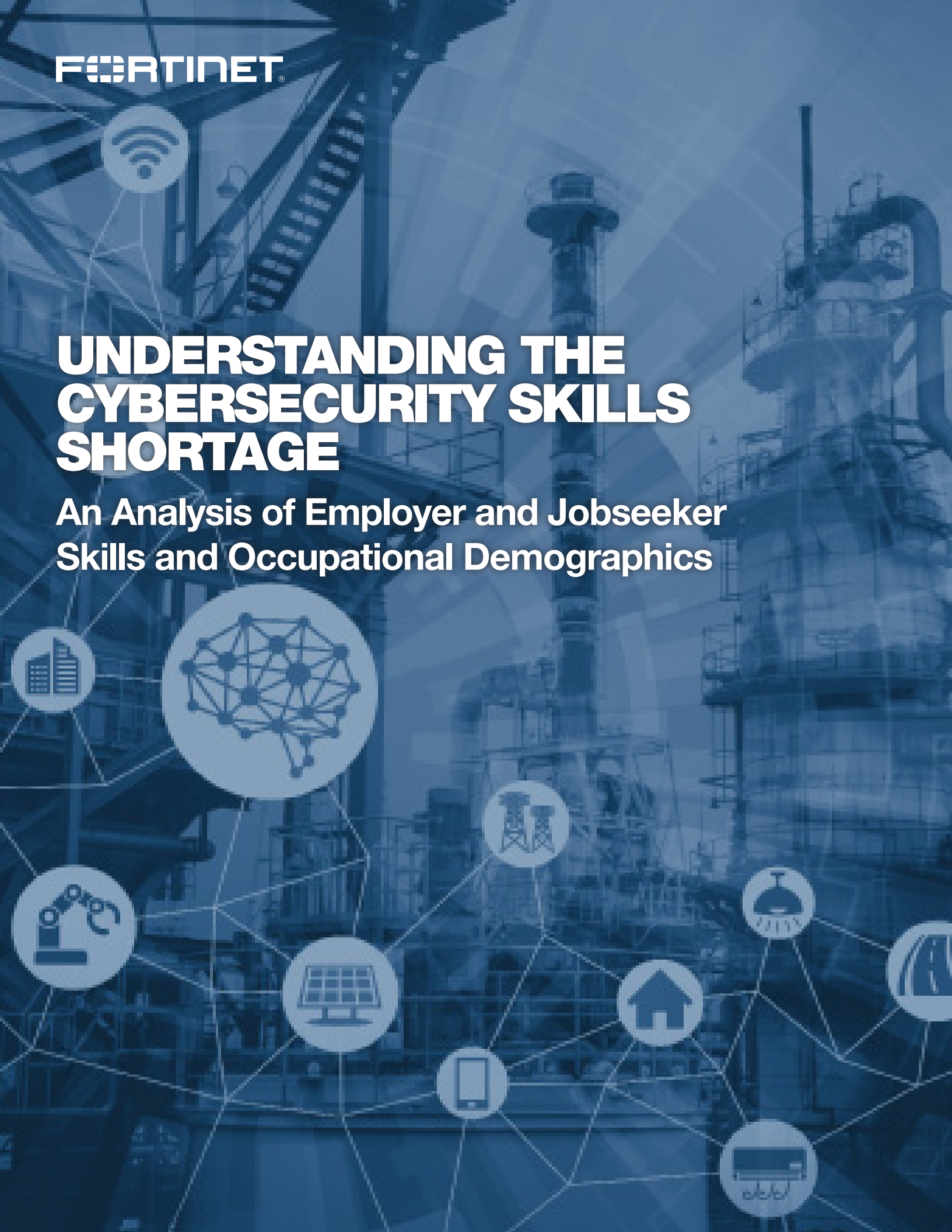


# **UNDERSTANDING THE CYBERSECURITY SKILLS SHORTAGE**

**An Analysis of Employer and Jobseeker  
Skills and Occupational Demographics**



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## EXECUTIVE SUMMARY



- This first report in a multi-part series, which appraises various cybersecurity occupations using natural language processing (NLP), examines the role of the CISO from the vantage point of employer job ads and CISO resumes. Findings show that the role and prominence of the chief information security officer (CISO) continues to expand and transform. CISOs are no longer seen as technologists tasked to manage their organizations' security risks. Much more than security tacticians, CISOs are seen as business strategists who reach across organizational boundaries to build business-level relationships and orchestrate business strategies that enable digital transformation and govern compliance-related issues.

### Core takeaways from the analysis include:

- Employers and CISO list virtually the same number of aggregate hard and soft skills—**20.52 vs. 20.36**. However, employers include **fewer hard skills** (12.72 vs. 14.62 or 15% less) and **more soft skills** (7.8 vs. 5.74 or 36% more) than CISOs. The former stands in contrast with other occupational studies where hard and soft skills rank higher for employers. (It is also noteworthy that 17 of the top 20 aggregate top skills are soft skills for employers, whereas only 6 of the top 20 aggregate top skills are soft skills for CISOs.) This deviation likely represents a turn by employers to find CISOs who are **more than technology tacticians** but rather **business strategists**.
- In terms of **hard skills**, our analysis reveals an interest by **employers** in **compliance** (8 of the top 20 hard skills), **incident and response management** (2 of the top 20), and **data protection** (2 of the top 20). These indicate an **aptitude for business processes and strategy** as well as the reality that **malicious intrusions and data breaches are inevitable**. In the case of the latter, employers seek CISOs who know how to minimize the impact and quickly remediate the issues.

<sup>1</sup> "2018 Skills Gap Report: An Analysis of Job Ads & Resumes," LiveCareer, November 2017

- Utilizing a soft skills quadrant approach that categorizes soft skills into one of our quadrants, our analysis shows there is a higher prevalence of soft skills—in terms of total percentage of job ads and resumes (**92.5% and 91%**) as well as frequency of occurrence (**4.67 and 4.13**)—in the Leadership Quadrant for both employers and CISOs (9 out of 20 top soft skills in each case). As **Leadership Quadrant** soft skills relate to more strategic functions, such as coaching and mentor, overseeing business process planning, and building cross-functional business relationships, this emphasis simply represents the change in focus for the CISO.
- Top soft skills employers seek in CISO candidates are **leadership, communications, and planning** (all appear over 50% of the time in job ads).
- When it comes to hard skills, **risk management** and **operational skills** rank on the leaderboard (8 of the top 20 fall into these two groups and appear in 60%-plus of resumes).
- When soft skill emphases for employers and CISOs are compared, the **biggest deviation** is the **Personal Characteristics Quadrant** (87.5%). While employers place a premium on Leadership Quadrant skills, they also value the **personal character/integrity** of their CISOs. Interestingly, the soft skills quadrant with the lowest deviation is the Leadership Quadrant (40%).
- Our examination of **educational degrees** and **certifications** shows that most employers want CISOs with two advanced degrees (with CISOs listing an average of 1.5 on their resumes). CISOs seem to be stuck in the past when it comes to certifications, including almost twice as many as employers list in job ads. While certifications may be critical for other members of the CISO's team, their importance to driving business strategy and transformation do not rank as high for employers.
- The analysis confirms red flags that others have raised in recent years about the **career tenure** and **job hopping** of CISOs. It's a problem, and it appears to be getting worse (**30-month average tenure over the past five years** compared to a **17-month tenure over the past two years**).



- The **CISO gender gap** is a serious challenge facing organizations today. Only **7%** of the CISO resumes were from women. Our data confirms that gender diversity is valuable, with **female CISOs scoring higher than their male counterparts in all four soft skill quadrants**: in the case of the Leadership Quadrant (46% more) and Analytical Quadrant (150% more), the difference is substantial (46% more and 150% more respectively). Although there are numerous reasons for the gender gap, employers can help by writing job ads that are more gender inclusive. For example, there are more than **twice as many male-gendered terms** in job ads than **female-gendered terms**.

<sup>2</sup> "Defining and Writing Effective Job Descriptions," Fortinet CISO Hiring Guide Series, April 2018.

## IMPACT OF SECURITY SKILLS SHORTAGE

It's no secret that cyber-attacks are growing in frequency and sophistication. In the last quarter of 2017, there were nearly 6,000 critical and high-severity exploits, more than 17,000 unique malware variants, and 500 daily botnet communications. At the same time, the destructive impact of these and other cyber-attacks is growing exponentially. To address these security challenges, along with the need to keep pace with an evolving and growing attack surface, security organizations are adding more and more point security products to their security infrastructures. The average enterprise uses 75 security products to secure their network today.

Not surprisingly, the need for cybersecurity professionals—particularly those with certain specific skillsets—has never been greater. Yet, the availability of skilled cybersecurity professionals is not keeping up. The global shortage of cybersecurity professionals is expected to reach two million by 2019. The effects of that shortage vary, but many are serious. More than half of organizations report delays as long as six months to find qualified security candidates. The shortage of qualified cybersecurity staff is even slowing migration to the cloud for 40% of IT professionals. Such shortages increase the likelihood of a cybersecurity disaster. One report revealed

that one in four organizations using Infrastructure as a Service (IaaS) or Software as a Service (SaaS) have experienced data theft from the public cloud.

The effects of malicious attacks on organizations are many:

- Angry customers (and lost customer confidence)
- Decreased productivity and operational efficiency
- Diminished revenue
- Damaged corporate reputations and public scrutiny
- Legal issues

So, the question facing CEOs, boards of directors, CISOs, and CIOs is, "What can you do to find the security professionals with the skillsets you need?"

The IT security function is understaffed;

**70%** of organizations surveyed say they do not have enough IT security staff.

<sup>3</sup> "Threat Landscape Report Q4 2017," Fortinet, January 2018.

<sup>4</sup> Kacy Zurkus, "[Defense in Depth: Stop Spending, Start Consolidating](#)," CSO Online, March 14, 2016.

<sup>5</sup> "[2016 Cybersecurity Skills Gap](#)," ISACA, January 2016.

<sup>6</sup> "State of Cybersecurity: Implications for 2015," ISACA and RSA Conference Survey, 2015.

<sup>7</sup> Alison DeNisco Rayome, "[The cybersecurity skills gap caused 40% of IT pros to stall their cloud migrations](#)," TechRepublic, April 15, 2018.

<sup>8</sup> Navigating a Cloudy Sky: Practical Guidance and the State of Cloud Security," McAfee, 2018.

<sup>9</sup> Understaffed and at Risk: Today's IT Security Department," Ponemon Institute Research Report, February 2014.

## USING THIS REPORT SERIES: UNDERSTANDING THE CYBERSECURITY SKILLS SHORTAGE

While much research exists on the cybersecurity skills gap, little has been done to analyze beyond the layer of asking which skills and qualifications are lacking or in the highest demand. The objective of this report series, “Understanding the Cybersecurity Skills Shortage,” is to help fill this void and provide actionable insights to provide boards of directors, business executives, CIOs, and CISOs with an understanding of the cybersecurity skills and qualification gaps across the most predominant cybersecurity occupations. Indeed, no matter how many applicants there are, prospects without the necessary qualifying skills and background simply cannot fill all of the open job requisitions today—let alone those in the future.

Yet, with a better understanding of what skills and qualifications are in the hottest demand, along with insights on job hopping and factors such as gender bias in job ads, organizations can hone their approach to find and hire the most qualified candidates to meet their cybersecurity needs.

**“Business leaders must urgently rethink how they recruit and retain talent, particularly if they wish to maximize the benefits from investment in digital transformation.”<sup>11</sup>**

## THE METHODOLOGICAL APPROACH TAKEN: NLP

The “Understanding the Cybersecurity Skills Shortage” report series examines the skills and qualification gaps across 10 different cybersecurity occupational areas:

- Chief Information Security Officer (CISO)/Chief Security Officer (CSO)
- Security Architect
- VP/Director of Network Engineering/Network Operations
- Director/Manager of Information Security
- Security Administrator
- Penetration Tester/Vulnerability Tester
- Cybersecurity Engineer
- Incident Response Specialist
- Director/Manager of Security Operations
- Director/Manager of Network Operations

While the audience for the report series is the CISO (also known as the CSO), the audience for this first report are those typically responsible for hiring the CISO—CEOs, the board of directors, or CIOs. Our analysis looked at thousands of job ads and resumes using natural language processing (NLP) to highlight top signals for employers and jobseekers and skill-set and occupational gaps. Aspects analyzed include:

- Hard (or technical) skills per employers and jobseekers
- Soft skills per employers and job seekers
- Education and certifications per employers and job seekers
- Average career tenure with a filtered lens for education and certification
- Gender breakdown and presence or absence of gendered language in job ads

<sup>10</sup> “[2018 Skills Gap Report](#),” LiveCareer, accessed April 30, 2018.

<sup>11</sup> Phil Muncaster, “[Cybersecurity Skills Gap Soars as Brexit Bites](#),” InfoSecurity Magazine, February 22, 2018.

## HIRING A CISO: EXPECT A CHALLENGE



The role of the CISO extends well beyond the bounds of simply eliminating security threats. The CISO must also deal with crises and their residual consequences. Not surprisingly, hiring a CISO with the right mix of hard and soft skills, including the ability to communicate with the board and other business executives, is one of the most important investments an organization can make. The CISO will usually have to partner with other executives to ensure that innovation progresses but with acceptable security procedures in place; indeed, hiring a CISO who meets the right balance of business leader and security expert might be the hardest tech role to fill. Although there is no perfect hiring formula, education—including certifications for information security management—and experience, including technical know-how, are critical skills that must be closely examined.

<sup>12</sup> Christophe Veltsos, [“Where the CISO Should Sit on the Security Org Chart and Why It Matters,”](#) January 9, 2018.

<sup>13</sup> Clint Boulton, [“Why CISO is the hardest tech role to fill,”](#) May 20, 2016.

<sup>14</sup> Georg Thomas, [“What ‘qualifies’ a CISO?”](#) September 27, 2017.

<sup>15</sup> Alison Doyle, [“Hard Skills vs. Soft Skills: What’s the Difference?”](#) The Balance Careers, March 21, 2018.

## HIRING A CISO: EXPECT A CHALLENGE

### WHAT SKILLS MATTER TO EMPLOYERS

No longer is the CISO seen as an IT role; the CISO is much broader in scope and includes key performance indicators tied to business measures. CISO skills that may have been highly sought-after a few years ago may not rank as high in importance today. At the same time, skills that weren't on the radar of most employers may be critical requirements for many now.

Skills break into two categories: hard (or technical skills) and soft skills. Hard (or technical) skills are those that can be defined or measured such as risk management, penetration testing, or strategic planning. Soft skills such as analytical, leader, or breaks down organizational barriers are less tangible and harder to quantify.

### TOP SKILLS—HARD, SOFT, AND IN AGGREGATE

When it comes to employers, the shift in focus for a CISO is reflected in the skills employers cite most often in job ads. The top 20 hard skills show a focus on compliance and security information and response, with eight aligning with compliance-related activities (risk, NIST, compliance, security policies, HIPAA, governance, security standards, SOX) and two pertaining to security information and response management. Data protection and privacy also show as relevant with two directly related (privacy, intellectual property) and various others are indirectly connected. Communications tops the top soft skills list (77%) followed by planning (52%). The occurrence percentages drop off dramatically after these first two.

| RANK | TOP HARD & SOFT SKILLS COMBINED | TOP HARD SKILLS            | TOP SOFT SKILLS                                      |
|------|---------------------------------|----------------------------|------------------------------------------------------|
| 1    | Risk, 90%                       | Risk, 90%                  | Leadership, 80%                                      |
| 2    | Leadership, 80%                 | Policies, 80%              | Communications, 77%                                  |
| 3    | Policies, 80%                   | Training, 65%              | Planning, 52.5%                                      |
| 4    | Communications, 77%             | Compliance, 57%            | Interpersonal, 35%                                   |
| 5    | Training, 65%                   | Security Policies, 55%     | Analytical, 25%                                      |
| 6    | Compliance, 57%                 | Incidents, 47%             | Research, 25%                                        |
| 7    | Collaboration, 55%              | Best Practices, 42%        | Personal Integrity, 22.5%                            |
| 8    | Security Policies, 55%          | Budget, 42%                | Problem-Solving, 22%                                 |
| 9    | Planning, 52%                   | Initiative, 42%            | Influence, 20%                                       |
| 10   | Incidents, 47%                  | Operations, 42%            | Critical Thinker, 17%                                |
| 11   | Best Practices, 42%             | Privacy, 42%               | High-Pressure, 17%                                   |
| 12   | Budget, 42%                     | Strategy, 42%              | Manage Multiple Projects Under Strict Timelines, 17% |
| 13   | Initiative, 42%                 | NIST, 32%                  | Negotiation, 17%                                     |
| 14   | Operations, 42%                 | HIPAA, 30%                 | Writing, 17%                                         |
| 15   | Privacy, 42%                    | Governance, 27%            | Alignment, 15%                                       |
| 16   | Strategy, 42%                   | Security Standards, 27%    | Lead and Motivate, 15%                               |
| 17   | Interpersonal, 35%              | ITIL, 20%                  | Liaison with, 15%                                    |
| 18   | NIST, 32%                       | SOX, 20%                   | Mentor, 15%                                          |
| 19   | HIPAA, 30%                      | Intellectual Property, 20% | Scheduling, 15%                                      |
| 20   | Governance, 27%                 | Proactive, 20%             | Nontechnical Audiences, 12%                          |

TOP 20 HARD AND SOFT SKILLS FOR EMPLOYERS

## HIRING A CISO: EXPECT A CHALLENGE

### SOFT SKILLS QUADRANTS

Much research has been conducted and written on the importance of soft skills, and many experts highlight soft skills as a critical linchpin for many organizations today. As part of the data analytics portion for this project, we logged nearly 200 different soft skills that appear in job ads and resumes. Then, based on a quadrant matrix, we broke them into four categories and placed each soft skill into one of the four quadrants: 1) Leadership, 2) Interpersonal/Communications, 3) Analytical, and 4) Personal Characteristics.

| ANALYTICAL                                                                                                                                                                 | LEADERSHIP                                                                                                                                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Average Number of Skills Per Job Ad: 1.27</b></p> <p><b>Occurrence in Job Ads: 60%</b></p> <p>75% of Job Ads: 0 to 2 Skills</p> <p>25% of Job Ads: 3 to 5 Skills</p> | <p><b>Average Number of Skills Per Job Ad: 4.67</b></p> <p><b>Occurrence in Job Ad: 92.5%</b></p> <p>Half of Job Ads: Between 2 and 7 Skills</p> <p>One-Quarter of Job Ads: Between 8 and 11 Skills</p> |
| <p><b>Average Number of Skills Per Job Ad: 1.15</b></p> <p><b>Occurrence in Job Ads: 40%</b></p> <p>75% of Job Ads: 0 to 2 Skills</p> <p>25% of Job Ads: 3 to 5 Skills</p> | <p><b>Average Number of Skills Per Job Ad: 2.95</b></p> <p><b>Occurrence in Resumes: 90%</b></p> <p>Half of Job Ads: Between 1 and 4 Skills</p> <p>25% of Job Ads: 5 to 8 Skills</p>                    |
| PERSONAL CHARACTERISTICS                                                                                                                                                   | COMMUNICATIONS/INTERPERSONAL                                                                                                                                                                            |

JOB AD SOFT SKILLS QUADRANT MATRIX

Three of the top 20 skills employers include in job ads fall into the Communications/Interpersonal Soft Skills Quadrant (communications, collaboration, interpersonal). Of the top 20 soft skills, twice as many Leadership Quadrant Skills are listed than any other quadrant area (see below for more details on the Soft Skills Quadrants):

- Leadership = 9
- Communications/Interpersonal = 4
- Personal Character = 3
- Analytical = 4

Three soft skills top the Top Soft Skills list—leadership (80%), communications (77%), and planning (52%). There is a fairly dramatic fall off after these three soft skills; all other soft skills occur in 35 percent or fewer of job ads. The Leadership Quadrant is dominated by leadership and planning. The Communications/Interpersonal Quadrant is dominated by communications.

<sup>16</sup> Riia O'Donnell, "[Employers' Top Training Priority for 2018? Soft Skills](#)," HRDive, March 13, 2018.

Three soft skills top the Top Soft Skills list—leadership (80%), communications (77%), and planning (52%). There is a fairly dramatic fall off after these three soft skills; all other soft skills occur in 35 percent or fewer of job ads. The Leadership Quadrant is dominated by leadership and planning. The Communications/Interpersonal Quadrant is dominated by communications.

Considering the increasing strategic importance of the CISO in organizations, it should be no huge surprise that the Leadership Quadrant tops the list when it comes to skills occurrence in job ads and the diversity of leadership skills. In the case of the latter, skills occurrence in job ads is about the same for the Communications/Interpersonal Quadrant (92.5% compared to 90%); however, the number and variety of skills is nearly half of the Leadership Quadrant (2.95 vs. 4.67). For the Leadership Quadrant, 50% of job ads have between two and seven leadership skills; 25% have between 7 and 11, a wider and larger number than the other three quadrants.

Employers seek a smaller grouping of Communications/Interpersonal skills than those in the Leadership Quadrant (viz., communications [77%] and interpersonal [35%]); notably, half of all job ads have between one and four communications/interpersonal skills. The need for excellent communications/interpersonal skills cannot be underemphasized: today's CISO must also communicate effectively with key staff members, assess attitudes, create work schedules to rotate personnel off the front lines, and even provide levels of support, stress relief, and career counseling.

While the Analytical and Personal Characteristics Quadrants rank lower in terms of soft skills occurrence, their skills mix is not as divergent. For example, analytical (25%), research (25%), problem-solving (22%), and critical thinker (17%) are closely grouped in the Analytical Quadrant. At the same time, personal integrity (22%), performing in high-pressure environments (17%), dependability (10%), high degree of initiative (10%), prioritize (10%), and work with little supervision (10%) group closely for the Personal Characteristics Quadrant.

## **EXAMINING THE CANDIDATE: CISO RESUMES**

Evaluating CISO candidates requires due diligence. Selecting the wrong CISO candidate can have detrimental repercussions. With the average tenure of a CISO at two years or less, many organizations are obviously making faulty hiring decisions (and CISOs are missing the mark in their selection of employers).

### **TOP SKILLS—HARD, SOFT, AND IN AGGREGATE**

Six of the top 20 skills listed by CISO jobseekers are soft skills, two falling into the Leadership Quadrant (leadership, 76%; planning, 60%), two into the Communications/Interpersonal Quadrant (communications, 49%; collaboration, 43%), and one into the Analytical Quadrant (research, 40%), and one into the Personal Characteristics Quadrant (initiative, 65%). Of the top 20 soft skills, seven fall into the bucket of governance and compliance (risk, compliance, policies, governance, privacy, HIPAA, security policies, NIST).

Eight hard skills appear at a high level of frequency—60% or more. These hard skills spread across multiple functional categories—risk management (risk, compliance, governance, etc.) and operations (operations, budget, training, policies, etc.). Few hard skills related to specific technologies appear (“cloud” is an exception). In terms of the four quadrants, the Leadership Quadrant has the most dramatic range, with 25% of resumes containing less than two leadership skills, half containing two to six leadership skills, and another 25% with between 7 and 12. The ranges for the other three quadrants are much flatter, with none of them exceeding three per resume except for outliers.

<sup>17</sup> Jon Oltsik, [“Cybersecurity Job Fatigue,”](#) February 6, 2018.

Compared to hard skills, the frequency of occurrence for soft skills is much lower, with planning topping the list at 60% and all other soft skills appearing in less than half of the resumes. Only three soft skills appear in frequency over 30% of the time—planning (60%), communications (49%), and research (40%). In terms of types of soft skills, the Leadership Quadrant touts twice the number of skills in the top 20 than the other three Soft Skills Quadrants:

- Leadership = 9
- Communications/Interpersonal = 4
- Personal Character = 3
- Analytical = 4

| RANK | TOP HARD & SOFT SKILLS COMBINED | TOP HARD SKILLS            | TOP SOFT SKILLS            |
|------|---------------------------------|----------------------------|----------------------------|
| 1    | Risk, 84%                       | Risk, 84%                  | Planning, 60%              |
| 2    | Operations, 77%                 | Operations, 77%            | Communications, 49%        |
| 3    | Compliance, 76%                 | Compliance, 76%            | Research, 40%              |
| 4    | Budget, 75%                     | Budget, 75%                | Mentor, 29%                |
| 5    | Leadership, 72%                 | Policies, 69%              | Focused, 23%               |
| 6    | Policies, 69%                   | Initiative, 65%            | Business Process, 22%      |
| 7    | Initiative, 65%                 | Strategy, 63%              | Change Management, 22%     |
| 8    | Strategy, 63%                   | Training, 62%              | Negotiation, 22%           |
| 9    | Training, 62%                   | Governance, 52%            | Alignment, 18%             |
| 10   | Planning, 60%                   | Privacy, 46%               | Customer Service, 16%      |
| 11   | Governance, 52%                 | HIPAA, 45%                 | Prioritize, 15%            |
| 12   | Communications, 49%             | Security Policies, 45%     | Assess, 13%                |
| 13   | Privacy, 46%                    | Best Practices, 42%        | Service Delivery, 13%      |
| 14   | HIPAA, 45%                      | NIST, 41%                  | Writing, 13%               |
| 15   | Security Policies, 45%          | Cloud, 39%                 | Coach, 12%                 |
| 16   | Collaboration, 43%              | SOX, 35%                   | Champion, 9%               |
| 17   | Best Practices, 42%             | Project Management, 31%    | Performance Management, 9% |
| 18   | NIST, 41%                       | Security Architecture, 27% | Partner with, 7%           |
| 19   | Research, 40%                   | Security Controls, 27%     | Analytical, 6%             |
| 20   | Cloud, 39%                      | Security Operations, 26%   | Influence, 6%              |

TOP HARD AND SOFT SKILLS FOR CISO JOBSEEKERS

## SOFT SKILLS QUADRANTS

The Leadership Quadrant has a higher frequency occurrence across resumes as well as number of skills included per resume. The latter is dramatically higher—2.7x—than the other three quadrants. Indeed, the Leadership Quadrant includes more skill mentions than the other three quadrants combined (4.13 to 2.9).

Planning (60%) occurs more than twice as often as any other Leadership Quadrant soft skill (next closest is “mentor” [29%]). What’s interesting here is that the volume of skill mentions (4.13 per resume on average) is quite high. Thus, outside of “planning,” CISO jobseekers use a myriad of different Leadership Quadrant soft skills (starting with mentor, 29%; change management, 22%; alignment, 18%).

For the Communications/Interpersonal Quadrant, four skills occur at a much higher frequency than other soft skills—communications (49%), negotiation (22%), customer service (16%), and writing (13%). For the Analytical Quadrant, three skills dominate the matrix—research (40%), business process (22%), and assessment (13%). In the case of the Personal Characteristics Quadrant, two skills rank significantly over others—focused (23%) and prioritize (15%). There are also a fewer number of Personal Characteristic skills (5) that show up at all (compared to the other quadrants).

| ANALYTICAL                                                                                                                                                                        | LEADERSHIP                                                                                                                                                                                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Average Number of Skills Per Job Ad: .91</b></p> <p><b>Occurrence in Job Ads: 58%</b></p> <p><b>75% of Job Ads: 0 to 1 Skill</b></p> <p><b>25% of Job Ads: 2 Skills</b></p> | <p><b>Average Number of Skills Per Job Ad: 4.13</b></p> <p><b>Occurrence in Job Ad: 91%</b></p> <p>Half of Job Ads: Between 2 and 6 Skills</p> <p>One-Quarter of Job Ads: Between 7 and 12 Skills</p> |
| <p><b>Average Number of Skills Per Job Ad: .45</b></p> <p><b>Occurrence in Job Ads: 40%</b></p> <p><b>75% of Job Ads: 0 to 1 Skill</b></p> <p><b>25% of Job Ads: 2 Skills</b></p> | <p><b>Average Number of Skills Per Job Ad: 1.54</b></p> <p><b>Occurrence in Resumes: 78%</b></p> <p>Half of Job Ads: Between 1 and 2 Skills</p> <p>25% of Job Ads: 3 Skills</p>                       |
| PERSONAL CHARACTERISTICS                                                                                                                                                          | COMMUNICATIONS/INTERPERSONAL                                                                                                                                                                          |

JOB AD SOFT SKILLS QUADRANT MATRIX

## ANALYZING THE GAPS BETWEEN EMPLOYERS AND CISO JOBSEEKERS

Interestingly, employers in their job ads and CISO jobseekers in their resume list virtually about the same number of hard and soft skills in aggregate—20.52 for employers and 20.36 for jobseekers. But there are measurable differences when hard and soft skills are examined individually. In the case of hard skills, CISO jobseekers include 15% more than employers cite in their job ads (14.62 vs. 12.72). The opposite is true when soft skills are examined: employers list 36% more soft skills in job ads than CISO include in their resumes. This likely signals changes regarding the role of the CISO from security tactician and technological delivery to strategic enabler. Here, soft skills are tied to this transformation, as employers place a higher premium on soft skills versus hard skills; CISO jobseekers are making this transition more slowly than employers.

### AVERAGE NUMBER OF SKILLS PER JOB AD AND RESUME

|                                                             |                                                            |                                                              |
|-------------------------------------------------------------|------------------------------------------------------------|--------------------------------------------------------------|
| <b>Hard Skills</b><br>12.72 for<br>Employers<br>Per Job Ad  | <b>Soft Skills</b><br>7.8 for<br>Employers<br>Per Job Ad   | <b>Total Skills</b><br>20.52 for<br>Employers<br>Per Job Ad  |
| <b>Hard Skills</b><br>14.62 for<br>Jobseekers<br>Per Resume | <b>Soft Skills</b><br>5.74 for<br>Jobseekers<br>Per Resume | <b>Total Skills</b><br>20.36 for<br>Jobseekers<br>Per Resume |

### SOFT SKILLS DEVIATIONS

On average, employers list a broader number of skills in job ads than CISO jobseekers (half of employers list between 11 to 30 vs. half of jobseekers including between 13 to 24). In particular, employers seek a number of soft skills that CISO jobseekers fail to cite in their resumes at the same level of frequency. Indeed, employers score higher than CISO jobseekers in all four Soft Skill Quadrants (based on average number of skills in each quadrant):

- Leadership, 6.7 vs. 4 (40% deviation)
- Communications/Interpersonal, 5 vs. 1.5 (70% deviation)
- Analytical, 3.3 vs. .9 (73% deviation)
- Personal Characteristics, 3.2 vs. .4 (87.5% deviation)

While the Leadership Quadrant dominates the other three quadrants in frequency of occurrence and volume, the Communications/Interpersonal and Personal Characteristics Quadrants rank the highest in percentage difference with CISO jobseekers (starting with “personal integrity” at 22.5%). CISO jobseekers need to find ways to articulate their attributes in these two areas more effectively in their resumes.

## ANALYZING THE GAPS BETWEEN EMPLOYERS AND CISO JOBSEEKERS



For employers, only three of the top 20 skills are hard skills (incident response, 22.5%; policies and security policies, 11% and 10%). Topping the list in the first two slots are interpersonal (34%) and communications (28.5%) skills. Soft skills aren't confined to one or two quadrants (17 in total), but rather spread across each:

- Leadership, 3
- Communications/Interpersonal, 6
- Analytical, 3
- Personal Characteristics, 5

### HARD SKILL DEVIATIONS

With threats often advancing faster than vulnerability patching and unknown threats growing at exponential rates, it is almost impossible to avoid malicious intrusions and data breaches. It makes sense that employers are seeking CISOs who not only can stop attacks but minimize and remediate intrusions and breaches when they occur. Yet, for enterprises wanting CISOs with security information and event management experience, the data seems to indicate there is a supply-demand problem (25.5% difference).

CISOs overemphasize hard skills in their resumes when compared to what employers include in job ads. Fourteen of the top 20 skill differences are hard skills (starting with cloud at 36.5%, operations at 34.5%, and budget at 32.5%, and governance at 24.5%). In the case of hard skills, CISOs place a higher premium on governance and compliance issues (governance at 24.5%, compliance at 18.5%, HIPAA and SOX at 15%, security controls at 14.5%) and operational issues (operations at 34.5%, budget at 32.5%, security operations at 21%, project management at 16%).

## ANALYZING THE GAPS BETWEEN EMPLOYERS AND CISO JOBSEEKERS

| SKILLS CITED BY EMPLOYERS MORE OFTEN                   | SKILLS CITED BY JOBSEEKERS MORE OFTEN |
|--------------------------------------------------------|---------------------------------------|
| Interpersonal, 34%                                     | Cloud, 36.5%                          |
| Communications, 28.5%                                  | Operations, 34.5%                     |
| Security Incidents, 25.5%                              | Budget, 32.5%                         |
| Personal Integrity, 22.5%                              | Governance, 24.5%                     |
| Resource Allocation/Management, 21%                    | Focused, 23%                          |
| Problem Solving, 20.5%                                 | Initiative, 22.5%                     |
| Analytical, 19%                                        | Security Operations, 21%              |
| Confidential Matters, 17.5%                            | Strategy, 20.5%                       |
| High Pressure, 17.5%                                   | Change Management, 19.5%              |
| Manage Multiple Projects Under Strict Timelines, 17.5% | Compliance, 18.5%                     |
| Critical Thinker, 16.5%                                | Project Management, 16%               |
| Lead and Motivate, 15%                                 | HIPAA, 15%                            |
| Influence, 14%                                         | SaaS, 15%                             |
| Nontechnical Audiences, 12.5%                          | SOX, 15%                              |
| Collaboration, 12%                                     | Research, 15%                         |
| Presentation Skills, 11.5%                             | Business Process, 14.5%               |
| Liaison With, 11%                                      | Security Controls, 14.5%              |
| Policies, 11%                                          | Mentor, 14%                           |
| Security Policies, 10%                                 | Vulnerability Assessments, 13%        |
| Dependability, 10%                                     | Security Architecture, 12%            |

LEADERSHIP QUADRANT

ANALYTICAL QUADRANT

COMMUNICATIONS/INTERPERSONAL QUADRANT

PERSONAL CHARACTERISTICS QUADRANT

PERCENT DIFFERENCE IN TOP 20 SKILLS LISTED BY EMPLOYERS AND CISO JOB SEEKERS

### EDUCATION AND CERTIFICATION: SIMILARITIES AND DIFFERENCES

Comparison of education and certifications reveals additional differences between employers and CISO jobseekers. Employers request an average of 1.9 degrees (typically a bachelors and a masters), while jobseekers include an average of 1.5 degrees in their resumes. The opposite is true for certifications: CISO jobseekers include 6.8 on average in their resumes, while employers request 3.6 in their job ads.

The fact that CISO jobseekers list certifications at a rate almost twice as often as employers in job ads is possibly a reflection that they value them more in the staff they recruit than their executive superiors. Couple this with CISO jobseekers including tactical hard skills at a much higher rate than employers (see above), and the divide comes into clearer picture. Too many CISO jobseekers still view their roles as tied to technological delivery rather than as business strategists.

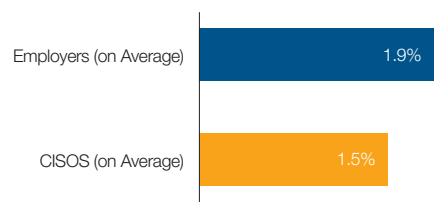
# ANALYZING THE GAPS BETWEEN EMPLOYERS AND CISO JOBSEEKERS

## EDUCATION AND CERTIFICATION: SIMILARITIES AND DIFFERENCES

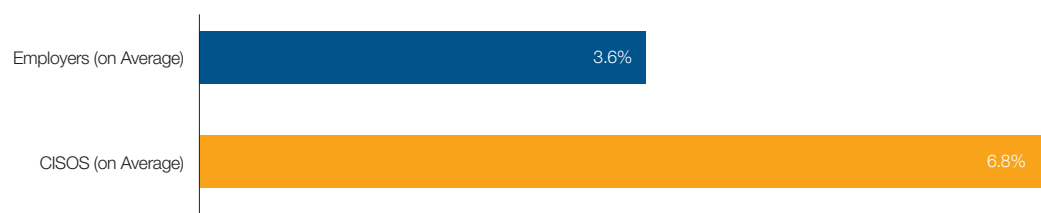
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### Advanced Educational Degrees Listed



### Certifications Listed



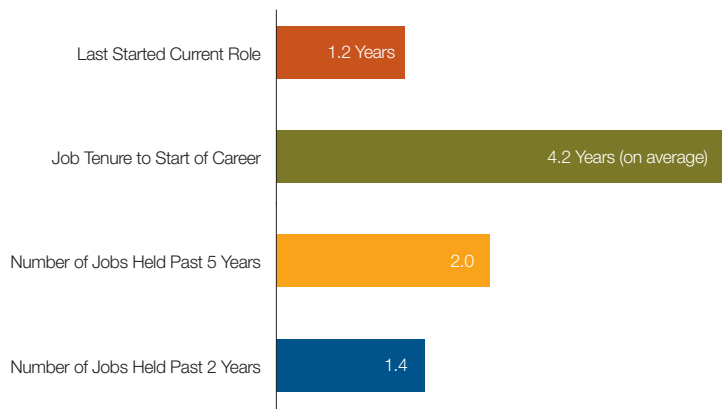
# CAREER TENURE AND JOB HOPPING

## CAREER TENURE AND JOB HOPPING

External data indicates there is a real problem when it comes to CISO tenure. Findings from this study corroborate these claims. The average age of a CISO jobseeker in the resumes analyzed is in the late 30s and early 40s, with their first job 16.8 years ago. They’ve held their latest position an average of 1.2 years.

What our research also found is the problem of CISO tenure seems to be getting worse. Over the past five years, CISO jobseekers have held an average of two jobs (as compared to 1.4 jobs in the past two years). This equates to a career tenure 30 months over the past five years versus 17 months over the past two years.

Graph/Table



The reasons for this change are myriad. A recent survey by ESG and Information Systems Security Association (ISSA) delineates four reasons behind CISOs changing jobs so often: <sup>19</sup>

- Higher compensation packages (38%)
- Lack of a corporate culture dedicated to security (36%)
- Inability to interact with and influence executive staff (34%)
- Inadequate security budgets commensurate with organizational requirements and size (31%)

<sup>19</sup> Jon Oltsik, “[Why Do CISOs Change Jobs So Frequently](#),” CSO Online, January 2, 2018.

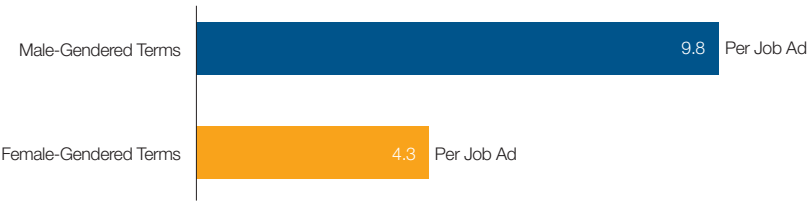
## GENDER GAP

The gender gap in technology is a serious concern, and it is a pressing problem in cybersecurity. And with many female CISOs nearing retirement, the gender gap is expected to become worse.<sup>20</sup> Our analysis parallels other research—female CISO resumes represented only 7% of the total resumes examined.

Our findings also highlight the importance of gender diversity. In the case of the soft skills quadrants, women CISOs score higher in all four when compared to their male counterparts. The biggest difference is the Analytical Quadrant (150% more) followed by the Leadership Quadrant (46% more).

As many of these skills align with employers’ focus on the CISO as a business strategist and enabler, these female candidates should resonate with those hiring leaders. But employers aren’t helping themselves when appealing to female CISO jobseekers. There are more than twice as many male-gendered terms in CISO job ads as female-gendered terms.<sup>21</sup>

### Graph/Table



## CONCLUDING THOUGHTS

Cybersecurity and the role of the CISO are not to be taken lightly. Organizations that fail to do so reap the repercussions. Our analysis of skills and occupational demographics for the CISO from the perspectives of employers and CISOs reveals that employers seek CISO candidates with skillsets that will transform the role of CISO from technologists and tactician to business strategist and enabler.

Having a broad, integrated, and automated security architecture in place is a critical linchpin. The Fortinet Security Fabric enables CISOs to focus on business-related issues and to extract themselves from the mire of being reactive tacticians to proactive business leaders. For more information on the Fortinet Security Fabric, check out the eBook, [“Security Transformation Requires a Security Fabric.”](#)

<sup>20</sup> [“The 2017 Global Information Security Workforce Study: Women in Cybersecurity,”](#) Frost & Sullivan White Paper, 2017.

<sup>21</sup> For a list of male- and female-gendered terms, see D. Gaucher and Aaron C. Kay, “Evidence That Gendered Wording in Job Advertisements Exists and Sustains Gender Inequality,” *Journal of Personality and Social Psychology* 10 (2010): 1-20.

Datalere is a data science, analytics, and business intelligence consulting company specializing in data architecture and modeling. Headquartered in Denver, CO, we partner with businesses from startups to Fortune 500 companies in various industries to use data for advanced analytics that are often leveraged in cloud-enabled environments. Our team of data engineers, data scientists, and business intelligence consultants deliver high-quality analytics, custom software and data applications, and business intelligence and big data solutions. For more information on Datalere, visit [datalere.com](http://datalere.com).



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