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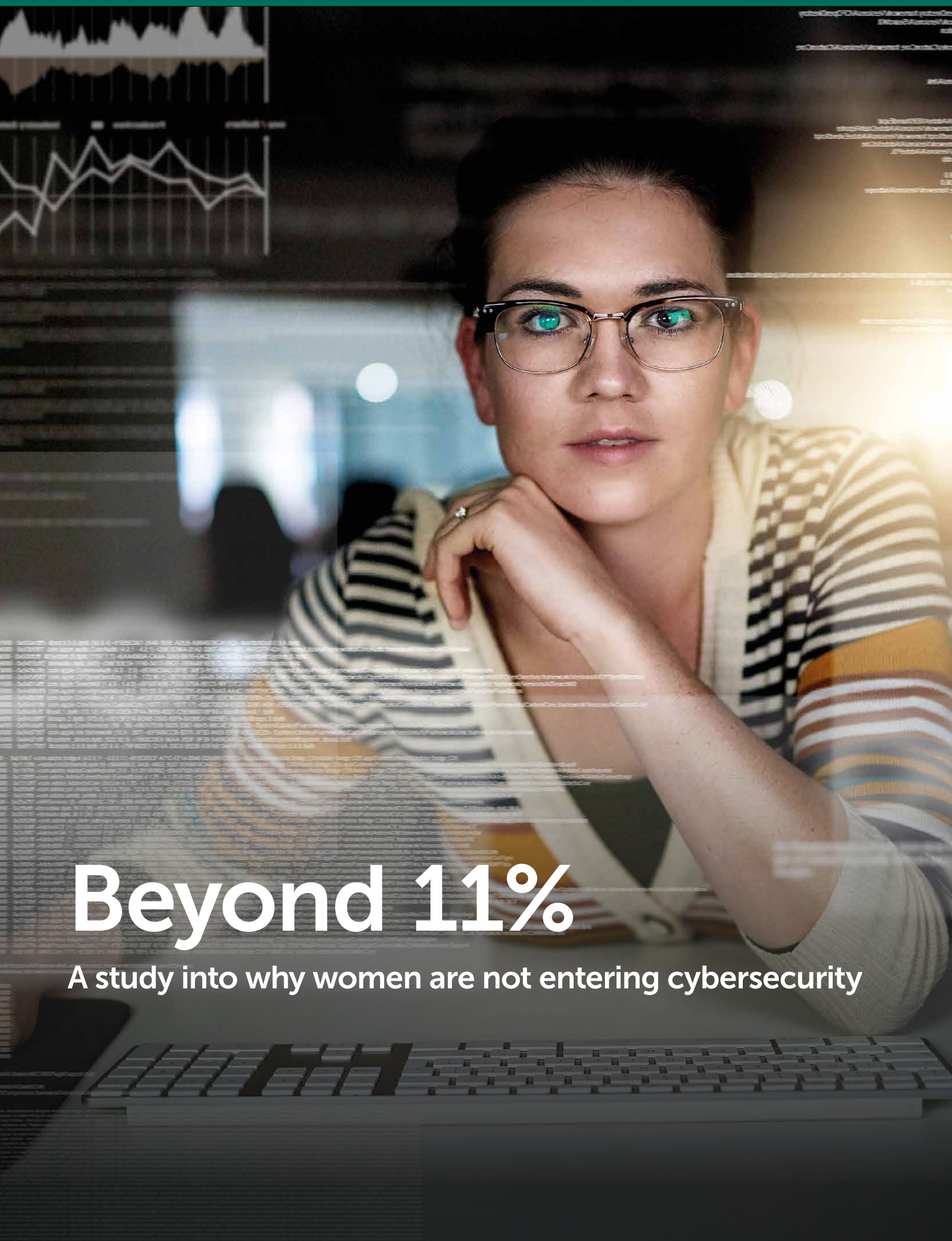
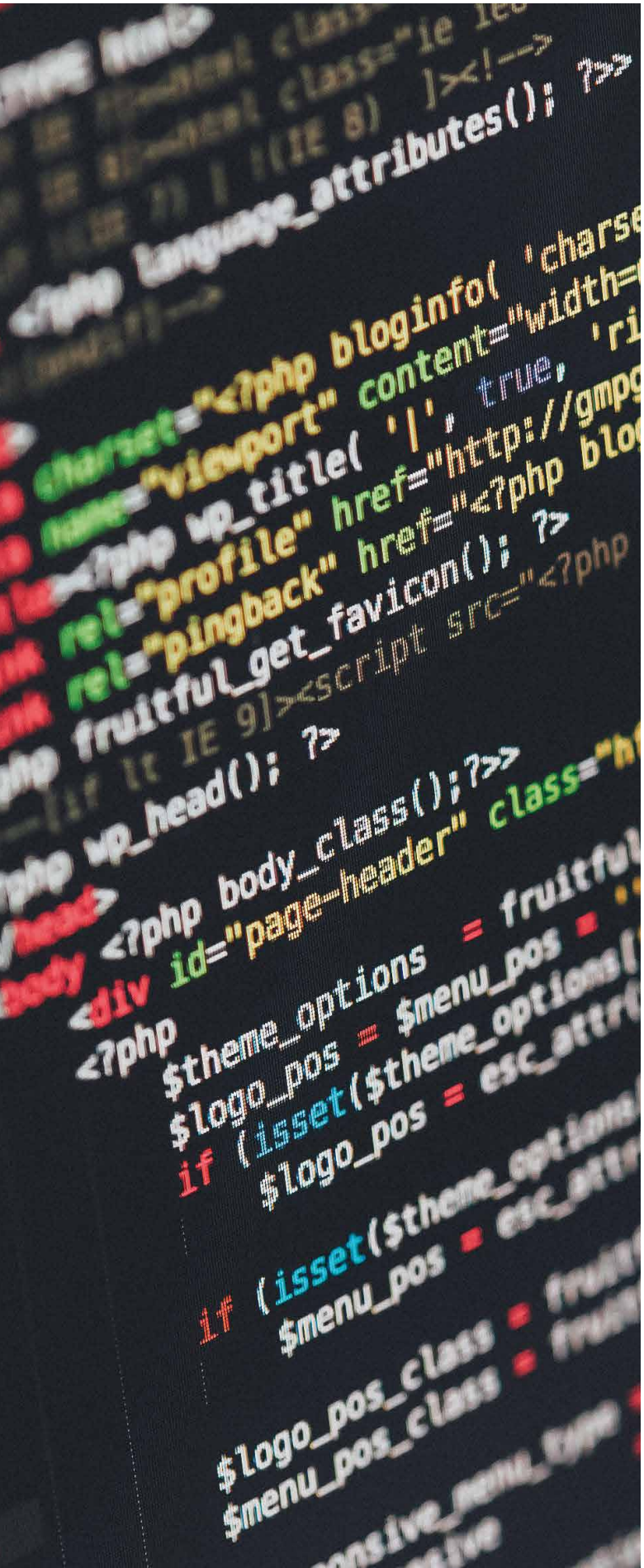


# Beyond 11%

## A study into why women are not entering cybersecurity



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# Acknowledgments

Given the critical nature of the issues explored by this report, Kaspersky Lab understands the importance of working with other concerned parties to learn from their own experiences, expertise and knowledge on the subject. As such, we have sought out a variety of opinions from industry experts who have contributed to, and helped shape, our own understanding of the issue.

Kaspersky Lab would like to thank the following people for their contributions to this report:

- Jacky Fox – Director – Cyber Lead, Deloitte
- Janice Richardson – Senior Advisor, European Schoolnet
- Stuart Madnick – Professor of Information Technology and Engineering Systems, MIT Sloan School of Management
- Neil Owen – Director, Robert Half Technology UK
- Noushin Shabab – Senior Security Researcher (GReAT), Kaspersky Lab

Their collective experience and insights are invaluable, and greatly appreciated.

# Introduction

**The cybersecurity field is well known to be suffering from a massive skills shortage, with firms struggling to encourage fresh talent into the sector and meet growing workforce demands. The gap, which is predicted to hit 1.8 million by 2022, is further exacerbated by a distinct lack of female representation – with women comprising only 11% of the workforce, according to The Global Information Security Workforce Study from (ISC)² and its Centre for Cyber Safety and Education.**

**Such striking disparity raises questions – would narrowing the gender divide help to address the skills gap? If so, how can it be achieved?**

Cybersecurity is one of the most progressive, dynamic and sought-after industries on the planet and at Kaspersky Lab, we believe we have a role to play in helping to better promote careers in cybersecurity. That is why we are working alongside like-minded organisations to improve our knowledge and understanding of the challenges contributing to the cyber skills shortage.

But it doesn't stop there. As founding members of the European Commission's Digital Jobs and Skills Coalition, we are committed to effecting positive change through our words and actions – promoting the issues, and investigating ways to overcome them.

It's through this commitment that we set out to better understand the obstacles preventing more women from entering cybersecurity careers. As a company, we believe that reducing the gender divide could not only have a profound effect on the broader skills gap, but could lead to even greater gains for individual businesses and the industry as a whole.

The following report is the culmination of a detailed research project, that aimed to find answers to the following crucial questions for our industry: 'why are women not entering cybersecurity?' and 'what on earth can be done about this situation?'

We found that contrary to popular opinion, young women do have the skills required to enter cybersecurity roles. They do perceive the role to be of value to society, and have largely had positive interactions with the industry.

So, what's missing? Why is this not translating into more women pursuing IT security careers? We believe it all comes down to a certain chain of events and influences that must occur as soon as girls start thinking about their future careers. From advice and information given in school, to the guidance of friends and family members and interactions with businesses and the media – somewhere along the line, a link is being missed.

By connecting these dots in the right ways, the cybersecurity industry has a good chance of attracting young women and proving itself as a worthy, reputable career, tackling a gender divide that is currently showing no signs of diminishing.

**The Global Information Security Workforce Study from (ISC)2 and its Centre for Cyber Safety and Education*

## Methodology

An online survey conducted by Arlington Research and Kaspersky Lab questioned 4,001 young people from the UK, USA, France, Germany, Italy, Spain, Israel and the Netherlands. Using an equal split of men and women, the research sought to uncover their interests, influences and attributes, and their awareness and perception of cybersecurity as a profession and future career.

All respondents were between 16–21 years of age and were either currently attending, have attended or wish to attend university.

## Research highlights

Career decided by age 15 years, 10 months

- **On average, respondents had decided on their future career before their 16th birthday (15 years and 10 months)**
- **Men were significantly more likely than women to choose mathematics (49% vs. 36%) and IT (21% vs. 7%) as their preferred subjects at school**
- **Only a fifth (20%) of respondents were clear on what a cybersecurity expert does, dropping to just 16% for women**
- **Among the reasons for not selecting a career in cybersecurity, a lack of experience of computer coding (57%), not having any interest in computing as a career (52%) and not being aware of, or knowing enough about cybersecurity careers (45%) were the most prevalent among women**
- **Nearly half (46%) of both men and women think that just a quarter or less of professional roles within cybersecurity are filled by women**

Many people will be familiar with the feeling of indecision when it comes to choosing a career but, according to our research, young people are making up their minds sooner than you might think.

A surprisingly high 72% of respondents to our survey, both male and female, had already decided on their future career paths, with female respondents being slightly more likely to have decided than their male counterparts (74% vs. 71%).

The average age at which young women have decided on their future career is fifteen years and ten months, and those that haven't decided by this time expect to have made a decision by the age of twenty-one and nine months, making it very difficult for cybersecurity firms to influence their choices after this point.

This gives the industry a challenge as businesses only have a small window in which to attract young people, especially women, to a career in cybersecurity. Positioning it as a practical and worthwhile career choice across all channels of influence is clearly more important than ever.

This suggests a need for young girls to have access to advice and information about the industry at a younger age, so that they don't rule it out in favour of more traditional professions such as lawyers, medics or teachers that have long-established career paths.

But where should this start? With women deciding their future career at an early age, home and school are likely to be key influencers in this decision, with the industry left vying for their attention long after they have made their choice. This is where promotion is critical. It may mean more work for the industry to be more visible at these early touch points, but the long-term benefits could be significant.

Janice Richardson, Senior Advisor, European Schoolnet

**"Schools and parents hold the keys"**

*Since career choices are both contextual and cultural, efforts to influence them need to be made at a much earlier age. Any steps taken by employers and universities alone, will have minimal impact, as we have seen with the low progression of women in jobs such as electrical engineering or piloting aeroplanes.*

*Schools have a big role to play and cybersecurity will only become attractive as a career path when young people are able to grasp the full sense and exciting challenges it offers. Hackathons and coding taught at school, can have limited appeal, but setting digital challenges to help children learn more about security whilst practicing their problem-solving skills could be more successful in promoting the career.*

*Three out of four parents also don't have sufficient information to guide this choice. Better information about cybersecurity careers could positively impact more young people choosing this path. Role models are important, but less so than breaking down the pre-conceived ideas of males, the media and the general public on stereotypes and "suitable" professions for girls. Efforts should therefore be made to inform families, and introduce notions of cybersecurity from early childhood years.*

## I don't have the skills for the job

Even if young women are attracted to a career in cybersecurity, there is still a general lack of understanding around exactly what skills employers are looking for and if they have the right attributes for the role.

During our research, we expected this young generation of respondents to state that they are highly literate in IT. What we actually found was that they consider themselves to be more likely to have general skills. For example, 'I am detail oriented' was the most affable statement among young women (82%), followed closely by 'I am empathetic to other people's needs' (81%) and 'I am good at critical thinking' (76%).

By comparison, 'I have strong general IT skills' (49%) and 'I have experience of computer coding' (30%) had low response rates, and lower response rates among women than men.

Furthermore, when asked why they haven't decided to pursue a cybersecurity career, women were more likely than men to claim that they don't have coding experience (57% vs. 43%), have no interest in computing (52% vs. 39%), are not aware of cybersecurity (45% vs. 38%) and that their maths is not good enough (38% vs. 25%).

The issue here is one of awareness, as companies today aren't just looking for coders. Skills such as critical thinking and problem solving are just as crucial to a career in cybersecurity, but the perception of the industry from the outside tends to focus primarily on the technical side.

Women need to be made aware that they don't have to be expert coders to be able to flourish in cybersecurity. There are plenty of other skills that are attractive to potential employers, all of which would help to plug the current skills gap.

Noushin Shabab, Senior Security Researcher (GReAT), Kaspersky Lab

**"No two days are the same"**

*I have always been fascinated by solving problems, and love puzzles and board games. From a young age, I knew that I wanted to pursue a career in computing, but never thought about getting into cybersecurity specifically. My first professional role was with a cybersecurity company as a malware analyst and it was only then that I realised it's an area I really enjoy and that I had the right skills to excel. The need to think creatively and differently becomes a way of life, but one of the key skills of the role is persistency.*

*The industry is ever-changing and each day brings a new challenge. The creativity of malicious attackers is increasing and the diversity of the role is what keeps me excited. It's important to always have a curious mind. Never stop asking questions about your surroundings in this line of work – be it with your colleagues, peers, mentors and role models. Don't be afraid to ask silly questions and speak your mind. All of these ingredients will help build confidence and knowledge among the next generation of cyber researchers, to help grow their skills and potential within the industry.*

## I want a career I'm passionate about

Women, more so than men, are on the hunt for careers that they are passionate about (72% women vs. 64% men), and which provide them a good work/life balance (40% women vs. 35% men), highlighting gender differences when it comes to career priorities.

Those that have considered cybersecurity as a career choice, however, were more likely to say that they want a job that allows them to make a difference to society, something which only 23% of young women are searching for in their careers.

Young women, indeed, tend to be most interested in pursuing careers in medicine, the creative arts and teaching, perhaps perceiving these to be jobs that will allow them to exercise their passions and make a difference at the same time. They are also much less interested in IT as a career than men (24% vs. 9%) and less driven by high salaries than men (32% vs. 46%).

But this doesn't mean cybersecurity should be dismissed. Businesses have a job to do here in promoting the merits of a career in cybersecurity by not just focusing on traditional drivers such as high wages, but also making it clear that the industry will allow them to follow their passions and enjoy a flexible work/life balance, as well as teach them a whole range of new skills.

Jacky Fox, Director – Cyber Lead, Deloitte

**"There's no room for gender bias"**

*At approximately eighteen years of age, Irish students sit their school leaving certificate exams. By this point, there is already a marked gender bias. The percentage of female students that take the following subjects at higher level are: maths 50%; engineering 8%; technology 15%; music 70%; and home economics 92%. Despite Ireland having a lot of single sex schools, and not all schools offering all subjects, mathematical aptitude is clearly not an issue.*

*While having a technology background is not essential, it can leave more options open for both men and women in cybersecurity. The tipping point for a group to no longer feel like a minority is 30% and I think this applies to STEM subjects in general. I have been the only female on courses throughout many of my studies from electronics to penetration testing.*

*The "brogrammers" culture and military style language can be off-putting to women. We are careful with our recruitment campaigns to make them gender neutral. When I first started working in the technology industry there were very few female role models, however my father worked in tech so I felt comfortable with the idea. In Deloitte Ireland, our cyber team is 30% women.*

*With cybersecurity now a board room issue, the career is becoming more visible. When I go to work I spend my days helping organisations to improve their defences and investigating cyber incidents. It is so interesting, and I am lucky to get the opportunity to make an impact that matters every day.*

## There are no female cybersecurity role models for me to follow

Arguably the biggest reason that women are not entering cybersecurity is the lack of high-profile role models or key influencers around them. Without someone to admire and look up to, it's simply too easy for women to assume it's a no-go area for them.

Only one-in-five young people has a clear idea of what a cybersecurity expert does, up from 14% in 2016. But young men are more likely than young women to understand what the role involves, likely directly related to the fact that there's a dearth of female role models in the industry. Men, for example, make up the majority of key commentators and experts in the media.

Trade shows and industry events are also usually dominated by men, which might be another key turn-off point in the career path choice for young women.

Most young people (69%) haven't met anyone who works in cybersecurity at all and even fewer (11%) have met a woman working in cybersecurity. But when they have, their opinion of the role skyrockets, with 63% of women thinking more positively about cybersecurity after meeting someone who works in the sector.

This clearly shows the power of role models in promoting the industry as a whole and how inspirational female personalities can be utilized to make cybersecurity a more attractive proposition for women and help to reduce today's skills shortage.

Workplace dynamics also come into play, as 42% think it is important to have a gender role model and half of women would prefer to work in an environment that has an equal male/female split (compared to 42% of men that have no preference), making the situation a self-perpetuating problem.

If they want to attract the next generation of employees, businesses have to be prepared to seek out suitable representatives from within their company to help inspire young women. The lack of female role models is central to connecting the dots and changing perceptions at every stage of the career journey.

Stuart Madnick, Professor of Information Technology and Engineering Systems, MIT Sloan School of Management

**"It's not all about technical skills"**

*Attracting women into cybersecurity is primarily a communications challenge, not a capability limitation. For example, MIT might be viewed by many as a male-dominated science and engineering institute. But MIT's founder, William Barton Rogers, envisioned MIT as a place which would "draw all the lovers of knowledge of both sexes to the halls of the Institute." In 1873, Ellen Swallow Richards became MIT's first female graduate (and later its first female instructor). Although attitudes in society at large changed slowly, which limited the rate at which women selected science and engineering, MIT now draws almost equally men and women (46% women to 54% men).*

*As shown in the Kaspersky Lab report, young women are often not aware, do not feel prepared, and do not see relatable role models that motivate them to consider cybersecurity roles. In particular, many individuals have the mistaken belief that cybersecurity is strictly a technical job requiring strong coding skills. Although that is true for some jobs, cybersecurity threats often come from deficiencies in an organization's culture and procedures – having "soft skills" can be as, and sometimes even more, important as technical skills in making a difference in an organization.*

*To meet the needs of the cybersecurity workforce, we must attract more young and non-traditional workers by explaining and demonstrating that these jobs are good fits and exciting opportunities. Role models that prospective workers can relate to, courses and workshops that teach the broad range of cybersecurity principles, and incentives that entice them to these jobs are mechanisms that managers can use to fill the workforce gaps. We have found that workers often seek a job that is meaningful, has an impact on something important, and is fun and engaging. Cybersecurity jobs fit these criteria. We just need to rethink and improve how we communicate this.*

## The cybersecurity stereotype is not what I want to be

When it comes to the general perception of the cybersecurity industry, our research suggests that there is certainly room for improvement.

Those that have considered a career in the sector consider cybersecurity professionals to be driven (44%), ambitious (33%) and adventurous (25%). However, stereotypes used in the media rarely reflect this. The solitary hacker hunched over a computer in a dark room is all-too-frequently used to represent the industry and only serves to highlight an image problem which could be solved by not only introducing more female role models to change perceptions, but also by adjusting the terminology and imagery used.

Terminology that's associated with cybersecurity is considered, generally, as having negative connotations – 'hacker', for example. In addition, a third of women think cybersecurity professionals are 'geeks' and a quarter think they are 'nerds', perhaps contributing to the reason why one-in-six women think that a career in cybersecurity would be dull.

Young people, particularly women, do not want to be associated with these terms, and are therefore looking for something different. The perception issue is one that could easily be solved by using more positive words such as 'protector' and 'guardian', which would likely go a long way to getting women interested from a young age.

Neil Owen, Director, Robert Half Technology UK

**"Tackling the skills gap should be a business priority"**

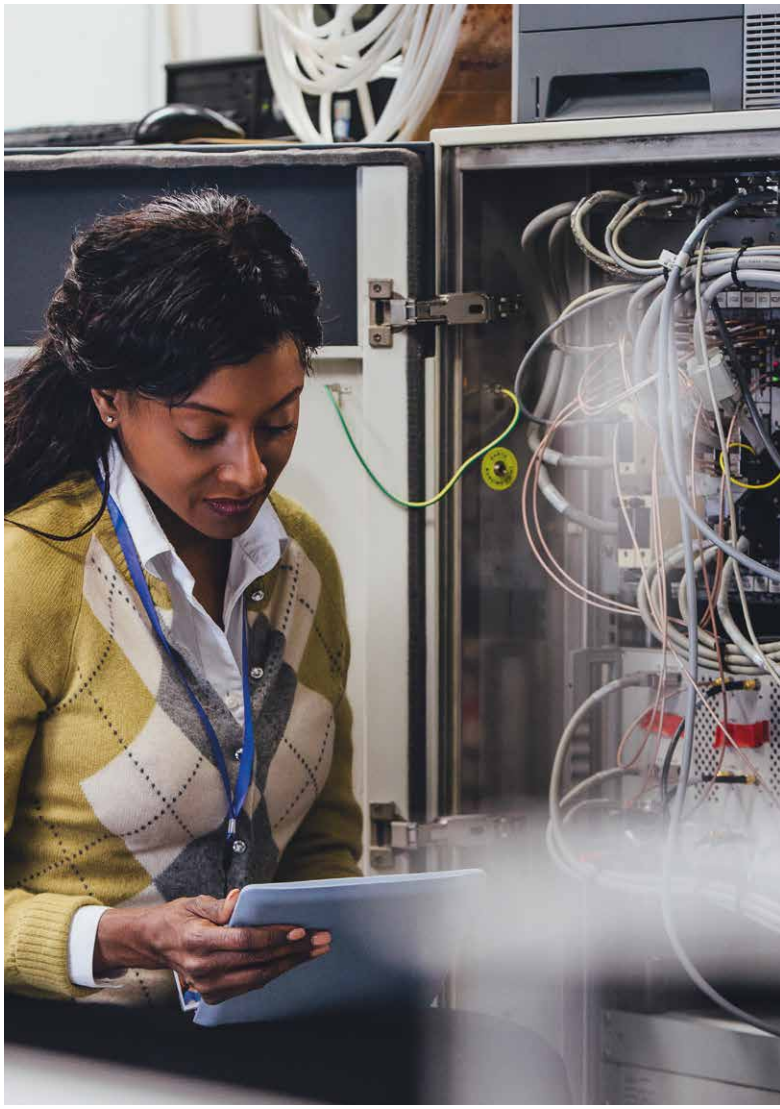
*The cybersecurity skills shortage is reaching epidemic proportions, but how have we reached this point? Conventional wisdom says that the problem begins at school with too few students studying foundational STEM subjects, but several other issues are just as important – not least of these is a stunning degree of complacency in the very organizations that should be driving demand for new generations of cybersecurity experts.*

*Organizations can't afford to underestimate their exposure to cyberattacks and should be championing the importance of cybersecurity while also investing in training to upskill their cybersecurity specialists.*

*Experts with the right specialist skills are challenging to find. The skills gap will not abate until the available expertise can keep pace with the industry's evolution. A robust technical foundation, up-to-date certifications, a willingness to develop, and the ability to learn and adapt are all key skills a cybersecurity professional needs to be successful. Retaining professionals with these multidisciplinary skills should be high on the business agenda.*

*Increasing female representation is one part of the solution to the cybersecurity skills crisis – but also the wider technology industry. One way to ensure a larger influx of available and skilled talent is for the industry to promote IT security as an attractive career path.*

*At the same time, organizations should consider how they can support female IT professionals looking for careers in cybersecurity. Offering networking, mentorship or training opportunities are all tools that businesses can use to create a balanced workforce.*



**One-in-six women think that a career in cybersecurity would be dull**

# Conclusion: Calling all role models...

Our research has shown that young women have a wide range of transferable skills. They have drive, ambition and want to work in a career they are passionate about. Meanwhile, cybersecurity firms want to recruit and are looking for candidates with passion, skill and enthusiasm.

So, what's the problem? What's going wrong in the career choice chain?

It's clear that, somewhere along the line, a link is being missed. Whether that be during school, university, or after finishing education, the dots aren't quite being connected, resulting in significantly more women than men dropping out of the system.

That vital connection, we believe, has three core strands which all need to come together for change to occur:

- **There is a need for cybersecurity to be better positioned as a viable career choice for young women**
- **The career itself needs to be promoted among young women, by women, and the industry as a whole**
- **Young women need to be made aware of, and get help developing, the skills required to work in the industry**

Crucial to tackling all of these changes and the common strand that weaves through each issue, is the importance of role models. The overwhelming evidence from our research suggests that women, more so than men, seek out gender role models and have the desire to work in an environment that has an equal male/female split.

At the moment, that's not something that the cybersecurity industry can offer them. But it's something that can change if women already in the industry are willing to act as role models in the future. Businesses, of course, also have a vital role to play in promoting their female employees and giving them support. Working more closely with schools and universities to position the right information, at the right time, in the right way, is something that the industry needs to ensure is happening.

We believe the effectively connecting the dots between the main barriers to entry will go a long way towards not only narrowing the cybersecurity gender divide, but also the overall skills shortage in the industry.

Women have plenty to offer the cybersecurity world and it's about time they were more equally represented. Businesses, and the industry in general, will certainly be better off for it.

## Kaspersky Lab would like to thank the following organisations for their support:

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