WEBVTT

1
00:00:00.010 --> 00:00:01.175
Some good questions for the panel

2
00:00:01.375 --> 00:00:02.535
'cause we gotta grill Taylor a little bit.

3
00:00:03.635 --> 00:00:05.855
All right. Our next speaker from the Boeing company

4
00:00:05.855 --> 00:00:06.935
will be Jack Van Vanilla.

5
00:00:07.675 --> 00:00:09.885
Jack is a senior instrumentation engineer

6
00:00:10.065 --> 00:00:12.285
and architect for instrumentation ops,

7
00:00:12.285 --> 00:00:13.645
processes, tools and technology.

8
00:00:14.275 --> 00:00:16.135
Uh, he's been the instrumentation lead for a number

9
00:00:16.135 --> 00:00:18.935
of programs at Boeing, including the the Boeing NASA

10
00:00:19.335 --> 00:00:21.295
collaborative Collaboration on the X 66.

11
00:00:21.875 --> 00:00:24.175
In his free time, he likes to roast coffee, brew beer,

12
00:00:24.595 --> 00:00:27.175
and play, uh, competitive complex car games.

13
00:00:27.755 --> 00:00:28.755
Let's give it up for Jack.

14
00:00:38.125 --> 00:00:38.475
Hello.

15
00:00:44.275 --> 00:00:45.785
First, I'd like to say thank you.

16
00:00:46.575 --> 00:00:50.195
Instrumentation is not always part of the safety discussion.

17
00:00:50.545 --> 00:00:53.715
It's been mentioned a couple times here to, uh, yesterday

18
00:00:53.735 --> 00:00:55.915
and today, but I can assure you

19
00:00:55.915 --> 00:00:57.875
that instrumentation is always working in the background

20
00:00:58.575 --> 00:00:59.675
to make sure that the data

21
00:00:59.675 --> 00:01:02.235
that we're providing is functional and accurate.

22
00:01:02.735 --> 00:01:05.315
And this is a little bit of what I'm gonna talk about today.

23
00:01:07.155 --> 00:01:08.695
My goal for the presentation is

24
00:01:08.695 --> 00:01:11.375
to put people in a head space to think about aspects

25
00:01:11.375 --> 00:01:14.415
of their checkout procedures that could be helped

26
00:01:14.475 --> 00:01:16.455
or assisted by computer automation.

27
00:01:17.215 --> 00:01:20.915

Uh, what I'm gonna talk about is a very complex

28
00:01:23.045 --> 00:01:25.705
safety monitoring system that we had had for decades,

29
00:01:26.445 --> 00:01:29.465
but it's pre-flight procedures for instrumentation

30
00:01:30.585 --> 00:01:34.885
didn't have the same degree of design intent

31
00:01:34.915 --> 00:01:38.125
that the safety monitoring system had, uh, itself.

32
00:01:40.155 --> 00:01:42.105
First, whenever we talk about automation,

33
00:01:42.105 --> 00:01:45.385
we must talk about the good and bad in relation to safety.

34
00:01:46.265 --> 00:01:48.765
Uh, I will touch on these three bullet points.

35
00:01:49.455 --> 00:01:51.635
Uh, I need to talk a little bit about the specifics

36
00:01:51.635 --> 00:01:55.945
of the monitoring system to give you guys a understanding

37
00:01:56.245 --> 00:01:58.545
of the scope of what we were working with,

38
00:01:59.045 --> 00:02:01.825
the previous functionality and what we did to automate

39
00:02:02.045 --> 00:02:03.345
and what we did not automate.

40
00:02:04.335 --> 00:02:07.675
Why did it make sense? Was it reducing understanding?

41
00:02:08.655 --> 00:02:10.355
Was it saving time in a good way?

42
00:02:10.935 --> 00:02:12.915
And then leave you with some closing thoughts.

43
00:02:15.285 --> 00:02:18.545
So first, automation good and bad for safety.

44
00:02:18.895 --> 00:02:20.025
What are people good at?

45
00:02:20.435 --> 00:02:22.855
People are good at certain things, taking a lot

46
00:02:22.855 --> 00:02:26.415
of data parameters, processing them quickly and outputting.

47
00:02:26.715 --> 00:02:28.855
In a sense, our monitoring system is doing

48
00:02:28.855 --> 00:02:30.895
that much faster than a human could,

49
00:02:31.195 --> 00:02:33.095
but there's certain things that humans are really good at

50
00:02:33.095 --> 00:02:36.455
that computers don't quite have a firm grasp at.

51
00:02:36.455 --> 00:02:39.115
Right now. What are people bad at?

52
00:02:39.335 --> 00:02:41.835
People are bad at really mundane tasks.

53
00:02:42.675 --> 00:02:44.925
Data entry, and this is what I'm gonna kind

54
00:02:44.925 --> 00:02:48.845

of highlight here, reducing proficiency.

55
00:02:49.105 --> 00:02:52.005
If we automate something, we don't give people the chance

56
00:02:52.025 --> 00:02:55.045
to practice that automation task

57
00:02:55.105 --> 00:02:56.565
or that task that was automated.

58
00:02:56.875 --> 00:02:58.245
What if the automation fails?

59
00:02:58.665 --> 00:03:02.365
Can people revert back to the manual tasks that they had

60
00:03:02.365 --> 00:03:03.965
before automation took place?

61
00:03:05.565 --> 00:03:08.475
Automation can also reduce the understanding in the system.

62
00:03:08.785 --> 00:03:10.395
Certainly the people

63
00:03:10.395 --> 00:03:12.915
that automated it might have a strong understanding,

64
00:03:13.335 --> 00:03:15.435
but the users themselves might not,

65
00:03:15.495 --> 00:03:17.235
and this could actually be a negative.

66
00:03:17.495 --> 00:03:21.525
So the previous system functionality,

67
00:03:22.445 --> 00:03:25.825
um, I'm talking about the tail load monitoring system on the

68
00:03:25.825 --> 00:03:27.685
Boeing commercial

69
00:03:28.265 --> 00:03:30.725
and some military derivative aircraft that we use.

70
00:03:30.755 --> 00:03:34.765
This is a system that is used during high risk testing

71
00:03:34.855 --> 00:03:37.845
where we expect to see very high tail loads.

72
00:03:39.485 --> 00:03:42.015
This is a very high level degree

73
00:03:42.195 --> 00:03:44.335
or diagram of how the system works.

74
00:03:44.595 --> 00:03:49.195
It is dozens of sensors that are being fed into a computer

75
00:03:49.695 --> 00:03:52.795
and then through algorithms are gonna output an alert

76
00:03:53.095 --> 00:03:56.035
to the pilot and the test crew to let them know

77
00:03:56.035 --> 00:03:57.795
that the airplane is safe.

78
00:03:58.015 --> 00:04:00.875
Or we might have just overstressed the tail

79
00:04:01.455 --> 00:04:03.875
and then either we're in a safe condition

80
00:04:03.875 --> 00:04:05.555
or we need to, uh, return to base

81
00:04:05.555 --> 00:04:10.455

for inspections daily.

82
00:04:10.455 --> 00:04:13.175
Pre-flight validation. We have this system.

83
00:04:13.475 --> 00:04:15.975
How do we make sure that it's working every single day?

84
00:04:16.495 --> 00:04:18.425
This picture is not myself, uh,

85
00:04:18.485 --> 00:04:22.105
but it is a historical Boeing image of instrumentation.

86
00:04:22.335 --> 00:04:27.205
Pref flighting. Um, the complex algorithm nec,

87
00:04:27.225 --> 00:04:30.325
uh, necessitated a very rigorous pre-flight check.

88
00:04:32.725 --> 00:04:34.825
The complexity of the system meant

89
00:04:34.825 --> 00:04:37.345
that the algorithm had a lot of variables to work with,

90
00:04:37.365 --> 00:04:40.345
and if any of them were off, it might lead to a false sense

91
00:04:40.345 --> 00:04:41.545
of safety in the system.

92
00:04:42.905 --> 00:04:46.285
So what did we do? We would disable some sensors.

93
00:04:46.355 --> 00:04:47.965
That means effectively turn 'em off.

94
00:04:48.535 --> 00:04:51.115
We would shift the scale of other sensors.

95
00:04:51.185 --> 00:04:52.835
This is all manual data entry.

96
00:04:52.945 --> 00:04:56.515
Mind you, we'll let the system compute the output,

97
00:04:56.855 --> 00:04:59.755
and then we would check, yeah, we're at 97% load.

98
00:05:00.055 --> 00:05:02.075
We expect a 97% load.

99
00:05:02.535 --> 00:05:06.305
And then we would repeat this 30 times.

100
00:05:07.475 --> 00:05:11.265
Every input was not just one, maybe four,

101
00:05:11.995 --> 00:05:13.625
maybe there's a negative sign there.

102
00:05:13.925 --> 00:05:17.625
So this could actually be in the 150 data entry points.

103
00:05:18.645 --> 00:05:21.905
We would do the cycle 30 times. This is a lot of data entry.

104
00:05:24.095 --> 00:05:25.735
I was fortunately put in the position

105
00:05:25.735 --> 00:05:28.485
to ask the question, what are we doing here?

106
00:05:29.235 --> 00:05:32.915
Does this make sense? Can we make everyone happy?

107
00:05:32.945 --> 00:05:34.795
What do we want? We want a safe airplane.

108
00:05:35.345 --> 00:05:38.325

We wanna provide quality data instrumentation.

109
00:05:38.785 --> 00:05:41.805
We wanna be confident in our pre-flight evaluation.

110
00:05:42.525 --> 00:05:44.595
We're saying the system is working today.

111
00:05:45.175 --> 00:05:46.955
Are we really confident that it is?

112
00:05:48.085 --> 00:05:50.545
And then lastly, we want the test to be successful

113
00:05:50.845 --> 00:05:51.945
and we want it to be safe.

114
00:05:53.565 --> 00:05:54.625
So what do we automate?

115
00:05:54.885 --> 00:05:59.045
We automated just the data entry portion. That's all we did.

116
00:05:59.045 --> 00:06:01.085
We didn't automate functionality of the system.

117
00:06:01.505 --> 00:06:05.715
We automated instead of a human disabling measurements,

118
00:06:06.895 --> 00:06:08.335
shifting values of measurements,

119
00:06:08.555 --> 00:06:10.295
and then reverting those changes.

120
00:06:10.835 --> 00:06:12.735
We automated that and that's it.

121
00:06:13.155 --> 00:06:15.055
We would double check the computer's work

122
00:06:15.515 --> 00:06:19.685
and they would the results off to our data customers

123
00:06:19.705 --> 00:06:24.455
for a secondary validation, operational efficiency.

124
00:06:25.725 --> 00:06:27.505
I'd like to say that we looked at this purely

125
00:06:27.535 --> 00:06:28.705
from a safety aspect.

126
00:06:28.905 --> 00:06:32.385
I had my concerns, but from an operational efficiency,

127
00:06:33.085 --> 00:06:35.465
we saved a lot of time by having a computer do this.

128
00:06:35.655 --> 00:06:39.305
I'll kind of touch on how I see that as a safety, uh,

129
00:06:39.735 --> 00:06:40.785
advantage later.

130
00:06:41.045 --> 00:06:44.425
But it used to take an average instrumentation person 10

131
00:06:44.445 --> 00:06:46.745
to 15 minutes to do just this subset

132
00:06:46.965 --> 00:06:48.185
of the data entry portion.

133
00:06:48.645 --> 00:06:50.105
We got that down to five seconds.

134
00:06:52.895 --> 00:06:54.425
What safety risk was removed?

135
00:06:55.115 --> 00:06:56.715

I talked about, uh,

136
00:06:56.815 --> 00:06:59.995
how the automation helped the data entry portion.

137
00:07:00.495 --> 00:07:04.195
And I kind of touched on what if we would've left one

138
00:07:04.195 --> 00:07:06.755
of those measurements in a shifted state?

139
00:07:07.265 --> 00:07:09.595
What if we would've left a measurement disabled?

140
00:07:10.765 --> 00:07:13.545
We could have caught it most of the time you would catch it,

141
00:07:13.885 --> 00:07:15.305
but there could be scenarios

142
00:07:15.305 --> 00:07:17.905
where you would manipulate a variable over here

143
00:07:18.485 --> 00:07:20.105
and tweak another variable here

144
00:07:20.645 --> 00:07:23.185
and it could leave you in a state, a state

145
00:07:23.185 --> 00:07:24.945
of false security.

146
00:07:28.395 --> 00:07:30.855
So what were we asking a computer to do that?

147
00:07:30.855 --> 00:07:32.735
Humans were not very good at.

148
00:07:32.845 --> 00:07:34.735
This data entry task was very mundane,

149
00:07:36.145 --> 00:07:39.165
and I would like to say that if we asked a human

150
00:07:39.185 --> 00:07:42.525
to do it a million times, they would have a 0% error rate.

151
00:07:42.545 --> 00:07:43.965
But we asked the computer to do this

152
00:07:43.985 --> 00:07:46.645
and then we validated it with another computer program.

153
00:07:49.395 --> 00:07:50.535
So why did it make sense?

154
00:07:50.825 --> 00:07:53.815
Again, we were not automating functionality of the system.

155
00:07:53.875 --> 00:07:55.615
We were automating the pre-flight check.

156
00:07:56.145 --> 00:07:59.205
Uh, and referencing the FA human factors design standard

157
00:07:59.205 --> 00:08:01.685
here, it's got a lot of sub references in it.

158
00:08:01.755 --> 00:08:03.765
It's a good collection of all the work

159
00:08:03.765 --> 00:08:05.845
that's been done on automation.

160
00:08:06.105 --> 00:08:09.285
Uh, the, uh, nuclear industry is actually

161
00:08:09.925 --> 00:08:14.395
referenced in it a lot automate only to improve performance.

162
00:08:16.035 --> 00:08:17.775

The performance that we were improving was

163
00:08:18.355 --> 00:08:21.575
humans were not able to do this task very quickly,

164
00:08:21.995 --> 00:08:24.365
and it was very air prone, uh,

165
00:08:24.395 --> 00:08:26.045
make the task easier to perform.

166
00:08:26.595 --> 00:08:28.685
This task of pref flighting.

167
00:08:28.685 --> 00:08:32.165
Our tail load system was not a desirable task to be assigned

168
00:08:32.545 --> 00:08:34.765
to the instrumentation engineer for pre-flight.

169
00:08:35.065 --> 00:08:37.045
It was a task we had to do, but

170
00:08:37.045 --> 00:08:40.605
because of its high degree of date entry

171
00:08:40.825 --> 00:08:45.735
and, uh, mundaneness, I don't even know if

172
00:08:45.735 --> 00:08:47.055
that's a word, but it is now.

173
00:08:48.315 --> 00:08:51.535
It was not a desirable thing to get assigned, but you did it

174
00:08:51.535 --> 00:08:54.735
and you were, uh, you, you took your time, uh,

175
00:08:54.735 --> 00:08:56.125
to make make sure that you got it right.

176
00:08:58.685 --> 00:09:03.165
How is this not reducing? Understanding the domain knowledge

177
00:09:03.165 --> 00:09:05.125
of how the system worked is still retained.

178
00:09:05.265 --> 00:09:09.925
We didn't take any of the, uh, the, the automation

179
00:09:10.065 --> 00:09:11.205
of the inputs and,

180
00:09:11.585 --> 00:09:14.565
and, uh, reversion was not really domain knowledge.

181
00:09:14.625 --> 00:09:18.005
The system, we all still understand how the system works.

182
00:09:18.505 --> 00:09:20.765
The code that was, uh, put in

183
00:09:20.765 --> 00:09:24.985
to automate the pre-flight checks didn't, uh, in my view,

184
00:09:24.985 --> 00:09:26.905
didn't reduce any understanding of the system.

185
00:09:30.015 --> 00:09:34.115
So if we go back to the HFDS automate with good reason,

186
00:09:34.735 --> 00:09:37.435
we had many reasons why we wanted to automate this,

187
00:09:38.345 --> 00:09:43.295
but, uh, my personal input was I didn't

188
00:09:43.295 --> 00:09:47.935
wanna leave the airplane in a state by a data entry air

189
00:09:48.515 --> 00:09:52.515

and cause a, uh, air turn back early

190
00:09:52.515 --> 00:09:54.955
because maybe we got high tail loads.

191
00:09:55.175 --> 00:09:59.455
But the very extreme scenario

192
00:09:59.755 --> 00:10:01.895
of we have high tail loads and we don't know it

193
00:10:01.895 --> 00:10:03.735
because we are suppressing the system.

194
00:10:05.035 --> 00:10:08.145
Easy access to data, that speed is easy.

195
00:10:08.205 --> 00:10:12.185
Access to data, uh, air resistant and air tolerant.

196
00:10:12.485 --> 00:10:15.105
The automation itself we tried to prove was air resistant

197
00:10:15.105 --> 00:10:17.785
and air tolerant, but we were certainly taking a system

198
00:10:17.855 --> 00:10:19.625
that was not air resistant

199
00:10:19.645 --> 00:10:21.425
and not air tolerant and making it.

200
00:10:21.425 --> 00:10:24.835
So why is saving time

201
00:10:25.025 --> 00:10:27.225
safe schedule and pressure?

202
00:10:27.225 --> 00:10:29.585
We've talked about a lot at this workshop.

203
00:10:30.585 --> 00:10:33.345
I argue that saving 15 minutes,

204
00:10:33.345 --> 00:10:35.985
while it might not seem like a lot for instrumentation

205
00:10:35.985 --> 00:10:39.025
during pre-flight, we have all the same pressures

206
00:10:39.405 --> 00:10:41.585
as the maintenance people preparing the aircraft.

207
00:10:42.285 --> 00:10:46.185
And those pressures of we're gonna take off at this time,

208
00:10:46.185 --> 00:10:48.425
whether that time was picked out of thin air

209
00:10:48.445 --> 00:10:50.065
or whether it's real due

210
00:10:50.065 --> 00:10:52.305
to environmental concerns are always there.

211
00:10:52.605 --> 00:10:55.465
So saving 15 minutes for an instrumentation engineer

212
00:10:55.725 --> 00:10:56.945
to go in pre-flight

213
00:10:57.005 --> 00:10:58.785
and look at something else with more rigor

214
00:10:59.365 --> 00:11:00.665
is actually quite big.

215
00:11:03.425 --> 00:11:04.525
So, closing thoughts.

216
00:11:06.995 --> 00:11:09.765

What Headspace has this presentation put you in?

217
00:11:10.065 --> 00:11:12.685
Are there not necessarily instrumentation pre-flight

218
00:11:13.005 --> 00:11:13.965
procedures, but are there

219
00:11:13.965 --> 00:11:15.365
pre-flight checks that you're doing?

220
00:11:15.705 --> 00:11:17.605
Is there test preparation that you're doing

221
00:11:17.995 --> 00:11:22.485
that results in a lot of data entry of a repeat

222
00:11:23.155 --> 00:11:25.525
type environment that you could automate

223
00:11:26.145 --> 00:11:28.725
and have a computer do better and faster

224
00:11:30.335 --> 00:11:34.035
and be very deliberate with your choices of

225
00:11:34.035 --> 00:11:36.955
what you automate and what you choose to retain?

226
00:11:38.125 --> 00:11:40.255
This is a picture of the 7 3 7 dash 10

227
00:11:40.605 --> 00:11:43.415
that I was the lead instrumentation on engineer on,

228
00:11:43.415 --> 00:11:45.815
and this is actually a picture reference from the Boeing

229
00:11:45.855 --> 00:11:47.215
Archives of Flood testing

230
00:11:47.555 --> 00:11:49.785
where the system was most certainly used.

231
00:11:54.055 --> 00:11:55.175
References. Again,

232
00:11:55.875 --> 00:11:58.175
the human factors design standard is excellent.

233
00:11:58.435 --> 00:12:00.415
Uh, chapter three talks about automation.

234
00:12:00.635 --> 00:12:04.435
The embedded references in there are also excellent

235
00:12:04.455 --> 00:12:05.635
and the images are great.

236
00:12:05.975 --> 00:12:09.035
I'd like to also mention and acknowledge my coworker

237
00:12:09.035 --> 00:12:10.075
and Dima Shafi.

238
00:12:10.535 --> 00:12:12.715
We all say we will fix this in software.

239
00:12:13.265 --> 00:12:15.155
NEMA was the one that actually wrote the code

240
00:12:15.455 --> 00:12:16.715
to fix this in software.

241
00:12:16.895 --> 00:12:18.475
And uh, I thank him for that.

242
00:12:22.425 --> 00:12:23.795
I'll open it up to any questions.

243
00:12:35.255 --> 00:12:38.875

Thank you for that, Jack. Um, do you, uh,

244
00:12:39.915 --> 00:12:41.115
I I thought it was really cool

245
00:12:41.115 --> 00:12:43.635
that you included the human Factors standards in there.

246
00:12:43.655 --> 00:12:46.215
That's, uh, two questions.

247
00:12:46.245 --> 00:12:48.455
Word, who thought of that or how did you think of that?

248
00:12:48.555 --> 00:12:50.095
And two, how did you actually do it?

249
00:12:50.125 --> 00:12:52.655
Like, did you involve human factors people

250
00:12:52.755 --> 00:12:55.135
or just use it, you know, from an engineering perspective?

251
00:12:56.045 --> 00:12:58.255
Yeah. Uh, how did we do it?

252
00:12:58.515 --> 00:13:00.735
We, it, it's a good reference, right?

253
00:13:00.905 --> 00:13:03.455
Again, like I mentioned, it's a collection of a lot

254
00:13:03.455 --> 00:13:06.535
of human factors work that is out there that is,

255
00:13:06.835 --> 00:13:07.935
has existed for decades.

256
00:13:08.555 --> 00:13:10.015
Um, I found it as interesting.

257
00:13:10.015 --> 00:13:12.215
Like I mentioned the presentation, a lot

258
00:13:12.215 --> 00:13:13.935
of it is actually from the nuclear industry.

259
00:13:14.165 --> 00:13:15.855
They automate a lot of things

260
00:13:16.865 --> 00:13:19.605
and, uh, they've had a lot of accidents.

261
00:13:19.885 --> 00:13:21.535
A lot of these standards

262
00:13:21.535 --> 00:13:24.925
that they've developed are born from tragic events.

263
00:13:25.265 --> 00:13:29.375
Um, so we, human factors is,

264
00:13:29.395 --> 00:13:31.095
is not new at Boeing, but the focus

265
00:13:31.155 --> 00:13:32.975
of it is certainly more present to myself.

266
00:13:33.045 --> 00:13:34.295
Even in instrumentation.

267
00:13:34.295 --> 00:13:37.375
We have an entire group now in our, uh,

268
00:13:37.375 --> 00:13:39.295
flight test analysis that's human factors.

269
00:13:39.875 --> 00:13:44.555
But we, uh, I was looking for material on what was out there

270
00:13:44.695 --> 00:13:47.435

and they pointed me to this, uh, reference guide,

271
00:13:48.085 --> 00:13:49.375
this, uh, reference material.

272
00:13:53.045 --> 00:13:54.095
Yeah, you bet. Thanks, Bob.

273
00:14:00.715 --> 00:14:04.695
Um, a question I have for you is, so I assume

274
00:14:04.695 --> 00:14:06.815
that you found this as instrumentation

275
00:14:06.815 --> 00:14:08.775
and you brought it up as being something

276
00:14:08.775 --> 00:14:09.855
you wanted to improve.

277
00:14:10.275 --> 00:14:14.415
As most of us are operations or pilots and, and engineers

278
00:14:14.415 --> 00:14:17.295
and not so much, uh, day to day working

279
00:14:17.295 --> 00:14:18.375
with the instrumentation.

280
00:14:18.795 --> 00:14:21.885
How can we help our colleagues,

281
00:14:21.885 --> 00:14:24.125
our instrumentation colleagues to identify these sort

282
00:14:24.125 --> 00:14:26.645
of things and empower them to make those improvements?

283
00:14:27.075 --> 00:14:28.125
Yeah, it's a good question.

284
00:14:28.405 --> 00:14:29.645
I can say in the development

285
00:14:29.665 --> 00:14:31.725
of our new tail loads monitoring system,

286
00:14:31.915 --> 00:14:33.325
this was considered,

287
00:14:33.705 --> 00:14:37.915
however, it was not implemented due to,

288
00:14:38.735 --> 00:14:41.515
uh, potentially schedule and budget

289
00:14:41.735 --> 00:14:43.435
or some of the other pressures.

290
00:14:43.735 --> 00:14:47.035
So I will say that this idea was not novel in myself.

291
00:14:47.255 --> 00:14:51.705
Uh, certainly, um, I, I remember doing this when I came

292
00:14:51.705 --> 00:14:54.905
to the company when the computer used floppy discs

293
00:14:55.395 --> 00:14:56.775
and then having to go

294
00:14:56.775 --> 00:15:00.215
through all the same data entry procedures was a little, uh,

295
00:15:01.005 --> 00:15:02.735
yeah, I, I, I questioned it then,

296
00:15:02.835 --> 00:15:04.055
but it, uh,

297
00:15:06.995 --> 00:15:08.195

I don't have a great answer for you.

298
00:15:08.475 --> 00:15:12.775
I think it's, whenever you put, I'll, I'll say this,

299
00:15:13.495 --> 00:15:15.335
whenever you try

300
00:15:15.335 --> 00:15:20.205
and produce a system with a lot of complexity

301
00:15:21.315 --> 00:15:25.285
into the flight test airplane, somebody has to validate that

302
00:15:25.285 --> 00:15:26.885
that works and somebody has to validate that

303
00:15:26.885 --> 00:15:27.885
that works every day.

304
00:15:28.385 --> 00:15:33.345
So being really intentional with a complex system is great,

305
00:15:33.725 --> 00:15:35.745
but you also have to be really intentional with

306
00:15:35.925 --> 00:15:37.785
how you're gonna check that out every day.

307
00:15:38.045 --> 00:15:41.825
We had this great safety monitoring system for decades,

308
00:15:42.355 --> 00:15:45.265
gives us a great, uh, analysis in our tail loads.

309
00:15:46.715 --> 00:15:51.255
We were a little blind to the checkout procedures, maybe,

310
00:15:51.905 --> 00:15:53.845
uh, not being as robust as they could.

311
00:15:59.105 --> 00:16:01.485
Hey, thanks for the presentation. Great case study.

312
00:16:02.545 --> 00:16:04.685
Uh, question for you, was there a readily available

313
00:16:04.685 --> 00:16:06.765
interface for you to go from typing on keyboard

314
00:16:06.945 --> 00:16:09.045
to inserting data somehow?

315
00:16:09.385 --> 00:16:10.445
Or did you have to invent one?

316
00:16:10.445 --> 00:16:13.525
And if you did, or there's thoughts about verifying

317
00:16:13.525 --> 00:16:15.245
that interface, either reliability

318
00:16:15.265 --> 00:16:16.695
or integrity or something?

319
00:16:16.765 --> 00:16:18.215
Yeah, good question. Uh,

320
00:16:18.315 --> 00:16:20.855
so the data entry interface was there.

321
00:16:21.195 --> 00:16:25.615
We, um, the old floppy disc version was a little bit crude.

322
00:16:25.635 --> 00:16:27.615
The newer version was a web-based tool,

323
00:16:27.915 --> 00:16:29.095
or is a web-based tool.

324
00:16:29.235 --> 00:16:31.575

We actually didn't disable that in our automation.

325
00:16:31.605 --> 00:16:35.495
It's still there. If we have any questions with, uh,

326
00:16:35.635 --> 00:16:36.935
how the automation is working,

327
00:16:37.035 --> 00:16:39.215
we can always revert back to the manual method.

328
00:16:39.835 --> 00:16:43.965
Um, can you ask

329
00:16:43.985 --> 00:16:45.005
the last part of your question

330
00:16:45.005 --> 00:16:46.125
again? I'm not really sure. I'm

331
00:16:46.305 --> 00:16:48.085
Oh, so you kind of answered it with the first one.

332
00:16:48.085 --> 00:16:49.885
Yeah. If, if you have to invent a new interface,

333
00:16:49.885 --> 00:16:50.885
it brings up some more questions,

334
00:16:50.885 --> 00:16:52.445
but it sounds like you had that readily available,

335
00:16:52.445 --> 00:16:54.285
which lended itself nicely. Yeah,

336
00:16:54.405 --> 00:16:58.685
I, I, I will say that the, the computer just doesn't pull

337
00:16:59.215 --> 00:17:02.565
these shifts and disabled measurements out of the air.

338
00:17:02.625 --> 00:17:05.485
You do have to create a configuration file

339
00:17:05.795 --> 00:17:07.245
that is gonna remain static.

340
00:17:07.245 --> 00:17:08.765
However, you're only doing that once,

341
00:17:08.825 --> 00:17:11.365
and you can check that as many times as you want

342
00:17:11.385 --> 00:17:12.965
before you put it in the computer.

343
00:17:13.265 --> 00:17:15.965
And you're also still double checking the computer's work.

344
00:17:15.985 --> 00:17:19.325
In our case, you're saying, I expected this tail load to go

345
00:17:19.325 --> 00:17:20.365
to 97%.

346
00:17:20.785 --> 00:17:23.405
Yep. It produced a result. That's 97%.

347
00:17:29.335 --> 00:17:30.335
All right. Thank you again.

348
00:17:43.495 --> 00:17:45.595
All right, three great presentations.

349
00:17:45.615 --> 00:17:46.915
Now it's time for another coffee break.

350
00:17:47.245 --> 00:17:48.555
We've got a little bit of extra time,

351
00:17:48.655 --> 00:17:52.395

but we're gonna be meeting back here on schedule at 1430.

352
00:17:53.215 --> 00:17:53.755
See y'all out there.