WEBVTT

1
00:00:00.000 --> 00:00:04.560
Presentation up is going to be from Boeing Molding,

2
00:00:04.860 --> 00:00:08.160
I'm sorry, from Boeing, exploring the visual t h a.

3
00:00:08.580 --> 00:00:11.920
So Darren and Moaz, are you on your way? Oh, there you are.

4
00:00:12.460 --> 00:00:16.400
So they both have degrees from, uh, Emory Riddle. They both work at Boeing.

5
00:00:17.380 --> 00:00:19.320
Uh, both work in flight tests,

6
00:00:20.020 --> 00:00:23.560
but I see that's where the similarity ends because Darren has a beard and well

7
00:00:23.590 --> 00:00:26.240
does not. But, uh, so, uh,

8
00:00:26.300 --> 00:00:29.960
Darren is a technical fellow for Boeing over 25 years of experience.

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00:00:30.000 --> 00:00:33.960
I know you guys all, uh, got introduced to him yesterday at the, the workshop.

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00:00:34.020 --> 00:00:37.960
But, uh, one of the things that I would really like to congratulate Darren on,

11
00:00:38.540 --> 00:00:41.320
we both sit on the manufacturer's flight test council, which is, you know,

12
00:00:41.320 --> 00:00:43.360
one of the reasons I'm still in the job I'm in,

13
00:00:43.360 --> 00:00:45.040
because that's one of the best things, uh,

14
00:00:45.040 --> 00:00:48.160
about going to work is the Thursday meetings because there's such good technical

15
00:00:48.360 --> 00:00:49.240
exchanges with all the people.

16
00:00:49.300 --> 00:00:52.760
And Darren and Terry are the glue that holds that, that organization together.

17
00:00:52.860 --> 00:00:56.960
So really appreciate that. Uh, and then, uh,

18
00:00:56.960 --> 00:01:00.560
started at Aerotech, uh, which is luckily, uh,

19
00:01:00.780 --> 00:01:02.160
not very far away from Boeing.

20
00:01:02.260 --> 00:01:05.200
So he just increased his commute by a couple of minutes by,

21
00:01:05.260 --> 00:01:07.240
by changing jobs there. Uh,

22
00:01:07.300 --> 00:01:10.160
and he just found out he is married to one of the ba uh,

23
00:01:10.160 --> 00:01:12.560
flight Sciences engineers that Mo and I, uh,

24
00:01:12.560 --> 00:01:16.560
knew from doing the performance testing on C-series. So congratulations on that.

25
00:01:16.700 --> 00:01:18.640

And I heard she was smart enough to leave aviation.

26
00:01:18.780 --> 00:01:22.520
So good job on diversifying and not having all your eggs in the aviation basket.

27
00:01:22.740 --> 00:01:26.600
So, guys, come on up and, uh, we're ready for exploring the visual t h a

28
00:01:36.330 --> 00:01:38.890
I didn't realize you could, uh, marry into this conference.

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00:01:42.090 --> 00:01:45.270
All right, well, we're excited to be here today and, uh,

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00:01:45.960 --> 00:01:48.510
thank you for giving us this opportunities too.

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00:01:49.380 --> 00:01:53.920
So we're working through updating our risk processes at Boeing, and, um,

32
00:01:55.080 --> 00:01:55.760
as part of that,

33
00:01:55.760 --> 00:02:00.500
we started exploring different T HHA formats and processes and we're looking

34
00:02:00.570 --> 00:02:05.270
into things and we kind of uncovered something that we really liked,

35
00:02:05.500 --> 00:02:07.430
some of the things that it made us think about,

36
00:02:07.690 --> 00:02:12.050
and we don't know where it's going yet. So as part of this experiment,

37
00:02:12.050 --> 00:02:16.470
we decided to bring it here and, uh, see what comes out of it,

38
00:02:16.490 --> 00:02:18.910

cuz we're looking forward to some feedback from the rest of you.

39
00:02:22.440 --> 00:02:24.790
So all of us are familiar with, uh,

40
00:02:24.790 --> 00:02:28.940
the T HHA as the preferred means of flight test, uh,

41
00:02:28.940 --> 00:02:30.380
process and risk analysis.

42
00:02:30.890 --> 00:02:34.620
Most of US American based testers can source our process of back to

43
00:02:34.910 --> 00:02:38.970
40 40, 26, or male standard 8 82. Um,

44
00:02:39.230 --> 00:02:43.680
but this is not the first time that ths have been part of the flight test safety

45
00:02:43.960 --> 00:02:47.640
workshop. In fact, I think it was the theme for the 2018 symposium,

46
00:02:47.970 --> 00:02:49.960
which was kicked off by Pat Moran when he said,

47
00:02:50.930 --> 00:02:55.660
most organizations have 90% commonality between them with the primary difference

48
00:02:55.660 --> 00:03:00.320
being in format. When we look at the th a process across the industry,

49
00:03:00.320 --> 00:03:02.280
we've talked about this today and yesterday,

50
00:03:02.590 --> 00:03:04.400
there's subjectivity associated with it.

51
00:03:04.400 --> 00:03:07.360

There's a lot of brainstorming associated with it. Uh, the,

52
00:03:07.430 --> 00:03:09.800
it's purposely subjective, it relies on our experience,

53
00:03:09.820 --> 00:03:13.360
but it doesn't have some of the rigor that a lot of the other tools don't have.

54
00:03:14.080 --> 00:03:18.940
Uh, other industries have tools such as s TPA or, uh,

55
00:03:18.970 --> 00:03:20.060
fish bones and so on.

56
00:03:20.440 --> 00:03:23.460
And we were looking at those tools and wondering is anything from them that we

57
00:03:23.460 --> 00:03:28.060
can bring into, into the th a that might level it up some level it up some more.

58
00:03:29.340 --> 00:03:32.120
During the process update that Darren's working on, uh,

59
00:03:32.140 --> 00:03:35.490
we decided to think about our airplanes today.

60
00:03:35.630 --> 00:03:36.970
We realized that at least at Boeing,

61
00:03:37.170 --> 00:03:38.770
our airplanes are getting more and more complex.

62
00:03:39.230 --> 00:03:42.610
Our ths are getting more and more detailed, more and more intricate,

63
00:03:42.830 --> 00:03:44.650
and we're starting to get to the point where we're,

64

00:03:44.650 --> 00:03:46.330
we're getting stuck in this wall of text.

65
00:03:50.590 --> 00:03:54.890
So a few, uh, format examples, again from the 2018 workshop, uh, which was,

66
00:03:54.890 --> 00:03:59.490
again, themed around ths. Uh, you'll notice that for the most part, uh,

67
00:03:59.490 --> 00:04:02.940
they're all fairly textual. Uh, they're all,

68
00:04:03.080 --> 00:04:05.620
all the elements are about the same. One of them has graphics,

69
00:04:06.280 --> 00:04:08.420
but fundamentally they're all walls of text,

70
00:04:08.420 --> 00:04:10.820
which we're seeing increase in length and density.

71
00:04:14.770 --> 00:04:17.550
So then we decided that perhaps we should, uh,

72
00:04:17.970 --> 00:04:21.870
do a little bit of a survey amongst any of our friends that we knew that worked

73
00:04:21.870 --> 00:04:26.110
flight test. And, um, as we started those conversations,

74
00:04:26.130 --> 00:04:29.350
the good news was there's a lot of energy. And, uh,

75
00:04:29.970 --> 00:04:32.470
we realized pretty quickly you've gotta have some time.

76
00:04:32.530 --> 00:04:36.430
If you ask somebody what they think about their th a process, uh,

77

00:04:37.430 --> 00:04:39.650
the other we uncovered, there's, um,

78
00:04:40.320 --> 00:04:42.650
some organizations also use it as their,

79
00:04:42.940 --> 00:04:47.130
their main repository of her lessons learned or lessons identified.

80
00:04:48.010 --> 00:04:49.740
And, uh, the,

81
00:04:49.760 --> 00:04:54.110
the final thing was kind of everybody thought that they had room for

82
00:04:54.110 --> 00:04:57.670
improvement, and so nobody thinks they've got the holy grail.

83
00:04:59.000 --> 00:05:03.770
Then I went back and I listened to the tutorial from 2018 again

84
00:05:03.960 --> 00:05:08.610
because it's on our flight test safety committee website. And, um,

85
00:05:08.780 --> 00:05:11.450
there was a couple quotes that really stood out for me.

86
00:05:11.450 --> 00:05:14.720
The first was from Pat Moran himself, and he, you know,

87
00:05:14.720 --> 00:05:19.200
basically said that his pet peeve is the way that we're constrained by
our

88
00:05:19.440 --> 00:05:21.680
templates and the tools, the formats that we use,

89
00:05:22.340 --> 00:05:26.840
and the wish that there's gotta be some better way to tell that whole
story

90

00:05:27.500 --> 00:05:30.840
and how to wrap up all those loose ends with, with our mitigations.

91
00:05:31.380 --> 00:05:32.520
And then there was someone in the,

92
00:05:32.580 --> 00:05:35.320
in the crowd that spoke up at one point and said, uh,

93
00:05:35.860 --> 00:05:40.000
you can never be sure that what comes outta your mouth is what meaningfully goes

94
00:05:40.030 --> 00:05:41.280
into the other person's mind.

95
00:05:42.060 --> 00:05:47.020
And that kind of brought out that that big piece related to

96
00:05:47.200 --> 00:05:51.580
why we do th HHAs is the communication part. Uh, and that's a critical,

97
00:05:52.180 --> 00:05:54.070
critical piece of it. Uh,

98
00:05:54.930 --> 00:05:59.200
so then kind of looking for the common pain points. We,

99
00:05:59.300 --> 00:06:04.200
we often hear about the copy paste errors and just, just, um, as a,

100
00:06:04.260 --> 00:06:08.760
as a big pain point. Uh, then there's the one about the expert input.

101
00:06:08.760 --> 00:06:11.840
We heard some about that last yesterday. Um,

102
00:06:11.950 --> 00:06:16.160
whether it's somebody that's new to flight test or that there's something that's

103

00:06:16.260 --> 00:06:20.890
new and, and technically different because of the airplane that we're testing,

104
00:06:21.400 --> 00:06:25.570
there's always something that we're just not quite as expert as we wish we were.

105
00:06:25.570 --> 00:06:30.170
When it comes time to identifying hazards and risks, those unknown unknowns.

106
00:06:31.800 --> 00:06:36.300
And then finally, there's that, that age old question about briefing.

107
00:06:36.300 --> 00:06:38.100
How do we brief? Do we read every page?

108
00:06:38.560 --> 00:06:42.780
How do we balance between the time available and the need to

109
00:06:42.890 --> 00:06:45.380
communicate a more complete story?

110
00:06:46.880 --> 00:06:49.930
What we definitely don't want to do is we don't want to be walking out of the,

111
00:06:49.950 --> 00:06:54.270
uh, brief hearing somebody go, man, we just briefed 86 pages.

112
00:06:54.590 --> 00:06:59.390
I think I remembered two of them, um, which is one of our challenges, obviously.

113
00:07:01.580 --> 00:07:05.400
So we decided, well, maybe it's time to do a risk assessment of DHAs.

114
00:07:06.610 --> 00:07:11.110
And I really like Bill Dean as one of our safety officers at Boeing in,

115
00:07:11.110 --> 00:07:11.943

in the uk.

116
00:07:12.250 --> 00:07:17.230
And unfortunately I can't mimic his perfect British accent.

117
00:07:17.650 --> 00:07:18.710
But, uh,

118
00:07:18.870 --> 00:07:23.590
I really like the way that he summed it up when he said that a th a is

119
00:07:23.590 --> 00:07:27.990
simply a visualization of the whole safety argument. And I really like that.

120
00:07:28.570 --> 00:07:30.430
And then thought a little more.

121
00:07:31.790 --> 00:07:36.690
If you think about the life cycle of a T hha, there's two very distinct phases.

122
00:07:37.510 --> 00:07:42.320
The first is that one that starts with the authoring of the th a and goes

123
00:07:42.320 --> 00:07:45.880
all the way through the review and approval process of your test plan and your

124
00:07:46.300 --> 00:07:48.580
ths. And so there's,

125
00:07:48.580 --> 00:07:51.860
there's that discovery process and then the approval process. And,

126
00:07:51.880 --> 00:07:56.300
and there'll be quite a few people that will need to look at that and,

127
00:07:56.960 --> 00:08:00.100
and understand what's, what's being discovered.

128

00:08:01.410 --> 00:08:04.030
But then that second phase is another really critical phase,

129
00:08:04.050 --> 00:08:08.670
and that's the one when it comes time to execute and to make sure that

130
00:08:09.260 --> 00:08:13.790
that communication flows through to the entire test crew that we're all seeing

131
00:08:13.810 --> 00:08:15.310
and understanding the same thing.

132
00:08:18.360 --> 00:08:22.740
So one of the other things that I recall distinctly and was reminded of when I

133
00:08:23.210 --> 00:08:26.780
watched the video again from the 2018 tutorial,

134
00:08:27.920 --> 00:08:31.860
was that there was some, some confusion and some disagreement, uh,

135
00:08:32.160 --> 00:08:35.980
and some spirited discussion about the, uh,

136
00:08:36.300 --> 00:08:38.900
relative importance of the different elements in a t hha,

137
00:08:39.480 --> 00:08:43.740
how they relate to each other, which one comes first. And, uh,

138
00:08:44.630 --> 00:08:48.010
at the end of the day, everyone kind of agreed that what really mattered was,

139
00:08:48.270 --> 00:08:52.500
is arriving at the, the destination. But

140
00:08:54.070 --> 00:08:57.390
that kind of, just as I thought about it more, it,

141
00:08:57.650 --> 00:09:02.270
it really points out how abstract our ths are and the

142
00:09:02.270 --> 00:09:07.190
difficulty of everyone having the same visual picture

143
00:09:07.250 --> 00:09:11.790
in their mind. And perhaps we need some way to visualize the relationships,

144
00:09:11.850 --> 00:09:14.710
the relative importance and the chronological flow.

145
00:09:18.130 --> 00:09:22.840
So if you think about the fact that ths are bounded by formats and,

146
00:09:22.980 --> 00:09:23.813
and our tools,

147
00:09:24.270 --> 00:09:28.760
they're bounded by our collective experience and the ever-changing landscape of

148
00:09:28.760 --> 00:09:29.920
the technologies we're testing,

149
00:09:30.850 --> 00:09:35.770
I think you can make a pretty solid argument that even the best practice ths

150
00:09:36.350 --> 00:09:39.730
are still going to represent an incomplete communication of the whole safety

151
00:09:40.050 --> 00:09:42.940
argument, which is a little bit disconcerting.

152
00:09:42.940 --> 00:09:47.020
Cause the whole reason we do 'em is to try and get that whole picture right.

153

00:09:47.800 --> 00:09:52.420
And so how often are we kind of left with black and white instead of color or

154
00:09:52.420 --> 00:09:53.940
just one corner of the painting?

155
00:09:56.370 --> 00:10:00.720
So that all aside, it left me with two big questions. The first is,

156
00:10:00.780 --> 00:10:05.040
can we reduce the risk of incomplete communication and can we improve the

157
00:10:05.040 --> 00:10:08.240
understanding of the whole safety argument? And then secondly,

158
00:10:08.310 --> 00:10:10.920
what if there was a format that made th HHAs more visual,

159
00:10:12.790 --> 00:10:16.460
which led me to the fact I could only come to one conclusion.

160
00:10:17.040 --> 00:10:18.620
We need picture books for pilots.

161
00:10:20.170 --> 00:10:24.070
And part of that realization was I was part of a, uh,

162
00:10:25.030 --> 00:10:29.510
a risk assessment for a, for a future demonstrator project.

163
00:10:30.620 --> 00:10:34.640
And so there was a format that I had never used before that were taught.

164
00:10:35.020 --> 00:10:38.870
And I struggled with it a little bit right out of the gate.

165
00:10:38.950 --> 00:10:43.570
I liked how visual it was, but it was, they had a bunch of different terms.

166

00:10:44.580 --> 00:10:47.920
And all of a sudden I realized that if I just took all the terms that we use for

167
00:10:47.920 --> 00:10:48.880
our T HHA elements,

168
00:10:48.980 --> 00:10:53.510
and I substituted them into this new format,

169
00:10:53.650 --> 00:10:55.430
all of a sudden it made a lot of sense to me.

170
00:10:56.280 --> 00:11:00.980
And so that's when I realized really what we need is picture books for flight

171
00:11:00.980 --> 00:11:05.580
test engineers too. And maybe if, excuse me,

172
00:11:06.150 --> 00:11:10.100
maybe if we just put it all together in one, one new package,

173
00:11:10.760 --> 00:11:12.300
we could all have a better result.

174
00:11:15.920 --> 00:11:20.460
So the method that Darren found was the encountered rather,

175
00:11:20.600 --> 00:11:24.100
was the bow time method of, uh, risk assessment. Uh,

176
00:11:24.120 --> 00:11:27.580
and the only time I'll say this, Darren, your wardrobe was not a mistake today.

177
00:11:28.690 --> 00:11:33.470
Uh, so the bow time methodology was pioneered by the oil and gas industry in the

178
00:11:33.470 --> 00:11:37.430

eighties and nineties, uh, after some high profile oil platform incidents,

179
00:11:38.360 --> 00:11:42.620
uh, in 2018. In fact, uh, Ben Luther brought it up in this forum. So, uh,

180
00:11:42.620 --> 00:11:46.360
it's not a new concept to the flight test safety workshop. Uh,

181
00:11:46.360 --> 00:11:49.160
since it's a visual tool, it does a direct job of communication,

182
00:11:49.500 --> 00:11:54.000
of communicating how, uh, risk and high hazard hazardous situations develop.

183
00:11:54.900 --> 00:11:55.760
And additionally,

184
00:11:55.860 --> 00:12:00.560
it can show areas where there might be mitigation gaps in your risk analysis by

185
00:12:00.560 --> 00:12:04.240
being this graphical tool that shows barriers in between causes,

186
00:12:04.240 --> 00:12:06.700
effects and hazards. Uh,

187
00:12:06.700 --> 00:12:09.580
the neat thing about this tool is that it's industry and situation agnostic.

188
00:12:10.130 --> 00:12:13.020
It's used by a large variety of aviation companies.

189
00:12:13.020 --> 00:12:16.100
And in even the UK's civil aviation authority,

190
00:12:17.390 --> 00:12:20.620
there are some nomenclature differences to how the bow tie is written, uh,

191
00:12:20.620 --> 00:12:21.620
in its traditional sense.

192
00:12:21.880 --> 00:12:26.020
We are using the whole presentation today using our th a terminology that a lot

193
00:12:26.020 --> 00:12:27.930
more of us might be familiar with. Uh,

194
00:12:27.930 --> 00:12:29.770
the question we had after getting introduced to it was,

195
00:12:29.870 --> 00:12:33.810
can the bow tie method enhance or supplement the th as it stands today?

196
00:12:35.410 --> 00:12:38.670
So we'll do a bit of, uh, level setting, make sure we're all on the same page,

197
00:12:39.530 --> 00:12:41.670
uh, and talk through the th a nomenclature,

198
00:12:42.320 --> 00:12:46.510
which I think most of us are familiar with. Uh, first we have a, uh, situation,

199
00:12:46.600 --> 00:12:50.390
which is the what are we doing that creates test related risk, uh,

200
00:12:50.390 --> 00:12:54.110
the environment, the situation, the test technique, intentional failure,

201
00:12:54.170 --> 00:12:57.020
and so on. The next thing we have is the hazard, uh,

202
00:12:57.020 --> 00:13:00.740
which is the undesirable event that you may not want to be in,

203
00:13:00.740 --> 00:13:05.160

but nothing's actually just gone wrong yet. Next we have the cause,

204
00:13:05.160 --> 00:13:09.680
which is the contributing factor that would lead to the hazard itself, uh,

205
00:13:09.680 --> 00:13:13.890
the effect, which is the impact of the hazard occurring.

206
00:13:14.600 --> 00:13:17.860
And then finally, the most important with the thing we're all talking about, uh,

207
00:13:17.860 --> 00:13:18.520
the mitigation,

208
00:13:18.520 --> 00:13:21.860
the steps you can take to reduce the probability of the cause or the severity of

209
00:13:22.400 --> 00:13:26.080
the effect. And the way we interpret the th a, uh,

210
00:13:26.140 --> 00:13:29.680
is that during the situation, the cause may lead to the hazard,

211
00:13:29.680 --> 00:13:31.240
which then in turn would lead to the effect.

212
00:13:34.880 --> 00:13:39.140
Uh, so we'll build an example of a th a in bow tie. Uh,

213
00:13:39.140 --> 00:13:42.180
we picked a common fixed-wing example, uh, style demonstration.

214
00:13:42.260 --> 00:13:46.020
A lot of us are familiar with in this room, with a even more common hazard, uh,

215
00:13:46.020 --> 00:13:49.360
which is the loss of control. Some, uh,

216
00:13:50.410 --> 00:13:54.600
usual suspects for the causes include insufficient elevator authority,

217
00:13:55.500 --> 00:13:57.760
uh, the unexpected aerodynamic characteristics,

218
00:13:57.760 --> 00:14:01.320
especially as you're opening up the envelope and pitch up at high angles of

219
00:14:01.320 --> 00:14:05.790
attack, which are common to swapping aircraft. Some of the effects could be,

220
00:14:06.290 --> 00:14:09.110
uh, impact with terrain, a catastrophic scenario of course,

221
00:14:09.770 --> 00:14:12.790
and structural damage due to buffering or any load factor.

222
00:14:15.880 --> 00:14:19.020
The next step is mitigate, mitigating our causes. Uh,

223
00:14:19.020 --> 00:14:22.540
very similar to doing a T hha, you would go ahead and add your causes in,

224
00:14:22.960 --> 00:14:25.980
in this case, they're very visual. They're in between the cause and the hazard.

225
00:14:26.840 --> 00:14:31.220
Uh, you'll notice that, uh, they're forming a barrier, uh, so to speak.

226
00:14:31.490 --> 00:14:34.620
What you also notice is that some of the, some of the mitigations are repeated.

227
00:14:34.620 --> 00:14:36.860
This is encouraged and required by the method.

228
00:14:37.670 --> 00:14:39.370

And we can start to see how this mitigation,

229
00:14:39.370 --> 00:14:43.210
this method is starting to force consideration of each cause and its associated

230
00:14:43.210 --> 00:14:44.980
mitigation. Uh,

231
00:14:44.980 --> 00:14:49.300
same exercise won't bore with the details of going through with mitigating the

232
00:14:49.300 --> 00:14:53.890
effects. At the end of it all, you'll notice that, uh,

233
00:14:54.070 --> 00:14:58.060
you have a complete t a uh, we realized that in a normal example,

234
00:14:58.070 --> 00:15:01.460
you'd have more than one hazard for a stall. Uh, but for the purposes,

235
00:15:01.460 --> 00:15:02.660
we're limiting it to just this one.

236
00:15:05.680 --> 00:15:07.660
All right, so bow ties.

237
00:15:08.410 --> 00:15:11.420
They're not just for looking snazzy at weddings and flight test safety

238
00:15:11.900 --> 00:15:16.500
workshops. Pete has also repeatedly told me they make you look taller.

239
00:15:20.810 --> 00:15:21.643
So

240
00:15:22.900 --> 00:15:26.400
one of the things that really stood out to me that I really found compelling

241

00:15:26.830 --> 00:15:30.760
when I used this method of visualizing my ths

242
00:15:32.210 --> 00:15:36.270
was the realization that there are three very distinct phases that can occur

243
00:15:36.270 --> 00:15:38.770
during a test event. And

244
00:15:40.380 --> 00:15:43.400
it also just kind of reminded me of more,

245
00:15:43.710 --> 00:15:45.800
more often than I would care to admit.

246
00:15:47.020 --> 00:15:49.900
I have been remiss on the recognition part.

247
00:15:51.150 --> 00:15:55.650
How often has anyone else realized that

248
00:15:55.950 --> 00:15:57.410
the hazard had come true?

249
00:15:57.990 --> 00:16:01.810
And it took them a little while to realize it or missed it all together,

250
00:16:01.830 --> 00:16:03.250
and someone else had to speak up.

251
00:16:03.960 --> 00:16:06.860
And so by putting it this way,

252
00:16:07.300 --> 00:16:11.060
I think it's a lot easier to have a conversation with the rest of my test crew

253
00:16:11.520 --> 00:16:14.540
and make sure that our displays are all set up the way we need to,

254

00:16:15.230 --> 00:16:19.860
and make sure that we've got proper roles assigned for not just the prevention

255
00:16:19.860 --> 00:16:21.700
side, which we tend to cover pretty well,

256
00:16:22.560 --> 00:16:25.940
but also to make sure that we've got monitoring for the recognition.

257
00:16:26.720 --> 00:16:30.700
And then to make sure that beyond that you've got procedures and communication

258
00:16:30.870 --> 00:16:35.820
plans, so that if that hazard, that recognition of a hazard comes true,

259
00:16:36.250 --> 00:16:39.740
everybody shifts into the recovery phase with no delay.

260
00:16:40.680 --> 00:16:44.900
And so I found that really compelling that and get that clarity that your

261
00:16:44.900 --> 00:16:49.420
emergency procedures live over there in between your effects and your hazard.

262
00:16:51.530 --> 00:16:52.363
The

263
00:16:53.770 --> 00:16:56.890
Other thing I like about this, uh, is how,

264
00:16:57.110 --> 00:17:02.070
how it really ties creates a very clear link between every

265
00:17:02.080 --> 00:17:05.830
mitigation and the cause or the effect that it's intended to,

266
00:17:06.290 --> 00:17:10.230
to modify and to really bring that clarity.

267
00:17:10.350 --> 00:17:13.030
I think that's really important thing that, um,

268
00:17:13.800 --> 00:17:16.620
is missing in a lot of t hha formats. And we lose,

269
00:17:16.760 --> 00:17:21.460
or it's difficult to make that linkage between a mitigation and what

270
00:17:22.260 --> 00:17:26.040
whatever cause or whatever effect it's intended to, to improve.

271
00:17:30.350 --> 00:17:32.850
And as moo kind of already mentioned,

272
00:17:33.000 --> 00:17:37.330
repeating the medi mitigations then becomes an important piece of that.

273
00:17:37.390 --> 00:17:42.180
So you don't lose that linkage between, even though this is the same mitigation,

274
00:17:43.080 --> 00:17:46.760
uh, it's intended to, to, uh,

275
00:17:47.100 --> 00:17:51.600
affect two different causes. And in, in this case, one of the effects. And,

276
00:17:52.300 --> 00:17:57.050
and so there might be nuances in there as well. Uh,

277
00:17:57.180 --> 00:17:59.530
regardless, it's important to,

278
00:18:00.030 --> 00:18:03.250
to know what those mitigations are expected to do.

279
00:18:05.850 --> 00:18:07.590
And finally, uh,

280
00:18:08.140 --> 00:18:12.990
just giving you the opportunity to focus on a single cause at a time or a

281
00:18:12.990 --> 00:18:13.950
single effect at a time,

282
00:18:13.950 --> 00:18:18.230
providing a little more structure than that unstructured brainstorming that we

283
00:18:18.230 --> 00:18:22.270
usually end up in, uh, is also, uh, an,

284
00:18:22.290 --> 00:18:26.010
an important factor here. And then if there's one that's empty,

285
00:18:26.630 --> 00:18:31.040
or perhaps you could have an orphan mitigation, and that,

286
00:18:31.040 --> 00:18:34.890
that orphan mitigation is a good one to really look at, because you,

287
00:18:35.030 --> 00:18:37.890
it may be an indication if you know it's a mitigation that makes sense.

288
00:18:38.680 --> 00:18:42.450
There's probably only two real reasons that, that you have an orphan.

289
00:18:42.950 --> 00:18:47.850
One is that it's so p that maybe doesn't really belong, and it's,

290
00:18:47.880 --> 00:18:50.860
it's just spurious fluff in your T hha.

291
00:18:51.800 --> 00:18:53.460
Or more importantly,

292
00:18:53.480 --> 00:18:57.300
it might be an indication that you're missing a hazard or a cause or an effect,

293
00:18:58.170 --> 00:18:59.590
and you've gotta dig a little deeper.

294
00:19:02.590 --> 00:19:04.170
And so speaking of digging deeper,

295
00:19:04.170 --> 00:19:08.730
that was one of the other big pieces of the conversation in our 2018

296
00:19:09.010 --> 00:19:11.530
tutorial, right, was, uh, what's the right level?

297
00:19:11.630 --> 00:19:14.930
How do you know when you've gone far enough? What's, how much is enough detail?

298
00:19:15.870 --> 00:19:20.170
And so in this case, let's take the pitch up at High OA as an example,

299
00:19:20.900 --> 00:19:23.000
and if we move that into the hazard position,

300
00:19:23.670 --> 00:19:26.250
the loss of control slides into an effect.

301
00:19:27.170 --> 00:19:31.990
And now if we study that as the hazard, we can uncover new effects,

302
00:19:32.370 --> 00:19:34.230
new causes. And because of that,

303
00:19:34.330 --> 00:19:38.790
now we've got better visibility into some new mitigations. In this case,

304
00:19:38.870 --> 00:19:43.110
I would argue you probably have an engine flame out is probably a new hazard for

305
00:19:43.110 --> 00:19:45.990
you to, to write down and explore that.

306
00:19:46.330 --> 00:19:48.110
And so you can shift things left or right.

307
00:19:48.110 --> 00:19:52.550
You can move an effect into the hazard location and drill deeper into the effect

308
00:19:52.550 --> 00:19:54.110
side or vice versa,

309
00:19:54.240 --> 00:19:58.390
until you've convinced yourself that you've bookended all your causes and

310
00:19:58.390 --> 00:20:00.990
effects and gotten full coverage of your t a.

311
00:20:04.420 --> 00:20:08.960
So now, the Darren's talked about how to make a basic bow tie. Um,

312
00:20:09.020 --> 00:20:10.920
we like it, we think it's neat. We, it,

313
00:20:11.030 --> 00:20:14.000
it's certainly easier to look at than all the words, but it,

314
00:20:14.050 --> 00:20:15.120
while painting a nice picture,

315
00:20:15.120 --> 00:20:18.960
it misses some of the things that we appreciate from the t hha and the processes

316
00:20:18.960 --> 00:20:20.280
we use today. Uh,

317
00:20:20.280 --> 00:20:23.720
so here's some stuff that we thought about that were inspired by ths that we

318
00:20:23.720 --> 00:20:25.920
were, were thinking about bringing into the bow tie,

319
00:20:25.920 --> 00:20:29.560
had to paint a more complete picture. Uh, the first one's pretty simple. Uh,

320
00:20:29.990 --> 00:20:34.160
risk assignment, probability, severity, uh, what we already do in ths,

321
00:20:34.320 --> 00:20:37.680
throwing it on here so that you get an even more detailed picture of what you're

322
00:20:37.680 --> 00:20:41.760
looking at in this case, uh, looks like it ended up at a high risk scenario.

323
00:20:42.740 --> 00:20:46.800
The second item is, uh, the concept of a mitigation assessment.

324
00:20:48.020 --> 00:20:50.390
This is from the bow tie method, uh,

325
00:20:50.390 --> 00:20:53.630
but it was a feature that we thought maybe this will help us consider each

326
00:20:53.630 --> 00:20:54.950
mitigation in more detail. Uh,

327
00:20:54.950 --> 00:20:59.230
the bow tie method asks us to consider the criticality and effectiveness of each

328
00:20:59.230 --> 00:21:01.950
mitigation. In this case, I've used, uh, three colors.

329
00:21:02.080 --> 00:21:04.870
We're not sure whether colors make sense numbers or something else,

330
00:21:05.450 --> 00:21:09.110
but it's a concept that really made us think about each mitigation in further

331
00:21:09.110 --> 00:21:12.950
detail as to what the impact would be if we lost this during our test point.

332
00:21:17.850 --> 00:21:20.790
And then lastly is the concept of the residual risk assessment.

333
00:21:21.290 --> 00:21:25.430
Now that we've done a mitigation assessment and we have an initial risk, we,

334
00:21:25.490 --> 00:21:29.230
we were wondering if there would be a way in the bow time method to come up with

335
00:21:29.350 --> 00:21:33.890
a more, uh, accurate or honest rather, uh,

336
00:21:34.090 --> 00:21:37.730
residual risk. It starts to tie into our risk matrix, which we're all, uh,

337
00:21:37.730 --> 00:21:41.610
so familiar with, and we also are thinking that it might, uh,

338
00:21:41.820 --> 00:21:43.970
supplement it in a more holistic way.

339
00:21:46.730 --> 00:21:49.350
So what what we're wondering really is, uh,

340
00:21:49.770 --> 00:21:53.110
if the bot tie could be the ergonomics update to the th a,

341
00:21:53.110 --> 00:21:57.490
that solves a few annoying problems, rather inexpensively. Uh,

342
00:21:57.490 --> 00:22:00.570
it's similar to moving a switch on the flight tech or reordering a checklist,

343
00:22:00.670 --> 00:22:05.010
you know, simple thing that could really, uh, level up the way we're doing, uh,

344
00:22:05.350 --> 00:22:09.410
ths. However, uh, they're not perfect. In fact, uh, Nancy Levon,

345
00:22:09.410 --> 00:22:13.570
who we heard a lot about yesterday is quoted to in, in her paper, uh,

346
00:22:13.620 --> 00:22:17.730
wrote that bow ties are the least powerful and least useful modeling and

347
00:22:17.730 --> 00:22:22.610
diagramming language available. So, uh, yeah,

348
00:22:22.610 --> 00:22:24.210
no, no pressure. Right? Uh,

349
00:22:24.210 --> 00:22:27.290
so here's some benefits and drawbacks that we came up with after thinking about

350
00:22:27.290 --> 00:22:30.130
this all the way through. Uh, so the first benefit is, uh,

351
00:22:30.130 --> 00:22:32.650
mitigations can earn their space on there. You,

352
00:22:32.670 --> 00:22:36.130
you have to not have a serious mitigation. Uh,

353
00:22:36.230 --> 00:22:39.410
it has to be a barrier between a cause and a hazard or a hazard and an effect.

354
00:22:40.010 --> 00:22:42.830
Uh, the next thing that Darren talked about, you need direct mitigation mapping.

355
00:22:43.170 --> 00:22:47.710

Uh, you have to associate with a particular cause or a particular effect.

356
00:22:48.580 --> 00:22:52.790
What this also means is that it's easier to figure out when you have a

357
00:22:52.790 --> 00:22:55.630
mitigation that's missing and what its impact might be. In this case,

358
00:22:56.210 --> 00:22:58.510
in the previous example, if I removed the knock it off aoa,

359
00:22:58.510 --> 00:23:02.630
there's a whole host of things that now, uh, might not be, might not be,

360
00:23:03.040 --> 00:23:06.520
might be closer to us than we were expecting. Uh,

361
00:23:06.520 --> 00:23:08.000
we also think it supplements the risk matrix,

362
00:23:08.070 --> 00:23:11.960
like I spoke about on the previous slide. Uh, and from a training standpoint,

363
00:23:11.980 --> 00:23:14.720
or from a learning standpoint or authoring standpoint, uh,

364
00:23:14.720 --> 00:23:17.920
we think it could reduce the copy paste potential because it provides the author

365
00:23:18.400 --> 00:23:22.200
a logical path to follow. Uh, similarly, or in addition to that,

366
00:23:22.260 --> 00:23:26.790
it also partially bridges that experience gap that we talked about by providing

367
00:23:26.830 --> 00:23:27.663
a logical pathway.

368

00:23:27.810 --> 00:23:31.150
It also allows the reviewer themselves to understand what the author was

369
00:23:31.150 --> 00:23:34.110
thinking, and very quickly figure out, Hey,

370
00:23:34.110 --> 00:23:35.470
this guy doesn't know what he's talking about.

371
00:23:35.490 --> 00:23:39.880
Here's some experience that I can give him and go back and update the T hha. Uh,

372
00:23:40.070 --> 00:23:43.600
last benefit is that we think it might improve briefing retention.

373
00:23:43.840 --> 00:23:48.700
A lot of people are visual, uh, visual learners, and more importantly,

374
00:23:48.700 --> 00:23:52.220
while we're on the airplane, be able to identify, here's a thing that we can,

375
00:23:52.820 --> 00:23:56.540
uh, take away that may impact us in greater detail.

376
00:23:59.190 --> 00:24:02.170
All right. So some of the drawbacks, the most, uh,

377
00:24:02.280 --> 00:24:06.530
obvious one is there's a very limited number of tools that are available that

378
00:24:06.530 --> 00:24:10.250
will just kind of do this for you and make the graphics. Uh,

379
00:24:11.680 --> 00:24:15.780
few people have the benefit that I had, which is MOO is a PowerPoint wizard,

380
00:24:16.160 --> 00:24:20.050
so that made these graphics easy. Um,

381
00:24:21.170 --> 00:24:24.700
obviously a training investment is always one that, uh,

382
00:24:25.900 --> 00:24:30.250
comes with some, some consternation. Uh, if we look at the test plan,

383
00:24:30.970 --> 00:24:34.530
I, I think we really need to retain the entire wall of text.

384
00:24:35.110 --> 00:24:36.850
And I would like to see us, uh,

385
00:24:37.600 --> 00:24:41.030
experiment with putting these graphics in,

386
00:24:41.530 --> 00:24:45.070
in an appendix or something, so they're available. Um,

387
00:24:45.530 --> 00:24:48.910
what's interesting to me is when it comes to test cards,

388
00:24:49.220 --> 00:24:53.110
whether these could replace our wallow text or not. So it could be a,

389
00:24:53.780 --> 00:24:57.020
I see it as a drawback in the test plan, take up more space, but, uh,

390
00:24:57.020 --> 00:25:01.730
test cards could actually be better potentially. Obviously,

391
00:25:01.730 --> 00:25:05.960
something like this, um, something that we've used for so long,

392
00:25:06.150 --> 00:25:10.560
there's a lot of organizational inertia and, uh,

393
00:25:10.990 --> 00:25:15.240
it's challenging to think about changing our ths in any way. So, um,

394

00:25:19.010 --> 00:25:22.510
And then, you know, we think it'll be a reduction in briefing length,

395
00:25:22.610 --> 00:25:27.400
but as people learn something new especially and try and figure

396
00:25:27.420 --> 00:25:30.960
out how to, uh, visualize our ths in a new way,

397
00:25:31.180 --> 00:25:34.560
it could actually run counter to that for us.

398
00:25:36.590 --> 00:25:41.410
So if we kind of pick all that into account and think about the future of our

399
00:25:41.530 --> 00:25:46.010
t a and where we may go with our risk process updates,

400
00:25:46.910 --> 00:25:51.650
um, we definitely don't think that this is the silver bullet,

401
00:25:51.870 --> 00:25:56.120
but, uh, I found it compelling enough to share and,

402
00:25:56.300 --> 00:26:00.920
and really enjoyed this journey we've gone on as we've kind of walked through

403
00:26:00.990 --> 00:26:04.440
some of our ths and thought about, um, uh,

404
00:26:04.440 --> 00:26:05.800
some of the things that we've uncovered.

405
00:26:06.300 --> 00:26:09.560
The other thing I'll point out is you can just as easily draw these on a,

406
00:26:09.740 --> 00:26:14.160
on a piece of paper or on a whiteboard, and use it as one of your tools,

407

00:26:14.300 --> 00:26:18.800
as you put a t hha together. So we don't have to wait for tools or processes.

408
00:26:19.500 --> 00:26:22.960
Um, and so with all that kind of in mind,

409
00:26:23.580 --> 00:26:27.800
we came up with three real questions that we wanted to leave y'all with.

410
00:26:28.620 --> 00:26:29.880
And the first is, uh,

411
00:26:30.260 --> 00:26:34.360
do our T HHA processes enable effective development and communication to our

412
00:26:34.360 --> 00:26:38.990
test crews? How badly are our formats and our processes holding us back?

413
00:26:41.370 --> 00:26:42.130
The second is,

414
00:26:42.130 --> 00:26:45.440
do we explore criticality and effectiveness of all our mitigations?

415
00:26:45.940 --> 00:26:50.360
It was certainly a, something that I had never done intentionally, uh, and,

416
00:26:50.540 --> 00:26:53.800
and I thought that was worth thinking about. And finally,

417
00:26:53.900 --> 00:26:57.760
do our test plan reviewers and test crews get the complete safety picture every

418
00:26:57.760 --> 00:27:02.060
single time, or we left with a.to dot that has a bunch of missing lines.

419
00:27:03.270 --> 00:27:08.060
So with that, we'd like your feedback and input.

420
00:27:09.000 --> 00:27:13.180
And marines, this is your time to shine. We'll take pictures.

421
00:27:24.160 --> 00:27:28.280
I have to congratulate you. This is the first time I hear

422
00:27:29.780 --> 00:27:34.260
a change of perception or approach to a th HHA since

423
00:27:34.940 --> 00:27:38.860
I, I, I was familiar 30 years ago or more, uh,

424
00:27:38.920 --> 00:27:42.300
on doing ths and doing safety. So I think,

425
00:27:42.540 --> 00:27:46.960
I think this is a great idea and, and if I were, uh,

426
00:27:47.160 --> 00:27:51.000
a CEO or a chief of flight test safety in my, in an organization,

427
00:27:51.160 --> 00:27:54.960
I would adopt this and I will start designing for it because,

428
00:27:55.180 --> 00:27:58.360
and I'll tell you why this is,

429
00:27:58.430 --> 00:28:02.920
this is kind of approaches the SST p process a little bit

430
00:28:02.950 --> 00:28:06.040
because there is more thinking in the,

431
00:28:06.100 --> 00:28:11.000
in this approach than there is in, in the one that we've been using in the past.

432
00:28:11.630 --> 00:28:16.480
Because now you got mitigations for effects as well as hazards or

433
00:28:16.780 --> 00:28:18.700
causes, excuse me. So,

434
00:28:18.720 --> 00:28:22.820
and then you can break them down even lower at a lower level like you,

435
00:28:22.850 --> 00:28:25.420
like you did, like you showed. So now you,

436
00:28:25.420 --> 00:28:29.820
you're catching the missing mitigations that, that the s stpa process,

437
00:28:30.800 --> 00:28:35.020
uh, uh, uh, targets. Mm-hmm. To make sure you don't miss the,

438
00:28:35.040 --> 00:28:39.630
the mitigations as far as, uh, looking at the higher level,

439
00:28:40.330 --> 00:28:43.470
how do you show this, this, uh, this, uh, uh,

440
00:28:43.740 --> 00:28:46.830
picture to the approving authorities? Uh,

441
00:28:47.260 --> 00:28:49.310
they have to approve the risk levels, et cetera,

442
00:28:49.530 --> 00:28:53.690
but how do they know that you haven't missed any mitigations and showing that

443
00:28:54.580 --> 00:28:58.050
I, I have, I have, uh,

444
00:28:58.430 --> 00:29:03.050
always endorsed and, and I use it myself when I go flight test,

445
00:29:03.270 --> 00:29:03.850
but I,

446

00:29:03.850 --> 00:29:08.560
I got pushback at the workshop on the ths because I really believe that if

447
00:29:08.560 --> 00:29:13.280
you're gonna brief the T HHAs and you briefed 20 Ts,

448
00:29:13.510 --> 00:29:17.740
then I makes a two hour briefing where it could have been an hour or, or less,

449
00:29:18.790 --> 00:29:21.240
because you gotta go through 30 pages. If you have,

450
00:29:22.010 --> 00:29:25.150
you have 20 TTS for a flight,

451
00:29:25.730 --> 00:29:30.030
and in your kinds of airplanes, you're doing multiple types of tests.

452
00:29:30.030 --> 00:29:31.430
You're doing stability and control,

453
00:29:31.430 --> 00:29:33.830
you're doing all kinds of systems and whatever.

454
00:29:34.330 --> 00:29:36.910
So you have these whole bunch of ths.

455
00:29:36.970 --> 00:29:40.990
So if you brief the THS one at a time, forget it.

456
00:29:42.500 --> 00:29:46.070
Yeah. That's not the way to do it. You gotta combine them. And,

457
00:29:46.130 --> 00:29:49.830
and I say that that, and that's a, that's a dirty word for some of you,

458
00:29:51.250 --> 00:29:54.870
but you have to combine it because what happens on a flight test,

459

00:29:54.880 --> 00:29:56.670
let's say you do, you're doing a stall test,

460
00:29:58.610 --> 00:30:02.750
how many houses are an stall test? Okay, so there's five, six,

461
00:30:03.330 --> 00:30:04.950
you know, you mentioned just one.

462
00:30:06.630 --> 00:30:10.850
Are you gonna go through each one for the stall test and brief all the

463
00:30:10.850 --> 00:30:15.330
mitigations associated with that one? No. When you're doing a stall test,

464
00:30:15.830 --> 00:30:19.690
you are exposing the airplane to all of the hazards at the same time,

465
00:30:20.110 --> 00:30:24.450
not one at a time. So you have to combine them when you brief them,

466
00:30:25.750 --> 00:30:30.320
because that's cause then that, that may be instead of 30 or 20,

467
00:30:30.940 --> 00:30:35.020
you reduce it to 10 or less. Mm-hmm. And that shortens your briefing time.

468
00:30:35.360 --> 00:30:39.700
It keeps the attention of the crew and the, and the team members and, and,

469
00:30:39.720 --> 00:30:43.940
and it makes it easier to brief. So, so I, I recommend that we,

470
00:30:44.330 --> 00:30:49.140
that when we brief, uh, uh, uh, the th HHAs on a flight test,

471
00:30:49.200 --> 00:30:53.360
we combine them for that. The stall testing has four hazards. Okay.

472

00:30:54.250 --> 00:30:57.180
Combine 'em in one picture, all four,

473
00:30:57.640 --> 00:31:01.780
and then just list the mitigations for all four of them and brief them in

474
00:31:01.810 --> 00:31:03.940
because you're gonna experince at the same time.

475
00:31:04.000 --> 00:31:07.380
So you need all the mitigations for that one stall test.

476
00:31:08.340 --> 00:31:09.680
So congratulations. Thank you.

477
00:31:09.680 --> 00:31:10.920
Well, thank you. Yeah.

478
00:31:10.920 --> 00:31:13.840
That's one of the experiments we wanna run and haven't had a chance to yet,

479
00:31:14.180 --> 00:31:19.160
is to see could we display just the picture on a

480
00:31:19.160 --> 00:31:21.000
screen while we brief the test plan?

481
00:31:21.980 --> 00:31:24.200
And as we get to each type of test we're doing,

482
00:31:24.200 --> 00:31:26.760
change the picture to match the test, um,

483
00:31:26.860 --> 00:31:28.560
to see what that would do to our pre-flight.

484
00:31:28.580 --> 00:31:32.410
So that's an experiment we still wanna run and see where it takes us and,

485
00:31:32.630 --> 00:31:37.170

and experiment with how we visually represent the th ths for our pre-flight

486
00:31:37.170 --> 00:31:38.003
specifically.

487
00:31:39.670 --> 00:31:43.210
Hi guys. Uh, I'm Terry this age from Sirius Aircraft. First of all,

488
00:31:43.760 --> 00:31:47.730
this was really novel, uh, very cool, and looking around,

489
00:31:48.070 --> 00:31:50.930
seeing more of my colleagues taking pictures of the screen.

490
00:31:50.930 --> 00:31:55.050
You planted a lot of seeds here that are going to, uh, grow. So very well done.

491
00:31:55.780 --> 00:31:59.000
Um, the question I do have for you is, how would you go about,

492
00:31:59.000 --> 00:32:03.360
typically with th is there some kind of an emergency procedure that's defined

493
00:32:04.020 --> 00:32:04.960
in your bow type picture?

494
00:32:04.960 --> 00:32:07.240
Would you have one emergency procedure if the hazard happened,

495
00:32:07.240 --> 00:32:11.160
you did one thing that covers all the mitigations related to all the effects,

496
00:32:11.160 --> 00:32:13.480
or would each effect have its own emergency procedure?

497
00:32:13.480 --> 00:32:18.000
Have you gotten that far into the nuts and bolts of it?

498
00:32:18.000 --> 00:32:18.833
Emergency procedure?

499
00:32:19.980 --> 00:32:21.960
Uh, so the, the simple answer is we haven't,

500
00:32:21.960 --> 00:32:25.560
we haven't figured that out with the bow tie specifically. Um,

501
00:32:26.100 --> 00:32:30.280
an early mentor of mine taught me that if you have more than one emergency

502
00:32:30.280 --> 00:32:34.360
procedure to a hazard, you need to think about the hazard again. Uh,

503
00:32:34.380 --> 00:32:36.480
so that's the more generic advice. I,

504
00:32:36.560 --> 00:32:40.840
I think what the bow tie will maybe help us with is

505
00:32:41.870 --> 00:32:44.850
eeking out those emergency procedures and making them more specific and more

506
00:32:44.850 --> 00:32:48.530
targeted in a way that, um, makes them eventually more effective.

507
00:32:49.680 --> 00:32:51.060
Any thoughts? More, more thoughts on that?

508
00:32:51.530 --> 00:32:53.830
Yeah. I think the way we,

509
00:32:54.090 --> 00:32:57.390
we have our emergency procedures in a separate section of our test plan,

510
00:32:57.880 --> 00:33:01.790
we're immediately following our risk assessment, our T hha. Um,

511
00:33:02.380 --> 00:33:04.070
what I like about this is,

512
00:33:05.020 --> 00:33:07.400
as a reviewer or as a test plan author,

513
00:33:07.560 --> 00:33:12.200
I would read through all the mitigations that are there on the effects side

514
00:33:12.540 --> 00:33:13.880
of a, of all the hazards.

515
00:33:14.340 --> 00:33:17.600
And I would make sure that the emergency procedures have full coverage of those

516
00:33:17.600 --> 00:33:18.433
mitigations.

517
00:33:19.740 --> 00:33:22.860
I think it'll help us write better emergency procedures and more complete

518
00:33:22.860 --> 00:33:23.900
emergency procedures.

519
00:33:26.050 --> 00:33:30.860
Yeah. I, I like what you, you got there. Um, there's the, in,

520
00:33:30.880 --> 00:33:33.940
in your early slides, you identified two areas.

521
00:33:34.520 --> 00:33:36.140
One is the review process,

522
00:33:36.760 --> 00:33:39.740
and I think this really hits the nail on the head there.

523
00:33:40.450 --> 00:33:44.470
The briefing process on the other hand, sometimes gets convoluted, uh,

524
00:33:44.470 --> 00:33:49.250
especially if you're repeating, uh, mitigations. Have you guys thought about,

525
00:33:50.350 --> 00:33:55.290
uh, a different format for the briefing that that would, uh, take into account,

526
00:33:56.150 --> 00:33:57.770
uh, those kind of things,

527
00:33:57.910 --> 00:34:02.130
the repeat mitigations mitigations that are built already

528
00:34:02.790 --> 00:34:05.090
on the, uh, on the cause side,

529
00:34:05.110 --> 00:34:08.890
we have a lot of mitigations that are built right into the test plan that a test

530
00:34:09.210 --> 00:34:12.810
director can say, yeah, yeah. Click, click. He doesn't have to brief that stuff.

531
00:34:13.120 --> 00:34:17.490
Yeah, he should, he should brief the stuff that is meaningful for the day.

532
00:34:18.090 --> 00:34:19.660
Have you guys thought about something like that?

533
00:34:20.570 --> 00:34:24.070
We, we thought about it, uh, to some extent. Again,

534
00:34:25.030 --> 00:34:26.890
no solution, but I think, uh, the,

535
00:34:26.910 --> 00:34:30.850
one of the ideas that Darren came up with was having the bow tie, uh,

536

00:34:30.870 --> 00:34:35.630
up on the screen while you brief a subset of mitigations, the,

537
00:34:35.630 --> 00:34:38.950
the stuff that you actually want to give the pilots that day, uh,

538
00:34:38.950 --> 00:34:40.310
and the pilots and the rest of the test crew,

539
00:34:40.330 --> 00:34:42.390
so that if they have a moment where they're like,

540
00:34:42.390 --> 00:34:44.590
I wonder why this is this way in the test plan, they can look up,

541
00:34:45.180 --> 00:34:48.240
see the bow tie, or frankly, just your th a go. Okay,

542
00:34:48.240 --> 00:34:51.140
that's where that's mapped. That's the cause or the effect, uh,

543
00:34:51.140 --> 00:34:52.420
that you're impacting, um,

544
00:34:52.550 --> 00:34:55.780
which should help the length of the briefings and really more
importantly,

545
00:34:55.780 --> 00:34:58.380
the understanding and what people walk away with from the briefing.

546
00:34:59.570 --> 00:35:02.340
Yeah. And we, our best practice today is that we,

547
00:35:02.840 --> 00:35:05.300
in our wall of text version of our th a,

548
00:35:06.120 --> 00:35:08.500
we categorize all our mitigations.

549
00:35:09.170 --> 00:35:13.550

And so we have the ones that are in the planning phase or have to happen prior

550
00:35:13.550 --> 00:35:16.330
to the pre-flight, the ones that need to be briefed,

551
00:35:16.670 --> 00:35:19.050
and then the ones that apply during test execution,

552
00:35:19.870 --> 00:35:24.610
and we haven't worked through yet. This is part of the experiment of, uh,

553
00:35:25.030 --> 00:35:27.170
you know, what are we gonna do in pre-flight? And I,

554
00:35:28.020 --> 00:35:32.800
you're giving me more ideas about how to shade or color or segregate

555
00:35:33.420 --> 00:35:35.800
so that we focus in, I think during the brief,

556
00:35:35.820 --> 00:35:40.600
we should be focusing mostly on just the execution mitigations and let the rest

557
00:35:41.800 --> 00:35:43.010
take a backseat somewhere.