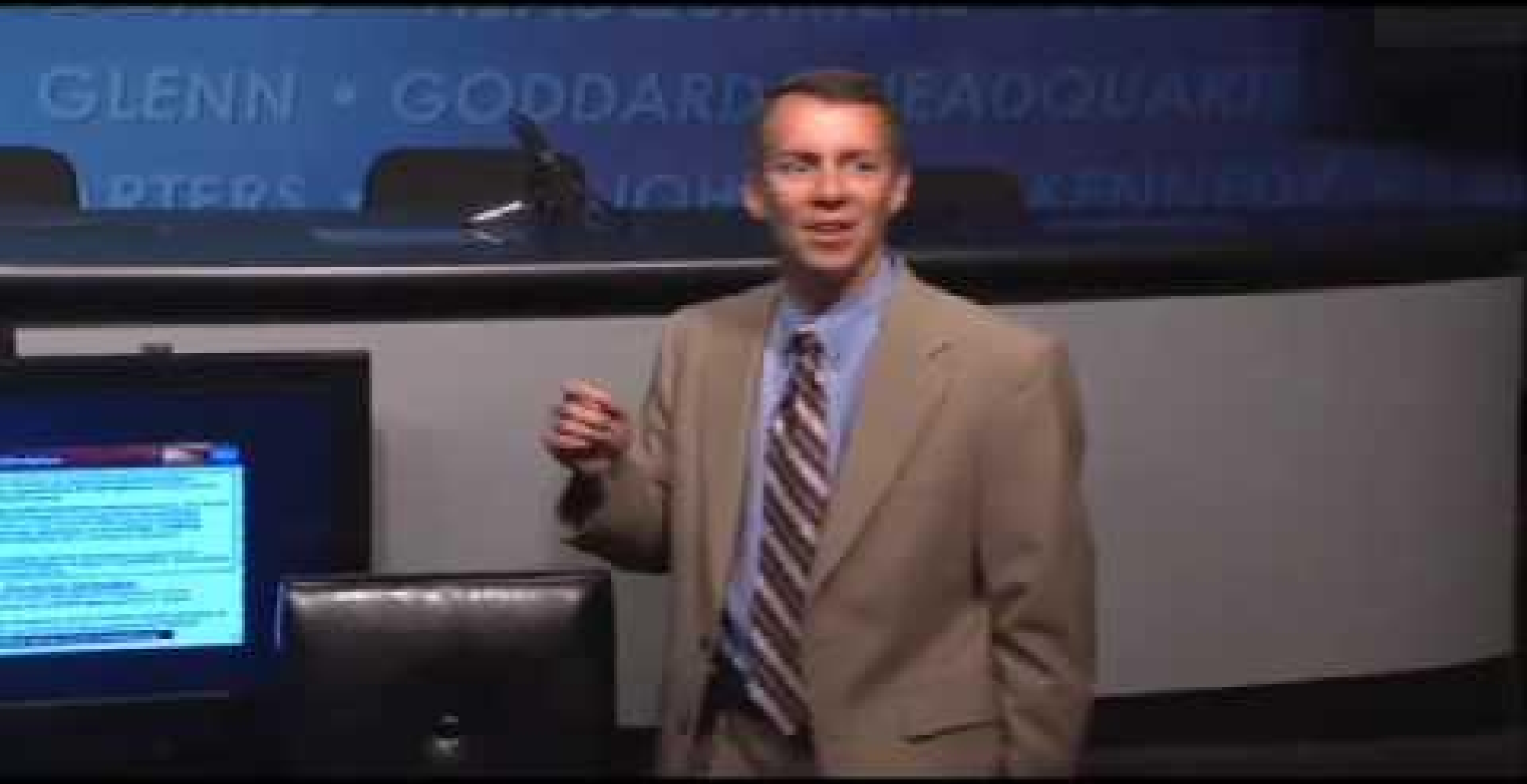
GLENN • GODDARD

1
00:02:12,070 --> 00:02:09,749
uh good afternoon and welcome to nasa

2
00:02:13,830 --> 00:02:12,080
headquarters here in washington dc

3
00:02:16,070 --> 00:02:13,840
for today's town hall meeting with bobby

4
00:02:17,830 --> 00:02:16,080
braun i'm dave steeds from nasa's office

5
00:02:19,510 --> 00:02:17,840
of communications

6
00:02:21,589 --> 00:02:19,520
today bobby is going to talk to us a

7
00:02:24,790 --> 00:02:21,599
little bit about his office and the role

8
00:02:27,190 --> 00:02:24,800
of technology in the future of nasa

9
00:02:29,110 --> 00:02:27,200
bobby was named to the position of nasa

10
00:02:31,430 --> 00:02:29,120
chief technologist on february 1 by

11
00:02:33,030 --> 00:02:31,440
administrator charlie bolden he's a

12
00:02:34,390 --> 00:02:33,040
professor of aerospace engineering at

13
00:02:38,790 --> 00:02:34,400

georgia tech

14
00:02:40,949 --> 00:02:38,800
for 16 years at nasa's langley research

15
00:02:42,790 --> 00:02:40,959
center in hampton virginia

16
00:02:44,630 --> 00:02:42,800
he's a graduate of penn state and holds

17
00:02:46,710 --> 00:02:44,640
a master's degree in astronautics from

18
00:02:48,070 --> 00:02:46,720
george washington university and a

19
00:02:50,470 --> 00:02:48,080
doctorate in aeronautics and

20
00:02:51,830 --> 00:02:50,480
astronautics from stanford

21
00:02:53,589 --> 00:02:51,840
during bobby's talk he's going to be

22
00:02:55,350 --> 00:02:53,599
addressing some slides that you're going

23
00:02:57,430 --> 00:02:55,360
to see on television

24
00:03:03,110 --> 00:02:57,440
you can also download those slides from

25
00:03:07,110 --> 00:03:05,110
slash offices

26
00:03:08,190 --> 00:03:07,120
slash oct

27
00:03:09,750 --> 00:03:08,200
slash

28
00:03:12,550 --> 00:03:09,760
index.html

29
00:03:14,710 --> 00:03:12,560
it's a long url i apologize but uh it

30
00:03:19,270 --> 00:03:14,720
may be more helpful if you go to that

31
00:03:21,509 --> 00:03:19,280
website nasa.gov slash offices slash oct

32
00:03:22,550 --> 00:03:21,519
slash index.html

33
00:03:26,789 --> 00:03:22,560
to

34
00:03:28,710 --> 00:03:26,799
following his comments we'll take

35
00:03:31,350 --> 00:03:28,720
questions from here at nasa headquarters

36
00:03:32,630 --> 00:03:31,360
and from participating nasa centers

37
00:03:33,910 --> 00:03:32,640
bobby

38
00:03:36,229 --> 00:03:33,920

great thank you

39
00:03:38,390 --> 00:03:36,239
thanks and uh thank you all for uh

40
00:03:39,990 --> 00:03:38,400
taking some time out of your day

41
00:03:41,190 --> 00:03:40,000
to join me here today

42
00:03:43,350 --> 00:03:41,200
and talk about

43
00:03:45,589 --> 00:03:43,360
there's a little feedback there now okay

44
00:03:47,110 --> 00:03:45,599
and talk about a topic that i'm pretty

45
00:03:48,949 --> 00:03:47,120
excited about

46
00:03:51,110 --> 00:03:48,959
the technology programs at nasa can we

47
00:03:53,270 --> 00:03:51,120
go to the next slide please

48
00:03:55,350 --> 00:03:53,280
i'm not going to refer directly to every

49
00:03:57,990 --> 00:03:55,360
slide just just so you know i wanted to

50
00:04:00,149 --> 00:03:58,000
prepare the slides and have them for you

51
00:04:03,350 --> 00:04:00,159
for your later reference and you could

52
00:04:05,990 --> 00:04:03,360
download them uh off the internet at the

53
00:04:07,750 --> 00:04:06,000
the site that was spoken uh in the back

54
00:04:09,750 --> 00:04:07,760
can you hear me okay or do i need to be

55
00:04:11,429 --> 00:04:09,760
a little louder louder okay i'm gonna

56
00:04:12,309 --> 00:04:11,439
stand up then

57
00:04:14,949 --> 00:04:12,319
um

58
00:04:17,830 --> 00:04:14,959
this is a slide that i put together uh

59
00:04:20,789 --> 00:04:17,840
to kind of address overall the the nasa

60
00:04:21,830 --> 00:04:20,799
budget the president's fy 11 uh budget

61
00:04:24,070 --> 00:04:21,840
request

62
00:04:25,990 --> 00:04:24,080
and there's a lot of different points on

63
00:04:27,350 --> 00:04:26,000

this slide that talk about the increase

64
00:04:29,749 --> 00:04:27,360
in the president's budget over the

65
00:04:32,390 --> 00:04:29,759
five-year period for nasa which by the

66
00:04:34,310 --> 00:04:32,400
way i i think of as a big deal

67
00:04:36,710 --> 00:04:34,320
that talk about the increase for science

68
00:04:39,189 --> 00:04:36,720
and aeronautics in particular

69
00:04:42,390 --> 00:04:39,199
uh the change or the shift in our

70
00:04:44,150 --> 00:04:42,400
approach to human exploration

71
00:04:47,270 --> 00:04:44,160
but really what i want to focus in on

72
00:04:50,070 --> 00:04:47,280
here today is one particular aspect of

73
00:04:52,070 --> 00:04:50,080
the president's fy 11 budget request and

74
00:04:54,150 --> 00:04:52,080
that's the significant focus on

75
00:04:56,310 --> 00:04:54,160
technology development

76
00:04:57,270 --> 00:04:56,320
as the chief technologist i you know

77
00:04:59,590 --> 00:04:57,280
this is something you would probably

78
00:05:01,350 --> 00:04:59,600
expect that i would focus in on this is

79
00:05:03,670 --> 00:05:01,360
something that you might expect that i'm

80
00:05:06,070 --> 00:05:03,680
excited about but i want to explain to

81
00:05:08,070 --> 00:05:06,080
you a little bit about why i'm excited

82
00:05:09,270 --> 00:05:08,080
about it and why i think this is a big

83
00:05:10,950 --> 00:05:09,280
deal

84
00:05:13,189 --> 00:05:10,960
first of all there is a significant

85
00:05:14,390 --> 00:05:13,199
focus on technology development in the

86
00:05:16,870 --> 00:05:14,400
president's

87
00:05:18,230 --> 00:05:16,880
budget request that focus

88
00:05:21,189 --> 00:05:18,240

actually is across the federal

89
00:05:23,270 --> 00:05:21,199
government it's not just a nasa thing

90
00:05:25,749 --> 00:05:23,280
okay across the federal government

91
00:05:28,070 --> 00:05:25,759
there's a significant theme in the

92
00:05:30,390 --> 00:05:28,080
president's fy 11 budget which is a

93
00:05:31,590 --> 00:05:30,400
focus on increasing research and

94
00:05:33,749 --> 00:05:31,600
development

95
00:05:35,189 --> 00:05:33,759
uh through across the federal agencies

96
00:05:36,870 --> 00:05:35,199
and that increase in research and

97
00:05:39,430 --> 00:05:36,880
development is there because of the

98
00:05:41,749 --> 00:05:39,440
impact that the administration believes

99
00:05:44,189 --> 00:05:41,759
that that investment will create

100
00:05:46,390 --> 00:05:44,199
frankly on the economy on

101
00:05:48,550 --> 00:05:46,400
technology-oriented jobs and on our

102
00:05:49,510 --> 00:05:48,560
nation's economic competitiveness in the

103
00:05:52,150 --> 00:05:49,520
future

104
00:05:54,390 --> 00:05:52,160
for nasa that's important because it

105
00:05:56,950 --> 00:05:54,400
means that we can consider

106
00:05:58,870 --> 00:05:56,960
a more productive and vital aeronautics

107
00:06:01,110 --> 00:05:58,880
and space future

108
00:06:02,870 --> 00:06:01,120
as we move forward but for the nation

109
00:06:04,629 --> 00:06:02,880
it's also important for some of these

110
00:06:06,710 --> 00:06:04,639
other reasons and i think it's very

111
00:06:08,870 --> 00:06:06,720
important to

112
00:06:11,350 --> 00:06:08,880
realize that at the outset

113
00:06:14,469 --> 00:06:11,360

now within nasa this focus on technology

114
00:06:16,150 --> 00:06:14,479
development uh shows itself both

115
00:06:19,110 --> 00:06:16,160
in the

116
00:06:21,830 --> 00:06:19,120
directorate where there are a large

117
00:06:23,590 --> 00:06:21,840
number of technology programs that are

118
00:06:24,469 --> 00:06:23,600
under formulation as part of the new

119
00:06:26,710 --> 00:06:24,479
plan

120
00:06:29,029 --> 00:06:26,720
and within a new budget line called

121
00:06:30,950 --> 00:06:29,039
space technology and it's that new

122
00:06:32,390 --> 00:06:30,960
budget line space technology which is

123
00:06:33,749 --> 00:06:32,400
going to be managed by the office of

124
00:06:37,029 --> 00:06:33,759
chief technologist that i'm going to

125
00:06:38,950 --> 00:06:37,039
focus on primarily today and at the top

126
00:06:42,469 --> 00:06:38,960
line that's about five billion dollars

127
00:06:45,110 --> 00:06:42,479
over five years next slide please

128
00:06:46,629 --> 00:06:45,120
now you might uh you might wonder and

129
00:06:49,830 --> 00:06:46,639
actually when i go around the country

130
00:06:51,830 --> 00:06:49,840
i've been asked many times

131
00:06:53,510 --> 00:06:51,840
where did this focus on technology come

132
00:06:55,670 --> 00:06:53,520
from by the way you don't need to read

133
00:06:56,790 --> 00:06:55,680
this slide it's okay you can download it

134
00:06:57,909 --> 00:06:56,800
later

135
00:06:59,990 --> 00:06:57,919
okay

136
00:07:00,790 --> 00:07:00,000
where did this focus on technology come

137
00:07:02,870 --> 00:07:00,800
from is this something the

138
00:07:05,510 --> 00:07:02,880

administration just came up with uh

139
00:07:07,990 --> 00:07:05,520
overnight or in a brief period of time

140
00:07:11,589 --> 00:07:08,000
uh well in actuality that's it's not

141
00:07:13,990 --> 00:07:11,599
correct okay the this shift or this

142
00:07:17,189 --> 00:07:14,000
focus on technology is something that

143
00:07:18,550 --> 00:07:17,199
many of us within nasa have discussed

144
00:07:21,029 --> 00:07:18,560
for a long time

145
00:07:23,110 --> 00:07:21,039
right if you go back to the space act

146
00:07:25,270 --> 00:07:23,120
and you think about the three

147
00:07:27,749 --> 00:07:25,280
fundamental long-standing core

148
00:07:30,469 --> 00:07:27,759
competencies that make nasa the special

149
00:07:33,189 --> 00:07:30,479
place that it is and i honestly believe

150
00:07:34,790 --> 00:07:33,199
that nasa is a very special organization

151
00:07:36,390 --> 00:07:34,800
within the federal government

152
00:07:38,870 --> 00:07:36,400
there are three things that jump out at

153
00:07:40,870 --> 00:07:38,880
you when you at least jump out at me

154
00:07:42,790 --> 00:07:40,880
when i think about nasa

155
00:07:44,469 --> 00:07:42,800
one of those is a research and

156
00:07:46,629 --> 00:07:44,479
technology competency

157
00:07:49,510 --> 00:07:46,639
the second is a flight hardware

158
00:07:51,670 --> 00:07:49,520
development competency and the third is

159
00:07:53,830 --> 00:07:51,680
mission operations

160
00:07:56,390 --> 00:07:53,840
also a critical long-standing core

161
00:07:58,790 --> 00:07:56,400
competency of nasa and in fact it's

162
00:08:01,189 --> 00:07:58,800
those three things together that i think

163
00:08:03,430 --> 00:08:01,199

make nasa the unique place it is that

164
00:08:04,469 --> 00:08:03,440
allow nasa to go and do things that

165
00:08:06,790 --> 00:08:04,479
frankly

166
00:08:08,790 --> 00:08:06,800
uh other government agencies can't and

167
00:08:11,270 --> 00:08:08,800
that our nation expects nasa to be able

168
00:08:13,110 --> 00:08:11,280
to do both in aeronautics and space

169
00:08:14,629 --> 00:08:13,120
and you can imagine that if any one of

170
00:08:17,430 --> 00:08:14,639
those three long-standing core

171
00:08:19,670 --> 00:08:17,440
competencies was removed

172
00:08:21,990 --> 00:08:19,680
nasa wouldn't be the unique place that

173
00:08:23,749 --> 00:08:22,000
it is today that's true if you were to

174
00:08:25,749 --> 00:08:23,759
move the research and technology core

175
00:08:27,909 --> 00:08:25,759
competency it's also true if you were to

176
00:08:29,350 --> 00:08:27,919
remove the flight hardware development

177
00:08:32,469 --> 00:08:29,360
or the mission operations core

178
00:08:35,190 --> 00:08:32,479
competency all three of these legs of a

179
00:08:37,110 --> 00:08:35,200
stool if you will are required for nasa

180
00:08:39,750 --> 00:08:37,120
to be the place that it is

181
00:08:42,469 --> 00:08:39,760
and it's no secret that over the past

182
00:08:45,269 --> 00:08:42,479
decade or so the research and technology

183
00:08:47,030 --> 00:08:45,279
competency at nasa has been down

184
00:08:49,910 --> 00:08:47,040
people within the agency have recognized

185
00:08:52,070 --> 00:08:49,920
that and people external to the agency

186
00:08:55,430 --> 00:08:52,080
have recognized that and what this slide

187
00:08:57,910 --> 00:08:55,440
shows is a list of high-level reports

188
00:08:59,350 --> 00:08:57,920

compiled by the the nrc the national

189
00:09:00,710 --> 00:08:59,360
research council

190
00:09:03,110 --> 00:09:00,720
actually there are four

191
00:09:06,070 --> 00:09:03,120
nrc reports listed on here

192
00:09:08,550 --> 00:09:06,080
by the augustine committee

193
00:09:10,790 --> 00:09:08,560
and in fact in the nasa authorization

194
00:09:12,790 --> 00:09:10,800
act of 2008

195
00:09:15,509 --> 00:09:12,800
and these six documents all of which

196
00:09:18,470 --> 00:09:15,519
were produced since 2008's their 2008

197
00:09:20,949 --> 00:09:18,480
2009 and 2010 documents

198
00:09:23,750 --> 00:09:20,959
they're all relatively recent they all

199
00:09:26,070 --> 00:09:23,760
say effectively the same thing they say

200
00:09:27,509 --> 00:09:26,080
that nasa needs to get back to its roots

201
00:09:30,470 --> 00:09:27,519
as a research and development

202
00:09:33,190 --> 00:09:30,480
organization not entirely but we need to

203
00:09:34,949 --> 00:09:33,200
lift up that research and technology

204
00:09:36,389 --> 00:09:34,959
competency and we need to make it

205
00:09:38,870 --> 00:09:36,399
visible again

206
00:09:40,790 --> 00:09:38,880
they say that without such a competency

207
00:09:43,269 --> 00:09:40,800
the missions that nasa goes after in the

208
00:09:45,110 --> 00:09:43,279
future will not be as far-reaching as

209
00:09:47,990 --> 00:09:45,120
they could be

210
00:09:50,150 --> 00:09:48,000
the the sustainability of our robotic

211
00:09:52,310 --> 00:09:50,160
and human exploration endeavors will not

212
00:09:55,509 --> 00:09:52,320
be what it could be

213
00:09:58,389 --> 00:09:55,519

and frankly the impact to society and to

214
00:09:59,990 --> 00:09:58,399
the nation will not be what it could be

215
00:10:02,470 --> 00:10:00,000
so i'm not going to quote you from any

216
00:10:04,389 --> 00:10:02,480
of these six different reports

217
00:10:05,269 --> 00:10:04,399
but i'll leave it to you to look at them

218
00:10:07,190 --> 00:10:05,279
later

219
00:10:10,389 --> 00:10:07,200
uh but they all generally speaking they

220
00:10:12,630 --> 00:10:10,399
all say that that type of uh content

221
00:10:14,389 --> 00:10:12,640
next slide please

222
00:10:15,350 --> 00:10:14,399
um there are a lot of ways for me to

223
00:10:17,670 --> 00:10:15,360
convey

224
00:10:19,430 --> 00:10:17,680
the importance of technology investments

225
00:10:21,030 --> 00:10:19,440
right and believe me technology

226
00:10:22,710 --> 00:10:21,040
investments are important to our science

227
00:10:24,310 --> 00:10:22,720
missions they're important to our

228
00:10:25,990 --> 00:10:24,320
aeronautics missions and they're

229
00:10:28,069 --> 00:10:26,000
important to our future human

230
00:10:30,630 --> 00:10:28,079
exploration endeavors

231
00:10:33,750 --> 00:10:30,640
perhaps the most dramatic way is with

232
00:10:36,790 --> 00:10:33,760
this slide which illustrates the amount

233
00:10:39,350 --> 00:10:36,800
of mass required in low earth orbit not

234
00:10:40,230 --> 00:10:39,360
on the ground but assembled in low earth

235
00:10:42,389 --> 00:10:40,240
orbit

236
00:10:44,790 --> 00:10:42,399
at the beginning of a human mars mission

237
00:10:47,110 --> 00:10:44,800
a mission to in place people on the

238
00:10:48,310 --> 00:10:47,120

surface of mars and return them safely

239
00:10:51,829 --> 00:10:48,320
to the earth

240
00:10:53,269 --> 00:10:51,839
and the reason that this slide is so

241
00:10:55,509 --> 00:10:53,279
significant to me

242
00:10:56,949 --> 00:10:55,519
is it's plotted on the y-axis i know it

243
00:10:57,910 --> 00:10:56,959
might be a little challenging to see in

244
00:11:00,550 --> 00:10:57,920
this room

245
00:11:03,190 --> 00:11:00,560
but it's plotted on the y-axis in units

246
00:11:05,110 --> 00:11:03,200
of international space station mass

247
00:11:07,509 --> 00:11:05,120
so down at the bottom in that little

248
00:11:09,190 --> 00:11:07,519
image is the international space station

249
00:11:11,590 --> 00:11:09,200
complete at one

250
00:11:13,590 --> 00:11:11,600
one international space station mass and

251
00:11:15,269 --> 00:11:13,600
up at the top of that scale are numbers

252
00:11:16,710 --> 00:11:15,279
like 12

253
00:11:19,269 --> 00:11:16,720
okay

254
00:11:20,790 --> 00:11:19,279
and with our existing technologies if we

255
00:11:23,430 --> 00:11:20,800
were to try to send humans to the

256
00:11:24,790 --> 00:11:23,440
surface of mars today it would take us

257
00:11:26,310 --> 00:11:24,800
you know depends a little bit on when

258
00:11:28,150 --> 00:11:26,320
you launch and what kind of assumptions

259
00:11:31,350 --> 00:11:28,160
you make but it would take us something

260
00:11:33,750 --> 00:11:31,360
like 12 international space stations

261
00:11:35,750 --> 00:11:33,760
in low earth orbit all put together in

262
00:11:38,550 --> 00:11:35,760
one vehicle

263
00:11:41,110 --> 00:11:38,560

or two vehicles to send humans to mars

264
00:11:43,590 --> 00:11:41,120
to the surface and return them safely

265
00:11:46,069 --> 00:11:43,600
now humans to mars by the way is a grand

266
00:11:47,670 --> 00:11:46,079
challenge okay and so these numbers are

267
00:11:48,790 --> 00:11:47,680
perhaps a little bit

268
00:11:50,550 --> 00:11:48,800
uh

269
00:11:52,230 --> 00:11:50,560
increased because it's such a grand

270
00:11:54,310 --> 00:11:52,240
challenge and we can certainly send

271
00:11:56,629 --> 00:11:54,320
humans to other destinations for

272
00:11:58,310 --> 00:11:56,639
instance a near-earth asteroid or into

273
00:12:00,310 --> 00:11:58,320
orbit about mars as the president

274
00:12:02,470 --> 00:12:00,320
discussed in his april 15 speech at the

275
00:12:04,710 --> 00:12:02,480
kennedy space center without these

276
00:12:07,110 --> 00:12:04,720
dramatic mass implications but the

277
00:12:09,030 --> 00:12:07,120
president did also say that in his

278
00:12:11,750 --> 00:12:09,040
lifetime he'd like to send humans to

279
00:12:14,230 --> 00:12:11,760
mars and i know our administrator

280
00:12:16,470 --> 00:12:14,240
shares that goal and actually i

281
00:12:18,629 --> 00:12:16,480
personally share that goal it's

282
00:12:21,030 --> 00:12:18,639
something that many of us in the agency

283
00:12:23,350 --> 00:12:21,040
are interested in now imagine taking a

284
00:12:25,509 --> 00:12:23,360
story to congress that says we need to

285
00:12:27,509 --> 00:12:25,519
assemble 12 international space stations

286
00:12:30,230 --> 00:12:27,519
in low earth orbit so we can start our

287
00:12:31,590 --> 00:12:30,240
human mars exploration missions

288
00:12:32,629 --> 00:12:31,600

you can imagine the reception you're

289
00:12:34,550 --> 00:12:32,639
going to get

290
00:12:36,550 --> 00:12:34,560
now what this slide shows graphically is

291
00:12:37,750 --> 00:12:36,560
that as we invest in technologies and

292
00:12:39,269 --> 00:12:37,760
there are a number of them listed on

293
00:12:41,829 --> 00:12:39,279
here things like

294
00:12:44,629 --> 00:12:41,839
cryogenic boil off advanced in-space

295
00:12:46,470 --> 00:12:44,639
propulsion aero capture those types of

296
00:12:49,509 --> 00:12:46,480
technologies as we invest in a number of

297
00:12:51,509 --> 00:12:49,519
technologies we can bring the required

298
00:12:54,550 --> 00:12:51,519
number of international space stations

299
00:12:55,430 --> 00:12:54,560
down to something like two

300
00:12:58,629 --> 00:12:55,440
okay

301
00:13:01,590 --> 00:12:58,639
now at two iss's sending humans to mars

302
00:13:04,150 --> 00:13:01,600
is still a grand challenge it's not a

303
00:13:07,430 --> 00:13:04,160
done deal it's not something we can bank

304
00:13:08,949 --> 00:13:07,440
on so to speak but at least at 2 or

305
00:13:11,990 --> 00:13:08,959
somewhere in that neighborhood we can

306
00:13:13,509 --> 00:13:12,000
have the conversation we can discuss it

307
00:13:14,949 --> 00:13:13,519
rationally

308
00:13:17,829 --> 00:13:14,959
in the government and we can make a

309
00:13:20,310 --> 00:13:17,839
decision about one day sending humans to

310
00:13:22,470 --> 00:13:20,320
the service of mars and to me that's the

311
00:13:27,110 --> 00:13:22,480
power if you will of technology

312
00:13:31,750 --> 00:13:30,230
so based on the external input that was

313
00:13:33,350 --> 00:13:31,760

gathered

314
00:13:34,550 --> 00:13:33,360
the president submitted his budget

315
00:13:36,629 --> 00:13:34,560
request

316
00:13:39,189 --> 00:13:36,639
and in february of this year actually on

317
00:13:41,430 --> 00:13:39,199
february 1st of this year i started here

318
00:13:43,430 --> 00:13:41,440
at nasa headquarters my second stint

319
00:13:45,110 --> 00:13:43,440
within nasa

320
00:13:46,870 --> 00:13:45,120
and we've been building something called

321
00:13:49,189 --> 00:13:46,880
the office of the chief technologist

322
00:13:51,030 --> 00:13:49,199
it's a new organization

323
00:13:52,310 --> 00:13:51,040
here at headquarters it's very important

324
00:13:53,670 --> 00:13:52,320
to realize it's not a mission

325
00:13:55,590 --> 00:13:53,680
directorate

326
00:13:58,230 --> 00:13:55,600
i'm not a mission director associate

327
00:13:59,910 --> 00:13:58,240
administrator i'm just the chief

328
00:14:03,509 --> 00:13:59,920
technologist

329
00:14:05,110 --> 00:14:03,519
has a number of goals and

330
00:14:06,310 --> 00:14:05,120
responsibilities and they're listed on

331
00:14:09,189 --> 00:14:06,320
this slide

332
00:14:10,949 --> 00:14:09,199
our number one responsibility is to to

333
00:14:12,150 --> 00:14:10,959
serve the administrator we are the

334
00:14:14,949 --> 00:14:12,160
principal

335
00:14:18,230 --> 00:14:14,959
advisor and advocate for administrator

336
00:14:19,590 --> 00:14:18,240
bolden on agency-wide technology

337
00:14:21,509 --> 00:14:19,600
programs

338
00:14:24,470 --> 00:14:21,519

and policy matters

339
00:14:26,310 --> 00:14:24,480
that includes communications out beyond

340
00:14:29,189 --> 00:14:26,320
the agency up and out advocacy for

341
00:14:31,030 --> 00:14:29,199
nasa's research and technology programs

342
00:14:33,030 --> 00:14:31,040
and that includes within the agency

343
00:14:35,030 --> 00:14:33,040
communication

344
00:14:37,030 --> 00:14:35,040
and integration with other agency

345
00:14:38,790 --> 00:14:37,040
technology efforts and by the way there

346
00:14:40,790 --> 00:14:38,800
are agency technology efforts that are

347
00:14:43,829 --> 00:14:40,800
very important within all the mission

348
00:14:45,829 --> 00:14:43,839
directorates okay and oct by no way

349
00:14:48,069 --> 00:14:45,839
replaces a mission directorate's

350
00:14:49,670 --> 00:14:48,079
technology programs instead what we're

351
00:14:51,350 --> 00:14:49,680
doing is we're responsible for

352
00:14:53,990 --> 00:14:51,360
integrating across

353
00:14:55,670 --> 00:14:54,000
these different technology programs and

354
00:14:58,069 --> 00:14:55,680
number three on this list for direct

355
00:15:00,230 --> 00:14:58,079
management of a new technology line

356
00:15:02,470 --> 00:15:00,240
called the space technology program that

357
00:15:05,030 --> 00:15:02,480
i'll go into in more detail

358
00:15:06,470 --> 00:15:05,040
so we're responsible for coordinating uh

359
00:15:09,189 --> 00:15:06,480
integrating

360
00:15:11,110 --> 00:15:09,199
uh when there are issues prioritizing

361
00:15:13,350 --> 00:15:11,120
the technology investments across the

362
00:15:15,430 --> 00:15:13,360
agency and these include both the

363
00:15:17,350 --> 00:15:15,440

mission-focused technology programs

364
00:15:20,590 --> 00:15:17,360
within the mission directorates

365
00:15:22,870 --> 00:15:20,600
and the more cross-cutting uh or

366
00:15:24,310 --> 00:15:22,880
non-mission-focused efforts within space

367
00:15:26,870 --> 00:15:24,320
technology

368
00:15:28,629 --> 00:15:26,880
also we're responsible for documenting

369
00:15:31,350 --> 00:15:28,639
communicating

370
00:15:34,150 --> 00:15:31,360
and demonstrating the societal impact of

371
00:15:37,829 --> 00:15:34,160
nasa's technology investments

372
00:15:41,829 --> 00:15:40,150
i've had a great team here at nasa

373
00:15:44,389 --> 00:15:41,839
headquarters over the last few months

374
00:15:46,790 --> 00:15:44,399
and i really should call out

375
00:15:49,030 --> 00:15:46,800
the folks on that team individually

376
00:15:51,189 --> 00:15:49,040
the folks on this team have come really

377
00:15:53,829 --> 00:15:51,199
started from within the ipp the

378
00:15:56,550 --> 00:15:53,839
innovative partnership program

379
00:15:58,790 --> 00:15:56,560
and we've added to that details

380
00:16:01,910 --> 00:15:58,800
folks from every center have come in the

381
00:16:05,430 --> 00:16:01,920
last few months to help me formulate

382
00:16:08,230 --> 00:16:05,440
fy 11 plans fiscal year 11 plans for the

383
00:16:09,430 --> 00:16:08,240
new technology programs at nasa and this

384
00:16:11,829 --> 00:16:09,440
slide

385
00:16:13,590 --> 00:16:11,839
describes kind of at a high level

386
00:16:15,670 --> 00:16:13,600
it's called nasa's integrated technology

387
00:16:18,470 --> 00:16:15,680
programs this slide describes at a high

388
00:16:20,710 --> 00:16:18,480

level the full suite of technology

389
00:16:22,550 --> 00:16:20,720
programs at nasa and what i want you to

390
00:16:23,749 --> 00:16:22,560
realize is a couple things about these

391
00:16:25,990 --> 00:16:23,759
programs

392
00:16:28,550 --> 00:16:26,000
first of all they span the entire

393
00:16:31,430 --> 00:16:28,560
technology readiness level spectrum all

394
00:16:33,829 --> 00:16:31,440
the way from concepts and paper studies

395
00:16:34,629 --> 00:16:33,839
what you might call trl one two kind of

396
00:16:36,150 --> 00:16:34,639
things

397
00:16:38,230 --> 00:16:36,160
through ground-based testing and

398
00:16:41,350 --> 00:16:38,240
laboratory testing

399
00:16:43,590 --> 00:16:41,360
trl three four-ish kind of things

400
00:16:45,590 --> 00:16:43,600
to flight testing uh getting our

401
00:16:48,230 --> 00:16:45,600
technologies proven in a relevant

402
00:16:50,790 --> 00:16:48,240
environment trl-6

403
00:16:52,150 --> 00:16:50,800
and up and infused into new missions new

404
00:16:53,829 --> 00:16:52,160
missions within the science mission

405
00:16:55,910 --> 00:16:53,839
directorate within the aeronautics

406
00:16:57,350 --> 00:16:55,920
mission directorate and with the within

407
00:16:58,470 --> 00:16:57,360
the exploration systems mission

408
00:17:00,389 --> 00:16:58,480
directorate

409
00:17:01,590 --> 00:17:00,399
now there are two kinds of technology

410
00:17:04,549 --> 00:17:01,600
programs

411
00:17:06,789 --> 00:17:04,559
uh within the agency as of this time

412
00:17:09,270 --> 00:17:06,799
there's uh what i would call technology

413
00:17:11,590 --> 00:17:09,280

pull programs and these are technology

414
00:17:13,829 --> 00:17:11,600
programs where requirements for the

415
00:17:15,829 --> 00:17:13,839
technology investments are flown down

416
00:17:17,429 --> 00:17:15,839
from the missions these are the kinds of

417
00:17:19,669 --> 00:17:17,439
things that the mission directorates do

418
00:17:22,549 --> 00:17:19,679
well frankly and have done for a number

419
00:17:24,949 --> 00:17:22,559
of years right given a set of goals and

420
00:17:27,829 --> 00:17:24,959
for esmd i should point out the

421
00:17:30,230 --> 00:17:27,839
president enunciated a very clear set of

422
00:17:32,710 --> 00:17:30,240
goals dates and destinations right when

423
00:17:35,190 --> 00:17:32,720
he said our new generation crude

424
00:17:37,190 --> 00:17:35,200
exploration vehicle will have early test

425
00:17:39,510 --> 00:17:37,200
flights in the earth system in the early

426
00:17:42,789 --> 00:17:39,520
part of the next decade uh we'll go out

427
00:17:44,630 --> 00:17:42,799
to a near-earth asteroid in 2025

428
00:17:47,510 --> 00:17:44,640
and then we'll go into orbit about mars

429
00:17:50,070 --> 00:17:47,520
returning human safely in 2035 landing

430
00:17:51,830 --> 00:17:50,080
on the surface at some subsequent time

431
00:17:54,230 --> 00:17:51,840
he didn't give a specific date for that

432
00:17:56,070 --> 00:17:54,240
one but with those goals those dates and

433
00:17:57,590 --> 00:17:56,080
destinations you can imagine that the

434
00:18:00,150 --> 00:17:57,600
mission directorates

435
00:18:01,909 --> 00:18:00,160
can populate mission architectures they

436
00:18:03,990 --> 00:18:01,919
can figure out what kind of spacecrafts

437
00:18:06,310 --> 00:18:04,000
they need and they can flow that down

438
00:18:08,549 --> 00:18:06,320

into technology requirements in fact

439
00:18:10,950 --> 00:18:08,559
that's what the heft team the human

440
00:18:12,789 --> 00:18:10,960
exploration frameworks team has been

441
00:18:15,190 --> 00:18:12,799
doing since they got stood up a couple

442
00:18:17,350 --> 00:18:15,200
months ago and the mission directors as

443
00:18:18,549 --> 00:18:17,360
i said are very good i think at doing

444
00:18:20,150 --> 00:18:18,559
that

445
00:18:22,310 --> 00:18:20,160
but there's a different kind of

446
00:18:24,230 --> 00:18:22,320
technology investment program that you

447
00:18:26,630 --> 00:18:24,240
might consider that we need in fact that

448
00:18:28,070 --> 00:18:26,640
i believe that we do need so if each of

449
00:18:30,630 --> 00:18:28,080
the mission directorates are doing

450
00:18:31,909 --> 00:18:30,640
technology pull or requirements slow

451
00:18:34,630 --> 00:18:31,919
down approach

452
00:18:35,830 --> 00:18:34,640
think about the space technology program

453
00:18:38,230 --> 00:18:35,840
within the office of the chief

454
00:18:40,630 --> 00:18:38,240
technologist an office that is not a

455
00:18:43,430 --> 00:18:40,640
mission directorate think about that as

456
00:18:45,830 --> 00:18:43,440
a technology push organization

457
00:18:49,669 --> 00:18:45,840
an organization that's going to focus on

458
00:18:53,590 --> 00:18:49,679
cross-cutting or grand challenges

459
00:18:56,549 --> 00:18:53,600
and solicit technologies to to sponsor

460
00:18:58,390 --> 00:18:56,559
that fulfill those grand challenges

461
00:19:00,789 --> 00:18:58,400
okay

462
00:19:03,029 --> 00:19:00,799
if you're going to invest in the future

463
00:19:05,909 --> 00:19:03,039

in a technology enabled way and you

464
00:19:07,350 --> 00:19:05,919
don't know precisely what technologies

465
00:19:09,110 --> 00:19:07,360
are required and i would say that

466
00:19:11,270 --> 00:19:09,120
because our missions some of our

467
00:19:13,270 --> 00:19:11,280
missions are relatively far off we're

468
00:19:15,110 --> 00:19:13,280
talking about going to an asteroid or to

469
00:19:17,110 --> 00:19:15,120
send humans to mars

470
00:19:18,630 --> 00:19:17,120
right we don't we may have a baseline

471
00:19:20,390 --> 00:19:18,640
set of technologies that we think we

472
00:19:22,150 --> 00:19:20,400
need but do we know

473
00:19:23,750 --> 00:19:22,160
with 100 percent certainty that if we

474
00:19:25,110 --> 00:19:23,760
make this investment we can accomplish

475
00:19:27,590 --> 00:19:25,120
that mission

476
00:19:30,390 --> 00:19:27,600
probably not so there are some alternate

477
00:19:33,110 --> 00:19:30,400
pathways or some disruptive technologies

478
00:19:35,510 --> 00:19:33,120
that we'd like to infuse in our missions

479
00:19:37,029 --> 00:19:35,520
anybody have a cell phone

480
00:19:39,190 --> 00:19:37,039
i know they told you to turn them off

481
00:19:41,830 --> 00:19:39,200
right so you must have them

482
00:19:43,909 --> 00:19:41,840
right well a cell phone is a great

483
00:19:46,230 --> 00:19:43,919
everyday example of a disruptive

484
00:19:47,510 --> 00:19:46,240
technology a decade ago did you have a

485
00:19:48,950 --> 00:19:47,520
cell phone

486
00:19:51,750 --> 00:19:48,960
probably not

487
00:19:53,590 --> 00:19:51,760
but today you probably feel

488
00:19:55,029 --> 00:19:53,600

attached to your cell phone more

489
00:19:57,029 --> 00:19:55,039
attached to your cell phone than to some

490
00:19:58,950 --> 00:19:57,039
people that you might meet

491
00:20:00,630 --> 00:19:58,960
right in fact you know here at nasa

492
00:20:03,350 --> 00:20:00,640
headquarters i see people walking in the

493
00:20:05,350 --> 00:20:03,360
halls you know in meetings constantly on

494
00:20:07,590 --> 00:20:05,360
their cell phone you know doing email

495
00:20:09,430 --> 00:20:07,600
and all kinds of things like that

496
00:20:11,029 --> 00:20:09,440
cell phones have changed the way we do

497
00:20:13,590 --> 00:20:11,039
business right and that's what i'm

498
00:20:15,110 --> 00:20:13,600
calling a disruptive technology

499
00:20:16,710 --> 00:20:15,120
we can have those same kind of

500
00:20:19,350 --> 00:20:16,720
breakthroughs in our space and

501
00:20:21,110 --> 00:20:19,360
aeronautics programs as well and through

502
00:20:23,350 --> 00:20:21,120
investments in the space technology

503
00:20:25,510 --> 00:20:23,360
program i believe that we will next

504
00:20:28,070 --> 00:20:25,520
slide please

505
00:20:29,510 --> 00:20:28,080
uh so this is the organization that we

506
00:20:31,510 --> 00:20:29,520
formed

507
00:20:34,549 --> 00:20:31,520
the office of the chief technologist

508
00:20:36,710 --> 00:20:34,559
organization and this office uh i should

509
00:20:38,470 --> 00:20:36,720
mention reports directly uh to the

510
00:20:40,870 --> 00:20:38,480
administrator

511
00:20:43,110 --> 00:20:40,880
uh and his staff by myself as the chief

512
00:20:44,710 --> 00:20:43,120
technologist and rick howard who

513
00:20:47,029 --> 00:20:44,720

couldn't be in the room here today as

514
00:20:48,950 --> 00:20:47,039
the deputy chief technologist

515
00:20:50,070 --> 00:20:48,960
we have a number of functions at the top

516
00:20:52,070 --> 00:20:50,080
that you would expect of any

517
00:20:54,870 --> 00:20:52,080
organization including a communications

518
00:20:57,029 --> 00:20:54,880
function a financial function

519
00:20:58,870 --> 00:20:57,039
we have a strategic integration function

520
00:21:00,950 --> 00:20:58,880
which will be where the responsibility

521
00:21:02,710 --> 00:21:00,960
will be for integrating

522
00:21:05,110 --> 00:21:02,720
the technology programs across the

523
00:21:07,750 --> 00:21:05,120
agency and we have a partnerships

524
00:21:09,510 --> 00:21:07,760
function that includes a strong

525
00:21:11,669 --> 00:21:09,520
commercial aspect

526
00:21:12,950 --> 00:21:11,679
and that that office will be responsible

527
00:21:15,270 --> 00:21:12,960
for building

528
00:21:17,510 --> 00:21:15,280
partnerships

529
00:21:20,630 --> 00:21:17,520
in all these pursuits much like by the

530
00:21:22,789 --> 00:21:20,640
way the the ipp program had been doing

531
00:21:24,549 --> 00:21:22,799
uh over the past few years

532
00:21:26,549 --> 00:21:24,559
down at the bottom on this slide you see

533
00:21:28,070 --> 00:21:26,559
three major divisions

534
00:21:30,549 --> 00:21:28,080
there's an early stage innovation

535
00:21:32,789 --> 00:21:30,559
division a game changing technology

536
00:21:34,710 --> 00:21:32,799
division and a cross-cutting capability

537
00:21:36,870 --> 00:21:34,720
demonstration division

538
00:21:39,510 --> 00:21:36,880

if you think in technology readiness

539
00:21:41,510 --> 00:21:39,520
level terminology the early stage

540
00:21:44,470 --> 00:21:41,520
innovation is all the concept work the

541
00:21:46,310 --> 00:21:44,480
paper studies the the brainstorming the

542
00:21:49,270 --> 00:21:46,320
visions of the future

543
00:21:50,630 --> 00:21:49,280
right and so that's the trl one two kind

544
00:21:52,470 --> 00:21:50,640
of work and there are a number of

545
00:21:55,110 --> 00:21:52,480
programs in there in fact there are five

546
00:21:56,310 --> 00:21:55,120
programs within early stage innovation

547
00:21:58,549 --> 00:21:56,320
and i'll talk a little bit more about

548
00:22:00,549 --> 00:21:58,559
those later within game changing there

549
00:22:02,630 --> 00:22:00,559
are two programs and within

550
00:22:04,549 --> 00:22:02,640
cross-cutting capability demonstration

551
00:22:06,630 --> 00:22:04,559
which is where we're taking things to

552
00:22:08,310 --> 00:22:06,640
flight hardware development

553
00:22:09,909 --> 00:22:08,320
to testing in a flight relevant

554
00:22:11,590 --> 00:22:09,919
environment excuse me

555
00:22:13,430 --> 00:22:11,600
there are three programs

556
00:22:16,950 --> 00:22:13,440
total of 10 programs across the

557
00:22:18,470 --> 00:22:16,960
organization next slide please

558
00:22:20,630 --> 00:22:18,480
i think i'm just going to breeze over

559
00:22:22,870 --> 00:22:20,640
this slide because i actually put it in

560
00:22:25,510 --> 00:22:22,880
there for your reference later on the

561
00:22:28,710 --> 00:22:25,520
one point i do want to make is that this

562
00:22:31,029 --> 00:22:28,720
program is set up largely in a way to

563
00:22:32,710 --> 00:22:31,039

attract the best ideas from wherever

564
00:22:35,430 --> 00:22:32,720
those ideas may come

565
00:22:38,230 --> 00:22:35,440
this includes ideas from industry from

566
00:22:40,470 --> 00:22:38,240
academia from within nasa itself from

567
00:22:42,390 --> 00:22:40,480
other national labs and the way we're

568
00:22:44,470 --> 00:22:42,400
going to get those ideas is largely

569
00:22:47,270 --> 00:22:44,480
through a competitive process

570
00:22:49,350 --> 00:22:47,280
this process is being modeled

571
00:22:52,070 --> 00:22:49,360
based on the successful competitive

572
00:22:54,149 --> 00:22:52,080
processes that smd has run for a number

573
00:22:57,110 --> 00:22:54,159
of years to be different because it's

574
00:22:58,630 --> 00:22:57,120
technology and not science but

575
00:23:00,789 --> 00:22:58,640
you know think of the same type of

576
00:23:02,870 --> 00:23:00,799
mechanisms if you will

577
00:23:05,190 --> 00:23:02,880
for this competitive process next slide

578
00:23:10,070 --> 00:23:07,830
so i mentioned the word grand challenges

579
00:23:11,110 --> 00:23:10,080
okay and grand challenges are important

580
00:23:13,190 --> 00:23:11,120
if you're running if you're interested

581
00:23:15,110 --> 00:23:13,200
in the space technology program

582
00:23:17,190 --> 00:23:15,120
uh the reason that grand challenges are

583
00:23:18,950 --> 00:23:17,200
important is because we obviously don't

584
00:23:20,310 --> 00:23:18,960
want to just put out a call for

585
00:23:21,990 --> 00:23:20,320
technology

586
00:23:24,549 --> 00:23:22,000
right imagine if we put out a call for

587
00:23:26,950 --> 00:23:24,559
technology think of all the you know the

588
00:23:29,270 --> 00:23:26,960

hundreds of thousands of responses we

589
00:23:31,270 --> 00:23:29,280
might get and how difficult it would be

590
00:23:34,070 --> 00:23:31,280
to actually sort you know the good

591
00:23:37,029 --> 00:23:34,080
responses from the not so good responses

592
00:23:38,549 --> 00:23:37,039
okay so instead of just a generic

593
00:23:39,990 --> 00:23:38,559
we're interested in technology that's

594
00:23:41,350 --> 00:23:40,000
not what this program is it's been

595
00:23:43,750 --> 00:23:41,360
reported that way

596
00:23:45,510 --> 00:23:43,760
i must point out this is not a just

597
00:23:47,830 --> 00:23:45,520
invest in technology and see what

598
00:23:49,830 --> 00:23:47,840
happens kind of program the way the

599
00:23:51,110 --> 00:23:49,840
program is going to be run is very much

600
00:23:53,830 --> 00:23:51,120
like darpa

601
00:23:55,110 --> 00:23:53,840
so darpa or arpa-e would be another

602
00:23:57,590 --> 00:23:55,120
example

603
00:24:00,630 --> 00:23:57,600
they set grand challenges they don't

604
00:24:02,630 --> 00:24:00,640
specify the technological solution that

605
00:24:04,870 --> 00:24:02,640
they're seeking they specify a

606
00:24:07,669 --> 00:24:04,880
capability that they would like to get

607
00:24:10,310 --> 00:24:07,679
to in a certain number of years

608
00:24:12,549 --> 00:24:10,320
and they put that capability out there

609
00:24:16,070 --> 00:24:12,559
and then folks respond

610
00:24:19,190 --> 00:24:16,080
with a range of technological solutions

611
00:24:21,029 --> 00:24:19,200
and often darpa or arpa-e will fund many

612
00:24:23,510 --> 00:24:21,039
of those teams they'll fund many of

613
00:24:25,510 --> 00:24:23,520

those technological solutions for a few

614
00:24:27,830 --> 00:24:25,520
years and then they'll down select to

615
00:24:30,070 --> 00:24:27,840
the most viable approach and carry that

616
00:24:32,310 --> 00:24:30,080
approach all the way up to flight

617
00:24:34,549 --> 00:24:32,320
that's the kind of program that we're

618
00:24:36,789 --> 00:24:34,559
talking about here in space technology

619
00:24:39,110 --> 00:24:36,799
next slide please

620
00:24:41,110 --> 00:24:39,120
uh graphically you can think of it this

621
00:24:43,029 --> 00:24:41,120
way all right we have

622
00:24:44,149 --> 00:24:43,039
the visions of the future we have

623
00:24:47,510 --> 00:24:44,159
hundreds

624
00:24:49,830 --> 00:24:47,520
well thousands of concepts paper studies

625
00:24:51,350 --> 00:24:49,840
analyses technology assessments that

626
00:24:53,350 --> 00:24:51,360
might be done from within the early

627
00:24:54,870 --> 00:24:53,360
stage innovation division

628
00:24:57,590 --> 00:24:54,880
uh by the way i've worked on a lot of

629
00:24:58,630 --> 00:24:57,600
these systems analyses myself and i'll

630
00:25:00,070 --> 00:24:58,640
tell you

631
00:25:01,830 --> 00:25:00,080
they all you know these things always

632
00:25:03,350 --> 00:25:01,840
look good on paper right and there's

633
00:25:04,870 --> 00:25:03,360
always just one

634
00:25:07,430 --> 00:25:04,880
little problem there's this little bit

635
00:25:09,350 --> 00:25:07,440
of physics right off in the corner that

636
00:25:11,350 --> 00:25:09,360
you have to prove and if that little bit

637
00:25:13,510 --> 00:25:11,360
of physics could be made to work the

638
00:25:15,110 --> 00:25:13,520

rest of the concept always looks great

639
00:25:16,950 --> 00:25:15,120
right always going to save cost it's

640
00:25:18,390 --> 00:25:16,960
always going to save time it's always

641
00:25:19,669 --> 00:25:18,400
going to save mass

642
00:25:21,430 --> 00:25:19,679
okay

643
00:25:22,870 --> 00:25:21,440
that little bit of physics that's what

644
00:25:24,630 --> 00:25:22,880
we're going to go after in the game

645
00:25:25,430 --> 00:25:24,640
changing division

646
00:25:27,029 --> 00:25:25,440
okay

647
00:25:29,750 --> 00:25:27,039
and this is a big difference this is a

648
00:25:32,070 --> 00:25:29,760
big thing for nasa in the past we've had

649
00:25:34,310 --> 00:25:32,080
concept groups and we've actually had

650
00:25:36,630 --> 00:25:34,320
flight program technology-oriented

651
00:25:39,590 --> 00:25:36,640
flight programs but we've never in my

652
00:25:42,549 --> 00:25:39,600
view had that focus on the middle

653
00:25:44,950 --> 00:25:42,559
on proving the fundamental physics

654
00:25:45,909 --> 00:25:44,960
of a of a concept before we took it to

655
00:25:48,230 --> 00:25:45,919
flight

656
00:25:50,310 --> 00:25:48,240
okay and so the game-changing division

657
00:25:52,149 --> 00:25:50,320
is very important in my view for this

658
00:25:53,909 --> 00:25:52,159
reason in game changing we're going to

659
00:25:56,149 --> 00:25:53,919
focus through ground-based testing

660
00:25:57,909 --> 00:25:56,159
through laboratory testing things like

661
00:26:00,630 --> 00:25:57,919
that on a certain

662
00:26:02,549 --> 00:26:00,640
a smaller number you know not hundreds

663
00:26:04,549 --> 00:26:02,559

but a smaller number of the visions of

664
00:26:07,590 --> 00:26:04,559
the future we're going to try to prove

665
00:26:08,950 --> 00:26:07,600
those fundamental physics and when we do

666
00:26:10,470 --> 00:26:08,960
we're going to take those things and

667
00:26:13,590 --> 00:26:10,480
pass them off to the cross-cutting

668
00:26:14,390 --> 00:26:13,600
capability demonstration division

669
00:26:16,310 --> 00:26:14,400
for

670
00:26:18,230 --> 00:26:16,320
testing in a relevant environment maybe

671
00:26:20,870 --> 00:26:18,240
in low-earth orbit maybe an atmospheric

672
00:26:22,950 --> 00:26:20,880
flight test depends exactly on the

673
00:26:25,029 --> 00:26:22,960
system that we're talking about but at

674
00:26:27,430 --> 00:26:25,039
the end of that process

675
00:26:29,750 --> 00:26:27,440
uh that technology will be at a trl of

676
00:26:31,669 --> 00:26:29,760
six it will be demonstrated in a

677
00:26:32,549 --> 00:26:31,679
relevant environment it will be flight

678
00:26:38,149 --> 00:26:32,559
ready

679
00:26:39,990 --> 00:26:38,159
science or exploration or aeronautics

680
00:26:41,830 --> 00:26:40,000
mission and in fact we're going to work

681
00:26:44,149 --> 00:26:41,840
with those mission directorates

682
00:26:47,110 --> 00:26:44,159
throughout this process to make sure

683
00:26:48,950 --> 00:26:47,120
that they're aware and ready uh for that

684
00:26:51,029 --> 00:26:48,960
handoff we're not just going to throw it

685
00:26:52,630 --> 00:26:51,039
over the fence if you will next slide

686
00:26:54,390 --> 00:26:52,640
please

687
00:26:56,950 --> 00:26:54,400
so a little more detail on each of these

688
00:26:59,029 --> 00:26:56,960

three divisions and then i'll wrap up

689
00:27:01,830 --> 00:26:59,039
the early stage innovation division i

690
00:27:04,390 --> 00:27:01,840
mentioned sponsors a wide range

691
00:27:05,669 --> 00:27:04,400
of low technology readiness level

692
00:27:08,470 --> 00:27:05,679
efforts

693
00:27:09,990 --> 00:27:08,480
advanced space system concepts initial

694
00:27:11,909 --> 00:27:10,000
technology

695
00:27:13,669 --> 00:27:11,919
readiness assessments

696
00:27:14,789 --> 00:27:13,679
across academia

697
00:27:16,549 --> 00:27:14,799
industry

698
00:27:17,830 --> 00:27:16,559
other government agencies in partnership

699
00:27:20,310 --> 00:27:17,840
with other government agencies and

700
00:27:22,549 --> 00:27:20,320
certainly with our nasa field centers

701
00:27:25,269 --> 00:27:22,559
there are five programs the space

702
00:27:27,350 --> 00:27:25,279
technology research grant program

703
00:27:29,590 --> 00:27:27,360
i view that as

704
00:27:32,230 --> 00:27:29,600
a space equivalent if you will to

705
00:27:36,310 --> 00:27:32,240
fundamental aeronautics with that air md

706
00:27:39,430 --> 00:27:36,320
runs today okay it's a grant type or a

707
00:27:41,990 --> 00:27:39,440
foundational research type of program

708
00:27:45,029 --> 00:27:42,000
focused on space technology it also

709
00:27:47,350 --> 00:27:45,039
includes a large fellowship program

710
00:27:49,750 --> 00:27:47,360
in which we will engage

711
00:27:52,230 --> 00:27:49,760
several hundred

712
00:27:54,470 --> 00:27:52,240
university students across the country

713
00:27:57,269 --> 00:27:54,480

both in research at their universities

714
00:28:00,950 --> 00:27:57,279
graduate research at their universities

715
00:28:02,470 --> 00:28:00,960
and summer research at a nasa center

716
00:28:05,029 --> 00:28:02,480
early stage innovation includes

717
00:28:07,190 --> 00:28:05,039
re-establishment of the niacc the net

718
00:28:09,990 --> 00:28:07,200
what was the nasa institute for advanced

719
00:28:11,269 --> 00:28:10,000
concepts uh this program

720
00:28:13,750 --> 00:28:11,279
previously

721
00:28:15,990 --> 00:28:13,760
uh was only open to folks external to

722
00:28:19,510 --> 00:28:16,000
nasa in the new nyack it will be open

723
00:28:21,269 --> 00:28:19,520
both to ideas from within and external

724
00:28:23,430 --> 00:28:21,279
to nasa

725
00:28:24,789 --> 00:28:23,440
there'll be a center innovation fund

726
00:28:27,190 --> 00:28:24,799
this will be a fund that will be

727
00:28:29,350 --> 00:28:27,200
distributed to each of the nasa centers

728
00:28:31,750 --> 00:28:29,360
and will be managed locally either by

729
00:28:33,590 --> 00:28:31,760
the center director or if they designate

730
00:28:34,470 --> 00:28:33,600
it to the chief technologist at each

731
00:28:36,950 --> 00:28:34,480
center

732
00:28:39,909 --> 00:28:36,960
be managed by those chief technologists

733
00:28:41,830 --> 00:28:39,919
and the centers will use these funds to

734
00:28:44,230 --> 00:28:41,840
stimulate within their center and in

735
00:28:47,590 --> 00:28:44,240
partnership with folks outside

736
00:28:49,430 --> 00:28:47,600
creativity and innovation

737
00:28:52,470 --> 00:28:49,440
seed funds basically you can think of it

738
00:28:55,909 --> 00:28:52,480

as an expanded ipp seed fund

739
00:28:58,310 --> 00:28:55,919
fourth we have the sbir sttr program and

740
00:29:01,029 --> 00:28:58,320
fifth the centennial challenges program

741
00:29:03,350 --> 00:29:01,039
both of those existed in ipp previously

742
00:29:05,990 --> 00:29:03,360
and are carried forward into the new

743
00:29:08,230 --> 00:29:06,000
office of the chief technologist one key

744
00:29:09,990 --> 00:29:08,240
facet about early stage innovation

745
00:29:13,029 --> 00:29:10,000
remember we're looking for the best

746
00:29:14,310 --> 00:29:13,039
ideas wherever they may be and so within

747
00:29:16,389 --> 00:29:14,320
this division

748
00:29:18,149 --> 00:29:16,399
it is a hundred percent

749
00:29:20,149 --> 00:29:18,159
uh competed

750
00:29:22,950 --> 00:29:20,159
all of the awards are made through

751
00:29:25,029 --> 00:29:22,960
various means of competition next slide

752
00:29:26,950 --> 00:29:25,039
please

753
00:29:28,710 --> 00:29:26,960
uh game changing technology this is

754
00:29:30,470 --> 00:29:28,720
where we're going after that fundamental

755
00:29:32,549 --> 00:29:30,480
physics that i mentioned earlier

756
00:29:35,430 --> 00:29:32,559
typically in ground-based testing or lab

757
00:29:37,190 --> 00:29:35,440
testing there are two programs here one

758
00:29:39,029 --> 00:29:37,200
is called the game changing development

759
00:29:40,870 --> 00:29:39,039
program this program is going to have a

760
00:29:43,029 --> 00:29:40,880
level 2 office i should have mentioned

761
00:29:44,870 --> 00:29:43,039
the level 2 offices on the other side i

762
00:29:47,110 --> 00:29:44,880
apologize this office is going to have a

763
00:29:48,870 --> 00:29:47,120

level 2 office at langley

764
00:29:51,590 --> 00:29:48,880
the game changing development program is

765
00:29:54,630 --> 00:29:51,600
going to focus on innovative ideas

766
00:29:57,190 --> 00:29:54,640
or new capabilities that could radically

767
00:30:00,149 --> 00:29:57,200
dramatically disruptive technologies

768
00:30:01,590 --> 00:30:00,159
right could dramatically impact a future

769
00:30:03,909 --> 00:30:01,600
nasa mission

770
00:30:05,430 --> 00:30:03,919
also there's a small satellite subsystem

771
00:30:07,510 --> 00:30:05,440
technology program which is going to

772
00:30:08,870 --> 00:30:07,520
have a level 2 program office at nasa

773
00:30:11,190 --> 00:30:08,880
ames

774
00:30:14,389 --> 00:30:11,200
and this office is going to focus on

775
00:30:16,710 --> 00:30:14,399
small set as the name implies small sat

776
00:30:19,350 --> 00:30:16,720
subsystem investments

777
00:30:22,070 --> 00:30:19,360
that could enable these small sets to

778
00:30:24,389 --> 00:30:22,080
provide unique functions for government

779
00:30:27,029 --> 00:30:24,399
or commercial users

780
00:30:29,990 --> 00:30:27,039
this program has some directed efforts

781
00:30:32,149 --> 00:30:30,000
but will be over 70 percent competed

782
00:30:34,070 --> 00:30:32,159
this not the program but this division

783
00:30:35,909 --> 00:30:34,080
next slide please

784
00:30:37,430 --> 00:30:35,919
uh within cross cutting this is where

785
00:30:39,909 --> 00:30:37,440
we're going to take a small number of

786
00:30:41,750 --> 00:30:39,919
things small number of technologies and

787
00:30:43,110 --> 00:30:41,760
demonstrate them in a flight relevant

788
00:30:45,750 --> 00:30:43,120

environment so we're going to take

789
00:30:47,350 --> 00:30:45,760
things up to trl 6. by the way the most

790
00:30:48,710 --> 00:30:47,360
successful

791
00:30:50,630 --> 00:30:48,720
cross-cutting

792
00:30:52,470 --> 00:30:50,640
demonstration program that i can think

793
00:30:54,549 --> 00:30:52,480
of in nasa's past

794
00:30:57,509 --> 00:30:54,559
is probably the new millennium program

795
00:30:58,789 --> 00:30:57,519
within smd that i believe is on its way

796
00:31:01,509 --> 00:30:58,799
out

797
00:31:03,590 --> 00:31:01,519
this program will in some ways replace

798
00:31:05,909 --> 00:31:03,600
the new millennium program in some ways

799
00:31:07,830 --> 00:31:05,919
it'll be a greatly augmented new

800
00:31:09,990 --> 00:31:07,840
millennium program there are three

801
00:31:12,230 --> 00:31:10,000
programs within cross-cutting the first

802
00:31:14,389 --> 00:31:12,240
is technology demonstration missions

803
00:31:17,269 --> 00:31:14,399
this is this is the largest this is

804
00:31:20,070 --> 00:31:17,279
where the largest projects within oct

805
00:31:22,149 --> 00:31:20,080
will reside so the largest technology

806
00:31:24,310 --> 00:31:22,159
demonstrators those that are required

807
00:31:25,110 --> 00:31:24,320
maybe to be tested in in the atmosphere

808
00:31:26,470 --> 00:31:25,120
or

809
00:31:28,310 --> 00:31:26,480
tested

810
00:31:30,310 --> 00:31:28,320
in low earth orbit they'll reside within

811
00:31:31,750 --> 00:31:30,320
that program the level two program

812
00:31:35,190 --> 00:31:31,760
office here is at the marshall space

813
00:31:39,990 --> 00:31:37,269

the edison small satellite missions

814
00:31:42,070 --> 00:31:40,000
program is also within this division

815
00:31:43,590 --> 00:31:42,080
edison is where we're going to take the

816
00:31:45,430 --> 00:31:43,600
level 2 program office for that is at

817
00:31:47,909 --> 00:31:45,440
nasa ames edison is where we're going to

818
00:31:50,950 --> 00:31:47,919
take and actually implement

819
00:31:53,509 --> 00:31:50,960
some small sat missions for nasa you may

820
00:31:56,470 --> 00:31:53,519
know that the air force has a small sap

821
00:31:59,190 --> 00:31:56,480
program nsf has a small sap program

822
00:32:01,430 --> 00:31:59,200
edison is going to be nasa's equivalent

823
00:32:04,389 --> 00:32:01,440
if you will to those programs and will

824
00:32:05,190 --> 00:32:04,399
be planned in collaboration

825
00:32:09,830 --> 00:32:05,200
not

826
00:32:11,830 --> 00:32:09,840
with those existing programs

827
00:32:13,430 --> 00:32:11,840
finally flight opportunities is the

828
00:32:14,870 --> 00:32:13,440
merging of

829
00:32:16,870 --> 00:32:14,880
two previous

830
00:32:20,149 --> 00:32:16,880
ipp programs

831
00:32:22,310 --> 00:32:20,159
fast and cruiser which basically are

832
00:32:23,750 --> 00:32:22,320
procuring services procuring flight

833
00:32:25,269 --> 00:32:23,760
services either

834
00:32:26,630 --> 00:32:25,279
aircraft or

835
00:32:28,630 --> 00:32:26,640
sub-orbital

836
00:32:30,789 --> 00:32:28,640
flight services

837
00:32:33,990 --> 00:32:30,799
four technology demonstrations for

838
00:32:37,029 --> 00:32:34,000

educational payloads and uh one day four

839
00:32:40,710 --> 00:32:39,029
and so those three programs by the way

840
00:32:43,029 --> 00:32:40,720
flight opportunities has a level two

841
00:32:44,789 --> 00:32:43,039
program office at the dryden

842
00:32:46,389 --> 00:32:44,799
flight research center

843
00:32:48,230 --> 00:32:46,399
those three programs make up cross

844
00:32:51,430 --> 00:32:48,240
cutting and overall cross cutting is

845
00:32:53,509 --> 00:32:51,440
about 70 percent or more competed next

846
00:32:56,630 --> 00:32:53,519
slide please

847
00:32:58,870 --> 00:32:56,640
well what will this investment bring

848
00:32:59,990 --> 00:32:58,880
it's hard to answer that question to be

849
00:33:01,430 --> 00:33:00,000
honest

850
00:33:03,750 --> 00:33:01,440
uh you know and the reason that it's

851
00:33:05,509 --> 00:33:03,760
hard to answer that question is because

852
00:33:07,509 --> 00:33:05,519
i'm talking about competition i'm

853
00:33:09,509 --> 00:33:07,519
talking about gathering the best ideas

854
00:33:11,830 --> 00:33:09,519
from wherever they may come and i don't

855
00:33:15,269 --> 00:33:11,840
have those ideas yet in fact i'm

856
00:33:16,950 --> 00:33:15,279
counting on many of you for those ideas

857
00:33:19,509 --> 00:33:16,960
but i can give you some

858
00:33:21,909 --> 00:33:19,519
some suggestions of the kinds of things

859
00:33:25,430 --> 00:33:21,919
that could come from this program and

860
00:33:27,509 --> 00:33:25,440
this slide here gives a few examples

861
00:33:30,149 --> 00:33:27,519
i want you to note that these systems

862
00:33:33,350 --> 00:33:30,159
have if you go back and look at nasa's

863
00:33:35,830 --> 00:33:33,360

technology reports or nasa's mission

864
00:33:37,909 --> 00:33:35,840
reports and what technologies are

865
00:33:39,990 --> 00:33:37,919
required by our future science or our

866
00:33:42,149 --> 00:33:40,000
future exploration missions

867
00:33:45,190 --> 00:33:42,159
many of these are on the list and have

868
00:33:47,750 --> 00:33:45,200
been for some time okay aero capture

869
00:33:50,389 --> 00:33:47,760
systems or inflatable decelerators that

870
00:33:52,310 --> 00:33:50,399
would allow us to go into orbit

871
00:33:54,389 --> 00:33:52,320
about planets with atmospheres in a more

872
00:33:56,549 --> 00:33:54,399
effective way or deliver more mass to

873
00:33:57,830 --> 00:33:56,559
the surface of a planet

874
00:33:59,909 --> 00:33:57,840
large scale

875
00:34:02,310 --> 00:33:59,919
large space structures that are deployed

876
00:34:04,950 --> 00:34:02,320
or assembled either for science purposes

877
00:34:08,389 --> 00:34:04,960
or exploration purposes are another

878
00:34:10,629 --> 00:34:08,399
example of such systems

879
00:34:12,550 --> 00:34:10,639
and there's there there are plenty more

880
00:34:14,869 --> 00:34:12,560
uh and we could maybe get into the talk

881
00:34:16,790 --> 00:34:14,879
about those a little bit more later on

882
00:34:19,030 --> 00:34:16,800
next slide please

883
00:34:21,270 --> 00:34:19,040
i'm gonna skip over this slide i just

884
00:34:22,550 --> 00:34:21,280
wanted you to have the budget uh

885
00:34:24,710 --> 00:34:22,560
information

886
00:34:25,750 --> 00:34:24,720
so it's in the the package that's on the

887
00:34:27,510 --> 00:34:25,760
internet

888
00:34:29,669 --> 00:34:27,520

uh the one thing i do want to say about

889
00:34:31,589 --> 00:34:29,679
the budget is it's it's advertised as

890
00:34:34,069 --> 00:34:31,599
about being about five billion dollars

891
00:34:35,510 --> 00:34:34,079
over five years

892
00:34:37,349 --> 00:34:35,520
you know when you get into the details

893
00:34:39,909 --> 00:34:37,359
of the budget and you include include

894
00:34:42,629 --> 00:34:39,919
for the fact that the sbir program which

895
00:34:45,030 --> 00:34:42,639
i think is very important and we need to

896
00:34:47,190 --> 00:34:45,040
uh certainly needs to be included along

897
00:34:49,270 --> 00:34:47,200
with these other technology programs but

898
00:34:51,510 --> 00:34:49,280
the budget for the sbir program is

899
00:34:53,510 --> 00:34:51,520
congressionally mandated and so the

900
00:34:55,510 --> 00:34:53,520
overall budget for space technology at

901
00:34:57,589 --> 00:34:55,520
least the budget that i can adjust if

902
00:34:59,510 --> 00:34:57,599
you will is really closer to about three

903
00:35:01,190 --> 00:34:59,520
and a half billion dollars over the

904
00:35:03,109 --> 00:35:01,200
five-year period

905
00:35:06,950 --> 00:35:03,119
and the breakout among the programs is

906
00:35:09,589 --> 00:35:06,960
shown on this slide next slide first

907
00:35:11,750 --> 00:35:09,599
i mentioned the formulation team

908
00:35:13,349 --> 00:35:11,760
that's come here at tenasa headquarters

909
00:35:14,710 --> 00:35:13,359
includes headquarters people and folks

910
00:35:16,390 --> 00:35:14,720
from all the centers

911
00:35:18,310 --> 00:35:16,400
i want you to know that team has been

912
00:35:20,790 --> 00:35:18,320
working hard

913
00:35:22,790 --> 00:35:20,800

and has put in some fairly detailed

914
00:35:23,670 --> 00:35:22,800
plans for how this program is going to

915
00:35:25,829 --> 00:35:23,680
run

916
00:35:27,910 --> 00:35:25,839
i've been reviewing these plans and i

917
00:35:30,069 --> 00:35:27,920
think they're very good

918
00:35:31,430 --> 00:35:30,079
this program is being constructed in a

919
00:35:34,550 --> 00:35:31,440
logical

920
00:35:37,190 --> 00:35:34,560
executable manner one in which we will

921
00:35:39,349 --> 00:35:37,200
bring in innovation and ideas from the

922
00:35:42,550 --> 00:35:39,359
outside and we will make those ideas

923
00:35:44,550 --> 00:35:42,560
we'll make those concepts a reality

924
00:35:46,710 --> 00:35:44,560
there are a couple of rfis that have

925
00:35:48,630 --> 00:35:46,720
already been released uh for this

926
00:35:50,630 --> 00:35:48,640
program there are a couple more that are

927
00:35:52,069 --> 00:35:50,640
going to come out this week uh there's

928
00:35:54,310 --> 00:35:52,079
one this week that's going to come out

929
00:35:56,390 --> 00:35:54,320
for technology demonstration missions

930
00:35:58,069 --> 00:35:56,400
and also for the edison smallsat

931
00:35:59,750 --> 00:35:58,079
missions

932
00:36:01,510 --> 00:35:59,760
and as we move forward in the summer

933
00:36:03,030 --> 00:36:01,520
this team is prepared

934
00:36:06,550 --> 00:36:03,040
should we be given

935
00:36:08,310 --> 00:36:06,560
authority by congress and and others

936
00:36:11,750 --> 00:36:08,320
we're prepared to

937
00:36:15,270 --> 00:36:11,760
release formal rfps and aos at such a

938
00:36:17,589 --> 00:36:15,280

time as it is warranted of course

939
00:36:18,790 --> 00:36:17,599
with the debate going on uh with the

940
00:36:20,550 --> 00:36:18,800
budget

941
00:36:22,870 --> 00:36:20,560
realizing that what i'm talking about of

942
00:36:24,950 --> 00:36:22,880
course is the president's budget request

943
00:36:27,109 --> 00:36:24,960
and that request has to be approved by

944
00:36:29,910 --> 00:36:27,119
congress and that approval has not

945
00:36:34,310 --> 00:36:31,829
obviously no awarding of funds would be

946
00:36:36,710 --> 00:36:34,320
made until such a time as budget

947
00:36:38,950 --> 00:36:36,720
approval is received but the team has

948
00:36:40,870 --> 00:36:38,960
been moving and the team is ready

949
00:36:42,630 --> 00:36:40,880
to implement this program next slide

950
00:36:44,310 --> 00:36:42,640
please

951
00:36:46,550 --> 00:36:44,320
i do want to point out just a couple of

952
00:36:48,710 --> 00:36:46,560
other things

953
00:36:50,069 --> 00:36:48,720
about the way we're running the program

954
00:36:52,390 --> 00:36:50,079
we've stood up

955
00:36:54,630 --> 00:36:52,400
to govern our technology investments

956
00:36:56,710 --> 00:36:54,640
we've stood up two new councils

957
00:36:58,390 --> 00:36:56,720
and this has been an approved governance

958
00:37:00,390 --> 00:36:58,400
model approved through the agency at

959
00:37:02,870 --> 00:37:00,400
this point one is called the nasa

960
00:37:05,349 --> 00:37:02,880
technology admit executive council it

961
00:37:07,349 --> 00:37:05,359
consists of myself and mike ruskevich

962
00:37:09,109 --> 00:37:07,359
the agency chief engineer and the

963
00:37:11,109 --> 00:37:09,119

associate administrators for each of the

964
00:37:12,870 --> 00:37:11,119
four mission directorates and this is

965
00:37:15,190 --> 00:37:12,880
the forum where we're going to integrate

966
00:37:16,950 --> 00:37:15,200
our technology programs and deal with

967
00:37:18,310 --> 00:37:16,960
any discrepancies

968
00:37:20,230 --> 00:37:18,320
if they arise

969
00:37:21,270 --> 00:37:20,240
we also have the center technology

970
00:37:23,829 --> 00:37:21,280
council

971
00:37:25,829 --> 00:37:23,839
the first at least telecon of that

972
00:37:27,510 --> 00:37:25,839
council occurred yesterday the first

973
00:37:29,589 --> 00:37:27,520
face-to-face meeting of both of these

974
00:37:31,750 --> 00:37:29,599
councils will be in june

975
00:37:33,349 --> 00:37:31,760
and the center technology council is the

976
00:37:35,030 --> 00:37:33,359
collection of the center chief

977
00:37:36,710 --> 00:37:35,040
technologists we've

978
00:37:39,030 --> 00:37:36,720
i've asked for and each of the center

979
00:37:42,230 --> 00:37:39,040
directors has appointed a chief

980
00:37:43,829 --> 00:37:42,240
technologist basically my primary

981
00:37:45,510 --> 00:37:43,839
interface

982
00:37:47,670 --> 00:37:45,520
at their center

983
00:37:49,910 --> 00:37:47,680
and those center chief technologists

984
00:37:52,710 --> 00:37:49,920
have been and are going to be very

985
00:37:54,870 --> 00:37:52,720
engaged in both the formulation and the

986
00:37:56,470 --> 00:37:54,880
execution the implementation of this

987
00:37:58,150 --> 00:37:56,480
program

988
00:38:01,829 --> 00:37:58,160

and we're going to do that through the

989
00:38:03,750 --> 00:38:01,839
center technology council next slide

990
00:38:05,510 --> 00:38:03,760
my last slide i just wanted to to

991
00:38:09,190 --> 00:38:05,520
summarize i want to make a couple points

992
00:38:14,710 --> 00:38:11,510
first of all i want to point out that

993
00:38:17,030 --> 00:38:14,720
through the fy 11 budget request

994
00:38:19,349 --> 00:38:17,040
the obama administration made their

995
00:38:21,750 --> 00:38:19,359
intent very well known

996
00:38:24,710 --> 00:38:21,760
right and their what their intent and

997
00:38:27,589 --> 00:38:24,720
focused on is a commitment to research

998
00:38:29,030 --> 00:38:27,599
technology and innovation

999
00:38:30,710 --> 00:38:29,040
you can look across the federal

1000
00:38:32,870 --> 00:38:30,720
government and you can see this all the

1001
00:38:34,950 --> 00:38:32,880
agencies that had a research and

1002
00:38:36,310 --> 00:38:34,960
technology component

1003
00:38:39,510 --> 00:38:36,320
got an increase even in the

1004
00:38:41,990 --> 00:38:39,520
discretionary budget that was held fixed

1005
00:38:44,310 --> 00:38:42,000
nasa included in that increase

1006
00:38:46,310 --> 00:38:44,320
and those that didn't took a decrease to

1007
00:38:47,670 --> 00:38:46,320
pay for those agencies that got an

1008
00:38:50,230 --> 00:38:47,680
increase

1009
00:38:52,790 --> 00:38:50,240
what a blessing it is frankly

1010
00:38:54,790 --> 00:38:52,800
that nasa got an increase in this

1011
00:38:56,550 --> 00:38:54,800
environment where discretionary spending

1012
00:38:59,030 --> 00:38:56,560
was held fixed

1013
00:39:00,710 --> 00:38:59,040

uh in my personal opinion and i'll admit

1014
00:39:02,150 --> 00:39:00,720
that you know i started on february 1st

1015
00:39:03,910 --> 00:39:02,160
so i wasn't here

1016
00:39:05,030 --> 00:39:03,920
in washington when these deliberations

1017
00:39:06,950 --> 00:39:05,040
were occurring

1018
00:39:08,550 --> 00:39:06,960
but in my personal opinion nasa would

1019
00:39:09,589 --> 00:39:08,560
not have gotten the increase that it

1020
00:39:12,550 --> 00:39:09,599
received

1021
00:39:15,750 --> 00:39:12,560
without a focus on research technology

1022
00:39:17,510 --> 00:39:15,760
and innovation okay

1023
00:39:18,950 --> 00:39:17,520
the obama administration is committed to

1024
00:39:21,750 --> 00:39:18,960
that because of what they believe it

1025
00:39:24,069 --> 00:39:21,760
means for our nation's future economy

1026
00:39:26,710 --> 00:39:24,079
for building economic competitiveness in

1027
00:39:28,790 --> 00:39:26,720
this country global you know to interact

1028
00:39:31,109 --> 00:39:28,800
with global markets

1029
00:39:33,190 --> 00:39:31,119
to create new products and services to

1030
00:39:35,349 --> 00:39:33,200
create new industries

1031
00:39:36,550 --> 00:39:35,359
and high quality technology oriented

1032
00:39:38,390 --> 00:39:36,560
jobs

1033
00:39:40,870 --> 00:39:38,400
nasa's budget request

1034
00:39:42,790 --> 00:39:40,880
is aligned with this national strategy

1035
00:39:44,230 --> 00:39:42,800
this is also awesome

1036
00:39:45,109 --> 00:39:44,240
okay

1037
00:39:48,150 --> 00:39:45,119
you know

1038
00:39:49,349 --> 00:39:48,160

nasa's budget is aligned with a national

1039
00:39:51,349 --> 00:39:49,359
initiative

1040
00:39:52,550 --> 00:39:51,359
that doesn't always occur either i want

1041
00:39:56,310 --> 00:39:52,560
to point out

1042
00:39:58,230 --> 00:39:56,320
nasa is being treated as a major part of

1043
00:40:01,109 --> 00:39:58,240
the obama administration's research

1044
00:40:04,309 --> 00:40:01,119
technology and innovation focus

1045
00:40:06,470 --> 00:40:04,319
it's a great opportunity for our agency

1046
00:40:08,230 --> 00:40:06,480
and just as importantly this renewed

1047
00:40:10,550 --> 00:40:08,240
emphasis on technology in the

1048
00:40:12,550 --> 00:40:10,560
president's fy 11 budget request

1049
00:40:13,750 --> 00:40:12,560
what it really does in my view is it

1050
00:40:15,829 --> 00:40:13,760
brings up

1051
00:40:17,829 --> 00:40:15,839
the research and technology competency

1052
00:40:20,150 --> 00:40:17,839
this long-standing competency within the

1053
00:40:22,470 --> 00:40:20,160
agency that had been down for over a

1054
00:40:25,109 --> 00:40:22,480
decade it brings it up and makes it

1055
00:40:27,109 --> 00:40:25,119
visible again and makes it a partner

1056
00:40:30,230 --> 00:40:27,119
with the flight system hardware and

1057
00:40:32,550 --> 00:40:30,240
mission operation competencies of nasa

1058
00:40:35,430 --> 00:40:32,560
in my view making nasa a healthy

1059
00:40:40,470 --> 00:40:37,910
in addition to providing a more vital

1060
00:40:42,069 --> 00:40:40,480
and productive aerospace future through

1061
00:40:43,829 --> 00:40:42,079
these investments

1062
00:40:46,309 --> 00:40:43,839
you should also realize that nasa

1063
00:40:49,030 --> 00:40:46,319

focused on technology and innovation has

1064
00:40:51,349 --> 00:40:49,040
some big impacts for our country

1065
00:40:53,510 --> 00:40:51,359
it will drive our nation's economic

1066
00:40:54,550 --> 00:40:53,520
competitiveness through the aerospace

1067
00:40:56,550 --> 00:40:54,560
sector

1068
00:40:58,630 --> 00:40:56,560
nasa will be able to serve continue to

1069
00:41:01,109 --> 00:40:58,640
serve i should say as a strong

1070
00:41:03,430 --> 00:41:01,119
inspiration for students and others

1071
00:41:05,670 --> 00:41:03,440
interested in educational and career

1072
00:41:07,910 --> 00:41:05,680
pathways in science technology

1073
00:41:10,150 --> 00:41:07,920
engineering and mathematics

1074
00:41:11,349 --> 00:41:10,160
and just as important i think it will

1075
00:41:13,510 --> 00:41:11,359
allow

1076
00:41:16,550 --> 00:41:13,520
a large you know some number of

1077
00:41:18,630 --> 00:41:16,560
researchers at the nasa field centers to

1078
00:41:21,750 --> 00:41:18,640
apply the intellectual capital that they

1079
00:41:23,910 --> 00:41:21,760
work every day in aerospace on to apply

1080
00:41:26,390 --> 00:41:23,920
some of that to some major societal

1081
00:41:28,950 --> 00:41:26,400
challenges challenges in energy

1082
00:41:31,670 --> 00:41:28,960
the environment weather health and

1083
00:41:33,510 --> 00:41:31,680
wellness and certainly national security

1084
00:41:35,750 --> 00:41:33,520
these are all areas that know nasa is

1085
00:41:38,069 --> 00:41:35,760
not going to lead these areas but these

1086
00:41:41,829 --> 00:41:38,079
are all areas that nasa's intellectual

1087
00:41:44,390 --> 00:41:41,839
capital can contribute to if asked

1088
00:41:45,910 --> 00:41:44,400

and these are frankly the set of things

1089
00:41:47,270 --> 00:41:45,920
is the reason that i'm excited about

1090
00:41:49,829 --> 00:41:47,280
this budget

1091
00:41:51,589 --> 00:41:49,839
i think i'll stop there and see if there

1092
00:41:53,510 --> 00:41:51,599
are any questions

1093
00:41:55,349 --> 00:41:53,520
okay thanks bobby uh we'll take

1094
00:41:57,910 --> 00:41:55,359
questions from here at headquarters and

1095
00:41:59,510 --> 00:41:57,920
then we'll go around to the nasa centers

1096
00:42:02,950 --> 00:41:59,520
if you have a question here just raise

1097
00:42:04,710 --> 00:42:02,960
your hand and wait for a microphone and

1098
00:42:05,670 --> 00:42:04,720
we'll get started here

1099
00:42:07,030 --> 00:42:05,680
hello

1100
00:42:08,230 --> 00:42:07,040
uh mike wright goddard space flight

1101
00:42:09,349 --> 00:42:08,240
center

1102
00:42:11,190 --> 00:42:09,359
a couple of

1103
00:42:12,950 --> 00:42:11,200
parts to this question one is what is

1104
00:42:15,030 --> 00:42:12,960
nasa doing to partner with other

1105
00:42:16,630 --> 00:42:15,040
agencies to avoid say

1106
00:42:18,950 --> 00:42:16,640
reinventing the wheel with regards to

1107
00:42:22,069 --> 00:42:18,960
not only technologies that we

1108
00:42:23,750 --> 00:42:22,079
could benefit in our mission but also um

1109
00:42:25,589 --> 00:42:23,760
that those other agencies maybe there's

1110
00:42:28,069 --> 00:42:25,599
something we have that could benefit

1111
00:42:29,750 --> 00:42:28,079
those other agencies as well

1112
00:42:31,030 --> 00:42:29,760
and secondly um

1113
00:42:32,950 --> 00:42:31,040

i think it's fair to say that the

1114
00:42:34,550 --> 00:42:32,960
talents and skills that

1115
00:42:36,309 --> 00:42:34,560
uh

1116
00:42:37,910 --> 00:42:36,319
scientists and engineers within the

1117
00:42:41,030 --> 00:42:37,920
agency um

1118
00:42:43,510 --> 00:42:41,040
have that make them good idea generators

1119
00:42:45,910 --> 00:42:43,520
that that make them visionaries

1120
00:42:49,190 --> 00:42:45,920
aren't also the same skills that allow

1121
00:42:51,589 --> 00:42:49,200
them to write really good proposals and

1122
00:42:55,430 --> 00:42:51,599
compete in that process

1123
00:42:58,550 --> 00:42:55,440
what is the oct doing to help facilitate

1124
00:43:00,390 --> 00:42:58,560
that process so that there might be some

1125
00:43:02,470 --> 00:43:00,400
good ideas out there but they just don't

1126
00:43:03,349 --> 00:43:02,480
have the right buzzwords to get

1127
00:43:04,870 --> 00:43:03,359
you know

1128
00:43:07,750 --> 00:43:04,880
to get that attention

1129
00:43:09,589 --> 00:43:07,760
great uh two very good questions so

1130
00:43:11,589 --> 00:43:09,599
first of all partnerships uh

1131
00:43:14,870 --> 00:43:11,599
partnerships across the federal

1132
00:43:16,710 --> 00:43:14,880
government are increasingly important

1133
00:43:19,030 --> 00:43:16,720
there is there's no fuzz on this

1134
00:43:21,510 --> 00:43:19,040
statement the the obama administration

1135
00:43:22,710 --> 00:43:21,520
is pushing all of the agencies to work

1136
00:43:25,750 --> 00:43:22,720
together

1137
00:43:26,790 --> 00:43:25,760
and we're all incentivized i'd say to do

1138
00:43:28,550 --> 00:43:26,800

so

1139
00:43:31,750 --> 00:43:28,560
i can pick up the phone and call my

1140
00:43:33,270 --> 00:43:31,760
counterpart at darpa or arpa-e or a

1141
00:43:34,710 --> 00:43:33,280
number of organizations and they'll

1142
00:43:38,710 --> 00:43:34,720
answer

1143
00:43:40,630 --> 00:43:38,720
it's in fact in my first week here i had

1144
00:43:42,550 --> 00:43:40,640
two meetings at darpa

1145
00:43:45,510 --> 00:43:42,560
in my second week here i had one with

1146
00:43:47,750 --> 00:43:45,520
the arpa-e director just as an example

1147
00:43:50,230 --> 00:43:47,760
and we are pursuing a number of

1148
00:43:52,309 --> 00:43:50,240
collaborative opportunities

1149
00:43:54,150 --> 00:43:52,319
some of these competitive

1150
00:43:55,910 --> 00:43:54,160
solicitations will actually be

1151
00:43:58,710 --> 00:43:55,920
co-sponsored

1152
00:44:00,390 --> 00:43:58,720
and we're also starting to coordinate uh

1153
00:44:02,069 --> 00:44:00,400
we have a long way to go

1154
00:44:03,349 --> 00:44:02,079
i'll admit that there are a large number

1155
00:44:06,790 --> 00:44:03,359
of agencies

1156
00:44:08,630 --> 00:44:06,800
and it's a big problem but we are

1157
00:44:10,230 --> 00:44:08,640
directly addressing

1158
00:44:13,190 --> 00:44:10,240
that issue

1159
00:44:15,990 --> 00:44:13,200
um the second your second question about

1160
00:44:17,109 --> 00:44:16,000
proposals uh we're also working on

1161
00:44:20,150 --> 00:44:17,119
um

1162
00:44:20,829 --> 00:44:20,160
i have no intention of creating a system

1163
00:44:24,390 --> 00:44:20,839

that

1164
00:44:27,270 --> 00:44:24,400
requires a million dollar investment in

1165
00:44:29,510 --> 00:44:27,280
proposal generation to win 100k

1166
00:44:31,270 --> 00:44:29,520
okay so there are a couple ways we can

1167
00:44:33,750 --> 00:44:31,280
do that we can streamline the proposal

1168
00:44:35,190 --> 00:44:33,760
process we can request

1169
00:44:37,589 --> 00:44:35,200
uh

1170
00:44:40,150 --> 00:44:37,599
one or two page proposals for early

1171
00:44:41,910 --> 00:44:40,160
stage innovation things more so you know

1172
00:44:43,670 --> 00:44:41,920
ten page i'm making up these numbers

1173
00:44:46,390 --> 00:44:43,680
okay don't quote me on

1174
00:44:48,790 --> 00:44:46,400
ten page proposals for game changing

1175
00:44:50,550 --> 00:44:48,800
kind of things and the bigger

1176
00:44:53,510 --> 00:44:50,560
uh think of them as full mission

1177
00:44:56,230 --> 00:44:53,520
proposals in the smd speak

1178
00:44:59,109 --> 00:44:56,240
for technology demonstration missions so

1179
00:45:01,270 --> 00:44:59,119
we can tailor the proposal process we

1180
00:45:04,230 --> 00:45:01,280
can the other thing i would say is if

1181
00:45:07,190 --> 00:45:04,240
the proposal selection process

1182
00:45:08,630 --> 00:45:07,200
is skewed towards buzzwords then we've

1183
00:45:10,309 --> 00:45:08,640
done a bad job

1184
00:45:14,069 --> 00:45:10,319
okay so the other big part of that is

1185
00:45:17,270 --> 00:45:14,079
peer review and how we do peer review

1186
00:45:19,750 --> 00:45:17,280
who's qualified to do peer review

1187
00:45:21,670 --> 00:45:19,760
um and you know

1188
00:45:22,390 --> 00:45:21,680

making sure that the peer review burden

1189
00:45:25,430 --> 00:45:22,400
is

1190
00:45:27,430 --> 00:45:25,440
appropriate

1191
00:45:28,790 --> 00:45:27,440
and not overly cumbersome

1192
00:45:30,470 --> 00:45:28,800
right and that's something else that

1193
00:45:32,950 --> 00:45:30,480
we're working we're getting a lot of

1194
00:45:34,390 --> 00:45:32,960
good advice i should point out from the

1195
00:45:36,630 --> 00:45:34,400
mission directorates that have done some

1196
00:45:38,950 --> 00:45:36,640
of this in the past

1197
00:45:41,109 --> 00:45:38,960
and we're modeling our efforts largely

1198
00:45:43,190 --> 00:45:41,119
on their processes but we are

1199
00:45:45,589 --> 00:45:43,200
tweaking it some because it's it's a

1200
00:45:47,270 --> 00:45:45,599
different focus than nasa has has a plot

1201
00:45:50,230 --> 00:45:47,280
in the past but those are very good

1202
00:45:51,990 --> 00:45:50,240
points i don't have the

1203
00:45:54,710 --> 00:45:52,000
final answer on that but i will tell you

1204
00:45:56,470 --> 00:45:54,720
that we're working at heart

1205
00:45:58,790 --> 00:45:56,480
and by the way if you have more input on

1206
00:46:00,710 --> 00:45:58,800
that i would suggest that you either

1207
00:46:02,069 --> 00:46:00,720
email me or

1208
00:46:03,589 --> 00:46:02,079
give it to your chief technology your

1209
00:46:05,589 --> 00:46:03,599
center chief technologist and i'm sure

1210
00:46:06,790 --> 00:46:05,599
they'll deliver it to me

1211
00:46:09,910 --> 00:46:06,800
yes ma'am

1212
00:46:10,870 --> 00:46:09,920
we have one more up here in the back oh

1213
00:46:12,630 --> 00:46:10,880

sorry

1214
00:46:14,630 --> 00:46:12,640
hi bobby

1215
00:46:16,230 --> 00:46:14,640
hey i have a quick question uh you

1216
00:46:18,069 --> 00:46:16,240
mentioned in your early stage um

1217
00:46:20,550 --> 00:46:18,079
innovation process that i think quote

1218
00:46:22,069 --> 00:46:20,560
we're looking for the best ideas

1219
00:46:24,710 --> 00:46:22,079
the question i have is

1220
00:46:26,069 --> 00:46:24,720
who and how is it determined what is the

1221
00:46:27,190 --> 00:46:26,079
best idea

1222
00:46:29,430 --> 00:46:27,200
yeah

1223
00:46:32,630 --> 00:46:29,440
that's good so that goes right into peer

1224
00:46:34,870 --> 00:46:32,640
review right so part of so

1225
00:46:36,870 --> 00:46:34,880
it depends exactly on what you know best

1226
00:46:38,950 --> 00:46:36,880
idea depends a little bit on which

1227
00:46:41,190 --> 00:46:38,960
program that we're talking about

1228
00:46:44,630 --> 00:46:41,200
okay but if we just pick a program for

1229
00:46:47,510 --> 00:46:44,640
example like the the new niacc program

1230
00:46:50,069 --> 00:46:47,520
the nasa institute for advanced concepts

1231
00:46:51,270 --> 00:46:50,079
right in the past that program you know

1232
00:46:54,390 --> 00:46:51,280
people would write

1233
00:46:56,069 --> 00:46:54,400
rather short proposals

1234
00:46:57,510 --> 00:46:56,079
in the past it was all done external and

1235
00:46:59,910 --> 00:46:57,520
people would write very rather short

1236
00:47:03,829 --> 00:46:59,920
proposals proposals were sent in to

1237
00:47:06,150 --> 00:47:03,839
niacc and they had an external team of

1238
00:47:07,990 --> 00:47:06,160

i think they called them superstars uh

1239
00:47:09,589 --> 00:47:08,000
these were people that had done this

1240
00:47:11,430 --> 00:47:09,599
kind of work in the past that would

1241
00:47:13,109 --> 00:47:11,440
review those proposals

1242
00:47:13,990 --> 00:47:13,119
and they'd have to pass through that

1243
00:47:15,589 --> 00:47:14,000
gate

1244
00:47:17,349 --> 00:47:15,599
and then the niacc director would make

1245
00:47:19,510 --> 00:47:17,359
the selections from there

1246
00:47:21,990 --> 00:47:19,520
okay and

1247
00:47:23,109 --> 00:47:22,000
we're looking at a similar process here

1248
00:47:24,950 --> 00:47:23,119
this time

1249
00:47:26,390 --> 00:47:24,960
except for you know the way we staff

1250
00:47:28,230 --> 00:47:26,400
that peer review team is going to be a

1251
00:47:30,710 --> 00:47:28,240
little bit different one of the things i

1252
00:47:33,510 --> 00:47:30,720
have to to my advantage now is i have

1253
00:47:35,990 --> 00:47:33,520
the center chief technologists okay

1254
00:47:38,150 --> 00:47:36,000
who are going to be

1255
00:47:39,430 --> 00:47:38,160
while they are at a center are going to

1256
00:47:41,349 --> 00:47:39,440
be away

1257
00:47:43,270 --> 00:47:41,359
from the bid and proposal process

1258
00:47:45,589 --> 00:47:43,280
separated from the bid and proposal

1259
00:47:48,309 --> 00:47:45,599
process so that they can help me in the

1260
00:47:50,069 --> 00:47:48,319
peer review we also by the way

1261
00:47:51,430 --> 00:47:50,079
have at our disposal a number of

1262
00:47:52,390 --> 00:47:51,440
organizations

1263
00:47:55,109 --> 00:47:52,400

including

1264
00:47:55,990 --> 00:47:55,119
the fellows at the nesc i should call

1265
00:47:58,470 --> 00:47:56,000
out

1266
00:47:59,910 --> 00:47:58,480
right the fellows at the nasc have been

1267
00:48:01,270 --> 00:47:59,920
are well established in various

1268
00:48:02,790 --> 00:48:01,280
disciplines

1269
00:48:04,790 --> 00:48:02,800
and for something like the space

1270
00:48:06,950 --> 00:48:04,800
technology research grant program which

1271
00:48:09,670 --> 00:48:06,960
you can think of as a disciplinary

1272
00:48:12,230 --> 00:48:09,680
program you can imagine involving some

1273
00:48:14,390 --> 00:48:12,240
of the nesc technical fellows and the

1274
00:48:15,510 --> 00:48:14,400
community that they

1275
00:48:18,549 --> 00:48:15,520
feed into

1276
00:48:21,109 --> 00:48:18,559
into the peer review process as well

1277
00:48:23,030 --> 00:48:21,119
so the best ideas you're right uh it's

1278
00:48:24,549 --> 00:48:23,040
very dependent on your peer reviewers

1279
00:48:26,870 --> 00:48:24,559
and that's why we're spending so much

1280
00:48:28,549 --> 00:48:26,880
time making sure that we identify

1281
00:48:31,109 --> 00:48:28,559
the right peer reviewers for the right

1282
00:48:34,309 --> 00:48:33,109
thank you okay we'll take one more from

1283
00:48:35,589 --> 00:48:34,319
headquarters and then we'll go to the

1284
00:48:38,069 --> 00:48:35,599
centers

1285
00:48:39,829 --> 00:48:38,079
um i think this is related to both of

1286
00:48:41,829 --> 00:48:39,839
the previous questions

1287
00:48:44,069 --> 00:48:41,839
if i understand correctly the

1288
00:48:46,549 --> 00:48:44,079

smd solicitation process inherits a lot

1289
00:48:49,030 --> 00:48:46,559
from the decadal surveys and i'm curious

1290
00:48:52,069 --> 00:48:49,040
if there's an analog to the science

1291
00:48:53,349 --> 00:48:52,079
decadal surveys for technology

1292
00:48:56,069 --> 00:48:53,359
yeah so the

1293
00:48:58,870 --> 00:48:56,079
the analog would be the technology road

1294
00:49:00,630 --> 00:48:58,880
mapping activities

1295
00:49:03,190 --> 00:49:00,640
for this program

1296
00:49:05,349 --> 00:49:03,200
at nasa the nasa technology road mapping

1297
00:49:06,230 --> 00:49:05,359
activities

1298
00:49:07,990 --> 00:49:06,240
now

1299
00:49:10,470 --> 00:49:08,000
one of the functions of my office is to

1300
00:49:11,589 --> 00:49:10,480
actually perform that technology road

1301
00:49:13,109 --> 00:49:11,599
mapping

1302
00:49:15,589 --> 00:49:13,119
i didn't have time to talk about it but

1303
00:49:16,549 --> 00:49:15,599
we are getting started on that process

1304
00:49:18,790 --> 00:49:16,559
it's something that we're going to

1305
00:49:20,630 --> 00:49:18,800
update on something like a four year

1306
00:49:22,710 --> 00:49:20,640
cycle

1307
00:49:24,790 --> 00:49:22,720
so it's not it's a little quicker than

1308
00:49:28,309 --> 00:49:24,800
the decadal survey but it's

1309
00:49:30,230 --> 00:49:28,319
in that standard if you will

1310
00:49:33,510 --> 00:49:30,240
and the last time this was done it was

1311
00:49:34,790 --> 00:49:33,520
done in about the 2004 time frame

1312
00:49:36,470 --> 00:49:34,800
um

1313
00:49:39,030 --> 00:49:36,480

right after the aldridge commission

1314
00:49:42,390 --> 00:49:39,040
report came out there were 16 technology

1315
00:49:43,750 --> 00:49:42,400
areas identified i think it was

1316
00:49:46,069 --> 00:49:43,760
i was out of the agency at that time i

1317
00:49:48,390 --> 00:49:46,079
think it was apio

1318
00:49:50,630 --> 00:49:48,400
that ran that activity so those things

1319
00:49:52,390 --> 00:49:50,640
those reports all exist actually and

1320
00:49:53,349 --> 00:49:52,400
we're we're using those as a starting

1321
00:49:55,829 --> 00:49:53,359
point

1322
00:49:58,790 --> 00:49:55,839
for kicking off this new activity and so

1323
00:50:01,270 --> 00:49:58,800
if you think about those apio reports or

1324
00:50:03,750 --> 00:50:01,280
a improved version an updated and

1325
00:50:06,069 --> 00:50:03,760
improved version of those apio reports

1326
00:50:09,190 --> 00:50:06,079
as a form of a decadal survey kind of

1327
00:50:11,829 --> 00:50:09,200
input then we do have that to inform our

1328
00:50:14,309 --> 00:50:11,839
grand challenges and to inform our

1329
00:50:15,109 --> 00:50:14,319
solicitations

1330
00:50:17,910 --> 00:50:15,119
thanks

1331
00:50:26,390 --> 00:50:17,920
okay we'll now uh take a question from

1332
00:50:31,829 --> 00:50:29,190
hello good afternoon mr brown and this

1333
00:50:33,750 --> 00:50:31,839
is uh dr shantaram pai

1334
00:50:34,710 --> 00:50:33,760
uh speaking from nasa glenn research

1335
00:50:38,150 --> 00:50:34,720
center

1336
00:50:40,790 --> 00:50:38,160
in cleveland ohio speaking i have a

1337
00:50:42,870 --> 00:50:40,800
three-part question and one

1338
00:50:45,510 --> 00:50:42,880

cautionary note

1339
00:50:49,510 --> 00:50:45,520
first of all you talked about

1340
00:50:51,829 --> 00:50:49,520
big nasa space act and you mentioned r t

1341
00:50:52,950 --> 00:50:51,839
competency level flight hardware

1342
00:50:55,589 --> 00:50:52,960
development

1343
00:50:57,829 --> 00:50:55,599
mission operations core competency

1344
00:50:59,670 --> 00:50:57,839
i would like to see how you are relating

1345
00:51:01,829 --> 00:50:59,680
those three points to

1346
00:51:04,069 --> 00:51:01,839
technology readiness level

1347
00:51:07,030 --> 00:51:04,079
game changing and cross-cutting

1348
00:51:10,069 --> 00:51:07,040
technologies on a one-to-one basis

1349
00:51:14,870 --> 00:51:10,079
second you talked about a lot about

1350
00:51:16,150 --> 00:51:14,880
physics based uh do we have any database

1351
00:51:18,150 --> 00:51:16,160
from the

1352
00:51:19,109 --> 00:51:18,160
presently constellation project or

1353
00:51:21,829 --> 00:51:19,119
anything

1354
00:51:24,790 --> 00:51:21,839
where we still need answers to some new

1355
00:51:25,829 --> 00:51:24,800
technology using physics

1356
00:51:28,150 --> 00:51:25,839
third

1357
00:51:31,510 --> 00:51:28,160
how does it change uh

1358
00:51:33,030 --> 00:51:31,520
the existing nasa goal

1359
00:51:34,950 --> 00:51:33,040
3f

1360
00:51:36,390 --> 00:51:34,960
which is understand the effects of space

1361
00:51:39,670 --> 00:51:36,400
and so on

1362
00:51:42,069 --> 00:51:39,680
lastly the cautionary note is

1363
00:51:43,829 --> 00:51:42,079

we have done similar thing under the

1364
00:51:46,549 --> 00:51:43,839
nglt program

1365
00:51:49,670 --> 00:51:46,559
we competed among ourselves among our

1366
00:51:52,870 --> 00:51:49,680
centers and lesson learned from that

1367
00:51:54,069 --> 00:51:52,880
will be very useful again thank you

1368
00:51:55,829 --> 00:51:54,079
okay

1369
00:51:58,150 --> 00:51:55,839
uh thank you for the question i will try

1370
00:52:00,150 --> 00:51:58,160
to address all the parts

1371
00:52:02,870 --> 00:52:00,160
uh that i can remember

1372
00:52:04,790 --> 00:52:02,880
um so uh first of all your first part

1373
00:52:06,069 --> 00:52:04,800
was about the three long-standing core

1374
00:52:08,309 --> 00:52:06,079
competencies

1375
00:52:11,670 --> 00:52:08,319
i cannot map those three long-standing

1376
00:52:13,109 --> 00:52:11,680
core competencies to the three divisions

1377
00:52:14,710 --> 00:52:13,119
okay because all three of those

1378
00:52:16,069 --> 00:52:14,720
divisions relate to research and

1379
00:52:22,470 --> 00:52:16,079
technology

1380
00:52:23,910 --> 00:52:22,480
uh spans a trl of one up to something

1381
00:52:26,470 --> 00:52:23,920
like six

1382
00:52:29,190 --> 00:52:26,480
so it includes fundamental work

1383
00:52:31,829 --> 00:52:29,200
ground-based and lab test work and

1384
00:52:33,750 --> 00:52:31,839
proving things in a relevant environment

1385
00:52:35,750 --> 00:52:33,760
i will tell you that all three of those

1386
00:52:37,190 --> 00:52:35,760
long-standing core competencies are

1387
00:52:39,109 --> 00:52:37,200
important

1388
00:52:41,349 --> 00:52:39,119

and you can imagine that if we did not

1389
00:52:42,870 --> 00:52:41,359
have a vibrant

1390
00:52:44,870 --> 00:52:42,880
strong investment in research and

1391
00:52:47,030 --> 00:52:44,880
technology you can imagine the kinds of

1392
00:52:49,270 --> 00:52:47,040
programs flight hardware and mission

1393
00:52:51,190 --> 00:52:49,280
operations programs that one would be

1394
00:52:52,790 --> 00:52:51,200
able to do in the future they would be

1395
00:52:54,870 --> 00:52:52,800
in my view they'd be a little more

1396
00:52:56,470 --> 00:52:54,880
incremental if you will

1397
00:52:57,910 --> 00:52:56,480
and you can also imagine that without

1398
00:52:59,430 --> 00:52:57,920
the flight hardware or mission

1399
00:53:01,510 --> 00:52:59,440
operations pull

1400
00:53:04,790 --> 00:53:01,520
we would end up spending all our time in

1401
00:53:07,589 --> 00:53:04,800
the proverbial technology sandbox which

1402
00:53:09,430 --> 00:53:07,599
is also not what nasa is about

1403
00:53:11,349 --> 00:53:09,440
so all three of those

1404
00:53:14,470 --> 00:53:11,359
long-standing core competencies i think

1405
00:53:16,150 --> 00:53:14,480
are important but within oct

1406
00:53:18,230 --> 00:53:16,160
the divisions and programs within the

1407
00:53:22,309 --> 00:53:18,240
office of the chief technologist are

1408
00:53:24,309 --> 00:53:22,319
focused on research and technology

1409
00:53:25,589 --> 00:53:24,319
uh another part of your question had to

1410
00:53:28,549 --> 00:53:25,599
do with uh

1411
00:53:31,190 --> 00:53:28,559
physics based uh

1412
00:53:33,430 --> 00:53:31,200
you know physic fundamental physics and

1413
00:53:35,829 --> 00:53:33,440

uh investments therein in the

1414
00:53:37,510 --> 00:53:35,839
constellation program i can point to a

1415
00:53:39,270 --> 00:53:37,520
number of things there i could talk

1416
00:53:41,910 --> 00:53:39,280
about the launch abort system for

1417
00:53:44,069 --> 00:53:41,920
example uh the one i know the most about

1418
00:53:46,230 --> 00:53:44,079
is the investments that were made in

1419
00:53:48,470 --> 00:53:46,240
heat shield technology this was not

1420
00:53:50,710 --> 00:53:48,480
actually made

1421
00:53:54,549 --> 00:53:50,720
within constellation it was made within

1422
00:53:56,309 --> 00:53:54,559
esmd in support of constellation

1423
00:53:58,230 --> 00:53:56,319
but there was an advanced development

1424
00:53:59,990 --> 00:53:58,240
project it was led out of nasa ames

1425
00:54:02,870 --> 00:54:00,000
research center it involved many of the

1426
00:54:04,390 --> 00:54:02,880
nasa centers including glenn

1427
00:54:05,990 --> 00:54:04,400
and they matured

1428
00:54:08,630 --> 00:54:06,000
uh eight

1429
00:54:10,309 --> 00:54:08,640
ablative tps materials

1430
00:54:11,430 --> 00:54:10,319
uh from five different commercial

1431
00:54:13,270 --> 00:54:11,440
vendors

1432
00:54:14,710 --> 00:54:13,280
and the reason this investment was made

1433
00:54:16,309 --> 00:54:14,720
was frankly at the beginning of the

1434
00:54:18,390 --> 00:54:16,319
program

1435
00:54:20,230 --> 00:54:18,400
nasa had not done much in ablative

1436
00:54:21,589 --> 00:54:20,240
thermal protection system materials in a

1437
00:54:23,750 --> 00:54:21,599
long time

1438
00:54:25,910 --> 00:54:23,760

and the fundamental physics of ablative

1439
00:54:27,270 --> 00:54:25,920
thermal protection materials was not

1440
00:54:29,270 --> 00:54:27,280
well known

1441
00:54:31,589 --> 00:54:29,280
and so through analysis and through a

1442
00:54:32,470 --> 00:54:31,599
lot of ground-based testing

1443
00:54:34,069 --> 00:54:32,480
these

1444
00:54:36,309 --> 00:54:34,079
eight different materials were matured

1445
00:54:37,910 --> 00:54:36,319
there were down selects along the way

1446
00:54:40,309 --> 00:54:37,920
there were two materials that were

1447
00:54:42,309 --> 00:54:40,319
brought all the way up for consideration

1448
00:54:44,630 --> 00:54:42,319
for flight on orion

1449
00:54:47,349 --> 00:54:44,640
one of them was ultimately selected avco

1450
00:54:49,750 --> 00:54:47,359
or a a reformulated avcote was

1451
00:54:51,510 --> 00:54:49,760
ultimately selected for flight on orion

1452
00:54:53,190 --> 00:54:51,520
the reason this is important to me is

1453
00:54:55,829 --> 00:54:53,200
that the other one the one that was not

1454
00:54:56,710 --> 00:54:55,839
selected which was a tiled pika heat

1455
00:54:58,309 --> 00:54:56,720
shield

1456
00:55:01,430 --> 00:54:58,319
something that had been developed

1457
00:55:03,430 --> 00:55:01,440
through this program this esmd program

1458
00:55:04,630 --> 00:55:03,440
is now going to fly on the mars science

1459
00:55:06,470 --> 00:55:04,640
laboratory

1460
00:55:09,430 --> 00:55:06,480
in fact you know in a parallel

1461
00:55:11,349 --> 00:55:09,440
development in the same slice of time

1462
00:55:13,589 --> 00:55:11,359
the mars science laboratory ran into

1463
00:55:15,910 --> 00:55:13,599

some challenges with its heat shield and

1464
00:55:18,390 --> 00:55:15,920
because of the investments in technology

1465
00:55:20,710 --> 00:55:18,400
that esmd had been making

1466
00:55:23,670 --> 00:55:20,720
tiled pika was an option

1467
00:55:25,910 --> 00:55:23,680
that the msl project could consider

1468
00:55:27,670 --> 00:55:25,920
they considered it in their own right

1469
00:55:29,670 --> 00:55:27,680
they did you know the design and

1470
00:55:31,990 --> 00:55:29,680
development on their own and it's now

1471
00:55:33,270 --> 00:55:32,000
going to fly to mars

1472
00:55:35,030 --> 00:55:33,280
uh you know

1473
00:55:36,630 --> 00:55:35,040
essentially a five meter diameter heat

1474
00:55:41,589 --> 00:55:36,640
shield is going to fly to mars launched

1475
00:55:43,430 --> 00:55:41,599
in 2010 and landing in 2012 essentially

1476
00:55:47,349 --> 00:55:43,440
um and this development wouldn't have

1477
00:55:48,789 --> 00:55:47,359
been possible this this use by the smd

1478
00:55:50,950 --> 00:55:48,799
on the mars science lab wouldn't have

1479
00:55:54,069 --> 00:55:50,960
been possible without the investment in

1480
00:55:57,510 --> 00:55:54,079
fundamental physics made years earlier

1481
00:55:58,630 --> 00:55:57,520
by esmd and so i think it is a useful

1482
00:55:59,829 --> 00:55:58,640
example

1483
00:56:05,750 --> 00:55:59,839
of

1484
00:56:09,349 --> 00:56:07,190
so your question on the agency's

1485
00:56:12,069 --> 00:56:09,359
strategic goals i you know i'm going to

1486
00:56:13,910 --> 00:56:12,079
have to come back to it another time

1487
00:56:15,270 --> 00:56:13,920
because i want to make sure we get to

1488
00:56:17,270 --> 00:56:15,280

all the questions

1489
00:56:19,109 --> 00:56:17,280
okay we're gonna hop out to the jet

1490
00:56:25,270 --> 00:56:19,119
propulsion lab where we have two

1491
00:56:30,309 --> 00:56:28,470
um hi uh bobby i wanted to ask you uh

1492
00:56:32,630 --> 00:56:30,319
are there going to be concept studies

1493
00:56:35,030 --> 00:56:32,640
developed for human missions to

1494
00:56:36,789 --> 00:56:35,040
asteroids and mars orbit and lagrangian

1495
00:56:39,670 --> 00:56:36,799
points and will they be tied in with the

1496
00:56:42,390 --> 00:56:39,680
technology program

1497
00:56:43,430 --> 00:56:42,400
uh yeah there will definitely be concept

1498
00:56:44,870 --> 00:56:43,440
studies

1499
00:56:46,950 --> 00:56:44,880
for all the human exploration

1500
00:56:48,470 --> 00:56:46,960
destinations that work is actually

1501
00:56:50,950 --> 00:56:48,480
ongoing

1502
00:56:53,589 --> 00:56:50,960
it's our it's been started it's being

1503
00:56:55,270 --> 00:56:53,599
run not by my organization it's being

1504
00:56:57,589 --> 00:56:55,280
run through the heft team the human

1505
00:56:59,750 --> 00:56:57,599
exploration frameworks team

1506
00:57:02,710 --> 00:56:59,760
and they're basically looking at a wide

1507
00:57:04,390 --> 00:57:02,720
range of design reference missions if

1508
00:57:05,910 --> 00:57:04,400
you will

1509
00:57:08,630 --> 00:57:05,920
that span

1510
00:57:10,829 --> 00:57:08,640
the range of destinations and dates

1511
00:57:13,670 --> 00:57:10,839
given in the president's speech and

1512
00:57:15,910 --> 00:57:13,680
different uh implementation approaches

1513
00:57:17,349 --> 00:57:15,920

uh for meeting those destinations and

1514
00:57:19,190 --> 00:57:17,359
dates

1515
00:57:21,190 --> 00:57:19,200
and that's that that team by the way is

1516
00:57:24,069 --> 00:57:21,200
sponsored by esmd

1517
00:57:26,470 --> 00:57:24,079
uh i have a representative on that team

1518
00:57:28,549 --> 00:57:26,480
uh rep you know representing technology

1519
00:57:30,230 --> 00:57:28,559
if you will and i'm actually serving on

1520
00:57:32,549 --> 00:57:30,240
the steering council

1521
00:57:43,510 --> 00:57:32,559
uh for the hef team but that work is

1522
00:57:49,510 --> 00:57:45,990
thank you for uh taking my question my

1523
00:57:52,390 --> 00:57:49,520
name is ernest robinson i'm a retired

1524
00:57:54,390 --> 00:57:52,400
aerospace engineer with a background in

1525
00:57:56,069 --> 00:57:54,400
the nuclear propulsion in the early

1526
00:57:59,030 --> 00:57:56,079
career

1527
00:58:01,829 --> 00:57:59,040
i want to focus on the issue of the

1528
00:58:04,309 --> 00:58:01,839
nuclear thermal rocket

1529
00:58:07,190 --> 00:58:04,319
based on nasa's

1530
00:58:09,510 --> 00:58:07,200
outstanding accomplishments

1531
00:58:13,190 --> 00:58:09,520
the nuclear rocket could

1532
00:58:16,309 --> 00:58:13,200
be flight qualified fairly quickly

1533
00:58:19,190 --> 00:58:16,319
and as recommended by the

1534
00:58:22,390 --> 00:58:19,200
dr 5.0

1535
00:58:25,349 --> 00:58:22,400
uh flight opportunities unmanned flight

1536
00:58:28,789 --> 00:58:25,359
opportunities for the nuclear rocket

1537
00:58:30,789 --> 00:58:28,799
uh are possible with the mars science re

1538
00:58:32,870 --> 00:58:30,799

sample return mission

1539
00:58:35,109 --> 00:58:32,880
and also with the proposed mission to a

1540
00:58:36,870 --> 00:58:35,119
neo

1541
00:58:41,630 --> 00:58:36,880
this

1542
00:58:46,150 --> 00:58:44,150
game-changing and cross-cutting

1543
00:58:47,829 --> 00:58:46,160
technology

1544
00:58:51,990 --> 00:58:47,839
that enables

1545
00:58:53,349 --> 00:58:52,000
a an affordable pilot admission to mars

1546
00:58:54,950 --> 00:58:53,359
one that

1547
00:58:57,270 --> 00:58:54,960
the logistics of which could be

1548
00:58:59,270 --> 00:58:57,280
supported by shuttle c

1549
00:59:01,109 --> 00:58:59,280
but my question is

1550
00:59:03,270 --> 00:59:01,119
will nasa

1551
00:59:05,750 --> 00:59:03,280
seriously consider

1552
00:59:07,109 --> 00:59:05,760
the nuclear rocket within the current

1553
00:59:11,510 --> 00:59:07,119
round

1554
00:59:14,069 --> 00:59:11,520
of rfis in enabling technology

1555
00:59:15,349 --> 00:59:14,079
and flagship demonstrations

1556
00:59:17,670 --> 00:59:15,359
and therefore

1557
00:59:20,069 --> 00:59:17,680
should we proceed to form up our

1558
00:59:22,630 --> 00:59:20,079
multi-agency team

1559
00:59:25,750 --> 00:59:22,640
and submit a proposal to flight qualify

1560
00:59:27,349 --> 00:59:25,760
the nuclear rocket thank you

1561
00:59:29,270 --> 00:59:27,359
thank you

1562
00:59:31,589 --> 00:59:29,280
yeah so

1563
00:59:35,030 --> 00:59:31,599

nuclear rockets are in

1564
00:59:36,390 --> 00:59:35,040
the esmd plants in fact if you're in

1565
00:59:39,109 --> 00:59:36,400
galveston

1566
00:59:40,630 --> 00:59:39,119
uh as part of the

1567
00:59:42,069 --> 00:59:40,640
industry days that are going on out

1568
00:59:43,670 --> 00:59:42,079
there you'll probably hear a little bit

1569
00:59:45,670 --> 00:59:43,680
about that

1570
00:59:47,589 --> 00:59:45,680
within etd

1571
00:59:49,750 --> 00:59:47,599
exploration technology development

1572
00:59:51,430 --> 00:59:49,760
demonstrator program there are some

1573
00:59:53,109 --> 00:59:51,440
investments being made in advanced

1574
00:59:57,430 --> 00:59:53,119
propulsion

1575
00:59:59,349 --> 00:59:57,440
cut across you know

1576
01:00:00,630 --> 00:59:59,359
split i guess you'd say and cut cut

1577
01:00:02,470 --> 01:00:00,640
across both

1578
01:00:05,109 --> 01:00:02,480
low thrust propulsion and high thrust

1579
01:00:07,910 --> 01:00:05,119
propulsion with uh in space propulsion

1580
01:00:10,870 --> 01:00:07,920
and within the high thrust uh you know

1581
01:00:12,870 --> 01:00:10,880
we're certainly looking at nuclear again

1582
01:00:14,470 --> 01:00:12,880
uh what the uh you know we're looking at

1583
01:00:17,190 --> 01:00:14,480
it technically

1584
01:00:18,950 --> 01:00:17,200
uh i i personally am excited about

1585
01:00:21,190 --> 01:00:18,960
looking at it technically what the

1586
01:00:23,510 --> 01:00:21,200
political and you know

1587
01:00:25,910 --> 01:00:23,520
social economic ramifications of that

1588
01:00:26,789 --> 01:00:25,920

are kind of downstream of us at this

1589
01:00:29,430 --> 01:00:26,799
point

1590
01:00:31,030 --> 01:00:29,440
but from a technical perspective uh it

1591
01:00:33,990 --> 01:00:31,040
should certainly be considered as you

1592
01:00:36,549 --> 01:00:34,000
have stated i personally don't think

1593
01:00:38,710 --> 01:00:36,559
it's related to mars sample return

1594
01:00:40,470 --> 01:00:38,720
uh i do think it's related to human

1595
01:00:42,069 --> 01:00:40,480
exploration to a wide variety of

1596
01:00:45,990 --> 01:00:42,079
destinations

1597
01:00:56,470 --> 01:00:48,630
okay thanks we'll now head out to nasa

1598
01:00:59,589 --> 01:00:57,829
good afternoon dr brown i'm donna

1599
01:01:01,990 --> 01:00:59,599
grigsby i was wondering if you would

1600
01:01:03,910 --> 01:01:02,000
share your views about anything that

1601
01:01:05,430 --> 01:01:03,920
your organization may be doing to break

1602
01:01:07,750 --> 01:01:05,440
down some of the other barriers to

1603
01:01:09,270 --> 01:01:07,760
proposal submission one of them being

1604
01:01:10,950 --> 01:01:09,280
the qualifications of the team or

1605
01:01:12,630 --> 01:01:10,960
individuals submitting it

1606
01:01:14,470 --> 01:01:12,640
which is derailed me

1607
01:01:17,990 --> 01:01:14,480
and others being that's not work that

1608
01:01:20,230 --> 01:01:19,190
oh

1609
01:01:23,030 --> 01:01:20,240
okay

1610
01:01:25,270 --> 01:01:23,040
well uh so part of the proposal process

1611
01:01:26,230 --> 01:01:25,280
uh will involve

1612
01:01:28,789 --> 01:01:26,240
uh

1613
01:01:31,109 --> 01:01:28,799

you know evaluation of the team that

1614
01:01:33,430 --> 01:01:31,119
submits the proposal qualifications of

1615
01:01:34,549 --> 01:01:33,440
the team that submits the proposal

1616
01:01:36,470 --> 01:01:34,559
but

1617
01:01:39,510 --> 01:01:36,480
at least within my program there's going

1618
01:01:40,710 --> 01:01:39,520
to be no uh

1619
01:01:43,349 --> 01:01:40,720
that's not something that your

1620
01:01:45,270 --> 01:01:43,359
organization should be doing kind of uh

1621
01:01:46,230 --> 01:01:45,280
feedback

1622
01:01:47,190 --> 01:01:46,240
um

1623
01:01:49,430 --> 01:01:47,200
i mean

1624
01:01:52,549 --> 01:01:49,440
this is best ideas from wherever the

1625
01:01:55,589 --> 01:01:52,559
best ideas may come okay i

1626
01:01:57,990 --> 01:01:55,599
think i've said that three times

1627
01:01:59,589 --> 01:01:58,000
i mean it

1628
01:02:00,870 --> 01:01:59,599
so i don't think you'll get that kind of

1629
01:02:03,670 --> 01:02:00,880
feedback

1630
01:02:04,950 --> 01:02:03,680
from the space technology program

1631
01:02:07,990 --> 01:02:04,960
but you know certainly we want to

1632
01:02:09,510 --> 01:02:08,000
consider the qualifications of the team

1633
01:02:11,029 --> 01:02:09,520
that is submitting the proposal because

1634
01:02:13,190 --> 01:02:11,039
when you select

1635
01:02:14,630 --> 01:02:13,200
uh an activity you want to have

1636
01:02:16,069 --> 01:02:14,640
assurances

1637
01:02:19,430 --> 01:02:16,079
uh that that activity will come to

1638
01:02:23,430 --> 01:02:21,510

okay thanks we'll now come back here to

1639
01:02:28,230 --> 01:02:23,440
headquarters for any final questions

1640
01:02:32,789 --> 01:02:30,230
up here in the front

1641
01:02:34,870 --> 01:02:32,799
could you hold for a microphone please

1642
01:02:50,230 --> 01:02:34,880
uh

1643
01:02:54,230 --> 01:02:50,240
mission directorate representative on

1644
01:02:56,470 --> 01:02:54,240
the sbir activities for esmd

1645
01:02:58,150 --> 01:02:56,480
so i've been involved for the last three

1646
01:03:01,190 --> 01:02:58,160
or four years in

1647
01:03:03,190 --> 01:03:01,200
in the sbir program

1648
01:03:05,029 --> 01:03:03,200
but one thing i've been doing a lot of

1649
01:03:06,230 --> 01:03:05,039
thinking on my own

1650
01:03:09,270 --> 01:03:06,240
um

1651
01:03:10,549 --> 01:03:09,280
exclusive of that activity of

1652
01:03:13,510 --> 01:03:10,559
what are the

1653
01:03:15,109 --> 01:03:13,520
real barriers to us accomplishing some

1654
01:03:17,670 --> 01:03:15,119
of the things we want to accomplish in

1655
01:03:20,870 --> 01:03:17,680
terms of space exploration

1656
01:03:23,750 --> 01:03:20,880
and and of course the first one you

1657
01:03:26,630 --> 01:03:23,760
first one you can easily define

1658
01:03:28,069 --> 01:03:26,640
is low-cost access to space

1659
01:03:29,750 --> 01:03:28,079
and that's a killer

1660
01:03:31,750 --> 01:03:29,760
i mean i've looked at all kinds of

1661
01:03:33,270 --> 01:03:31,760
concepts

1662
01:03:35,029 --> 01:03:33,280
you're not going to get more out of

1663
01:03:36,789 --> 01:03:35,039

chemical propulsion than you're getting

1664
01:03:39,430 --> 01:03:36,799
out of it now

1665
01:03:41,670 --> 01:03:39,440
i worked in that field for 25 years

1666
01:03:44,630 --> 01:03:41,680
before i started here so

1667
01:03:48,230 --> 01:03:44,640
and and in those 40 years total

1668
01:03:51,430 --> 01:03:48,240
our advances in isp were a few seconds

1669
01:03:53,349 --> 01:03:51,440
so we're not going any further with that

1670
01:03:56,549 --> 01:03:53,359
so i try to look at some alternative

1671
01:03:59,029 --> 01:03:56,559
concepts such as power beaming

1672
01:04:01,349 --> 01:03:59,039
with use of a hydrogen tank on the on

1673
01:04:04,150 --> 01:04:01,359
the vehicle you beam heat the hydrogen

1674
01:04:05,510 --> 01:04:04,160
you get maybe an isp of a thousand

1675
01:04:08,230 --> 01:04:05,520
um

1676
01:04:11,510 --> 01:04:08,240
anyway i'm diverging a little bit here

1677
01:04:12,470 --> 01:04:11,520
but my curiosity is is somebody sitting

1678
01:04:15,109 --> 01:04:12,480
there

1679
01:04:17,910 --> 01:04:15,119
trying to start from a viewpoint of what

1680
01:04:21,190 --> 01:04:17,920
is it that nasa needs to accomplish

1681
01:04:23,270 --> 01:04:21,200
a lot of its future goals and and trying

1682
01:04:27,029 --> 01:04:23,280
to define what technologies you got to

1683
01:04:30,230 --> 01:04:27,039
work on on that basis

1684
01:04:31,990 --> 01:04:30,240
uh yeah yeah um so you uh in a nutshell

1685
01:04:35,589 --> 01:04:32,000
you just define my job

1686
01:04:38,230 --> 01:04:36,950
so when i talk about these grand

1687
01:04:39,589 --> 01:04:38,240
challenges

1688
01:04:41,029 --> 01:04:39,599

right

1689
01:04:42,230 --> 01:04:41,039
where do these grand challenges come

1690
01:04:43,910 --> 01:04:42,240
from

1691
01:04:45,510 --> 01:04:43,920
you know you might start with nasa's

1692
01:04:47,670 --> 01:04:45,520
strategic plan

1693
01:04:48,870 --> 01:04:47,680
right which includes things like

1694
01:04:51,349 --> 01:04:48,880
low-cost

1695
01:04:53,349 --> 01:04:51,359
access to space

1696
01:04:57,910 --> 01:04:53,359
and you might flow from that strategic

1697
01:05:00,230 --> 01:04:57,920
plan to capabilities that nasa seeks

1698
01:05:02,470 --> 01:05:00,240
and then solicit ideas solicit

1699
01:05:07,029 --> 01:05:02,480
technological solutions to fulfill those

1700
01:05:10,630 --> 01:05:08,950
i agree with what you're saying uh in

1701
01:05:12,390 --> 01:05:10,640
particular about the importance of

1702
01:05:14,470 --> 01:05:12,400
low-cost access to space and the

1703
01:05:16,870 --> 01:05:14,480
difficulty in achieving it

1704
01:05:18,789 --> 01:05:16,880
uh both of those statements i think are

1705
01:05:20,230 --> 01:05:18,799
factually correct

1706
01:05:22,950 --> 01:05:20,240
um

1707
01:05:24,630 --> 01:05:22,960
that doesn't mean we shouldn't try right

1708
01:05:26,470 --> 01:05:24,640
and we can try a number of different

1709
01:05:30,069 --> 01:05:26,480
ways so there are investments being made

1710
01:05:31,750 --> 01:05:30,079
in esmd uh in the heavy lift program for

1711
01:05:34,630 --> 01:05:31,760
example

1712
01:05:36,630 --> 01:05:34,640
maybe not to improve isp so much but to

1713
01:05:38,710 --> 01:05:36,640

provide a larger system to lift more

1714
01:05:40,710 --> 01:05:38,720
payload into orbit

1715
01:05:44,069 --> 01:05:40,720
there are certainly also investments we

1716
01:05:46,470 --> 01:05:44,079
can make in in-space propulsion

1717
01:05:47,829 --> 01:05:46,480
or in propellant transfer and storage

1718
01:05:49,430 --> 01:05:47,839
capabilities

1719
01:05:50,870 --> 01:05:49,440
because 80 percent of these vehicles

1720
01:05:53,510 --> 01:05:50,880
that we're talking about for a mars

1721
01:05:54,630 --> 01:05:53,520
mission or for a near-earth object

1722
01:05:55,990 --> 01:05:54,640
human mission

1723
01:05:58,470 --> 01:05:56,000
is propellant

1724
01:05:59,910 --> 01:05:58,480
right and so having a propellant depot

1725
01:06:01,430 --> 01:05:59,920
or something like that

1726
01:06:04,630 --> 01:06:01,440
that's operational would be you know

1727
01:06:07,270 --> 01:06:04,640
could be a big swinger here so we have

1728
01:06:09,750 --> 01:06:07,280
basically right now within esmd alone

1729
01:06:11,029 --> 01:06:09,760
there are three parallel paths that all

1730
01:06:12,710 --> 01:06:11,039
affect

1731
01:06:14,309 --> 01:06:12,720
not getting to low earth orbit but

1732
01:06:18,150 --> 01:06:14,319
getting out

1733
01:06:20,390 --> 01:06:18,160
right heavy lift investments in space

1734
01:06:21,349 --> 01:06:20,400
propulsion and propellant transfer and

1735
01:06:24,309 --> 01:06:21,359
storage

1736
01:06:25,190 --> 01:06:24,319
in addition to that within my office

1737
01:06:26,710 --> 01:06:25,200
we're

1738
01:06:29,829 --> 01:06:26,720

investing we have a small amount of

1739
01:06:31,510 --> 01:06:29,839
funding to invest in longer term

1740
01:06:33,990 --> 01:06:31,520
solutions

1741
01:06:35,990 --> 01:06:34,000
like your power beaming example

1742
01:06:38,150 --> 01:06:36,000
a lot another example would be nano

1743
01:06:40,150 --> 01:06:38,160
energetics which is a

1744
01:06:42,549 --> 01:06:40,160
a very high thrust

1745
01:06:45,589 --> 01:06:42,559
it's not an isp benefit but it's a for

1746
01:06:47,029 --> 01:06:45,599
cargo for lifting cargo up

1747
01:06:49,270 --> 01:06:47,039
effectively

1748
01:06:50,710 --> 01:06:49,280
it also has some national security

1749
01:06:52,230 --> 01:06:50,720
implications

1750
01:06:55,190 --> 01:06:52,240
uh so we could do that in partnership

1751
01:06:56,630 --> 01:06:55,200
with some other government agencies

1752
01:06:59,190 --> 01:06:56,640
so there are so while we make

1753
01:07:01,510 --> 01:06:59,200
investments in what we might think of as

1754
01:07:04,069 --> 01:07:01,520
near-term near-term approaches that

1755
01:07:06,069 --> 01:07:04,079
could get to the capabilities we need

1756
01:07:07,589 --> 01:07:06,079
we can also invest

1757
01:07:10,470 --> 01:07:07,599
we also need to keep an eye to the

1758
01:07:12,950 --> 01:07:10,480
future and make i would say smaller

1759
01:07:16,870 --> 01:07:12,960
investments but certainly

1760
01:07:19,190 --> 01:07:16,880
non-zero investments in those long-term

1761
01:07:23,029 --> 01:07:19,200
more visionary approaches

1762
01:07:29,270 --> 01:07:24,549
okay i think we have time for one more

1763
01:07:34,630 --> 01:07:31,029

hi bobby i'm darren skelly with booz

1764
01:07:36,069 --> 01:07:34,640
allen hamilton um question for you is

1765
01:07:39,190 --> 01:07:36,079
around culture

1766
01:07:42,230 --> 01:07:39,200
um we do a lot of support excuse me with

1767
01:07:43,910 --> 01:07:42,240
darpa arpa-e and irpa and one of the

1768
01:07:45,990 --> 01:07:43,920
things that makes them so successful as

1769
01:07:48,549 --> 01:07:46,000
you well know based on your experience

1770
01:07:51,589 --> 01:07:48,559
is that acceptance of failure

1771
01:07:54,069 --> 01:07:51,599
and changing to a culture where

1772
01:07:56,470 --> 01:07:54,079
nasa is so success oriented and so

1773
01:07:57,910 --> 01:07:56,480
driven to to meet the requirements how

1774
01:08:00,150 --> 01:07:57,920
are you going to allow or how are you

1775
01:08:02,309 --> 01:08:00,160
going to help this organization more

1776
01:08:03,589 --> 01:08:02,319
where failure is an acceptable answer to

1777
01:08:05,270 --> 01:08:03,599
really get those game-changing and

1778
01:08:07,109 --> 01:08:05,280
innovative technologies

1779
01:08:10,870 --> 01:08:07,119
yeah that's a great question and i'm

1780
01:08:12,950 --> 01:08:10,880
very thank you for asking that um

1781
01:08:15,270 --> 01:08:12,960
that's something that i've been focused

1782
01:08:19,110 --> 01:08:15,280
on since the day i came back to nasa

1783
01:08:21,349 --> 01:08:19,120
okay and and you're absolutely right

1784
01:08:24,149 --> 01:08:21,359
if failure is not an option is the

1785
01:08:26,070 --> 01:08:24,159
mantra for the whole agency including

1786
01:08:29,110 --> 01:08:26,080
our technology program

1787
01:08:30,709 --> 01:08:29,120
then we're not going to take large steps

1788
01:08:31,990 --> 01:08:30,719

uh we're going to take

1789
01:08:34,309 --> 01:08:32,000
you know small

1790
01:08:36,470 --> 01:08:34,319
steps towards the future

1791
01:08:38,789 --> 01:08:36,480
uh i so what i've been

1792
01:08:40,709 --> 01:08:38,799
advocating for and uh by the way the

1793
01:08:42,550 --> 01:08:40,719
administrator uh

1794
01:08:43,910 --> 01:08:42,560
will probably be talking about this

1795
01:08:45,590 --> 01:08:43,920
rather shortly

1796
01:08:47,269 --> 01:08:45,600
it's something that he's he's very

1797
01:08:48,789 --> 01:08:47,279
attuned to

1798
01:08:51,510 --> 01:08:48,799
is a tiered

1799
01:08:53,990 --> 01:08:51,520
uh approach to acceptable risk what we

1800
01:08:55,829 --> 01:08:54,000
as an agency define as acceptable risk

1801
01:08:57,110 --> 01:08:55,839
obviously for our human space flight

1802
01:09:00,229 --> 01:08:57,120
systems

1803
01:09:01,910 --> 01:09:00,239
you know where safety is job one

1804
01:09:04,709 --> 01:09:01,920
there's there's a very high risk

1805
01:09:07,829 --> 01:09:04,719
threshold right or very low excuse me

1806
01:09:09,349 --> 01:09:07,839
risk threshold um

1807
01:09:11,030 --> 01:09:09,359
as you go maybe and you look at some of

1808
01:09:12,550 --> 01:09:11,040
the flagship missions that the science

1809
01:09:14,950 --> 01:09:12,560
mission direct science mission

1810
01:09:17,189 --> 01:09:14,960
directorate accomplishes these are very

1811
01:09:19,430 --> 01:09:17,199
large investments financially

1812
01:09:20,870 --> 01:09:19,440
and failure in one of those investments

1813
01:09:23,110 --> 01:09:20,880

you know would be significant for the

1814
01:09:25,430 --> 01:09:23,120
agency so maybe you know no lives are

1815
01:09:27,189 --> 01:09:25,440
lost so maybe it's a step down from what

1816
01:09:29,510 --> 01:09:27,199
we do in human space flight but it's not

1817
01:09:31,349 --> 01:09:29,520
a very significant step down it's just a

1818
01:09:32,950 --> 01:09:31,359
modest modest step down

1819
01:09:36,309 --> 01:09:32,960
but as you look at maybe the smaller

1820
01:09:39,110 --> 01:09:36,319
missions that smd and other and within

1821
01:09:41,349 --> 01:09:39,120
esmd that the that the robotic

1822
01:09:43,269 --> 01:09:41,359
the robotic scouts might look at you

1823
01:09:45,189 --> 01:09:43,279
certainly should be we should actually

1824
01:09:47,269 --> 01:09:45,199
encourage our people

1825
01:09:49,110 --> 01:09:47,279
to take more risk and we should applaud

1826
01:09:50,789 --> 01:09:49,120
them when they do

1827
01:09:52,630 --> 01:09:50,799
and as you step away from the missions

1828
01:09:55,510 --> 01:09:52,640
into the technology program it's

1829
01:09:57,830 --> 01:09:55,520
absolutely essential that we take risk

1830
01:10:00,550 --> 01:09:57,840
the game-changing development program

1831
01:10:03,669 --> 01:10:00,560
within technology is where we can take

1832
01:10:05,590 --> 01:10:03,679
that risk and it's where we will

1833
01:10:07,830 --> 01:10:05,600
take that risk

1834
01:10:09,189 --> 01:10:07,840
we've been talking about what you might

1835
01:10:12,709 --> 01:10:09,199
consider to be

1836
01:10:13,750 --> 01:10:12,719
rather low success rates

1837
01:10:15,830 --> 01:10:13,760
now

1838
01:10:17,990 --> 01:10:15,840

the important thing there is that

1839
01:10:21,669 --> 01:10:18,000
when we fail notice i didn't say if we

1840
01:10:23,430 --> 01:10:21,679
fail i said when we fail because we will

1841
01:10:26,310 --> 01:10:23,440
when we fail

1842
01:10:27,669 --> 01:10:26,320
we can't fail because of

1843
01:10:30,709 --> 01:10:27,679
incompetence

1844
01:10:34,070 --> 01:10:30,719
right we can't fail because we made some

1845
01:10:35,750 --> 01:10:34,080
sign error right an equation somewhere

1846
01:10:38,470 --> 01:10:35,760
or something like that

1847
01:10:39,910 --> 01:10:38,480
but it has to be acceptable to fail

1848
01:10:43,030 --> 01:10:39,920
because we

1849
01:10:45,270 --> 01:10:43,040
reached so far and we just missed

1850
01:10:47,590 --> 01:10:45,280
right as long as we gather the lessons

1851
01:10:50,070 --> 01:10:47,600
learned from that failure

1852
01:10:53,030 --> 01:10:50,080
it's not really a failure

1853
01:10:54,790 --> 01:10:53,040
an example that i have for you is

1854
01:10:56,630 --> 01:10:54,800
i worked on a program

1855
01:10:58,709 --> 01:10:56,640
at jpl once through the new millennium

1856
01:11:00,229 --> 01:10:58,719
program actually was called the ds2 mars

1857
01:11:02,149 --> 01:11:00,239
microprobes

1858
01:11:03,990 --> 01:11:02,159
there were maybe a handful of us that

1859
01:11:06,390 --> 01:11:04,000
designed this aeroshell

1860
01:11:08,870 --> 01:11:06,400
was a single stage entry system meaning

1861
01:11:10,470 --> 01:11:08,880
it had no deployables had no parachute

1862
01:11:11,990 --> 01:11:10,480
nothing like that it's just an aeroshell

1863
01:11:13,830 --> 01:11:12,000

that came through the it was designed to

1864
01:11:16,550 --> 01:11:13,840
go through the atmosphere of mars and

1865
01:11:19,030 --> 01:11:16,560
hit the ground actually supersonically

1866
01:11:21,430 --> 01:11:19,040
and then place a penetrator into the

1867
01:11:24,390 --> 01:11:21,440
subsurface of mars

1868
01:11:26,070 --> 01:11:24,400
the whole mission was 25 million dollars

1869
01:11:29,270 --> 01:11:26,080
and it was carried to mars by another

1870
01:11:31,270 --> 01:11:29,280
spacecraft that actually failed as well

1871
01:11:33,910 --> 01:11:31,280
uh the mars power lander

1872
01:11:34,790 --> 01:11:33,920
um and when it got to mars i told you it

1873
01:11:37,590 --> 01:11:34,800
failed

1874
01:11:40,229 --> 01:11:37,600
okay and it was written off as a failure

1875
01:11:41,910 --> 01:11:40,239
well that same team of people then

1876
01:11:44,229 --> 01:11:41,920
worked on something called the mars

1877
01:11:46,470 --> 01:11:44,239
sample return earth entry vehicle which

1878
01:11:48,870 --> 01:11:46,480
is a single stage entry system

1879
01:11:50,470 --> 01:11:48,880
that is designed to bring samples back

1880
01:11:53,430 --> 01:11:50,480
from mars and fly through the earth's

1881
01:11:56,070 --> 01:11:53,440
atmosphere and land safely

1882
01:11:58,229 --> 01:11:56,080
perhaps at a place like the utah desert

1883
01:12:00,550 --> 01:11:58,239
or another range like that the mars

1884
01:12:01,990 --> 01:12:00,560
sample return is one of the premier

1885
01:12:03,990 --> 01:12:02,000
missions within the science mission

1886
01:12:06,470 --> 01:12:04,000
directorate and the technology that

1887
01:12:08,390 --> 01:12:06,480
we're using that we're planning to use

1888
01:12:10,470 --> 01:12:08,400

many years from now

1889
01:12:12,790 --> 01:12:10,480
in the return of those samples is based

1890
01:12:15,750 --> 01:12:12,800
on the technology developed through the

1891
01:12:16,550 --> 01:12:15,760
mars microapproach the ds2 mission

1892
01:12:19,030 --> 01:12:16,560
so

1893
01:12:20,310 --> 01:12:19,040
i might ask was the ds2 mission really a

1894
01:12:22,870 --> 01:12:20,320
failure

1895
01:12:24,310 --> 01:12:22,880
or was that 25 million dollars just an

1896
01:12:26,229 --> 01:12:24,320
investment

1897
01:12:28,630 --> 01:12:26,239
in knowledge and expertise and

1898
01:12:30,470 --> 01:12:28,640
experience that could deliver

1899
01:12:31,910 --> 01:12:30,480
this new system

1900
01:12:34,070 --> 01:12:31,920
right and that's the way you need to

1901
01:12:36,630 --> 01:12:34,080
think about the technology program is

1902
01:12:38,390 --> 01:12:36,640
that even when we fail we need to we

1903
01:12:40,229 --> 01:12:38,400
need to be on a pathway towards

1904
01:12:42,470 --> 01:12:40,239
something bigger and we need to make

1905
01:12:44,470 --> 01:12:42,480
progress towards something bigger

1906
01:12:48,709 --> 01:12:44,480
and then when we fail it's okay

1907
01:12:51,270 --> 01:12:48,719
right a couple weeks ago darpa flew a uh

1908
01:12:53,270 --> 01:12:51,280
a mach 20 hypersonic vehicle

1909
01:12:55,430 --> 01:12:53,280
i was on the front page of the papers

1910
01:12:58,390 --> 01:12:55,440
darpa sets speed record

1911
01:13:00,870 --> 01:12:58,400
right with its mach 20 vehicle what was

1912
01:13:01,669 --> 01:13:00,880
like down in paragraph 8 or something it

1913
01:13:03,590 --> 01:13:01,679

said

1914
01:13:05,669 --> 01:13:03,600
the vehicle was lost and not recovered

1915
01:13:06,709 --> 01:13:05,679
you know basically after it flew mach 20

1916
01:13:10,310 --> 01:13:06,719
they had a

1917
01:13:11,910 --> 01:13:10,320
control issue and they lost the vehicle

1918
01:13:13,669 --> 01:13:11,920
if that was nasa how do you think it

1919
01:13:14,950 --> 01:13:13,679
would have been reported

1920
01:13:16,149 --> 01:13:14,960
right which would have been the headline

1921
01:13:18,390 --> 01:13:16,159
and which would have been

1922
01:13:22,149 --> 01:13:18,400
in paragraph eight and what i'm saying

1923
01:13:23,590 --> 01:13:22,159
is uh we need to change that game

1924
01:13:25,590 --> 01:13:23,600
we nasa

1925
01:13:27,030 --> 01:13:25,600
need to say hey

1926
01:13:28,950 --> 01:13:27,040
we're cutting we're a cutting edge

1927
01:13:31,110 --> 01:13:28,960
agency and if we're a cutting edge

1928
01:13:32,709 --> 01:13:31,120
agency we're gonna take risk

1929
01:13:34,709 --> 01:13:32,719
where we can take that risk is in our

1930
01:13:36,709 --> 01:13:34,719
technology program and we're going to do

1931
01:13:39,910 --> 01:13:36,719
it and not everything is going to be a

1932
01:13:42,149 --> 01:13:39,920
glorified success but we will learn from

1933
01:13:43,990 --> 01:13:42,159
every one of our technology programs i

1934
01:13:44,830 --> 01:13:44,000
think that's the key

1935
01:13:48,950 --> 01:13:44,840
thank

1936
01:13:50,070 --> 01:13:48,960
out of time so we're going to go ahead

1937
01:13:52,709 --> 01:13:50,080
and wrap up

1938
01:13:54,950 --> 01:13:52,719

uh again for the slides that bobby

1939
01:13:59,669 --> 01:13:54,960
talked about earlier in the program if

1940
01:14:02,790 --> 01:14:00,870
offices

1941
01:14:03,790 --> 01:14:02,800
slash oct

1942
01:14:05,750 --> 01:14:03,800
slash

1943
01:14:10,149 --> 01:14:05,760
index.html

1944
01:14:12,630 --> 01:14:10,159
again nasa.gov slash offices slash oct

1945
01:14:14,709 --> 01:14:12,640
slash index.html you'll be able to

1946
01:14:18,310 --> 01:14:14,719
download all of his slides that he