to

821
00:37:30,080 --> 00:37:26,670
demonstrate feasibility of this

822
00:37:33,020 --> 00:37:30,090
technique for the gateway in 2016 we

823
00:37:34,610 --> 00:37:33,030
selected a industry partner who is

824
00:37:37,310 --> 00:37:34,620
finishing the development of the system

825
00:37:39,320 --> 00:37:37,320
and also qualification for gateway in

826
00:37:41,000 --> 00:37:39,330
the May time frame I think Deb might

827
00:37:43,100 --> 00:37:41,010
have referred to that hardware will be

828
00:37:45,020 --> 00:37:43,110
receiving the first engineering

829
00:37:46,730 --> 00:37:45,030
technology units and we will be

830
00:37:48,470 --> 00:37:46,740
conducting development testing including

831
00:37:50,420 --> 00:37:48,480
functional performance environmental

832
00:37:52,340 --> 00:37:50,430
testing all in all the support of the

833
00:37:55,730 --> 00:37:52,350
Gateway awesome

834
00:37:59,330 --> 00:37:55,740
last question when we think about the

835
00:38:01,490 --> 00:37:59,340
next human outpost in space in orbit

836
00:38:04,310 --> 00:38:01,500
around the moon it's starting in

837
00:38:06,230 --> 00:38:04,320
Cleveland how do the folks of Cleveland

838
00:38:09,710 --> 00:38:06,240

feel about being at the forefront of

839
00:38:11,540 --> 00:38:09,720
this opportunity I think I'll speak on

840
00:38:12,860 --> 00:38:11,550
behalf of the entire team here at the

841
00:38:15,130 --> 00:38:12,870
Glenn Research Center

842
00:38:17,720 --> 00:38:15,140
we're so excited to be a part of this

843
00:38:20,150 --> 00:38:17,730
folks have worked in this area literally

844
00:38:24,230 --> 00:38:20,160
for decades back to this chamber was put

845
00:38:26,390 --> 00:38:24,240
here in 1961 so yeah we're we're beyond

846
00:38:28,360 --> 00:38:26,400
excited to bring that expertise to bear

847
00:38:30,800 --> 00:38:28,370
for such an important thing for NASA

848
00:38:32,600 --> 00:38:30,810
Dave and Deb thank you for your great

849
00:38:34,520 --> 00:38:32,610
work make sure everybody there knows how

850
00:38:38,090 --> 00:38:34,530
grateful we are and we look forward to

851
00:38:40,450 --> 00:38:38,100
making this really a winning achievement

852
00:38:49,890 --> 00:38:40,460
and and thank you for your good work

853
00:38:54,730 --> 00:38:52,660
so we've talked today a lot about the

854
00:38:56,650 --> 00:38:54,740
moon and we have all heard the

855
00:38:58,450 --> 00:38:56,660
president's space policy directive one

856
00:39:00,880 --> 00:38:58,460
which I am charged with carrying out

857
00:39:04,110 --> 00:39:00,890
that today's budget announcement enables

858
00:39:07,420 --> 00:39:04,120
us to achieve to go to the moon

859
00:39:10,990 --> 00:39:07,430
sustainably with international partners

860
00:39:14,380 --> 00:39:11,000
and commercial partners to utilize the

861
00:39:16,240 --> 00:39:14,390
resources of the moon in other words the

862
00:39:18,760 --> 00:39:16,250
hundreds of millions of tons of water

863
00:39:21,610 --> 00:39:18,770

ice that we've already discovered water

864
00:39:24,490 --> 00:39:21,620
ice is air to breathe its water to drink

865
00:39:26,320 --> 00:39:24,500
it is in fact propulsion and it's

866
00:39:29,830 --> 00:39:26,330
available in hundreds of millions of

867
00:39:32,980 --> 00:39:29,840
tons on the surface of the Moon but it's

868
00:39:34,870 --> 00:39:32,990
about more than just those things the

869
00:39:37,090 --> 00:39:34,880
last part of his first base policy

870
00:39:39,940 --> 00:39:37,100
directive says to take these

871
00:39:43,360 --> 00:39:39,950
capabilities for an eventual mission to

872
00:39:47,760 --> 00:39:43,370
Mars so what we're trying to do is prove

873
00:39:51,270 --> 00:39:47,770
capability prove technology retire risk

874
00:39:54,430 --> 00:39:51,280
make sure that what we develop is not a

875
00:39:56,500 --> 00:39:54,440
dead end and in fact has capabilities of

876
00:39:59,770 --> 00:39:56,510
being utilized on another world that

877
00:40:03,340 --> 00:39:59,780
other world of course being Mars let's

878
00:40:05,020 --> 00:40:03,350
talk for a second about Mars and by the

879
00:40:07,240 --> 00:40:05,030
way when we're talking about Mars let's

880
00:40:09,550 --> 00:40:07,250
start talking about the science Mission

881
00:40:10,870 --> 00:40:09,560
Directorate the planetary science

882
00:40:12,610 --> 00:40:10,880
division of the science Mission

883
00:40:16,740 --> 00:40:12,620
Directorate here's what we know about

884
00:40:19,570 --> 00:40:16,750
Mars because of Spirit and Opportunity

885
00:40:22,000 --> 00:40:19,580
we now know that Mars was at one time

886
00:40:24,610 --> 00:40:22,010
covered with water in fact its northern

887
00:40:27,670 --> 00:40:24,620
hemisphere was two-thirds covered with

888
00:40:31,390 --> 00:40:27,680

water and in fact there were there was

889
00:40:34,350 --> 00:40:31,400
flowing water on Mars because of the

890
00:40:37,030 --> 00:40:34,360
maven orbiter we now understand

891
00:40:38,950 --> 00:40:37,040
ultimately what happened to that

892
00:40:41,530 --> 00:40:38,960
atmosphere on Mars when you talk about

893
00:40:42,820 --> 00:40:41,540
an ocean what you mean is yes there was

894
00:40:44,470 --> 00:40:42,830
an ocean but that means there was a

895
00:40:45,880 --> 00:40:44,480
thick atmosphere as well and at the same

896
00:40:48,580 --> 00:40:45,890
time that means there must have been a

897
00:40:50,230 --> 00:40:48,590
magnetosphere protecting Mars from all

898
00:40:53,860 --> 00:40:50,240
of that radiation coming from the Sun

899
00:40:55,600 --> 00:40:53,870
and from deep space we know that to be

900
00:41:00,580 --> 00:40:55,610
the case now because of Spirit and

901
00:41:02,020 --> 00:41:00,590
Opportunity and maven all of these

902
00:41:04,810 --> 00:41:02,030
things collude to say that

903
00:41:07,570 --> 00:41:04,820
one time in Mars's history it was

904
00:41:12,360 --> 00:41:07,580
habitable I'm not suggesting that it was

905
00:41:16,060 --> 00:41:12,370
inhabited but it was habitable and

906
00:41:19,120 --> 00:41:16,070
here's what we know now because of the

907
00:41:21,430 --> 00:41:19,130
Curiosity rover we now know that there

908
00:41:23,530 --> 00:41:21,440
are complex organic compounds on the

909
00:41:26,560 --> 00:41:23,540
surface of Mars and by the way that

910
00:41:29,110 --> 00:41:26,570
discovery is just in the last year we

911
00:41:31,210 --> 00:41:29,120
now know in the last year that the

912
00:41:34,530 --> 00:41:31,220
methane cycles of Mars are perfectly

913
00:41:37,810 --> 00:41:34,540

commensurate with the seasons of Mars

914
00:41:41,950 --> 00:41:37,820
complex organic compounds friends don't

915
00:41:44,400 --> 00:41:41,960
exist on the moon but they exist on Mars

916
00:41:48,010 --> 00:41:44,410
and of course they're all over Earth

917
00:41:50,290 --> 00:41:48,020
they are the building blocks of life the

918
00:41:53,320 --> 00:41:50,300
probability that we might find life on

919
00:41:55,150 --> 00:41:53,330
another world has gone up when the

920
00:41:56,980 --> 00:41:55,160
methane cycles are commensurate with the

921
00:41:59,560 --> 00:41:56,990
seasons again it doesn't guarantee that

922
00:42:01,870 --> 00:41:59,570
there's life but the probability of life

923
00:42:04,030 --> 00:42:01,880
on another world just went up again now

924
00:42:06,160 --> 00:42:04,040
I'm not talking about bunny rabbits I

925
00:42:09,400 --> 00:42:06,170
want to be clear I'm talking about

926
00:42:13,300 --> 00:42:09,410
microbial life and I think it's

927
00:42:15,790 --> 00:42:13,310
important and this budget funds our

928
00:42:18,610 --> 00:42:15,800
ability to reach out to another world

929
00:42:28,799 --> 00:42:18,620
and find potentially life on another

930
00:42:36,009 --> 00:42:31,719
so how do we do that this budget fully

931
00:42:38,439 --> 00:42:36,019
funds Mars 2020 this is an amazing

932
00:42:42,249 --> 00:42:38,449
capability for the first time we are

933
00:42:44,739 --> 00:42:42,259
going to cash samples of Mars for an

934
00:42:46,779 --> 00:42:44,749
eventual return we're also going to

935
00:42:49,630 --> 00:42:46,789
figure out how do we use the carbon

936
00:42:51,189 --> 00:42:49,640
dioxide of Mars to create oxygen that

937
00:42:54,160 --> 00:42:51,199
eventually humans will be able to

938
00:42:57,099 --> 00:42:54,170

breathe and even more exciting we are

939
00:43:00,130 --> 00:42:57,109
going to for the first time fly a

940
00:43:09,279 --> 00:43:00,140
helicopter on another world with the

941
00:43:15,499 --> 00:43:12,259
Mars 2020 is fully funded in this budget

942
00:43:18,049 --> 00:43:15,509
request but even more a Mars sample

943
00:43:25,299 --> 00:43:18,059
return is also funded in this budget

944
00:43:32,179 --> 00:43:29,299
the moon is the proving ground Mars is

945
00:43:35,569 --> 00:43:32,189
the Horizon goal and it requires an

946
00:43:36,890 --> 00:43:35,579
all-of-the-above approach I'm going to

947
00:43:38,479 --> 00:43:36,900
anchor on the science Mission

948
00:43:40,969 --> 00:43:38,489
Directorate just a second because I need

949
00:43:44,059 --> 00:43:40,979
to give a lot of credit to a lot of

950
00:43:45,469 --> 00:43:44,069
people when I was home over the holidays

951
00:43:47,779 --> 00:43:45,479
a number of very important things

952
00:43:50,239 --> 00:43:47,789
happened osiris-rex entered orbit around

953
00:43:52,069 --> 00:43:50,249
Ben knew the smallest object that we've

954
00:43:54,499 --> 00:43:52,079
ever been able to orbit in human history

955
00:43:58,039 --> 00:43:54,509
and because of that we're going to have

956
00:44:00,289 --> 00:43:58,049
this little robot ultimately do a sample

957
00:44:05,599 --> 00:44:00,299
return from Ben you an asteroid in deep

958
00:44:08,029 --> 00:44:05,609
space and just a few days later we

959
00:44:10,880 --> 00:44:08,039
thought we flew by Ultima Thule with New

960
00:44:12,620 --> 00:44:10,890
Horizons 4 billion miles from Earth on

961
00:44:15,319 --> 00:44:12,630
the other side of Pluto in the Kuiper

962
00:44:18,499 --> 00:44:15,329
belt and we're getting beautiful image

963
00:44:21,079 --> 00:44:18,509

images of this asteroid in the Kuiper

964
00:44:23,479 --> 00:44:21,089
belt that is a binary contact and of

965
00:44:25,880 --> 00:44:23,489
course before we did this flyby we had

966
00:44:27,890 --> 00:44:25,890
no idea what this object would look like

967
00:44:30,199 --> 00:44:27,900
but now we know and we're getting

968
00:44:32,329 --> 00:44:30,209
valuable scientific information the

969
00:44:36,199 --> 00:44:32,339
science Mission Directorate friends in

970
00:44:39,049 --> 00:44:36,209
this budget is funded very very well and

971
00:44:42,019 --> 00:44:39,059
it is in fact healthy so that takes us

972
00:44:44,870 --> 00:44:42,029
back to this all of NASA approach if

973
00:44:46,339 --> 00:44:44,880
we're gonna fly humans to Mars what

974
00:44:47,929 --> 00:44:46,349
other parts of the science Mission

975
00:44:50,269 --> 00:44:47,939
Directorate do we need to understand do

976
00:44:51,769 --> 00:44:50,279
we need to fund and understand well if

977
00:44:53,199 --> 00:44:51,779
we're gonna take humans to Mars they're

978
00:44:55,609 --> 00:44:53,209
gonna have to travel through deep space

979
00:44:58,249 --> 00:44:55,619
one of the most dangerous elements of

980
00:45:00,109 --> 00:44:58,259
deep space is of course the radiation

981
00:45:02,209 --> 00:45:00,119
that comes from the Sun and radiation

982
00:45:05,779 --> 00:45:02,219
that comes from deep space we need to

983
00:45:07,640 --> 00:45:05,789
better understand how the Sun puts this

984
00:45:10,909 --> 00:45:07,650
radiation into space we need to be able

985
00:45:14,239 --> 00:45:10,919
to in fact predict solar flares and

986
00:45:15,769 --> 00:45:14,249
coronal mass ejections because if we're

987
00:45:17,509 --> 00:45:15,779
not able to predict that and our

988
00:45:19,339 --> 00:45:17,519

astronauts end up in the middle of

989
00:45:20,220 --> 00:45:19,349
something like that it could be very

990
00:45:22,290 --> 00:45:20,230
damaging for

991
00:45:24,900 --> 00:45:22,300
their health so when it comes to

992
00:45:26,970 --> 00:45:24,910
heliophysics Parker Solar Probe is fully

993
00:45:29,160 --> 00:45:26,980
funded and of course we are following

994
00:45:31,320 --> 00:45:29,170
the guidance of the de kado surveys for

995
00:45:33,870 --> 00:45:31,330
heliophysics so that ultimately we can

996
00:45:35,970 --> 00:45:33,880
understand how the Sun interacts with

997
00:45:38,220 --> 00:45:35,980
the earth other planetary bodies and

998
00:45:40,650 --> 00:45:38,230
ultimately be able to predict so we can

999
00:45:43,440 --> 00:45:40,660
provide protection for humans here on

1000
00:45:47,010 --> 00:45:43,450
earth not just on Mars to be clear I

1001
00:45:48,930 --> 00:45:47,020
want to be clear on this if we have a

1002
00:45:52,320 --> 00:45:48,940
coronal mass ejection

1003
00:45:54,630 --> 00:45:52,330
like a Carrington event in the 1800s it

1004
00:45:56,849 --> 00:45:54,640
could be very damaging for humankind

1005
00:45:59,700 --> 00:45:56,859
imagine not having the power grid work

1006
00:46:02,070 --> 00:45:59,710
or your cell towers work that could be

1007
00:46:03,810 --> 00:46:02,080
existential so we need to be very good

1008
00:46:05,310 --> 00:46:03,820
at being able to predict when these kind

1009
00:46:07,230 --> 00:46:05,320
of events are going to occur and within

1010
00:46:08,910 --> 00:46:07,240
the science Mission Directorate we are

1011
00:46:12,270 --> 00:46:08,920
funding those capabilities with the

1012
00:46:15,590 --> 00:46:12,280
Parker Solar Probe and others and that

1013
00:46:18,530 --> 00:46:15,600

takes us out from the Sun to the earth

1014
00:46:21,480 --> 00:46:18,540
the president has now signed into law

1015
00:46:23,490 --> 00:46:21,490
the highest earth science budget in the

1016
00:46:25,650 --> 00:46:23,500
history of the United States of America

1017
00:46:35,190 --> 00:46:25,660
every year he has been the president of

1018
00:46:42,750 --> 00:46:40,050
and this budget request is higher than

1019
00:46:45,720 --> 00:46:42,760
five of the of the budgets that came out

1020
00:46:48,359 --> 00:46:45,730
of the previous administration when I

1021
00:46:49,589 --> 00:46:48,369
came to NASA I committed to Congress and

1022
00:46:51,510 --> 00:46:49,599
I commit to you now

1023
00:46:52,890 --> 00:46:51,520
that the Earth Science Division of the

1024
00:46:56,490 --> 00:46:52,900
science Mission Directorate would be

1025
00:46:57,150 --> 00:46:56,500
strong that we would move forward no

1026
00:46:59,040 --> 00:46:57,160
kidding

1027
00:47:01,829 --> 00:46:59,050
with the de kado surveys that come from

1028
00:47:05,099 --> 00:47:01,839
the National Academy of Sciences in all

1029
00:47:06,780 --> 00:47:05,109
of their agenda items starting with

1030
00:47:09,089 --> 00:47:06,790
understanding the interaction with the

1031
00:47:11,550 --> 00:47:09,099
water cycle and the energy cycle

1032
00:47:15,270 --> 00:47:11,560
ultimately being able to predict weather

1033
00:47:17,819 --> 00:47:15,280
and air quality understanding natural

1034
00:47:20,280 --> 00:47:17,829
disasters and how they occur when we

1035
00:47:22,829 --> 00:47:20,290
think about ecosystem change which

1036
00:47:24,839 --> 00:47:22,839
friends it is changing carbon dioxide is

1037
00:47:25,920 --> 00:47:24,849
in the atmosphere in levels that we've

1038
00:47:27,660 --> 00:47:25,930

never seen before

1039
00:47:31,170 --> 00:47:27,670
we are responsible for that it is a

1040
00:47:34,230 --> 00:47:31,180
greenhouse gas nASA has an obligation to

1041
00:47:36,990 --> 00:47:34,240
continue studying these activities we

1042
00:47:39,240 --> 00:47:37,000
want to reduce climate uncertainty and

1043
00:47:41,760 --> 00:47:39,250
what we do when we study the planet is

1044
00:47:44,099 --> 00:47:41,770
we sense the earth and every part of the

1045
00:47:45,960 --> 00:47:44,109
electromagnetic spectrum and we share

1046
00:47:48,809 --> 00:47:45,970
that information with the world

1047
00:47:51,510 --> 00:47:48,819
and we do it for free NASA is an agency

1048
00:47:53,309 --> 00:47:51,520
we don't do policy we don't make

1049
00:47:55,680 --> 00:47:53,319
recommendations about what to do with

1050
00:47:57,930 --> 00:47:55,690
what we learn but what we do is we study

1051
00:47:59,970 --> 00:47:57,940
the earth and as I committed from the

1052
00:48:02,069 --> 00:47:59,980
beginning we are studying the earth with

1053
00:48:04,829 --> 00:48:02,079
as strong a budget as we have seen

1054
00:48:06,990 --> 00:48:04,839
really in a very long time right now and

1055
00:48:18,040 --> 00:48:07,000
this budget request for earth science is

1056
00:48:23,300 --> 00:48:20,660
let's talk about astrophysics for a

1057
00:48:27,880 --> 00:48:23,310
while talk about some exciting

1058
00:48:31,700 --> 00:48:27,890
discoveries you know what's amazing is

1059
00:48:34,790 --> 00:48:31,710
we're learning more about not just our

1060
00:48:37,760 --> 00:48:34,800
solar system not just about our galaxy

1061
00:48:41,000 --> 00:48:37,770
but in fact about the entire universe

1062
00:48:42,829 --> 00:48:41,010
all the time now we're discovering new

1063
00:48:46,400 --> 00:48:42,839

planets around other stars the de kado

1064
00:48:47,300 --> 00:48:46,410
Survey for astrophysics wants us to see

1065
00:48:50,690 --> 00:48:47,310
no kidding

1066
00:48:54,230 --> 00:48:50,700
the beginning of the universe what we

1067
00:48:57,770 --> 00:48:54,240
call cosmic dawn to see the first light

1068
00:49:00,710 --> 00:48:57,780
in the universe light from stars light

1069
00:49:03,859 --> 00:49:00,720
from galaxies to even assess the

1070
00:49:05,630 --> 00:49:03,869
earliest black holes and friends were

1071
00:49:07,250 --> 00:49:05,640
starting because of these capabilities

1072
00:49:09,010 --> 00:49:07,260
that have been launched in previous

1073
00:49:12,109 --> 00:49:09,020
decades we're starting to understand

1074
00:49:15,859 --> 00:49:12,119
physics astrophysics in a way that

1075
00:49:18,380 --> 00:49:15,869
previously was only theory and for now

1076
00:49:21,370 --> 00:49:18,390
for the first time we're proving out the

1077
00:49:23,180 --> 00:49:21,380
reality of the theory of relativity

1078
00:49:25,910 --> 00:49:23,190
Einstein and all of these other things

1079
00:49:27,770 --> 00:49:25,920
we're seeing it for the first time well

1080
00:49:29,900 --> 00:49:27,780
we now know because of these missions we

1081
00:49:35,000 --> 00:49:29,910
talked about Hubble and Chandra and

1082
00:49:38,450 --> 00:49:35,010
Spitzer and Kepler we now know that the

1083
00:49:40,940 --> 00:49:38,460
universe is not only expanding but it's

1084
00:49:44,210 --> 00:49:40,950
expanding at an ever-increasing rate it

1085
00:49:47,650 --> 00:49:44,220
is in fact accelerating and the question

1086
00:49:51,829 --> 00:49:47,660
is why and we talk about things like

1087
00:49:54,500 --> 00:49:51,839
dark matter which we now know is most of

1088
00:49:56,540 --> 00:49:54,510

the matter in the universe we can't

1089
00:49:58,460 --> 00:49:56,550
interact with it we can't see it but we

1090
00:50:02,750 --> 00:49:58,470
know it's there because we can see its

1091
00:50:05,540 --> 00:50:02,760
gravitational effects and of course when

1092
00:50:07,250 --> 00:50:05,550
we talk about the acceleration usually

1093
00:50:08,089 --> 00:50:07,260
matter has this gravity and it pulls

1094
00:50:10,490 --> 00:50:08,099
things together

1095
00:50:14,960 --> 00:50:10,500
but instead the universe is accelerating

1096
00:50:19,579 --> 00:50:14,970
faster and faster away from this point

1097
00:50:23,300 --> 00:50:19,589
and so we used words like dark energy is

1098
00:50:25,250 --> 00:50:23,310
causing this to happen well in order to

1099
00:50:27,230 --> 00:50:25,260
learn more about this kind of activity

1100
00:50:29,870 --> 00:50:27,240
we need to be able to see very but to

1101
00:50:30,289 --> 00:50:29,880
the very beginning we need to be able to

1102
00:50:32,509 --> 00:50:30,299
see

1103
00:50:35,929 --> 00:50:32,519
that cosmic dawn the first light in the

1104
00:50:37,519 --> 00:50:35,939
universe and I will tell you it has been

1105
00:50:39,529 --> 00:50:37,529
a challenge for me is your NASA

1106
00:50:41,059 --> 00:50:39,539
Administrator to go up to the hill and

1107
00:50:43,880 --> 00:50:41,069
talk about the James Webb Space

1108
00:50:47,359 --> 00:50:43,890
Telescope some of you might have seen

1109
00:50:49,579 --> 00:50:47,369
those hearings and they're not fun but I

1110
00:50:51,949 --> 00:50:49,589
will also tell you this this

1111
00:50:54,169 --> 00:50:51,959
administration is committed to the James

1112
00:50:57,049 --> 00:50:54,179
Webb Space Telescope and we have

1113
00:50:59,959 --> 00:50:57,059

bipartisan support for the James Webb

1114
00:51:02,209 --> 00:50:59,969
Space Telescope and it is our agenda our

1115
00:51:04,939 --> 00:51:02,219
number one agenda for James Webb is

1116
00:51:06,859 --> 00:51:04,949
mission success we can talk about

1117
00:51:09,229 --> 00:51:06,869
budgets and we can talk about schedules

1118
00:51:10,729 --> 00:51:09,239
but at this point this mission is so

1119
00:51:13,429 --> 00:51:10,739
important to the United States of

1120
00:51:16,249 --> 00:51:13,439
America and here's why we're talking

1121
00:51:19,539 --> 00:51:16,259
about establishing America as the lead

1122
00:51:22,160 --> 00:51:19,549
in physics for the next 30 years

1123
00:51:24,769 --> 00:51:22,170
when James Webb Space Telescope is

1124
00:51:26,870 --> 00:51:24,779
launched and we're able to see cosmic

1125
00:51:30,259 --> 00:51:26,880
dawn it establishes the United States as

1126
00:51:33,859 --> 00:51:30,269
the leader of physics for the next 30

1127
00:51:35,689 --> 00:51:33,869
years but it goes beyond that sure we

1128
00:51:38,380 --> 00:51:35,699
want to lead but we also want to

1129
00:51:40,789 --> 00:51:38,390
discover we have models and ideas about

1130
00:51:43,880 --> 00:51:40,799
really what the universe looked like in

1131
00:51:45,589 --> 00:51:43,890
those days but we're gonna know and I

1132
00:51:49,069 --> 00:51:45,599
can tell you this here's what we already

1133
00:51:51,439 --> 00:51:49,079
know the models aren't right so this is

1134
00:51:53,120 --> 00:51:51,449
an exciting time the other thing that's

1135
00:51:55,309 --> 00:51:53,130
important that this comes straight from

1136
00:51:59,390 --> 00:51:55,319
the de kado survey we want to be able to

1137
00:52:00,949 --> 00:51:59,400
look at other stars and not only look at

1138
00:52:03,279 --> 00:52:00,959

those stars but look at other planets

1139
00:52:06,370 --> 00:52:03,289
around those stars and characterize

1140
00:52:10,459 --> 00:52:06,380
those planets as to their habitability

1141
00:52:13,279 --> 00:52:10,469
could those planets be able to host life

1142
00:52:15,469 --> 00:52:13,289
and James Webb is going to give us an

1143
00:52:17,689 --> 00:52:15,479
opportunity to look at the light as it

1144
00:52:19,880 --> 00:52:17,699
you know transfer you transfers through

1145
00:52:21,410 --> 00:52:19,890
that atmosphere certain parts of the

1146
00:52:23,359 --> 00:52:21,420
Elector for certain parts of the

1147
00:52:24,410 --> 00:52:23,369
spectrum are not going to make it

1148
00:52:26,660 --> 00:52:24,420
through and we're going to be able to

1149
00:52:28,839 --> 00:52:26,670
determine the atmospheres of planets

1150
00:52:32,150 --> 00:52:28,849
around other stars and make assessments

1151
00:52:36,349 --> 00:52:32,160
as to characterize if you will the

1152
00:52:38,809 --> 00:52:36,359
atmospheres of those planets James Webb

1153
00:52:39,510 --> 00:52:38,819
is going to be an amazing capability for

1154
00:52:43,110 --> 00:52:39,520
the United State

1155
00:52:45,900 --> 00:52:43,120
of America as we're on astrophysics I

1156
00:52:50,820 --> 00:52:45,910
also want to make one last statement

1157
00:52:52,770 --> 00:52:50,830
that I think is important we talked

1158
00:52:54,300 --> 00:52:52,780
about the Gateway and how it's going to

1159
00:52:56,070 --> 00:52:54,310
give us access to the surface of the

1160
00:52:58,530 --> 00:52:56,080
Moon we want humans on the moon we want

1161
00:52:59,850 --> 00:52:58,540
robots and Landers and Rovers we want to

1162
00:53:02,490 --> 00:52:59,860
get to more parts of the moon than ever

1163
00:53:05,070 --> 00:53:02,500

before the Gateway is not just about

1164
00:53:06,840 --> 00:53:05,080
getting to the moon it's not just about

1165
00:53:09,300 --> 00:53:06,850
studying the moon from an orbit around

1166
00:53:12,630 --> 00:53:09,310
the moon the Gateway gives us an

1167
00:53:16,200 --> 00:53:12,640
opportunity to study deep space from a

1168
00:53:17,850 --> 00:53:16,210
human tended Space Station which gives

1169
00:53:20,100 --> 00:53:17,860
us a capability that heretofore we've

1170
00:53:22,080 --> 00:53:20,110
never seen here's what we know on the

1171
00:53:24,690 --> 00:53:22,090
far side of the Moon it is very quiet

1172
00:53:27,240 --> 00:53:24,700
why is it so quiet because all of the

1173
00:53:30,540 --> 00:53:27,250
electromagnet electromagnetic radiation

1174
00:53:33,660 --> 00:53:30,550
that we create it's quiet on the far

1175
00:53:36,240 --> 00:53:33,670
side of the moon so we can image deep

1176
00:53:38,880 --> 00:53:36,250
space in parts of the electromagnetic

1177
00:53:41,310 --> 00:53:38,890
spensive or electromagnetic spectrum

1178
00:53:43,950 --> 00:53:41,320
that we can't currently image deep space

1179
00:53:45,990 --> 00:53:43,960
with and by the way it's not just

1180
00:53:49,530 --> 00:53:46,000
gateway but it's also surface activities

1181
00:53:52,640 --> 00:53:49,540
we can do astrophysics from the surface

1182
00:53:55,020 --> 00:53:52,650
of the Moon with very thin wire antennas

1183
00:53:58,500 --> 00:53:55,030
now that's maybe not in this budget

1184
00:54:00,540 --> 00:53:58,510
request but the gateway opens to the

1185
00:54:05,220 --> 00:54:00,550
door to all of these capabilities in the

1186
00:54:09,360 --> 00:54:05,230
future so in closing I want everybody to

1187
00:54:12,350 --> 00:54:09,370
know that NASA's budget request is very

1188
00:54:14,820 --> 00:54:12,360

good and we have bipartisan support

1189
00:54:17,460 --> 00:54:14,830
which I have been committed to from the

1190
00:54:19,740 --> 00:54:17,470
beginning for NASA not just in the house

1191
00:54:21,510 --> 00:54:19,750
but also in the Senate and we're going

1192
00:54:23,310 --> 00:54:21,520
to be able to accomplish more than we've

1193
00:54:25,560 --> 00:54:23,320
ever been able to accomplish before

1194
00:54:27,870 --> 00:54:25,570
because of the administration support

1195
00:54:34,620 --> 00:54:27,880
and bipartisan support so what does that

1196
00:54:38,160 --> 00:54:34,630
mean for us friends we need to make sure

1197
00:54:40,110 --> 00:54:38,170
that when we consider our agency I just

1198
00:54:41,490 --> 00:54:40,120
talked about heliophysics and how

1199
00:54:43,980 --> 00:54:41,500
important it is if we're gonna send

1200
00:54:45,840 --> 00:54:43,990
astronauts to Mars how important is

1201
00:54:48,240 --> 00:54:45,850
heliophysics for the lives of those

1202
00:54:49,400 --> 00:54:48,250
astronauts but just not those astronauts

1203
00:54:51,650 --> 00:54:49,410
but also the

1204
00:54:54,530 --> 00:54:51,660
and the rovers and the robots that means

1205
00:54:57,560 --> 00:54:54,540
heliophysics is a critical piece of our

1206
00:55:00,110 --> 00:54:57,570
moon to Mars capability and it goes

1207
00:55:02,960 --> 00:55:00,120
beyond that I was in the hotel this

1208
00:55:05,090 --> 00:55:02,970
morning and I was talking to a lady who

1209
00:55:07,520 --> 00:55:05,100
had the opportunity to visit the Kennedy

1210
00:55:09,560 --> 00:55:07,530
Space Center and she said one of the

1211
00:55:11,900 --> 00:55:09,570
things that was most striking to her and

1212
00:55:14,540 --> 00:55:11,910
Bob Cabana this is a compliment to you

1213
00:55:17,380 --> 00:55:14,550

and your whole team she ran into

1214
00:55:20,360 --> 00:55:17,390
somebody at the Kennedy Space Center and

1215
00:55:22,490 --> 00:55:20,370
asked him what he did and he said well

1216
00:55:25,550 --> 00:55:22,500
I'm helping us go to the moon and on to

1217
00:55:28,160 --> 00:55:25,560
Mars that was his answer and she said

1218
00:55:31,430 --> 00:55:28,170
okay well what do you do and he said I'm

1219
00:55:34,820 --> 00:55:31,440
a custodian friends these objectives are

1220
00:55:37,430 --> 00:55:34,830
an all of NASA approach every Center

1221
00:55:39,980 --> 00:55:37,440
that we operate all ten of them are

1222
00:55:42,230 --> 00:55:39,990
critical to this mission and every

1223
00:55:44,810 --> 00:55:42,240
Mission Directorate is critical to

1224
00:55:47,120 --> 00:55:44,820
achieving these goals including the

1225
00:55:49,730 --> 00:55:47,130
Mission Support Directorate we talked

1226
00:55:52,310 --> 00:55:49,740
about the infrastructure and in some

1227
00:55:55,400 --> 00:55:52,320
cases infrastructure often becomes a

1228
00:55:57,260 --> 00:55:55,410
target but friends we can't accomplish

1229
00:55:59,150 --> 00:55:57,270
any of these objectives without the

1230
00:56:01,550 --> 00:55:59,160
infrastructure as well so the Mission

1231
00:56:05,120 --> 00:56:01,560
Support Director Directorate is also a

1232
00:56:07,550 --> 00:56:05,130
critical capability for our shared

1233
00:56:10,460 --> 00:56:07,560
achievement in heading to the moon and

1234
00:56:12,290 --> 00:56:10,470
on to Mars so I just want to share with

1235
00:56:13,850 --> 00:56:12,300
you one last thing for all the people

1236
00:56:16,150 --> 00:56:13,860
that are watching I see a lot of TV

1237
00:56:19,370 --> 00:56:16,160
cameras and maybe some social media I

1238
00:56:26,000 --> 00:56:19,380

want to encourage everybody to visit

1239
00:56:31,580 --> 00:56:26,010
nasa.gov slash moon to Mars nasa.gov

1240
00:56:34,100 --> 00:56:31,590
slash moon to Mars I want you to go to

1241
00:56:36,980 --> 00:56:34,110
the website and I want you to learn for

1242
00:56:39,530 --> 00:56:36,990
the NASA employees here I want you to

1243
00:56:41,360 --> 00:56:39,540
figure out how you can communicate all

1244
00:56:43,970 --> 00:56:41,370
of these great things that we are trying

1245
00:56:46,880 --> 00:56:43,980
to achieve to the public engage on

1246
00:56:49,130 --> 00:56:46,890
social media I want you to engage on

1247
00:56:52,010 --> 00:56:49,140
social media if you have Twitter or

1248
00:56:55,070 --> 00:56:52,020
Facebook or just talk to your friends

1249
00:56:57,910 --> 00:56:55,080
make sure you are letting them know what

1250
00:57:00,050 --> 00:56:57,920
we are doing and why because this is

1251
00:57:02,060 --> 00:57:00,060
transformational and it's only going to

1252
00:57:05,810 --> 00:57:02,070
happen if all of America

1253
00:57:09,680 --> 00:57:05,820
in the other day I went to the world Ag

1254
00:57:12,050 --> 00:57:09,690
Expo and everybody was like why is the

1255
00:57:15,200 --> 00:57:12,060
NASA Administrator going to the world Ag

1256
00:57:17,120 --> 00:57:15,210
Expo I'll tell you why because we need

1257
00:57:19,520 --> 00:57:17,130
all of America to understand how we have

1258
00:57:21,290 --> 00:57:19,530
changed the human condition when it

1259
00:57:23,510 --> 00:57:21,300
comes to agriculture we're sensing every

1260
00:57:26,000 --> 00:57:23,520
part though the earth and every part of

1261
00:57:29,620 --> 00:57:26,010
the electromagnetic spectrum and sharing

1262
00:57:32,510 --> 00:57:29,630
that with the world well who needs that

1263
00:57:33,860 --> 00:57:32,520

farmers sometimes need that we have an

1264
00:57:35,870 --> 00:57:33,870
agreement with the Cooperative Extension

1265
00:57:37,820 --> 00:57:35,880
of the University of California where

1266
00:57:40,130 --> 00:57:37,830
we're taking that great information and

1267
00:57:42,580 --> 00:57:40,140
sharing it with them to the point where

1268
00:57:46,040 --> 00:57:42,590
they are able to increase crop yields

1269
00:57:48,230 --> 00:57:46,050
while reducing their water usage by 25%

1270
00:57:50,950 --> 00:57:48,240
and by the way in the desert of

1271
00:57:53,270 --> 00:57:50,960
California that is a big deal

1272
00:57:55,970 --> 00:57:53,280
and at the same time because they're not

1273
00:57:57,770 --> 00:57:55,980
watering so much preserving 50% of the

1274
00:57:59,900 --> 00:57:57,780
nitrates that normally would have eroded

1275
00:58:02,240 --> 00:57:59,910
into the water supply those nitrates

1276
00:58:03,410 --> 00:58:02,250
help the plants grow and guess what when

1277
00:58:05,000 --> 00:58:03,420
they're in the water supply they're very

1278
00:58:06,620 --> 00:58:05,010
bad for humans and it costs a lot of

1279
00:58:09,800 --> 00:58:06,630
money to get them out of the water

1280
00:58:11,330 --> 00:58:09,810
supply so we're saving money increasing

1281
00:58:12,890 --> 00:58:11,340
crop yields the plants are doing much

1282
00:58:14,900 --> 00:58:12,900
better because the nitrates are actually

1283
00:58:16,790 --> 00:58:14,910
in the soil where they ought to be and

1284
00:58:18,620 --> 00:58:16,800
they're able to achieve these because

1285
00:58:21,170 --> 00:58:18,630
the Earth Science Division of the

1286
00:58:22,610 --> 00:58:21,180
science Mission Directorate is providing

1287
00:58:25,010 --> 00:58:22,620
this data to the Cooperative Extension

1288
00:58:28,310 --> 00:58:25,020

of the University of California in a

1289
00:58:30,800 --> 00:58:28,320
small scale what does this mean for the

1290
00:58:34,070 --> 00:58:30,810
future when I was at the world Ag Expo I

1291
00:58:37,700 --> 00:58:34,080
talked about doing it for Uganda Uganda

1292
00:58:40,250 --> 00:58:37,710
was able to use NASA technology to to be

1293
00:58:42,590 --> 00:58:40,260
made aware of a drought that was on the

1294
00:58:45,500 --> 00:58:42,600
horizon we can we can detect plant

1295
00:58:47,870 --> 00:58:45,510
stress long before humans can detect

1296
00:58:50,690 --> 00:58:47,880
plant stress we can do it from space and

1297
00:58:52,700 --> 00:58:50,700
because of that instead of spending tens

1298
00:58:54,830 --> 00:58:52,710
of millions of dollars doing disaster

1299
00:58:56,870 --> 00:58:54,840
relief we spent a couple of million

1300
00:59:00,770 --> 00:58:56,880
mitigating the disaster before it

1301
00:59:02,620 --> 00:59:00,780
happened saving lives saving money but

1302
00:59:05,480 --> 00:59:02,630
friends it's not just about crops

1303
00:59:07,700 --> 00:59:05,490
although crops are a critical piece the

1304
00:59:10,340 --> 00:59:07,710
way we communicate DirecTV Dish Network

1305
00:59:12,740 --> 00:59:10,350
Internet broadband from space XM radio

1306
00:59:14,290 --> 00:59:12,750
sending high-resolution motion pictures

1307
00:59:17,320 --> 00:59:14,300
all over the world for nationals

1308
00:59:19,170 --> 00:59:17,330
and defense communications born from

1309
00:59:22,390 --> 00:59:19,180
this little agency we call NASA

1310
00:59:24,520 --> 00:59:22,400
space-based communications we talk about

1311
00:59:26,320 --> 00:59:24,530
how we navigate with GPS how we produce

1312
00:59:28,900 --> 00:59:26,330
food which we just talked about how we

1313
00:59:30,970 --> 00:59:28,910

produce energy geo carb another Earth

1314
00:59:33,040 --> 00:59:30,980
Science Division mission that is helping

1315
00:59:36,130 --> 00:59:33,050
us make sure that as we produce energy

1316
00:59:38,230 --> 00:59:36,140
were not polluting the atmosphere and

1317
00:59:39,520 --> 00:59:38,240
that by the way the energy companies

1318
00:59:43,870 --> 00:59:39,530
love that because then they don't get

1319
00:59:46,890 --> 00:59:43,880
fined which is a good thing the way the

1320
00:59:49,120 --> 00:59:46,900
way we do weather prediction and

1321
00:59:52,510 --> 00:59:49,130
understand the climate the way we do

1322
00:59:56,920 --> 00:59:52,520
disaster relief in national security the

1323
00:59:58,510 --> 00:59:56,930
way we do banking 84 all of the banking

1324
01:00:00,490 --> 00:59:58,520
transactions in the United States of

1325
01:00:02,860 --> 01:00:00,500
America are dependent on a timing signal

1326
01:00:04,990 --> 01:00:02,870
from GPS a lot of people don't realize

1327
01:00:06,220 --> 01:00:05,000
that the way we regulate the the flows

1328
01:00:08,850 --> 01:00:06,230
of electricity on the power grid

1329
01:00:11,200 --> 01:00:08,860
dependent on a timing signal from GPS

1330
01:00:14,140 --> 01:00:11,210
terrestrial wireless networks dependent

1331
01:00:16,660 --> 01:00:14,150
on a timing signal from GPS when we

1332
01:00:20,800 --> 01:00:16,670
think about how we have elevated the

1333
01:00:23,410 --> 01:00:20,810
human condition this little agency that

1334
01:00:26,800 --> 01:00:23,420
constitutes one one-half less than 1/2

1335
01:00:29,080 --> 01:00:26,810
of 1% of the federal budget this little

1336
01:00:30,960 --> 01:00:29,090
agency has elevated the human condition

1337
01:00:34,450 --> 01:00:30,970
in ways that most people don't even know

1338
01:00:36,370 --> 01:00:34,460

it's on us to let them know it's on us

1339
01:00:39,280 --> 01:00:36,380
as the NASA employees the NASA workforce

1340
01:00:41,470 --> 01:00:39,290
that includes our contractors as well

1341
01:00:43,300 --> 01:00:41,480
let them know what we are doing to

1342
01:00:45,430 --> 01:00:43,310
elevate the human condition not just for

1343
01:00:49,420 --> 01:00:45,440
the United States but for the entire

1344
01:00:51,580 --> 01:00:49,430
world this is an amazing agency and I

1345
01:00:53,890 --> 01:00:51,590
got to tell you I am overwhelmingly

1346
01:00:55,650 --> 01:00:53,900
humbled every day when I get up and I

1347
01:00:58,990 --> 01:00:55,660
have the opportunity to interact with

1348
01:01:03,610 --> 01:00:59,000
the just amazingly talented people that

1349
01:01:06,100 --> 01:01:03,620
work here so I want to say no this NASA

1350
01:01:07,720 --> 01:01:06,110
is going to get a healthy budget the

1351
01:01:09,550 --> 01:01:07,730
administration is supporting it

1352
01:01:11,590 --> 01:01:09,560
we've got bipartisan support in the

1353
01:01:13,240 --> 01:01:11,600
House and the Senate what we've got to

1354
01:01:16,450 --> 01:01:13,250
do is make sure we communicate it to the

1355
01:01:17,860 --> 01:01:16,460
world and ultimately keep it strong for

1356
01:01:19,590 --> 01:01:17,870
the future and the only way we do that

1357
01:01:24,400 --> 01:01:19,600
is communicated to the world again

1358
01:01:26,110 --> 01:01:24,410
nasa.gov slash moon to Mars thank you so

1359
01:01:27,510 --> 01:01:26,120
much it's great being here at the

1360
01:01:36,500 --> 01:01:27,520
kennedy space