



Women in Software and Cybersecurity: Grace Lewis

featuring Grace Lewis as Interviewed by Eileen Wrubel

Eileen Wrubel: Welcome to the SEI Podcast Series, a production of Carnegie Mellon University's Software Engineering Institute. The SEI is a federally-funded research and development center sponsored by the Department of Defense and operated by Carnegie Mellon University. A transcript of today's podcast is available at sei.cmu.edu/podcasts.

My name is [Eileen Wrubel](#). I am the initiative lead for the SEI's Continuous Lifecycle Solutions Initiative. With me today is [Grace Lewis](#), who is a principal researcher here at the SEI and also the lead of our tactical technologies group initiative.

Grace leads our research and tactical-edge computing and also security for the Internet of Things. To put it another way, Grace's work helps soldiers and sensors stay securely connected while on the battlefield. This interview is part of our new podcast series that we are launching highlighting the work of women in the fields of software and cybersecurity. Welcome.

Grace Lewis: Thank you.

Eileen: Grace, let's start by having you tell us a little bit about yourself and your role here at the SEI. Specifically, what do you mean when you talk about edge computing? How does your work get used in the field?

Grace: OK, like you said before, I lead a group called the Tactical Technologies Group. What we do is we develop technologies for people that operate in the field: soldiers, first responders, medics—technologies that can help them do their job better.

Tactical-edge computing, which is my area of research, it's about pushing cloud resources to the edge. It's about getting people there in the field access to the cloud, or something like the cloud, even if they're not fully connected to the cloud. Just like when you travel, you pack a suitcase.

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So what these folks do is they pack a cloudlet or a server. They put everything that they need there for their mission—data, maps, computing—everything that they need. Once these cloudlets are deployed in the field, they can access these resources from their mobile devices.

More recently I've been working on IoT security or security for the Internet of Things where the idea is to be able to use these cloudlets also as collection points for sensors and actuators in the field. With the research that I am doing right now, the goal is to be able to know if these devices are compromised in any way. That is basically what I'm doing now.

Eileen: Okay, that's really cool.

Grace: It is cool.

Eileen: Can we go back into the way-back machine and talk about your early experiences? How did you find your way into software engineering? Were you really good at math as a kid?

Grace: I'm going to date myself right now. It was back in 1983. I come from a Hispanic family, and in Hispanic families turning 15 is a big deal, especially for girls. Most people want big parties or big trips or big dresses. I wanted a computer. That is what I got for my 15th birthday. I thought it was the coolest thing ever. Some friends had it. I had seen my friends' houses. I had seen them on TV, but this was my own. This was my own personal computer, which was a big deal back in 1983. It was an IBM PC.

I was fascinated. I taught myself [BASIC](#). The way I did it, which is kind of backwards, is that... I don't remember the name of this magazine, but they had this magazine that had code snippets in them in BASIC. I would take the code snippets, and I would just transcribe them in my editor, and out came a program. I was just fascinated, *I wrote this and I can get it to do that*. And so I would start tweaking things a little, *What if I changed this? What if I changed that?* And, I taught myself BASIC. All of a sudden I knew how to do that and so that's how I got into computers.

As far as math and science, yes, I like math and science. I did well in math and science. As a matter of fact, you know those assignments when you are growing up where you draw yourself as what you would do in the future? My drawing would be me in a lab coat in a lab with test tubes and beakers for some reason. But that was me growing up. I thought I was going to be a scientist or at least that's my perception of a scientist. Once I found computers, I was like *No, no, no. This is what I want to do*. I think what was the most attractive for me was the creative process. I found it just so creative. That is really what sold me, and this is why I do what I do.

Eileen: That's great. Did you encounter any roadblocks along the way, and, if you did, how did you address them?



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Eileen: I wouldn't say any roadblocks. I think the good thing for me is that my parents were really so supportive of everything I did. They never said, *Oh you can't do that or oh that's way above your age level or anything*. Again, dating myself, I was probably 10 years old, and I would balance the checkbook. I know you don't do this anymore, but I was the one that balanced the checkbook, and nobody ever told me not to do it. So I never encountered roadblocks in that sense, but I do think there are roadblocks for women in general.

I'm still shocked by the fact that, for example, some people think that *If you are a female there is no way you could be a scientist or an engineer*. Or, for example, I get these really nice email messages that say Dr. Lewis, blah, blah, blah, and then halfway through I realize, *They think I'm a man*. just because you have that that title. Or just, for example, I remember going to conferences or going to meetings even and people handing me things, *oh can you go make a copy of this because*, and then they're shocked because the main speaker, Grace Lewis, and they're like, *Oh my gosh I totally screwed that one up*. That still happens. To me that is shocking; that is shocking.

Probably the worst story that I can share is I was picking up my son at CCD class, and the CCD teacher said to me, *Your son is very bright. Your husband must be so intelligent*. Yes, it made me mad, but what it made me think about is what if that was my mom? What if my mom would have said, *Oh no, no, you can't be a scientist or you can't be intelligent or whatever. You can't do that because you're female*.

I think that is the major roadblock still for women, which is sad. It's the belief that there are men things, and there are women things, and science and engineering is not a woman thing. So I think that we really have to start educating parents and teachers. That is who we should be educating, so they stop doing the male/female thing and gender things. To me that is the only roadblock that is still out here for women. I was very fortunate because my parents were extremely supportive and also my teachers. I do understand that not everybody has that luxury.

Eileen: That there is still this gendered representation, even in things like math problems.

Grace: Oh yes, absolutely.

Eileen: The doctors are represented as men.

Grace: Yes, absolutely.

Eileen: Recently, on one of our [SEI podcasts](#), you interviewed [Carol Frieze](#) and [Jeria Quesenberry](#) about recruiting women into the [computer science department here at CMU](#). You talked a little bit about your own experience in the [master's program](#). I'm wondering if you should share that with us again.



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Grace: Sure. So, as I said before, I am a first generation American. My parents are Hispanic. They came here in the '60s looking for the American dream just like many people back then. When I was 17, my parents divorced, and I moved to Colombia, which is where my family is from to live with my mom's family. It was only supposed to be a year and a half while I finished high school, and I ended up staying there for 12 years because I absolutely loved it. I loved it. I loved being close to family. I loved the experience.

When I started my undergraduate program there it was called software systems engineering, not quite computer science or software engineering, like a mix of the two. I was in a 50/50 class and that was actually very common, 50/50. To me that was like, *That's how it is everywhere. It is always 50/50.* I understand from what I heard that things are changing there as well, but back then it was 50/50. So after 12 years, I came back to the U.S., came back to CMU, to the Masters of Software Engineering Program. I walk into orientation, and I look around, and I'm the only woman there. I later found out there was another one, so it was two of us in a group of about 35. So I start asking, *Is this normal?* and everybody is like, *Yes, it's normal.* I'm like wow, that's different for me. That's shocking. I'm so used to something completely different.

So I'm walking around campus one day and I see this flyer and it says, *New group starting on campus, [Women at SCS](#).* And I'm like, *This is where they are.* So I said, *I have to be there.* I wanted to be there, but especially because I wanted to make a difference because I kept thinking the few females that are here have to have the same experience that I had, you know, a 50/50 kind of group, and they're not getting that. I'm sure there's a way we can make a difference. So I joined the group. I am actually one of the founding members of women at SCS. I got to work with [Lenore Blum](#) and also Carol Frieze, who are just absolutely wonderful people. Those are definitely my favorite memories from back then.

The group started because that was the very first year that they had admitted a large group of women. Basically the dean told Lenore, *We have a lot of women coming in, which is absolutely great. We have to create an environment where they feel welcomed, where they feel comfortable. We have to make them stay,* was basically what she was told. That is how the group started. I remember those days and now going to campus and it's such a different, different experience.

You see so, so many women in computer science. Fifty percent for a couple of years in a row, I want to say [three years in a row](#), and that is in part due to Lenore Blum, Carol Frieze, and now Jeria. They just published a book; it's called [Kicking Butt in Computer Science: Women in Computing at Carnegie Mellon University](#). With data they demonstrate how the key is just changing the culture. It's changing the culture; it's making it seem just normal. It is absolutely wonderful what they've done. I really admire the work that they've done.



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Eileen: That's great. And that's such a great story, thanks for sharing the early years of [Women@SCS](#). I really enjoy hearing about that. One of the things I think that our listeners are always interested in is how do you stay current? What kinds of resources are you looking at on a daily or regular basis to stay on top of your field?

Grace: To stay on top of things I really start my day by saying, even if it's just 10 minutes, I subscribe to a couple of newsletters. I get them in the morning. One is [Infoworld](#). The other one is [Wired](#). Even if I don't read them, like everything, I at least see OK, these are the new things, this is what is going on. So I definitely do that. There are also a couple of publications that I read, more like on a yearly basis like [Gartner's Hype Cycle For Emerging Technologies](#), just, you know, just to see what is out there. That's something I read. There are other things like that. But really, the way I keep on top of things is actually by doing service work, which to me, it's like killing two birds with one stone? Is that the saying?

Because I get asked to get on program committees where you review papers or, for example, to review manuscripts for journals. I know it's a lot of work and when the deadline is coming I'm like, *Why did I do this?* but it really forces me. It forces me to stay on top of things because, you know, if you're going to look at a peer piece of work, well, you better know what you're talking about, right? So it really forces me, so I use it as a forcing function.

As far as books, I protect my me-time and my family time very much. So when I read books they're for fun. They're not technical and to me that's also very important, being able to separate the two. When I leave here I try my best to go home. It's family time and it's me time, and not to mix the two things. So when I read books it is really for fun.

Eileen: Okay, great. Looking ahead at where do you see your work related to the IoT and edge computing going, maybe in the next five years?

Grace: Actually, they are going to come together. They are going to come together, and they are already coming together because the thing is that IoT devices in the field or anywhere, they are collecting so, so, so much data. You can't expect any network in the world to be able to handle that data as it's going to the cloud because that's where people want to send that data, right? Going to the cloud so it can be processed, shared.

Where edge computing comes in is, imagine if you had these cloudlets, for example, deployed at the edge, deployed close to those IoT devices? They are doing all the pre-processing, all the analysis. So what is sent to the cloud is what really matters, not all the raw data but processed data. So I see them coming together very, very, very nicely.

Eileen: Okay, great. If you could give us one piece of advice to a young person that's looking to follow your journey into the field what would you tell them?

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Grace: To let go of stereotypes. To me that is the big thing. I give talks to schools and things like that, and one of the big questions I usually get is like, *Is it really just about coding?* No, it's not actually. It's not. Sure, it's where you start because that is where kind of like the love starts, right? *Oh, I like coding.* But it's just breaking those stereotypes. I mean there is so much more that I do that is not coding. I mean coding is just the tool, right? It's really about changing the world. The code that is being written nowadays, it's self-driving cars, it's being able to do all these data visualizations, taking education to parts of the world that don't have access to the Internet or things like that. So yes, there is programming, but it's not that stereotype.

It's not the male with the glasses and the pocket protector. I mean, those are stereotypes. It's so different. Just walk around CMU and you'll see. It is very, very different. So it's really that, it's breaking those stereotypes. It's more than just programming. It's really just about what you do is eventually going to change the world in some way and to me that's the big thing.

Eileen: So thinking about really, what is your purpose, what are you coding for? What kind of thing are you trying to achieve to leave the world better than you found it?

Grace: Sounds good.

Eileen: Thank you so much for joining us today, Grace.

Grace: I appreciate it.

Eileen: I really appreciate it. This podcast is available on the SEI website at sei.cmu.edu/podcasts and on [Carnegie Mellon University's iTunes U site](#), the [SEI's Youtube channel](#) and [SoundCloud](#). As always, if you have any questions please don't hesitate to email us at info@sei.cmu.edu. Thanks.