Behind the Tech with Kevin Scott

EP 04 – Judy Estrin: Co-creator in developing Internet – engineer, entrepreneur & executive

1

00:00:02,825 --> 00:00:05,603

Right now, so much of what

2

00:00:05,619 --> 00:00:07,686

is going on in the industry

3

00:00:07,692 --> 00:00:13,013

is driven by the values of scale and speed.

4

00:00:13,038 --> 00:00:15,513

It is about maximizing growth.

5

00:00:15,513 --> 00:00:18,961

It is about maximizing connectivity.

6

00:00:18,982 --> 00:00:21,095

What about thinking about what

7

00:00:21,120 --> 00:00:23,913

we're losing in those values.

8

00:00:23,938 --> 00:00:26,289

There's nothing wrong with growth,

9

00:00:26,321 --> 00:00:31,155

but not at the expense of humanity.

10

00:00:41,076 --> 00:00:42,042

>> Hi, everyone.

11

00:00:42,067 --> 00:00:42,899

Welcome to

Behind the Tech.

12

00:00:42,900 --> 00:00:44,032

I'm your host,

Kevin Scott,

13

00:00:44,233 --> 00:00:47,199

Chief Technology Officer

for Microsoft.

14

00:00:47,200 --> 00:00:48,266

In this podcast,

we're going to get

15

00:00:48,267 --> 00:00:49,532

behind the tech.

16

00:00:49,533 --> 00:00:50,242

We'll talk with some of

the people who have

17

00:00:50,267 --> 00:00:51,766

made our modern

tech world possible

18

00:00:51,767 --> 00:00:53,599

and understand what

motivated them to

19

00:00:53,600 --> 00:00:54,966

create what they did.

20

00:00:54,967 --> 00:00:57,266

So, join me to maybe

learn a little bit about

21

00:00:57,267 --> 00:00:59,732

the history of computing,

and get a few

22

00:00:59,733 --> 00:01:02,466

behind-the-scenes insights

into what's happening today.

23

00:01:02,467 --> 00:01:03,132

Stick around.

24

00:01:03,133 --> 00:01:08,132

(music)

25

00:01:08,133 --> 00:01:10,399

Today, I'm joined by my

colleague, Christina Warren.

26

00:01:10,400 --> 00:01:12,232

Christina is a senior cloud

developer advocate

27

00:01:12,233 --> 00:01:13,332

at Microsoft.

28

00:01:13,333 --> 00:01:14,266

Welcome back, Christina.

29

00:01:14,267 --> 00:01:16,266

>>Hey, Kevin.

Great to be here again.

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00:01:16,267 --> 00:01:20,799

>>So, we are going to talk

with Judy Estrin today.

31

00:01:20,800 --> 00:01:23,966

And I have been super

excited to get this interview

32

00:01:23,967 --> 00:01:27,066

on the books, because Judy

is truly one of the most

33

00:01:27,067 --> 00:01:31,699

amazing individuals in tech

who I've ever met.

34

00:01:31,700 --> 00:01:34,432

>>Yeah. Just seeing how far

back her association

35

00:01:34,433 --> 00:01:36,532

with the Internet goes,

and all the different roles

36

00:01:36,533 --> 00:01:38,966

that she's had as an engineer

and as an entrepreneur.

37

00:01:38,967 --> 00:01:39,932

>>Yeah, her story is

incredible.

38

00:01:39,933 --> 00:01:43,399

Like the fact that it starts

with amazing anecdotes

39

00:01:43,400 --> 00:01:45,032

like her dad working for

John Von Neumann

40

00:01:45,033 --> 00:01:47,099

at the Institute for

Advanced Study.

41

00:01:47,100 --> 00:01:48,866

And sort of goes

all the way through

42

00:01:48,867 --> 00:01:52,099

her direct involvement

in the creation of

43

00:01:52,100 --> 00:01:56,199

the Internet protocols, to

illustrious career in

44

00:01:56,200 --> 00:01:59,799

the technology industry as an

executive and board member.

45

00:01:59,800 --> 00:02:00,799

I mean, just incredible stuff.

46

00:02:00,800 --> 00:02:02,099

>>I'm really looking forward

47

00:02:02,100 --> 00:02:03,666

to hearing what you two

discuss.

48

00:02:03,667 --> 00:02:05,532

>>Awesome. Well, thanks

for chatting, Christina.

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00:02:05,533 --> 00:02:06,632

We'll catch up later

in the show.

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00:02:06,633 --> 00:02:07,499

>>Talk soon.

51

00:02:07,500 --> 00:02:10,666

(music)

52

00:02:10,667 --> 00:02:12,232

Coming up next,

Judy Estrin.

53

00:02:12,233 --> 00:02:14,566

Internet pioneer,

entrepreneur,

54

00:02:14,567 --> 00:02:15,599

tech executive,

55

00:02:15,600 --> 00:02:18,199

author of the book

Closing the Innovation Gap,

56

00:02:18,200 --> 00:02:20,699

and one of the most incisive

thinkers on the intersection

57

00:02:20,700 --> 00:02:23,499

of the Internet, democracy,

and humanity.

58

00:02:23,500 --> 00:02:24,732

So, welcome, Judy.

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00:02:24,733 --> 00:02:26,032

>>It's a pleasure

to be here.

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00:02:26,033 --> 00:02:26,799

>>Oh, awesome, awesome.

61

00:02:26,800 --> 00:02:29,166

I've been so looking forward

to chatting with you.

62

00:02:29,167 --> 00:02:32,032

So, I wanted to start

with your childhood

63

00:02:32,033 --> 00:02:35,266

because you had this

amazing career

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00:02:35,267 --> 00:02:39,632

in technology, and your

father is a very well-known

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00:02:39,633 --> 00:02:40,299

computer scientist.

66

00:02:40,300 --> 00:02:42,932

So, with you, it started

especially early. Right?

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00:02:42,933 --> 00:02:46,199

>>Yeah. I had the advantage

of being a second-generation

68

00:02:46,200 --> 00:02:50,366

technologist when computers

didn't really exist.

69

00:02:50,367 --> 00:02:51,732

But it wasn't just my father.

70

00:02:51,733 --> 00:02:53,232

it was my father

and my mother.

71

00:02:53,233 --> 00:02:56,499

My father worked with

Von Neumann on the

72

00:02:56,500 --> 00:02:57,366

part of the team at

73

00:02:57,367 --> 00:02:58,666

the Institute for

Advanced Sciences

74

00:02:58,667 --> 00:03:01,332

on the first computer.

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00:03:01,333 --> 00:03:06,132

He and my mom were then

invited to go to Israel

76

00:03:06,133 --> 00:03:09,132

to help lead the team that

built the first computer

77

00:03:09,133 --> 00:03:10,766

in the Middle East,

the WEIZAC.

78

00:03:10,767 --> 00:03:14,466

They then ultimately came

back and came to California

79

00:03:14,467 --> 00:03:16,499

and my dad started the

computer science department

80

00:03:16,500 --> 00:03:18,599

at UCLA, and was there

for years.

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00:03:18,600 --> 00:03:22,899

My mother also has a PhD in

electrical engineering.

82

00:03:22,900 --> 00:03:26,032

And when she got her PhD

from Wisconsin,

83

00:03:26,033 --> 00:03:29,032

there was one other woman

in the country who got a PhD

84

00:03:29,033 --> 00:03:30,866

in electrical engineering

that year.

85

00:03:30,867 --> 00:03:31,766

>>Wow.

86

00:03:31,767 --> 00:03:33,999

>>At least that was the story

in our family. And so --

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00:03:34,000 --> 00:03:35,299

>>And when was that?

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00:03:35,300 --> 00:03:36,466

>>It was in the late '40s.

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00:03:36,467 --> 00:03:38,366

An interesting story.

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00:03:38,367 --> 00:03:42,332

When they came to UCLA,

she could not work in the

91

00:03:42,333 --> 00:03:44,732

engineering department,

where my dad was

92

00:03:44,733 --> 00:03:47,266

because of nepotism rules.

93

00:03:47,267 --> 00:03:50,132

And so she ended up

starting a data processing lab

94

00:03:50,133 --> 00:03:53,399

in the Brain Research Institute

at UCLA.

95

00:03:53,400 --> 00:03:55,999

So, she was one of the first

biomedical engineers

96

00:03:56,000 --> 00:03:58,832

and really excelled and helped

build that field.

97

00:03:58,833 --> 00:04:02,999

So, I had two unbelievable

role models.

98

00:04:03,000 --> 00:04:06,899

And lots of positive aspects

to that.

99

00:04:06,900 --> 00:04:08,299

>>And I'm guessing there's

some intimidation, too,

100

00:04:08,300 --> 00:04:09,066

as well.

101

00:04:09,067 --> 00:04:09,999

>>Some intimidation.

102

00:04:10,000 --> 00:04:12,232

I can still remember in

high school when my dad

103

00:04:12,233 --> 00:04:16,332

brought home some video

tapes to learn Fortran.

104

00:04:16,333 --> 00:04:20,499

And my dad ended up leaving

me notes in Fortran.

105

00:04:20,500 --> 00:04:23,666

So, he would leave me

"if, then, else" statements

106

00:04:23,667 --> 00:04:26,799

of what I was supposed to do

that day. (laugh)

107

00:04:26,800 --> 00:04:29,432

And so it was my way to bond

with my father

108

00:04:29,433 --> 00:04:32,766

that I ended up probably

going into computer science.

109

00:04:32,767 --> 00:04:34,199

>>Well, let's talk about your

mother a little bit more.

110

00:04:34,200 --> 00:04:36,266

So, your dad is Gerald Estrin.

111

00:04:36,267 --> 00:04:36,899

>>Right.

112

00:04:36,900 --> 00:04:38,966

>>And I think I know less

about your mother,

113

00:04:38,967 --> 00:04:42,166

but it sounds like her career

path, in many ways,

114

00:04:42,167 --> 00:04:45,432

might be the most

extraordinary one.

115

00:04:45,433 --> 00:04:48,066

Did she share any stories with

you about what it was like

116

00:04:48,067 --> 00:04:49,799

to get that PhD

in electrical engineering

117

00:04:49,800 --> 00:04:51,232

at that point in time?

118

00:04:51,233 --> 00:04:54,566

And, like, she must have had

this beautiful vantage point

119

00:04:54,567 --> 00:04:56,299

to sort of see how

the field unfolded

120

00:04:56,300 --> 00:04:58,966

over the past many decades.

121

00:04:58,967 --> 00:05:04,566

>>Yeah, both of them were

pioneers in their own right

122

00:05:04,567 --> 00:05:05,732

and in different ways.

123

00:05:05,733 --> 00:05:08,466

But one of the interesting

things is that I remember

124

00:05:08,467 --> 00:05:10,799

when I was younger,

and people assume

125

00:05:10,800 --> 00:05:14,966

that my father probably got

my mother into engineering.

126

00:05:14,967 --> 00:05:18,432

It actually was

somewhat reversed.

127

00:05:18,433 --> 00:05:19,632

I just grew up in an

environment where

128

00:05:19,633 --> 00:05:25,132

my parents were so equal

in terms of their balance of

129

00:05:25,133 --> 00:05:27,866

career and passion.

130

00:05:27,867 --> 00:05:33,266

My mom was a very strong

personality, very outspoken.

131

00:05:33,267 --> 00:05:37,866

And so, yes, we heard a lot

about how hard it was,

132

00:05:37,867 --> 00:05:41,499

every step of the way,

being a pioneer

133

00:05:41,500 --> 00:05:43,032

as a woman in the field.

134

00:05:43,033 --> 00:05:45,099

She was very involved

in the IEEE.

135

00:05:45,100 --> 00:05:49,066

She was always running for

office in different things.

136

00:05:49,067 --> 00:05:52,166

She often talked about being

a woman in a man's world.

137

00:05:52,167 --> 00:05:55,299

She went on to also, though

be very, very involved

138

00:05:55,300 --> 00:05:58,332

in organizations that would

help other women.

139

00:05:58,333 --> 00:06:00,866

And so whether it was the

Society for Women Engineers

140

00:06:00,867 --> 00:06:03,266

or Grace Hopper,

started out as

141

00:06:03,267 --> 00:06:04,999

the Anita Borg Institute,

142

00:06:05,000 --> 00:06:09,666

she was a very strong

advocate for exposing

143

00:06:09,667 --> 00:06:13,266

girls and women to

engineering and the sciences

144

00:06:13,267 --> 00:06:15,499

and providing opportunities

for them.

145

00:06:15,500 --> 00:06:17,999

>>Yeah. So, it sounds like

some of your first exposure

146

00:06:18,000 --> 00:06:20,999

to programming were these

Fortran tapes and your dad's

147

00:06:21,000 --> 00:06:21,832

"if, then, else" instructions --

148

00:06:21,833 --> 00:06:23,166

>>Right.

149

00:06:23,167 --> 00:06:24,466

-- about chores and whatnot.

150

00:06:24,467 --> 00:06:26,332

Do you remember the first

program you wrote

151

00:06:26,333 --> 00:06:27,432

and what it did?

152

00:06:27,433 --> 00:06:31,732

>>Well, I don't know if I

remember the first program.

153

00:06:31,733 --> 00:06:33,866

I vividly remember --

154

00:06:33,867 --> 00:06:36,899

So, at UCLA -- now, let me

back up a minute.

155

00:06:36,900 --> 00:06:42,032

For people who are exposed

to the world today,

156

00:06:42,033 --> 00:06:45,999

most people who wrote their

first program, you know,

157

00:06:46,000 --> 00:06:49,999

maybe it goes back to having

an Apple or some kind of --

158

00:06:50,000 --> 00:06:52,366

remember, there were no

personal computers.

159

00:06:52,367 --> 00:06:53,499

>>Yeah.

160

00:06:53,500 --> 00:06:56,299

>>So, in order to write

a program, you needed

161

00:06:56,300 --> 00:06:58,566

access to a mainframe.

162

00:06:58,567 --> 00:06:59,432

>>Yeah.

163

00:06:59,433 --> 00:07:01,766

>>So, there really wasn't an

opportunity to write

164

00:07:01,767 --> 00:07:05,166

a program before being

exposed to --

165

00:07:05,167 --> 00:07:07,532

>>Yeah, and so you had to

get to a terminal room --

166

00:07:07,533 --> 00:07:08,432

>>Well --

167

00:07:08,433 --> 00:07:09,266

>> -- probably not even a

terminal room.

168

00:07:09,267 --> 00:07:09,632

>>Right. Yes.

169

00:07:09,633 --> 00:07:10,732

>>You were doing

punch cards.

170

00:07:10,733 --> 00:07:12,732

>>So, you were still

doing punch cards

171

00:07:12,733 --> 00:07:14,899

and batch submitting.

172

00:07:14,900 --> 00:07:17,599

One of my favorite stories,

and I ended up using this

173

00:07:17,600 --> 00:07:21,399

in the book, is that I can still

remember that I was working

174

00:07:21,400 --> 00:07:22,132

on something.

175

00:07:22,133 --> 00:07:27,499

I kept submitting these cards

and it kept coming back

176

00:07:27,500 --> 00:07:29,832

"abend" -- abnormal ending.

177

00:07:29,833 --> 00:07:32,299

So, you know, the equivalent

of crashing

178

00:07:32,300 --> 00:07:34,066

your computer today.

179

00:07:34,067 --> 00:07:35,899

And I had been up all night

doing it.

180

00:07:35,900 --> 00:07:39,132

I just came home in tears.

181

00:07:39,133 --> 00:07:42,332

I mean, I just was

so frustrated.

182

00:07:42,333 --> 00:07:46,132

And my father sat me down

and said,

183

00:07:46,133 --> 00:07:49,632

"Take a step back. When you

have a problem that you just

184

00:07:49,633 --> 00:07:53,866

are overwhelmed by, try to

figure out how to break it

185

00:07:53,867 --> 00:07:58,732

into pieces, and how can you

solve the individual pieces?

186

00:07:58,733 --> 00:08:01,732

But keep in mind how all the

pieces fit together."

187

00:08:01,733 --> 00:08:05,999

That approach to problem

solving stuck in my head

188

00:08:06,000 --> 00:08:09,832

through my whole life,

and not just when it comes to

189

00:08:09,833 --> 00:08:13,432

writing a program.

But how do you tackle

190

00:08:13,433 --> 00:08:18,966

really complex problems,

not going to the extreme?

191

00:08:18,967 --> 00:08:20,932

And, frankly, we can talk

about this if you want.

192

00:08:20,933 --> 00:08:23,866

One of my problems with

Agile these days is

193

00:08:23,867 --> 00:08:26,332

the notion of break it into

little pieces,

194

00:08:26,333 --> 00:08:29,499

but not keeping

the architectural piece

195

00:08:29,500 --> 00:08:31,499

sometimes, of knowing how

they fit together.

196

00:08:31,500 --> 00:08:32,099

>>Yeah.

197

00:08:32,100 --> 00:08:37,532

>>That balance of addressing

complex issues by being able

198

00:08:37,533 --> 00:08:40,999

to figure out pieces

that you can solve

199

00:08:41,000 --> 00:08:45,199

and the interconnections,

that system level of thinking

200

00:08:45,200 --> 00:08:49,599

was something that my dad,

I think, it was so much about

201

00:08:49,600 --> 00:08:54,099

his approach to life and how

he saw things.

202

00:08:54,900 --> 00:08:56,299

>>So, what you were just

talking about,

203

00:08:56,300 --> 00:08:59,399

this amazing advice that your

dad gave you about

204

00:08:59,400 --> 00:09:03,699

decomposing a problem is

something that has come up

205

00:09:03,700 --> 00:09:05,932

somewhat frequently in the

conversations I have with

206

00:09:05,933 --> 00:09:09,066

other computer scientists

recently.

207

00:09:09,067 --> 00:09:12,332

And there's this question of

kids these days who are

208

00:09:12,333 --> 00:09:15,099

being trained as software

engineers are dealing with

209

00:09:15,100 --> 00:09:18,866

such higher-level abstractions

than the ones that

210

00:09:18,867 --> 00:09:21,432

we were dealing with when

we were up and coming

211

00:09:21,433 --> 00:09:23,299

as programmers.

212

00:09:23,300 --> 00:09:25,099

And the question that

I hear people asking

213

00:09:25,100 --> 00:09:28,499

over and over again is

whether or not

214

00:09:28,500 --> 00:09:31,499

they're missing something by

not being exposed

215

00:09:31,500 --> 00:09:34,366

to just this wide differential

between

216

00:09:34,367 --> 00:09:37,332

the top-level understanding of

the problem and just these

217

00:09:37,333 --> 00:09:39,632

absolute nitty-gritty,

atomic details

218

00:09:39,633 --> 00:09:41,699

of how to get a solution.

219

00:09:41,700 --> 00:09:44,232

And I don't know what the

answer to the question is.

220

00:09:44,233 --> 00:09:49,066

I know that I learned to code

on Apple IIe's and a

221

00:09:49,067 --> 00:09:51,199

Radio Shack

Color Computer 2,

222

00:09:51,200 --> 00:09:54,899

which hooked up to a

little 13-inch television.

223

00:09:54,900 --> 00:09:57,899

And, subsequently,

got the chance to

224

00:09:57,900 --> 00:10:00,232

muck around with

manufacturing equipment

225

00:10:00,233 --> 00:10:03,966

that were controlled by

PDP-8s and systems that

226

00:10:03,967 --> 00:10:07,632

had wire-wrapped

backplane buses and whatnot.

227

00:10:07,633 --> 00:10:10,132

But I've never coded,

you know, with punch cards.

228

00:10:10,133 --> 00:10:10,932

>>Right.

229

00:10:10,933 --> 00:10:12,832

>>And, you know, like,

I just sort of wonder, like,

230

00:10:12,833 --> 00:10:14,532

what did I miss by

not having that?

231

00:10:14,533 --> 00:10:17,566

>>So, I don't think it's the

punch cards that you miss.

232

00:10:17,567 --> 00:10:18,699

>>Yeah. (laughs)

233

00:10:18,700 --> 00:10:22,532

>>Meaning, I do think you're

really on to something here.

234

00:10:22,533 --> 00:10:26,666

The punch cards are part of it

which has to do with

235

00:10:26,667 --> 00:10:29,099

a little bit of friction,

a little bit of obstacle

236

00:10:29,100 --> 00:10:30,166

being put in.

237

00:10:30,167 --> 00:10:32,499

But let me start this off

by saying, yes,

238

00:10:32,500 --> 00:10:33,899

we're missing something.

239

00:10:33,900 --> 00:10:37,499

But it isn't that everybody

needs to go back

240

00:10:37,500 --> 00:10:39,066

to doing that,

241

00:10:39,067 --> 00:10:41,066

it's that we need to recognize

242

00:10:41,067 --> 00:10:44,366

that there's a certain type

of training

243

00:10:44,367 --> 00:10:46,832

that is not happening,

and figuring out

244

00:10:46,833 --> 00:10:49,332

how to be additive.

245

00:10:49,333 --> 00:10:51,799

The underlying thing I would

say is we've lost

246

00:10:51,800 --> 00:10:54,266

system thinking.

247

00:10:54,267 --> 00:10:56,432

In the days when computer

science was about

248

00:10:56,433 --> 00:11:00,466

building systems,

building infrastructure,

249

00:11:00,467 --> 00:11:03,032

understanding how compilers

work, how you talk

250

00:11:03,033 --> 00:11:03,732

to a computer --

251

00:11:03,733 --> 00:11:08,366

all of those things taught you

a sense of learning

252

00:11:08,367 --> 00:11:08,999

of system thinking.

253

00:11:09,000 --> 00:11:10,632

And when I say

system thinking,

254

00:11:10,633 --> 00:11:13,166

I mean two different things:

255

00:11:13,167 --> 00:11:17,666

One is how pieces are

interconnected into a whole.

256

00:11:17,667 --> 00:11:21,566

So, there's an architectural

sense there,

257

00:11:21,567 --> 00:11:23,699

as opposed to looking

at things as just

258

00:11:23,700 --> 00:11:26,432

individual points.

259

00:11:26,433 --> 00:11:27,799

And then the second thing is

thinking about

260

00:11:27,800 --> 00:11:29,499

the consequences of things.

261

00:11:29,500 --> 00:11:32,466

When you're building

a system, you have inputs

262

00:11:32,467 --> 00:11:35,366

and then a complex set

of interaction that may have

263

00:11:35,367 --> 00:11:38,266

different outputs, and poking

it in different ways,

264

00:11:38,267 --> 00:11:41,432

that unless you're thinking

about systems

265

00:11:41,433 --> 00:11:44,999

that are complicated,

you don't think about

266

00:11:45,000 --> 00:11:48,666

consequences -- intended and

unintended consequences.

267

00:11:48,667 --> 00:11:52,066

And so, those two things are

really important.

268

00:11:52,067 --> 00:11:56,666

And I think that whereas the

abstraction, in some ways,

269

00:11:56,667 --> 00:12:01,899

is so beneficial because,

you know, I remember

270

00:12:01,900 --> 00:12:04,032

writing assembly code for a

PROM programmer.

271

00:12:04,033 --> 00:12:07,932

That wasn't necessarily a good

use of how many hours

272

00:12:07,933 --> 00:12:10,132

it took to do it,

or the punch cards.

273

00:12:10,133 --> 00:12:15,432

But it seems to me, we have

three side effects:

274

00:12:15,433 --> 00:12:20,932

One is, do people know how

to tackle hard problems?

275

00:12:20,933 --> 00:12:23,132

Or do they only look for

things that can be

276

00:12:23,133 --> 00:12:24,799

easily solved?

277

00:12:24,800 --> 00:12:29,866

And do we turn away or

avoid or actually try to

278

00:12:29,867 --> 00:12:32,999

simplify the problem to

something we can solve

279

00:12:33,000 --> 00:12:35,399

and then there are

world problems that

280

00:12:35,400 --> 00:12:37,099

get delayed?

281

00:12:37,100 --> 00:12:40,266

The second is this whole

thing of pieces in a whole.

282

00:12:40,267 --> 00:12:43,566

And as I mentioned before,

I really worry about

283

00:12:43,567 --> 00:12:47,832

the extreme of everybody take

a little piece

284

00:12:47,833 --> 00:12:52,866

and not enough thinking

about the architecture,

285

00:12:52,867 --> 00:12:55,566

how they fit together,

do you have a foundation

286

00:12:55,567 --> 00:12:58,032

that is not brittle?

287

00:12:58,033 --> 00:12:59,632

I worry about reactiveness.

288

00:12:59,633 --> 00:13:04,532

But there's a third thing

which is, it is so easy

289

00:13:04,533 --> 00:13:06,566

to iterate on things.

290

00:13:06,567 --> 00:13:08,899

We all talk about iterating,

iterating, iterating.

291

00:13:08,900 --> 00:13:14,266

So, what happens is that you

don't take as much time

292

00:13:14,267 --> 00:13:16,466

to think about what

you're doing.

293

00:13:16,467 --> 00:13:19,199

And that's one of the things,

the batch cards,

294

00:13:19,200 --> 00:13:25,399

it wasn't so easy to do a

turnaround and try again,

295

00:13:25,400 --> 00:13:28,232

and so, you thought a little bit

more about how

296

00:13:28,233 --> 00:13:30,266

you were fixing it before you

submitted the cards.

297

00:13:30,267 --> 00:13:31,232

>>Yeah.

298

00:13:31,233 --> 00:13:36,599

>>When you have very rapid

iteration, on one hand it is --

299

00:13:36,600 --> 00:13:38,266

we all know this,

it's wonderful.

300

00:13:38,267 --> 00:13:40,299

You can fix problems quickly.

301

00:13:40,300 --> 00:13:43,299

You can do A/B testing.

302

00:13:43,300 --> 00:13:47,099

It also makes you sloppy

in your thinking at times or --

303

00:13:47,100 --> 00:13:49,032

I shouldn't say "sloppy" --

lazy.

304

00:13:49,033 --> 00:13:53,832

We don't have to put the same

amount of thought into it,

305

00:13:53,833 --> 00:13:59,532

and if you're talking about

failure that is

306

00:13:59,533 --> 00:14:04,032

not just inconvenient,

but can be harmful,

307

00:14:04,033 --> 00:14:06,799

you can't just say, "Oops."

Right?

308

00:14:06,800 --> 00:14:11,632

So, whether it is a self-driving

car that hits somebody

309

00:14:11,633 --> 00:14:15,799

or a social media system

whose implications is

310

00:14:15,800 --> 00:14:17,799

threatening democracy,

311

00:14:17,800 --> 00:14:20,399

we're not allowed

to just say, "Oops."

312

00:14:20,400 --> 00:14:24,732

We have to be thinking about

the consequences of the

313

00:14:24,733 --> 00:14:26,866

technologies that we are

bringing to market,

314

00:14:26,867 --> 00:14:31,166

because we are now in

the center of

315

00:14:31,167 --> 00:14:32,732

everything in our lives.

316

00:14:32,733 --> 00:14:33,299

>>Yeah.

317

00:14:33,300 --> 00:14:38,599

>>And I just am concerned

that as that happened,

318

00:14:38,600 --> 00:14:41,799

as we became more and more

consequential to the world,

319

00:14:41,800 --> 00:14:47,366

we also have not been

training ourselves

320

00:14:47,367 --> 00:14:52,766

or training new engineers

and computer scientists

321

00:14:52,767 --> 00:14:55,732

to think about those systems

and consequences

322

00:14:55,733 --> 00:14:55,766

in the same way.

323

00:14:55,767 --> 00:14:56,732

>>Yeah.

324

00:14:56,733 --> 00:15:00,232

>>And, actually, the culture is

in the other direction, which is

325

00:15:00,233 --> 00:15:04,566

move faster, get out a

minimal viable product,

326

00:15:04,567 --> 00:15:06,266

get out your feature,

327

00:15:06,267 --> 00:15:08,666

and then we'll learn from

our mistakes.

328

00:15:08,667 --> 00:15:10,932

I'm a big believer in learning

from mistakes

329

00:15:10,933 --> 00:15:13,732

and learning from failure

and taking risks,

330

00:15:13,733 --> 00:15:17,499

but we need to take a step

back and say,

331

00:15:17,500 --> 00:15:18,666

"What are those risks?"

332

00:15:18,667 --> 00:15:19,699

"What are the consequences

of the risks?"

333

00:15:19,700 --> 00:15:21,999

>>Yeah. You know, I

couldn't agree with you more.

334

00:15:22,000 --> 00:15:24,666

I think there were a bunch

of really powerful points

335

00:15:24,667 --> 00:15:25,966

you made there.

336

00:15:25,967 --> 00:15:29,166

Like, sometimes the struggle,

itself, like having to

337

00:15:29,167 --> 00:15:31,532

sort of slow down and think

about something holistically,

338

00:15:31,533 --> 00:15:33,466

really sharpens your thinking.

339

00:15:33,467 --> 00:15:35,432

And some of the most

interesting breakthroughs

340

00:15:35,433 --> 00:15:37,166

happen that way.

341

00:15:37,167 --> 00:15:39,632

I remember being irritated

when I was a senior

342

00:15:39,633 --> 00:15:41,666

in high school taking

my first real

343

00:15:41,667 --> 00:15:45,966

computer science class

at my professor,

344

00:15:45,967 --> 00:15:49,432

who made us write the

solutions to our programming

345

00:15:49,433 --> 00:15:51,632

assignments down on paper

before we typed them

346

00:15:51,633 --> 00:15:52,466

into the computer.

347

00:15:52,467 --> 00:15:54,732

And he could tell if you

typed the thing

348

00:15:54,733 --> 00:15:58,532

into the computer and done

this iterative debug cycle

349

00:15:58,533 --> 00:15:59,466

to try to get it right.

350

00:15:59,467 --> 00:16:02,966

And I didn't appreciate

at the time what

351

00:16:02,967 --> 00:16:08,232

slowing down was doing to

help me be a better thinker

352

00:16:08,233 --> 00:16:10,866

about what it was that

I was doing.

353

00:16:10,867 --> 00:16:13,466

And then your whole point

about this sort of crossing

354

00:16:13,467 --> 00:16:15,132

of these two curves --

355

00:16:15,133 --> 00:16:17,332

the importance of technology

and its ubiquity

356

00:16:17,333 --> 00:16:20,999

in our day-to-day lives.

At the same time where

357

00:16:21,000 --> 00:16:23,532

we're sort of more fragmented

in the way that we do

358

00:16:23,533 --> 00:16:24,599

software development.

359

00:16:24,600 --> 00:16:27,666

We've "atomized" things into a

bunch of different pieces.

360

00:16:27,667 --> 00:16:30,132

Which, on the one hand,

you've got to have

361

00:16:30,133 --> 00:16:31,866

some mechanism to deal

with complexity,

362

00:16:31,867 --> 00:16:34,366

but just because you're trying

to solve a complex problem

363

00:16:34,367 --> 00:16:37,066

doesn't absolve you of

the responsibility

364

00:16:37,067 --> 00:16:38,966

of having to think

very carefully about

365

00:16:38,967 --> 00:16:41,732

the problem and its

second-order effects.

366

00:16:41,733 --> 00:16:48,232

>>So, I bring up these issues

to say what we need to do is

367

00:16:48,233 --> 00:16:51,866

shift our values or remind

ourselves of the values

368

00:16:51,867 --> 00:16:54,532

that drive that talent.

369

00:16:54,533 --> 00:16:59,466

Right now, so much of what is

going on in the industry

370

00:16:59,467 --> 00:17:04,532

is driven by the values of

scale and speed.

371

00:17:04,533 --> 00:17:06,466

It is about maximizing

growth.

372

00:17:06,467 --> 00:17:08,432

It is about --

even in some ways,

373

00:17:08,433 --> 00:17:10,666

which it sounds like

a good value,

374

00:17:10,667 --> 00:17:12,899

maximizing connectivity.

375

00:17:12,900 --> 00:17:16,632

What about thinking about

what we're losing

376

00:17:16,633 --> 00:17:18,966

in those values.

377

00:17:18,967 --> 00:17:21,132

There's nothing wrong

with growth,

378

00:17:21,133 --> 00:17:25,799

but not at the expense of

humanity.

379

00:17:25,800 --> 00:17:28,866

Not at the expense

of society.

380

00:17:28,867 --> 00:17:34,166

It might be nice to think

that maximum flat,

381

00:17:34,167 --> 00:17:37,232

borderless connectivity

should be a goal,

382

00:17:37,233 --> 00:17:41,266

but if you actually look at

the way humans act

383

00:17:41,267 --> 00:17:45,232

and understand a little bit

more about people,

384

00:17:45,233 --> 00:17:47,432

you might say,

"You know what?

385

00:17:47,433 --> 00:17:51,299

With connectivity needs to

be some containment."

386

00:17:51,300 --> 00:17:55,832

Look what happens when

we build fast in Houston

387

00:17:55,833 --> 00:18:00,999

and don't think about how

waters move

388

00:18:01,000 --> 00:18:04,332

and a hurricane comes and

the floods were way worse

389

00:18:04,333 --> 00:18:08,232

because we built for scale

and we didn't pay attention

390

00:18:08,233 --> 00:18:10,166

to containment.

391

00:18:10,167 --> 00:18:12,266

When you're fighting

a wildfire,

392

00:18:12,267 --> 00:18:14,066

you think about containment.

393

00:18:14,067 --> 00:18:18,932

Well, misinformation spreads

if you have maximum

394

00:18:18,933 --> 00:18:21,232

connectivity without

thinking about

395

00:18:21,233 --> 00:18:23,232

where you need to contain,

396

00:18:23,233 --> 00:18:25,499

because bad things

can happen.

397

00:18:25,500 --> 00:18:29,666

So, our industry is filled

with so many talented,

398

00:18:29,667 --> 00:18:33,232

wonderful people, but I think

sometimes we as leaders

399

00:18:33,233 --> 00:18:37,099

are pointing those people

in a direction

400

00:18:37,100 --> 00:18:41,499

and setting values which are

not, in the end,

401

00:18:41,500 --> 00:18:42,532

changing the world for good.

402

00:18:42,533 --> 00:18:44,866

>>Yeah.

So, I want to dig in more

403

00:18:44,867 --> 00:18:47,766

on this whole notion of

values, but through the lens of

404

00:18:47,767 --> 00:18:48,932

some of your early

experience.

405

00:18:48,933 --> 00:18:52,666

So, you were present

at the literal creation

406

00:18:52,667 --> 00:18:54,666

of the modern Internet.

407

00:18:54,667 --> 00:18:56,599

So, tell us a little bit about

that story, like how --

408

00:18:56,600 --> 00:18:58,899

after you graduated UCLA.

409

00:18:58,900 --> 00:19:02,866

>>Right. So, it goes back

a little bit more in that, again,

410

00:19:02,867 --> 00:19:05,099

my dad was chairman

for a time

411

00:19:05,100 --> 00:19:07,832

at the computer science

department at UCLA.

412

00:19:07,833 --> 00:19:11,032

And actually, UCLA and

Stanford compete

413

00:19:11,033 --> 00:19:12,132

for where the Internet began,

414

00:19:12,133 --> 00:19:15,032

because one of the initial

ARPANET nodes

415

00:19:15,033 --> 00:19:16,932

was at UCLA.

416

00:19:16,933 --> 00:19:19,632

Paul Baran, who's the father

of packet switching,

417

00:19:19,633 --> 00:19:22,099

was one of my dad's

PhD students.

418

00:19:22,100 --> 00:19:26,899

And so, again, by osmosis,

I'm being exposed to this.

419

00:19:26,900 --> 00:19:29,599

The other person who was

one of my dad's PhD students

420

00:19:29,600 --> 00:19:34,699

was Vint Cerf, who is known

as the father of the Internet.

421

00:19:34,700 --> 00:19:37,232

So, I ended up

coming to Stanford,

422

00:19:37,233 --> 00:19:39,432

doing my master's,

and Vint Cerf

423

00:19:39,433 --> 00:19:41,199

was my advisor.

424

00:19:41,200 --> 00:19:45,232

And he was leading the team

that was developing

425

00:19:45,233 --> 00:19:47,366

the initial TCP protocol spec.

426

00:19:47,367 --> 00:19:49,632

At that time, it wasn't

TCP/IP yet,

427

00:19:49,633 --> 00:19:53,932

it was just TCP --

Carl Sunshine, Yogen Dalal.

428

00:19:53,933 --> 00:19:56,932

There was no computer

science department then.

429

00:19:56,933 --> 00:19:58,966

It was EE computer

engineering.

430

00:19:58,967 --> 00:20:02,132

And I was one of three

women

431

00:20:02,133 --> 00:20:04,799

in the master's program.

432

00:20:04,800 --> 00:20:09,732

They had already mapped out

the initial spec for TCP,

433

00:20:09,733 --> 00:20:11,266

and it was my job

to do the testing

434

00:20:11,267 --> 00:20:13,566

of the initial implementations.

435

00:20:13,567 --> 00:20:17,299

I can still remember

the basement lab

436

00:20:17,300 --> 00:20:19,999

that I used to go sometimes

at 3:00 in the morning

437

00:20:20,000 --> 00:20:22,599

because the two sites

we tested was

438

00:20:22,600 --> 00:20:26,966

BBN in Boston and the

University of College London.

439

00:20:26,967 --> 00:20:29,199

So, we don't think of it today

because one of the beauties

440

00:20:29,200 --> 00:20:31,032

of the Internet is

that you have

441

00:20:31,033 --> 00:20:33,266

asynchronous communication.

442

00:20:33,267 --> 00:20:36,266

But we would send packets,

and then we would have

443

00:20:36,267 --> 00:20:38,799

a teletype machine

in real time to say,

444

00:20:38,800 --> 00:20:40,999

"Did you get it?"

445

00:20:41,000 --> 00:20:42,032

So, we had to be on

the same time frame.

446

00:20:42,033 --> 00:20:44,999

So, it was a pretty exciting

time in terms of

447

00:20:45,000 --> 00:20:46,399

being part of that.

448

00:20:46,400 --> 00:20:50,466

I will say that it was also my

first exposure of

449

00:20:50,467 --> 00:20:51,899

people not accepting --

450

00:20:51,900 --> 00:20:53,899

they didn't really want a girl

joining their group.

451

00:20:53,900 --> 00:20:56,199

Not all of them, not Yogen,

452

00:20:56,200 --> 00:20:59,199

but there were three

unnamed people in that group

453

00:20:59,200 --> 00:21:03,566

that just made my life

miserable for that year.

454

00:21:03,567 --> 00:21:05,532

And it was, I think,

my first time of

455

00:21:05,533 --> 00:21:07,866

"Oh, this is what my mom's

been talking about

456

00:21:07,867 --> 00:21:12,908

all of the time." It was a

wonderful experience.

457

00:21:12,933 --> 00:21:18,166

While I was at Stanford,

I built a local area network

458

00:21:18,167 --> 00:21:22,975

out of these three circuit

board suitcases with Z80s.

459

00:21:23,000 --> 00:21:27,032

That was the very beginning

of Z80 microprocessors.

460

00:21:27,033 --> 00:21:29,632

And so I built this

local area network.

461

00:21:29,633 --> 00:21:32,432

I ended up,

when I left Stanford,

462

00:21:32,433 --> 00:21:34,399

my first job was at Zilog.

463

00:21:34,400 --> 00:21:36,699

>>And you were on the CPU

design team

464

00:21:36,700 --> 00:21:38,499

for one of their

microprocessors, right?

465

00:21:38,500 --> 00:21:44,066

>>I was on the design team

of the Z8 and Z8000.

466

00:21:44,067 --> 00:21:46,132

I was part of the

software group.

467

00:21:46,133 --> 00:21:49,266

And, you know, now it

sounds obvious,

468

00:21:49,267 --> 00:21:52,266

but in those days,

it was very advanced.

469

00:21:52,267 --> 00:21:55,132

My boss and the people

at Zilog

470

00:21:55,133 --> 00:21:59,432

decided it would be good

for me to be part of the group

471

00:21:59,433 --> 00:22:01,666

to look at the instruction sets

472

00:22:01,667 --> 00:22:04,332

from a software developer's

perspective.

473

00:22:04,333 --> 00:22:06,299

Nobody had ever

done that before.

474

00:22:06,300 --> 00:22:12,332

And actually, I suggested

an instruction in the Z8000 --

475

00:22:12,333 --> 00:22:13,066

>>Which one?

476

00:22:13,067 --> 00:22:14,332

>>Compare string.

477

00:22:14,333 --> 00:22:17,699

That nobody had ever put

in a microprocessor.

478

00:22:17,700 --> 00:22:20,699

I was very lucky to be

in an environment of --

479

00:22:20,700 --> 00:22:23,699

that notion of it's not so much

interdisciplinary,

480

00:22:23,700 --> 00:22:28,232

but the different perspectives

and the strength of having

481

00:22:28,233 --> 00:22:33,299

software and hardware

designers working together.

482

00:22:33,300 --> 00:22:36,899

This is one of the early

examples of the abstraction

483
00:22:36,900 --> 00:22:39,166
of how do you abstract,

484
00:22:39,167 --> 00:22:41,066
and one of the benefits

of doing it.

485
00:22:41,067 --> 00:22:41,699
>>Yeah.

486
00:22:41,700 --> 00:22:44,466
>>Because it just made things

like that so much easier.

487
00:22:44,467 --> 00:22:46,866
>>Yeah. And, you know,

now it's just incredible

488

00:22:46,867 --> 00:22:48,632

to think about where

the abstractions are.

489

00:22:48,633 --> 00:22:49,566

>>Right.

490

00:22:49,567 --> 00:22:51,599

>>You can, with a few

lines of code,

491

00:22:51,600 --> 00:22:52,532

maybe no code at all,

492

00:22:52,533 --> 00:22:54,332

you can go to

a cloud provider

493

00:22:54,333 --> 00:22:56,432

and click a few checkboxes

494

00:22:56,433 --> 00:23:00,366

and have petabyte-scale

data storage system

495

00:23:00,367 --> 00:23:03,366

deployed planet wide that

can do tens of millions

496

00:23:03,367 --> 00:23:05,132

of transactions per second,

497

00:23:05,133 --> 00:23:07,732

and build your application

on top of this.

498

00:23:07,733 --> 00:23:10,499

So, on the one hand, I think

the abstractions are

499

00:23:10,500 --> 00:23:11,866

absolutely beneficial.

500

00:23:11,867 --> 00:23:14,132

You don't want everybody

all the way back, you know,

501

00:23:14,133 --> 00:23:16,632

at the dawn of time having to

write assembly language

502

00:23:16,633 --> 00:23:18,499

for their apps.

503

00:23:18,500 --> 00:23:20,599

But being able to punch

past those abstraction

504

00:23:20,600 --> 00:23:23,066

boundaries when you need to

and to be able

505

00:23:23,067 --> 00:23:24,499

to think holistically

about these systems

506

00:23:24,500 --> 00:23:26,732

I think is still just as

important as ever.

507

00:23:26,733 --> 00:23:30,232

>>We do realize that there's

a huge amount of power

508

00:23:30,233 --> 00:23:33,799

in some of these systems

that we are making --

509

00:23:33,800 --> 00:23:37,299

enabling people to use

who don't understand

510

00:23:37,300 --> 00:23:38,666

the power of it.

511

00:23:38,667 --> 00:23:45,366

There are some abstractions

that maybe you shouldn't do,

512

00:23:45,367 --> 00:23:49,599

because if you understand

how a system works,

513

00:23:49,600 --> 00:23:53,899

you understand how it

can go wrong.

514

00:23:53,900 --> 00:23:55,866

And then you're a little bit

more careful

515

00:23:55,867 --> 00:23:58,166

in terms of how you deploy it.

516

00:23:58,167 --> 00:24:02,266

And we look at cars

and how cars have evolved

517

00:24:02,267 --> 00:24:06,232

and where you can fix things,

where you can't,

518

00:24:06,233 --> 00:24:09,532

and let's take self-driving

cars out for a minute.

519

00:24:09,533 --> 00:24:13,632

When we let somebody get

behind the wheel

520

00:24:13,633 --> 00:24:18,232

and yield the power

of a machine that

521

00:24:18,233 --> 00:24:21,366

can do wonders, and do

harm, we train them.

522

00:24:21,367 --> 00:24:23,099

They get a license.

523

00:24:23,100 --> 00:24:27,366

We could abstract brakes and

putting your foot on the gas

524

00:24:27,367 --> 00:24:32,499

even more than we do,

and we don't for a reason,

525

00:24:32,500 --> 00:24:34,566

because there are

consequences

526

00:24:34,567 --> 00:24:39,199

if you don't understand a little

bit about those trade-offs.

527

00:24:39,200 --> 00:24:39,999

>>Yeah.

528

00:24:40,000 --> 00:24:44,099

>>And so, I worry, especially

with cloud computing,

529

00:24:44,100 --> 00:24:46,066

that we can get to a place

where that --

530

00:24:46,067 --> 00:24:49,732

we unleash technology

without people having to have

531

00:24:49,733 --> 00:24:50,766

an understanding of

the consequences.

532

00:24:50,767 --> 00:24:51,799

>>Yeah.

533

00:24:51,800 --> 00:24:52,599

>>And the stuff that's

gone on

534

00:24:52,600 --> 00:24:54,332

about facial recognition.

535

00:24:54,333 --> 00:24:56,499

We really need to think

about how we

536

00:24:56,500 --> 00:24:58,099

communicate those

implications.

537

00:24:58,100 --> 00:25:00,432

>>Yeah. There's also this

impetuousness

538

00:25:00,433 --> 00:25:03,066

to young engineers

sometimes,

539

00:25:03,067 --> 00:25:07,032

where you'll just sort of

disregard a bunch of learning

540

00:25:07,033 --> 00:25:09,632

that other people have done,

especially if it's in

541

00:25:09,633 --> 00:25:11,932

the analog world, and just

sort of assume

542

00:25:11,933 --> 00:25:14,399

that you can do better

with software.

543

00:25:14,400 --> 00:25:18,032

And, sometimes, like the

control systems for cars,

544

00:25:18,033 --> 00:25:20,732

these things have evolved

over the course of

545

00:25:20,733 --> 00:25:23,832

a century, where people have

iterated and

546

00:25:23,833 --> 00:25:27,432

looked at the data and they

understand that these things

547

00:25:27,433 --> 00:25:29,632

are safer when they're

implemented

548

00:25:29,633 --> 00:25:30,799

in this particular way.

549

00:25:30,800 --> 00:25:32,299

You know, I remember

one of my bosses

550

00:25:32,300 --> 00:25:34,799

told me this story.

551

00:25:34,800 --> 00:25:36,799

So, he was a power systems

engineer by training,

552

00:25:36,800 --> 00:25:39,632

and he was telling me about

Three Mile Island,

553

00:25:39,633 --> 00:25:43,799

and that one of the reasons

that they didn't notice

554

00:25:43,800 --> 00:25:48,666

the meltdown sooner was the

monitoring systems

555

00:25:48,667 --> 00:25:50,332

were just too noisy.

556

00:25:50,333 --> 00:25:50,732

>>Right.

557

00:25:50,733 --> 00:25:54,066

>>The operator was staring

at this wide, wide panel

558

00:25:54,067 --> 00:25:56,166

that had dials and gauges

and indicators

559

00:25:56,167 --> 00:25:58,232

and flashing lights,

and just sort of

560

00:25:58,233 --> 00:26:01,766

missed the one important one.

561

00:26:01,767 --> 00:26:02,532

And I've always thought

about that

562

00:26:02,533 --> 00:26:04,799

from and operations

engineering perspective.

563

00:26:04,800 --> 00:26:08,332

You can monitor a large-scale,

distributed system

564

00:26:08,333 --> 00:26:11,466

and literally have millions

of instruments out there

565

00:26:11,467 --> 00:26:13,132

sort of looking at everything.

566

00:26:13,133 --> 00:26:16,132

But if you're not able to

surface the most important

567

00:26:16,133 --> 00:26:19,632

thing to folks who are

going to have to fix things,

568

00:26:19,633 --> 00:26:21,732

then it's all sort of pointless.

569

00:26:21,733 --> 00:26:23,899

And we're having this

conversation, I think,

570

00:26:23,900 --> 00:26:27,599

more urgently now

around AI and data.

571

00:26:27,600 --> 00:26:29,032

You know,

the facial recognition stuff

572

00:26:29,033 --> 00:26:31,566

and bias in data sets.

573

00:26:31,567 --> 00:26:33,799

I like the direction that

the conversation

574

00:26:33,800 --> 00:26:37,366

is proceeding in,

but I think there's still

575

00:26:37,367 --> 00:26:38,432

a lot more to be done.

576

00:26:38,433 --> 00:26:40,566

>>Right. So, I'm not just

saying this to flatter you

577

00:26:40,567 --> 00:26:44,299

and because it's your podcast,

but my conversations with you

578

00:26:44,300 --> 00:26:47,632

on this over the last year that

we've been talking about this

579

00:26:47,633 --> 00:26:51,866

have given me some hope.

Because I think there are

580

00:26:51,867 --> 00:26:58,866

forces in the industry,

some that are really just

581

00:26:58,867 --> 00:27:03,099

so focused on progress

at all costs,

582

00:27:03,100 --> 00:27:06,632

and others that are

understanding of the technology,

583

00:27:06,633 --> 00:27:10,099

but are conscious

of those trade-offs.

584

00:27:10,100 --> 00:27:11,566

And then there are

a lot of people who can

585

00:27:11,567 --> 00:27:12,732

throw stones at all of this,

586

00:27:12,733 --> 00:27:13,999

but if you're not in the

middle of it,

587

00:27:14,000 --> 00:27:19,432

and you don't understand,

look, I understand some,

588

00:27:19,433 --> 00:27:22,799

but I've been out of

the sphere for enough time

589

00:27:22,800 --> 00:27:25,732

to know I don't know,

at a visceral level,

590

00:27:25,733 --> 00:27:27,632

the details of everything.

591

00:27:27,633 --> 00:27:31,432

And so, again, not just saying

this because it's your podcast,

592

00:27:31,433 --> 00:27:34,332

but the role you play,

and being in a position

593

00:27:34,333 --> 00:27:37,666

to actually understand,

make a difference,

594

00:27:37,667 --> 00:27:43,799

and having that conscious

is just -- it's heartwarming.

595

00:27:43,800 --> 00:27:45,599

>>I appreciate you

saying that.

596

00:27:45,600 --> 00:27:47,766

And I know that there are

a bunch of other

597

00:27:47,767 --> 00:27:51,799

very thoughtful folks

pushing against the problem

598

00:27:51,800 --> 00:27:54,032

as well at a bunch

of companies.

599

00:27:54,033 --> 00:27:55,532

So, I'm hopeful.

600

00:27:55,533 --> 00:27:57,399

>>We're in your hands,

so, please be. (laugh)

601

00:27:57,400 --> 00:28:01,866

>>Yeah. We all need to

look at this with the gravity

602

00:28:01,867 --> 00:28:02,999

that it deserves.

603

00:28:03,000 --> 00:28:03,199

>>Right.

604

00:28:03,200 --> 00:28:06,132

>>It's just too important

to be cavalier with.

605

00:28:06,133 --> 00:28:07,432

>>Yeah.

606

00:28:07,433 --> 00:28:10,499

>>So, you're at Zilog

doing microprocessors,

607

00:28:10,500 --> 00:28:11,932

software code design.

608

00:28:11,933 --> 00:28:14,299

And then you become

an entrepreneur.

609

00:28:14,300 --> 00:28:18,399

>>Well, I was at Zilog doing

the microprocessor stuff.

610

00:28:18,400 --> 00:28:21,066

I was the project manager

on something called

611

00:28:21,067 --> 00:28:23,399

Z-Net, which was the

first commercial

612

00:28:23,400 --> 00:28:24,566

local area network.

613

00:28:24,567 --> 00:28:27,966

So, while at Zilog,

I had the opportunity

614

00:28:27,967 --> 00:28:30,199

to be involved

in the development

615

00:28:30,200 --> 00:28:32,432

and introduction of this

local area network.

616

00:28:32,433 --> 00:28:33,332

>>And when is this?

617

00:28:33,333 --> 00:28:36,299

>>I think in '79 or '80.

618

00:28:36,300 --> 00:28:37,499

>>So, this is super early.

619

00:28:37,500 --> 00:28:39,366

Like the state of the art for

high-performance computing

620

00:28:39,367 --> 00:28:42,166

then are like these

big vector machines.

621

00:28:42,167 --> 00:28:44,799

>>Yeah. So, we built

a system --

622

00:28:44,800 --> 00:28:47,332

part of the reason -- this was

a semiconductor company,

623

00:28:47,333 --> 00:28:49,066

a microprocessor company,

why were we building

624

00:28:49,067 --> 00:28:50,766

a local area network?

625

00:28:50,767 --> 00:28:53,866

Zilog decided to go into

the systems business

626

00:28:53,867 --> 00:28:56,699

around their microprocessors.

627

00:28:56,700 --> 00:28:59,532

And so what we did

was develop

628

00:28:59,533 --> 00:29:06,032

a local area network

to interconnect these systems.

629

00:29:06,033 --> 00:29:08,499

And our computing system

was called an MCZ system,

630

00:29:08,500 --> 00:29:12,166

which was an early PC,

but it wasn't a PC.

631

00:29:12,167 --> 00:29:15,932

And we had an operating

system that was called RIO --

632

00:29:15,933 --> 00:29:19,866

Real I/O, which was

a predecessor

633

00:29:19,867 --> 00:29:22,732

to the operating systems

of PCs.

634

00:29:22,733 --> 00:29:24,599

But Zilog was a

microprocessor company,

635

00:29:24,600 --> 00:29:26,266

not a systems company.

636

00:29:26,267 --> 00:29:30,832

And so one of the things

I learned was up until then,

637

00:29:30,833 --> 00:29:32,766

I was an engineering elitist.

638

00:29:32,767 --> 00:29:35,499

I thought marketing people

weren't important. (laugh)

639

00:29:35,500 --> 00:29:38,799

But I learned a really

important lesson, which is:

640

00:29:38,800 --> 00:29:40,699

If you don't look at the needs

of the market

641

00:29:40,700 --> 00:29:45,066

and match the technology,

the technology is for naught.

642

00:29:45,067 --> 00:29:46,899

And even if you meet

those needs,

643

00:29:46,900 --> 00:29:49,532

if you don't understand how

to market and sell it

644

00:29:49,533 --> 00:29:51,499

and you don't have

distribution channels

645

00:29:51,500 --> 00:29:53,599

that match up,

you don't get anywhere,

646

00:29:53,600 --> 00:29:54,766

you don't solve

any problems.

647

00:29:54,767 --> 00:29:55,432

>>Yeah.

648

00:29:55,433 --> 00:29:56,632

>>So, it's fine if

what you're doing is

649

00:29:56,633 --> 00:29:59,232

research and discovery,

and you're not trying

650

00:29:59,233 --> 00:30:00,866

to bring a product to market,

651

00:30:00,867 --> 00:30:03,132

but if you're trying

to solve a problem,

652

00:30:03,133 --> 00:30:04,666

you need all these pieces.

653

00:30:04,667 --> 00:30:08,266

I very quickly,

within those years at Zilog,

654

00:30:08,267 --> 00:30:11,032

moved from being

an individual contributor

655

00:30:11,033 --> 00:30:12,999

to a first-level

and then second-level.

656

00:30:13,000 --> 00:30:14,899

I moved into management

pretty quickly.

657

00:30:14,900 --> 00:30:16,632

>>Did you enjoy

the transition?

658

00:30:16,633 --> 00:30:18,032

>>Yes. I --

659

00:30:18,033 --> 00:30:19,732

>>And was it obvious to you

that that was the right

660

00:30:19,733 --> 00:30:20,599

way to go?

661

00:30:20,600 --> 00:30:23,166

>>I never would have

thought.

662

00:30:23,167 --> 00:30:25,899

I, as a kid, was not

one of these people

663

00:30:25,900 --> 00:30:26,932

that thought I wanted lead,

664

00:30:26,933 --> 00:30:29,432

thought I wanted

to be an entrepreneur.

665

00:30:29,433 --> 00:30:30,432

I didn't have a lemonade stand.

666

00:30:30,433 --> 00:30:33,199

I didn't do any of that stuff.

667

00:30:33,200 --> 00:30:36,732

And I found myself

in this position,

668

00:30:36,733 --> 00:30:40,099

and what I realized

very quickly

669

00:30:40,100 --> 00:30:43,599

is that I love people.

670

00:30:43,600 --> 00:30:46,099

I love collaborating.

671

00:30:46,100 --> 00:30:48,466

I love helping people and

helping people develop

672

00:30:48,467 --> 00:30:49,932

and leading a team.

673

00:30:49,933 --> 00:30:52,832

And, you know,

the fact of the matter is,

674

00:30:52,833 --> 00:30:55,332

I wasn't a great

software engineer.

675

00:30:55,333 --> 00:30:59,866

I think what I was best at

was the architecture

676

00:30:59,867 --> 00:31:03,399

and the thinking about the

kind of systems thinking.

677

00:31:03,400 --> 00:31:07,999

I never wrote the fastest

or best code.

678

00:31:08,000 --> 00:31:11,499

And so, I ended up lucky

that I had the opportunity.

679

00:31:11,500 --> 00:31:12,466

By going to Zilog,

680

00:31:12,467 --> 00:31:15,366

I also met the person

who became my husband,

681

00:31:15,367 --> 00:31:17,366

now my ex-husband.

682

00:31:17,367 --> 00:31:18,799

We started

Bridge Communications,

683

00:31:18,800 --> 00:31:23,766

which was one of the early

local area network providers.

684

00:31:23,767 --> 00:31:24,832

And so the name Bridge

685

00:31:24,833 --> 00:31:27,666

was about interconnecting

networks.

686

00:31:27,667 --> 00:31:27,799

And it was interesting,

687

00:31:27,800 --> 00:31:29,732

our business plan,

when we started,

688

00:31:29,733 --> 00:31:33,166

was going to be about

interconnecting networks.

689

00:31:33,167 --> 00:31:34,332

And very quickly,

we realized

690

00:31:34,333 --> 00:31:36,999

there are not enough

networks to interconnect.

691

00:31:37,000 --> 00:31:42,066

And so we started off selling

communications servers,

692

00:31:42,067 --> 00:31:44,399

which were connecting devices

into networks,

693

00:31:44,400 --> 00:31:46,566

and then also interconnected

those networks.

694

00:31:46,567 --> 00:31:47,699

>>That's awesome.

695

00:31:47,700 --> 00:31:50,799

So, presumably, you ran

engineering and technology

696

00:31:50,800 --> 00:31:51,566

at the startup.

697

00:31:51,567 --> 00:31:51,899

>>Right.

698

00:31:51,900 --> 00:31:54,766

>>So, you went from being

a second-level manager

699

00:31:54,767 --> 00:31:56,599

to the buck stops with you.

700

00:31:56,600 --> 00:31:57,099

So, how was that transition?

701

00:31:57,100 --> 00:31:59,966

>>It was --

So, Bill was the CEO.

702

00:31:59,967 --> 00:32:02,566

I was the Executive

Vice President

703

00:32:02,567 --> 00:32:04,999

in charge of engineering

704

00:32:05,000 --> 00:32:07,199

for the first couple

of years.

705

00:32:07,200 --> 00:32:10,199

But, you know, early on,

it felt very natural.

706

00:32:10,200 --> 00:32:14,366

And because Bill and I

were partners,

707

00:32:14,367 --> 00:32:17,499

we kind of shared

a lot of the responsibility.

708

00:32:17,500 --> 00:32:20,899

But the thing I really

had to learn

709

00:32:20,900 --> 00:32:23,766

was how to make decisions.

710

00:32:23,767 --> 00:32:24,566

And not how to

make decisions,

711

00:32:24,567 --> 00:32:28,032

but how to make decisions

in that kind of environment.

712

00:32:28,033 --> 00:32:32,166

And as an engineer

who loves solving problems,

713

00:32:32,167 --> 00:32:33,399

I wanted to get it right.

714

00:32:33,400 --> 00:32:34,066

>>Yeah.

715

00:32:34,067 --> 00:32:36,966

>>And sometimes you have

to make a decision

716

00:32:36,967 --> 00:32:40,832

with the data you have,

717

00:32:40,833 --> 00:32:42,866

and you can't know

that it's right.

718

00:32:42,867 --> 00:32:43,299

>>Yeah.

719

00:32:43,300 --> 00:32:46,899

>>And it was a really

interesting challenge for me.

720

00:32:46,900 --> 00:32:50,832

Bill had a very different

style than me.

721

00:32:50,833 --> 00:32:54,599

He sometimes would say,

"Go and fire that person," or

722

00:32:54,600 --> 00:32:56,732

"Go pound on the table."

723

00:32:56,733 --> 00:32:58,866

And there are people who are

very effective

724

00:32:58,867 --> 00:33:01,366

with an intimidating style.

725

00:33:01,367 --> 00:33:02,266

That isn't me.

726

00:33:02,267 --> 00:33:06,866

And if I had tried to be that,

I wouldn't have been,

727

00:33:06,867 --> 00:33:09,066

I don't think, as successful,

because I wouldn't have been

728

00:33:09,067 --> 00:33:10,866

authentic to who I am.

729

00:33:10,867 --> 00:33:12,899

>>Yeah. I think that's

really interesting.

730

00:33:12,900 --> 00:33:14,699

One of the things that I

struggled with

731

00:33:14,700 --> 00:33:16,866

when I first became

a manager,

732

00:33:16,867 --> 00:33:20,266

I struggled with different

flavors of this

733

00:33:20,267 --> 00:33:23,632

for a very, very long time,

734

00:33:23,633 --> 00:33:25,632

until I was managing

hundreds of people.

735

00:33:25,633 --> 00:33:29,299

I just didn't understand

that in leadership,

736

00:33:29,300 --> 00:33:32,132

many, many, many times,

maybe more often than not,

737

00:33:32,133 --> 00:33:34,332

there isn't a right

and a wrong.

738

00:33:34,333 --> 00:33:38,132

There's the best you can do

at any particular point in time.

739

00:33:38,133 --> 00:33:41,132

That's particularly true

around people.

740

00:33:41,133 --> 00:33:42,199

>>Right.

741

00:33:42,200 --> 00:33:45,199

>>For a super long time,

this is maybe the last big

742

00:33:45,200 --> 00:33:50,366

management lesson that

I learned is that I would

743

00:33:50,367 --> 00:33:55,599

keep people on the team who

were toxic for the culture

744

00:33:55,600 --> 00:33:58,466

that I was trying to create just

because by the numbers,

745

00:33:58,467 --> 00:33:59,432

they were doing their

job well.

746

00:33:59,433 --> 00:34:00,699

>>Right.

747

00:34:00,700 --> 00:34:03,832

>>And giving myself

permission to say,

748

00:34:03,833 --> 00:34:07,332

"Okay, this is my team, there's

no right and wrong of it.

749

00:34:07,333 --> 00:34:08,799

This is the group

of people

750

00:34:08,800 --> 00:34:11,632

that I want to surround

myself with,

751

00:34:11,633 --> 00:34:14,099

and this is the culture

that we want to have

752

00:34:14,100 --> 00:34:15,999

in order to go solve

these problems."

753

00:34:16,000 --> 00:34:18,366

That's sort of okay.

754

00:34:18,367 --> 00:34:20,366

>>But you just used

an interesting example,

755

00:34:20,367 --> 00:34:26,799

which is there is no right

or wrong decision, often,

756

00:34:26,800 --> 00:34:31,899

but internally, you're guided

by what is right or wrong.

757

00:34:31,900 --> 00:34:32,499

>>Yes.

758

00:34:32,500 --> 00:34:36,666

>>So, you used an example

of not tolerating behavior

759

00:34:36,667 --> 00:34:41,266

because of performance based

on you're driven by what --

760

00:34:41,267 --> 00:34:44,032

your values in terms of what

is right or wrong.

761

00:34:44,033 --> 00:34:47,699

I've seen leaders who use

the excuse of,

762

00:34:47,700 --> 00:34:50,132

"There is no right or

wrong decision,"

763

00:34:50,133 --> 00:34:52,766

to actually go in

the opposite direction.

764

00:34:52,767 --> 00:34:57,032

And so I think that

learning how to be able

765

00:34:57,033 --> 00:35:01,232

to make those decisions with

a combination of

766

00:35:01,233 --> 00:35:03,299

your gut and your intellect,

767

00:35:03,300 --> 00:35:07,532

with a combination of data

and compassion.

768

00:35:07,533 --> 00:35:09,199

It's the balance.

769

00:35:09,200 --> 00:35:11,966

It's why we're not

machine learning algorithms.

770

00:35:11,967 --> 00:35:15,899

Right? You know, we bring

something different to it

771

00:35:15,900 --> 00:35:17,666

because there's a lot

of nuance.

772

00:35:17,667 --> 00:35:18,999

>>I love what you just said.

773

00:35:19,000 --> 00:35:20,999

This whole notion of

data plus compassion,

774

00:35:21,000 --> 00:35:24,066

I think actually does lead to

the best decisions.

775

00:35:24,067 --> 00:35:25,166

>>Right.

776

00:35:25,167 --> 00:35:26,732

>>And that's a hard thing

777

00:35:26,733 --> 00:35:28,166

to get pounded through

the head

778

00:35:28,167 --> 00:35:29,399

of a computer scientist.

779

00:35:29,400 --> 00:35:29,866

>>Right.

780

00:35:29,867 --> 00:35:32,066

I like to say that you can have

data-driven management,

781

00:35:32,067 --> 00:35:34,999

but you need

human-driven leadership.

782

00:35:35,000 --> 00:35:37,666

Leadership is not data driven.

783

00:35:37,667 --> 00:35:38,866

Managing is data driven.

784

00:35:38,867 --> 00:35:42,599

And so, you somehow have to

combine the two of those.

785

00:35:42,600 --> 00:35:44,766

>>So, at some point, like,

your career --

786

00:35:44,767 --> 00:35:47,699

you built this successful

business.

787

00:35:47,700 --> 00:35:50,699

You're this hugely successful

tech executive,

788

00:35:50,700 --> 00:35:53,666

and one of the things that

you and I have chatted about

789

00:35:53,667 --> 00:35:55,666

you were CTO of Cisco

for a while.

790

00:35:55,667 --> 00:35:58,499

There are very few people

who have been CTOs

791

00:35:58,500 --> 00:36:00,066

of big tech companies.

792

00:36:00,067 --> 00:36:02,566

And I've gotten a bunch of

good advice from you

793

00:36:02,567 --> 00:36:04,766

about how to do my job.

794

00:36:04,767 --> 00:36:07,899

So, what was the transition

like for you,

795

00:36:07,900 --> 00:36:09,666

going from entrepreneur,

796

00:36:09,667 --> 00:36:11,266

you got the mission

of the company,

797

00:36:11,267 --> 00:36:13,932

you're building the team,

you know everybody,

798

00:36:13,933 --> 00:36:15,699

to, "Holy crap, I'm

CTO of Cisco."

799

00:36:15,700 --> 00:36:18,332

>>Yeah, fascinating.

So, Cisco bought Precept,

800

00:36:18,333 --> 00:36:21,366

and I became Cisco's

Chief Technology Officer.

801

00:36:21,367 --> 00:36:24,032

And that was in 1998.

802

00:36:24,033 --> 00:36:26,299

So, I was there from '98

to 2000.

803

00:36:26,300 --> 00:36:28,799

The company went from

18,000

804

00:36:28,800 --> 00:36:32,666

to 36,000 people

in that timeframe.

805

00:36:32,667 --> 00:36:33,966

I was CTO.

806

00:36:33,967 --> 00:36:37,832

I had legal, M&A also

reporting to me.

807

00:36:37,833 --> 00:36:41,999

It was fascinating to go from

being an entrepreneur

808

00:36:42,000 --> 00:36:45,632

who was always fighting,

the scrappy company

809

00:36:45,633 --> 00:36:48,766

fighting against big companies

to all of a sudden

810

00:36:48,767 --> 00:36:50,132

be at this company

where everybody

811

00:36:50,133 --> 00:36:51,632

returned your phone call.

812

00:36:51,633 --> 00:36:53,399

Everybody wanted to see you.

813

00:36:53,400 --> 00:36:59,599

And I loved learning

a different level of issues.

814

00:37:00,000 --> 00:37:02,466

It was also intensely

frustrating for me,

815

00:37:02,467 --> 00:37:05,099

because I was not building,

816

00:37:05,100 --> 00:37:06,532

I was the CTO.

817

00:37:06,533 --> 00:37:09,132

>>But you must have learned

something in that role

818

00:37:09,133 --> 00:37:11,966

about managing at a distance

and via influence,

819

00:37:11,967 --> 00:37:14,766

because you had these

incredibly successful

820

00:37:14,767 --> 00:37:18,466

and long board runs at

Disney and at FedEx.

821

00:37:18,467 --> 00:37:21,466

>>So, I was just about to say

that I think it was the inverse

822

00:37:21,467 --> 00:37:22,532

in some ways.

823

00:37:22,533 --> 00:37:25,199

I had been on the board

of FedEx --

824

00:37:25,200 --> 00:37:28,532

I went on the board of

FedEx in 1989.

825

00:37:28,533 --> 00:37:31,132

So, I had been on the FedEx

board for a long time,

826

00:37:31,133 --> 00:37:33,732

which gave me exposure

to the issues

827

00:37:33,733 --> 00:37:37,066

of a big company,

a different type of leadership.

828

00:37:37,067 --> 00:37:42,166

I went on the board of Disney

the same year

829

00:37:42,167 --> 00:37:43,932

I became CTO at Cisco.

830

00:37:43,933 --> 00:37:45,132

And I had been on the board

831

00:37:45,133 --> 00:37:46,899

of Sun Microsystems

for a while.

832

00:37:46,900 --> 00:37:49,499

So, the board work gave me

833

00:37:49,500 --> 00:37:52,632

a sense of scale

and innovation

834

00:37:52,633 --> 00:37:54,899

and the issues of that

size company.

835

00:37:54,900 --> 00:37:59,866

It also gave me a sense

of how to make an impact

836

00:37:59,867 --> 00:38:02,532

without direct-line

responsibility.

837

00:38:02,533 --> 00:38:05,199

>>And I think you had some

really interesting moments

838

00:38:05,200 --> 00:38:06,799

in your board tenure.

839

00:38:06,800 --> 00:38:08,032

>>Yeah. That is true.

840

00:38:08,033 --> 00:38:10,599

But I've got to tell you,

the opportunity to serve

841

00:38:10,600 --> 00:38:15,766

on the FedEx and Disney

boards is just phenomenal

842

00:38:15,767 --> 00:38:19,766

in terms of helping to build

my understanding

843

00:38:19,767 --> 00:38:23,966

of a bunch of different things

of innovation at scale,

844

00:38:23,967 --> 00:38:27,332

what it's like to

use technology,

845

00:38:27,333 --> 00:38:30,766

as opposed to being the

developer of the technology.

846

00:38:30,767 --> 00:38:32,766

The media business,

what I learned at Disney

847

00:38:32,767 --> 00:38:35,366

about the media business,

and now that there's been

848

00:38:35,367 --> 00:38:36,899

a confluence between the

technology

849

00:38:36,900 --> 00:38:37,999

and the media business,

850

00:38:38,000 --> 00:38:41,699

it's really important part of

my sets of experiences.

851

00:38:41,700 --> 00:38:44,166

>>Awesome. Well, so,

one last thing

852

00:38:44,167 --> 00:38:45,199

before we let you go.

853

00:38:45,200 --> 00:38:47,099

I want to talk about

some of the stuff

854

00:38:47,100 --> 00:38:48,966

that you've been doing

more recently.

855

00:38:48,991 --> 00:38:53,569

So, and you and I have been

having conversations about where

856

00:38:53,594 --> 00:38:56,366

 both technology and

technologists, potentially

857

00:38:56,367 --> 00:38:59,166

can have impact, both

positive and negative,

858

00:38:59,167 --> 00:39:00,042

on the public good.

859

00:39:00,067 --> 00:39:01,899

You're doing some

really interesting thinking

860

00:39:01,900 --> 00:39:03,399

and collaborations there.

861

00:39:03,400 --> 00:39:04,899

So, tell us a little bit

about that.

862

00:39:04,900 --> 00:39:07,132

>>So, I'm spending a

a certain amount of time

863

00:39:07,133 --> 00:39:11,499

thinking and writing

and collaborating in the area

864

00:39:11,500 --> 00:39:19,032

of the impacts of today's

technology on democracy,

865

00:39:19,033 --> 00:39:20,232

on humanity, on media,

866

00:39:20,233 --> 00:39:24,032

and trying to look at

some of the unintended

867

00:39:24,033 --> 00:39:26,999

and intended consequences

of today's business model,

868

00:39:27,000 --> 00:39:30,232

of the disruption

of disinformation,

869

00:39:30,233 --> 00:39:32,932

of addiction to technology.

870

00:39:32,933 --> 00:39:36,799

There's a whole set of

interrelated issues.

871

00:39:36,800 --> 00:39:39,932

My concern comes from,

often, we want to, again,

872

00:39:39,933 --> 00:39:41,299

just look at a piece.

873

00:39:41,300 --> 00:39:42,532

Is it data privacy?

874

00:39:42,533 --> 00:39:44,599

Is it just election hacking?

875

00:39:44,600 --> 00:39:46,399

It's a lot of things.

876

00:39:46,400 --> 00:39:50,532

And so I've been working with

a number of people both

877

00:39:50,533 --> 00:39:52,999

in terms of writing

and collaborating,

878

00:39:53,000 --> 00:39:56,766

but also some specific

things of, okay,

879

00:39:56,767 --> 00:39:59,199

what are some of the things

we can do about this?

880

00:39:59,200 --> 00:40:03,832

And I really do believe

this is similar to big oil

881

00:40:03,833 --> 00:40:08,366

or big pharma or big food,

where you have an industry

882

00:40:08,367 --> 00:40:11,099

that is very successfully

focused in an area,

883

00:40:11,100 --> 00:40:13,332

but there are consequences.

884

00:40:13,333 --> 00:40:16,932

And then what happens is

there's opportunity

885

00:40:16,933 --> 00:40:19,866

in developing

alternative energy.

886

00:40:19,867 --> 00:40:22,866

There's opportunity

in developing healthy food.

887

00:40:22,867 --> 00:40:28,199

And the existing legacy

companies have a choice.

888

00:40:28,224 --> 00:40:33,076

They can either choose

to understand

889

00:40:33,101 --> 00:40:34,866

the consequences

of their action,

890

00:40:34,867 --> 00:40:38,366

and embrace that opportunity

and work with new companies

891

00:40:38,367 --> 00:40:42,299

and, ultimately, open up

to provide

892

00:40:42,300 --> 00:40:44,566

all the wonderful things

they provide

893

00:40:44,567 --> 00:40:48,232

without some of the harm.

Or they can deny climate

894

00:40:48,233 --> 00:40:49,732

and go in their hole

895

00:40:49,733 --> 00:40:53,399

and, ultimately, they'll get

regulated, disrupted --

896

00:40:53,400 --> 00:40:55,887

hopefully, in the climate case.

897

00:40:55,900 --> 00:40:58,632

But I just think we need to be

more aware of

898

00:40:58,633 --> 00:41:00,199

all of those consequences.

899

00:41:00,200 --> 00:41:02,499

So, I'm spending a certain

amount of time on that.

900

00:41:02,500 --> 00:41:03,766

>>Which is fantastic.

901

00:41:03,767 --> 00:41:08,032

And I'm really, really glad that

you are engaged here,

902

00:41:08,033 --> 00:41:10,266

because one of the real

difficulties that I see

903

00:41:10,267 --> 00:41:14,899

is that these issues are,

I think, unprecedented

904

00:41:14,900 --> 00:41:16,932

in terms of the complexity.

905

00:41:16,933 --> 00:41:19,499

There's just nothing in

human experience

906

00:41:19,500 --> 00:41:22,466

that would let you

develop an intuitive feel

907

00:41:22,467 --> 00:41:24,499

for what's happening

under the hood

908

00:41:24,500 --> 00:41:25,632

of some of this technology.

909

00:41:25,633 --> 00:41:28,499

And it's not all sinister, right?

910

00:41:28,500 --> 00:41:31,666

I would put forth that most

of this stuff,

911

00:41:31,667 --> 00:41:32,932

like the vast majority,

912

00:41:32,933 --> 00:41:35,299

especially built by

tech companies,

913

00:41:35,300 --> 00:41:37,899

is like well-intentioned

technology,

914

00:41:37,900 --> 00:41:39,499

where we haven't

thought about the

915

00:41:39,500 --> 00:41:41,432

second-order consequences of

916

00:41:41,433 --> 00:41:43,066

what people are going to do

with them,

917

00:41:43,067 --> 00:41:45,999

and a variety of

different things.

918

00:41:46,000 --> 00:41:49,666

But getting the public

to be informed enough

919

00:41:49,667 --> 00:41:55,232

about how these systems

work so that they can have

920

00:41:55,233 --> 00:41:58,432

a degree of agency, they

understand what's going on

921

00:41:58,433 --> 00:42:00,632

both for themselves,

and for how they are

922

00:42:00,633 --> 00:42:02,799

pushing their own advocacy

out in the world

923

00:42:02,800 --> 00:42:05,666

for how they would

like things regulated,

924

00:42:05,667 --> 00:42:07,632

and how they would

like companies

925

00:42:07,633 --> 00:42:08,599

to better serve them.

926

00:42:08,600 --> 00:42:09,832

I think is really,

really important.

927

00:42:09,833 --> 00:42:11,399

And it's tough because of

the complexity.

928

00:42:11,400 --> 00:42:12,599

>>Yeah, it is tough.

929

00:42:12,600 --> 00:42:16,366

And I think that we just need

to keep in mind --

930

00:42:16,367 --> 00:42:19,799

and you said it,

it's not that people are bad,

931

00:42:19,800 --> 00:42:24,199

but we look at the incentives

of organizations.

932

00:42:24,200 --> 00:42:26,499

When we were talking about

making decisions,

933

00:42:26,500 --> 00:42:30,332

all of these decisions are made

by who are you serving?

934

00:42:30,333 --> 00:42:36,232

And so it is easy

in a capitalist, for-profit

935

00:42:36,233 --> 00:42:38,632

environment that you serve

shareholders

936

00:42:38,633 --> 00:42:42,066

who are pushing you for

short-term returns,

937

00:42:42,067 --> 00:42:44,732

to want to maximize

growth.

938

00:42:44,733 --> 00:42:46,066

It's not like your trying

to do harm,

939

00:42:46,067 --> 00:42:49,166

but you're measuring

the things.

940

00:42:49,167 --> 00:42:50,899

We manage what we measure.

941

00:42:50,900 --> 00:42:55,742

And if we pick those metrics

around things that are

942

00:42:55,767 --> 00:42:59,399

focused on short-term growth,

short-term profits,

943

00:42:59,400 --> 00:43:01,366

it's not like we want

to do harm,

944

00:43:01,367 --> 00:43:03,197

but we're not measuring

the harm.

945

00:43:03,167 --> 00:43:05,199

And if you're not measuring

the harm,

946

00:43:05,200 --> 00:43:06,799

then the people

in the organization

947

00:43:06,800 --> 00:43:08,232

don't rally against it.

948

00:43:08,233 --> 00:43:12,032

And I am fortunate

at this point in my life

949

00:43:12,033 --> 00:43:14,999

to have the understanding

of technology

950

00:43:15,000 --> 00:43:17,899

at a broad level,

951

00:43:17,900 --> 00:43:23,366

but no longer being in the

middle of an organization

952

00:43:23,367 --> 00:43:25,932

or set of organizations.

953

00:43:25,933 --> 00:43:30,432

So, I see if I can bridge

that gap without an agenda,

954

00:43:30,433 --> 00:43:32,999

so having an understanding

of the for-profit world,

955

00:43:33,000 --> 00:43:34,899

having an understanding

of those incentives,

956

00:43:34,900 --> 00:43:36,966

understanding technology,

957

00:43:36,967 --> 00:43:39,299

but now being

independent enough

958

00:43:39,300 --> 00:43:41,299

to actually be able to

look at it and say,

959

00:43:41,300 --> 00:43:43,166

"You know what?

When I was doing that,

960

00:43:43,167 --> 00:43:47,032

I had that problem also,

but now I can see

961

00:43:47,033 --> 00:43:50,966

that we need to think about

how to change that,

962

00:43:50,967 --> 00:43:52,566

because it's doing harm."

963

00:43:52,567 --> 00:43:54,432

And so I'm just

really fortunate

964

00:43:54,433 --> 00:43:58,166

to be at a point

where I can at least

965

00:43:58,167 --> 00:44:00,699

try to add my voice

to the debate.

966

00:44:00,700 --> 00:44:02,366

>>We're so glad that this is

967

00:44:02,367 --> 00:44:04,232

how you're choosing

to spend your time.

968

00:44:04,233 --> 00:44:07,032

So, thank you so much for

being on the podcast today.

969

00:44:07,033 --> 00:44:07,999

>>It was my pleasure.

970

00:44:08,000 --> 00:44:09,766

Thank you for

inviting me.

971

00:44:09,767 --> 00:44:16,166

(music)

972

00:44:19,767 --> 00:44:21,266

>>Well, thanks for

joining us for

973

00:44:21,267 --> 00:44:22,199

Behind the Tech.

974

00:44:22,200 --> 00:44:23,666

What a great conversation

we just had

975

00:44:23,667 --> 00:44:24,399

with Judy Estrin.

976

00:44:24,400 --> 00:44:28,236

>>Yeah, it was really great

hearing the two of you talk.

977

00:44:28,243 --> 00:44:29,542

And hearing about

Judy's career

978

00:44:29,567 --> 00:44:30,966

and all the things

that she's done

979

00:44:30,991 --> 00:44:33,986

and how she's literally been

involved with the Internet

980

00:44:34,011 --> 00:44:37,250

from basically, its inception

through the present

981

00:44:37,367 --> 00:44:39,099

is so interesting.

982

00:44:39,100 --> 00:44:42,249

>>Yeah. Now, Judy has been

an incredible mentor to me.

983

00:44:42,300 --> 00:44:43,799

Her story is inspiring.

984

00:44:43,800 --> 00:44:46,032

She has so much wisdom.

985

00:44:46,033 --> 00:44:48,166

She's such a good

technologist.

986

00:44:48,167 --> 00:44:50,102

I've learned a ton from her

over the years.

987

00:44:50,167 --> 00:44:53,499

>>I was really struck by one

of the things that she said

988

00:44:53,500 --> 00:44:54,724

in your conversation where

she was talking about

989

00:44:54,800 --> 00:44:57,249

growth without the

expense of humanity.

990

00:44:57,233 --> 00:45:01,805

And how that seems

easy to say,

991

00:45:01,867 --> 00:45:04,332

but seems in practice, actually,

really difficult.

992

00:45:04,333 --> 00:45:06,099

>>I think there are a bunch

of things that we can do.

993

00:45:06,100 --> 00:45:09,490

She was sort of dead on with

this notion of we don't

994

00:45:09,490 --> 00:45:11,264

don't fix

what we don't measure.

995

00:45:11,264 --> 00:45:14,666

And part of what I think

we're learning right now

996

00:45:14,666 --> 00:45:16,369

with some of the things

that are going on

997

00:45:16,369 --> 00:45:18,876

in the tech industry is how

to measure some of

998

00:45:18,876 --> 00:45:22,261

the things where

people are using

999

00:45:22,261 --> 00:45:25,544

the technology that we've built

in these sort of unanticipated,

1000

00:45:25,544 --> 00:45:26,905

bad ways.

1001

00:45:26,905 --> 00:45:30,768

And I think we will learn

very quickly as an industry,

1002

00:45:30,768 --> 00:45:32,960

how to get better

on this stuff.

1003

00:45:32,960 --> 00:45:36,256

But, I think

it really is going to

1004

00:45:36,256 --> 00:45:40,920

require us to start thinking

about our role

1005

00:45:40,920 --> 00:45:42,807

as computer scientists

and engineers

1006

00:45:42,807 --> 00:45:44,898

and technologists

a little bit differently.

1007

00:45:44,898 --> 00:45:47,943

And for us to start

when we are educating folks

1008

00:45:47,943 --> 00:45:51,982

to make sure that that

human part of the job

1009

00:45:51,982 --> 00:45:57,174

is just as well emphasized

as the technological part.

1010

00:45:57,199 --> 00:46:00,130

I went to a liberal arts

school to get

1011

00:46:00,155 --> 00:46:01,811

my computer science degree.

1012

00:46:01,811 --> 00:46:04,719

And even there,

at a liberal arts school,

1013

00:46:04,719 --> 00:46:08,470

things like taking an ethics

class weren't mandatory.

1014

00:46:08,470 --> 00:46:11,935

I wound up taking

a philosophy class.

1015

00:46:11,935 --> 00:46:14,468

We've sort of developed

over the many centuries

1016

00:46:14,468 --> 00:46:16,803

this whole notion of

a liberal arts education

1017

00:46:16,803 --> 00:46:19,221

because it's

important. What all of us

1018

00:46:19,221 --> 00:46:21,065

have to like really understand,

especially

1019

00:46:21,065 --> 00:46:24,050

those of us who are in fields

where we're

1020

00:46:24,147 --> 00:46:25,447

building technology

that has

1021

00:46:25,447 --> 00:46:27,003

such a pervasive impact.

1022

00:46:27,003 --> 00:46:29,499

>>Do you think having that

background in humanities,

1023

00:46:29,499 --> 00:46:31,616

do you think that helped you

as you became a technologist,

1024

00:46:31,616 --> 00:46:34,211

and as you've transitioned into

becoming a manager

1025

00:46:34,211 --> 00:46:35,778

and now an executive?

1026

00:46:35,778 --> 00:46:37,235

>>Yeah, I think it has in

interesting

1027

00:46:37,235 --> 00:46:38,653

unanticipated ways.

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00:46:38,653 --> 00:46:41,440

If you'd asked me

the question 20 years ago,

1029

00:46:41,440 --> 00:46:44,227

probably I would have said,

"Not so much."

1030

00:46:44,227 --> 00:46:46,277

The obvious things

I think that it helped with

1031

00:46:46,277 --> 00:46:48,281

were

with just writing,

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00:46:48,281 --> 00:46:49,106

for instance.

1033

00:46:49,106 --> 00:46:50,804

And being an

effective communicator.

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00:46:50,804 --> 00:46:52,690

The thing that I think

is really useful,

1035

00:46:52,690 --> 00:46:53,728

part of this is --

1036

00:46:53,728 --> 00:46:55,052

part of this, I think you sort of

learn more

1037

00:46:55,052 --> 00:46:56,165

from being a manager

than you do

1038

00:46:56,165 --> 00:46:57,719

from a liberal arts education,

1039

00:46:57,719 --> 00:47:00,211

is just having

compassion for people.

1040

00:47:00,236 --> 00:47:01,000

Once put yourself

1041

00:47:01,000 --> 00:47:02,138

in the mindset that,

1042

00:47:02,138 --> 00:47:03,723

you have to take care

of people,

1043

00:47:03,723 --> 00:47:06,872

it really does change

how you make decisions.

1044

00:47:06,872 --> 00:47:08,590

And, I think if anything,

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00:47:08,590 --> 00:47:11,781

what we need to have a

consistent understanding of

1046

00:47:11,968 --> 00:47:14,071

in the technology industry

is, like, that's our job.

1047

00:47:14,071 --> 00:47:15,702

We have to take care

of the people

1048

00:47:15,702 --> 00:47:17,258

who are

using our products.

1049

00:47:17,258 --> 00:47:19,622

>>So, Judy talked about

her transition

1050

00:47:19,622 --> 00:47:21,642

from being an engineer

and into management

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00:47:21,642 --> 00:47:23,343

and entrepreneurship.

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00:47:23,343 --> 00:47:24,997

Did you relate

to any of that at all?

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00:47:24,997 --> 00:47:26,253

Did any of that kind of

resonate with you

1054

00:47:26,253 --> 00:47:28,851

in your transition from being

an individual contributor

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00:47:29,000 --> 00:47:30,816

to leading

hundreds and thousands

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00:47:30,816 --> 00:47:32,169

and more people?

1057

00:47:32,169 --> 00:47:33,054

>>Yeah, no, totally.

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00:47:33,054 --> 00:47:35,134

I think it's really

interesting to see

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00:47:35,134 --> 00:47:37,731

what a consistent experience

that is for leaders.

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00:47:37,731 --> 00:47:39,694

I think a lot of what

Judy went through,

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00:47:39,694 --> 00:47:41,236

I went through as well.

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00:47:41,236 --> 00:47:43,554

It's really challenging

as an engineer

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00:47:43,554 --> 00:47:46,030

to go from

this mindset of, like,

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00:47:46,030 --> 00:47:47,176

"Okay, I'm solving problems

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00:47:47,176 --> 00:47:48,300

that have a right

and a wrong."

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00:47:48,300 --> 00:47:49,892

To, like, "Okay, now

I'm solving problems

1067

00:47:49,892 --> 00:47:51,255

that don't have a right

and wrong."

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00:47:51,255 --> 00:47:53,588

And

a bunch of constituencies

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00:47:53,613 --> 00:47:56,590

who are asserting their right

to be heard,

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00:47:56,590 --> 00:47:58,256

and you have

a bunch stakeholders involved

1071

00:47:58,256 --> 00:48:00,153

in the outcome

of the decision,

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00:48:00,153 --> 00:48:01,435

you gotta

just sort of basically,

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00:48:01,435 --> 00:48:04,669

make calls on imperfect

and incomplete data.

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00:48:04,669 --> 00:48:07,720

And I think that struggle

is something that every

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00:48:07,720 --> 00:48:09,419

leader goes through

at some point.

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00:48:09,419 --> 00:48:11,562

 It is

an interesting transition.

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00:48:11,562 --> 00:48:13,247

And it makes you,

on many days,

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00:48:13,247 --> 00:48:15,344

wish that you just

stayed an engineer.

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00:48:15,344 --> 00:48:17,078

(laughter)

1080

00:48:17,078 --> 00:48:18,197

>>That's really --

that's amazing.

1081

00:48:18,197 --> 00:48:19,798

But I think what you're

just talking about,

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00:48:19,798 --> 00:48:21,774

again, goes back to

kind of what I picked up

1083

00:48:21,774 --> 00:48:23,695

as the thesis

of you and Judy's discussion,

1084

00:48:23,695 --> 00:48:26,239

which is all about

thinking about

1085

00:48:26,264 --> 00:48:27,602

and being aware of

consequences

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00:48:27,602 --> 00:48:28,698

as you're building things.

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00:48:28,698 --> 00:48:31,515

>>Yeah. And given

the complexity of the things

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00:48:31,515 --> 00:48:34,070

that you're building

that is easier said than done,

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00:48:34,070 --> 00:48:37,501

but increasingly necessary,

nonetheless.

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00:48:37,501 --> 00:48:38,968

>>Well, I'm glad that

people like Judy

1091

00:48:38,968 --> 00:48:41,662

are working to help

other businesses

1092

00:48:41,662 --> 00:48:44,108

and other people think

about those things.

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00:48:44,108 --> 00:48:45,537

I'm glad that you're aware

of those things

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00:48:45,537 --> 00:48:46,742

and are doing that as well,

1095

00:48:46,742 --> 00:48:47,622

because we definitely need

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00:48:47,622 --> 00:48:49,043

all the help we can get.

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00:48:49,043 --> 00:48:52,575

>>Yeah. I'm super grateful

for the folks like Judy,

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00:48:52,575 --> 00:48:54,672

who are choosing to use

their time in this way

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00:48:54,672 --> 00:48:56,529

to like try to

benefit everyone.

1100

00:48:56,529 --> 00:48:58,316

Great conversation, Christina.

1101

00:48:58,316 --> 00:48:59,852

Looking forward to

chatting with you again

1102

00:48:59,852 --> 00:49:00,624

on the next episode.

1103

00:49:00,649 --> 00:49:01,492

>>I can't wait.

1104

00:49:02,929 --> 00:49:05,512

Next time on Behind the Tech,

we'll talk with Danielle Feinberg.

1105

00:49:05,537 --> 00:49:08,998

Danielle is director of photography at Pixar Studios.

1106

00:49:09,030 --> 00:49:10,995

Her love of combining computers and art began

1107

00:49:11,020 --> 00:49:12,385

when she was eight years old.

1108

00:49:12,410 --> 00:49:15,582

 This eventually led her to a BA in

computer science from Harvard.

1109

00:49:15,607 --> 00:49:18,954

Today, besides making films for Pixar,

she mentors teenage girls,

1110

00:49:18,979 --> 00:49:22,158

 encouraging them to pursue code,

 math, and science.

1111

00:49:22,183 --> 00:49:24,198

 So, be sure to tell your friends about our podcast,

1112

00:49:24,223 --> 00:49:25,915

 Behind the Tech, hope to see you next time.