1
00:00:11,310 --> 00:00:09,900
welcome everybody to our career panel

2
00:00:12,990 --> 00:00:11,320
event this year if you guys don't know

3
00:00:15,600 --> 00:00:13,000
me yet my name is Jess I'm one of the

4
00:00:18,269 --> 00:00:15,610
Canadian organizers a student at Western

5
00:00:19,950 --> 00:00:18,279
University in London and every year we

6
00:00:21,930 --> 00:00:19,960
won't Lisa why last couple years we've

7
00:00:23,430 --> 00:00:21,940
tried to arrange a career panel just

8
00:00:25,890 --> 00:00:23,440
kind of an informal question-and-answer

9
00:00:27,870 --> 00:00:25,900
period between the conference attendees

10
00:00:31,080 --> 00:00:27,880
and people who have made careers out of

11
00:00:32,660 --> 00:00:31,090
astrobiology which assuming is something

12
00:00:36,600 --> 00:00:32,670
we all aspire to you because we're here

13
00:00:39,210 --> 00:00:36,610

so without further ado we have four

14
00:00:42,060 --> 00:00:39,220
career panelists today the first is

15
00:00:45,000 --> 00:00:42,070
Roman Cruiser lucky room it Roman did

16
00:00:47,640 --> 00:00:45,010
his PhD at U of T and engineering he is

17
00:00:49,410 --> 00:00:47,650
the senior research scientist at mpb

18
00:00:50,610 --> 00:00:49,420
communications is involved in instrument

19
00:00:52,710 --> 00:00:50,620
development has worked on several

20
00:00:54,240 --> 00:00:52,720
different analogue missions lunar

21
00:00:55,500 --> 00:00:54,250
missions i worked with roman on a

22
00:00:58,950 --> 00:00:55,510
Martian analog mission a couple years

23
00:01:01,500 --> 00:00:58,960
ago we've got Richard love I a heated is

24
00:01:06,300 --> 00:01:01,510
a PhD at Western my alma mater his alma

25
00:01:08,820 --> 00:01:06,310
mater he is a CSA scientist of the

26
00:01:12,539 --> 00:01:08,830
Canadian Space Agency and he's also on

27
00:01:15,170 --> 00:01:12,549
the MSL chemcam instrument and then we

28
00:01:20,010 --> 00:01:15,180
have Lyle white he did his PhD at

29
00:01:21,419 --> 00:01:20,020
Waterloo another Canadian and he is the

30
00:01:24,149 --> 00:01:21,429
candid research chair environmental

31
00:01:25,380 --> 00:01:24,159
microbiology here and is the lead p I in

32
00:01:27,209 --> 00:01:25,390
the Canadian astrobiology training

33
00:01:29,639 --> 00:01:27,219
program and then up on the big screen

34
00:01:32,490 --> 00:01:29,649
here we've got Murray Schmidt she's

35
00:01:36,649 --> 00:01:32,500
coming to us from Brock University she

36
00:01:39,630 --> 00:01:36,659
did her PhD at Oregon State yes yes and

37
00:01:41,819 --> 00:01:39,640
she is a assistant professor of Brock

38
00:01:44,550 --> 00:01:41,829

and also an adjunct at Western and is

39
00:01:48,179 --> 00:01:44,560
also on MSL so what we've tried to do is

40
00:01:50,880 --> 00:01:48,189
kind of get an array of panelists from

41
00:01:52,919 --> 00:01:50,890
academia industry and the space agency

42
00:01:54,749 --> 00:01:52,929
so that way you kind of have an idea of

43
00:01:57,090 --> 00:01:54,759
all the asked questions about the broad

44
00:01:59,999 --> 00:01:57,100
range of astrobiology careers out there

45
00:02:01,349 --> 00:02:00,009
so just to get started I just gave a

46
00:02:03,809 --> 00:02:01,359
really brief introduction if we could

47
00:02:06,300 --> 00:02:03,819
have each of the panelists to maybe five

48
00:02:08,279 --> 00:02:06,310
minutes or so under five minutes tell us

49
00:02:09,779 --> 00:02:08,289
a little bit about how they got into

50
00:02:10,889 --> 00:02:09,789
astrobiology what they started kind of

51
00:02:14,089 --> 00:02:10,899
how they ended up where they are and

52
00:02:18,610 --> 00:02:14,099
what they're working on right now maybe

53
00:02:23,030 --> 00:02:21,740
basically I did my PhD at U of T in the

54
00:02:24,709 --> 00:02:23,040
electrical engineering and solid-state

55
00:02:26,599 --> 00:02:24,719
physics so I got into material

56
00:02:29,209 --> 00:02:26,609
processing there we were developing the

57
00:02:32,360 --> 00:02:29,219
Marfa silicon solar cells for which he

58
00:02:35,300 --> 00:02:32,370
got a patent and we try to industrialize

59
00:02:38,750 --> 00:02:35,310
that with arise actually based near

60
00:02:40,759 --> 00:02:38,760
Waterloo and then my first position was

61
00:02:43,420 --> 00:02:40,769
at McMaster University and engineering

62
00:02:46,879 --> 00:02:43,430
physics where we set up Canada's first

63
00:02:48,830 --> 00:02:46,889

gas a source molecular beam epitaxy for

64
00:02:51,080 --> 00:02:48,840
going kind of crystals that are used for

65
00:02:53,599 --> 00:02:51,090
laser diodes so again kind of applicable

66
00:02:55,780 --> 00:02:53,609
to astrobiology but really much more

67
00:03:00,110 --> 00:02:55,790
focused on the technologies that could

68
00:03:04,429 --> 00:03:00,120
enable the signs and then after that I

69
00:03:06,920 --> 00:03:04,439
had my position at mpb and one of the

70
00:03:08,720 --> 00:03:06,930
mat when I first started the job one of

71
00:03:11,720 --> 00:03:08,730
the managers it was leaving to get a

72
00:03:14,809 --> 00:03:11,730
position at Bell Norvin research so she

73
00:03:16,550 --> 00:03:14,819
handed me her project was was with the

74
00:03:18,500 --> 00:03:16,560
Canadian Defense Department to develop a

75
00:03:20,960 --> 00:03:18,510
miniature spectrometer called I'll spec

76
00:03:23,030 --> 00:03:20,970
so kind of I let the development who if

77
00:03:26,119 --> 00:03:23,040
I know is kind of a collaboration and we

78
00:03:27,680 --> 00:03:26,129
got a patent on that and through that we

79
00:03:29,479 --> 00:03:27,690
developed some collaborations with

80
00:03:31,460 --> 00:03:29,489
professor at clueless at the University

81
00:03:33,170 --> 00:03:31,470
of Winnipeg and he would bring us all

82
00:03:34,670 --> 00:03:33,180
sorts of rock samples he said all these

83
00:03:37,129 --> 00:03:34,680
things have wonderful interesting

84
00:03:38,960 --> 00:03:37,139
spectra in them and so basically we were

85
00:03:40,670 --> 00:03:38,970
shining a light bouncing it off and said

86
00:03:42,110 --> 00:03:40,680
that doesn't really work that great he

87
00:03:43,759 --> 00:03:42,120
said well you've got the wrong geometry

88
00:03:47,179 --> 00:03:43,769

and he came over and kind of helped us

89
00:03:49,460 --> 00:03:47,189
to set up and give us some hands on how

90
00:03:50,960 --> 00:03:49,470
to do diffuse reflectance and so we were

91
00:03:52,749 --> 00:03:50,970
able to get some spectra very similar to

92
00:03:55,399 --> 00:03:52,759
the previous talk you know so I could

93
00:03:58,580 --> 00:03:55,409
recognize the gypsum and Alan I'd and

94
00:04:00,229 --> 00:03:58,590
Kayla night and so on and then through

95
00:04:02,289 --> 00:04:00,239
our collaborations we got a number of

96
00:04:05,839 --> 00:04:02,299
projects with the Canadian Space Agency

97
00:04:08,539 --> 00:04:05,849
one was to look at the COG do a survey

98
00:04:09,770 --> 00:04:08,549
and provide recommendations on the kind

99
00:04:12,349 --> 00:04:09,780
of instruments that would be suitable

100
00:04:14,379 --> 00:04:12,359
for you son Mars to really ate the

101
00:04:19,009 --> 00:04:14,389
detection of vile indicator so basically

102
00:04:21,860 --> 00:04:19,019
spectrometers Raman spectroscopy and so

103
00:04:24,439 --> 00:04:21,870
on and through that we got the follow-on

104
00:04:27,800 --> 00:04:24,449
work to develop a potential Canadian let

105
00:04:30,290 --> 00:04:27,810
Mars mission called inukshuk which had a

106
00:04:31,909 --> 00:04:30,300
lot of interesting elements but still

107
00:04:34,820 --> 00:04:31,919
in the planning phases but hopefully at

108
00:04:37,219 --> 00:04:34,830
some point and then follow on to that

109
00:04:38,659 --> 00:04:37,229
basically we got to develop one of

110
00:04:40,100 --> 00:04:38,669
Canada's micro Rover it's called

111
00:04:42,740 --> 00:04:40,110
Catholic and apparently there's now a

112
00:04:45,230 --> 00:04:42,750
rock on mars called Caprica that we

113
00:04:48,529 --> 00:04:45,240

should mention yeah not quite related to

114
00:04:49,820 --> 00:04:48,539
our Rover but we'll take it yeah yeah

115
00:04:52,600 --> 00:04:49,830
but we got to get the real thing up

116
00:04:55,159 --> 00:04:52,610
there something for Canada and then

117
00:04:57,290 --> 00:04:55,169
assoc of some of our micro rover work we

118
00:04:59,990 --> 00:04:57,300
got into analog mission so basically

119
00:05:01,550 --> 00:05:00,000
with Jessica we did two field

120
00:05:05,149 --> 00:05:01,560
deployments for the Mars mapping mission

121
00:05:08,930 --> 00:05:05,159
basically searching for methane as a

122
00:05:11,450 --> 00:05:08,940
potential bio indicator in asbestos and

123
00:05:13,909 --> 00:05:11,460
your bestest minds not too far for in

124
00:05:15,379 --> 00:05:13,919
the Eastern Townships I guess and we

125
00:05:17,959 --> 00:05:15,389
were able to actually find natural

126
00:05:20,480 --> 00:05:17,969
methane and find new species of

127
00:05:22,399 --> 00:05:20,490
methanogens which were clicking here and

128
00:05:25,070 --> 00:05:22,409
I guess Lyle White and his group was

129
00:05:26,930 --> 00:05:25,080
doing some analysis on it and since then

130
00:05:29,570 --> 00:05:26,940
we've been trying to develop the annual

131
00:05:31,790 --> 00:05:29,580
Canadian let missions such as cable for

132
00:05:34,129 --> 00:05:31,800
a lunar exploration of volatiles that

133
00:05:37,459 --> 00:05:34,139
may have been deposited by meteoroid

134
00:05:39,740 --> 00:05:37,469
impacts now in terms of a career in

135
00:05:41,809 --> 00:05:39,750
industry of course one has to find some

136
00:05:44,469 --> 00:05:41,819
sort of funding to support your research

137
00:05:46,580 --> 00:05:44,479
endeavors and transform that into

138
00:05:48,379 --> 00:05:46,590

potential instruments that can be built

139
00:05:50,330 --> 00:05:48,389
but you also have to understand the

140
00:05:52,760 --> 00:05:50,340
signs and how the instrument is going to

141
00:05:54,559 --> 00:05:52,770
be used and what the requirements for

142
00:05:56,540 --> 00:05:54,569
that are because basically if you

143
00:05:58,249 --> 00:05:56,550
isolate the scientist and the instrument

144
00:06:00,469 --> 00:05:58,259
makers the scientists will come up with

145
00:06:01,700 --> 00:06:00,479
a lot of things you know that would

146
00:06:03,200 --> 00:06:01,710
require an instrument bigger than the

147
00:06:05,450 --> 00:06:03,210
size of this room and you know a

148
00:06:07,850 --> 00:06:05,460
supercomputer to operate and of course

149
00:06:09,649 --> 00:06:07,860
on the technology site they're looking

150
00:06:12,559 --> 00:06:09,659
at something really small well if we

151
00:06:14,089 --> 00:06:12,569
measure that's simple parameter can you

152
00:06:16,610 --> 00:06:14,099
answer some questions with that and then

153
00:06:19,480 --> 00:06:16,620
there's the struggle of upscaling what

154
00:06:22,580 --> 00:06:19,490
the industry wants to build and you know

155
00:06:24,529 --> 00:06:22,590
kind try to clarify what the scientists

156
00:06:26,899 --> 00:06:24,539
want to do so it can be very interesting

157
00:06:28,610 --> 00:06:26,909
and hopefully through our collaboration

158
00:06:30,920 --> 00:06:28,620
so if universities like mcgill we have

159
00:06:33,200 --> 00:06:30,930
an ongoing collaboration and certainly

160
00:06:34,519 --> 00:06:33,210
with the space agency canadian one we're

161
00:06:36,740 --> 00:06:34,529
also doing some work with visa and

162
00:06:38,839 --> 00:06:36,750
jackson that there can be opportunities

163
00:06:40,730 --> 00:06:38,849

for microbiologist definitely an

164
00:06:42,610 --> 00:06:40,740
industry on the sensor side and how to

165
00:06:47,480 --> 00:06:42,620
apply the sensors

166
00:06:50,690 --> 00:06:47,490
thanks her we just cycle through and

167
00:06:54,170 --> 00:06:50,700
yeah yeah okay all right hi I'm I'm

168
00:06:56,330 --> 00:06:54,180
gonna go back into pre undergrad days

169
00:07:00,650 --> 00:06:56,340
when I thought I was going to be an

170
00:07:02,000 --> 00:07:00,660
engineer and we do something in Quebec

171
00:07:05,480 --> 00:07:02,010
here between high school and university

172
00:07:06,740 --> 00:07:05,490
called stasia and my session chef marks

173
00:07:08,360 --> 00:07:06,750
were not very good so I actually wasn't

174
00:07:12,350 --> 00:07:08,370
accepted into engineering which is

175
00:07:13,790 --> 00:07:12,360
pretty pretty pretty sad but I figured

176
00:07:15,469 --> 00:07:13,800
you know I'll go take some courses and

177
00:07:19,070 --> 00:07:15,479
transfer into engineering after a year

178
00:07:20,870 --> 00:07:19,080
but turns out i ended up in geology not

179
00:07:23,870 --> 00:07:20,880
sure I can't really remember why or how

180
00:07:25,219 --> 00:07:23,880
but I turned out i liked it i really

181
00:07:27,409 --> 00:07:25,229
liked it and i learned a little bit more

182
00:07:29,390 --> 00:07:27,419
about engineering and realized that that

183
00:07:31,670 --> 00:07:29,400
really wasn't what I wanted to do so so

184
00:07:35,260 --> 00:07:31,680
I ended up doing under gree undergrad

185
00:07:37,879 --> 00:07:35,270
degree in geology actually a

186
00:07:39,140 --> 00:07:37,889
specialization called geology ecology so

187
00:07:41,840 --> 00:07:39,150
but a third of my courses were in

188
00:07:43,250 --> 00:07:41,850

biology I was sort of heading towards

189
00:07:46,070 --> 00:07:43,260
environmental science I thought that was

190
00:07:47,870 --> 00:07:46,080
a good mix but little did i know i would

191
00:07:51,650 --> 00:07:47,880
actually continue using geology and

192
00:07:52,909 --> 00:07:51,660
biology you know in my career for grad

193
00:07:56,930 --> 00:07:52,919
school I was looking at environmental

194
00:08:00,350 --> 00:07:56,940
science programs and Kay McKay macross

195
00:08:02,750 --> 00:08:00,360
the guy who is a very old Joe chemist by

196
00:08:04,580 --> 00:08:02,760
the name of a bill fife who had turned

197
00:08:05,930 --> 00:08:04,590
into more of an environmentalist and he

198
00:08:08,510 --> 00:08:05,940
was doing some interesting environmental

199
00:08:10,279 --> 00:08:08,520
projects like using fly ash to remediate

200
00:08:12,320 --> 00:08:10,289
soils in India I thought that was really

201
00:08:15,800 --> 00:08:12,330
interesting so one thing led to another

202
00:08:18,320 --> 00:08:15,810
I ended up at Western and much to my

203
00:08:21,200 --> 00:08:18,330
surprise he had a bag of rocks from

204
00:08:24,020 --> 00:08:21,210
these caves in Hawaii and these rocks

205
00:08:26,960 --> 00:08:24,030
had slimy mineral coatings with you know

206
00:08:30,020 --> 00:08:26,970
greenish and brownish colors clearly not

207
00:08:31,850 --> 00:08:30,030
only mineral but biological and he asked

208
00:08:34,310 --> 00:08:31,860
me if I was interested in then as a

209
00:08:37,520 --> 00:08:34,320
young early grad student I said I guess

210
00:08:41,060 --> 00:08:37,530
I have to say yes so so I ended up

211
00:08:42,800 --> 00:08:41,070
working in Hawaii for my so that was for

212
00:08:47,120 --> 00:08:42,810
my master's degree and that's another

213
00:08:49,370 --> 00:08:47,130

story but became a PhD degree and worked

214
00:08:51,740 --> 00:08:49,380
on these caves in Hawaii looked on

215
00:08:53,560 --> 00:08:51,750
looked at how microorganisms influence

216
00:08:58,570 --> 00:08:53,570
mineral formation

217
00:09:00,280 --> 00:08:58,580
and and then was not thinking of you

218
00:09:03,010 --> 00:09:00,290
know other planets at the time was not

219
00:09:06,460 --> 00:09:03,020
thinking of space exploration I was just

220
00:09:07,870 --> 00:09:06,470
enjoying what I was doing and and then

221
00:09:12,430 --> 00:09:07,880
somewhere along the way I got interested

222
00:09:15,010 --> 00:09:12,440
in in deep-sea hydrothermal vents and so

223
00:09:16,870 --> 00:09:15,020
when came time to look for a postdoc I i

224
00:09:18,700 --> 00:09:16,880
wanted to do deep-sea hydrothermal vent

225
00:09:21,130 --> 00:09:18,710
work and so that's what i did so i

226
00:09:22,810 --> 00:09:21,140
actually came back to montreal worked

227
00:09:25,330 --> 00:09:22,820
with a guy by the name of Kim Kim

228
00:09:28,030 --> 00:09:25,340
juniper who was at University to Quebec

229
00:09:30,070 --> 00:09:28,040
here in Montreal he's now at University

230
00:09:32,380 --> 00:09:30,080
of Victoria worked on deep sea

231
00:09:35,380 --> 00:09:32,390
hydrothermal vents that was really cool

232
00:09:38,520 --> 00:09:35,390
but again not thinking of space or you

233
00:09:41,830 --> 00:09:38,530
know Mars or Europa at least not much

234
00:09:43,960 --> 00:09:41,840
until I got more involved with some you

235
00:09:46,480 --> 00:09:43,970
know space-related conferences in

236
00:09:49,270 --> 00:09:46,490
particular canadian ones and made some

237
00:09:51,430 --> 00:09:49,280
contacts at the csa and eventually an

238
00:09:55,120 --> 00:09:51,440

opportunity came up to to go work at the

239
00:09:57,520 --> 00:09:55,130
csa so so kind of was never planned that

240
00:10:00,430 --> 00:09:57,530
way you know plan a was always academia

241
00:10:04,270 --> 00:10:00,440
and like I said an opportunity came up

242
00:10:07,860 --> 00:10:04,280
and I jumped at it and and yeah so I've

243
00:10:10,300 --> 00:10:07,870
been there for over eight years now and

244
00:10:12,070 --> 00:10:10,310
a couple of years ago I said it would be

245
00:10:13,840 --> 00:10:12,080
great you know since I'm a my official

246
00:10:17,620 --> 00:10:13,850
title is planetary scientists I should

247
00:10:20,290 --> 00:10:17,630
work on a planetary mission msl was was

248
00:10:21,790 --> 00:10:20,300
was sort of getting ready to launch the

249
00:10:23,590 --> 00:10:21,800
NASA had a call for participating

250
00:10:27,610 --> 00:10:23,600
scientists I said this is my chance

251
00:10:29,710 --> 00:10:27,620
wrote a proposal and it was selected and

252
00:10:33,250 --> 00:10:29,720
then so since then I've been working

253
00:10:36,460 --> 00:10:33,260
with the mslt mon on great things on

254
00:10:39,670 --> 00:10:36,470
Mars and meeting great people like

255
00:10:41,380 --> 00:10:39,680
Marique and many many others and it's

256
00:10:43,600 --> 00:10:41,390
really been an adventure and a mentor

257
00:10:48,100 --> 00:10:43,610
working with with the with the MSL

258
00:10:51,910 --> 00:10:48,110
mission so yeah sort of a torture but

259
00:10:55,600 --> 00:10:51,920
said a strange path of a career path but

260
00:10:57,450 --> 00:10:55,610
Iowa smile when I think of you know when

261
00:11:00,730 --> 00:10:57,460
I when I went to Western I had another

262
00:11:04,020 --> 00:11:00,740
graduate opportunity to to go to Quebec

263
00:11:07,150 --> 00:11:04,030

City to work with a young researcher on

264
00:11:08,889 --> 00:11:07,160
fish ecology in rivers

265
00:11:11,350 --> 00:11:08,899
and how the sedimentation in the rivers

266
00:11:12,999 --> 00:11:11,360
affected the fish spawning and so it you

267
00:11:16,540 --> 00:11:13,009
know it took advantage of my geology

268
00:11:22,900 --> 00:11:16,550
biology background but yeah I don't know

269
00:11:26,069 --> 00:11:22,910
where that pathway to led me okay let's

270
00:11:28,809 --> 00:11:26,079
see well I'll tell you my story so I

271
00:11:30,579 --> 00:11:28,819
started as an undergrad as well at the

272
00:11:32,769 --> 00:11:30,589
University of Regina and Saskatchewan

273
00:11:34,240 --> 00:11:32,779
way back when I don't think I'm as old

274
00:11:37,540 --> 00:11:34,250
as Roman but I think I'm starting to get

275
00:11:39,759 --> 00:11:37,550
there anyways i started in general

276
00:11:41,710 --> 00:11:39,769
biology and by the second year I became

277
00:11:44,170 --> 00:11:41,720
really interested in things all things

278
00:11:46,389 --> 00:11:44,180
microbiological so I ended up finishing

279
00:11:49,869 --> 00:11:46,399
as a getting an undergrad degree in

280
00:11:51,790 --> 00:11:49,879
microbiology and from there I had no

281
00:11:53,259 --> 00:11:51,800
idea what I was going to do next and I

282
00:11:55,809 --> 00:11:53,269
ended up working for the Royal Canadian

283
00:11:58,990 --> 00:11:55,819
Mounted Police as a forensic scientist

284
00:12:00,670 --> 00:11:59,000
for about four years and I was became an

285
00:12:02,559 --> 00:12:00,680
expert a so-called expert in the

286
00:12:06,639 --> 00:12:02,569
serology body fluid identification and

287
00:12:09,879 --> 00:12:06,649
characterization unfortunately for me

288
00:12:12,759 --> 00:12:09,889

and the RCMP I really had no passion in

289
00:12:16,210 --> 00:12:12,769
crime it just wasn't this wasn't my

290
00:12:17,410 --> 00:12:16,220
thing and and well it was always in the

291
00:12:20,620 --> 00:12:17,420
back of my head to go to graduate school

292
00:12:22,509 --> 00:12:20,630
so after working with the RCMP for about

293
00:12:24,999 --> 00:12:22,519
four years there were four good years I

294
00:12:27,759 --> 00:12:25,009
ended up at Waterloo starting a master's

295
00:12:32,410 --> 00:12:27,769
degree in waterloo in about 19 god I

296
00:12:35,829 --> 00:12:32,420
can't even remember now 1987 86-88

297
00:12:37,300 --> 00:12:35,839
something like that and so that went

298
00:12:39,910 --> 00:12:37,310
very well I was working with a guy named

299
00:12:41,920 --> 00:12:39,920
bill Ennis who was a specialist and

300
00:12:43,990 --> 00:12:41,930
cold-adapted microbes mostly on the

301
00:12:45,970 --> 00:12:44,000
physiology side we didn't have things

302
00:12:48,579 --> 00:12:45,980
like molecular biology back then in a

303
00:12:50,350 --> 00:12:48,589
very little molecular biology and that

304
00:12:52,449 --> 00:12:50,360
was a good fit for me and I was looking

305
00:12:53,740 --> 00:12:52,459
at how certain bugs grow at very cold

306
00:12:54,970 --> 00:12:53,750
temperatures or low temperatures what I

307
00:12:57,370 --> 00:12:54,980
thought were very gold temperatures at

308
00:13:00,340 --> 00:12:57,380
that time I finished there and i think

309
00:13:02,620 --> 00:13:00,350
it was 93 or 92 and I came to Montreal

310
00:13:04,119 --> 00:13:02,630
and started as a postdoc with something

311
00:13:05,710 --> 00:13:04,129
the National Research Council of

312
00:13:07,389 --> 00:13:05,720
Montreal at the biotechnology research

313
00:13:09,670 --> 00:13:07,399

institute the National Research Council

314
00:13:12,759 --> 00:13:09,680
is the government the federal government

315
00:13:15,249 --> 00:13:12,769
research arm they have about 15

316
00:13:18,189 --> 00:13:15,259
institutes across Canada doing various

317
00:13:19,600 --> 00:13:18,199
things including biotechnology and I was

318
00:13:20,830 --> 00:13:19,610
working with a guy I still worked with

319
00:13:23,650 --> 00:13:20,840
this gent this guy

320
00:13:26,020 --> 00:13:23,660
Greer who is a specialist in bio

321
00:13:29,200 --> 00:13:26,030
degradation by remediation and he

322
00:13:31,510 --> 00:13:29,210
essentially hired me to look at low

323
00:13:33,760 --> 00:13:31,520
temperature biodegradation in northern

324
00:13:37,450 --> 00:13:33,770
climates which is also a very good fit

325
00:13:39,220 --> 00:13:37,460
for Canada so that started 1993 as hired

326
00:13:42,160 --> 00:13:39,230
as a postdoc in two years I was hired

327
00:13:43,090 --> 00:13:42,170
then as a research scientist which was a

328
00:13:44,710 --> 00:13:43,100
good thing because it was a full-time

329
00:13:47,290 --> 00:13:44,720
job so you're for sure very much happy

330
00:13:50,560 --> 00:13:47,300
happier about that we had a very good

331
00:13:53,470 --> 00:13:50,570
run there I started doing projects and

332
00:13:54,700 --> 00:13:53,480
let's say southern Canada and for some

333
00:13:56,590 --> 00:13:54,710
reason we started going farther and

334
00:13:58,990 --> 00:13:56,600
farther north and at one time I was on

335
00:14:01,330 --> 00:13:59,000
Ellesmere Island about 900 kilometers

336
00:14:05,170 --> 00:14:01,340
from the North Pole doing biodegradation

337
00:14:07,450 --> 00:14:05,180
bioremediation at a contaminated site on

338
00:14:09,070 --> 00:14:07,460

Ellesmere Island Eureka and if you want

339
00:14:11,560 --> 00:14:09,080
you can google that final where Eureka's

340
00:14:13,240 --> 00:14:11,570
which about halfway up Alzner about the

341
00:14:16,080 --> 00:14:13,250
same time i think that i think the

342
00:14:19,480 --> 00:14:16,090
Eureka moment for me came in nineteen

343
00:14:23,650 --> 00:14:19,490
yeah well sort of at the same time but

344
00:14:25,780 --> 00:14:23,660
yeah about 1997 when the famous Mars

345
00:14:27,910 --> 00:14:25,790
meteorite came out and we have a

346
00:14:29,680 --> 00:14:27,920
professor here at McGill who was one of

347
00:14:31,360 --> 00:14:29,690
the co-authors of that paper and he did

348
00:14:35,530 --> 00:14:31,370
a lot of the microscopic work as name is

349
00:14:36,940 --> 00:14:35,540
a doctor but we just call him valley in

350
00:14:39,580 --> 00:14:36,950
he's part of the Canaan astrobiology

351
00:14:42,730 --> 00:14:39,590
trading program as well he was

352
00:14:46,360 --> 00:14:42,740
responsible the microscopic work on the

353
00:14:48,070 --> 00:14:46,370
famous ALJ 10 00 for which created quite

354
00:14:49,750 --> 00:14:48,080
a buzz way back in nineteen ninety-seven

355
00:14:50,920 --> 00:14:49,760
although i think most people in this

356
00:14:53,140 --> 00:14:50,930
room were a little bit younger by then

357
00:14:55,740 --> 00:14:53,150
it probably didn't notice it but the

358
00:14:58,360 --> 00:14:55,750
point was i saw a presentation by a

359
00:14:59,350 --> 00:14:58,370
couple presentations at mcgill by dr.

360
00:15:01,120 --> 00:14:59,360
valley and the guy that he was working

361
00:15:03,250 --> 00:15:01,130
with dale anderson talking about this

362
00:15:05,170 --> 00:15:03,260
and I got to talking with dale anderson

363
00:15:06,760 --> 00:15:05,180

who was working with wayne Pollard here

364
00:15:08,080 --> 00:15:06,770
at McGill University and they said well

365
00:15:09,520 --> 00:15:08,090
you're up at eureka why don't you come

366
00:15:13,150 --> 00:15:09,530
and he started talking about one of

367
00:15:14,380 --> 00:15:13,160
these this really weird site on axel

368
00:15:15,880 --> 00:15:14,390
Heiberg Island you could look that up

369
00:15:17,260 --> 00:15:15,890
from google tonight too if you want but

370
00:15:19,810 --> 00:15:17,270
I'll tell you where it is anyways it's

371
00:15:21,700 --> 00:15:19,820
right by eureka on Ellesmere Island just

372
00:15:23,740 --> 00:15:21,710
to the left to the west and there are

373
00:15:26,800 --> 00:15:23,750
some very interesting Springs there that

374
00:15:29,080 --> 00:15:26,810
go through 600 meters of permafrost and

375
00:15:30,370 --> 00:15:29,090
he invited me to go to this site one

376
00:15:33,120 --> 00:15:30,380
time when I was up Ellsbury doing

377
00:15:35,880 --> 00:15:33,130
biodegradation so i ended up there and

378
00:15:37,290 --> 00:15:35,890
uh uh uh yeah you know they gave this

379
00:15:39,600 --> 00:15:37,300
presentation I said well who's doing the

380
00:15:42,900 --> 00:15:39,610
microbiology on this and he says well

381
00:15:45,990 --> 00:15:42,910
nobody and and it was at that particular

382
00:15:48,000 --> 00:15:46,000
time it clicked in my head that I had no

383
00:15:50,460 --> 00:15:48,010
interest in planetary science until that

384
00:15:52,290 --> 00:15:50,470
moment and and it was kind of that just

385
00:15:56,490 --> 00:15:52,300
sort of connected a few dots and say

386
00:15:58,560 --> 00:15:56,500
Mars really really cold and no one's

387
00:16:00,120 --> 00:15:58,570
really looking at microbes and extreme

388
00:16:02,430 --> 00:16:00,130

environments or very few people are

389
00:16:04,410 --> 00:16:02,440
looking at microbes in really really

390
00:16:07,530 --> 00:16:04,420
cold environments on earth as earth

391
00:16:09,750 --> 00:16:07,540
analogs and and you know long story

392
00:16:12,300 --> 00:16:09,760
short I eventually ended up in the gill

393
00:16:14,160 --> 00:16:12,310
in 2003 and that has been the basis of

394
00:16:16,140 --> 00:16:14,170
my research program since i came to

395
00:16:19,560 --> 00:16:16,150
McGill looking at things like permafrost

396
00:16:21,180 --> 00:16:19,570
and these cold saline springs and some

397
00:16:23,280 --> 00:16:21,190
other wacky environments we can find in

398
00:16:26,280 --> 00:16:23,290
the High Arctic and try to understand is

399
00:16:29,040 --> 00:16:26,290
is there microbial life in these places

400
00:16:31,320 --> 00:16:29,050
are they active microbial communities

401
00:16:33,030 --> 00:16:31,330
and then taking that as an analog site

402
00:16:34,440 --> 00:16:33,040
and trying to extrapolate well what what

403
00:16:38,010 --> 00:16:34,450
would you look for in places like Mars

404
00:16:40,440 --> 00:16:38,020
or Europa or Enceladus and that's kind

405
00:16:41,820 --> 00:16:40,450
of how the whole thing evolved so in my

406
00:16:45,780 --> 00:16:41,830
case kind of like Richard there was

407
00:16:48,660 --> 00:16:45,790
really no master plan I don't think it

408
00:16:53,550 --> 00:16:48,670
just opportunities came ideas popped up

409
00:16:55,980 --> 00:16:53,560
and I you know it was AI always followed

410
00:16:57,690 --> 00:16:55,990
my passion I think and I think that was

411
00:17:00,420 --> 00:16:57,700
sort of one of the keys if I had any

412
00:17:04,230 --> 00:17:00,430
success but is doing that where my real

413
00:17:10,710 --> 00:17:04,240

interest was was directing me there you

414
00:17:15,960 --> 00:17:10,720
go all right I guess I guess it's my

415
00:17:19,699 --> 00:17:15,970
turn yeah um so uh hi from st.

416
00:17:21,990 --> 00:17:19,709
Catherine's so I am an igneous petrology

417
00:17:25,410 --> 00:17:22,000
vulcanologist I wouldn't call myself an

418
00:17:31,140 --> 00:17:25,420
astrobiologist until very recently my

419
00:17:34,110 --> 00:17:31,150
background coming from an undergrad just

420
00:17:37,830 --> 00:17:34,120
in general geology at a small school in

421
00:17:41,610 --> 00:17:37,840
Maine and then I knew that I wanted to

422
00:17:44,180 --> 00:17:41,620
go out west for grad work the reason

423
00:17:46,770 --> 00:17:44,190
being that that there were active

424
00:17:48,570 --> 00:17:46,780
tectonics they're active

425
00:17:51,090 --> 00:17:48,580
volcanoes there and that's really where

426
00:17:54,600 --> 00:17:51,100
I where I wanted to go so that brought

427
00:18:00,260 --> 00:17:54,610
me to Oregon State University where for

428
00:18:04,170 --> 00:18:00,270
my my PhD I I worked on mapping a

429
00:18:07,320 --> 00:18:04,180
volcano in the Central Oregon Cascades I

430
00:18:10,080 --> 00:18:07,330
I worked out its eruptive history and

431
00:18:15,030 --> 00:18:10,090
have published quite a bit on its

432
00:18:18,240 --> 00:18:15,040
igneous evolution so after that after

433
00:18:21,810 --> 00:18:18,250
finishing my PhD oh and also during my

434
00:18:25,260 --> 00:18:21,820
PhD I used to I work for the USGS as a

435
00:18:28,380 --> 00:18:25,270
hydrologist sampling hot springs in the

436
00:18:32,130 --> 00:18:28,390
Cascade Range and so that was sort of a

437
00:18:36,110 --> 00:18:32,140
way into understanding hydro thermal

438
00:18:39,080 --> 00:18:36,120

processes and hydrologic processes and

439
00:18:41,940 --> 00:18:39,090
so but that was just a side project

440
00:18:45,300 --> 00:18:41,950
something that helped to pay the bills

441
00:18:47,820 --> 00:18:45,310
when I was a PhD student and when I when

442
00:18:49,170 --> 00:18:47,830
I finish as a PhD student I kind of

443
00:18:53,040 --> 00:18:49,180
thought I would actually go into the

444
00:18:55,530 --> 00:18:53,050
USGS thinking that I that I would go on

445
00:18:57,930 --> 00:18:55,540
that track and and in fact I've had you

446
00:19:00,960 --> 00:18:57,940
know a couple interviews to work for the

447
00:19:04,440 --> 00:19:00,970
USGS but nothing really panned out but

448
00:19:06,960 --> 00:19:04,450
instead what happened was that uh that I

449
00:19:09,960 --> 00:19:06,970
had this opportunity to go to the

450
00:19:12,480 --> 00:19:09,970
Smithsonian for a postdoc and so all

451
00:19:15,390 --> 00:19:12,490
that happened was that after i finished

452
00:19:19,350 --> 00:19:15,400
my PhD i had i responded to an

453
00:19:21,570 --> 00:19:19,360
advertisement that was put out by the

454
00:19:23,580 --> 00:19:21,580
Smithsonian looking for a postdoc to

455
00:19:25,740 --> 00:19:23,590
work on the mars exploration rover

456
00:19:28,530 --> 00:19:25,750
mission and they were looking for

457
00:19:30,560 --> 00:19:28,540
someone that had my expertise as an

458
00:19:34,020 --> 00:19:30,570
igneous petrology stand vulcanologist

459
00:19:36,960 --> 00:19:34,030
and also with experience thinking about

460
00:19:40,440 --> 00:19:36,970
hydrothermal systems so it was it was

461
00:19:43,290 --> 00:19:40,450
almost a perfect fit and so I wanted to

462
00:19:46,380 --> 00:19:43,300
work at the Smithsonian Natural History

463
00:19:49,830 --> 00:19:46,390

Museum I worked with a guy named Tim

464
00:19:53,010 --> 00:19:49,840
McCoy who was the curator of meteorites

465
00:19:56,070 --> 00:19:53,020
at the Smithsonian I didn't know a thing

466
00:19:58,020 --> 00:19:56,080
about meteorites before my postdoc and I

467
00:19:59,220 --> 00:19:58,030
learned a great deal about them while I

468
00:20:04,470 --> 00:19:59,230
was there

469
00:20:07,860 --> 00:20:04,480
I have held a LH so I know that that

470
00:20:09,390 --> 00:20:07,870
Rockwell it's a fascinating Rock but

471
00:20:11,780 --> 00:20:09,400
there's lots of other Martian meteorites

472
00:20:15,539 --> 00:20:11,790
at the Smithsonian Sula to investigate

473
00:20:19,700 --> 00:20:15,549
so I was at the Smithsonian for 44 years

474
00:20:22,770 --> 00:20:19,710
and working on the rover mission

475
00:20:26,190 --> 00:20:22,780
primarily working with a spirit rover I

476
00:20:30,480 --> 00:20:26,200
was involved with the apxs instrument

477
00:20:34,650 --> 00:20:30,490
and the mossbauer instrument and from

478
00:20:37,380 --> 00:20:34,660
there I I worked I was lucky enough to

479
00:20:41,430 --> 00:20:37,390
be there when we discovered this feature

480
00:20:44,750 --> 00:20:41,440
called home plate which is a which is a

481
00:20:47,990 --> 00:20:44,760
volcanic deposit it's a basaltic

482
00:20:50,610 --> 00:20:48,000
pyroclastic deposit that has been

483
00:20:55,200 --> 00:20:50,620
variably altered by hydrothermal

484
00:20:58,140 --> 00:20:55,210
processes and so I was able to lend my

485
00:21:02,250 --> 00:20:58,150
expertise to helping to interpret those

486
00:21:05,400 --> 00:21:02,260
rocks which is really really cool but

487
00:21:09,450 --> 00:21:05,410
when i when i left the smithsonian to

488
00:21:13,530 --> 00:21:09,460

take a to take a faculty position at

489
00:21:16,560 --> 00:21:13,540
Brock University I had to leave Mars

490
00:21:20,310 --> 00:21:16,570
behind when you're a postdoc on a

491
00:21:22,080 --> 00:21:20,320
mission you can't necessarily continue

492
00:21:23,909 --> 00:21:22,090
on that mission when you go somewhere

493
00:21:28,860 --> 00:21:23,919
else especially since i came to canada

494
00:21:33,150 --> 00:21:28,870
and so my research went back towards

495
00:21:36,570 --> 00:21:33,160
Earth and I started to so I wrote up

496
00:21:39,570 --> 00:21:36,580
some of my um I wrote up some of my

497
00:21:43,560 --> 00:21:39,580
stuff working with spirit this is being

498
00:21:45,840 --> 00:21:43,570
here but also I've developed projects

499
00:21:48,090 --> 00:21:45,850
working on volcanic fields on earth I

500
00:21:51,270 --> 00:21:48,100
think primarily about the integrated

501
00:21:55,070 --> 00:21:51,280
history of volcanic fields particularly

502
00:21:59,220 --> 00:21:55,080
looking at hydro volcanic features and

503
00:22:01,980 --> 00:21:59,230
alteration of those assaults as well as

504
00:22:03,840 --> 00:22:01,990
their history and magma evolution so

505
00:22:07,110 --> 00:22:03,850
sort of a holistic approach to

506
00:22:11,880 --> 00:22:07,120
understanding the history of volcanic

507
00:22:13,289 --> 00:22:11,890
fields and when I when I learned that

508
00:22:15,149 --> 00:22:13,299
the CS

509
00:22:17,669 --> 00:22:15,159
a was going to support participating

510
00:22:19,619 --> 00:22:17,679
scientists on the MSL mission attempted

511
00:22:22,169 --> 00:22:19,629
the chance run proposal and I was

512
00:22:25,950 --> 00:22:22,179
selected along with Richard to be on

513
00:22:29,999 --> 00:22:25,960

this mission and so that has sort of

514
00:22:33,479 --> 00:22:30,009
taken up a lot of my research experience

515
00:22:35,879 --> 00:22:33,489
now or our focus now but in general I

516
00:22:39,299 --> 00:22:35,889
try to keep my my research focus be

517
00:22:40,919 --> 00:22:39,309
about 5050 between Earth and Mars but

518
00:22:43,440 --> 00:22:40,929
then also I have to teach on top of that

519
00:22:47,129 --> 00:22:43,450
so I'm spread pretty thin right now and

520
00:22:50,369 --> 00:22:47,139
i have but i have students who work on

521
00:22:52,680 --> 00:22:50,379
terrestrial volcanic projects um in

522
00:22:58,080 --> 00:22:52,690
terms of about what I do relates to

523
00:23:01,169 --> 00:22:58,090
habitability I working on working on a

524
00:23:03,289 --> 00:23:01,179
volcanic field in central oregon we've

525
00:23:07,190 --> 00:23:03,299
been discovering some of these little

526
00:23:10,200 --> 00:23:07,200
analytic micropores into basaltic tufts

527
00:23:12,359 --> 00:23:10,210
so that's that's sort of something that

528
00:23:15,509 --> 00:23:12,369
I'm following up on right now in

529
00:23:17,820 --> 00:23:15,519
addition working on MSL it's a

530
00:23:20,279 --> 00:23:17,830
habitability mission and then everything

531
00:23:24,389 --> 00:23:20,289
that we are looking at it's basically

532
00:23:27,119 --> 00:23:24,399
through the lens of whether or not Mars

533
00:23:30,869 --> 00:23:27,129
could have been habitable at one time so

534
00:23:34,470 --> 00:23:30,879
we're we're looking at alteration come

535
00:23:38,039 --> 00:23:34,480
mineralogy and two at the geochemistry

536
00:23:40,859 --> 00:23:38,049
to understand whether or not life could

537
00:23:44,249 --> 00:23:40,869
once been possible in terms of my role

538
00:23:46,289 --> 00:23:44,259

on the apx I mean on the MSL mission I'm

539
00:23:48,720 --> 00:23:46,299
a participating scientists like Richard

540
00:23:51,779 --> 00:23:48,730
but i also am on the alpha particle

541
00:23:54,810 --> 00:23:51,789
x-ray spectrometer team there's a team

542
00:23:57,180 --> 00:23:54,820
of scientists a lot of us are focused

543
00:23:58,859 --> 00:23:57,190
our base actually in canada there's a

544
00:24:01,799 --> 00:23:58,869
group of guelph there's a group that you

545
00:24:05,009 --> 00:24:01,809
can be and so we we all work together to

546
00:24:09,450 --> 00:24:05,019
interpret those two chemical data and i

547
00:24:10,859 --> 00:24:09,460
guess i'll i'll leave it there oh so now

548
00:24:21,619 --> 00:24:10,869
that now that all you're really other

549
00:24:26,369 --> 00:24:24,810
okay all good okay so now that we're all

550
00:24:27,240 --> 00:24:26,379
familiar we're basically just going to

551
00:24:28,770 --> 00:24:27,250
oak it open

552
00:24:31,530 --> 00:24:28,780
up to an informal question-and-answer

553
00:24:33,960 --> 00:24:31,540
period so anything you guys are

554
00:24:37,470 --> 00:24:33,970
wondering about careers in astrobiology

555
00:24:40,800 --> 00:24:37,480
what it's like to be in space agency

556
00:24:41,970 --> 00:24:40,810
faculty working on missions feel free to

557
00:24:45,330 --> 00:24:41,980
ask them what they want they've

558
00:24:47,310 --> 00:24:45,340
consented to this so if you have a

559
00:24:48,540 --> 00:24:47,320
question you can yell it out and I'll

560
00:24:52,020 --> 00:24:48,550
repeat it into the mic so that way our

561
00:24:55,230 --> 00:24:52,030
followers online can hear and they'll be

562
00:25:03,510 --> 00:24:55,240
happy to answer anything anyone have any

563
00:25:09,510 --> 00:25:03,520

questions think of their questions I'll

564
00:25:11,930 --> 00:25:09,520
just add to the alh84001 story I was a

565
00:25:14,670 --> 00:25:11,940
grad student in 96 when the when the

566
00:25:15,990 --> 00:25:14,680
paper came out in science and the you

567
00:25:18,650 --> 00:25:16,000
know the press conference and everything

568
00:25:23,190 --> 00:25:18,660
and I wasn't thinking of Mars or

569
00:25:26,430 --> 00:25:23,200
astrobiology but but when I saw what

570
00:25:29,130 --> 00:25:26,440
these people had done in their study you

571
00:25:31,050 --> 00:25:29,140
know they had used you know oxygen and

572
00:25:32,940 --> 00:25:31,060
carbon isotopes they'd use electron

573
00:25:36,330 --> 00:25:32,950
microscopy they're looking at minerals

574
00:25:38,610 --> 00:25:36,340
and and and bio signatures and I said to

575
00:25:41,400 --> 00:25:38,620
myself wow this is what I'm doing but

576
00:25:43,320 --> 00:25:41,410
you know on a very tres triol project

577
00:25:46,830 --> 00:25:43,330
and so that was kind of the first hint

578
00:25:49,140 --> 00:25:46,840
that yeah you can do stuff on earth in

579
00:25:50,700 --> 00:25:49,150
our earth labs and of course it's

580
00:25:53,340 --> 00:25:50,710
relevant to planetary or space

581
00:25:58,020 --> 00:25:53,350
exploration and you know it took a few

582
00:25:59,580 --> 00:25:58,030
years after that but and you know many

583
00:26:02,730 --> 00:25:59,590
people have noted this before it the

584
00:26:05,010 --> 00:26:02,740
importance of that meteorite in that

585
00:26:06,600 --> 00:26:05,020
study to the field of astrobiology you

586
00:26:11,150 --> 00:26:06,610
know no matter what you think of the

587
00:26:13,320 --> 00:26:11,160
findings of that study it really

588
00:26:15,540 --> 00:26:13,330

affected people you know just as Lyle

589
00:26:16,620 --> 00:26:15,550
mentioned as I mentioned you know and

590
00:26:19,230 --> 00:26:16,630
Marique mentions you know what an

591
00:26:22,920 --> 00:26:19,240
interesting rocket is our meteorite well

592
00:26:26,370 --> 00:26:22,930
it's a rock it really affected the field

593
00:26:29,400 --> 00:26:26,380
of astrobiology and and and if you look

594
00:26:32,490 --> 00:26:29,410
at just this conference which is I think

595
00:26:35,040 --> 00:26:32,500
ten years old you know that's post you

596
00:26:37,740 --> 00:26:35,050
know 96 you know and in the new era of

597
00:26:39,690 --> 00:26:37,750
Nai and and a lot of initiatives like

598
00:26:41,139 --> 00:26:39,700
that so it's interesting from a

599
00:26:46,389 --> 00:26:41,149
historical perspective

600
00:26:48,190 --> 00:26:46,399
how how things evolved by all right we

601
00:26:51,009 --> 00:26:48,200
actually have an online question so I'm

602
00:26:53,440 --> 00:26:51,019
going to read it out you're next from

603
00:26:55,779 --> 00:26:53,450
shanna cool Kendall shanna Kendall and

604
00:27:00,190 --> 00:26:55,789
is asking what did grad school not

605
00:27:08,159 --> 00:27:00,200
prepare you for so anyone want to start

606
00:27:11,589 --> 00:27:08,169
off interviewing and hiring students and

607
00:27:16,349 --> 00:27:11,599
filling out evaluation of those students

608
00:27:19,209 --> 00:27:16,359
and so a lot of the a lot of the I I

609
00:27:23,529 --> 00:27:19,219
think a lot of the administration of

610
00:27:25,149 --> 00:27:23,539
doing research managing budgets even to

611
00:27:26,440 --> 00:27:25,159
some extent writing proposals but I

612
00:27:27,940 --> 00:27:26,450
guess different people may have

613
00:27:30,940 --> 00:27:27,950

different experience and in terms of

614
00:27:32,619 --> 00:27:30,950
their grad school exposure to that but

615
00:27:38,019 --> 00:27:32,629
certainly the administration part of

616
00:27:39,729 --> 00:27:38,029
budgets hiring or firing things like

617
00:27:43,719 --> 00:27:39,739
that because because when you do have a

618
00:27:45,789 --> 00:27:43,729
research program I I think in all areas

619
00:27:48,639 --> 00:27:45,799
you do have some of that that that

620
00:27:51,190 --> 00:27:48,649
administration and management which is

621
00:27:54,190 --> 00:27:51,200
generally not the fun part of our jobs I

622
00:27:55,930 --> 00:27:54,200
don't I don't think anyone would but

623
00:28:00,190 --> 00:27:55,940
that's certainly one thing I can think

624
00:28:02,680 --> 00:28:00,200
of go ahead okay I think on our part of

625
00:28:05,379 --> 00:28:02,690
definitely preparing proposals to csa

626
00:28:06,729 --> 00:28:05,389
and other agencies which can be quite

627
00:28:09,639 --> 00:28:06,739
involved in trying to build the teams

628
00:28:13,089 --> 00:28:09,649
and getting a cohesive focus to what we

629
00:28:14,589 --> 00:28:13,099
want to do on the student side is you

630
00:28:16,149 --> 00:28:14,599
have to plan work for other people like

631
00:28:17,709 --> 00:28:16,159
we have junior engineers they say what

632
00:28:21,070 --> 00:28:17,719
do we do what should i do today or this

633
00:28:22,450 --> 00:28:21,080
weekend still see and sometimes it can

634
00:28:24,669 --> 00:28:22,460
get lost because some of our projects

635
00:28:27,159 --> 00:28:24,679
are quite you know complex technically

636
00:28:28,749 --> 00:28:27,169
and so how do you approach that and

637
00:28:31,359 --> 00:28:28,759
we're still learning new things because

638
00:28:34,029 --> 00:28:31,369

I'm I never study for example

639
00:28:35,469 --> 00:28:34,039
atmospheric sciences science but when we

640
00:28:38,169 --> 00:28:35,479
got into developing instruments for

641
00:28:39,879 --> 00:28:38,179
example for trace gas analysis we also

642
00:28:41,529 --> 00:28:39,889
had to work with the scientist like

643
00:28:42,989 --> 00:28:41,539
Professor Drummond to try to understand

644
00:28:45,579 --> 00:28:42,999
the processes that are happening

645
00:28:46,659 --> 00:28:45,589
associate of climate change and whatever

646
00:28:50,349 --> 00:28:46,669
and the same thing in terms of

647
00:28:52,149 --> 00:28:50,359
astrobiology I had eugenics and biology

648
00:28:54,520 --> 00:28:52,159
you know to some background in

649
00:28:56,980 --> 00:28:54,530
university but not really related to

650
00:28:58,300 --> 00:28:56,990
looking for life on other worlds you

651
00:29:01,090 --> 00:28:58,310
know and we're still trying to

652
00:29:02,470 --> 00:29:01,100
understand life on our planet but as you

653
00:29:04,750 --> 00:29:02,480
can see what's happening with the

654
00:29:06,580 --> 00:29:04,760
science like with the more powerful

655
00:29:08,590 --> 00:29:06,590
telescopes they're trying they're

656
00:29:10,750 --> 00:29:08,600
finding out that our solar system is not

657
00:29:14,260 --> 00:29:10,760
that unique there are many other solar

658
00:29:15,910 --> 00:29:14,270
systems with planets orbiting one or

659
00:29:18,340 --> 00:29:15,920
multiple sons and now they're even

660
00:29:20,950 --> 00:29:18,350
starting to discover planets that aren't

661
00:29:23,310 --> 00:29:20,960
just gas giants but could be in that you

662
00:29:26,380 --> 00:29:23,320
know critical zone were you could have

663
00:29:28,390 --> 00:29:26,390

water and so on and in our own solar

664
00:29:31,740 --> 00:29:28,400
system it's not just Mars there's like

665
00:29:34,300 --> 00:29:31,750
Europa and the other planets that are

666
00:29:36,730 --> 00:29:34,310
probably participating in all sorts of

667
00:29:38,710 --> 00:29:36,740
processes that could be related to

668
00:29:40,240 --> 00:29:38,720
astrobiology maybe even something in the

669
00:29:43,900 --> 00:29:40,250
atmosphere on Venus you know you never

670
00:29:45,910 --> 00:29:43,910
know again an extreme environment so I

671
00:29:48,250 --> 00:29:45,920
think there's a great potential at some

672
00:29:50,920 --> 00:29:48,260
point definitely man will want to go

673
00:29:52,690 --> 00:29:50,930
beyond the earth like Columbus dips you

674
00:29:54,520 --> 00:29:52,700
discover North America so I think

675
00:29:56,740 --> 00:29:54,530
they'll be looking at going to Mars or

676
00:29:59,740 --> 00:29:56,750
maybe some of the moons of Jupiter or

677
00:30:00,880 --> 00:29:59,750
Saturn and starting colonies and if we

678
00:30:02,920 --> 00:30:00,890
ever you know come up with good

679
00:30:05,740 --> 00:30:02,930
technologies on how to get beyond our

680
00:30:07,450 --> 00:30:05,750
own solar system or you know some family

681
00:30:10,060 --> 00:30:07,460
wants to spend several generations and

682
00:30:13,840 --> 00:30:10,070
space to go to the next potentially

683
00:30:16,330 --> 00:30:13,850
livable solar system and planet then

684
00:30:18,730 --> 00:30:16,340
yeah I think there'll be a growing

685
00:30:21,220 --> 00:30:18,740
amount and really new technical areas

686
00:30:26,050 --> 00:30:21,230
that will be developed associated with

687
00:30:29,980 --> 00:30:26,060
this yeah what did grad school not me

688
00:30:32,050 --> 00:30:29,990

prepare me for well I'm on two minds of

689
00:30:34,030 --> 00:30:32,060
this I think Richard hit it it's a very

690
00:30:36,670 --> 00:30:34,040
important points and sort of Roman this

691
00:30:38,350 --> 00:30:36,680
idea that you know as an academic it did

692
00:30:41,410 --> 00:30:38,360
not teach me it did not teach me how to

693
00:30:43,900 --> 00:30:41,420
teach that's for sure but as an academic

694
00:30:46,210 --> 00:30:43,910
and everyone can tell you most academics

695
00:30:49,590 --> 00:30:46,220
never were taught how to teach so you

696
00:30:52,290 --> 00:30:49,600
kind of do it on the job managing people

697
00:30:57,160 --> 00:30:52,300
certainly is not something that's on the

698
00:30:59,890 --> 00:30:57,170
grad school program so you learn this on

699
00:31:01,930 --> 00:30:59,900
the job dealing with bureaucracies well

700
00:31:04,360 --> 00:31:01,940
you do to deal with bureaucracies all

701
00:31:06,340 --> 00:31:04,370
these administrative things I don't find

702
00:31:07,850 --> 00:31:06,350
those things very important though as as

703
00:31:08,810 --> 00:31:07,860
a priority and

704
00:31:11,030 --> 00:31:08,820
at school and I had this conversation

705
00:31:12,740 --> 00:31:11,040
with Jen was way in the back who's my

706
00:31:14,120 --> 00:31:12,750
current postdoc and you probably hear

707
00:31:17,330 --> 00:31:14,130
from her sometime this week about what

708
00:31:20,450 --> 00:31:17,340
she's doing here you know when when when

709
00:31:23,240 --> 00:31:20,460
I look at as a graduate student or as a

710
00:31:24,500 --> 00:31:23,250
postdoc as a postdoc do you want to

711
00:31:26,690 --> 00:31:24,510
start writing grants maybe you're

712
00:31:29,960 --> 00:31:26,700
getting involved in that as a PhD stone

713
00:31:32,030 --> 00:31:29,970

or a master student I really think you

714
00:31:35,560 --> 00:31:32,040
want to learn how to do really good

715
00:31:38,419 --> 00:31:35,570
science and that should be the focus

716
00:31:41,270 --> 00:31:38,429
okay and I'll tell you why as an

717
00:31:43,340 --> 00:31:41,280
academic and Richard and other people

718
00:31:46,820 --> 00:31:43,350
can chime in here so if you send me your

719
00:31:49,360 --> 00:31:46,830
CV when you finish your PhD or you know

720
00:31:52,610 --> 00:31:49,370
you want apply as a postdoc with me or

721
00:31:55,580 --> 00:31:52,620
or a PhD student I go to the first page

722
00:31:58,460 --> 00:31:55,590
and I look for publications and most

723
00:32:01,520 --> 00:31:58,470
academics are like this I'm looking you

724
00:32:03,950 --> 00:32:01,530
know the other stuff is nice to have but

725
00:32:05,659 --> 00:32:03,960
if you apply it for me for example as a

726
00:32:09,409 --> 00:32:05,669
postdoc and you have a week publication

727
00:32:12,080 --> 00:32:09,419
record it's just gone okay I'm not

728
00:32:15,470 --> 00:32:12,090
interested anymore and I think most

729
00:32:18,380 --> 00:32:15,480
academics will tell you that as your

730
00:32:20,299 --> 00:32:18,390
training to be a scientist it's a very

731
00:32:22,640 --> 00:32:20,309
competitive world and what we're doing

732
00:32:24,770 --> 00:32:22,650
try to be the best scientists you can

733
00:32:27,380 --> 00:32:24,780
and get that stuff out and published and

734
00:32:29,000 --> 00:32:27,390
and a lot of doors will open from that

735
00:32:30,740 --> 00:32:29,010
that particular point because you will

736
00:32:32,419 --> 00:32:30,750
be invited to give conference

737
00:32:35,270 --> 00:32:32,429
presentations you will be invited to

738
00:32:37,310 --> 00:32:35,280

meet people all across the board so on

739
00:32:38,900 --> 00:32:37,320
and so forth that are going to create

740
00:32:41,539 --> 00:32:38,910
opportunities for you and your career

741
00:32:43,430 --> 00:32:41,549
down the future that make sense so

742
00:32:46,400 --> 00:32:43,440
publish our parish still rings true yeah

743
00:32:48,830 --> 00:32:46,410
it's very true but it's it's it's you

744
00:32:50,870 --> 00:32:48,840
could go to conferences you can give

745
00:32:53,419 --> 00:32:50,880
presentations or poster presentations

746
00:32:56,240 --> 00:32:53,429
but at the level that we're at we're

747
00:32:59,150 --> 00:32:56,250
looking for can you can you finish the

748
00:33:00,799 --> 00:32:59,160
project and get it published and a nice

749
00:33:02,180 --> 00:33:00,809
and a really good journal or a good

750
00:33:03,620 --> 00:33:02,190
journal that sort of thing because that

751
00:33:05,900 --> 00:33:03,630
tells us you can do the whole thing and

752
00:33:08,090 --> 00:33:05,910
and that's what as a professor that we

753
00:33:10,490 --> 00:33:08,100
want you to do and my colleague here

754
00:33:13,850 --> 00:33:10,500
would indicate and just indicated that

755
00:33:15,980 --> 00:33:13,860
she is an extremely busy person okay and

756
00:33:17,240 --> 00:33:15,990
so my I have four kids at home you might

757
00:33:21,139 --> 00:33:17,250
need a couple tonight when we come back

758
00:33:22,700 --> 00:33:21,149
to the museum you know so so we

759
00:33:24,409 --> 00:33:22,710
want to hire people that can do that

760
00:33:28,369 --> 00:33:24,419
that I don't have to write their papers

761
00:33:30,799 --> 00:33:28,379
for them entirely okay and if you

762
00:33:39,139 --> 00:33:30,809
haven't done that on your CV it's not a

763
00:33:42,019 --> 00:33:39,149

good sign yeah I guess some said just to

764
00:33:44,269 --> 00:33:42,029
add to that point so it's it's not just

765
00:33:46,489 --> 00:33:44,279
like trying to get your postdoc or

766
00:33:47,959 --> 00:33:46,499
trying to finish your PhD where you want

767
00:33:49,279 --> 00:33:47,969
to publish I'm right now on this date

768
00:33:51,469 --> 00:33:49,289
where I'm going to go for ten year next

769
00:33:54,889 --> 00:33:51,479
year but everything will be put together

770
00:33:58,729 --> 00:33:54,899
and my whole a publication record will

771
00:34:04,389 --> 00:33:58,739
be evaluated from you know to see where

772
00:34:08,619 --> 00:34:04,399
my future will be um so but i guess to

773
00:34:12,680 --> 00:34:08,629
to say another to put another spin on

774
00:34:14,899 --> 00:34:12,690
what graduate school didn't prepare me

775
00:34:19,129 --> 00:34:14,909
for i guess there are a couple things um

776
00:34:21,619 --> 00:34:19,139
in terms of writing I don't think I

777
00:34:23,990 --> 00:34:21,629
really knew how to write until I was a

778
00:34:26,000 --> 00:34:24,000
postdoc and I really forced myself to do

779
00:34:29,000 --> 00:34:26,010
it and i would say i'm still learning

780
00:34:31,730 --> 00:34:29,010
how to write it is a process and for

781
00:34:33,859 --> 00:34:31,740
some people it's comes naturally and for

782
00:34:36,769 --> 00:34:33,869
other people we really have to work at

783
00:34:41,930 --> 00:34:36,779
it and develop a lot of time to it and

784
00:34:43,639 --> 00:34:41,940
so don't just put rush to put together a

785
00:34:46,519 --> 00:34:43,649
draft and published you want it to be

786
00:34:48,980 --> 00:34:46,529
the best thing you can so that people

787
00:34:52,039 --> 00:34:48,990
actually read it the other the other

788
00:34:55,460 --> 00:34:52,049

point that I would bring up is that when

789
00:34:58,279 --> 00:34:55,470
I was in grad school I worked on the

790
00:35:01,569 --> 00:34:58,289
eruptive history of a volcano but I was

791
00:35:04,880 --> 00:35:01,579
very I was focused regionally and

792
00:35:11,059 --> 00:35:04,890
tectonic lee in a very in a specific

793
00:35:13,940 --> 00:35:11,069
place and when i moved into a postdoc

794
00:35:17,480 --> 00:35:13,950
and I started to my mind is kind of

795
00:35:20,779 --> 00:35:17,490
expanded with the idea of working on

796
00:35:23,779 --> 00:35:20,789
other planets and so I think that um

797
00:35:28,220 --> 00:35:23,789
another point to bring home is that you

798
00:35:32,690 --> 00:35:28,230
know a very detailed work is really

799
00:35:33,780 --> 00:35:32,700
important it's the foundation of the

800
00:35:36,990 --> 00:35:33,790
foundation of

801
00:35:39,240 --> 00:35:37,000
of good science however we want to think

802
00:35:41,100 --> 00:35:39,250
also about applicability and the big

803
00:35:44,970 --> 00:35:41,110
picture implications of the work that we

804
00:35:46,890 --> 00:35:44,980
do and so you know be sure to keep that

805
00:35:49,370 --> 00:35:46,900
in mind because it's really easy to get

806
00:35:52,730 --> 00:35:49,380
caught up in the in the small details

807
00:35:55,620 --> 00:35:52,740
and when you're when you move on

808
00:35:59,100 --> 00:35:55,630
especially especially for writing

809
00:36:01,560 --> 00:35:59,110
proposals and also for for writing

810
00:36:04,470 --> 00:36:01,570
papers you want to have that spin of why

811
00:36:06,750 --> 00:36:04,480
your work matters when you're a postdoc

812
00:36:08,490 --> 00:36:06,760
or when you're a PhD student you may not

813
00:36:14,390 --> 00:36:08,500

necessarily think about things and that

814
00:36:43,770 --> 00:36:14,400
and that from that perspective alright

815
00:36:45,030 --> 00:36:43,780
Alyssa that's the next question all

816
00:36:47,520 --> 00:36:45,040
right I'm just going to repeat it in the

817
00:36:48,870 --> 00:36:47,530
mic so that everyone can hear but she's

818
00:36:50,580 --> 00:36:48,880
basically just commenting on how

819
00:36:52,620 --> 00:36:50,590
international astrobiology has become

820
00:36:53,970 --> 00:36:52,630
there's opportunities all over the world

821
00:36:55,440 --> 00:36:53,980
even here we've got participants from

822
00:36:56,760 --> 00:36:55,450
everywhere and what are the

823
00:36:58,560 --> 00:36:56,770
opportunities for working in other

824
00:37:00,450 --> 00:36:58,570
countries other than your citizenship in

825
00:37:03,420 --> 00:37:00,460
terms of academia space agencies and

826
00:37:06,810 --> 00:37:03,430
things like that cool and you want to

827
00:37:12,170 --> 00:37:06,820
start um i guess i can because i'm i'm

828
00:37:15,360 --> 00:37:12,180
the one from the US on the panel and

829
00:37:16,740 --> 00:37:15,370
moving to another country the

830
00:37:19,260 --> 00:37:16,750
opportunities are there but it's

831
00:37:22,350 --> 00:37:19,270
difficult to break into it I'm not gonna

832
00:37:25,980 --> 00:37:22,360
lie when I when I first when I first

833
00:37:29,160 --> 00:37:25,990
came to Canada having to learn the whole

834
00:37:32,340 --> 00:37:29,170
funding system here and to sort of make

835
00:37:34,650 --> 00:37:32,350
myself part of the CSA or to try to

836
00:37:38,280 --> 00:37:34,660
generate funding through the CSA hasn't

837
00:37:40,290 --> 00:37:38,290
really still even easy also to build

838
00:37:45,870 --> 00:37:40,300

collaborations with other Canadian

839
00:37:47,520 --> 00:37:45,880
scientists has you know is it isn't that

840
00:37:51,830 --> 00:37:47,530
isn't necessarily that easy

841
00:37:55,710 --> 00:37:51,840
but you could do it and for me moving to

842
00:37:58,250 --> 00:37:55,720
Canada has really worked out I was

843
00:38:01,260 --> 00:37:58,260
really lucky to this work out however

844
00:38:05,330 --> 00:38:01,270
there's there's some challenges with

845
00:38:07,980 --> 00:38:05,340
with coming to Canada at least for me

846
00:38:10,590 --> 00:38:07,990
finding work for my husband for example

847
00:38:14,460 --> 00:38:10,600
that was tricky you know things like

848
00:38:15,900 --> 00:38:14,470
that are things you don't necessarily

849
00:38:23,010 --> 00:38:15,910
think about when you move into another

850
00:38:24,870 --> 00:38:23,020
country okay actually just directly

851
00:38:28,320 --> 00:38:24,880
related to that our last higher in our

852
00:38:31,440 --> 00:38:28,330
group was a postdoc from KS who actually

853
00:38:33,120 --> 00:38:31,450
originally comes from Iran and so kind

854
00:38:36,690 --> 00:38:33,130
of joined our group two years ago to

855
00:38:38,760 --> 00:38:36,700
help us to do the software for the

856
00:38:41,340 --> 00:38:38,770
robotics and navigation on the Catholic

857
00:38:46,110 --> 00:38:41,350
micro rover and basically we've kept it

858
00:38:47,730 --> 00:38:46,120
on now as a permanent engineer in our

859
00:38:49,470 --> 00:38:47,740
group so definitely there are

860
00:38:52,050 --> 00:38:49,480
opportunities and we've had some

861
00:38:54,240 --> 00:38:52,060
students doing either their masters or

862
00:38:56,250 --> 00:38:54,250
PhD like for one from Kyoto University

863
00:38:58,590 --> 00:38:56,260

who spent a couple years in Canada and

864
00:39:00,750 --> 00:38:58,600
with us so there are opportunities for

865
00:39:02,370 --> 00:39:00,760
international students in Canada if you

866
00:39:04,920 --> 00:39:02,380
have to kind of the right mix of skills

867
00:39:06,810 --> 00:39:04,930
and you know the interest jive with what

868
00:39:16,370 --> 00:39:06,820
the company is interested are what's

869
00:39:26,960 --> 00:39:23,569
I think it depends on your experience

870
00:39:29,390 --> 00:39:26,970
and how adaptable you are to do what's

871
00:39:30,769 --> 00:39:29,400
needed you know but a lot of times it's

872
00:39:32,450 --> 00:39:30,779
also luck that you know you have the

873
00:39:39,170 --> 00:39:32,460
right skills for what's needed for what

874
00:39:45,799 --> 00:39:39,180
you're looking for yeah yeah yeah maybe

875
00:39:48,190 --> 00:39:45,809
I'll just comment yeah so similar to

876
00:39:50,900 --> 00:39:48,200
Roman you know we we've had a couple of

877
00:39:53,420 --> 00:39:50,910
Spanish students come for internships

878
00:39:55,640 --> 00:39:53,430
including G animal for a few months at a

879
00:39:58,519 --> 00:39:55,650
time just to get that sort of

880
00:40:01,819 --> 00:39:58,529
cross-pollination new ideas new people

881
00:40:03,769 --> 00:40:01,829
different backgrounds and as well I have

882
00:40:08,210 --> 00:40:03,779
a post doc who just finished with me a

883
00:40:12,740 --> 00:40:08,220
Spaniard as well and a lot of you people

884
00:40:14,089 --> 00:40:12,750
know and and and he's going back to the

885
00:40:18,079 --> 00:40:14,099
States oh yeah up so people people

886
00:40:22,400 --> 00:40:18,089
people need you know mobility is always

887
00:40:24,200 --> 00:40:22,410
an issue in in in academia and science

888
00:40:26,930 --> 00:40:24,210

and research you know going where the

889
00:40:29,809 --> 00:40:26,940
opportunities are it's not always easy

890
00:40:34,430 --> 00:40:29,819
especially in terms of you know couples

891
00:40:37,880 --> 00:40:34,440
and families um so it's always you know

892
00:40:41,210 --> 00:40:37,890
it's I was a challenge but I think you

893
00:40:43,490 --> 00:40:41,220
know um you gotta get it you got to try

894
00:40:45,430 --> 00:40:43,500
and make things happen and you got it

895
00:40:48,140 --> 00:40:45,440
sometimes create opportunities and

896
00:40:51,049 --> 00:40:48,150
that's that's certainly you know my

897
00:40:54,349 --> 00:40:51,059
history of trying to make things happen

898
00:40:56,359 --> 00:40:54,359
and then taking advantage of things in

899
00:41:00,140 --> 00:40:56,369
terms of you know fellowships jobs and

900
00:41:02,599 --> 00:41:00,150
so on I'm going to ask a question to

901
00:41:04,670 --> 00:41:02,609
Richard what what hot is it easy for

902
00:41:06,410 --> 00:41:04,680
foreign nationals to get hired by the

903
00:41:10,970 --> 00:41:06,420
federal government of canada for example

904
00:41:15,650 --> 00:41:10,980
or by the canadian space agency so

905
00:41:20,509 --> 00:41:15,660
canada has immigration laws where it to

906
00:41:24,650 --> 00:41:20,519
hire someone for a job you the normal

907
00:41:26,509 --> 00:41:24,660
rule or law is that if if there's a

908
00:41:29,089 --> 00:41:26,519
Canadian there yet or a permanent

909
00:41:30,140 --> 00:41:29,099
resident you you pick them if not you

910
00:41:32,599 --> 00:41:30,150
can pick someone else

911
00:41:35,000 --> 00:41:32,609
but I mean that's that's kind of the

912
00:41:37,039 --> 00:41:35,010
simple version of law for students and

913
00:41:40,640 --> 00:41:37,049

fellowships like n cirque funding that

914
00:41:42,200 --> 00:41:40,650
doesn't apply and in fact it's

915
00:41:43,400 --> 00:41:42,210
encouraged to bring in people from the

916
00:41:46,279 --> 00:41:43,410
outside who are that you know the

917
00:41:48,319 --> 00:41:46,289
smartest in their field and two and two

918
00:41:51,470 --> 00:41:48,329
to help you know whatever research is

919
00:41:55,279 --> 00:41:51,480
happening in Canada so yeah so if you're

920
00:41:59,569 --> 00:41:55,289
talking jobs there is that that sort of

921
00:42:03,349 --> 00:41:59,579
immigration law that but that needs to

922
00:42:05,210 --> 00:42:03,359
be considered and it's it's somewhat

923
00:42:06,200 --> 00:42:05,220
different in academia compared to the

924
00:42:07,819 --> 00:42:06,210
federal government or federal

925
00:42:09,230 --> 00:42:07,829
government's I think in the United

926
00:42:11,299 --> 00:42:09,240
States it's probably much the same as in

927
00:42:12,859 --> 00:42:11,309
Canada or vice versa so that I think

928
00:42:16,390 --> 00:42:12,869
there's probably a few doors that are

929
00:42:20,079 --> 00:42:16,400
closed at government agencies sometimes

930
00:42:24,170 --> 00:42:20,089
in industry and academia certainly in

931
00:42:25,730 --> 00:42:24,180
academia you know I have we take

932
00:42:28,099 --> 00:42:25,740
graduate students and postdocs from

933
00:42:30,470 --> 00:42:28,109
around the world essentially it's it's

934
00:42:32,390 --> 00:42:30,480
not an issue for us we just sort of take

935
00:42:35,000 --> 00:42:32,400
the best people that we can attract that

936
00:42:37,760 --> 00:42:35,010
are willing to come and work for us when

937
00:42:39,640 --> 00:42:37,770
you when professors are hired Richard

938
00:42:41,690 --> 00:42:39,650

just indicated that there are

939
00:42:43,519 --> 00:42:41,700
stipulation and rules that you know

940
00:42:45,170 --> 00:42:43,529
Canadians would be hired first so on and

941
00:42:48,650 --> 00:42:45,180
so forth and most nations have these

942
00:42:51,200 --> 00:42:48,660
sort of rules but in reality academia

943
00:42:54,620 --> 00:42:51,210
universities like McGill will take the

944
00:42:56,180 --> 00:42:54,630
best person as a new professor for

945
00:42:58,130 --> 00:42:56,190
example that can fill that position

946
00:43:00,319 --> 00:42:58,140
regardless of where they come from and

947
00:43:04,069 --> 00:43:00,329
they'll make it work and I kind of think

948
00:43:05,900 --> 00:43:04,079
in industry it's that way as well so and

949
00:43:08,990 --> 00:43:05,910
especially at the level that we're at in

950
00:43:11,059 --> 00:43:09,000
this room and you know it's it's we're

951
00:43:13,579 --> 00:43:11,069
looking for the best people all the way

952
00:43:15,680 --> 00:43:13,589
through and are there roadblocks yeah I

953
00:43:17,359 --> 00:43:15,690
mean yeah there are I mean moving from

954
00:43:18,680 --> 00:43:17,369
one country to another country is not an

955
00:43:20,299 --> 00:43:18,690
easy proposition that's going to take

956
00:43:22,220 --> 00:43:20,309
you six months to a year to get used to

957
00:43:24,829 --> 00:43:22,230
what's going on in your new place I

958
00:43:26,210 --> 00:43:24,839
moved from Saskatchewan to Quebec which

959
00:43:30,769 --> 00:43:26,220
is kind of like going from country to

960
00:43:34,370 --> 00:43:30,779
country be sometimes and well in both

961
00:43:36,410 --> 00:43:34,380
negative and positive ways yeah yeah i

962
00:43:38,269 --> 00:43:36,420
mean that's tough is it are there are

963
00:43:42,410 --> 00:43:38,279

other roadblocks for me it's more

964
00:43:43,710 --> 00:43:42,420
difficult to fun foreign students

965
00:43:45,180 --> 00:43:43,720
graduate students let's say

966
00:43:46,320 --> 00:43:45,190
84 have them apply for Canadian

967
00:43:47,849 --> 00:43:46,330
scholarships because a lot of the

968
00:43:50,130 --> 00:43:47,859
Canadian scholarships are closed to

969
00:43:51,780 --> 00:43:50,140
Canadians so that makes it a little bit

970
00:43:53,670 --> 00:43:51,790
more challenging but I have a gentleman

971
00:43:57,359 --> 00:43:53,680
from Brazil up there right now for the I

972
00:43:59,010 --> 00:43:57,369
have a guy from Taiwan in my lab we have

973
00:44:01,170 --> 00:43:59,020
at least one American that's in my lab

974
00:44:02,760 --> 00:44:01,180
right now the Canadian astrobiology

975
00:44:05,790 --> 00:44:02,770
training program which a lot of people a

976
00:44:07,109 --> 00:44:05,800
lot of the Canadians are from here is

977
00:44:09,210 --> 00:44:07,119
open it's one of the few that is

978
00:44:11,250 --> 00:44:09,220
actually open where we can hire foreign

979
00:44:13,710 --> 00:44:11,260
nationals no problem and give them

980
00:44:15,210 --> 00:44:13,720
scholarships using canadian dollars this

981
00:44:16,650 --> 00:44:15,220
is not always the case I think the

982
00:44:20,099 --> 00:44:16,660
American system is almost a little bit

983
00:44:22,260 --> 00:44:20,109
more open that way or not I'm not sure

984
00:44:25,950 --> 00:44:22,270
it's not easy to move money across

985
00:44:30,210 --> 00:44:25,960
borders but we all somehow work it out

986
00:44:34,200 --> 00:44:30,220
some way in some way manner or form now

987
00:44:37,440 --> 00:44:34,210
with this conference we have another

988
00:44:39,870 --> 00:44:37,450

question online actually this is from

989
00:44:42,060 --> 00:44:39,880
again are from kira tucker asking which

990
00:44:43,470 --> 00:44:42,070
skill is more important to develop to

991
00:44:45,210 --> 00:44:43,480
write technically to an audience of

992
00:44:55,710 --> 00:44:45,220
scientists or to be able to write simply

993
00:44:58,530 --> 00:44:55,720
to a general audience ya know i think

994
00:45:00,740 --> 00:44:58,540
that being able to communicate is one of

995
00:45:09,210 --> 00:45:00,750
the more important things that we do um

996
00:45:11,040 --> 00:45:09,220
yeah i think both yeah I mean um you

997
00:45:12,660 --> 00:45:11,050
know you often hear people saying like

998
00:45:14,490 --> 00:45:12,670
scientists who say you know I don't like

999
00:45:16,980 --> 00:45:14,500
the right and I think you're alluding

1000
00:45:18,839 --> 00:45:16,990
earlier a lot that it's difficult to

1001
00:45:22,349 --> 00:45:18,849
write and it's it's it takes a lot of

1002
00:45:24,359 --> 00:45:22,359
time do well and so on but that that's

1003
00:45:26,730 --> 00:45:24,369
pretty much what we do we do stuff that

1004
00:45:28,230 --> 00:45:26,740
needs to be shared with others because

1005
00:45:32,250 --> 00:45:28,240
doing science in your lab and not

1006
00:45:35,579 --> 00:45:32,260
sharing that there's no point to that so

1007
00:45:40,710 --> 00:45:35,589
communication is key both to your peers

1008
00:45:44,089 --> 00:45:40,720
but also to to the general public also

1009
00:45:48,690 --> 00:45:44,099
too you know higher managers to

1010
00:45:52,770 --> 00:45:48,700
journalists to agency you know funding

1011
00:45:54,930 --> 00:45:52,780
agency personnel it's all it's all part

1012
00:45:57,309 --> 00:45:54,940
of getting your message across to

1013
00:46:00,759 --> 00:45:57,319

different peoples in different ways

1014
00:46:03,279 --> 00:46:00,769
so I would wrap that up as as one big

1015
00:46:06,489 --> 00:46:03,289
major skill that needs to be developed

1016
00:46:08,650 --> 00:46:06,499
as best as possible and and and one way

1017
00:46:11,499 --> 00:46:08,660
to develop it is to do you know to

1018
00:46:15,400 --> 00:46:11,509
practice writing proposals writing

1019
00:46:19,059 --> 00:46:15,410
papers writing stuff for public

1020
00:46:22,120 --> 00:46:19,069
consumption outreach activities and so

1021
00:46:25,059 --> 00:46:22,130
on okay definitely an industry you have

1022
00:46:27,839 --> 00:46:25,069
to be able to prepare plans write

1023
00:46:29,769 --> 00:46:27,849
reports test reports maybe contribute

1024
00:46:32,199 --> 00:46:29,779
definitely even our junior engineers

1025
00:46:35,769 --> 00:46:32,209
contribute to proposals monthly progress

1026
00:46:38,349 --> 00:46:35,779
reports things like that we also try to

1027
00:46:40,839 --> 00:46:38,359
do several papers a year to you know

1028
00:46:44,170 --> 00:46:40,849
basically to advertise our technologies

1029
00:46:45,670 --> 00:46:44,180
and collaborations we've done so we

1030
00:46:47,739 --> 00:46:45,680
generally do like two three sometimes

1031
00:46:50,349 --> 00:46:47,749
even four papers and go to conferences

1032
00:46:51,880 --> 00:46:50,359
and so on so again we try to get some of

1033
00:46:53,799 --> 00:46:51,890
our junior engineers to go and present

1034
00:46:56,069 --> 00:46:53,809
as well they kind of draw straws okay no

1035
00:46:59,229 --> 00:46:56,079
I want to go I don't want to go so

1036
00:47:01,479 --> 00:46:59,239
definitely uh so I think a lot of the

1037
00:47:05,410 --> 00:47:01,489
skills also apply and of course you have

1038
00:47:08,370 --> 00:47:05,420

to be skilled technically and it's like

1039
00:47:11,410 --> 00:47:08,380
really pros and things like that but

1040
00:47:13,930 --> 00:47:11,420
definitely both oral skills to be able

1041
00:47:15,999 --> 00:47:13,940
to present your ideas and written skills

1042
00:47:17,979 --> 00:47:16,009
are very important because if you can't

1043
00:47:19,930 --> 00:47:17,989
describe to others or to your end

1044
00:47:25,959 --> 00:47:19,940
customers what you're doing then that's

1045
00:47:28,779 --> 00:47:25,969
kind of lost yeah I don't have a lot

1046
00:47:30,099 --> 00:47:28,789
more to add on to that except to say

1047
00:47:31,509 --> 00:47:30,109
that you know if you were to ask me

1048
00:47:33,160 --> 00:47:31,519
what's more difficult I would say is

1049
00:47:36,519 --> 00:47:33,170
writing science is more difficult it

1050
00:47:38,370 --> 00:47:36,529
takes a lot more time and brainpower to

1051
00:47:40,989 --> 00:47:38,380
talk about the genome sequence of

1052
00:47:42,670 --> 00:47:40,999
something called plain old window caucus

1053
00:47:44,559 --> 00:47:42,680
halo cryo Phyllis and it does to do an

1054
00:47:48,849 --> 00:47:44,569
interview with The Globe and Mail okay a

1055
00:47:50,529 --> 00:47:48,859
reporter it just it's more challenging i

1056
00:47:51,910 --> 00:47:50,539
guess that way takes a lot more time but

1057
00:47:54,609 --> 00:47:51,920
having said that it's also very

1058
00:47:57,430 --> 00:47:54,619
important that you can do public

1059
00:47:59,410 --> 00:47:57,440
outreach and education activities i

1060
00:48:01,449 --> 00:47:59,420
guess we're university professors we're

1061
00:48:02,739 --> 00:48:01,459
so used to getting up and talking to

1062
00:48:04,449 --> 00:48:02,749
students and people i was just thinking

1063
00:48:06,430 --> 00:48:04,459

about this took me about six or seven

1064
00:48:08,410 --> 00:48:06,440
years as professor to you know getting

1065
00:48:11,230 --> 00:48:08,420
up every morning in front of 100 or 200

1066
00:48:12,670 --> 00:48:11,240
students to realize that i could say

1067
00:48:16,900 --> 00:48:12,680
anything to those people and they would

1068
00:48:18,280 --> 00:48:16,910
believe me so then you know you start

1069
00:48:19,600 --> 00:48:18,290
doing stupid things like saying

1070
00:48:22,690 --> 00:48:19,610
something really stupid just to see who

1071
00:48:25,000 --> 00:48:22,700
was listening and anyways but you have

1072
00:48:28,810 --> 00:48:25,010
to you have to be able to to learn the

1073
00:48:33,160 --> 00:48:28,820
skills of trying to get right down in

1074
00:48:35,230 --> 00:48:33,170
grants proposals of all types the

1075
00:48:37,270 --> 00:48:35,240
questions that you're trying to ask and

1076
00:48:39,190 --> 00:48:37,280
how you're going to answer it and build

1077
00:48:41,410 --> 00:48:39,200
and to be able to do that it goes with

1078
00:48:43,780 --> 00:48:41,420
publications it goes with doing public

1079
00:48:45,160 --> 00:48:43,790
outreach media events of saying this is

1080
00:48:46,450 --> 00:48:45,170
the clear message these are the two or

1081
00:48:48,280 --> 00:48:46,460
three things I really want to get across

1082
00:48:50,470 --> 00:48:48,290
in this particular whatever I'm doing

1083
00:48:56,109 --> 00:48:50,480
thing and that takes a little bit of

1084
00:48:57,910 --> 00:48:56,119
practice and skill I think yeah and I

1085
00:48:59,800 --> 00:48:57,920
guess the one other thing that I would

1086
00:49:01,960 --> 00:48:59,810
add about the importance of

1087
00:49:05,100 --> 00:49:01,970
communication is that when you work on a

1088
00:49:07,480 --> 00:49:05,110

Mars mission a lot of times the

1089
00:49:09,820 --> 00:49:07,490
scientists and the engineers they have

1090
00:49:12,130 --> 00:49:09,830
very different backgrounds than we do so

1091
00:49:14,170 --> 00:49:12,140
we have to be able to just be able to

1092
00:49:16,300 --> 00:49:14,180
communicate with each other and

1093
00:49:18,730 --> 00:49:16,310
sometimes you have to bring it down to

1094
00:49:21,130 --> 00:49:18,740
basics in order to do that but it's

1095
00:49:26,980 --> 00:49:21,140
really critical for a conveyor point

1096
00:49:29,590 --> 00:49:26,990
you're something add Richard all rights

1097
00:49:31,150 --> 00:49:29,600
with the MSL mission uh you know it's an

1098
00:49:33,580 --> 00:49:31,160
amazing you know piece of machinery

1099
00:49:35,200 --> 00:49:33,590
that's been sent you know hundreds of

1100
00:49:38,140 --> 00:49:35,210
million kilometers to another planet and

1101
00:49:40,180 --> 00:49:38,150
it landed you know as planned it's an

1102
00:49:44,349 --> 00:49:40,190
amazing amazing technological feat but

1103
00:49:46,480 --> 00:49:44,359
you know the daily grind of a mission it

1104
00:49:50,140 --> 00:49:46,490
boils down to people interacting with

1105
00:49:52,330 --> 00:49:50,150
other people and a day of activities or

1106
00:49:53,830 --> 00:49:52,340
operations is a bunch of meetings

1107
00:49:55,750 --> 00:49:53,840
basically whether its meetings

1108
00:49:57,940 --> 00:49:55,760
face-to-face or meetings online or

1109
00:49:59,560 --> 00:49:57,950
telecoms whatever and its people talking

1110
00:50:00,580 --> 00:49:59,570
to other people and like Marique to say

1111
00:50:02,590 --> 00:50:00,590
you know with very different

1112
00:50:05,830 --> 00:50:02,600
perspectives or very different

1113
00:50:07,660 --> 00:50:05,840

objectives and and you have to end up

1114
00:50:09,880 --> 00:50:07,670
you know getting to a common goal so

1115
00:50:12,010 --> 00:50:09,890
again you know communication is just key

1116
00:50:14,320 --> 00:50:12,020
and there's been so many issues so many

1117
00:50:16,960 --> 00:50:14,330
examples that not so many issues are so

1118
00:50:18,940 --> 00:50:16,970
many examples of I've just you know

1119
00:50:20,800 --> 00:50:18,950
people not quite understanding the other

1120
00:50:22,480 --> 00:50:20,810
person and it takes a bit of time and

1121
00:50:25,200 --> 00:50:22,490
you eventually come to an understanding

1122
00:50:28,410 --> 00:50:25,210
but yeah communication is key

1123
00:50:51,830 --> 00:50:28,420
and getting to the essence of yeah what

1124
00:50:55,670 --> 00:50:53,790
I'm just going to repeat the question

1125
00:50:59,580 --> 00:50:55,680
quickly for the online viewers this is a

1126
00:51:02,280 --> 00:50:59,590
young new to be under grad student at

1127
00:51:03,570 --> 00:51:02,290
Western sorry at McGill that is

1128
00:51:05,820 --> 00:51:03,580
interested in astrobiology is entering

1129
00:51:07,760 --> 00:51:05,830
biology and wondering what other classes

1130
00:51:09,720 --> 00:51:07,770
they should take and what sort of

1131
00:51:11,880 --> 00:51:09,730
knowledge base they should build for

1132
00:51:22,229 --> 00:51:11,890
field is multidisciplinary as

1133
00:51:27,670 --> 00:51:24,880
yeah I'll just say a few words to start

1134
00:51:31,690 --> 00:51:27,680
that discussion I well you you know it's

1135
00:51:33,430 --> 00:51:31,700
good to be a biologist if you're going

1136
00:51:35,819 --> 00:51:33,440
to do astrobiology I would argue would

1137
00:51:38,469 --> 00:51:35,829
probably be a good idea to be a

1138
00:51:40,029 --> 00:51:38,479

microbiologist because we're essentially

1139
00:51:41,469 --> 00:51:40,039
looking for little green bugs on these

1140
00:51:44,219 --> 00:51:41,479
other places unless things change

1141
00:51:46,479 --> 00:51:44,229
drastically in the next 15 or 20 years

1142
00:51:49,559 --> 00:51:46,489
that's not to say that there aren't fish

1143
00:51:52,839 --> 00:51:49,569
swimming around in the oceans of Europa

1144
00:51:54,999 --> 00:51:52,849
or in other places or on different

1145
00:51:56,650 --> 00:51:55,009
exoplanets that sort of thing so it's

1146
00:51:59,049 --> 00:51:56,660
good to be a you know if you're going to

1147
00:52:01,690 --> 00:51:59,059
you need to do molecular ecology or

1148
00:52:02,589 --> 00:52:01,700
molecular bio informatics to know mix

1149
00:52:03,969 --> 00:52:02,599
all these sort of things but that's

1150
00:52:05,499 --> 00:52:03,979
going to be part of your biology /

1151
00:52:08,380 --> 00:52:05,509
microbiology training anyways because

1152
00:52:12,160 --> 00:52:08,390
that's what we all do in any respect is

1153
00:52:13,870 --> 00:52:12,170
it good to be multidisciplinary yeah for

1154
00:52:15,460 --> 00:52:13,880
sure what do you want to know geology I

1155
00:52:17,140 --> 00:52:15,470
mean I have a terrible background

1156
00:52:18,789 --> 00:52:17,150
geology and every time I talk to a guy

1157
00:52:21,249 --> 00:52:18,799
like Richard I don't know what he's

1158
00:52:24,009 --> 00:52:21,259
talking about and I picked things up

1159
00:52:27,190 --> 00:52:24,019
over time but you know we have to have

1160
00:52:30,249 --> 00:52:27,200
very basic discussions geology planetary

1161
00:52:32,349 --> 00:52:30,259
science you know I've worked with Roman

1162
00:52:34,479 --> 00:52:32,359
on the Mars methane emissions and and

1163
00:52:36,190 --> 00:52:34,489

having this discussion with engineers

1164
00:52:39,430 --> 00:52:36,200
and engineers talking about just you

1165
00:52:42,009 --> 00:52:39,440
have to learn how about how engineers

1166
00:52:44,469 --> 00:52:42,019
think breathe and and and try to

1167
00:52:46,870 --> 00:52:44,479
understand what their their lingo so to

1168
00:52:48,430 --> 00:52:46,880
speak so if you can acquire some of

1169
00:52:50,410 --> 00:52:48,440
those I don't know which classes you

1170
00:52:52,779 --> 00:52:50,420
take to do you know instrumentation

1171
00:52:54,029 --> 00:52:52,789
engineering but these are all good

1172
00:52:57,130 --> 00:52:54,039
things you know multidisciplinary

1173
00:53:01,900 --> 00:52:57,140
geology history of the earth evolution

1174
00:53:04,930 --> 00:53:01,910
of the earth Richard my lucky yeah

1175
00:53:08,739 --> 00:53:04,940
that's a good question and one I I see

1176
00:53:11,589 --> 00:53:08,749
in here a lot in in sort of you know the

1177
00:53:15,160 --> 00:53:11,599
astrobiology field it's true it really

1178
00:53:17,229 --> 00:53:15,170
is multidisciplinary it's also true that

1179
00:53:21,640 --> 00:53:17,239
you won't be able to be an expert in all

1180
00:53:23,079 --> 00:53:21,650
those subfields of astrobiology so you

1181
00:53:25,950 --> 00:53:23,089
know don't try don't try to be an

1182
00:53:29,799 --> 00:53:25,960
astronomer biologist geologist chemist

1183
00:53:32,469 --> 00:53:29,809
you know engineer but certainly and and

1184
00:53:35,109 --> 00:53:32,479
you know my undergrad degree as I said

1185
00:53:37,480 --> 00:53:35,119
earlier mmm I did it was about 23

1186
00:53:39,009 --> 00:53:37,490
geology in a third biology and I thought

1187
00:53:41,589 --> 00:53:39,019
that was great because I got exposed to

1188
00:53:44,920 --> 00:53:41,599

a lot of different things I knew I

1189
00:53:47,440 --> 00:53:44,930
wasn't going to be a hardcore geologist

1190
00:53:49,960 --> 00:53:47,450
that studies say s Granite's for 30

1191
00:53:51,640 --> 00:53:49,970
years and I knew at the same time I

1192
00:53:55,329 --> 00:53:51,650
didn't want to study you know animals

1193
00:53:57,430 --> 00:53:55,339
and plants and but but but there is a

1194
00:53:59,529 --> 00:53:57,440
there is a nice sort of intersection

1195
00:54:01,930 --> 00:53:59,539
there of geology mineralogy and Joe

1196
00:54:05,650 --> 00:54:01,940
chemistry and microbiology and how those

1197
00:54:09,609 --> 00:54:05,660
two fields interact in both ways so I

1198
00:54:11,620 --> 00:54:09,619
had that sort of broad dual aspect to my

1199
00:54:15,539 --> 00:54:11,630
training that has served me you know to

1200
00:54:18,039 --> 00:54:15,549
this day and it's something that I enjoy

1201
00:54:19,900 --> 00:54:18,049
you know those are to my interests you

1202
00:54:23,589 --> 00:54:19,910
know microbiology in geology and

1203
00:54:25,450 --> 00:54:23,599
mineralogy so sigh I think if you can

1204
00:54:27,640 --> 00:54:25,460
pinpoint a couple of interests like that

1205
00:54:31,269 --> 00:54:27,650
you can maybe go after courses and in

1206
00:54:35,140 --> 00:54:31,279
those maybe a couple of areas and build

1207
00:54:37,509 --> 00:54:35,150
sort of a dual strength but in general

1208
00:54:38,950 --> 00:54:37,519
yeah it depends on on your interests

1209
00:54:41,200 --> 00:54:38,960
because because you can't you can't be

1210
00:54:44,769 --> 00:54:41,210
an expert in everything so if you really

1211
00:54:47,200 --> 00:54:44,779
want to be a microbiologist that's great

1212
00:54:48,819 --> 00:54:47,210
I would I would you know personally i

1213
00:54:50,859 --> 00:54:48,829

would add either some some courses in

1214
00:54:53,559 --> 00:54:50,869
instrumentation and and maybe certain

1215
00:54:55,900 --> 00:54:53,569
techniques of analysis or useful or of

1216
00:54:57,130 --> 00:54:55,910
interest to you or maybe again you know

1217
00:54:58,809 --> 00:54:57,140
like wile said you know geology

1218
00:55:00,819 --> 00:54:58,819
mineralogy in Joe chemistry that that's

1219
00:55:03,069 --> 00:55:00,829
always useful if especially if we're

1220
00:55:05,529 --> 00:55:03,079
going to planets like Mars and our

1221
00:55:07,450 --> 00:55:05,539
Moon's like Europa they're essentially

1222
00:55:12,549 --> 00:55:07,460
rocks and they interact with water and

1223
00:55:13,839 --> 00:55:12,559
Isis and so on so but if astronomy is

1224
00:55:15,849 --> 00:55:13,849
your thing well that's that's another

1225
00:55:18,249 --> 00:55:15,859
sort of direction that you can take and

1226
00:55:21,670 --> 00:55:18,259
and and you can merge micro biology and

1227
00:55:25,720 --> 00:55:21,680
astronomy but but but don't try and do

1228
00:55:27,970 --> 00:55:25,730
everything okay I guess from my own

1229
00:55:30,400 --> 00:55:27,980
example I did my undergraduate if you

1230
00:55:32,019 --> 00:55:30,410
have tea in engineering physics so

1231
00:55:35,259 --> 00:55:32,029
basically it was an engineering

1232
00:55:36,519 --> 00:55:35,269
discipline but we had a broad especially

1233
00:55:37,390 --> 00:55:36,529
the first few years was very broad

1234
00:55:40,809 --> 00:55:37,400
because we've got a little bit of

1235
00:55:43,150 --> 00:55:40,819
mechanical engineering chemistry physics

1236
00:55:45,279 --> 00:55:43,160
electrical engineering and so on but it

1237
00:55:47,289 --> 00:55:45,289
but again all the disciplines really

1238
00:55:48,640 --> 00:55:47,299

changed because at UF dl's working on

1239
00:55:51,130 --> 00:55:48,650
designing integrated circuit

1240
00:55:54,309 --> 00:55:51,140
so now we're working on you know

1241
00:55:56,170 --> 00:55:54,319
developing missions where you need much

1242
00:55:58,990 --> 00:55:56,180
you have to bring together a much

1243
00:56:03,250 --> 00:55:59,000
broader range of knowledge and I'm sure

1244
00:56:04,390 --> 00:56:03,260
as astrobiology matures the requirements

1245
00:56:06,930 --> 00:56:04,400
there and how it's going to be applied

1246
00:56:09,760 --> 00:56:06,940
will be changing so I think and

1247
00:56:12,279 --> 00:56:09,770
basically you have to try you'll need to

1248
00:56:14,440 --> 00:56:12,289
become an expert in several things that

1249
00:56:17,529 --> 00:56:14,450
you can do really well but also you know

1250
00:56:19,450 --> 00:56:17,539
you have to be like an octopus where you

1251
00:56:20,710 --> 00:56:19,460
have your fingers and other areas that

1252
00:56:22,960 --> 00:56:20,720
could be helpful because you're not

1253
00:56:24,880 --> 00:56:22,970
never quite sure all the knowledge that

1254
00:56:29,380 --> 00:56:24,890
you'll need to be able to do the work

1255
00:56:31,779 --> 00:56:29,390
eventually once you finish yeah the fact

1256
00:56:33,460 --> 00:56:31,789
that you're here today and and I guess

1257
00:56:35,730 --> 00:56:33,470
this week is a really good start and

1258
00:56:38,200 --> 00:56:35,740
you're going to make great people and

1259
00:56:39,910 --> 00:56:38,210
that's a big part of you know what we do

1260
00:57:14,570 --> 00:56:39,920
is the people we interact with and

1261
00:57:20,460 --> 00:57:18,540
okay opportunities outside academia and

1262
00:57:21,630 --> 00:57:20,470
how they differ from academia and what

1263
00:57:23,240 --> 00:57:21,640

sort of obstacles are in your way when

1264
00:57:26,490 --> 00:57:23,250
you're working for a company or a

1265
00:57:29,190 --> 00:57:26,500
government I definitely industry of

1266
00:57:32,370 --> 00:57:29,200
course but it's also true in government

1267
00:57:34,020 --> 00:57:32,380
or the space agency it will be related

1268
00:57:35,730 --> 00:57:34,030
to some kind of funding source I mean

1269
00:57:37,830 --> 00:57:35,740
usually we try to do like forward

1270
00:57:40,620 --> 00:57:37,840
leading edge rd and combine that with

1271
00:57:42,780 --> 00:57:40,630
more applied research so we may be

1272
00:57:47,130 --> 00:57:42,790
developing a new type of coding or a new

1273
00:57:49,800 --> 00:57:47,140
process to enable some coding or censor

1274
00:57:51,870 --> 00:57:49,810
or whatever and so may involve some new

1275
00:57:54,150 --> 00:57:51,880
science or physics and things but also

1276
00:57:56,370 --> 00:57:54,160
at the end you have to come up with some

1277
00:57:59,670 --> 00:57:56,380
tangible either knowledge that you can

1278
00:58:01,440 --> 00:57:59,680
apply to make something or how to use

1279
00:58:04,200 --> 00:58:01,450
something so it's kind of a combination

1280
00:58:06,540 --> 00:58:04,210
but usually an industry you have two

1281
00:58:08,460 --> 00:58:06,550
channels you have kind of longleat rd

1282
00:58:10,740 --> 00:58:08,470
where we may be developing a new type of

1283
00:58:13,980 --> 00:58:10,750
process to make say I'm you type of

1284
00:58:17,400 --> 00:58:13,990
fiber Bragg gratings of optical fiber or

1285
00:58:19,440 --> 00:58:17,410
and so on as well as more applied kind

1286
00:58:21,420 --> 00:58:19,450
of day-to-day kind of bread and butter

1287
00:58:23,460 --> 00:58:21,430
kind of stuff that you get paid more

1288
00:58:24,839 --> 00:58:23,470

upfront so usually a combination of the

1289
00:58:26,609 --> 00:58:24,849
two sometimes can be overwhelming

1290
00:58:29,099 --> 00:58:26,619
because some of the systems we work on

1291
00:58:31,410 --> 00:58:29,109
are really multi-disciplinary where

1292
00:58:34,170 --> 00:58:31,420
you've got a leading edge you know

1293
00:58:35,339 --> 00:58:34,180
optics design mechanical engineering and

1294
00:58:37,849 --> 00:58:35,349
so on you have to bring it all together

1295
00:58:40,500 --> 00:58:37,859
but usually do have a group of people

1296
00:58:42,329 --> 00:58:40,510
definitely where we work like we have

1297
00:58:44,130 --> 00:58:42,339
mechanical engineers software engineers

1298
00:58:47,040 --> 00:58:44,140
electrical engineers and so on so you

1299
00:58:49,620 --> 00:58:47,050
kind of have to work together and so on

1300
00:58:52,079 --> 00:58:49,630
and I'm sure probably in academia

1301
00:58:53,460 --> 00:58:52,089
they'll be the same although you may be

1302
00:58:55,020 --> 00:58:53,470
working with different departments

1303
00:58:57,300 --> 00:58:55,030
because basically you've got

1304
00:59:00,570 --> 00:58:57,310
microbiology may need some help from the

1305
00:59:08,790 --> 00:59:00,580
geologists or chemists and so on or as

1306
00:59:12,660 --> 00:59:08,800
well as on the sensor side yeah I

1307
00:59:14,490 --> 00:59:12,670
sometimes tell people including you know

1308
00:59:17,960 --> 00:59:14,500
colleagues where I work that you know

1309
00:59:19,890 --> 00:59:17,970
there's only one kind of research and

1310
00:59:21,180 --> 00:59:19,900
because because you often hear in

1311
00:59:22,859 --> 00:59:21,190
government often hear about you know

1312
00:59:25,710 --> 00:59:22,869
government research or internal research

1313
00:59:27,320 --> 00:59:25,720

or what having I guess similar to

1314
00:59:30,090 --> 00:59:27,330
industry

1315
00:59:31,890 --> 00:59:30,100
the research is essentially the same

1316
00:59:34,490 --> 00:59:31,900
it's why you do it that's different you

1317
00:59:37,800 --> 00:59:34,500
know Lyle and Marie do research because

1318
00:59:40,290 --> 00:59:37,810
because it's cool and you know and

1319
00:59:43,710 --> 00:59:40,300
because they like it and and because

1320
00:59:45,960 --> 00:59:43,720
they can write in industry normally

1321
00:59:48,450 --> 00:59:45,970
research is designed to develop things

1322
00:59:51,240 --> 00:59:48,460
that will eventually be bought by

1323
00:59:52,950 --> 00:59:51,250
someone and create revenue and in

1324
00:59:55,110 --> 00:59:52,960
government research is generally because

1325
00:59:57,750 --> 00:59:55,120
government needs it to be done whether

1326
01:00:03,420 --> 00:59:57,760
it's for you know policy or regulatory

1327
01:00:05,400 --> 01:00:03,430
reasons or or or other reasons so so

1328
01:00:07,380 --> 01:00:05,410
yeah so you can see I I think you can

1329
01:00:15,060 --> 01:00:07,390
you can work on Cole research projects

1330
01:00:17,970 --> 01:00:15,070
in all three sectors and it you may have

1331
01:00:19,440 --> 01:00:17,980
some constraints I have constraints I'm

1332
01:00:23,880 --> 01:00:19,450
sure Roman does too and I'm sure Lila

1333
01:00:25,500 --> 01:00:23,890
Marie do I i think it's it's it's in

1334
01:00:27,600 --> 01:00:25,510
some ways it's finding the best fit for

1335
01:00:34,800 --> 01:00:27,610
you you know if you are looking at these

1336
01:00:36,750 --> 01:00:34,810
potential you know sectors every place

1337
01:00:40,080 --> 01:00:36,760
has its advantages and disadvantages and

1338
01:00:46,590 --> 01:00:40,090

and I think we're all pretty happy here

1339
01:00:49,860 --> 01:00:46,600
okay and yeah maybe just yet well an

1340
01:00:51,810 --> 01:00:49,870
industry at in the end of your work it's

1341
01:00:53,970 --> 01:00:51,820
got to work that's the main thing it

1342
01:00:55,560 --> 01:00:53,980
can't be just an R&D where okay maybe we

1343
01:00:58,290 --> 01:00:55,570
will improve this or maybe we'll look at

1344
01:01:01,470 --> 01:00:58,300
this so that kind of I guess constrains

1345
01:01:04,230 --> 01:01:01,480
it up it like it can't be too while but

1346
01:01:06,330 --> 01:01:04,240
again we never say I pay cannot be done

1347
01:01:07,770 --> 01:01:06,340
it's just well we may not know today how

1348
01:01:10,380 --> 01:01:07,780
to do it so we have to break it down

1349
01:01:11,880 --> 01:01:10,390
into simpler problems or hand off some

1350
01:01:13,680 --> 01:01:11,890
of it to universities because you should

1351
01:01:15,390 --> 01:01:13,690
have a lot of our research is partnering

1352
01:01:16,560 --> 01:01:15,400
for universities and sometimes we go to

1353
01:01:18,840 --> 01:01:16,570
them and say well can you work in this

1354
01:01:22,530 --> 01:01:18,850
and say gee whiz but that really needs

1355
01:01:24,930 --> 01:01:22,540
real R&D and because they can also

1356
01:01:26,280 --> 01:01:24,940
sometimes be you know conservative but

1357
01:01:27,720 --> 01:01:26,290
that's the main thing that you do have

1358
01:01:30,270 --> 01:01:27,730
to be able to deliver something at the

1359
01:01:32,340 --> 01:01:30,280
end that's tangible that maybe can be

1360
01:01:36,180 --> 01:01:32,350
marketed or may be useful to some other

1361
01:01:37,380 --> 01:01:36,190
government agency oh and so on yeah so

1362
01:01:39,420 --> 01:01:37,390
that that would be a big difference

1363
01:01:40,680 --> 01:01:39,430

worse at the University can be more

1364
01:01:42,599 --> 01:01:40,690
applied and just

1365
01:01:44,220 --> 01:01:42,609
may be answering some questions but you

1366
01:01:55,710 --> 01:01:44,230
know you don't have to get to the final

1367
01:01:58,440 --> 01:01:55,720
conclusion what just just before we move

1368
01:02:01,170 --> 01:01:58,450
on to maybe some more academic

1369
01:02:05,849 --> 01:02:01,180
perspective that the government

1370
01:02:08,730 --> 01:02:05,859
perspective is is the key variable there

1371
01:02:11,390 --> 01:02:08,740
is the government which which which

1372
01:02:13,800 --> 01:02:11,400
changes every once in a while right and

1373
01:02:16,319 --> 01:02:13,810
government priorities change and and

1374
01:02:20,339 --> 01:02:16,329
those have a trickle-down effect on on

1375
01:02:22,950 --> 01:02:20,349
on researchers and and so you again in

1376
01:02:25,290 --> 01:02:22,960
terms of constraints or or the nature or

1377
01:02:27,180 --> 01:02:25,300
the kinds of projects that you you you

1378
01:02:28,680 --> 01:02:27,190
may be able to do may be affected by

1379
01:02:30,210 --> 01:02:28,690
certain you know the government of the

1380
01:02:37,740 --> 01:02:30,220
day or the government's priorities of

1381
01:02:39,210 --> 01:02:37,750
the of the day yeah um I guess I don't

1382
01:02:42,690 --> 01:02:39,220
have too much to add to this discussion

1383
01:02:46,109 --> 01:02:42,700
saying yes I'm an academic but um I have

1384
01:02:48,750 --> 01:02:46,119
worked for the US federal government a

1385
01:02:51,780 --> 01:02:48,760
couple different times and when I was at

1386
01:02:54,510 --> 01:02:51,790
the Smithsonian it was yeah we're

1387
01:02:57,839 --> 01:02:54,520
definitely you have to worry about what

1388
01:02:59,970 --> 01:02:57,849

the the fiscal years like what the what

1389
01:03:04,230 --> 01:02:59,980
the budget is like are we in a hiring

1390
01:03:08,400 --> 01:03:04,240
freeze in those sorts of things are real

1391
01:03:10,290 --> 01:03:08,410
struggle and also on top of that you

1392
01:03:12,569 --> 01:03:10,300
know the money that pays for our

1393
01:03:16,230 --> 01:03:12,579
research comes from the government

1394
01:03:18,900 --> 01:03:16,240
ultimately you so sometimes they the

1395
01:03:23,480 --> 01:03:18,910
government can issue a new perspective

1396
01:03:25,650 --> 01:03:23,490
of of what we should be researching

1397
01:03:28,589 --> 01:03:25,660
which which is can be a little

1398
01:03:31,309 --> 01:03:28,599
frustrating but it hasn't affected me

1399
01:03:34,680 --> 01:03:31,319
too much just that you know recently

1400
01:03:37,800 --> 01:03:34,690
there's it been this edict set out that

1401
01:03:40,980 --> 01:03:37,810
insert will be more focused towards

1402
01:03:44,069 --> 01:03:40,990
applied research I really don't do

1403
01:03:46,829 --> 01:03:44,079
applied research so we'll see how this

1404
01:03:49,170 --> 01:03:46,839
influences or impacts my research in the

1405
01:03:51,000 --> 01:03:49,180
future but for right now I'm doing all

1406
01:03:54,670 --> 01:03:51,010
right you know I'm on a Mars mission

1407
01:03:58,590 --> 01:03:54,680
which is pretty awesome so if if

1408
01:04:02,680 --> 01:03:58,600
comes to it I may have to you know adapt

1409
01:04:05,530 --> 01:04:02,690
I haven't gone into industry yet but a

1410
01:04:07,660 --> 01:04:05,540
lot of there is money and mining for the

1411
01:04:09,580 --> 01:04:07,670
kinds of work that I do so that's

1412
01:04:11,890 --> 01:04:09,590
something that you know I'll hold in my

1413
01:04:17,890 --> 01:04:11,900

back pocket or if if I ever need to go

1414
01:04:19,690 --> 01:04:17,900
that route yeah i'll just add a few

1415
01:04:22,450 --> 01:04:19,700
things there so i've been lucky enough

1416
01:04:26,140 --> 01:04:22,460
to work for the federal government for

1417
01:04:28,510 --> 01:04:26,150
10 years and as well as an academia now

1418
01:04:30,160 --> 01:04:28,520
for about 10 10 11 years federal

1419
01:04:31,750 --> 01:04:30,170
government I've worked with the National

1420
01:04:33,700 --> 01:04:31,760
Research Council and I had a great run

1421
01:04:36,070 --> 01:04:33,710
there you have very good resources

1422
01:04:38,020 --> 01:04:36,080
probably better resources than you do

1423
01:04:40,090 --> 01:04:38,030
with a university lab because they have

1424
01:04:42,160 --> 01:04:40,100
bigger budget so they can buy new things

1425
01:04:45,460 --> 01:04:42,170
every year and so on and so forth and

1426
01:04:46,800 --> 01:04:45,470
you have a a number of technicians that

1427
01:04:49,870 --> 01:04:46,810
will be there to support your research

1428
01:04:52,030 --> 01:04:49,880
activities so you can really make the

1429
01:04:54,640 --> 01:04:52,040
best of it and if you if you do want to

1430
01:04:56,830 --> 01:04:54,650
you can become a five or nine o'clock to

1431
01:05:00,310 --> 01:04:56,840
five o'clock civil servant if you choose

1432
01:05:02,350 --> 01:05:00,320
or you can really push the envelope and

1433
01:05:03,790 --> 01:05:02,360
do a lot of great things so I had a very

1434
01:05:05,920 --> 01:05:03,800
good experience there so i wouldn't say

1435
01:05:08,680 --> 01:05:05,930
you can't do great things as a scientist

1436
01:05:10,960 --> 01:05:08,690
within the federal government you know

1437
01:05:12,430 --> 01:05:10,970
being an academic researcher that you

1438
01:05:14,350 --> 01:05:12,440

can do you're right richard said you can

1439
01:05:17,890 --> 01:05:14,360
do any research you want one little

1440
01:05:19,270 --> 01:05:17,900
small caveat and that's called money you

1441
01:05:20,830 --> 01:05:19,280
have to convince someone to give you

1442
01:05:23,530 --> 01:05:20,840
some money to do that great thing that

1443
01:05:25,240 --> 01:05:23,540
you think is so amazingly wonderful and

1444
01:05:28,360 --> 01:05:25,250
going to benefit society so that's the

1445
01:05:30,310 --> 01:05:28,370
catch i'm going to change the discussion

1446
01:05:32,620 --> 01:05:30,320
just a little bit here you know because

1447
01:05:34,210 --> 01:05:32,630
we have a astrobiology group here we're

1448
01:05:37,330 --> 01:05:34,220
talking about careers in a sober ology

1449
01:05:39,040 --> 01:05:37,340
this is a real challenge I think I'm you

1450
01:05:41,140 --> 01:05:39,050
know I know this because I'm part of

1451
01:05:43,240 --> 01:05:41,150
this organization called the Canadian

1452
01:05:44,770 --> 01:05:43,250
astrobiology training program I have to

1453
01:05:46,690 --> 01:05:44,780
give we've been funded for six years to

1454
01:05:50,050 --> 01:05:46,700
do this I have to give reports every

1455
01:05:52,510 --> 01:05:50,060
year or second year to continue our

1456
01:05:55,090 --> 01:05:52,520
funding the taxpayers of Canada are

1457
01:05:57,820 --> 01:05:55,100
paying for this they want to know okay

1458
01:05:59,230 --> 01:05:57,830
we're training these people 20 25 people

1459
01:06:02,080 --> 01:05:59,240
a year what are they going to do after

1460
01:06:03,940 --> 01:06:02,090
they're finished here so you know your

1461
01:06:06,280 --> 01:06:03,950
your your mind you say what am I going

1462
01:06:08,510 --> 01:06:06,290
to do after I'm finished here okay and I

1463
01:06:09,890 --> 01:06:08,520

have to convince you don't have to

1464
01:06:12,320 --> 01:06:09,900
you to do this accountability thing

1465
01:06:14,540 --> 01:06:12,330
where we are we training people are we

1466
01:06:17,390 --> 01:06:14,550
giving them useful skills across the

1467
01:06:19,820 --> 01:06:17,400
board there is no astrobiology sector in

1468
01:06:22,070 --> 01:06:19,830
Canada okay there's you know the car

1469
01:06:24,890 --> 01:06:22,080
sector there's others a space science

1470
01:06:26,300 --> 01:06:24,900
sector there is an environmental sector

1471
01:06:29,030 --> 01:06:26,310
there's a health sector but there's no

1472
01:06:31,250 --> 01:06:29,040
astrobiology sector okay so you have to

1473
01:06:32,990 --> 01:06:31,260
realize that and i think i think what

1474
01:06:38,090 --> 01:06:33,000
i'm saying is really there is no

1475
01:06:39,770 --> 01:06:38,100
astrobiology sector on the planet to a

1476
01:06:41,720 --> 01:06:39,780
certain respect there are certain

1477
01:06:44,110 --> 01:06:41,730
academic positions that say okay I need

1478
01:06:47,020 --> 01:06:44,120
a higher and astrobiologist there are

1479
01:06:49,340 --> 01:06:47,030
certain space science organizations

1480
01:06:51,950 --> 01:06:49,350
Institute's that will say yes we need to

1481
01:06:56,570 --> 01:06:51,960
hire astrobiologists but those positions

1482
01:06:58,460 --> 01:06:56,580
are not many I don't think so you really

1483
01:07:00,650 --> 01:06:58,470
have to think seriously about what

1484
01:07:01,580 --> 01:07:00,660
you're training to be and i can tell you

1485
01:07:04,640 --> 01:07:01,590
i'm just going to give you one example

1486
01:07:06,080 --> 01:07:04,650
now i'm going to shut up i have five or

1487
01:07:08,900 --> 01:07:06,090
six people in the back there and there

1488
01:07:12,230 --> 01:07:08,910

my goal for me is to train them the best

1489
01:07:14,180 --> 01:07:12,240
I can in environmental microbiology /

1490
01:07:16,040 --> 01:07:14,190
microbial ecology so that they can take

1491
01:07:18,320 --> 01:07:16,050
those skills and apply it to things like

1492
01:07:20,180 --> 01:07:18,330
astrobiology if that is what they want

1493
01:07:23,600 --> 01:07:20,190
to do become a planetary scientist so on

1494
01:07:26,960 --> 01:07:23,610
and so forth and until somebody creates

1495
01:07:27,950 --> 01:07:26,970
an astrobiology sector where people and

1496
01:07:29,720 --> 01:07:27,960
I think the only one that's going to

1497
01:07:32,510 --> 01:07:29,730
really happen is if we discover life on

1498
01:07:35,510 --> 01:07:32,520
Mars which will then result in a boom I

1499
01:07:38,150 --> 01:07:35,520
would say you know it'll pass life on

1500
01:07:40,880 --> 01:07:38,160
Mars where you would have a real a real

1501
01:07:42,740 --> 01:07:40,890
strong driving force because in this

1502
01:07:44,950 --> 01:07:42,750
area of astrobiology there are a lot of

1503
01:07:48,200 --> 01:07:44,960
people think that we are dreamers and

1504
01:07:49,580 --> 01:07:48,210
you have to you know realize that that

1505
01:07:50,720 --> 01:07:49,590
we were thinking they think that we're

1506
01:07:52,960 --> 01:07:50,730
spending money that could be better

1507
01:07:55,310 --> 01:07:52,970
spent doing a hundred different things

1508
01:07:57,230 --> 01:07:55,320
so I don't know what I'm trying to say

1509
01:07:58,760 --> 01:07:57,240
here is but I think you need to think

1510
01:08:01,510 --> 01:07:58,770
long and hard but what you're training

1511
01:08:04,970 --> 01:08:01,520
for and make sure that there's a plan B

1512
01:08:06,680 --> 01:08:04,980
okay that you're getting a duel a duel

1513
01:08:07,910 --> 01:08:06,690

training experience so that when you are

1514
01:08:10,400 --> 01:08:07,920
finish this because you are going to

1515
01:08:12,710 --> 01:08:10,410
want to have a family get married maybe

1516
01:08:17,840 --> 01:08:12,720
have kids do all these different things

1517
01:08:19,309 --> 01:08:17,850
and that requires a career okay I'll

1518
01:08:54,240 --> 01:08:19,319
just pass the microphone on to someone

1519
01:08:58,470 --> 01:08:56,760
alright I'm going to I'm going to repeat

1520
01:09:00,240 --> 01:08:58,480
that quickly saying in the last couple

1521
01:09:02,309 --> 01:09:00,250
years has been a significant shrinkage

1522
01:09:04,320 --> 01:09:02,319
and the amount of funding available for

1523
01:09:07,079 --> 01:09:04,330
astrobiology research and as p is it

1524
01:09:08,730 --> 01:09:07,089
often seems that their primary job is to

1525
01:09:10,829 --> 01:09:08,740
get this funding in order to pay for

1526
01:09:12,599 --> 01:09:10,839
students in to do research and have they

1527
01:09:15,599 --> 01:09:12,609
noticed as a result of this students

1528
01:09:17,340 --> 01:09:15,609
changing their career paths just

1529
01:09:19,860 --> 01:09:17,350
primarily to avoid all that paperwork

1530
01:09:25,440 --> 01:09:19,870
and writing grants and the stress of

1531
01:09:26,640 --> 01:09:25,450
trying to get funding yeah well I'm

1532
01:09:28,530 --> 01:09:26,650
hoping everyone is going to jump in here

1533
01:09:30,420 --> 01:09:28,540
and add on I don't think you should be

1534
01:09:32,190 --> 01:09:30,430
looking at it that way I think you

1535
01:09:33,599 --> 01:09:32,200
should be looking at yourself saying I

1536
01:09:35,820 --> 01:09:33,609
want to be a great scientist in this

1537
01:09:36,990 --> 01:09:35,830
area okay I don't think you should be

1538
01:09:39,030 --> 01:09:37,000

looking at yourself saying well I want

1539
01:09:40,860 --> 01:09:39,040
to be a principal investigator and and

1540
01:09:43,980 --> 01:09:40,870
writing grants all those things will

1541
01:09:45,450 --> 01:09:43,990
happen as part of the evolution of your

1542
01:09:47,249 --> 01:09:45,460
career you will not be the principal

1543
01:09:50,730 --> 01:09:47,259
investigator until you become a really

1544
01:09:52,620 --> 01:09:50,740
good scientist does it bug me that I

1545
01:09:54,450 --> 01:09:52,630
have to spend time looking for money not

1546
01:09:57,090 --> 01:09:54,460
really it's kind of a game in a way it's

1547
01:09:59,130 --> 01:09:57,100
kind of a challenge okay you know and

1548
01:10:00,900 --> 01:09:59,140
and a lot of us are Type A personalities

1549
01:10:02,940 --> 01:10:00,910
and and that's just the way we are and

1550
01:10:05,130 --> 01:10:02,950
it's just part of the business and I'll

1551
01:10:07,500 --> 01:10:05,140
just finish by adding it you know Roman

1552
01:10:10,560 --> 01:10:07,510
and I have been around for a while we've

1553
01:10:12,180 --> 01:10:10,570
seen research monies go up and we've

1554
01:10:14,760 --> 01:10:12,190
seen research monies go down when I

1555
01:10:16,980 --> 01:10:14,770
graduated with my PhD in 93 we were in

1556
01:10:18,090 --> 01:10:16,990
the midst of a severe recession i would

1557
01:10:21,630 --> 01:10:18,100
say worse than the one we're in right

1558
01:10:24,330 --> 01:10:21,640
now but it all worked out and it will

1559
01:10:25,950 --> 01:10:24,340
work out so just keep that in mind you

1560
01:10:27,060 --> 01:10:25,960
know these things come and go I think

1561
01:10:28,200 --> 01:10:27,070
we're just about hitting the bottom

1562
01:10:29,460 --> 01:10:28,210
right now and I'm hopefully that the

1563
01:10:31,110 --> 01:10:29,470

American economy is going to really

1564
01:10:33,120 --> 01:10:31,120
improve and I know that'll bring up the

1565
01:10:34,590 --> 01:10:33,130
Canadian economy and maybe in four and

1566
01:10:39,720 --> 01:10:34,600
five years these tough times are going

1567
01:10:41,640 --> 01:10:39,730
to be over and life will continue okay

1568
01:10:43,350 --> 01:10:41,650
maybe I cannot I mean in our group what

1569
01:10:45,840 --> 01:10:43,360
has really helped is to be diversified I

1570
01:10:47,550 --> 01:10:45,850
mean they're years where like ISA is

1571
01:10:50,310 --> 01:10:47,560
interested in fiber optic sensors like

1572
01:10:53,100 --> 01:10:50,320
we're developing one to characterize

1573
01:10:55,800 --> 01:10:53,110
spacecraft during orbital reentry and

1574
01:10:58,110 --> 01:10:55,810
other years were earth observation and

1575
01:11:00,330 --> 01:10:58,120
climate change is hot and basically

1576
01:11:03,030 --> 01:11:00,340
developing instruments for satellite

1577
01:11:05,970 --> 01:11:03,040
missions is really important and they'll

1578
01:11:07,860 --> 01:11:05,980
be years especially if they find

1579
01:11:09,120 --> 01:11:07,870
something really cool on Mars where

1580
01:11:10,470 --> 01:11:09,130
you know getting to the Moon or Mars so

1581
01:11:13,560 --> 01:11:10,480
it will be really important so you have

1582
01:11:16,980 --> 01:11:13,570
to be really diversified and definitely

1583
01:11:19,020 --> 01:11:16,990
probably even in our work like in my

1584
01:11:21,390 --> 01:11:19,030
position forty percent of my time is

1585
01:11:24,000 --> 01:11:21,400
spent looking at where we can you know

1586
01:11:25,800 --> 01:11:24,010
do prepare new proposals and you know

1587
01:11:28,650 --> 01:11:25,810
look for new funding sources we try to

1588
01:11:30,450 --> 01:11:28,660

be a few years ahead i'm looking at 2015

1589
01:11:33,750 --> 01:11:30,460
right now so we have to be a little bit

1590
01:11:36,890 --> 01:11:33,760
ahead so so that's going to be part of

1591
01:11:41,970 --> 01:11:36,900
life whether you're guessing industry or

1592
01:11:43,410 --> 01:11:41,980
in academia now in terms of governments

1593
01:11:45,780 --> 01:11:43,420
that you're looking for good projects

1594
01:11:48,240 --> 01:11:45,790
that can respond to the government

1595
01:11:50,640 --> 01:11:48,250
requirements and meet the latest

1596
01:11:53,220 --> 01:11:50,650
government goals and so on so it depends

1597
01:11:55,050 --> 01:11:53,230
like whichever governments in power the

1598
01:11:58,050 --> 01:11:55,060
they'll have certain priorities and so

1599
01:12:00,470 --> 01:11:58,060
that will influence how the programs are

1600
01:12:07,530 --> 01:12:00,480
developed by the Canadian Space Agency

1601
01:12:12,000 --> 01:12:07,540
NRC and so on yeah I'm I had a couple of

1602
01:12:13,980 --> 01:12:12,010
thoughts there um yeah like like Lyle

1603
01:12:17,420 --> 01:12:13,990
said you know if you want to be a

1604
01:12:19,710 --> 01:12:17,430
scientist you know be a scientist you

1605
01:12:20,940 --> 01:12:19,720
know I'm thinking research scientist if

1606
01:12:22,650 --> 01:12:20,950
that's what you want to do you know

1607
01:12:24,090 --> 01:12:22,660
pursue that and you can pursue that in

1608
01:12:28,590 --> 01:12:24,100
different ways you know in different

1609
01:12:30,930 --> 01:12:28,600
places but but don't think of it as you

1610
01:12:34,170 --> 01:12:30,940
know principal investigator writing

1611
01:12:37,470 --> 01:12:34,180
grants as a principal investigator that

1612
01:12:40,950 --> 01:12:37,480
that's you know when your job is to you

1613
01:12:43,470 --> 01:12:40,960

know study hot springs on Mars or to

1614
01:12:46,020 --> 01:12:43,480
look at you know funky bugs that grow in

1615
01:12:47,280 --> 01:12:46,030
really cold you know conditions you know

1616
01:12:49,500 --> 01:12:47,290
there's going to be a few small

1617
01:12:52,530 --> 01:12:49,510
inconveniences to those cool jobs and

1618
01:12:56,910 --> 01:12:52,540
and and one of them is is continually

1619
01:12:58,560 --> 01:12:56,920
writing you know proposals and it you

1620
01:13:00,120 --> 01:12:58,570
know it takes a lot of time it takes a

1621
01:13:02,220 --> 01:13:00,130
lot of thought there's never enough time

1622
01:13:03,900 --> 01:13:02,230
to you know sit down and think and and

1623
01:13:06,060 --> 01:13:03,910
so on but you just got to do it it's

1624
01:13:09,090 --> 01:13:06,070
just part of the job you know I'm sure

1625
01:13:11,580 --> 01:13:09,100
there's faculty meetings that you go to

1626
01:13:15,360 --> 01:13:11,590
that you would rather not go to I have

1627
01:13:19,170 --> 01:13:15,370
more meetings than then I should or than

1628
01:13:20,630 --> 01:13:19,180
any human should and it's it's kind of

1629
01:13:23,810 --> 01:13:20,640
part of the deal right but but

1630
01:13:25,070 --> 01:13:23,820
ultimately the the what keeps us doing

1631
01:13:28,010 --> 01:13:25,080
what we do is because we really like

1632
01:13:29,720 --> 01:13:28,020
doing you know asking questions and

1633
01:13:33,980 --> 01:13:29,730
trying to answer them so that that's I

1634
01:13:36,440 --> 01:13:33,990
think the essence of what we do and and

1635
01:13:40,040 --> 01:13:36,450
in different ways in different places

1636
01:13:43,520 --> 01:13:40,050
but yeah and and I've come across

1637
01:13:45,410 --> 01:13:43,530
students who have said like really

1638
01:13:48,140 --> 01:13:45,420

really good smart students who say if

1639
01:13:50,000 --> 01:13:48,150
stop at the end of a masters and they

1640
01:13:51,530 --> 01:13:50,010
know that's not for them they or at

1641
01:13:52,820 --> 01:13:51,540
least they think they know and and and

1642
01:13:54,620 --> 01:13:52,830
they want to get a job they want to

1643
01:13:58,370 --> 01:13:54,630
experience something different than then

1644
01:14:02,570 --> 01:13:58,380
research or or you know academia or

1645
01:14:05,780 --> 01:14:02,580
whatever and that's okay you know one

1646
01:14:08,330 --> 01:14:05,790
you know we're talking about upgrading

1647
01:14:09,940 --> 01:14:08,340
from you know masters to PhD and some of

1648
01:14:13,010 --> 01:14:09,950
you here probably have done that already

1649
01:14:15,740 --> 01:14:13,020
some of you may may do that or may have

1650
01:14:20,090 --> 01:14:15,750
that that choice put in front of you

1651
01:14:21,620 --> 01:14:20,100
soon I was given some very simple advice

1652
01:14:23,540 --> 01:14:21,630
when I was deciding you know do I want

1653
01:14:25,100 --> 01:14:23,550
to do a PhD or do I want to finish a

1654
01:14:26,960 --> 01:14:25,110
masters and do a PhD somewhere else or

1655
01:14:29,090 --> 01:14:26,970
or do I even want to do a PhD are you

1656
01:14:30,620 --> 01:14:29,100
know and someone basically said well to

1657
01:14:32,390 --> 01:14:30,630
do a master's you have to like what

1658
01:14:33,620 --> 01:14:32,400
you're doing and to do a PhD you have to

1659
01:14:38,180 --> 01:14:33,630
love what you're doing because because

1660
01:14:41,390 --> 01:14:38,190
you're taking a step towards a you know

1661
01:14:44,060 --> 01:14:41,400
more than just career you know a pathway

1662
01:14:50,960 --> 01:14:44,070
through life which could change of

1663
01:14:53,620 --> 01:14:50,970

course but yeah so yeah and then just to

1664
01:14:57,170 --> 01:14:53,630
add a little bit about my personal story

1665
01:15:00,760 --> 01:14:57,180
so I was hired by by Brock four years

1666
01:15:05,120 --> 01:15:00,770
ago and four years ago was when the

1667
01:15:08,660 --> 01:15:05,130
economy collapsed and so I went through

1668
01:15:11,120 --> 01:15:08,670
the hiring cycle and a year when many

1669
01:15:14,150 --> 01:15:11,130
many faculty searches were just canceled

1670
01:15:17,810 --> 01:15:14,160
flat-out cancels universities lost

1671
01:15:19,970 --> 01:15:17,820
endowments and in order to make my way

1672
01:15:22,850 --> 01:15:19,980
as an academic I really had to persevere

1673
01:15:24,710 --> 01:15:22,860
and I had to take a position at Brock

1674
01:15:28,430 --> 01:15:24,720
that was less than favorable actually

1675
01:15:30,470 --> 01:15:28,440
now I'm happy here but initially they I

1676
01:15:31,960 --> 01:15:30,480
interviewed for a tenure-track position

1677
01:15:33,610 --> 01:15:31,970
and then they came

1678
01:15:35,380 --> 01:15:33,620
at me and said oh we don't have money to

1679
01:15:37,960 --> 01:15:35,390
offer you a tenure-track position you

1680
01:15:39,910 --> 01:15:37,970
have to be a postdoc / instructor for a

1681
01:15:45,220 --> 01:15:39,920
year so it was kind of like a bait and

1682
01:15:48,160 --> 01:15:45,230
switch and they they were able to to

1683
01:15:51,640 --> 01:15:48,170
offer me a tenure-track position

1684
01:15:53,290 --> 01:15:51,650
eventually just a year down the road but

1685
01:15:55,660 --> 01:15:53,300
there were some complications with that

1686
01:16:00,040 --> 01:15:55,670
like my salary was much less and I was

1687
01:16:01,660 --> 01:16:00,050
moving to a new country and and my

1688
01:16:04,060 --> 01:16:01,670

husband didn't have work when we first

1689
01:16:07,390 --> 01:16:04,070
got here so so there are definitely

1690
01:16:10,600 --> 01:16:07,400
there were definitely some things that

1691
01:16:14,290 --> 01:16:10,610
hit home when that when the economy

1692
01:16:17,260 --> 01:16:14,300
turned the way it did and I know lots of

1693
01:16:19,870 --> 01:16:17,270
people around that time around you

1694
01:16:22,960 --> 01:16:19,880
finish their PhD around when I did

1695
01:16:24,580 --> 01:16:22,970
they're still posted ox Potok after post

1696
01:16:26,860 --> 01:16:24,590
doc but that you know that's okay

1697
01:16:29,500 --> 01:16:26,870
they're they're turning out publications

1698
01:16:32,160 --> 01:16:29,510
and they're doing really neat research

1699
01:16:36,070 --> 01:16:32,170
and eventually it translates into a

1700
01:16:39,430 --> 01:16:36,080
full-time job a lot of times and then

1701
01:16:41,730 --> 01:16:39,440
other times you know they figure out

1702
01:16:43,810 --> 01:16:41,740
that that's not really for them and

1703
01:16:46,930 --> 01:16:43,820
decide that they're gonna you know

1704
01:16:49,780 --> 01:16:46,940
either become a mom full-time and then

1705
01:16:52,780 --> 01:16:49,790
go into industry fee or you know other

1706
01:16:55,780 --> 01:16:52,790
things um I think that you just

1707
01:16:59,490 --> 01:16:55,790
constantly have to evaluate why you are

1708
01:17:04,170 --> 01:16:59,500
where you are and what your drive is and

1709
01:17:10,720 --> 01:17:04,180
and you know stick it out if you need to

1710
01:17:13,510 --> 01:17:10,730
sometimes it'll work so yeah we have

1711
01:17:15,310 --> 01:17:13,520
another online question it's for

1712
01:17:17,170 --> 01:17:15,320
everyone but specifically Richard and

1713
01:17:19,750 --> 01:17:17,180

Marique is msl scientists how do you

1714
01:17:26,700 --> 01:17:19,760
manage to balance work and life or do

1715
01:17:38,890 --> 01:17:33,310
um yeah I think I think uh so I don't

1716
01:17:40,870 --> 01:17:38,900
have kids and so right now my life is a

1717
01:17:42,870 --> 01:17:40,880
lot of it is to actually spend in front

1718
01:17:45,340 --> 01:17:42,880
of my computer like I am right now

1719
01:17:50,020 --> 01:17:45,350
talking over the telephone

1720
01:17:52,120 --> 01:17:50,030
and but I think I do you just have to to

1721
01:17:55,180 --> 01:17:52,130
make time for it I try to take a least

1722
01:17:57,430 --> 01:17:55,190
one day off a week and the weekend to

1723
01:18:01,380 --> 01:17:57,440
not check my email I'm not always

1724
01:18:06,880 --> 01:18:01,390
successful but um you do yeah it does

1725
01:18:08,950 --> 01:18:06,890
require a great deal of time I would say

1726
01:18:11,230 --> 01:18:08,960
definitely that when I when I first

1727
01:18:13,420 --> 01:18:11,240
started working on MSL I was in really

1728
01:18:16,540 --> 01:18:13,430
good shape I was able to exercise a lot

1729
01:18:20,830 --> 01:18:16,550
and and you know I definitely lost that

1730
01:18:22,690 --> 01:18:20,840
shape since I'm since I've joined MSL so

1731
01:18:26,020 --> 01:18:22,700
because the days are quite long and I

1732
01:18:27,970 --> 01:18:26,030
get home around dinner time anymore so

1733
01:18:31,270 --> 01:18:27,980
I'm sure richard has more stories to

1734
01:18:34,510 --> 01:18:31,280
share about that yeah well maybe just

1735
01:18:37,450 --> 01:18:34,520
just to add some specifics to you know

1736
01:18:38,800 --> 01:18:37,460
it when when when curiosity landed in in

1737
01:18:43,900 --> 01:18:38,810
August you know Marique and I were both

1738
01:18:45,910 --> 01:18:43,910

in at JPL and Pasadena and we spent part

1739
01:18:49,900 --> 01:18:45,920
of the first three months they're based

1740
01:18:52,270 --> 01:18:49,910
there you know I spent about maybe total

1741
01:18:53,800 --> 01:18:52,280
to two out of three months there and

1742
01:18:57,280 --> 01:18:53,810
when we first started we you know we're

1743
01:19:00,040 --> 01:18:57,290
working on Mars time we are working you

1744
01:19:01,900 --> 01:19:00,050
know 16 hour days or whatever it was

1745
01:19:04,810 --> 01:19:01,910
intense you know really seven out of

1746
01:19:06,250 --> 01:19:04,820
seven days a week it was intense and it

1747
01:19:08,980 --> 01:19:06,260
was exciting so you didn't want to miss

1748
01:19:10,870 --> 01:19:08,990
anything it was all news you know here's

1749
01:19:13,720 --> 01:19:10,880
a rover in a place where no one has gone

1750
01:19:15,130 --> 01:19:13,730
before and and and there's still a

1751
01:19:16,660 --> 01:19:15,140
feeling of you don't want to miss stuff

1752
01:19:18,550 --> 01:19:16,670
like like murray KY don't know did we

1753
01:19:21,760 --> 01:19:18,560
get to Point Lake today or you know I

1754
01:19:23,830 --> 01:19:21,770
haven't followed today so so uh but but

1755
01:19:26,050 --> 01:19:23,840
you get emails summarizing things you

1756
01:19:28,480 --> 01:19:26,060
get you know the you tune in the next

1757
01:19:31,480 --> 01:19:28,490
day and and you you you find out what's

1758
01:19:34,510 --> 01:19:31,490
going and and and you have to you have

1759
01:19:36,520 --> 01:19:34,520
to make sort of decisions on on when

1760
01:19:37,720 --> 01:19:36,530
you're going to really dive in and try

1761
01:19:40,030 --> 01:19:37,730
and contribute something you know

1762
01:19:41,890 --> 01:19:40,040
intelligent other than just you know

1763
01:19:44,320 --> 01:19:41,900

following you know passively all the

1764
01:19:47,440 --> 01:19:44,330
time and and just having it suck up all

1765
01:19:50,530 --> 01:19:47,450
your time so so nowadays you know

1766
01:19:54,460 --> 01:19:50,540
operations are five days a week you know

1767
01:19:56,350 --> 01:19:54,470
regular a dish our day so you could

1768
01:19:59,140 --> 01:19:56,360
spend the whole day still five five days

1769
01:20:01,750 --> 01:19:59,150
a week that's still a big week but

1770
01:20:06,070 --> 01:20:01,760
I don't think anyone really does spend

1771
01:20:08,110 --> 01:20:06,080
all their time on on MSL so it's really

1772
01:20:09,760 --> 01:20:08,120
making choices and and anyway we can't

1773
01:20:11,740 --> 01:20:09,770
really because there's other things that

1774
01:20:14,620 --> 01:20:11,750
they do call for our attention whether

1775
01:20:16,780 --> 01:20:14,630
it's other projects or certain deadlines

1776
01:20:18,970 --> 01:20:16,790
for certain things so it's kind of in

1777
01:20:20,140 --> 01:20:18,980
and out you know okay you know we're

1778
01:20:21,490 --> 01:20:20,150
coming to a point that I'm really

1779
01:20:22,570 --> 01:20:21,500
interested or place that I'm really

1780
01:20:24,520 --> 01:20:22,580
interested i'm gonna i'm going to

1781
01:20:27,220 --> 01:20:24,530
participate in ops and try and help with

1782
01:20:28,720 --> 01:20:27,230
targeting or we just did some really

1783
01:20:30,910 --> 01:20:28,730
cool amount analysis i'm going to help

1784
01:20:33,160 --> 01:20:30,920
with the the analysis of that data and

1785
01:20:35,380 --> 01:20:33,170
you spend a few days really intensely

1786
01:20:36,820 --> 01:20:35,390
working on it but then maybe you know

1787
01:20:39,520 --> 01:20:36,830
the next week you sort of go back to

1788
01:20:41,770 --> 01:20:39,530

your earth of stuff and angela ms i'll

1789
01:20:46,560 --> 01:20:41,780
go on you know that the science team on

1790
01:20:50,950 --> 01:20:46,570
MSL is is up to about 460 people now so

1791
01:20:53,740 --> 01:20:50,960
you know i'm not so self-centered to

1792
01:20:55,330 --> 01:20:53,750
think that I can you know that I can't

1793
01:20:56,830 --> 01:20:55,340
take a day off for a few days off you

1794
01:21:13,040 --> 01:20:56,840
know things will continue in the rover

1795
01:21:18,260 --> 01:21:15,740
I mean I don't know who has kids here

1796
01:21:21,020 --> 01:21:18,270
but that hope that you know Richard and

1797
01:21:22,850 --> 01:21:21,030
I certainly knew Roman has you know it

1798
01:21:25,280 --> 01:21:22,860
adds a whole new dimension to your life

1799
01:21:26,450 --> 01:21:25,290
you have to you have kids because you

1800
01:21:28,160 --> 01:21:26,460
want to have kids you want to enjoy your

1801
01:21:30,380 --> 01:21:28,170
kids and you don't want to be in your

1802
01:21:32,630 --> 01:21:30,390
office on Saturday morning or sunday

1803
01:21:35,510 --> 01:21:32,640
afternoon or whatever and I don't do

1804
01:21:37,580 --> 01:21:35,520
that anymore just because you know I

1805
01:21:38,960 --> 01:21:37,590
want to be with my kids and my wife

1806
01:21:40,970 --> 01:21:38,970
certainly wants to be there one of the

1807
01:21:42,530 --> 01:21:40,980
toughest things I have to do now you

1808
01:21:45,830 --> 01:21:42,540
know as an academic we have to travel a

1809
01:21:48,770 --> 01:21:45,840
lot and this is not so easy when you

1810
01:21:50,180 --> 01:21:48,780
have a young family your spouse is not

1811
01:21:52,430 --> 01:21:50,190
going to be happy when you take off to

1812
01:21:55,610 --> 01:21:52,440
the High Arctic for two weeks and leave

1813
01:21:57,740 --> 01:21:55,620

her with the four monsters because they

1814
01:21:58,970 --> 01:21:57,750
do drive you nuts sometimes you know so

1815
01:22:00,590 --> 01:21:58,980
thats you got to find that balance

1816
01:22:01,820 --> 01:22:00,600
someone you got to find that balance and

1817
01:22:04,490 --> 01:22:01,830
it usually means that you're going to

1818
01:22:07,340 --> 01:22:04,500
have to give up a little bit on on your

1819
01:22:10,220 --> 01:22:07,350
career side if you want to have I think

1820
01:23:01,020 --> 01:22:10,230
a family and do that but that's okay

1821
01:23:05,850 --> 01:23:03,930
alright this question eludes back to

1822
01:23:07,620 --> 01:23:05,860
what Marique was saying about how we

1823
01:23:09,000 --> 01:23:07,630
stay very focused on one small project

1824
01:23:10,919 --> 01:23:09,010
but it's really important to keep it all

1825
01:23:11,939 --> 01:23:10,929
in the big perspective what's going on

1826
01:23:14,669 --> 01:23:11,949
in science especially in a field like

1827
01:23:16,560 --> 01:23:14,679
astrobiology and asking the panelists

1828
01:23:18,029 --> 01:23:16,570
their thoughts on that and if they have

1829
01:23:20,010 --> 01:23:18,039
any habits they've picked up over the

1830
01:23:21,859 --> 01:23:20,020
years that have helped them kind of be

1831
01:23:24,899 --> 01:23:21,869
more efficient in their work and

1832
01:23:26,160 --> 01:23:24,909
maintain that technical kind of

1833
01:23:31,770 --> 01:23:26,170
small-scale stuff while keeping

1834
01:23:33,629 --> 01:23:31,780
everything in perspective okay I'm back

1835
01:23:36,240 --> 01:23:33,639
and look at the broader picture of how

1836
01:23:38,040 --> 01:23:36,250
your research relates to what other

1837
01:23:40,850 --> 01:23:38,050
people are doing I definitely keep up

1838
01:23:44,010 --> 01:23:40,860

with new papers are being published

1839
01:23:45,930 --> 01:23:44,020
relevant to your area also to plan out

1840
01:23:47,370 --> 01:23:45,940
your work because if you're really close

1841
01:23:49,379 --> 01:23:47,380
up and you're looking through the

1842
01:23:50,760 --> 01:23:49,389
microscope at your samples okay that's

1843
01:23:52,620 --> 01:23:50,770
nice you're getting some detailed

1844
01:23:55,080 --> 01:23:52,630
information but you have to kind of find

1845
01:23:58,319 --> 01:23:55,090
out where that information is going to

1846
01:24:00,049 --> 01:23:58,329
lead you and try to formulate your

1847
01:24:03,089 --> 01:24:00,059
research so you can get some meaningful

1848
01:24:04,799 --> 01:24:03,099
publications as mentioned by Lyle so

1849
01:24:06,270 --> 01:24:04,809
basically you want to kind of try to do

1850
01:24:08,129 --> 01:24:06,280
something new so you have to kind of

1851
01:24:10,589 --> 01:24:08,139
know what's being done now what's been

1852
01:24:13,049 --> 01:24:10,599
done and then okay we're can you add to

1853
01:24:14,520 --> 01:24:13,059
that and I think that will help but

1854
01:24:16,890 --> 01:24:14,530
definitely planning out your work a bit

1855
01:24:18,899 --> 01:24:16,900
yeah really helps you know say okay this

1856
01:24:21,359 --> 01:24:18,909
week I want to accomplish these types of

1857
01:24:27,959 --> 01:24:21,369
steps and so I think that's very

1858
01:24:30,209 --> 01:24:27,969
important yeah I was fortunate to have a

1859
01:24:33,510 --> 01:24:30,219
couple of PhD advisors one in particular

1860
01:24:36,439 --> 01:24:33,520
who is very you know focused on on the

1861
01:24:39,180 --> 01:24:36,449
big picture and and he'd just you know

1862
01:24:42,779 --> 01:24:39,190
instill that and mean and and so I think

1863
01:24:45,660 --> 01:24:42,789

I've always kind of had that but just

1864
01:24:49,069 --> 01:24:45,670
through through through writing whether

1865
01:24:51,899 --> 01:24:49,079
it's writing papers or proposals or

1866
01:24:55,439 --> 01:24:51,909
maybe even more you know general

1867
01:24:59,370 --> 01:24:55,449
audience pieces whatever that helps

1868
01:25:02,160 --> 01:24:59,380
helps you to to put your you know little

1869
01:25:07,439 --> 01:25:02,170
laboratory observations into a larger

1870
01:25:10,379 --> 01:25:07,449
perspective so just by doing that

1871
01:25:12,509 --> 01:25:10,389
although you know I co-authored a paper

1872
01:25:14,129 --> 01:25:12,519
once with you know and then title was

1873
01:25:17,339 --> 01:25:14,139
kind of you know blah blah implications

1874
01:25:19,049 --> 01:25:17,349
for Mars and and my co-author didn't

1875
01:25:20,549 --> 01:25:19,059
really say anything in the paper but

1876
01:25:22,770 --> 01:25:20,559
those implications that I said well

1877
01:25:24,509 --> 01:25:22,780
shouldn't we say something he's like I

1878
01:25:34,859 --> 01:25:24,519
let the audience worry about that you

1879
01:25:36,629 --> 01:25:34,869
know what can I add to that yeah you

1880
01:25:39,330 --> 01:25:36,639
have to be able to focus you know don't

1881
01:25:41,969 --> 01:25:39,340
spread yourself too thin you're doing a

1882
01:25:45,060 --> 01:25:41,979
PhD project or a master's project don't

1883
01:25:47,729 --> 01:25:45,070
try to do everything for everybody try

1884
01:25:49,319 --> 01:25:47,739
to focus I try to get my students right

1885
01:25:50,969 --> 01:25:49,329
off the when they first start with me

1886
01:25:52,259 --> 01:25:50,979
you know i call it the mother question

1887
01:25:55,680 --> 01:25:52,269
or the mother you have to be able to

1888
01:25:58,799 --> 01:25:55,690

tell your mother in three minutes what

1889
01:26:00,600 --> 01:25:58,809
you're doing why you're doing it and why

1890
01:26:02,459 --> 01:26:00,610
it's important and then she's going to

1891
01:26:05,399 --> 01:26:02,469
walk away from that and say yeah okay I

1892
01:26:06,930 --> 01:26:05,409
get it okay and that quote and that and

1893
01:26:07,919 --> 01:26:06,940
that's something that is very useful

1894
01:26:09,509 --> 01:26:07,929
because you know especially in

1895
01:26:11,129 --> 01:26:09,519
astrobiology too because you know and

1896
01:26:12,770 --> 01:26:11,139
Roman talked about this you're talking

1897
01:26:15,540 --> 01:26:12,780
to about you're talking the engineers

1898
01:26:16,919 --> 01:26:15,550
geochemist microbiologist and and you

1899
01:26:19,469 --> 01:26:16,929
have to be able to do that okay

1900
01:26:21,060 --> 01:26:19,479
deadlines are very good for focusing the

1901
01:26:24,060 --> 01:26:21,070
mind you know an industry you guys have

1902
01:26:26,430 --> 01:26:24,070
hard deadlines that cost money in

1903
01:26:28,290 --> 01:26:26,440
academia we have hard deadlines that

1904
01:26:31,160 --> 01:26:28,300
says that n circ needs their discovery

1905
01:26:33,930 --> 01:26:31,170
grant proposal on this date here or else

1906
01:26:36,029 --> 01:26:33,940
that's good make artificial deadlines if

1907
01:26:37,379 --> 01:26:36,039
you have to get your professor when I

1908
01:26:39,330 --> 01:26:37,389
like to do this where are my students

1909
01:26:40,979 --> 01:26:39,340
you know I say okay I want a paper I

1910
01:26:42,629 --> 01:26:40,989
want this done blah blah blah I don't

1911
01:26:44,969 --> 01:26:42,639
and the reason I do it is not I don't

1912
01:26:47,209 --> 01:26:44,979
say this not so much that I really want

1913
01:26:49,979 --> 01:26:47,219

the paper that day I want them to focus

1914
01:26:52,589 --> 01:26:49,989
on what they're doing why they're doing

1915
01:27:00,270 --> 01:26:52,599
it and you know just so that they can

1916
01:27:05,890 --> 01:27:03,339
great oh yeah I'm sorry I thought your

1917
01:27:10,770 --> 01:27:05,900
respect your say something Richard um so

1918
01:27:13,959 --> 01:27:10,780
I guess my my advice would be to

1919
01:27:17,410 --> 01:27:13,969
definitely follow up on on reading

1920
01:27:20,469 --> 01:27:17,420
papers read a lot of papers um but also

1921
01:27:22,629 --> 01:27:20,479
talk to people and talk to your

1922
01:27:23,799 --> 01:27:22,639
colleagues talk to you fellow students I

1923
01:27:26,219 --> 01:27:23,809
think that's really important because

1924
01:27:30,219 --> 01:27:26,229
you're surrounded by creative people and

1925
01:27:33,939 --> 01:27:30,229
you know talk to them about science and

1926
01:27:35,949 --> 01:27:33,949
I think that well conferences like the

1927
01:27:37,810 --> 01:27:35,959
one you're at right now is are critical

1928
01:27:40,989 --> 01:27:37,820
for this for building some sort of

1929
01:27:45,850 --> 01:27:40,999
camaraderie with uh with your fellow

1930
01:27:48,040 --> 01:27:45,860
students and postdocs but uh there's

1931
01:27:51,669 --> 01:27:48,050
when you go to conferences also you know

1932
01:27:53,890 --> 01:27:51,679
make the effort to introduce yourself to

1933
01:27:57,040 --> 01:27:53,900
the guy who's papers you've been meeting

1934
01:27:59,080 --> 01:27:57,050
because sometimes you know they'll have

1935
01:28:01,540 --> 01:27:59,090
some really interesting perspectives as

1936
01:28:04,959 --> 01:28:01,550
well so that's that's definitely

1937
01:28:10,839 --> 01:28:04,969
something to follow up on and I don't

1938
01:28:14,379 --> 01:28:10,849

know I guess uh yeah keep it up and in

1939
01:28:17,669 --> 01:28:14,389
terms of when you go to conferences like

1940
01:28:21,129 --> 01:28:17,679
this and you're building camaraderie and

1941
01:28:22,569 --> 01:28:21,139
you know I guess when I first started to

1942
01:28:25,449 --> 01:28:22,579
go to conferences yeah you're sort of

1943
01:28:30,000 --> 01:28:25,459
overwhelmed by all these all these older

1944
01:28:34,330 --> 01:28:30,010
people the the gray hair is I guess and

1945
01:28:37,929 --> 01:28:34,340
they are they are definitely our mentors

1946
01:28:39,219 --> 01:28:37,939
but also keep in mind that where the

1947
01:28:41,469 --> 01:28:39,229
younger generation where the ground

1948
01:28:44,830 --> 01:28:41,479
spell and so that's the kind of thing

1949
01:28:48,040 --> 01:28:44,840
where eventually will help I'll be a

1950
01:28:50,350 --> 01:28:48,050
gray-haired and as well those guys the

1951
01:28:51,910 --> 01:28:50,360
rest of you the audience we are the ones

1952
01:28:55,239 --> 01:28:51,920
that are going to take over at some

1953
01:28:57,219 --> 01:28:55,249
point so um you know keep that in mind

1954
01:29:01,029 --> 01:28:57,229
there's their generations that are going

1955
01:29:07,540 --> 01:29:01,039
to be changing all right i'll leave it

1956
01:29:08,110 --> 01:29:07,550
there I can't hear you Richard I'm just

1957
01:29:11,710 --> 01:29:08,120
gonna add

1958
01:29:14,970 --> 01:29:11,720
a practical a trick that you can try in

1959
01:29:18,940 --> 01:29:14,980
your presentations and I got this from

1960
01:29:20,860 --> 01:29:18,950
Emily lock the lock de wallahs from the

1961
01:29:24,160 --> 01:29:20,870
Planetary Society her her guide to not

1962
01:29:27,580 --> 01:29:24,170
giving a talk that sucks and one of her

1963
01:29:29,430 --> 01:29:27,590

her tricks was 22 you know don't

1964
01:29:31,690 --> 01:29:29,440
conclude your presentation with like

1965
01:29:34,090 --> 01:29:31,700
acknowledgments or a slide that says

1966
01:29:38,410 --> 01:29:34,100
thank you conclude it with a you know a

1967
01:29:39,670 --> 01:29:38,420
tweet like 140 character statement that

1968
01:29:42,820 --> 01:29:39,680
that people are going to leave the room

1969
01:29:45,670 --> 01:29:42,830
saying oh yeah you know that person

1970
01:29:47,530 --> 01:29:45,680
worked on you know calcite and and its

1971
01:29:50,140 --> 01:29:47,540
really relevant to I don't know you know

1972
01:29:51,910 --> 01:29:50,150
some some microbe or some bio saying you

1973
01:29:54,460 --> 01:29:51,920
know like like not i'm not a fan of

1974
01:29:57,370 --> 01:29:54,470
dumbing things down to twitter level but

1975
01:29:59,050 --> 01:29:57,380
i have a clear statement about what you

1976
01:30:01,060 --> 01:29:59,060
just talked about over you know whether

1977
01:30:04,630 --> 01:30:01,070
it's 10 minute presentation or an hour

1978
01:30:06,400 --> 01:30:04,640
long seminar you know try and try and

1979
01:30:09,250 --> 01:30:06,410
have any little twist to it and that

1980
01:30:10,570 --> 01:30:09,260
helps you to ask yourself well what is

1981
01:30:12,670 --> 01:30:10,580
this all about what you know what is

1982
01:30:35,010 --> 01:30:12,680
this you know what are these 80 slides

1983
01:30:39,640 --> 01:30:38,109
alright so this question is talking

1984
01:30:41,080 --> 01:30:39,650
about what we discussed really about 10

1985
01:30:42,310 --> 01:30:41,090
year and how an academia tenure is kind

1986
01:30:45,669 --> 01:30:42,320
of like the ultimate goal of job

1987
01:30:47,530 --> 01:30:45,679
security and is there any job security

1988
01:30:50,919 --> 01:30:47,540

in industry and government when it comes

1989
01:30:54,399 --> 01:30:50,929
to loss of funding and economy and that

1990
01:30:56,050 --> 01:30:54,409
sort of thing there is 0 for mize

1991
01:30:57,669 --> 01:30:56,060
perspective in terms of government being

1992
01:30:59,919 --> 01:30:57,679
a government research scientists and

1993
01:31:02,500 --> 01:30:59,929
Lyle will know this as well there are

1994
01:31:07,149 --> 01:31:02,510
sort of promotional levels that you go

1995
01:31:09,510 --> 01:31:07,159
through as you increase in your ability

1996
01:31:13,300 --> 01:31:09,520
of being a research scientist so so so

1997
01:31:14,530 --> 01:31:13,310
and and then in terms of jobs and

1998
01:31:17,140 --> 01:31:14,540
government there you can have a

1999
01:31:19,120 --> 01:31:17,150
determinate job which is like contract

2000
01:31:22,840 --> 01:31:19,130
position or it can have an indeterminate

2001
01:31:25,510 --> 01:31:22,850
job which has no end no end specified

2002
01:31:29,740 --> 01:31:25,520
but that position still could be ended

2003
01:31:31,240 --> 01:31:29,750
for you so yeah job security is is like

2004
01:31:35,950 --> 01:31:31,250
one of those terms you know what is it

2005
01:31:39,520 --> 01:31:35,960
and so I don't think it's comparable to

2006
01:31:46,209 --> 01:31:39,530
a tenure per se because because tenure

2007
01:31:48,310 --> 01:31:46,219
is pretty a pretty sacred but okay yeah

2008
01:31:50,890 --> 01:31:48,320
I mean I don't think you should get too

2009
01:31:52,540 --> 01:31:50,900
hung up on tenure track and tenure and

2010
01:31:55,359 --> 01:31:52,550
all that kind of stuff you know in the

2011
01:31:58,300 --> 01:31:55,369
real world there is no job security in

2012
01:32:00,040 --> 01:31:58,310
anything you do if you do a crappy job

2013
01:32:02,530 --> 01:32:00,050

at something unless you're a senator in

2014
01:32:05,560 --> 01:32:02,540
Canada you're gonna lose your job you

2015
01:32:07,270 --> 01:32:05,570
know that's just the way it is so so

2016
01:32:11,700 --> 01:32:07,280
just don't put yourself on that position

2017
01:32:15,700 --> 01:32:14,290
yeah I guess an industry the same thing

2018
01:32:17,590 --> 01:32:15,710
we don't have tenure unless you own the

2019
01:32:19,990 --> 01:32:17,600
company or something there but then

2020
01:32:21,520 --> 01:32:20,000
again you may creek go bankrupt the next

2021
01:32:23,590 --> 01:32:21,530
year I mean I've seen you know so many

2022
01:32:25,660 --> 01:32:23,600
business and it's closing I mean the

2023
01:32:27,820 --> 01:32:25,670
really key thing for us has been being

2024
01:32:29,830 --> 01:32:27,830
sufficiently diversified that depending

2025
01:32:31,450 --> 01:32:29,840
on which market sector there's always

2026
01:32:33,790 --> 01:32:31,460
something that's important like we

2027
01:32:36,729 --> 01:32:33,800
thought last year with csa undergoing

2028
01:32:39,550 --> 01:32:36,739
all these changes we'd be really looking

2029
01:32:41,589 --> 01:32:39,560
for work and somehow certain

2030
01:32:43,390 --> 01:32:41,599
technologies become through the Harper

2031
01:32:45,310 --> 01:32:43,400
government became very important and now

2032
01:32:45,950 --> 01:32:45,320
I mean people are complaining they're

2033
01:32:48,350 --> 01:32:45,960
worth

2034
01:32:50,690 --> 01:32:48,360
overworked at work so it's so we've

2035
01:32:52,459 --> 01:32:50,700
tried to just stay diversified again

2036
01:32:54,680 --> 01:32:52,469
then you have to have a broad area of

2037
01:32:56,300 --> 01:32:54,690
knowledge you know because different

2038
01:32:57,530 --> 01:32:56,310

years you'll be working like one year

2039
01:32:58,940 --> 01:32:57,540
will be working on things like Mars

2040
01:33:01,970 --> 01:32:58,950
mapping mission this year we're working

2041
01:33:03,950 --> 01:33:01,980
on earth observation and monitoring the

2042
01:33:06,290 --> 01:33:03,960
tar sands for the government so so it

2043
01:33:09,050 --> 01:33:06,300
really varies so I guess that's kind of

2044
01:33:11,330 --> 01:33:09,060
a way of providing job security rovan

2045
01:33:15,530 --> 01:33:11,340
maybe you mpb could hire some young

2046
01:33:26,930 --> 01:33:15,540
scientists and engineers if you're so

2047
01:33:32,150 --> 01:33:26,940
overworked all right good thing I made a

2048
01:33:35,390 --> 01:33:32,160
list so no we discussed a little bit

2049
01:33:37,640 --> 01:33:35,400
about how there really aren't that many

2050
01:33:38,959 --> 01:33:37,650
positions available in academia is in

2051
01:33:42,530 --> 01:33:38,969
astrobiology because there is no

2052
01:33:43,790 --> 01:33:42,540
astrobiology industry or anything like

2053
01:33:44,990 --> 01:33:43,800
that and so Marique was saying for

2054
01:33:46,070 --> 01:33:45,000
instance you took the job at Brock

2055
01:33:48,200 --> 01:33:46,080
originally it wasn't her first choice

2056
01:33:52,940 --> 01:33:48,210
but there's should we just be taking

2057
01:33:55,010 --> 01:33:52,950
what we can get or can we risk waiting

2058
01:34:01,760 --> 01:33:55,020
for the perfect job is there a perfect

2059
01:34:06,560 --> 01:34:01,770
job I think there's the near perfect job

2060
01:34:10,250 --> 01:34:06,570
for you you know each of you but but

2061
01:34:12,800 --> 01:34:10,260
even then I mean jobs evolve you know

2062
01:34:14,870 --> 01:34:12,810
one day you may think you have an ideal

2063
01:34:19,760 --> 01:34:14,880

job and then you know something happens

2064
01:34:22,130 --> 01:34:19,770
and and so I I think you you need to

2065
01:34:24,350 --> 01:34:22,140
look at opportunities create

2066
01:34:27,110 --> 01:34:24,360
opportunities and and and sees the ones

2067
01:34:29,630 --> 01:34:27,120
that season seemed the best and then you

2068
01:34:31,370 --> 01:34:29,640
know do your best at whatever that job

2069
01:34:33,709 --> 01:34:31,380
is or whatever that position is and and

2070
01:34:35,600 --> 01:34:33,719
try and make the best of it and if it

2071
01:34:37,100 --> 01:34:35,610
doesn't work out or you don't like it

2072
01:34:40,270 --> 01:34:37,110
you can always change later down the

2073
01:34:43,160 --> 01:34:40,280
road you know it might not be easy but

2074
01:34:46,070 --> 01:34:43,170
yeah you're not you know you know the

2075
01:34:47,990 --> 01:34:46,080
the the good thing about lack of job

2076
01:34:49,920 --> 01:34:48,000
security in a way is that you can you

2077
01:34:52,200 --> 01:34:49,930
can change jobs you know and

2078
01:34:54,500 --> 01:34:52,210
and you know why was a good example of

2079
01:35:00,470 --> 01:34:54,510
someone who went from government to

2080
01:35:03,420 --> 01:35:00,480
academia and you know both both of his

2081
01:35:08,430 --> 01:35:03,430
jobs that he had I think he would say

2082
01:35:14,100 --> 01:35:08,440
were had lots of advantages each and you

2083
01:35:18,180 --> 01:35:14,110
know it's worked out well so I forget

2084
01:35:20,010 --> 01:35:18,190
the question basically should we wait

2085
01:35:21,780 --> 01:35:20,020
around for the the perfect project of

2086
01:35:24,030 --> 01:35:21,790
the perfect job yeah well no because how

2087
01:35:26,370 --> 01:35:24,040
are you gonna recognize it you know I

2088
01:35:28,350 --> 01:35:26,380

mean yeah you've got to get your feet

2089
01:35:31,770 --> 01:35:28,360
wet and gonna take what you can get at

2090
01:35:34,950 --> 01:35:31,780
this point because I wouldn't say it's

2091
01:35:37,440 --> 01:35:34,960
necessarily that bat bleak I mean again

2092
01:35:38,940 --> 01:35:37,450
try and be good at what you do and try

2093
01:35:40,800 --> 01:35:38,950
and find the best opportunity and try

2094
01:35:42,480 --> 01:35:40,810
and seek out the best opportunity or try

2095
01:35:44,490 --> 01:35:42,490
and create some opportunities especially

2096
01:35:46,440 --> 01:35:44,500
in terms of you know students looking

2097
01:35:48,960 --> 01:35:46,450
for postdocs you know that that's a

2098
01:35:51,150 --> 01:35:48,970
really an area where you can you can

2099
01:35:53,340 --> 01:35:51,160
find someone and and and and maybe

2100
01:35:55,110 --> 01:35:53,350
develop an interesting project and and

2101
01:35:56,550 --> 01:35:55,120
then you get funding for that you know

2102
01:36:00,270 --> 01:35:56,560
there's a lot of fellowship programs and

2103
01:36:01,860 --> 01:36:00,280
so on you know those those postdocs are

2104
01:36:07,290 --> 01:36:01,870
not necessarily going to be advertised

2105
01:36:10,230 --> 01:36:07,300
you know in in EOS or whatever so yeah I

2106
01:36:12,330 --> 01:36:10,240
think I were you gonna say yeah yeah

2107
01:36:15,090 --> 01:36:12,340
don't wait for the perfect job I don't I

2108
01:36:16,710 --> 01:36:15,100
don't think I don't think that maybe for

2109
01:36:19,460 --> 01:36:16,720
some people one one in a hundred times

2110
01:36:21,810 --> 01:36:19,470
that actually happens in real life

2111
01:36:24,030 --> 01:36:21,820
marique just told us about her position

2112
01:36:25,860 --> 01:36:24,040
you know when she went to Brock and it

2113
01:36:27,870 --> 01:36:25,870

didn't turn out initially what she

2114
01:36:29,820 --> 01:36:27,880
wanted it to be but at the same time

2115
01:36:32,460 --> 01:36:29,830
it's evolved she taken this this this

2116
01:36:34,860 --> 01:36:32,470
opportunity and made the best of it okay

2117
01:36:36,360 --> 01:36:34,870
when I went to McGill I was going into a

2118
01:36:38,310 --> 01:36:36,370
department where the microbiology

2119
01:36:41,070 --> 01:36:38,320
component for most people's perspectives

2120
01:36:42,510 --> 01:36:41,080
was in a state of decline and there was

2121
01:36:44,430 --> 01:36:42,520
people wondering why did I even go there

2122
01:36:47,310 --> 01:36:44,440
and I just looked at it as an

2123
01:36:49,110 --> 01:36:47,320
opportunity and it was it perfect no I

2124
01:36:52,050 --> 01:36:49,120
took a pay cut going from the federal

2125
01:36:54,780 --> 01:36:52,060
government you know was it perfect no

2126
01:36:56,580 --> 01:36:54,790
but I have I have a PhD student well I

2127
01:36:59,280 --> 01:36:56,590
had a PhD to this is done a post doc now

2128
01:37:01,320 --> 01:36:59,290
he was offered at least one or two

2129
01:37:03,509 --> 01:37:01,330
faculty positions but he decided not to

2130
01:37:06,329 --> 01:37:03,519
take those offers because they were at

2131
01:37:07,529 --> 01:37:06,339
so called let's say minor universities

2132
01:37:10,319 --> 01:37:07,539
and he wanted something bigger and

2133
01:37:12,479 --> 01:37:10,329
better and he lost his opportunity in

2134
01:37:14,729 --> 01:37:12,489
that respect I don't I don't think he

2135
01:37:16,500 --> 01:37:14,739
made the best decision so there is no

2136
01:37:18,809 --> 01:37:16,510
such thing as a perfect job you know

2137
01:37:20,009 --> 01:37:18,819
even even as an academia the Mariko

2138
01:37:22,529 --> 01:37:20,019

tells that this while you know I have

2139
01:37:24,089 --> 01:37:22,539
for good days and five days and for good

2140
01:37:25,709 --> 01:37:24,099
days and one bad day every week and I

2141
01:37:30,509 --> 01:37:25,719
think that's pretty much what the rest

2142
01:37:34,019 --> 01:37:30,519
of the world experiences as well yeah I

2143
01:37:37,979 --> 01:37:34,029
guess um what what I would ask that is

2144
01:37:40,500 --> 01:37:37,989
when I was going through the there's a

2145
01:37:46,199 --> 01:37:40,510
bit of an echo now um when I was going

2146
01:37:49,489 --> 01:37:46,209
through the job search I I definitely I

2147
01:37:54,509 --> 01:37:49,499
would go through it and see if there was

2148
01:37:57,449 --> 01:37:54,519
some sort of a witch where I wanted to

2149
01:38:00,750 --> 01:37:57,459
go geographically that was the concern

2150
01:38:03,329 --> 01:38:00,760
could I stand living there and like I

2151
01:38:05,579 --> 01:38:03,339
probably I wasn't going to apply to a

2152
01:38:07,289 --> 01:38:05,589
place in Alabama just because it didn't

2153
01:38:09,269 --> 01:38:07,299
really appeal to me you know whereas

2154
01:38:11,099 --> 01:38:09,279
moving to st. Catharines Ontario was

2155
01:38:14,039 --> 01:38:11,109
actually a pretty nice place so I'm

2156
01:38:18,269 --> 01:38:14,049
happy to to bend it up here and yeah you

2157
01:38:21,959 --> 01:38:18,279
make the most of it and you be rise to

2158
01:38:23,779 --> 01:38:21,969
the occasion whenever it comes up cool

2159
01:38:26,579 --> 01:38:23,789
do you still have to leave early low

2160
01:38:29,549 --> 01:38:26,589
okay so I think unless there's any

2161
01:38:30,709 --> 01:38:29,559
really really pressing questions we're

2162
01:38:34,139 --> 01:38:30,719
going to wrap up couple minutes early

2163
01:38:36,179 --> 01:38:34,149

but I have one last thing if there's one

2164
01:38:49,090 --> 01:38:36,189
piece of advice you could leave all of

2165
01:38:57,290 --> 01:38:53,690
well give two pieces of advice no try to

2166
01:38:58,910 --> 01:38:57,300
judge know your your limitations let's

2167
01:39:00,050 --> 01:38:58,920
say what you're really good at I mean

2168
01:39:01,430 --> 01:39:00,060
you know if you were to ask me when I

2169
01:39:02,750 --> 01:39:01,440
was 20 years old what did I really want

2170
01:39:05,060 --> 01:39:02,760
to do I want to be professional hockey

2171
01:39:07,010 --> 01:39:05,070
player like every guy I want to be the

2172
01:39:08,270 --> 01:39:07,020
next Wayne Gretzky but you know what 20

2173
01:39:10,460 --> 01:39:08,280
years old you know that's not going to

2174
01:39:13,160 --> 01:39:10,470
happen so just you know leave it leave

2175
01:39:15,920 --> 01:39:13,170
it at that the other piece of advice I

2176
01:39:18,080 --> 01:39:15,930
would say is if you can go where your

2177
01:39:19,730 --> 01:39:18,090
passion is I know it's not always easy

2178
01:39:21,410 --> 01:39:19,740
to find what that passion is but if you

2179
01:39:24,500 --> 01:39:21,420
can you can discover what your passion

2180
01:39:26,240 --> 01:39:24,510
is go there you will be happy there you

2181
01:39:27,940 --> 01:39:26,250
will do very well there you may it may

2182
01:39:29,990 --> 01:39:27,950
cost you in some circumstances

2183
01:39:35,170 --> 01:39:30,000
financially but still you will be

2184
01:39:43,250 --> 01:39:37,940
yeah absolutely I would I would echo

2185
01:39:47,570 --> 01:39:43,260
that you know do what you do well and do

2186
01:39:52,970 --> 01:39:47,580
it well and and you know do what you

2187
01:39:55,040 --> 01:39:52,980
like and and you'll like what you do so

2188
01:39:57,380 --> 01:39:55,050

it's kind of mentioned by Lyle and we

2189
01:40:01,250 --> 01:39:57,390
should make the most of each opportunity

2190
01:40:04,640 --> 01:40:01,260
like like there's never a perfect job

2191
01:40:06,170 --> 01:40:04,650
there's never totally perfect made of

2192
01:40:10,310 --> 01:40:06,180
course the opposite side is always

2193
01:40:12,670 --> 01:40:10,320
perfect by day but I never stop learning

2194
01:40:15,650 --> 01:40:12,680
because even now I'm learning new things

2195
01:40:17,030 --> 01:40:15,660
getting to know new areas of science or

2196
01:40:18,620 --> 01:40:17,040
whatever so that's the thing I mean

2197
01:40:20,480 --> 01:40:18,630
that's the whole journey through life is

2198
01:40:25,180 --> 01:40:20,490
to keep improving yourself and keep

2199
01:40:27,800 --> 01:40:25,190
learning all right well those are all

2200
01:40:30,680 --> 01:40:27,810
great ideas and I guess the only thing

2201
01:40:33,860 --> 01:40:30,690
what I would add is to be open-minded

2202
01:40:36,590 --> 01:40:33,870
about where you're gonna go you know I

2203
01:40:40,370 --> 01:40:36,600
think that if you if you say I'm going

2204
01:40:42,050 --> 01:40:40,380
to you know do this degree so i can get

2205
01:40:45,230 --> 01:40:42,060
this specific postdoc to get this

2206
01:40:47,600 --> 01:40:45,240
specific job and then you know if you

2207
01:40:48,920 --> 01:40:47,610
have it all mapped out you're not going

2208
01:40:52,940 --> 01:40:48,930
to you're going to run into roadblocks

2209
01:40:54,380 --> 01:40:52,950
you have to be adaptable and eventually

2210
01:40:59,000 --> 01:40:54,390
you'll get to where you want to go but

2211
01:41:01,919 --> 01:40:59,010
it just takes some time good

2212
01:41:03,870 --> 01:41:01,929
thank you well if you guys could all