Podcast Name: *ACM ByteCast*
Episode: Bob Metcalfe - Episode 40

Welcome to the *ACM ByteCast* podcast, a series from the Association for Computing Machinery! The podcast features conversations with researchers, practitioners, and innovators at the intersection of computing research and practice about their experiences, lessons learned, and visions for the future of computing. In this episode, host Scott Hanselman interviews guest Dr. Bob Metcalfe. Bob graduated from MIT in 1969, is the co inventor of ethernet and co-founded 3Com.

To begin, Bob talks about what he's doing currently. He took a job as a computational engineer at MIT. He models geothermal wells, and loves the challenge, and recognizes that he needs to have a deeper understanding of thermodynamics. He had retired several times before this, but after 2 or 3 weeks it gets boring. He likes being on the steep part of the learning curve and says geothermal can be very influential if it can work, however, we need to know how to get it out of the Earth. When he first got started in geothermal, he was dragged kicking and screaming by a geothermal enthusiast. The cool thing about geothermal is that it is right beneath our feet and could solve many problems, but the drilling is too expensive. A mistake so many people make is just thinking that energy has to be clean, but it has to be cheap too to get massive adoption. Bob wants the levelized cost of energy (LCOE) to get it to 1 cent, but that is very unrealistic. He predicts that it will come suddenly and for the long term. They also discuss the modern path of pathology of connectivity and how we get pathology down to an acceptable level. Bob tells how when he worked for Citibank, the line item for fraud offended him, but business people realized that you work down the pathologies to an acceptable level and then move on.

Next, Scott and Bob discuss "stretch goals", or unwavering goals that push you more than other people. When Bob wrote on the ethernet paper, their coax cable had more of a band width with 2.9 megabytes per second. Then, they built 100 megabytes per second, but no computer could take that bandwidth. The memory bandwidth was a constraint and kids now can take for granted our gigabyte. Most people have a high megabyte in their house, but we are only using maybe 20 or 30 megabytes per second. 82% of the traffic on the internet is video, but the internet was never designed for video. Zoom is a 2 way video, but Netflix is one way. During COVID, Bob was a professor at the University of Texas on startups, and all 18 of his students were all remote. He also taught over video as a consulting professor at Stanford in the 70's. They next discuss google docs and how they started creating demos for this in 1968. This took so long for google docs to be used, because the NLS user ran out of 10-36 bit word, but then it exploded on personal computers. They also talk about how it doesn't matter who created the invention and who gets credit, but it really is many people and inventions that led to that one.

Before wrapping up, Bob talks about how he received the IEEE Medal of Honor and the National Medal of Technology and Innovation awards for his work on the ethernet cable, but there were hundreds of people also involved in it. Ethernet will persist forever, but new technologies and innovations will change it underneath. There is also not just one ethernet, but a dozen of them. They also talk about the idea "how far in the stack do you go." There is so

much to learn, but you have to decide how deep to learn these new concepts, or just let them go. It is possible to have a rich, full life and never know these new ideas. Finally, Bob discusses how he does think he will see a geothermal breakthrough in his lifetime. They will need the oil and gas industry for scale, and they are now encouraging startups in geothermal and partnerships between the oil companies to work together. They predict they will achieve scale in this decade.

Key Takeaways:
0:27 - Introducing today's guest Dr. Bob Metcalfe.
1:25 - What are you doing now?
2:40 - What made you interested in geothermal?
5:28 - Why is drilling for geothermal so hard to do?
9:31 - "Stretch goals."
12:40 - What were you doing during COVID?
20:00 - Bob received two awards for his work on the ethernet cable.
28:50 - How far in the stack do you go?
32:04 - Do you think you'll see a geothermal breakthrough in your lifetime?

Links
Learn more about Bob Metcalfe.
Learn more about Scott Hanselman.
Learn more about the ACM ByteCast podcast at https://learning.acm.org/bytecast

Tags
Bob Metcalfe, Scott Hanselman, Stanford University, University of Texas, ethernet cable, 3Com, geothermal, COVID, drilling, Zoom, internet, megabyte, levelized cost of energy, oil, gas, clean energy, pathology, startups, scale