1
00:00:27,509 --> 00:00:25,429
[Music]

2
00:00:30,150 --> 00:00:27,519
hello my name is jim warhart

3
00:00:33,830 --> 00:00:30,160
and i'm the deputy administrator at nasa

4
00:00:36,549 --> 00:00:33,840
on november 2nd of 2000 the expedition 1

5
00:00:39,670 --> 00:00:36,559
crew of commander william shepherd

6
00:00:41,190 --> 00:00:39,680
sergey krikalov and yuri godzinko

7
00:00:43,910 --> 00:00:41,200
arrived at the international space

8
00:00:46,790 --> 00:00:43,920
station since that day we've had a

9
00:00:49,430 --> 00:00:46,800
continuous human presence of astronauts

10
00:00:52,150 --> 00:00:49,440
living and working aboard the world's

11
00:00:53,990 --> 00:00:52,160
only orbiting laboratory

12
00:00:56,150 --> 00:00:54,000
the international space station is one

13
00:00:57,670 --> 00:00:56,160

of the most ambitious international

14
00:00:59,349 --> 00:00:57,680
collaborations

15
00:01:00,150 --> 00:00:59,359
ever attempted

16
00:01:03,510 --> 00:01:00,160
and

17
00:01:06,070 --> 00:01:03,520
is a convergence of science technology

18
00:01:09,030 --> 00:01:06,080
and human innovation that provides

19
00:01:12,149 --> 00:01:09,040
humanity a one-of-a-kind proving ground

20
00:01:14,230 --> 00:01:12,159
for artemis as we go forward to the moon

21
00:01:16,469 --> 00:01:14,240
and then on to mars

22
00:01:19,510 --> 00:01:16,479
it's a demonstration platform for new

23
00:01:22,469 --> 00:01:19,520
technologies and a research laboratory

24
00:01:24,950 --> 00:01:22,479
for breakthroughs not possible on earth

25
00:01:26,870 --> 00:01:24,960
it represents the most complex space

26
00:01:28,550 --> 00:01:26,880
exploration program

27
00:01:30,630 --> 00:01:28,560
ever undertaken

28
00:01:33,670 --> 00:01:30,640
and in the two decades that humans have

29
00:01:36,390 --> 00:01:33,680
inhabited the space station we've used

30
00:01:39,190 --> 00:01:36,400
the unique orbiting laboratory to build

31
00:01:41,670 --> 00:01:39,200
our understanding of how humans can

32
00:01:43,670 --> 00:01:41,680
safely live in microgravity

33
00:01:44,950 --> 00:01:43,680
we've made groundbreaking advancements

34
00:01:46,950 --> 00:01:44,960
in medicine

35
00:01:49,350 --> 00:01:46,960
we've tested technologies that will help

36
00:01:50,950 --> 00:01:49,360
us travel farther into space

37
00:01:54,550 --> 00:01:50,960
at the same time we've gained new

38
00:01:56,950 --> 00:01:54,560

insights into our home planet on earth

39
00:01:58,950 --> 00:01:56,960
and we've stimulated an emerging low

40
00:02:01,749 --> 00:01:58,960
earth orbit economy

41
00:02:04,149 --> 00:02:01,759
on behalf of nasa congratulations to the

42
00:02:06,310 --> 00:02:04,159
international space station program and

43
00:02:08,389 --> 00:02:06,320
all of our international partners on

44
00:02:10,229 --> 00:02:08,399
this historic milestone

45
00:02:14,229 --> 00:02:10,239
we look forward to what the next 20

46
00:02:18,710 --> 00:02:16,790
hi i'm gene misserv and it's my pleasure

47
00:02:21,830 --> 00:02:18,720
to host a conversation that really is

48
00:02:23,910 --> 00:02:21,840
life and world changing today i am

49
00:02:26,790 --> 00:02:23,920
joined on the program by the five

50
00:02:29,190 --> 00:02:26,800
primary partners of the international

51
00:02:32,949 --> 00:02:29,200
space station uh let me introduce them

52
00:02:36,229 --> 00:02:32,959
now joel montalbano of nasa frank dewin

53
00:02:39,270 --> 00:02:36,239
of the european space agency luke dubay

54
00:02:42,550 --> 00:02:39,280
of the canadian space agency junichi

55
00:02:45,830 --> 00:02:42,560
sakai of the japan aerospace exploration

56
00:02:48,229 --> 00:02:45,840
agency and sergey krikalev of ross

57
00:02:49,910 --> 00:02:48,239
cosmos with the russian federation

58
00:02:50,949 --> 00:02:49,920
welcome to all of you great to have you

59
00:02:53,270 --> 00:02:50,959
with us

60
00:02:55,430 --> 00:02:53,280
and a special thank you to nasa for

61
00:02:57,750 --> 00:02:55,440
their assistance in assembling these

62
00:03:01,830 --> 00:02:57,760
leaders and to the space foundation

63
00:03:02,949 --> 00:03:01,840

space symposium 365 platform

64
00:03:05,509 --> 00:03:02,959
and now

65
00:03:07,670 --> 00:03:05,519
let's go

66
00:03:10,229 --> 00:03:07,680
um

67
00:03:13,030 --> 00:03:10,239
joel montalbano let me start with you a

68
00:03:16,470 --> 00:03:13,040
lot of relationships don't work for 20

69
00:03:19,750 --> 00:03:16,480
years but this one has can you explain

70
00:03:21,670 --> 00:03:19,760
why this relationship is still going on

71
00:03:24,070 --> 00:03:21,680
and successfully

72
00:03:25,830 --> 00:03:24,080
well excellent question and and hold

73
00:03:27,910 --> 00:03:25,840
everyone and thank you for getting

74
00:03:30,630 --> 00:03:27,920
together today you know to me it works

75
00:03:32,710 --> 00:03:30,640
because we help each other we learn from

76
00:03:35,030 --> 00:03:32,720
each other and we cooperate from each

77
00:03:37,270 --> 00:03:35,040
other you know throughout the 20-plus

78
00:03:39,270 --> 00:03:37,280
years of the international space station

79
00:03:41,190 --> 00:03:39,280
whenever we've had a challenge there's

80
00:03:43,509 --> 00:03:41,200
another partner that's always ready to

81
00:03:46,630 --> 00:03:43,519
step up and help wherever they can

82
00:03:48,470 --> 00:03:46,640
across the 20-plus years that we've seen

83
00:03:50,070 --> 00:03:48,480
operations of the international space

84
00:03:53,350 --> 00:03:50,080
station you know we've had those

85
00:03:54,869 --> 00:03:53,360
opportunities and every single time it a

86
00:03:57,110 --> 00:03:54,879
partner has reached out to another

87
00:03:59,350 --> 00:03:57,120
partner when they were in need and to me

88
00:04:01,190 --> 00:03:59,360

that has been the biggest success of the

89
00:04:03,030 --> 00:04:01,200
international space station

90
00:04:06,070 --> 00:04:03,040
uh sergey krikalev do you want to weigh

91
00:04:07,670 --> 00:04:06,080
in on why this has been successful

92
00:04:09,750 --> 00:04:07,680
um joel

93
00:04:11,830 --> 00:04:09,760
already mentioned that

94
00:04:13,910 --> 00:04:11,840
this probably was successful for last 20

95
00:04:16,550 --> 00:04:13,920
years because it really started earlier

96
00:04:18,629 --> 00:04:16,560
than uh 20 years ago

97
00:04:20,310 --> 00:04:18,639
we started our first joint mission in

98
00:04:22,310 --> 00:04:20,320
1975

99
00:04:24,629 --> 00:04:22,320
apollo says mission

100
00:04:27,990 --> 00:04:24,639
uh we start our joint flights on shuttle

101
00:04:29,270 --> 00:04:28,000
and on mir station uh in beginning of uh

102
00:04:35,430 --> 00:04:29,280
90s

103
00:04:36,310 --> 00:04:35,440
uh the main reason why it works after

104
00:04:38,310 --> 00:04:36,320
that

105
00:04:40,950 --> 00:04:38,320
was because we have a really strong

106
00:04:43,270 --> 00:04:40,960
desire to do this and this was first

107
00:04:45,350 --> 00:04:43,280
part and second part is that we have uh

108
00:04:48,310 --> 00:04:45,360
very good professionals who was doing

109
00:04:49,270 --> 00:04:48,320
this because uh good professionals had

110
00:04:52,230 --> 00:04:49,280
really

111
00:04:54,870 --> 00:04:52,240
big desire to to be successful we were

112
00:04:57,189 --> 00:04:54,880
successful for these 20 years

113
00:04:58,629 --> 00:04:57,199

there are as you all know skeptics on

114
00:05:00,390 --> 00:04:58,639
earth who are asking

115
00:05:03,270 --> 00:05:00,400
why are we spending this much money on

116
00:05:06,150 --> 00:05:03,280
space exploration mr dewin can you tell

117
00:05:09,510 --> 00:05:06,160
us what value the space station has

118
00:05:11,909 --> 00:05:09,520
brought to people on earth

119
00:05:14,629 --> 00:05:11,919
well one of the biggest values of course

120
00:05:16,390 --> 00:05:14,639
is the cooperation itself and you you

121
00:05:18,629 --> 00:05:16,400
see around the world it's not always

122
00:05:21,510 --> 00:05:18,639
always so easy for big nations to work

123
00:05:23,350 --> 00:05:21,520
together and this partnership has shown

124
00:05:25,270 --> 00:05:23,360
that if you have a common goal if you

125
00:05:27,189 --> 00:05:25,280
want to work together that you can

126
00:05:29,749 --> 00:05:27,199
achieve great things and i think the

127
00:05:32,469 --> 00:05:29,759
example that it sets in that area is

128
00:05:35,270 --> 00:05:32,479
tremendous but it has also brought very

129
00:05:37,749 --> 00:05:35,280
specific results for example isa has

130
00:05:39,749 --> 00:05:37,759
done the experiment airway monitoring

131
00:05:41,990 --> 00:05:39,759
where we studied the lung functions of

132
00:05:44,310 --> 00:05:42,000
astronauts on board of the space station

133
00:05:47,029 --> 00:05:44,320
well the results of that research have

134
00:05:49,510 --> 00:05:47,039
led to new technologies new tests that

135
00:05:53,749 --> 00:05:49,520
can be used on asthma patients

136
00:05:55,270 --> 00:05:53,759
and as a result of that 300 000 patients

137
00:05:57,590 --> 00:05:55,280
have been tested

138
00:05:59,670 --> 00:05:57,600

36 million tests have been performed and

139
00:06:02,150 --> 00:05:59,680
those patients have received specific

140
00:06:05,110 --> 00:06:02,160
medication for their disease so it had a

141
00:06:07,430 --> 00:06:05,120
direct impact on their quality of life

142
00:06:08,469 --> 00:06:07,440
another example is for example the melfi

143
00:06:09,749 --> 00:06:08,479
freezer

144
00:06:11,909 --> 00:06:09,759
that we have on board of the

145
00:06:15,270 --> 00:06:11,919
international space station it freezes

146
00:06:17,909 --> 00:06:15,280
our samples up to minus 80 degrees well

147
00:06:19,749 --> 00:06:17,919
the technology that is used to maintain

148
00:06:21,990 --> 00:06:19,759
those kind of temperatures on board of

149
00:06:25,670 --> 00:06:22,000
the international space stations is now

150
00:06:28,309 --> 00:06:25,680
used on big ships that transport gas and

151
00:06:31,110 --> 00:06:28,319
this gas that normally boils off can be

152
00:06:36,309 --> 00:06:31,120
recycled and due to that we are

153
00:06:38,870 --> 00:06:36,319
recycling per year 100 000 tons of co2

154
00:06:41,350 --> 00:06:38,880
carbon emissions meaning that it has a

155
00:06:43,909 --> 00:06:41,360
direct impulse impact on fighting

156
00:06:46,309 --> 00:06:43,919
climate change these are only two

157
00:06:48,710 --> 00:06:46,319
examples but i know that our partners

158
00:06:51,990 --> 00:06:48,720
across the board have many more have

159
00:06:53,909 --> 00:06:52,000
thousands of examples how research

160
00:06:56,870 --> 00:06:53,919
innovation on the international space

161
00:07:00,950 --> 00:06:56,880
station has directly impacted the life

162
00:07:04,469 --> 00:07:02,629
you know i'll say a couple things you

163
00:07:06,469 --> 00:07:04,479

know on the you know frank mentioned the

164
00:07:09,270 --> 00:07:06,479
uh the freezers we have aboard and and

165
00:07:10,870 --> 00:07:09,280
the minus 80 degree freezers you know we

166
00:07:12,870 --> 00:07:10,880
because of the

167
00:07:15,909 --> 00:07:12,880
the assets we have on the international

168
00:07:18,309 --> 00:07:15,919
space station and the the need for us to

169
00:07:20,950 --> 00:07:18,319
transport across the globe

170
00:07:23,029 --> 00:07:20,960
we have reached out to help these drug

171
00:07:25,589 --> 00:07:23,039
companies that are about to start

172
00:07:28,469 --> 00:07:25,599
distributing the coven 19

173
00:07:31,110 --> 00:07:28,479
vaccine and using our experience and

174
00:07:33,270 --> 00:07:31,120
offering up this this experience that we

175
00:07:35,749 --> 00:07:33,280
have globally to help this global

176
00:07:38,070 --> 00:07:35,759
pandemic so to me it is just one one of

177
00:07:39,830 --> 00:07:38,080
the many examples where we can

178
00:07:41,189 --> 00:07:39,840
capitalize on the international space

179
00:07:43,430 --> 00:07:41,199
station and what we've learned over

180
00:07:47,270 --> 00:07:43,440
these 20 plus years to help others and

181
00:07:53,270 --> 00:07:50,869
political winds blow leadership changes

182
00:07:56,230 --> 00:07:53,280
um joel montalbano let me start with you

183
00:08:00,950 --> 00:07:56,240
on how you think these sorts of changes

184
00:08:06,150 --> 00:08:03,430
you know over the 20 plus years we've

185
00:08:08,230 --> 00:08:06,160
had leadership changes uh and all our

186
00:08:10,550 --> 00:08:08,240
agencies and and and the governments

187
00:08:12,230 --> 00:08:10,560
associated with them and you know

188
00:08:14,710 --> 00:08:12,240

throughout that the

189
00:08:16,869 --> 00:08:14,720
standard that's been cooperation and

190
00:08:18,550 --> 00:08:16,879
we've been able to cooperate while

191
00:08:21,189 --> 00:08:18,560
meeting the different national

192
00:08:23,350 --> 00:08:21,199
priorities of the different agencies and

193
00:08:25,670 --> 00:08:23,360
and to me the the benefit of the

194
00:08:28,230 --> 00:08:25,680
international space station is we work

195
00:08:31,029 --> 00:08:28,240
on a physics-based and physics is the

196
00:08:33,670 --> 00:08:31,039
same across the globe so regardless of

197
00:08:36,149 --> 00:08:33,680
any political change and leadership

198
00:08:37,829 --> 00:08:36,159
change we're able to manage and operate

199
00:08:39,589 --> 00:08:37,839
the international space station we're

200
00:08:43,029 --> 00:08:39,599
able to communicate because we're

201
00:08:45,910 --> 00:08:43,039
communicating in a physics type method

202
00:08:48,790 --> 00:08:45,920
we're able to operate and stay below any

203
00:08:51,110 --> 00:08:48,800
political type challenges but we still

204
00:08:53,829 --> 00:08:51,120
are able to meet each agency's national

205
00:08:55,350 --> 00:08:53,839
goals and so to me that's again another

206
00:08:57,750 --> 00:08:55,360
benefit of the international space

207
00:08:59,509 --> 00:08:57,760
station and i'll open it up to any of my

208
00:09:01,750 --> 00:08:59,519
other colleagues if they want to add to

209
00:09:09,430 --> 00:09:01,760
that

210
00:09:12,550 --> 00:09:10,310
okay

211
00:09:16,150 --> 00:09:12,560
well your agencies have worked together

212
00:09:18,710 --> 00:09:16,160
for two decades now amazingly um what

213
00:09:21,430 --> 00:09:18,720

are some of the things that you are able

214
00:09:23,430 --> 00:09:21,440
to do now that you could not do 20 years

215
00:09:24,550 --> 00:09:23,440
ago 15 years ago

216
00:09:26,550 --> 00:09:24,560
years ago

217
00:09:29,030 --> 00:09:26,560
mr dubai why don't you go ahead with

218
00:09:31,670 --> 00:09:29,040
that one so in our case you know our

219
00:09:34,070 --> 00:09:31,680
original operation concept for the

220
00:09:36,710 --> 00:09:34,080
canada tune dexter was based

221
00:09:39,829 --> 00:09:36,720
on how the shuttle arm was operated with

222
00:09:42,630 --> 00:09:39,839
astronaut driving at every step but what

223
00:09:44,870 --> 00:09:42,640
we do now looks nothing like that css

224
00:09:47,910 --> 00:09:44,880
flight control room which holds the csc

225
00:09:49,750 --> 00:09:47,920
flight controller is now used a lot

226
00:09:52,470 --> 00:09:49,760
the development of our ground segment is

227
00:09:54,070 --> 00:09:52,480
a big part of the ground completely

228
00:09:57,590 --> 00:09:54,080
controlling the robots from the ground

229
00:09:59,269 --> 00:09:57,600
is not most of the way we operate so we

230
00:10:01,590 --> 00:09:59,279
work also with the american and the

231
00:10:03,590 --> 00:10:01,600
japanese partner we also added the

232
00:10:07,190 --> 00:10:03,600
capability to capture a free-flying

233
00:10:09,590 --> 00:10:07,200
cargo vehicle so since 2009 we have done

234
00:10:11,829 --> 00:10:09,600
43 fleet fire captures

235
00:10:13,590 --> 00:10:11,839
we also have unexpectedly become a kit

236
00:10:15,910 --> 00:10:13,600
provider for robotic services to

237
00:10:18,230 --> 00:10:15,920
external payload so as a result the

238
00:10:20,550 --> 00:10:18,240

demand of our robotics has gone up and

239
00:10:23,590 --> 00:10:20,560
up so we have started also developing

240
00:10:25,430 --> 00:10:23,600
autonomous control on our iss robots so

241
00:10:29,190 --> 00:10:25,440
this will become the basis for how we

242
00:10:31,190 --> 00:10:29,200
design and operate on our future systems

243
00:10:32,870 --> 00:10:31,200
mr sakai do you want to weigh in on this

244
00:10:34,069 --> 00:10:32,880
question of what you can do now that you

245
00:10:36,790 --> 00:10:34,079
couldn't do

246
00:10:39,269 --> 00:10:36,800
10 or 15 years ago

247
00:10:41,750 --> 00:10:39,279
yeah now we are able to proceed a

248
00:10:44,150 --> 00:10:41,760
variety of utilizations that were not

249
00:10:46,550 --> 00:10:44,160
originally expected due to the great

250
00:10:48,710 --> 00:10:46,560
efforts of engineers and

251
00:10:51,670 --> 00:10:48,720
researchers on the iss

252
00:10:55,030 --> 00:10:51,680
for example there is a research in space

253
00:10:57,190 --> 00:10:55,040
medicine that will be useful for human

254
00:10:59,509 --> 00:10:57,200
future human exploration

255
00:11:02,310 --> 00:10:59,519
and the private sector is

256
00:11:04,949 --> 00:11:02,320
actively utilizing the iss

257
00:11:07,750 --> 00:11:04,959
we are also trying commercial components

258
00:11:10,470 --> 00:11:07,760
in iss the success of

259
00:11:13,030 --> 00:11:10,480
crew dragon is a also an

260
00:11:15,670 --> 00:11:13,040
epoch making it event

261
00:11:17,990 --> 00:11:15,680
if i may appeal to you uh the japanese

262
00:11:20,949 --> 00:11:18,000
experimental module kibo has both a

263
00:11:23,590 --> 00:11:20,959

levatic airlock and a robotic arm to

264
00:11:26,550 --> 00:11:23,600
conduct cubesat deployment

265
00:11:29,190 --> 00:11:26,560
and material exposure experiment

266
00:11:32,630 --> 00:11:29,200
there was developed by an engineer's

267
00:11:35,110 --> 00:11:32,640
idea after kibo become operational we

268
00:11:36,630 --> 00:11:35,120
have learned that assets having

269
00:11:39,990 --> 00:11:36,640
expandably

270
00:11:41,670 --> 00:11:40,000
expandability foster the utilization and

271
00:11:43,910 --> 00:11:41,680
future needs

272
00:11:46,870 --> 00:11:43,920
i also believe that one of the

273
00:11:49,030 --> 00:11:46,880
achievements is that iss international

274
00:11:50,389 --> 00:11:49,040
partners have been also to

275
00:11:53,269 --> 00:11:50,399
discuss and

276
00:11:55,829 --> 00:11:53,279
consider the gateway the next human

277
00:11:58,069 --> 00:11:55,839
specification based on the

278
00:12:01,350 --> 00:11:58,079
cooperative experiments of

279
00:12:06,470 --> 00:12:03,990
has the international space change

280
00:12:09,350 --> 00:12:06,480
space station changed your countries and

281
00:12:11,110 --> 00:12:09,360
your country's aspirations in space this

282
00:12:13,509 --> 00:12:11,120
is something i would like all of you to

283
00:12:16,230 --> 00:12:13,519
respond to but mr krikalev why don't we

284
00:12:20,150 --> 00:12:16,240
start with you has it changed the

285
00:12:24,790 --> 00:12:22,470
um in the beginning of course although

286
00:12:27,269 --> 00:12:24,800
we have experience of international

287
00:12:30,230 --> 00:12:27,279
copyrighting on previous stages but

288
00:12:31,350 --> 00:12:30,240

still was pretty big concern how well we

289
00:12:32,629 --> 00:12:31,360
can

290
00:12:34,949 --> 00:12:32,639
work together

291
00:12:37,269 --> 00:12:34,959
uh what is going to be a result of our

292
00:12:40,629 --> 00:12:37,279
work and how we will

293
00:12:42,790 --> 00:12:40,639
move forward together now we know that

294
00:12:44,870 --> 00:12:42,800
this partnership is working

295
00:12:46,629 --> 00:12:44,880
really well and

296
00:12:48,790 --> 00:12:46,639
now we are looking at the station not

297
00:12:50,870 --> 00:12:48,800
only as a

298
00:12:52,870 --> 00:12:50,880
platform for

299
00:12:55,670 --> 00:12:52,880
current exploration but also as a

300
00:12:57,910 --> 00:12:55,680
platform for future future exploration

301
00:12:58,710 --> 00:12:57,920
we use uh space station as a test bed

302
00:13:03,590 --> 00:12:58,720
for

303
00:13:05,750 --> 00:13:03,600
experiments that uh a result of this

304
00:13:12,150 --> 00:13:05,760
experiment we expect will be useful for

305
00:13:16,550 --> 00:13:14,069
mr dwind do you want to weigh into this

306
00:13:20,629 --> 00:13:16,560
obviously uh countries plural in your

307
00:13:24,470 --> 00:13:20,639
case um has the is changed things uh in

308
00:13:27,509 --> 00:13:24,480
terms of um space aspirations in europe

309
00:13:29,670 --> 00:13:27,519
uh absolutely it has changed a lot uh

310
00:13:32,150 --> 00:13:29,680
i'm coming from a small country myself

311
00:13:34,550 --> 00:13:32,160
belgium but nevertheless i was able to

312
00:13:36,550 --> 00:13:34,560
fly to space twice without an

313
00:13:38,150 --> 00:13:36,560

international cooperation like the

314
00:13:40,310 --> 00:13:38,160
international space station this would

315
00:13:42,470 --> 00:13:40,320
of course not have been possible and

316
00:13:44,790 --> 00:13:42,480
today we see we are actually starting a

317
00:13:47,829 --> 00:13:44,800
new astronaut selection in europe in the

318
00:13:50,069 --> 00:13:47,839
next months we see that a lot of

319
00:13:52,790 --> 00:13:50,079
countries have the aspiration to have

320
00:13:55,110 --> 00:13:52,800
their citizens fly into space and i'm

321
00:13:57,430 --> 00:13:55,120
sure that in the future every european

322
00:13:59,430 --> 00:13:57,440
citizen can can have these dreams and

323
00:14:02,310 --> 00:13:59,440
this is of course relating directly to

324
00:14:04,470 --> 00:14:02,320
young people who have to invest in stem

325
00:14:07,430 --> 00:14:04,480
uh science technology engineering and

326
00:14:09,509 --> 00:14:07,440
math uh skills that we will need to

327
00:14:10,550 --> 00:14:09,519
build further our society in in the

328
00:14:12,069 --> 00:14:10,560
future

329
00:14:14,389 --> 00:14:12,079
but of course it's not only linked to

330
00:14:16,629 --> 00:14:14,399
human space flight and to what we do on

331
00:14:19,829 --> 00:14:16,639
board of the international space station

332
00:14:21,710 --> 00:14:19,839
there are so many other domains in space

333
00:14:24,069 --> 00:14:21,720
navigation earth observation

334
00:14:25,670 --> 00:14:24,079
telecommunications where we will need a

335
00:14:27,269 --> 00:14:25,680
lot of people and the fact that we can

336
00:14:29,670 --> 00:14:27,279
work in cooperation that there is a

337
00:14:32,870 --> 00:14:29,680
visible element that people can see in

338
00:14:34,710 --> 00:14:32,880

the sky every night and say my citizens

339
00:14:37,350 --> 00:14:34,720
they are flying there they are working

340
00:14:39,990 --> 00:14:37,360
there for the benefit of humankind has

341
00:14:42,949 --> 00:14:40,000
dramatically changed uh the way that

342
00:14:45,670 --> 00:14:42,959
europeans look to to space

343
00:14:47,110 --> 00:14:45,680
uh luke debay how about your what are

344
00:14:50,230 --> 00:14:47,120
your thoughts

345
00:14:52,550 --> 00:14:50,240
yeah so our contribution the canadian

346
00:14:55,430 --> 00:14:52,560
arm has allowed canada to become a world

347
00:14:57,350 --> 00:14:55,440
leader in space robotics it also gave us

348
00:14:59,269 --> 00:14:57,360
the access to a big laboratory for

349
00:15:01,910 --> 00:14:59,279
science and allow the canada to have his

350
00:15:04,069 --> 00:15:01,920
astronauts like long duration mission

351
00:15:05,829 --> 00:15:04,079
and international cooperation

352
00:15:07,590 --> 00:15:05,839
it's also helped promoting the space in

353
00:15:09,670 --> 00:15:07,600
canada and was key for the development

354
00:15:10,870 --> 00:15:09,680
of such in the industries and the

355
00:15:13,990 --> 00:15:10,880
academy

356
00:15:16,710 --> 00:15:14,000
so it's inspire future generations in

357
00:15:19,189 --> 00:15:16,720
science and technology education so it's

358
00:15:21,189 --> 00:15:19,199
a dream to come to for many canadians so

359
00:15:23,509 --> 00:15:21,199
we are very proud to contribute to such

360
00:15:25,829 --> 00:15:23,519
an important research opportunities

361
00:15:27,990 --> 00:15:25,839
it is largely thanks to the iss that the

362
00:15:30,310 --> 00:15:28,000
space community in canada are now

363
00:15:32,710 --> 00:15:30,320

setting their site and destination like

364
00:15:35,030 --> 00:15:32,720
the moon and mars so for 20 years the

365
00:15:37,430 --> 00:15:35,040
iss has been a vital test

366
00:15:39,590 --> 00:15:37,440
bed for that enables us to prepare to

367
00:15:41,509 --> 00:15:39,600
explore deeper into space so the

368
00:15:44,310 --> 00:15:41,519
canadian space agency is very proud to

369
00:15:47,430 --> 00:15:44,320
play a big role in this and lever

370
00:15:49,269 --> 00:15:47,440
joel montalbano your thoughts

371
00:15:51,110 --> 00:15:49,279
you know as as you heard from sergey and

372
00:15:53,749 --> 00:15:51,120
frank and luke

373
00:15:55,030 --> 00:15:53,759
this space station has inspired a

374
00:15:58,230 --> 00:15:55,040
generation

375
00:16:01,030 --> 00:15:58,240
that is going to take us from low earth

376
00:16:03,269 --> 00:16:01,040
orbit where we are today to return to

377
00:16:05,590 --> 00:16:03,279
the moon and then eventually to mars and

378
00:16:07,749 --> 00:16:05,600
and we're using the experiences we have

379
00:16:09,430 --> 00:16:07,759
on the international space station you

380
00:16:11,030 --> 00:16:09,440
know going back to your last question

381
00:16:13,910 --> 00:16:11,040
you talked about things have changed

382
00:16:16,389 --> 00:16:13,920
over the last 10 or 15 years and when we

383
00:16:19,910 --> 00:16:16,399
first started this project we each of

384
00:16:21,829 --> 00:16:19,920
the agencies had had really individual a

385
00:16:23,590 --> 00:16:21,839
lot of individual projects and what

386
00:16:26,310 --> 00:16:23,600
we've learned over time

387
00:16:28,470 --> 00:16:26,320
is if we work together and we cooperate

388
00:16:30,949 --> 00:16:28,480

and we combine assets and combine

389
00:16:33,430 --> 00:16:30,959
resources we can do much more with the

390
00:16:34,310 --> 00:16:33,440
international space station and and that

391
00:16:38,230 --> 00:16:34,320
that

392
00:16:41,749 --> 00:16:38,240
international space station has spilled

393
00:16:44,150 --> 00:16:41,759
over outside of just human space flight

394
00:16:46,069 --> 00:16:44,160
in the uh in the science mission

395
00:16:47,749 --> 00:16:46,079
directorates that we cooperate

396
00:16:50,150 --> 00:16:47,759
internationally across the different

397
00:16:52,310 --> 00:16:50,160
agencies we've taken the lessons learned

398
00:16:55,110 --> 00:16:52,320
from space station and we've used that

399
00:16:57,269 --> 00:16:55,120
to cooperate in those areas as well that

400
00:16:59,350 --> 00:16:57,279
they based it on what we did on the

401
00:17:01,269 --> 00:16:59,360
international space station so to me

402
00:17:03,749 --> 00:17:01,279
just it's it's been pretty cool it's

403
00:17:05,909 --> 00:17:03,759
been cool to watch and it's been uh just

404
00:17:07,750 --> 00:17:05,919
an awesome adventure so far

405
00:17:11,110 --> 00:17:07,760
and if i could just follow up on that

406
00:17:13,590 --> 00:17:11,120
with you um in the current uh

407
00:17:15,829 --> 00:17:13,600
world of budgetary constraints is this

408
00:17:17,270 --> 00:17:15,839
kind of international cooperation

409
00:17:19,750 --> 00:17:17,280
necessary

410
00:17:20,789 --> 00:17:19,760
in space simply from a financial point

411
00:17:23,029 --> 00:17:20,799
of view

412
00:17:24,949 --> 00:17:23,039
it's mandatory in my mind

413
00:17:29,029 --> 00:17:24,959

um you know we've learned a long time

414
00:17:31,350 --> 00:17:29,039
ago that any single agency does not have

415
00:17:32,630 --> 00:17:31,360
the resources to do everything they they

416
00:17:34,789 --> 00:17:32,640
want to do

417
00:17:36,789 --> 00:17:34,799
and but when you combine you put all

418
00:17:38,870 --> 00:17:36,799
these agencies together we can

419
00:17:41,750 --> 00:17:38,880
accomplish so much more and we have been

420
00:17:44,230 --> 00:17:41,760
and the cool thing is we've demonstrated

421
00:17:45,990 --> 00:17:44,240
we don't just talk about it we do it and

422
00:17:47,510 --> 00:17:46,000
that's one of the best things about the

423
00:17:48,870 --> 00:17:47,520
international space station i'm a little

424
00:17:51,430 --> 00:17:48,880
biased as the

425
00:17:53,110 --> 00:17:51,440
as you know the nasa program manager but

426
00:17:55,669 --> 00:17:53,120
i can tell you the the people we're

427
00:17:57,830 --> 00:17:55,679
talking to today i know would would sign

428
00:18:00,070 --> 00:17:57,840
up right behind me and agree

429
00:18:03,270 --> 00:18:00,080
uh mr sakai we didn't get your thoughts

430
00:18:05,190 --> 00:18:03,280
on that initial question of how the iss

431
00:18:07,830 --> 00:18:05,200
has changed your country and its

432
00:18:10,789 --> 00:18:07,840
aspirations in space

433
00:18:13,590 --> 00:18:10,799
well um i guess i the iss program and

434
00:18:17,110 --> 00:18:13,600
its accomplishment has changed leo

435
00:18:19,750 --> 00:18:17,120
utilization easier than previous

436
00:18:22,470 --> 00:18:19,760
it is not only allowed for some special

437
00:18:26,070 --> 00:18:22,480
person but for everyone having what he

438
00:18:27,750 --> 00:18:26,080

wants to something but to try something

439
00:18:30,630 --> 00:18:27,760
in leo

440
00:18:33,830 --> 00:18:30,640
iss accomplishment in many different

441
00:18:36,150 --> 00:18:33,840
areas uh for example basic science

442
00:18:38,150 --> 00:18:36,160
scientific research but

443
00:18:41,510 --> 00:18:38,160
practical research

444
00:18:44,630 --> 00:18:41,520
leading to industrial industrialization

445
00:18:47,510 --> 00:18:44,640
educational use of the next generations

446
00:18:50,710 --> 00:18:47,520
international corporation etc

447
00:18:51,990 --> 00:18:50,720
and jaxa as a only iss participant in

448
00:18:53,990 --> 00:18:52,000
naija

449
00:18:56,470 --> 00:18:54,000
provides opportunities for asian

450
00:18:59,110 --> 00:18:56,480
countries to utilize the kibo while

451
00:19:02,150 --> 00:18:59,120
building cooperation in the space field

452
00:19:05,669 --> 00:19:02,160
and promoting the significance of space

453
00:19:07,430 --> 00:19:05,679
experiments for each country

454
00:19:09,270 --> 00:19:07,440
space is becoming more and more of a

455
00:19:12,310 --> 00:19:09,280
commercial enterprise and i'm wondering

456
00:19:14,230 --> 00:19:12,320
how that's going to change uh the iss

457
00:19:16,549 --> 00:19:14,240
and potentially your partnership with

458
00:19:18,390 --> 00:19:16,559
one another joel montalbano you want to

459
00:19:20,630 --> 00:19:18,400
handle that first

460
00:19:22,789 --> 00:19:20,640
all right you know so the first 10 years

461
00:19:25,909 --> 00:19:22,799
of space station were dedicated really

462
00:19:28,390 --> 00:19:25,919
to assembly and then after assembly we

463
00:19:29,830 --> 00:19:28,400

moved into a utilization research

464
00:19:31,990 --> 00:19:29,840
technology development where we're

465
00:19:34,230 --> 00:19:32,000
actually optimizing the use of the

466
00:19:36,230 --> 00:19:34,240
international space station

467
00:19:37,830 --> 00:19:36,240
and then in these last say five or six

468
00:19:40,070 --> 00:19:37,840
years we've been developing this this

469
00:19:42,390 --> 00:19:40,080
commercial market in the us and and

470
00:19:44,470 --> 00:19:42,400
working with our partners to understand

471
00:19:46,870 --> 00:19:44,480
you know what it means to them and and

472
00:19:49,110 --> 00:19:46,880
how we could help and how we can utilize

473
00:19:52,390 --> 00:19:49,120
the great space station we have

474
00:19:55,750 --> 00:19:52,400
you know in in our mind we've um

475
00:19:57,430 --> 00:19:55,760
we've been able to optimize with these

476
00:19:59,909 --> 00:19:57,440
commercial partners the use of the

477
00:20:01,669 --> 00:19:59,919
international space station this weekend

478
00:20:04,549 --> 00:20:01,679
we had the hundredth

479
00:20:06,630 --> 00:20:04,559
launch of the falcon 9 rocket

480
00:20:08,310 --> 00:20:06,640
and you know because we've helped

481
00:20:10,710 --> 00:20:08,320
develop that rocket we've helped develop

482
00:20:13,669 --> 00:20:10,720
the antares rocket for northrop grumman

483
00:20:16,149 --> 00:20:13,679
and we've taken those activities as well

484
00:20:17,750 --> 00:20:16,159
as other activities and we brought items

485
00:20:19,669 --> 00:20:17,760
to the international space station we

486
00:20:22,149 --> 00:20:19,679
opened doors to the international space

487
00:20:24,549 --> 00:20:22,159
station for additional research

488
00:20:27,590 --> 00:20:24,559

and utilization technology development

489
00:20:29,830 --> 00:20:27,600
on board and now we've opened these

490
00:20:32,470 --> 00:20:29,840
opportunities to commercial and it's not

491
00:20:34,789 --> 00:20:32,480
just nasa russia has done it canada has

492
00:20:36,549 --> 00:20:34,799
done it you know esa has done it jaxa

493
00:20:38,230 --> 00:20:36,559
has done it we've all you know we're all

494
00:20:40,630 --> 00:20:38,240
starting in different places but we're

495
00:20:42,789 --> 00:20:40,640
all moving and trying to optimize the

496
00:20:44,310 --> 00:20:42,799
the use of commercialization and use

497
00:20:46,710 --> 00:20:44,320
this great resource that we have on

498
00:20:48,549 --> 00:20:46,720
board the international space station

499
00:20:52,230 --> 00:20:48,559
uh sergey krikalev you want to weigh in

500
00:20:55,270 --> 00:20:52,240
on that commercialization question

501
00:20:57,750 --> 00:20:55,280
i can just said uh what uh joel said

502
00:20:59,830 --> 00:20:57,760
that we really started from uh some

503
00:21:02,870 --> 00:20:59,840
simple things like uh we were flying

504
00:21:03,909 --> 00:21:02,880
tourists of flight participants as we

505
00:21:05,669 --> 00:21:03,919
call them

506
00:21:08,870 --> 00:21:05,679
to space and it was

507
00:21:10,710 --> 00:21:08,880
only one side of commercialization

508
00:21:13,110 --> 00:21:10,720
but now we see much more opportunities

509
00:21:14,870 --> 00:21:13,120
such as commercial experiments and we

510
00:21:17,669 --> 00:21:14,880
know that some

511
00:21:20,070 --> 00:21:17,679
some companies need some data uh using

512
00:21:22,390 --> 00:21:20,080
space environment and we can use it uh

513
00:21:25,270 --> 00:21:22,400

space station can be used to provide

514
00:21:27,029 --> 00:21:25,280
this data so uh the variety of

515
00:21:28,549 --> 00:21:27,039
commercial application is much bigger

516
00:21:30,470 --> 00:21:28,559
than it was uh

517
00:21:32,789 --> 00:21:30,480
a while ago

518
00:21:34,470 --> 00:21:32,799
uh frank to win uh from the european

519
00:21:36,789 --> 00:21:34,480
perspective any downside to the

520
00:21:38,630 --> 00:21:36,799
commercialization or is this all a big

521
00:21:43,190 --> 00:21:38,640
plus

522
00:21:46,630 --> 00:21:43,200
and again it shows very clearly the

523
00:21:48,789 --> 00:21:46,640
agility of the partnership because

524
00:21:50,630 --> 00:21:48,799
we have done so many new things with

525
00:21:53,590 --> 00:21:50,640
this partnership

526
00:21:56,390 --> 00:21:53,600
under this agreement that was signed now

527
00:21:58,149 --> 00:21:56,400
probably 25 years ago and that we have

528
00:22:00,870 --> 00:21:58,159
been able to adapt to the new

529
00:22:03,190 --> 00:22:00,880
environment and to the new world uh of

530
00:22:04,950 --> 00:22:03,200
course it also puts some strains on the

531
00:22:07,190 --> 00:22:04,960
on the system because the commercial

532
00:22:09,350 --> 00:22:07,200
companies they want their data quicker

533
00:22:12,870 --> 00:22:09,360
they want better access they want easier

534
00:22:14,549 --> 00:22:12,880
access so it also strains on our side

535
00:22:18,070 --> 00:22:14,559
the way that we operate we need to

536
00:22:20,950 --> 00:22:18,080
completely uh continuously rethink what

537
00:22:23,110 --> 00:22:20,960
we can do how we can better now service

538
00:22:25,270 --> 00:22:23,120

a customer another customer because

539
00:22:26,789 --> 00:22:25,280
initially our customers were only the

540
00:22:29,350 --> 00:22:26,799
scientists and they were used to work

541
00:22:31,430 --> 00:22:29,360
with us now we have to get used to work

542
00:22:34,230 --> 00:22:31,440
with other entities that have other

543
00:22:36,310 --> 00:22:34,240
drivers so it's not always easy but it

544
00:22:37,350 --> 00:22:36,320
shows for the agility of the partnership

545
00:22:39,990 --> 00:22:37,360
that again

546
00:22:41,990 --> 00:22:40,000
not one of the agencies apart is able to

547
00:22:44,390 --> 00:22:42,000
do that but through the cooperation

548
00:22:46,710 --> 00:22:44,400
through exchanging experiences how we do

549
00:22:48,870 --> 00:22:46,720
that we are able to manage this uh this

550
00:22:51,430 --> 00:22:48,880
great new endeavor and at the end of

551
00:22:54,390 --> 00:22:51,440
course the aim is to build an economy in

552
00:22:57,190 --> 00:22:54,400
lower earth orbit the aim is not that we

553
00:22:59,430 --> 00:22:57,200
as agencies we continue to operate and

554
00:23:01,190 --> 00:22:59,440
and to fly and then and to build

555
00:23:03,430 --> 00:23:01,200
everything in lower orbit but that there

556
00:23:05,830 --> 00:23:03,440
is a real economy and we're just one of

557
00:23:08,470 --> 00:23:05,840
the users of the systems that will be

558
00:23:11,510 --> 00:23:08,480
there and then we can focus as was said

559
00:23:14,149 --> 00:23:11,520
already by a number of our guests we can

560
00:23:15,669 --> 00:23:14,159
focus on exploration the gateway going

561
00:23:17,990 --> 00:23:15,679
to the surface of the moon and

562
00:23:20,149 --> 00:23:18,000
eventually to mars this is where

563
00:23:23,190 --> 00:23:20,159

we should have to shift our focus of the

564
00:23:24,710 --> 00:23:23,200
agencies in the next 10 to 20 years

565
00:23:26,870 --> 00:23:24,720
um could i just

566
00:23:29,510 --> 00:23:26,880
follow up a moment and ask you about the

567
00:23:31,430 --> 00:23:29,520
strains that the commercial

568
00:23:32,950 --> 00:23:31,440
enterprises are putting on the system

569
00:23:35,590 --> 00:23:32,960
can you be specific about what you're

570
00:23:39,510 --> 00:23:37,350
well of course if you have a commercial

571
00:23:41,750 --> 00:23:39,520
company that says i want to do my

572
00:23:44,149 --> 00:23:41,760
research on board of the space station

573
00:23:45,909 --> 00:23:44,159
they want to have of course a guarantee

574
00:23:47,830 --> 00:23:45,919
that they can fly they want to have a

575
00:23:49,590 --> 00:23:47,840
return on investment that's everything

576
00:23:52,310 --> 00:23:49,600
that is there about the commercial

577
00:23:54,870 --> 00:23:52,320
companies so how do we manage this as

578
00:23:56,789 --> 00:23:54,880
agencies how do we put the priorities

579
00:23:59,110 --> 00:23:56,799
right with our member states especially

580
00:24:01,510 --> 00:23:59,120
in isa because they fund the national

581
00:24:03,430 --> 00:24:01,520
science how do we manage all these

582
00:24:05,350 --> 00:24:03,440
different inputs that we are getting

583
00:24:07,029 --> 00:24:05,360
these different requirements that we are

584
00:24:09,750 --> 00:24:07,039
getting and this is something that we

585
00:24:12,710 --> 00:24:09,760
need to learn uh we are not there yet we

586
00:24:16,710 --> 00:24:12,720
are not fully 100 proficient yet but i'm

587
00:24:20,950 --> 00:24:18,630
looking back on the challenges of

588
00:24:23,830 --> 00:24:20,960

designing and also building the space

589
00:24:26,789 --> 00:24:23,840
station i'm one day wondering sergey

590
00:24:29,830 --> 00:24:26,799
sergey krikalov um what advice you might

591
00:24:33,110 --> 00:24:29,840
have for future projects that are this

592
00:24:38,789 --> 00:24:36,149
um i think what we experienced from very

593
00:24:41,190 --> 00:24:38,799
beginning that on top of regular work

594
00:24:43,110 --> 00:24:41,200
relationship we start to build personal

595
00:24:45,110 --> 00:24:43,120
relationship inside the program and i

596
00:24:47,430 --> 00:24:45,120
think this is very important because

597
00:24:49,830 --> 00:24:47,440
we in this way we can trust to each

598
00:24:52,070 --> 00:24:49,840
other we know each other better

599
00:24:54,310 --> 00:24:52,080
and i think from my point of view at

600
00:24:56,149 --> 00:24:54,320
least it's one of the big advantages we

601
00:24:57,350 --> 00:24:56,159
have through this program because now i

602
00:24:59,990 --> 00:24:57,360
have friends

603
00:25:04,070 --> 00:25:00,000
in europe in european space agency in

604
00:25:06,149 --> 00:25:04,080
states in canada in japan and with some

605
00:25:08,470 --> 00:25:06,159
people we were close together in space

606
00:25:10,070 --> 00:25:08,480
with some people we were working

607
00:25:11,110 --> 00:25:10,080
together here on the ground and mission

608
00:25:14,390 --> 00:25:11,120
control

609
00:25:16,789 --> 00:25:14,400
but i think this is probably one of the

610
00:25:18,710 --> 00:25:16,799
reason why our program was successful

611
00:25:21,269 --> 00:25:18,720
because we

612
00:25:22,789 --> 00:25:21,279
start to build trust to each other and i

613
00:25:25,669 --> 00:25:22,799

think it's based on a personal

614
00:25:28,310 --> 00:25:25,679
relationship and i treasure this is

615
00:25:30,630 --> 00:25:28,320
a part of my life experience and in

616
00:25:32,470 --> 00:25:30,640
terms of the challenges of designing and

617
00:25:33,990 --> 00:25:32,480
building what did you learn what would

618
00:25:38,230 --> 00:25:34,000
you do differently if you were to do it

619
00:25:41,909 --> 00:25:39,830
i think we

620
00:25:43,750 --> 00:25:41,919
we have different learning on different

621
00:25:46,710 --> 00:25:43,760
stages because sometimes

622
00:25:49,830 --> 00:25:46,720
we try to do things standard and it has

623
00:25:53,110 --> 00:25:49,840
some advantages but also the life shows

624
00:25:55,110 --> 00:25:53,120
that things still different we have one

625
00:25:57,350 --> 00:25:55,120
voltage russian segment we have a

626
00:25:59,750 --> 00:25:57,360
different voltage on the u.s segment and

627
00:26:01,269 --> 00:25:59,760
it has pluses and minuses and because

628
00:26:03,909 --> 00:26:01,279
station is basically

629
00:26:05,750 --> 00:26:03,919
basically the lab where we can learn uh

630
00:26:08,470 --> 00:26:05,760
what is the best way to operate uh

631
00:26:10,789 --> 00:26:08,480
having a variety of

632
00:26:13,669 --> 00:26:10,799
technical solution uh we will have more

633
00:26:15,909 --> 00:26:13,679
data and even if we found out that one

634
00:26:17,990 --> 00:26:15,919
of the solution is not as good as

635
00:26:21,590 --> 00:26:18,000
another but if we wouldn't try we

636
00:26:24,390 --> 00:26:21,600
wouldn't know about this so i think uh

637
00:26:25,830 --> 00:26:24,400
having this variety is also good

638
00:26:27,510 --> 00:26:25,840

for the station for the program in

639
00:26:29,430 --> 00:26:27,520
general

640
00:26:31,750 --> 00:26:29,440
mr dube what are your thoughts on this

641
00:26:33,990 --> 00:26:31,760
on the challenges of design and build

642
00:26:35,110 --> 00:26:34,000
and what might be done differently

643
00:26:37,029 --> 00:26:35,120
yeah i think

644
00:26:38,390 --> 00:26:37,039
the the fact that it's so complex

645
00:26:40,230 --> 00:26:38,400
there's a need probably to have

646
00:26:43,110 --> 00:26:40,240
continuous communication between the

647
00:26:45,590 --> 00:26:43,120
partners especially during the design

648
00:26:48,070 --> 00:26:45,600
phases because there will be a lot of

649
00:26:50,950 --> 00:26:48,080
changes that will impact each other so

650
00:26:53,110 --> 00:26:50,960
uh we need to better define interface

651
00:26:55,669 --> 00:26:53,120
and well define also the role and

652
00:26:57,830 --> 00:26:55,679
responsibilities of every partner i know

653
00:26:59,750 --> 00:26:57,840
like on the iss program at the beginning

654
00:27:02,870 --> 00:26:59,760
during the design phase

655
00:27:05,909 --> 00:27:02,880
we had a couple of changes over time and

656
00:27:08,230 --> 00:27:05,919
that impacted us and our design for the

657
00:27:10,149 --> 00:27:08,240
canadarm and

658
00:27:12,390 --> 00:27:10,159
and it cost a lot of money and also had

659
00:27:15,190 --> 00:27:12,400
a big impact also on the schedule so

660
00:27:16,390 --> 00:27:15,200
don't need to be defined clearly and

661
00:27:18,789 --> 00:27:16,400
also

662
00:27:20,950 --> 00:27:18,799
on a regular basis to make sure that at

663
00:27:22,950 --> 00:27:20,960

least we could react quickly on those

664
00:27:25,029 --> 00:27:22,960
changes so

665
00:27:27,909 --> 00:27:25,039
uh john maltomano do you want to weigh

666
00:27:30,870 --> 00:27:27,919
in on this as well how future

667
00:27:32,870 --> 00:27:30,880
uh projects that might be very complex

668
00:27:34,710 --> 00:27:32,880
might have learned from the iss

669
00:27:36,470 --> 00:27:34,720
experience

670
00:27:38,950 --> 00:27:36,480
my biggest advice and i talk to our

671
00:27:41,669 --> 00:27:38,960
gateway folks all the time is you can't

672
00:27:45,029 --> 00:27:41,679
start soon enough talking globally you

673
00:27:47,909 --> 00:27:45,039
got to get out of this this this idea of

674
00:27:50,789 --> 00:27:47,919
you know a single agency item this has

675
00:27:53,110 --> 00:27:50,799
to be a global endeavor it has to be a

676
00:27:55,029 --> 00:27:53,120
global partnership and and the sooner

677
00:27:57,510 --> 00:27:55,039
you can start working together and the

678
00:28:00,710 --> 00:27:57,520
sooner you can start sharing

679
00:28:03,350 --> 00:28:00,720
you know desires needs requirements on

680
00:28:05,909 --> 00:28:03,360
how you want to operate to me you you

681
00:28:08,230 --> 00:28:05,919
can't start early enough

682
00:28:10,149 --> 00:28:08,240
it's a huge benefit of the international

683
00:28:12,710 --> 00:28:10,159
space station you know when when we

684
00:28:14,230 --> 00:28:12,720
first started it you know we were all

685
00:28:16,630 --> 00:28:14,240
kind of getting to know how each other

686
00:28:19,110 --> 00:28:16,640
operates and and you can imagine that

687
00:28:21,990 --> 00:28:19,120
comes with some different challenges

688
00:28:23,830 --> 00:28:22,000

um you know think of uh of a marriage

689
00:28:25,510 --> 00:28:23,840
you start with a marriage you know you

690
00:28:29,350 --> 00:28:25,520
it's it's you're starting to learn each

691
00:28:31,029 --> 00:28:29,360
other today we operate and again i'm

692
00:28:33,269 --> 00:28:31,039
probably a little biased i believe we

693
00:28:35,510 --> 00:28:33,279
operate seamlessly you know when we have

694
00:28:37,510 --> 00:28:35,520
an issue we're ready to work together

695
00:28:39,990 --> 00:28:37,520
and we can solve things so much quicker

696
00:28:41,830 --> 00:28:40,000
today than we did in the early days and

697
00:28:44,149 --> 00:28:41,840
it's because of what we've done and you

698
00:28:45,909 --> 00:28:44,159
know with our global partnership and so

699
00:28:48,630 --> 00:28:45,919
i tell the gateway guys all the time

700
00:28:50,870 --> 00:28:48,640
start early and and keep pressing in

701
00:28:52,950 --> 00:28:50,880
that direction and specifically i

702
00:28:55,430 --> 00:28:52,960
presume when it comes to design and

703
00:28:57,590 --> 00:28:55,440
build you have to get talking to one

704
00:28:58,549 --> 00:28:57,600
another at the design phase early

705
00:29:01,510 --> 00:28:58,559
correct

706
00:29:02,389 --> 00:29:01,520
absolutely absolutely and you know it's

707
00:29:04,389 --> 00:29:02,399
it's

708
00:29:07,430 --> 00:29:04,399
you know this this pandemic makes it

709
00:29:09,350 --> 00:29:07,440
hard right for some for some people and

710
00:29:11,830 --> 00:29:09,360
and it's harder for us you know no doubt

711
00:29:14,710 --> 00:29:11,840
but the beauty of space station is

712
00:29:17,029 --> 00:29:14,720
because of all the different time zones

713
00:29:18,870 --> 00:29:17,039

we've already been operating remotely we

714
00:29:21,430 --> 00:29:18,880
had a lot of practice in the

715
00:29:23,590 --> 00:29:21,440
international space station so while the

716
00:29:25,430 --> 00:29:23,600
pandemic has added different challenges

717
00:29:27,830 --> 00:29:25,440
we can't see each other face to face

718
00:29:30,310 --> 00:29:27,840
like we like we need to and like we you

719
00:29:32,310 --> 00:29:30,320
know we we've done in the past we have

720
00:29:34,789 --> 00:29:32,320
some experience on this and we're able

721
00:29:37,350 --> 00:29:34,799
to use that so i'll tell you that while

722
00:29:39,029 --> 00:29:37,360
the pandemic's been hard on on everybody

723
00:29:40,470 --> 00:29:39,039
it could have been a lot harder if we

724
00:29:42,230 --> 00:29:40,480
didn't have this partnership already

725
00:29:44,149 --> 00:29:42,240
well established somebody else want to

726
00:29:46,070 --> 00:29:44,159
weigh in on this question of boundaries

727
00:29:48,549 --> 00:29:46,080
being pushed out further and further and

728
00:29:50,630 --> 00:29:48,559
and and how the partnership can help

729
00:29:52,830 --> 00:29:50,640
enable some of these very ambitious

730
00:29:54,630 --> 00:29:52,840
missions that are now on the drawing

731
00:29:57,110 --> 00:29:54,640
boards um

732
00:30:00,870 --> 00:29:57,120
sergey uh kriegelev you want to take a

733
00:30:04,789 --> 00:30:02,549
uh joe already

734
00:30:05,750 --> 00:30:04,799
talked about this that if we work

735
00:30:08,070 --> 00:30:05,760
together

736
00:30:11,190 --> 00:30:08,080
all the time we work in in some limits

737
00:30:12,630 --> 00:30:11,200
we have financial limits we have

738
00:30:17,830 --> 00:30:12,640

work

739
00:30:19,990 --> 00:30:17,840
together we can

740
00:30:20,710 --> 00:30:20,000
inside the same limits we can

741
00:30:23,510 --> 00:30:20,720
move

742
00:30:26,149 --> 00:30:23,520
much further

743
00:30:28,549 --> 00:30:26,159
combining our efforts we can do more

744
00:30:30,789 --> 00:30:28,559
things than we

745
00:30:32,230 --> 00:30:30,799
we would be able to do if we

746
00:30:34,870 --> 00:30:32,240
walk alone

747
00:30:36,950 --> 00:30:34,880
mr dewin i wanted to ask you this same

748
00:30:39,669 --> 00:30:36,960
question about pushing out boundaries

749
00:30:42,470 --> 00:30:39,679
and how the iss lessons uh can be

750
00:30:43,909 --> 00:30:42,480
applied and and will enable future

751
00:30:46,230 --> 00:30:43,919
missions

752
00:30:48,470 --> 00:30:46,240
yeah absolutely i think it's mandatory

753
00:30:50,310 --> 00:30:48,480
that in the future if we want to to go

754
00:30:52,230 --> 00:30:50,320
further that we will have to cooperate

755
00:30:54,470 --> 00:30:52,240
that we will have to work together and

756
00:30:56,070 --> 00:30:54,480
again the friendship and the trust and

757
00:30:57,990 --> 00:30:56,080
the word trust was used a couple of

758
00:31:00,389 --> 00:30:58,000
times that we have built in this

759
00:31:03,750 --> 00:31:00,399
partnership has allowed us for example

760
00:31:05,990 --> 00:31:03,760
to to move much faster in the the way

761
00:31:08,149 --> 00:31:06,000
that we have set up the gateway program

762
00:31:10,549 --> 00:31:08,159
but the gateway program is yes it's

763
00:31:12,549 --> 00:31:10,559

going towards the moon but at the end we

764
00:31:14,789 --> 00:31:12,559
all want to explore together the surface

765
00:31:17,509 --> 00:31:14,799
of the moon and even later on we want to

766
00:31:20,149 --> 00:31:17,519
go to mars and this will be impossible

767
00:31:21,590 --> 00:31:20,159
if we don't continue to build this trust

768
00:31:25,509 --> 00:31:21,600
built on the lessons that we have

769
00:31:28,470 --> 00:31:25,519
learned from the iss and uh and yes work

770
00:31:31,029 --> 00:31:28,480
together in ever more complex missions

771
00:31:33,909 --> 00:31:31,039
and ever more complex systems because

772
00:31:37,029 --> 00:31:33,919
yes the iss is very complex but imagine

773
00:31:39,750 --> 00:31:37,039
that one day we have to fly with uh

774
00:31:41,750 --> 00:31:39,760
six or ten young people uh to mars and

775
00:31:43,750 --> 00:31:41,760
and bring them safely back the

776
00:31:45,909 --> 00:31:43,760
complexity of that today we i don't

777
00:31:47,750 --> 00:31:45,919
think that we can even imagine and so we

778
00:31:50,230 --> 00:31:47,760
will meet all the forces and all the

779
00:31:52,870 --> 00:31:50,240
minds bright minds in all the agencies

780
00:31:56,470 --> 00:31:52,880
that are there around the world

781
00:31:58,230 --> 00:31:56,480
uh joel maltombano i i'd like to uh come

782
00:32:00,389 --> 00:31:58,240
back to you you have offered a few

783
00:32:01,750 --> 00:32:00,399
thoughts already

784
00:32:11,509 --> 00:32:01,760
on

785
00:32:13,029 --> 00:32:11,519
that you would like to share

786
00:32:14,470 --> 00:32:13,039
probably the

787
00:32:17,190 --> 00:32:14,480
you know in addition to what i've said

788
00:32:19,830 --> 00:32:17,200

is my words of wisdom then would be just

789
00:32:20,549 --> 00:32:19,840
get started try you know you don't have

790
00:32:23,190 --> 00:32:20,559
to

791
00:32:25,750 --> 00:32:23,200
go for the the biggest uh the biggest

792
00:32:27,990 --> 00:32:25,760
success right off the bat try and fly a

793
00:32:30,549 --> 00:32:28,000
payload or two on the international

794
00:32:33,750 --> 00:32:30,559
space station see how that works try and

795
00:32:36,230 --> 00:32:33,760
understand the processes allow us to to

796
00:32:38,230 --> 00:32:36,240
show what we can do as a partnership you

797
00:32:40,549 --> 00:32:38,240
know fly a small payload then fly a

798
00:32:42,630 --> 00:32:40,559
larger payload then fly a person on

799
00:32:44,870 --> 00:32:42,640
board you know you see some of the work

800
00:32:47,269 --> 00:32:44,880
with uae where they united arab emirates

801
00:32:49,269 --> 00:32:47,279
where they flew at an astronaut on board

802
00:32:51,830 --> 00:32:49,279
the international space station so

803
00:32:54,149 --> 00:32:51,840
they're taking steps over time

804
00:32:55,029 --> 00:32:54,159
getting the game is would be my my

805
00:32:57,110 --> 00:32:55,039
biggest

806
00:33:00,630 --> 00:32:57,120
my next set of wisdom is just get in the

807
00:33:02,549 --> 00:33:00,640
game and uh let us play together

808
00:33:04,310 --> 00:33:02,559
mr sakai do you have any thoughts on

809
00:33:05,509 --> 00:33:04,320
this that you'd like to share with

810
00:33:07,590 --> 00:33:05,519
others

811
00:33:10,070 --> 00:33:07,600
yeah um

812
00:33:13,590 --> 00:33:10,080
i'm not sure that this is a

813
00:33:16,710 --> 00:33:13,600

appropriate word but iss pro program all

814
00:33:19,350 --> 00:33:16,720
allows to stay non-iss partners or

815
00:33:22,149 --> 00:33:19,360
participants astronauts at iss as you

816
00:33:23,110 --> 00:33:22,159
know may as you may know lost cosmos has

817
00:33:26,389 --> 00:33:23,120
already

818
00:33:28,470 --> 00:33:26,399
mediated the civil private astronaut

819
00:33:32,310 --> 00:33:28,480
the crew one launched successfully on

820
00:33:34,630 --> 00:33:32,320
november 15th so i guess the area

821
00:33:36,870 --> 00:33:34,640
the era of commercial human space flight

822
00:33:38,950 --> 00:33:36,880
will open up soon

823
00:33:41,190 --> 00:33:38,960
if the country has states the human

824
00:33:43,830 --> 00:33:41,200
space right not learning human space

825
00:33:47,029 --> 00:33:43,840
environment or its difficulties i

826
00:33:50,630 --> 00:33:47,039
recommend to try the uh

827
00:33:53,509 --> 00:33:50,640
onerous owner service of iss utilization

828
00:33:55,509 --> 00:33:53,519
to demonstrate the technology for the

829
00:33:56,870 --> 00:33:55,519
human space environment

830
00:33:58,070 --> 00:33:56,880
through the develop

831
00:34:00,310 --> 00:33:58,080
through this

832
00:34:02,149 --> 00:34:00,320
demonstration they can

833
00:34:03,350 --> 00:34:02,159
learn the philosophy of the human

834
00:34:05,509 --> 00:34:03,360
specified

835
00:34:07,350 --> 00:34:05,519
and the detailed requirement of human

836
00:34:09,990 --> 00:34:07,360
safety

837
00:34:13,030 --> 00:34:10,000
in the future human space activity will

838
00:34:14,629 --> 00:34:13,040

expand from the leo to the moon

839
00:34:16,950 --> 00:34:14,639
but the further

840
00:34:19,190 --> 00:34:16,960
further we go the great

841
00:34:21,510 --> 00:34:19,200
greater the cost of

842
00:34:23,909 --> 00:34:21,520
transportation and communication and the

843
00:34:26,149 --> 00:34:23,919
greater the technical risks

844
00:34:29,510 --> 00:34:26,159
it is difficult to carry out a mission

845
00:34:32,470 --> 00:34:29,520
in a single country and i believe that

846
00:34:35,669 --> 00:34:32,480
the most economical and efficient way to

847
00:34:38,550 --> 00:34:35,679
carry out a mission is for the countries

848
00:34:41,349 --> 00:34:38,560
to cooperate with each other in the

849
00:34:43,829 --> 00:34:41,359
military and beneficial relationship

850
00:34:46,710 --> 00:34:43,839
i hope a lot of countries develop their

851
00:34:49,750 --> 00:34:46,720
own strengths and promote international

852
00:34:52,230 --> 00:34:49,760
corporations using their strengths as a

853
00:34:53,990 --> 00:34:52,240
contribution

854
00:34:55,589 --> 00:34:54,000
uh mr krikalev do you have any

855
00:34:57,270 --> 00:34:55,599
additional words of wisdom you'd like to

856
00:35:00,310 --> 00:34:57,280
share with some other space agencies

857
00:35:05,990 --> 00:35:03,190
i would like to say that uh human space

858
00:35:09,030 --> 00:35:06,000
flights is very wide area and um it's

859
00:35:11,270 --> 00:35:09,040
not necessarily to fly uh person into

860
00:35:13,750 --> 00:35:11,280
space to to be participant of this uh

861
00:35:17,670 --> 00:35:13,760
human space flight exploration because

862
00:35:19,990 --> 00:35:17,680
uh like uh space or human space flight

863
00:35:21,030 --> 00:35:20,000

related science it can be life science

864
00:35:23,270 --> 00:35:21,040
it can be

865
00:35:25,990 --> 00:35:23,280
fundamental physics science

866
00:35:29,109 --> 00:35:26,000
there is a big variety of activity that

867
00:35:30,390 --> 00:35:29,119
can be done by especially new agencies

868
00:35:33,589 --> 00:35:30,400
they can do

869
00:35:36,550 --> 00:35:33,599
a specific scientific experiment and in

870
00:35:39,190 --> 00:35:36,560
many cases it can be done on automated

871
00:35:41,270 --> 00:35:39,200
spacecraft on satellites but

872
00:35:43,510 --> 00:35:41,280
in many cases it's much more efficient

873
00:35:45,109 --> 00:35:43,520
actually to do on human spaceflights so

874
00:35:47,910 --> 00:35:45,119
really a

875
00:35:49,349 --> 00:35:47,920
space station is a very good testbed for

876
00:35:54,790 --> 00:35:49,359
new

877
00:35:55,750 --> 00:35:54,800
future flights and being participant in

878
00:35:58,230 --> 00:35:55,760
this

879
00:36:00,230 --> 00:35:58,240
has very different very many different

880
00:36:01,829 --> 00:36:00,240
applications

881
00:36:03,990 --> 00:36:01,839
i want to thank all of you for your

882
00:36:06,470 --> 00:36:04,000
comments and reflections on what has

883
00:36:08,470 --> 00:36:06,480
been just an incredible international

884
00:36:09,990 --> 00:36:08,480
space station adventure

885
00:36:12,310 --> 00:36:10,000
i now want to bring back shelly

886
00:36:15,109 --> 00:36:12,320
brunswick who is the chief operating

887
00:36:18,390 --> 00:36:15,119
officer of the space foundation who has

888
00:36:20,230 --> 00:36:18,400

a special presentation for all of you

889
00:36:22,310 --> 00:36:20,240
thank you gene and thank you to all the

890
00:36:25,109 --> 00:36:22,320
international space station partners for

891
00:36:27,510 --> 00:36:25,119
that very inspirational conversation you

892
00:36:30,390 --> 00:36:27,520
make all of us very proud because you

893
00:36:33,190 --> 00:36:30,400
show the world what is possible when we

894
00:36:34,870 --> 00:36:33,200
all work together to do bold things

895
00:36:37,670 --> 00:36:34,880
and that is why i'm rejoining you in

896
00:36:40,470 --> 00:36:37,680
today's program as it is my privilege to

897
00:36:42,390 --> 00:36:40,480
bestow a very special award to each of

898
00:36:44,150 --> 00:36:42,400
the iss partners

899
00:36:46,790 --> 00:36:44,160
it was our hope to present these awards

900
00:36:49,270 --> 00:36:46,800
in person to the five partner nations at

901
00:36:51,670 --> 00:36:49,280
our annual space symposium this year but

902
00:36:54,310 --> 00:36:51,680
the best laid plans sometimes encounter

903
00:36:56,790 --> 00:36:54,320
unforeseen conditions that require us to

904
00:36:58,310 --> 00:36:56,800
adapt to new situations and that is what

905
00:37:01,190 --> 00:36:58,320
we are doing today with this virtual

906
00:37:03,270 --> 00:37:01,200
ceremony for over two decades our space

907
00:37:05,990 --> 00:37:03,280
achievement award has recognized

908
00:37:07,990 --> 00:37:06,000
individuals or organizations that have

909
00:37:10,630 --> 00:37:08,000
demonstrated space achievement

910
00:37:13,109 --> 00:37:10,640
breakthrough space technology or program

911
00:37:15,829 --> 00:37:13,119
or product success representing critical

912
00:37:18,230 --> 00:37:15,839
milestones in the evolution of space

913
00:37:20,470 --> 00:37:18,240

exploration and development

914
00:37:23,109 --> 00:37:20,480
its recipients are a who's who of the

915
00:37:25,109 --> 00:37:23,119
global space community and today

916
00:37:27,190 --> 00:37:25,119
we add your nation's names to that

917
00:37:29,190 --> 00:37:27,200
distinguished list

918
00:37:31,430 --> 00:37:29,200
in the 20 years since the hatch opened

919
00:37:33,670 --> 00:37:31,440
and the crew of expedition 1 claimed it

920
00:37:36,550 --> 00:37:33,680
as our new home citizens from more than

921
00:37:39,190 --> 00:37:36,560
a dozen countries have visited the iss

922
00:37:42,069 --> 00:37:39,200
to live work and advance the human

923
00:37:43,510 --> 00:37:42,079
adventure and exploration of space

924
00:37:46,470 --> 00:37:43,520
in recognition of their shared

925
00:37:49,510 --> 00:37:46,480
leadership initiative and investment the

926
00:37:51,829 --> 00:37:49,520
space foundation presents its 2020 space

927
00:37:54,630 --> 00:37:51,839
achievement award to the five space

928
00:37:56,390 --> 00:37:54,640
agencies that have led the iss program

929
00:37:58,150 --> 00:37:56,400
since its inception

930
00:38:00,310 --> 00:37:58,160
the national aeronautics and space

931
00:38:01,589 --> 00:38:00,320
administration for the united states of

932
00:38:05,349 --> 00:38:01,599
america

933
00:38:08,230 --> 00:38:05,359
canadian space agency for canada

934
00:38:11,190 --> 00:38:08,240
european space agency for its 22

935
00:38:13,510 --> 00:38:11,200
european members roscosmos for the

936
00:38:17,109 --> 00:38:13,520
russian federation and the japan

937
00:38:19,430 --> 00:38:17,119
aerospace exploration agency for japan

938
00:38:21,750 --> 00:38:19,440

on behalf of space foundation and the

939
00:38:24,390 --> 00:38:21,760
team i want to congratulate all of these

940
00:38:27,030 --> 00:38:24,400
organizations for setting the example of

941
00:38:28,950 --> 00:38:27,040
how effective teams work together to

942
00:38:30,829 --> 00:38:28,960
benefit all of us

943
00:38:32,710 --> 00:38:30,839
thank you all and

944
00:38:34,630 --> 00:38:32,720
congratulations thank you shelley and

945
00:38:36,950 --> 00:38:34,640
we'd like to give each of the recipients

946
00:38:41,430 --> 00:38:36,960
an opportunity to make a few remarks

947
00:38:43,750 --> 00:38:41,440
joel maltobano of nasa take it away

948
00:38:46,310 --> 00:38:43,760
well first of all let me show the award

949
00:38:48,710 --> 00:38:46,320
it's a it's an honor to receive this

950
00:38:50,710 --> 00:38:48,720
award and a huge thank you to the space

951
00:38:52,069 --> 00:38:50,720
foundation for the award and for

952
00:38:53,349 --> 00:38:52,079
recognizing the international

953
00:38:55,750 --> 00:38:53,359
partnership

954
00:38:58,230 --> 00:38:55,760
like we've talked about today the 20

955
00:39:00,390 --> 00:38:58,240
plus years of operations on the

956
00:39:03,030 --> 00:39:00,400
international space station have taught

957
00:39:05,349 --> 00:39:03,040
the world how to cooperate globally

958
00:39:07,750 --> 00:39:05,359
in my opinion we've set the standard on

959
00:39:10,870 --> 00:39:07,760
how to do that and to be recognized for

960
00:39:12,550 --> 00:39:10,880
that is just it's just outstanding so on

961
00:39:14,310 --> 00:39:12,560
behalf of nasa

962
00:39:16,310 --> 00:39:14,320
and our partners and i know our partners

963
00:39:18,150 --> 00:39:16,320

are going to get a huge

964
00:39:20,310 --> 00:39:18,160
they'll be able to talk as well i just

965
00:39:22,150 --> 00:39:20,320
want to say a huge thank you to everyone

966
00:39:24,069 --> 00:39:22,160
and i promise you will continue this

967
00:39:26,550 --> 00:39:24,079
great operations of the international

968
00:39:28,390 --> 00:39:26,560
space station for many years to come

969
00:39:31,670 --> 00:39:28,400
thank you and now frank dewin of the

970
00:39:33,750 --> 00:39:31,680
european space agency

971
00:39:35,829 --> 00:39:33,760
yes uh also on behalf of the european

972
00:39:37,910 --> 00:39:35,839
space agency thank you very much to the

973
00:39:39,430 --> 00:39:37,920
space foundation to to give us this

974
00:39:41,190 --> 00:39:39,440
great reward

975
00:39:43,349 --> 00:39:41,200
but it's a reward especially for the

976
00:39:45,750 --> 00:39:43,359
people i think there are thousands of

977
00:39:48,870 --> 00:39:45,760
people working every single day

978
00:39:52,069 --> 00:39:48,880
seamlessly around the globe together

979
00:39:54,710 --> 00:39:52,079
to make sure that six of our citizens

980
00:39:57,349 --> 00:39:54,720
can fly safely in space can operate can

981
00:40:00,069 --> 00:39:57,359
do science and can work for the benefit

982
00:40:02,550 --> 00:40:00,079
of humankind so to all those thousand

983
00:40:04,950 --> 00:40:02,560
peoples in all our agencies thank you

984
00:40:06,790 --> 00:40:04,960
very much on behalf of isa and thank you

985
00:40:09,670 --> 00:40:06,800
of course to the space foundation for

986
00:40:13,750 --> 00:40:09,680
giving us this great reward

987
00:40:15,750 --> 00:40:13,760
luke dubay of the canadian space agency

988
00:40:18,390 --> 00:40:15,760

yeah so i would like also to thank you

989
00:40:20,309 --> 00:40:18,400
for that award it's a great honor for me

990
00:40:22,870 --> 00:40:20,319
to receive it on behalf of the canadian

991
00:40:24,710 --> 00:40:22,880
space agency so i will share it with all

992
00:40:26,790 --> 00:40:24,720
the csa employees who supported this

993
00:40:29,349 --> 00:40:26,800
program over these years and also with

994
00:40:31,589 --> 00:40:29,359
the canadian industry particularly mde

995
00:40:33,030 --> 00:40:31,599
will also contribute to the success so

996
00:40:35,750 --> 00:40:33,040
we now

997
00:40:37,430 --> 00:40:35,760
control the iss robots from the ground

998
00:40:39,430 --> 00:40:37,440
and continue to evolve with the addition

999
00:40:41,430 --> 00:40:39,440
of the autonomous control so the

1000
00:40:44,309 --> 00:40:41,440
canadarm2 along also with the shuttle

1001
00:40:46,630 --> 00:40:44,319
arm basically build the iss so canada

1002
00:40:48,950 --> 00:40:46,640
will continue to partner with the other

1003
00:40:50,950 --> 00:40:48,960
spacefaring nation and will continue to

1004
00:40:53,430 --> 00:40:50,960
evolve so thank you

1005
00:40:56,069 --> 00:40:53,440
let me give the floor to junichi sakai

1006
00:40:58,069 --> 00:40:56,079
of the japan aerospace exploration

1007
00:41:01,190 --> 00:40:58,079
agency

1008
00:41:03,589 --> 00:41:01,200
yeah thank you very much to uh

1009
00:41:06,470 --> 00:41:03,599
space symposium and it is a great honor

1010
00:41:09,430 --> 00:41:06,480
to receive such a glorious hour

1011
00:41:11,430 --> 00:41:09,440
and japan joined the iss program in the

1012
00:41:13,990 --> 00:41:11,440
1980s

1013
00:41:16,230 --> 00:41:14,000

in the beginning japan has less

1014
00:41:19,510 --> 00:41:16,240
experience and achievements in human

1015
00:41:21,589 --> 00:41:19,520
space activity than the us and russia

1016
00:41:23,910 --> 00:41:21,599
and i heard that it was difficult to

1017
00:41:27,510 --> 00:41:23,920
carry out the program

1018
00:41:30,710 --> 00:41:27,520
i've been working on the iss since 1992

1019
00:41:33,349 --> 00:41:30,720
and i am very impressed with the

1020
00:41:35,670 --> 00:41:33,359
20th anniversary of human human mission

1021
00:41:37,349 --> 00:41:35,680
in diocese and the various

1022
00:41:39,829 --> 00:41:37,359
accomplishments it

1023
00:41:42,630 --> 00:41:39,839
it has pro produced

1024
00:41:46,470 --> 00:41:42,640
i hope that this partnership on the iss

1025
00:41:48,950 --> 00:41:46,480
will benefit its partners and humanity

1026
00:41:52,870 --> 00:41:48,960
and that it will continue to grow not

1027
00:41:54,390 --> 00:41:52,880
only at the iss but also beyond the iss

1028
00:41:56,950 --> 00:41:54,400
thank you very much

1029
00:42:00,309 --> 00:41:56,960
and sergey krikalev of ross cosmos with

1030
00:42:04,390 --> 00:42:02,470
and i would like to continue what uh

1031
00:42:06,550 --> 00:42:04,400
frank already said that

1032
00:42:08,470 --> 00:42:06,560
this award is

1033
00:42:10,390 --> 00:42:08,480
a word for a huge

1034
00:42:11,510 --> 00:42:10,400
number of people working in different

1035
00:42:14,390 --> 00:42:11,520
countries

1036
00:42:16,630 --> 00:42:14,400
uh working together and some people is

1037
00:42:18,710 --> 00:42:16,640
on very uh some people

1038
00:42:20,630 --> 00:42:18,720

on very important positions

1039
00:42:22,390 --> 00:42:20,640
some of them just

1040
00:42:24,150 --> 00:42:22,400
new engineers and scientists who just

1041
00:42:26,550 --> 00:42:24,160
recently joined the program

1042
00:42:29,910 --> 00:42:26,560
and i think this award belonged to all

1043
00:42:33,510 --> 00:42:29,920
this uh big crowd that actually

1044
00:42:37,430 --> 00:42:33,520
built even some something before this

1045
00:42:40,550 --> 00:42:37,440
program started because a lot of things

1046
00:42:41,670 --> 00:42:40,560
nasa inherited from previous

1047
00:42:43,510 --> 00:42:41,680
program

1048
00:42:46,309 --> 00:42:43,520
the same with us some engineers who

1049
00:42:47,349 --> 00:42:46,319
develop hardware for near station a lot

1050
00:42:49,190 --> 00:42:47,359
of this

1051
00:42:50,950 --> 00:42:49,200
technical solution was adopted for

1052
00:42:52,790 --> 00:42:50,960
international space station so i think

1053
00:42:54,630 --> 00:42:52,800
this award belonged to all these people

1054
00:42:56,950 --> 00:42:54,640
and i think it's very important for a

1055
00:42:59,349 --> 00:42:56,960
new generation who is just coming to

1056
00:43:01,990 --> 00:42:59,359
motivate them to see

1057
00:43:03,910 --> 00:43:02,000
how it was done in previous stages and

1058
00:43:06,309 --> 00:43:03,920
probably

1059
00:43:07,829 --> 00:43:06,319
several years later a new new team will

1060
00:43:11,109 --> 00:43:07,839
receive new award

1061
00:43:13,750 --> 00:43:11,119
so thank you all for doing all of this

1062
00:43:16,150 --> 00:43:13,760
congratulations to each of you for

1063
00:43:18,630 --> 00:43:16,160

receiving the space foundation space

1064
00:43:21,829 --> 00:43:18,640
achievement award and thank you also for

1065
00:43:23,910 --> 00:43:21,839
participating in this conversation today

1066
00:43:25,910 --> 00:43:23,920
we're grateful to everybody for taking

1067
00:43:28,630 --> 00:43:25,920
part in this and we look forward to even

1068
00:43:29,990 --> 00:43:28,640
more shared adventures living off of

1069
00:43:32,790 --> 00:43:30,000
planet earth

1070
00:43:42,390 --> 00:43:32,800
and a future with even more bold

1071
00:43:45,990 --> 00:43:44,230
and liftoff

1072
00:43:48,069 --> 00:43:46,000
liftoff of the proton rocket and the

1073
00:43:52,550 --> 00:43:48,079
zarya control module the international

1074
00:43:56,870 --> 00:43:55,190
we have booster ignition and liftoff of

1075
00:43:58,150 --> 00:43:56,880
the space shuttle endeavor with the

1076
00:44:00,069 --> 00:43:58,160
first american element of the

1077
00:44:02,150 --> 00:44:00,079
international space station uniting our

1078
00:44:08,970 --> 00:44:02,160
efforts in space to achieve our common

1079
00:44:11,990 --> 00:44:10,390
[Music]

1080
00:44:14,630 --> 00:44:12,000
the first two pieces

1081
00:44:17,910 --> 00:44:14,640
uh the zarya module launching from

1082
00:44:19,990 --> 00:44:17,920
kazakhstan and the node unity from from

1083
00:44:22,790 --> 00:44:20,000
the united states the first time those

1084
00:44:25,750 --> 00:44:22,800
pieces ever touched each other was

1085
00:44:28,470 --> 00:44:25,760
250 miles above the earth traveling 17

1086
00:44:30,470 --> 00:44:28,480
500 miles an hour

1087
00:44:32,630 --> 00:44:30,480
they fit together perfectly and the

1088
00:44:34,550 --> 00:44:32,640

electrical signals across the interface

1089
00:44:39,370 --> 00:44:34,560
was perfect and yet that was the first

1090
00:45:14,230 --> 00:45:12,390
[Music]

1091
00:45:15,510 --> 00:45:14,240
we all pull together as a partnership

1092
00:45:19,109 --> 00:45:15,520
both the united states and russia but

1093
00:45:21,190 --> 00:45:19,119
really also japan isa and canada all

1094
00:45:22,790 --> 00:45:21,200
pitch in and help each other through

1095
00:45:25,349 --> 00:45:22,800
these times

1096
00:45:27,589 --> 00:45:25,359
thank you to our ground support teams

1097
00:45:29,530 --> 00:45:27,599
and we really respect your

1098
00:45:35,589 --> 00:45:29,540
professionalism

1099
00:45:39,589 --> 00:45:37,990
when we're up on orbit we were

1100
00:45:41,270 --> 00:45:39,599
pretty relieved to have all the risk of

1101
00:45:44,230 --> 00:45:41,280
launch behind us

1102
00:45:47,589 --> 00:45:44,240
but then there was kind of a

1103
00:45:49,910 --> 00:45:47,599
very busy scramble particularly to find

1104
00:45:52,550 --> 00:45:49,920
the tv hookup and the tv cable so we

1105
00:45:54,630 --> 00:45:52,560
could give you that downlink we were

1106
00:45:56,550 --> 00:45:54,640
really close to the wire getting that

1107
00:45:58,950 --> 00:45:56,560
all rigged and happy and we almost

1108
00:45:58,960 --> 00:46:02,470
a good it

1109
00:46:02,480 --> 00:46:08,080
we finally got access to the internet

1110
00:46:12,150 --> 00:46:10,630
[Music]

1111
00:46:13,829 --> 00:46:12,160
we're really happy with it because it

1112
00:46:18,080 --> 00:46:13,839
helps us feel like we're a little bit

1113
00:46:30,140 --> 00:46:18,090

more in touch with the world below us

1114
00:46:30,150 --> 00:46:37,030
[Applause]

1115
00:46:41,190 --> 00:46:38,390
shall we start

1116
00:46:47,460 --> 00:46:41,200
taking this symbol of partnership and

1117
00:46:57,589 --> 00:46:56,069
[Music]

1118
00:47:00,069 --> 00:46:57,599
who explore

1119
00:47:02,470 --> 00:47:00,079
people who venture into the frontier

1120
00:47:04,470 --> 00:47:02,480
will want to share the experience it's

1121
00:47:06,550 --> 00:47:04,480
an amazing experience we have the

1122
00:47:08,870 --> 00:47:06,560
internet and we can get the story out to

1123
00:47:11,190 --> 00:47:08,880
more people so if we step away and we

1124
00:47:13,829 --> 00:47:11,200
can look at the earth from above we can

1125
00:47:15,270 --> 00:47:13,839
get a very good feel for all the dynamic

1126
00:47:18,069 --> 00:47:15,280
changes that are happening both in the

1127
00:47:19,430 --> 00:47:18,079
ocean in the atmosphere on land and so

1128
00:47:21,430 --> 00:47:19,440
forth

1129
00:47:23,270 --> 00:47:21,440
this is the cupola it's one of those

1130
00:47:24,710 --> 00:47:23,280
places you find yourself hanging out in

1131
00:47:26,630 --> 00:47:24,720
all the time because all you want to do

1132
00:47:28,790 --> 00:47:26,640
is look back at our planet

1133
00:47:30,950 --> 00:47:28,800
i play this game with myself about where

1134
00:47:33,109 --> 00:47:30,960
we're flying over the earth you can sort

1135
00:47:34,790 --> 00:47:33,119
of figure it out you can tell different

1136
00:47:36,390 --> 00:47:34,800
cloud types over different continents

1137
00:47:39,620 --> 00:47:36,400
you can tell different soil types over

1138
00:47:42,150 --> 00:47:39,630

different continents

1139
00:47:43,430 --> 00:47:42,160
[Music]

1140
00:47:46,850 --> 00:47:43,440
were

1141
00:47:54,470 --> 00:47:46,860
my favorite things

1142
00:47:59,349 --> 00:47:56,790
i've definitely drawn encouragement from

1143
00:48:01,030 --> 00:47:59,359
mentors and so recognizing that we may

1144
00:48:03,030 --> 00:48:01,040
be offering that for future space

1145
00:48:05,270 --> 00:48:03,040
explorers was definitely a privilege and

1146
00:48:07,589 --> 00:48:05,280
an honor

1147
00:48:11,750 --> 00:48:07,599
we have a gift and an opportunity to

1148
00:48:15,670 --> 00:48:13,430
it's unbelievable that like something

1149
00:48:17,030 --> 00:48:15,680
that i am doing is going to be like in

1150
00:48:18,829 --> 00:48:17,040
space

1151
00:48:21,349 --> 00:48:18,839
so i'm just

1152
00:48:23,990 --> 00:48:21,359
like wow

1153
00:48:25,589 --> 00:48:24,000
i think this has a really neat potential

1154
00:48:27,990 --> 00:48:25,599
you know something that wasn't available

1155
00:48:29,430 --> 00:48:28,000
when i was growing up but where the

1156
00:48:31,510 --> 00:48:29,440
students themselves can actually

1157
00:48:36,550 --> 00:48:31,520
participate in what's going on on board

1158
00:48:40,790 --> 00:48:38,470
[Music]

1159
00:48:42,470 --> 00:48:40,800
first we see these pure discoveries

1160
00:48:44,549 --> 00:48:42,480
where out of the blue you learn

1161
00:48:46,309 --> 00:48:44,559
something nobody had a clue and it

1162
00:48:49,349 --> 00:48:46,319
changes the way that a discipline thinks

1163
00:48:51,109 --> 00:48:49,359

about itself forever

1164
00:48:53,750 --> 00:48:51,119
we're studying the long-duration effects

1165
00:48:55,510 --> 00:48:53,760
of space flight on humans and on the

1166
00:48:57,750 --> 00:48:55,520
life support systems that are required

1167
00:48:58,790 --> 00:48:57,760
to support our life working and living

1168
00:49:00,630 --> 00:48:58,800
in space

1169
00:49:03,829 --> 00:49:00,640
we're most interested in understanding

1170
00:49:06,309 --> 00:49:03,839
the human body in zero gravity because

1171
00:49:11,430 --> 00:49:06,319
we want to go beyond a low earth orbit

1172
00:49:16,069 --> 00:49:13,670
also we have this applied research that

1173
00:49:18,950 --> 00:49:16,079
leads us to real earth benefits where we

1174
00:49:20,630 --> 00:49:18,960
go out we seek information we bring that

1175
00:49:22,820 --> 00:49:20,640
information back to earth and directly

1176
00:49:24,710 --> 00:49:22,830
start impacting people's lives

1177
00:49:27,190 --> 00:49:24,720
[Music]

1178
00:49:29,030 --> 00:49:27,200
today experiments have been run

1179
00:49:31,030 --> 00:49:29,040
on boards that have touched over 103

1180
00:49:32,950 --> 00:49:31,040
countries around the world

1181
00:49:41,410 --> 00:49:32,960
so it's something that the whole world