WEBVTT

1
00:00:28.715 --> 00:00:30.905
Hello, everybody, if you could take your seats.

2
00:00:47.645 --> 00:00:50.975
Okay. We only have about a half hour more. We're gonna talk.

3
00:00:51.195 --> 00:00:53.895
Um, I'm gonna finish.

4
00:00:54.255 --> 00:00:55.735
I I'm gonna have Mike talk first

5
00:00:56.155 --> 00:00:58.855
and, uh, I'll, I'm gonna introduce him here in a moment,

6
00:00:59.115 --> 00:01:01.295
and then I'm gonna talk about two things

7
00:01:01.295 --> 00:01:05.455
that are on beaker's paper that we haven't talked about yet.

8
00:01:05.715 --> 00:01:08.255
Uh, it'll only be a handful of slides to cover those.

9
00:01:08.355 --> 00:01:11.255
That's the stuff RJ talked about, drift

10
00:01:12.035 --> 00:01:13.895
and, uh, democratizing safety.

11
00:01:14.475 --> 00:01:16.455
I'm gonna talk to that after Mike.

12
00:01:16.965 --> 00:01:19.375
Mike is the guy when I was doing flight loads,

13
00:01:20.155 --> 00:01:21.335
uh, on the aircraft.

14
00:01:21.445 --> 00:01:24.895
Mike was the guy in my ear. He was the, the head of tm.

15
00:01:25.245 --> 00:01:26.535
He's been doing it for years.

16
00:01:26.875 --> 00:01:29.775
He was the test coordinator on our, our, uh,

17
00:01:29.775 --> 00:01:32.095
highest risk test aircraft for years.

18
00:01:32.955 --> 00:01:37.135
And now he mentors the team, develops, uh, all the TM guys.

19
00:01:37.995 --> 00:01:40.495
And he started out as a dynamicist with me.

20
00:01:41.165 --> 00:01:44.215
He's, he's with Boeing and been with Boeing the whole time.

21
00:01:44.515 --> 00:01:47.615
Uh, he started out as a dynamicist on our team

22
00:01:47.615 --> 00:01:49.615
and then moved up into a flight test engineer

23
00:01:49.675 --> 00:01:51.095
and test coordinator position.

24
00:01:52.075 --> 00:01:54.855
And he's, he's one of my best friends.

25
00:01:55.355 --> 00:01:57.015
Uh, we fly fish together

26
00:01:57.195 --> 00:01:59.695
and I try not to let him buy drinks at any time.

27
00:01:59.725 --> 00:02:02.335

He's around me. So Mike Olley,

28
00:02:02.335 --> 00:02:03.895
he is gonna talk a little bit about tm.

29
00:02:06.645 --> 00:02:08.495
Good morning everybody. Uh, apologize.

30
00:02:08.995 --> 00:02:12.615
My technical presentation is still churning in the system.

31
00:02:13.115 --> 00:02:15.975
Uh, so no slides for you today, uh, unfortunately,

32
00:02:16.475 --> 00:02:19.215
but I think with the folks in the audience today in this

33
00:02:19.225 --> 00:02:22.255
venue, I do have two topics, uh, where I'm gonna share

34
00:02:22.395 --> 00:02:25.935
how we do it on V 22 and then open up the floor.

35
00:02:25.935 --> 00:02:29.335
And I'd like to hear your constructive critical feedback,

36
00:02:29.335 --> 00:02:31.415
maybe on why you think we do it wrong

37
00:02:31.875 --> 00:02:34.335
or why you do it differently, and why it could be better.

38
00:02:34.955 --> 00:02:37.455
So the first topic is what we call hot mic.

39
00:02:37.955 --> 00:02:42.255
So this is aircraft ICS embedded in the telemetry signal.

40
00:02:43.075 --> 00:02:45.455
So what that means for the folks in the telemetry room

41
00:02:46.075 --> 00:02:47.535
is if we have this active,

42
00:02:47.595 --> 00:02:50.215
we hear everything going on in the cockpit.

43
00:02:50.755 --> 00:02:53.655
We hear all of the ICS comms among the air crew

44
00:02:54.195 --> 00:02:57.175
and all their airspace coordination with ground

45
00:02:57.855 --> 00:02:59.605
A TC and range control.

46
00:03:00.545 --> 00:03:02.565
Uh, one of the issues is that

47
00:03:02.565 --> 00:03:04.245
because it's embedded in the TM signal,

48
00:03:04.715 --> 00:03:07.125
it's also susceptible to data dropout.

49
00:03:07.585 --> 00:03:10.685
So in our opinion, it's not a great way for the air crew

50
00:03:10.905 --> 00:03:14.125
to reliably communicate with us the second

51
00:03:14.465 --> 00:03:16.925
and arguably, what is the driving force

52
00:03:16.925 --> 00:03:18.805
behind our decision to prohibit?

53
00:03:18.865 --> 00:03:23.085
It is, in my experience, it's an incredible distraction

54
00:03:23.085 --> 00:03:24.405

to the folks in this lum room.

55
00:03:25.065 --> 00:03:27.125
So for the engineers I have in the room with me,

56
00:03:27.665 --> 00:03:31.045
the stress folks flying qualities, uh,

57
00:03:31.155 --> 00:03:32.805
data ops in our project engineers.

58
00:03:33.445 --> 00:03:35.445
I need them in the room with me.

59
00:03:36.365 --> 00:03:38.845
I need them focused on what is going on in the room.

60
00:03:39.395 --> 00:03:43.365
Because most of the things that happen on a very, uh,

61
00:03:43.365 --> 00:03:44.925
technically challenging aircraft

62
00:03:45.865 --> 00:03:47.685
are always multidisciplinary.

63
00:03:48.065 --> 00:03:50.485
So if FQ is saying something that they're observing,

64
00:03:50.925 --> 00:03:52.485
I need my dynamicist to hear it.

65
00:03:52.485 --> 00:03:53.685
I need my stress engineer,

66
00:03:54.325 --> 00:03:56.325
I need my project engineer to hit it.

67
00:03:56.665 --> 00:03:58.285
And we need to be able to answer the question,

68
00:03:58.285 --> 00:04:01.525
should I care about what my colleague is talking about?

69
00:04:02.235 --> 00:04:04.605
However, if we have hot mic enabled

70
00:04:05.185 --> 00:04:07.885
and they're listening to what a TC is telling the Osprey

71
00:04:07.885 --> 00:04:10.725
to do in the airspace, they are not in fact in the room

72
00:04:10.725 --> 00:04:14.405
with me and potentially missing vital information.

73
00:04:15.675 --> 00:04:18.015
So that's how we handle hot mic on V 22.

74
00:04:18.675 --> 00:04:21.095
Are there any teams out there that find benefits

75
00:04:21.355 --> 00:04:24.415
of using such a technology while conducting flight test?

76
00:04:28.455 --> 00:04:29.455
Yes, sir.

77
00:04:31.505 --> 00:04:32.125
22,

78
00:04:36.125 --> 00:04:38.125
consider factor.

79
00:04:39.025 --> 00:04:41.085
Uh, the test team was trained in

80
00:04:41.085 --> 00:04:42.685
monitoring the pilots breathing.

81
00:04:43.355 --> 00:04:47.725

Uh, they can certainly, uh, tell

82
00:04:48.235 --> 00:04:50.935
toward the end of a three hour load to,

83
00:05:00.645 --> 00:05:02.535
Okay, so monitoring of aircrew.

84
00:05:02.725 --> 00:05:03.725
Yeah. Okay.

85
00:05:05.055 --> 00:05:07.855
I think all I got was the, uh, the intercom mic. The

86
00:05:07.855 --> 00:05:09.695
First one was dead, Just intercom.

87
00:05:10.235 --> 00:05:13.575
Um, they didn't have all the a TC transmissions

88
00:05:13.575 --> 00:05:16.015
and all that stuff to, to cloud the issue shoe.

89
00:05:18.115 --> 00:05:20.055
We had some arguments about it.

90
00:05:20.075 --> 00:05:23.575
The benefits, the benefits are that the TM

91
00:05:24.385 --> 00:05:26.055
Knows what the air crew is doing,

92
00:05:26.555 --> 00:05:29.855
but with the dual piloted aircraft like us, there's a lot

93
00:05:29.855 --> 00:05:32.615
of communications in there that really don't necessarily

94
00:05:33.365 --> 00:05:34.535
help in that regard.

95
00:05:35.275 --> 00:05:38.535
Um, I could see it more as value

96
00:05:38.535 --> 00:05:39.975
to a single piloted aircraft.

97
00:05:42.315 --> 00:05:44.135
So I was just gonna point out, this is sort

98
00:05:44.135 --> 00:05:46.055
of a crew coordination topic, right?

99
00:05:46.055 --> 00:05:47.255
That we're on. Uh,

100
00:05:47.475 --> 00:05:49.495
and when you're, when you're dealing with crew,

101
00:05:49.765 --> 00:05:53.295
crew coordination, CRM, crew resource management, uh,

102
00:05:53.995 --> 00:05:55.455
and you have a telemetry room,

103
00:05:55.455 --> 00:05:57.135
they are part of the crew, right?

104
00:05:57.225 --> 00:05:58.525
And you have to treat them like that.

105
00:05:58.545 --> 00:06:00.085
And so how you, uh,

106
00:06:00.465 --> 00:06:03.005
how you run your communications is, is really critical.

107
00:06:03.545 --> 00:06:06.565
Um, I've seen a couple of teams

108
00:06:06.715 --> 00:06:10.205

that will use like a selectable voiceover internet,

109
00:06:10.205 --> 00:06:12.085
you know, so they'll go selectively hot mic

110
00:06:12.085 --> 00:06:13.885
for maybe a high risk test point

111
00:06:13.885 --> 00:06:16.525
or when they're approaching, uh, you know, not, not

112
00:06:16.525 --> 00:06:18.805
for the whole flight, but, uh, when, when you're on point,

113
00:06:19.225 --> 00:06:22.045
um, I've also seen you can, there's different ways to,

114
00:06:22.145 --> 00:06:25.525
to manage your comms so that, uh, range

115
00:06:25.545 --> 00:06:27.165
and everything else is not necessarily coming

116
00:06:27.165 --> 00:06:28.365
over, over that.

117
00:06:28.865 --> 00:06:30.645
Uh, and then potentially if you've got a chase

118
00:06:30.845 --> 00:06:31.965
aircraft or something, they're handling that.

119
00:06:32.425 --> 00:06:34.485
Uh, so you can kind of clean it up a little bit.

120
00:06:34.505 --> 00:06:36.925
But I see your point, uh, about if you're,

121
00:06:37.105 --> 00:06:39.565
the way your architecture's set, if, if you have to listen

122
00:06:39.565 --> 00:06:42.565
to everything, it's overwhelming, um, and distracting.

123
00:06:43.105 --> 00:06:45.285
And there, there are exceptions, like most things, right?

124
00:06:45.285 --> 00:06:47.365
There are exceptions. Uh, two tests that come to mind

125
00:06:47.365 --> 00:06:51.285
where we do utilize hot mic, uh, arrow refueling,

126
00:06:51.825 --> 00:06:53.805
and during some of our autopilot testing

127
00:06:54.225 --> 00:06:56.845
and both of those, the case to, to use it is,

128
00:06:56.845 --> 00:07:00.245
it's an enhancement, uh, for sa in the telemetry room.

129
00:07:00.245 --> 00:07:01.325
That's first and foremost.

130
00:07:01.705 --> 00:07:03.685
Uh, if we don't have the tanker, uh,

131
00:07:03.685 --> 00:07:06.005
differential GPS down into the room, we don't know

132
00:07:06.005 --> 00:07:07.245
where in the sky the aircraft are.

133
00:07:07.505 --> 00:07:10.485
Uh, and if we were not listening to the ICS, we're not sure,

134
00:07:10.925 --> 00:07:12.205
I mean, they can key us, right?

135
00:07:12.205 --> 00:07:14.125

They'll tell us like, Hey, are TM are you ready?

136
00:07:14.345 --> 00:07:16.605
But are they in the echelon position? How close are they?

137
00:07:16.605 --> 00:07:17.605
Are they in pre-contact?

138
00:07:17.825 --> 00:07:20.565
So we wouldn't enable hot mic for arrow refueling usually.

139
00:07:21.105 --> 00:07:22.885
And then for the autopilot features,

140
00:07:23.145 --> 00:07:24.925
we like the running narrative, uh,

141
00:07:24.925 --> 00:07:26.445
especially if the robot's flying, right?

142
00:07:26.785 --> 00:07:28.885
Uh, because we like to hear their observations for,

143
00:07:28.905 --> 00:07:30.485
for note taking, or maybe we're,

144
00:07:30.515 --> 00:07:31.645
it's a tuning effort, right?

145
00:07:31.645 --> 00:07:32.845
We're dialing in some games

146
00:07:33.145 --> 00:07:36.085
and trying to improve, uh, the behavior of the system.

147
00:07:36.465 --> 00:07:37.725
We like that running narrative.

148
00:07:37.725 --> 00:07:40.285
We like to hear the pilots go, that was a weird pitch,

149
00:07:40.285 --> 00:07:41.365
or Why did it roll there?

150
00:07:41.365 --> 00:07:43.165
Or That power pool seemed excessive.

151
00:07:43.465 --> 00:07:45.285
So that's another instance where we, uh,

152
00:07:45.285 --> 00:07:47.605
during the autopilot testing that we would, uh,

153
00:07:47.605 --> 00:07:49.485
allow the folks in TM to use hot mic.

154
00:07:51.545 --> 00:07:54.405
So he kinda stole a little bit of my answer there is that,

155
00:07:54.545 --> 00:07:58.285
you know, your TM crew is part of your crew

156
00:07:58.865 --> 00:08:03.845
and you have to have that essay from the cockpit so

157
00:08:03.845 --> 00:08:07.125
that your TM crew can be effective in, you know,

158
00:08:07.395 --> 00:08:08.405
solving problems.

159
00:08:08.405 --> 00:08:10.525
You know, a lot of times, especially high risk missions,

160
00:08:11.245 --> 00:08:14.685
RTM crew will be taking the primary OER the primary, uh,

161
00:08:15.335 --> 00:08:17.125
notes for the, uh, flight crew.

162
00:08:17.665 --> 00:08:20.245

And unless they can hear everything going on

163
00:08:20.245 --> 00:08:22.285
and the kind of stream of conscience coming down from the

164
00:08:22.305 --> 00:08:23.725
pilots, they don't know what

165
00:08:23.725 --> 00:08:25.245
to write down, when to write down.

166
00:08:26.105 --> 00:08:30.645
Uh, the other thing is I find it's invaluable for sa

167
00:08:30.645 --> 00:08:33.405
of just what's going on in the airplane and the airspace,

168
00:08:33.715 --> 00:08:38.005
because I've run missions with hot mic and without hot mic

169
00:08:38.145 --> 00:08:42.525
and without hot mic, I really feel blind to what is going on

170
00:08:42.555 --> 00:08:45.845
because if I call back with feedback,

171
00:08:46.685 --> 00:08:49.765
I have no idea what's going on in the cockpit.

172
00:08:50.385 --> 00:08:52.685
Um, you know, even if I'm sitting there, you know, asking,

173
00:08:52.785 --> 00:08:53.925
you know, ready for feedback

174
00:08:53.925 --> 00:08:57.565
and they chime in ready, a TC can then hop on

175
00:08:57.565 --> 00:09:00.165
and just completely blow out anything I'm given to 'em.

176
00:09:00.195 --> 00:09:04.565
Sure. And as far as it being a distraction

177
00:09:04.865 --> 00:09:08.965
to your TM crew, I think that's just more training, uh,

178
00:09:08.965 --> 00:09:12.965
that needs to happen and getting people in your TM room,

179
00:09:13.945 --> 00:09:16.325
uh, to be comfortable with the fact that yeah,

180
00:09:16.325 --> 00:09:17.885
there is this background information,

181
00:09:17.885 --> 00:09:19.325
background noise going on.

182
00:09:19.635 --> 00:09:21.085
Your T TM director

183
00:09:21.105 --> 00:09:23.405
and maybe your lead FTEs need to be listening to that,

184
00:09:24.025 --> 00:09:26.925
but the discipline specific engineers need

185
00:09:26.925 --> 00:09:29.205
to be concentrating on their data.

186
00:09:31.635 --> 00:09:33.285
Sure. Points. Absolutely.

187
00:09:34.325 --> 00:09:37.485
I, I think a real valid point there is that, uh,

188
00:09:38.675 --> 00:09:42.125
that essay, it really comes with experience.

189
00:09:42.355 --> 00:09:45.765

Like Mike knows what's going on in the cockpit when we're

190
00:09:45.765 --> 00:09:47.485
talking and what what we're doing on maneuvers.

191
00:09:48.415 --> 00:09:51.685
Other guys in the TM room don't necessarily, so they're,

192
00:09:51.825 --> 00:09:54.165
we have had gaps occur in that respect.

193
00:09:54.425 --> 00:09:58.725
So it helps to have him educate them as

194
00:09:58.725 --> 00:09:59.725
to what's going on.

195
00:10:00.065 --> 00:10:05.005
And, uh, um, if you have a really experienced TM crew,

196
00:10:05.745 --> 00:10:08.885
uh, they generally know what's in that,

197
00:10:09.105 --> 00:10:10.285
what's going on in the c**k.

198
00:10:11.155 --> 00:10:14.965
It's those newbies that, that, uh, it starts you,

199
00:10:14.985 --> 00:10:16.245
you start to break that link.

200
00:10:16.985 --> 00:10:19.845
Uh, but then there the newbies are easily distracted

201
00:10:19.845 --> 00:10:21.085
by all the other stuff too.

202
00:10:21.315 --> 00:10:25.565
They have not learned to tune it out. Yeah.

203
00:10:26.495 --> 00:10:27.845
Thank you. Good points. Thank you.

204
00:10:28.145 --> 00:10:31.085
Um, I have one over here, uh, right now, uh,

205
00:10:31.095 --> 00:10:34.605
doing E 2D flight tests, doing flutter on the Japan program.

206
00:10:34.945 --> 00:10:37.005
And with that we have a backend

207
00:10:37.265 --> 00:10:40.485
and a copilot who's working the CCB basically setting

208
00:10:40.505 --> 00:10:41.845
for if we're doing sweeps or dwells.

209
00:10:41.865 --> 00:10:42.885
So having that hot mic

210
00:10:42.885 --> 00:10:45.645
and hearing their conversation internally

211
00:10:45.985 --> 00:10:49.125
of is the FES laptop ready where they're at,

212
00:10:49.225 --> 00:10:50.405
um, if it's dropped out.

213
00:10:50.505 --> 00:10:53.085
And then right now we're doing VL test points.

214
00:10:53.425 --> 00:10:56.325
So being able to hear the pilot's comments going

215
00:10:56.325 --> 00:10:57.685
through the dive, um,

216
00:10:57.845 --> 00:10:59.805

'cause we only have about 30 seconds on condition for that,

217
00:11:00.265 --> 00:11:02.805
for us, just having that continual conversation between him

218
00:11:02.805 --> 00:11:05.765
and the co-pilot for us to hear is extremely helpful.

219
00:11:06.025 --> 00:11:09.525
And then also being able to kind of hear their thoughts

220
00:11:09.525 --> 00:11:11.365
of once they come back, get behind the points

221
00:11:11.365 --> 00:11:13.005
of the EL line, we're looking at the data

222
00:11:13.185 --> 00:11:15.205
and processing that, making sure

223
00:11:15.205 --> 00:11:18.165
that they're not making assumptions that they're ready to go

224
00:11:18.165 --> 00:11:20.965
and starting to speed up and being past our modern limits

225
00:11:20.965 --> 00:11:25.325
and on our limits, um, just helps gauge where they're at

226
00:11:25.325 --> 00:11:28.765
and also keeps our team on the ball of like, Hey, you know,

227
00:11:28.835 --> 00:11:31.965
there's pace, but if you hear them starting to prep

228
00:11:32.265 --> 00:11:35.365
and you're not ready, you're tumbleweed, you can speak up,

229
00:11:35.425 --> 00:11:36.365
let us know, and then we can

230
00:11:36.525 --> 00:11:37.485
communicate that to the aircraft.

231
00:11:37.625 --> 00:11:40.645
Um, so for us, it's been valuable to just keep pacing

232
00:11:40.645 --> 00:11:43.365
and making sure that everyone in the team, even if they're

233
00:11:43.915 --> 00:11:47.885
sitting on a load spot, that really doesn't see much, uh,

234
00:11:47.975 --> 00:11:51.405
excitation, um, just make sure that they're not zoning out

235
00:11:51.465 --> 00:11:53.525
or losing their concentration on there.

236
00:11:53.525 --> 00:11:55.205
Which again, with more experience helps

237
00:11:55.475 --> 00:11:56.685
them kind of keep on that.

238
00:11:56.785 --> 00:12:00.445
But even then on a two three sort day, your mind kind

239
00:12:00.445 --> 00:12:01.765
of starts to drift off there.

240
00:12:01.765 --> 00:12:04.485
Just helps keep the team, I think, centered on

241
00:12:04.875 --> 00:12:07.205
what the mission is and when we're about to execute. And

242
00:12:07.305 --> 00:12:10.005
Are you configured, uh, kind of the way RJ alluded to,

243
00:12:10.025 --> 00:12:12.765

are you configured where you're just hearing air crew

244
00:12:13.505 --> 00:12:16.485
or would you, are you also getting like a TC calls

245
00:12:16.505 --> 00:12:18.845
and other aircraft in the vicinity on top of all that?

246
00:12:18.955 --> 00:12:20.045
Yeah, we have a chase jet

247
00:12:20.045 --> 00:12:22.285
that will take over once we actually get into airspace.

248
00:12:22.305 --> 00:12:23.965
Um, so it helps a lot so they can turn down,

249
00:12:24.025 --> 00:12:25.645
but we still hear a little bit of it just

250
00:12:25.645 --> 00:12:27.845
so if there is a call that they need to respond

251
00:12:27.845 --> 00:12:29.205
to, uh, they can take over.

252
00:12:29.505 --> 00:12:31.285
But we have kind of our left

253
00:12:31.285 --> 00:12:32.565
and right ear split to

254
00:12:32.565 --> 00:12:34.405
where our internal ICS is our right ear

255
00:12:34.405 --> 00:12:36.045
and then pilots are the left.

256
00:12:36.375 --> 00:12:38.165
Understood. Okay. Interesting.

257
00:12:46.685 --> 00:12:48.685
I think there's other things you have to consider.

258
00:12:48.785 --> 00:12:52.285
Um, had a flight test at, at NASA flying a tilt rotor

259
00:12:52.285 --> 00:12:53.685
where it was an experimental blade.

260
00:12:53.785 --> 00:12:55.005
It was fully instrumented,

261
00:12:55.625 --> 00:13:00.285
and it had a in inboard cuff that during the flight test,

262
00:13:00.415 --> 00:13:02.485
which was for acoustics, nothing to do

263
00:13:02.485 --> 00:13:06.325
with high risk test at all, uh, the, he had a failure

264
00:13:06.505 --> 00:13:08.965
of the cuff and it slid outboard when it did,

265
00:13:08.965 --> 00:13:11.365
you got about a 3000 pound imbalance in the rotor.

266
00:13:11.505 --> 00:13:13.405
You can imagine what the aircraft felt like.

267
00:13:14.385 --> 00:13:15.605
The problem was the tm,

268
00:13:15.875 --> 00:13:17.525
when it ripped out the instrumentation,

269
00:13:17.985 --> 00:13:20.365
the TM was on the radio, which was our only means

270
00:13:20.365 --> 00:13:23.725

of communication, and starts calling off all the parameters

271
00:13:23.725 --> 00:13:26.365
that they started leaving after about eight

272
00:13:26.365 --> 00:13:28.685
or 10 parameters that they had lost,

273
00:13:29.305 --> 00:13:31.365
he suddenly I think realized, oh, shoot,

274
00:13:31.365 --> 00:13:33.485
what's the condition of the aircraft finally

275
00:13:33.635 --> 00:13:34.725
quit transmitting.

276
00:13:34.725 --> 00:13:36.445
And we could say, we've got a severe vibration,

277
00:13:36.445 --> 00:13:38.565
we're putting it on the ground, which was the first time

278
00:13:38.565 --> 00:13:40.525
they'd considered what the aircraft status was.

279
00:13:41.145 --> 00:13:42.925
Um, it was, vibration was

280
00:13:42.925 --> 00:13:44.605
so bad you couldn't even read the instruments.

281
00:13:44.625 --> 00:13:46.045
It was because, but

282
00:13:46.355 --> 00:13:49.085
because they had the mic keyed, we couldn't talk.

283
00:13:50.305 --> 00:13:53.445
That's a good segue. May the other questions maybe, sir,

284
00:13:53.445 --> 00:13:55.045
we'll wait until the, the panel later.

285
00:13:55.385 --> 00:13:58.125
Um, I'll move on. That's a good segue into topic number two

286
00:13:58.505 --> 00:14:01.165
was who's allowed, who has radio privileges at dm?

287
00:14:01.865 --> 00:14:04.605
Uh, so what we have settled on, again, there are exceptions

288
00:14:04.605 --> 00:14:07.125
to the rule, but in V 22 land,

289
00:14:07.505 --> 00:14:09.125
all comms go through the test directory.

290
00:14:09.125 --> 00:14:11.125
And the reason why we do that over the years is

291
00:14:11.125 --> 00:14:12.485
because of this exact reason.

292
00:14:13.345 --> 00:14:14.365
So when we, you know,

293
00:14:14.365 --> 00:14:16.405
through executing the pre-flight briefing,

294
00:14:16.825 --> 00:14:19.405
we can have things that range from just advisory calls.

295
00:14:19.815 --> 00:14:21.485
Watch your speed, watch your bank

296
00:14:21.585 --> 00:14:22.765
all the way over to knock it off.

297
00:14:22.945 --> 00:14:24.645

Of course, implying terminate,

298
00:14:24.645 --> 00:14:26.245
either something bad has happened

299
00:14:26.545 --> 00:14:28.165
or something is imminent, right?

300
00:14:28.625 --> 00:14:31.245
Uh, so by funneling everything through the test director

301
00:14:31.245 --> 00:14:34.805
for 99% of our tests, that immediate escalation can happen.

302
00:14:35.265 --> 00:14:37.925
So even though someone says, watch your,

303
00:14:38.185 --> 00:14:40.845
the test director keys to radio, watch your,

304
00:14:41.035 --> 00:14:43.205
when someone else in the room starts yelling, knock it off,

305
00:14:43.395 --> 00:14:44.685
it's immediate escalation,

306
00:14:44.945 --> 00:14:47.605
the radio call was now escalated to a knock it off.

307
00:14:48.185 --> 00:14:50.325
And air crew, of course, can respond appropriately.

308
00:14:52.225 --> 00:14:55.085
Uh, the exceptions to the rule, uh, would be ship testing

309
00:14:55.225 --> 00:14:57.005
for us, because anything

310
00:14:57.005 --> 00:15:00.005
that's hazardous when we're doing envelope expansion on a

311
00:15:00.125 --> 00:15:01.165
ship dynamic interface,

312
00:15:01.165 --> 00:15:03.405
testing everything coalesces at the deck edge

313
00:15:03.785 --> 00:15:06.325
and time is critically important.

314
00:15:07.025 --> 00:15:08.845
Um, so typical configuration for a ship

315
00:15:08.845 --> 00:15:12.765
that four flying qualities engineers, one test director, uh,

316
00:15:13.765 --> 00:15:15.765
embedded in the ship, uh, the billy of the ship,

317
00:15:15.835 --> 00:15:17.605
somewhere in a closet, usually

318
00:15:18.565 --> 00:15:19.845
wherever they give us to operate out of.

319
00:15:20.145 --> 00:15:21.885
Uh, but everyone has radio privileges.

320
00:15:23.025 --> 00:15:24.765
If there most calls are knock it offs.

321
00:15:24.935 --> 00:15:26.725
There were other high risk tests

322
00:15:26.725 --> 00:15:29.605
where we had the handling qualities guy, um,

323
00:15:29.825 --> 00:15:33.285
but he had definitive guidelines as to when he could talk.

324
00:15:34.225 --> 00:15:37.845

And so frequency sweeps, for instance, uh,

325
00:15:39.015 --> 00:15:42.605
those sort of things, Aero server, elastic points,

326
00:15:45.545 --> 00:15:49.605
Any opinions on radio, radio privileges out there?

327
00:15:49.605 --> 00:15:50.805
How do other teams, yes, sir.

328
00:15:54.385 --> 00:15:55.565
Did you have a comment or not?

329
00:16:00.565 --> 00:16:01.685
I agree very much with that.

330
00:16:01.865 --> 00:16:04.405
Um, having one point of contact up to the

331
00:16:04.985 --> 00:16:06.965
flight crew is really important.

332
00:16:07.065 --> 00:16:09.365
So they're not suddenly bombarded with five

333
00:16:09.365 --> 00:16:11.325
or six radio calls when something goes sideways.

334
00:16:12.265 --> 00:16:16.845
Um, about the only time we make that exception

335
00:16:16.945 --> 00:16:20.085
of someone other than the test director is making those

336
00:16:20.085 --> 00:16:22.005
calls is during like flight flutter,

337
00:16:22.175 --> 00:16:24.525
where we've got our flutter experts watching all their

338
00:16:24.645 --> 00:16:26.925
squiggly lines, and they're gonna be the first ones

339
00:16:26.925 --> 00:16:28.085
to see something go south

340
00:16:28.305 --> 00:16:30.205
and make that a board aboard, aboard call.

341
00:16:31.065 --> 00:16:34.005
Um, and even when we do that, it's,

342
00:16:34.105 --> 00:16:35.885
we treat it just like the airplane

343
00:16:35.885 --> 00:16:37.885
where it is a positive transfer of control.

344
00:16:38.305 --> 00:16:42.485
You have the radio and, uh, then they take over.

345
00:16:43.195 --> 00:16:44.685
Yeah. Uh, we, we do the same.

346
00:16:44.785 --> 00:16:45.845
Uh, Marty alluded to this,

347
00:16:45.845 --> 00:16:48.325
but steady heading side slip, we have dynamic, uh,

348
00:16:48.325 --> 00:16:49.405
side slip limits, right?

349
00:16:49.405 --> 00:16:51.365
That change with, uh, true air speed.

350
00:16:51.825 --> 00:16:54.405
Uh, but agree a hundred percent when we do that.

351
00:16:54.405 --> 00:16:56.405

Typically a flying quality engineer, he

352
00:16:56.405 --> 00:16:59.125
or she inherits all radio car responsibilities.

353
00:16:59.145 --> 00:17:00.645
So even though they're wearing the FQ hat,

354
00:17:00.905 --> 00:17:02.645
if they've got the ball for radio comms,

355
00:17:02.675 --> 00:17:05.005
even if a loads person calls knock it off, that fq,

356
00:17:05.005 --> 00:17:07.085
the delegate with the radio responsibilities,

357
00:17:07.475 --> 00:17:08.605
parrots that call as well.

358
00:17:08.745 --> 00:17:09.725
So the test director is

359
00:17:09.725 --> 00:17:11.045
effectively outta the loop at that point.

360
00:17:18.195 --> 00:17:22.005
Yeah. So, so my opinion, I've, I've been

361
00:17:22.005 --> 00:17:23.765
through the formal training where everything goes

362
00:17:23.765 --> 00:17:25.685
through the test director, but in real life I've found

363
00:17:25.685 --> 00:17:26.765
that that doesn't always work.

364
00:17:27.705 --> 00:17:32.125
Um, in, in larger teams, especially when you've got TM

365
00:17:32.125 --> 00:17:35.725
and you've got a, a whole team of people on board

366
00:17:35.725 --> 00:17:39.205
and aircraft, um, what I've found is

367
00:17:39.795 --> 00:17:42.845
that sometimes, for example, the flight controls, people

368
00:17:43.745 --> 00:17:45.005
are going through procedures

369
00:17:45.265 --> 00:17:47.165
and they're talking to the crew on the aircraft.

370
00:17:48.555 --> 00:17:50.285
It's important for them. You can't work

371
00:17:50.285 --> 00:17:52.285
through the test director, it's just not possible.

372
00:17:53.065 --> 00:17:55.445
But the test director still needs to have overall control

373
00:17:55.675 --> 00:17:59.685
because you could have a knock it off during that phase

374
00:17:59.685 --> 00:18:01.245
where somebody else calls a knock it off,

375
00:18:02.345 --> 00:18:05.165
and it's brief that it's, well, in that case,

376
00:18:07.025 --> 00:18:10.645
the agreement was knock it off, go straight to the aircraft,

377
00:18:11.505 --> 00:18:13.125
and then the test director will take over

378
00:18:13.125 --> 00:18:15.925

and sort of say what it is that, that we need to do.

379
00:18:19.245 --> 00:18:21.165
CRM for me, I think is, is complicated.

380
00:18:21.195 --> 00:18:23.525
It's not, it's not just a simple, the test director has

381
00:18:23.525 --> 00:18:25.525
to do everything, everything goes through the test director.

382
00:18:25.825 --> 00:18:29.645
And I think a sign of a well, um,

383
00:18:31.245 --> 00:18:34.925
well-trained team is the ability to do this coordination.

384
00:18:35.665 --> 00:18:39.245
And I think I, I always talk about a symphony orchestra

385
00:18:39.245 --> 00:18:40.765
and how we all, all communicate with each other,

386
00:18:40.765 --> 00:18:45.605
and I think that ability to Regulat regulate

387
00:18:45.605 --> 00:18:49.045
and do this communication, um, correctly,

388
00:18:49.045 --> 00:18:50.605
but not necessarily all

389
00:18:50.605 --> 00:18:53.965
through the test director is very helpful and very valuable.

390
00:18:55.065 --> 00:18:56.245
So that's what I've done.

391
00:18:57.245 --> 00:18:59.285
I, I, I know that it's sort of deviates from what

392
00:19:00.425 --> 00:19:02.645
my training and what a lot of people say you should do,

393
00:19:02.645 --> 00:19:04.165
but I found that it's very effective.

394
00:19:26.915 --> 00:19:30.205
Yeah. Just one model that, uh, I think maybe touches on

395
00:19:30.205 --> 00:19:32.005
what was just spoken about was, uh,

396
00:19:33.115 --> 00:19:35.565
this is one telemetry room that, uh, team that I worked

397
00:19:35.565 --> 00:19:39.885
with, everybody had a transmit capability, right?

398
00:19:40.265 --> 00:19:42.605
Uh, by nature, uh,

399
00:19:42.665 --> 00:19:45.325
the test director was doing the coordination directly

400
00:19:45.325 --> 00:19:46.725
with the aircraft, the pilot.

401
00:19:47.345 --> 00:19:51.845
Um, but each, uh, engineer had the ability,

402
00:19:52.025 --> 00:19:54.605
and we, we, we talked about it every t every day, right?

403
00:19:54.755 --> 00:19:57.565
When, when do you, when do you speak, when do you transmit?

404
00:19:58.305 --> 00:19:59.565
Um, and, uh,

405
00:19:59.745 --> 00:20:04.005

and it was really, I, I, I was remarkably impressed with how

406
00:20:05.085 --> 00:20:08.845
diligent the, the young engineers were with, uh, not,

407
00:20:09.185 --> 00:20:10.645
not overusing the button.

408
00:20:11.185 --> 00:20:12.365
Uh, so that's one thing.

409
00:20:12.425 --> 00:20:15.405
And that, and I also, I was also impressed on a number

410
00:20:15.405 --> 00:20:19.365
of occasions when they didn't hesitate to use it, right?

411
00:20:19.385 --> 00:20:21.525
And that's the thing that I worry about is

412
00:20:21.525 --> 00:20:23.645
that they're gonna, there's gonna be a hesitation.

413
00:20:24.265 --> 00:20:25.765
Uh, I'm not sure, you know,

414
00:20:25.765 --> 00:20:27.125
that they're gonna doubt themselves or something,

415
00:20:27.125 --> 00:20:31.205
but I, I, historically I've seen the, that they,

416
00:20:31.235 --> 00:20:32.405
they treat it with respect.

417
00:20:32.585 --> 00:20:34.765
You, you, as long as you talk about it, you train to it.

418
00:20:35.195 --> 00:20:37.605
They know when, you know when they're supposed

419
00:20:37.605 --> 00:20:38.645
to transmit and when they're not.

420
00:20:38.785 --> 00:20:41.965
Uh, you know, so I I, I've had really good luck with, uh,

421
00:20:41.975 --> 00:20:45.525
given that, uh, capability to each individual station

422
00:20:46.065 --> 00:20:49.205
and then, uh, training and teaching when to transmit

423
00:20:49.345 --> 00:20:50.405
and when to not, right?

424
00:20:50.405 --> 00:20:52.965
Sure. So, which is, was definitely a skill.

425
00:20:53.345 --> 00:20:55.765
Um, and then the other thing that I think that, uh,

426
00:20:55.975 --> 00:20:59.165
comes down to when, when to transmit or when to talk, uh,

427
00:20:59.225 --> 00:21:01.405
and then how you're talking is whether

428
00:21:01.405 --> 00:21:06.005
or not you're using, uh, uh, VHF or UHF com comms,

429
00:21:06.305 --> 00:21:09.045
or if you're using that, uh, voiceover internet, um,

430
00:21:09.045 --> 00:21:10.485
because the voiceover internet, there's no,

431
00:21:10.545 --> 00:21:13.405
you're not truncating, you're not, you're not losing the,

432
00:21:13.425 --> 00:21:15.085

uh, you know, the first part of that transmission.

433
00:21:15.105 --> 00:21:18.525
But often what happens, uh, when you're, uh,

434
00:21:19.305 --> 00:21:22.245
you key the mic, you, you have to know aviators know, Hey,

435
00:21:22.555 --> 00:21:26.125
give it a, a, you know, sort of a potato and then speak.

436
00:21:26.545 --> 00:21:29.845
Um, but under duress, you will speak

437
00:21:30.065 --> 00:21:31.445
and pull at the same time.

438
00:21:31.545 --> 00:21:36.365
And often the first part of that first word is truncated or,

439
00:21:36.505 --> 00:21:37.685
or cropped, right?

440
00:21:38.345 --> 00:21:41.005
And, uh, and so it doesn't come, it comes across as, or,

441
00:21:41.705 --> 00:21:44.245
and you, you don't know what was really said.

442
00:21:44.245 --> 00:21:47.205
And so, uh, somebody just talked about the abort procedure,

443
00:21:47.265 --> 00:21:51.845
and I noticed that he said, abort, abort, abort, right?

444
00:21:51.905 --> 00:21:55.205
And so when, whenever you have a voice comm that has

445
00:21:55.205 --> 00:21:59.285
to go over, uh, from the, from the telemetry room, I love

446
00:21:59.285 --> 00:22:01.925
that idea that you repeat it three times, right?

447
00:22:01.985 --> 00:22:04.725
So that there's no one that there's no doubt.

448
00:22:05.105 --> 00:22:07.845
Uh, and two, that first part, you know, you might just get

449
00:22:08.025 --> 00:22:09.885
or abort, abort, right?

450
00:22:09.945 --> 00:22:12.525
If you're, if you're using A-A-V-H-F and,

451
00:22:12.705 --> 00:22:15.725
and you crop that, that first word, so, and I've seen that

452
00:22:16.065 --> 00:22:19.205
and occur, uh, and, uh,

453
00:22:19.205 --> 00:22:21.245
and cause confusion when, when

454
00:22:21.245 --> 00:22:23.525
that truncated transmission comes through

455
00:22:23.525 --> 00:22:24.765
to the telemetry room and they go,

456
00:22:24.915 --> 00:22:26.045
what, what did he just say?

457
00:22:26.225 --> 00:22:27.285
And they, they're,

458
00:22:27.625 --> 00:22:30.325
now you've got two different situational awarenesses

459
00:22:30.325 --> 00:22:32.365

that are, uh, in the telemetry room.

460
00:22:32.385 --> 00:22:33.405
And in the cockpit,

461
00:22:36.945 --> 00:22:38.925
We do have, uh, the rolling pull up

462
00:22:38.925 --> 00:22:40.365
that Marty briefed earlier today.

463
00:22:40.865 --> 00:22:43.765
Uh, is it a good example of oftentimes like

464
00:22:43.765 --> 00:22:45.645
through instruction, like course room level stuff,

465
00:22:45.645 --> 00:22:47.525
and then in the pre-flight brief, uh,

466
00:22:47.525 --> 00:22:48.565
there'll be decision points

467
00:22:48.565 --> 00:22:50.165
during the conduct of the maneuver, right?

468
00:22:50.165 --> 00:22:52.365
Marty talked about slow deliberate recoveries, right?

469
00:22:52.865 --> 00:22:55.565
So there's, you know, a heinous input followed

470
00:22:55.625 --> 00:22:57.845
by a very methodical recovery.

471
00:22:58.385 --> 00:23:01.005
Uh, so typically what the way we'll brief that in tm, right?

472
00:23:01.025 --> 00:23:03.685
Is our, our, the smart people in the front row, uh, are,

473
00:23:03.685 --> 00:23:04.885
they're so compartmentalized

474
00:23:04.975 --> 00:23:06.205
loads, people are staring to load stuff.

475
00:23:06.305 --> 00:23:08.645
FQ standard, right? Um, the test director's kind

476
00:23:08.645 --> 00:23:10.285
of narrating over ICS he's setting

477
00:23:10.285 --> 00:23:11.325
up, okay, here it comes, right?

478
00:23:11.865 --> 00:23:14.365
Um, but I always tell my TM folks, I don't need you

479
00:23:14.365 --> 00:23:16.485
to decide if the input is in or not.

480
00:23:16.545 --> 00:23:17.765
I'm gonna tell you if the input is in,

481
00:23:17.765 --> 00:23:19.925
if you have a knock it off, tell me, I tell me,

482
00:23:19.925 --> 00:23:21.125
knock it off over ICS.

483
00:23:21.355 --> 00:23:23.525
It's, the onus is then on me as the test director,

484
00:23:23.525 --> 00:23:25.085
whether I convey that to the aircraft.

485
00:23:25.425 --> 00:23:28.165
Um, 'cause air crew puts in their rolling, pull up full,

486
00:23:28.165 --> 00:23:29.405

that stick full waft, right?

487
00:23:29.785 --> 00:23:31.245
The terrible thing has already happened.

488
00:23:31.535 --> 00:23:33.405
Everything else from there on is benign.

489
00:23:33.405 --> 00:23:34.805
They're just trying to write the aircraft.

490
00:23:35.105 --> 00:23:36.925
So at any point during the maneuver, we tell our folks,

491
00:23:36.945 --> 00:23:37.965
you tell me, knock it off,

492
00:23:38.505 --> 00:23:40.845
and then it's up to me with the input's already in,

493
00:23:41.285 --> 00:23:43.245
I will convey that to the air crew post maneuver rather,

494
00:23:43.245 --> 00:23:44.925
rather than yelling in their ear while they're

495
00:23:44.925 --> 00:23:46.120
halfway, halfway upside down already.

496
00:23:47.075 --> 00:23:49.565
Yeah. One of those that I put in there was like,

497
00:23:49.565 --> 00:23:52.525
knock it off air speed, meaning I'm in the recovery

498
00:23:52.545 --> 00:23:56.805
and I'm slowing, you know, you better get control of that.

499
00:23:57.025 --> 00:23:58.165
You know, you're, you're about

500
00:23:58.165 --> 00:24:00.045
to go into the bat area here, so,

501
00:24:03.955 --> 00:24:04.955
Okay. Thank

502
00:24:04.955 --> 00:24:07.285
you very much, everyone for your time. Over to Marty.

503
00:24:14.905 --> 00:24:17.645
Mike's gonna be here on the panel here in a

504
00:24:17.645 --> 00:24:18.685
little bit to talk a little more.

505
00:24:19.465 --> 00:24:23.925
I'm gonna pick up on, um, beaker's paper.

506
00:24:23.975 --> 00:24:26.165
There was two more things that were on his paper.

507
00:24:27.025 --> 00:24:30.085
I'm gonna very, uh, uh, this is a real quick summary

508
00:24:30.345 --> 00:24:34.645
of those positive safety culture

509
00:24:35.285 --> 00:24:38.565
democratizes safety and resist drift to the unsafe.

510
00:24:39.035 --> 00:24:40.605
Both the RJ

511
00:24:40.605 --> 00:24:43.445
and I, when we started putting this together, we thought

512
00:24:43.445 --> 00:24:45.525
of beaker's paper and we thought of all these things,

513
00:24:45.625 --> 00:24:47.085

and it really made sense to us.

514
00:24:47.135 --> 00:24:50.125
We're sitting there having a drink and chatting about it

515
00:24:50.125 --> 00:24:52.005
and saying, oh, you know, that paper too?

516
00:24:52.105 --> 00:24:55.285
And it was a big influence for both of us as testers.

517
00:24:55.345 --> 00:24:58.525
So, uh, we're gonna, we're gonna finish it off

518
00:24:58.525 --> 00:25:00.885
with these two discussions.

519
00:25:01.885 --> 00:25:04.765
Democratized safety, the no vote. He's already talked about.

520
00:25:06.405 --> 00:25:07.445
Everyone's a risk manager.

521
00:25:07.865 --> 00:25:11.965
Uh, this came home to me, uh, on the V 22 team.

522
00:25:12.825 --> 00:25:15.045
We were, uh, contractor, run team.

523
00:25:15.225 --> 00:25:18.045
We had two safety officers. They were in every test brief.

524
00:25:18.355 --> 00:25:20.565
They were everywhere all the time.

525
00:25:21.625 --> 00:25:24.645
And then we went under government control, under a squadron

526
00:25:24.645 --> 00:25:28.645
that had multiple test entities with one safety officer.

527
00:25:29.025 --> 00:25:30.845
And when we did that, I went nuts.

528
00:25:31.085 --> 00:25:33.125
I was like, what happened? No safety officer.

529
00:25:33.305 --> 00:25:37.805
You know, I really made the mistake of thinking that, that,

530
00:25:37.835 --> 00:25:40.005
that that guy's more like a cheerleader.

531
00:25:40.185 --> 00:25:43.885
You know, he's the guy who, who, and Andy helps.

532
00:25:44.185 --> 00:25:46.085
He, he, he's a, um,

533
00:25:48.155 --> 00:25:49.925
he's a social worker sometimes too,

534
00:25:50.465 --> 00:25:54.445
but, um, he helps the team put together

535
00:25:55.005 --> 00:25:57.565
a safety management system and,

536
00:25:58.265 --> 00:26:00.485
and implement that, that was already in place

537
00:26:00.485 --> 00:26:02.925
with the government, but our guy did not

538
00:26:02.925 --> 00:26:04.165
show up to our briefings.

539
00:26:04.585 --> 00:26:08.565
Uh, he had too many entities in the squadron to do that.

540
00:26:09.265 --> 00:26:10.925

And that's when I started realizing that

541
00:26:12.025 --> 00:26:13.565
the safety was really on us.

542
00:26:14.375 --> 00:26:16.885
Every individual on the team was involved in safety.

543
00:26:17.545 --> 00:26:20.805
We had already democratized safety and,

544
00:26:21.145 --> 00:26:23.365
and we didn't necessarily need the safety officer

545
00:26:23.815 --> 00:26:24.885
there all the time.

546
00:26:25.345 --> 00:26:28.885
We did need him there for issues that rose where we disagree

547
00:26:28.885 --> 00:26:32.925
with management or something was just not right.

548
00:26:33.425 --> 00:26:37.325
Um, but that's when I realized

549
00:26:37.435 --> 00:26:40.125
that we really hadn't become less safe.

550
00:26:41.185 --> 00:26:43.245
And, uh, that was a big deal.

551
00:26:44.705 --> 00:26:47.845
And we continued that way for, it's been, I don't know

552
00:26:47.845 --> 00:26:50.765
how many years now, over 10 years as a team, um,

553
00:26:51.585 --> 00:26:54.565
one safety officer for how many people are in the squadron.

554
00:26:55.005 --> 00:26:56.765
I can't even, uh,

555
00:26:57.145 --> 00:26:59.485
but there's, there's multiple different aircraft,

556
00:27:00.745 --> 00:27:04.005
um, within the team.

557
00:27:04.005 --> 00:27:05.325
You have to have communication

558
00:27:05.325 --> 00:27:07.205
of this uncertainty that I talk about.

559
00:27:07.425 --> 00:27:11.045
Uh, here, you know, we, we've,

560
00:27:11.095 --> 00:27:12.445
we've already defined it.

561
00:27:12.945 --> 00:27:14.965
The guys need to know there's different elements,

562
00:27:14.965 --> 00:27:17.885
different ways of handling that uncertainty.

563
00:27:18.785 --> 00:27:22.165
And, uh, by doing that, they're better risk managers.

564
00:27:23.465 --> 00:27:27.445
And you definitely need to find some way of rewarding.

565
00:27:27.945 --> 00:27:32.165
Um, the, the safety guys we had, we had some guys

566
00:27:32.165 --> 00:27:35.285
that were just stellar at, at, at seeing things

567
00:27:35.285 --> 00:27:36.525

that were about to go wrong

568
00:27:36.785 --> 00:27:39.165
and that multiple awards for those guys

569
00:27:39.345 --> 00:27:41.565
and really recognize their efforts.

570
00:27:42.025 --> 00:27:46.125
Um, we always tried to improve the team and,

571
00:27:46.345 --> 00:27:50.085
and those improvements you had to recognize the processes.

572
00:27:50.085 --> 00:27:51.845
You had to recognize, not

573
00:27:51.845 --> 00:27:54.645
that we were layering more processes on, it was more

574
00:27:54.645 --> 00:27:56.885
that we were improving the ones that were in place,

575
00:27:59.255 --> 00:28:03.975
C-R-M-O-R-M, uh, the things we're typically do we do 'em

576
00:28:04.155 --> 00:28:08.895
before the flight, but then that a margin assessment

577
00:28:08.925 --> 00:28:11.855
that I'm talking about, that constant ORM knowing

578
00:28:12.405 --> 00:28:13.935
what points on the test,

579
00:28:14.405 --> 00:28:17.455
test card today are really the bad ones

580
00:28:17.635 --> 00:28:19.015
and what you,

581
00:28:19.045 --> 00:28:21.055
what control measures you're willing to implement.

582
00:28:22.845 --> 00:28:26.105
And then I've seen with all the various test teams,

583
00:28:26.135 --> 00:28:27.505
I've worked with all the services

584
00:28:27.925 --> 00:28:30.425
and I've worked with other organizations,

585
00:28:30.605 --> 00:28:33.675
and I've seen teams fail

586
00:28:33.675 --> 00:28:37.315
because they have got an individual that drags them down.

587
00:28:38.135 --> 00:28:41.395
And you gotta be able to identify that individual.

588
00:28:41.605 --> 00:28:43.635
These are just some of the types I've seen,

589
00:28:44.615 --> 00:28:48.245
and you've got to work with 'em

590
00:28:48.665 --> 00:28:53.405
and have the team members help them become better.

591
00:28:53.865 --> 00:28:56.245
You know, I call it lift each other up.

592
00:28:57.245 --> 00:29:02.145
Um, we have, we have some older gents on the team

593
00:29:02.215 --> 00:29:05.425
that we did anyway, that we get new people on.

594
00:29:05.565 --> 00:29:07.665

And I, for, I'll give you an example.

595
00:29:07.765 --> 00:29:12.345
You know, the te the, uh, test is done where RT TB

596
00:29:12.925 --> 00:29:15.585
and the new guy is, you know, on his phone

597
00:29:16.165 --> 00:29:18.185
or he is going for his lunch,

598
00:29:18.645 --> 00:29:21.665
and the old guy leans over says, testing's not done, man.

599
00:29:21.685 --> 00:29:24.345
You know, that airplane's still in the air, pay attention.

600
00:29:24.525 --> 00:29:26.305
You know, it's just that kind of stuff.

601
00:29:26.305 --> 00:29:30.065
Keeping bucking up that standard was really important.

602
00:29:30.565 --> 00:29:33.905
And, uh, that, that really made a difference.

603
00:29:36.135 --> 00:29:40.795
Um, drift. This is the chart he shows where you're trying

604
00:29:40.795 --> 00:29:44.085
to push against that unacceptable program delays

605
00:29:44.225 --> 00:29:47.125
and, uh, cost overruns, that sort of thing.

606
00:29:47.585 --> 00:29:52.005
Uh, there's another one that that's a little more, um,

607
00:29:53.445 --> 00:29:57.785
a little more tricky, and I call it institutional.

608
00:29:58.735 --> 00:30:02.465
This is a one like the challenger thing, normalization

609
00:30:02.485 --> 00:30:07.065
of deviance, complacency, hubris in an organization,

610
00:30:07.685 --> 00:30:10.705
you think you got it wired, you've done it so many times,

611
00:30:11.125 --> 00:30:14.065
and you had just let drop the ball big time.

612
00:30:14.495 --> 00:30:17.385
Kind of what I was showing you on the bonded blade tabs.

613
00:30:18.085 --> 00:30:20.785
We had been doing loads, testing a lot,

614
00:30:20.965 --> 00:30:22.505
and we got complacent.

615
00:30:23.285 --> 00:30:24.545
We made some assumptions,

616
00:30:24.885 --> 00:30:26.865
we didn't do our homework like we should have.

617
00:30:27.525 --> 00:30:32.405
You've, and, and when you get that surprise, like,

618
00:30:32.465 --> 00:30:35.245
uh, RJ said, take it as a warning, a warning

619
00:30:35.245 --> 00:30:38.125
that you're not exactly doing what you're supposed to do

620
00:30:38.145 --> 00:30:40.885
as a team, and you need to buck yourself up

621
00:30:41.105 --> 00:30:42.405

and, and fight this.

622
00:30:43.505 --> 00:30:47.165
So, some things to do that, I, I always hear people

623
00:30:47.825 --> 00:30:51.085
saying zero accident, uh, rate is a goal.

624
00:30:51.465 --> 00:30:54.645
Uh, um, it's, it's a goal,

625
00:30:54.645 --> 00:30:56.725
but it's not a metric, you know?

626
00:30:57.545 --> 00:31:01.645
Uh, so you have to have other metrics to monitor

627
00:31:02.395 --> 00:31:04.405
near misses, whatever you want to call it.

628
00:31:04.785 --> 00:31:09.445
Um, exceedances how many times you've stepped, uh,

629
00:31:09.445 --> 00:31:10.445
you've missed a process.

630
00:31:10.825 --> 00:31:14.285
Is a process faulty? And do we need to revisit it?

631
00:31:14.635 --> 00:31:17.245
Kind of track those kind of metrics to they're,

632
00:31:17.245 --> 00:31:19.805
they're a lot better for telling you whether you're doing

633
00:31:19.805 --> 00:31:24.205
your job right, audit processes, you know, getting

634
00:31:24.205 --> 00:31:27.725
that third party to come in and look at you.

635
00:31:28.505 --> 00:31:32.525
Um, you have a problem, an accident, uh,

636
00:31:32.905 --> 00:31:36.525
an incident have, uh, at, at bell we had this just,

637
00:31:36.555 --> 00:31:41.165
just culture investigation, which looked at the processes,

638
00:31:41.265 --> 00:31:44.005
the people not necessarily trying to target

639
00:31:44.585 --> 00:31:45.885
the individual involved,

640
00:31:45.885 --> 00:31:48.285
but figure out where we as a team screwed up.

641
00:31:49.025 --> 00:31:51.485
One of the things interesting about NTSB reports,

642
00:31:51.665 --> 00:31:54.125
if you look at 'em, they talk about the problem.

643
00:31:55.555 --> 00:31:58.885
They, even if they're, it's a flight test issue,

644
00:31:59.235 --> 00:32:00.365
they don't kind

645
00:32:00.365 --> 00:32:02.965
of rule on the flight test team whether they

646
00:32:02.965 --> 00:32:04.005
were doing it right or not.

647
00:32:04.715 --> 00:32:07.805
It's important to understand that the NTSB IST there

648
00:32:07.945 --> 00:32:10.645

as an audit agency for us flight testers.

649
00:32:10.665 --> 00:32:13.485
So when we have an accident, it's up to us,

650
00:32:14.105 --> 00:32:18.965
or to go back and do our own investigation

651
00:32:19.265 --> 00:32:23.005
and our own process of auditing what the heck we did wrong.

652
00:32:24.065 --> 00:32:26.685
And, uh, and you see that a lot, um,

653
00:32:30.355 --> 00:32:32.925
Leaders reflect the culture.

654
00:32:33.425 --> 00:32:36.325
Um, you need to kind of educate 'em on that.

655
00:32:36.825 --> 00:32:39.325
As testers, we need to kinda sometime nudge 'em

656
00:32:39.325 --> 00:32:41.725
and say, Hey, you need to, you need to support the team.

657
00:32:42.115 --> 00:32:45.805
It's what I mentioned early on today that, you know,

658
00:32:45.805 --> 00:32:46.925
there's, there's the head.

659
00:32:46.925 --> 00:32:48.605
That's that risk mitigation plan,

660
00:32:48.995 --> 00:32:50.885
then the hands putting all the right people

661
00:32:50.945 --> 00:32:52.125
in place to execute it.

662
00:32:52.585 --> 00:32:54.165
But the bottom line, you have to have a culture

663
00:32:54.165 --> 00:32:56.725
that supports the, those two things very well.

664
00:32:57.505 --> 00:33:01.365
So a culture that, um, endorses training,

665
00:33:02.215 --> 00:33:05.125
continuing, uh, education for their engineers,

666
00:33:05.835 --> 00:33:09.845
rewards those guys that are doing well, recognizes them, um,

667
00:33:10.665 --> 00:33:12.045
and holds 'em to a high standard

668
00:33:14.935 --> 00:33:16.125
Formalized procedures.

669
00:33:16.285 --> 00:33:18.285
This is the, the nuts and bolts.

670
00:33:18.865 --> 00:33:22.685
Uh, when I started on the team,

671
00:33:23.385 --> 00:33:28.245
we had some rudimentary procedures, mostly in test plans,

672
00:33:28.345 --> 00:33:30.245
and we did a lot of cut and paste in test plans.

673
00:33:31.145 --> 00:33:34.525
And that, as I stayed on the team for a while, I realized

674
00:33:34.755 --> 00:33:36.485
that we had through cut

675
00:33:36.485 --> 00:33:40.365

and paste drifted away from, uh,

676
00:33:41.075 --> 00:33:43.885
certain things, especially in, uh, it was

677
00:33:43.885 --> 00:33:45.765
during aero server elastic testing.

678
00:33:46.745 --> 00:33:48.485
We, we were tickling all these modes

679
00:33:48.545 --> 00:33:52.725
and we had the wrong criteria in place because it was a cut

680
00:33:52.925 --> 00:33:54.645
and paste from test plans years ago.

681
00:33:55.425 --> 00:33:58.485
And it was a test plan for a specific reason.

682
00:33:59.545 --> 00:34:02.925
So at that point, I, I took upon myself

683
00:34:02.945 --> 00:34:05.125
to start putting together a test guide

684
00:34:05.785 --> 00:34:08.125
and collecting all of the institutional knowledge

685
00:34:08.125 --> 00:34:10.685
of the team and putting it in there for a SC.

686
00:34:11.025 --> 00:34:12.685
So we wouldn't do that thing again.

687
00:34:13.265 --> 00:34:15.325
In the same vein, we did one for loads.

688
00:34:16.225 --> 00:34:19.485
Uh, so those kinda really ticklish things

689
00:34:19.635 --> 00:34:23.805
that you don't do often, uh, but you'll go back and revisit.

690
00:34:25.045 --> 00:34:27.565
I think you need to have a procedure and have guys training.

691
00:34:27.795 --> 00:34:31.005
Something unique that's going on in the V 22 team right now

692
00:34:31.105 --> 00:34:32.805
is they are actually putting a training

693
00:34:32.805 --> 00:34:34.405
program together for loads.

694
00:34:34.405 --> 00:34:35.805
They're not, they're in a period

695
00:34:35.805 --> 00:34:37.525
where they're not doing a whole lot of loads testing.

696
00:34:38.545 --> 00:34:41.965
So they've got a test plan with reduced limits,

697
00:34:42.625 --> 00:34:44.525
and they're going out and keeping the guys,

698
00:34:44.825 --> 00:34:46.765
the telemetry room and the pilots

699
00:34:47.315 --> 00:34:49.285
current on doing this loads testing

700
00:34:49.285 --> 00:34:51.805
because they know there's some coming their way

701
00:34:52.345 --> 00:34:53.605
and they don't want to be rusty.

702
00:34:53.605 --> 00:34:54.845

They wanna ramp up.

703
00:34:55.115 --> 00:34:56.925
There's risk to doing something like that.

704
00:34:57.425 --> 00:34:58.885
But I think they're managing well.

705
00:34:58.915 --> 00:35:00.485
It's, I think it's a great idea.

706
00:35:01.185 --> 00:35:02.925
Uh, they can afford to do it.

707
00:35:02.955 --> 00:35:06.605
Some places can't do that, but works good.

708
00:35:08.685 --> 00:35:09.805
Personal transition plans.

709
00:35:10.355 --> 00:35:12.765
Make sure when guys come in, you,

710
00:35:13.385 --> 00:35:16.045
you educate 'em on your culture, you know,

711
00:35:16.065 --> 00:35:17.325
the SOPs and all that.

712
00:35:17.325 --> 00:35:18.485
Of course we do that,

713
00:35:18.625 --> 00:35:22.485
but I think it's just as important to talk about culture,

714
00:35:23.305 --> 00:35:24.965
how we think is a test team.

715
00:35:25.865 --> 00:35:29.885
Um, on the V 22 team, we have Bell Boeing government,

716
00:35:29.985 --> 00:35:34.965
and one of the highest, uh, compliments I ever got was, uh,

717
00:35:35.245 --> 00:35:37.005
I think it was, uh, uh, one

718
00:35:37.085 --> 00:35:39.125
of the European guys test pos came in.

719
00:35:39.125 --> 00:35:40.685
He says, I can't tell who's who.

720
00:35:41.425 --> 00:35:43.565
And I'm like, that's exactly how it's supposed

721
00:35:43.565 --> 00:35:45.325
to work on an integrated team.

722
00:35:46.145 --> 00:35:49.245
He couldn't tell. And, uh, that was our culture.

723
00:35:49.315 --> 00:35:51.485
That still is. We lived by it.

724
00:35:52.025 --> 00:35:56.725
And, uh, then pauses,

725
00:35:56.725 --> 00:35:58.525
safety stand downs, things like this.

726
00:35:58.715 --> 00:36:00.765
Make sure the organization needs

727
00:36:00.765 --> 00:36:02.965
to make sure they send people to places like this.

728
00:36:04.105 --> 00:36:05.365
The lessons learned here

729
00:36:05.365 --> 00:36:07.805

and the things discussed have made it into

730
00:36:08.865 --> 00:36:10.405
my thinking, my presentations.

731
00:36:10.465 --> 00:36:13.445
And when I was a senior test test pilot on the,

732
00:36:13.665 --> 00:36:15.845
on the program, I made sure everybody heard

733
00:36:15.845 --> 00:36:17.285
it over and over.

734
00:36:18.145 --> 00:36:20.685
And, uh, so it's important to do that.

735
00:36:22.195 --> 00:36:25.205
Then last thing I recommend is drive engagement.

736
00:36:25.205 --> 00:36:27.045
This is from a, a book called Drive.

737
00:36:27.465 --> 00:36:29.245
Um, they were trying

738
00:36:29.245 --> 00:36:32.085
to figure out why certain organizations did really well

739
00:36:32.185 --> 00:36:35.765
and others didn't, and then came up with three things.

740
00:36:36.025 --> 00:36:37.885
And when I looked at those three

741
00:36:37.885 --> 00:36:39.165
things, it kind of made sense.

742
00:36:39.265 --> 00:36:41.725
It made sense for getting people

743
00:36:41.865 --> 00:36:43.565
to perform at their highest level.

744
00:36:44.385 --> 00:36:49.205
Um, you mastery, if you're recognized as being,

745
00:36:49.705 --> 00:36:52.245
uh, very proficient at your job,

746
00:36:52.245 --> 00:36:54.045
you're gonna just become more proficient.

747
00:36:54.505 --> 00:36:55.645
And, um,

748
00:36:56.305 --> 00:37:00.485
and if you encourage that, you, you get guys that are better

749
00:37:00.505 --> 00:37:02.125
and better, more engaged

750
00:37:02.705 --> 00:37:04.885
and want to share their vision with people.

751
00:37:06.045 --> 00:37:08.205
Autonomy, you gotta give your people a little bit of room

752
00:37:08.205 --> 00:37:11.525
to work on the things they think are important.

753
00:37:12.665 --> 00:37:16.445
Uh, when I became, uh, an associate tech fellow,

754
00:37:16.595 --> 00:37:17.965
they gave me a lot of autonomy,

755
00:37:18.105 --> 00:37:20.765
and that's when the test guides came out.

756
00:37:20.865 --> 00:37:23.925

That's when I had time to look at our problems,

757
00:37:24.435 --> 00:37:26.605
develop the test guides, go

758
00:37:26.665 --> 00:37:28.045
and talk to all the team members,

759
00:37:28.185 --> 00:37:32.605
and collect that into a, a coordinating document for us

760
00:37:32.665 --> 00:37:36.125
to execute on that autonomy really made a difference for me.

761
00:37:37.025 --> 00:37:40.325
And then purpose, you gotta sell a, sell a vision

762
00:37:41.385 --> 00:37:43.125
for your team that you're gonna,

763
00:37:43.305 --> 00:37:45.685
you're gonna perform at a high level all the time

764
00:37:45.745 --> 00:37:47.725
and a little bit of pride goes a long way.

765
00:37:49.585 --> 00:37:54.245
So that's it, that's my view of

766
00:37:54.385 --> 00:37:56.965
how to, what Beaker was talking about

767
00:37:57.065 --> 00:37:59.285
and how we executed on the V 22 team.

768
00:38:00.745 --> 00:38:03.165
Any questions anybody wanna add to that?

769
00:38:03.725 --> 00:38:07.405
I think we have, uh, are you gonna talk to NTSB now?

770
00:38:10.915 --> 00:38:15.205
Yeah, let's take the questions to the panel. So thank you.

771
00:38:29.615 --> 00:38:33.075
Thanks. That was great. Um, hopefully you all enjoyed that

772
00:38:33.135 --> 00:38:35.525
and had a good opportunity to get reset

773
00:38:35.525 --> 00:38:36.765
and the brilliance and the basics.

774
00:38:37.185 --> 00:38:40.845
The, um, obviously a lot of emphasis this morning on, hey,

775
00:38:40.845 --> 00:38:41.885
what would you wanna do as a startup?

776
00:38:42.025 --> 00:38:45.085
But I also wanna reaffirm that large organizations,

777
00:38:45.475 --> 00:38:47.445
institutional drift, easy

778
00:38:47.505 --> 00:38:49.645
to get buried in your own processes

779
00:38:49.645 --> 00:38:50.845
to completely forget the basics

780
00:38:51.225 --> 00:38:52.805
and get yourself into trouble that way.

781
00:38:52.805 --> 00:38:54.005
So it's just as applicable.

782
00:38:54.765 --> 00:38:56.765
I also hope that you take these conversations.

783
00:38:56.765 --> 00:38:58.005

We're gonna have a panel discussion shortly

784
00:38:58.345 --> 00:38:59.965
and we'll talk about it, but I want you to take

785
00:38:59.965 --> 00:39:01.445
that conversation to the lunch.

786
00:39:01.925 --> 00:39:03.045
I want you to take it to the bus.

787
00:39:03.285 --> 00:39:04.845
I want you to talk about it. We're in the tour

788
00:39:05.345 --> 00:39:07.765
and that's really the reason we want these workshops, right?

789
00:39:07.765 --> 00:39:09.205
That's why we don't just do a big zoom meeting.

790
00:39:09.505 --> 00:39:12.085
We want that interaction, that collaboration.

791
00:39:12.085 --> 00:39:14.405
So I really hope you have a chance to, uh, um,

792
00:39:14.835 --> 00:39:16.885
talk more about this in depth, both today

793
00:39:16.885 --> 00:39:18.645
and tomorrow during the other social

794
00:39:18.825 --> 00:39:20.245
and the networking opportunities.

795
00:39:20.505 --> 00:39:20.725
So.