**Original transcript/timeline of Lynn Conway 2015 NSF Pride Talk**

1

00:00:01,174 --> 00:00:04,560

(light jazz music)

2

00:00:16,442 --> 00:00:17,520

- [Voiceover] Hello everybody!

3

00:00:17,520 --> 00:00:18,609

- [Voiceover] Good morning!

4

00:00:18,609 --> 00:00:19,534

- [Voiceover] Oh wow!

5

00:00:19,534 --> 00:00:21,326

It's almost like being a teacher here.

6

00:00:21,326 --> 00:00:24,560

Good morning everybody! (laughs).

7

00:00:25,660 --> 00:00:28,153

On behalf of the National

Science Foundation,

8

00:00:28,153 --> 00:00:30,416

the size, and the Engineering Directorate,

9

00:00:30,416 --> 00:00:33,168

The Office of Diversity and Inclusion,

10

00:00:33,168 --> 00:00:36,341

and the LGBT & Allies group.

11

00:00:36,341 --> 00:00:40,114

It's really my pleasure to

welcome all of you here,

12

00:00:40,114 --> 00:00:43,123

and to welcome Dr. Lynn Conway

13

00:00:43,123 --> 00:00:44,980

to the National Science Foundation.

14

00:00:46,170 --> 00:00:48,246

You know, as a computer scientist,

15

00:00:48,246 --> 00:00:50,166

and one of the most amazing things

16

00:00:50,166 --> 00:00:52,890

about working here at the

National Science Foundation

17

00:00:52,890 --> 00:00:54,744

is that we have pioneers

18

00:00:54,744 --> 00:00:58,203

in all areas of science and engineering

19

00:00:58,203 --> 00:01:00,892

coming through and talking to us here

20

00:01:00,892 --> 00:01:02,226

and walking the through the halls here.

21

00:01:02,226 --> 00:01:05,512

And, you know, so as a computer scientist

22

00:01:05,512 --> 00:01:07,845

and someone who learned about VLSI

23

00:01:07,845 --> 00:01:09,125

from Lynn's book,

24

00:01:09,125 --> 00:01:11,365

and it's really wonderful to have one

25

00:01:11,365 --> 00:01:15,653

of the pioneers of our field

of computing here today.

26

00:01:15,653 --> 00:01:17,480

When I was in grad school,

27

00:01:17,480 --> 00:01:21,221

it was right after Lynn's

very, very influential book

28

00:01:21,221 --> 00:01:24,510

on Introduction to VLSI Systems came out.

29

00:01:24,510 --> 00:01:27,390

Sometimes people just

call it Mead and Conway.

30

00:01:27,390 --> 00:01:28,350

It's so influential!

31

00:01:28,350 --> 00:01:30,545

All you have to do is say

the names of the authors,

32

00:01:30,545 --> 00:01:33,198

and everybody knows exactly

who you were talking about.

33

00:01:33,198 --> 00:01:36,368

It really revolutionized the teaching

34

00:01:36,368 --> 00:01:38,718

of VLSI really.

35

00:01:38,718 --> 00:01:40,353

The first textbook in the field

36

00:01:40,353 --> 00:01:43,848

got people thinking about

systems architecture.

37

00:01:45,008 --> 00:01:46,712

As a textbook author myself,

38

00:01:46,712 --> 00:01:51,712

I've always thought of

the Mead and Conway book

39

00:01:52,069 --> 00:01:54,345

and (mumbles) Silberschatz's

Operating Systems book

40

00:01:54,345 --> 00:01:57,096

as sort of the way to write textbooks.

41

00:01:57,096 --> 00:02:00,069

So, in addition to learning

technical things from Lynn,

42

00:02:00,069 --> 00:02:02,539

I've also learned writing from Lynn

43

00:02:02,539 --> 00:02:05,099

also through her book.

44

00:02:05,099 --> 00:02:07,275

As I mentioned,

45

00:02:07,275 --> 00:02:10,475

Lynn is really one of the pioneers,

46

00:02:10,475 --> 00:02:13,867

and responsible for this notion of VLSI:

47

00:02:13,867 --> 00:02:17,614

Very Large Scale Integration.

48

00:02:17,614 --> 00:02:19,883

And, really, introducing what's been known

49

00:02:19,883 --> 00:02:22,635

as the VLSI design revolution

50

00:02:22,635 --> 00:02:23,886

through her textbook

51

00:02:23,886 --> 00:02:26,702

and also through her work.

52

00:02:26,702 --> 00:02:29,586

We're gonna be hearing from Lynn

53

00:02:29,586 --> 00:02:30,379

in just a second.

54

00:02:30,379 --> 00:02:32,271

And if I were to tell

you all the many awards

55

00:02:32,271 --> 00:02:34,539

and great accomplishments that she has,

56

00:02:34,539 --> 00:02:36,971

I would take up far too much of her time.

57

00:02:36,971 --> 00:02:38,251

So, let me just tell you briefly.

58

00:02:38,251 --> 00:02:40,079

She's a long time faculty member

59

00:02:40,079 --> 00:02:42,411

at the University of Michigan

60

00:02:42,411 --> 00:02:45,081

where she's an emerita, a faculty member.

61

00:02:45,081 --> 00:02:47,641

She's a member of the National

Academy of Engineering

62

00:02:47,641 --> 00:02:49,167

and I triple E fellow,

63

00:02:49,167 --> 00:02:53,966

a recipient of the I triple E

Computer Society Pioneer Award

64

00:02:53,966 --> 00:02:57,004

and this year will be

receiving the Maxwell Medal

65

00:02:57,004 --> 00:03:01,484

from the I triple E and the

Royal Society of Edinboro.

66

00:03:01,484 --> 00:03:05,004

So, as the head of the Computer

and Information Science...

67

00:03:05,004 --> 00:03:08,271

Information Science and Engineering.

68

00:03:08,271 --> 00:03:09,551

Sorry! Directorate.

69

00:03:09,551 --> 00:03:10,895

And, really on behalf

70

00:03:10,895 --> 00:03:14,508

of the entire National Science Foundation,

71

00:03:14,508 --> 00:03:16,147

as a computer scientist,

72

00:03:16,147 --> 00:03:17,147

(audio cuts out)

73

00:03:17,147 --> 00:03:19,645

learned from your book and benefitted

74

00:03:19,645 --> 00:03:21,329

from your research innovation.

75

00:03:21,329 --> 00:03:24,244

I wanna say what an honor it is for us

76

00:03:24,244 --> 00:03:26,867

to have you here and to

thank you for coming.

77

00:03:26,867 --> 00:03:30,347

(audio cuts out)

78

00:03:31,349 --> 00:03:34,193

And so, let me turn the podium

over now to Donna Riley,

79

00:03:34,193 --> 00:03:36,211

who also wants to make a few remarks.

80

00:03:36,211 --> 00:03:37,137

Thank you.

81

00:03:37,987 --> 00:03:40,223

(audience applause)

82

00:03:42,304 --> 00:03:42,945

- [Voiceover] Hi everybody.

83

00:03:42,945 --> 00:03:43,904

I'm Donna Riley,

84

00:03:43,904 --> 00:03:45,954

and first, in my role as Program Director

85

00:03:45,954 --> 00:03:47,105

and the Engineering Director,

86

00:03:47,105 --> 00:03:49,309

I wanna bring greeting from (mumbles),

87

00:03:49,309 --> 00:03:50,936

who is the AD for engineering,

88

00:03:50,936 --> 00:03:52,536

who works with Lynn at Michigan

89

00:03:52,536 --> 00:03:54,556

and, unfortunately, is out of town today.

90

00:03:54,556 --> 00:03:56,696

But, he sends his best.

91

00:03:57,846 --> 00:03:58,845

I am...

92

00:03:58,845 --> 00:04:00,088

now I'm gonna put my hat on

93

00:04:00,088 --> 00:04:03,412

as the co-convener of

the LGBT+ & Allies group

94

00:04:03,412 --> 00:04:05,112

with Beth Strausser,

95

00:04:05,112 --> 00:04:08,684

and welcome you all to our Pride event,

96

00:04:08,684 --> 00:04:11,856

which we are very excited to be holding.

97

00:04:11,856 --> 00:04:14,006

And I wanted to just give

you a little bit of history

98

00:04:14,006 --> 00:04:16,344

about the LGBT movement,

99

00:04:16,344 --> 00:04:19,289

and how it relates to science.

100

00:04:19,289 --> 00:04:22,390

And one of the really interesting bits

101

00:04:22,390 --> 00:04:25,782

of LGBTQ history is that Frank Kameny,

102

00:04:25,782 --> 00:04:28,193

who's one of the founders of the movement,

103

00:04:28,193 --> 00:04:30,433

was himself a Ph. D. Astronomer

104

00:04:30,433 --> 00:04:34,337

and a Federal employee,

briefly, in the 1950s.

105

00:04:34,337 --> 00:04:39,337

And it was his firing

from the Army Map Service

106

00:04:39,675 --> 00:04:42,427

that caused him to file a complaint

107

00:04:42,427 --> 00:04:46,945

with the Civil Service.

108

00:04:46,945 --> 00:04:51,835

That was the first complaint on the basis

109

00:04:51,835 --> 00:04:55,069

of sexual orientation in the United States

110

00:04:55,069 --> 00:04:56,288

as a civil rights issue.

111

00:04:56,288 --> 00:04:58,811

So, we have kind of an

interesting science connection

112

00:04:58,811 --> 00:05:00,319

to the birth of the movement.

113

00:05:00,319 --> 00:05:01,493

And Frank Kameny went on

114

00:05:01,493 --> 00:05:04,840

to be a founder of the

LGBT Rights Movement

115

00:05:04,840 --> 00:05:07,749

in D.C., locally, and nationally.

116

00:05:07,749 --> 00:05:10,309

And the reason that

Pride month is in June...

117

00:05:10,309 --> 00:05:13,957

does anybody know why

there's Pride in June?

118

00:05:13,957 --> 00:05:14,889

Go ahead.

119

00:05:14,889 --> 00:05:16,389

(audience member answers faintly)

120

00:05:16,389 --> 00:05:17,029

Exactly!

121

00:05:17,029 --> 00:05:18,216

Because of the Stonewall riots,

122

00:05:18,216 --> 00:05:19,781

and I think what's important to remember

123

00:05:19,781 --> 00:05:21,829

about Stonewall is that the people

124

00:05:21,829 --> 00:05:24,139

that were at Stonewall that rioted

125

00:05:24,139 --> 00:05:27,117

were not the conventional, kind of,

126

00:05:27,117 --> 00:05:29,870

wealthy, white gay men in preppy clothes

127

00:05:29,870 --> 00:05:32,203

that you kind of see

as part of the (laughs)

128

00:05:32,203 --> 00:05:33,454

gay marriage stuff.

129

00:05:33,454 --> 00:05:36,427

They were a lot of transgender folks.

130

00:05:36,427 --> 00:05:38,603

They were people that were

gender non-conforming.

131

00:05:38,603 --> 00:05:39,307

In other ways,

132

00:05:39,307 --> 00:05:40,175

they were drag queens,

133

00:05:40,175 --> 00:05:41,483

they were butch dykes,

134

00:05:41,483 --> 00:05:43,058

they were people of color,

135

00:05:43,058 --> 00:05:44,848

they were sex workers.

136

00:05:44,848 --> 00:05:48,395

And they were not people that were

137

00:05:48,395 --> 00:05:52,875

part of respectable society

for a variety of reasons,

138

00:05:52,875 --> 00:05:55,499

and the police were taking

action against them.

139

00:05:55,499 --> 00:05:57,483

And it was their gender non-conformity,

140

00:05:57,483 --> 00:05:59,758

but it was also their

race and class status

141

00:05:59,758 --> 00:06:02,254

that caused them to be

targets of police action

142

00:06:02,254 --> 00:06:03,279

in New York City.

143

00:06:03,279 --> 00:06:04,303

In those ways,

144

00:06:04,303 --> 00:06:06,315

it's important to

recognize the connections

145

00:06:06,315 --> 00:06:09,259

between the LGBT Movement

and Anti-Racist Movement.

146

00:06:09,259 --> 00:06:12,046

A lot of the movements

that are going on now

147

00:06:12,046 --> 00:06:15,822

with Black Lives Matter and

aggressing police actions

148

00:06:15,822 --> 00:06:17,323

against people of color.

149

00:06:17,323 --> 00:06:18,795

LGBT folks will often show up

150

00:06:18,795 --> 00:06:20,749

at actions like that when we recognize

151

00:06:20,749 --> 00:06:23,505

that link in our history at Stonewall.

152

00:06:23,505 --> 00:06:28,505

So all of that is to say

that it's my pleasure

153

00:06:30,571 --> 00:06:31,915

to introduce Lynn Conway

154

00:06:31,915 --> 00:06:36,558

as the first transgender speaker

for our Pride celebration.

155

00:06:36,558 --> 00:06:39,887

Pride Month started out

in a very radical way

156

00:06:39,887 --> 00:06:42,831

and didn't become a

federal recognized month

157

00:06:42,831 --> 00:06:46,059

until June 2000 when Bill

Clinton declared Pride Month

158

00:06:46,059 --> 00:06:47,885

and then we didn't have Pride Month again

159

00:06:47,885 --> 00:06:51,728

until Obama declared Pride

Month in June of 2009.

160

00:06:51,728 --> 00:06:54,094

And he has declared

Pride Month ever since.

161

00:06:54,094 --> 00:06:56,783

And so at NSF,

162

00:06:56,783 --> 00:07:00,173

the history was that we

formed an LGBT+ & Allies Group

163

00:07:00,173 --> 00:07:04,847

in 2012 and Kei Koizumi was

our first keynote speaker

164

00:07:04,847 --> 00:07:08,047

was for National Coming

Out day in October of 2012

165

00:07:08,047 --> 00:07:09,777

and then the Office of Diversity

166

00:07:09,777 --> 00:07:11,798

and Inclusion partnered with us in 2013

167

00:07:11,798 --> 00:07:16,798

for our first keynote

speaker who was Ron Buckmire.

168

00:07:16,881 --> 00:07:20,630

Then in 2014 we had Evelynn

Hammonds from Harvard

169

00:07:20,630 --> 00:07:23,153

and so Lynn is our first

transgender speaker,

170

00:07:23,153 --> 00:07:24,980

and we are thrilled to have you.

171

00:07:24,980 --> 00:07:26,324

Welcome Lynn.

172

00:07:26,324 --> 00:07:28,944

(audience applause)

173

00:07:33,427 --> 00:07:35,187

- [Voiceover] Thank you folks for the...

174

00:07:37,937 --> 00:07:39,322

It's great to be here with you today.

175

00:07:41,552 --> 00:07:46,026

(audio cuts in and out)

176

00:08:27,268 --> 00:08:28,750

In the central part of the top,

177

00:08:28,750 --> 00:08:30,964

there will be quite a montage of slides.

178

00:08:30,964 --> 00:08:34,510

What we will do is arrange to

post these slides somewhere.

179

00:08:34,510 --> 00:08:36,046

They contain many links

180

00:08:36,046 --> 00:08:39,730

and so the details of things

that might interest you

181

00:08:39,730 --> 00:08:41,102

or that you might be curious about,

182

00:08:41,102 --> 00:08:44,584

you can find by accessing these links.

183

00:08:46,474 --> 00:08:51,474

But let me take us back to June 13, 2013.

184

00:08:51,720 --> 00:08:54,635

There was a Pride

celebration that I attended

185

00:08:54,635 --> 00:08:56,172

and on reflection afterward,

186

00:08:56,172 --> 00:08:57,480

I wrote an essay.

187

00:08:57,480 --> 00:08:58,632

I’d just like to read that to you.

188

00:08:58,632 --> 00:09:01,960

It tells you a little bit

about me and about our time.

189

00:09:02,950 --> 00:09:05,424

On a sultry June afternoon,

190

00:09:05,424 --> 00:09:07,024

as my husband and I strolled

191

00:09:07,024 --> 00:09:09,134

towards the White House East Entrance,

192

00:09:09,134 --> 00:09:11,758

I reflected back on my gender transition,

193

00:09:11,758 --> 00:09:15,351

decades before, in 1968.

194

00:09:15,351 --> 00:09:17,556

Shamed as a social outcast,

195

00:09:17,556 --> 00:09:21,112

I'd lost my family, my friends

and all social support.

196

00:09:21,112 --> 00:09:23,252

I'd been fired by IBM,

197

00:09:23,252 --> 00:09:26,998

and lost a promising

computer research career.

198

00:09:26,998 --> 00:09:27,612

In many places,

199

00:09:27,612 --> 00:09:29,393

I could have been

arrested as a sex offender

200

00:09:29,393 --> 00:09:32,260

or institutionalized in a mental hospital

201

00:09:32,260 --> 00:09:34,326

and forced to undergo electroshock therapy

202

00:09:34,326 --> 00:09:37,018

or even far worse.

203

00:09:37,018 --> 00:09:37,821

Evading those fates,

204

00:09:37,821 --> 00:09:39,485

I finished my transition

205

00:09:39,485 --> 00:09:43,802

and began building a career

in a secret new identity,

206

00:09:43,802 --> 00:09:45,978

starting at the bottom of the ladder

207

00:09:45,978 --> 00:09:48,061

as a contract programmer.

208

00:09:48,061 --> 00:09:51,468

So, Lynn Conway just reappeared

as a contract programmer,

209

00:09:51,468 --> 00:09:54,632

right back in the Bay area, I

transitioned in San Francisco.

210

00:09:54,632 --> 00:09:58,024

Now, any 'outing' could

have led to media exposure,

211

00:09:58,024 --> 00:10:00,172

and I'd have become unemployable,

212

00:10:00,172 --> 00:10:02,248

and on the streets for good.

213

00:10:02,248 --> 00:10:05,616

These fears channeled my

life into 'stealth-mode.'

214

00:10:05,616 --> 00:10:08,666

And for over 30 years, I covered my past,

215

00:10:08,666 --> 00:10:10,842

always looking over my shoulder,

216

00:10:10,842 --> 00:10:14,205

as if a foreign spy in my own country.

217

00:10:14,205 --> 00:10:17,021

But this was now 2013,

218

00:10:17,021 --> 00:10:19,866

and what a contrast it was.

219

00:10:19,866 --> 00:10:20,973

My husband Charlie and I

220

00:10:20,973 --> 00:10:23,320

were about to join the

President's White House Reception

221

00:10:23,320 --> 00:10:25,745

to celebrate LGBT Pride Month.

222

00:10:25,745 --> 00:10:28,468

The atmosphere was full of joy

223

00:10:28,468 --> 00:10:32,098

and, as we waited for the

President, I reflected further.

224

00:10:32,098 --> 00:10:34,402

I had been 'out' for 15 years now,

225

00:10:34,402 --> 00:10:36,258

or so I'd thought:

226

00:10:36,258 --> 00:10:40,262

out on the Web to inform

colleagues about my past,

227

00:10:40,262 --> 00:10:43,042

out as an advocate for transgender people,

228

00:10:43,042 --> 00:10:46,917

out as an activist against the

psychiatric-pathologization

229

00:10:46,917 --> 00:10:48,327

of gender variance.

230

00:10:48,327 --> 00:10:50,948

It was one thing to hide in the back-rooms

231

00:10:50,948 --> 00:10:54,882

of Xerox Palo Alto Research

Center decades ago,

232

00:10:54,882 --> 00:10:57,221

launching innovations as the hidden-hand

233

00:10:57,221 --> 00:11:00,258

behind the VLSI

microelectronics revolution

234

00:11:00,258 --> 00:11:02,406

in Silicon Valley

235

00:11:02,406 --> 00:11:05,159

a revolution that's

changed the world forever.

236

00:11:05,159 --> 00:11:08,258

I didn't mind being almost invisible

237

00:11:08,258 --> 00:11:10,114

in my field back then

238

00:11:10,114 --> 00:11:12,966

or that no one had a clue

what I was really doing,

239

00:11:12,966 --> 00:11:15,170

much less who was doing it.

240

00:11:15,170 --> 00:11:17,766

I was thrilled to even have a job.

241

00:11:19,746 --> 00:11:21,999

But 'out' has many shades of grey,

242

00:11:21,999 --> 00:11:26,170

and even in recent years

I kept on partly covering,

243

00:11:26,170 --> 00:11:28,026

shyly holding back,

244

00:11:28,026 --> 00:11:29,362

lingering in the shadows.

245

00:11:29,362 --> 00:11:31,154

I thought I was out, but I really wasn't.

246

00:11:31,154 --> 00:11:32,562

Although times had changed,

247

00:11:32,562 --> 00:11:34,455

I'd clung on to old habits.

248

00:11:34,455 --> 00:11:37,490

Down through the years

no one could explain

249

00:11:37,490 --> 00:11:40,533

how the VLSI revolution actually happened.

250

00:11:40,533 --> 00:11:43,634

The results were simply taken for granted.

251

00:11:43,634 --> 00:11:45,874

Although I'd gained vital knowledge

252

00:11:45,874 --> 00:11:49,557

about generating such

engineering paradigm shifts,

253

00:11:49,557 --> 00:11:52,028

I feared that my history would loom large,

254

00:11:52,028 --> 00:11:56,686

obscuring any attempts at

explanation of such things.

255

00:11:56,686 --> 00:11:59,780

It wasn't till 2012 that

I finally got up the nerve

256

00:11:59,780 --> 00:12:01,416

to publish a career memoir,

257

00:12:01,416 --> 00:12:03,208

to begin telling the story

258

00:12:03,208 --> 00:12:05,924

of how the revolution came about...

259

00:12:05,924 --> 00:12:07,779

As the president entered the room,

260

00:12:07,779 --> 00:12:11,940

I glanced around and

took in the joyful vibes.

261

00:12:11,940 --> 00:12:13,760

As he began to speak,

262

00:12:13,760 --> 00:12:17,254

I grasped the reality

of how far we'd come.

263

00:12:17,254 --> 00:12:20,814

A fresh wind was sweeping

through our society,

264

00:12:20,814 --> 00:12:23,694

especially amongst the

younger generations.

265

00:12:23,694 --> 00:12:25,742

Then I thought of the millions

266

00:12:25,742 --> 00:12:28,430

of other LGBT people out there.

267

00:12:28,430 --> 00:12:31,118

I tried to envision the

enormity of lifelong struggles

268

00:12:31,118 --> 00:12:34,100

against stigmatization and ostracism,

269

00:12:34,100 --> 00:12:37,006

of losses of families and employment,

270

00:12:37,006 --> 00:12:41,648

of their oppression by having

to 'cover', always covering,

271

00:12:41,648 --> 00:12:44,186

often not fully engaging

life nor being known

272

00:12:44,186 --> 00:12:49,186

for who they were, what they'd done,

273

00:12:50,102 --> 00:12:52,712

who they loved or who loved them.

274

00:12:53,532 --> 00:12:54,327

In a flash,

275

00:12:54,327 --> 00:12:55,865

I'd visualized the vastness

276

00:12:55,865 --> 00:12:58,579

of the many shades down through time.

277

00:12:58,579 --> 00:12:59,638

And it hit me:

278

00:12:59,638 --> 00:13:01,431

we've come so far, so fast

279

00:13:01,431 --> 00:13:02,889

that ever-so-many others could

280

00:13:02,889 --> 00:13:05,299

begin shedding old habits too.

281

00:13:05,299 --> 00:13:09,134

After all, freedom isn't

just an external concept,

282

00:13:09,134 --> 00:13:11,209

framed by our laws.

283

00:13:11,209 --> 00:13:14,921

It's a gift of the spirit

that we must give ourselves,

284

00:13:14,921 --> 00:13:18,505

in this case by going towards

brighter shades of 'out'.

285

00:13:22,649 --> 00:13:23,545

With that as a background,

286

00:13:23,545 --> 00:13:25,564

let us now reflect

287

00:13:25,564 --> 00:13:29,199

on the historical treatment of

women's contribution instead.

288

00:13:29,199 --> 00:13:31,412

We have the same themes

289

00:13:31,412 --> 00:13:35,087

and ideas (mumbles) one

through all of this.

290

00:13:35,087 --> 00:13:38,991

First, listen as Megan Smith

291

00:13:38,991 --> 00:13:43,099

reveals what is being erased

292

00:13:43,099 --> 00:13:45,772

from history in STEM.

293

00:13:48,203 --> 00:13:49,665

Very amazing video.

294

00:13:50,745 --> 00:13:53,768

An interview with

Charlie Rose on April 28.

295

00:13:53,768 --> 00:13:55,302

- It is even up til the 80s.

296

00:13:55,302 --> 00:13:57,580

Computer science was

sort of 30 to 40% women

297

00:13:57,580 --> 00:13:59,027

and we just tanked.

298

00:13:59,027 --> 00:14:00,627

We talk about jobs.

299

00:14:00,627 --> 00:14:02,050

There's these incredible photographs

300

00:14:02,050 --> 00:14:03,749

from the launch of Macintosh

301

00:14:03,749 --> 00:14:06,722

in the 80s and there's

the Rolling Stone pictures

302

00:14:06,722 --> 00:14:08,322

that were published.

303

00:14:08,322 --> 00:14:11,778

The historic record

shows this group actually

304

00:14:11,778 --> 00:14:15,298

of 10 people in a pyramid, actually 11.

305

00:14:15,298 --> 00:14:18,342

Seven men and four women.

306

00:14:18,342 --> 00:14:21,634

And every photograph you

see with the Mac team,

307

00:14:21,634 --> 00:14:24,066

Joanna Hoffman who was product manager,

308

00:14:24,066 --> 00:14:26,095

a great teammate of Steve Jobs.

309

00:14:26,095 --> 00:14:27,427

And Susan (mumbles) did all the graphics.

310

00:14:27,427 --> 00:14:29,234

(Indiscernable)

311

00:14:30,072 --> 00:14:32,917

None of them made it into the Jobs movie,

312

00:14:32,917 --> 00:14:33,779

in the Mac scene.

313

00:14:33,779 --> 00:14:34,649

They're not even cast.

314

00:14:34,649 --> 00:14:38,069

And every man in the

photograph is in the movie

315

00:14:38,069 --> 00:14:39,157

and with a speaking role.

316

00:14:39,157 --> 00:14:42,267

It is debilitating to our young women

317

00:14:42,267 --> 00:14:45,786

to have their history

almost erased or unclogged.

318

00:14:45,786 --> 00:14:48,025

- A blanket discrimination.

319

00:14:48,025 --> 00:14:49,881

How does that happen?

320

00:14:49,881 --> 00:14:51,992

What is the interest of somebody

321

00:14:51,992 --> 00:14:55,192

not recognizing the contribution of women?

322

00:14:55,192 --> 00:14:57,013

How do they benefit from that?

323

00:14:57,013 --> 00:14:57,653

- Yeah, I don't know.

324

00:14:57,653 --> 00:14:58,997

I don't see any real benefit.

325

00:14:58,997 --> 00:14:59,863

- [Voiceover] Of course not.

326

00:14:59,863 --> 00:15:00,981

Why do they do it?

327

00:15:00,981 --> 00:15:01,611

- I don't know,

328

00:15:01,611 --> 00:15:02,755

but it's something we need to get over.

329

00:15:02,755 --> 00:15:04,892

Katherine Johnson, an

African American women

330

00:15:04,892 --> 00:15:06,379

who calculated the trajectory

331

00:15:06,379 --> 00:15:08,811

for Alan Sheppard, John Glenn,

332

00:15:08,811 --> 00:15:10,827

who wouldn't fly without

Katherine checking the math.

333

00:15:10,827 --> 00:15:12,939

And the Apollo mission.

334

00:15:12,939 --> 00:15:16,222

There is no African-American

woman technical person

335

00:15:16,222 --> 00:15:18,049

in the Apollo movies that I ever saw

336

00:15:18,049 --> 00:15:20,254

as a kid, you know, we

have to get these in there.

337

00:15:20,254 --> 00:15:23,074

If you know your past,

as we were discussing,

338

00:15:23,074 --> 00:15:25,061

your future is different.

339

00:15:30,731 --> 00:15:32,260

- [Voiceover] Not just

women have a harder time

340

00:15:32,260 --> 00:15:33,822

breaking into STEM.

341

00:15:33,822 --> 00:15:38,423

It's the many contributions

they do make, aren't celebrated.

342

00:15:38,423 --> 00:15:42,404

This effect is seen throughout

the history of science.

343

00:15:42,404 --> 00:15:45,311

There is a great series of

books by Margaret Rossiter,

344

00:15:45,311 --> 00:15:48,904

that anyone interested in

this topic should really study

345

00:15:48,904 --> 00:15:52,490

because she just documents

numerous case studies

346

00:15:52,490 --> 00:15:56,592

of such historical

(mumbles) over many years

347

00:15:56,592 --> 00:15:59,513

and through different periods

of our social history.

348

00:16:00,737 --> 00:16:02,343

She coined the term,

349

00:16:02,343 --> 00:16:04,930

the Matilda effect, for

the systematic repression

350

00:16:04,930 --> 00:16:07,526

and denial for these contributions.

351

00:16:07,526 --> 00:16:09,922

We voice it often to Mel colleagues.

352

00:16:09,922 --> 00:16:14,254

And it's analogous to Merton's

term, the Matthew effect.

353

00:16:14,254 --> 00:16:16,822

Describing how eminent

scientist's often get more credit

354

00:16:16,822 --> 00:16:20,755

than less known researchers

even if their work is similar.

355

00:16:22,735 --> 00:16:24,370

For example, a prize

almost always will go to

356

00:16:24,370 --> 00:16:27,018

the most senior researcher

involved in a project

357

00:16:27,018 --> 00:16:28,424

even if all the work was all done

358

00:16:28,424 --> 00:16:30,033

by a grad student.

359

00:16:30,327 --> 00:16:31,604

So, let's go to a case study

360

00:16:31,604 --> 00:16:35,666

that I'm familiar with

and sketch some of this.

361

00:16:35,666 --> 00:16:39,223

And we will make some

conjectures about it.

362

00:16:42,253 --> 00:16:43,596

The stage was set by the emergence

363

00:16:43,596 --> 00:16:46,402

of the integrated circuit

technology in the 60s

364

00:16:46,402 --> 00:16:49,730

Numbers of transistors in

their wiring to be printed

365

00:16:49,730 --> 00:16:51,927

on the (mumbles).

366

00:16:51,927 --> 00:16:54,556

Potentiated in the early 70s revolution,

367

00:16:54,556 --> 00:16:57,786

by the early 70s revolution

first computing and networking.

368

00:16:57,786 --> 00:17:02,166

Especially with the innovation

of the interactive display

369

00:17:02,166 --> 00:17:04,474

mouse-controlled personal

control computer,

370

00:17:04,474 --> 00:17:08,781

local area network, laser

printer, and the Arpanet.

371

00:17:08,781 --> 00:17:12,498

These things were emerging

at that same time.

372

00:17:12,498 --> 00:17:14,438

The ongoing advances in lithography

373

00:17:14,438 --> 00:17:17,766

kept enabling finer features to be printed

374

00:17:17,766 --> 00:17:20,012

in silicon, actually increasing the number

375

00:17:20,012 --> 00:17:23,060

of transistors you could

print on a single chip.

376

00:17:23,060 --> 00:17:25,601

There was a watershed event in 1971

377

00:17:25,601 --> 00:17:27,776

that begins instruction

with the Intel 404,

378

00:17:27,776 --> 00:17:29,380

the first single-chip microprocessor.

379

00:17:29,380 --> 00:17:32,736

It contained 2,300 transistors.

380

00:17:32,736 --> 00:17:34,804

You will see links on the top

381

00:17:34,804 --> 00:17:36,250

and later, if people have questions

382

00:17:36,250 --> 00:17:38,015

or wonder about, "What

was that all about?",

383

00:17:38,015 --> 00:17:39,340

or how do these things relate,

384

00:17:39,340 --> 00:17:41,390

you will be able to check this out.

385

00:17:41,390 --> 00:17:44,406

I will get it posted

somewhere on the Internet.

386

00:17:44,406 --> 00:17:48,101

Gordon Moore at Intel observed,

387

00:17:48,101 --> 00:17:49,640

and you can take a look

at these graphs here,

388

00:17:49,640 --> 00:17:52,916

that the number of

transistors reliably credible

389

00:17:52,916 --> 00:17:56,025

on commercial chips was

roughly double every two years.

390

00:17:56,025 --> 00:17:58,835

This is an empirical observation.

391

00:17:59,483 --> 00:18:01,404

Lots of numbers.

392

00:18:01,404 --> 00:18:04,151

Carver Mead, a professor at Caltech

393

00:18:04,151 --> 00:18:07,059

who was a consultant to Intel.

394

00:18:07,059 --> 00:18:09,427

Consultant to Gordon Moore.

395

00:18:09,427 --> 00:18:12,578

Coined the term "Moore's Law",

396

00:18:12,578 --> 00:18:15,245

(mumbles)

397

00:18:15,245 --> 00:18:17,295

and predicted that there

were no physical limits

398

00:18:17,295 --> 00:18:18,766

to increasing chip density

399

00:18:18,766 --> 00:18:21,486

up to at least 1 million transistors.

400

00:18:21,486 --> 00:18:23,616

They did some good device physics.

401

00:18:23,616 --> 00:18:26,910

That was a pretty startling result.

402

00:18:26,910 --> 00:18:30,470

In 1976, this set off an acquired push

403

00:18:30,470 --> 00:18:33,808

between my team at Xerox

Palo Alto Research Center

404

00:18:33,808 --> 00:18:37,823

and students at Caltech to figure out how

405

00:18:37,823 --> 00:18:41,253

to enable such complex

chips to be designed.

406

00:18:43,873 --> 00:18:45,695

We are really fired up because,

407

00:18:45,695 --> 00:18:50,695

if you look at the far point

up there, 1,000,000 x 1990,

408

00:18:50,700 --> 00:18:52,312

it appeared conceivable

409

00:18:52,312 --> 00:18:55,798

that you could put an entire

supercomputer, at the time,

410

00:18:55,798 --> 00:18:58,592

printed on a single chip.

411

00:18:58,592 --> 00:19:01,475

Just a few years into the future.

412

00:19:01,475 --> 00:19:03,933

If you really believed that

413

00:19:03,933 --> 00:19:06,089

and you were there at the time,

414

00:19:06,089 --> 00:19:09,417

this would fire you up.

415

00:19:09,417 --> 00:19:11,158

It fired me up.

416

00:19:11,228 --> 00:19:12,758

(audience laughs)

417

00:19:13,212 --> 00:19:15,552

And a sudden disruptive

breakout was triggered

418

00:19:15,552 --> 00:19:18,376

by a cluster of abstract

innovations primarily at PARC,

419

00:19:18,376 --> 00:19:21,331

included were a set of

scalable design roles

420

00:19:21,331 --> 00:19:24,721

in the form of ratioed

dimensionless inequality equations.

421

00:19:24,721 --> 00:19:28,028

They enabled abstract chip designs

422

00:19:28,028 --> 00:19:30,105

to be digitally shrunk down

423

00:19:30,105 --> 00:19:34,110

and re-used as Moore's

Law rapidly advanced.

424

00:19:34,110 --> 00:19:35,910

These also enabled the accruing

425

00:19:35,910 --> 00:19:37,680

of chip subsystems designs

426

00:19:37,680 --> 00:19:39,316

that could be widely shared.

427

00:19:39,316 --> 00:19:44,316

Even through ways of density improvement.

428

00:19:46,150 --> 00:19:48,966

I began documenting the

emerging new Mead-Conway system

429

00:19:48,966 --> 00:19:52,679

of simplified and restrustured

design level abstractions

430

00:19:52,679 --> 00:19:57,223

in an evolving computer-edited book.

431

00:19:57,223 --> 00:20:00,160

(mumbles)

432

00:20:00,705 --> 00:20:03,581

And so began using theAlto,

433

00:20:03,581 --> 00:20:05,811

not just as tools for

generating chip-designs,

434

00:20:05,811 --> 00:20:08,162

but also to mechanize the evolution

435

00:20:08,162 --> 00:20:10,088

of the chip-design knowledge.

436

00:20:10,088 --> 00:20:14,675

And the computer-edited evolving book

437

00:20:14,675 --> 00:20:18,084

printed using laser

printers at PARC, initially

438

00:20:18,084 --> 00:20:21,028

and distributed in experimental

courses became the draft

439

00:20:21,028 --> 00:20:24,074

of the famous text by Mead and Conway

440

00:20:24,074 --> 00:20:26,027

that was published in 1980,

441

00:20:26,027 --> 00:20:28,656

later called the "book

that changed everything".

442

00:20:28,656 --> 00:20:31,139

So you have this iconic

and some names on it

443

00:20:31,139 --> 00:20:34,834

and claimed "the book

that changed everything".

444

00:20:34,834 --> 00:20:37,986

There's more to the story than that.

445

00:20:37,986 --> 00:20:41,925

But anyway, we also used our Altos

446

00:20:41,925 --> 00:20:45,509

to generate open-source

cell-layout designs

447

00:20:45,509 --> 00:20:47,714

for key digital subsystems

448

00:20:47,714 --> 00:20:50,485

so that we could

disseminate them to students

449

00:20:50,485 --> 00:20:52,469

and colleagues by the ARPANET.

450

00:20:52,469 --> 00:20:56,104

There is other material

being generated at PARC.

451

00:20:56,104 --> 00:21:00,069

And then, I followed the script

452

00:21:00,069 --> 00:21:02,310

that Charles Steinmetz used to propagate

453

00:21:02,310 --> 00:21:06,628

his revolutionary AC electricity

method at Union college.

454

00:21:06,628 --> 00:21:08,137

A story I was very familiar with,

455

00:21:08,137 --> 00:21:09,928

because Steinmetz is one of my heroes.

456

00:21:09,928 --> 00:21:13,550

And I introduced these new methods

457

00:21:13,550 --> 00:21:17,692

in a special, experimental

VLSI design course

458

00:21:17,692 --> 00:21:21,404

at MIT in 1978.

459

00:21:21,404 --> 00:21:25,116

Here is a picture of

students in the course,

460

00:21:25,116 --> 00:21:26,908

some links about the course

461

00:21:26,908 --> 00:21:30,958

and a little bit of rhetoric

462

00:21:30,958 --> 00:21:33,003

about what the course is about.

463

00:21:33,003 --> 00:21:35,115

In this course,

464

00:21:35,115 --> 00:21:36,863

the students learned to design chips

465

00:21:36,863 --> 00:21:38,218

using these new methods

466

00:21:38,218 --> 00:21:39,930

in the first half of the course

467

00:21:39,930 --> 00:21:42,807

and then did project

chip-designs in the second half.

468

00:21:42,807 --> 00:21:45,687

And they were fabricated in a laboratory

469

00:21:45,687 --> 00:21:47,709

at HP shortly after the course

470

00:21:47,709 --> 00:21:51,083

by a gal named Pat Castro who led the lab.

471

00:21:51,083 --> 00:21:55,092

She was one of the HP's

first woman engineers.

472

00:21:55,092 --> 00:21:57,142

And her work was phenomenal.

473

00:21:57,142 --> 00:21:59,282

She has never been recognized for it.

474

00:21:59,282 --> 00:22:02,542

But anyway, here are

pictures from the course.

475

00:22:02,542 --> 00:22:06,354

Students designing chips, checking plots.

476

00:22:06,354 --> 00:22:09,410

And there were some amazing results

477

00:22:09,410 --> 00:22:12,177

from this first full experimental course

478

00:22:12,177 --> 00:22:13,393

on these new methods.

479

00:22:13,393 --> 00:22:14,900

Just check out these results.

480

00:22:14,900 --> 00:22:17,277

There is a map and photomicrograph

481

00:22:17,277 --> 00:22:19,362

of the 19 student project.

482

00:22:19,362 --> 00:22:21,692

These were by students who

never designed chips before.

483

00:22:21,692 --> 00:22:24,615

Mostly masters-level students in the ECS

484

00:22:26,755 --> 00:22:28,402

One of the students,

485

00:22:28,402 --> 00:22:33,402

Guy Steele, designed

a list microprocessor.

486

00:22:34,915 --> 00:22:37,813

A list microprocessor,

and his first design.

487

00:22:37,813 --> 00:22:39,873

There were some power in these methods.

488

00:22:39,873 --> 00:22:42,076

This really turned something loose.

489

00:22:42,076 --> 00:22:44,628

But anyway...

490

00:22:46,524 --> 00:22:49,579

now, this course stunned

top folks in Silicon Valley.

491

00:22:49,579 --> 00:22:52,971

And many other top research

universities want to offer

492

00:22:52,971 --> 00:22:55,374

such a course, but how?

493

00:22:55,374 --> 00:22:58,923

Suddenly, the answer came to me.

494

00:22:58,923 --> 00:23:03,211

Why not figure out a way

to simultaneously rerun

495

00:23:03,211 --> 00:23:05,763

that MIT course at several

research universities

496

00:23:05,763 --> 00:23:09,647

using my lecture notes I

created MIT to keep all

497

00:23:09,647 --> 00:23:11,147

of those courses on sync.

498

00:23:11,147 --> 00:23:14,095

In other words, just mimic

the entire course experience.

499

00:23:14,095 --> 00:23:16,051

Have it all in a series of lecture notes

500

00:23:16,051 --> 00:23:18,763

that I created as we went along in MIT.

501

00:23:20,883 --> 00:23:24,790

But how would you print all

502

00:23:24,790 --> 00:23:27,509

of the resulting student project chips?

503

00:23:27,509 --> 00:23:29,137

I was stumbling around for ideas

504

00:23:29,137 --> 00:23:31,055

and I suddenly got an idea.

505

00:23:31,055 --> 00:23:32,207

I envisioned a new form

506

00:23:32,207 --> 00:23:34,575

of e-commerce manufacturing system

507

00:23:34,575 --> 00:23:36,367

that would enable student design files

508

00:23:36,367 --> 00:23:40,003

to be remotely submitted

by the Arpanet to a server.

509

00:23:41,633 --> 00:23:44,199

The server would run logistics

software and pack the designs

510

00:23:44,199 --> 00:23:47,385

into the multiproject

chip files like composing

511

00:23:47,385 --> 00:23:50,153

print-files for a magazine

where you remotely

512

00:23:50,153 --> 00:23:51,405

submit a bunch of articles

513

00:23:51,405 --> 00:23:53,659

and you lay them out (audio cuts out)

514

00:23:53,659 --> 00:23:55,687

We did make maps from those

515

00:23:55,687 --> 00:23:58,055

and print those chips

516

00:23:58,055 --> 00:24:01,509

at HP labs where my

collaborator, Pat Castro,

517

00:24:01,509 --> 00:24:03,622

can run on the year before.

518

00:24:03,622 --> 00:24:07,751

And then, quickly return

the chips to the students.

519

00:24:07,751 --> 00:24:10,119

I don't know if you are

noticing all through this,

520

00:24:10,119 --> 00:24:13,607

there is nobody telling me to do this.

521

00:24:13,607 --> 00:24:16,807

There is nobody funding this.

522

00:24:16,807 --> 00:24:20,583

This is all, sort of, just being done.

523

00:24:20,583 --> 00:24:23,463

Can you envision that?

524

00:24:23,463 --> 00:24:26,443

So in the fall of 79,

525

00:24:26,443 --> 00:24:30,270

having announced it early in the summer,

526

00:24:30,270 --> 00:24:33,344

taking a big chance because

if this didn't work,

527

00:24:33,344 --> 00:24:34,473

my name would be mud.

528

00:24:34,473 --> 00:24:37,033

I orchestrated a huge happening

529

00:24:37,033 --> 00:24:40,083

called MPC79 involving

530

00:24:40,083 --> 00:24:43,313

129 budding VLSI designers

taking this course

531

00:24:43,313 --> 00:24:45,974

at 12 research universities.

532

00:24:45,974 --> 00:24:49,137

And I worked with my group

533

00:24:49,137 --> 00:24:51,990

and we filled out the little core

534

00:24:51,990 --> 00:24:53,659

of the e-commerce systems

535

00:24:53,659 --> 00:24:55,811

and launched this whole

thing out on the ARPANET.

536

00:24:55,811 --> 00:25:00,803

And this provided not only

a large scale demonstration,

537

00:25:00,803 --> 00:25:04,177

operation, and validation

of the design method

538

00:25:04,177 --> 00:25:07,057

but also the design

courses, the design tools

539

00:25:07,057 --> 00:25:09,342

and the e-commerce technology

540

00:25:09,342 --> 00:25:11,916

for getting all the chips fabricated.

541

00:25:11,916 --> 00:25:12,642

And so, what it did,

542

00:25:12,642 --> 00:25:15,580

is it bootstrapped, triggered cyclic gain,

543

00:25:15,580 --> 00:25:19,612

and an exponentiation of the

budding VLSI-design ecosystem.

544

00:25:19,612 --> 00:25:22,620

In other words, the system

of all of the above.

545

00:25:22,620 --> 00:25:25,321

It wasn't just one bootstrap,

546

00:25:25,321 --> 00:25:28,421

it was a series of embedded bootstraps.

547

00:25:29,321 --> 00:25:31,786

A little computer science

thinking behind that,

548

00:25:31,786 --> 00:25:32,682

but that is another story.

549

00:25:32,682 --> 00:25:34,154

The math is another story.

550

00:25:34,154 --> 00:25:36,740

But here is the flowchart.

551

00:25:36,740 --> 00:25:39,556

So, this shows the thing

going from code to chips.

552

00:25:39,556 --> 00:25:41,895

And where it's happening,

553

00:25:41,895 --> 00:25:43,222

who is involved, what are the interfaces

554

00:25:43,222 --> 00:25:44,627

and what is the system?

555

00:25:44,627 --> 00:25:46,302

Sort of a block diagram.

556

00:25:48,232 --> 00:25:51,075

And here is this next series

557

00:25:51,075 --> 00:25:53,827

of bootstraps simultaneously going on.

558

00:25:53,827 --> 00:25:58,827

A joint evolution of

multilevel cluster embeddings,

559

00:25:59,405 --> 00:26:01,004

a cluster of systems.

560

00:26:01,004 --> 00:26:05,036

So, what you really need to think

561

00:26:05,036 --> 00:26:06,636

about is not the things

562

00:26:06,636 --> 00:26:09,488

but the ideas moving ahead with people.

563

00:26:09,488 --> 00:26:12,268

Ideas on how to design and make things.

564

00:26:12,268 --> 00:26:14,689

You need to visualize

the technosocial dynamics

565

00:26:14,689 --> 00:26:16,417

that triggered this exponentiation

566

00:26:16,417 --> 00:26:19,068

in the spread of innovative

VLSI design and making ideas

567

00:26:19,068 --> 00:26:22,932

via the emerging internet

communication technology

568

00:26:22,932 --> 00:26:25,530

Remember this is back in 1979.

569

00:26:25,530 --> 00:26:27,540

But when you look at this now,

570

00:26:27,540 --> 00:26:29,844

and step back even further,

571

00:26:29,844 --> 00:26:32,652

you start to envision my goodness.

572

00:26:32,652 --> 00:26:34,188

What is going on out there?

573

00:26:34,188 --> 00:26:36,556

In this community.

574

00:26:36,556 --> 00:26:38,192

They are all doing this,

575

00:26:38,192 --> 00:26:43,107

because they're just learning

how to do VLSI design.

576

00:26:43,107 --> 00:26:47,585

By 1982 or three, these

courses are being offered

577

00:26:47,585 --> 00:26:50,457

in 113 universities all around the world.

578

00:26:50,457 --> 00:26:52,840

So on reflection now,

579

00:26:52,840 --> 00:26:56,735

the words exist now to sort

of say what this is or was.

580

00:26:56,735 --> 00:26:59,209

It had been a successful

early experimental exploration

581

00:26:59,209 --> 00:27:02,502

in what is now termed social physics.

582

00:27:02,502 --> 00:27:07,502

(mumbles) at MIT and folks at (mumbles).

583

00:27:07,622 --> 00:27:10,635

So let's just visualize

584

00:27:10,635 --> 00:27:14,126

this exponentiating wave of innovation.

585

00:27:14,126 --> 00:27:17,072

It started in 76' with the question,

586

00:27:17,072 --> 00:27:18,544

how to focus with the complexity

587

00:27:18,544 --> 00:27:20,592

of the future design.

588

00:27:20,592 --> 00:27:25,465

In 77', I invented these

scalable design rules

589

00:27:25,465 --> 00:27:29,150

and other methods of

structuring the extraction level

590

00:27:29,150 --> 00:27:30,649

from digital design.

591

00:27:30,649 --> 00:27:34,419

And 78', I watched a course at MIT.

592

00:27:34,419 --> 00:27:37,263

And having completed a draft

593

00:27:37,263 --> 00:27:39,089

of the book by then.

594

00:27:39,089 --> 00:27:43,108

And 1979, I launched the on-site courses.

595

00:27:43,108 --> 00:27:48,108

And the bootstrapping ecosystem via MPC79.

596

00:27:48,557 --> 00:27:50,604

I was there four years

597

00:27:50,604 --> 00:27:52,524

so I stayed on track the whole way.

598

00:27:52,524 --> 00:27:57,524

(mumbles) there always are S curves.

599

00:27:59,732 --> 00:28:03,931

So it's been doing this and

it's now starting to taper.

600

00:28:03,931 --> 00:28:05,625

That is another story.

601

00:28:08,755 --> 00:28:11,104

Starting with several thousand in 1971,

602

00:28:11,104 --> 00:28:13,504

the number of transitions on a chip

603

00:28:13,504 --> 00:28:17,703

did pass 1 million by 1991, not 1990.

604

00:28:17,703 --> 00:28:19,991

And by 2011, passed several billion.

605

00:28:22,801 --> 00:28:26,093

Doing it kind of just all the same way.

606

00:28:26,093 --> 00:28:28,525

Everything getting finer and finer.

607

00:28:28,525 --> 00:28:30,867

Decreasing cast of thousands.

608

00:28:30,867 --> 00:28:33,475

Pushing the envelope in

every little corner further.

609

00:28:33,475 --> 00:28:35,178

But the same process.

610

00:28:35,178 --> 00:28:40,178

So really, this is sort

of fascinating stuff

611

00:28:40,572 --> 00:28:44,732

because it's about cultural

evolution and exponentiation,

612

00:28:44,732 --> 00:28:48,356

compounding techno-social

interests accumulating.

613

00:28:48,356 --> 00:28:50,246

It is about techno-social entropy,

614

00:28:50,246 --> 00:28:53,476

about a bunch of things,

yet to be figured out.

615

00:28:55,296 --> 00:28:56,748

But given all of that, let's go back.

616

00:28:56,748 --> 00:29:00,170

Let's follow the high-tech

communities reactions

617

00:29:00,170 --> 00:29:04,057

to the Mead-Conway innovations

during the ensuing decades.

618

00:29:04,057 --> 00:29:05,814

This is a different topic

619

00:29:05,814 --> 00:29:08,410

and has nothing to do with

what actually happened

620

00:29:08,410 --> 00:29:09,901

This is another process.

621

00:29:09,901 --> 00:29:11,038

(audience laughs)

622

00:29:11,205 --> 00:29:13,252

This is just another process.

623

00:29:14,446 --> 00:29:17,943

The key people said something

significant had happened

624

00:29:17,943 --> 00:29:19,438

and Mead and Conway began

625

00:29:19,438 --> 00:29:23,176

receiving major innovation

right away, right in the 80's.

626

00:29:23,776 --> 00:29:26,097

A few of you probably familiar

with Electronics magazine.

627

00:29:26,097 --> 00:29:31,097

This was the key magazine back in the day.

628

00:29:31,563 --> 00:29:32,587

In electronics.

629

00:29:32,587 --> 00:29:35,632

And it also largely in computing.

630

00:29:35,632 --> 00:29:40,331

And it developed the award for electronics

631

00:29:40,331 --> 00:29:42,479

and considered really prestigious

632

00:29:42,479 --> 00:29:45,167

All of a sudden we got this award.

633

00:29:47,757 --> 00:29:49,440

During the rest of the 80s,

634

00:29:49,440 --> 00:29:50,395

there were some more.

635

00:29:50,395 --> 00:29:51,646

Pender Award,

636

00:29:51,646 --> 00:29:53,851

Moore School at the

University of Pennsylvania.

637

00:29:53,851 --> 00:29:58,317

We both got the Wietherill

Medal at Franklin Institute.

638

00:29:58,317 --> 00:30:02,605

So this is sort of related

639

00:30:02,605 --> 00:30:04,973

but it is an independent process.

640

00:30:04,973 --> 00:30:08,301

But then, something happened.

641

00:30:08,301 --> 00:30:11,431

From 89' through the 90s

642

00:30:11,431 --> 00:30:14,632

and on over the next 20 years,

643

00:30:14,632 --> 00:30:18,883

Mead kept increasingly

receiving major recognitions

644

00:30:18,883 --> 00:30:20,695

while my world just disappeared.

645

00:30:20,695 --> 00:30:22,908

We go down through these

646

00:30:22,908 --> 00:30:24,506

and there are pretty good ones on here.

647

00:30:26,986 --> 00:30:31,986

Got the Phil Kaufman award for EDA in 96'.

648

00:30:32,387 --> 00:30:35,707

That one's interesting, (mumbles).

649

00:30:35,707 --> 00:30:36,655

I don't remember him.

650

00:30:36,655 --> 00:30:41,225

The one that got me

was the Lemelson award.

651

00:30:41,225 --> 00:30:42,697

$500,000.

652

00:30:42,697 --> 00:30:45,257

I could have used some of that!

653

00:30:45,257 --> 00:30:48,073

(audience laughs)

654

00:30:49,463 --> 00:30:52,344

I am not walking around rich or anything.

655

00:30:53,004 --> 00:30:55,509

And Fellow Award, Computer History Museum,

656

00:30:55,509 --> 00:30:56,506

that was a big one.

657

00:30:56,506 --> 00:30:58,104

That is huge.

658

00:30:58,104 --> 00:31:01,397

And this was one that you

folks ought to think about.

659

00:31:01,397 --> 00:31:05,050

He got the National Medal

of Technology in 2002.

660

00:31:05,050 --> 00:31:07,738

And a Founder's Award.

661

00:31:07,738 --> 00:31:09,403

And there is this last one

662

00:31:09,403 --> 00:31:10,846

we will talk a little bit about.

663

00:31:10,846 --> 00:31:12,923

Inventors Hall of Fame in '09.

664

00:31:12,923 --> 00:31:17,923

The interesting thing is,

665

00:31:17,951 --> 00:31:21,307

most of these awards were for innovations,

666

00:31:21,307 --> 00:31:26,148

what the innovations

were, those were mine.

667

00:31:26,148 --> 00:31:29,101

What can I say?

668

00:31:31,791 --> 00:31:34,767

By 2009 the erasure was complete.

669

00:31:34,767 --> 00:31:36,047

See, you've heard of Mead and Conway,

670

00:31:36,047 --> 00:31:38,793

but who would connect

Conway with Lynn Conway?

671

00:31:38,793 --> 00:31:40,886

A woman, and now a trans woman.

672

00:31:40,886 --> 00:31:44,086

It's an iconic thing out there

673

00:31:44,086 --> 00:31:47,002

in cyberspace somewhere

these things happen.

674

00:31:47,002 --> 00:31:49,247

But who is Lynn Conway?

675

00:31:49,247 --> 00:31:52,153

She is gone now. Not really.

676

00:31:52,153 --> 00:31:54,278

But here is what happened.

677

00:31:54,278 --> 00:31:55,750

A great event.

678

00:31:55,750 --> 00:31:58,239

The 50th birthday celebration

of the integrated circuit

679

00:31:58,239 --> 00:31:59,618

in Silicon Valley.

680

00:31:59,618 --> 00:32:04,383

And 15 men who were honored

681

00:32:04,383 --> 00:32:08,031

as maybe the founding

fathers of Silicon Valley.

682

00:32:08,031 --> 00:32:11,569

A huge gala event at the

Computer History Museum.

683

00:32:12,139 --> 00:32:14,247

The inductees included Gordon Moore,

684

00:32:14,247 --> 00:32:18,973

and the Moore's Law named by Carver Mead,

685

00:32:18,973 --> 00:32:21,277

who was there, and also Andy Grove.

686

00:32:21,277 --> 00:32:26,277

So what we see is these three

men taking center stage.

687

00:32:27,293 --> 00:32:29,789

A big spread in the San Jose Mercury

688

00:32:29,789 --> 00:32:32,562

and here is a little insight into it.

689

00:32:34,842 --> 00:32:38,222

Remember Megan Smith's,

690

00:32:38,222 --> 00:32:42,097

sort of, a before and after picture.

691

00:32:42,097 --> 00:32:44,002

Think about the before,

692

00:32:44,002 --> 00:32:45,282

the cover of Electronics,

693

00:32:45,282 --> 00:32:46,806

and the after.

694

00:32:46,806 --> 00:32:50,518

So here we have Andy Grove, Gordon Moore,

695

00:32:50,518 --> 00:32:52,154

and, of course Carver Mead.

696

00:32:54,304 --> 00:32:55,200

By the way, I wasn't invited.

697

00:32:55,200 --> 00:33:00,200

I didn't even know it

was happening in 2009.

698

00:33:00,258 --> 00:33:05,258

So, after all this stuff

699

00:33:06,146 --> 00:33:07,262

had happened over the decades,

700

00:33:07,262 --> 00:33:08,515

I don't know if you can imagine.

701

00:33:08,515 --> 00:33:09,780

But, I'm actually a human being

702

00:33:09,780 --> 00:33:11,288

with feelings and emotions.

703

00:33:11,288 --> 00:33:14,680

I started to get serious PTS

704

00:33:14,680 --> 00:33:16,217

because of all of these events.

705

00:33:16,217 --> 00:33:18,120

It was really, pretty heavy actually.

706

00:33:18,120 --> 00:33:19,996

You know, not from the transition,

707

00:33:19,996 --> 00:33:21,697

not from all the crazy things the cops

708

00:33:21,697 --> 00:33:22,940

were doing in San Francisco.

709

00:33:22,940 --> 00:33:26,582

None of that. I went forward.

710

00:33:26,582 --> 00:33:28,094

This stuff really got to me.

711

00:33:28,094 --> 00:33:29,347

This really hurt.

712

00:33:29,347 --> 00:33:33,122

So I began investigating

and doing research.

713

00:33:35,052 --> 00:33:37,181

Trying to figure out what is going on.

714

00:33:37,181 --> 00:33:38,525

How does this stuff happen?

715

00:33:38,525 --> 00:33:42,939

And I actually got excited

by what I was learning.

716

00:33:42,939 --> 00:33:46,284

I started getting really

weird intuitive insights

717

00:33:46,284 --> 00:33:48,764

and I began writing about a lot of this.

718

00:33:48,764 --> 00:33:50,236

There is a lot more to talk about.

719

00:33:50,236 --> 00:33:52,930

But, I was hoping somehow to regain

720

00:33:52,930 --> 00:33:56,826

some of my legacy or at least explain

721

00:33:56,826 --> 00:34:00,224

how could this have happened.

722

00:34:00,224 --> 00:34:02,119

And that is quite a story

723

00:34:02,119 --> 00:34:05,408

but I really did uncover

all sorts of stuff.

724

00:34:05,408 --> 00:34:10,180

What it ended up leading

me to was to write

725

00:34:10,180 --> 00:34:15,056

and publish my reminiscences

of VLSI revolution.

726

00:34:15,056 --> 00:34:20,056

This special issue

Solid-State Circuits magazine

727

00:34:20,292 --> 00:34:22,020

back in 2012.

728

00:34:22,020 --> 00:34:23,187

That was the first time

729

00:34:23,187 --> 00:34:26,259

I'd actually come forward

to tell the story.

730

00:34:26,259 --> 00:34:29,470

And there is a lot more

that I had begun to write.

731

00:34:29,470 --> 00:34:32,762

There are more links you can explore.

732

00:34:32,762 --> 00:34:37,242

But since 2012, things

have started to happen.

733

00:34:37,242 --> 00:34:40,378

First of all, in 2014,

734

00:34:40,378 --> 00:34:43,855

I got elected as a fellow at

the Computer History Museum.

735

00:34:43,855 --> 00:34:46,169

And again, it's a very big

deal in Silicon Valley.

736

00:34:46,169 --> 00:34:49,715

And I am going to receive

one of the continentals

737

00:34:49,715 --> 00:34:53,848

from I triple E and Royal

Side Edinboro next week.

738

00:34:53,848 --> 00:34:55,705

The James Clerk Maxwell Medal,

739

00:34:55,705 --> 00:34:59,429

which I consider a really,

really great honor.

740

00:35:01,429 --> 00:35:03,858

But what does that mean "it's begun"?

741

00:35:03,858 --> 00:35:07,496

That is just the

beginning of the new phase

742

00:35:07,496 --> 00:35:10,029

of the new process of the signing credits

743

00:35:10,029 --> 00:35:11,784

or being noticed or something

744

00:35:11,784 --> 00:35:12,908

which is completely independent

745

00:35:12,908 --> 00:35:14,920

from actually doing anything.

746

00:35:14,920 --> 00:35:16,847

(audience laughs)

747

00:35:16,847 --> 00:35:18,824

All of this is sort of connected

748

00:35:18,824 --> 00:35:21,622

with doing some things

like writing the story.

749

00:35:21,622 --> 00:35:25,632

But let me kind of

reflect on this knowledge.

750

00:35:25,632 --> 00:35:28,406

Reflect on some lessons that I've learned.

751

00:35:30,336 --> 00:35:33,726

Throughout this setting, you can observe,

752

00:35:33,726 --> 00:35:35,839

you could observe and

do observed repression

753

00:35:35,839 --> 00:35:38,530

of contributions by women scientists.

754

00:35:38,530 --> 00:35:40,748

But, what do I mean by

the term repression?

755

00:35:40,748 --> 00:35:45,036

That is something actively

happening to stop it.

756

00:35:45,036 --> 00:35:46,768

The Matthew effect:

757

00:35:46,768 --> 00:35:48,751

eminent scientists get more credit.

758

00:35:48,751 --> 00:35:50,700

Well, of course they do.

759

00:35:50,700 --> 00:35:53,320

And I was very junior in the (mumbles)

760

00:35:53,320 --> 00:35:56,937

reputation comparative to

(mumbles) professor at Caltech.

761

00:35:56,937 --> 00:36:00,551

So naturally, I was like a

grad student to a professor.

762

00:36:01,461 --> 00:36:05,601

But is that all there is or

is that what it really is?

763

00:36:08,211 --> 00:36:10,255

You can think about these effects.

764

00:36:10,255 --> 00:36:12,108

You get yourself spiraling downward

765

00:36:12,108 --> 00:36:14,457

into them and thinking

about only those effects.

766

00:36:14,457 --> 00:36:19,457

Thinking of them as using

logic, self-fulfilling prophecy.

767

00:36:20,826 --> 00:36:22,420

What is that?

768

00:36:22,420 --> 00:36:26,679

A false definition of a situation

that evokes a new behavior

769

00:36:26,679 --> 00:36:30,350

which makes the original

false conception come true.

770

00:36:30,350 --> 00:36:33,585

The species validity of the

self-fulfilling prophecy

771

00:36:33,585 --> 00:36:36,274

perpetuates a reign of error.

772

00:36:36,274 --> 00:36:38,199

I see that happening.

773

00:36:38,199 --> 00:36:39,796

So the profit will cite the actual course

774

00:36:39,796 --> 00:36:41,682

of events as proof that he was right

775

00:36:41,682 --> 00:36:43,190

from the very beginning.

776

00:36:43,190 --> 00:36:45,418

The course (mumbles) did the

work because he got all credit.

777

00:36:45,418 --> 00:36:47,136

Well, of course.

778

00:36:47,136 --> 00:36:49,368

But, is that is that really

what's happening here?

779

00:36:49,368 --> 00:36:53,768

Or are there other forces in play?

780

00:36:54,608 --> 00:36:56,991

After closely investigating

and thinking about,

781

00:36:56,991 --> 00:37:00,081

and coming at all of this in

a whole lot of different ways,

782

00:37:00,081 --> 00:37:01,718

based on evidence,

783

00:37:01,718 --> 00:37:04,691

I began to sense something

more subliminal occurring

784

00:37:04,691 --> 00:37:07,699

at a social level and

it involves no errors,

785

00:37:07,699 --> 00:37:11,483

no conspiracies, no

repressions, and no bad guys.

786

00:37:14,019 --> 00:37:15,815

Here is the conjecture.

787

00:37:15,815 --> 00:37:17,623

Almost all people are fine to innovations

788

00:37:17,623 --> 00:37:19,992

especially ones made by those

789

00:37:19,992 --> 00:37:23,131

whom they do not expect

to make a innovations.

790

00:37:23,131 --> 00:37:25,755

People simply don't see them.

791

00:37:25,755 --> 00:37:26,991

They don't see an innovation

792

00:37:26,991 --> 00:37:29,441

being made right in front of their eyes.

793

00:37:31,972 --> 00:37:36,972

For most people, those

equals almost all people.

794

00:37:37,260 --> 00:37:38,796

So very few people ever witnessed

795

00:37:38,796 --> 00:37:43,076

or visualized innovations.

796

00:37:43,076 --> 00:37:44,996

Even those made right

in front of their eyes

797

00:37:44,996 --> 00:37:48,058

including sometimes

those made by themselves.

798

00:37:49,698 --> 00:37:52,224

It sounds counterintuitive

but bear with me.

799

00:37:52,224 --> 00:37:57,224

Instead, they look for

tells and cues from others.

800

00:37:57,280 --> 00:38:02,180

When constructing internal

orientations toward novelties,

801

00:38:02,180 --> 00:38:03,492

they stumble upon.

802

00:38:03,492 --> 00:38:05,572

Something different.

803

00:38:06,535 --> 00:38:08,172

And not just whether or not to accept

804

00:38:08,172 --> 00:38:09,656

or reject a novelty,

805

00:38:09,656 --> 00:38:12,920

but also whether to even

notice it in the first place.

806

00:38:17,430 --> 00:38:18,572

From this perspective,

807

00:38:18,572 --> 00:38:22,028

the Matthew and Matilda effects

are actually derivatives

808

00:38:22,028 --> 00:38:26,688

of this conjectured social

level, Conley effect.

809

00:38:28,328 --> 00:38:31,849

Once visualized this effect

in action in this past story.

810

00:38:31,849 --> 00:38:34,048

See, the students at MIT in '78,

811

00:38:34,048 --> 00:38:36,410

what do they think they were doing?

812

00:38:36,410 --> 00:38:37,225

They thought they were learning

813

00:38:37,225 --> 00:38:40,070

how chips were designed in Silicon Valley.

814

00:38:40,070 --> 00:38:43,476

Actually, I had been a

student at MIT back in the 50s

815

00:38:43,476 --> 00:38:48,119

and I was tremendously affected

816

00:38:48,119 --> 00:38:50,452

by this idea of doing hacks, MIT hacks.

817

00:38:50,452 --> 00:38:52,730

Not a hack like a software hack,

818

00:38:52,730 --> 00:38:55,550

this is an MIT hack where

you can go on Google

819

00:38:55,550 --> 00:38:57,086

and check it out.

820

00:38:57,086 --> 00:39:01,182

It's creating things

that just amaze people.

821

00:39:01,182 --> 00:39:06,182

And people get so curious looking at it,

822

00:39:06,673 --> 00:39:08,590

they cannot figure out how you did it.

823

00:39:08,590 --> 00:39:11,313

So, they spend their time so puzzled

824

00:39:11,313 --> 00:39:13,524

that they just have to

figure out how you did it.

825

00:39:13,524 --> 00:39:17,108

They gradually engineer how you did it.

826

00:39:17,108 --> 00:39:18,488

So, you got to amaze people

827

00:39:18,488 --> 00:39:19,308

but you have to make them want

828

00:39:19,308 --> 00:39:21,320

to know how you did it.

829

00:39:21,320 --> 00:39:23,798

The thing is never knowing actually

830

00:39:23,798 --> 00:39:27,693

how it was done and,

especially, who did it.

831

00:39:27,693 --> 00:39:30,255

This is a way for invisible people

832

00:39:30,255 --> 00:39:32,428

to actually go around doing things.

833

00:39:32,428 --> 00:39:35,384

You see, they did it without realizing

834

00:39:35,384 --> 00:39:38,748

they were learning radically new methods.

835

00:39:38,748 --> 00:39:39,677

The astonished reaction

836

00:39:39,677 --> 00:39:42,957

among the Silicon Valley

cognoscenti led to intense interest

837

00:39:42,957 --> 00:39:45,413

in reverse engineering of

how MIT was doing this.

838

00:39:45,413 --> 00:39:47,799

Remember how MIT was doing it?

839

00:39:49,887 --> 00:39:51,488

Plus the other research universities

840

00:39:51,488 --> 00:39:55,116

immediately wanna offer such courses.

841

00:39:56,826 --> 00:39:59,847

Folks using MPC79 that I

announced the next year...

842

00:39:59,847 --> 00:40:02,406

if you have these courses going,

843

00:40:02,406 --> 00:40:06,816

send us your design and we

will print them for you.

844

00:40:06,816 --> 00:40:10,055

Well, everybody signed up.

845

00:40:10,055 --> 00:40:13,949

No one realized that MPC79

846

00:40:13,949 --> 00:40:16,160

was an even bigger

paradigm-shifting hackathon

847

00:40:16,160 --> 00:40:18,529

to launch the modern

world of fabless design,

848

00:40:18,529 --> 00:40:19,616

silicon foundries,

849

00:40:19,616 --> 00:40:22,817

plus internet-based

e-commerce infrastructure.

850

00:40:22,817 --> 00:40:27,105

What were the MPC79 participants thinking?

851

00:40:27,105 --> 00:40:31,970

I'm talking a lot of careers

were launched by all of this.

852

00:40:31,970 --> 00:40:34,427

Tennessee, Patterson, all of those guys.

853

00:40:34,427 --> 00:40:35,323

They had no idea

854

00:40:35,323 --> 00:40:39,711

that this was something

cooked up and was a hack.

855

00:40:39,711 --> 00:40:41,668

Since it used the ARPANET,

856

00:40:41,668 --> 00:40:44,541

some thought DARPA did it.

857

00:40:44,541 --> 00:40:47,591

DARPA is great for

claiming credit for things,

858

00:40:47,591 --> 00:40:49,511

like (mumbles) M16 and all of that.

859

00:40:49,511 --> 00:40:51,171

There's this long history

860

00:40:51,171 --> 00:40:53,805

You had to get money from

Congress so you did it.

861

00:40:55,395 --> 00:41:00,051

I googled (mumbles), they

had their own dark list

862

00:41:00,051 --> 00:41:05,051

(mumbles) so, when DARPA funded

863

00:41:07,584 --> 00:41:11,956

and transferred the MPC79

technology to USC-ISI.

864

00:41:11,956 --> 00:41:16,796

many users thought MOSIS

had been created by DARPA

865

00:41:16,796 --> 00:41:17,730

So, that was great,

866

00:41:17,730 --> 00:41:20,702

because similar government

supported MOSIS-like services

867

00:41:20,702 --> 00:41:25,601

began springing up in

other countries (laughs).

868

00:41:25,601 --> 00:41:29,889

You see how this is being orchestrated?

869

00:41:29,889 --> 00:41:33,986

The VLSI revolution swept

through the high-tech community

870

00:41:33,986 --> 00:41:37,062

without anyone realizing it

had been deliberately generated

871

00:41:37,062 --> 00:41:40,636

much less how it was done and who did it.

872

00:41:43,742 --> 00:41:47,070

Although the VLSI Book by Mead

became iconically connected

873

00:41:47,070 --> 00:41:49,976

with these large-scale

socio-technological events,

874

00:41:49,976 --> 00:41:53,686

Mead himself could never

explain what happened.

875

00:41:54,686 --> 00:41:58,299

Until I wrote that article.

876

00:41:59,196 --> 00:42:01,095

No one kind of can to understand,

877

00:42:01,095 --> 00:42:02,820

I'm sure not anybody understands quite yet

878

00:42:02,820 --> 00:42:04,740

because they haven't told

the story I am telling today.

879

00:42:04,740 --> 00:42:08,836

I am reframing it in

this more open manner.

880

00:42:08,836 --> 00:42:10,522

Given this is Pride Month,

881

00:42:10,522 --> 00:42:14,490

I have to uncover it a little further.

882

00:42:14,490 --> 00:42:17,754

Meanwhile, I remain in the

shadows up until just 2012.

883

00:42:17,754 --> 00:42:19,610

When I was finally able to emerge,

884

00:42:19,610 --> 00:42:21,412

I was able to explain how it happened,

885

00:42:21,412 --> 00:42:23,460

the reason was by then,

886

00:42:23,460 --> 00:42:28,460

we were in a really

different emerging time.

887

00:42:28,681 --> 00:42:33,095

President Obama, the LGBT Pride Month.

888

00:42:33,095 --> 00:42:38,095

This was really a huge change.

889

00:42:38,668 --> 00:42:42,865

And I just felt I am just

going to tell the story

890

00:42:42,865 --> 00:42:46,395

because I think some

people will understand it.

891

00:42:48,535 --> 00:42:50,076

The Conway effect.

892

00:42:50,076 --> 00:42:51,377

Almost all people are blind to innovations

893

00:42:51,377 --> 00:42:52,428

especially when it is made

894

00:42:52,428 --> 00:42:56,048

by people they do not

expect to make innovations.

895

00:42:56,048 --> 00:42:59,942

For the result, innovations

diffuse via social processes

896

00:42:59,942 --> 00:43:03,010

involving subliminal subgroup

noticings, mimickings,

897

00:43:03,010 --> 00:43:04,714

rejections, adoptions, adaptations,

898

00:43:04,714 --> 00:43:07,689

tradings, and displacements.

899

00:43:08,909 --> 00:43:13,775

Credits for innovations are

seperately, as social tokens,

900

00:43:13,775 --> 00:43:15,822

are separately subliminally generated,

901

00:43:15,822 --> 00:43:19,178

gathered, seized, gained,

granted, bartered, and so forth.

902

00:43:19,178 --> 00:43:22,758

By a so-called tokening

processes modulated by

903

00:43:22,758 --> 00:43:25,452

visibility status, prestige,

class, power, location,

904

00:43:25,452 --> 00:43:27,402

credentials, prejudice,

popularity, influence,

905

00:43:27,402 --> 00:43:29,130

money, and accident.

906

00:43:29,130 --> 00:43:33,344

In ways that sustain those

social tokening processes

907

00:43:33,344 --> 00:43:35,954

thus maintaining underlying

blindness to innovations.

908

00:43:37,294 --> 00:43:41,842

And a point corollary to all

of this is that if possible,

909

00:43:41,842 --> 00:43:44,640

the trigger large-scale paradigm shifts

910

00:43:44,640 --> 00:43:46,792

right out in the open

911

00:43:46,792 --> 00:43:48,748

without people having a clue

912

00:43:48,748 --> 00:43:50,000

of what you are doing.

913

00:43:50,000 --> 00:43:51,594

(audience laughs)

914

00:43:52,723 --> 00:43:53,741

Think about it.

915

00:43:54,132 --> 00:43:56,228

I mean it's like...

916

00:43:56,228 --> 00:44:00,296

well anyway, it's engineering I guess.

917

00:44:00,296 --> 00:44:05,188

I would like to enter a little Q&A

918

00:44:05,188 --> 00:44:07,864

and raise some thoughts for discussion.

919

00:44:07,864 --> 00:44:12,864

Let me do it in a way where instead

920

00:44:13,240 --> 00:44:14,572

of you asking me questions,

921

00:44:14,572 --> 00:44:16,564

I ask you questions.

922

00:44:17,302 --> 00:44:20,533

You have to step into the future.

923

00:44:22,982 --> 00:44:24,591

Just start doing it differently.

924

00:44:25,045 --> 00:44:26,169

So here is a few.

925

00:44:26,169 --> 00:44:28,384

Have you noticed an innovation today?

926

00:44:28,384 --> 00:44:32,224

Have you made an innovation today?

927

00:44:32,224 --> 00:44:35,369

What is an innovation?

928

00:44:35,369 --> 00:44:39,394

And if we have time, just a

couple of thought experiments.

929

00:44:39,394 --> 00:44:41,058

But I want to put those three questions

930

00:44:41,058 --> 00:44:45,474

in the air including to the WebEx audience

931

00:44:45,474 --> 00:44:50,176

and see if -- see how

folks would answer those.

932

00:44:50,176 --> 00:44:52,288

Has anyone noticed an innovation today?

933

00:44:52,288 --> 00:44:54,912

Have you made an innovation today?

934

00:44:54,912 --> 00:44:58,648

Or do you have an idea of

what is an innovation anyway?

935

00:44:58,648 --> 00:44:59,928

There are no right or wrong answers.

936

00:44:59,928 --> 00:45:04,126

There's only the stories you can tell.

937

00:45:04,126 --> 00:45:06,877

That you feel.

938

00:45:06,877 --> 00:45:09,272

Does anyone want to go first?

939

00:45:09,272 --> 00:45:12,262

Or you can ask me a

question if you'd like.

940

00:45:14,022 --> 00:45:15,701

We have plenty of time.

941

00:45:16,118 --> 00:45:17,088

Yes?

942

00:45:20,419 --> 00:45:21,379

- [Voiceover] Hi, my name is Ashton

943

00:45:21,379 --> 00:45:22,979

and thank you so much for your talk.

944

00:45:22,979 --> 00:45:26,025

A personal question or two.

945

00:45:26,025 --> 00:45:28,867

What is your relationship to me now

946

00:45:28,867 --> 00:45:29,955

and do you expect people

947

00:45:29,955 --> 00:45:32,381

to fight for you anymore?

948

00:45:32,998 --> 00:45:35,517

- [Voiceover] Actually, it's interesting.

949

00:45:35,517 --> 00:45:38,077

One of the things I hope would come out

950

00:45:38,077 --> 00:45:41,149

of the talk is that you would see that

951

00:45:41,149 --> 00:45:43,795

there are no good guys,

bad guys, or anything.

952

00:45:43,795 --> 00:45:48,795

This is a way society, culture has evolved

953

00:45:49,831 --> 00:45:52,032

including gaining new insights

954

00:45:52,032 --> 00:45:53,313

by reflecting on the past

955

00:45:53,313 --> 00:45:55,453

and trying to figure out what happened.

956

00:45:55,453 --> 00:45:58,525

It has been a long time since I have seen

957

00:45:58,525 --> 00:46:03,112

we parted our way very

early in the process.

958

00:46:03,112 --> 00:46:04,714

For a bunch of reasons.

959

00:46:04,714 --> 00:46:09,014

And I may say more about that someday.

960

00:46:09,014 --> 00:46:10,102

But that is a little personal.

961

00:46:10,102 --> 00:46:15,102

About the issue of taking

the things that I did

962

00:46:18,067 --> 00:46:19,639

and going and showing them to other people

963

00:46:19,639 --> 00:46:21,367

as if he had done them.

964

00:46:21,367 --> 00:46:22,897

So once I saw that happening,

965

00:46:22,897 --> 00:46:24,405

I just stopped telling

Mead what I was doing.

966

00:46:24,405 --> 00:46:26,631

And that is probably why he

never understood what happened.

967

00:46:26,631 --> 00:46:30,231

Because of that kind of chaos,

968

00:46:30,231 --> 00:46:35,231

I really haven't interacted

with him for decades.

969

00:46:36,311 --> 00:46:37,719

At all.

970

00:46:37,719 --> 00:46:39,675

I have no idea whether he is even aware

971

00:46:39,675 --> 00:46:42,583

that the story is out there

972

00:46:42,583 --> 00:46:43,479

or much cares,

973

00:46:43,479 --> 00:46:47,038

because his reputation

at (mumbles) is cemented.

974

00:46:47,038 --> 00:46:48,746

And all of these things, I hope,

975

00:46:48,746 --> 00:46:53,746

will begin to change in not my situation

976

00:46:54,597 --> 00:46:56,552

but the situation for young women

977

00:46:56,552 --> 00:46:59,112

coming up in things now.

978

00:46:59,112 --> 00:47:02,627

So it's really not about

me, and it's not about Mead.

979

00:47:02,627 --> 00:47:05,269

It is about something else.

980

00:47:05,269 --> 00:47:08,021

Is that we don't notice the actual things

981

00:47:08,021 --> 00:47:10,235

that are being done and propagated.

982

00:47:10,235 --> 00:47:12,323

We don't understand the processes.

983

00:47:12,323 --> 00:47:15,112

Right now is the time when

the government is trying

984

00:47:15,112 --> 00:47:17,527

to shut down research and social finance.

985

00:47:18,752 --> 00:47:23,752

We are stumbling into

an emerging vast domain,

986

00:47:23,776 --> 00:47:25,831

a labyrinth of social physics.

987

00:47:25,831 --> 00:47:27,829

You have to be investigated.

988

00:47:27,829 --> 00:47:29,783

Especially involving computer science.

989

00:47:29,783 --> 00:47:34,647

The data and all sorts of modern methods.

990

00:47:34,647 --> 00:47:39,647

So that is really what I would

like to leave folks with.

991

00:47:40,850 --> 00:47:45,229

Think of it as it's almost like mythology.

992

00:47:45,229 --> 00:47:48,392

Mead and Conway, it's like a

story from Greek mythology.

993

00:47:48,392 --> 00:47:50,184

Forget it even happened.

994

00:47:50,184 --> 00:47:51,427

Just remember the story

995

00:47:51,427 --> 00:47:54,563

and what you learned from the story.

996

00:47:54,563 --> 00:47:58,246

And the learning is about how people

997

00:47:58,246 --> 00:48:00,259

didn't even notice the innovations made

998

00:48:00,259 --> 00:48:02,239

in front of their eyes.

999

00:48:02,239 --> 00:48:03,933

They just used them.

1000

00:48:03,933 --> 00:48:05,505

They used them for

their own personal gain.

1001

00:48:05,505 --> 00:48:07,615

That you count on that you did this.

1002

00:48:07,615 --> 00:48:08,815

The young faculty members

1003

00:48:08,815 --> 00:48:10,252

wanted to offer VLSI course,

1004

00:48:10,252 --> 00:48:13,903

because young faculty members

(mumbles) way to get tenure.

1005

00:48:13,903 --> 00:48:18,768

So a sort of, in the military sense,

1006

00:48:18,768 --> 00:48:22,697

a general knows how to maneuver armies

1007

00:48:22,697 --> 00:48:25,641

and divisions and battalions.

1008

00:48:25,641 --> 00:48:29,701

(audio cuts out)

1009

00:48:31,991 --> 00:48:33,237

Special ops.

1010

00:48:33,237 --> 00:48:35,896

They visualize what is going on

1011

00:48:35,896 --> 00:48:37,916

and then they spring it.

1012

00:48:37,916 --> 00:48:40,732

And often afterwards,

1013

00:48:40,732 --> 00:48:43,100

this was very difficult to go back

1014

00:48:43,100 --> 00:48:48,100

and reverse engineer what they did.

1015

00:48:48,924 --> 00:48:51,118

Especially if they do not tell the story.

1016

00:48:51,118 --> 00:48:54,665

Other questions. I'm talking too much.

1017

00:48:54,665 --> 00:48:56,294

Yes?

1018

00:48:56,294 --> 00:49:01,294

- [Voiceover] Actually,

I came to CISE in 1987.

1019

00:49:02,846 --> 00:49:05,059

And at some point shortly thereafter,

1020

00:49:05,059 --> 00:49:07,838

you were on our CISE advisory committee.

1021

00:49:07,838 --> 00:49:09,502

What years were those?

1022

00:49:09,502 --> 00:49:11,267

- [Voiceover] I don't remember.

1023

00:49:11,267 --> 00:49:12,382

It was a long time ago.

1024

00:49:12,382 --> 00:49:13,726

- [Voicoever] Yeah, it was a long time ago

1025

00:49:13,726 --> 00:49:18,334

and your history was solidly known inside

1026

00:49:18,334 --> 00:49:21,280

at the time because I

didn't know who you were

1027

00:49:21,280 --> 00:49:23,347

and someone said "Oh, that's Lynn Conway

1028

00:49:23,347 --> 00:49:24,985

and this is what she did!"

1029

00:49:24,985 --> 00:49:27,763

And all of this information.

1030

00:49:27,763 --> 00:49:29,210

So that's the first thing.

1031

00:49:29,210 --> 00:49:31,795

So CISE knew.

1032

00:49:31,795 --> 00:49:32,729

- [Voiceover] Good.

1033

00:49:32,729 --> 00:49:37,729

- [Voicoever] The second

is there was post,

1034

00:49:38,707 --> 00:49:41,843

a Washington post article,

about the Internet,

1035

00:49:41,843 --> 00:49:43,606

the design of the Internet and security

1036

00:49:43,606 --> 00:49:48,280

not being built-in, in which

NSF has not mentioned at all

1037

00:49:48,280 --> 00:49:52,979

and they also included a recent funding

1038

00:49:52,979 --> 00:49:56,792

by DARPA for reinventing the Internet

1039

00:49:56,792 --> 00:50:01,171

and making it secure when

in fact NSF, since 2006,

1040

00:50:01,171 --> 00:50:04,435

did this grand challenge

of reinventing Internet

1041

00:50:04,435 --> 00:50:09,043

without looking at the current Internet

1042

00:50:09,043 --> 00:50:10,294

to make it secure,

1043

00:50:10,294 --> 00:50:15,294

we had four, now we have three

prototypes of such things

1044

00:50:18,259 --> 00:50:19,283

that never got mentioned.

1045

00:50:19,283 --> 00:50:23,351

So institution may also fall to your...

1046

00:50:23,351 --> 00:50:25,398

- [Voiceover] Absolutely.

1047

00:50:25,398 --> 00:50:28,600

More than that, even ideologies.

1048

00:50:28,600 --> 00:50:32,779

Some of these reframings, abraders,

1049

00:50:32,779 --> 00:50:34,118

insurgents have happened

1050

00:50:34,118 --> 00:50:38,499

because other (mumbles) sources have...

1051

00:50:38,499 --> 00:50:43,499

need tokens for their machinations.

1052

00:50:43,582 --> 00:50:45,866

And they kick off someone or some ideas,

1053

00:50:45,866 --> 00:50:50,025

and, sort of, amplify

them for those purposes.

1054

00:50:50,025 --> 00:50:52,458

So there are many forces at loose.

1055

00:50:52,458 --> 00:50:56,965

And many different things

going on in this laboratory.

1056

00:50:56,965 --> 00:51:00,037

Many of which are

discoverable by new methods.

1057

00:51:00,037 --> 00:51:01,381

Yes?

1058

00:51:01,381 --> 00:51:04,746

- [Voiceover] I really enjoyed your talk.

1059

00:51:04,746 --> 00:51:07,525

There is a saying often

1060

00:51:07,525 --> 00:51:09,893

that history is written by the victors.

1061

00:51:09,893 --> 00:51:12,552

And I recently heard somebody recast

1062

00:51:12,552 --> 00:51:15,498

that as history is written by the writer.

1063

00:51:15,498 --> 00:51:20,498

And so, in thinking

about innovation today.

1064

00:51:20,517 --> 00:51:24,456

You wrote your story.

1065

00:51:24,456 --> 00:51:26,597

And how do we get more people

1066

00:51:26,597 --> 00:51:28,556

to out themselves in these ways.

1067

00:51:28,556 --> 00:51:31,717

- [Voiceover] If anyone would

like to ask a question online,

1068

00:51:31,717 --> 00:51:33,957

you may press star one at this time.

1069

00:51:33,957 --> 00:51:35,659

Star one to ask a question.

1070

00:51:35,659 --> 00:51:37,789

I'll rejoin you back into conference.

1071

00:51:39,539 --> 00:51:42,823

- [Voiceover] I do have an idea.

1072

00:51:42,823 --> 00:51:47,823

About how things could change.

1073

00:51:47,943 --> 00:51:50,823

Where people don't have to,

1074

00:51:50,823 --> 00:51:54,343

let's say in ways that

feel unnatural to them,

1075

00:51:54,343 --> 00:51:59,343

to push their stories or

claim this or whatever.

1076

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

I really think we are

entering a Renaissance,

1077

00:52:06,375 --> 00:52:09,356

a social age, where our

technology is allowing us

1078

00:52:09,356 --> 00:52:13,351

to much more dramatically cross-connect

1079

00:52:13,351 --> 00:52:15,719

and interconnect with others,

1080

00:52:15,719 --> 00:52:19,111

really share our stories with our friends.

1081

00:52:19,111 --> 00:52:23,762

And do it in a way that we

are always leaving trends.

1082

00:52:23,762 --> 00:52:26,315

And engineering teams now,

1083

00:52:26,315 --> 00:52:28,775

the kind of infrastructure being used,

1084

00:52:28,775 --> 00:52:31,591

social interactions that are done,

1085

00:52:31,591 --> 00:52:36,172

techno-social that are

done to do the work.

1086

00:52:36,172 --> 00:52:39,015

Involve leaving tracks, leaving trails.

1087

00:52:39,015 --> 00:52:43,274

So now, it becomes much more difficult

1088

00:52:43,274 --> 00:52:47,126

for someone to accidentally

run off and tell someone

1089

00:52:47,126 --> 00:52:52,126

about an idea and then

have them misunderstand

1090

00:52:52,583 --> 00:52:53,974

and think it was their idea,

1091

00:52:53,974 --> 00:52:56,012

If it turns out to be important.

1092

00:52:56,012 --> 00:52:59,111

So, if that other person goes

1093

00:52:59,111 --> 00:53:02,346

and says, "Wow, did you hear

what so-and-so has invented?"

1094

00:53:02,346 --> 00:53:04,321

So-and-so will now feel embarrassed

1095

00:53:04,321 --> 00:53:07,302

if someone got the idea they invented it.

1096

00:53:07,302 --> 00:53:08,673

Things tend to more,

1097

00:53:08,673 --> 00:53:11,297

chain back automatically to those sources.

1098

00:53:11,297 --> 00:53:13,153

It will actually start uncovering

1099

00:53:13,153 --> 00:53:14,881

where some things came from.

1100

00:53:14,881 --> 00:53:16,097

I can tell you numerous stories

1101

00:53:16,097 --> 00:53:19,425

in the VLSI Revolution's.

1102

00:53:19,425 --> 00:53:24,425

Very important innovations

made in retrospect.

1103

00:53:24,929 --> 00:53:28,999

Why young students, some

of who did not realize

1104

00:53:28,999 --> 00:53:31,969

how important their innovations had been,

1105

00:53:31,969 --> 00:53:34,081

become foundational things.

1106

00:53:34,081 --> 00:53:36,807

Especially in the area of EDA,

electronic design automation.

1107

00:53:36,807 --> 00:53:38,177

I can think of numerous examples.

1108

00:53:38,177 --> 00:53:42,977

And, if the case were a

student at the right point

1109

00:53:42,977 --> 00:53:43,681

at the right time,

1110

00:53:43,681 --> 00:53:46,535

in their world of knowing what they know,

1111

00:53:46,535 --> 00:53:49,313

new and fresh from various deals

1112

00:53:49,313 --> 00:53:50,721

that others don't know about.

1113

00:53:50,721 --> 00:53:51,974

they come upon a problem,

1114

00:53:51,974 --> 00:53:52,853

and they solve it,

1115

00:53:52,853 --> 00:53:54,607

where no one else has solved it before

1116

00:53:54,607 --> 00:53:56,523

or even seen it before.

1117

00:53:57,433 --> 00:53:59,707

That is often the way

innovations are made.

1118

00:53:59,707 --> 00:54:04,707

And so I think the social age

1119

00:54:08,322 --> 00:54:10,853

we are entering is going

to be very liberating

1120

00:54:10,853 --> 00:54:11,513

in this way.

1121

00:54:11,513 --> 00:54:13,531

Where we're gonna find more

joy interacting with people.

1122

00:54:13,531 --> 00:54:15,642

There's less fear of sharing your ideas.

1123

00:54:15,642 --> 00:54:17,782

Because if they were ideas,

1124

00:54:17,782 --> 00:54:21,046

they would be known.

1125

00:54:21,046 --> 00:54:22,939

And we're going to run out

of time here pretty quick.

1126

00:54:22,939 --> 00:54:26,422

I did want to show a couple

of thought experiments.

1127

00:54:26,422 --> 00:54:31,422

I would actually like to leave

you with these two ideas.

1128

00:54:32,416 --> 00:54:34,422

So that you can think about these

1129

00:54:34,422 --> 00:54:37,110

as a way of remembering

what we talked about.

1130

00:54:37,110 --> 00:54:41,189

This will take about two minutes.

1131

00:54:42,054 --> 00:54:45,737

First, is the story of the

blue-chip birds in England

1132

00:54:45,737 --> 00:54:50,156

and how somewhere along

the line somewhere,

1133

00:54:50,156 --> 00:54:54,315

a chip bird managed to find a milk bottle,

1134

00:54:54,315 --> 00:54:57,532

the top of which was

either busted or (mumbles).

1135

00:54:57,532 --> 00:54:59,808

Got it open and got the cream.

1136

00:54:59,808 --> 00:55:01,538

And maybe this kind of event happens

1137

00:55:01,538 --> 00:55:03,583

once in a while, scattered,

1138

00:55:03,583 --> 00:55:07,856

but among this particular

species of birds,

1139

00:55:07,856 --> 00:55:10,803

they are flocking; flocking birds.

1140

00:55:10,803 --> 00:55:14,323

and they are always kind of

noticing each other's behaviors.

1141

00:55:14,323 --> 00:55:17,048

And so, somewhere along the line further,

1142

00:55:17,048 --> 00:55:20,339

another bird saw a bird do

this and started doing it.

1143

00:55:20,339 --> 00:55:23,347

And got the cream.

1144

00:55:23,347 --> 00:55:27,818

And so what happened was this spread

1145

00:55:27,818 --> 00:55:31,913

from an area because birdwatchers

watch bird behaviors,

1146

00:55:31,913 --> 00:55:33,450

so they count behaviors.

1147

00:55:33,450 --> 00:55:37,221

I just put this spreading

topography on here.

1148

00:55:37,221 --> 00:55:39,717

I could not find the

actual original diagram.

1149

00:55:39,717 --> 00:55:41,381

But, what happened was,

1150

00:55:41,381 --> 00:55:43,784

it was clear this was

within a certain region

1151

00:55:43,784 --> 00:55:46,565

and then more and more and more.

1152

00:55:46,565 --> 00:55:47,461

And it spread.

1153

00:55:47,461 --> 00:55:49,033

It was an epidemic.

1154

00:55:49,033 --> 00:55:52,837

And just kept going on down

through time (mumbles).

1155

00:55:52,837 --> 00:55:55,891

Now, think about it.

1156

00:55:55,891 --> 00:55:58,115

If you saw this happen,

1157

00:55:58,115 --> 00:56:01,507

does this chip bird know

it made an innovation?

1158

00:56:03,137 --> 00:56:07,066

Does anybody know who was

the first one to do this?

1159

00:56:07,066 --> 00:56:10,596

What modulated the spreading?

1160

00:56:10,596 --> 00:56:12,071

It turns out robins occasionally

1161

00:56:12,071 --> 00:56:13,707

open milk bottles too,

1162

00:56:13,707 --> 00:56:15,820

but it never propagated among robins.

1163

00:56:15,820 --> 00:56:18,885

Not a flocking species.

1164

00:56:19,467 --> 00:56:21,345

Not such a social species.

1165

00:56:22,247 --> 00:56:24,523

So, that is an interesting start

1166

00:56:24,523 --> 00:56:27,793

and it tells you something

about the evolution of culture.

1167

00:56:27,793 --> 00:56:31,696

The accumulation of innovations

1168

00:56:31,696 --> 00:56:36,461

in an animal society.

1169

00:56:36,461 --> 00:56:40,557

My message mainly observation

and imitation and diffusion.

1170

00:56:40,557 --> 00:56:42,363

Here's another one.

1171

00:56:42,363 --> 00:56:43,963

This one is great.

1172

00:56:43,963 --> 00:56:48,780

It is a story about work

1173

00:56:48,780 --> 00:56:50,747

in the Japanese Monkey Center

1174

00:56:50,747 --> 00:56:53,179

where macaques were isolated

in groups on a small island

1175

00:56:53,179 --> 00:56:57,247

and what they actually

observed was an occasion

1176

00:56:57,247 --> 00:56:59,361

of the particular female,

1177

00:56:59,361 --> 00:57:01,537

the female genius of the macaque,

1178

00:57:01,537 --> 00:57:05,403

who at the age of two,

invented washing sand off

1179

00:57:05,403 --> 00:57:07,387

of sweet potatoes before eating them.

1180

00:57:07,387 --> 00:57:10,267

They just watched what they did.

1181

00:57:10,267 --> 00:57:14,811

And she somehow stumbled into this.

1182

00:57:14,811 --> 00:57:16,896

Maybe she had one and walked in the water

1183

00:57:16,896 --> 00:57:17,825

and got it wet

1184

00:57:17,825 --> 00:57:19,197

and realized, "Oh, that's cool!"

1185

00:57:19,197 --> 00:57:20,989

But anyway, she did that.

1186

00:57:20,989 --> 00:57:22,694

(audience laughs)

1187

00:57:22,694 --> 00:57:25,667

But then later, she built on that.

1188

00:57:25,667 --> 00:57:27,203

Somehow, built on it.

1189

00:57:27,203 --> 00:57:29,305

She found a way to

separate wheat from sand

1190

00:57:29,305 --> 00:57:30,777

by throwing the mixture in the water

1191

00:57:30,777 --> 00:57:33,721

and skimming the weed off the surface.

1192

00:57:33,721 --> 00:57:38,009

These discoveries actually did

spread through the community.

1193

00:57:38,009 --> 00:57:40,825

These macaques are social animals.

1194

00:57:40,825 --> 00:57:41,849

They wash each other.

1195

00:57:41,849 --> 00:57:44,813

If someone's doing something,

they might try it to.

1196

00:57:44,813 --> 00:57:45,808

They don't know what they're doing,

1197

00:57:45,808 --> 00:57:46,861

they just try it.

1198

00:57:46,861 --> 00:57:48,944

The older individuals

1199

00:57:48,944 --> 00:57:51,597

were the last to acquire the new trick.

1200

00:57:51,597 --> 00:57:54,093

So when you want to spread things,

1201

00:57:54,093 --> 00:57:56,826

you usually think of a younger generation.

1202

00:57:56,826 --> 00:58:01,826

Again, what was (mumbles) thinking?

1203

00:58:02,759 --> 00:58:05,117

She just figured out a way

to wash sweet potatoes.

1204

00:58:05,117 --> 00:58:06,499

Is it an important innovation?

1205

00:58:06,499 --> 00:58:07,741

I don't know.

1206

00:58:07,741 --> 00:58:09,917

But could something be built on it?

1207

00:58:09,917 --> 00:58:11,491

Well, yeah it was.

1208

00:58:11,491 --> 00:58:15,202

So these processes are subliminal.

1209

00:58:15,202 --> 00:58:16,317

Largely.

1210

00:58:16,317 --> 00:58:18,109

And these things happen.

1211

00:58:18,109 --> 00:58:19,169

So what people do,

1212

00:58:19,169 --> 00:58:21,885

they do it all the time

1213

00:58:21,885 --> 00:58:24,546

and often themselves do not recognize

1214

00:58:24,546 --> 00:58:26,209

that they are doing it.

1215

00:58:26,209 --> 00:58:30,333

So everyone is talking about innovation

1216

00:58:30,333 --> 00:58:32,676

and really the question

I want to leave you with

1217

00:58:32,676 --> 00:58:35,757

is what is an innovation?

1218

00:58:37,337 --> 00:58:39,135

What is an innovation?

1219

00:58:39,135 --> 00:58:40,409

Anyway, thank you very much.

1220

00:58:40,409 --> 00:58:43,475

(audience applause)

1221

00:58:53,115 --> 00:58:55,228

- [Voiceover] Thank

you so much Dr. Conway.

1222

00:58:55,228 --> 00:58:57,049

I’m Beth Strausser.

1223

00:58:57,049 --> 00:59:02,049

I am the Co-Chair of the NSF

LGBT+ and Allies group here.

1224

00:59:02,187 --> 00:59:04,462

And on behalf of the group,

1225

00:59:04,462 --> 00:59:06,127

I wanted to present you

1226

00:59:06,127 --> 00:59:08,843

with a little token of our appreciation.

1227

00:59:08,843 --> 00:59:13,843

We got you a little NSF mug

1228

00:59:13,963 --> 00:59:18,315

and a pen and a little NSF pin.

1229

00:59:18,315 --> 00:59:22,347

And then if you can open this box here.

1230

00:59:25,897 --> 00:59:27,466

We got you some little NSF swag,

1231

00:59:27,466 --> 00:59:28,297

in other words.

1232

00:59:28,297 --> 00:59:30,026

(audience laughs)

1233

00:59:32,146 --> 00:59:34,871

(paper crinkles)

1234

00:59:42,847 --> 00:59:46,653

This is a plaque to thank Dr. Conway

1235

00:59:46,653 --> 00:59:49,661

and it says, ”In grateful

appreciation to Dr. Lynn Conway

1236

00:59:49,661 --> 00:59:51,389

for her outstanding contribution

1237

00:59:51,389 --> 00:59:54,787

as the NSF Pride Month keynote speaker”.

1238

00:59:55,417 --> 00:59:56,828

(audience applause)

1239

00:59:56,828 --> 00:59:58,649

Thank you so much.

1240

00:59:58,649 --> 01:00:00,753

It was wonderful.

1241

01:00:00,753 --> 01:00:04,856

Your talk was just very fascinating

1242

01:00:04,856 --> 01:00:06,586

and very thought provoking.

1243

01:00:06,586 --> 01:00:10,681

And I also wanted to thank...

1244

01:00:10,681 --> 01:00:12,534

you know it takes kind of a village

1245

01:00:12,534 --> 01:00:16,310

to put these things on and so,

1246

01:00:16,310 --> 01:00:18,287

I’ve gotta put my glasses on here.

1247

01:00:18,287 --> 01:00:22,547

I wanted to thank the CISE

and Engineering Directorates

1248

01:00:22,547 --> 01:00:24,404

for co-sponsoring this event.

1249

01:00:24,404 --> 01:00:26,863

I wanted to thank my wonderful Co-Chair,

1250

01:00:26,863 --> 01:00:29,139

Dr. Donna Riley,

1251

01:00:29,139 --> 01:00:31,983

who actually was able to get Lynn to come

1252

01:00:31,983 --> 01:00:33,711

and speak to us today.

1253

01:00:33,711 --> 01:00:37,359

I want to thank the Office

of Diversity and Inclusion,

1254

01:00:37,359 --> 01:00:39,471

specifically Rhonda Davis,

1255

01:00:39,471 --> 01:00:42,031

the acting Head and Tracey France

1256

01:00:42,031 --> 01:00:47,031

for all of their help in

putting this together.

1257

01:00:47,343 --> 01:00:50,607

And of course, our wonderful committee,

1258

01:00:50,607 --> 01:00:55,607

Philo Mbong, Arthur

Fitzmaurice and Harry Stock.

1259

01:00:56,431 --> 01:00:58,991

We also have some goodie bags out here

1260

01:00:58,991 --> 01:01:01,976

that were provided by Out in STEM.

1261

01:01:01,976 --> 01:01:04,175

And finally, last but not least,

1262

01:01:04,175 --> 01:01:08,591

the A.V. folks who made

sure that everything worked

1263

01:01:08,591 --> 01:01:10,447

and we had the WebEx up and running.

1264

01:01:10,447 --> 01:01:15,447

So thank you to Edith Burkett

and Christopher Johnson.

1265

01:01:16,051 --> 01:01:20,751

And oh, also, a little

commercial announcement

1266

01:01:20,751 --> 01:01:22,771

that the Office of Diversity

1267

01:01:22,771 --> 01:01:25,139

and Inclusion wanted me to mention.

1268

01:01:25,139 --> 01:01:28,687

So if you enjoyed this

Special Emphasis event

1269

01:01:28,687 --> 01:01:30,415

that we had here,

1270

01:01:30,415 --> 01:01:31,742

then you definitely want to come

1271

01:01:31,742 --> 01:01:35,257

to our NSF Women's

Equality Day observance.

1272

01:01:35,257 --> 01:01:36,751

It is tentatively scheduled

1273

01:01:36,751 --> 01:01:40,143

for August 26th from 10am – 11am

1274

01:01:40,143 --> 01:01:43,279

and the guest speaker

is Dr. Gwendoyln Boyd,

1275

01:01:43,279 --> 01:01:46,008

she’s president of the

Alabama State University

1276

01:01:46,008 --> 01:01:50,319

and a former engineer at Johns

Hopkins Applied Physics lab.

1277

01:01:50,319 --> 01:01:53,903

So ODI will be putting out information

1278

01:01:53,903 --> 01:01:56,562

about that on the Weekly

Wire, so stay tuned.

1279

01:01:56,562 --> 01:02:00,373

But let's thank Dr.

Conway again for her talk.

1280

01:02:00,415 --> 01:02:03,482

(audience applause)

1281

01:02:06,364 --> 01:02:07,733

Thank you.