Pilot Intervention Rating Scale
1
00:00:11.180 --> 00:00:14.820
All right. So on to the papers. I will say,

2
00:00:15.580 --> 00:00:19.580
talking about attendees and coming in and taking lessons learned back.

3
00:00:19.640 --> 00:00:22.720
At Bell, we do a yearly safety standdown.

4
00:00:22.820 --> 00:00:26.560
We get together, all flight operations, talk about safety for

5
00:00:27.740 --> 00:00:28.280
a day.

6
00:00:29.680 --> 00:00:33.240
This year, there happens to be four different flight

7
00:00:33.360 --> 00:00:36.960
test related conferences right here in the DFW

8
00:00:37.060 --> 00:00:40.900
area. And so this year I've asked every one of the folks at

9
00:00:40.920 --> 00:00:43.030
Bell to attend a conference

10
00:00:44.320 --> 00:00:47.120
like this, and that's why you'll see a lot of Bell folks here today.

11
00:00:47.129 --> 00:00:50.580
Attend a conference like this and then take those lessons and learn back.

12
00:00:50.660 --> 00:00:54.640
So we're kind of doing a safety standdown, but distributed through all
the

13
00:00:54.660 --> 00:00:58.220
different conferences that that flight test community

14
00:00:58.540 --> 00:00:59.780
does throughout the year. So

15
00:01:00.720 --> 00:01:04.681
glad we could host this year in the DFW area.

16
00:01:04.740 --> 00:01:08.220
It's a great place to come. Hopefully, you enjoy your dinner last night and went

17
00:01:08.260 --> 00:01:11.880
down to Cowtown or Flying Saucer or somewhere else.

18
00:01:12.640 --> 00:01:15.560
So first paper today is Buck Joslin.

19
00:01:15.620 --> 00:01:18.720
So there's two doctors that are presenting today.

20
00:01:19.440 --> 00:01:22.860
You know they're doctors because they have the longest titles in their

21
00:01:22.960 --> 00:01:23.440
papers.

22
00:01:25.500 --> 00:01:28.840
I knew Buck when he was not a doctor. He was just Buck.

23
00:01:29.780 --> 00:01:33.460
And then since I've known him working at Pax River, he's

24
00:01:33.540 --> 00:01:35.760
moved on and got his

25
00:01:36.620 --> 00:01:40.560
PhD and then went to the FAA. If you look in his resume, he was

26
00:01:40.640 --> 00:01:43.440
chief scientist at FAA. That's pretty impressive.

27
00:01:43.980 --> 00:01:45.880
Now he's a professor at Embry-Riddle.

28
00:01:46.360 --> 00:01:46.620
And

29
00:01:48.000 --> 00:01:49.390
Buck's one of those guys that has

30
00:01:50.460 --> 00:01:51.660
come out of the flight test community.

31
00:01:51.690 --> 00:01:55.660
He's been thinking a lot about how to make flight test safety better, how

32
00:01:55.700 --> 00:01:59.630
to make us better as a community. So I'm interested to see what Buck has
to

33
00:02:00.080 --> 00:02:01.580
talk to us about today. Thank you.

34
00:02:12.810 --> 00:02:15.980
Thanks, Tom. I'll send you a prescription later on there if need be.

35
00:02:16.720 --> 00:02:17.820
Okay. So

36
00:02:18.920 --> 00:02:21.930
I'm the leadoff hitter today, which is kind of a first for me because I
never was a

37
00:02:21.980 --> 00:02:25.800
good ball player, so they put me halfway in the order there to minimize
the damage.

38
00:02:25.840 --> 00:02:29.340
But today I'd like to discuss Pilot Intervention Rating Scale for

39
00:02:29.360 --> 00:02:33.000
identifying and categorizing pilot contributions to aviation

40
00:02:33.100 --> 00:02:36.680
safety. So the first thing we need to do is define what a pilot

41
00:02:36.720 --> 00:02:39.950
intervention is, and within that pilot intervention, there are some other

42
00:02:39.980 --> 00:02:43.600
definitions. So it's actions taken to mitigate a threat, right, in order to

43
00:02:43.620 --> 00:02:47.300
maintain safety margins, such as interrupting the performance of an automated task

44
00:02:48.180 --> 00:02:51.910
or an undesired aircraft state, or when encountering uncertain environments and

45
00:02:51.960 --> 00:02:55.750
unforeseen situations. Which dovetails nicely into what Chia was talking about,

46
00:02:55.810 --> 00:02:59.380
about the human element in all this thing, and we're going to get into the LLMs

47
00:02:59.420 --> 00:03:03.020
here shortly. So first definition, uncertain

48
00:03:03.080 --> 00:03:06.940
environment. Well, it's where there's a lack of information, uncertainty

49
00:03:07.040 --> 00:03:10.730
about both the probability and consequences, derived from a French Air and Space

50
00:03:10.840 --> 00:03:14.140
Academy document on dealing with unforeseen

51
00:03:14.180 --> 00:03:17.880
situations. An unforeseeable situation, I'll defer to the

52
00:03:17.960 --> 00:03:21.480
JDs here, the legal folks here on the definition of reasonably

53
00:03:21.520 --> 00:03:24.890
expected, but it's something that cannot be reasonably expected or

54
00:03:24.940 --> 00:03:27.000
anticipated or known beforehand.

55
00:03:27.060 --> 00:03:27.350
And I have

56
00:03:28.480 --> 00:03:31.300
one legal definition on the bottom there.

57
00:03:31.340 --> 00:03:35.180
So the other definition there is a threat, and there's a lot of definitions of

58
00:03:35.200 --> 00:03:37.860
threat out there. This was derived from two

59
00:03:38.840 --> 00:03:42.400
references up there, the "Risk Management Handbook" from the FAA and also from the

60
00:03:42.520 --> 00:03:44.950
FAA Advisory Circular and Line Operations Safety Audits.

61
00:03:45.350 --> 00:03:48.760
It's an event that occurs outside the influence of flight crew, but then

62
00:03:48.800 --> 00:03:52.620
requires crew attention and management in order to maintain safety

63
00:03:52.680 --> 00:03:56.260
margins. And finally, an undesired aircraft state, once again, a condition,

64
00:03:56.320 --> 00:03:59.780

position, or something else that reduces safety margins, therefore

65
00:03:59.840 --> 00:04:02.920
compromising safety. So we've got that out of the way.

66
00:04:03.460 --> 00:04:07.310
So the problem statement, first of all, in the context of operational scenarios, is

67
00:04:07.380 --> 00:04:10.960
that if you look at the current safety reporting systems such as Human Factors

68
00:04:11.000 --> 00:04:14.930
Analysis Classification System, Threat Error Management Model, and others,

69
00:04:15.640 --> 00:04:18.579
as well as press releases, they always focus on pilot error.

70
00:04:20.221 --> 00:04:24.120
Okay. And other than those few high-profile ones, and then we make movies

71
00:04:24.200 --> 00:04:27.620
out of them. However, we don't have a formal way of

72
00:04:27.740 --> 00:04:31.440
capturing those and disseminate the positive pilot performance, that

73
00:04:31.500 --> 00:04:35.280
pilot resilience. We do it here and there in free-form comments, but there's no

74
00:04:35.500 --> 00:04:37.640
formal way in order to capture those things.

75
00:04:37.920 --> 00:04:40.850
There's a quotation there at the bottom there from the Commercial Aviation Safety

76
00:04:40.940 --> 00:04:42.640
Team that says that, "Hey, guess what?

77
00:04:42.660 --> 00:04:46.560
The safety system relies on that pilot intervention to maintain safety."

78
00:04:47.420 --> 00:04:50.120
Those are those two movies, right? What do they rely on?

79
00:04:50.560 --> 00:04:52.450
Practical intelligence, judgment, creativity.

80
00:04:52.520 --> 00:04:56.320
Because in both cases, there was no explicit emergency procedure, hadn't happened

81
00:04:56.360 --> 00:04:59.020
before, so the AI wouldn't have learned it yet, right?

82
00:04:59.560 --> 00:05:02.620
The Miracle on the Hudson, right? The engine failure, climbing out in just a flock

83
00:05:02.660 --> 00:05:05.560
of geese, low altitude, the engine failure, ditch in the Hudson.

84
00:05:06.460 --> 00:05:08.380
No fatalities, no serious injuries.

85
00:05:08.700 --> 00:05:12.540
The practical intelligence, judgment, and creativity of that human made that

86
00:05:12.550 --> 00:05:15.410
possible. The other one is the Sioux City miracle, right?

87
00:05:15.840 --> 00:05:19.190
That's the one they lost all hydraulics, ended up flying back with asymmetrical

88
00:05:19.260 --> 00:05:22.800
thrust, made it back to the airport environment, and

89

00:05:23.420 --> 00:05:27.310
of course, they landed. However, over half the folks survived that

90
00:05:27.440 --> 00:05:30.680
mishap. The practical intelligence, judgment, creativity, have I said that enough,

91
00:05:31.060 --> 00:05:33.380
of that human element made that happen.

92
00:05:35.200 --> 00:05:38.600
So this is just for the review, right? Human factors, HFACTS, right?

93
00:05:38.700 --> 00:05:42.480
If you look at the different categories and the levels of human failure, what does

94
00:05:42.500 --> 00:05:43.440
it say? Error.

95
00:05:44.540 --> 00:05:47.520
Failed. Error. That's what the focus is on. Okay.

96
00:05:48.160 --> 00:05:51.888
Same thing with the Threat Error Management Model.And this is derived in the case

97
00:05:51.908 --> 00:05:55.468
from the Line Operations Safety Audit Advisory Circular. What does it focus on?

98
00:05:55.688 --> 00:05:56.688
Errors. Failed to

99
00:05:57.968 --> 00:06:01.188
do a takeoff checklist. Failed the rejected takeoff.

100
00:06:01.548 --> 00:06:03.088
Didn't do this. It's all error.

101
00:06:03.988 --> 00:06:07.118

Once again, there are those provisions where you can put a free-form comment in

102
00:06:07.128 --> 00:06:10.908
there, but there's no standardized way to capture those, so you can aggregate

103
00:06:10.928 --> 00:06:14.758
those to a homogenous data set and then use those data for lessons learned,

104
00:06:15.168 --> 00:06:18.448
and as I'll suggest later on, plugging those things back

105
00:06:18.508 --> 00:06:22.288
into both the new and improved safety database, safety significant event

106
00:06:22.348 --> 00:06:25.548
reports, and move those lessons forward.

107
00:06:26.508 --> 00:06:30.448
So in the context of flight tests, as I alluded to, and

108
00:06:30.488 --> 00:06:32.328
I'm not going to attempt to define artificial intelligence.

109
00:06:32.468 --> 00:06:35.788
There's many definitions, as there are people in this room and probably in the

110
00:06:35.868 --> 00:06:37.048
world as well as machine learning.

111
00:06:37.108 --> 00:06:39.568
I have one at the bottom there that is actually codified or codified

112
00:06:40.648 --> 00:06:42.468
in an act

113
00:06:43.868 --> 00:06:47.838
in the United States. However, artificial intelligence,

114
00:06:48.028 --> 00:06:51.388
as you all have already-- and I know you can't disclose it here, but people are

115
00:06:51.398 --> 00:06:54.028
dabbling in it. We're going to see it in certification flight tests, where you're

116
00:06:54.048 --> 00:06:57.388
going to have to certify a system that has

117
00:06:57.728 --> 00:07:01.288
some aspect of AI, whatever that is, or machine learning or

118
00:07:01.348 --> 00:07:05.128
complements thereof. But we don't have a formal way of--

119
00:07:05.148 --> 00:07:08.968
and the expectation is, of course, that system, which is artificial

120
00:07:09.008 --> 00:07:12.928
intelligence or LLM-related things with machine learning, has to provide

121
00:07:12.948 --> 00:07:16.888
an equivalent, and I call it equivalent or better level of safety to that of

122
00:07:16.928 --> 00:07:20.768
a human. That's why it's being done, right? I call it EBLOS, but instead of ELOS.

123
00:07:21.708 --> 00:07:25.588
But there's no formal, once again, standardized method for capturing this

124
00:07:25.608 --> 00:07:29.528
thing. And flight testers, when you all have to intervene, okay, well,

125
00:07:29.568 --> 00:07:32.468
how do we document it? "Well, okay, we had to talk at the bar," or whatever else.

126

00:07:32.548 --> 00:07:35.148
I put a little comment on this SSE or wherever.

127
00:07:35.648 --> 00:07:39.368
I'm trying to make a new THA or add to the THA, but there's no formal way to do

128
00:07:39.408 --> 00:07:40.208
it as of yet.

129
00:07:41.468 --> 00:07:45.178
So the purpose of this study was to, as you can read up there, test, evaluate, and

130
00:07:45.248 --> 00:07:49.008
contribute to the validation of the utility of a pilot

131
00:07:49.088 --> 00:07:52.858
intervention rating scale, which I'll call PIRS from here on out, for identifying

132
00:07:52.908 --> 00:07:55.208
and categorizing those pilot interventions.

133
00:07:55.748 --> 00:07:59.448
And this was done through an analysis of the

134
00:07:59.627 --> 00:08:03.388
voluntary reports submitted to the NASA FAA Aviation Safety Reporting

135
00:08:03.468 --> 00:08:03.678
System.

136
00:08:04.748 --> 00:08:08.318
Not privy to, obviously, that information for actual flight tests, right?

137
00:08:08.318 --> 00:08:12.228
A lot of those are proprietary, or it's not de-identified, so this was an easy

138
00:08:12.288 --> 00:08:15.758
access way to get to it. Aviation Safety Reporting System reports.

139
00:08:16.028 --> 00:08:18.828
There's a preview of the PIRS right there in the middle there.

140
00:08:19.828 --> 00:08:23.148
So the research question was, you know, it's academia, I have to have a research

141
00:08:23.188 --> 00:08:23.458
question.

142
00:08:24.328 --> 00:08:27.818
Can a pilot intervention rating scale identify and categorize scenarios and

143
00:08:27.868 --> 00:08:31.588
undesired aircraft states where automated systems, uncertain environments,

144
00:08:31.748 --> 00:08:35.509
and unforeseeable situations have required pilot

145
00:08:35.568 --> 00:08:36.228
interventions?

146
00:08:39.749 --> 00:08:43.389
The significance is, once again, if we can identify those interventions,

147
00:08:43.788 --> 00:08:46.508
we can say, okay, this is where the technology needs to be improved.

148
00:08:46.548 --> 00:08:48.728
We have to do something about this. Okay, we need to get that.

149
00:08:48.768 --> 00:08:51.678
There's the learned part and the learning part, right, of artificial intelligence,

150
00:08:51.768 --> 00:08:55.128
the deterministic part, and then the probabilistic part where it's learning.

151
00:08:55.888 --> 00:08:58.308
Identify what we have to do for those technologies.

152
00:08:58.388 --> 00:09:02.178
Why do we have the pilot intervention? And also, hey, I'll be straight up.

153
00:09:02.608 --> 00:09:04.748
Identify those functions and tasks where you know what?

154
00:09:04.788 --> 00:09:08.528
We still need the carbon-based unit to be in the loop on this thing.

155
00:09:08.608 --> 00:09:10.188
And are we ever going to get beyond that?

156
00:09:10.248 --> 00:09:12.708
Well, I don't know, and I have a notional curve.

157
00:09:14.008 --> 00:09:17.908
The limitations, as I mentioned earlier, was that since I was not privy

158
00:09:17.988 --> 00:09:20.668
to flight test reports, right? Proprietary stuff.

159
00:09:21.088 --> 00:09:24.848
That's why the Aviation Safety Reporting System voluntary reports were

160
00:09:24.868 --> 00:09:28.228
considered a suitable and reasonable surrogate.

161
00:09:29.748 --> 00:09:30.388
The assumptions,

162
00:09:31.348 --> 00:09:35.288
once again, as I mentioned, it was assumed the NASA ASRS reports were a surrogate

163
00:09:35.388 --> 00:09:36.808
for actual flight test reports

164
00:09:37.688 --> 00:09:40.448
in terms of what happened, in terms of the uncertain environment, unforeseeable

165
00:09:40.528 --> 00:09:43.528
situation, pilot intervention, and that they were

166
00:09:44.128 --> 00:09:47.448
truthful. When you write those reports, it's assumed that the person that wrote

167
00:09:47.488 --> 00:09:48.827
them was truthful in what they saw.

168
00:09:50.628 --> 00:09:54.448
Additional limitations. The ASRS reports don't really undergo any

169
00:09:54.528 --> 00:09:57.368
scrutiny. Some of you, hopefully everybody, has submitted one somewhere along the

170
00:09:57.408 --> 00:10:00.068
line, and other countries have the equivalents under different names.

171
00:10:00.988 --> 00:10:02.668
The same type of voluntary reporting system.

172
00:10:03.108 --> 00:10:06.888
But the accuracy is not verified. They'll do some administrative stuff or whatever,

173
00:10:06.948 --> 00:10:09.788
but it's not, "Okay, wait, we're going to find out, did that really happen?" No, it

174
00:10:09.808 --> 00:10:13.768
doesn't go that deep. And of course, they're subject to whoever's writing it,

175
00:10:13.888 --> 00:10:16.948
right? My own biases, whether it's because of my organization,

176
00:10:17.828 --> 00:10:21.698
where I did it, some previous experience I had or didn't have,

177
00:10:22.068 --> 00:10:25.928
or the atmospheric conditions, they all can affect the accuracy of the report.

178
00:10:27.548 --> 00:10:31.008
So the delimitations, those are things that you as a researcher

179
00:10:31.048 --> 00:10:34.278
impose on the study. Okay. So by choice,

180
00:10:34.368 --> 00:10:37.948
right? So in short, keep this to a manageable size and

181
00:10:38.048 --> 00:10:42.028
also to avoid the contextual errors that Chia alluded to that we can

182
00:10:42.088 --> 00:10:45.668
have with LLMs and AI. The keywords

183
00:10:45.848 --> 00:10:49.548
automation and intervention and derivatives thereof, automated,

184
00:10:49.588 --> 00:10:52.698
intervene, whatever, was used for the text mining.

185
00:10:54.288 --> 00:10:58.057
The pilot interventions did not include these four things,

186
00:10:58.108 --> 00:11:01.888
and I heard that Eric hijacked a video that I think I showed at FAA

187
00:11:01.988 --> 00:11:05.148
Flight Test Safety a decade ago, but I might run it again.

188
00:11:05.568 --> 00:11:08.008
The first one is pilot action to mitigate one's own error.

189

00:11:08.028 --> 00:11:10.328
Okay, I screwed up, and I'm going to fix it.

190
00:11:10.788 --> 00:11:14.508
So those weren't included. The other one is, hey, you screwed up.

191
00:11:15.728 --> 00:11:17.808
I got it. Those weren't included.

192
00:11:18.768 --> 00:11:22.498
The other thing is, okay, ATC says, "Hey, turn right, descend to 2,000,"

193
00:11:22.888 --> 00:11:23.648
and you say, "No.

194
00:11:25.428 --> 00:11:28.288
There's a mountain there. I'm not going to do it." And finally, it's like, okay,

195
00:11:28.408 --> 00:11:30.808
ATC says, so this is ATC to pilot intervention.

196
00:11:31.208 --> 00:11:33.528
Like, "Hey, I told you to climb to five, you're going through seven.

197
00:11:34.368 --> 00:11:37.948
Come back down and call this number when you land." Okay, those were not included.

198
00:11:39.368 --> 00:11:42.148
So pilot intervention, I'm going to run this again because I put it in there, but

199
00:11:42.988 --> 00:11:44.668
you have to send me a check here, Eric.

200
00:11:45.228 --> 00:11:47.768
This is an example of a pilot-to-pilot intervention, maybe.

201
00:11:49.028 --> 00:11:49.807
You saw this already.

202
00:11:53.632 --> 00:11:55.512
Check your final positions. I'm going to take her down.

203
00:11:55.672 --> 00:11:58.672
Wait a few more minutes, Captain. Do as I say. It looks like- Do as I say.

204
00:11:58.832 --> 00:11:59.752
Give him a few more minutes.

205
00:11:59.792 --> 00:12:01.952
I've already waited too long. Here we go.

206
00:12:02.812 --> 00:12:06.572
No, we don't. Get a hold of yourself, you yellow.

207
00:12:07.232 --> 00:12:10.892
Okay. It's kind of like your FAM-1 at the test pilot course, where you had three

208
00:12:10.932 --> 00:12:13.212
hours of ground school, and you jump in there with the instructor, and they say,

209
00:12:13.262 --> 00:12:13.952
"Okay, have at it."

210
00:12:15.112 --> 00:12:17.992
Anyway, but the pedigree of this Pilot Intervention Rating Scale

211
00:12:19.132 --> 00:12:22.672
starts out with the Cooper-Harper Rating Scale, Hannan-Qualley's rating scale.

212
00:12:22.732 --> 00:12:24.752
Everybody here is intimately familiar with that, right?

213
00:12:25.152 --> 00:12:28.422
It's intended to give you a, quote, "numerical rating"

214
00:12:29.192 --> 00:12:32.572

based upon your ability to perform with the certain-- whatever the

215
00:12:33.192 --> 00:12:37.032
pilot compensation is, acceptable or otherwise, with adequate

216
00:12:37.092 --> 00:12:40.852
or desired performance, right? There's two parts to the HQRS scale, and it

217
00:12:40.912 --> 00:12:42.232
starts in the lower left-hand corner.

218
00:12:42.872 --> 00:12:46.162
Simple flow diagram, dichotomous choices, yes/no, right?

219
00:12:46.532 --> 00:12:49.272
Yes/no will lead you up to one of those three levels, level one, level two, level

220
00:12:49.372 --> 00:12:51.952
three, and you end up with a score. So you have a score, great.

221
00:12:51.982 --> 00:12:55.492
You can compare things. You can compare one pilot versus another.

222
00:12:55.552 --> 00:12:58.652
You can compare one aircraft to another aircraft.

223
00:12:59.392 --> 00:13:02.632
Easy to use, made for Marines and former Marines.

224
00:13:04.592 --> 00:13:07.932
From that, about a decade later, the Bedford Pilot Workbook Scale was developed,

225
00:13:08.032 --> 00:13:11.932
right? This is to see how much excess capacity do you

226
00:13:11.972 --> 00:13:12.252
have

227

00:13:13.232 --> 00:13:14.972
when you're performing a required function.

228
00:13:15.112 --> 00:13:18.562
Like, "Hey, I can get this done," but the aircraft's on fire, I'm nearly running

229
00:13:18.572 --> 00:13:22.482
into a mountain. Well, then that's not good. Okay. Same idea.

230
00:13:22.762 --> 00:13:25.192
Simple flow diagram, lower left-hand corner.

231
00:13:25.272 --> 00:13:28.972
Yes/no questions leads you to two levels, so to

232
00:13:29.072 --> 00:13:32.932
speak, numerical scores. Okay. And as I mentioned, you can compare

233
00:13:32.972 --> 00:13:36.312
things. This is an example. I don't know what the system is from an Army report,

234
00:13:37.332 --> 00:13:40.552
our sister service. And you can see, you can just compare the scores. Okay.

235
00:13:40.612 --> 00:13:42.012
That's very easily done.

236
00:13:45.402 --> 00:13:48.112
So from that, the Pilot Intervention Rating Scale was developed.

237
00:13:49.052 --> 00:13:51.352
Looks a lot like the other ones, right? Same idea.

238
00:13:52.192 --> 00:13:56.052
As a former Marine, I have no original thought, so use the same one and just

239
00:13:56.112 --> 00:13:58.112
change some of the letters on there. Okay.

240
00:13:58.212 --> 00:14:01.072
Start lower left-hand corner, numerical categorization.

241
00:14:01.112 --> 00:14:04.992
The idea is, okay, the pilot had to intervene, but at the

242
00:14:05.032 --> 00:14:05.532
bottom there,

243
00:14:08.172 --> 00:14:10.572
what was the level of pilot compensation?

244
00:14:10.612 --> 00:14:13.252
Was it to avoid something that was a normal kind of a condition?

245
00:14:13.292 --> 00:14:16.982
Was it to avoid what would end up in an abnormal condition or an
emergency

246
00:14:17.052 --> 00:14:19.472
condition? So you have those three levels as you go up.

247
00:14:20.112 --> 00:14:22.292
Yes/no questions leads you all the way through that.

248
00:14:22.512 --> 00:14:24.372
So there's even scores and odd scores.

249
00:14:24.772 --> 00:14:28.412
So the intervention, if it was, let's say, for an emergency

250
00:14:28.452 --> 00:14:32.092
condition, and I used the procedure straight out of

251
00:14:32.152 --> 00:14:36.132
the quick reference handbook, pocket checklist, dash

252
00:14:36.252 --> 00:14:39.012
one, dash 10, whatever you're using, okay?

253
00:14:39.452 --> 00:14:41.072
Straight up, I used it, it was great.

254
00:14:41.352 --> 00:14:45.281
But no, I had to adjust it a little bit. I had to make an ad hoc procedure.

255
00:14:45.352 --> 00:14:47.672
I didn't follow that exact procedure. Maybe I switched steps.

256
00:14:47.992 --> 00:14:50.832
So that's the difference between the odd and the even scores.

257
00:14:50.892 --> 00:14:52.311
But you end up with a numerical rating.

258
00:14:52.572 --> 00:14:55.972
It's not time and labor intensive, just like all the Newark cards we currently use.

259
00:14:56.052 --> 00:14:59.512
If it's for the Hannan-Qualley Rating Scale or the Bedford,

260
00:14:59.972 --> 00:15:02.912
simple. They can be understood by those with limited expertise.

261
00:15:03.232 --> 00:15:06.552
Hey, this high number is good or a high number is bad, and the low number is the

262
00:15:06.572 --> 00:15:08.612
other way around. Very simple to be understood.

263
00:15:09.072 --> 00:15:10.852
Decision tree, easy to use on the flight deck.

264
00:15:11.172 --> 00:15:14.032
I have objective criteria in the end game, right, because you end up with a score,

265
00:15:14.452 --> 00:15:17.662

not a narrative where I say, "Well, you said this, and I said that.

266
00:15:17.712 --> 00:15:20.552
Are we saying the same thing?" No. A five is a five is a five.

267
00:15:20.712 --> 00:15:22.752
A four is a four. That's it. That's what you have.

268
00:15:23.402 --> 00:15:24.452
And like they say,

269
00:15:25.552 --> 00:15:29.132
real men who have a hard time committing always say, "Well, it's a 4.5."
No, you

270
00:15:29.172 --> 00:15:32.712
got to go with the one score. Four or five, you can't dance around.

271
00:15:32.752 --> 00:15:36.552
Full scores only. And it's a measurement tool for pilot resilience,

272
00:15:36.752 --> 00:15:38.592
as I beat up the microphone here.

273
00:15:39.552 --> 00:15:41.552
Yeah, they told me I had to stay right here. Don't move.

274
00:15:41.602 --> 00:15:44.052
So I have to move my hands instead of my body.

275
00:15:44.092 --> 00:15:45.412
So there's a definition of resilience.

276
00:15:45.452 --> 00:15:48.392
There's a million down there, a million different definitions.

277
00:15:48.412 --> 00:15:51.652
But it says, "Ability to sustain required operations under both

278
00:15:51.712 --> 00:15:55.552
expected and unexpected conditions." And that's really the

279
00:15:55.592 --> 00:15:59.152
bottom line, right? That kind of distinguish us between

280
00:15:59.192 --> 00:16:03.132
the use of artificial intelligence and certification, and how we handle it,

281
00:16:03.212 --> 00:16:04.712
and the way we do it now.

282
00:16:05.832 --> 00:16:08.552
So I kind of alluded to this before, emergency condition, right?

283
00:16:08.672 --> 00:16:12.392
Everybody knows this, right, from whatever kind of Part 23, 25,

284
00:16:12.512 --> 00:16:15.432
27, 29, or the equivalent military aircraft.

285
00:16:15.872 --> 00:16:19.152
Immediate awareness, immediate intervention, fight for emergency.

286
00:16:19.712 --> 00:16:22.622
Abnormal, immediate awareness, subsequent pilot intervention, and finally, the

287
00:16:22.672 --> 00:16:24.932
normal is pilot awareness impossible.

288
00:16:26.692 --> 00:16:30.672
So the top level per scoring rules, if the pilot had to

289
00:16:30.682 --> 00:16:34.612
intervene for any reason at all during a critical phase of flight, and if you

290
00:16:34.652 --> 00:16:38.582
look at the extent literature and general agreement is that, hey, the critical

291

00:16:38.672 --> 00:16:39.362
phases of flight,

292
00:16:40.552 --> 00:16:43.152
take-off and departure, approach and landing.

293
00:16:43.632 --> 00:16:47.452
If you had to intervene then, it's considered critical phase of flight, and even if

294
00:16:47.592 --> 00:16:50.842
what you did was something that, hey, it's not a big deal, as we'll see in the

295
00:16:50.932 --> 00:16:54.332
example, it was just a simple maneuver, but it was in a critical phase of flight.

296
00:16:54.372 --> 00:16:57.892
If you have to do a simple maneuver at 50 feet above the deck, not that that ever

297
00:16:57.932 --> 00:17:01.662
happens, right? That United flight yesterday or two days

298
00:17:01.672 --> 00:17:04.732
ago. Then it's a critical phase of flight, right?

299
00:17:05.652 --> 00:17:08.962
So anything involving a collision, whether it's to terrain, obstacles,

300
00:17:09.492 --> 00:17:11.472
geese, not that that ever happens, right?

301
00:17:11.932 --> 00:17:15.613
That would drive it to the high level per score or an unusual attitude.

302
00:17:18.652 --> 00:17:22.333
So the methodology, once again, was they looked at reports

303
00:17:22.353 --> 00:17:24.093
submitted to the Aviation Safety Reporting system.

304
00:17:24.113 --> 00:17:28.002
It's been around since the '70s, went online in the '80s, and when you

305
00:17:28.032 --> 00:17:31.832
plug this in, ended up with 139 hits

306
00:17:31.842 --> 00:17:35.502
using those keywords, automation, intervention, and derivatives

307
00:17:35.652 --> 00:17:39.442
thereof. However, when you drill down there and look at them, and

308
00:17:39.472 --> 00:17:42.292
this gets into the whole contextual thing, it says, yeah, the pilot had to

309
00:17:42.372 --> 00:17:45.712
intervene because there was a problem with a passenger in the

310
00:17:45.812 --> 00:17:48.992
back with the automated coffee maker or something.

311
00:17:49.352 --> 00:17:52.732
So in other words, this contextual thing, and I'm exaggerating a little bit, you

312
00:17:52.752 --> 00:17:55.832
got to read them. You got to read them because you take it out of context,

313
00:17:55.892 --> 00:17:57.592
especially when you have a specialized field.

314
00:17:58.132 --> 00:18:01.998
And anyway, and I find that in academia it's aA huge

315
00:18:02.088 --> 00:18:05.668
problem now, I call it the student ALOC, artificial

316
00:18:05.688 --> 00:18:07.868

intelligence loss of critical thinking.

317
00:18:07.968 --> 00:18:09.968
It's out of control,

318
00:18:11.188 --> 00:18:13.708
and it's a challenge. But anyway, I digress.

319
00:18:14.328 --> 00:18:16.268
I'll bring it up at the faculty meeting next week, and whatever.

320
00:18:17.268 --> 00:18:20.968
So then it was applied to each and every one of these reports, and a score was

321
00:18:21.008 --> 00:18:24.408
assigned. So this is an excerpt, an example of one of the reports,

322
00:18:24.908 --> 00:18:27.588
and it has a PR of five. Okay, why is that?

323
00:18:28.048 --> 00:18:30.988
Well, it says, "Hey," the flight director guidance says, "Hey, you're on and on."

324
00:18:31.368 --> 00:18:35.348
And guess what? I had to intervene so I wouldn't miss the

325
00:18:35.428 --> 00:18:37.908
runway entirely. Critical phase of flight.

326
00:18:37.988 --> 00:18:40.528
Yeah, it jinked to the left or right or whatever it was.

327
00:18:40.557 --> 00:18:43.188
I'd have to look at the report. Is it a normal maneuver?

328
00:18:43.298 --> 00:18:45.968
Well, maybe not down that low because you could hit a truck or something, right?

329

00:18:46.408 --> 00:18:48.048
But anyway, there you have it.

330
00:18:50.508 --> 00:18:54.188
This is the universe of the reports. I know it's an eye chart.

331
00:18:54.948 --> 00:18:58.908
Hey, really did collect the data just to make this up. Made up a little bit of it.

332
00:18:59.228 --> 00:18:59.528
Anyway,

333
00:19:00.628 --> 00:19:04.538
so the excerpts are there. All the ACN, the report numbers are there as well, and

334
00:19:04.538 --> 00:19:08.068
distilled it down that far. When you actually put in the context, put in that human

335
00:19:08.148 --> 00:19:10.428
element, it's like, "Hey, wait a second. What does that really mean?

336
00:19:10.788 --> 00:19:14.548
What would this LLM pull from it?" This is just an example of a

337
00:19:14.608 --> 00:19:14.988
couple,

338
00:19:15.848 --> 00:19:16.768
and once again, they're excerpts.

339
00:19:16.808 --> 00:19:18.948
We talked about the first one, or I talked about the first one.

340
00:19:19.308 --> 00:19:22.168
The next one is an airspeed deviation. It has a one.

341
00:19:22.228 --> 00:19:25.048
Well, okay, but what's the issue with that?

342
00:19:25.088 --> 00:19:28.968
Well, it says, okay, it went up to 270 knots at 7,000 feet.

343
00:19:29.028 --> 00:19:32.468
Okay, and it weren't configured or anything like that.

344
00:19:32.528 --> 00:19:34.708
So is that VMO? Is there an issue there?

345
00:19:35.348 --> 00:19:35.528
Well,

346
00:19:36.548 --> 00:19:36.948
what happened?

347
00:19:38.068 --> 00:19:39.288
7,000 feet, 270.

348
00:19:40.688 --> 00:19:43.948
At least in the US of America, 250 and below.

349
00:19:44.348 --> 00:19:47.968
So you got to intervene to do something there to avoid that flight violation.

350
00:19:49.168 --> 00:19:52.248
The next one actually also has an airspeed deviation, but it's a

351
00:19:52.288 --> 00:19:55.908
three. And why is that? Well, it says it would overspeed

352
00:19:55.928 --> 00:19:58.688
without pilot intervention. It would overspeed, and I'd have to look and see what

353
00:19:58.728 --> 00:19:58.828
the

354
00:19:59.768 --> 00:20:01.728
conditions were, but it was up and away.

355
00:20:01.848 --> 00:20:05.808
And whether it's a maneuvering speed limitation, whatever, they

356
00:20:05.848 --> 00:20:07.528
had to intervene to avoid the

357
00:20:09.908 --> 00:20:13.608
overspeed in this case. But a non-critical phase of flight drove it to a

358
00:20:13.648 --> 00:20:15.168
three instead of the one.

359
00:20:17.488 --> 00:20:19.288
So in the aggregate, this was the breakdown.

360
00:20:20.888 --> 00:20:21.578
Obviously, in

361
00:20:22.388 --> 00:20:24.948
more rigorous research, you'd have a larger data set,

362
00:20:26.028 --> 00:20:28.108
but then you want a valid data set as well.

363
00:20:28.228 --> 00:20:31.788
There's a lot of them that are not valid, doesn't do you any good at all.

364
00:20:31.808 --> 00:20:34.468
But that was the breakdown in terms of the number, but kind of an even
split

365
00:20:34.488 --> 00:20:36.168
between emergency and normal interventions.

366
00:20:36.208 --> 00:20:40.048
The pilot had to intervene to avoid a condition

367
00:20:40.388 --> 00:20:44.248
in terms of damage to the aircraft or injury to people in emergency,

368

00:20:44.308 --> 00:20:45.268
normal, or abnormal.

369
00:20:47.288 --> 00:20:50.728
So they were all findings. Once again, there was a whole range of PER scores from

370
00:20:50.808 --> 00:20:52.888
one all the way up to five in this case.

371
00:20:53.788 --> 00:20:57.528
Specifically, they found gaps in the automated systems.

372
00:20:58.188 --> 00:21:01.508
I didn't use the AI word because none of these were written in that context at the

373
00:21:01.568 --> 00:21:01.888
time.

374
00:21:03.308 --> 00:21:07.068
If you look at those reports, there's one that starts in the '80s, and then the

375
00:21:07.928 --> 00:21:11.648
last one was all the way up in 2024 that I got hit on for the

376
00:21:12.608 --> 00:21:14.048
text mining. Anyway,

377
00:21:15.008 --> 00:21:18.928
inability to-- deviations in track, airspeed, altitude, and some

378
00:21:19.028 --> 00:21:21.248
collision things where the pilot had to intervene.

379
00:21:21.328 --> 00:21:25.098
So once again, it required that pilot practical intelligence, judgment, and

380
00:21:25.108 --> 00:21:25.628
creativity.

381
00:21:28.748 --> 00:21:29.418
So the conclusion,

382
00:21:30.268 --> 00:21:33.698
the Pilot Intervention Rating Scale seems a viable method for identifying and

383
00:21:33.748 --> 00:21:37.488
categorizing pilot interventions in those scenarios, both in flight

384
00:21:37.548 --> 00:21:39.028
tests and operational scenarios.

385
00:21:39.038 --> 00:21:40.768
And in flight tests we do quote

386
00:21:41.968 --> 00:21:45.758
at one stage of the game. In the FAA, it's the tail end, functional reliability

387
00:21:45.848 --> 00:21:48.888
test, where you're just going out there flying real-world scenarios.

388
00:21:49.468 --> 00:21:52.588
Same thing with the military. Operational test and evaluation, same idea.

389
00:21:52.717 --> 00:21:56.148
So it applies both ways. Anyway, it's a way to

390
00:21:56.228 --> 00:21:59.238
categorize that pilot resilience, a formal way to do it,

391
00:22:00.068 --> 00:22:03.488
where we have issues with, once again, uncertain environments, unforeseeable

392
00:22:03.588 --> 00:22:07.328
situations. That's the big deal. If it's right out of the book, hey, this

393
00:22:07.368 --> 00:22:09.628

happens, you pull the fire handle, no problem.

394
00:22:10.348 --> 00:22:13.788
But the next step is the unforeseeable uncertain

395
00:22:13.828 --> 00:22:17.687
environments. That's where the human element comes in, and that's where those

396
00:22:17.728 --> 00:22:19.848
new AI models, they need to learn that first.

397
00:22:20.448 --> 00:22:23.988
So that's great you learned it, but what happens to those five, six, seven times

398
00:22:24.028 --> 00:22:25.088
before you learned it?

399
00:22:28.028 --> 00:22:31.148
This is a definition that the FAAI

400
00:22:31.728 --> 00:22:35.368
roadmap for safety assurance uses, and they bifurcated

401
00:22:35.388 --> 00:22:39.348
into learned and learning. So the learned is the learning stuff,

402
00:22:39.528 --> 00:22:42.748
it's the deterministic stuff. Write an algorithm.

403
00:22:42.788 --> 00:22:45.008
The guy or gal writes the algorithm, boom, boom.

404
00:22:45.048 --> 00:22:46.728
If this happens, that happens in known environments.

405
00:22:46.768 --> 00:22:50.408
In flight tests, all the idea is canned scenarios.

406
00:22:50.448 --> 00:22:54.288

That's the idea. Hey, we're going to go head-to-head for this traffic collision

407
00:22:54.308 --> 00:22:57.128
avoidance system. We're going to use this river as a barrier feature.

408
00:22:57.188 --> 00:22:59.748
We're going to knock it off here. We do canned scenarios.

409
00:22:59.768 --> 00:23:02.768
So we can write an algorithm for all that stuff and everything that we do in flight

410
00:23:02.808 --> 00:23:05.548
tests. That's the whole idea. That's why we keep it safe.

411
00:23:06.628 --> 00:23:09.328
Canned scenarios, THA, see what happens.

412
00:23:09.408 --> 00:23:12.308
But what about those uncertain environments and unforeseen situations?

413
00:23:12.378 --> 00:23:14.248
Something that wasn't in there anymore.

414
00:23:14.808 --> 00:23:18.568
So that's where the learning, and that's the unsupervised learning that the machine

415
00:23:18.628 --> 00:23:22.268
learning-- and I hate to use these words interchangeably, but the large language

416
00:23:22.308 --> 00:23:25.988
models, and depending upon if you're getting into deep

417
00:23:26.068 --> 00:23:28.608
learning, so there's different aspects of it.

418
00:23:28.628 --> 00:23:28.938
But anyway,

419
00:23:29.748 --> 00:23:33.568
but it gives the ability to automatically learn and improve on the basis of

420
00:23:33.588 --> 00:23:36.148
experience without being explicitly programmed.

421
00:23:37.848 --> 00:23:41.448
So we have to separate those into those two areas there between the learned and

422
00:23:41.528 --> 00:23:42.728
learning, where right now

423
00:23:43.868 --> 00:23:44.488
there's a gap.

424
00:23:45.788 --> 00:23:49.768
So the human, we have a certain amount of knowledge that we've learned, but then

425
00:23:49.828 --> 00:23:52.248
we interject our practical intelligence, judgment, creativity.

426
00:23:52.258 --> 00:23:53.668
It's like Miracle on the Hudson,

427
00:23:54.528 --> 00:23:54.688
the

428
00:23:55.508 --> 00:23:56.438
Sioux City miracle,

429
00:23:57.348 --> 00:23:57.658
things that

430
00:23:58.548 --> 00:24:02.124
probably everybody in this room have had one or two times, hopefully.One

431
00:24:02.504 --> 00:24:05.044

or maybe more that you had to intervene and say, "Hey, this wasn't in the book.

432
00:24:05.084 --> 00:24:07.484
We didn't have a procedure. We didn't plan for this in the DHA.

433
00:24:07.564 --> 00:24:09.644
I got to do something." That's great. You're there.

434
00:24:09.684 --> 00:24:12.614
But what if you're not there and we're relying on some automation to do it?

435
00:24:12.644 --> 00:24:16.474
We need to capture those things other than a comment or a brief at

436
00:24:16.924 --> 00:24:20.904
a safety standdown that's forgotten five years later because everybody's gone by

437
00:24:20.964 --> 00:24:24.824
then, where we can memorialize that for the future

438
00:24:24.944 --> 00:24:27.283
use. I see the light of death coming on here pretty soon.

439
00:24:28.224 --> 00:24:30.514
So are we there at that intersection point?

440
00:24:31.784 --> 00:24:33.964
I don't think so. Actually, I'll say no, we're not.

441
00:24:35.124 --> 00:24:38.304
We're not there. Can we get there? Who knows?

442
00:24:38.324 --> 00:24:42.124
But in the meantime, we still have to test before we even have a chance of getting

443
00:24:42.164 --> 00:24:44.004
to that crossover point.

444
00:24:45.404 --> 00:24:49.284
Recommendations. Implement the PURS tool, as I said, during flight and

445
00:24:49.344 --> 00:24:53.224
operational test scenarios to categorize pilot

446
00:24:53.244 --> 00:24:57.134
resilience and pilot interventions, and identify those gaps in the capability,

447
00:24:57.224 --> 00:25:01.214
both during the, in this case, the applicant or the services'

448
00:25:01.524 --> 00:25:03.584
show of compliance and the finding of compliance.

449
00:25:04.004 --> 00:25:06.804
And then address the gaps by improving the technologies.

450
00:25:06.824 --> 00:25:07.343
"Hey, this thing,

451
00:25:08.244 --> 00:25:11.724
we didn't have an emergency procedure for dual engine failure at low altitude over

452
00:25:11.764 --> 00:25:13.404
water." Okay. Well, we need to do something about it.

453
00:25:13.584 --> 00:25:16.034
That one's obvious, got a lot of press, but all those other ones that don't get the

454
00:25:16.104 --> 00:25:20.024
press, we need to track those. And also identify those things, as I said

455
00:25:20.084 --> 00:25:20.924
way at the beginning that,

456
00:25:22.044 --> 00:25:24.884
I'll say it straight up, hey, we still need to have humans involved.

457
00:25:24.964 --> 00:25:27.284
We're not there yet. We want to identify those as well.

458
00:25:27.364 --> 00:25:29.384
Just say, "No, no, it'll take care of"-- No.

459
00:25:29.784 --> 00:25:32.484
We want to identify it and capture it and memorialize it

460
00:25:33.864 --> 00:25:37.264
so we can roll those into whatever the new and improved flight test safety database

461
00:25:37.284 --> 00:25:40.884
will look like, as Chia mentioned coming up. Also in our SSEs.

462
00:25:41.444 --> 00:25:44.904
Roll it into there as well, so we can plug those things back in there so it's

463
00:25:44.944 --> 00:25:48.884
memorialized, and we have something that we can use as a comparison, a comparative

464
00:25:48.924 --> 00:25:51.124
analysis, in this case, quantitative.

465
00:25:51.824 --> 00:25:55.704
The bulk of this is in a recent article, not recent now, I guess in December,

466
00:25:56.144 --> 00:25:59.494
in the Defense Acquisition University or "Defense Acquisition" magazine,

467
00:26:00.084 --> 00:26:02.434
talks about the AI trust and

468
00:26:03.284 --> 00:26:05.724
verify that kind of summarizes what I talked about today.

469

00:26:06.804 --> 00:26:10.744
And was fortunate enough to have part of this submitted and published in

470
00:26:11.684 --> 00:26:14.944
the SETP magazine, and also in

471
00:26:14.964 --> 00:26:17.324
"Aerospace" from the Royal Aeronautical Society.

472
00:26:18.264 --> 00:26:18.964
So closing thought.

473
00:26:20.384 --> 00:26:24.054
And this is a quote from the folks in the Boeing Center for Aviation

474
00:26:24.144 --> 00:26:24.494
Safety,

475
00:26:25.784 --> 00:26:29.724
Aerospace and Aviation Safety. "The lack of a taxonomy to categorize

476
00:26:29.744 --> 00:26:33.653
and classify positive behaviors adds to the difficulty of

477
00:26:33.744 --> 00:26:37.593
studying pilot performance." And I would contend that the Pilot

478
00:26:37.644 --> 00:26:40.984
Intervention Rating Scale provides us that taxonomy to do

479
00:26:41.024 --> 00:26:44.124
so. And I think that is it. Any questions, comments?

480
00:26:44.884 --> 00:26:48.824
I've got 43 seconds, so I'll tell you what I did last summer if you'd like.

481
00:26:48.944 --> 00:26:49.024
No.

482
00:26:51.004 --> 00:26:51.164

Okay.

483
00:26:52.944 --> 00:26:55.504
Since I'm the first guy, I don't know what the rules of engagement are for

484
00:26:55.644 --> 00:26:57.924
questions. Just take easy ones or what's the--

485
00:26:59.744 --> 00:27:00.624
Microphones or-

486
00:27:00.904 --> 00:27:02.364
Raise your hand and we'll get a mic to you.

487
00:27:03.304 --> 00:27:07.104
Yes, sir. Buck, do you see this someday also going to

488
00:27:07.114 --> 00:27:08.984
rate UAV control?

489
00:27:10.004 --> 00:27:13.544
Absolutely. So I think I tried to, maybe I didn't.

490
00:27:13.764 --> 00:27:17.364
Hopefully, I tried to use the word aircraft generically

491
00:27:17.444 --> 00:27:21.064
across the board there in terms of anything that flies, since unmanned

492
00:27:21.104 --> 00:27:22.074
aircraft are

493
00:27:23.004 --> 00:27:25.584
rolled into that as well. Yes. Yeah.

494
00:27:28.264 --> 00:27:29.964
How about the planned questions I did? No.

495
00:27:31.424 --> 00:27:35.264
No planned questions. Okay. It was either real

496
00:27:35.384 --> 00:27:35.864
good or real

497
00:27:36.924 --> 00:27:40.164
bad. So I don't know. Or maybe something in the middle there. Yes.

498
00:27:40.764 --> 00:27:41.284
Question, no?

499
00:27:43.184 --> 00:27:44.224
There's a mic.

500
00:27:44.324 --> 00:27:44.524
Oh.

501
00:27:47.184 --> 00:27:50.604
Have you looked at the Dave Houle Accident Database of

502
00:27:51.404 --> 00:27:52.684
flight test accidents

503
00:27:53.584 --> 00:27:53.884
and

504
00:27:54.704 --> 00:27:55.924
put that through there?

505
00:27:56.274 --> 00:27:56.274
Which-

506
00:27:56.404 --> 00:27:59.504
So there's a Dave Houle Accident Database that goes back to the

507
00:27:59.804 --> 00:28:03.264
B-17 prototype accident up to about 2006,

508
00:28:03.904 --> 00:28:07.684
and Tom Huff contributed a few new ones there

509

00:28:07.764 --> 00:28:10.884
after Dave Houle passed away. But that's a

510
00:28:11.624 --> 00:28:14.664
searchable database of flight test accidents,

511
00:28:14.884 --> 00:28:15.933
not-

512
00:28:16.024 --> 00:28:16.164
Right

513
00:28:16.174 --> 00:28:17.094
... just operational.

514
00:28:17.284 --> 00:28:18.004
Yeah. So,

515
00:28:18.804 --> 00:28:22.324
I took a look at that in the literature review

516
00:28:23.304 --> 00:28:27.224
when developing this, and obviously, some of them are real

517
00:28:27.264 --> 00:28:30.584
dated. So they're not applicable.

518
00:28:30.944 --> 00:28:34.564
The vacuum tubes, not that that's directly related, but they're really dated.

519
00:28:34.644 --> 00:28:37.764
So I wasn't confident on the relevancy

520
00:28:38.164 --> 00:28:41.824
to current technologies and things that we

521
00:28:41.884 --> 00:28:45.804
have. But yeah, it's a good source from a historical standpoint, but

522
00:28:47.304 --> 00:28:51.044

it's in the research literature review, but just was hesitant to do that from a

523
00:28:51.064 --> 00:28:54.304
credibility standpoint and say, "Guess what? We don't do that.

524
00:28:54.344 --> 00:28:57.724
We don't use LORAN anymore," or whatever.

525
00:28:58.704 --> 00:29:00.144
Or Omega or whatever. No.

526
00:29:02.844 --> 00:29:04.384
I've got one question for you.

527
00:29:04.414 --> 00:29:04.423
Oh, God, Tom.

528
00:29:04.464 --> 00:29:05.324
I'll step up here.

529
00:29:05.364 --> 00:29:05.664
Jesus.

530
00:29:05.844 --> 00:29:05.984
So-

531
00:29:06.184 --> 00:29:06.804
Why are you doing this?

532
00:29:08.264 --> 00:29:11.784
So in a normal flight test environment where we

533
00:29:11.864 --> 00:29:15.434
write the test plan, we brief the flight, we execute the flight,

534
00:29:16.144 --> 00:29:19.304
come back and debrief, where does this tool fit into that?

535
00:29:21.204 --> 00:29:23.144
Excellent question, Tom, and it wasn't even planned.

536
00:29:23.444 --> 00:29:23.844
But anyway,

537
00:29:24.824 --> 00:29:28.714
so the good thing is, once again, no original thought,

538
00:29:28.804 --> 00:29:28.964
right?

539
00:29:29.824 --> 00:29:30.184
I have none.

540
00:29:31.324 --> 00:29:32.344
What do we do for

541
00:29:33.384 --> 00:29:35.264
Cooper Harpers or our Bedfords, right?

542
00:29:35.464 --> 00:29:38.584
The idea is to fill it out in flight when the maneuver happens,

543
00:29:40.044 --> 00:29:43.984
whether it's the FTE or the human factors specialist or the other person not

544
00:29:44.024 --> 00:29:46.324
flying, and then you bring that back to the ready room

545
00:29:47.144 --> 00:29:50.884
for the debrief. And so it's just that stack of cards, it would

546
00:29:50.904 --> 00:29:54.124
depend upon the type of test you're doing, if it's a performance test or one that's

547
00:29:54.164 --> 00:29:57.884
related to workload. Boom, boom, boom. You got a third card.

548
00:29:58.044 --> 00:30:01.924
We have PIO rating scales, right? For shipboard operations, we have

549
00:30:01.964 --> 00:30:03.164
dynamic interface testing

550
00:30:04.084 --> 00:30:07.844
scales. There's a lot of them out there for giving us a

551
00:30:07.864 --> 00:30:10.264
numerical score that we can easily use there.

552
00:30:10.304 --> 00:30:14.184
In this case, it follows the same flow diagram, so people should be very

553
00:30:14.284 --> 00:30:16.644
familiar with it as the Bedford and the Cooper Harper.

554
00:30:17.064 --> 00:30:18.584
But once again, we have other ones as well as that

555
00:30:22.294 --> 00:30:23.694
All right. Oh, we got another question.

556
00:30:24.474 --> 00:30:24.634
Oh.

557
00:30:25.714 --> 00:30:26.054
I can hear you.

558
00:30:26.134 --> 00:30:26.533
I can hear you.

559
00:30:26.754 --> 00:30:28.574
Yeah. All right. So quick question then.

560
00:30:28.994 --> 00:30:31.754
Traditionally, Cooper-Harper Bedford workload

561
00:30:32.554 --> 00:30:35.334
tend to be kind of acceptable to an unacceptable.

562

00:30:35.374 --> 00:30:37.933
There's a dividing line that is more acceptable, unacceptable.

563
00:30:38.594 --> 00:30:41.734
At least as I see it, it kind of looks like this is more of a safety-driven rating

564
00:30:41.814 --> 00:30:45.224
scale, where obviously if I'm up at altitude in cruise flight, I'd still get a

565
00:30:45.234 --> 00:30:48.944
flight violation, but it's not a safety critical thing if I overspeed my

566
00:30:49.414 --> 00:30:52.054
250 knot speed limit. Whereas obviously in a critical phase of flight, it

567
00:30:52.094 --> 00:30:55.594
definitely is safety-related. So it seems to be a slightly different focus.

568
00:30:55.654 --> 00:30:59.214
Do you view this as acceptable, unacceptable, or is this kind of a safety

569
00:30:59.274 --> 00:31:02.634
divided? And again, I'm not throwing shade. I think it's great.

570
00:31:02.834 --> 00:31:04.734
I could certainly have used this in some of my flights.

571
00:31:04.934 --> 00:31:08.834
But is there a difference in how you view this being used in terms of acceptable

572
00:31:08.894 --> 00:31:09.614
versus safety?

573
00:31:09.814 --> 00:31:10.114
Yeah, no.

574
00:31:10.194 --> 00:31:10.564
That makes sense.

575
00:31:10.774 --> 00:31:12.734
Good point. It actually hits both.

576
00:31:12.834 --> 00:31:15.144
So for example, in the overspeed example,

577
00:31:17.294 --> 00:31:21.194
it depends on the specific scenario, and that's why the narratives

578
00:31:21.254 --> 00:31:23.774
were text mined because, hey, well, why was that?

579
00:31:23.834 --> 00:31:27.314
Well, maybe the issue was the overspeed was because you were overtaking somebody

580
00:31:27.354 --> 00:31:27.594
else.

581
00:31:28.614 --> 00:31:31.894
What was the context of that overall overspeed?

582
00:31:32.294 --> 00:31:34.714
If it was just something like that, maybe it wouldn't even write up.

583
00:31:34.754 --> 00:31:38.594
So that's why I'm getting there, but I'm

584
00:31:38.634 --> 00:31:42.434
hesitant on relying on large language models, because it'll

585
00:31:42.494 --> 00:31:45.594
grab something like that and say, "Well, who cares?" Well, no.

586
00:31:45.834 --> 00:31:49.314
Now, if you're overtaking somebody else and how many times we had those things

587
00:31:49.374 --> 00:31:53.334
where, hey, yeah, the issue was you went-- But now we have a

588
00:31:53.654 --> 00:31:55.654
collision avoidance scenario developing.

589
00:31:56.094 --> 00:31:59.634
It hasn't happened yet, but that's why you have an airspeed restriction both for

590
00:31:59.754 --> 00:32:03.394
sequencing, right? You screw up the sequence, okay, maybe delays, but maybe there's

591
00:32:03.474 --> 00:32:06.094
also issues. Well, now it's going to squeeze somebody in there. We don't know that.

592
00:32:06.454 --> 00:32:10.364
That's why it's really important to get that practical intelligence, judgment, and

593
00:32:10.394 --> 00:32:12.804
creativity in there to realize what's going on.

594
00:32:12.854 --> 00:32:15.794
I have another minute here. So an example,

595
00:32:17.554 --> 00:32:21.424
automated driving systems are ahead of us when it comes to use of this

596
00:32:21.514 --> 00:32:24.294
stuff, right? They are ahead. They have an SAE standard.

597
00:32:24.354 --> 00:32:27.754
It's ahead, and they're on the road, and especially where you live.

598
00:32:27.774 --> 00:32:28.654
It depends on where you live.

599
00:32:29.674 --> 00:32:33.294
If it's California or Arizona, there's a lot of them out

600

00:32:33.354 --> 00:32:36.924
there. Well, an example that was given, not by me, by

601
00:32:37.074 --> 00:32:38.104
another

602
00:32:38.954 --> 00:32:39.214
person,

603
00:32:41.234 --> 00:32:44.534
and there's been accidents involving these things, but this is where that really

604
00:32:44.574 --> 00:32:46.014
comes to light. It really shed the light on me.

605
00:32:46.024 --> 00:32:50.014
I know, hey, practical intelligence and judgment, creativity is essential.

606
00:32:50.044 --> 00:32:53.404
Automatic drive systems driving down the road, there are cars parked on both sides,

607
00:32:54.114 --> 00:32:57.814
and the sensors pick up a ball going across the road. Whoa.

608
00:32:58.514 --> 00:32:59.714
Well, now the ball is clear.

609
00:33:01.474 --> 00:33:02.534
No harm, no foul, right?

610
00:33:03.614 --> 00:33:06.413
No. Guess what's coming after that ball that's hidden behind the car?

611
00:33:06.474 --> 00:33:07.174
A little kid,

612
00:33:08.034 --> 00:33:10.974
right? So my practical intelligence, judgment, and creativity says, "Well, wait a

613
00:33:10.994 --> 00:33:14.834
second. The obstacle is clear. I'm good." But I know

614
00:33:15.494 --> 00:33:18.474
that no, there's a good possibility there's going to be a child running by the road

615
00:33:18.514 --> 00:33:21.154
there. I need to brake or at least slow down. Okay.

616
00:33:21.194 --> 00:33:24.334
And there's all kinds of things that you see in the automated driving system.

617
00:33:24.354 --> 00:33:26.344
We have to be straight up. That's a good place to look.

618
00:33:26.634 --> 00:33:29.694
I know it's two-dimensional and everything else, but there's a lot of lessons

619
00:33:29.754 --> 00:33:33.334
learned here. Anything change, you change a taxiway painting of some sort,

620
00:33:33.674 --> 00:33:36.894
or you have some kind of a weird deviation on taxi surface.

621
00:33:36.914 --> 00:33:39.934
Well, their problem with that with the automated driving systems there, where

622
00:33:39.974 --> 00:33:42.704
they're picking something up, "Hey, I don't know that. I've never seen that before.

623
00:33:42.734 --> 00:33:46.414
What do those cones mean today?" And whoever put out the cones didn't put them in

624
00:33:46.454 --> 00:33:50.264

the standard way. Well, now I'm off into the grass, or I ran into

625
00:33:50.314 --> 00:33:53.614
somebody. So once again, you have to interject that in the real world.

626
00:33:53.914 --> 00:33:57.774
I don't know if that addressed your question or not. Oh, that wasn't a question.

627
00:33:57.814 --> 00:33:59.174
I just went off on a tangent there anyway.

628
00:34:00.634 --> 00:34:01.534
All right. Thank you, Buck.

629
00:34:01.574 --> 00:34:01.874
Thank you.