

2017

# WOMEN IN CYBERSECURITY A PROGRESSIVE MOVEMENT

---



## Introduction

We know that it's very challenging to design and implement systems that are highly resistant to malicious activity. We also know that diversity in teams produces better results.

*Why is there such a lack of diversity in cybersecurity?*

## Our truth about women in cybersecurity

This report is about women in cybersecurity. Women are one of many categories (an inaccurate one at that, given the non-binary nature of gender) that are underrepresented in our field. I cannot solve the diversity problem, but I can tell my story. I can help other women tell their stories too.

## Who should read this report?

- **Hiring managers.** I want them to know what women bring to the table in the cybersecurity workplace.
- **Women in the field.** I want them to know they are not alone.
- **Girls and young women.** I want them to know that working in cybersecurity is an option, and hopefully to be inspired by these stories to pursue a career in the field.

I want guys to read it too. Here's the real deal, straight from more than 300 women in cybersecurity.

*Caroline Wong, CISSP. Vice President of Security Strategy, Cobalt*

---

---

## Methodology and acknowledgements

### Thanks to the more than 300 women in cybersecurity who provided the information for this report.

In July 2017, 313 respondents who self-identified as women in cybersecurity completed a survey. Several also participated in deep dive interviews.

They include:

Afifa Abbas, Tahmina Ahmed, Kim Albarella, Rachel Amity Brown, Meg Anderson, Pauline Ang, Dawn Angel, Rushda Anwar, Divya Aradhya, Sam Armstrong, Sarah Armstrong-Smith, Bhanu Arora, Faseela Ashraf, Sandra Avery, Dideolu Badmus, Karen Baez, Debra Baker, Sue Barrows, Diana Bidulescu, Cheryl Biswas, Kate Brew, Abigail Burton, Morgan Carroll, Jennifer Carson, Christelle Chau, Aditi Chaudhry, Magda Chelly, Marrci Conner, Edna Conway, Colleen Csech, Sophia Czaus, Anitha Dakamarri, Deneen DeFiore, Michelle Denedy, Dinah Davis, Danny Dresner, Ismat Jahan Siraji Ema , Victoria Estrada, Amelia Estwick, Heba Farahat, Debra Farber, Alyss Feola, Paula Fetterman, Barbara Filkins, Vanessa Fonseca, Summer Fowler, Cary Gatton, Diaspina Ghosh, Ruth Ginzberg, Ruth Godfrey, Vidya Gopalakrishnan, Lori Gordon, Wendy Goucher, Joanna Grama, Wendy Habermann, Rania Hammoud, Jessica Hebenstreit, Ronda Henning, Allison Henry, Rebecca Herold, Eman Ibrahim, Enkeleda Ibrahim, Celia Jenkins, Becca Johnson, Gurpreet Kaur, Lisa Kendall, Ambreen Khan, Danielle Kingsbury, Leticia Kinuthia, Nina Kollars, Natalie Kossman, Amritha Kumar, Elena Kvochko, Krittika Lalwaney, Kim Lamoureux, Rachel Langham, Melissa Legan, Masenyane Lekgowane, Jeri Leonard, Heather Leonforte, Andrea Little Limbago, Heather Mahalik, Tracy Maleeff, Ledia Maleqka, Melissa Marcil Marcil, Samantha Martin-Woodgate, Rebecca Mathisen, Connie Matthews, Carla Mays, Cecilia McGuire, Vikki McNally, Kathryn Merhout, Lisa Miglioratti, Kim Milford, Kelley Misata, Koshitha Nagarajan, Suzan Nascimento, Diah Nasution, Liz Nicholson, Yiota Nicolaidou, Marilyn, Lisa Norris, Carrie O'Connell, Nuala O'Connor, A Omerri, Sharon O'Neal, Bernadette Palmer, Anthe Papageorgiou, Jean Pawluk, Ksenia Peguero, Jessica Penaherrera, Joan Pepin, Susan Peterson, Elena Peterson, Simone Petrella, Ashley Podhradsky, Farah Ramlee, Sherri Ramsay, Megan Roddie, Rocio Rodriguez, Brenda Rose, Amanda Rousseau, Pam Rowland, Robin Stuart, Ana Santos, Lara Sanz, Lisa Schaefer, Tiffany Schoenike, Anusha Seshadri, Rinki Sethi, Devi Sharma, Swati Sharma, Anna Stylianou, Meera Subbarao, Nitha Suresh, Becky Swain, Ai-Chee Tang, Blair Taylor, Patricia Titus, Ashley Tolbert, Carine Touzeau, Becky Turner, Susan Urbanski, Neha Vachhani, Michelle Valdez, Hilde van Gils, Johanna Vazzana, Da Zhuang Wang, Charlene Watson, Kim White, Marnie Wilking, Beatriz Wlodarczyk, and Kaliya Young.

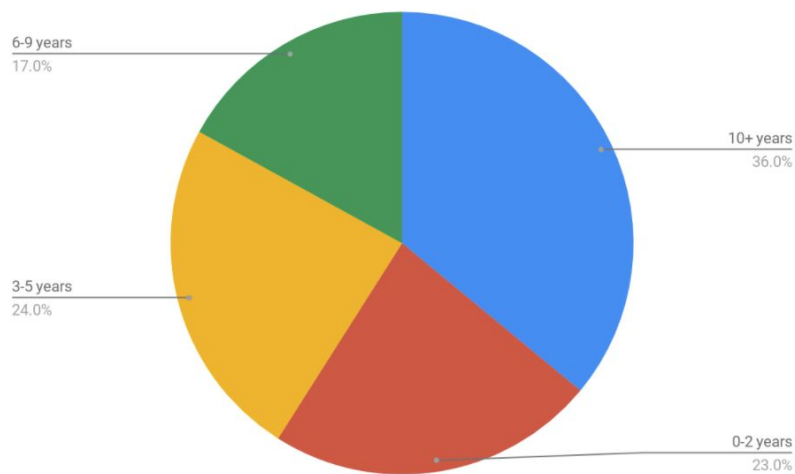
---

## Survey results

### How long have you worked in cybersecurity?

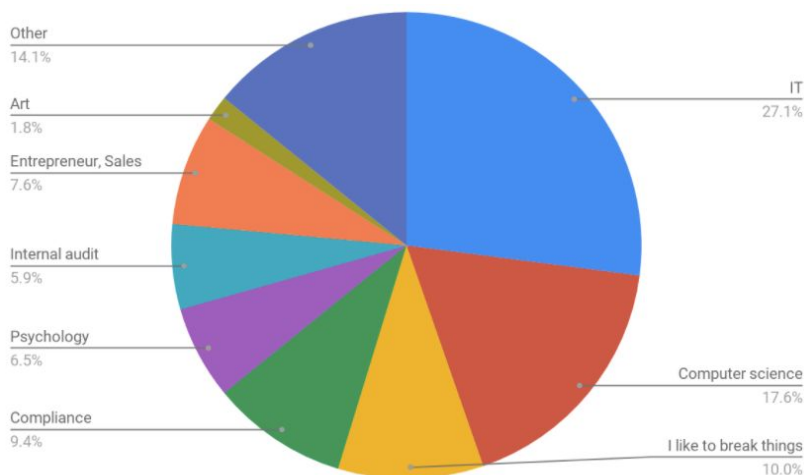
While some may assume that women working in this field is something new - it's not.

- 36% of respondents have been working in the field for 10 or more years
- 53% of respondents have been working in the field for more than 5 years



### What led you to cybersecurity?

Fewer than 50% of respondents entered the field via IT or Computer Science. The respondents are diverse in their backgrounds, coming from Compliance, Psychology, Internal Audit, Entrepreneurship, Sales, Art, and more.



---

## Survey results

### What excites you most about cybersecurity?

- |   |     |
|---|-----|
| 1. Solving complex problems               | 73% |
| 2. Growing field with lots of opportunity | 65% |
| 3. New technology                         | 48% |
| 4. Future innovation                      | 46% |
| 5. Legal and regulatory aspects           | 29% |
| 6. Other                                  | 9%  |

*So many people naturally go to the threat, think about the threat, want to stop the threat. It's sexy and adrenaline driven.*

*I'm the kind of person that takes a different approach. I prefer to look at a problem - what do we want to prevent, and what is the outcome we want. I work backwards from there.*

***Michelle Valdez, Sr. Director, Enterprise Cyber Resilience, Capital One***

*I'm very transparent with people. I'm big on building trust and allowing myself to be vulnerable - when I don't know something, I'll say it. This encourages other people to be honest and talk about the issues at hand.*

*The only way "risk" becomes a less dirty word is to shine a light on it. I want everybody to be very clear about what the issues are.*

***Suzan Nascimento, SVP of Application Security, MUFG***

---

## Survey results

### What do you love about your role?

- |  |     |
|--|-----|
| 1. Helping people                        | 65% |
| 2. Solving complex problems              | 64% |
| 3. Creating a better future and world    | 62% |
| 4. Securing organizations                | 56% |
| 5. Seeing things before anyone else does | 38% |
| 6. Applying my skills                    | 24% |
| 7. Other                                 | 7%  |

*This is the most exciting field to be in. You can make it what you want to be. There is never a lack of challenge and there's always opportunity for growth.*

*I'm fortunate to have had really great mentors throughout my career. I've always had strong people telling me, "you can do this."*

***Patricia Titus, Chief Privacy and Information Security Officer, Markel Corporation***

*What I enjoy the most is my deep sense of purpose and the opportunity to be surrounded by professionals that demonstrate a strong sense of ethics as well as trustworthiness. It's extremely rewarding to safeguard your firm's assets and know that you are performing your duty as a corporate and country citizen.*

***Christelle Chau, Director, Information Security Governance, E\*TRADE***

---

## Survey results

### What's the best part of your work day?

- Learning something new 69%
- Delivering great work 60%
- Brainstorming new solutions 59%
- Being appreciated by my team, colleagues, or clients 54%
- Helping a friend, colleague, or client 53%
- Being creative 53%
- Solving a technical problem 44%
- Being detail oriented 32%
- Responding to urgent issues 31%
- I like high pressure situations 22%
- Other 3%

*I am most proud of the my team's success and influence -- not only at GE, but in the industry at large. When I see someone's approach incorporated into a standard or their idea shape a regulation... wow!*

*Developing leaders is both humbling and fun.*

***Deneen DiFiore, SVP, CTO, Security & Compliance - GE Digital. CISO - GE Aviation.***

*Why do I do it? I do this job for my kids. We are building towards a world in which everything will be digitally enabled. You'll talk to your wall and it will make you coffee. I work in a world that is science fiction and it's really here.*

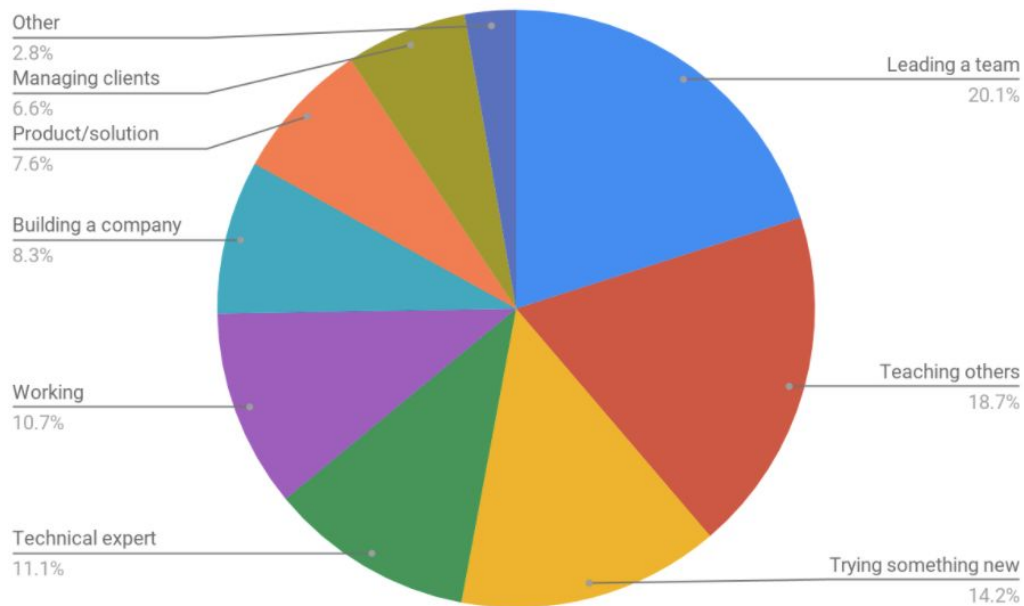
*Is this going to be Star Trek or Star Wars? I'm trying to build a world for my children where it's a lot more Star Trek - all sizes and shapes included and valued for their special gifts.*

***Nuala O'Connor, President & CEO, Center for Democracy and Technology***

---

## Survey results

### Where do you see yourself in 5 years?



*The field of cybersecurity is growing rapidly. From protecting data and processes in the cloud, to automation and orchestration of advanced systems, to maturing SOC capabilities in order to prevent cybersecurity breaches -- we are solving problems that the world has never encountered before.*

***Rinki Sethi, Senior Director, Information Security, Palo Alto Networks***

*When I think about my bucket list, I ask myself, "What can I give back to the community?"*

*I want to provide things that I didn't have when I was learning. I didn't attend classes where assembly language was taught well. It was really hard for me to learn just by reading the textbook.*

*I've created REVERSING 101 to help make it easier for the next generation.*

***Amanda Rousseau, Malware Researcher, Endgame, Inc.***

---

## Survey results

### What do you struggle with?

- I wish I had more technical skills 52%
- Managing the expectations I have of myself 43%
- Work life balance 32%
- Organizational buy-in 28%
- Others who simply don't "get it" 26%
- Finding talented individuals to work with 23%
- Managing the expectations of others 21%
- Lack of teamwork 15%
- Criticism from others 13%
- I wish I understood more about business 10%
- Other 10%

### What value do you bring to the table in the cybersecurity workforce?

- I communicate effectively across cross-functional teams 74%
- I get things done 70%
- I multi-task well 65%
- I bring a fresh perspective to the table 62%
- I think about the big picture 55%
- I use my intuition 54%
- I communicate effectively across global teams 51%
- I coordinate and supervise 50%
- Drive 48%
- I use long term thinking 48%
- I create community 41%
- I use technical focus and skills 29%
- Other 9%



## Survey results

### What else?

Here are some of the free form responses to the survey.

<p>People are generally helpful and want to help you succeed. You just have to ask.</p> <p style="text-align: right;"><b>Diah Nasution</b></p>	<p>Developers aren't the only people working in cybersecurity -- there is a need for project managers, technical writers, trainers, instructional designers, social media managers, and more.</p> <p style="text-align: right;"><b>Rachel Amity Brown</b></p>	<p>I work with individuals all around the world from various IT and non-IT backgrounds who bring ingenuity and expertise to the organization.</p> <p style="text-align: right;"><b>Sue Barrows</b></p>
<p>Diversity and inclusion are very important areas we need to foster in the community. This also includes embracing our veteran service members.</p> <p style="text-align: right;"><b>Amelia Estwick</b></p>	<p>A career in cybersecurity can be challenging, but it's also very rewarding.</p> <p style="text-align: right;"><b>Debra Baker</b></p>	<p>We have very little issue with women in cyber - other than needing to find more candidates.</p> <p style="text-align: right;"><b>Elena Peterson</b></p>
<p>A team that integrates diversity of all kinds - disciplines, genders, backgrounds, ethnicities, etc. It ensures fresh perspectives, prompting innovation and creativity.</p> <p style="text-align: right;"><b>Andrea Little Limbago</b></p>	<p>Cybersecurity is a complex problem. We need diverse teams to help solve it. Additionally, we need diverse role models to encourage future students to consider working in the field.</p> <p style="text-align: right;"><b>Blair Taylor</b></p>	<p>My team... we are black, latino, middle eastern, white, LGBT, straight, men, and women. We are intentionally diverse and it makes a big difference.</p> <p style="text-align: right;"><b>Carla Mays</b></p>
<p>International teams with wildly different skill sets make the impossible probable and then successful by experimenting, failing, and learning from what didn't work. You put all the good pieces together and it becomes great.</p> <p style="text-align: right;"><b>Robin Stuart</b></p>	<p>Different ways of thinking, different approaches, uniqueness and creativity are necessary because we are not all the same and we complete each other. Each of us has a unique perspective which contributes to the big picture.</p> <p style="text-align: right;"><b>Yiota Nicolaidou</b></p>	<p>Many of the women on my team have come from related fields and are able to bring entire canons of experience and methods with them. This is greatly beneficial to problem solving and the development of new tools.</p> <p style="text-align: right;"><b>Carrie O'Connell</b></p>
<p>To be successful, individuals MUST remain open minded to different perspectives.</p> <p style="text-align: right;"><b>Melissa Marcil</b></p>	<p>Collaborating with team members from different countries helps us to come up with a stronger solution.</p> <p style="text-align: right;"><b>Beatriz Wlodarczyk</b></p>	<p>It's not always easy being a woman in cybersecurity, but it's extremely important.</p> <p style="text-align: right;"><b>Lisa Schaefer</b></p>

---

## Survey results

### What else?

Here are some more free form responses to the survey.

<p>Working in an international corporation, we have to think about what security implications exist for our global customers. Having a team of diverse members stretches our thinking and adds a dimension we wouldn't otherwise think about. It really makes a difference and the outcome is always better.</p> <p><b>Patricia Titus</b></p>	<p>Keyboards don't know the gender of the hands that touch them. Failure is nothing to be afraid of -- I'm much more afraid of not trying.</p> <p><b>Robin Stuart</b></p>	<p>Despite challenges, it's been a really great career that has given me the flexibility I need to balance work and family obligations. Considering the relatively high pay, prestige, and low unemployment, it is distressing to me that more women aren't getting into the field.</p> <p><b>Allison Henry</b></p>
<p>The best teams in this field are made up of a broad spectrum of technical security, regulatory compliance, and audit expertise, along with individuals who have good business and marketing acumen.</p> <p><b>Becky Swain</b></p>	<p>A team that represents diversity across age, gender, nationality, skill sets, internal employees and external vendors will be the most effective at securing an organization. Everyone's unique experiences provide a rich assembly of ideas from which to glean solutions.</p> <p><b>Brenda Rose</b></p>	<p>I have high functioning autism and my managers have been very patient and understanding. They have worked hard to learn how to work with neurodiverse individuals and see the benefits.</p> <p><b>Megan Roddie</b></p>
<p>Women are critical to the field. The way our technology works needs to equally reflect all of society, not just the way men program it to operate.</p> <p><b>Tiffany Schoenike</b></p>	<p>You need to understand the concept correctly before presenting the problem. You need to dig deeper on the technical side, which can be from the male or female counterparts of your team.</p> <p><b>Farah Ramlee</b></p>	<p>I'm working on a team now - we're three women and five men, from two different countries and five different time zones. Each of us has a different role. It's been exciting and productive to work with different leadership styles at various stages of the project.</p> <p><b>Rachel Amity Brown</b></p>

---

## Key takeaways

Many reports on women in cybersecurity focus on the negative aspects of the situation -- under representation, inadequate pay, and challenges in the workplace.

These aspects are true, however there is also another story that's just as true, and that's how many women in the field are flourishing.

Because of this, I would like readers to take away a few key points:

### 1. Women in cybersecurity are thriving

I personally know so many women - and now we have the data to back it up - that love their jobs, feel deeply satisfied by the work they're doing, and are tremendously successful.

### 2. The best teams are diverse

Harvard, Stanford, MIT, Princeton, McKinsey, Gallup, and Scientific American have all published studies in the past few years that show the value of diverse teams - diversity drives innovation, it makes us smarter, and it has a positive impact on learning.

The benefits of diverse teams are well known.

### 3. Solving the diversity problem requires a different approach to hiring

Our industry has a major talent shortage.

I've talked to a lot of people about the diversity of the teams they've worked on, and it seems to me that there are two key differences between managers that build diverse teams and the rest.

- **Managers with diverse teams want to build the best team they can, and they look everywhere.** They are personally engaged in the hiring process and thoughtful about exactly what types of skills, backgrounds, and experiences they are looking for in a candidate. Managers of diverse teams don't necessarily hire to meet quotas - they take the time to discover and leverage alternative pipelines. And they hire the best people they can find.

- 
- **Other managers *also* want to build the best team that they can, but for whatever reason they focus their search in only the most obvious places.** They rely heavily on HR and Recruiting functions to find potential candidates.

#### 4. The pipeline problem needs to be solved too

The long term solution to the talent shortage is to increase the pipeline.

I hope that this report can contribute to the conversation in a way that inspires girls and young women to consider a career in cybersecurity.

There's something about telling the truth from first hand experience that I believe can act as a change agent to dispel myths and stereotypes. Each of us has the ability to, when confronted with a situation where someone is making an inaccurate assumption, speak our truth and have it be heard.

I believe that the stories we hear influence the values that we have, and that the role models we see affect how we choose to behave. As a little girl, I wanted to grow up and be a rockstar (or a giraffe). I didn't think to myself, "I want to be a technology executive one day." I didn't know or see any technology executives, so I didn't know what that life might be like, and I couldn't want it if I didn't know what it was.

#### Good advice

I want to conclude with a quote from my friend and colleague, Suzan.

*If I could share one piece of advice for women in cybersecurity, this is what I would say:*

*Know yourself and be yourself. Own it and rock it.*

*Suzan Nascimento, SVP of Application Security, MUFG*

---

## About the author

### **Caroline Wong, CISSP, Vice President of Security Strategy, Cobalt**

Caroline's close and practical information security knowledge stems from broad experience as a Digital consultant, a Symantec product manager, and day-to-day leadership roles at eBay and Zynga. She is a well known thought leader on the topic of security metrics and has been featured at industry conferences including RSA (USA and Europe), BSidesLV, IT Web Summit (South Africa), OWASP AppSec, Metricon, The Executive Women's Forum, ISC2, and the Information Security Forum.

Caroline received a 2010 Women of Influence Award in the One to Watch category and authored the popular textbook *Security Metrics: A Beginner's Guide*, published by McGraw-Hill in 2011. She graduated from the University of California, Berkeley with a B.S. in Electrical Engineering and Computer Sciences and holds a certificate in Finance and Accounting from Stanford University Graduate School of Business.