



Alta Associates'  
**Executive  
Women's Forum**  
*Information Security, Risk Management & Privacy*

Presented by The Center for Cyber Safety and Education™ and Executive Women's Forum on Information Security, Risk Management & Privacy

## The 2017 Global Information Security Workforce Study: Women in Cybersecurity

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A Frost & Sullivan White Paper

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**Executive  
Women's Forum**  
*Information Security, Risk Management & Privacy*

Over the past 15 years, the Executive Women's Forum on Information Security, Risk Management and Privacy has been committed to the important mission of engaging, developing and advancing women leaders in cybersecurity. Along with our members, Corporate Benefactors and Sponsors we have worked to improve the representation and advancement of women in our field.

The EWF and its members understand that the underrepresentation and underutilization of female talent is both a critical business issue and a hindrance to the development of world class cybersecurity organizations and resilient companies, as well as the overall safety and protection of our country.

It is for that reason we embarked on partnering with (ISC)<sup>2</sup> to create a report which specifically highlights the state of women in cybersecurity today. We also acknowledge the sponsors of this report for their commitment to women in cybersecurity.

The report clearly highlights the fact that as the workforce gap in cybersecurity continues to rise, the number of women professionals in the field remains stagnant at 11%. Despite higher levels of education, women still earn less than men and more than half experience various forms of discrimination. It is also very clear that not only do women feel more valued by participating in mentorship, sponsorship and leadership development programs, those women in the most senior level roles indicate participation as important to their success.

As cybersecurity executives enter the C suite and impact businesses bottom line, the diverse skills and perspectives that women bring to cybersecurity teams is invaluable. In order to make tangible changes in the workplace, it is imperative that corporations, executives and hiring managers act swiftly to attract, develop and retain women in cybersecurity.

It is for that reason that the Executive Women's Forum passionately strives to enable and empower women in our field and Alta Associates is dedicated to providing a diverse slate of candidates on every search they perform.

Our hope is that you are both educated and inspired by the results of this study to join us in improving the representation and advancement of women in cybersecurity. The Executive Women's Forum and Alta Associates look forward to partnering with you on this journey.

Sincerely,

A handwritten signature in cursive script that reads 'Joyce Brocaglia'.

Joyce Brocaglia, Founder of the Executive Women's Forum

CEO, Alta Associates Inc.

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The Center for Cyber Safety and Education™ and (ISC)<sup>2</sup>® are proud to be partnering with the Executive Women's Forum to take this unique look at the role and status of women in the cybersecurity profession. The 2017 Global Information Security Workforce Study (GISWS) – sponsored by (ISC)<sup>2</sup> and Booz Allen Hamilton – was conducted June - September 2016, and had 19,641 respondents from 170 countries, likely making it the largest study of its kind ever conducted.

Since the first GISWS release in 2004, the study gauges the opinions of information security professionals, and provides detailed insight into important trends and opportunities within the information security profession. It aims to provide a clear understanding of pay scales, skills gaps, training requirements, corporate hiring practices, security budgets, career progression and corporate attitudes towards information security, that is of use to companies, hiring managers and the members of the profession.

The Women in Cybersecurity report focuses on the unique attributes, as well as the challenges facing women in this industry, including:

- Women comprise only 11 percent of the information security workforce.
- Women reported higher levels of education than men.
- Fifty-one percent of women surveyed indicated they have experienced various forms of discrimination.

I would like to thank our thought partners, the Executive Women's Forum and Alta Associates, for their indispensable contribution to the authorship of the Women in Cybersecurity report. And a big 'thank you' to our presenting sponsor PricewaterhouseCoopers LLC. We are also grateful for the support from Veracode, Inc. and IBM Security. This report wouldn't be possible without any of our partners and sponsors.

Together we are pleased to present the 2017 Women in Cybersecurity report. I encourage you to check back regularly to our website IAmCyberSafe.org for updates to this report, and the other reports and analyses that will be published from the 2017 GISWS.

Sincerely,

A handwritten signature in blue ink that reads 'David P. Shearer'.

David Shearer, CISSP  
Chief Executive Officer  
(ISC)<sup>2</sup> & The Center for Cyber Safety and Education

SPECIAL THANKS

This study was made possible by:

Co-Authors



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## EXECUTIVE SUMMARY

The Global Information Security Workforce Study (GISWS), is conducted every two years by the Center for Cyber Safety and Education and (ISC)<sup>2</sup>. The latest worldwide study was conducted from June 22 through September 11, 2016. This online survey gauged the opinions of 19,641 information security professionals from 170 countries regarding trends and issues affecting their profession and careers. The **Women in Cybersecurity** report is designed to capture expansive viewpoints and produce statistically significant findings about women in the cybersecurity profession.

Key findings include:

- Women are globally underrepresented in the cybersecurity profession at 11%, much lower than the representation of women in the overall global workforce.
- Globally men are four times more likely to hold C- and executive-level positions, and nine times more likely to hold managerial positions than women.
- 51% of women report various forms of discrimination in the cybersecurity workforce
- Women who feel valued in the workplace have also benefited from leadership development programs in greater numbers than women who feel undervalued.
- In 2016 women in cybersecurity earned less than men at every level.

## INTRODUCTION

### Workforce Composition

Participation in the 2017 Global Information Security Workforce Study increased 40.9% over participation levels in the previous survey. Although participation in the survey increased substantially, the total number of women employed globally in the cybersecurity profession stands at 11%, which is the same rate of participation as 2013<sup>1</sup>. Despite increased interest in the past four years to increase female participation in the profession worldwide, the ratio of men to women, or the “needle,” has barely moved forward.

Examining the issue from a regional view point tells a slightly different, yet intriguing story. In North America, women comprise 14% of the cybersecurity workforce, the highest regional concentration in the world. Nevertheless, with the population balance of women to men for working age adults falling at essentially 50/50<sup>2</sup>, women remain under-represented in North America. For example, females in the United States comprised 48% of the workforce<sup>3</sup>. An examination of other regions of the world shows that female participation is smaller than North America, which leads one to wonder if cultural issues, discrimination, access to education, or a combination thereof are contributing factors. The 2017 study did not measure these variables and thus cannot provide definitive answers.

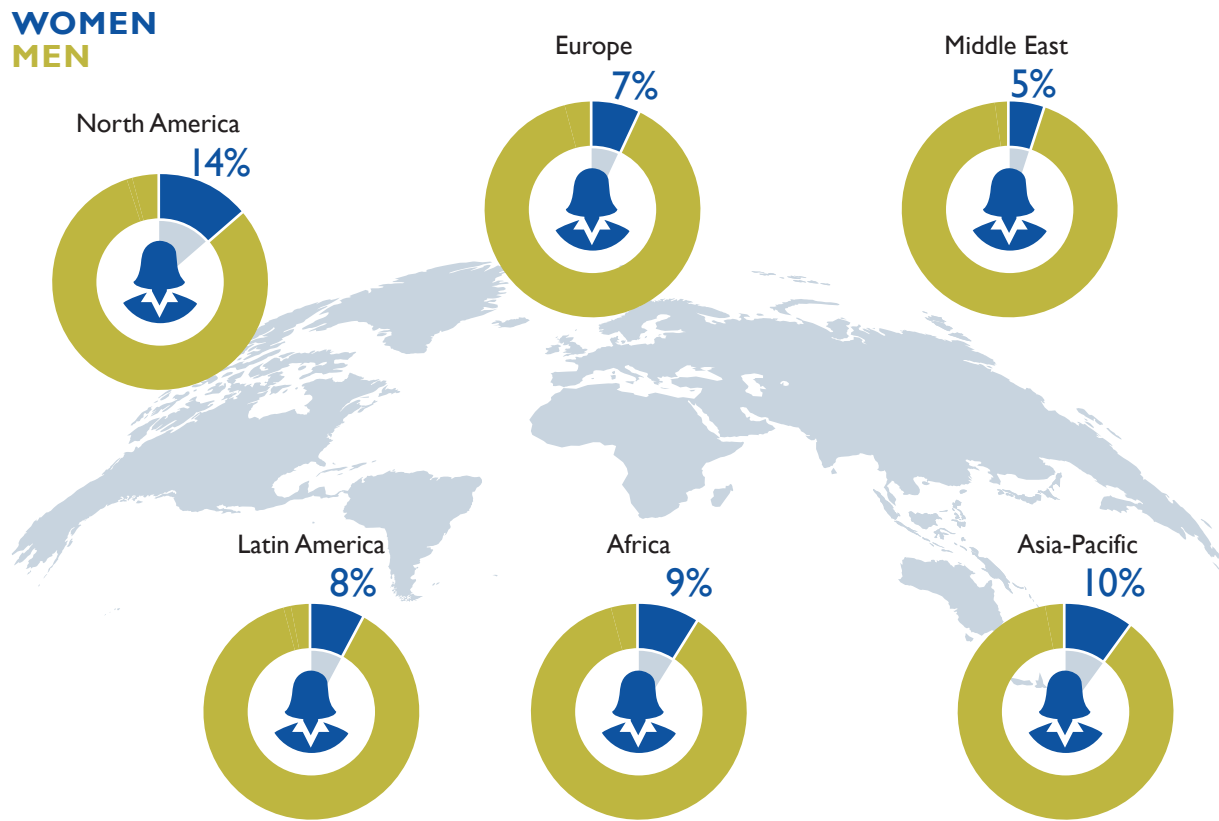
1 <https://iamcybersafe.org/research/historical-data/>

2 <https://www.census.gov/population/international/data/idb/worldpop.php>

3 <https://qwexplorer.ces.census.gov/static/explore.html#x=0&g=0>



Exhibit #1: Male and Female Cybersecurity Workforce Composition, by Region



Source: 2017 Global Information Security Workforce Study, (n=19,641)

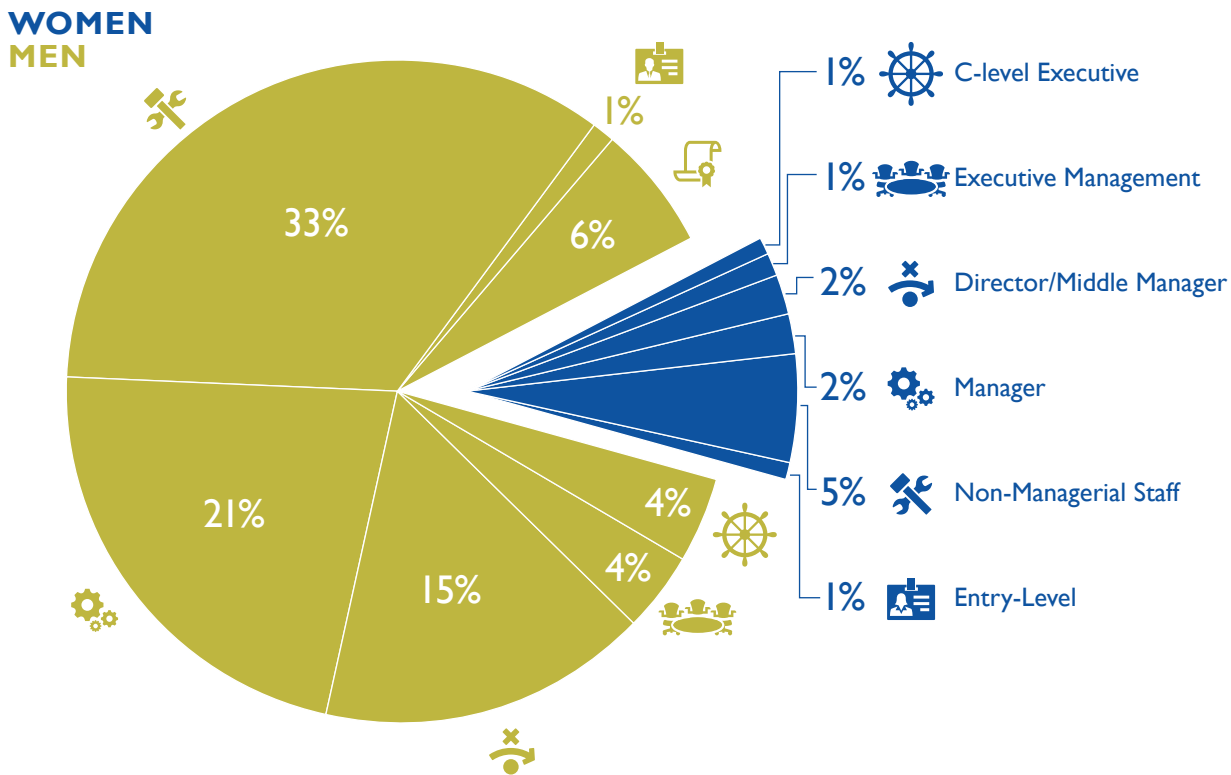
What is clear is that enterprise and government efforts to attract and retain more women in the global cybersecurity profession have not made a meaningful impact. The stagnation of women’s participation in the workforce is noteworthy because the workforce gap<sup>4</sup> continues to grow. In fact, Frost & Sullivan projections show that the gap between available qualified professionals and unfilled positions will widen to 1.8 million by 2022. Attracting women to the profession across all regions has the potential to shrink the workforce gap, but only if they can be hired, trained, and retained in sufficient numbers.

### Women’s Representation in Organizations

Overall, men outnumber women by a margin of approximately nine to one. Nowhere is this trend more notable than in the upper echelons of organizations, where men dominate all senior roles, including Directors, Executive Management, and the C-Suite. Women disproportionately occupy entry-level and non-managerial positions.

<sup>4</sup> [https://iamcybersafe.org/research\\_millennials/](https://iamcybersafe.org/research_millennials/)

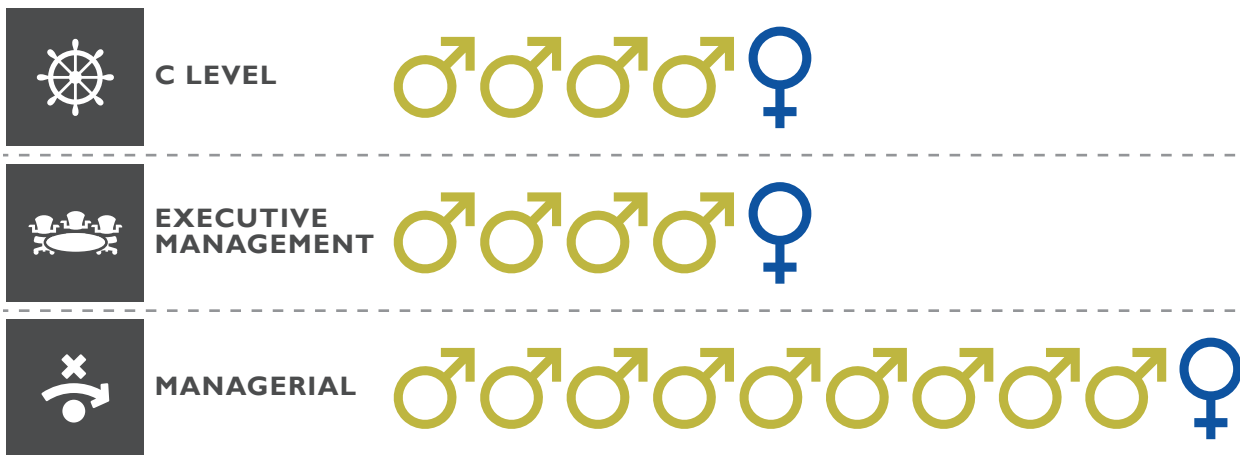
Exhibit #2: Gender Distribution of the Cybersecurity Workforce, by Organizational Positions Globally



Source: 2017 Global Information Security Workforce Study

Globally men are four times more likely to be in C-level positions, four times more likely to be in executive management positions and nine times more likely to be in a managerial position.

Exhibit #3: Organizational Positions by Gender, Globally

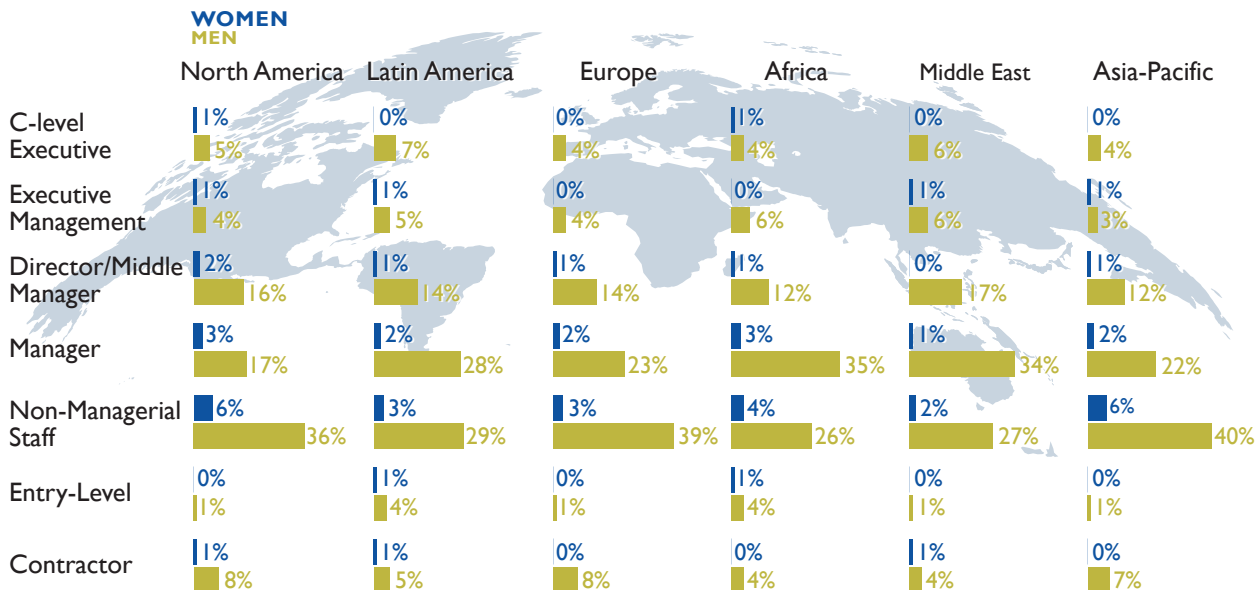


Source: 2017 Global Information Security Workforce Study



Although North America employs the most women in cybersecurity as a proportion of the workforce, the prevalence of women in senior executive roles remains extremely low at 4% compared to men at 25%. Globally, the preponderance of women is located among non-managerial staff.

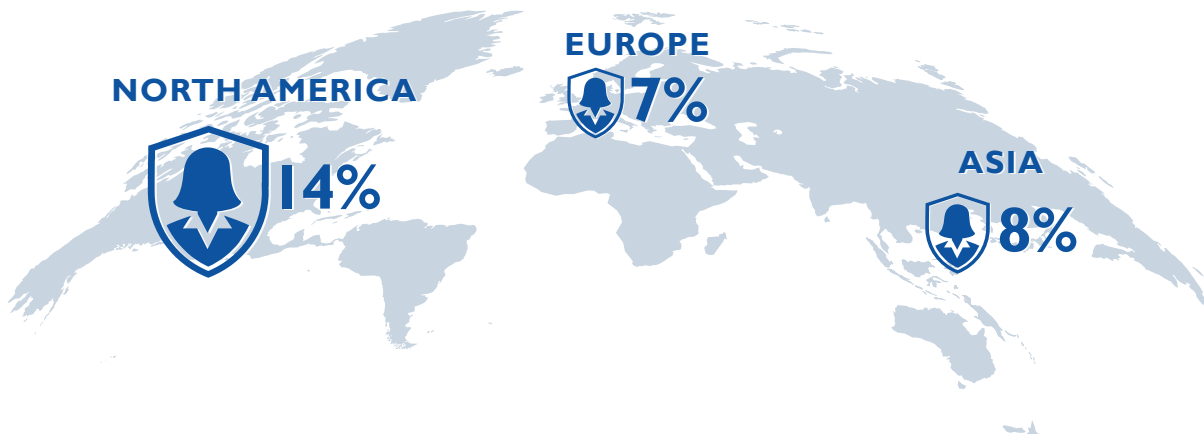
Exhibit #4: Gender Distribution by Organizational Position of the Cybersecurity Workforce, by Region



Source: 2017 Global Information Security Workforce Study, (Women n= 2,134; Men n=16,679)  
 Note: Some percentages may not add up to 100% due to rounding

North America leads the way in terms of total population globally of women in the workforce at 14% while Europe is 7% and Asia 8%. Low female participation in the cybersecurity workforce is a global problem and needs to be addressed as a global issue and is not limited only to North America.

Exhibit #5: Women in the Cybersecurity Workforce

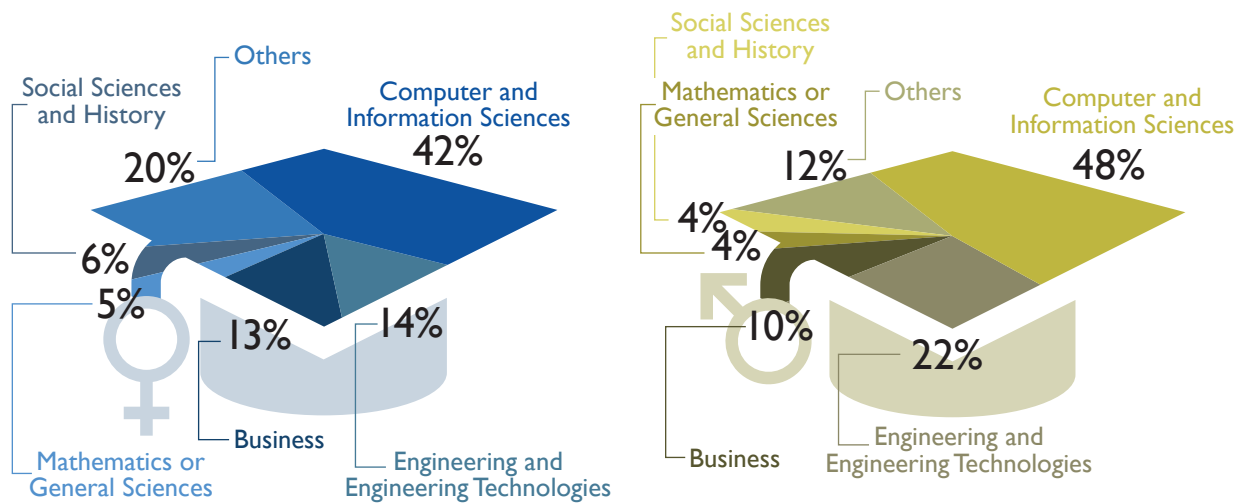


Source: 2017 Global Information Security Workforce Study

## Women’s Education Levels in Cybersecurity

Women in the cybersecurity profession enter the profession with higher education levels than men. Fifty one percent of women in the profession have a Master’s degree or higher, compared to 45% of men. An examination of undergraduate degrees revealed that 48% of men hold computer and information sciences degrees versus 42% of women, a 6% difference. The technical degree gap widens further between men and women for engineering and engineering technologies, where 22% of men hold an undergraduate degree versus 14% of women.

Exhibit #6: Gender and Education in the Cybersecurity Workforce, Globally



Source: 2017 Global Information Security Workforce Study

In total, the global divide between men and women with undergraduate technical degrees is 70% for men and 56% for women.

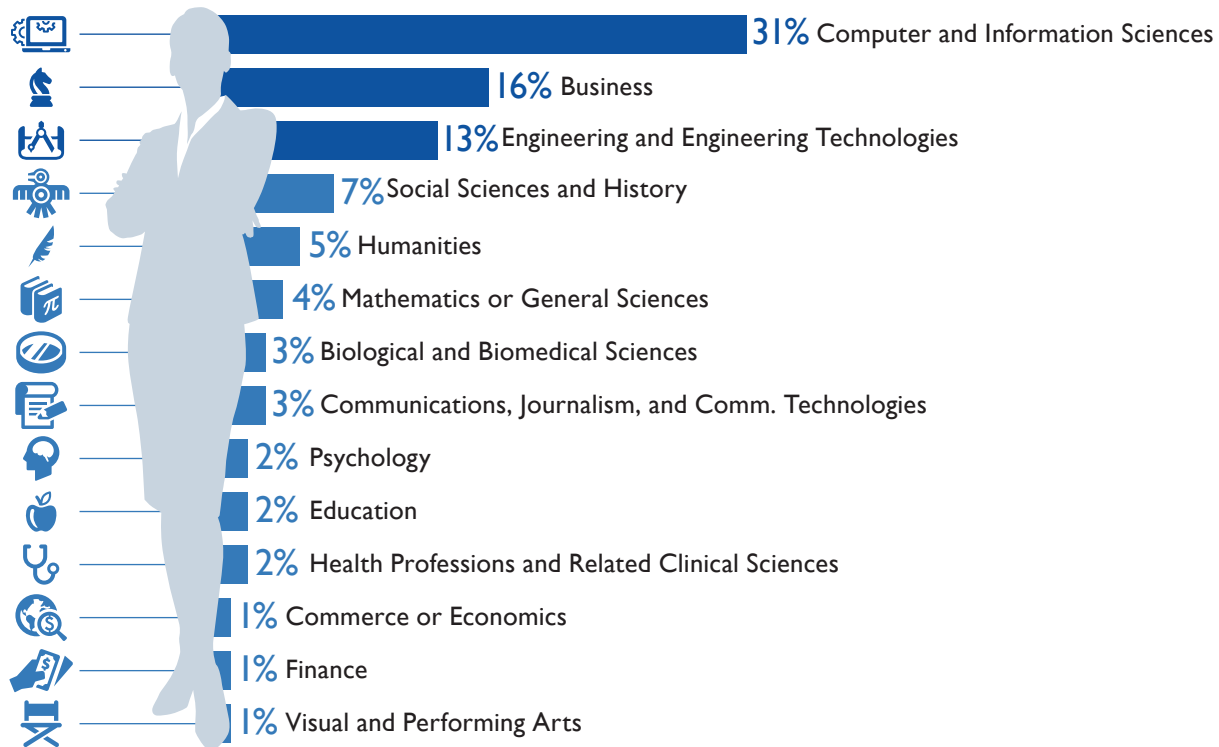
Of note the millennial generation<sup>5</sup>, also known as digital natives, is significantly closing the gap when it comes to computer science and engineering disciplines. Amongst millennials, 52% of women under the age of 29 have a computer science undergraduate degree. This educational shift could result in more women in roles traditionally led by men. Only time will tell how the educational shift will impact the different functional roles, but areas of imbalance that should be watched over the next decade include management; network security architecture; security consulting; as well as governance, risk, and compliance (GRC) roles.

Among women who have advanced to management roles in organizations, it is not uncommon to see a wide variety of educational backgrounds. This contrasts with men, who overwhelmingly have engineering or computer science backgrounds.

Among women who have advanced to management roles, their wider variety of backgrounds reflects the different skillsets that women bring to their roles, and highlights the values of their interdisciplinary skills.

<sup>5</sup> <https://iamcybersafe.org/research/historical-data/>

Exhibit #7: Types of Undergraduate Degrees Held by Women in Cybersecurity Director-Level Positions or Higher, Globally



Source: 2017 Global Information Security Workforce Study

Note: Some percentages may not add up to 100% due to rounding

That said, the educational background of females in the millennial generation represents a significant shift that employers cannot ignore. While the more experienced female workforce brings a diverse array of educational backgrounds to the organization, millennial females are earning degrees in technical areas that have been led by men for decades.

The increased homogenization of educational backgrounds for women and men in the labor force will have several implications for employers. The most notable implication is that women with the same educational backgrounds as their male peers will have strong reasons to expect and demand equal compensation, which is currently uneven in the profession.

## CHALLENGES IN THE WORKPLACE

### Underrepresentation

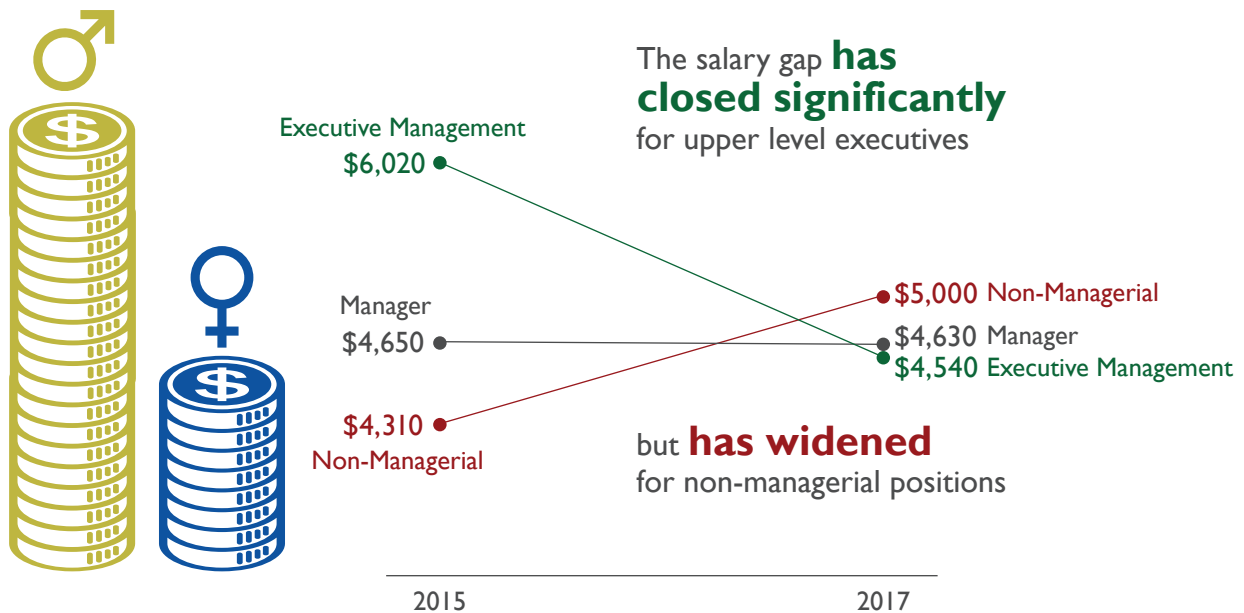
The number of women in the cybersecurity profession has statistically remained steady at 11% globally<sup>6</sup>. Considering the ever-growing workforce gap, the profession needs to attract and retain women. Measurable initiatives to engage and develop women are needed to begin moving the needle of female participation significantly above the 11% mark.

<sup>6</sup> Ibid. footnote 1.

## The Wage Gap

A wage gap exists in the cybersecurity profession. Globally, on average, women earn less than men.

Exhibit #8: Average North American Cybersecurity Salary Gap in 2015 and 2017, by Organizational Position



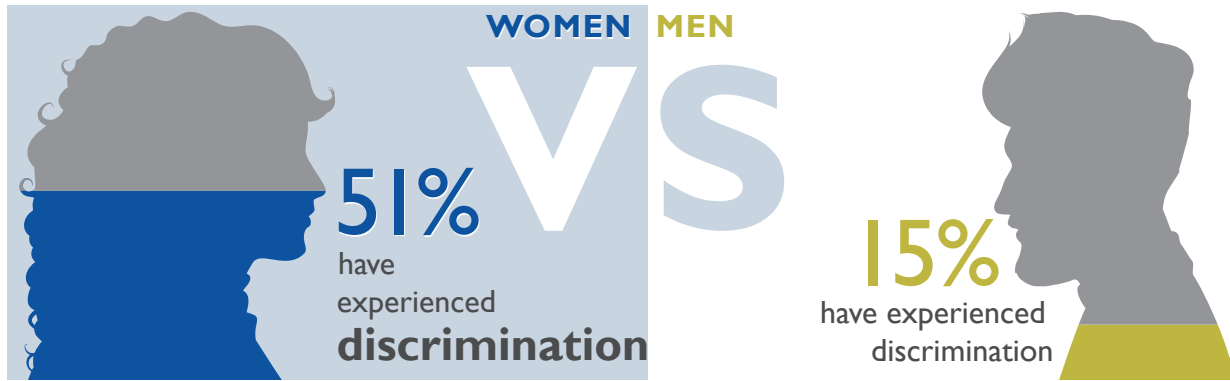
Source: 2017 Global Information Security Workforce Study

The wage gap of women at the Director level and above has narrowed from salaries reported in 2015, however women are still paid 3% less than men in equivalent roles. At the manager level the gap has remained relatively the same with women earning 4% less than men. The gap at the non-managerial level has widened to 6% from 4% in 2015.

## Disenfranchisement in Information Security

For the first time, the (ISC)<sup>2</sup> Global Information Security Workforce Study asked male and female participants in North America and Latin America questions about diversity and inclusion. In those geographies, a remarkable 51% of women indicated they have experienced discrimination. In comparison, only 15% of men indicate that they have experienced discrimination.

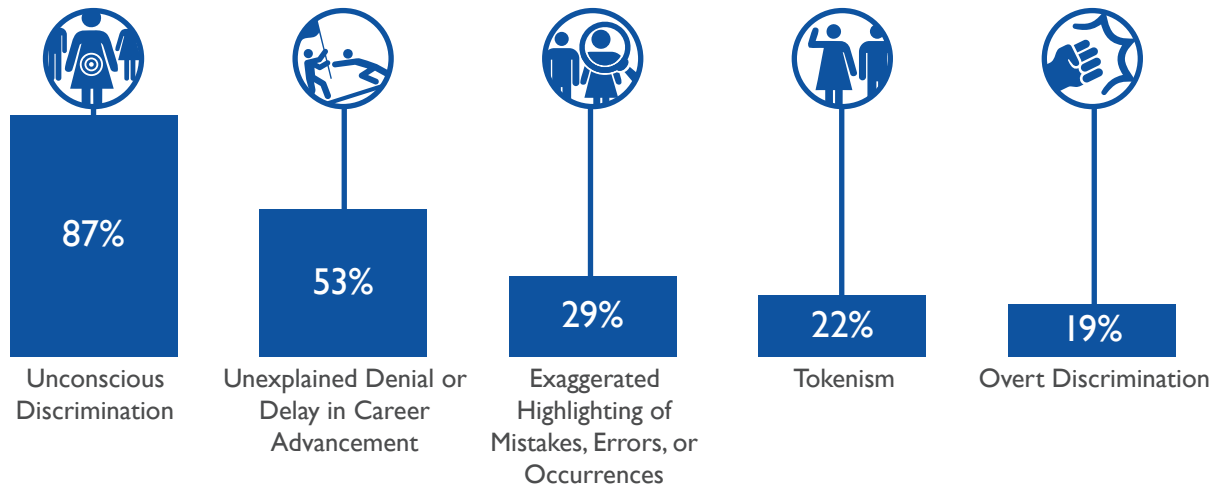
Exhibit #9: Discrimination in North America and Latin America, by Gender



Source: 2017 Global Information Security Workforce Study

Among the 51% of women in the cybersecurity workforce that experienced discrimination, the graphic below describes the forms of discrimination and the percentages of women who experienced them.

Exhibit #10: Forms of Discrimination Personally Experienced by Women in Cybersecurity, Globally

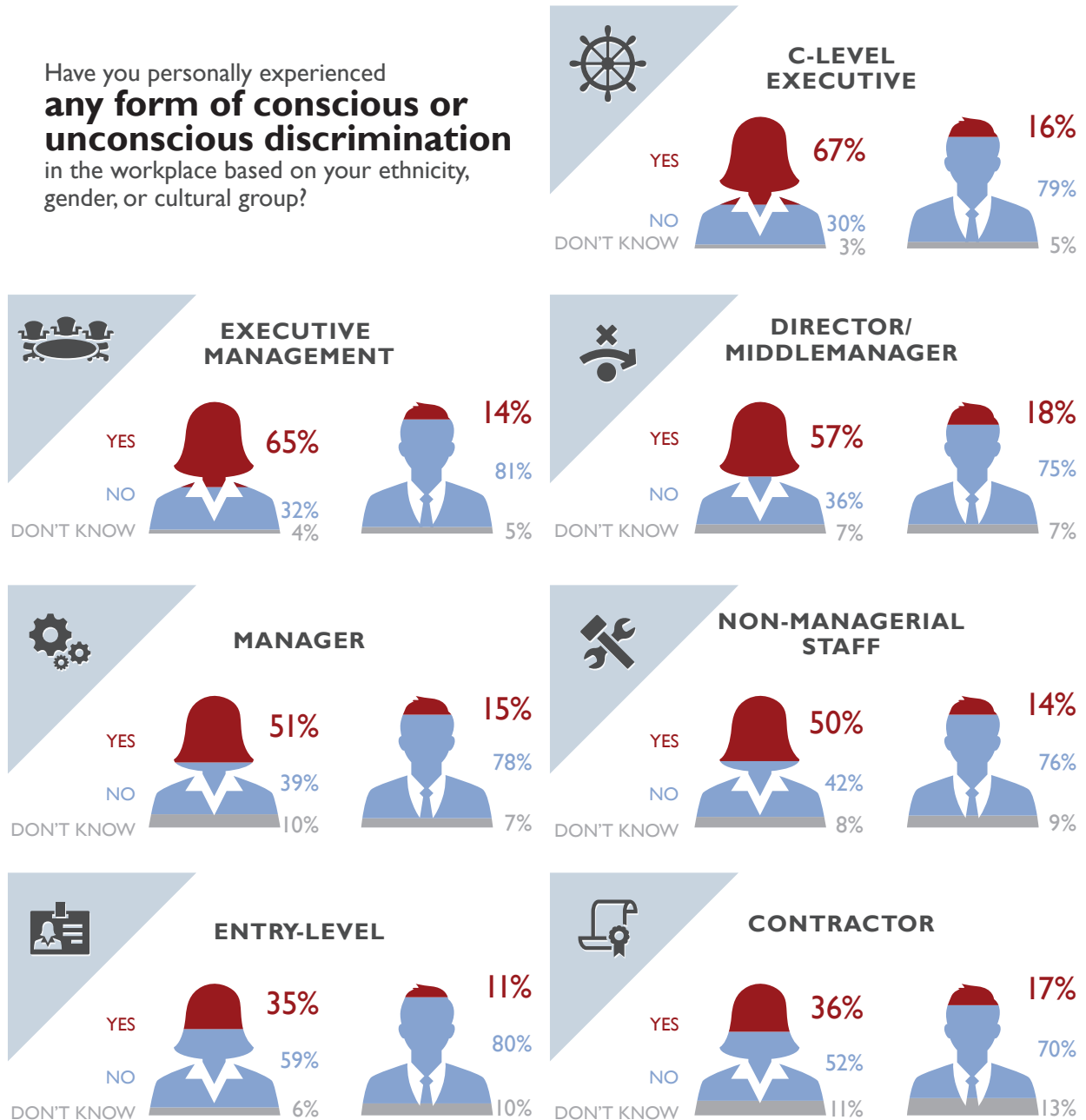


Source: 2017 Global Information Security Workforce Study

The most eye-opening aspect of discrimination against women in cybersecurity in the Western hemisphere is how it becomes far more prevalent the higher a woman rises in an organization. These findings raise the question: is discrimination against women one possible reason that global female participation in the profession continues to hover at 11%? A closer examination of this issue in the future is necessary.

Exhibit #11: Personal Experience of Discrimination in the Workplace Based on Ethnicity, Gender, or Cultural Group by Organizational Position, Globally

Have you personally experienced **any form of conscious or unconscious discrimination** in the workplace based on your ethnicity, gender, or cultural group?

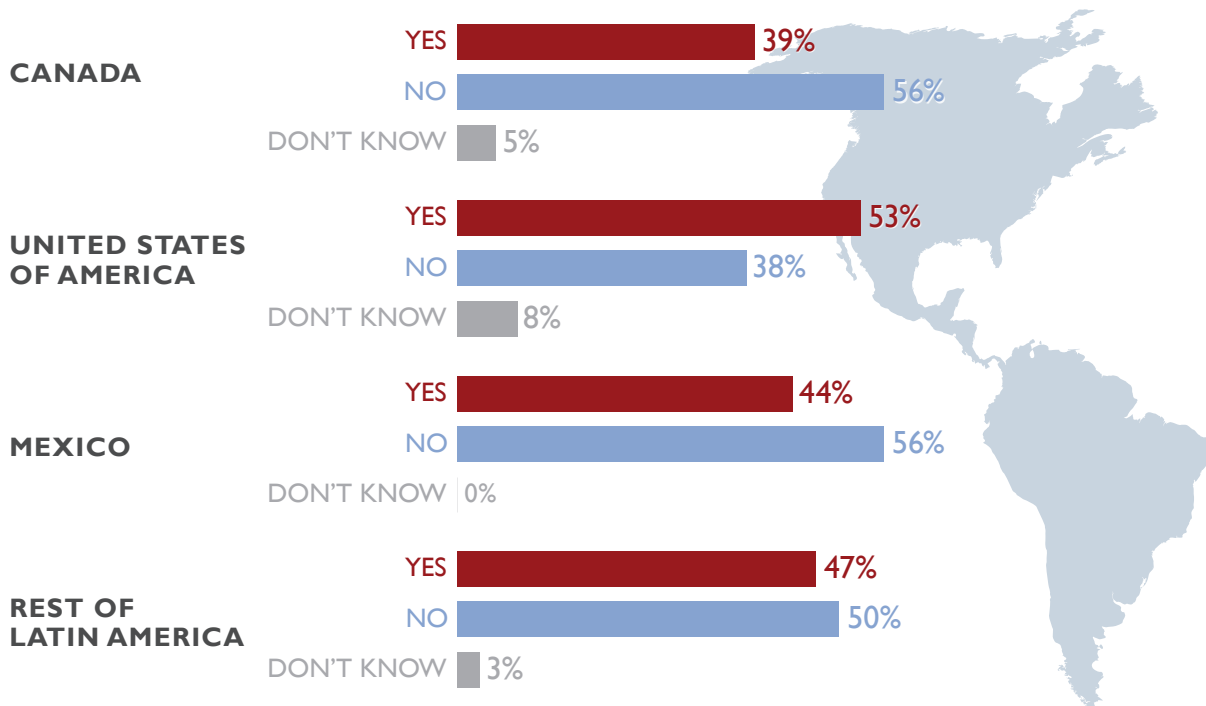


Source: 2017 Global Information Security Workforce Study  
 Note: Some percentages may not add up to 100% due to rounding

Canada and Mexico both have significantly less reported discrimination than the United States. The question that cannot be answered by the 2017 survey is if these regional differences are the result of differences in legal and cultural standards. A qualitative examination of why these regional differences exist could provide a deeper understanding of the treatment of women in this profession globally.



Exhibit #12: Personal Experience of Discrimination in the Workplace Based on Ethnicity, Gender, or Cultural Group, by Region



Source: 2017 Global Information Security Workforce Study  
 Note: Some percentages may not add up to 100% due to rounding

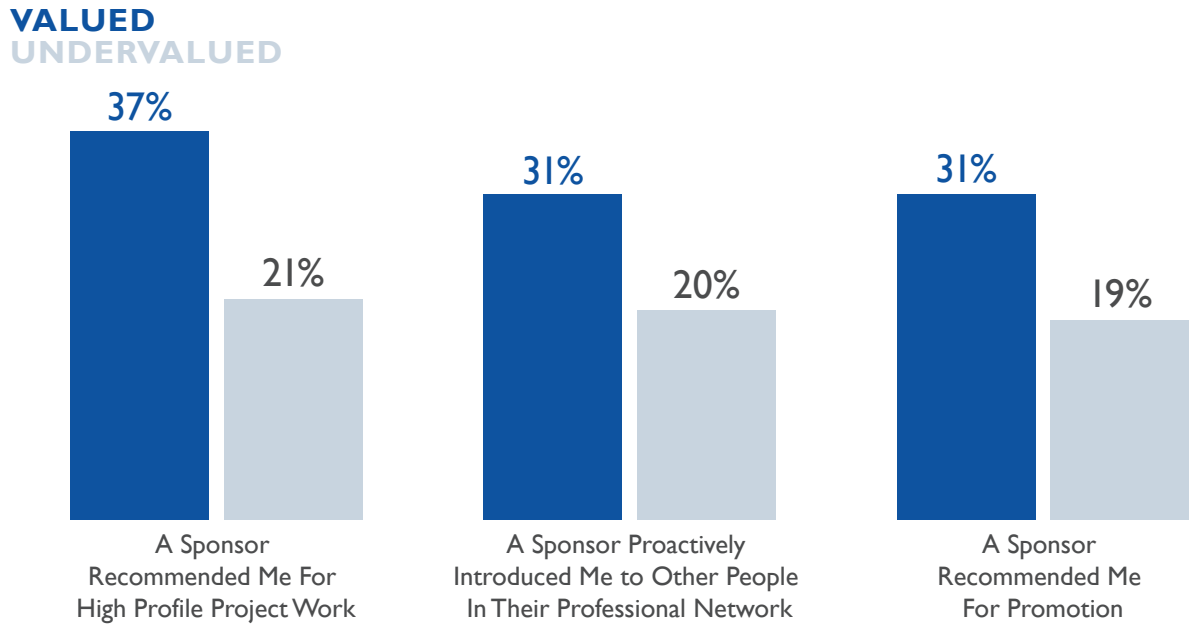
### Challenges and Barriers in the Workplace

In this study women were asked about their impact on the security posture of their organization. Twenty eight percent of women indicated that their opinions are not valued.

When comparing the groups of women who feel valued and not valued, the most significant differences concerned training, mentorship, sponsorship, and leadership programs. Women who feel valued in their position were more likely to indicate that their organization provides adequate training and leadership development resources, at a margin of 61% compared to 47% of women that feel undervalued who say their organization does not provide adequate training.

In a telling measure of job satisfaction, a large proportion of women who feel valued in their role also reported higher levels of access to sponsorship, which is defined as a relationship with a superior that extends beyond mentorship.

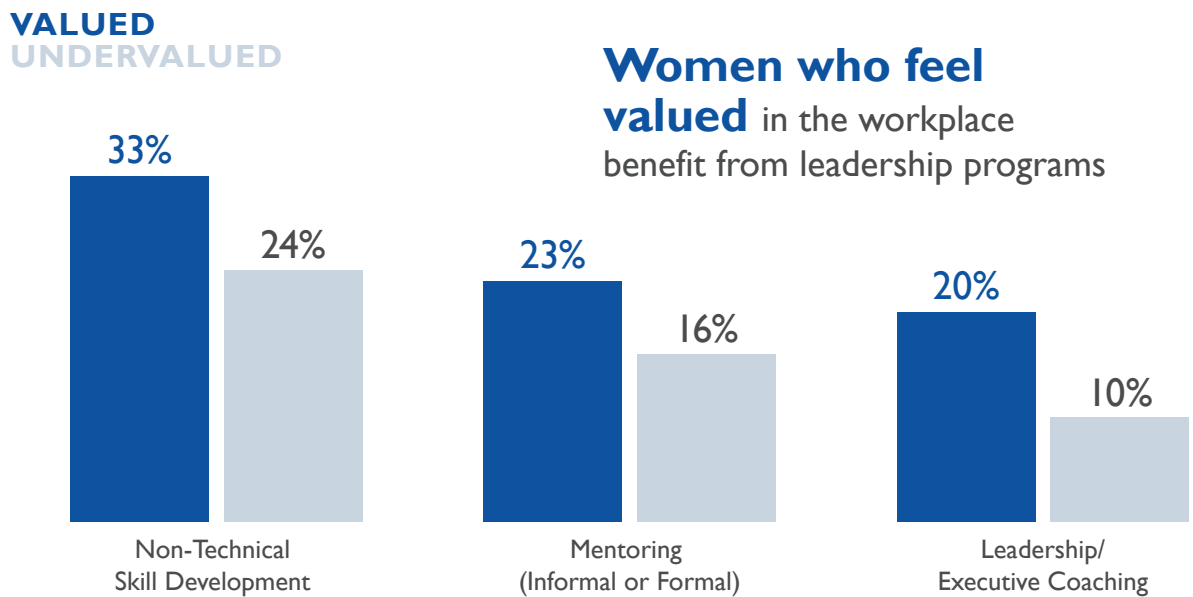
Exhibit #13: Percentage of Women (Who Feel Valued Versus Undervalued) Who Benefited From Sponsorship Options, Globally



Source: 2017 Global Information Security Workforce Study

In another revealing measure of job satisfaction, women who feel valued in the workplace have also benefited from leadership programs in greater numbers than women who feel undervalued in the profession.

Exhibit #14: Percentage of Women (Who Feel Valued Versus Undervalued) Who Benefited From Leadership Programs, Globally



**Women who feel valued** in the workplace benefit from leadership programs

Source: 2017 Global Information Security Workforce Study  
 Note: Some percentages may not add up to 100% due to rounding

Lastly, more than half of women who feel undervalued in their workplace indicate that they would participate in career development programs if they were available. Taking the growing workforce gap into account, organizations that want to increase job satisfaction and help women succeed need to offer and enroll women in internal and external mentorship and leadership development.

## **IN CONCLUSION**

The cybersecurity profession is one where demand is outstripping supply. Based on the technological advancements and the ever-increasing threat landscape there will continue to be an increasing need for skilled professionals into the foreseeable future.

Although women represent half of the population, the number of women professionals in the field remains stagnant at 11% globally. With a projected workforce gap of 1.8 million cybersecurity professionals by 2022, the problem of underrepresentation and underutilization of women needs to be solved to shrink this gap.

Companies must take swift and considerable actions to engage, develop, and retain women in the field or the global workforce gap will continue to grow year over year.

Executives should proactively determine if their organizational culture is one that welcomes and values women, or enables behaviors that intentionally or unintentionally deter women from joining and succeeding in the cybersecurity profession. Identifying and sponsoring high potential women for advancement and enrolling them in mentorship and leadership development programs increases job satisfaction and engagement as well as provides women with a sense of being valued.

## Key Takeaways

*The facts are:*

- 1** Females are approximately 50% of the global population yet **only 11% are represented globally** in the cybersecurity profession.
- 2** Fifty one percent of women versus 45% of men hold graduate level degrees, yet **hold significantly fewer positions in executive management.**
- 3** Globally **men are four times more likely** to hold C- and executive-level positions, and nine times more likely to hold managerial positions than women.
- 4** In 2016, **women in cybersecurity earned less than men at every level.** At the Director level and above, women's average salaries were \$4,540 less than their male counterparts. At the Manager level the wage gap was \$4,630 and women in Non-Managerial roles earned \$5,000 less than men in equivalent roles.
- 5** Women who receive sponsorship and mentorship are **more likely to be successful.**

## Key Takeaways

CONTINUED

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6 Women that have been mentored, sponsored, and offered participation in leadership development programs have **higher levels of job satisfaction.**

7 Fifty one percent of women experienced various forms of **discrimination in the workplace.**

8 Women who feel most valued in their organization report **higher levels of access to sponsorship.**

9 Women who feel valued in the workplace have also **benefited from leadership development programs** in greater numbers than women who feel undervalued.

10 Women in management roles have a **wider variety of undergraduate degrees** than their male counterparts.

## Actionable Solutions to Engage, Develop, and Advance Women in Cybersecurity

### 1. Corporations and cybersecurity departments need to create inclusive work places to support the advancement of women.

- a. Take intentional actions to close the workforce gap with a multi-year initiative to attract, advance, and retain top female talent.
  - i. Develop quantitative Key Performance Indicators (KPI) that measure progress towards written goals and track them on a quarterly basis.
  - ii. Evaluate unconscious and conscious bias in recruiting practices and performance evaluations on an ongoing basis.
  - iii. Use all internal facts and data available to understand your female pipeline and succession plans to executive and C-level management roles.
  - iv. Tie gender equality goals to both business objectives and executive compensation.
  - v. If progress towards written goals is lackluster, engage with a neutral outside firm to determine root causes and solutions.

### 2. Increase satisfaction and success.

- a. Sponsorship, mentorship, and leadership development programs are correlated with the success and satisfaction of women at all levels.
  - i. Identify high potential and high performing women, and engage them in professional development programs and events.
  - ii. Conduct a gap analysis to see if programs exist internally and externally, and determine how accessible they are to women in the organization.

### 3. End pay inequity.

- a. Develop a statistical approach to measure and analyze pay data and determine inequities.
  - i. Create a formal remediation process to address problems.
  - ii. Adopt pay transparency policies that will allow women to understand salary ranges so they have adequate information to negotiate their compensation or ask to be paid fairly.

### 4. Value all educational backgrounds.

- a. Recognize and leverage the unique perspectives that women without a STEM education bring to the profession and the organization.
- b. Adjust the organization today for the technically educated wave of female millennials who will expect and demand equal pay, treatment and opportunities.
- c. Leverage the multidisciplinary educational backgrounds of senior level women to apply their full depth and breadth of knowledge to solving critical problems, communicating ideas, and influencing change.



# GLOBAL INFORMATION SECURITY WORKFORCE STUDY

The Global Information Security Workforce Study (GISWS), is conducted every two years by the Center for Cyber Safety and Education (Center) and (ISC)<sup>2</sup>. The latest worldwide study was conducted from June 22 through September 11, 2016. This online survey gauged the opinions of 19,641 information security professionals from 170 countries regarding trends and issues affecting their profession and careers. It was designed to capture expansive viewpoints and produce statistically significant findings. The Center has conducted similar surveys since 2004 and has made results available to private, governmental and non-profit organizations as a means for these organization to plan, assess and implement workforce policies. The study was conducted by Frost and Sullivan and sponsored by (ISC)<sup>2</sup> and Booz Allen Hamilton.



Booz | Allen | Hamilton

F R O S T & S U L L I V A N

*The findings from this massive study will be released throughout 2017 in a series of dedicated reports*

## 2017 FEATURED GISWS REPORTS

### WOMEN IN CYBERSECURITY

*Co-Authored by the Executive Women's Forum on Information Security, Risk Management & Privacy and (ISC)<sup>2</sup>. Presented by PricewaterhouseCoopers. Sponsored by Alta Associates, IBM and Veracode.*

This report will take a new and unique look into the vital role women play in cybersecurity today and in the future. As the need for security professionals grows, women continue to be an under-tapped resource.

### MILLENNIALS IN SECURITY

*Presented by (ISC)<sup>2</sup> and Booz Allen Hamilton.*

This online, interactive infographic takes a look into the future information security workforce. What makes them tick? How do I get and retain these vital employees?

### US GOVERNMENT SECURITY WORKFORCE

*Presented by (ISC)<sup>2</sup>.*

Government security has always been in the forefront of the news but now more than ever has the general public paid attention. Take a look at the people that work behind the scenes with our national secrets and security.

### GLOBAL / REGIONAL REPORTS

*Presented by (ISC)<sup>2</sup> and Booz Allen Hamilton.*

This series of reports will focus on the global workforce as a whole but will also take a closer look at data through a regional lenses (EMEA, APAC, LATAM, and North America).

### DIVERSITY REPORT

*Presented by (ISC)<sup>2</sup>.*

For the first time ever we will look at the growing role that minorities play in the cybersecurity workforce. What makes this group such a valued asset and how do we grow this portion of the workforce?



These reports (and past reports) are found at [www.IAmCyberSafe.org/GISWS](http://www.IAmCyberSafe.org/GISWS)

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