



Out 100: 16/19:07+



100: 16/19:07+



PAO

Astronomical System  
**ASCR**  
Communications  
& Control



1  
00:00:00,006 --> 00:00:01,456  
[ Silence ]

2  
00:00:01,456 --> 00:00:03,946  
>> My name is Clair,  
I live in Tacoma.

3  
00:00:04,186 --> 00:00:06,886  
How many jobs are there  
on the Mission Control?

4  
00:00:08,346 --> 00:00:11,986  
>> In Mission Control, there  
are a lot of different jobs.

5  
00:00:11,986 --> 00:00:14,866  
There are -- right  
now, there are probably

6  
00:00:14,866 --> 00:00:17,266  
about 30 people here  
at Mission Control.

7  
00:00:18,066 --> 00:00:22,266  
They -- their team is led by  
a flight director and then

8  
00:00:22,546 --> 00:00:25,016  
that flight director is in  
charge of the entire team

9  
00:00:25,016 --> 00:00:28,266  
and then each of these folks has  
a specific area that they work

10  
00:00:28,266 --> 00:00:31,026  
in whether it's space walking,

11  
00:00:31,026 --> 00:00:33,916

or whether it's environmental control systems

12

00:00:33,916 --> 00:00:35,616  
or communication systems.

13

00:00:36,166 --> 00:00:38,176  
And that whole team works together here and then

14

00:00:38,176 --> 00:00:41,956  
in addition there are back rooms, as we call them,

15

00:00:42,276 --> 00:00:44,206  
where they have additional specialists

16

00:00:44,206 --> 00:00:47,366  
that may have a particular part of that system

17

00:00:47,366 --> 00:00:49,176  
that they're really expert at.

18

00:00:49,646 --> 00:00:52,606  
And then those folks all work together to bring

19

00:00:52,606 --> 00:00:54,906  
that into the full team and make sure

20

00:00:54,906 --> 00:00:57,456  
that we make the right decisions for the astronauts on orbit.

21

00:00:57,456 --> 00:00:59,606  
And then of course, we're also connecting

22

00:00:59,996 --> 00:01:02,796  
with Mission Control  
centers around the world

23

00:01:02,796 --> 00:01:05,596  
since we have five different  
space agencies working

24

00:01:05,596 --> 00:01:07,126  
on the International  
Space Station,

25

00:01:07,706 --> 00:01:09,556  
representing 15 different  
countries.

26

00:01:09,836 --> 00:01:10,636  
And so these folks here

27

00:01:10,636 --> 00:01:14,756  
in Mission Control have  
similar counterparts in Munich

28

00:01:14,756 --> 00:01:20,186  
and Moscow, in Scuba, Japan,  
in [inaudible] Canada,

29

00:01:20,736 --> 00:01:25,816  
and also in other  
areas of the country

30

00:01:25,816 --> 00:01:27,726  
that helps support  
their work here,

31

00:01:28,096 --> 00:01:31,236  
areas like Marshall Space Flight  
Center in Huntsville, Alabama,

32

00:01:31,746 --> 00:01:33,406

where they help coordinate  
all the research

33

00:01:33,406 --> 00:01:34,246

on the Space Stations.

34

00:01:34,246 --> 00:01:36,896

A really big team, I couldn't  
give you an exact number

35

00:01:36,896 --> 00:01:38,426

but here in Mission  
Control right now,

36

00:01:38,426 --> 00:01:43,876

there's about 30 people.

37

00:01:43,876 --> 00:01:45,876

>> My name is Emma.

38

00:01:45,876 --> 00:01:51,126

I live in Seattle, and  
my question is, "Do --

39

00:01:51,706 --> 00:01:54,556

do you always work  
at the same job

40

00:01:54,556 --> 00:01:56,346

and do the same thing  
in Mission Control?"

41

00:01:57,376 --> 00:02:01,386

>> You know, I'm going to bring  
Mark in on this a little bit.

42

00:02:01,816 --> 00:02:07,026

Most people work in a particular

area and focus on that area

43

00:02:07,026 --> 00:02:10,006

at least for a portion of  
their time in Mission Control.

44

00:02:10,456 --> 00:02:13,916

However, a lot of people move  
around into different areas

45

00:02:13,916 --> 00:02:16,866

because you've got basically  
engineers and scientists

46

00:02:16,866 --> 00:02:18,856

for the most part that  
work in Mission Control,

47

00:02:19,156 --> 00:02:22,546

and they have a broad background  
in whatever area they're in.

48

00:02:22,836 --> 00:02:24,806

And so they sometimes  
can translate those

49

00:02:24,806 --> 00:02:28,106

over in different areas  
and they like to do

50

00:02:28,106 --> 00:02:30,936

that to expand their  
careers because a lot

51

00:02:30,936 --> 00:02:33,536

of these folks would like to  
in addition to just working

52

00:02:33,536 --> 00:02:35,776

in Mission Control,

they'd like someday maybe

53

00:02:35,776 --> 00:02:37,516

to be a flight director  
and be in charge.

54

00:02:37,516 --> 00:02:40,416

And so in order to get  
experience in different areas,

55

00:02:40,766 --> 00:02:42,676

they do that kind of thing.

56

00:02:42,676 --> 00:02:45,356

We also have people like  
Mark who work with the crews

57

00:02:45,356 --> 00:02:47,236

and help prepare them  
and maybe you can talk

58

00:02:47,236 --> 00:02:49,256

about all the other  
support work.

59

00:02:49,976 --> 00:02:52,956

>> Well, yeah, I mean I --  
I've been here about 20 years.

60

00:02:52,956 --> 00:02:54,396

I started off, I worked

61

00:02:54,396 --> 00:02:57,746

in the Exercise Physiology Lab  
doing research for about four

62

00:02:57,746 --> 00:03:00,676

or five years and I've  
been currently in my job

63

00:03:00,676 --> 00:03:02,316  
that I have now as the Strength

64

00:03:02,316 --> 00:03:04,296  
and Conditioning coach  
for about 16 years.

65

00:03:04,856 --> 00:03:08,406  
>> Okay. Does that  
answer your question?

66

00:03:09,376 --> 00:03:09,443  
>> Yeah.

67

00:03:12,736 --> 00:03:14,486  
>> Hello. My name is  
Natia [assumed spelling].

68

00:03:14,836 --> 00:03:17,466  
I live in Burnham, B.C.  
and my question is,

69

00:03:17,706 --> 00:03:19,516  
"What kind of education  
do you need

70

00:03:19,516 --> 00:03:20,846  
to work in Mission Control?"

71

00:03:22,456 --> 00:03:24,656  
>> Well, again, most  
of the folks that work

72

00:03:24,656 --> 00:03:27,326  
in Mission Control are  
scientists or engineers.

73

00:03:27,656 --> 00:03:30,216  
There are a lot of different

engineering backgrounds.

74

00:03:30,216 --> 00:03:32,966

There's electrical engineering,  
there's mechanical engineering.

75

00:03:32,966 --> 00:03:35,066

There is aeronautical  
engineering.

76

00:03:35,416 --> 00:03:39,036

There's physics, Math,  
essentially for education,

77

00:03:39,036 --> 00:03:42,526

you want to get a broad  
education in science,

78

00:03:42,576 --> 00:03:44,196

technology, and engineering.

79

00:03:44,606 --> 00:03:47,786

But what's really key is to find  
something that you love to do,

80

00:03:48,206 --> 00:03:52,836

because whenever you are  
trying to improve yourself

81

00:03:52,836 --> 00:03:56,266

and get ready for a career, it's  
important to be doing something

82

00:03:56,266 --> 00:03:58,506

that you like to do  
because that's going

83

00:03:58,506 --> 00:04:01,106

to help you do it better and  
it's going to help you focus

84

00:04:01,106 --> 00:04:02,566  
on learning what  
you need to know.

85

00:04:02,956 --> 00:04:07,596  
And then continuing as  
you get older and maturer,

86

00:04:07,916 --> 00:04:10,446  
to learn more all the time  
and it's going to inspire

87

00:04:10,446 --> 00:04:13,616  
in you the idea of continuing  
to learn throughout your life

88

00:04:13,666 --> 00:04:15,726  
which everybody here  
in this room is --

89

00:04:15,726 --> 00:04:17,346  
is definitely focused on doing

90

00:04:17,346 --> 00:04:21,906  
that because every time  
we do something in space,

91

00:04:21,966 --> 00:04:24,406  
on the space station,  
or on a space craft,

92

00:04:24,496 --> 00:04:25,546  
we learn something new.

93

00:04:25,546 --> 00:04:28,056  
Yesterday, we had a  
problem on the space walk

94

00:04:28,056 --> 00:04:32,516  
and we had a brand new problem  
that we'd never had before.

95  
00:04:32,516 --> 00:04:34,906  
We had a bunch of water  
collected inside Luca

96  
00:04:34,906 --> 00:04:36,456  
Parmitano's helmet and they had

97  
00:04:36,456 --> 00:04:37,886  
to come home early  
on the space walk.

98  
00:04:38,346 --> 00:04:39,206  
That's a new thing.

99  
00:04:39,206 --> 00:04:40,176  
We're learning from that.

100  
00:04:40,176 --> 00:04:43,896  
We're trying to figure out now,  
what exactly happened and it's

101  
00:04:43,896 --> 00:04:47,116  
that kind of learning attitude  
that you need to develop as much

102  
00:04:47,116 --> 00:04:54,716  
as anything as you're studying  
to try to get to work here.

103  
00:04:55,636 --> 00:04:57,866  
>> My name is Jeanie  
and I live in Seattle.

104  
00:04:58,266 --> 00:05:00,396  
This is my question,  
"Can people who work

105

00:05:00,396 --> 00:05:03,116  
in Mission Control become  
astronauts and vice versa?"

106

00:05:04,626 --> 00:05:06,326  
>> As a matter of fact, yes.

107

00:05:06,326 --> 00:05:09,716  
There are a number of  
astronauts who started out as --

108

00:05:09,716 --> 00:05:11,426  
as flight controllers.

109

00:05:11,756 --> 00:05:13,866  
Mark, you've worked  
with some of them.

110

00:05:13,866 --> 00:05:16,146  
Maybe you can remember  
somebody who did that.

111

00:05:16,276 --> 00:05:17,536  
>> You know, I -- off the top

112

00:05:17,536 --> 00:05:20,776  
of my head I can't remember  
actually somebody although I

113

00:05:20,776 --> 00:05:20,936  
know [crosstalk].

114

00:05:21,006 --> 00:05:22,346  
>> I know that Shannon Walker...

115

00:05:22,346 --> 00:05:22,436  
>> Oh yeah.

116

00:05:22,436 --> 00:05:25,896

>> ...one of the Houston native  
and Mark's a Houston native too.

117

00:05:26,156 --> 00:05:29,236

She started out as a flight  
controller and worked a variety

118

00:05:29,236 --> 00:05:32,336

of different jobs here before  
she became an astronaut.

119

00:05:32,836 --> 00:05:35,856

I'm trying to think of others  
-- off the top of my head --

120

00:05:35,856 --> 00:05:37,456

but there are -- have been five

121

00:05:37,456 --> 00:05:39,036

or six different  
astronauts at least.

122

00:05:39,036 --> 00:05:41,236

>> You also have in  
here at Mission Control,

123

00:05:41,236 --> 00:05:42,366

you have flight surgeons,

124

00:05:42,366 --> 00:05:44,726

and there's been a few flight  
surgeons that have also moved

125

00:05:44,726 --> 00:05:47,136

from being a flight surgeon  
into the Astronaut Office.

126

00:05:47,446 --> 00:05:50,246

>> Mike Barrett was a flight surgeon and he moved

127

00:05:50,246 --> 00:05:53,026  
into the [inaudible], spent six months on the space station.

128

00:05:54,846 --> 00:05:54,056  
Tom...

129

00:05:54,846 --> 00:05:57,186  
>> ...Marshburn who just got back from a six month stay

130

00:05:57,186 --> 00:05:58,596  
on the space station,  
is a doctor,

131

00:05:58,596 --> 00:05:59,906  
and was also a flight surgeon.

132

00:06:00,726 --> 00:06:03,776  
So yes, definitely a lot of people work in Mission Control

133

00:06:03,776 --> 00:06:05,166  
and then become astronauts.

134

00:06:05,246 --> 00:06:06,546  
And then once you're an astronaut,

135

00:06:06,546 --> 00:06:09,256  
you work in Mission Control often because you serve

136

00:06:09,256 --> 00:06:12,846  
as a space craft communicator, talking with the team on orbit

137

00:06:12,906 --> 00:06:14,996

and in a way becoming  
a translator.

138

00:06:14,996 --> 00:06:16,176

Since you're an astronaut,

139

00:06:16,176 --> 00:06:19,096

you understand how an  
astronaut thinks and the kind

140

00:06:19,096 --> 00:06:22,526

of questions an astronaut  
might have and how best

141

00:06:22,526 --> 00:06:25,596

to present the information that  
needs to go to the astronaut.

142

00:06:25,846 --> 00:06:29,006

And so we utilize them a lot  
to help relay information back

143

00:06:29,006 --> 00:06:30,196

and forth to the crews.

144

00:06:30,616 --> 00:06:33,176

Thank you.

145

00:06:34,126 --> 00:06:35,916

>> Hi. My name is Eula.

146

00:06:35,946 --> 00:06:37,506

I live on British Island.

147

00:06:38,086 --> 00:06:41,426

Can you eat or drink or nap  
inside the Mission Control?

148

00:06:43,166 --> 00:06:44,636

>> Yes, you can.

149

00:06:44,636 --> 00:06:47,926

Not so much napping but  
people do have to eat

150

00:06:47,926 --> 00:06:51,236

and drink throughout their  
day and a lot of times

151

00:06:51,236 --> 00:06:53,736

when you see the pictures of  
us here at Mission Control

152

00:06:53,736 --> 00:06:56,796

on NASA television, you'll  
see folks that have cookies

153

00:06:56,796 --> 00:06:59,326

up on the back deck  
of their consoles

154

00:06:59,326 --> 00:07:01,876

or they'll be eating  
their lunch and it's kind

155

00:07:01,876 --> 00:07:04,686

of a catch-as-catch-can  
kind of a think.

156

00:07:04,686 --> 00:07:08,856

Everybody used to -- Mission  
Control teams generally work

157

00:07:08,856 --> 00:07:11,196

about a 10-hour shift.

158

00:07:11,196 --> 00:07:14,946

They've got eight hours worth of work that they do in the middle

159

00:07:14,946 --> 00:07:16,856

of the shift where

they're the main person

160

00:07:17,236 --> 00:07:20,126

but then they've got an

hour before and an hour

161

00:07:20,126 --> 00:07:24,026

after when they are handing

off from their off-coming

162

00:07:24,106 --> 00:07:27,846

and ongoing team members

because this is a 24/7 operation

163

00:07:27,846 --> 00:07:31,546

over here and you have to be

able to share what happened

164

00:07:31,546 --> 00:07:33,176

on the previous shift

so that you're ready

165

00:07:33,176 --> 00:07:34,376

to begin your next shift.

166

00:07:34,376 --> 00:07:36,576

And then when you go

off, you got to make sure

167

00:07:36,576 --> 00:07:38,856

that your relief has all

the information they need

168

00:07:38,856 --> 00:07:39,876

to do their jobs.

169

00:07:39,876 --> 00:07:42,036

And so we all bring  
our lunches here

170

00:07:42,036 --> 00:07:44,946

and we usually eat  
them on console.

171

00:07:45,386 --> 00:07:47,226

We have very brief  
breaks here and there

172

00:07:47,226 --> 00:07:48,966

where we can leave  
the control room,

173

00:07:49,306 --> 00:07:51,036

but most of the time we  
have good communication

174

00:07:51,036 --> 00:07:52,096

with the space station.

175

00:07:52,096 --> 00:07:55,406

And so it's only --  
you only get about five

176

00:07:55,406 --> 00:07:58,136

or 10 minutes per orbit.

177

00:07:58,186 --> 00:07:59,926

It takes 90 minutes  
for the space station

178

00:07:59,926 --> 00:08:00,816

to go around the world.

179

00:08:01,216 --> 00:08:02,706

And so about five or 10 minutes

180

00:08:02,706 --> 00:08:04,566  
of that each orbit  
is your chance

181

00:08:04,566 --> 00:08:07,546  
to go take a restroom break  
or grab something to drink.

182

00:08:07,546 --> 00:08:09,836  
So you do have to kind  
of measure what you --

183

00:08:10,026 --> 00:08:12,446  
what you consume because you  
don't want to have to run

184

00:08:12,446 --> 00:08:13,406  
to the bathroom a lot.

185

00:08:13,836 --> 00:08:15,756  
>> Thank you.

186

00:08:17,196 --> 00:08:22,166  
>> I'm Sam and I live in  
Seattle and my question is,

187

00:08:22,166 --> 00:08:25,866  
"What has been the most exciting  
event that you have had to deal

188

00:08:25,866 --> 00:08:27,406  
with while in Mission Control?"

189

00:08:28,936 --> 00:08:33,866  
>> Wow. I have been working in  
Mission Control myself for more

190

00:08:33,866 --> 00:08:37,066  
than 20 years and I've --

191  
00:08:37,226 --> 00:08:39,976  
I've been involved in a  
lot of different events,

192  
00:08:40,546 --> 00:08:42,586  
some interesting space walks.

193  
00:08:42,616 --> 00:08:44,146  
You know, yesterday's  
space walk,

194  
00:08:44,146 --> 00:08:49,036  
they got cut short was the  
second shortest space walk ever.

195  
00:08:49,036 --> 00:08:50,796  
It was an hour and  
32 minutes long.

196  
00:08:51,256 --> 00:08:55,346  
I actually was here doing the  
voice of Mission Control work

197  
00:08:55,696 --> 00:08:59,106  
when Mike Fincke did the  
shortest space walk ever.

198  
00:08:59,176 --> 00:09:01,386  
That was actually a  
Russian space walk.

199  
00:09:01,836 --> 00:09:07,346  
It was on Expedition 9 a number  
of years ago, and he got outside

200  
00:09:07,346 --> 00:09:11,356  
and his life support system

was not properly connected

201

00:09:11,356 --> 00:09:13,726

and so he had to come  
back in after only

202

00:09:13,726 --> 00:09:15,266

about 10 minutes outside.

203

00:09:15,666 --> 00:09:18,426

That has to be one  
of the most exciting

204

00:09:18,426 --> 00:09:20,806

and interesting times I had  
here in Mission Control.

205

00:09:21,376 --> 00:09:27,356

>> My name is Brian  
Lender [assumed spelling].

206

00:09:27,356 --> 00:09:28,716

I live in Covington, Washington.

207

00:09:28,946 --> 00:09:31,976

My question is, "Is there  
a common language that --

208

00:09:31,976 --> 00:09:33,626

that all the space  
agency's use --

209

00:09:33,976 --> 00:09:37,316

like do the Russian  
cosmonauts talk

210

00:09:37,316 --> 00:09:39,876

to the Russian Mission Control  
in Russian or do they talk

211  
00:09:40,046 --> 00:09:42,196  
to the Mission Control in  
English and vice versa?

212  
00:09:42,576 --> 00:09:44,786  
Is everything on the space  
station written in English

213  
00:09:44,786 --> 00:09:47,406  
or is some of it still  
written in Russian?"

214  
00:09:47,976 --> 00:09:52,326  
>> The -- the common language  
we use aboard the space station

215  
00:09:52,366 --> 00:09:57,856  
for everybody is English and for  
Mission Control, we always deal

216  
00:09:57,856 --> 00:10:00,976  
in English when we go back and  
forth in terms of conversations.

217  
00:10:01,306 --> 00:10:06,146  
Each control center, though,  
from around the world, in --

218  
00:10:06,176 --> 00:10:12,316  
in Japan, and Russia, and  
Europe, and Canada, of course,

219  
00:10:12,316 --> 00:10:14,556  
they speak their own native  
language when they're talking

220  
00:10:14,556 --> 00:10:16,746  
to the crews through their  
communication systems.

221

00:10:16,746 --> 00:10:20,056

And so there's some of that but  
when we all need to get together

222

00:10:20,056 --> 00:10:22,566

and work on an issue, we  
generally work it in English.

223

00:10:22,916 --> 00:10:26,486

The majority of things  
that are printed

224

00:10:26,486 --> 00:10:29,236

on board the space station  
are printed in English

225

00:10:29,236 --> 00:10:31,226

or on the computer  
screens in English.

226

00:10:31,546 --> 00:10:33,816

But there's a lot of  
[inaudible] as well in --

227

00:10:33,816 --> 00:10:36,986

in Russian because it's a  
totally different alphabet.

228

00:10:37,036 --> 00:10:39,816

There are also things  
that go up in Japanese

229

00:10:39,816 --> 00:10:43,446

which has another different  
alphabet and there's things,

230

00:10:43,536 --> 00:10:46,736

for example, for Canadian  
astronauts that go up bi-lingual

231  
00:10:46,736 --> 00:10:49,616  
in both English and French.

232  
00:10:50,056 --> 00:10:53,546  
And we try to help each  
of the crew members

233  
00:10:53,546 --> 00:10:57,096  
from their countries have a  
little bit of their home flavor

234  
00:10:57,096 --> 00:10:59,406  
in whatever we do  
and we allow their --

235  
00:10:59,916 --> 00:11:01,426  
their control centers  
to talk with them

236  
00:11:01,426 --> 00:11:04,456  
in whatever language is natural  
for them as well as in English.

237  
00:11:09,016 --> 00:11:10,876  
>> Hello. My name is Nick  
Mallett [assumed spelling].

238  
00:11:10,876 --> 00:11:13,896  
I'm from Olympia, Washington,  
and hypothetically speaking,

239  
00:11:13,896 --> 00:11:16,346  
if a team of 16 is sent to Mars,

240  
00:11:16,756 --> 00:11:19,006  
how large of a support  
group would be needed to --

241  
00:11:19,006 --> 00:11:21,206

needed to be provided  
back on Earth

242

00:11:21,206 --> 00:11:22,646  
at Mission Control  
to support them?"

243

00:11:23,716 --> 00:11:26,126  
>> Boy, that would be a  
pretty big team to go to Mars.

244

00:11:26,126 --> 00:11:31,776  
16, that's a lot of mass to get  
into orbit and to get to Mars.

245

00:11:32,216 --> 00:11:35,706  
One thing you need to remember  
about going there is it's going

246

00:11:35,706 --> 00:11:38,626  
to take about six months and  
if you can stop and think

247

00:11:38,626 --> 00:11:43,926  
about how much food, water,  
air, electricity we'd need

248

00:11:43,926 --> 00:11:46,836  
to generate to do a mission  
that long, you're probably going

249

00:11:46,836 --> 00:11:50,676  
to be looking at smaller  
crews especially early

250

00:11:50,676 --> 00:11:53,066  
on -- on a trip to Mars.

251

00:11:53,786 --> 00:11:57,686  
We're working all the time here

to minimize the number of people

252

00:11:58,086 --> 00:12:02,116

that we have in Mission  
Control because it -- it --

253

00:12:02,216 --> 00:12:05,026

having an efficient team work  
together doesn't always mean you

254

00:12:05,026 --> 00:12:05,946

have more people.

255

00:12:05,946 --> 00:12:10,366

We want to be able to access a  
lot of people who are experts

256

00:12:10,366 --> 00:12:13,886

in the different fields that are  
necessary to support the thing

257

00:12:14,186 --> 00:12:16,246

but you don't necessarily  
want to have them

258

00:12:16,246 --> 00:12:18,376

on duty 24-seven all the time.

259

00:12:18,456 --> 00:12:22,796

So I would say probably, you'd  
have a team similar to this kind

260

00:12:22,796 --> 00:12:25,146

of size that we have  
here in Mission Control,

261

00:12:25,146 --> 00:12:28,446

20 or 30 people, when there's  
a lot of activity going

262

00:12:28,446 --> 00:12:30,596  
on and the crew's awake.

263

00:12:30,666 --> 00:12:32,966  
But then on weekends and  
when the crew's sleeping,

264

00:12:33,306 --> 00:12:36,146  
just like we do here for the  
International Space Station,

265

00:12:36,146 --> 00:12:38,936  
we staff down and there's  
just two or three people,

266

00:12:38,936 --> 00:12:41,746  
a flight director and a couple  
of people that monitor a lot

267

00:12:41,746 --> 00:12:45,066  
of different systems so that  
we can minimize the support

268

00:12:45,066 --> 00:12:47,936  
requirements both because  
you don't need them and also

269

00:12:47,936 --> 00:12:51,456  
because it's expensive to  
have people working 24-seven

270

00:12:51,516 --> 00:12:53,356  
for a long period.

271

00:12:57,176 --> 00:12:59,256  
>> Hi. My name is Amanda  
Chalfont [assumed spelling]

272

00:12:59,256 --> 00:13:00,896

and I'm from Issaquah,  
Washington.

273

00:13:01,336 --> 00:13:04,206

My question is, "Space  
travel is inherently risky

274

00:13:04,486 --> 00:13:07,066

and how do you cope with  
those risks and assess what is

275

00:13:07,066 --> 00:13:09,376

or is not necessary for the  
ultimate goal of the mission?"

276

00:13:11,026 --> 00:13:15,816

>> The main thing I would  
say is there -- what we --

277

00:13:15,906 --> 00:13:18,156

we talk a lot about  
mitigating risk.

278

00:13:19,036 --> 00:13:21,966

We know that there is risk  
that as you say is inherent

279

00:13:22,006 --> 00:13:23,996

in space flight and  
all the activities

280

00:13:23,996 --> 00:13:25,436

that are required to do that.

281

00:13:25,436 --> 00:13:28,246

There's -- there's risk in --  
in launching people on the talk

282

00:13:28,246 --> 00:13:31,236

of the rockets, there's this

risk in having people live

283

00:13:31,606 --> 00:13:34,046  
in a pressurized environment  
that could be damaged

284

00:13:34,046 --> 00:13:36,246  
by orbital debris  
or a meteorite.

285

00:13:36,596 --> 00:13:39,486  
There's risk in having  
people depend on systems

286

00:13:39,486 --> 00:13:41,876  
to recycle their  
water and their air

287

00:13:42,256 --> 00:13:45,906  
and to generate their  
electricity and there's risk

288

00:13:45,906 --> 00:13:48,106  
in -- in doing maintenance  
activities, when you have

289

00:13:48,106 --> 00:13:50,456  
to go outside the space  
station like we saw yesterday.

290

00:13:51,106 --> 00:13:52,566  
Things don't always work right.

291

00:13:52,976 --> 00:13:54,696  
The key word is mitigating

292

00:13:54,696 --> 00:13:56,826  
and what we do is we  
have a very complex

293

00:13:56,866 --> 00:14:03,006

and mathematically-based system  
for establishing probabilities

294

00:14:03,006 --> 00:14:07,936

of risk and we try to manage and  
make sure that the probability

295

00:14:07,936 --> 00:14:14,466

of a problem that it is a danger  
to the safety and well-being

296

00:14:14,466 --> 00:14:17,456

of the crew and to  
the accomplishment

297

00:14:17,456 --> 00:14:21,526

of the mission are managed  
at a level where we think

298

00:14:21,576 --> 00:14:25,536

that we can take care of  
anything that might come up out

299

00:14:25,536 --> 00:14:28,686

of the ordinary that we  
don't expect because we know

300

00:14:28,686 --> 00:14:30,686

that those risks are  
there and we also know

301

00:14:30,686 --> 00:14:32,816

that no matter how  
much you train,

302

00:14:32,816 --> 00:14:35,656

no matter how much you prepare,  
there's always something

303

00:14:35,656 --> 00:14:38,806

that you haven't thought  
of that is going to come up

304

00:14:38,806 --> 00:14:40,306

and you're going to need to  
be ready to deal with it.

305

00:14:40,306 --> 00:14:43,466

And for that, we do  
training of the team here

306

00:14:43,466 --> 00:14:46,016

in Mission Control, of the  
astronauts that are on orbit,

307

00:14:46,436 --> 00:14:49,316

and you know, Mark --  
I'm going to bring you

308

00:14:49,316 --> 00:14:51,356

in because physical  
training is a part

309

00:14:51,356 --> 00:14:53,196

of that too, for the astronauts.

310

00:14:53,196 --> 00:14:54,506

You want to keep them healthy.

311

00:14:54,576 --> 00:14:55,656

Maybe you could talk  
a little bit

312

00:14:55,656 --> 00:14:56,736

about that, since you're here.

313

00:14:56,796 --> 00:15:00,356

>> Well, one of the things

that we look at is that we look

314

00:15:00,356 --> 00:15:02,466  
at worst-case scenarios a lot.

315

00:15:02,466 --> 00:15:05,306  
So we're looking at  
emergency egress situations,

316

00:15:05,306 --> 00:15:07,626  
emergency EVA situations,  
things like that.

317

00:15:07,626 --> 00:15:11,026  
So we always have to have them  
in a state of preparedness

318

00:15:11,176 --> 00:15:12,626  
from the physical  
fitness standpoint

319

00:15:12,626 --> 00:15:14,746  
or a functional standpoint  
to be able to do their job

320

00:15:14,946 --> 00:15:17,046  
for whatever -- whatever  
that may be.

321

00:15:17,406 --> 00:15:20,986  
Even on landing -- you know,  
if they land off course four

322

00:15:20,986 --> 00:15:23,606  
or five hours -- you know, off  
course and they have to get

323

00:15:23,606 --> 00:15:26,876  
out of the capsule and -- on  
their own without help and set

324

00:15:26,876 --> 00:15:29,556

up a camp to get the beacon  
set up so they can find

325

00:15:29,556 --> 00:15:31,936

out where they are -- anything  
like that, I mean they have

326

00:15:31,936 --> 00:15:33,606

to be physically able  
to do those things.

327

00:15:33,606 --> 00:15:35,966

So part of my job is to make  
sure they can do those things.

328

00:15:36,316 --> 00:15:38,566

>> Okay. And so essentially,  
it's --

329

00:15:38,566 --> 00:15:40,686

it's kind of like  
being in the Scouts.

330

00:15:40,686 --> 00:15:44,156

The preparedness is -- is the  
main thing and you want to train

331

00:15:44,156 --> 00:15:49,436

for -- for any potential thing  
that could go wrong and --

332

00:15:49,436 --> 00:15:53,246

and then, you know, you  
prepare for the worst and hope

333

00:15:53,246 --> 00:16:00,566

for the best and try to manage  
that risk as best you can.

334

00:16:00,786 --> 00:16:01,916

>> Hi. My name is Adrian  
Wing [assumed spelling],

335

00:16:01,916 --> 00:16:03,076

I'm from Belleview, Washington.

336

00:16:03,296 --> 00:16:05,416

My question is, "Can you  
share more information

337

00:16:05,416 --> 00:16:06,636

about the recent helmet leak

338

00:16:06,636 --> 00:16:09,256

and how Mission Control  
responded to the emergency?"

339

00:16:10,736 --> 00:16:13,796

>> You know, that's  
a really good example

340

00:16:13,796 --> 00:16:16,406

of how this team comes together

341

00:16:16,696 --> 00:16:19,956

when there is an  
unexpected problem.

342

00:16:20,206 --> 00:16:23,436

Yesterday, everything  
was going just exactly

343

00:16:23,436 --> 00:16:28,446

as we had expected it and the  
preparations for the space walk,

344

00:16:28,446 --> 00:16:32,206

Chris Cassidy and Luca  
Parmitano had checked

345

00:16:32,206 --> 00:16:34,036  
out their space suits and --

346

00:16:34,066 --> 00:16:36,846  
because they had just done  
a space walk a week ago

347

00:16:37,026 --> 00:16:38,116  
and it all went fine.

348

00:16:38,116 --> 00:16:40,676  
They accomplished all the  
objectives and then some.

349

00:16:40,676 --> 00:16:43,066  
So the team here had already  
been doing a lot of work

350

00:16:43,126 --> 00:16:47,326  
to replan for this space walk  
that was planned yesterday,

351

00:16:47,326 --> 00:16:49,996  
because they had taken care of  
so many of the get-ahead tasks

352

00:16:49,996 --> 00:16:51,626  
that they were able  
to add some new tasks

353

00:16:51,626 --> 00:16:53,656  
into what was planned  
for yesterday.

354

00:16:54,086 --> 00:16:56,696  
And then when they  
stepped out the door,

355

00:16:56,696 --> 00:16:58,006  
everything seemed  
to be going fine.

356

00:16:58,006 --> 00:17:00,816  
And then Luca mentioned that  
he had some water inside

357

00:17:00,816 --> 00:17:04,576  
of his helmet and -- that  
he didn't think it was going

358

00:17:04,576 --> 00:17:05,316  
to be a problem.

359

00:17:05,316 --> 00:17:08,476  
They finished their first  
job, both Chris and Luca did.

360

00:17:08,966 --> 00:17:12,666  
And then -- because your  
buddy system, kind of like

361

00:17:12,666 --> 00:17:16,196  
when you're diving undersea,  
Chris went over to check on Luca

362

00:17:16,196 --> 00:17:18,236  
because he was reporting  
this water problem

363

00:17:18,236 --> 00:17:21,486  
and he started having some  
problems with his ability

364

00:17:21,486 --> 00:17:25,156  
to communicate and that there  
was a sensor that showed --

365

00:17:25,566 --> 00:17:28,996  
that tracks carbon dioxide  
levels inside the space station.

366

00:17:28,996 --> 00:17:30,506  
The folks here at  
Mission Control saw

367

00:17:30,506 --> 00:17:34,036  
that that wasn't working  
properly and so Chris took a --

368

00:17:34,076 --> 00:17:36,896  
took a look inside Luca's helmet  
and he saw a lot more water

369

00:17:36,896 --> 00:17:38,916  
than Luca even knew  
was in there.

370

00:17:39,406 --> 00:17:41,836  
At that point, they reported  
that to Mission Control

371

00:17:41,886 --> 00:17:47,316  
and the EVA team told the flight  
director, Dave Korth that, "Hey,

372

00:17:47,316 --> 00:17:49,886  
we think this is a problem  
that we're not going to be able

373

00:17:49,886 --> 00:17:51,426  
to continue doing  
the space walk.

374

00:17:51,856 --> 00:17:54,956  
And so we recommend that you  
guys bring them in early."

375

00:17:54,956 --> 00:17:57,436

And Dave Korth said,  
"Yeah, you're right.

376

00:17:57,476 --> 00:17:59,876

Let's go ahead and get  
them in before this gets

377

00:17:59,876 --> 00:18:00,946

to be a serious problem."

378

00:18:01,746 --> 00:18:07,046

And so they did that and they  
had trained well in procedures

379

00:18:07,046 --> 00:18:08,536

to get them in quickly.

380

00:18:09,346 --> 00:18:10,746

They had Luca come right

381

00:18:10,746 --> 00:18:13,536

into the airlock immediately  
and get him started.

382

00:18:13,836 --> 00:18:15,866

They had Chris do a  
couple of clean-up tasks

383

00:18:15,866 --> 00:18:17,546

because you can't put two  
people through the door

384

00:18:17,546 --> 00:18:19,216

that small at the same time.

385

00:18:19,666 --> 00:18:23,556

And so he did the cleanup and  
lashed things down temporarily,

386

00:18:23,556 --> 00:18:25,946  
and then he came back  
in so he could help Luca

387

00:18:25,946 --> 00:18:28,316  
and they could close the  
hatch and get back inside.

388

00:18:28,766 --> 00:18:32,396  
And this team worked together  
through established procedures,

389

00:18:32,426 --> 00:18:38,046  
a plan that had been discussed  
at length and practiced both

390

00:18:38,096 --> 00:18:40,946  
by the crew and by the team  
here in Mission Control.

391

00:18:41,336 --> 00:18:44,336  
And so they're all working from  
the same page and the same book,

392

00:18:44,746 --> 00:18:47,526  
and were able to get  
those guys back in.

393

00:18:47,526 --> 00:18:51,276  
and here's some video of  
the team working together.

394

00:18:51,276 --> 00:18:53,806  
You've got Karen Nyberg  
and Fyodor Yurchikhin,

395

00:18:53,806 --> 00:18:59,396  
also helping Alexander  
Misurkin and Pavel Vinogradov,

396

00:18:59,636 --> 00:19:05,276

all joined in to help get  
Luca out of his space suit

397

00:19:05,366 --> 00:19:07,426

and they kind of got in  
the way of the camera.

398

00:19:07,426 --> 00:19:09,086

You can't really see  
him too well right here,

399

00:19:09,086 --> 00:19:11,656

but in just a second, I think  
you're going to see Luca's face

400

00:19:12,026 --> 00:19:14,836

and you're going to see him  
able to wipe that water off

401

00:19:14,836 --> 00:19:18,386

of his face and that  
was the success.

402

00:19:18,386 --> 00:19:21,466

That's why that was a  
successful space walk

403

00:19:21,576 --> 00:19:25,016

because even though we had  
a problem, we were able

404

00:19:25,016 --> 00:19:29,796

to get Luca and Chris back in  
safely and here you can start

405

00:19:29,796 --> 00:19:31,376

to see Luca there,  
having to wipe --

406

00:19:31,446 --> 00:19:32,986  
he was getting a lot of water.

407

00:19:32,986 --> 00:19:35,236  
He had water in his  
ears, water in his nose.

408

00:19:35,686 --> 00:19:37,356  
And that's one of the  
things about water.

409

00:19:37,456 --> 00:19:41,816  
It tends to coalesce  
into a globule because --

410

00:19:41,816 --> 00:19:46,146  
because of the way water acts  
in space through surface tension

411

00:19:46,516 --> 00:19:48,436  
and it can collect in areas

412

00:19:48,436 --> 00:19:49,996  
that you wouldn't  
want it to collect in.

413

00:19:50,106 --> 00:19:51,576  
It would be a serious problem.

414

00:19:51,576 --> 00:19:54,916  
So that's an example  
of team work in action

415

00:19:54,916 --> 00:19:56,436  
and preparation in action.

416

00:19:56,436 --> 00:19:58,076  
Now, Mark, do you

have anything to add?

417

00:19:58,076 --> 00:19:59,306

>> Not -- I don't have anything to add to that.

418

00:19:59,306 --> 00:20:00,976

It was interesting watching it [laughter], so...

419

00:20:03,106 --> 00:20:05,966

>> Hi. My name is Clay.

420

00:20:07,536 --> 00:20:09,726

Excuse me.

421

00:20:09,976 --> 00:20:11,896

I live in Edmonds and my question is,

422

00:20:11,966 --> 00:20:16,176

"What do you think [inaudible] opinion was the scariest moment

423

00:20:16,176 --> 00:20:17,066

in Mission Control?"

424

00:20:18,206 --> 00:20:23,186

>> You know, I got to be honest.

425

00:20:23,306 --> 00:20:25,016

We don't get scared in Mission Control much [laughter].

426

00:20:25,946 --> 00:20:28,446

There's -- there's scary things happen but --

427

00:20:28,536 --> 00:20:32,966

but we train so much, and we  
practice so much, and we study

428

00:20:32,966 --> 00:20:36,156

so much, all of the systems  
that we work with that --

429

00:20:36,156 --> 00:20:40,126

that fear doesn't enter  
into it a whole lot.

430

00:20:40,126 --> 00:20:42,906

You have those moments  
when you say, "Uh-oh."

431

00:20:43,436 --> 00:20:46,806

But then your training  
kicks in and you --

432

00:20:47,186 --> 00:20:48,976

and you start working  
the problem

433

00:20:49,196 --> 00:20:52,916

and you focus your efforts  
on figuring out what you need

434

00:20:52,916 --> 00:20:55,346

to do, the order you  
need to do it in,

435

00:20:55,716 --> 00:20:59,036

what other potential  
problems could be associated

436

00:20:59,036 --> 00:21:02,776

with what's going on, and how  
you keep the entire crew safe,

437

00:21:02,776 --> 00:21:04,566

and how you make  
sure that you are --

438

00:21:04,566 --> 00:21:06,706

try to accomplish the  
mission that you're doing.

439

00:21:06,706 --> 00:21:10,556

So I don't think there  
really is a whole lot

440

00:21:10,556 --> 00:21:12,326

of fear here in Mission Control.

441

00:21:12,326 --> 00:21:14,176

There's some trepidation

442

00:21:14,176 --> 00:21:17,776

and there's some immediate being  
startled when you have a problem

443

00:21:17,776 --> 00:21:19,696

like that but -- but  
training kind of kicks in

444

00:21:19,696 --> 00:21:21,726

and you don't -- you don't  
worry so much about it.

445

00:21:21,726 --> 00:21:23,176

You work to get the job done.

446

00:21:23,176 --> 00:21:25,306

Mark? Got anything to  
add there as you work

447

00:21:25,306 --> 00:21:27,086

with these astronauts in  
training all the time?

448

00:21:27,596 --> 00:21:30,976

>> Yeah, but I'm not in Mission Control so it's very different

449

00:21:30,976 --> 00:21:32,766

for me from you guys, so --

450

00:21:33,236 --> 00:21:35,996

I don't really see anything in my normal day

451

00:21:35,996 --> 00:21:37,446

that -- that startles me.

452

00:21:37,446 --> 00:21:39,396

You know, a piece of hardware breaks, we just figure out how

453

00:21:39,396 --> 00:21:41,496

to fix the hardware and go back to doing what we need to do.

454

00:21:41,566 --> 00:21:43,146

So, you know, that's about it.

455

00:21:43,766 --> 00:21:46,846

>> Okay. Sorry, not [chuckles] not a really exciting answer

456

00:21:46,846 --> 00:21:48,906

about fear because -- because we kind

457

00:21:48,906 --> 00:21:50,056

of train it out of ourselves.

458

00:21:52,556 --> 00:21:55,396

>> Hello. My name is Josh, I'm from Deep Harbor, Washington,

459

00:21:55,396 --> 00:21:58,386  
and my question is, "We have  
recently learned that one

460

00:21:58,386 --> 00:22:01,016  
of the dangers of the Mars  
Mission would be boredom

461

00:22:01,066 --> 00:22:03,576  
for the astronauts and  
so what do astronauts

462

00:22:03,576 --> 00:22:05,446  
on the International  
Space Station do

463

00:22:05,446 --> 00:22:08,126  
to keep themselves busy and  
entertained when they have

464

00:22:08,516 --> 00:22:09,616  
like some sort of free time?"

465

00:22:10,746 --> 00:22:11,306  
>> Well, I...

466

00:22:11,306 --> 00:22:11,956  
>> If they have free time.

467

00:22:11,956 --> 00:22:14,646  
>> ...the favorite thing when  
they have free time is to look

468

00:22:14,646 --> 00:22:15,816  
out the window at  
the Earth below.

469

00:22:16,126 --> 00:22:17,756

There's no doubt about that.

470

00:22:17,756 --> 00:22:20,336

We have a special  
module called the Cupola

471

00:22:20,776 --> 00:22:24,846

which is basically a  
360 degree bay window

472

00:22:24,996 --> 00:22:27,626

and there are seven different  
windows, a big round one

473

00:22:27,626 --> 00:22:29,096

in the middle and  
then six round --

474

00:22:29,096 --> 00:22:30,946

six trapezoidal windows  
around it

475

00:22:31,276 --> 00:22:34,266

and it gives you a 360  
degree view of the Earth.

476

00:22:34,376 --> 00:22:35,756

And any astronaut  
I've ever talked

477

00:22:35,756 --> 00:22:37,736

to says whenever  
they get spare time,

478

00:22:37,736 --> 00:22:39,986

the number one thing  
they want to go do is --

479

00:22:40,136 --> 00:22:41,396

is go out and look at the Earth.

480

00:22:41,396 --> 00:22:43,716

Now, you got to remember that  
half the time they're going

481

00:22:43,716 --> 00:22:45,956

around the planet it's  
dark and so if you're

482

00:22:45,956 --> 00:22:48,376

over the Pacific Ocean, there  
may not be a lot to look at.

483

00:22:48,376 --> 00:22:50,086

And so they do have other  
things they like to do.

484

00:22:50,386 --> 00:22:54,466

They can watch movies on --  
on orbit, they can read books.

485

00:22:54,916 --> 00:22:58,996

They have multiple different  
ways of communicating

486

00:22:58,996 --> 00:23:00,726

with their friends and  
family on the ground.

487

00:23:00,726 --> 00:23:04,286

They have an IP, internet  
protocol telephone

488

00:23:04,696 --> 00:23:07,256

that they can call down and talk  
to their friends and family.

489

00:23:07,976 --> 00:23:11,026

They have email that they  
can share messages with.

490

00:23:11,306 --> 00:23:13,936

They have a crew  
support internet LAN,

491

00:23:13,976 --> 00:23:17,616

local area network, that they  
can actually access the --

492

00:23:18,016 --> 00:23:22,216

the network here, the internet  
here on Earth somewhat directly

493

00:23:22,216 --> 00:23:25,406

and go off and they  
can post tweets and --

494

00:23:25,406 --> 00:23:27,526

and Facebook things and do that.

495

00:23:27,526 --> 00:23:30,066

It's a little slower than your  
regular network is, but --

496

00:23:30,066 --> 00:23:33,246

because of the limitations  
of the --

497

00:23:33,246 --> 00:23:35,126

of the downlink capability  
on the space station

498

00:23:35,126 --> 00:23:37,936

but it does allow them to  
have a lot of interaction

499

00:23:37,936 --> 00:23:39,406

with folks on the ground.

500

00:23:39,776 --> 00:23:41,666

And they enjoy each other's company.

501

00:23:41,666 --> 00:23:43,616

They enjoy learning about different cultures

502

00:23:43,616 --> 00:23:46,626

because there are so many different cultures involved

503

00:23:46,626 --> 00:23:48,496

in the space station, the different crew members

504

00:23:48,496 --> 00:23:49,356

and their backgrounds.

505

00:23:49,746 --> 00:23:52,956

And so I would say probably enjoying each other's company

506

00:23:52,956 --> 00:23:55,606

and becoming a team and -- and continue to work as a team

507

00:23:55,846 --> 00:23:58,066

and looking out the window are the most interesting things

508

00:23:58,746 --> 00:24:00,326

for them.

509

00:24:01,256 --> 00:24:02,506

>> Hi. I'm Hans Martin.

510

00:24:02,546 --> 00:24:07,196

I'm from Yakima, Washington and where is the ISS right now?

511

00:24:07,196 --> 00:24:09,136

>> I'm going to look  
over my shoulder.

512

00:24:09,166 --> 00:24:12,996

Right now, the International  
Space Station is orbiting

513

00:24:13,706 --> 00:24:19,286

over the Gulf of Mexico just  
off the coast of Florida.

514

00:24:20,656 --> 00:24:25,836

>> One quick question,  
"How do you wake the crew

515

00:24:25,836 --> 00:24:26,446

up in the morning?

516

00:24:26,536 --> 00:24:27,736

Is there a special  
protocol for that?

517

00:24:27,736 --> 00:24:30,536

Is there an alarm clock?"

518

00:24:30,536 --> 00:24:32,276

>> You know, different  
crews do that differently.

519

00:24:32,276 --> 00:24:34,046

It's kind of a personal  
preference thing.

520

00:24:34,046 --> 00:24:36,696

In the shuttle days, we  
used to wake the crews

521

00:24:36,696 --> 00:24:39,036  
up with morning wake-up music.

522

00:24:39,366 --> 00:24:41,836  
But on the space station,  
we generally don't do that.

523

00:24:41,896 --> 00:24:45,436  
They have alarms that they can  
set on board for themselves.

524

00:24:45,886 --> 00:24:50,336  
But no special notes -- we do  
have a daily planning conference

525

00:24:50,336 --> 00:24:52,356  
that starts the day but that's  
about an hour and a half

526

00:24:52,356 --> 00:24:53,436  
after the crew wakes up.

527

00:24:53,886 --> 00:24:56,846  
But that's always something they  
want to make sure they're ready

528

00:24:56,846 --> 00:25:00,086  
for and in talking to different  
astronauts, some of them wake

529

00:25:00,256 --> 00:25:02,916  
up early, some of them wake

530

00:25:02,916 --> 00:25:05,256  
up just right before the  
daily planning conference.

531

00:25:05,816 --> 00:25:08,176  
But they've got an hour  
and a half worth of time

532

00:25:08,176 --> 00:25:11,956

where they can have a morning meal and talk about themselves

533

00:25:11,956 --> 00:25:14,236

and -- and amongst themselves I should say

534

00:25:14,666 --> 00:25:16,426

and they do a preliminary inspection

535

00:25:16,426 --> 00:25:17,216

of the different areas

536

00:25:17,216 --> 00:25:19,616

of the space station making sure everything is good.

537

00:25:19,696 --> 00:25:22,366

But no -- no main wake-up call.

538

00:25:22,366 --> 00:25:23,736

It kind of depends on the crew

539

00:25:23,736 --> 00:25:24,986

and how they want to do it themselves.

540

00:25:25,406 --> 00:25:25,626

All right.

541

00:25:27,296 --> 00:25:29,976

So I understand that's all the time we have for today.

542

00:25:29,976 --> 00:25:32,876

I want to thank Mark Guilliams

for being here with us today

543

00:25:32,876 --> 00:25:35,646

and I want to thank you all  
for your great questions.

544

00:25:35,646 --> 00:25:37,856

I understand you've got  
a great exhibit there

545

00:25:38,146 --> 00:25:40,826

with the full fuselage  
trainer from the space shuttle

546

00:25:41,046 --> 00:25:43,496

and destination station, I  
believe is at your museum.

547

00:25:43,496 --> 00:25:45,256

I hope you take an  
opportunity to go see it.

548

00:25:45,506 --> 00:25:46,026

Thanks again.

549

00:25:46,356 --> 00:25:46,686

>> Thank you.