HIGHER EDUCATION CHIEF INFORMATION SECURITY OFFICER STUDY

Dr. Wayne A. Brown

CHECS
Center for Higher Education Chief Information Officer Studies, Inc.
2017 Higher Education
Chief Information Security Officer Study

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Foreword by
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Foreword

For the second consecutive year, Information Security is the #1 issue in EDUCAUSE’s Top Ten IT Issues. Information security appears on the EDUCAUSE list every year except 2012 since it first appeared on the list in 2007. Some of the reasons for this are outside the control of the research and education community. Breaches of personally identifiable information from data storage giant Equifax and NSA intelligence rock the foundation of the internet and IT systems and get major play in the news cycle. The attacks themselves have morphed, now focused on targeting the individual (credentials and accounts) as much as or maybe even more than organizational assets (machines), making mitigation safeguards distributed, time-consuming, and expensive. Unfortunately, reducing safeguards on older exploits and threats isn’t an option, as attackers frequently revisit their greats hits. IU’s Vice President for Information Technology Brad Wheeler recently opined, I’ve spent more time in the past 18 months on cybersecurity than I did during the previous 10 years.

To keep up, cybersecurity jobs are in high demand. The need for security professionals is predicted to trend up for the foreseeable future. Research and education organizations must continue to find and develop information security professionals to meet the current and future needs of protecting vast information technology networks and services against the backdrop of sophisticated, ongoing, and persistent attacks. The job markets make it more challenging to find and retain skilled information security professionals: the Bureau of Labor Statistics projects the rate of growth for jobs in information security at 37%. In addition, the constant cycle of new attack tactics, techniques and practices make continuous education a necessity for information security professionals.

Organizations must be strategic in their approach to staffing and developing the critical role of Chief Information Security Officer. Understanding the skills, experiences, expectations, and needs of the CISO can provide valuable insight into hiring and retaining CISOs.

In August 2017, CIOs and CISOs from higher education were invited to participate in the CHECS fourth annual CISO survey. Both versions of the survey contained identical questions to gauge similarities and differences in perspective. The results of the survey present an excellent opportunity to better understand the role of the CISO, who fulfills that role, their challenges, concerns and motivations.

I’d like to thank Dr. Wayne A. Brown, the CHECS Advisory Board, and its sponsors for supporting the work of CISOs. The CHECS survey is relevant and comprehensive. The CHECS CISO report provides clear and timely analysis about Information Security leaders in our own institutions and more globally. This allows CIOs and Technical Leaders insight into hiring, developing, and training CISOs. CISOs can use the report to get a better understanding of their role and informal peer review on their priorities. Aspiring CISOs can develop their own skillsets consistent with the findings. The initiative continues to provide value to the higher education community.

Kim Milford
Executive Director, REN-ISAC

2017 Institution Subscribers

In 2016, CHECS began offering a subscription option to higher education institutions. The subscriptions provide access to all of the CHECS research, presentations, and webinars. In addition, subscribers enjoy a vendor-free discussion area and free job postings. All subscribers are given two free resume reviews and can submit information to a dream job file. If you are interested in subscribing, please visit www.checs.org for more information. The 2017 subscribers are listed below.

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Acknowledgements

I became a chief information officer (CIO) in the mid-1990s while serving in the United States Air Force, and I was immediately fascinated with the position, its potential, the people in it, and its interaction with the rest of the organization. In the ensuing years as I moved into the higher education sector, my deep passion for the field never waned.

This year, as I enter retirement, the position continues to hold my interest. I’m excited to be able to devote more time to CIO studies and the other CHECS research, which continually expands. As always, I hope CHECS supporters will find the results interesting and useful.

Thank you to the 2017 survey participants in CHECS’s research: CIOs, Technology Leaders (TL), members of the Institution Management Team (IMT), and Chief Information Security Officers (CISO). Ongoing participation and interest demonstrate this work is critical. The CIO and IMT surveys are in their thirteenth year, TL its ninth year and CISO in its fourth year.

Through my career, independent work and later through CHECS, I’ve had the honor of observing and reporting on the higher education technology leadership profession as it has matured. I know how busy technology executives and other leaders are, and I appreciate everyone taking the time to participate in the research.

I could not continue this work or the other CHECS initiatives without the CHECS sponsors and subscribers and their generous support. The sponsors and subscribers are committed to this research and to the higher education technology professions. If you see one of the CHECS sponsors or subscribers, please be sure to thank them for their help with this work.

I also want to thank the CHECS’s advisory board. I have continued to challenge them with new responsibilities and volunteer opportunities and they never disappoint. The work required to operate a private nonprofit organization is another layer of intense activity on top of the research, writing and presentations. The advisory board has helped shoulder some of the operations work and I am forever grateful to them. The all-volunteer board has devoted countless hours to expand and realize CHECS’s mission: Contributing to the education and development of the CIO in higher education. Our esteemed board of CIOs, CISOs, TLs, Presidents, and sponsor representatives have selflessly shared their thoughts and experiences to benefit the higher education technology leadership field.

Some of our recent innovations include offering our first professional development course in 2017 and we began a ‘color commentary’ series on some of the CHECS research topics. In 2016, we introduced a subscription model, and in 2014, we launched our first Chief Information Security
Officer (CISO) study. We continue to offer a successful webinar series, bringing study results and respected guest panelists together for lively, informative discussions. Our Webinars have been highly popular with registrations filling to capacity. These initiatives are due in part to our distinguished advisory board and our sponsors. Look for more CHECS initiatives soon.

As you may know, CHECS is a nonprofit organization. Funds raised through sponsorships, report sales, subscriptions, and resume services help CHECS in support of its mission. To that end, we have endowed perpetual academic scholarships at four institutions, benefiting technology students at different levels of education. CHECS has donated almost $90,000 to these scholarships, which directly benefits students seeking a technology degree. The scholarships were created to recognize influential technology or education leaders who have left a lasting mark on CHECS’s studies. Through these scholarships, CHECS is helping future technology leaders who may take over the CIO-reins within higher education. As CHECS research has shown, there is little diversity in the technology leadership role. To help promote diversity, two of the scholarship were created to benefit either women and/or minorities. The four scholarships are:

- **The Dr. Trudy Abramson Scholarship**, Nova Southeastern University, Fort Lauderdale, Florida — $1,000 annual scholarship to a doctoral candidate
- **The Dr. Polley Ann McClure Scholarship**, University of Texas, Austin — $1,000 annual scholarship benefiting an undergraduate woman and/or minority
- **The Dr. Detlev H. Smaltz Scholarship**, Florida State University, Tallahassee, Florida — $1,000 annual scholarship to a graduate student
- **The Stephen Pribyl Scholarship Fund**, Excelsior College, Albany, New York — need-based annual scholarship for women and/or minorities

We also want to thank Dr. Herb Smaltz, our chief information officer and institution management team surveys are based on his 1999 doctoral healthcare research. We are ever grateful to Dr. Smaltz. The research, the scholarships, the webinars — these are all efforts in line with CHECS’s mission. Our mission could not be achieved without your continued support. Thank you again.

Best regards,

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Executive Summary

In July 2017, higher education CISOs and CIOs were invited to participate in the CHECS CISO survey. Both surveys contained some identical questions to gather data from the two different perspectives in this report. In addition, results from the CHECS 2017 CIO and Technology Leader research are also presented as a comparison to the CISO.

The average higher education chief information security officer in 2017 was younger than in previous iterations of this work, but there were fewer women. Seventy percent of female CISOs were 51 years old or older, which is a stark contrast to 51 percent of the male CISOs who were 45 or younger. Only nine percent of all CISOs were minorities and one percent were Hispanic, a new low for this research. The average CISO had been in his or her position for five years and three months — the least amount of time among the CIO, TL, and CISO groups. Only 27 percent of CISOs predicted retirement in the next 10 years, another new low result for the CISO research. However, when examining retirement by gender, a different picture emerges. Forty percent of female CISOs predicted retirement in the next decade compared to 25 percent of the male CISOs.

To map the path to the CISO position, CISOs responded to questions regarding how they arrived at the role. Nearly a quarter, 24 percent, were CISOs in their last position. More than 80 percent of the respondents followed an IT department career path, and 84 percent had worked in an IT department two jobs prior to their current position. Three quarters of the respondents (75 percent) worked in higher education in their last position, a similar course was identified in CHECS’s 2017 CIO study. The average CISO had spent more than 22 years working in IT departments and 49 percent of them were internal candidates for their current position. This result is the lowest level in the four years this research has been conducted. Almost 40 percent of the CISO respondents held the CISO title.

An advanced education has been important for CIOs, and CISOs have heard that message. While only 57 percent of the CISOs thought an advanced degree was required for their position, 70 percent of them had an advanced degree, a new high for this research. In contrast, only 41 percent of CIOs indicated an advanced degree was required for a CISO. There were 45 percent of the CISOs who thought a technology major was required for the CISO and CIOs overall agreed by response with that assessment. Thirty-nine percent of the CISOs indicated they had a technology major.

The CIO viewed the CISO as a technical and policy-focused position while the CISO, who performs the role, viewed it as a position requiring soft skills. Incidentally, the CIO faces this same dichotomy when CHECS compares the responses by CIOs and IMTs regarding CIO-required skills. There were some differences in the skills the IMT respondents indicated a CIO needed and the skills the CIOs believed the CIO needed. This difference of opinion is important because IMT members may be interviewing, hiring, and supervising CIOs.

The CISOs were asked what activities should be undertaken for an aspiring CISO. The most frequently selected response (83 percent) was On-the-job training. Eighty-four percent of the CISOs selected Mentored by a CISO. The third most frequently selected answer was Professional
development at 80 percent. In CHECS's CIO research, the two most frequently selected methods to prepare for the CIO role were Mentoring and On-the-job training.

The CISOs were asked which security model(s) they used. The two most widely used models were NIST (31 percent) and a combination of models (24 percent). The CISOs were indicated the value of the security model(s) they were using. CISOs rated their security models from Least valuable to Very valuable. Fifty-four percent of the CISOs found their security model to be Valuable while none of the respondents indicated their model was Least valuable.

The CISOs were also asked to rate their security program maturity. There were 19 percent of the CISOs who considered their security program to be Mature or a Leader and another 29 percent indicated their security program was Ad hoc or Under Development. The single largest answer, 52 percent, was the program was Improving. The percentage of CISOs who viewed their program as mature, or a leader, increased by five percent since 2014. The CIOs provided their point of view about the maturity of their security program and their responses were similar to those of the CISOs. Only 18 percent of the CIOs considered their security program Mature or a Leader. There were 34 percent of the CIOs who indicated their program was Ad hoc or Under Development. The single largest answer was Improving at 48 percent.

In this research, there were a group of CIOs (19 percent) who served as the CIO and were also the CISO. Among that group, 18 percent of CIOs considered their program to be Mature and six percent of them rated their program a Leader. There were 42 percent of the CIO/CISOs who viewed their program as Ad hoc or Under Development. Another 35 percent said their program was Improving. On the surface, these CIOs appear to be doing two very demanding and complex full-time jobs. Attempting to perform both functions may be too much for one person and, thus, the program maturity may suffer.

The percentage of all three groups who suffered a data breach was higher than the disruption results except for the CIO who also served as the CISO. There were 27 percent of the CISOs and 24 percent of the CIOs who had suffered a breach in the past three years. Given the lack of resources and people devoted to information security, it is surprising only six percent of the CIOs who served as the CISO reported a breach.
INTRODUCTION

Through this research, CHECS has learned that the higher education chief information security officer (CISO) is similar to the higher education chief information officer (CIO) from the mid-1990s. The CISO also bears some resemblance to the 2017 CIO. The two groups suffer misunderstandings about the skills and education required to serve in the positions. For instance, while the CIO’s peers or supervisors on the institution management team (IMT) believe technical knowledge is very important, technical knowledge often does not make the CIO’s top five list of required CIO skills. CISOs have a similar challenge in that the CIO (who supervises the vast majority of CISOs) believes a CISO should be very technical, yet the CISO indicates more soft skills are needed for their jobs. The literature on the higher education CISO is sparse and some of it is based on small sample sizes or anecdotal information. It is obviously an important role and security threats to higher education institution systems is real.

The CISO position and the people in it have risen through the IT department and predominantly in higher education. The position, although not necessarily novel, continues to mature. There is a great deal of speculation that the CISO position should report to the President and serve on the IMT. Indeed, IBM reported there was a drive to expand CISOs’ responsibility so it was not only a defensive position (van Zadelhoff, Lovejoy, & Jarvis, 2013). However, that reality has not arrived in higher education.

In July 2017, higher education CISOs and CIOs were invited to participate in a CHECS CISO survey. Both surveys contained some identical questions to gather data from the two different perspectives. In addition, results from the CHECS 2017 CIO and Technology Leader research are also presented in this report as a comparison to the CISO (Brown, 2017a, 2017b).

This report is divided into three primary sections. The first section examined CISO characteristics. The second reviewed the security programs at institutions, and the final section reported on the importance of CISO roles and their effectiveness operating in those roles based on CISO and CIO assessments.
CHARACTERISTICS OF THE CISO

Age

During the four years this research has been conducted, it was found the higher education CISOs were overall a younger group than higher education CIOs. In fact, in 2017, the percentage of CISOs who were 51 or older dropped to a new low of 33 percent (chart below). In comparison, the average higher education president was 61.7 years old ("Almanac Issue 2016-2017," 2017).

Chart 1. Age of CISOs
The chart below depicts the percentage of CISOs who were 51 years old or older for the four years this research has been conducted.

**Chart 2. CISOs 51 Years Old or Older, 2014-2017**

The chart below depicts a comparison of CISOs, Technology Leaders (TL), and CIOs who were 51 years old or older in 2017. The TLs are defined as the individuals in the next organizational layer down from the CIO. Two-thirds of CIOs were 51 years old or older, while 52 percent of TLs were in that same age group.

**Chart 3. TL, CISO, and CIOs over 51 Years Old in 2016**

**Gender**

As found in all the CHECS research, higher education technology leadership positions are overwhelmingly held by men. The percentage of women who were CIOs reached a near low of 22
percent in 2017 and that downward trend may continue given several factors discussed in the CHECS CIO report. The percentage of female CIOs is not representative of higher education in general. In comparison 30 percent of higher education presidents and 54.6 percent of faculty and staff were women ("Almanac Issue 2016-2017," 2017).

The CISOs were also following a downward trend for the percentage who were women. In 2017, only 11 percent of the CISOs were women (chart below). This disparity is even more pronounced compared to technology students in 2015 where more than 56 percent of higher education students were women ("Almanac Issue 2015-2016," 2015).

**Chart 4. Gender**

![Pie chart showing gender distribution of CISOs from 2014 to 2017]

The chart below depicts the percentage of female CISOs from 2014 to 2017. The percentage has declined from 19 percent to 11 percent in the four years this research has been conducted.

**Chart 5. Female CISOs, 2014-2017**

![Line chart showing percentage of female CISOs from 2014 to 2017]

In 2017, the percentage of female CIOs declined to a near low (chart below). For the TLs, the percentage of females was more than triple that of the CISOs.
In the chart below, the CISO respondents are broken down by gender and age group. As with CIOs, the female CISOs tended to be older with 70 percent of them reporting they were 51 years or older. This high concentration of the female CISOs in older age ranges may have a negative impact on the percentage of female CISOs in the future. In comparison, 51 percent of the male CISOs were 45 years old or younger.

**Chart 7. CISO Age and Gender**

**Race**

Higher education technology executives are not a racially diverse group. Eighty-three percent of the CISOs were White. The other races only accounted for nine percent, while seven percent declined to answer (chart below). In comparison, 66.9 percent of higher education freshman and 73.4 percent of faculty and staff were White ("Almanac Issue 2016-2017," 2017).
The percentage of CISOs who were minorities has fluctuated between five and nine percent. The chart below depicts the percentage of CISOs who were minorities from 2014-2017.

The 2017 percentage of minorities holding the CISO, TL, and CIO positions are depicted in the chart below. The small percentages of minorities in these roles do not reflect the population they work with or the population they serve.
The CISOs were asked whether they were Hispanic. The results are in the chart below. One percent of the CISOs reported they were Hispanic. Another three percent declined to answer. There were 7.5 percent of faculty and staff who were Hispanic ("Almanac Issue 2016-2017," 2017). The percentage of higher education students in the United States who were Hispanic was more than 15 percent in 2017 ("Almanac Issue 2016-2017," 2017).

**Chart 11. Percentage of Hispanic CISOs**

The chart below shows the percentage of CISOs who were Hispanic from 2014 to 2017. The result has ranged from one percent in 2017 to nine percent in 2016.
Hispanic CISOs, TLs, and CIOs are presented in the chart below.

**Chart 13. Percentage of Hispanic CISOs, TLs, and CIOs in 2017**

**Institution Types**

The CISO is a new position in higher education. In some institutions, it may not exist at all despite cyber threats becoming more prevalent. The increased threat creates a need for a dedicated position to be funded and filled. Nevertheless, the CISO position may not found in every institution or in significant numbers among every institution type. In fact, in many institutions, the CIO continues to be the executive who is responsible for information security. With that dual-role environment in mind, the represented organizations in this study did not reflect the overall makeup of U.S. higher education institutions. For example, this study had a majority of responses (52 percent) from doctorate level institutions while, according to the *Chronicle of Higher Education*, only six percent of institutions in 2012 were doctorate level. The following chart illustrates the higher education institution types in the United States according to the *Chronicle of Higher Education* and the responding CISOs in 2017 (*Almanac Issue 2012-2013*, 2012).
Tenure

The average time in current position for the CISO, TL, and CIO is depicted in the table below. In CHECS’s recent CIO study, tenure for that group rose to six years and nine months. The TLs were the second longest average tenure at six years and one month. The CISO’s average tenure was the shortest of the three groups at five years and three months, which speak to a contemporary role. In comparison, the average higher education president spent 6.5 years in their position ("Almanac Issue 2016-2017," 2017).

Table 1. Tenure in Current Position for 2017

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<td>6</td>
<td>6</td>
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<tr>
<td>Months</td>
<td>3</td>
<td>1</td>
<td>9</td>
</tr>
</tbody>
</table>

Although the CISO tenure rose in 2015, it leveled off in 2016 and 2017. The chart below depicts the tenure in current position for the CISOs from 2014 to 2017.
Retirement Plans

Fifty percent or more of the higher education CIO population have consistently predicted their retirement in the next 10 years. With CISOs, however, retirement is not on a foreseeable horizon; 27 percent of them predicted retirement in the decade (chart below). There may be many reasons for the difference with the most obvious being that the CISOs were a younger group than the CIOs.

Chart 16. CISO Retirement Plans

The percentage of CISOs predicting retirement in the next 10 years had remained constant in the mid-30 percent range until 2017 drop. The results are depicted in the chart below.

Chart 17. Percentage of CISOs Retiring in 10 Years, 2014-2017

A comparison for the 10-year retirement projection for CISOs, TLs, and CIOs is depicted in the chart below. Consistent with prior CIO studies, that projection remained at 53 percent in 2017.
It is always constructive to review data by gender. The retirement plans for men and women CISOs are depicted in the chart below. In the next decade, 40 percent of the female CISOs plan to retire versus 25 percent of the male CISOs. This prediction aligns with the age differences reviewed earlier in this section of the report. Unless there is an equivalent influx of women into this role, if this result comes to fruition, future studies may find a percentage reduction for women CISOs.

Chart 18. Projected Retirement in Next 10 Years

Chart 19. CISO Retirement Plans by Gender
The following chart depicts the CISO retirement plans by age groups and gender. A comparison between the genders is difficult because all female CISOs were represented in four age groups – 41-45, 51-55, 56-60, and 61-65 – while men were represented in age groups from 26-30 through 61-65.

When limiting the analysis to the age groups where women were represented, there were some differences between the genders. For instance, 33 percent of the women between the age of 51 and 55 were predicting they would retire within the next 10 years, while 50 percent of the men in that same age range had the same retirement plans. In the 56 to 60 age range, more male CISOs (83 percent) predicted retirement in the next 10 years compared to female CISOs (50 percent).

**Chart 20. CISO Retirement Plans by Gender and Age**
Previous Positions

The study gathered information regarding the CISOs last two positions. By collecting this data, a potential trend for a career path may emerge. There were 24 percent of CISOs who were CISOs in their last position (chart below). Over 80 percent of the CISO positions were filled by people who had served in traditional IT department positions in their last job. This result is similar to CIOs.

Chart 21. Titles Held Prior to Current CISO Position

The chart below reflects the job titles CISOs held two positions prior to their current post. This list is more varied than the chart above. However, 84 percent of the respondents indicated they held positions typically found in an IT department. Clearly, the path to become a CISO has been carved through the technology department. Auditor, consultant, and military combined accounted for 16 percent of the responses.
CISO Sector for Last Position

The study collected data regarding the CISO’s last position industry. A choice of five sectors was provided:

- *Higher Education*
- *Public (local, state, or federal government)*
- *Healthcare*
- *Commercial/for profit*
- *Nonprofit outside of higher education.*
The figure below depicts the responses by sector. The majority of CISOs, 75 percent, came from *Higher Education*. Another 13 percent of CISOs were from the *Commercial/for profit* sector. The other three sectors collectively accounted for 12 percent of the CISOs. Clearly, the higher education CISO rose through the ranks of a higher education IT department.

**Figure 1. CISO Sector for Their Last Position**

During the four years the CHECS CISO research has been conducted, the percentage of CISOs whose last position was in the commercial sector has declined by 12 percent (chart below). This decline could be related to the increasing maturity of higher education information security professional development programs and career paths.

**Chart 23. CISO Commercial Sector for Their Last Position, 2014-2017**
In the CHECS CIO research, the higher education CIOs also provided information regarding their last position sector. The following chart compares the sectors CIOs and CISOs migrated from to their present position. The results were similar. There were 75 percent of the CIOs who were from Higher Education and 73 percent of the CISOs who were from Higher Education. The difference between the two groups for those who came from the commercial sector was four percent.

**Chart 24. CISO and CIO Sector for Their Last Position**

![Chart Title](chart)

<table>
<thead>
<tr>
<th>Sector</th>
<th>CIO</th>
<th>CISO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher Education</td>
<td>73%</td>
<td>75%</td>
</tr>
<tr>
<td>Public Sector (local, state, or federal government)</td>
<td>4%</td>
<td>6%</td>
</tr>
<tr>
<td>Healthcare</td>
<td>3%</td>
<td>6%</td>
</tr>
<tr>
<td>Commercial (for profit outside higher education)</td>
<td>17%</td>
<td>13%</td>
</tr>
<tr>
<td>Nonprofit outside higher education</td>
<td>2%</td>
<td>0%</td>
</tr>
</tbody>
</table>

**Prior Work Experience**

The CISOs were asked about their prior work experience, including how long CISOs had spent working in each of four different sectors. The CISOs selected one of four sectors where they have worked during their career. The four sectors are listed below.

- *Higher Education Technology*
- *Technology Not in Higher Education*
- *Higher Education Not in Technology*
- *Outside of Higher Education and Technology*
Figure 2. CISO Prior Work Experience Areas

Overall, higher education CISOs spent the bulk of their career in technology, whether it was in or out of higher education. On average, the CISOs spent more than half of their careers (14.13 years) working in *IT Inside Higher Education*. The next closest area was *IT Outside of Higher Education* at 7.88 years (figure below). This division of experience is similar for the higher education CIO.

Figure 3. Average CIO Area Work Experience

The higher education CISOs came from a technology background. On average, they had spent just over 22 years working in IT in or outside of higher education. Conversely, they had spent less than four years working outside of technology in higher education or outside of higher education and IT. While the CISOs had spent some time working in technology outside of higher education, their time in higher education was almost twice as much (chart below).
Chart 25. Average CISO Work Experience Inside and Out of Information Technology

Chart 26. CISO Position as an Internal Hire

CISO Internal Candidates for Current Position

Almost half of the CISOs, 49 percent, were employed by their current institution before they became the CISO (chart below). This result is similar for the CHECS CIO research.

Chart 26. CISO Position as an Internal Hire

The chart below depicts the CISO internal-hire data collected in this study from 2014 to 2017. The percentage of CISOs who worked in their institution before they were hired as the CISO reached 57 percent in 2016 and declined to the lowest level in 2017.
The following chart illustrates a comparison between 2017 CIOs and CISOs who were internal candidates for their current positions. A higher percentage of CISOs, 49 percent, were selected from within the institution for their role than CIOs, 43 percent.

**Chart 28. Internal Candidates 2017**

Current CISO Titles

The CISOs provided information regarding their current title. Of the respondents, 39 percent held the CISO title, while another 29 percent were Directors (titles depicted in chart below).
Degree Level

The CHECS research has consistently shown that an advanced degree is important for higher education technology executives. In the CHECS CIO and TL research, two-thirds or more of the survey respondents held an advanced degree. Moreover, the IMT respondents almost unanimously indicated an advanced degree requirement for the CIO position. The IMT perspective is particularly important since that group may be influential in hiring decisions. In 2017, the percentage of CISOs who held an advanced degree continued to rise with 70 percent of CISOs holding an advanced degree (chart below).

Chart 30. Degree Level for CISO
The percentage of CISOs with an advanced degree has increased by 11 percent since this question was first asked in 2014. The chart below shows the percentage of CISOs with an advanced degree from 2014 to 2017.

**Chart 31. Percentage of CISOs with Advanced Degree, 2014-2017**

![Percentage of CISOs with Advanced Degree, 2014-2017](image)

As a comparison, the chart below depicts the percentage of CISOs, CIOs, and TLs holding an advanced degree in 2017 studies. The CISOs had the second highest percentage of respondents with an advanced degree among the three groups.

**Chart 32. Advanced Degree for CISO, CIO and TL**

![Advanced Degree for CISO, CIO and TL](image)

The CISOs and CIOs were asked for their opinions about what degree was necessary for the CISO position. There were 57 percent of the CISOs who indicated an advanced degree is required for the CISO position. The full breakdown of CISO and CIO responses are illustrated in the charts below.
The most frequently selected answer, 55 percent, for the required CISO degree according to the CIOs was a bachelor’s degree. Less than half of the CIOs (41 percent) indicated CISOs should have an advanced degree.

The chart below depicts a side-by-side comparison of the CIO and CISO responses regarding the required degree for the CISO position. Whether CISOs hold an advanced degree may not seem like a critical decision. However, the challenge is some higher education CISOs may believe it is important to be a part of the IMT and to report to the institution chief executive officer (CEO) (Raths, 2016). However, being an IMT member and reporting to the CEO may, likewise, come with higher expectations for the CISO in terms of the degree held.
In 2017, 91 percent of the IMT members expected CIOs to have an advanced degree. It would not be a major leap to surmise that those expectations could extend to CISOs someday, especially if the position is part of the IMT and reports to the CEO. For CISOs, the challenge may be complicated when considering that CIOs hire and supervise a majority of them. If the CIO does not believe an advanced degree is important, he or she may not seek CISO candidates with an advanced degree. The following chart depicts CIO and CISO opinion regarding the degree needed for the CISO role.

**Chart 35. Required CISO Degree Comparison**

![Bar Chart showing CIO and CISO opinion on required degree for CISO role]

<table>
<thead>
<tr>
<th>Degree Level</th>
<th>CISO</th>
<th>CIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>High School</td>
<td>0%</td>
<td>3%</td>
</tr>
<tr>
<td>Associate's</td>
<td>1%</td>
<td>2%</td>
</tr>
<tr>
<td>Bachelors</td>
<td>42%</td>
<td>55%</td>
</tr>
<tr>
<td>Master's</td>
<td>56%</td>
<td>40%</td>
</tr>
<tr>
<td>Doctorate</td>
<td>1%</td>
<td>1%</td>
</tr>
</tbody>
</table>

**Degree Major**

The CISOs provided data regarding their degree major. There were 39 percent of the CISOs who indicated they held a *Technology* major (chart below). Another 26 percent of the CISOs had a *Business* major. There were also a number of other degree majors represented.

**Chart 36. CISO Degree Major**

![Pie Chart showing CISO degree majors]

- Leadership or Management: 26%
- Engineering: 7%
- Administration (Higher education, public, etc): 6%
- Humanities: 6%
- Education: 6%
- Business (Business, MBA, etc): 4%
- Other: 3%
- Technology (IT, IS, Computer Science, etc): 3%
- Other, 9%
The percentage of CISOs with a Technology major has remained in the mid to high 30 percent range through the life of this research. The Technology major result from 2014 to 2017 is shown in the chart below.

**Chart 37. Percentage of CISOs with Technology Major, 2014-2017**

The Technology major was the most frequently selected response for the CISO and should not come as a surprise for the CISO role. However, among the CIO and TL research, the Technology major has not been the most frequently found degree major. Only 28 percent of the CIOs and 25 percent of TLs held a Technology major. The following chart depicts the percentage of CISOs, TLs, and CIOs who had a Technology major in 2016.

**Chart 38. Technology Major Comparison**
CISO Degree Major Opinions

CISOs were asked which degree major a CISO should possess. The single largest response, 45 percent, was Technology. The next closest answer was the Major is not important at 34 percent. These two responses were also the most frequently named CIO-required degrees in the CHECS 2017 CIO research. The two charts below depict the CISO and CIO opinions regarding what major is important for a CISO.

Chart 39. CISO: Degree Major Needed for CISO

CIOs gave the same top two responses as the CISOs (chart below). There were 46 percent of the CIOs who selected the Major is not important. Another 45 percent of the CIOs indicated a CISO should have a Technology major. As noted earlier in this report, these CIO preferences may find their way into the CISO job description and hiring practices as the vast majority of CISOs report to the CIO or someone who reports to the CIO.

Chart 40. CIOs: Degree Major Needed for CISO
The chart below depicts the two most frequently selected answers for the required CISO degree major according to the CIO and CISO: Technology and Major is not important. There were 91 percent of the CIOs who selected one of these two answers compared to 79 percent of the CISOs.

**Chart 41. Two Most Frequent Degree Majors Needed for CISO**

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### Skills Needed by the CISO

The CISOs and CIOs were asked to select the five most important CISO skills needed for the role from a provided list or they could provide their own choices. The skill list was created based on CISO literature and feedback from practicing higher education CISOs and CIOs. The most frequently selected skills and the percentage of CISOs and CIOs who selected them are displayed in the chart below.

Three of the five skills selected by the CIOs were IT-focused. Those three were *IT Security Best Practices* (the most frequently named skill), *Technical Knowledge*, and *IT Legal and Policy Expertise*. *Communication* was the second most frequently selected skill selected by the CIOs. In the CHECS CIO research, one of the two most frequently named skills for the CIO role has consistently been *Communication*. *Leadership* was the fifth most frequently selected skill by the CIOs and third most frequently selected by the CISOs. The fifth most frequently selected skill by the CISOs was *Interpersonal skill*.

Based on the responses, the CIO may view the CISO as a technical and policy-focused position while the CISO, who performs the role, may view it as a position requiring soft skills. Incidentally, the CIO faces this same dichotomy when CHECS examines CIO-required skills according to the CIO and IMT. There is some difference in the skills the IMT respondents indicated a CIO needed and the skills the CIOs believed the CIO needed. For sets of groups (CIO/CISO and IMT/CIO) the
difference of opinion is important because IMT members may be interviewing, hiring, and supervising CIOs, and CIOs are interviewing, hiring and supervising CISOs.

**Chart 42. CISOs and CIOs: Skills Needed by CISO**

![Bar chart showing skills needed by CISOs and CIOs](chart)

**Actual and Ideal CISO Reporting**

The CISOs were asked how many organizational reporting levels separated them from the CEO of the institution. The single largest response was one layer at 46 percent (chart below). The next most frequently selected answer was two layers at 35 percent. Only six percent of CISOs reported to the CEO.
The chart below depicts the percentage from 2014 to 2017 of CISOs who reported to the CEO. The result has steadily ranged between four percent and seven percent.

The CIOs and CISOs in this study provided the position they reported to and the position they believed would be ideal for CISO reporting. The two charts below depict CISO and CIO opinion regarding the ideal and actual reporting structure. As in previous iterations of this CHECS research, the majority of CISOs, 73 percent, reported to the CIO (chart below). In addition, the CISOs' most frequently selected answer for ideal reporting was CIO at 44 percent.
The chart below depicts the actual and ideal CISO reporting according to the CIO. There were 70 percent of the CISOs who reported to the CIO and 80 percent of CIOs indicated this was the ideal reporting relationship. The CIOs reported that four percent of the CISOs reported to the CEO and nine percent of the CIOs indicated this was the ideal reporting relationship.

**Chart 45. CISO Reporting Title – Actual and Ideal According to CISO**

**Chart 46. CISO Reporting Title – Actual and Ideal According to CIO**
The chart below brings both the CIO and CISO opinion together; it depicts the CISO ideal reporting configuration according to each group. The most frequently named response for both groups was CIO, but the percentages were very different. Eighty percent of the CIOs indicated the CISO should report to the CIO while 44 percent of CISOs gave that same answer.

Thirty-one percent of CISOs believed reporting to the CEO was the ideal relationship. Less than 10 percent of the CIOs gave the CEO answer. The remaining responses were small and distributed over different reporting arrangements.

**Chart 47. Most Frequently Selected Ideal CISO Reporting Titles**

The following chart illustrates the CIO and the CISO reporting structure in terms of the number of levels separating from each group from the CEO. Zero level represented a direct report to the CEO. Since 2003, CHECS studies have consistently found that 97 percent or more of the CIOs reported within one level of the CEO. Among CISOs, 52 percent who reported within one level of the CEO. There has been a great deal of information in the industry literature which suggests the CISO should report to the CEO, although this arrangement has not become a reality for the majority of CISOs. Given the importance of this position and the number of information security threats directed against an institution, it is a concern that almost 50 percent of the CISOs report two or more levels away from the CEO.
IMT Membership

The IMT is the group of executives who lead the institution. This group may be called the cabinet, executive staff, or another term. As with reporting to the CEO, many executives believe they must serve on the IMT to be effective in their role. Membership on this group may give the executive the ability to have a significant influence on the organization and, overall, raise their profile. In this research, 22 percent of the CISOs were members of the IMT (chart below). While some believe the CISO should be (or already is) a part of the IMT, in higher education IMT membership status for the CISO is infrequent.

Chart 49. CISO IMT Membership
The percentage of CISOs serving as a member of the IMT was 18 percent in 2014 and 22 percent in 2017 (chart below).

**Chart 50. CISO IMT Membership, 2014-2017**

The percentage of CIOs who were members of the IMT has remained more than 50 percent since the early 2000s. In 2017, the percentage of CIOs who served on the IMT was 55 percent. The chart below depicts a comparison of CIO and CISO IMT membership and non-membership for 2017.

**Chart 51. CISO and CIO IMT Membership**

The reporting relationship and IMT membership results have an impact on the CISOs interaction with the CEO and IMT. As shown in the chart below, only 12 percent of the CISOs had weekly interaction with the CEO. Another eight percent reported monthly interaction with the institution CEO. The single largest percentage of CISOs, 46 percent, reported formal interaction with the CEO occurred once a year or less.
There were 12 percent of CISOs who interacted daily with the IMT and another 18 percent indicated weekly interactions. The single largest percentage, 35 percent, interacted with the IMT a few times per year. CIO and CISO interaction occurred much more frequently. Sixty-three percent of CISOs interacted with the CIO daily. Another 33 percent of the CISOs interacted with CIOs weekly.

**Chart 52. CISOs’ Formal Interaction with CEO, IMT, and CIO**

<table>
<thead>
<tr>
<th>Frequency</th>
<th>CEO Interaction</th>
<th>IMT Interaction</th>
<th>CIO Interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily</td>
<td>63%</td>
<td>12%</td>
<td>12%</td>
</tr>
<tr>
<td>Weekly</td>
<td>33%</td>
<td>18%</td>
<td>8%</td>
</tr>
<tr>
<td>Monthly</td>
<td>25%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>A few times per year</td>
<td>33%</td>
<td>35%</td>
<td>33%</td>
</tr>
<tr>
<td>Once a year or less</td>
<td>46%</td>
<td>10%</td>
<td>0%</td>
</tr>
</tbody>
</table>

- **On average, I interact with the CEO on a formal basis (e.g., official meetings, work-related calls, etc.)**
- **On average, I interact with the other members of the institution management team (other VPs, Provost etc.) on a formal basis (e.g., official meetings, work-related calls, etc.)**
- **On average, I interact with the CIO on a formal basis (e.g., official meetings, work-related calls, etc.)**

**CISO Preparation Activities**

The CISOs selected from a list of activities that should be undertaken for an aspiring CISO. The most frequently selected response, 84 percent, was Mentored by a CISO. There were 83 percent of the respondents who chose On-the-job training. The third most frequently selected answer was Professional development at 80 percent. In CHECSâ€œCIO research, CIOsâ€œtwo most frequently selected methods to prepare for that role were Mentoring and On-the-job training (chart below).
CIOs provided their insight regarding the best ways to prepare for the CISO position. The CIO responses mirrored CISO responses, naming the same top four activities (chart below).

**Chart 53. CISO Preparation Activities**

- On the job training: 83%
- Mentored by a CISO: 84%
- Professional Development: 80%
- Certifications: 63%
- Actively pursuing next degree: 10%
- Other: 3%

**Chart 54. CIO View of CISO Preparation Activities**

- Other: 2%
- Actively pursuing next degree: 7%
- Professional Development: 78%
- On the job training: 73%
- Certifications: 76%
- Mentored by a CISO or other executive: 82%

**Security Model**

The CISOs were asked which security model(s) they used. The two most widely used models were NIST at 31 percent and a combination of models at 24 percent (chart below).
The CISOs also rated the value of the security model(s) they were using. The choice of ratings CISOs could choose from were Least valuable, Some value, Neutral, Valuable, and Very valuable. There were 54 percent of the CISOs who found their security model to be Valuable while none of the respondents indicated their model was Least valuable (chart below).

**Chart 56. Value of Security Model Used**

Security Program Maturity

The CISOs also rated their security program maturity. CISOs selected from the following list:
• Ad hoc
• Under development
• Improving
• Mature
• Leader

Among the respondents, 19 percent of the CISOs considered their security program to be Mature or a Leader. Another 29 percent indicated their security program was Ad hoc or Under Development. The single largest response at 52 percent was the program was Improving (chart below).

Chart 57. Security Program Maturity – CISO

Since 2014, the percentage of CISOs who viewed their program as Mature or a Leader has increased by five percent (chart below).

Chart 58. CISO Mature or Leader Security Programs
To gain another perspective, CIOs were also asked about the maturity of their security program and their responses were similar to the CISOs. Only 18 percent of the CIOs considered their security program *Mature* or a *Leader*, and 34 percent of the CIOs indicated their program was *Ad hoc* or *Under Development*. The single largest answer was *Improving* at 48 percent (chart below).

**Chart 59. Security Program Maturity – CIO**

![Chart 59. Security Program Maturity – CIO](chart59)

In this research, 19 percent of CIOs not only served as the CIO, but also as the CISO. Examining only that group for program maturity, 18 percent of CIOs considered their program to be *Mature* and six percent of them rated their program a *Leader*. There were 42 percent of the CIO/CISOs who viewed their program as *Ad hoc* or *Under Development*. Another 35 percent said their program was *Improving* (chart below). These CIO/CISOs are doing two demanding and complex full-time jobs. Attempting to perform both functions may be too much for one person and, thus, the program maturity may suffer.

**Chart 60. CIO also serving as the CISO: Security Program Maturity**

![Chart 60. CIO also serving as the CISO: Security Program Maturity](chart60)
Security Program Resources

Security program budget should be an important component in the technology budget. The CISOs and CIOs were asked about their security program budget. Among respondents, 45 percent of CISOs indicated there was not a dedicated security budget. This result is the highest percentage in the four years this research has been conducted. The lack of a budget may play a part in the percentage of respondents who considered their security programs to be immature.

Chart 61. CISO: Security Program Budget

Among CIOs, 51 percent indicated there was not a dedicated security budget (chart below). It seems that it would be difficult to undertake a complex endeavor, like information security, without a budget.

Chart 62. CIO: Security Program Budget
As might be expected given the dual roles they hold, the majority of CIO/CISOs (65 percent) stated there was no security budget. This lack of resources may be one of the reasons why a significant percent of their programs were under development.

**Chart 63. CIO/CISO: Security Program Budget**

The percentage of CISOs without a security budget reached its highest level in 2017. The chart below depicts the 2014 to 2017 percentage of CISOs who indicated they did not have a security budget.

**Chart 64. CISO: No Security Program Budget, 2014-2017**
A security budget comparison is depicted in the chart below. The comparison includes CISOs, CIOs, and CIO/CISOs. More than 60 percent of all three groups indicated their dedicated security budget was $100,000 or less. For the CIO/CISO this percentage was almost 80 percent.

**Chart 65. CISO/CIO: Security Program Budget Comparison**

In addition to examining the budget, the survey also collected data regarding dedicated security program staffing. The two charts below depict the CISO and CIO responses. There were 80 percent of the CISOs who had employees dedicated to their security programs.

**Chart 66. CISO: Dedicated Security Program Employee**
There were 32 percent of the CIOs who indicated they did not have any dedicated security employees, while another 25 percent stated they had one employee in their security program.

**Chart 67. CIO: Dedicated Security Program Employee**

The chart below reflects the 2014 to 2017 CIO respondents who did not have any dedicated security employees. The percentage of CIOs without security employees declined to its lowest level in 2017.

**Chart 68. CIO: No Employees Devoted to Security, 2014-2017**

For the group of CIOs who also served as CISOs, 68 percent of them indicated they did not have any employees devoted to the security program. Another 19 percent indicated there was one person in their security program.
Disruptions and Breaches

An information security program’s goal should be preventing disruptions and breaches. The CISOs and CIOs were asked if their organizations had suffered a disruption or breach in the last three years. Twenty-one percent of the CISOs indicated their organization had suffered a *Disruption*. There were 12 percent of the dual role CIO/CISOs who indicated there had been a *Disruption*. The full results are depicted in the chart below.

The percentage of all three groups who suffered a *Data breach* was higher than the *Disruption* results except for the CIO who also served as the CISO. There were 27 percent of the CISOs and 24 percent of the CIOs who had suffered a breach in the past three years. Given the lack of resources and people devoted to information security, it is surprising only 6 percent of the CIOs who also served as the CISO reported a breach.
The chart below depicts the 2014 to 2017 percentage of CISOs who indicated they had a disruption in the past three years. The 2017 result for this question was a new low.

While a disruption in service is a challenge for an institution, a breach can have a far more significant financial and reputational implications for an institution. The average cost of a breach in 2016 was reported as $4M ("2016 Ponemon Cost of Data Breach Study," 2016). The CISOs and CIOs were asked if they had experienced a data breach in the past three years. There were 27 percent of the CISOs who indicated they had experienced a Data breach. Another eight percent of the CISOs Declined to answer (chart below).
Chart 72. CISO: Data Breach in Past Three Years

The CIO responses revealed similar results with 24 percent of the CIOs indicating a *Breach* had occurred and 13 percent *Declining to answer* (chart below).

Chart 73. CIO: Data Breach in Past Three Years

The 2014 to 2017 CISOs results for the *Breach* question are depicted in the chart below. The result declined from a high of 45 percent in 2014 to 24 percent in 2017. Perhaps, the decline is a sign of information security programs maturing.

Chart 74. Breach According to CISO, 2014-2017
CISO Role Importance and Effectiveness

Role importance and effectiveness

Information security is critical to the higher education institution. The people leading information security are as complex as the position itself. They come from a wide variety of roles within an IT department and are expected to be and do many things. They may be at a disadvantage in that the people who hire and supervise the majority of CISOs have a different opinion about skills and education required to perform the CISO job from the people who are working in the position.

The CISOs and CIOs were asked a series of questions about the importance of CISO tasks and how effective the CISOs were in performing those tasks. The results were combined into six CISO roles which range from Foundational roles to Higher order roles. The CISO roles are depicted and defined in the table below.

Table 2. CISO Roles

<table>
<thead>
<tr>
<th>CISO ROLE</th>
<th>RESPONSIBILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profession Advocate</td>
<td>Active in the professional and higher education community</td>
</tr>
<tr>
<td>Strategist</td>
<td>Develops programs and standards</td>
</tr>
<tr>
<td>Educator</td>
<td>Educates the institution on security policy and general security awareness</td>
</tr>
<tr>
<td>Traditional Security Operations</td>
<td>Framework implementation and incident response</td>
</tr>
<tr>
<td>Trusted Risk Advisor</td>
<td>Risk assessment and mitigation</td>
</tr>
</tbody>
</table>

To assess CISO Role Effectiveness, CISOs and CIOs answered questions to rate each of the roles on a scale of 1 to 5 for Importance: 1 indicated No importance and 5 indicated Critically important. Likewise, both groups rated the CISO functioning in each role for Effectiveness: 1 represented Expectations not met and 5 represented Outstanding. These ratings are defined in the table below.

Table 3. CISO Role Importance and Effectiveness

<table>
<thead>
<tr>
<th>IMPORTANCE</th>
<th>EFFECTIVENESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = No importance</td>
<td>1 = Expectations not met</td>
</tr>
<tr>
<td>2 = Least important</td>
<td>2 = Could be better</td>
</tr>
<tr>
<td>3 = Important</td>
<td>3 = Satisfactory</td>
</tr>
<tr>
<td>4 = Very important</td>
<td>4 = Excellent</td>
</tr>
<tr>
<td>5 = Critically important</td>
<td>5 = Outstanding</td>
</tr>
</tbody>
</table>
The aggregate CISO ratings of importance for the six roles are depicted in the table below. Among the responses, all roles were rated as *Important* or *Very Important* on the scale. According to the CISOs, the two most important roles were *Strategist* and *Traditional Security Operations*. The third most important role was *Architect*. As CHECS also found in its CIO role-importance research, the *Educator* and *Profession Advocate* roles were two of the *Least important* roles.

### Table 4. CISO Role Importance According to CISO

<table>
<thead>
<tr>
<th>Role</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategist</td>
<td>4.20</td>
</tr>
<tr>
<td>Traditional Security Operations</td>
<td>4.13</td>
</tr>
<tr>
<td>Architect</td>
<td>4.03</td>
</tr>
<tr>
<td>Trusted Risk Advisor</td>
<td>4.02</td>
</tr>
<tr>
<td>Educator</td>
<td>3.73</td>
</tr>
<tr>
<td>Profession Advocate</td>
<td>3.39</td>
</tr>
</tbody>
</table>

Effectiveness rating is an evaluation of the CISOs effectiveness in each of the six roles. In the table below, CISOs evaluated themselves. On the 1-to-5 scale, all the self-evaluation ratings for the roles were *Satisfactory*. CISOs considered themselves most effective in the role of *Traditional Security Operations*, which was one of their most important roles.

### Table 5. CISO: CISO Role Effectiveness

<table>
<thead>
<tr>
<th>Role</th>
<th>Effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional Security Operations</td>
<td>3.59</td>
</tr>
<tr>
<td>Strategist</td>
<td>3.50</td>
</tr>
<tr>
<td>Trusted Risk Advisor</td>
<td>3.50</td>
</tr>
<tr>
<td>Profession Advocate</td>
<td>3.49</td>
</tr>
<tr>
<td>Architect</td>
<td>3.24</td>
</tr>
<tr>
<td>Educator</td>
<td>3.12</td>
</tr>
</tbody>
</table>

While a CISO self-evaluation is useful, it is also important to gather the CIO perspective. The CIO evaluation of the CISO *Role Importance* is depicted in the chart below. All the roles were rated on a 1 to 5 scale as *Important* or *Very Important*. The CIOs agreed with the CISOs on the two most important roles, however, in reverse order. The remainder of the roles were in the same order as the CISOs.

### Table 6. CIO: CISO Role Importance

<table>
<thead>
<tr>
<th>Role</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategist</td>
<td>4.31</td>
</tr>
<tr>
<td>Traditional Security Operations</td>
<td>4.26</td>
</tr>
<tr>
<td>Architect</td>
<td>4.22</td>
</tr>
<tr>
<td>Trusted Risk Advisor</td>
<td>4.02</td>
</tr>
<tr>
<td>Educator</td>
<td>3.97</td>
</tr>
<tr>
<td>Profession Advocate</td>
<td>3.36</td>
</tr>
</tbody>
</table>
The next table depicts the CIOs’ evaluation of CISO effectiveness for the six roles. All of the roles were rated a 3 on the 1-to-5 scale. The three most important roles according to the CIO were Traditional Security Operations, Profession Advocate, and Strategist. In what has become a recurring result in this research, the CIOs rated all CISO roles lower than the CISO effectiveness ratings.

**Table 7. CIO: CISO Role Effectiveness**

<table>
<thead>
<tr>
<th>Role</th>
<th>Effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional Security Operations</td>
<td>3.41</td>
</tr>
<tr>
<td>Profession Advocate</td>
<td>3.18</td>
</tr>
<tr>
<td>Strategist</td>
<td>3.13</td>
</tr>
<tr>
<td>Architect</td>
<td>3.09</td>
</tr>
<tr>
<td>Trusted Risk Advisor</td>
<td>3.07</td>
</tr>
<tr>
<td>Educator</td>
<td>3.01</td>
</tr>
</tbody>
</table>

The following illustration depicts a side-by-side comparison between the CIOs’ and CISOs’ role importance ranking as well as the role effectiveness.

**Chart 75. CISO Role Importance and Effectiveness Comparison**
The table below depicts some of the CISO questions and the results for 2014 through 2017.

### Table 8. Higher Education Chief Information Security Officer for 2014-2017

<table>
<thead>
<tr>
<th>Question</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age ⩾ percentage older than 51 years</td>
<td>52%</td>
<td>43%</td>
<td>48%</td>
<td>33%</td>
</tr>
<tr>
<td>Female percentage</td>
<td>19%</td>
<td>15%</td>
<td>14%</td>
<td>11%</td>
</tr>
<tr>
<td>Minority percentage</td>
<td>5%</td>
<td>9%</td>
<td>5%</td>
<td>9%</td>
</tr>
<tr>
<td>Hispanic percentage</td>
<td>6%</td>
<td>5%</td>
<td>9%</td>
<td>1%</td>
</tr>
<tr>
<td>Tenure in current position</td>
<td>3 years 10 months</td>
<td>5 years 3 months</td>
<td>5 years 3 months</td>
<td>5 years 3 months</td>
</tr>
<tr>
<td>Percentage with advanced degree</td>
<td>59%</td>
<td>58%</td>
<td>64%</td>
<td>70%</td>
</tr>
<tr>
<td>Percentage with technology major</td>
<td>35%</td>
<td>39%</td>
<td>37%</td>
<td>39%</td>
</tr>
<tr>
<td>Percentage retiring in 10 years</td>
<td>35%</td>
<td>35%</td>
<td>36%</td>
<td>27%</td>
</tr>
<tr>
<td>Reporting to CEO</td>
<td>4%</td>
<td>7%</td>
<td>4%</td>
<td>6%</td>
</tr>
<tr>
<td>Serving on IMT</td>
<td>18%</td>
<td>23%</td>
<td>23%</td>
<td>22%</td>
</tr>
<tr>
<td>Disruption in past three years CISO</td>
<td>25%</td>
<td>31%</td>
<td>29%</td>
<td>21%</td>
</tr>
<tr>
<td>Breach in past three years CISO</td>
<td>45%</td>
<td>47%</td>
<td>31%</td>
<td>27%</td>
</tr>
<tr>
<td>No dedicated budget CISO</td>
<td>40%</td>
<td>38%</td>
<td>36%</td>
<td>45%</td>
</tr>
<tr>
<td>No employees devoted to security CIO</td>
<td>35%</td>
<td>36%</td>
<td>38%</td>
<td>32%</td>
</tr>
<tr>
<td>Security Program Maturity (Mature and Leader) CISO</td>
<td>14%</td>
<td>13%</td>
<td>20%</td>
<td>19%</td>
</tr>
</tbody>
</table>
REFERENCES


About CHECS

CHECS was founded in 2009 by Dr. Wayne A. Brown to enable continued studies focusing on higher education CIOs' attributes, education, experience and effectiveness. The research is unique from other CIO studies in that it is a two-part survey involving the CIO as well as other members of the institution management team. The annual study invites participation from the CIO (or senior technology person) at every two- and four-year higher education institution in the United States and other international institutions. Survey responses are analyzed in aggregate and statistical data is extracted and synthesized into an annual report. The CIO study has been conducted since 2003.

In 2009, CHECS launched a second study focusing on those individuals in the next organizational layer down from the CIO. This survey is administered to higher education technology leaders and CIOs are asked some of the same questions to create the *Higher Education Technology Leadership Study: The Chief Information Officers of the Future.* CHECS also conducts a chief information security officer (CISO) study that began in 2014. Like the other two reports, the CISO research is based on multiple perspectives, gathered through one survey completed by higher education CISOs and a similar survey completed by CIOs.

CHECS is a nonprofit (501c3) organization dedicated to the education and development of the higher education chief information officer. The organization and studies are funded through report sales, subscriptions, and sponsor donations.

In 2010, CHECS began funding a scholarship endowment to benefit higher education technology management doctoral students at Nova Southeastern University. CHECS funds a second scholarship endowment at University of Texas, Austin, to benefit undergraduate students seeking a higher education technology management degree. In 2014, CHECS began funding a third scholarship at Florida State University to benefit students in the Management Information Systems programs. The fourth CHECS scholarship is at Excelsior College in Albany, New York and it is a need-based scholarship for women and minorities.

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In 2016, CHECS launched a subscription, which gives an entire institution access to all CHECS research, presentations, webinars, and other services. For more information, visit CHECS online (www.CHECS.org).

CHECS gratefully acknowledges Dr. Detlev H. Smaltz. CHECS' CIO survey was based on one created by Dr. Smaltz; the survey was modified and used with his permission.
About Wayne Brown

Wayne A. Brown, Ph.D., is the Chief Executive Officer and Founder of CHECS. He worked as a chief information officer since the mid-1990s and worked in higher education at colleges in San Francisco, Kansas, and New York beginning in 2000. In 2017, he was named Excelsior College’s Vice President for Information Technology Emeritus. Prior to his academic career, he was in the U.S. Air Force for more than 20 years, serving in the Medical Service Corps, Education and Training, and Security Forces.

Dr. Brown began researching the higher education chief information officer roles and effectiveness as a doctoral dissertation and continued the surveys almost every year since 2003. Dr. Brown's work has been widely published in higher education and technology publications, such as Chronicle for Higher Education, Information Week, CIO, Inside Higher Ed, Public CIO, EDUCAUSE Quarterly, League of Innovation in the Community College, Gartner, EDUCAUSE Review, CIO, and Campus Technology, and he has presented research findings at technology conferences throughout the United States.