

A conversation with Martin Cooper

From *The Payphone: an Illustrated Romance, Told by Artists, Engineers, Politicians, Punks & Pranksters*
by Kyle Cassidy & Jessa Lingel (This text has been edited down from a longer conversation.)

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"I got interested in wireless telephony as early as 1955. When I joined Motorola someone had just invented an electrical gadget that, in essence, added a ringer to a two-way radio, which were very substantial devices back then. It was nothing more than a stepping relay that could be programmed to a telephone number and if you wanted to call a two-way radio, you would send a series of tones, and it would relay and it would close up a circuit.... All it did was ring a bell, in one mobile out of 50,000. I was in research then and I had discovered this thing called a transistor, which at that time was still a research object. And so I developed a transistorized replacement for this electro-mechanical object that allowed the radio to be hand-held instead of mounted in a car. And I did really as an exercise, but it was a first step. And from that step going forward, I started to understand more about the pros and cons of mobile telephones were -- and at some point in my career the Bell system had decided that they weren't ready to do cellular yet, so they did a thing called the "Interim Mobile Telephone System". And I, at Motorola, took that on as a project and ended up building virtually all of what are called "IMTS" telephones. In the late 60s, Bell decided to implement cellular. By that time I was now in the portable radio business and what I discovered was the difference between a car device and a personal device was huge. They were really two very different kinds of devices. The device in a car could be used only when you were in the car and most people are in their cars just a few percent of their daily hours, whereas the personal phone became a part of them. And so that instigated a huge battle between Motorola and AT&T, which fortunately for society, Motorola won.

The FCC was about to make a decision about releasing radio spectrum for personal communications and whether to make cellular a monopoly of the Bell system or have it be competitive. If it was competitive, then we would have a chance to write the rules so that you could use [hand held] portables as well as [car mounted] mobiles. If AT&T had had their monopoly, they would've defined the system -- the power output of a base station would be typically 20 watts or more, and you would've had to have a 10 or 20 watt mobile radio, which didn't make a lot of sense for a portable.

So for obvious reasons, I decided that the only way we were really going to persuade the FCC to make the right decision was to actually demonstrate this. If you have this thing in your hand, it would become obvious what the difference was -- we had a handheld portable compared to a monstrosity in a car. So what was in the back of my mind was a demonstration.

The first guy that I called was our industrial designer -- he and I had worked before on some unique products. We had built a wrist pager some years before, and he was well aware of what the nature of communications products were. And so I explained to him that I wanted to build a cell phone. He asked me, "what's a cell phone?" I described it to him and he was captivated by this.

He ran a group of half a dozen people who provided services throughout our country -- he turned all of these people loose on this one problem. *Design a cell phone the way Marty described it.* And in two weeks, these guys put on a presentation for me in a restaurant near our plant. I bought them dinner and each of these young geniuses put up their version of what a cell phone would look like and they were marvelous. They had a flip phone, a slider phone, a phone that opened like a book, but the design I chose was a single block. All of the designs were clever, but we had no time for cleverness in the mechanics of this thing. The more complicated something is, the higher the likelihood of it breaking. So we ended up picking the simplest implementation. So now we have something that looks like a phone, it was small enough to hold in your hand and put up to your ear, but that's all we had. Now to turn it into a real product that would talk and listen and do that over hundreds of radio channels.... We took this little box to our research department -- they also did not work for me -- but they are people with whom I had worked for years and years -- and I got them excited about this thing and they took on this project in December 1972 and by March of 1973, they had a working unit.

This was hand built, with thousands of components, all squeezed into a box that had now expanded to what was the first cell phone, which was about 10 inches high and an inch and a half wide and about three inches deep. It weighed almost two and a half pounds and had a battery life of 20 minutes of talking -- which doesn't sound like much, but this thing weighed two and a half pounds -- you couldn't hold it up for more than 20 minutes. And then on top of that, the phone itself doesn't do a thing. You need a system to make it work. Motorola had the resources because I had built this previous system; the IMTS. We took parts of the IMTS and built the base stations and a switch that could respond to this phone and connect the phone to the telephone network. The idea wasn't much but having a lot of skilled people around made a huge difference.

We had been giving the FCC arguments for years about making cellular competitive. The number of filings that I wrote, along with our lawyers, could've been six feet high -- explaining to them that the time was ready for portables, a second that monopolies were bad, thirdly that they should not allow AT&T to take over the two-way radio business -- which is one of the things that AT&T had proposed -- so we had made all the arguments, but now we took this thing, first of all to New York, and set all our PR people loose.

We knew that the politicians in Washington read the New York Times and the other local papers and the Wall Street Journal, so we also went to Washington and actually set up a system and set up some traveling vans so we could take a group of FCC people and congressmen or senators and drive them around the city with a portable and let them talk on it until they understood what the power and what the freedom was of a phone that you could carry with you and that you could call from anytime. That demonstration, I think, made all the difference in the world. If we were right, someday everybody would have a phone. We actually created a joke -- we said that someday when you were born, you would be assigned a phone number and if you didn't answer the phone, you had died.

In contrast with that, the Bell system did a study with McKenzie and McKenzie concluded that there would never be more than two million car telephones in the world. They were right. That's exactly what happened. The first cellular phones, most of them were car telephones, but within a few years, the portable started working better and within ten years, you couldn't buy a car telephone anywhere. So then the actual number of car phones never exceeded a couple million. So clearly what was different was the mission.

The Bell system saw so little of this idea of a personal telephone and they were so involved and captivated by their own history, that when they broke up the Bell system, they turned the portable business over to the operating companies and they kept what they thought was the important part of the business, which was long lines.

This where they thought the future was and where the money was, and of course they were absolutely wrong about that. The operating companies were the ones that actually built the cellular concept. As you can tell, I have a very strong respect for Bell laboratories, but not very much for AT&T. I think monopolies are terrible.

We had a vision of what the freedom was to be able to talk anywhere and the Bell system never understood that. They could not get out of their comfort cage: people using a wire. Recently this group that my wife founded, *The Wireless History Foundation*, gave an award to the people that stimulated the first car telephone cellular system. Which there are two people that ran the system, Joe Engel and Dick Frenkiel. Turns out that both of them had portable cell phones. Joe Engel said that he only turned his cell phone on when he wanted to make a phone call and Frenkiel said he saw no value in a smart phone and hardly ever used it. These guys never got it. Even after they grew up and this system was a reality, they never got the idea that a phone would become a part of a person and a person could not exist without their phone.

We're still in early days. We are still trying to figure out what to do with this device that we carry with us all the time. We have become entranced by the technology, but the technology is suboptimal. If you try to build a universal device that does all things for all people, it's not going to do any of them optimally. A cell phone at the moment is a flat piece of glass and metal that you have to hold up to a curved face. It really is not an optimum telephone. It's not an optimum computer terminal because the screen is too small and the computer is not powerful enough. And it's not an optimal sensing device because it's all in one package and it's not where you want to sense things. So I believe that the cell phone is going to evolve. It's going to evolve in a way that is the future of all technology and that is personalization and customization. Every person is different from every other person and the thought that you can find a universal device that will satisfy everybody's needs is arrogant.

I could give you one vision of what a phone could be: I will have devices, sensors, on my body that are medically oriented. If I was a person that had a genetic disposition for congestive heart failure for example, I might have a device that would anticipate that heart attack and tell me what to do to stop it and save my life.

And if you expand that still further, and it's possible to sense diseases in essence before they happen. If you could sense that something is happening before it is out of control, then you could stop it. Those are important things.

Another big thing that's going to change -- I think that our educational system is archaic. It's obviously not too bad to produce a lot of very smart people, but this basic system where you have a lecturer stand up in front of a group of people and tell them things is archaic. We know how to capture people's attention. There's nothing wrong with being addicted to curiosity and knowledge. In fact, I think that's one of my addictions. I think the education system is going to become revolutionized because people will be able to connect with all the knowledge in the world in some very creative ways and they will do that 24/7 wherever they are instead of saying the only way you're going to get educated is to spend a few hours a day in school listening to boring lectures. But the biggest thing that's going to happen is the concept of collaboration. The idea that you can exchange ideas with other people in much easier and much cleverer ways. I think we're just starting to ease up on that opportunity with all of our social media. Social media, to me, are kind of a game stage in society catching up with technology, but when we learn how to use the cell phone and learn how to advance our use of social media, we will have many, many more opportunities for productive collaboration. I think that that collaboration is going to improve the efficiency of doing absolutely everything.

If you are an engineer like I am you know that efficiency leads to more productivity. More productivity means greater wealth and at some point, everybody benefits from that. So ... a world of highly educated people with no disease and enough wealth so

poverty will become a thing of the past. Everybody will have, in this utopia that I envision, everyone will have as much as they want of anything because we will be able to cover all of our needs by virtue of all these other advances.

I have a mantra that I've been delivering many years and that is: "technology is the application of science to create products and services that make people's lives better." If you take the people out, it's not technology. It could be science, it could be a technical curiosity, but it's not meaningful to society unless it improves people's lives. So I don't think any engineer is a good engineer unless the people part of it is at the forefront of what they're thinking. You see so many would be inventors that are trying to solve non-problems. I know there have been all kinds of books written about ridiculous inventions, but the role of the inventor is to make society better. If you want to get really philosophical -- which I have more time to do because I, at the moment, don't have to earn a living -- a few weeks ago, I was invited to speak before the local school district and most people don't tell me what to talk about but this school group wanted me to talk about what the purpose of people's lives is. For a long time, I thought that I had no purpose, I was just lucky enough to get involved in useful endeavors. But the requirement to give this talk disciplined me -- and here's what I concluded: I think the purpose in life is to learn and the purpose of learning is to make yourself grow. The purpose of growth is to make society better. And in order to achieve this purpose, you need two things: you need passion for solving problems, and you need a powerful love for your fellow humans."