

MASTER'S THESIS

**THE CHIEF INFORMATION SECURITY OFFICER
(CISO) AND SOFT SKILLS**

The expectations of the CISO, the demand of the business on the set of soft skills needed for CISO leadership.

Richard Smit
Jeroen J.M. van Yperen Hagedoorn

Lector
P. Ravesteijn PhD

Supervisor
P. Versteeg MSc



‘Change will happen when people are willing, not before’

F.M. Wibaut, 1859–1936

Photo of mosaic portrait by artist Siomara van Eer

Words of gratitude

Richard Smit

My thanks go to my employer, who granted me the opportunity to follow and complete this Master thesis. In addition, I thank my family, who has not seen me for many hours, especially my wife, Marga, who gave me all the space I needed to take this opportunity to develop myself. Of course, great thanks go towards Jeroen my study companion for the last three years. It was a great journey for me to undertake with you, but it was fun to do.

I hope my curiosity continues through my sons, Quintin and Rowan, into the world around them and perhaps beyond.

Jeroen MJ van Yperen Hagedoorn

I am grateful to the team at the HU who afforded us the opportunity to write this combined thesis. This topic is so interesting; it deserves wider research. A big thank you also to the CISO and business leader response groups; without your input for our Delphi study and your willingness to remain aligned for the two rounds, our research would not have been valuable.

Thanks to my study buddy, Richard, for the hard work, beers, and hamburgers, for keeping me sane, and for the endless fun – face to face and, during the lockdown period, monitor to monitor.

Finally, without the love and support of my wife, Simone, this Master education could not have been completed in the midst of our busy lives. I know we have missed quite a bit of quality time together, so you own a significant portion of this success.

Content

1	INTRODUCTION AND BACKGROUND	5
2	PROBLEM STATEMENT	6
3	RESEARCH QUESTION	8
3.1	THE RESEARCH QUESTION AND SCOPE CONSIDERATIONS	9
3.2	MAIN RESEARCH QUESTION	10
3.3	SUB-RESEARCH QUESTION	10
4	LITERATURE REVIEW	11
4.1	ANALYSIS OF RELEVANT PAPERS	11
4.2	REVIEW OF LITERATURE	12
4.2.1	CISO SOFT SKILLS VIEWED FROM A CISO PERSPECTIVE	15
4.2.2	CISO SOFT SKILLS VIEWED FROM A BUSINESS LEADER'S DEMAND PERSPECTIVE	22
5	RESEARCH METHOD AND PROCESS	26
5.1	RESEARCH METHOD	26
5.2	MULTISOURCE RESEARCH APPROACH	27
5.3	RESEARCH MODEL	28
5.4	RESEARCH PROCESS	28
5.5	RESEARCH TAXONOMY OF DELPHI DESIGN CHOICES	29
5.6	RESEARCH ETHICS AND PRIVACY IN DATA MANAGEMENT	30
5.7	RESEARCH TARGET AUDIENCE AND CONTENT	31
5.8	REACHING THE TARGET AUDIENCE AND RESEARCHING THE COLLECTED CONTENT	32
5.9	RESEARCHING EFFORT AND BALANCE	33
6	FINDINGS AND DISCUSSION	34
6.1	FINDINGS FROM LITERATURE – RELEVANT LEADERSHIP POSITION SOFT SKILLS	34
6.2	FINDINGS LITERATURE CISO PERSPECTIVE	36
6.3	FINDINGS LITERATURE BUSINESS LEADERS' PERSPECTIVE	38
6.4	FINDINGS OF JOB ADS	39
6.5	FINDINGS OF DELPHI STUDY CISO PERSPECTIVE	42
6.5.1	COMPOSITION OF THE CISO RESPONSE GROUP	42
6.5.2	FINDINGS OF ROUND 1 OF THE DELPHI STUDY – CISO PERSPECTIVE	46
6.5.3	FINDINGS OF ROUND 2 OF THE DELPHI STUDY – CISO PERSPECTIVE	46
6.6	FINDINGS OF GAP ANALYSIS OF DELPHI STUDY – CISO PERSPECTIVE AND JOB DESCRIPTIONS	55
6.7	FINDINGS OF DELPHI STUDY – BUSINESS LEADER'S PERSPECTIVE	56
6.7.1	COMPOSITION OF THE BUSINESS LEADERS RESPONSE GROUP	57
6.7.2	FINDINGS OF DELPHI STUDY – BUSINESS LEADERS' PERSPECTIVE; ROUND 1	59
6.7.3	FINDINGS OF DELPHI STUDY – BUSINESS LEADERS' PERSPECTIVE; ROUND 2	60
6.8	FINDINGS OF GAP ANALYSIS OF DELPHI STUDY – BUSINESS LEADERS' PERSPECTIVE AND JOB DESCRIPTIONS	71
6.9	FINDINGS OF META-ANALYSIS	73
6.10	DISCUSSION	79
6.10.1	WHAT SOFT SKILLS ARE RELEVANT FOR LEADERSHIP POSITIONS?	79
6.10.2	WHAT SOFT SKILLS ARE RELEVANT FOR A CISO?	80
6.10.3	WHICH SOFT SKILLS ARE EXPECTED BY BUSINESS LEADERS FOR THE ROLE OF THE CISO?	80
6.10.4	HOW DO BUSINESS LEADERS VALUE THE SOFT SKILLS OF A CISO?	81
6.10.5	WHAT IS A CISO LEADERSHIP POSITION?	82
6.10.6	HOW DOES A CISO USE SOFT SKILLS TO INFLUENCE BUSINESS LEADERS / USERS / THE IT DEPARTMENT?	83
6.10.7	HOW DO BUSINESS LEADERS VALUE THE CISO SOFT SKILLS FOR DEALING WITH BUSINESS LEADERS / USERS / THE IT DEPARTMENT?	83
6.10.8	DOES A CISO EXPERIENCE A BETTER LEADERSHIP POSITION WITH A CERTAIN SET OF SOFT SKILLS?	84
6.10.9	DO BUSINESS LEADERS EXPERIENCE A BETTER LEADERSHIP POSITION OF THE CISO WITH A CERTAIN SET OF SOFT SKILLS?	85
6.10.10	HOW DO THE SOFT SKILLS DESCRIBED IN THE JOB DESCRIPTION RELATE TO THE REQUIRED EVERYDAY SOFT SKILLS?	86
6.10.11	DO EMPLOYERS SEE SOFT SKILLS AS A REQUIREMENT IN A JOB DESCRIPTION?	87
6.10.12	WHAT SOFT SKILLS POSITIVELY INFLUENCE THE CHIEF INFORMATION SECURITY OFFICER LEADERSHIP POSITION IN DUTCH ORGANISATIONS WITH MORE THAN 500 EMPLOYEES?	88
7	CONCLUSION AND RECOMMENDATIONS	89
7.1	CONCLUSION RELATED TO RESEARCH QUESTION	89
7.2	SCIENTIFIC IMPLICATION	91
7.3	PRACTICAL IMPLICATIONS	91
7.4	LIMITATIONS	93
7.5	FUTURE RESEARCH	93
	REFERENCES	95
	TABLES	97
	FIGURES	97
	CONTRIBUTIONS BY AUTHORS	99

ADDENDUM	100
SOFT SKILLS PER ANNE MAR	100
DETAILED OVERVIEW ANALYZED JOB ADS INCLUDED WITH GROUNDEDNESS OF CODES	102
DELPHI STUDY ROUND 1 CISO QUESTIONNAIRE	112
DELPHI STUDY ROUND 1 CISO ANALYSIS	125
DELPHI STUDY ROUND 2 CISO QUESTIONNAIRE	126
DELPHI STUDY ROUND 2 CISO ANALYSIS	138
DELPHI STUDY ROUND 1 BUSINESS LEADERS' QUESTIONNAIRE	139
DELPHI STUDY ROUND 1 BUSINESS LEADERS ANALYSIS	152
DELPHI STUDY ROUND 2 BUSINESS LEADERS' QUESTIONNAIRE	153
DELPHI STUDY ROUND 2 BUSINESS LEADERS ANALYSIS	163
DELPHI STUDY CISO AND BUSINESS LEADERS ANALYSIS T-TEST	164

Revision History

Issue Date	Author	Version	Revision Description
Nov 8th 2020	Richard Smit HU Student & Jeroen J.M. van Yperen Hagedoorn	1-0	Initial release
Dec 17th 2020	Richard Smit HU Student & Jeroen J.M. van Yperen Hagedoorn	1-1	Updated two minor errors: Correction of typographic error in Formula (page 74) Correction of missing future work Page

1 Introduction and Background

We, students Richard Smit and Jeroen van Yperen Hagedoorn, joined forces to research an undeveloped area in cybersecurity: the role of the chief information security officer (CISO) and the soft skills required for this role. The goal is to explore a multi-angled view – described as multisource research in the academic field (Zohrabi, 2013, p. 259) – on the topic, both from a business leader's perspective and from the CISO's perspective. Thus, our research focuses not only on the position of the CISO and their needed or expected soft skills, but also on business leaders' perspective and the expected capabilities, interpersonal skills and personal attributes of a CISO. The Deloitte article 'The New CISO' indicates that C-level executives (business leaders) see the role of the CISO broadening but at the same time, knowingly or unknowingly, impeding security organisational progress (Aguas, Kark, & Francois, 2016).

Different sources discuss the CISO role profile. For example, the security job profiles of the Dutch Platform voor Informatie Beveiliging (Platform for Information Security) demonstrate a curriculum for the CISO (Platform van Informatie Beveiliging, 2019), and the Forbes website contains an article by Gil Press (2017) discussing the translator capabilities of the CISO. These job profiles and articles raise the following question: how do soft skills enhance the leadership position of the CISO in a business (e.g., in the boardroom, towards the security team and the end users)? Hooper and McKissack (2016) discussed this position and the required competencies by analysing more than 100 job advertisements from three countries, namely, the US, Canada and New Zealand. In most of those job advertisements, they found a high degree of technical skills, daily operational tasks and a strong focus on security (hard skills). Only a minority of the job advertisements focused on candidates who are excellent in communication.

Our research topic cannot be viewed exclusively from either the position of the CISO or that of the business. The need for a dual perspective is emphasised by the Gil Press article (2017), which states that translating security risks from technological language into the board and business leaders' language is a must. Furthermore, a Deloitte article demonstrates that C-level demand is for a strategic CISO role and a leadership position. However, business leaders may still view the CISO as a policeman instead of a partner due to inadequate alignment (Aguas, Kark, & Francois, 2016). Both the CISO and business leaders have their own perspectives on the CISO role and its skill set (Kleinman, 2018). On the one hand, when researched from a single perspective, the outcome of the research will most likely lead to an unbalanced outcome. On the other hand, when done correctly, this multisource research would require more time than an individual thesis provides. Moreover, two individual studies, within the same research programme, would lack alignment on a review of existing literature, alignment on survey questions and outcomes, combined analysis of the meta-data and the governance regarding which student is the author of which text for equal contribution. Therefore, to gain the most out of this topic, a combined thesis approach was born. Although researching both perspectives extensively will take more time and effort, it will yield comprehensive insights into this topic and will be of value to the field of developing skills for the CISO. For a balance of the research effort, an overview of the Contributions by authors (page 99) is provided.

2 Problem Statement

The use of IT systems or IT-powered solutions is prolific nowadays. Organisations use IT systems to support their processes, and IT is the primary process in digitally enabled companies. Digitisation has created new ways of working, new services and new business models (The Open University, 2019).

The downside is that with the use of new technologies, the threat of misuse or even abuse of IT systems rises, as documented in the European Union Agency for Network and Information Security (ENISA, 2019, p. 9). The rise in cybercrime calls for a well-organised approach to minimise the risk of falling victim to such crime. In addition, laws such as the General Data Protection Regulation (GDPR) (Council of the European Union, 2016) in Europe create a new need for companies to be in control of information security.

In a single organisation, control of information security is still the task of the IT department and the responsibility of the chief information officer (CIO), whereas in other, more information-security-aware organisations, the information security programme is the responsibility of the CISO (IGguru Information Governance News & Community, 2019), who reports to the chief executive officer (CEO). Furthermore, the website cio.co.uk states that in 2017, 70% of companies still had the CISO report to the CIO (Qualtrough, 2017). Hayslip (2019) defines CISOs and their positions in his CISO manifesto: Recruiting CISOs not unicorns. The CISO manifesto states, 'The basic definition of a Chief Information Security Officer is a senior-level executive who has the responsibility to establish and maintain the organisation's security program' (Hayslip, 2019).

With the rise in cybercrime, organisations are recruiting CISOs to lead their security teams and to organise a better security position for the entire organisation. Throughout February–June 2019, 89 CISO job descriptions from a variety of Dutch organisations (government, healthcare, education, commercial enterprises and industry) were collected from websites that focus on the Netherlands. For 5 months, these websites were reviewed, and all CISO job offers were saved as unformatted .txt documents for analysis.

These job offers all hint at soft skills next to a list of hard skills. A brief analysis revealed that soft skills are all captured in descriptive text, whereas hard skills are clearly and specifically defined (e.g., managing CISCO ASA firewall rules). In addition, research by ASRC Federal, a consulting firm for public services, demonstrates the 10 must-have skills for CISOs – communication and presentation skills are in first place, and 3 of the top 10 are soft-skill-related. Furthermore, the observation is that the right combination of skills is the key to being a successful CISO (Death, 2019). In an initial search in the academic library of the HU University of Applied Sciences, Utrecht, we found only one book on CISO soft skills (Collette, Gentile, & Gentile, 2008). When searching the academic library of the University of Amsterdam and the Amsterdam University of Applied Sciences, this result was confirmed.

The book, published by Collette et al. (2008), is relevant when implementing a security model, as it relates to the user's behaviour towards security measures. While the authors have substantial experience advising on models used and implementing security measures, the book does not reference any academic research regarding the influence of soft skills on CISOs themselves. Multiple books are available on CISO leadership, for example *Essential principles for success* (Fitzgerald & Krausse, 2007) or *The CISO handbook* (Gentile & Ron Collette, 2016), and on the CISO leadership role, risk management and CISO positions; however, there is little to no relevant academic literature that describes soft skills in relation to the CISO. With the only publication on CISO soft skills being the one by Collette et al. (2008), the lack of academic rigor emphasises the academic relevance of our thesis. Our research contributes to understanding how soft skills affect the (position of the) CISO based on

rigorous academic research. The following question thus arises and is the topic of the main research question: what are the relevant (or necessary) CISO soft skills?

CISOs are active in many types of organisations and in various positions: directly reporting to the CEO, the CIO or the IT manager and aligning with multiple stakeholders. Based on the theory of Luftman (2000), namely, business and IT alignment, the best-performing organisations have a high degree of alignment. Thus, the alignment between any IT function and the business is essential (Luftman, 2000). Projecting the proven business and IT alignment theory on the CISO position, the question arises as to how security aligns with the business. Nick Sanna (2018), an author at Securityweek, writes in one of his blogs that information security teams are more IT-centric and do not have a business-aligned viewpoint. Essential elements in the alignment model of Luftman (2000) are communicating, informing and reporting to the stakeholders in an organisation. When applied to the CISO, this could mean that with the right skills, those three elements could have a positive impact on the leadership position of the CISO.

As the CISO position is changing from reporting to the CIO to reporting directly to the CEO, the role shifts from a technical implementer of security hard- and software to a more business-focused executive (Putrus, 2019, p. 29). The CISO's internal stakeholders are now the board, management, the IT department, the user organisation, the software development team and service managers. The CISO consequently becomes responsible for the whole company, from top to bottom. Due to the dynamics in organisations and the prevailing security cultures, the need for soft skills is vital to be a successful CISO, who is ultimately responsible for aligning the organisation to comply with new or existing security policies, as the conclusion of the research by ASRC Federal suggests (Death, 2019, p. 13). With the changing role of the CISO, when alignment with business leaders is required, managing stakeholders throughout the organisation becomes essential.

The CISO must therefore balance between people, process and technology (Leavitt, 1964). Mark Eggleston emphasises this balancing act, stating that to be effective in getting organisations to comply with security policies, CISOs 'should focus on servant leadership and becoming mentally strong leaders' (Eggleston, 2018). Furthermore, in an article on Forbes describing the new CISO, Chief Cyber Security Advisor Kleiman focuses on the leadership enigma of the CISO and emphasises that the CISO is effective with a blend of hard and soft skills. Processes and technologies require in-depth knowledge of the organisation and technologies, hard skills, but to manage the people aspect, the CISO needs leadership abilities, an attribute of soft skills (Kleinman, 2018). The leadership enigma feeds into the following questions: first, how do soft skills relate to the leadership position of the CISO, and second, do management skills, as described by Tejay and Winkfield, support the leadership position of the CISO (Tejay & Winkfield, 2015)?

The previously articulated questions feed into our problem statement, which will help to formulate our main research question:

- what are the CISO soft skills?
- how do soft skills relate to the leadership position of the CISO?
- what are the best fitting curriculum and capabilities of the CISO?
- are these soft skills a requirement in current job offers?

These questions drive our belief that it is challenging to prepare for an executive position as a CISO and that it is unclear how soft skills are valued for this position. The problem statement, for this research, is that it is unclear

which soft skills are required for a CISO leadership position, and therefore, the CISO development (training, education, building the right capabilities) is not optimal.

3 Research Question

With increasing digitisation in organisations, information security is a topic of increasing importance (ENISA, 2019, p. 14). Before the Internet, organisations provided information in-house with no access to those outside the company, and security was a relatively clear-cut landscape: employees processed data within the company, and input and output were physical items. Information security evolved from these early stages in three waves: technically focused, management-focused, and institutionalisation-focused security (Solms, 2000, p. 616).

Nowadays, organisations connect to all sorts of networks for data exchange and collaboration with customers, partners and suppliers, and most of the inputs and outputs are in a digital form. Securing information in a highly connected world, with various types of digital interactions, makes the landscape of information security highly dynamic. The Von Solms (2006) article, Information Security – the Fourth Wave, states that the fourth wave of information security governance is not about technology. While the base will still be a set of technologies, the fourth wave is about information security governance. Von Solms (2006) states,

Information Security Governance is an integral part of Corporate Governance, and consists of

- *the management and leadership commitment of the Board and Top management towards good information security;*
- *the proper organisational structures for enforcing good information security;*
- *full user awareness and commitment towards good information security; and*
- *the necessary policies, procedures, processes, technologies and compliance enforcement mechanisms.*

According to Eggleston (2018), securing the information of a company is the CISO's core function. The CISO works within the triangle of people, process and technology to manage risks and to limit or resolve information security incidents and compliance issues.

The CISO deals with various parts of the organisation: business leaders (higher management), users (the business), legal, and the IT department. Leadership and communication skills are essential, as are technical understanding, knowledge of legal and business processes, and risk management (Eggleston, 2018). Todd (2012), a seasoned security consultant and author at the market research organisation TechTarget, stated that 'a CISO is more than just a techie – really, a good CISO should be a jack of all trades'.

With the changing role of IT in organisations, the role of the CISO also changes. IT becomes part of the business, and in some organisations, IT is the business. Integration of IT into businesses increases the need for (more) co-ordination of information security. Based on the initial review of the gathered job offers, the generic soft skill description is as follows: 'be flawless in writing and communications'. However, this definition is too narrow compared to the 10 most relevant soft skills for business leaders determined by Robles (2012, p. 445). The topic of soft skills is widely researched. Our research into soft skills in general yielded results similar to those of Weber, Crawford, Rivera Jr. and Finley (2011); Zhang (2012); and Mar (2016).

As described in the problem statement, it is clear that a gap exists between being 'flawless in writing and communications' and the various lists of soft skills for business leaders, IT professionals or other executive

functions. This identified gap leads to the formulation of the research question. During the problem statement, a preliminary question arose: what is the best soft skill set for a CISO? However, this preliminary question is not a valid research question; rather, it fuels the process and must be shaped according to the applied research design canvas (Grondelle, 2018) based on the following elements : rigor and relevance research (Hevner, 2007). This preliminary question feeds into the main research question, which is described later in this chapter.

3.1 The Research Question and Scope Considerations

Before the research question is described, the scope considerations are listed. We have identified three scoping elements:

- Perspectives
- Locality of addressable sample size
- Size of organisations.

Perspectives

As previously mentioned, security awareness is no longer a technical focus, and there are multiple perspectives on the topic of security risks, as emphasised by the Gil Press (2017) article, which states that translating security risks from technological language into the board and business leaders' language is essential. A Deloitte article (Aguas, Kark, & Francois, 2016) demonstrates that C-level has a demand for a more strategic CISO role and leadership position. However, Aguas et al. (2016) demonstrated that business leaders may still see the CISO as a policeman instead of a partner due to inadequate alignment. Both the CISO and business leaders have their own perspectives on the CISO role and its skill set (Kleinman, 2018).

Moreover, the academic relevance of a multisource approach to the research question – by using a Delphi study on a mixed response group (CISO perspective and business leaders' perspective) – is that it enhances the validity of the research outcome. Triangulation on the research question, using various techniques and/or sources, results in a validated and unbiased outcome (Zohrabi, 2013).

Knowing that using multiple sources enhances the quality of the data and the demand for CISO soft skills is influenced by business leaders, the scoping decision was thus made to include both the CISO and the business leaders' perspectives.

The locality of addressable sample size

The research question is limited to Dutch organisations because the researchers did not have access to an international sample size. The scoping decision was made to include only organisations located within the Netherlands.

Size of organisations

The decision was made to scope organisations with more than 500 employees to select businesses with a designated CISO and to build a representative sample size of the CISO population (Bryman & Bell, 2015, p. 187). The number of employees was deliberately set at a minimum of 500 based on the Dutch Central Bureau for Statistics (CBS) categorisation of organisation sizes. Organisations beyond 500 employees are considered to be large enterprises (Centraal Bureau voor de Statistiek, 2019), and those below 500 employees (small and medium enterprises) are not likely to employ a full-time CISO. The scoping decision was hence made to include organisations with more than 500 employees.

3.2 Main Research Question

This research aims to determine whether soft skills have a positive influence on the alignment between the CISO and the organization and whether having soft skills is a must to be an effective leader. The main research question is thus formulated as follows:

What soft skills positively influence the chief information security officer leadership position in Dutch organisations with more than 500 employees?

3.3 Sub-Research Question

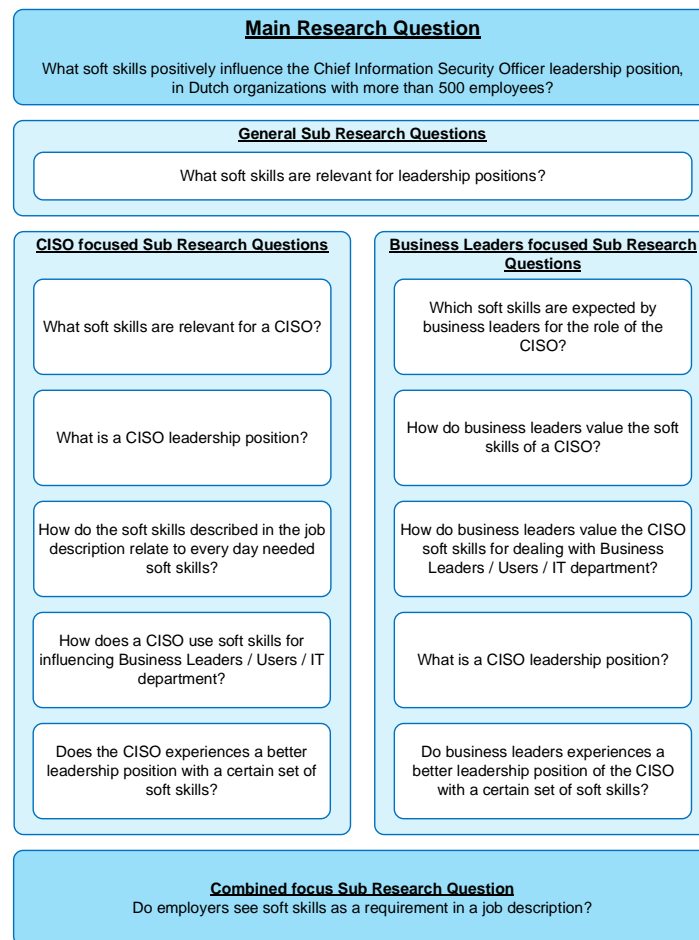
Following the main research question, the required soft skills are researched from two perspectives: the CISO perspective and the business leaders' perspective. Using the Oost and Markenhof (2010, pp. 51-53) theory on research functions, the main research question is a descriptive question and is broken down into a series of sub-questions on the topic of soft skills, as presented in Table 1:

Table 1 Sub-research questions

Focus	Sub-research question	Research function	Insight
General	What soft skills are relevant for leadership positions?	Describe	The definitions of soft skills that are relevant for leadership positions are obtained.
CISO-focused	What soft skills are relevant for a CISO?	Describe	An overview of the type of soft skills that are relevant for a CISO is acquired.
CISO-focused	What is a CISO leadership position?	Describe	Insights are gleaned regarding what a leadership position is for a CISO in a Dutch organisation with more than 500 employees.
CISO-focused	How do the soft skills described in the job description relate to the required everyday soft skills?	Evaluate	This offers insight into the gap between the official job description and the daily use of soft skills.
CISO-focused	How does a CISO use soft skills to influence business leaders, users or the IT department?	Evaluate	The CISO has their view on the value of soft skills and whether these soft skills differ when dealing with different types of groups in an organisation.
CISO-focused	Does the CISO experience a better leadership position with a certain set of soft skills?	Evaluate	The specific soft skills that contribute to a better CISO leadership position are identified.
Focus on business leaders	Which soft skills are expected by business leaders for the role of the CISO?	Describe	Organisations that employ a CISO expect the CISO to have a number of capabilities, interpersonal skills and personal attributes. Answers to this sub-question provide insight into the soft skills that the business expects.
Focus on business leaders	How do business leaders value the soft skills of a CISO?	Evaluate	This focus offers insight into how the business values the soft skills of a CISO in relation to other capabilities. It determines whether soft skills are more relevant than hard skills?
Focus on business leaders	How do business leaders value the CISO's soft skills for dealing with business leaders, users or the IT department?	Evaluate	The various groups in the business have their view on the value of soft skills, and the research focus here highlights how these groups value the CISO's soft skills in particular.
Focus on business leaders	What is a CISO leadership position?	Describe	The business leaders' perspective on what a leadership position is for a CISO is obtained here.
Focus on business leaders	Do business leaders experience a better leadership position of the CISO with a certain set of soft skills?	Evaluate	This question aids in understanding the factors that contribute to a better leadership position.
Combined focus	Do employers see soft skills as a requirement in a job description?	Evaluate	This focus allows for an analysis of job descriptions of soft skills requirements in relation to the outcome of the previous research questions. It aids in identifying whether a gap exists between what is required and what is recruited for?

Figure 1 depicts the main research question, along with the sub-research questions.

Figure 1 Main research question and sub-research questions



4 Literature Review

For this thesis, an in-depth literature review was performed. There is little to no relevant academic literature that describes the CISO in relation to soft skills. An online search of the keywords CISO and soft skills, in different libraries, yielded 22 results. All of these results point towards a single book, namely, CISO Soft Skills, by Collette et al. (2008). While this book reflects a broad set of research, none of the authors published an academic paper, and as mentioned in the Problem Statement, the publication lacks academic relevance by missing the rigorous academic research on CISO soft skills.

Furthermore, academic research is available on the following: information security by Vom Solms (2006); the best archetype of a security organisation by NEN-ISO/IEC (2017) or NIST (2019); the effect of soft skills in management functions by Cano, Fernández-Sanz and Misra (2013); and the hard skills of information security officers (ISOs) by Platform van Informatie Beveiliging (2019) and European Union (2014). However, the combination of CISO and soft skills is not a well-researched topic.

4.1 Analysis of Relevant Papers

Figure 2 illustrates the search questions for the search of relevant papers. The main topic is CISO soft skills, and the additional topics are related to the research question.

Figure 2 Search topics in relevant papers



The term ‘soft skill’ and other relevant search terms are not a random choice. The set-up of the relevant search terms is based on the initial review of the thesis topic. In multiple discussions, a storyline of topics relevant to the thesis topic, as presented in Figure 2, was created. Based on the paper by Robles (2012) and the article by Chimatti (2016), our storyline leads to the addition of soft-skill-related search terms such as ‘soft skills’, ‘empathy’ and ‘culture’. In addition, based on Kleinman’s (2018) article about the leadership enigma and role, the search terms ‘leadership’ and ‘roles’ were added, and the search term ‘technology’ was added because in recent decades of information security, the developments have a clear technology origin (Solms, 2000). Search terms such as ‘skills framework’ and ‘business demand’ (in the broadest context) were also added based on articles and publications discussing the demand for a CISO and the right skill set (Hayslip, 2019).

The search terms presented in Figure 2 are combined, omitted (explicitly CISO), or similar terms.

Moreover, our search approach was based on the following:

- Related topics – examples are risk management and privacy management.
- Similar functions – soft skills and C-level functions. As an example of the output, an article about CIO and soft skills (Cano, Fernández-Sanz, & Misra, 2013) is used in the literature review.

The following hierarchy was applied to the publications:

- Peer-reviewed above non-reviewed publications
- Recent publications (2008–2018) above older publications
- A quoted article over unquoted articles.

4.2 Review of Literature

In the Literature review of soft skills and leadership is from both authors, as shown in the table Contributions by authors (page 99). Matteson et al. (2016) state that soft skills are often a catch-all category for non-technical skills, where technical skills are the skills needed to perform one's job, and soft skills are for interpersonal relations. Defining soft skills is complicated and influenced by multiple factors (Chimatti, 2016).

The Cambridge Dictionary defines soft skills as follows:

‘People’s abilities to communicate with each other and work well together.’

Furthermore, the context of soft skills is essential. Chimatti (2016) found that all professions have their view and interpretation of the attributes of soft skills, and individuals use their personal experience or context to express their soft skills. This type of skill set is not a list of skills that an individual can learn in a school setting.

Individuals typically learn such skills from a young age from parents and by socialising in school, sports and other activities with other people (Chimatti, 2016).

Recruiters and business leaders search for prospective employees who have developed soft skills and consequently add value to their new employers. Much (non-academic) content is available on recruitment websites, such as indeed.nl – one of the websites used to capture job ads over the 5-month study period (see 5.7 Research Target Audience and Content) – that show the combination of work ethic and integrity. Some websites suggest that integrity is a subset of work ethic, and vice versa for others (Indeed.com, 2020). In 7.5 this mixture of subsets of work ethic and integrity is noted as future research.

Different academic studies list different attributes of soft skills. According to Marcel Robles (2012), the following are the 10 most relevant attributes of soft skills that are critical for business leaders:

- *Integrity*
- *Communication*
- *Courtesy*
- *Responsibility*
- *Interpersonal skills*
- *Professionalism*
- *Positive attitude*
- *Teamwork skills*
- *Flexibility*
- *Work ethic.*

The attributes by Robles (2012) are useful for our study because this research determines not only the critical soft skills that employers are expecting from their employees, but also the relation with business educators to align their curriculum to improve the employability of graduating business seniors.

As stated in Chapter 3 Research Question, the topic of soft skills is widely researched, and the list of 10 most relevant soft skills for business leaders, determined by Robles (2012, p. 455), is not absolute, and Weber et al. (2011) found 101 relevant soft skills for an entry-level manager in hospitality. In addition, in a peer assessment study of soft and hard skills, Zhang (2012) found that IT managers rate the following nine soft skills to be of importance for IT professionals:

- *Honesty and integrity*
- *Communication skills*
- *Analytical skills*
- *Teamwork*
- *Interpersonal skills*
- *Motivation*
- *Flexibility and adaptability*
- *Creative thinking*

- *Organisational skills.*

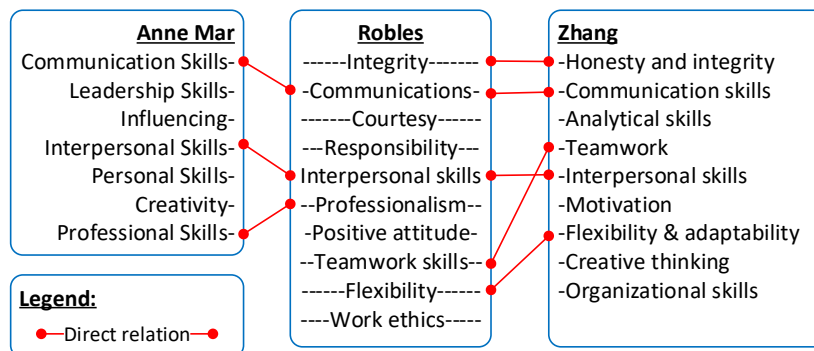
Both researchers are fully aware that CISOs are not IT professionals; their information security focus is broader than only IT security. In their daily job, however, working with IT staff is a given (Platform van Informatie Beveiliging, 2019).

Furthermore, a non-academic researched website, Simplicable, posted by Anna Mar (2016), published 87 soft skills in seven categories¹. This website targets business leaders for management training, and the seven categories are as follows:

- *Communication skills*
- *Leadership skills*
- *Influencing*
- *Interpersonal skills*
- *Personal skills*
- *Creativity*
- *Professional skills.*

To select the best fitting overview of relevant soft skills used in this research, the soft skills found by three other researchers are compared. This is based on a direct relation between the soft skill attributes (e.g., communication skills). Figure 3 illustrates the direct relations between the three researchers' findings. An indirect relation also exists between the soft skill elements, where the topics are not similar in description but can be indirectly related. The three compared research works all have different abstraction levels; therefore, a direct comparison is difficult between the top level of the found soft skills.

Figure 3 Overview of relations between soft skills



For this research, the soft skills identified by Robles are used. This decision was based on the following reasons:

- The element of integrity was observed in the assessed job advertisements but not in the relevant soft skills by Anne Mar (2016).
- The element of ethics was seen in some of the assessed job advertisements but does not appear as a direct topic on the list of relevant soft skills by Anne Mar (2016) or by Aima Zhang (2012).
- The non-academic researched soft skills by Anne Mar (2016) focus on the development of skills in a broader set of commercial management trainings.

¹ The detailed overview of the eighty-seven soft skills are listed in the addendum Soft skills per Anne Mar

- Aima Zhang's (2012) research identified nine soft skills that are of importance for IT professionals, according to IT managers. However, our research question focuses on the CISO, and the CISO is not an IT professional.
- Robles (2012, p. 455) 10 most relevant soft skills for business leaders are linked to our main research question.

For this research, the relevant soft skills identified by Robles (2012, p. 455) are considered as the reference set of soft skills, and it is expected that the CISO soft skills could vary from the high-level definition. Part of the research question pertains to the soft skills that positively influence the CISO leadership position; therefore, Robles' (2012, p. 455) list was chosen because it is aimed at business leaders, whereas the soft skills identified by Anne Mar (2016) and Aima Zhang (2012) do not focus on soft skills' influence on a leadership position. Table 2 lists the attributes for each of Robles' 10 most relevant soft skills.

Table 2 Soft skill attributes (Robles, 2012)

Soft skill	Attributes
Communication	Oral, speaking, written, presenting and listening capabilities
Courtesy	Manners, etiquette, business etiquette, gracious, says please and thank you, respectful
Flexibility	Adaptability, willing to change, lifelong learner, accepts new things, adjusts, teachable
Integrity	Honest, ethical, high morals, has personal values, does what is right
Interpersonal skills	Nice, personable, sense of humour, friendly, nurturing, empathetic, has self-control, patient, sociability, warmth, social skills
Positive attitude	Optimistic, enthusiastic, encouraging, happy, confident
Professionalism	Business-like, well-dressed, appearance, poised
Responsibility	Accountable, reliable, gets the job done, resourceful, self-disciplined, wants to do well, conscientious, common sense
Teamwork	Co-operative, gets along with others, agreeable, supportive, helpful, collaborative
Work ethic	Hard working, willing to work, loyal, initiative, self-motivated, on time, good attendance

4.2.1 CISO soft skills viewed from a CISO perspective

The research had a dominant factor on soft skills. This section – by author J.M.J. van Yperen Hagedoorn as shown in the index: Contributions by authors (page 99) – reflects the literature review on soft skills from the CISO perspective..

Recruiters typically fish in the pool of CISOs and upcoming CISOs, such as ISOs, IT security managers or specialists. The job profiles from the Dutch Platform van Informatie Beveiligers (Platform van Informatie Beveiliging, 2019) show the role or job description of the CISO, and part of the role description is education and experience:

- *A master's degree or equivalent level of knowledge and skills*
- *Five years of experience in an information security profession*
- *Five years of management experience.*

All other security roles described in the job profile description (Platform van Informatie Beveiliging, 2019) focus on hard skills.

In a broader context, the review of Yang and Wen's (2017) research revealed a common cybersecurity curriculum. Their research, at numerous undergraduate business schools, demonstrated that the majority of these curricula focus on hard skills. Their analysis of 27 cybersecurity programmes (out of the offered 278 information systems and information technology programmes) also indicated that none of these courses is explicitly related

to soft skills (Yang & Wen, 2017, p. 4), and all courses focus on hard skills, such as application programming, networking skills and digital forensics. A detailed analysis of the individual courses is missing, although two listed courses hint at the inclusion of soft-skill-related topics:

- IT risk Management or managerial issues
- Policy, legal, ethics, and compliance

All of the researched business schools, in 2010, are AACSB-accredited institutions in the United States and are therefore credible educational institutions.

Furthermore, the descriptive model proposed by Yang and Wen (2017) shows a separation of educational core courses:

- IT security
- IT risk management or managerial issues

Their explanation of the core courses is that the security course addresses technical issues of cybersecurity, while the course on IT risk management or managerial issues covers the administrative, organisational and people aspects (Yang & Wen, 2017, p. 5).

Having demonstrated that soft skills are not a standard element of the majority of the CISO curriculum, the following question then arises: how does a CISO develop soft skills? The research by Lavasseur (2013) asks, ‘Why do so many technical people lack soft skills?’ Based on his research, the development of soft skills is related to Maslow's hierarchy of needs: the development of hard skills is primary, whereas the development of soft skills is secondary. His observation is that hard skills are learned through education and learning, while the development of soft skills is the result of self-actualisation. The question, ‘What is the best way to develop soft skills?’, is also answered: soft skills are the result of behaviour (interaction between a person and their environment) and skills development (developed behaviour). Levasseur (2013) emphasises the relevance of our research in his paper: many technical people lack soft skills.

Based on the previous research, the Cambridge Dictionary definition of soft skills (Cambridge dictionary, 2019) is not sufficient for our use. According to Robles’ (2012), soft skills consist of interpersonal skills (how to interact with others / social skills) and personal attributes (skills needed in a professional setting, such as work or volunteer work). Robles’ (2012) definition, and studies such as Zhang (2012) and Yang and Wen (2017), help to focus on the relevant aspects of soft skills in a working environment:

$$\text{Soft Skills} = \text{Interpersonal (People) Skills} + \text{Personal (Career) Attributes}$$

(Yang & Wen, 2017)

This definition is used to define soft skills in this study. The definition by Robles (2012) was chosen based on the purpose of the study to determine the critical soft skills that employers seek in their employees and in relation to business educators to align their curriculum to improve the employability of graduating business seniors. The study by Robles aimed to collect input at the executive level, acknowledging the balance between hard skills (technology) and soft skills, and it references the changing work environment ‘from an industrial economy to an information society and an office economy’ (Robles, 2012, pp. 453-454). These elements closely align with this study.

Next, the questions of how a CISO, or an upcoming CISO, prepares him/herself for this demanding role and what is known to develop which skill set, are explored. This exploration reflects the literature found on the curriculum and development of the CISO.

The rise of IT, and hence a more digital society and economy, influence a CISO's required skills. This is because of our digitised society and the use of IT systems within companies, requiring different skills for the workforce.

The research of Van Laar et al. teaches a conceptual framework of 21st-century skills:

- *Learning skills (creativity and innovation, critical thinking and problem solving, communication and collaboration)*
- *Literacy skills (information, media and ICT literacy)*
- *Life skills (flexibility and adaptability, initiative and self-directed, social and cross-cultural skills, productive and accountability, leadership and responsibility).*

In Van Laar et al.'s (2017) examination of 75 articles, the majority of the articles focused either on the broader society or on students. They linked general skills to the skills of the workforce through a conceptual 21st-century skills framework, and their concluding remark was that the modern knowledge worker is in charge of their own learning: (digital) hard skills and soft skills. Their study is related to our research question in that the skills of employees, including the CISO, go beyond solely professional knowledge (Van Laar, van Deursen, van Dijk, & de Haan, 2017).

Furthermore, the CISO is not the only executive responsible for information security. Williams' (2007) article states that multiple executives and board members are responsible for articulating the security policies in their respective span of control. The CISO is responsible not only for articulating those policies, but also for the broader information risk management process (Williams, 2007, pp. 12-13). In a study by Cano et al. (2013) on the soft skills for a CIO, which is a similar executive role (Chief) to that of the CISO, but with a focus on delivering IT functionality, the conclusion was that soft skills are a limited part of current training programmes but essential in the role as CIO. The research on job ads for CIOs shows the rise in the demand for non-technical skill sets over the past 20 years. Other job ads for IT functions seek a more technical skill set. Cano et al. (2013) research combined the skill sets demanded and time spent on activities, and it demonstrated that the CIO's main activities are human resource management, interactions with peers, strategic planning and discussions with subordinates. They conclude that unlike the average IT employees, a CIO speaks with multiple 'types' of employees in an organisation, and a prime set of soft skills is hence necessary. In some cases, non-technical skills are the critical factors to success. Another conclusion was that on the career journey, the development of soft skills should be in parallel with the hard skills needed. The foreseeable future demonstrates that the development of professional IT skills is required, and to make such knowledge useful, the development of personal skills will be even more significant. With this knowledge that soft skills are a relevant skill set for the executive management role of the CIO, it is our belief, at this time, that soft skills are likely of value for the executive position of a CISO. This relates to the sub-research question regarding how business leaders value the soft skills of a CISO (3 Research Question).

The non-peer reviewed study by Ashenden and Sasse (2013) suggests that there is an unbalanced communication – which Robles (2012) and Zhang (2012) deem to be one of the most relevant soft skills – between the CISO and end users. Through a set of structured interviews with five enterprise CISOs, they concluded that communication is mostly a one-way model of communication. The research by Ashenden and Sasse (2013) focuses on cultural

change by the CISO, with the goals to improve the position of an organisation on the topic of information security by using awareness training. The interviewed CISOs stated that their communication is less effective than it should be and that it is missing a dialogue. Moreover, an observation regarding the unbalanced communication is that the CISO has a authoritative role, which could have a surprising effect on the relationship between the end user and the CISO. The description of the relationship could be a parent–child relationship, with an unclear end user's behaviour expectation. Although Ashenden and Sasse's research is a qualitative study of five CISOs, it indicates that broader research is needed to ultimately formulate a framework that can measure the effect of the CISO's soft skills on the change management of organisations' information security (Ashenden & Sasse, 2013).

The study of 'the influence of a good relationship between the internal audit and information security functions on information security outcomes' (Steinbart, Raschke, Gal, & Dilla, 2018) presents a strong indication that soft skills contribute to the improved effectiveness of security. The respondents in that study were members of the Information Management and Technology Assurance (IMTA) Community section of the American Institute of Certified Public Accountants, and data collection was done via a web survey. In addition, a literature study complemented the surveyed data. The researchers demonstrated that the better the relationship is between the internal auditors and the managers responsible for the information security, including the CISO, the more effective the security measures are that are embedded in the organisation.

Side effects of an ideal relationship between the internal audit and information security functions are that the detection of incidents increases, and the effects of harm are limited before and after an incident. Research by Steinbart et al. (2018) describes two antecedents of such an ideal relationship:

- senior management must be committed to information security
- the reporting structure of the CISO must be independent of the information security function.

Their research, however, did not specify what elements contribute to an ideal relationship; it was limited to the question of relationship quality. Referring to the adopted definition of soft skills, this demonstrates that developed interpersonal skills influence the relationship and have a positive effect on security measures. Another indicator of the effect of communication is found in the research on 'the effects of an auditor's communication mode and professional tone on client responses to audit inquiries' (non-peer reviewed) by Steinbart et al. (Steinbart, Raschke, Gal, & Dilla, 2018). This research is relevant because a CISO, similarly to an auditor, must perform internal audits where they need to motivate an organisation to adjust the (information security) policies (Platform van Informatie Beveiliging, 2019).

Furthermore, the researchers Saiewitza and Kida (2017) demonstrate that the tone of communication is directly related to the response. A more formal approach has a less bias effect on the receiver's position compared to an informal approach. Another outcome is the use of communication methods: the authors' research tested the use of email as a communication method versus audio and/or visual inquiry. They found that the response of the receiver via email is less likely to agree with a proposed income-decreasing audit adjustment, and the receiver is likely to negotiate more aggressively in response to the proposed audit adjustment (Saiewitza & Kida, 2017). The outcome of Saiewitza and Kida's (2017) research is of value for the present study. The CISO must organise measures to safeguard the organisation against any cyberthreat, including measures that will affect co-workers ways of working (Levy, Delaney, Hill, & Buckalew, 2019). In this regard, Saiewitza and Kida demonstrate that the tone of voice and the type of communication will affect employees' willingness to accept change (Saiewitza

& Kida, 2017). This conclusion demonstrates that the interpersonal skills, as stated in the adopted definition of Robles (2012), is of value for the CISO.

To compel an organisation to accept and comply with information security policies (ISPs), it is imperative that the CISO can convince people to do so. One's tone of voice is a way to influence employees to accept change, as stated by Saiewitza and Kida (2017). In their research, leadership is positioned as an extension of interpersonal skills. Moreover, based on the research by Popper (2004), leadership has two distinctions: authority and influence. Authority is a more traditional type of leadership, with correlated items being power, control and hierarchy. The second distinction concerns transformational leadership, which has its roots in influence. This view of a leader is perceived by the people who are influenced (Popper, 2004, pp. 106-107). One discussion point of Popper is that strong relations are a better fit in this era compared to the more traditional, authoritative posture (Popper, 2004, pp. 117-118).

As stated before, soft skills are not a standard element of the majority of CISO curricula (Yang & Wen, 2017), and many technical people lack soft skills (Levasseur, 2013); however, the development of soft skills is necessary for 21st-century skills (Van Laar, van Deursen, van Dijk, & de Haan, 2017). The question then arises as to which frameworks can be used for the development of such skills. In this research, we analysed two framework types:

- Employee skills framework (personal development of the individual employee)
- Information-security-focused frameworks (best practices on the organisational implementation of security management).

The researched frameworks focus on implementing an information security management system (ISMS) in organisations. The decision to research not only frameworks for employee skills but also a more technical focused framework is because most of the job ads for CISOs request hard and soft skills. Yang and Wen researched cybersecurity course curricula and demonstrated a minimal focus on soft skills in these courses, although some hint at soft skill development (Yang & Wen, 2017). To prevent soft skill research bias by solely focusing on the employee skills frameworks, the development of these skills could be influenced by the curriculum for training and certifications based on information-security-focused frameworks.

Maria Cinque (2016) highlighted a misalignment in the education of skills between students, employers and educators. In this research, based on a literature study and the results of two European projects for alignment of higher education with the labour market, the conclusion was that the universities and companies move in 'parallel universes'. One of the issues is that there are multiple soft skills studies and projects that assign different names to soft skills. Even within European countries, different names and definitions or standards are used. Table 3 lists the names for soft skills in some European countries (Cinque, 2016).

Table 3 Different names for soft skills in some European countries; Cinque (2016)

Countries	Denominations
Austria	Schlüsselkompetenzen (key competencies)
Belgium	Belgium fr.: compétences transversales (transversal competencies) Belgium nl.: Sleutelcompetenties (key competencies)
Denmark	Nøglekompetence (key competencies)
England	Key skills (England, Ireland) Core skills (Scotland) Life skills, key transferable skills, cross competencies
France	Compétences transversales (transversal competencies)
Germany	Schlüsselkompetenzen (key competencies), übergreifende Kompetenzen (general competencies)
Italy	Competenze trasversali (transversal competencies)

Countries	Denominations
Portugal	Competências essenciais (essential competencies), competências transversais ou genéricas (transversal or generic competencies)
Spain	Competencias genéricas (generic competencies)

To overcome the national standards of local frameworks, the Organisation for Economic Cooperation and Development (OECD) has developed the European Qualification Framework (EQF). The intent is to transform European national qualification frameworks (NQFs) by moulding these local frameworks into a learning outcomes framework. The result of the EQF is a European curriculum vitae (CV) with a standardised outcome; it makes the CVs of European candidates transparent and affords recruiters a comparable insight into those individuals' knowledge, skills and competencies. Méhaut and Winch's (2012) research regarding the EQF demonstrates that, in particular, the term 'soft skills' is misleading. They state,

Soft skills' is a confusing phrase because the ability to work with other people is, in France, Germany and the Netherlands, conceived of more as a second-order transversal ability, not a task-specific skill.

Furthermore, the conceptions of savoir être (Fr), Sozialkompetenzen (DE) and houding (NL) have a moral and civic dimension to them which is lacking in the idea of a 'soft skill' (Méhaut & Winch, 2012, pp. 378-379).

Another source for development of soft skills is the European e-Competence Framework. This framework is a common European framework for ICT professionals in all industry sectors. Although a CISO is not explicitly an ICT professional, this framework is used for other parties in the information security domain, such as Platform van Informatie Beveiliging (PvIB), which has based its competence framework on the European e-Competence Framework.

When assessing the European e-Competence Framework version 3.0, published in 2014, the term 'soft skills' does not appear in the document. Moreover, when assessing the document on 'communication', the result is as follows:

However, to maintain an ICT focus, the e-CF avoids generic competences such as 'Communications or General Management' although very applicable these transversal competences are comprehensively articulated in other structures (European Union, 2014, p. 5).

The PvIB Beroepsprofielen Informatiebeveiliging 2.0 (Job Profiles Information Security version 2.0) is the document that contains a reasonable amount of non-hard-skills-related competencies. All of the topics related to soft skills, such as leadership, communication and persuasiveness, are grouped under the topic of generic competencies (Platform van Informatie Beveiliging, 2019).

The second category of researched frameworks consists of frameworks that support the implementation of an ISMS. The following frameworks were researched:

- CIS Cyber Security Controls (CIS, 2019)
- COBIT 5
- ISA 62443-2-1:2009
- ISO/IEC 27002 Information technology – Security techniques – Code of practice for information security management (NEN-ISO/IEC, 2017)
- NIST Cybersecurity framework (NIST, 2019).

Researching these frameworks offers insight into which skills are required. The skills mentioned in the frameworks focus on hard skills and are described as, for example, security management processes, security architectures and reporting activities. The only hint at soft skills could be distilled from topics such as awareness in the NIST Cybersecurity framework:

PROTECT (PR) Awareness and Training (PR.AT): The organization's personnel and partners are provided cybersecurity awareness education and are trained to perform their cybersecurity-related duties and responsibilities consistent with related policies, procedures, and agreements. PR.AT-5: Physical and cybersecurity personnel understand their roles and responsibilities (NIST, 2019).

The CIS Cyber Security Controls have a similar focus. In the CIS Control 17: Implement a Security Awareness and Training Program, the required skills are described as the skills and behaviours needed. However, what the skills and behaviours are, is not stipulated (CIS, 2019).

Although the ISMS frameworks explain that employees, management and security personal must understand their roles and responsibilities, in-depth descriptions are lacking. To understand those roles and responsibilities, frameworks such as e-CF and PvIB are used, and as described earlier, these frameworks either tend to only present high-level descriptions or avoid generic competencies such as 'communication'.

It is our conclusion that the use of frameworks for employee skills and the implementation of security controls offers limited guidance in developing the needed soft skills in general. Therefore, although these frameworks are highly relevant to CISOs, they offer no guidance on how the leadership position is positively affected.

The non-peer reviewed article Cybersecurity Leadership: Competencies, Governance, and Technologies for Industrial Control Systems demonstrates that employees require optimal leadership support to be aware of cyber risks (Auffret, et al., 2017, p. 11). Not only the CISO but also the broader group of business leaders should be fully aware of the need for two out of three security pillars: processes and technologies. This is necessary to create a high level of awareness about the third pillar of security defence: the people.

An article by Auffret (2017) states clearly:

Like other C-level positions, certain skills have been repeatedly recognized by industry experts as essential for a CISO's success. Leadership skill, for example is increasingly becoming the primary skill that organizations are looking for when hiring a CISO. ... A CISO's communications and interpersonal skills are deemed to be essential, especially as CISOs spend more time presenting in front of the board, other executives, business unit leaders, technical teams and the organisation's customer. Like anyone in a leadership role, a CISO should be an excellent team builder and collaborate in an effective manner (Auffret, et al., 2017, p. 11).

However, the article by Auffret et al. (2017) does not contain the explicit ingredients of an ideal leadership position.

Furthermore, the article by Guhr et al. (2019) explains what type of leadership has the best impact on employees' intended information security behaviour. Their study addresses a gap in literature: how the dimensions of full-range leadership influence employees' intended information security behaviour. In addition, through the research of Tsohou and Holtkamp, we learned that general users are willing to comply with ISPs but lack understanding (Tsohou & Holtkamp, 2018). The study by Guhr et al. (2019) also demonstrated how and why different

leadership styles enhance employees' intended information security behaviour. In their research, three leadership styles were tested against two user (employee) intentions.

The leadership styles are as follows:

- Passive/avoidant leadership, which is based on two leadership styles: management-by-exception (passive) and laissez-faire
- Transactional leadership, which is based on rewards and punishment in exchange for achieving previously defined performance goals
- Transformational leadership, which is based on leading by example and motivating followers to identify with the leaders.

The user (employees) intentions are as follows:

- Information security compliance intention
- Information security participation intention.

Their data was collected via a cross-sectional, anonymous, self-reported survey to gather empirical data and gain valuable insights. First, passive/avoidant leadership was found to have neither a positive nor a negative effect on employees' intended information security behaviour. Second, transactional leadership did not have a positive effect on employees' intended behaviour. This finding is different than other studies, where punishment for information security violations resulted in a higher security awareness and thus better compliance behaviour by employees. Third, transformational leadership had a positive effect on employees' intended information security compliance behaviour. Therefore, transformational leadership is the best style to encourage employees to adopt information security compliance measures. In their research, Guhr et al. (2019) state that transactional leadership and transformational leadership are not opposite in behaviour but are separate leadership dimensions. A leader can demonstrate transformational leadership qualities to enhance employees' willingness to adopt ISPs. Moreover, the same leader can demonstrate the corrective actions of a transactional leader (e.g., reporting or punishment) if an employee violates ISPs (Guhr, Lebek, & Breitner, 2019).

4.2.2 CISO soft skills viewed from a business leader's demand perspective

The set-up of this research not only focuses on the perspective of the CISO, but also includes the demand by business leaders. This multisource approach enhances the validity of the research outcome (Zohrabi, 2013). Literature on the demand for CISO soft skills from the perspective of business leaders is limited. The result is an aligned collection of research that feeds into the main research questions stated in Figure 1 (page 11). This section – written by author R. Smit, as shown in the index: Contributions by authors (page 99) – presents the literature review on soft skills from the business leader perspective..

The research includes Weishäupl et al., not because of the outcome of their research but for the input of the interviewed responders. The authors' work is titled, 'Information security investments: An exploratory multiple case study on decision-making, evaluation, and learning via qualitative research among business users'. Nine out of 12 of the interviewees were non-security-related business professionals, ranging from CEOs and sales and marketing directors up to heads of data centres. The interviews adopted a structured approach, and some of the quoted interviewee responses indicate the merit in researching business leaders' need for a CISO equipped with soft skills. The following is a direct quote from the interviewed sales and marketing director regarding the awareness programme:

Awareness is a complex issue that has not yet been discovered entirely. Influencing the behaviour of 200,000 employees is a challenging task. In addition, IT security tends to be managed by technicians who are more knowledgeable in technology rather than in human behaviour (Weishäupl, Yasasin, & Schryen, 2018, p. 812).

This quote demonstrates the need for better alignment. Furthermore, the study by Weishäupl et al. (2018) is not an isolated study; multiple formal and informal studies, such as the research into CISO (Levy, Delaney, Hill, & Buckalew, 2019), confirm the technical focus of the curriculum of general IT professionals.

In the Elsevier Business Horizon periodic, Hooper and McKissack (2016) demonstrate the non-alignment of expectations via research of the 15 most popular job websites and the CISO job ads. In three countries, namely, the US, Canada and New Zealand, these websites were the source for the over 100 collected job ads. In the majority of job advertisements, Hooper and McKissack (2016) found a high degree of technical skills, daily operational tasks and a strong focus on security (hard skills). A minority of the researched job advertisements sought a candidate who is excellent in communication, which would include verbal, written, or public speaking skills, and an even smaller portion sought outstanding analytical skills. Some of the advertisements also described the need for a CISO with strong ethics and personal integrity, and an understanding of business was a further requirement in a limited number of the ads. It is interesting that little was found on soft skills in job ads. Nonetheless, the authors clearly state in their research that soft skills are an element of success:

As a communicator, success in the CISO role requires the ability to understand what is important to both business and technical audiences. It is unlikely that the issues faced by members of the executive team are the same as those who are developing and administering security controls within the organization. Having understood the expectations of all stakeholders, the CISO's role is to explain security concepts in terms that can be understood within the C-suite (e.g., through the use of analogy) and to educate the security team about the business drivers that direct the focus of security investment (Hooper & McKissack, 2016).

This quote is a clear indication that business leaders do not need solely technically skilled CISOs. To have a successful relationship between business leaders and the CISO, the skill set of the latter must be broader than only technical in nature to get the information security (risks) message across. This drives the question of how business leaders articulate soft skill requirements. Moreover, understanding the needs of business leaders drives the soft skills approach of our multisource research: the CISO perspective and the business perspective.

Furthermore, hard skills are clearly defined (e.g., managing CISCO ASA firewall rules) in the literature. As quoted before, the research by ASRC Federal demonstrates that of the top 10 CISO skills, 3 are soft-skill-related. Furthermore, the observation is that the right combination of skills is the key to be a successful CISO (Death, 2019).

Knowing that the modern CISO needs more than just technical skills leads to the following question: where can business leaders find the correct skill sets? The European e-Competence Framework includes no soft skills assessment (European Union, 2014); the PvIB Beroepsprofielen Informatiebeveiliging 2.0 (Job Profiles Information Security version 2.0) also has no overview of relevant soft skills and only refers to generic competencies (Platform van Informatie Beveiliging, 2019).

The non-peer reviewed article by Succi and Wieandt (2019), Walk the talk: soft skills' assessment of graduates, indicates that a soft skill assessment during the recruitment phase is done via interviews. Although the authors focused on university graduates, in their research the hiring managers were the focus area of the demand side of

the hiring process. In addition, the interview, structured or not, had its shortcomings as a selection method: the validity of the interview and the many factors possibly influencing the interview course in a negative way. Apart from the shortcomings, it is still one of the most preferred and most frequently used interviews in relation to all other selection procedures. An alternative that has gained importance in the recruitment phase is video interviewing. Although this type of interviewing enables organisations to be more efficient, process a higher volume of candidates and save time and money, the basics remain the same: an interpretation of the candidate via an interview (Succi & Wieandt, 2019, p. 5).

A business does not only consist of C-level management or the board. Rather, it has a large group that the CISO must address: the workforce, also known as the end user. An interesting element is the end user who needs to have the capabilities to understand the ISPs, which are the basis of working safely with digital information. Tsohou and Holtkamp (2018) conducted research to answer the question, 'Are users competent enough to comply with information security policies?' They focused on the competency of users because ISP has gained much attention by organisations. The human element is the major cause of information security breaches (Blackhat.com, 2017), and ISPs are designed to mitigate the risk. As a result, users are confronted with these ISPs. The conclusion is that users are generally willing to comply with ISPs but lack understanding – the research found that there can be a difference between education and job profiles. There is, however, a general lack of information security in the competence requirements of various job profiles throughout companies. Therefore, the authors concluded that further research and development of frameworks is required to bridge the gap in higher information security awareness (Tsohou & Holtkamp, 2018). When referring to the adopted definition of soft skills, from Robles (2012), the understanding of soft skill is of value for the CISO, who must address a user's knowledge of security topics, which could affect adoption when implementing new or changed security policies.

Based on the reviewed research, the following question arises: are business leaders able to articulate the information security demand properly? One paper by Bachlechner et al. (2014), that comes close to answering this question is the article titled, 'Security and compliance challenges in complex IT outsourcing arrangements: A multi-stakeholder perspective'. Their research does not address the topic of articulating the demand, but instead focuses on the explicit demand and supply of outsourcing combined with security and compliance. The link with the research questions is as follows: when the business demand for capabilities cannot be articulated well in an outsourcing construct, how can it be articulated and valued in an internal fulfilment?

Bachlechner et al. (2014) concentrated on six significant security and compliance challenges. Two of those are related to the research question: coping with a lack of security awareness and co-ordinating involved parties. With respect to the first topic, they concluded that the end user has difficulty dealing with security and compliance within the organisation; that difficulty is exacerbated in complex IT outsourcing arrangements. Then, regarding the second topic addresses, the authors found that the constantly changing regulation and the complex IT outsourcing arrangement tend to see conflicting client requirements (Bachlechner, Thalmann, & Maier, 2014). The need for co-ordination between parties demonstrates that researching the value of CISO capabilities and requirements for a curriculum is well worth the effort. The dimension of the added value of the CISO, being able to articulate the security needs accurately, is out of scope of this research and will be added to the future work chapter in the thesis.

In the article by Dor and Elovici (2016), the authors demonstrated a model of information security investment decision-making. This model helps decision-makers to decide on information security investments. Their method of interviewing 23 information security experts and decision-makers from nine firms delivered a solid understanding of the relevant topics of influence on the decision-making process. The model covers specific activities to overcome some of the gaps in an organisation's current decision-making process. What stands out on that the presented checklist is that none of the activities relates to the field of soft skills – 13 of the 14 recommended activities are financial or task-based activities, and only one stands out: retain consultants who are familiar to the board and trusted by its members. Trust is difficult to measure in numbers and relates to soft skills and the ability to build trust. One of the researchers' conclusions is the observation that information security investment decision-making is a process that consists of a complex socio-technical balance (Dor & Elovici, 2016).

As demonstrated in Auffret et al.'s (2017) article, 'Cybersecurity Leadership: Competencies, Governance, and Technologies for Industrial Control Systems', employees need strong leadership support to be aware of cyber risks. Auffret et al. (2017) mention that not only the CISO but also the broader group of business leaders should be fully aware of the need for security: Moreover, they state that

Leadership skill, for example is increasingly becoming the primary skill that organizations are looking for when hiring a CISO. ...Like anyone in a leadership role, a CISO should be an excellent team builder and collaborate in an effective manner (Auffret, et al., 2017, p. 11).

Tejay and Winkfield (2015) researched how a CISO can become an effective leader. In their non-peer reviewed article, they examined the path-goal leadership approach – via a literature review, they aimed to understand how CISOs can be more effective security leaders. In their research, the path-goal theory was applied as a theoretical lens on information security leadership. This theory contains four major elements: leadership behaviours, subordinate characteristics, work environment characteristics and motivation towards a goal. Although the latter three elements – subordinate characteristics, work environment characteristics and motivation towards a goal – are highly relevant for the adoption of security measures and behaviours, only one suggestion is made on the topic of leadership behaviour. The suggestion is that CISOs' leadership styles must be tailored, since tailoring communication and influencing the subordinates' perception are the paths to the attainment of information security goals (Tejay & Winkfield, 2015, p. 7).

Colbert et al. (2014) researched personality and leadership composition in top management teams (TMTs), investigating whether TMT personality and leadership are associated with organisational effectiveness beyond the effects of CEO personality and leadership. Using direct measures of personality and leadership, rather than proxy variables from archival sources or demographic data, Colbert et al. (2014) found that mean levels of conscientiousness among TMT members were related to lagged indicators of organisational performance, as were CEO conscientiousness and transformational leadership. Moreover, follower commitment to the organisation was found to be associated with higher levels of transformational leadership from both the CEO and the TMT. The results are that organisational effectiveness is influenced not only by the CEO but also by a dominant coalition of leaders. However, the results also suggest that the CEO plays a distinct role in influencing organisational financial performance and collective organisational commitment (Colbert, Barric, & Bret, 2014). For the present research regarding the specific 'soft skills that positively influence the CISO leadership position in Dutch organisations with more than 500 employees?', we do not focus on the financial performance of the

organisation; instead, we use the outcome of the topic of collective organisational commitment. Colbert et al. (2014) demonstrated that not only the transformation leadership skills of the CEO but also those of the entire TMT have an impact on organisational commitment. They suggest that to select leaders, organisations should instate formal systems to develop transformational leadership among current and potential future CEOs and TMT members. They also state that having a TMT that is composed of highly transformational leaders, who can effectively communicate with one another and co-ordinate their efforts, will have a crucial impact on the team's success (Colbert, Barric, & Bret, 2014, pp. 379-380). Colbert et al.'s (2014) findings emphasise the relevance of the outcome of the research by Guhr et al. (2019), who state that transformational leadership qualities enhance employees' willingness to adopt ISPs.

The research by Sunindijo and Zou (2013) tested whether emotional intelligence, interpersonal skills and transformational leadership positively influence the implementation of safety management tasks, which leads to the development of a better safety climate (Sunindijo & Zou, 2013). Although their focus was on project teams in construction companies, there is a resemblance to the work of the CISO. One of the tasks of the CISO is to implement an ISMS, which includes creating awareness of information security tasks and building a secure environment (Platform van Informatie Beveiliging, 2019). Sunindijo and Zou (2013) formulated six hypotheses for this research, and they found empirical evidence that project managers in construction firms can use human skills, which consist of emotional intelligence, interpersonal skills and transformational leadership, to improve safety in construction projects. They also found that emotional intelligence is a prerequisite of the effective implementation of safety management tasks. Furthermore, transformational leadership combined with the implementation of safety management tasks, in conjunction with an indirect influence from interpersonal skills, contributes to the development of a safe climate (Sunindijo & Zou, 2013, p. 109). This leads to the conclusion that recruiting a CISO with the right set of soft skills, which supports transformational leadership, will result in a better leadership position.

5 Research Method and Process

This chapter describes the research method and process of this study.

5.1 Research Method

As stated in the literature review, little research has been conducted on the selected thesis topic. Based on the research functions articulated by Oost, the research method has a defined research function (Oost & Markenhof, 2010). Since little to no research has been conducted on the research question itself, the theory of inductive research is employed in this study (Bryman & Bell, 2015), using the Delphi method, which was chosen because it offers the opportunity to draw together existing knowledge efficiently and pinpoints areas of agreement or disagreement in the field of experts (Iqbal & Papon-Young, 2009, p. 600). In addition, the Delphi method contains both elements of other research methods, such as qualitative and quantitative methods. By the nature of its procedural structure (to incorporate both qualitative [an expert group] and quantitative methods [surveys] to reach consensus), it allows the opportunity to achieve a more complete answer to the research question with a limited response group (Iqbal & Papon-Young, 2009, p. 600). The Delphi method is favoured because it is anticipated that CISOs and business leaders of organisations with 500+ employees are difficult to reach and obtaining the minimum sample size for a quantitative research is hence a challenge. This is similar for a

quantitative research, where the business leaders and CISOs are assumed to have limited availability for interviews.

A quantitative content analysis was selected as the research method for analysing the collected job offers. The approach of using content published on websites is based on the public documents content research approach (Bryman & Bell, 2015, pp. 558-559). This approach was chosen to build an understanding of the content of the collected job offers, which were processed and coded using the Atlas.ti software coding tool.

5.2 Multisource Research Approach

The multisource approach is a dominant factor in this thesis. Multisource research is a logical approach to the topic, since the development of skills is essential for an individual in the role of the CISO, and the organisation employing the CISO requires staff with the right skills (Hasson, Keeney, & McKenna, 2000, p. 5).

The academic relevance of a multisource approach to the research question – using a Delphi study on a mixed response group (CISO view and business leaders' view) – is that it enhances the validity of the research outcome. As Mohammad Zohrabi (2013) describes in the paper 'Mixed Method Research: Instruments, Validity, Reliability, and Reporting Findings', triangulation enhances the validity of the data:

The researcher should use different procedures such as questionnaires, interviews and classroom observations to collect data. Also, this information needs to be obtained through different sources such as learners, students, ex-students, language instructors, subject instructors and program staff. Therefore, collecting varied types of information through different sources can enhance the reliability of the data and the results (Zohrabi, 2013, p. 259).

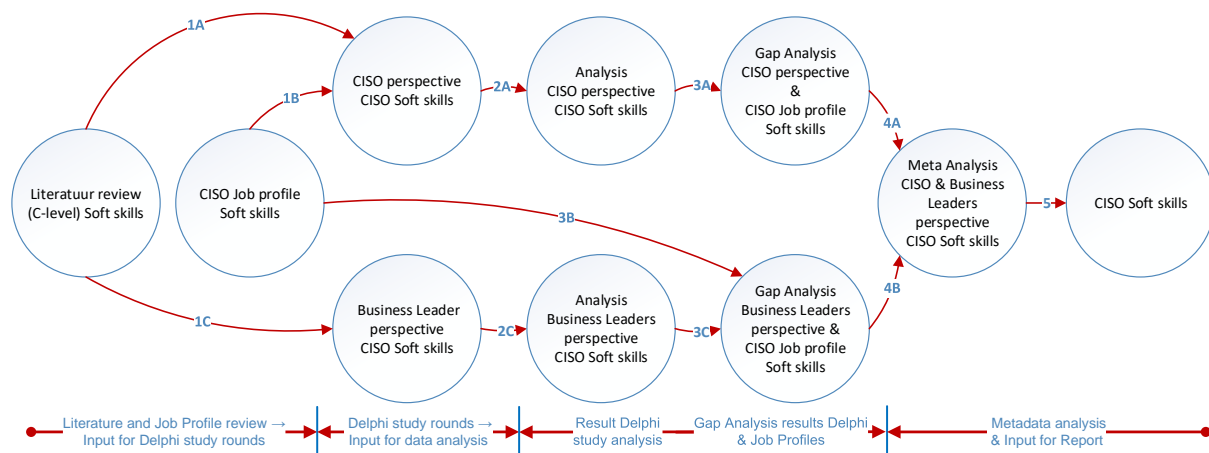
The mixed method research outcome of the Delphi study and the analysis of the job offers both ensure validity and reliability of the understanding of employers and their knowledge of CISO functions. The combined outcome of the Delphi study and the quantitative content analysis (Bryman & Bell, 2015, pp. 314-317) will provide insights into the gap analysis.

The chosen strategy of multisource and mixed method data collection drives the validity to rule out alternative explanations for the findings. Moreover, the use of a single source or a single-method data collection would not yield correct and complete answers to the research questions, from both perspectives – CISO and business leaders (Holmbeck, Li, Schurman, Friedman, & Coakley, 2002, p. 5).

5.3 Research Model

The research concentrates on CISO soft skills from both the CISO perspective and business leaders' perspective. The research model in Figure 4 illustrates the information flow during the research.

Figure 4 Research model



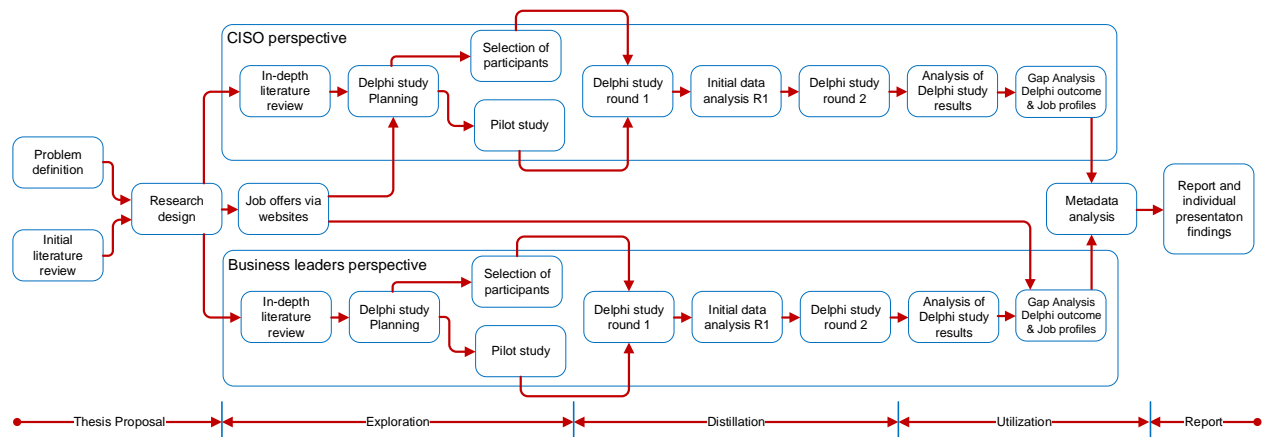
The literature review is the input for the Delphi study rounds (Information Flow 1A and 1C in Figure 4). The collected job profiles provide the input for the CISO perspective on the expected soft skills (Information Flow 1B in Figure 4) for use in the Delphi study rounds. The Delphi study rounds validate what soft skills influence the CISO leadership position, while the study from the CISO perspective validates the soft skills needed by the CISO him/herself. Moreover, the business leaders' perspective study validates the view from the demand side (business leaders), and surveys derived from the sub-research questions and the in-depth literature research will validate the soft skills required of the CISO in total.

The data analysis of the Delphi studies consists of a list of the desired CISO soft skills (Information Flow 2A and 2C in Figure 4). As stated in Chapter 2 Problem Statement, the initial analysis of job profiles offers a hint at soft skills as a component of an ideal candidate, and the gap analysis (fed with Information Flow 3A) will reveal the alignment or misalignment of the soft skills needed by a CISO. Furthermore, the gap analysis from the business leaders' perspective will have the outcome of the Delphi study and the job profiles (Information Flow Variables 3B and 3C in Figure 4), and the meta-data analysis will be based on the combined outcome (Information Flow 4A and 4B in Figure 4). The meta-analysis of the research will feed the report with the articulated CISO soft skill requirements (Information Flow 5 in Figure 4).

5.4 Research Process

The research process in Figure 5 depicts the planned Delphi survey approach of this thesis. The Delphi Toolkit, proposed by Jacqueline Day and Milena Bobeva (Day & Bobeva, 2005), was adopted for this thesis. This is a toolkit for the successful management of Delphi studies.

Figure 5 Research process



Although the research is inductive, the initial literature review (thesis proposal phase) and an extensive literature review are conducted before initiation of Round 1 of the Delphi study. Initial literature research is done to ensure the relevance of the proposed research. Then, in the exploration phase, in-depth research of existing literature is needed to gain a sound understanding of soft skills in C-level functions and cultural influences on security postures. This topic under study will feed into the knowledge and pinpoint areas of agreement or disagreement in the expert field, which includes the surveys to be designed. Furthermore, the exploration phase will be the phase in which participants are selected. This phase also includes pilot group testing of the designed surveys.

Thereafter, the distillation phase, conforming to the Delphi toolkit (Day & Bobeva, 2005, p. 105), consists of two rounds of surveying the selected participants. In Round 1, the first feedback on the survey is obtained, and areas of agreement or disagreement in the expert field are highlighted. The initial analysis from this round feed into the survey set-up of Round 2. The aim of Round 2 is to reach consensus on the part of the respondent group (Hasson, Keeney, & McKenna, 2000, p. 1009).

The final analysis of the survey response is then done in the utilisation phase. This analysis from the CISO perspective and the business leaders' perspective is processed, and the outcome will emphasise the consensus on the desired CISO soft skills per perspective. The utilisation phase is dedicated to analysing the job offers. The scanning of job offers on websites is a continuous process, and the selected and scanned recruitment websites, over a projected period of 5 months, will build up to a substantial sample size of unique job offers. We utilised job offers as a source of information because the literature review revealed that little research is available on the subject, and a quick scan of the job offers provides us with an understanding of employers and their knowledge of CISO functions. The output of processing the collected job offers will be input for the quantitative content analysis. The approach of using website published content was chosen to understand the expert field (outcome of Delphi study), the capabilities that are essential for CISOs and the gap in the current recruitment process. Finally, the analysis of the job offers will feed into the meta-data analysis. This meta-data will provide the ability to perform a gap analysis of the desired soft skills from the Delphi studies versus the required soft skills in the job offers. Combining these analyses will form the conclusion of this thesis.

5.5 Research Taxonomy of Delphi Design Choices

Within this Delphi study, specific design decisions were made. The taxonomy is presented in Table 4.

Table 4 Taxonomy of Delphi design choices

Criteria	Choices for Delphi study
Purpose of study	Exploratory Reason: few academic studies have been done on the research questions.
Research function	Define Reason: the outcome is to define what soft skills are needed that positively influence the CISO leadership position.
Number of rounds	Two rounds Reason: more than one round helps to align the opinions of the CISO and business leaders.
Expected saturation of responses	Two rounds Reason: acceptance of the results from the previous Delphi round is expected.
Consensus in the Delphi study	Consensus is reached either when 70% or more of the responders agree on statements in Round 1 or when the responders agree on the majority of their feedback in Round 2. Based on 'the Delphi Technique: Making Sense of Consensus' by Hsu and Sandford (2007)
Consensus count in the Delphi study	The use of combined consensus is based on the research by Börger (2012, p. 157), who stated that responders using Likert scales tend to answer moderately and avoid extreme answers. Therefore, both positive answers (agree and strongly agree) are combined into one positive answer. A similar structure is used for the negative answers (disagree and strongly disagree).
Risk of non-alignment within response groups in two rounds	Outcome of research input for future quantitative research
Participants	Two groups: business leaders and CISOs. CISOs make up a homogeneous group. Business leaders are a heterogeneous group. Reason: multisource research will improve the validity of the research.
Mode of operation	Remote survey Reason: difficulty exists in planning the availability of CISOs and business leaders to participate in a group debate.
Anonymity	Anonymous Reason: there is no need for personally identifiable information or opinions during the analysis of data.
Communication media	Electronic survey Reason: surveys are easy for participants and researchers to process.
Survey questions validation	Survey questions are validated by the Question Appraisal System QAS-99 by Gordon B Willis (1999) and with two test rounds. Reason: QAS-99 provides a checklist for questionnaire preparation. Field testing for each survey round prevents unclear questions and research bias.
Socially desirable answers	The questions are structured based on a 5-scale Likert question, with the neutral answer in Position 3. With this construct, positive answers are in Positions 1 and 2, and negative answers are in Positions 4 and 5. With this construct, we include both the socially desirable answers and the extreme answers of the responders (Börger, 2012, p. 157).
Concurrency of rounds	Sequential Reason: the outcome of analysis of Round 1 will feed into the questionnaires of Round 2.

5.6 Research Ethics and Privacy in Data Management

There are ethical considerations in this research. These considerations are in addition to the ethical principles described in Bryman and Bell's Business Research Methods (2015). First, stereotyping in either the outcome of the research or the details of the sub-research questions is a valid risk, and carefully designing and reviewing the survey questions mitigates this risk. The formulation of the questions and answer options should avoid answers leading to stereotyping. Moreover, not only the input for the research but also the explanation of data gathered must be nuanced. Paying extra attention to the set-up of questions, the answers, and nuanced processing of the data will limit the possibility of stereotyping. Second, although the responses of this Delphi study are stored anonymously, individual, personal opinions and visions are incorporated into the research. A risk might be that these individual and personal opinions are traceable to a participant. Mitigating measures are to ensure that all personal data is processed anonymously and to minimise traceable attributes in the questions (examples of traceable attributes are man/woman, number of years of work experience and the specific type of organisation). Table 5 lists the privacy data management choices in this study.

Table 5 Privacy data management

Topics	Choices for Delphi study
Anonymous	All collected survey response data were processed anonymously. Reason: there is no need for personally identifiable data for analysis of the data and in line with the HU directions for research data (Hogeschool Utrecht, 2018).
Publicly published job ads	All collected job ads were stored as publicly published content. If personally identifiable information was contained in the document, it was stored as the original content. Reason: we did not want to alter publicly published documentation.
Email addresses	Email addresses were collected only from responders who stated that they would like to participate in the research and/or would like to receive a copy of the thesis report when available. This collection of email addresses was stored within the students' own environment and not shared with the supervisor, lector or any other person associated with the HU. Once the research was conducted and the report was shared with responders who stated that they would like to receive a copy of the report, all personal data was deleted from the digital environment of the students. Reason: there is no need to retain personally identifiable information after a thesis project is completed, and the stored email addresses were not shared, nor did the HU require them to grad this thesis.
Proof of participation	As requested by the supervisor, only three responders per response group were requested to participate in the proof of participation. This is due to the anonymisation of the data sets. The gathered personally identifiable information consisted of responders' names and email addresses and will be handed over to the HU. Reason: there is a requirement for evidence of participation in the Delphi study with free will.
Survey tooling data locality	The survey tool SmartSurvey was used. This UK-based survey tooling is GDPR compliant. All data is stored in a secure UK-based data centre (ISO27001 certified) (SmartSurvey, 2020) and deleted once the subscription ends. Reason: the need for a GDPR-compliant survey tooling is in line with the HU directions for research data (Hogeschool Utrecht, 2018).
Data set	All data sets consisted of the following: <ul style="list-style-type: none"> • 89 job ads (raw-data and word txt format) • 77 processed job ads (Atlas.ti data set) • Delphi study Round 1 – CISO responses (raw data, SPSS data and SPSS HTML report) • Delphi study Round 2 – CISO responses (raw data, SPSS data and SPSS HTML report) • Delphi study Round 1 – business leader responses (raw data, SPSS data and SPSS HTML report) • Delphi study Round 2 – business leader responses (raw data, SPSS data and SPSS HTML report) These data sets will be handed over for future use within the HU Reason: They contribute to the HU-MOI future research.

5.7 Research Target Audience and Content

For the CISO focus of this research, the relevant audience consists of CISOs themselves. For the business leaders' focus of this research, C-level and senior management are the relevant audiences. The research materials for the analysis of the job descriptions were harvested from various websites:

- www.linkedin.com
- www.indeed.nl
- www.monsterboard.nl
- www.stepstone.nl
- www.jobbird.com
- www.nationalevacaturebank.nl
- www.uitzendbureau.nl
- www.vacatures.nl

These websites are top job offer sites in the Netherlands. They were reviewed for 5 months, and all CISO job offers were saved for later analysis. All the job offers were first scanned to eliminate double entries and then filed as unformatted .txt documents.

5.8 Reaching the Target Audience and Researching the Collected Content

Part of the research aim is to reach consensus from the expert groups of CISOs and business leaders. In this research, two major data sets were gathered, each with a specific focus:

- Information that may generate consensus among the CISO response group
- Information that may generate consensus among the business leaders response group

Based on the article by Hasson et al., the planned rounds were limited to two rounds of information gathering and expert input. These two rounds helped to prevent early saturation of responders and to maximise commitment (Hasson, Keeney, & McKenna, 2000, p. 1009).

For the determination of the sample size, there are limited guidelines in a Delphi study. Akins et al. state in their article that the definition of a small or large data set is not determined. The only guidelines are that studies with a sample size of less than 10 respondents are rarely conducted (Akins, Tolson, & Cole, 2005, p. 599). This is confirmed by Okoli and Pawlowski (2004, p. 19), who state that the best fitting sample size for a Delphi study is 10–18 subject matter experts. The sample size in this Delphi study is 15 CISOs and 15 individuals from C-level management. Two arguments for this number of respondents are as follows:

- The network of the researcher's addressable respondents
- A subset of the sample set based on the quantitative sample size calculation, as presented in Table 6.

In practical terms, this means that 15 participants for each response group are realistic for the Delphi study, given that a relevant Delphi sample group is between 10 and 18 experts (Okoli & Pawlowski, 2004, p. 18). Table 6 lists the criteria used to determine the sample sets. The sample size of 15 participants for the Delphi study is 34.9% of the sample size of the equivalent sample size in quantitative research. The use of an expert group in a Delphi study overcomes the need of a large sample size which is needed in a quantitative research. The sample size based on a quantitative research, as shown in Table 6, is projected by the researchers to be of a too large number to convince to participate in this research. To obtain a similar data set of the C-level population, an equivalent sample set to that of the CISOs was set up. The researchers are aware that the number of Dutch C-level management individuals exceeds the 790 CISOs in the Netherlands.

Table 6 Sample size for quantitative research into CISO role

Topic	Number	Argument	Source
Dutch Organisations (with >500 employees)	1,550	Scoping research questions for larger organisations	CBS
CISO profile	1,837	The combined number of Dutch and English profiles for CISO roles	LinkedIn (14-05-2019)
% of Dutch Organisations (>500 employees) with own IT staff	61% (1,121)	Not every organisation has its own IT staff, due to outsourcing or out-tasking, among other things.	CBS
CISO population	75% (840)	An assumption is made that 75% of the 1,121 organisations have a CISO.	Assumption
Vacancies	50	Based on the collection of job descriptions (February–April 2019)	Various sources
Research population	790	CISOs to be included in the research population	
The margin of error (confidence interval)	10%	The quality of data	
Confidence level	95%	A confidence level of 95% is expected to be sufficient to research causality.	
Response rate	50%	A response rate of 40% is expected.	

Topic	Number	Argument	Source
Sample size needed for a quantitative research	86	The sample size of Dutch CISOs in organisations with >500 employees	

The practical issue is, who to approach for the data collection? This was addressed by sending an invite to CISOs and business leaders via the researchers' own networks, and additional targeted invites, were sent via the LinkedIn professional social network. The targeting was based on the company profile (500+ employees and Dutch-based location).

To address the generic sub-research question (do employers see soft skills as a requirement in job descriptions?), the collected content from the recruitment websites was analysed. An overview of job descriptions was developed and resulted in categories, themes and focuses on soft skills for candidates. The collected content is available on various public websites; therefore, no issues of non-disclosure apply. Basic descriptive statistics were applied to determine how many organisations value soft skills in candidates' job descriptions. These analysed outcomes, along with the outcome of the Delphi study on the CISO and business leaders' perspectives regarding CISO and soft skills, contribute to the conclusion of this thesis.

5.9 Researching Effort and Balance

As described in the introduction, a combined thesis approach was employed to answer the research question. This is a non-standard approach – students of HU-Master of Informatics normally undertake an individual thesis research – and approval for this combined approach was issued by the HU-Master of Informatics. Part of our combined thesis is a transparent overview of the effort per student, whose efforts must be balanced.

The set-up of the research, as illustrated in Figure 1 (page 11), shows the main research question and sub-research questions, and the research process presented in Figure 5 contains two main tracks in the research: the CISO perspective and the business leader perspective. This approach was chosen to facilitate a well-balanced research effort, with the main balance being between all research, surveys and analyses per topic:

- CISO focus: J.M.J. van Yperen Hagedoorn
- business leader focus: R. Smit
- combined focus (i.e., introduction, problem statement or meta-analysis): R. Smit and J.M.J. van Yperen Hagedoorn

Table 7 lists the high-level research topics and ownership. The detailed ownership, per paragraph, is presented in the index: Contributions by authors (page 99).

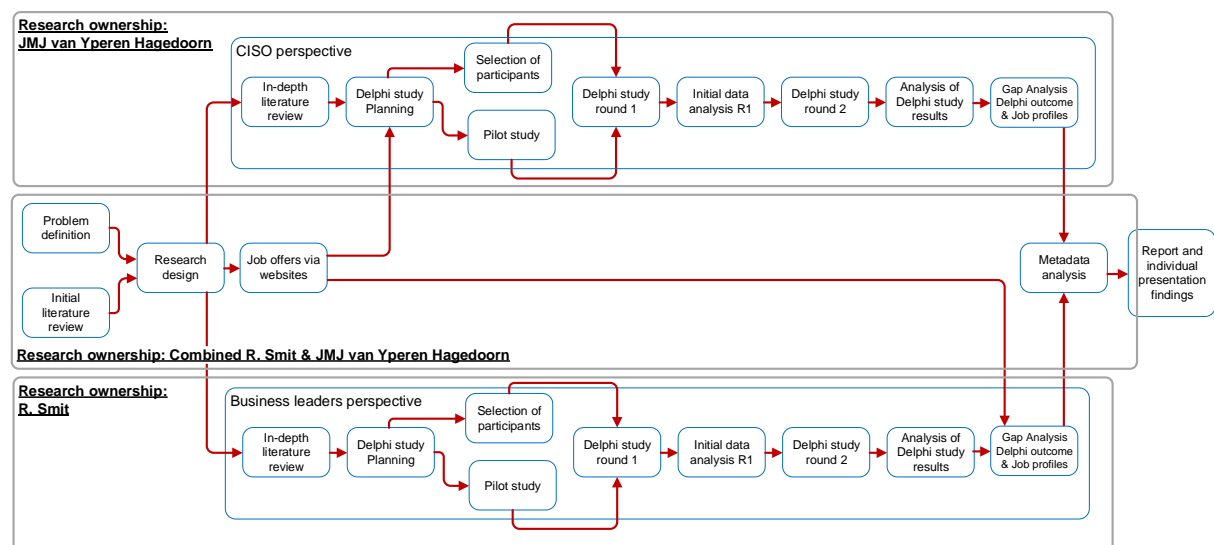
Table 7 High-level research topics and ownership

Research topic	Ownership / author
Introduction and background	R. Smit and J.M.J. van Yperen Hagedoorn
Problem statement	R. Smit and J.M.J. van Yperen Hagedoorn
Research question	R. Smit and J.M.J. van Yperen Hagedoorn
Literature review of soft skills and leadership	R. Smit and J.M.J. van Yperen Hagedoorn
Literature review regarding CISOs	J.M.J. van Yperen Hagedoorn
Literature review of business leaders	R. Smit
Research method and process	R. Smit and J.M.J. van Yperen Hagedoorn
Research of job ads	R. Smit and J.M.J. van Yperen Hagedoorn
Delphi study – CISO response group	J.M.J. van Yperen Hagedoorn
Delphi study – business leaders response group	R. Smit

Research topic	Ownership / author
Findings from literature – CISO perspective	J.M.J. van Yperen Hagedoorn
Findings from literature – business leaders' perspective	R. Smit
Findings – job ads	R. Smit and J.M.J. van Yperen Hagedoorn
Findings from Delphi study – CISO perspective	J.M.J. van Yperen Hagedoorn
Findings from Delphi study – business leaders' perspective	R. Smit
Conclusions and recommendations	R. Smit and J.M.J. van Yperen Hagedoorn

When the research topics and ownership are plotted over the research process, it offers a clear overview, as illustrated in Figure 6.

Figure 6 Research topics and ownership



6 Findings and Discussion

After the literature research, the analysis of the job ads and the results of the Delphi rounds, data was thoroughly analysed. The outcomes are presented in this chapter.

6.1 Findings from Literature – Relevant Leadership Position Soft Skills

Both authors were involved in the analysis of the literature on soft skills and leadership, as indicated in the index: Contributions by authors (page 99). The literature review demonstrates that soft skills are well researched. Various studies, such as those by Robles (2012) and Zhang (2012), claim their definitions on soft skills and present the sub-categories of soft skill elements. The field of non-academic research on soft skills is even more widespread. Mar (2016) presents 87 soft skill attributes that are grouped into seven soft skill categories.

The analysis of the selected soft skill studies revealed two overarching skills, namely, communication skills and interpersonal skills, which are the two dominant skills in the researched literature. Other soft skills have indirect relations. For example, among the 18 attributes aligned to Mar's (2016) leadership-related soft skills are team building, coaching and giving feedback. Then, regarding Robles' (2012) work, we found these attributes in a similar description of 'teamwork', which used words such as co-operative, resourceful and helpful. Moreover, the attributes of soft skills were grouped differently by the different researchers – specifically, the analysis of attributes revealed a variation in definitions of soft skills. In a high-level analysis, the variations of

soft skills were found to be compatible. The non-academic research by Mar (2016) lists the skill ‘leadership’, whereas Zhang (2012) does not. Both researchers focused on the importance of soft skills for IT professionals, according to IT Managers. This is similar for the research of Robles (2012), who focused on the most relevant soft skills for business leaders. The 10 most relevant soft skills by Robles (2012) are as follows:

- *Integrity*
- *Communication*
- *Courtesy*
- *Responsibility*
- *Interpersonal skills*
- *Professionalism*
- *Positive attitude*
- *Teamwork skills*
- *Flexibility*
- *Work ethic.*

From the literature, we learned that not only does the focus of the research have an influence on soft skills, but the context of soft skills for individuals is also essential. The research of Chimatti (2016) found that all professions have their view and interpretation of soft skill attributes, and individuals use their personal experience or context to express their soft skills. Furthermore, soft skills are not a list of skills that a single individual can gain via education. Learning soft skills starts at a young age and is in principle taught by parents and by socialising in school, sports and other activities with other people (Chimatti, 2016).

According to Guhr et al. (2019), there are three different leadership styles:

- Passive/avoidant leadership, which is based on two leadership styles: management-by-exception (passive) and laissez-faire (avoidant)
- Transactional leadership, which is based on rewards and punishment for achievement or non-achievement, respectively, of previously defined performance goals and objectives
- Transformational leadership, which is based on leading by example and motivating followers to identify with them.

Guhr et al. (2019) focused on user (employee) intentions regarding information security compliance and information security participation. They concluded that the passive/avoidant leadership style has neither a positive nor a negative effect on employees' intended information security behaviour.

Moreover, the transactional leadership style does not have a positive effect on employees' intended behaviour.

Guhr et al.'s (2019) findings differ from other studies, where punishment for information security violations resulted in a higher security awareness and consequently better compliant behaviour among employees.

Transformational leadership is the style that has a positive effect on an employee's intended behaviour regarding information security compliance.

So, as described in the Literature Review, for the best effect on employees adopting information security compliance measures is to demonstrate transformational leadership. Guhr et al. (2019) state that transactional leadership and transformational leadership are no opposites in behaviour but as separate leadership dimensions. A leader can demonstrate transformational leadership qualities to enhance employees' willingness to adopt information security policies. Also, Guhr et al. (2019) conclude that the same leader can demonstrate corrective

actions of a transactional leader (like reporting/punishment) if an employee violates information security policies.

Furthermore, Auffret et al. (2017) demonstrated that employees need strong leadership support to be aware of cyber risks. Moreover, Tejay and Winkfield (2015) researched how a CISO can become an effective leader by examining the path-goal leadership approach. They suggested that CISO's leadership styles must be tailored to attain information security goals (Tejay & Winkfield, 2015, p. 7).

Colbert et al. (2014) found that both the CEO's and the entire TMT's transformation leadership skills have an impact on organisational commitment. They also state that for team success, a TMT should be composed of highly transformational leaders.

Our conclusion, based on the literature review, is that having a balance of hard and soft skills positively influences the effectiveness of a leadership position. Moreover, not only the right balance between those two sets of skills, but also a combined leadership style of transactional and transformational leadership will have a positive impact on the leadership position. In addition, the ideal balance of skills and leadership styles also has a positive effect on the willingness to conform to governance and ISPs.

6.2 Findings Literature CISO Perspective

The literature review and job ads analysis of the CISO perspective on soft skills, performed by author J.M.J. van Yperen Hagedoorn as shown in the index: Contributions by authors (page 99), revealed that the topic is highly relevant, but limited details are known. Research of job profiles by the Dutch PvIB (Platform van Informatie Beveiliging, 2019) indicated that roles or job descriptions of the CISO focus on hard skills such as education and experience. The security roles described in the job profile description (Platform van Informatie Beveiliging, 2019) also focused on hard skills.

Furthermore, Yang and Wen (2017) researched the cybersecurity curriculum of undergraduate business schools. Their analysis of 27 cybersecurity programmes. They found that a focus on soft skills is not a default or an integrated element in the education and training of CISOs on their career path.

This lack of soft skill focus is not incidental for a CISO's education. Lavasseur (2013) demonstrated that the development of hard skills is prioritised over the development of soft skills. His observation is that hard skills are learned through education and is embedded in the learning system, whereas soft skills are developed through self-actuation.

Given that soft skills are a necessary skill set, the research of Van Laar et al. (2017) proposes a conceptual framework of 21st-century skills. Their research suggests that the skills of employees, including the CISO, extend beyond just professional knowledge (Van Laar, van Deursen, van Dijk, & de Haan, 2017) and that learning hard skills or professional knowledge alone is not sufficient for the ideal profile of the modern employee.

The addition of soft skills to the skill set is emphasised by Cano et al. (2013), concluded that on one's career journey, soft skills should be developed in parallel with hard skills. Moreover, professional IT skills should be

developed, and the development of personal skills will be even more significant (Cano, Fernández-Sanz, & Misra, 2013).

Skills frameworks in general or information-security-focused frameworks can be used as a source for the development of soft skills. The review of these frameworks learned that there is a clear focus on development of hard skills but give little attention to the development of soft skills. In the Literature Review, we analysed two framework types:

- The employee skills framework (personal development)
- Information-security-focused frameworks (best practices on the organisational implementation of security management).

Maria Cinque's (2016) research highlighted a misalignment in the education curricula: a gap in focus between students, employers and educators on the development of skills. Her conclusion is that universities and companies move in 'parallel universes'. With multiple soft skills studies and projects calling soft skills by different names, there is no universal definition of soft skills.

To optimise the EU countries' local frameworks, the OECD has developed the EQF to transform European NQFs by assimilating the EU countries' local frameworks into a single framework. Working from a single framework makes the CVs of European candidates transparent. However, even at the level of a single European framework for skills, Méhaut and Winch (2012) state that the term soft skills is misleading.

A different source for the development of soft skills is the previously described European e-Competence Framework. When assessing the European e-Competence Framework version 3.0, published in 2014, the term 'soft skills' does not even appear in the document. Only the term communication is mentioned as a skill but is not elaborated in depth. The explanation of communication is a generic competence, and the framework avoids generic competencies.

Furthermore, the PvIB Beroepsprofielen Informatiebeveiliging 2.0 (Job Profiles Information Security version 2.0) contains a reasonable amount of non-hard-skills-related competencies. All of the soft-skills-related topics, such as leadership, communication and persuasiveness, are – similar to the European e-Competence Framework – grouped under the topic of generic competencies (Platform van Informatie Beveiliging, 2019).

The second type of researched frameworks are those that support implementing an ISMS. The frameworks researched were

- CIS Cyber Security Controls (CIS, 2019)
- COBIT 5
- ISA 62443-2-1:2009
- ISO/IEC 27002 Information technology - Security techniques - Code of practice for information security management (NEN-ISO/IEC, 2017)
- NIST Cybersecurity framework (NIST, 2019).

Researching the frameworks offered insight into which skills are required for various security management processes, security architectures and reporting activities. The required skills in the researched frameworks focus

on hard skills, and the only hint at soft skills could be distilled from topics such as the topic of awareness in the NIST Cybersecurity framework. The CIS Cyber Security Controls have a similar focus. The CIS Control 17: Implement a Security Awareness and Training Program describes the required skills as the skills and behaviours needed, but it does not explain what the skills and behaviours are (CIS, 2019).

The CISO role clearly calls for hard skills and a set of soft skills. CISOs undergo much training and development along their career path. Via all sorts of security training, knowledge is broadened and, in the frameworks (employee development and ISMS) soft skills are mentioned as being of importance. The findings are that soft skills are more than relevant and having soft skills will contribute to a better alignment with business leaders, the users in an organisation and other relations inside and outside of an organisation. The development of soft skills is still referred to as important, done primarily by parents and early life socialising activities. Self-reflection is a way to determine further development of soft skills (Chimatti, 2016).

Based on the analysis of the literature, employee development frameworks and ISMS frameworks, the key finding is that soft skills are highly relevant for a CISO and a CISO leadership position. Still, little to no guidance is offered to develop soft skills on the career path of the CISO.

6.3 Findings Literature Business Leaders' Perspective

The analysis of the literature on soft skills and leadership from the business leaders' perspective was performed by author R. Smit, as shown in the: index Contributions by authors (page 99).

According to Weishäupl et al. (2018), IT security has a strong technology focus; however, influencing employees to be more aware of information security risks is a challenging task that cannot be accomplished with a sole technological focus. Levy et al.'s (2019) research regarding CISCO confirms the technical focus of the curriculum of general IT professionals.

Moreover, Yang and Wen (2017) demonstrated that not only the IT professional but also the cybersecurity curriculum has a highly technical focus. Their research revealed that the majority of cybersecurity programmes in undergraduate business schools' curricula focus on hard skills.

The findings are that soft skills are not a standard element of the majority of the CISO curriculum. In addition, in the research by Lavoisier (2013), we found that the development of soft skills is related to Maslow's hierarchy of needs.

While the curricula of cybersecurity and IT professionals in general do not focus on soft skills, business leaders require a more broadly skilled CISO than one with only hard skills. The research by Hooper and McKissack (2016) suggests that for successful relationship between business leaders and the CISO, the skill set of the CISO must be broader than just technical know-how. As a communicator, the CISO must understand what is important for the business and technical audiences (Hooper & McKissack, 2016).

In various role descriptions, such as the European e-Competence Framework (European Union, 2014) or the PvIB Beroepsprofielen Informatiebeveiliging 2.0 (Job Profiles Information Security version 2.0) (Platform van Informatie Beveiliging, 2019), no soft skills assessment has been included, nor does the framework contain an overview of relevant soft skills. There is only reference to generic competencies. Furthermore, ASRC Federal researched the top 10 CISO skills and found that 3 of the 10 are soft-skill-related:

- Communication and presentation skills
- Political skills
- Collaboration and conflict management skills.

Another observation is that the right combination of skills is the key to being a successful CISO (Death, 2019, p. 3).

Based on Bachlechner et al. (2014), who researched security awareness in complex IT outsourcing arrangements, business leaders have difficulty in stating the security needs and hence in stating the right fit for CISO job descriptions.

The general findings are that businesses are seeking a well-balanced, skilled CISO. The balance should be between hard and soft skills. The right set of soft skills, which are tailored – as stated by Tejay and Winkfield (2015) – will afford CISOs a better leadership position than a CISO without tailored soft skills. This is confirmed by Sunindijo and Zou (2013): a CISO with the right set of soft skills, and who supports transformational leadership, will be in a better leadership position.

6.4 Findings of Job Ads

Over the course of 5 months, top job offer websites in the Netherlands were reviewed for CISO job ads. The CISO job ads were copied and saved for analysis. A total of 89 job ads are collected, 12 of which did not meet the profile of a CISO or the Dutch equivalent role description. Therefore, 77 job descriptions were processed via the qualitative data analysis tool Atlas.ti, and using Robles' (2012) definition of soft skills, the individual job ads were then labelled.

This analysis of the job ads – performed by both authors, as shown in the index: Contributions by authors (page 99) – provides insight into what organisations are seeking in the role of a CISO. Although the vast majority of the positions were titled CISO (or the Dutch equivalent of the role), in some instances, the position was combined with the role of privacy officer. Many of the advertisements offered a clear description of hard skills, with some listing the hard skills in bulletized lists. For example, the following skills were requested by ING:

- *Contributes to the development of ING Bank security control frameworks and reference architectures based on (internal and external) threats identified*
- *Coordinates roll-out and monitors adherence to IT security standards and anti-fraud standards*
- *Has escalation/veto power in relation to business activities that are judged to present unacceptable threats to ING; Acts as point of escalation for security issues*
- *Oversees, manages and responds to major threats and security incidents*
- *Collaborates with Data Protection Officer to protect data subject to data privacy regulations and collaborate on data breaches security incident management*
- *Supports security related audits*
- *Steers the operation of existing applications and services owned by security*
- *Reviews and approves risk acceptances/waivers from security perspective as a member of the risk committee (ING, 2019).*

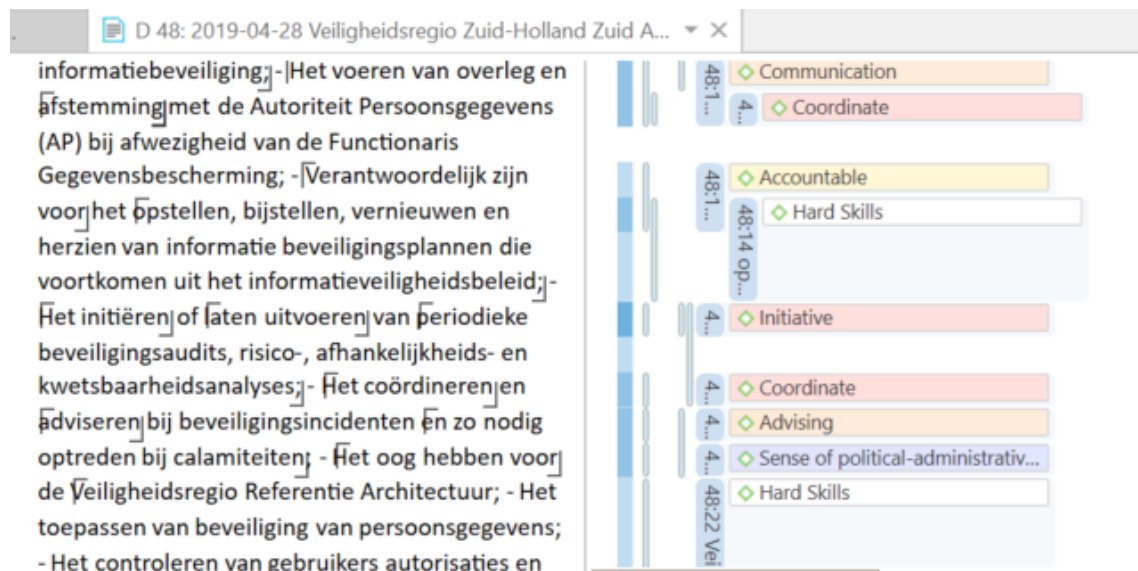
In addition, certification in the field of CISOs was listed:

- *CISSP*

- CISA
- CISM,
- ISO27001/2 or equivalent (Gemeente Amsterdam, 2019).

In contrast, the soft skills in the job ads are less clear. The majority of job ads' requirements for soft skills were mentioned in descriptive sentences. For example, Figure 7 presents a snapshot from Atlas.ti where soft skills and hard skills are mixed in the text of the job ad.

Figure 7 Mixed description of skills



After analysing the 77 job ads, the sentence pertaining to writing and communicating stands out as one of the few with a high degree of recognition when analysing the job ads. For example,

Excellent written & spoken English essential. Multiple languages preferred (ING, 2019).

Data analysis using Atlas.ti provides information on the frequency or 'groundedness' of codes, meaning that it shows how many quotations, or pieces of text, are linked to a code. In the data analysis, the soft skills identified by Robles (2012) were used to label the described skills, and two additional skills were added:

- Hard skills
- Leadership.

Hard skills were the top requested skills in the job ads, with 547 labels applied to the text. In reality, this figure is much higher; however, during the labelling process, bulletized lists of hard skills were assigned one label. The reasoning for this aggregated labelling is that this research focuses on soft skills and does not identify the number of actual mentioned hard skills. The label of hard skills is merely used as an indicator of balance. When this outcome is compared to the research of (Hooper & McKissack, 2016), their finding remains valid: the majority of the job advertisements a strong focus on technical skills, daily operational tasks and security (hard skills).

Then, in terms of leadership, the soft skills identified by Robles (2012) are those that business leaders indicate as a necessary characteristic of a leader. While the list of soft skills does not include leadership, the job ads referred

to leadership skills for the CISO role. The addition of leadership is based on the described need in the job ads and on evidence such as the article by Auffret et al. (2017).

Our analysis of the needed soft skills in job ads revealed that communication is the top skill requirement based on the groundedness of codes. This is followed by leadership, work ethic and interpersonal skills. These three soft skills are closely matched in the number of described needs.

One soft skill in particular draws our attention: Robles (2012) identified courtesy as a soft skill; however, it was not found in any of the 77 analysed job ads. Moreover, we could not find an academic explanation for this.

Based on the feedback from the CISO response group and business leaders, courtesy is the lowest ranked soft skill. The generic explanation by the CISOs is twofold:

1. Courtesy is part of every soft skill
2. Courtesy is not embedded in the Dutch (working) culture.

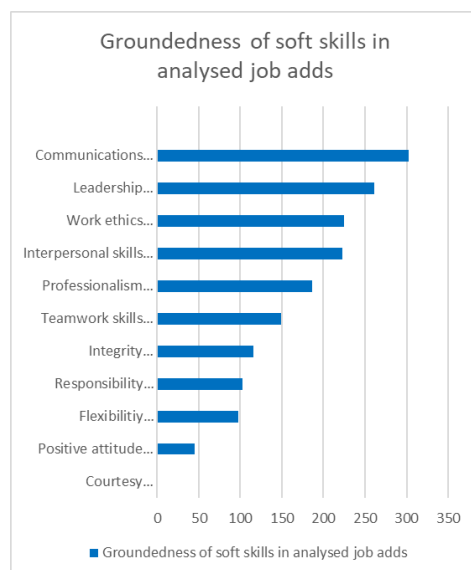
See Section 6.5 Findings of Delphi Study CISO Perspective for the detailed analysis. Table 8 presents the complete list of soft skills and the number of times they were found in the 77 analysed job ads.

Table 8 Soft skills found in analysed job ads

Soft skills found in analysed job ads	Groundedness of codes
Communication	303
Leadership	261
Work ethic	225
Interpersonal skills	223
Professionalism	186
Teamwork skills	149
Integrity	116
Responsibility	103
Flexibility	97
Positive attitude	45
Courtesy	0

The absolute numbers can be plotted in a graph. Figure 8 clearly displays the focus on communication skills in the analysed job ads.

Figure 8 Groundedness of soft skills in job ads



The outcome of the job ads analysis is included in the Delphi study from the CISO and business leaders' perspectives. Furthermore, the ranking based on the job ads analysis is included in the CISO questionnaire, in line with the research model presented in Figure 4 (page 28).

In the Delphi study from the CISO's perspective, we emphasised the position of courtesy to obtain feedback from the response group regarding whether courtesy is a relevant soft skill for Dutch CISOs. The Delphi study from the business leaders' perspective will not have the outcome of the job ads analysis in the business leader questionnaire. This is in line with the research model presented in Figure 4 (page 28).

6.5 Findings of Delphi Study CISO Perspective

This section describes the findings of the Delphi study and is based on the CISO perspective – owned by author J.M.J. van Yperen Hagedoorn, as shown in the index: Contributions by authors (page 99). The first sub-section describes the composition of the response group for both rounds of the Delphi study. The second sub-section presents the findings from Round 1 of the Delphi study, and the findings from Round 2 constitute the content of the last section.

6.5.1 Composition of the CISO response group

For Rounds 1 and 2 of the CISO perspective questionnaire, 31 CISOs were willing to participate. The final number of responders in Round 1 was 27, as three of the responders did not meet the response group criteria of being employed in an organisation with 500 or more employees. In Round 2 of the Delphi study from the CISO perspective, 25 CISOs responded to the questionnaire. Two responders were removed from the data analysis due to not meeting the criteria. Figure 9 shows that the responders included in Round 1 are all (self-)employed as CISOs or ISOs. However, two responders are not in the role of a CISO or an ISO, and they were included in the response group based on their current roles: IT director in a security organisation and project manager for IT security projects in enterprise organisations. Another three of the responders indicated that they are employed in an organisation with less than 500 employees, and two of the responders are self-employed and contracted in organisations with 500+ employees. One responder is employed in a financial association and is working for and with large-scale financial institutes. The responders in Rounds 1 and 2 exceed the minimum requirement of 15 experts in this Delphi study, as stated in Section 5.8 Reaching the Target Audience and Researching the Collected Content.

Figure 9 Function – CISO response group

		Count	Column N %
Q1. Function: Which of the following best describes your role in the organization you currently work for?	Chief Information Security Officer (Primary function)	14	58.3%
	Chief Information Security Officer role (CISO as a role next to other roles/function)	3	12.5%
	Information Security Officer (Primary function)	3	12.5%
	Information Security Officer role (ISO as a role next to other roles/function)	2	8.3%
	Other (please specify):	2	8.3%

Furthermore, all of the responders are employed (or working as a contractor) in Dutch organisations with 500 or more employees. Figure 10 contains one answer of 'not working for a Dutch organisation'. This answer was given by a contractor employed in a Dutch branch office and included in the further analysis.

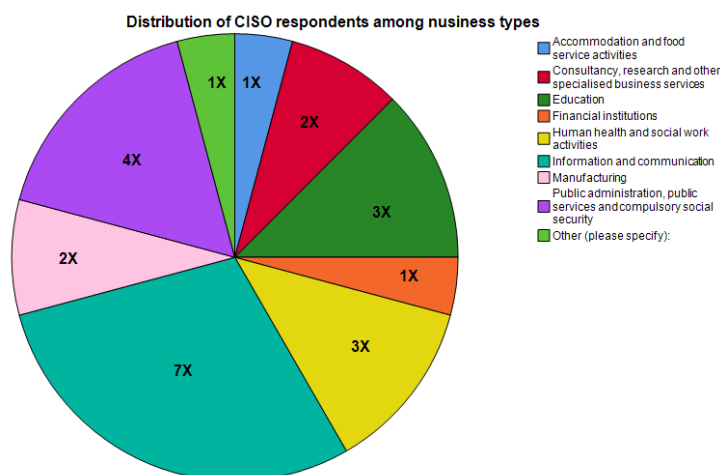
Figure 10 Employment – CISO response groups

Q6. Are you employed in a Dutch organisation?

	Frequency	Percent	Valid Percent
Yes, a Dutch organisation	12	50.0	50.0
Yes, a Dutch organisation with international subsidiaries	7	29.2	29.2
Yes, a Dutch subsidiary of an international organisation	4	16.7	16.7
No, not working for a Dutch organisation	1	4.2	4.2
Total	24	100.0	100.0

The CISO response group has an even spread across the categories of organisations. The outcome of the research will benefit from this spread to represent the CISOs in Dutch organisations. Figure 11 illustrates that the 24 responders included in Round 1 are working in eight different categories, and one contractor state that all categories apply. This spread of organisation category confirms that the response group is not biased in a too-narrow segment of organisations.

Figure 11 Organisation category – CISO response group



The response group is fairly new in their current role. Figure 12 presents the number of years the CISO response group has been employed in their current role and confirms that the CISO role is a fairly new role in the Netherlands.

Figure 12 Work history – CISO response group

		Count	Column N %
Q2. Work history: how long have you held your current role?	1-2 years	13	54.2%
	3-5 years	5	20.8%
	6-10 years	3	12.5%
	more then 10 years	3	12.5%

Figure 13 indicates that nine CISOs applied for the role, and nine CISOs were informed about the role in another way. The other six descriptions ranged from an ad-interim position to network channels to claiming the role, based on knowledge on the information security topic.

Figure 13 CISO role application

		Frequency	Percent	Valid Percent
Valid	Yes, I applied based on a job ad	9	37.5	37.5
	No, there was no job ad/I got informed in another way	9	37.5	37.5
	Other (please specify):	6	25.0	25.0
	Total	24	100.0	100.0

Most of the job descriptions of the CISOs from the response group ($N = 24$) have a description of soft skills. Figure 14 illustrates that only 20.8% of the responders ($n = 5$) have a clear definition of soft skills in their job descriptions, while 45% ($n = 11$) of the response group has soft skills in their role description, but those skills are not clearly described. The remaining one-third of the response group ($n = 8$) have no soft skills in their role description.

Figure 14 CISO role description

		Frequency	Percent	Valid Percent
Valid	Yes, soft skills required are clearly described in the job description	5	20.8	20.8
	Yes, although the soft skill required are not clearly described	11	45.8	45.8
	No, the required soft skills are not described	6	25.0	25.0
	No, the job description only lists the required hard skills	2	8.3	8.3
	Total	24	100.0	100.0

Moreover, the CISO response group ($N = 24$) was asked if they would be involved in the recruitment of the next CISO; 54.5% ($n = 13$) found it very relevant, and 20% ($n = 5$) have chosen the answer of moderately relevant. The remaining 25% ($n = 6$) answered with slightly relevant and not at all relevant.

From the 15 CISOs who have a team of direct reports, the size averages 1–10 team members. Figure 15 shows the team size spread. The missing nine answers are from CISOs without direct reports.

Figure 15 Security team size

Q13. How many Security personnel or other direct reports that carry tasks of securing your corporate information are in the security team?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-10	13	54.2	86.7	86.7
	11-20	1	4.2	6.7	93.3
	More then 30	1	4.2	6.7	100.0
	Total	15	62.5	100.0	
Missing	System	9	37.5		
Total		24	100.0		

Figure 16 shows the education level of the CISO response group. This group is well educated and well certified in the security domain, as Figure 16 and Figure 17 demonstrate.

Figure 16 Education – CISO response group

		Count	Column N %
Q3. What is your highest education?	PHD/Academic	3	12.5%
	Master level/Academic	7	29.2%
	Bachelor/Applied science	11	45.8%
	High school	3	12.5%

Figure 17 Certification – CISO response group

		Responses		Percent of Cases
		N	Percent	
4. Do you have a security certification? ^a	CISA	8	15.1%	42.1%
	Certified Ethical Hacker (CEH)	6	11.3%	31.6%
	CISM	8	15.1%	42.1%
	Computer Hacking Forensic Investigator (CHFI)	1	1.9%	5.3%
	CRISC	3	5.7%	15.8%
	CISSP	11	20.8%	57.9%
	Certified Information Privacy Professional	4	7.5%	21.1%
	Other: CCISO Professor, CCISO, ISAP, PCIISA, ISO 27001 Lead Implementer, CGEIT, CCSP, CIPM, ISO27001LI, ISO27001LA, SCF, SCP/RISK, S-ISF / S-ISIP / S-ISME, CCSP, Information Security Foundation (ISF) and a load of IT-technical certs like MCSE, SANS GIAC GSTRT (strategic CISO certification), CIPM	12	22.6%	63.2%
	Total	53	100.0%	278.9%

a. Dichotomy group tabulated at value 1.

The Certified Information Systems Security Professional (CISSP) certification is the most obtained certificate among the response group. This certification, together with the runners up – CISA and CISM – form the top three. These certifications are in line with the analysed job ads:

- *CISSP*
- *CISA*
- *CISM*,
- *ISO27001/2 or equivalent* (Gemeente Amsterdam, 2019).

The professional background of the CISO response group comprises a vast number of technology roles. In the question on professional background (where responders could choose all options that apply) 75% of the CISO response group have a technical background, as shown in Figure 18.

Figure 18 Professional background – CISO response group

		Responses		Percent of Cases
		N	Percent	
5. What is your professional background	Information Management background (IM/Product owner/etc.)	6	15.8%	25.0%
	Technical background (IT/Infrastructure/Networking/etc.)	18	47.4%	75.0%
	Compliance background (Quality control/internal auditor/etc.)	8	21.1%	33.3%
	Other (please specify): service account management, General Management, Project manager IT, Business director, Project manager, Infosec consultant (Security) Manager	6	15.8%	25.0%
Total		38	100.0%	158.3%

a. Dichotomy group tabulated at value 1.

The composition of the CISO response group is diverse. The CISOs work in various types of organisations and fit the selection criteria (Dutch organisations with 500+ employees).

6.5.2 Findings of Round 1 of the Delphi study – CISO perspective

On the topic of familiarity with soft skills, we anticipated a result that would be in line with Yang and Wen's (2017) findings. Their research on a common cybersecurity curriculum at numerous undergraduate business schools revealed that most of these curricula focus on hard skills. Our expectation, based on the high level of security certification and technology backgrounds, was that soft skills are not quite familiar. This expectation would be confirmed by Lavasseur (2013), who found that the development of hard skills is prioritised over the development of soft skills in technical education and learning. However, Figure 19 indicates that the CISO response group is familiar (three extremely and 16 very familiar) with soft skills. None of the responders are unfamiliar with soft skills. Therefore, our finding is that soft skills are well known by the CISO response group.

Figure 19 Soft skill familiarity – CISO response group

Are you familiar with soft skills?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Extremely	3	12.5	12.5	12.5
	Very	16	66.7	66.7	79.2
	Moderately	5	20.8	20.8	100.0
	Total	24	100.0	100.0	

Regarding the topic of leadership style familiarity, the answer was less convincing, yet still positive. Figure 20 shows an even split between CISOs who are very and moderately familiar with leadership styles.

Figure 20 CISO leadership familiarity

Are you familiar with variations in leadership styles?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very	12	50.0	50.0	50.0
	Moderately	12	50.0	50.0	100.0
	Total	24	100.0	100.0	

The analysis of Round 1 of the Delphi study from the CISO perspective is limited to the main topics of familiarity regarding soft skills and leadership. These topics are the basis for the reliability of the outcome of Round 2. Each of the questions had a score based on a 5-point scale, where 1 = extremely, 2 = very, 3 = moderately, 4 = slightly and 5 = not at all. The question of soft skills received no scoring on slightly or not at all, and the question on leadership was answered only with very and moderately. The conclusion is that the CISO response group is able to participate as an expert group. All other analyses of Round 1, which serve as input for the consensus in Round 2, are reported in the addendum Delphi Study round 1 CISO analysis.

6.5.3 Findings of Round 2 of the Delphi study – CISO perspective

The objective of Round 2 of the Delphi study was to reach consensus among the responders on the outcome of Round 1.

In terms of the relevance of soft skills, the use of variations of soft skills in different organisations and using soft skills differently with various audiences is relevant within the response group. Just as the confirmation by the

response group that having soft skills and working with different audiences has a positive effect. Figure 21 indicates a high degree of consensus. The mean of answers – ranging from 1.43 to 1.78 – shows that the responders are in agreement (strongly agree or agree) that soft skills for a CISO are relevant. Each of the questions had a score based on a 5-point scale, where 1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree and 5 = strongly disagree.

Figure 21 Frequency table of soft skill relevance questions

	Q4.1. Do you agree with the responders' consensus of Very relevant on the question: 'are soft skills relevant for the CISO?'.	Q4.2. Do you agree with the responders' consensus of Very relevant on the question: 'do you see the benefit of variations in soft skills for influencing different audiences (like: business leaders, the users or the IT department)'?	Q4.3. Do you agree with the responders' consensus of Very relevant on the question: 'do you appreciate working with different sets of soft skills for influencing different audiences (like: business leaders, the users or the IT department)'?	Q4.4. Do you agree with the responders' consensus of Very relevant on the question: 'have you experienced a positive effect from using different sets of soft skills for influencing different audiences (like: business leaders, the users or the IT depart'.	Q4.5. Do you agree with the responders' consensus of Very relevant on the question: 'are the soft skills needed different per type of organisation (i. e. education has different soft skill needs than financial institutions)'?
N	23	23	23	23	23
Valid					
Missing	0	0	0	0	0
Mean	1.52	1.43	1.61	1.52	1.78
Std. Deviation	.593	.590	.583	.511	.795
Minimum	1	1	1	1	1
Maximum	3	3	3	2	4

Since the responses to Q4.1 through Q4.5 are synonyms, a Cronbach's alpha analysis was performed to check whether there is a basis to combine the data of the questions into one mean. The Cronbach's alpha reliability analysis revealed that the consolidation of the responders' data on the CISO soft skill answers is allowed (Baarda & Dijkum, 2014, p. 48). Table 9 shows a 0.830 score on Cronbach's alpha reliability.

Table 9 Cronbach's alpha reliability analysis – CISO soft skill responses

Reliability statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items	N of Items
.830	.847	5

Based on the high degree of consensus on the questions and the correlation of the questions, the responders' data was consolidated. This results in a data set, based on a small set of highly professional responders, with a significant amount of data. A check for inter-item correlation revealed a strong correlation in the responders' group answers. See addendum Delphi Study round 2 CISO analysis for details on the inter-item correlation matrix.

There was an option to raise the Cronbach's alpha if Q4.5 – 'are soft skills needed per type of organisation? (i.e., education has a different soft skill need than financial institutions)' – was excluded from the consolidation. This would raise the figure by 0.025 points if only survey Round 2 Q4.1–Q4.4 were consolidated. This marginal increase would not have influenced the combined outcome in an effective manner; Therefore, the five individual questions (Q4.1–Q4.5) on the relevance of CISO soft skills were consolidated into one data set:

RelevanceCISO_SK. The naming convention used is the Relevance by the CISO response group on soft skills (SK) resulting in the name: RelevanceCISO_SK. See addendum Delphi Study round 2 CISO analysis for details on the consolidated data set.

The CISO response group was in consensus that business leaders' audience demands a better demonstration of CISO soft skills compared to the other groups in an organisation. Other groups are the IT department or the users in the organisation.

Figure 22 CISO agreement – demonstration of soft skills

Q5.1. Do you agree with the outcome that the Business leaders demand better demonstration of the CISO soft skills compared to the other groups?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Strongly agree	4	17.4	17.4	17.4
	2 Agree	13	56.5	56.5	73.9
	3 Neutral	2	8.7	8.7	82.6
	4 Disagree	4	17.4	17.4	100.0
	Total	23	100.0	100.0	

Figure 22 shows a high degree of consensus (73.9%). This combined consensus (56.5% on agree and 17.5% on strongly agree) is confirmation of the outcome of Round 1, where 70.8% ($n = 17$) of the responders selected business leaders as the group that demanded a better demonstration of soft skills compared to the other groups. Note that in Round 1 of the surveys, the answering option was 'select all that apply'. See addendum Delphi Study round 1 CISO analysis for the response to Q15 and for the position of the second place, namely, the users in the organisation ($n = 9$). The IT department was in third place ($n = 7$). The use of combined consensus is based on research by Börger (2012, p. 154), who stated that responders using Likert scales tend to answer moderately and avoid extreme answers. Therefore, the both positive answers (agree and strongly agree) were combined into one positive answer, and a similar structure was used for the negative answers (disagree and strongly disagree), as described in Section 5.5 Research Taxonomy of Delphi Design Choices. The soft skill ranking in Round 1 was confirmed in Round 2 and is listed in Table 10.

Table 10 Soft skills confirmation – CISO response group

Soft skill rankings confirmation – CISO response group
Communication
Leadership
Integrity
Interpersonal skills
Professionalism
Work ethic
Responsibility
Teamwork skills
Positive attitude
Flexibility
Courtesy
Ranking is in order of importance. Top row is most important; bottom row is least important. Note that the soft skill 'leadership' is not included in Robles' (2012) overview.

Table 10 indicates that Dutch CISOs recognise the soft skills identified by Robles (2012) but have a different view on the ranking of the importance of the skills. The ranking, based on Round 1 of the surveys, is agreed with a 73.9% consensus. The CISO response group assigned courtesy the lowest soft skill rank. The generic explanation by the CISOs was twofold:

1. Courtesy is part of every soft skill
2. Courtesy is not embedded in the Dutch (working) culture.

See addendum Delphi Study round 1 CISO analysis for detailed answers to Q18 regarding the absence of the soft skill 'courtesy' in the found job ads. There is no consensus on the topic of courtesy in this Delphi study.

Furthermore, Round 2 revealed a cumulative percentage of 60.9% on strongly agree and agree on the question, 'do you agree with the consensus of the responders that courtesy is part of every soft skill?'. Consensus was thus

not met based on the 70% consensus scoring as set in the research taxonomy of Delphi design choices (for details of the research design choices, see Table 4 Taxonomy of Delphi design choices – page 30). The question was scored based on a 5-point scale, where 1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree and 5 = strongly disagree.

In Round 1 of the survey, the question on soft skills was presented without the detailed soft skill attributes shown in Table 2 (Soft skill attributes – page 15). This was deliberately done to not steer the responders' in adding additional soft skills. The CISO response group added 18 additional soft skills to the questions, if a soft skill was missing from the list identified by Robles (2012). Then, in Round 2, these additional soft skills were presented back to the CISO response group, and the group was asked to validate their relevance. Each of the additional soft skills was scored based on a 5-point scale, where 1 = extremely relevant, 2 = very relevant, 3 = moderately relevant, 4 = slightly relevant and 5 = not at all relevant. None of them received a 'not relevant at all' ranking. Furthermore, results with a mean above 2.50 were ignored (from moderately relevant and downwards), and this brings the number of additional soft skills back to 50% of the initial collection, as presented in Table 11.

Table 11 Additional soft skills – CISO response group

Additional soft skill	Mean
Understand the business (1x)	1.83
Be able to listen and hear (1x)	1.87
Interested (1x)	2.30
Dedication (1x)	2.35
Decisiveness (1x)	2.39
Patience (1x)	2.39
Being Rational (1x)	2.43
Empathy (3x)	2.43
Curious (1x)	2.48

Analysing the additional soft skills, all of them could be labelled as attributes of Robles' (2012) identified soft skill attributes. Table 12 shows the distribution of the additional attributes, as presented in Table 2 (Soft skill attributes – page 15).

Table 12 Additional soft skill attributes – CISO response group

Soft skill	Additional attribute
Communication	<ul style="list-style-type: none"> Be able to listen and hear (1x) Understand the business (1x)
Leadership	<ul style="list-style-type: none"> Decisiveness (1x)
Interpersonal skills	<ul style="list-style-type: none"> Empathy (3x) Patience (1x) Interested (1x)
Work ethic	<ul style="list-style-type: none"> Being rational (1x) Dedication (1x)
Flexibility	<ul style="list-style-type: none"> Curious (1x)

The analysis confirms the completeness of the adopted soft skills format from Robles (2012).

In this Delphi study, there is consensus among the CISO response group on the topic of the best fitting CISO leadership style. Round 2 revealed a cumulative percentage of 78.3% on strongly agree and agree on the question: 'do you agree with the consensus of the responders that the combination of transactional and transformational leadership is the most relevant leadership style a CISO must have?'. This percentage is above the 70% consensus scoring as set in the research taxonomy of Delphi design choices (for details on the research design choices, see Table 4 [Taxonomy of Delphi design choices – page 30]).

The questions on leadership position, style and effect of softs skills on leadership are highly relevant in the response group. Figure 23 indicates a high degree of consensus. The mean of the answers – ranging from 1.57 to 1.96 – demonstrates that the responders are in agreement (agree) that the effect of soft skills is highly relevant

for a CISO leadership position. Each of the leadership questions had a score based on a 5-point scale, where 1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree and 5 = strongly disagree.

Figure 23 Frequency table – CISO leadership questions

	Mean	Std. Deviation	N
Q10.1. Do you agree with the responders' consensus of Very relevant on the question: 'the CISO will function at her/his best when they have a leadership position?'.	1.91	.848	23
Q10.2. Do you agree with the responders' consensus of Very relevant on the question: 'the CISO should be able to demonstrate specific leadership styles in various situations?'.	1.57	.507	23
Q10.3. Do you agree with the responders' consensus of Very relevant on the question: 'the CISO has a better leadership experience with soft skills?'.	1.96	.706	23
Q10.4. Do you agree with the responders' consensus of Very relevant on the question: 'the CISO should be able to demonstrate specific soft skills in various situations?'.	1.78	.671	23

The Cronbach's alpha reliability analysis determined that a consolidation of the responders' data and the CISO leadership data on all questions is not allowed. Table 13 shows a 0.477 Cronbach's alpha reliability score, which is lower than the minimum 0.6 score required for a strong Cronbach's alpha score (Baarda & Dijkum, 2014, p. 48).

Table 13 Cronbach's alpha reliability analysis – CISO leadership responses

Reliability statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items	N of Items
.830	.847	5

This low score can be explained by the structure of the questions. The first of the four leadership questions is about the CISO leadership position. The subsequent three questions pertain to the effect of soft skills combined with the leadership position. A check for inter-item correlation revealed a strong correlation in the responders' group answers to the three remaining questions. See addendum Delphi Study round 2 CISO analysis for details on the inter-item correlation matrix for the four leadership questions. Furthermore, raising the Cronbach's alpha to the required 0.6 or higher could be achieved by removing the question of 'Do you agree with the responders' consensus of very relevant on the question: the CISO will function at her/his best when they have a leadership position?'. This would raise the Cronbach's alpha from 0.477 to 0.748 points if only the remaining three leadership questions from survey Round 2 were consolidated. This consolidation would add significant value to the response data. The three individual questions on the effect of soft skills and the leadership position were thus consolidated into one data set: LeadershipCISO_SK. The naming convention used is the relevance of leadership

by the CISO response group in relation with soft skills (SK) resulting in the name: LeadershipCISO_SK. See addendum Delphi Study round 2 CISO analysis for details on the consolidated data set.

One responder added the leadership style of servant leadership. This style was not researched in the literature review in relation to the CISO position; therefore, it was not listed as a choice in the answering options. This type of leadership in relation to the CISO position will be added to the future work.

The questions related to the recruitment of the CISO, namely,

- Q11.1. Do you agree with the responders' consensus of very relevant on the question: 'do soft skills have priority in selecting the best fit CISO?'
- Q11.2. Do you agree with the responders' consensus of very relevant on the question: 'is it relevant that the CISO job ad describes the soft skills needed?',

are highly relevant, and consensus was reached (70%+), with a mean of 2.17 for Q11.1 and a mean of 2.22 for Q11.2. Both recruitment questions were scored based on a 5-point scale, where 1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree and 5 = strongly disagree.

However, based on the data of the response group, there is no correlation between the two questions. The inter-item correlation matrix shows a 0.128 score, which reflects a low correlation due to the number of questions in the Cronbach's alpha test and the way in which the questions were answered.

There was also no consensus on who to recruit. The outcome of Round 1 of the CISO Delphi study revealed that 54.2% of the response group favours a candidate who has the best-developed soft skills and is trainable for hard skills. The outcome of Round 2 shows a cumulative percentage of 52.2% on strongly agree and agree. This percentage, however, does not reach the 70% needed to claim consensus on the topic as set in the research taxonomy of Delphi design choices (for details of the research design choices, see Table 4 [Taxonomy of Delphi design choices – page 30]). Eleven out of 23 responders did not agree on the consensus.

The entire data set was analysed for correlation using Spearman's rank correlation coefficient.

$$(\rho_s = 1 - \frac{6 \sum d_i^2}{n(n^2-1)}).$$

This non-parametric measure of statistical dependence between the rankings of two variables is optimal for the ordinal data set of the CISO Round 2 responses (Baarda & Dijkum, 2014, p. 121). Table 14 demonstrates the relationships between the outcome of two questions.

Table 14 Spearman's correlation coefficient – CISO response group

Survey questions (top row / left column)	Spearman's correlation coefficient – CISO response group							
	Relevance CISO_SK	Q10.1.	Leadership CISO_SK	Q6.1.	Q9.1.	Q11.1.	Q11.2.	Q12.1.
RelevanceCISO_SK (Q4.1–Q4.5)	1.000	-0.013	0.721**	0.198	0.219	0.269	-0.202	-0.020
Q10.1. Do you agree with the responders' consensus of very relevant on the question: 'the CISO will function at her/his best when they have a leadership position?.'		0.954	0.000	0.365	0.315	0.214	0.355	0.929
	-0.013	1.000	0.050	0.251	0.092	-0.138	-0.073	-0.364
LeadershipCISO_SK (Q10.2–Q10.4)		0.954	0.819	0.248	0.678	0.530	0.741	0.088
	0.721**	0.050	1.000	0.173	0.268	0.527**	0.029	0.196
Q6.1. Do you agree with the ranking?	0.000	0.819		0.430	0.217	0.010	0.896	0.371
	0.198	0.251	0.173	1.000	0.039	-0.168	-0.198	0.047
	0.365	0.248	0.430		0.861	0.442	0.365	0.833
	0.219	0.092	0.268	0.039	1.000	0.128	-0.318	-0.315

Survey questions (top row / left column)	Spearman's correlation coefficient – CISO response group							
	Relevance CISO_SK	Q10.1.	Leadership CISO_SK	Q6.1.	Q9.1.	Q11.1.	Q11.2.	Q12.1.
Q9.1. Do you agree with the consensus of the responders that the combination of transactional and transformational leadership is the most relevant leadership style a CISO must have?	0.315	0.678	0.217	0.861		0.561	0.139	0.143
Q11.1. Do you agree with the responders' consensus of very relevant on the question: 'do soft skills have priority in selecting the best fit CISO?'	0.269	-0.138	0.527**	-0.168	0.128	1.000	0.103	0.500*
	0.214	0.530	0.010	0.442	0.561		0.640	0.015
Q11.2. Do you agree with the responders' consensus of very relevant on the question: 'is it relevant that the CISO job ad describes the soft skills needed?'	-0.202	-0.073	0.029	-0.198	-0.318	0.103	1.000	0.155
	0.355	0.741	0.896	0.365	0.139	0.640		0.479
Q12.1. Do you agree with the responders' consensus that it is better to select the candidate with best developed soft skills, but trainable for hard skills?'	-0.020	-0.364	0.196	0.047	-0.315	0.500*	0.155	1.000
	0.929	0.088	0.371	0.833	0.143	0.015	0.479	
**. Correlation is significant at the 0.01 level (2-tailed).								
*. Correlation is significant at the 0.05 level (2-tailed).								
Legend:	Significant positive correlation	Moderate significant positive correlation	Moderate significant negative correlation	Mediocre significant negative correlation	Significance 2-tailed.			
The correlation scoring on Spearman's rho is based on the following ratio:								
o 0.4 and above: Significant positive correlation (negative is the opposite scale of the positive scoring)								
o 0.3–0.4: Moderate significant positive correlation (negative is the opposite scale of the positive scoring)								
o 0.2–0.3: Mediocre significant positive correlation (negative is the opposite scale of the positive scoring)								
o 0.2 and below: Irrelevant positive correlation (negative is the opposite scale of the positive scoring)								

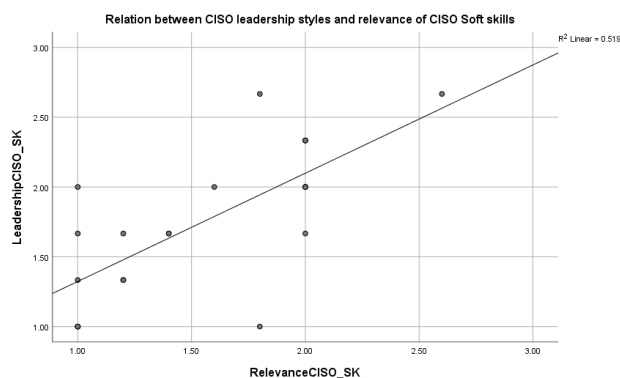
Based on Spearman's correlation coefficient, as shown in Table 14, we now explain, using scatterplots, three significant positive correlations and three moderate significant negative correlations. The explanation is in order of significance, starting with the highest positive correlations and followed by the highest negative correlations.

The correlation between relevance of CISO softs skills and CISO leadership is significant and positive.

According to the responders, a CISO applying soft skills has a better leadership position (0.721 score on Spearman's rho). This relevance was found for soft skills in general for a CISO and when applying different sets of soft skills to various audiences (Relevance CISO_SK). Moreover, the soft skills contribute to various leadership styles in different circumstances (Leadership CISO_SK).

This relation is considered high because the answers to the softs skills questions indicate a) the soft skills needed for audiences from the leadership position of the CISO and b) whether the leadership position benefits from having softs skills. Both sets of questions answer the same topic from a different angle and were answered similar. Figure 24 illustrates a significant positive relationship between leadership styles and relevance of CISO soft skills.

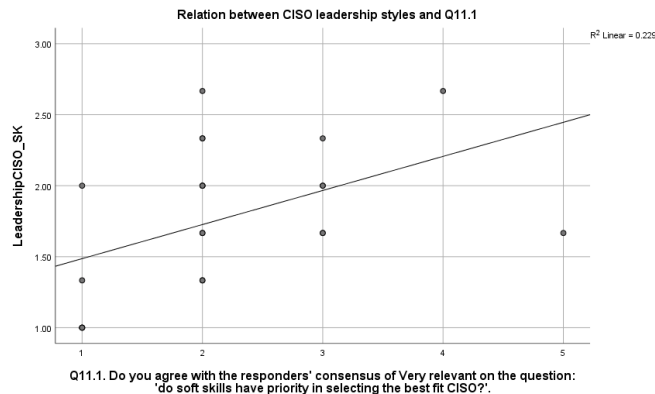
Figure 24 Scatterplot of leadership vs relevance



With a score of 0.527 on Spearman's rho, the second significant, positive correlation is between soft skills' contribution to various leadership styles in different circumstances (Leadership CISO_SK) and the prioritisation of soft skills in recruitment. Figure 25 illustrates this significant positive correlation, demonstrating that the

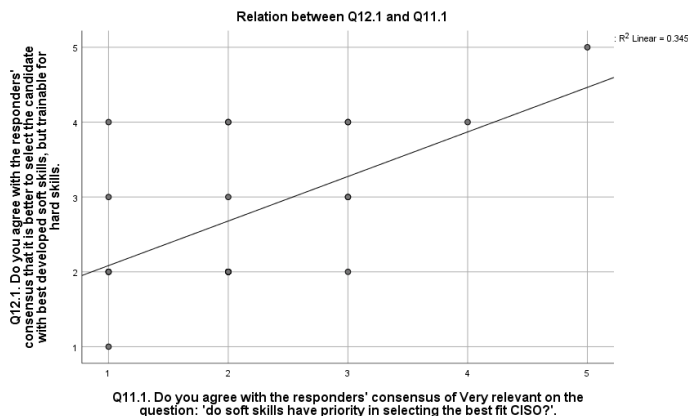
CISO response group values a) the importance of soft skills that have an effect on the leadership position and b) a focus on soft skills in the recruitment phase.

Figure 25 Scatterplot of Q11.1 vs leadership



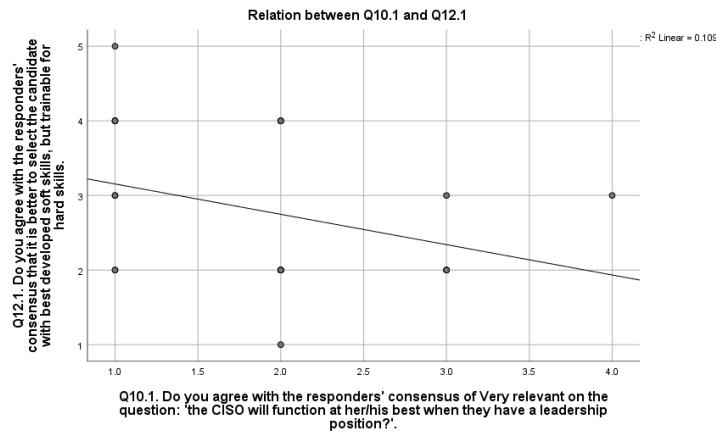
The third significant and positive correlation is between the CISO response group's value of soft skills being prioritised when selecting the best-fitting CISO (Q11.1. 'do soft skills have priority in selecting the best fit CISO?') and their agreement that it is better to select the candidate with best-developed soft skills, but who is trainable for hard skills (Q12.1. is it better to select the candidate with best developed soft skills, but trainable for hard skills?). This is depicted in Figure 26, where a significant positive correlation is plotted with a 0.500 score on Spearman's rho.

Figure 26 Scatterplot of Q11.1 vs Q12.1



There are also negative scores, albeit that the three highest negative correlations are in the area of moderately significant negative correlations. The first moderately significant negative correlation (-0.364 score on Spearman's rho) is between the CISO leadership position (Q10.1. 'the CISO will function at her/his best when they have a leadership position?') and selecting the CISO candidate equipped with soft skills over one with the best-fitting hard skills (Q12.1. 'it is better to select the candidate with best developed soft skills, but trainable for hard skills?'). Figure 27 illustrates the downwards scatter of the correlation. The explanation, based on the CISO response group, is that when recruiting a CISO for a leadership position, there is no correlation between the trainability of hard skills and the possession of soft skills.

Figure 27 Scatterplot of Q10.1 vs Q12.1

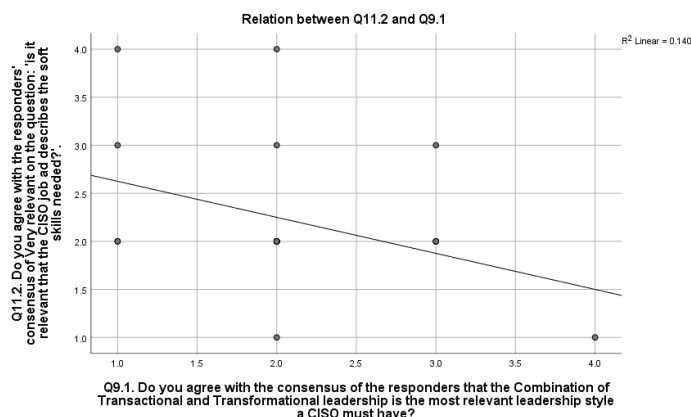


The non-correlation is emphasised by the outcome of Q12.1 (better to select the candidate with the best-developed soft skills, but who is trainable for hard skills). The elaboration on the answers shows a strong focus on being well equipped with hard skills for the CISO role. The following are statements from the CISO response group:

- *'Trainability is an assumption. I would go for education (diplomas, certification) + experience (many years) + exposure (different places).'*
- *'The CISO role is very reliant on experience and knowledge, which cannot be learned quickly or easily. I believe that CISOs (and other managerial, technical, security or privacy roles) should (continuously) develop soft skills.'*
- *'Trainable does not mean they will get trained. More likely, they'll frustrate the team (if you even have one) with their lack of knowledge, derailing important projects, and overall doing significant damage before they get trained.'*

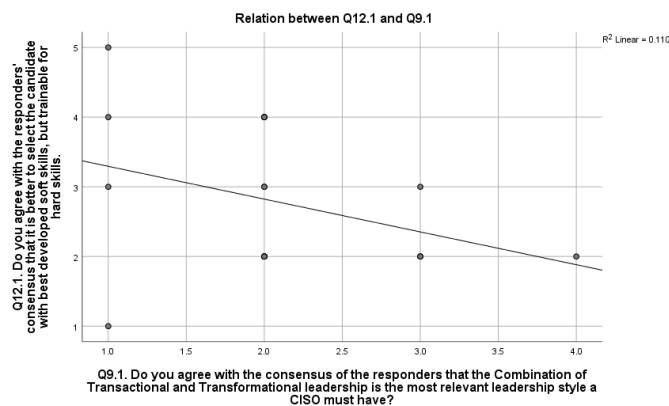
The second moderately significant negative correlation is between the most relevant leadership style and the job ad description. Figure 28 illustrates the negative score of -0.318 on Spearman's rho on Q9.1 (regarding whether the combination of transactional and transformational leadership is the most relevant leadership style that a CISO must have) and Q11.2 ('is it relevant that the CISO job ad describes the soft skills needed?'). The negative correlations (-0.318 score on Spearman's rho) can be explained by the CISO response group not correlating the leadership style with job descriptions including soft skills.

Figure 28 Scatterplot of Q9.1 vs Q11.2



The third negative moderately significant negative correlation is between combined transactional and transformational leadership being the most relevant leadership style that a CISO must have and responders' non-consensus that it is better to select a candidate with the best-developed soft skills, but who is trainable for hard skills (-0.315 score on Spearman's rho). Figure 29 demonstrates that the CISO response group agrees on the leadership style but not on the selection of the best-fitting candidate.

Figure 29 Scatterplot of Q9.1 vs Q12.1



The question on the best-fitting candidate was a fictitious question on hiring one of two candidates, and it will probably not be a real-life situation. As one of the CISO responders elaborated: 'if it comes down to these two candidates, ask your recruiters to search for better-suited candidates'.

6.6 Findings of Gap Analysis of Delphi Study – CISO Perspective and Job Descriptions

Combining the findings from the job descriptions and those from the Delphi study analysis from the CISO perspective – written by author J.M.J. van Yperen Hagedoorn, as shown in the index: Contributions by authors (page 99) – offers insight into how big the gap is between demand (role descriptions) and expectations (view of the CISO response group) regarding CISOs' soft skills in their roles.

As stated in the section, Findings of Delphi Study CISO Perspective, the soft skill ranking in Round 1 was confirmed in Round 2. The CISO response group agrees on the soft skills identified by Robles (2012) but disagrees on the ranking based on the analysed CISO job ads between February and July 2019, published on major Dutch recruitment websites. Table 15 shows the CISO response group's variation in ranking of the job ads.

Table 15 Soft skills confirmation – CISO response group, job ads analysis and Robles (2012)

Ranking: Soft skills identified by Robles (2012)	Ranking: Soft skills found in analysed Job ads	Ranking: Soft skills confirmation CISO response group
Integrity	Communication	Communication
Communication	Leadership	Leadership
Courtesy	Work ethic	Integrity
Responsibility	Interpersonal skills	Interpersonal skills
Interpersonal skills	Professionalism	Professionalism
Positive attitude	Teamwork skills	Work ethic
Professionalism	Integrity	Responsibility
Flexibility	Responsibility	Teamwork skills
Teamwork skills	Flexibility	Positive attitude
Work ethic	Positive attitude	Flexibility
	Courtesy	Courtesy
Legend: Ranking is in order of importance. Top row is most important; bottom row is least important. Note that the soft skill 'leadership' is not included in Robles' (2012) overview.		
Similar ranking	One position difference	Significant difference

Table 15 presents a different view between the CISO response group, the job ads and Robles (2012) on the ranking of the importance of these soft skills. Agreement was observed in the ranking, based on Round 1 of the

surveys with a 73.9% consensus ($M = 2.35$, $SD = 0.48$), as shown in the addendum Delphi Study round 2 CISO analysis. The Round 2 question ('Do you agree with the ranking?') was scored based on a 5-point scale, where 1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree and 5 = strongly disagree.

The difference in ranking based on the job ads analysis and the CISO response group has a more aligned ranking compared to the ranking based on the research of Robles (2012). Between the two rankings from the job ads and from the CISO response group, 5 of the 11 soft skills (including leadership, which is not on Robles' list of soft skills) were ranked in the same position, while 3 out of the 11 were ranked with a one-position difference, and the remaining three have a difference of more than one ranking position.

The difference in positioning is stronger against the soft skill rankings found by Robles (2012). No soft skills were ranked in an equal position, and four soft skills were ranked with a one-position difference (compared to the CISO response group's ranking).

The major difference is the positioning of the soft skill 'courtesy', marked as a 'significant difference', against the ranking by Robles (2012). From the analysis of the job ads, we learned that there is an absence of the soft skill 'courtesy' in the job ads. As stated in Section 6.5 Findings of Delphi Study CISO Perspective, there is no consensus on the topic of courtesy in this Delphi study.

Moreover, as described in that section, there is a moderately significant negative correlation between the most relevant leadership style and the job ad description. There seems to be no support for a CISO with requested soft skills (in the job ads) and with a transformational and transactional leadership style.

Furthermore, there is a mediocre significant negative correlation that was not described in Section 6.5 Findings of Delphi Study CISO Perspective. That is, the negative correlation, albeit with a -0.202 score on Spearman's rho, between the relevance of soft skills (Relevance CISO_SK) and Q11.2 ('is it relevant that the CISO job ad describes the soft skills needed?'). Although both individual questions achieved consensus in terms of being highly relevant, the mediocre significant negative correlation can be explained by the difference in focus of the response group: soft skills are highly relevant for the CISO, and the job ads should state the required soft skills, especially when there are differences in soft skills needed per type of organisation (see Figure 21 – page 47). The soft skills in job ads are valued less by the CISO response group. This was emphasised by various comments of the CISO response group:

- *A job ad is just paper.'*
- *'Job ads are meant to attract as many candidates as possible, the next round is more important.'*
- *To mention soft skills explicitly in a job ad likely communicates a certain message on the image of the company employees or its company culture you may want to avoid sending out publicly.*

The gap analysis revealed that the ranking of the soft skills based on the job ads and the ranking based on the CISO response group are different. Other gaps (based on Spearman's correlation coefficient) are not significant.

6.7 Findings of Delphi Study – Business Leader's Perspective

This section describes the findings of the Delphi study based on the business leaders' perspective and is owned by author R. Smit, as shown in the index: Contributions by authors (page 99). The first section describes the composition of the response group for both rounds of the Delphi study. The second section presents the findings from Round 1, and Round-2 findings are shared in the last section.

For Round 1 of the business leaders' perspective 28 business leaders were willing to participate. The final response group consisted of 21 responders, and Round 2 also had 21 responders. The responders in Rounds 1 and 2 exceeds the minimum requirement of 15 experts in this Delphi study, as stated in Section 5.8 Reaching the Target Audience and Researching the Collected Content.

6.7.1 Composition of the business leaders response group

All of the responders met the response group criteria of being employed in an organisation with 500 or more employees. Three of the responders' stated that they are not working for an organisation that has less than 500 employees, while two responders are part of an international organisation with Dutch branch offices that meet the criteria. Moreover, one responder is part of a start-up, but held a former interim position in an organisation of 10,000+ employees; we asked him to answer the questionnaire from that perspective. All responders were included in the further analysis. Figure 30 illustrates that all responders are in a leadership position.

Figure 30 Function – business leaders response group

Q1. Function: Which of the following best describes your role in the organization you currently work for? These functions cover the most common Business Leader roles. If your role is not listed, please use the Other answer line..

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Chief Executive Officer (Algemeen directeur / Collège voorzitter)	5	23.8	23.8	23.8
	Chief Financial Officer (Financieel directeur)	1	4.8	4.8	28.6
	Chief Technology Officer (Technisch directeur)	2	9.5	9.5	38.1
	Chief Information Officer (IT directeur / Directeur informatievoorziening)	5	23.8	23.8	61.9
	Chief Operation Officer (Operationeel directeur)	2	9.5	9.5	71.4
	Other (please specify): Head of Channels & Alliances EMEA North Chief Commercial Officer / Founder Technical Consultant / Designer Head of sales and channel Sales director Commercieel directeur	6	28.6	28.6	100.0
	Total	21	100.0	100.0	

All of the responders are employed in Dutch organisations with 500 or more employees. Figure 31 displays five answers as 'not working for a Dutch organisation'. This answer was given by responders working for international organisations with a Dutch-based subsidiary, and all of them were included for further analysis.

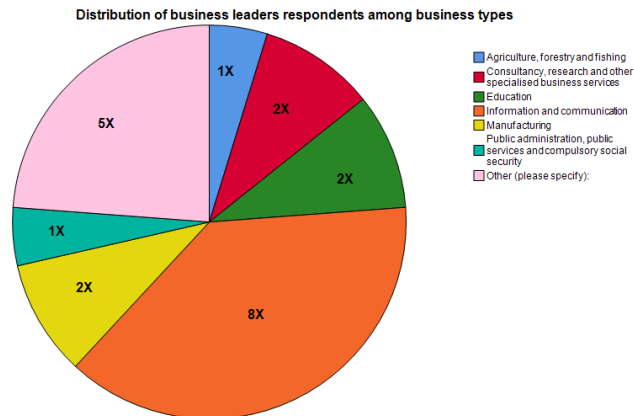
Figure 31 Employment – business leaders response group

Q3. Are you employed in a Dutch organisation?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes, a Dutch organisation	9	42.9	42.9	42.9
	Yes, a Dutch organisation with international subsidiaries	1	4.8	4.8	47.6
	Yes, a Dutch subsidiary of an international organisation	6	28.6	28.6	76.2
	No, not working for a Dutch organisation	5	23.8	23.8	100.0
	Total	21	100.0	100.0	

Figure 32 illustrates that the 21 responders are working in 10 different categories. The business leaders response group has a fair spread across the categories of organisations, with nine of the responders working in the category of information and communication.

Figure 32 Organisation category – business leaders response group



The response group members are seasoned in their current role. Figure 33 lists the number of years they have been employed in their current role.

Figure 33 Work history – business leaders response group

Q2. Work history: how long have you held your current role?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-2 years	2	9.5	9.5	9.5
	3-5 years	4	19.0	19.0	28.6
	6-10 years	9	42.9	42.9	71.4
	more than 10 years	6	28.6	28.6	100.0
	Total	21	100.0	100.0	

Almost all the organisations employ a CISO, as shown in Figure 34. The one responder who has no CISO employed is part of a start-up but used to be employed in organisation with 10,000+ employees, including a CISO.

Figure 34 Responses to question, 'Does your organisation have a CISO employed?'

Q6. Does your organisation have a CISO employed?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes - Full position	11	52.4	52.4	52.4
	Yes - Combined role (i.e. combined with Privacy Officer)	9	42.9	42.9	95.2
	No	1	4.8	4.8	100.0
	Total	21	100.0	100.0	

Figure 35 shows the reporting line of the CISO employed in the business leaders response group. It indicates that the majority of CISOs report to the CIO, followed by the board and the CEO.

Figure 35 CISO reporting line

\$Q8WhoCisoReportTo Frequencies

		Responses		Percent of Cases
		N	Percent	
8. To whom does the CISO report to ^a	The board	8	25.0%	40.0%
	The Chief Executive Officer (Algemeen directeur / College voorzitter)	7	21.9%	35.0%
	The Chief Financial Officer (Financieel directeur)	2	6.3%	10.0%
	The Chief Information Officer (IT directeur / Directeur informatievoorziening)	11	34.4%	55.0%
	The IT manager or equivalent role	1	3.1%	5.0%
	n/a Chief Operating Officer (COO) / Development Director Steering committee as specified above	3	9.4%	15.0%
Total		32	100.0%	160.0%

a. Dichotomy group tabulated at value 1.

The composition of the business leaders response group is diverse in roles, background, and organisation type and fits the selection criteria (Dutch organisations with 500+ employees).

6.7.2 Findings of Delphi study – business leaders' perspective; Round 1

Reporting on Round 1 of the business leaders' perspective is limited to the answer of familiarity with two topics:

- Soft skills
- Leadership.

Figure 36 indicates that the business leaders response group is highly familiar with soft skills, and even slightly more so than the CISO response group (CISO: $M = 2.08$, $SD = 0.584$; Business leaders: $M = 1.71$, $SD = 0.717$). Only one of the responders is slightly familiar with soft skills.

Figure 36 Soft skill familiarity – business leaders

Are you familiar with soft skills?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Extremely	8	38.1	38.1	38.1
	Very	12	57.1	57.1	95.2
	Slightly	1	4.8	4.8	100.0
	Total	21	100.0	100.0	

Our finding is that soft skills are well known among the business leaders response group. On the question regarding whether the leaders are familiar with leadership styles, the answer was a confirmation ($M = 2.20$, $SD = 0.969$). Figure 37 displays the spread of responses.

Figure 37 Leadership familiarity – business leaders

Are you familiar with variations in leadership styles?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Extremely	2	9.5	10.0	10.0
	Very	13	61.9	65.0	75.0
	Moderately	4	19.0	20.0	95.0
	Slightly	1	4.8	5.0	100.0
	Total	20	95.2	100.0	
Missing	System	1	4.8		
Total		21	100.0		

Both questions had a score based on a 5-point scale, where 1 = extremely, 2 = very, 3 = moderately, 4 = slightly and 5 = not at all. For both topics, the lowest score was slightly (one responder). The conclusion is that the business leaders response group is well suited to participate as an expert group. The detailed analysis of the data captured in survey Round 1 served as input for the consensus Round 2. For the detailed analysis, see addendum: Delphi Study round 1 business leaders analysis.

6.7.3 Findings of Delphi study – business leaders’ perspective; Round 2

The objective of Round 2 of the Delphi study from the business leaders response group was to reach consensus on the outcome of Round 1. Regarding the relevance of soft skills for a CISO, the benefit of variations of soft skills in different organisations and audiences is highly relevant in the business leaders response group ($M = 1.74$, $SD = 0.768$). The response group appreciated the variations in the use of soft skills influencing different audiences and shared the observation of the positive effect of having soft skills and working with different audiences.

Figure 38 depicts a high level of consensus. The answers – ranging from a minimum of 1.62 to a maximum of 2.19 – demonstrate that the responders agree that soft skills for a CISO are relevant. Each of the questions was scored based on a 5-point scale, where 1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree and 5 = strongly disagree.

Figure 38 Frequency table of soft skill relevance questions – business leaders response group

		Q1.1. Do you agree with the responders' consensus of Very relevant on the question: 'are soft skills relevant for the CISO?'.	Q1.2. Do you agree with the responders' consensus of Very relevant on the question: 'do you experience the effect of a CISO equipped with soft skills interacting with others in your organization?'.	Q1.3. Do you agree with the responders' consensus of Very relevant on the question: 'do you see the benefit of variations in soft skills for influencing different audiences (like: business leaders, the users or the IT department)'?	Q1.4. Do you agree with the responders' consensus of Very relevant on the question: 'do you appreciate working with different sets of soft skills for influencing different audiences (like: business leaders, the users or the IT department)'?	Q1.5. The outcome on the question: 'have you experienced a positive effect from the CISO on using different sets of soft skills for influencing different audiences (like: business leaders, the users or the IT department)'? is in balance between Very an	Q1.6. Do you agree with the responders' consensus of Very relevant on the question: 'are the soft skills needed different per type of organisation? (i.e. education has different soft skill needs than financial institutions)'?
N	Valid	21	21	21	21	21	21
	Missing	0	0	0	0	0	0
Mean		1.62	2.00	1.71	1.62	2.19	2.05
Std. Deviation		.865	1.304	.902	.865	1.123	.921
Minimum		1	1	1	1	1	1
Maximum		4	6	4	4	6	4

For the business leaders response group, the Cronbach’s alpha reliability analysis determined that a consolidation of the responders’ data on the CISO soft skill answers is allowed (Baarda & Dijkum, 2014, p. 48). Table 16 shows that $\alpha = 0.866$ on the Cronbach's alpha reliability analysis.

Table 16 Cronbach's alpha reliability analysis of CISO soft skills – business leaders’ responses

Reliability statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items	N of Items
.866	.869	6

Based on the high degree of consensus on the six questions and the correlation of the type of questions, the responders’ data was consolidated because Q1.1–Q1.6 are synonyms. This brings the small data set of the business leaders to a significant amount of data. Moreover, a check for inter-item correlation revealed that there is a strong correlation in the responders’ group answers. See addendum Delphi Study round 2 CISO analysis for

details on the inter-item correlation matrix. The six individual questions (Q1.1–Q1.6) on the relevance of CISO soft skills were consolidated into one data set: RelevanceBL_SK. The naming convention used is the Relevance by the business leaders (BL) on soft skills (SK) resulting in the name: RelevanceBL_SK. See addendum Delphi Study round 2 CISO analysis for details on the consolidated data set.

The business leaders response group achieved consensus on the fact that the user in an organisation's audience demands a better demonstration of CISO soft skills compared to the other groups in an organisation. Other groups are the IT department or the organisation's business leaders.

Figure 39 CISO agreement on demonstration of soft skills – business leaders response group

Q2.1. Do you agree with the outcome that the Users in the organisation demand better demonstration of the CISO soft skills compared to the other groups?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	3	14.3	14.3	14.3
	Agree	13	61.9	61.9	76.2
	Neutral	2	9.5	9.5	85.7
	Disagree	3	14.3	14.3	100.0
	Total	21	100.0	100.0	

Figure 39 illustrates a high degree of consensus (76.2%, $M = 2.24$, $SD = 0.889$). This combined consensus (14.3% on strongly agree and 76.2% on agree) is confirmation of the outcome of Round 1, where 66.7% ($n = 14$) of the responders selected the users in the organisation as the group that demanded a better demonstration of soft skills compared to the other groups. Note that in Round 1 of the surveys, the answer prompt was 'select all that apply'. See addendum Delphi Study round 1 business leaders analysis for the response to Q12 and for the position of the second audience, namely, the business leaders ($n = 11$). Number three is the IT department ($n = 3$). The soft skill ranking in Round 1 was confirmed in Round 2 and is shown in Table 17.

Table 17 Soft skills confirmation – business leaders response group

Ranking: Soft skills confirmation – business leaders response group	
Communication	
Leadership	
Interpersonal skills	
Professionalism	
Integrity	
Responsibility	
Positive attitude	
Flexibility	
Teamwork skills	
Work ethic	
Courtesy	
Ranking is in order of importance. Top row is most important; bottom row is least important. Note that the soft skill 'leadership' is not included in Robles' (2012) overview.	

Table 17 shows that the Dutch business leaders recognise the soft skills identified by Robles (2012); however, as with the CISOs, they have a different view on the ranking of the importance of the individual soft skills. The ranking, based on Round 1 of the surveys, is agreed, with a combined 81% consensus (9.5% strongly agree and 71.4% agree, $M = 2.14$, $SD = 0.655$). In addition, the business leaders response group ranked the soft skill 'courtesy' in the lowest place.

In Round 1 of the survey of the business leaders perspective, the question on soft skills was presented without the detailed soft skill attributes listed in Table 2 (Soft skill attributes – page 15). This was deliberately done to not steer the responders' in adding additional soft skills. The CISO response group added 21 additional soft skills to the questions, if a soft skill was missing from the list identified by Robles (2012). In Round 2, the CISO

response group was then re-presented with these additional soft skills and asked to validate their relevance. Each of those skills had a score based on a 5-point scale, where 1 = extremely relevant, 2 = very relevant, 3 = moderately relevant, 4 = slightly relevant and 5 = not at all relevant. None of the additional soft skill attributes received a 'not relevant at all' ranking. The results with a mean ≥ 2.50 were ignored (from moderately relevant and on), and this brings the number of additional soft skills back to 6 of the initial 21, as shown in Table 18.

Table 18 Additional soft skills – business leaders response group

Additional soft skill	Mean
Business sense (understand the business needs of the organisation) (1x)	1.90
Accountability (1x)	2.19
Being able to listen (1x)	2.29
Results-driven (1x)	2.38
Responsiveness (1x)	2.43
Can-do mentality (1x)	2.48

Analysing the additional soft skills, all of them could be labelled as attributes of Robles' (2012) identified soft skills. Table 19 presents the distribution of the additional soft skill attributes over the soft skills identified by Robles (2012), including leadership.

Table 19 Additional soft skill attributes – business leaders response group

Soft skill	Additional attribute
Communication	<ul style="list-style-type: none"> • Business sense (understand the business needs of the organisation) (1x) • Being able to listen (1x)
Responsibility	<ul style="list-style-type: none"> • Accountability (1x) • Results-driven (1x)
Work ethic	<ul style="list-style-type: none"> • Can-do mentality (1x)
Flexibility	<ul style="list-style-type: none"> • Responsiveness (1x)

This analysis confirms the completeness of the adopted soft skills format by Robles (2012).

In this Delphi study, there is consensus among the business leaders response group on the topic of the best-fitting CISO leadership style. Round 2 yielded a cumulative percentage of 85.7% on strongly agree and agree on Q5.1 regarding the combination of transactional and transformational leadership ($M = 1.81$, $SD = 0.928$) being the most relevant leadership style that a CISO must have. That percentage is above the 70% consensus scoring as set in the research taxonomy of Delphi design choices (for details on the research design choices, see Table 4 [page 30]).

The questions on the leadership position, style and effect of softs skills on leadership highly relevant to the business leaders response group. Figure 40 demonstrates a high degree of consensus among the business leaders on the CISO leadership questions. The mean of answers – ranging from a minimum of 1.57 to a maximum of 1.00 over four questions – shows that the responders are in agreement (agree) that the effect on soft skills is highly relevant for a CISO leadership position. Each of the leadership questions was scored based on a 5-point scale, where 1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree and 5 = strongly disagree.

Figure 40 Frequency table of CISO leadership questions – business leaders response group

	Mean	Std. Deviation	N
Q6.1. Do you agree with the responders' consensus of Very relevant on the question: 'the CISO will function at her/his best when they have a leadership position?'.	1.90	.700	21
Q6.2. Do you agree with the responders' consensus of Very relevant on the question: 'the CISO should be able to demonstrate specific leadership styles in various situations?'.	1.71	.717	21
Q6.3. Do you agree with the responders' consensus of Very relevant on the question: 'the CISO experiences a better leadership position with soft skills?'.	1.57	.746	21
Q6.4. Do you agree with the responders' consensus of Very relevant on the question: 'the CISO should be able to demonstrate specific soft skills in various situations?'.	1.71	.717	21

The Cronbach's alpha reliability analysis revealed that a partial consolidation of the responders' data on the leadership questions is allowed. Based on the similarity of Q6.2–6.4 ($\alpha = 0.874$), these questions were consolidated, which was allowed because they all focus on leadership in combination with soft skills. Question 6.1 was not included because the question only addressed the leadership position of the CISO. Table 20 shows a Cronbach's alpha reliability analysis score of 0.874 after the aforementioned consolidation. This is above the minimal score of 0.6, which is required for a strong Cronbach's alpha score (Baarda & Dijkum, 2014, p. 48).

Table 20 Cronbach's alpha reliability analysis of CISO leadership – business leaders response group

Reliability statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items	N of Items
.874	.875	3

This adds significant value to the response data. The three individual questions on the effect of soft skills and the leadership position were consolidated into a single data set: LeadershipBL_SK ($M = 1.83$, $SD = 0.852$). The naming convention used is the relevance of leadership by the business leader (BL) response group in relation with soft skills (SK) resulting in the name: LeadershipBL_SK. See addendum Delphi Study round 2 CISO analysis for details on the consolidated data set. Question 6.1 regarding whether the CISO will function at her/his best when they have a leadership position was left out of the consolidation. This raised the Cronbach's alpha score from the original $\alpha = 0.810$ to the current $\alpha = 0.874$.

The questions related to the recruitment of the CISO, namely,

- Q7.1 'do soft skills have priority in selecting the best fit CISO?' and
- Q7.2. 'is it relevant that the CISO job ad describes the soft skills needed?',

are highly relevant, and consensus was reached (70%+), with $M = 1.95$ and $SD = 0.81$ for Q7.1 and $M = 2.00$ and $SD = 1.00$ for Q7.2. Both recruitment questions had a score based on a 5-point scale, where 1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree and 5 = strongly disagree.

The business leaders response group have consensus on who to recruit. The outcome of Round 1 of the CISO Delphi study revealed that a cumulative of 76.2% of the response group favours a candidate with the best-developed soft skills, but who is trainable for hard skills. The outcome of Round 2 yielded a cumulative percentage of 71.4% on strongly agree and agree. This is slightly lower than Round 1, but it does reach the 70% needed to claim consensus on the topic as set in the research taxonomy of Delphi design choices (for details of the research design choices, see Table 4 [Taxonomy of Delphi design choices – page 30]).

The entire data set was analysed on correlation with the use of Spearman's rank correlation coefficient:

$$\left(\rho_s = 1 - \frac{6 \sum d_i^2}{n(n^2 - 1)} \right)$$

This non-parametric measure of statistical dependence between the rankings of two variables is optimal for the ordinal data set of the CISO Round 2 response (Baarda & Dijkum, 2014, p. 121). Table 21 displays the relationships between the outcome of two questions.

Table 21 Spearman's correlation coefficient – business leaders response group

Questions (top row and left column)	Spearman's correlation coefficient – business leaders response group									
	Relevance BL_SK	Q1.6.	Q2.1.	Q3.1.	Q5.1.	Q6.1.	Leader ship- BL_SK	Q7.1	Q7.2.	Q8.1.
RelevanceBL_SK (Q1.1–Q1.5)	1.000	0.420	-0.187	0.497*	0.528*	0.232	0.664**	0.592**	0.484*	0.294
Q1.6. Do you agree with the responders' consensus of very relevant on the question: 'are the soft skills needed different per type of organisation? (i.e., education has different soft skill needs than financial institutions)'.	0.420	1.000	0.193	0.011	0.191	0.077	0.364	0.496*	0.314	0.033
Q2.1. Do you agree with the outcome that the users in the organisation demand better demonstration of the CISO soft skills compared to the other groups?	-0.187	0.193	1.000	0.088	0.102	-0.085	0.215	-0.067	0.128	-0.010
Q3.1. Do you agree with the ranking?	0.497*	0.011	0.088	1.000	0.184	0.178	0.445*	0.281	0.255	0.360
Q5.1. Do you agree with the consensus of the responders that the combination of transactional and transformational leadership is the most relevant leadership style a CISO must have?	0.528*	0.191	0.102	0.184	1.000	0.382	0.602**	0.295	0.220	0.092
Q6.1. Do you agree with the responders' consensus of very relevant on the question: 'the CISO will function at her/his best when they have a leadership position?'.	0.232	0.077	-0.085	0.178	0.382	1.000	0.410	0.189	-0.013	0.283
LeadershipBL_SK (Q6.2–Q6.4)	0.664**	0.364	0.215	0.445*	0.602**	0.410	1.000	0.515*	0.459*	0.298
Q7.1. Do you agree with the responders' consensus of very relevant on the question: 'do soft skills have priority in selecting the best fit CISO?'.	0.592**	0.496*	-0.067	0.281	0.295	0.189	0.515*	1.000	0.561**	0.511*
Q7.2. Do you agree with the responders' consensus of very relevant on the question: 'is it relevant that the CISO job ad describes the soft skills needed?'.	0.484*	0.314	0.128	0.255	0.220	-0.013	0.459*	0.561**	1.000	0.183
Q8.1. Do you agree with the responders' consensus that it is better to select the candidate with best developed soft skills, but trainable for hard skills?	0.294	0.033	-0.010	0.360	0.092	0.283	0.298	0.511*	0.183	1.000

** . Correlation is significant at the 0.01 level (2-tailed).

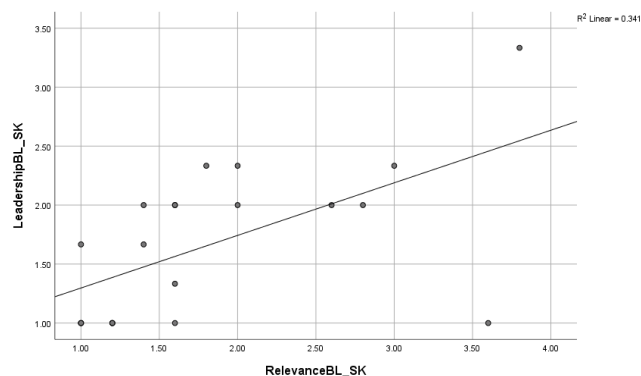
c. Listwise N = 23

Questions (top row and left column)	Spearman's correlation coefficient – business leaders response group									
	Relevance BL_SK	Q1.6.	Q2.1.	Q3.1.	Q5.1.	Q6.1.	Leader ship- BL_SK	Q7.1	Q7.2.	Q8.1.
*. Correlation is significant at the 0.05 level (2-tailed).										
Legend:	Significant positive correlation			Moderate significant positive correlation			Significance 2-tailed.			
The correlation scoring on Spearman's rho is based on the following ratio:										
o 0.4 and above: Significant positive correlation (negative is the opposite scale of the positive scoring)										
o 0.3–0.4: Moderate significant positive correlation (negative is the opposite scale of the positive scoring)										
o 0.2–0.3: Mediocre significant positive correlation (negative is the opposite scale of the positive scoring)										
o 0.2 and below: Irrelevant positive correlation (negative is the opposite scale of the positive scoring)										

Based on Spearman's correlation coefficient, as shown in Table 21, we report the findings of the 14 significant positive correlations via the use of scatterplots. To shorten the scatterplots labelling and to keep the relation with the business leaders response group, the abbreviation of BL (business leader response group) is in the label. The findings are in order of significance, starting with the highest positive correlations, followed by the next one in ranking.

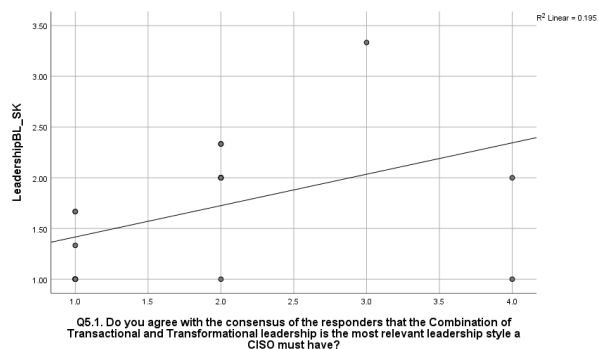
A score of $r_s = 0.664$ and $p = 0.001$ of Spearman's ρ is a significant positive correlation between soft skills contributing to various leadership styles in different circumstances (Leadership CISO_SK) and a CISO applying soft skills. The explanation is that business leaders are of the opinion that soft skills in general for a CISO and applying different sets of soft skills to various audiences (Relevance CISO_SK) contribute to leadership style(s) in different circumstances (Leadership CISO_SK). Figure 41 demonstrates a significant positive relationship.

Figure 41 Scatterplot of relevanceBL_SK vs LeadershipBL_SK



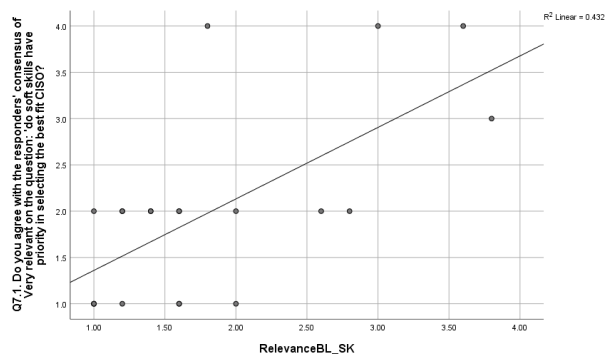
Furthermore, Figure 42 shows a significant positive correlation between leadership style and leadership position. The business leaders response group confirmed the importance of the combination of transactional and transformational leadership as the most relevant leadership style a CISO must have and that it has a positive effect on the leadership position of the CISO.

Figure 42 Scatterplot of BL Q5.1 vs LeadershipBL_SK



With a score of $r_s = 0.602$ and $p = 0.004$ of Spearman's ρ , the second significant positive correlation is confirmed. That is, the correlation between the relevance of CISO soft skills and Q7.1 ('do soft skills have priority in selecting the best fit CISO?') is significant and positive. According to the responders, CISO soft skills are relevant, and the focus on soft skills in the recruitment process is highly relevant ($r_s = 0.592$, $p = 0.005$ score of Spearman's ρ is significant). All the following were found to be relevant: soft skills in general for a CISO and the application of different sets of soft skills to various audiences (RelevanceBL_SK). Moreover, working with a CISO with the right set of soft skills starts during recruitment. This relation is considered high because the answers to the soft skills questions address the soft skills that a CISO candidate needs. Both questions answer the same topic from a different perspective. Figure 43 demonstrates the significant positive relationship.

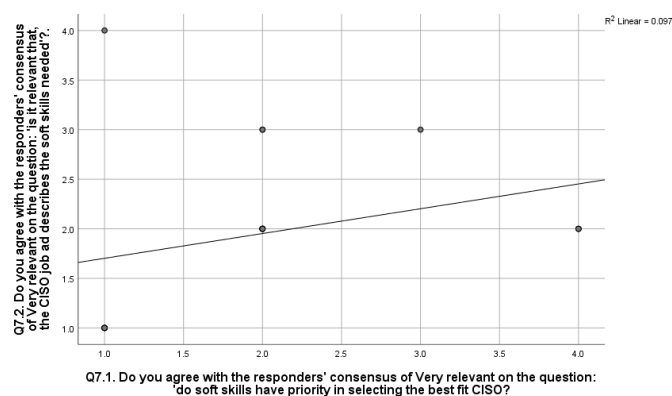
Figure 43 Scatterplot of BL relevance vs Q7.1



The fourth significant positive correlation is between soft skills having a priority in selecting the best candidate and the job ad describing the soft skills needed in the organisation. With a score of $r_s = 0.561$ and $p = 0.008$ of Spearman's ρ being significant, the consequent answering of the response group is confirmed.

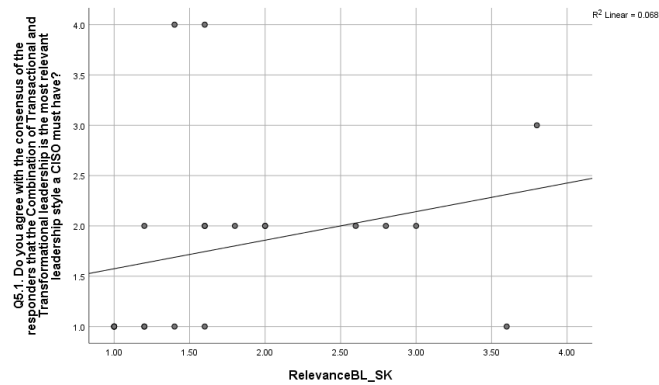
Figure 44 illustrates the correlation between Q7.1. ('do soft skills have priority in selecting the best fit CISO?') and Q7.2. ('Do you agree with the responders' consensus of very relevant on the question: is it relevant that the CISO job ad describes the soft skills needed?').

Figure 44 Scatterplot of BLQ71 vs Q7.2



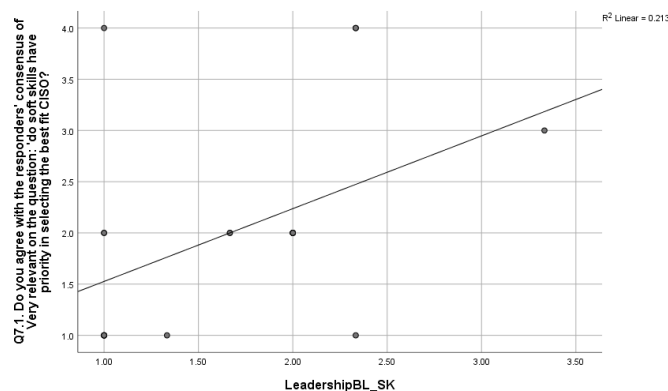
The correlation between the relevance of business leaders softs skills on the one hand and the importance of the combination of transactional and transformational leadership as the most relevant leadership style a CISO must have (Q5.1) on the other is highly relevant. The responders believe that CISO soft skills are relevant and that the best-fitting leadership style is the combination of transactional and transformational leadership ($r_s = 0.528$, $p = 0.014$ score of Spearman's ρ is significant). The relevance was found in soft skills in general for a CISO and in applying different sets of leadership styles in various circumstances. Figure 45 demonstrates the significant positive relationship.

Figure 45 Scatterplot of RelevanceBL_SK vs Q5.1



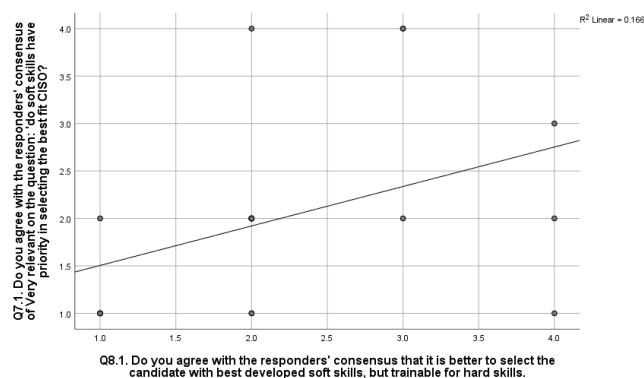
The sixth positive significant correlation is between soft skills contributing to various leadership styles in different circumstances (Leadership CISO_SK) and the prioritisation of soft skills in recruitment. Figure 46 illustrates the significant score on Spearman's ρ ($r_s = 0.515$, $\rho = 0.017$), with the relevance being that the CISO leadership is in need of soft skills and that having a CISO with the right set of soft skills starts in the recruitment phase.

Figure 46 Scatterplot of BL leadership vs Q7.1



The previous correlation is confirmed by the following: the business leaders response group would prioritise soft skills in the recruitment phase (Q7.1. 'do soft skills have priority in selecting the best fit CISO?') by hiring a candidate with soft skills above one with the best-fitting hard skills (Q8.1. 'it is better to select the candidate with best developed soft skills, but trainable for hard skills'). Figure 47 shows the score on Spearman's rho ($r_s = 0.511$, $\rho = 0.018$), which is similar to the score on the previous correlation.

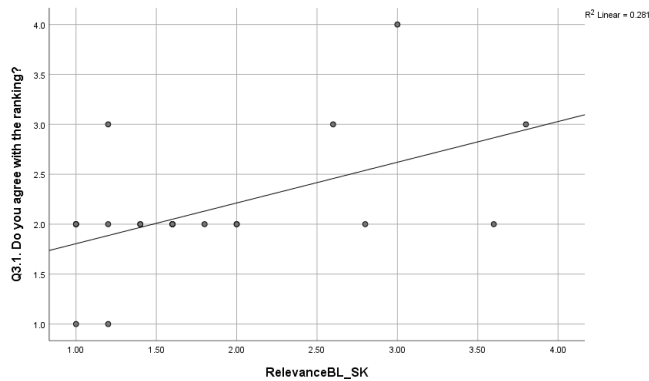
Figure 47 Scatterplot of BL Q8.1 vs Q7.1



A significant correlation, which was expected, is between the ranking of soft skills, as stated in Round 1, and the relevance of these skills for a CISO. With $r_s = 0.497$ and $\rho = 0.022$ on Spearman's ρ , as depicted in Figure 48,

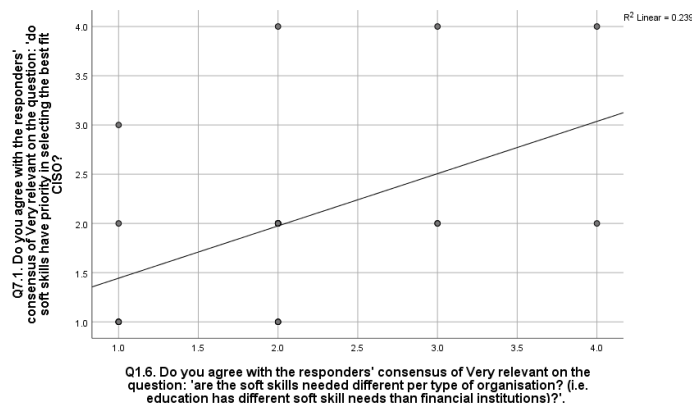
the relevance was found in soft skills in general for a CISO and the ranked soft skills (Q3.1. ‘Do you agree with the ranking?’)

Figure 48 Scatterplot of relevanceBL_SK vs Q3.1



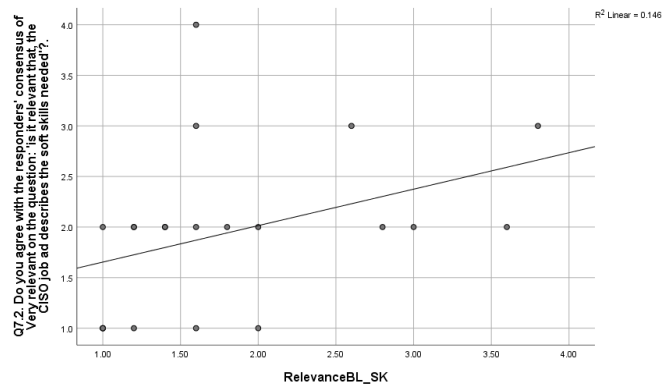
Furthermore, the ninth positive significant correlation is between the different soft skills needed per type of organisation and the prioritisation of soft skills in recruitment. Figure 49 shows the score on Spearman’s ρ ($r_s = 0.496$, $\rho = 0.022$) and demonstrates the relevance of both the soft skills needed and their variation per organisation type (Q1.6. ‘Do you agree with the responders’ consensus of very relevant on the question: “are the soft skills needed different per type of organisation?” (i.e., education has different soft skill needs than financial institutions)’ and the recruitment question (Q7.1 ‘do soft skills have priority in selecting the best fit CISO?’).

Figure 49 Scatterplot of BL Q1.6 vs Q7.1



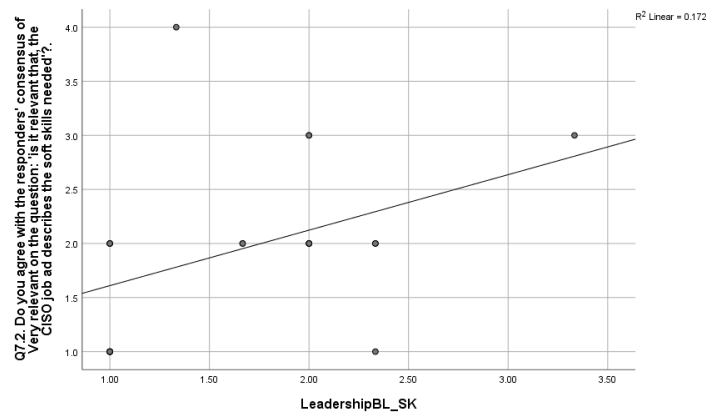
The previous correlation is confirmed by the 10th correlation: the business leaders response group found the soft skills to be relevant and would include them in job ads. Figure 50 shows a significant positive correlation ($r_s = 0.484$, $\rho = 0.026$ score on Spearman’s ρ) between the questions concerning soft skills’ relevance (RelevanceBL_SK) and Q7.2. (‘is it relevant that the CISO job ad describes the soft skills needed?’). This is confirmation of the previous correlation.

Figure 50 Scatterplot of BL relevance vs Q7.2



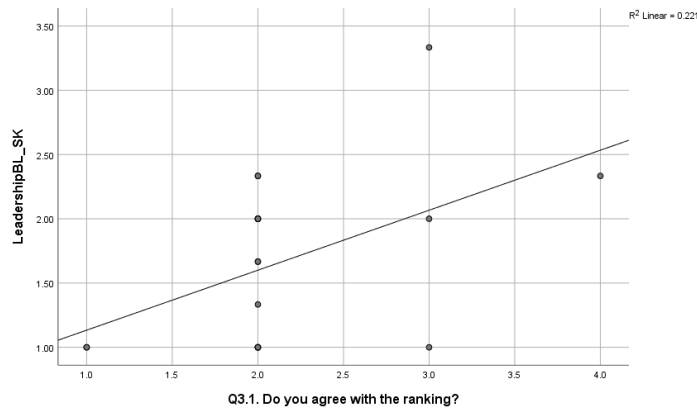
The 11th significant positive correlation is between soft skills contributing to various leadership styles in different circumstances (Leadership CISO_SK) and job ads having a description of the soft skills needed in an organisation (Q7.2. 'is it relevant that the CISO job ad describes the soft skills needed?'). The response group found both of these items valuable. Figure 51 illustrates the significant positive correlation, with a score of $r_s = 0.459$ and $\rho = 0.036$ on Spearman's ρ . This confirms that the business leaders have a demand for a CISO who can own the leadership position with soft skills. This demand is prioritised in recruitment.

Figure 51 Scatterplot of BL leadership vs Q7.2



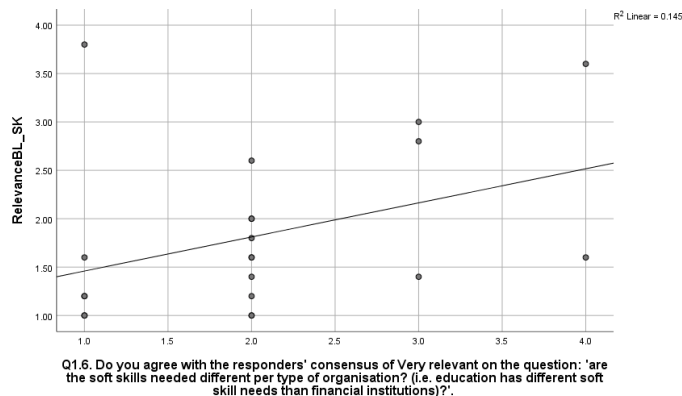
The 12th significant correlation is between the ranking of the soft skills, as stated in Round 1, and soft skills contributing to various leadership styles in different circumstances (Leadership CISO_SK). The score on Spearman's ρ ($r_s = 0.445$, $\rho = 0.043$) shows the relevance of the ranked soft skills (Q3.1. 'Do you agree with the ranking?') and the consolidated leadership question. This significant correlation confirms the previous scoring on the importance of soft skills during recruitment, and Figure 52 illustrates the positive significant correlation.

Figure 52 Scatterplot of BL Q3.1 vs LeadershipBL_SK



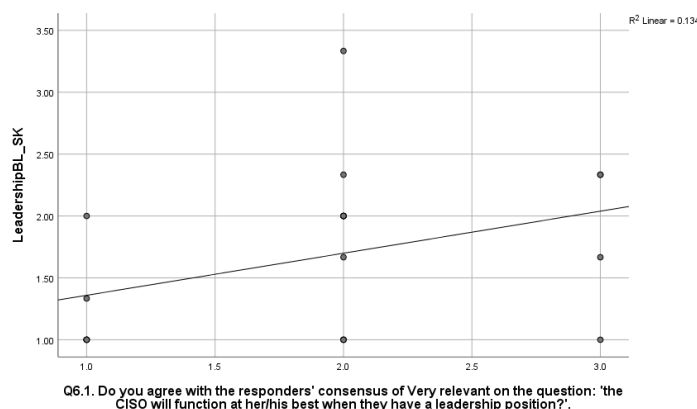
The second-to-last correlation is an insignificant positive correlation, as illustrated in Figure 53, between the relevance of soft skills and the need for different soft skills per organisation type ($r_s = 0.420$, $\rho = 0.058$ on Spearman's ρ). The correlation is not significant because of ρ being >0.050 .

Figure 53 Scatterplot of BL Q1.6 vs relevance



The final scatterplot of the selection 'not significant positive correlations' depicts the correlation between the consolidation of the leadership questions and Q6.1 (regarding whether a CISO will function at their best in a leadership position). Figure 54 shows the positive significant correlation ($r_s = 0.410$, $\rho = 0.068$ on Spearman's ρ). The correlation is not significant because of ρ being >0.050 . This emphasises the leadership position, the ability to demonstrate various leadership styles in various situations and the mastery soft skills needed per situation.

Figure 54 Scatterplot of Q6.1 vs LeadershipBL_SK



The findings of the business leader Delphi study concentrate on the agreement on the relevance of a CISO with soft skills, the relevance of a leadership position based on soft skills and that recruiting a candidate with the right set of soft skills is a priority.

6.8 Findings of Gap Analysis of Delphi Study – Business Leaders’ Perspective and Job Descriptions

Combining the outcome of the job descriptions and the outcome of the Delphi study analysis from business leaders’ perspective provides insight into how big the gap is between demand (role descriptions) and expectations (view of the business leaders response group) regarding CISOs’ soft skills in their roles. This section is owned by author R. Smit, as shown in the index: Contributions by authors (page 99).

As stated in section 6.7.2 concerning the findings of the Delphi study from the business leaders’ perspective, the soft skill ranking in Round 1 was confirmed in Round 2. The business leaders response group agrees on the soft skills identified by Robles (2012), but has a different view of the most important ranking based on the analysed CISO job ads between February and July 2019, published on major Dutch recruitment websites. Table 22 shows the variation in ranking.

Table 22 Soft skills confirmation – business leaders response group, job ads analysis and Robles (2012)

Ranking: Soft skills identified by Robles (2012)	Ranking: Soft skills found in analysed job ads	Ranking: Soft skills confirmation – business leaders response group
Integrity	Communication	Communication
Communication	Leadership	Leadership
Courtesy	Work ethic	Interpersonal skills
Responsibility	Interpersonal skills	Professionalism
Interpersonal skills	Professionalism	Integrity
<i>Positive attitude</i>	Teamwork skills	Responsibility
Professionalism	Integrity	<i>Positive attitude</i>
<i>Flexibility</i>	Responsibility	<i>Flexibility</i>
<i>Teamwork skills</i>	Flexibility	<i>Teamwork skills</i>
<i>Work ethic</i>	Positive attitude	Work ethic
	Courtesy	Courtesy
Legend: Ranking is in order of importance. Top row is most important; bottom row is least important. Note that the soft skill ‘leadership’ is not included Robles’ (2012) overview.		
Similar ranking BL & Job Ads <i>BL & Robles</i> Job Ads & Robles	One position difference BL & Job Ads <i>BL & Robles</i> Job Ads & Robles	Significant difference

As indicated in Table 22, the business leaders response group confirms the soft skills but has a different view than Robles (2012) regarding the ranking of their importance. The ranking, based on Round 1 of the surveys, is agreed, with 70% consensus. The combined consensus of strongly agree and agree is at 80% ($M = 2.15$, $SD = 0.76$, $N = 22$), as shown in the addendum Delphi Study round 2 business leaders analysis. The Round 2 question (Q3.1 ‘Do you agree with the ranking?’) had a score based on a 5-point scale, where 1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree and 5 = strongly disagree.

The upper rankings based on the job ads analysis and the upper rankings by the business leaders response group are aligned compared to those based on Robles’ (2012) research. The alignment with Robles is better in the lower section of the ranking. Furthermore, between the two rankings of the job ads and the business leaders response group, 3 of the 11 soft skills – including leadership, which is not included in the top ten by Robles’ (2012) list of soft skills – are ranked in the same position. Another 3 out of the 11 are ranked with a one-position difference, and the remaining four have a difference of more than one ranking position. Based on the job ads, there is an alignment with the business leader top-ranked softs skills:

- Communication

- Leadership.

The following alignment has a one-position difference:

- Interpersonal skills
- Professionalism
- Flexibility

There is a significant difference in the position of the soft skill work ethic between the job ads and the business leaders' rankings. In the former, work ethic is positioned third, whereas the latter positioned it second-last.

Furthermore, the lower rankings from the business leaders response group are different from the job ads rankings, but equal when compared to the soft skill rankings found by Robles (2012), excluding the last position of courtesy.

It is expected that the rankings of the soft skills found in the analysed job ads and those confirmed by the business leaders response group would be closely aligned, since the business leaders constitute the demand side in the recruitment of a CISO. The responses in Round 1 of the Delphi study of the business leaders response group revealed that the group is moderately involved in the recruitment process ($M = 3.38$, $SD = 1.72$, $N = 21$), scored on a 5-point scale, where 1 = extremely, 2 = very, 3 = moderately, 4 = slightly and 5 = not at all. Analysing the responses in detail, we found that 10 out of 21 responders are not involved in the recruitment of the CISO. Therefore, the difference in alignment between the soft skill rankings based on the job ads analysis and those by the business leaders response group can be explained as follows: 43% of the business leaders are involved and 48% are not involved in the CISO recruitment. Although the response group is divided on participating in the actual recruitment process, this does not mean that their opinion on soft skills and CISOs can be ignored; they are still demanding behavioural patterns from their CISOs.

The major difference in the positioning of the soft skill 'courtesy' against the ranking by Robles (2012) is repeated by the business leaders response group, just as the CISO response group positioned courtesy as the last relevant soft skill. From the analysis of the job ads, we learned that there is an absence on the soft skill 'courtesy' in the job ads, and this was confirmed by the business leaders response group.

As described in Section 6.7.3 Findings of Delphi study – business leaders' perspective; Round , there are no negative correlations that could explain a gap between the outcome of the job ads analysis and the business leaders' perspectives. The opposite is the reality: three significant correlations were found between Q7.2 ('is it relevant that the CISO job ad describes the soft skills needed?') and soft skills:

- RelevanceBL_SK (Q1.1–Q1.5)
- LeadershipBL_SK (Q6.2–Q6.4)
- Q7.1. Do you agree with the responders' consensus of very relevant on the question: 'do soft skills have priority in selecting the best fit CISO?'

These correlations confirm that the business leaders value a CISO equipped with the right set of soft skills for their organisation and having this set of soft skills benefits the leadership position of the CISO. The significant correlations close the gap between the soft skill rankings based on the analysis of the job ads and those by the business leaders. Even though a difference in ranking exists, the need for a CISO equipped with soft skills is evident.

6.9 Findings of Meta-Analysis

Combining the individual Delphi studies of the CISO and business leader response groups and the job ads analysis leads to the meta-analysis. This section combines the three analyses and is the effort of both authors, as shown in the index: Contributions by authors (page 99).

Combining the data sets from the two response groups regarding the soft skills' relevance and leadership position, the use of the independent samples t-test allows for a comparison of the outcomes of both response groups based on the following:

- The independently measured responses are based on an ordinal scale (each of the questions were scored on a 5-point scale, where 1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree and 5 = strongly disagree).
- Both response groups are independent.
- The responses in both response groups are less than 30, and based on Levene's test for equal variances, the equal variances are spread accordingly (Baarda & Dijkum, 2014, pp. 99-106).

The meta-analysis of the relevance of soft skills revealed consensus among both response groups. Table 23 displays the means of agreement on the consolidated soft skill relevance questions over both response groups (each of the questions was scored on a 5-point scale, where 1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree and 5 = strongly disagree).

Table 23 Group statistics – soft skills' relevance

Group statistics – soft skills' relevance				
CISO_BL	N	Mean	Std. Deviation	Std. Error Mean
CISO	23	1.5739	0.47979	0.10004
Business Leader	21	1.8286	0.85155	0.18582

Table 24 depicts a significance of less than 2.00, based on Levene's test for equality of variances. This concludes that both response groups have little variance in their answering on the soft skills' relevance.

Table 24 Independent samples test – soft skills' relevance

Independent samples test – soft skills' relevance									
Levene's Test for Equality of Variances			t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	4.379	0.042	-1.236	42	0.223	-0.25466	0.20601	-0.67041	0.16109

Using the outcome of the t-test, the difference in the response groups was calculated as follows:

$$d = \frac{2t}{\sqrt{df}} = \frac{2 \times 1.24}{\sqrt{42}} = 0.38$$

$$r = \frac{d}{\sqrt{d^2 + 4}} = \frac{0.38}{\sqrt{0.38^2 + 4}} = 0.19$$

The difference between the CISO response group and the business leader response group in percentage is:

$$\% = r^2 \times 100\% = 0.19^2 \times 100\% \approx 4\%$$

Four percent of the difference is based on the response samples of the CISO and business leaders. The conclusion is hence that the variation in soft skills' relevance between the CISO response group ($M = 1.5739$, $SD = 0.47979$) and the business leader response group ($M = 1.8286$, $SD = 0.85155$) is not significant ($t(42) = -1.236$, $p = 0.223$) because $p > 0.050$. This demonstrates that both response groups are aligned in their responses.

Performing a similar analysis of the relevance of leadership revealed an even lower difference and thereby a high consensus among both response groups, compared to the soft skills' relevance. Table 25 lists the means of agreement on the consolidated leadership questions (each of the questions was scored on a 5-point scale, where 1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree and 5 = strongly disagree).

Table 25 Group statistics – leadership relevance

Group statistics – leadership relevance				
CISO_BL	N	Mean	Std. Deviation	Std. Error Mean
CISO	23	1.7681	0.51674	0.10775
Business Leader	21	1.6667	0.64979	0.14179

Table 26 shows a less than 2.00 significance, based on Levene's test for equality of variances. This indicates that both response groups have little variance in their answering and therefore agree on the relevance of leadership.

Table 26 Independent samples test – leadership relevance

Independent samples test – leadership relevance									
Levene's Test for Equality of Variances			t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	1.504	0.227	0.576	42	0.568	0.10145	0.17623	-0.25420	0.45710

Using the outcome of the t-test, the difference in the response groups was calculated as follows:

$$d = \frac{2t}{\sqrt{df}} = \frac{2 \times 0.58}{\sqrt{42}} = 0.18$$

$$r = \frac{d}{\sqrt{d^2 + 4}} = \frac{0.18}{\sqrt{0.18^2 + 4}} = 0.09$$

The percentage difference between the CISO response group and the business leader response group is

$$\% = r^2 \times 100\% = 0.09^2 \times 100\% \approx 1\%$$

One percent of the difference is based on the response samples of the CISO and business leaders. The conclusion is thus that variation in soft skills' relevance between the CISO response group ($M = 1.77$, $SD = 0.52$) and the business leader response group ($M = 1.67$, $SD = 0.65$) is not significant ($t(42) = -0.58$, $p = 0.568$) because $p > 0.05$. These findings suggest that both the CISO response group and the business leader response group agree that a CISO equipped with soft skills has the best leadership position.

With consensus on the relevance of soft skills in general and the relevance of soft skills for a CISO leadership position, the meta-analysis shows the combined overview of soft skills. Table 27 presents the combined overview of the soft skills listed in the job ads findings (Table 8 – page 41), the CISO findings (Table 10 – page 48) and the business leaders findings (Table 17 – page 61) against the soft skills identified by Robles (2012). It demonstrates that the CISO and business leaders have a similar view of the priority of soft skills: communication

and leadership. The middle rankings then vary, but both groups agree on the low relevance of courtesy, which they ranked as the least relevant soft skill, similarly to the job ad ranking.

Table 27 Soft skills confirmation – both response groups, job ads analysis and Robles (2012)

Ranking: Soft skills identified by Robles (2012)	Ranking: Soft skills found in analysed Job ads	Ranking: Soft skills confirmation – CISO response group	Ranking: Soft skills confirmation – business leaders response group
Integrity	Communication	Communication	Communication
Communication	Leadership	Leadership	Leadership
Courtesy	Work ethic	Integrity	Interpersonal skills
Responsibility	Interpersonal skills	Interpersonal skills	Professionalism
Interpersonal skills	Professionalism	Professionalism	Integrity
<i>Positive attitude</i>	Teamwork skills	Work ethic	Responsibility
Professionalism	Integrity	Responsibility	<i>Positive attitude</i>
<i>Flexibility</i>	Teamwork skills	Teamwork skills	<i>Flexibility</i>
<i>Teamwork skills</i>	Flexibility	Positive attitude	<i>Teamwork skills</i>
<i>Work ethic</i>	Positive attitude	Flexibility	Work ethic
	Courtesy	Courtesy	Courtesy
Legend: Ranking is in order of importance. Top row is most important; bottom row is least important. Note that the soft skill 'leadership' is not included in Robles' (2012) overview.			
Similar ranking CISO & Job Ads BL & Job Ads CISO & Robles BL & Robles Job Ads & Robles	One-position difference CISO & Job Ads BL & Job Ads CISO & Robles BL & Robles Job Ads & Robles	Significant difference CISO & Job Ads BL & Job Ads CISO & Robles BL & Robles Job Ads & Robles	Adjusted valuation of individual soft skills 'work ethic' and 'integrity'.

A conspicuous deviation was observed in the difference in the soft skill 'work ethic'. Based on the job ad rankings, this particular soft skill took the third position, the expectation being that the business leaders (the demand side of recruitment) would be in line with the job ad descriptions by stating the demand from the organisation. Table 27 indicates that the business leaders ranked work ethic in the second-lowest position, which can be explained by the decomposition of the soft skills 'work ethic' and 'integrity'. In this research, the soft skills found by Robles (2012) were adopted. The attributes of work ethic, as listed in Table 2 (Soft skill attributes – page 15), include the following: hard-working, willing to work, loyal, initiative self-motivated, on time, and good attendance. Moreover, the attributes of integrity are as follows: honest, ethical, high morals, has personal values, and does what is right. These attributes of both soft skills are closely aligned, and in the Delphi study questionnaires, the attributes were deliberately not presented to responders to prevent the bias on the question of additional soft skills.

When looking beyond the academic literature, much content is available on recruitment websites – such as indeed.nl, which was one of the websites used to capture the job ads over 5 months (see Section 5.7 Research Target Audience and Content) – that highlights the combination of work ethic and integrity. Some websites show that integrity is a subset of work ethic, and vice versa (Indeed.com, 2020).

Work ethic and integrity could be viewed as similar or even synonymous soft skills; however, this is different for the other soft skills. Analysing Table 27, with a view of the interchangeable items of work ethic and integrity, we learned that there is one position between CISOs' ranking of work ethic and business leaders' ranking of integrity, and two positions between the job ads analysis rankings (work ethic and integrity) and the business leaders' ranking of integrity (average position compared to the job ads ranking). In the questionnaires sent to the CISO and business leaders response groups, the omitted attributes of the soft skill rankings adopted from Robles (2012) can add to the discussion that the individuals framed the listed soft skills.

Combining the ranking of the soft skills from both response groups with the job ads analysis results in a combined overview of the following: the soft skills listed in the job ads findings (Table 8 – page 41), the CISO findings section (Table 10 – page 48) and the soft skills listed in the business leaders findings (Table 17 – page 61). The combined rankings are listed in Table 28. The valuation is based on the mean of the ranking (Position 1 = 11 points > position 11 – 1 point), and the three individual rankings are valued equally, and rankings are unweighted. The top two soft skills are communication and leadership, which were constantly the top two in the individual analysis. Similarly, courtesy was consistently ranked in last place. Furthermore, the soft skills ‘integrity’ and ‘work ethic’ are listed consecutively. This is in line with the assumed overlap in the attributes of the soft skill and therefore the skills’ close alignment with each other.

Table 28 Overview of combined soft skill rankings

Ranking: Soft skills	
Communication	
Leadership	
Interpersonal skills	
Professionalism	
Integrity	
Work ethic	
Responsibility	
Teamwork skills	
Positive attitude	
Flexibility	
Courtesy	
Legend: Ranking is in order of importance. Top row is most important; bottom row is least important. Note that the soft skill ‘leadership’ is not included in Robles’ (2012) overview.	

The soft skills in Table 28 show a different ranking than those ranked by Robles (2012). The Dutch CISOs and business leaders thus clearly have a different view on the valuation of the soft skills. The explanation for the difference is that Robles is a US-based researcher, and the research was conducted in the US, where 45 students in a junior-level business communication class interviewed executives to list the 10 most important soft skills they wanted new employees to possess when hired for a position within their organisation (Robles, 2012, p. 454). In short: Robles work covered a U.S. population; however, Robles’ findings might not be generalizable to a Dutch context, since the U.S. and Dutch contexts might be different. The research on the locality of the CISO population and the effect on the soft skills is marked as future work.

The analysis of the soft skill rankings revealed consensus among both response groups based on Round 2 of the Delphi survey. The individual input from Round 1 in the Delphi study was analysed using the independent samples t-test. This allowed us to determine whether a significant difference existed between the means of the two response groups on the soft skill rankings (Baarda & Dijkum, 2014, p. 99). The rankings from Round 1 of the original Delphi study were based on an ordinal positioning from most important to least important. The first output from the t-test, using SPSS, was a collection of the group statistics. Round 1 of the Delphi study on the ranking of soft skills had 24 CISO responders ($N = 24$) and 20 business leaders ($N = 20$). The outcome of the group statistics, as presented in Table 29, shows the mean, standard deviation and standard error on the mean of the individually ranked soft skills per response group.

Table 29 Group statistics – soft skills

Group statistics – soft skills				
CISO N24				
Business Leader (BL) N20	Mean	Std. Deviation	Std. Error	
CISO_BL			Mean	
Communication	CISO	2.92	2.501	0.510

Group statistics – soft skills				
CISO N24 Business Leader (BL) N20 CISO_BL		Mean	Std. Deviation	Std. Error Mean
	BL	3.30	2.812	0.629
Leadership	CISO	7.63	3.132	0.639
	BL	4.30	3.310	0.740
Interpersonal skills	CISO	5.46	2.206	0.450
	BL	5.05	3.677	0.822
Professionalism	CISO	7.21	2.949	0.602
	BL	5.20	3.736	0.835
Integrity	CISO	5.04	2.851	0.582
	BL	5.40	3.119	0.697
Work ethic	CISO	10.54	2.536	0.518
	BL	8.80	4.021	0.899
Responsibility	CISO	8.21	2.587	0.528
	BL	5.85	2.601	0.582
Teamwork skills	CISO	8.33	3.595	0.734
	BL	8.75	2.613	0.584
Positive attitude	CISO	4.83	3.397	0.693
	BL	7.35	3.014	0.674
Flexibility	CISO	6.25	3.068	0.626
	BL	8.10	2.125	0.475
Courtesy	CISO	3.79	2.686	0.548
	BL	9.45	2.929	0.655

The second output from the t-test, using SPSS, was the independent samples test of soft skill rankings. Levene's test scores for equality of variances are listed in the left-hand columns of Table 30. Only the line of assumed equal variances was used in Table 30, based on the explanation of (Baarda & Dijkum, 2014, pp. 98-102). Moreover, the significant differences in the rankings of the soft skills between the two response groups are marked, where the significance (2-tailed) is less than or equal to 0.05. and the t-value is smaller than -2 or greater than 2. The t-test exercise was performed to drill down on the data behind the rankings, as shown in Table 29.

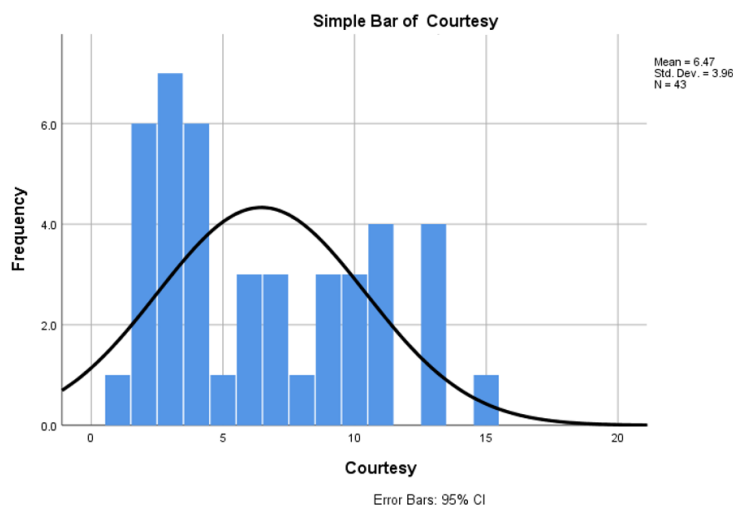
Table 30 Independent samples test – soft skill rankings

Independent samples test – soft skill rankings									
Levene's Test for Equality of Variances			t-test for Equality of Means						
Equal variances assumed > V Soft skills					Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
	F	Sig.	T	Df				Lower	Upper
Communication	0.093	0.762	-0.479	42	0.635	-0.383	0.801	-2.000	1.233
Leadership	0.103	0.749	3.417	42	0.001	3.325	0.973	1.361	5.289
Interpersonal skills	5.881	0.020	0.455	42	0.651	0.408	0.897	-1.403	2.219
Professionalism	1.966	0.168	1.993	42	0.053	2.008	1.008	-0.025	4.042
Integrity	1.788	0.188	-0.398	42	0.693	-0.358	0.901	-2.176	1.459
Work ethic	8.875	0.005	1.747	42	0.088	1.742	0.997	-0.270	3.753
Responsibility	0.314	0.578	3.003	42	0.004	2.358	0.785	0.774	3.943
Teamwork skills	1.674	0.203	-0.432	42	0.668	-0.417	0.965	-2.365	1.532
Positive attitude	1.645	0.207	-2.574	42	0.014	-2.517	0.978	-4.490	-0.544

Independent samples test – soft skill rankings									
Flexibility	3.073	0.087	-2.278	42	0.028	-1.850	0.812	-3.489	-0.211
Courtesy	1.443	0.236	-6.678	42	0.000	-5.658	0.847	-7.368	-3.948
Legend:	Marked for further analyses when:	t-value is <-2.000 / >2.000	significance is <0.05						

Furthermore, Table 30 lists the mean of agreement on the soft skill ‘courtesy’. All other soft skills vary in position between the two response groups. In the previous section, the soft skill rankings showed courtesy in the last position. This is confirmed by the ranking based on the job ads: none of the job ads had a demand for the soft skill ‘courtesy’. Table 30 also shows that courtesy has the highest significant difference between the two response groups. Figure 55 is the outcome of the data check regarding courtesy, which, when plotted, results in a normally distributed, bell-shaped distribution curve. The response on the soft skill ranking of courtesy is distributed across the ranking positions.

Figure 55 Normal distribution check – soft skill ‘courtesy’



Using the outcome of the t-test, the difference in the response groups was calculated as follows:

$$d = \frac{2t}{\sqrt{df}} = \frac{2 \times -6.68}{\sqrt{42}} = -2.06$$

$$r = \frac{d}{\sqrt{d^2 + 4}} = \frac{-2.06}{\sqrt{-2.06^2 + 4}} = 0.72$$

The difference in the ranking of courtesy between the CISO response group ($M = 3.87$, $SD = 2.72$) and the business leader response group ($M = 9.45$, $SD = 2.93$) is significant ($t(41) = -6.48$, $p < 0.001$).

The difference in the ranking of courtesy is as follows:

$$\% = r^2 \times 100\% = 0.72^2 \times 100\% \approx 52\%$$

Fifty-two percent of the difference is based on the response samples of the CISO and business leaders and can be explained by the difference between the two groups' views on this particular soft skill.

Given the ranking of the soft skills, the analysis of the data sets clearly indicates that CISOs and business leaders have different target audiences (business leaders and users, respectively), and each group believes that their audience demands a better demonstration of soft skills from CISOs. The CISO views the group of business leaders as the group that demands a better demonstration of soft skills (74%, $N = 23$), while the business leaders response group (67%, $N = 21$) indicated that the users in the organisation require a better demonstration of soft

skills by the CISO. Note that in Round 1 of the surveys, the answering prompt was ‘select all that apply’, and the business leaders response group selected business leaders as the second group to demonstrate the soft skills (52%, $N = 21$). See addendum Delphi Study round 1 CISO analysis and addendum Delphi Study round 1 business leaders analysis for the responses. This outcome emphasises that the CISO is responsible for aligning the entire organisation to comply with new or existing security policies, based on the conclusion of the ASRC Federal (Death, 2019, p. 13) research. With the changing role of the CISO, when alignment with business leaders is required, managing stakeholders throughout the organisation becomes a must.

6.10 Discussion

Combining the literature study, the outcome of the job ads analysis and the findings from the Delphi studies affords us the ability to address the research question and sub-questions. This section follows the structure of the sub-research questions, as listed in Table 1 Sub-research questions (page 10).

6.10.1 What soft skills are relevant for leadership positions?

Contributions to this discussion section were made by both authors, as shown in the index: Contributions by authors (page 99). The soft skills according to Marcel Robles (2012) are relevant for business leaders and hence for a leadership position. Robles found the 10 most relevant soft skills that are critical for business leaders – Table 2 (Soft skill attributes - page 15) lists these soft skills, along with their attributes. Due to the leadership position of the CISO, the research questions in the Delphi study surveys were expanded to include the soft skill ‘leadership’ on the list identified by Robles (2012).

The literature review showed the broad academic view on soft skills. Matteson et al. (2016) states that soft skills are often a catch-all category for non-technical skills, where technical skills are the skills required to perform a job, and soft skills are for interpersonal relations. Furthermore, interactions with people (parents, school, sports and other activities) fuel the learning process to develop soft skills, and defining soft skills is complicated and influenced by multiple factors (Chimatti, 2016).

The adoption of Robles’ (2012) list of soft skills was based on the focus of that author’s research. The soft skills identified therein are useful for this study because the research determines the critical soft skills that employers expect from their employees. Moreover, the skills are relevant to business educators to align their curriculum to improve the employability of graduating business seniors.

Other researchers, such as Anne Mar (2016) and Aima Zhang (2012), also present soft skills close to our research topic; however, we chose not to adopt them. While Anne Mar’s (2016) soft skills have an extensive list of attributes, see addendum Soft skills per Anne Mar, they lack academic support. In addition, integrity emerged as a soft skill in the job ads analysis; however, it is missing in both Anne Mar and Aima Zhang’s (2012) overviews of the relevant soft skills. The nine soft skills presented by Aima Zhang (2012) are of importance for IT professionals in the eyes of IT Managers, but our research question focuses on CISOs, who are not IT professionals. This led to a) the adoption of the soft skills identified by Robles (2012) as the best-fitting soft skills for a leadership position and b) the addition of leadership to the list.

Those two decisions were confirmed by the CISO and business leader response groups. In the dual Delphi survey, soft skills were added by the expert groups, if they found any skills missing. Both groups added further soft skills, and after analysing them, they were all found to be attributes of the soft skills listed by Robles (2012).

Table 12 Additional soft skill attributes – CISO response group (page 49) and Table 19 Additional soft skill attributes – business leaders response group (page 62) display the additional soft skills as attributes of the adopted list.

6.10.2 What soft skills are relevant for a CISO?

Author J.M.J. van Yperen Hagedoorn contributed to this discussion section, as shown in the index: Contributions by authors (page 99). The CISO response groups had consensus on the ranking of the soft skills, as listed in Table 10 (page 48). However, it is different from the ranking based on Robles (2012). This can be explained by the focus of the research: Robles's research was conducted in the US, and the Dutch CISOs had a different view on the ranking.

The CISOs' positioning of the soft skills is more in line with the outcome of the job ads analysis (as shown in Table 8 – page 41) than with the soft skills presented by Robles (2012). The ranking confirms the outcome of the research by Chimatti (2016) that the context of soft skills is essential. Locality is a context that influenced the ranking by the Dutch CISOs and was confirmed by the analysis of the job ads.

With a background in technical professions – see Figure 18 (page 45) – the anticipated lower familiarity on the topic of soft skills did not emerge from the CISO response group's answers. This group is familiar with the topic, which was unexpected based on the academic research such as (Yang & Wen, 2017, p. 5), who analysed 27 cybersecurity programmes (out of the 278 information systems and information technology programmes offered by undergraduate business schools) and found that none of the 27 courses is explicitly related to soft skills. Moreover, Laverseur (2013) addressed the question, 'Why do so many technical people lack soft skills' and found that the development of soft skills is related to Maslow's hierarchy of needs and that the development of hard skills is valued over the development of soft skills. Laverseur's observation is also that hard skills are learned through education and learning, whereas soft skills are developed through self-actuation.

As stated in Chapter 2 Problem Statement, the topic of CISOs and soft skills is an area with scarce academic research. However, much content is available without an academic base, such as the Deloitte article on the CISO next-generation strategic security organisation (Aguas, Kark, & Francois, 2016) or CISOs' must-have skills (Death, 2019). This content could explain why the topic of soft skills is known among the CISO expert group.

Future research could encompass the wider European CISO population to investigate the difference in the local rankings of soft skills and how CISOs can develop soft skills that are in demand by organisations.

6.10.3 Which soft skills are expected by business leaders for the role of the CISO?

Contributions to this discussion section were made by author R. Smit, as shown in the index: Contributions by authors (page 99). The business leaders response group reached consensus on the ranking of the soft skills, as listed in Table 17 (page 61). As with the CISO response group, the business leader response group's rankings were different from the ranking based on Robles (2012). Although not all the responders in the business leaders response group are actively involved in CISO recruitment, they are able to articulate the demand for the soft skills needed in their organisation.

Again, the rankings of the soft skills are more in line with the outcome of the job ads analysis (as shown in Table 8 – page 41) than with the ranked soft skills presented by Robles (2012). As stated in the CISO soft skills

discussion, both of the analyses confirm the outcome of the research by Chimatti (2016): the context of soft skills is essential. The locality (country or culture) is a context that influences the ranking by the business leaders and was confirmed by the analysis of the job ads.

It would be expected that the job ads analysis is a true representation of the business leaders' demand for soft skills. A significant difference was observed in the ranking between the job ads and the business leaders on two soft skills: work ethic and integrity, as shown in Table 22 (page 71). On the one hand, Robles' (2012) attributes of the soft skill 'work ethic', as listed in Table 2 (page 15), include hard working, willing to work, loyal, initiative self-motivated, on time, and good attendance. On the other hand, the attributes of the soft skill 'integrity' are as follows: honest, ethical, high morals, has personal values, and does what is right. The attributes of both soft skills are highly aligned. In the Delphi study questionnaires or the expert groups, the attributes were not presented to the responders to prevent bias on the question of additional soft skills. The response groups thus answered the questions without the academic literature shared. Beyond the academic literature, much content is available on recruitment websites that demonstrates the combination of work ethic and integrity, where one is shown as a subset of the other (Indeed.com, 2020).

From the response group, work ethic and integrity could be viewed as similar soft skills, or they could even be used interchangeably. Based on Table 27 (page 75), which displays the interchangeable items of work ethic and integrity, there is one position between CISOs' ranking of work ethic and business leaders' ranking of integrity, and two positions between the job ads analysis (work ethic and integrity) and the business leaders' ranking of integrity (average position compared to the job ads ranking). The gap becomes even less when the rankings from the job ads and from both response groups are combined, as shown in Table 28 (page 76). The soft skills 'integrity' and 'work ethic' are in the fifth and sixth position, respectively.

6.10.4 How do business leaders value the soft skills of a CISO?

This section is by author R. Smit, as shown in the index: Contributions by authors (page 99). Although soft skills vary per type of organisation, the business leaders response group value CISO soft skills highly when recruiting someone for the role.

Figure 43 Scatterplot of BL relevance vs Q7.1 (page 66) demonstrates a significant positive relationship ($r_s = 0.561, p = 0.008$) between the relevance of the soft skills and the priority in selecting a CISO with those skills. The soft skills valuation by this response group, which constitutes the demand side of recruitment, is in line with the literature review. Although academic literature on CISOs, soft skills and their demand from business leaders is scarce, there is literature that mirrors one of the responders statements:

Hooper and McKissack (2016) analysed over 100 CISO job ads, which they collected from the most popular job websites in three countries (the US, Canada and New Zealand). The outcome of their research is a clear indication that business leaders need CISOs who are skilled in more than just the technical area.

In our research, the business leaders response group values selecting a CISO with soft skills, believing that it is better to hire a candidate with soft skills instead of one with the best-fitting hard skills. Figure 47 Scatterplot of BL Q8.1 vs Q7.1 (page 67) illustrates the positive correlation ($r_s = 0.511, p = 0.018$) between the priority in selecting a CISO with soft skills and hiring a candidate with soft skills.

The priority in selecting the CISO with the best-fitting soft skills is reflected by Dor and Elovici (2016). They demonstrated a model of information security investment decision-making that helps decision-makers (business leaders) to decide on information security investments. Their method of interviewing 23 information security experts and decision-makers from nine firms delivered a solid understanding of the relevant topics of influence on the decision-making. The model covers specific activities to overcome some of the gaps in an organisation's current decision-making process. What stands out in the presented checklist is that none of the activities relates to the field of soft skills – 13 of the 14 recommended activities are financial or task-based activities, and only one stands out: retain consultants who are familiar to the board and trusted by its members. Trust is difficult to capture in numbers and relates to soft skills and the ability to build trust. One of the conclusions of the researchers is the observation that information security investment decision-making is a process that consists of a complex socio-technical balance (Dor & Elovici, 2016).

Given that complex socio-technical balance, the Dutch business leaders would prefer a CISO with well-developed soft skills pertaining to the social component. The demand is not aligned with the majority of education for a CISO because it focusses mostly on hard skills. This is confirmed by Yang and Wen's (2017) research into common cybersecurity curricula at numerous undergraduate business schools and the job descriptions in the various frameworks. The job profiles by the Dutch PvIB (Platform van Informatie Beveiliging, 2019) showed the role or job description of the CISO, part of which was education and experience:

- *A master's degree or equivalent level of knowledge and skills*
- *Five years of experience in an information security profession*
- *Five years of management experience*

6.10.5 What is a CISO leadership position?

This section is by author J.M.J. van Yperen Hagedoorn, as shown in the index: Contributions by authors (page 99). A CISO will function at their best when they are in a leadership position. In more detail: the leadership position for the CISO is one based on the combination of transactional and transformational leadership. This combined leadership style is the most relevant leadership style that a CISO must have. This is the consensus in both response groups (BL consensus 86% and CISO consensus 78%). However, it is not limited to the leadership style. the CISO should be able to demonstrate specific leadership styles in various situations. Figure 23 (page 50) ($M = 1.77$, $SD = 0.52$) and Figure 38 (page 60) ($M = 1.67$, $SD = 0.65$) show the high degree of consensus on the combined data on the leadership questions.

The outcome of the two response groups is confirmed by Guhr et al. (2019) research, which states that the transformational leadership style has a positive effect on an employee's intended behaviour regarding information security compliance. This is because passive/avoidant leadership had neither a positive nor negative effect on the employees' intended information security behaviour, and the transactional leadership style did not have a positive effect on employees' intended behaviour. Furthermore, Guhr et al. (2019) suggest that a leader can demonstrate transformational leadership qualities to enhance employees' willingness to adopt ISPs and that the same leader can take corrective actions of a transactional leader (such as reporting/punishing) if an employee violates those policies.

As stated in the Findings from Literature – Relevant Leadership Position Soft Skills (page 34), the outcome of Guhr et al.'s (2019) study is different than other studies, where punishment for information security violations resulted in a higher security awareness and, as a result, better compliant behaviour among employees.

Both response groups have a clear view on the management position and style: a combination of transactional and transformational leadership and the ability to use the appropriate leadership style when the situation calls for it.

In Round 1 of the survey, one responder remarked that servant leadership would be of value for CISOs. This type of leadership style was mentioned in the problem statement via an internet article by Eggleston (2018) as a new form of leadership and becoming mentally strong leaders. It is also not in the researched literature in relation to the CISO position. Therefore, this new type of leadership style was not included as an answer option. However, this does not mean that servant leadership, in relation to the CISO position and effectiveness, is not a valid leadership style. The CISO and servant leadership is added to future work.

6.10.6 How does a CISO use soft skills to influence business leaders / users / the IT department?

A CISO uses soft skills to influence. From the CISO response group, we learned that business leaders demand a better demonstration of soft skills from CISOs when dealing with them, as researched by author J.M.J. van Yperen Hagedoorn and shown in the index: Contributions by authors (page 99). This demand for a better demonstration of soft skills was confirmed by the CISO response group (74%, $N = 23$). Figure 22 CISO agreement – demonstration of soft skills (page 48) shows a high degree of consensus in this regard.

The outcome is in line with the research based on Steinbart et al. (2018), who studied the relationship between internal audits and information security functions. We learned that an optimal relationship has two antecedents:

- senior management must be committed to information security
- the reporting structure of the CISO must be independent of the information security function.

The focus on the business leaders is confirmed by Weishäupl et al. In their study of information security investments, 9 out of 12 of the interviewees were non-security-related business professionals, ranging from CEOs and sales and marketing directors to heads of data centres, and the finding was that decision-making regarding investments is mostly done by the business leaders in an organisation (Weishäupl, Yasasin, & Schryen, 2018). This could explain the view of the CISO response group to focus on business leaders as the main group who needs a better demonstration of soft skills to influence this decision-making process.

It is surprising that the CISOs from the response group did not state that users in the organisation require the better demonstration of soft skills. As demonstrated in the literature review, academic literature suggests that users are a significant element in the adoption of security policies and constitute an important audience for the CISO, and that transformational leadership qualities enhance employees' willingness to adopt ISPs (Guhr, Lebek, & Breitner, 2019). This leads to the future work of more detailed research on how to use soft skills to influence the various audiences and maximise the effect for CISOs.

6.10.7 How do business leaders value the CISO soft skills for dealing with business leaders / users / the IT department?

The business leaders response group value a CISO's use of soft skills that are relevant for the users in the organisation before the business leaders, with a 76% confirmation. This confirmation was researched by author R. Smit, as shown in the index: Contributions by authors (page 99).

The answer option for the question in Round 1 of the Delphi study was ‘select all that apply’. For details see the addendum Delphi Study round 1 CISO analysis and Delphi Study round 1 business leaders analysis. Different from the CISO response group, the business leaders had a smaller gap between the first and the second audience. In the business leader response group, 14 responders selected the users in the organisation and 11 selected business leaders as the group with the highest demand for the CISO to demonstrate soft skills.

This is in line with the literature from Cano et al. (2013) on soft skills for a CIO. Their conclusion was that soft skills are a limited part of current training programmes but essential in the role as a CIO, and unlike the average IT employee, a CIO speaks with multiple ‘types’ of employees in an organisation; therefore, an optimal set of soft skills is necessary. In some cases, non-technical skills are the critical factors to success (Cano, Fernández-Sanz, & Misra, 2013).

Furthermore, Saiewitza and Kida demonstrated that the tone of voice and the type of communication will affect the willingness of employees to accept change (Saiewitza & Kida, 2017). This conclusion demonstrates that interpersonal skills, as stated in the adopted definition by Robles (2012), are of value for a CISO. Auffret’s (2017) article on cybersecurity leadership further demonstrates that employees need sound leadership support to be aware of cyber risks, and via the research of Tsohou and Holtkamp, we know that general users are willing to comply with ISPs but lack understanding (Tsohou & Holtkamp, 2018).

It is an interesting discussion that the CISO response group stated that business leaders demand a better demonstration of soft skills from the CISO, whereas business leaders find that the users in an organisation demand better demonstration of those skills. Especially when the second group is added to the overview, there is a significant gap in the CISOs’ second audience, namely, the users in an organisation. In contrast, the business leaders response group has a small gap in the second audience: the business leaders themselves.

Both response groups cited the IT department as the third audience demanding a demonstration of soft skills. This could be associated with the audience and is understandable when related to the research by Lavasseur (2013) regarding why many technical people lack soft skills. Based on his research, the development of soft skills is linked to Maslow’s hierarchy of needs, where the development of hard skills is primary, and the development of soft skills is secondary. His observation was that hard skills are learned through education and learning, while the development of soft skills is the result of self-actualisation. It can be stated that the response groups see or experience the IT department as a department of technical people.

6.10.8 Does a CISO experience a better leadership position with a certain set of soft skills?

A CISO experiences a better leadership position with a certain set of soft skills. This was confirmed by the CISO response group and researched by author J.M.J. van Yperen Hagedoorn, as shown in the index: Contributions by authors (page 99).

The CISO response group agreed on the statement that a CISO has a better leadership position with soft skills. However, we did not research which situation demands what combination of soft skills to claim the sets of soft skills needed per situation; these possibilities are endless. This particular response group nevertheless found it highly relevant that a CISO should be able to demonstrate specific soft skills in various situations – Figure 23 Frequency table – CISO leadership questions (page 50) shows the agreement on the topic. This means that the CISO should be able to master soft skills and be able to make use of the various skills when interacting with

others in various situations, and the literature review presented evidence of the outcome. The research by Van Laar et al. (2017) teaches a conceptual framework of 21st-century skills (learning skills, digital skills and life skills). Their research suggests that the skills of employees, including the CISO, go beyond their professional knowledge (Van Laar, van Deursen, van Dijk, & de Haan, 2017). Learning solely hard skills or gaining only professional knowledge is not enough for the ideal profile of the modern employee. The addition of soft skills to the skill set is emphasised by Cano et al. (2013). Their conclusion is that one's career journey, the development of soft skills should occur in parallel to the development of the necessary hard skills. Moreover, the development of professional IT skills is needed, and development of personal skills will be even more significant (Cano, Fernández-Sanz, & Misra, 2013).

The complexity is in determining how to develop soft skills. The researched frameworks for skills development, from the literature review, offer little guidance for developing soft skills. The aim of the OECD, which has developed the EQF, is hence to consolidate EU countries frameworks into a single framework. This is because working from a single framework makes the CVs of European candidates transparent, although even in a single European framework for skills, the term soft skills is still misleading.

A different source for the development of soft skills is the European e-Competence Framework – a common European Framework for ICT professionals in all sectors of industry. In version 3.0 of this framework, published in 2014, the term 'soft skills' does not even appear in the document; only the term 'communication' is mentioned as a skill, but it is not explored on a deeper level.

Furthermore, the PvIB (Association for information security in the Netherlands) Beroepsprofielen Informatiebeveiliging 2.0 (Job Profiles Information Security version 2.0) contains a reasonable amount of non-hard-skill-related competencies. All of the soft-skill-related topics, such as leadership, communication and persuasiveness, are – similar to the European e-Competence Framework – grouped under the topic of generic competencies (Platform van Informatie Beveiliging, 2019).

These career development frameworks do not facilitate an answer to the question of which soft skills are most relevant in a leadership position. This is similar for frameworks that support implementing an ISMS. Although the researched frameworks (CIS, COBIT 5, ISA 62443-2-1:2009, ISO/IEC 27002 and NIST) offer insight into which skills are required for various security management processes, security architectures and reporting activities, the required skills in those frameworks focus on hard skills. They only hint at soft skills when distilling topics such as the topic of awareness in the NIST Cybersecurity framework.

6.10.9 Do business leaders experience a better leadership position of the CISO with a certain set of soft skills?

Business leaders experience a better leadership position of the CISO with a certain set of soft skills. This was confirmed by the business leader response group, and this outcome was researched by author R. Smit, as shown in the index: Contributions by authors (page 99).

As with the CISO response group, the business leaders response group agreed on the statement that a CISO has a better leadership position with soft skills ($M = 1.90$, $SD = 0.7$). Figure 40 Frequency table of CISO leadership questions – business leaders response group (page 63) shows the agreement on the topic.

From the point of view of the business leaders, a CISO should be able to master soft skills and be able to use them when interacting with others in various situations. In addition, the article by Auffret et al. (2017) on cybersecurity leadership confirms the Dutch business leaders' view that a CISO should demonstrate leadership support to employees to make them aware of cyber risks.

Furthermore, team work skills and work ethic are clearly soft skills, as listed by Robles (2012) in Table 2 (page 15). Tailoring the skills – not only in relation to leadership styles but also for communication and influence to achieve information security goals (Tejay & Winkfield, 2015, p. 7) – is emphasised by Tejay and Winkfield (2015). They researched how a CISO can become an effective leader by examining the path-goal leadership approach and applying it as a theoretical lens on information security leadership. Albeit with only one suggestion in their research, it correlates with the outcome of consensus among the business leaders response group. This literature outcome was confirmed by the business leaders response group ($M = 1.71$, $SD = 0.902$) when the data on Q1.3 was analysed. The business leaders confirmed that they see the benefit of a CISO using different soft skills to influence different audiences.

6.10.10 How do the soft skills described in the job description relate to the required everyday soft skills?

Both authors – as shown in the index: Contributions by authors (page 99) – can state that the job descriptions of the CISO response group do not reflect the soft skills required in daily work.

Although most of the CISO job descriptions, from the response group ($N = 24$), included descriptions of soft skills, Figure 14 CISO role description (page 44) illustrates that only 20.8% ($n = 5$) of those descriptions were clear. In contrast, 45% ($n = 11$) of the response group had soft skills in their role description that were unclear. The remaining one-third of the response group had no soft skills in their role description. This is an interesting outcome, especially considering that soft skills vary per organisation, and therefore the emphasis on soft skills differ per organisation type. This was confirmed by the CISO response group in Figure 21 Frequency table of soft skill relevance questions (Q4.5 on page 47) and by the business leaders response group in Figure 38 Frequency table of soft skill relevance questions – business leaders response group (Q1.6 on page 60), both of which demonstrate that soft skills vary per type of organisation.

This is also emphasised by the fact that there is a strong positive correlation between the relevance of soft skills and the relevance, according to business leaders, of prioritising the selection of the best-fitting CISO with soft skills. Figure 43 Scatterplot of BL relevance vs Q7.1 (page 66) demonstrates this significant positive relationship. Moreover, the questions of 'do soft skills have priority in selecting the best fit CISO?' and 'is it relevant that the CISO job ad describes the soft skills needed?' have a significant positive correlation, As illustrated in Figure 44 Scatterplot of BLQ71 vs Q7.2 (page 66).

The CISO response group have a moderately significant negative correlation on the question 'is it relevant that the CISO job ad describes the soft skills needed?' and the type of leadership style. Figure 28 Scatterplot of Q9.1 vs Q11.2 (page 54) shows the non-significant negative score on Spearman's ρ ($r_s = -0.318$, $p = 0.139$) for Q9.1 (regarding whether the combination of transactional and transformational leadership is the most relevant leadership style that a CISO must have) and Q11.2 ('is it relevant that the CISO job ad describes the soft skills needed?'). This can be explained by the fact that when a CISO acquires the leadership styles and is able to utilise

a different style per situation, an explicit listing of the necessary soft skills is not relevant. This is because a transformational leader must have soft skills.

Furthermore, Saiewitza and Kida (2017) demonstrate that the tone of communication is directly related to the response. In their research, leadership was positioned as an extension of interpersonal skills, and they found that tone of voice and the type of communication will affect employees' willingness to accept change (Saiewitza & Kida, 2017). This conclusion demonstrates that interpersonal skills, which are part of the definition adopted from Robles (2012), are of value for the CISO leadership position.

Based on research by Popper (2004), leadership has two distinctions: authority and influence. Authority is a more traditional type of leadership, With the following correlated items: power, control and hierarchy. In contrast, transformational leadership has its roots in influence (Popper, 2004, pp. 106-107). One of Popper's discussion points is that strong relations are a better fit in this era compared to a more traditional authoritative posture (Popper, 2004, pp. 117-118).

It makes sense that when a CISO has the skills required for transformational leadership, soft skill attributes, such as strong relations and the mastery of tone of voice in communicating, are considered natural skills. These consequently do not need to be listed explicitly. Future research could explore how to embed the soft skills needed in everyday jobs and how they can be combined with the soft skills for a specific organisation and listed in an effective way in job ads.

6.10.11 Do employers see soft skills as a requirement in a job description?

Employers see soft skills as a requirement in job descriptions. This is the finding from the research performed by both authors, as shown in the index: Contributions by authors (page 99).

Based on the Delphi study among the business leaders, and as described in Section 6.7.3 (page 60), consensus was reached on the topic of the relevance of CISO job ads describing the soft skills needed. With $M = 2.00$ and $SD = 1.00$, the business leader response group was in agreement. There is a significant positive correlation between the soft skills as a priority in selecting the best fit CISO and the consensus of the relevance the CISO job ad describes the soft skills needed. Figure 44 (page 66) shows the correlation between the two topics. This correlation is not the only significant positive correlation that was observed (page 64). Figure 50 (page 69) and Figure 51 (page 69) show the correlation with the relevance of soft skills and the leadership position, respectively.

The correlation between the soft skills and the leadership position was confirmed by the analysis of the job ads – 77 job descriptions that were processed via a qualitative data analysis – which provide an overview of the soft skills listed in the job ads. Table 8 (page 41) displays the soft skills found in the analysed job ads and is a representation of the demand side of organisations. When the soft skill rankings of the job ads and those rankings by the business leaders response group are compared, 3 of the 11 soft skills – including leadership, which is not on Robles' (2012) list of soft skills – are ranked at the same position. Table 22 (page 71) indicates that another three skills are ranked with a one-position difference. The remaining four have more than one ranking position difference.

The significant difference in the position of the soft skill ‘work Ethic’ is interesting when the ranking based on the job ads is reviewed. In the job ads ranking, ‘work Ethic’ is positioned third. In contrast, the business leaders response group ranked it in second-last place. The ranking of the soft skills found in the analysed job ads and the ranking of soft skills confirmed by the business leaders response group are closely aligned. The responses in Round 1 of the Delphi Study of the business leaders response group revealed that the response group is moderately involved in the recruitment process ($M = 3.38$, $SD = 1.72$, $N = 21$), scored on a 5-point scale, where 1 = extremely, 2 = very, 3 = moderately, 4 = slightly and 5 = not at all. Analysing the responses in detail revealed that 10 out of 21 responders are not involved in the recruitment of the CISO; therefore the difference in alignment of the soft skill rankings between the job ads analysis and the business leaders response group can be explained by the fact that 43% of business leaders are involved and 48% are not involved in the CISO recruitment process. Although the response group is divided in this regard, it this does not mean that their opinion on soft skills and CISOs can be ignored, since the business leaders are still demanding behavioural patterns from their CISOs.

A major difference was observed in the positioning of the soft skill ‘courtesy’ against the ranking by Robles (2012). Both the business leaders response group and the CISO response group positioned courtesy as the last relevant soft skill. From the analysis of the job ads, we learned that courtesy was absent from the soft skills listed in the job ads, and this was confirmed by the business leaders response group, as shown in Table 28 (page 76).

In the literature, Hooper and McKissack (2016) demonstrated the non-alignment of expectations via the research of the 15 most popular job websites and CISO job ads in three countries (the US, Canada and New Zealand). Hooper and McKissack (2016) found a high degree of focus on technical skills, daily operational tasks and security (hard skills) in the majority of the job advertisements. The job ads analysis confirms a similar situation for the job ads. Even though soft skills are described in the ads – see Figure 8 Groundedness of soft skills in job ads (page 41) – the link between the descriptions and the alignment to the daily situation could be better, as stated by the CISO response group; see Figure 14 CISO role description (page 44).

6.10.12 What soft skills positively influence the chief information security officer leadership position in Dutch organisations with more than 500 employees?

Both authors, as shown in the index: Contributions by authors (page 99), can confirm what soft skills positively influence the CISO leadership position in Dutch organisations with more than 500 employees. The soft skills identified by Robles (2012), with the inclusion of leadership, were ranked in order based on the combined findings from the Dutch CISO job ads analysis on the one hand and CISOs and business leaders in Dutch organisations with more than 500 employees on the other. As shown in Table 28 (page 75), the ranking, from most to least important is as follows:

- Communication
- Leadership
- Interpersonal skills
- Professionalism
- Integrity
- Work ethic
- Responsibility

- Teamwork skills
- Positive attitude
- Flexibility
- Courtesy.

7 Conclusion and Recommendations

This chapter presents the conclusions drawn from our research. Both authors contributed to this chapter, as shown in the index: Contributions by authors (page 99).

7.1 Conclusion Related to Research Question

The main goal of this study was to contribute academic evidence to solve our problem statement. The presented problem statement is that it is unclear which soft skills are required for a CISO leadership position, and therefore, the CISO development (training, education and building the right capabilities) is not optimal. We thus undertook this study to answer our main research question:

What soft skills positively influence the chief information security officer leadership position in Dutch organisations with more than 500 employees?

This main research question was formulated because little to no relevant studies have previously been conducted on the topic. We hence carried out the research by analysing 77 job ads published over 5 months from top job offer websites in the Netherlands. In addition, we performed a Delphi study with two expert groups: CISOs and business leaders. This provided a multi-angled view of the topic and brings the following conclusions:

The first conclusion of this inductive research is that the soft skills identified by Robles (2012) positively influence the CISO leadership position in Dutch organisations with more than 500 employees, albeit in a significantly different order. Based on our findings, there is a significant difference in the ranking of soft skills between the US-based research of Robles (2012) and Dutch CISOs and business leaders, as well as job ads. Based on our research, of the soft skills that positively influence the CISO leadership position in Dutch organisations with more than 500 employees are:

- Communication
- Leadership
- Interpersonal skills
- Professionalism
- Integrity
- Work ethic
- Responsibility
- Teamwork skills
- Positive attitude
- Flexibility
- Courtesy

Ranking is in order of importance. Top row is most important; bottom row is least important, and the soft skill 'leadership' is not included in Robles' (2012) overview.

The second conclusion is that soft skills are highly relevant for the leadership position of a CISO in Dutch organisations with more than 500 employees, and business leaders have a high demand for a CISO with these skills. The CISO and business leader response groups confirmed that a CISO must possess soft skills to have a positive effect on the leadership position. Moreover, both response groups agree that a CISO must be able to utilise different soft skills in different situations, depending on the audience (business leaders, the IT department or users), and it is confirmed that soft skills vary per type of organisation. This means that a CISO must be able to use soft skills flexibly, although determining when and how to use which soft skills is a complex exercise.

Our third conclusion is that the soft skills identified by Robles (2012), with the addition of the soft skill 'leadership', are complete, since no additional soft skill was introduced by the CISO and business leader response groups. From the analysis of 77 job ads and the Delphi study with those two expert groups, we conclude that two soft skill are consistently ranked as top skills:

- Communication
- Leadership.

Table 27 (page 75) presents the ranking per source (job ads, CISO response group and business leader response group), where communication and leadership hold the top two positions – they were constantly the top two in the individual analysis. The 'middle' section varies per individual analysis, and our conclusion is that, similarly to the first conclusion, this variation is influenced by the type of organisation, the situation and the audience. The last row featured a similar consistency to the top two rows: considering the difference in locality (based on geographic location and/or culture), the conclusion is that the soft skill 'courtesy' is not relevant in the Netherlands. This is based on the low relevance of this skill in job ads and among the response groups, compared to the original ranking by Robles (2012). In this research, we did not include which position a soft skill has in the ranking, how that relates to the other soft skills and why – this is part of future work.

Furthermore, in the listing of the soft skills, work ethic and integrity are highly interchangeable. We observed a strong variation in the positioning of these two soft skills' rankings from the job ads as well as among the CISO and business leader response groups, as presented in Table 27 (page 75). Non-academic sources, such as the website Indeed.com (2020), indicate that these soft skills are either bundled or considered as subsets. Therefore, our conclusion is that the CISOs and business leaders in our response groups have different views on the meaning of work ethic and integrity related to security roles. Future research could thus review whether integrity is a subset of work ethic, or vice versa, in security roles.

The last conclusion is that business leaders would prefer to recruit a CISO candidate who has soft skills and is trainable for hard skills over a candidate with the best-fitting hard skills. More specifically, businesses demand a CISO with well-developed soft skills who is adaptable per situation and/or audience and who suits the characteristics of the organisation. Moreover, the majority of security training and education lacks a focus on soft skills. This emphasises that the development of soft skills occurs mainly via social interactions at a young age and via self-actuation (Chimatti, 2016). Our general conclusion is that a gap exists between businesses' demand for and the development of a CISO focusing on hard skills (via traditional training and education).

Therefore, a CISO in a leadership position will benefit from the development of soft skills, and organisations should find a way to drive the self-actuation of the development of these soft skills.

7.2 Scientific Implication

The multi-angled view on the topic of soft skills that positively influence CISOs (both from a business leader's perspective and from CISOs themselves) yields a unique data set. Given the lack of research on the topic of CISO soft skills, this study provides clear insight into the soft skill demand from both aforementioned perspectives. The research also provides insight into the frameworks of career development, wherein little focus is placed on the development of soft skills. This is proven to be a skill set in high demand, and we found that this demand is not solely applicable to the CISO: the literature review emphasises business leaders' broader demand for soft skills. The implication is that the frameworks must be extended based on the confirmation in this research.

7.3 Practical Implications

As stated, the main goal of this study was to contribute academic evidence regarding how soft skills positively influence the CISO leadership position in Dutch organisations with more than 500 employees. In addition to the academic evidence found in our report, the outcome of this study has several practical implications in the following fields:

- Personal development
- Educational curricula and frameworks
- Job advertising
- Recruitment.

With regard to a CISO's personal development, professional training focuses mainly on the development of hard skills. For the CISO, the outcome of this research highlights the imbalance between the skills adopted via training and education on the one hand and the demand by business leaders on the other. The business need is for a well-educated CISO who also excels in skills not presented via training and education: soft skills. To bridge that gap, the CISO should also focus on developing soft skills and understand that this development is not achievable with just a single course. Based on the research by Levasseur (2013), the development of soft skills is the result of self-actuation, which requires more effort than picking a single course from a course catalogue.

For business leaders, the practical implication is to understand that soft skills are a result of multiple factors, as demonstrated by Chimatti (2016). As mentioned earlier, development of soft skills is a result of self-actuation (Levasseur, 2013). The majority of CISOs have a technical background, as indicated in the outcome of Round 1 of the CISO Delphi study; see Figure 18 (page 45). This is because the development of soft skills is not an element in the majority of security education curricula, as shown by Yang and Wen (2017). Business leaders should recognise that to develop employees' soft skills – and in this research, specifically those of a CISO – training in more than communication is required. The practical implementation could be a personal development programme that triggers one's willingness to develop soft skills; as Wibaut states, 'Change will happen when people are willing, not before' (Wibaut, 1859-1936).

In the field of educational curricula and frameworks, a significant implication, based on the outcome that soft skills are highly relevant, is that these educational systems and personal development frameworks can be further developed. In this regard, the inclusion of the much-needed soft skills must become part of educational curricula. Yang and Wen (2017) demonstrated that cybersecurity curricula have a technical focus and that the majority of cybersecurity programs in undergraduate business schools concentrate on hard skills. Combining this with the knowledge of Chimatti, in principle, soft skills are taught by parents from a young age and learned through socialising in school, sports and other activities with other people (Chimatti, 2016). Therefore, enriching the security educational curriculum with a soft skills component will CISOs' careers, the effectiveness of their leadership position and their alignment with the business needs.

Beyond educational systems, we researched personal development frameworks and security frameworks, and the finding could have an impact on the former, such as the European e-Competence Framework (European Union, 2014). In the current version of this framework (Version 3.0), the term 'soft skills' does not even feature; only the term 'communication' is mentioned as a skill. A new version of this framework is being developed, and although this research is focused on CISO competencies, it could be used as a reminder to include soft skills in the competence framework.

The various researched ISMS frameworks offer little guidance on soft skills. In our Delphi study, both response groups acknowledged that soft skills have a positive effect on the CISO leadership position, that the various organisational types require a different utilisation of soft skills and that different groups in organisations need a different set of soft skills. We thus advise that ISMS frameworks include a focus on the CISO leadership position and improve its effectiveness through the development and use of soft skills.

The input from the Dutch CISOs and Dutch business leaders, as well as the analysis of the job ads, revealed that CISO job descriptions could be better detailed in terms of which soft skills are relevant for a specific organisation. This is a direct, practical implementation. Based on the outcome of the Delphi study and the analysis of the job ads, we learned that the necessary hard skills are listed clearly, whereas the soft skills that are important for the recruiting organisation are less clearly stated. Articulating them in a better way will benefit the alignment between a company's demands and the soft skills presented by the CISO. Organisations, such as the PvIB, which facilitates job profiles via the document Beroepsprofielen Informatiebeveiliging 2.0 (Job Profiles Information Security version 2.0), could also be updated to include the soft skills that are mentioned in this research. This would add to the hard-skill-related competencies and eliminate generic competencies that contain grouped skills, such as leadership, communication and persuasiveness (Platform van Informatie Beveiliging, 2019). When drafting a job ad, these job descriptions would provide a prime indication of the competencies that a CISO should have, and better-described job ads lead to better candidates.

The outcome of Round 1 of the CISO Delphi study revealed that 76.2% of the response group favours a candidate with the best-developed soft skills, but who is trainable for hard skills. Then, in the second round, 71.4% of participants strongly agreed and agreed with that outcome. This practical implication means that testing of soft skills must be a significant part of the recruitment process. Through Succi and Wieandt's research, we learned that interviewing candidates, despite the shortcomings of the technique, is still one of the most preferred and most frequently used methods compared to all other selection procedures (Succi & Wieandt, 2019, p. 5). A practical implication would be that interviewers learn techniques to recognise the soft skills needed and

desired by organisations. In addition, we found that soft skills go beyond the following example: ‘*Excellent written & spoken English essential. Multiple languages preferred*’ (ING, 2019). It is thus beneficial for the candidate and the recruiting organisation that interviews also involve an assessment of the necessary soft skills.

7.4 Limitations

In our research, the first limitation is the Dutch CISO population: there is a significant difference in the ranking order of the soft skills identified by Robles in the US (2012) and those in our Dutch sample. Although the CISOs and business leaders in our response groups are experts in their field, it would be of interest to benchmark the outcome across Europe and even globally. Second, the use of the Delphi method offers a limited expert group size, which has an effect on the statistical analysis. Although the CISO and business leader response groups exceeded the minimum of 15 responders per group, the data set is still relatively small for statistical analysis. Third, the survey responses could contain socially desirable answers. As researched by Börger (2012, p. 157), responders tend not to choose the highest and lowest options in Likert scale questions. With this construct, the positive answers are in Positions 1 and 2, and negative answers are in Positions 4 and 5. We thus included the socially desirable answers and the extreme answers of the responders.

7.5 Future Research

This final section of the thesis describes the future work that is necessary to deepen the insights obtained so far. As stated in the literature review (Section 4.2.2 CISO soft skills viewed from a business leader’s demand perspective), the research by Bachlechner et al. (2014) was adopted. One finding was the dimension of the added value of CISOs being able to articulate security needs accurately. We stated that this topic is out of scope for this research; it could thus be studied further.

Furthermore, in the CISO response group, one respondent mentioned that servant leadership would be of value for CISOs. We found one citation of this type of leadership style: in the problem statement of an internet article by Eggleston (2018). It does not feature in the researched literature in relation to the CISO position and hence was not included as an answer option in our survey. Therefore, exploring what leadership styles are beneficial in relation to the CISO position and its effectiveness is a logical future work.

Future research is also advised on how the soft skills needed in a day-to-day job, as well as in regard to a specific organisation, can be listed in a job ad in an effective way. This could be for CISOs themselves or even as part of wider research into the generic role descriptions of a CISO.

In addition, CISOs and business leaders differ in their view on the soft skills ‘work ethic’ and ‘integrity’. Future research could review whether integrity is a subset of work ethic, or vice versa, in security roles.

Moreover, given the difference in soft-skill rankings between the US-based study (Robles, 2012, p. 454) and our Dutch CISO soft skills ranking, the findings might not be generalisable to a broader Dutch context, since the U.S. and Dutch environments might be different. Future research is required in a wider national context (e.g., European scale) regarding soft skills for a CISO.

The need for co-ordination between parties, with the ever-changing regulations concerning data and IT, demonstrates that researching the value of CISO capabilities and requirements for a curriculum is well worth the

effort. The dimension of the added value of the CISO, being able to articulate the security needs accurately in the changing demand from the business and regulatory bodies, is out of scope of this research and should be included in future research of the changing CISO roles and right-fit curriculum.

Finally, our research lists the ranked soft skills that are relevant for a CISO. Future work could entail a more detailed research *on how to* utilise these listed soft skills effectively to influence the various audiences and situations and to maximise the CISO leadership position.

References

- Aguas, T., Kark, K., & Francois, M. (2016). *Deloitte articles*. Opgehaald van Deloitte: https://www2.deloitte.com/content/dam/insights/us/articles/ciso-next-generation-strategic-security-organization/DR19_TheNewCISO.pdf
- Akins, R., Tolson, H., & Cole, B. (2005, December). Stability of response characteristics of a Delphi panel: application of bootstrap data expansion. *BioMed Central Medical Research Methodology*, pp. 598-601.
- Ashenden, D., & Sasse, A. (2013, November). CISOs and organisational culture: Their own worst enemy? *Elsevier Computers & Security, Volume 39, Part B, (Part B)*, 396-405.
- Auffret, J.-P., Stavrou, A., Warweg, P., Snowdon, J. L., Katz, J. S., Kelley, D., . . . Allor, P. (2017, March 01). Cybersecurity Leadership: Competencies, Governance, and Technologies for Industrial Control Systems. *Journal of Interconnection Networks*, pp. 1-23.
- B. Willis, G., & Lessler, J. T. (1999). Question Appraisal System QAS-99. *Researchgate*, 1-86.
- Baarda, B., & Dijkum, C. v. (2014). *Statistiek met SPSS*. Groningen: Noordhof Uitgevers bv.
- Bachlechner, D., Thalmann, S., & Maier, R. (2014). Security and compliance challenges in complex IT outsourcing arrangements: A multi-stakeholder perspective. *Elsevier Computers & Security*, 38 - 59.
- Blackhat.com. (2017, July). *2017-Black-Hat-Attendee-Survey*. Opgehaald van <https://www.blackhat.com/docs/us-17/2017-Black-Hat-Attendee-Survey.pdf>
- Börger, T. (2012). *Social desirability and environmental valuation*. Frankfurt am Main: Peter Lang.
- Bryman, A., & Bell, E. (2015). *Business Research Methods*. New York: Oxford University Press.
- Cambridge dictionary. (2019). *Meaning of soft skills in English*. Opgehaald van Cambridge Dictionary: <https://dictionary.cambridge.org/dictionary/english/soft-skills>
- Cano, C., Fernández-Sanz, L., & Misra, S. (2013, January - March). Featuring CIO: Roles, Skills and Soft Skills. *International Journal of Human Capital and Information Technology Professionals*, pp. 22-33.
- Centraal Bureau voor de Statistiek. (2019, May 19). *Statline*. Opgehaald van CBS Opendata: <https://opendata.cbs.nl/statline/#/CBS/nl/dataset/81588NED/table?ts=1558277443601>
- Chimatti, B. (2016). Definition, development, assessment of soft skills and their role for the quality of organizations and enterprises. *International Journal for Quality Research v10 n1*, 97-130.
- Cinque, M. (2016). "Lost in translation". Soft skills development in European countries. *Tuning Journal for Higher Education*, 389-428.
- CIS. (2019, November 24). *CIS Cyber Security Controls*. Opgehaald van CIS: <https://www.cisecurity.org/controls/>
- Colbert, A. E., Barric, M. R., & B. H. (2014). Personality And Leadership Composition in Top Management Teams: Implications For Organizational Effectiveness. *Personnel Psychology*, pp. 351-387.
- Collette, R., Gentile, M., & Gentile, S. (2008). *CISO Soft Skills*. New York: Auerbach Publications.
- Council of the European Union. (2016, April 6). Directive 95/46/EC General Data Protection Regulation. *Directive 95/46/EC General Data Protection Regulation*. Brussels: Council of the European Union.
- Day, J., & Bobeva, M. (2005). A Generic Toolkit for the Successful Management of Delphi Studies. *Electronic Journal of Business Research Methods*, pp. 103-116.
- Death, D. (2019, February 18). *Security Current Resources*. Opgehaald van Security Current: <https://securitycurrent.com/must-have-skills-for-cisos-a-cisos-connect-report/>
- Dor, D., & Elovici, Y. (2016). A model of the information security investment decision-making process. *Elsevier Computers & Security*, 1-13.
- Eggleston, M. (2018, January 29). *People, Process and Technology: Tips for Strengthening the Three Pillars of a Highly Effective Security Program*. Opgehaald van Security Current: <https://securitycurrent.com/people-process-technology-tips-strengthening-three-pillars-highly-effective-security-program/>
- ENISA. (2019, January 28). *ENISA Publications*. Opgehaald van ENISA: <https://www.enisa.europa.eu/publications/enisa-threat-landscape-report-2018>
- European Union. (2014, 11 17). *European-e-Competence-Framework-3.0_CEN_CWA_16234-1_2014*. Opgehaald van http://www.ecompetences.eu: http://www.ecompetences.eu/wp-content/uploads/2014/02/European-e-Competence-Framework-3.0_CEN_CWA_16234-1_2014.pdf
- Fitzgerald, T., & Krausse, M. (2007). *CISO Leadership: essential principles for success*. New York: Auerbach Publications.
- Gemeente Amsterdam. (2019, 04 28). *Stepstone*. Opgehaald van Stepstone: stepstone.nl
- Gentile, M., & Ron Collette, T. D. (2016). *The CISO Handbook*. New York: CRC Press.
- Grondelle, J. v. (2018, Voorjaar). ARW Workshop 2018-1 slides. Utrecht.
- Guhr, N., Lebek, B., & Breitner, M. H. (2019, March). The impact of leadership on employees' intended information security behaviour: An examination of the full-range leadership theory. *Information Systems Journal*, pp. 340-362.
- Hasson, F., Keeney, S., & McKenna, H. (2000, October). Research guidelines for the Delphi survey technique. *Journal of Advanced Nursing*, pp. 1008-1015.
- Hayslip, G. (2019, May 5). *CISO Manifesto: Recruiting CISOs not Unicorns*. Opgehaald van Peerlyst: https://www.peerlyst.com/posts/ciso-manifesto-recruiting-cisos-not-unicorns-gary-hayslip-cissp-cisa-crisc-ccsk?utm_source=peerlyst_perspective&utm_medium=email&utm_content=peerlyst_post&utm_campaign=top_posts_on_peerlyst_this_week_05142019
- Hevner, A. R. (2007). A Three Cycle View of Design Science Research . *Scandinavian Journal of Information Systems: Vol. 19 : Iss. 2*, pp. 87-92.
- Hogeschool Utrecht. (2018, 05 01). *wat-betekent-de-nieuwe-privacywetgeving-voor-onderzoek-binnen-de-hu*. Opgehaald van HU.nl: <https://husite.nl/digitalehu2/wat-betekent-de-nieuwe-privacywetgeving-voor-onderzoek-binnen-de-hu/>
- Holmbeck, G., Li, S., Schurman, J. V., Friedman, D., & Coakley, R. M. (2002, Januari). Collecting and Managing Multisource and Multimethod Data in Studies of Pediatric Populations. *Journal of Pediatric Psychology*, pp. 5-18.
- Hooper, V., & McKissack, J. (2016, November - December). The emerging role of the CISO. *Elsevier Business Horizons*, pp. 585-591.

- Hsu, C.-C., & Sandford, B. A. (2007). The Delphi Technique: Making Sense Of Consensus. *Practical Assessment, Research & Evaluation*, 1-8.
- IGguru Information Governance News & Community. (2019, March 12). *IGguru News*. Opgehaald van IGguru: <https://igguru.net/2019/03/12/ciso-the-c-level-executive-missing-from-your-board/>
- Indeed.com. (2020, July 30). *Work Ethic Skills: Top 8 Values to Develop*. Opgehaald van Career development: <https://www.indeed.com/career-advice/career-development/work-ethic-skills>
- ING. (2019, 04 28). *Indeed*. Opgehaald van Indeed: indeed.nl
- Iqbal, S., & Pipon-Young, L. (2009, July). The Delphi method. *The Psychologist*, pp. 598-601.
- ISACA. (2018, 11 25). *ISACA Certification Certified Information Security Manager Job-Practice-Areas*. Opgehaald van ISACA.org: <https://www.isaca.org/Certification/CISM-Certified-Information-Security-Manager/Job-Practice-Areas/Pages/default.aspx>
- Kleinman, L. (2018, July 26). *Forbes Technology Council*. Opgehaald van Forbes: <https://www.forbes.com/sites/forbestechcouncil/2018/07/26/cybersecurity-and-the-new-ciso-the-leadership-enigma/#6c9744243422>
- Leavitt, H. J. (1964). Applied organization change in industry structural, technical, and human approaches. *New perspectives in organization research : [consisting of papers from a Conference on Research in Organizations ...June 22 - 24, 1962, a Seminar on the Social Science of Organizations ...June 10 - 23, 1962]*, 55-71.
- Levasseur, R. E. (2013). People Skills: Developing Soft Skills— A Change Management Perspective. *Interfaces*, 566-571.
- Levy, E., Delaney, K., Hill, J., & Buckalew, L. (2019). *Next-Generation IT Talent Strategies*. Opgehaald van Connected Future: <https://connectedfutures.cisco.com/report/next-generation-it-talent-strategies/>
- Luftman, J. N. (2000). *IT-Business Strategic Alignment Maturity*. Hoboken: CAIS.
- Mar, A. (2016, July 7). *87 Soft Skills (The Big List)*. Opgehaald van Simplicable: <https://training.simplicable.com/training/new/87-soft-skills>
- Matteson, M. L., Anderson, L., & Boyden, C. (2016). "Soft Skills": A Phrase in Search of Meaning. *portal: Libraries and the Academy*, 16(1), 71-88.
- Méhaut, P., & Winch, C. (2012). The European Qualification Framework: skills, competences or knowledge? *European Educational Research Journal*, 369-381.
- NEN-ISO/IEC. (2017, Maart). *NEN-shop*. Opgehaald van NEN.nl: <https://www.nen.nl/NEN-Shop/Norm/NENENISOIEC-270022017-en.htm>
- NIST. (2019, 11 24). *NIST Cyberframework Framework documents*. Opgehaald van NIST: <https://www.nist.gov/cyberframework/framework>
- Okoli, C., & Pawlowski, S. D. (2004). The Delphi method as a research tool: An example, design considerations and applications. *Information & Management*, 15-29.
- Oost, H., & Markenhof, A. (2010). *Een onderzoek voorbereiden*. Amersfoort: ThiemeMeulenhoff.
- Platform van Informatie Beveiliging. (2019, 04 23). *PvIB kenniscentrum*. Opgehaald van PvIB.nl: <https://www.pvib.nl/kenniscentrum/documenten/beroepsprofielen-informatiebeveiliging-2-0>
- Popper, M. (2004, June). Leadership as Relationship. *Journal for the Theory of Social Behaviour*, pp. 107- 125.
- Press, G. (2017, December 13). *Enterprise & Cloud*. Opgehaald van Forbes.com: <https://www.forbes.com/sites/gilpress/2017/12/13/profiles-in-cybersecurity-steve-martino-chief-information-security-officer-cisco/#19364f75b73>
- Putrus, R. (2019). The role of the CISO and the digital security landscape. *ISACA Journal*, 2, 22-29.
- Qualtrough, E. (2017, may 18). *CIOs expecting budget increases to tackle cyber threat | Security breaches detected at more than half of CIO 100 organisations*. Opgehaald van CIO from IDG: <https://www.cio.co.uk/it-security/cios-see-security-budget-increase-tackle-cyber-threat-3607644/>
- Raosoftware. (2018, 07 27). <http://www.raosoftware.com/samplesize.html>. Opgehaald van <http://www.raosoftware.com/samplesize.html>
- Robles, M. M. (2012). Executive perceptions of the top 10 soft skills needed in today's workplace. *Business Communication Quarterly*, 453-465.
- Saiewitza, A., & Kida, T. (2017). The effects of an auditor's communication mode and professional tone on client responses to audit inquiries. *Elsevier Accounting, Organizations and Society*, 33-43.
- Sanna, N. (2018, August 27). *Management & Strategy*. Opgehaald van SecurityWeek: <https://www.securityweek.com/cyber-risk-business-risk-time-business-aligned-ciso>
- SmartSurvey. (2020, 10 03). *SmartSurvey and GDPR*. Opgehaald van <https://www.smartsurvey.co.uk>: <https://www.smartsurvey.co.uk/gdpr>
- Solms, B. v. (2000). Information Security - The Third Wave? *Elsevier Computers & Security*, 615-620.
- Solms, B. v. (2006). Information Security - The Fourth Wave. *Elsevier Computers & Security*, 165 - 168.
- Steinbart, P. J., Raschke, R. L., Gal, G., & Dilla, W. N. (2018). The influence of a good relationship between the internal audit and information security functions on information security outcomes. *Elsevier Accounting, Organizations and Society*, 15-29.
- Succi, C., & Wieandt, M. (2019, July 8). Walk the talk: soft skills' assessment of graduates. *European Journal of Management and Business Economics*, p. 19.
- Sunindijo, R. Y., & Zou, P. X. (2013, September). The Roles of Emotional Intelligence, Interpersonal Skill, and Transformational Leadership in Improving Construction Safety. *Australasian Journal of Construction Economics and Building*, pp. 97-113.
- Tejay, G. P., & Winkfield, M. (2015, December). How CISOs Can Become Effective Leaders? A Path-Goal Approach. *Association for Information Systems AIS Electronic Library (AISeL)*, pp. 1-11.
- The Open University. (2019, 05 18). *Information technology: A new era?* Opgehaald van OpenLearn: <https://www.open.edu/openlearn/people-politics-law/politics-policy-people/sociology/information-technology-new-era/content-section-0?active-tab=description-tab>

- Todd, M. (2012, November). *TechTarget Storage Search*. Opgehaald van TechTarget: <https://searchsecurity.techtarget.com/opinion/Chief-information-security-officer-skills-go-beyond-customary-technical-roles>
- Tsohou, A., & Holtkamp, P. (2018, January 06). Are users competent to comply with information security policies? An analysis of Professional competence models. *Information Technology & People*, pp. 1047-1068.
- Van Laar, E., van Deursen, A. J., van Dijk, J. A., & de Haan, J. (2017). The relation between 21st-century skills and digital skills: A systematic literature review. *Elsevier Computers in Human Behavior*, pp. 577-588.
- Weber, M. R., Crawford, A., Rivera Jr., D., & Finley, D. A. (2011). Using Delphi Panels to Assess Soft Skill Competencies in Entry Level Managers. *Journal of Tourism Insights*, 1(1), 98-106.
- Weber, M. R., Crawford, A., Rivera Jr., D., & Finley, D. A. (2011). Using Delphi Panels to Assess Soft Skill Competencies in Entry Level Managers. *Journal of Tourism Insights*, 1(1), 98-106.
- Weishäupl, E., Yasasin, E., & Schryen, G. (2018). Information security investments: An exploratory multiple case study on decision-making, evaluation and learning. *Elsevier Computers & Security*, 807-823.
- Wibaut, F. M. (1859-1936).
- Williams, P. (2007, August). Executive and board roles in information security. *Elsevier Network Security*, pp. 11-14.
- Yang, S. C., & Wen, B. (2017). Toward a cybersecurity curriculum model for undergraduate business schools: A survey of AACSB-accredited institutions in the United States. *Journal of Education for Business*, 1-8.
- Zhang, A. (2012). Peer Assessment of Soft Skills and Hard Skills. *Journal of Information Technology Education: Research*, 11, 155-168.
- Zohrabi, M. (2013, Februari). Mixed Method Research: Instruments, Validity, Reliability and Reporting Findings. *Theory and Practice in Language Studies*, pp. 254-262.

Tables

Table 1 Sub-research questions	10
Table 2 Soft skill attributes (Robles, 2012)	15
Table 3 Different names for soft skills in some European countries; Cinque (2016)	19
Table 4 Taxonomy of Delphi design choices	30
Table 5 Privacy data management.....	31
Table 6 Sample size for quantitative research into CISO role	32
Table 7 High-level research topics and ownership	33
Table 8 Soft skills found in analysed job ads	41
Table 9 Cronbach's alpha reliability analysis – CISO soft skill responses	47
Table 10 Soft skills confirmation – CISO response group	48
Table 11 Additional soft skills – CISO response group.....	49
Table 12 Additional soft skill attributes – CISO response group	49
Table 13 Cronbach's alpha reliability analysis – CISO leadership responses	50
Table 14 Spearman's correlation coefficient – CISO response group	51
Table 15 Soft skills confirmation – CISO response group, job ads analysis and Robles (2012)	55
Table 16 Cronbach's alpha reliability analysis of CISO soft skills – business leaders' responses	60
Table 17 Soft skills confirmation – business leaders response group	61
Table 18 Additional soft skills – business leaders response group	62
Table 19 Additional soft skill attributes – business leaders response group.....	62
Table 20 Cronbach's alpha reliability analysis of CISO leadership – business leaders response group	63
Table 21 Spearman's correlation coefficient – business leaders response group	64
Table 22 Soft skills confirmation – business leaders response group, job ads analysis and Robles (2012).....	71
Table 23 Group statistics – soft skills' relevance	73
Table 24 Independent samples test – soft skills' relevance	73
Table 25 Group statistics – leadership relevance.....	74
Table 26 Independent samples test – leadership relevance.....	74
Table 27 Soft skills confirmation – both response groups, job ads analysis and Robles (2012).....	75
Table 28 Overview of combined soft skill rankings	76
Table 29 Group statistics – soft skills.....	76
Table 30 Independent samples test – soft skill rankings.....	77
Table 31 Soft skills per Anne Mar.....	100
Table 32 Detailed overview analyzed job ads included with groundedness of codes.....	102

Figures

Figure 1 Main research question and sub-research questions	11
Figure 2 Search topics in relevant papers	12
Figure 3 Overview of relations between soft skills	14
Figure 4 Research model.....	28
Figure 5 Research process	29
Figure 6 Research topics and ownership	34
Figure 7 Mixed description of skills.....	40
Figure 8 Groundedness of soft skills in job ads	41
Figure 9 Function – CISO response group	42

Figure 10 Employment – CISO response groups	43
Figure 11 Organisation category – CISO response group	43
Figure 12 Work history – CISO response group	43
Figure 13 CISO role application.....	44
Figure 14 CISO role description.....	44
Figure 15 Security team size	44
Figure 16 Education – CISO response group	45
Figure 17 Certification – CISO response group	45
Figure 18 Professional background – CISO response group	45
Figure 19 Soft skill familiarity – CISO response group	46
Figure 20 CISO leadership familiarity	46
Figure 21 Frequency table of soft skill relevance questions	47
Figure 22 CISO agreement – demonstration of soft skills	48
Figure 23 Frequency table – CISO leadership questions.....	50
Figure 24 Scatterplot of leadership vs relevance	52
Figure 25 Scatterplot of Q11.1 vs leadership	53
Figure 26 Scatterplot of Q11.1 vs Q12.1	53
Figure 27 Scatterplot of Q10.1 vs Q12.1	54
Figure 28 Scatterplot of Q9.1 vs Q11.2.....	54
Figure 29 Scatterplot of Q9.1 vs Q12.1	55
Figure 30 Function – business leaders response group.....	57
Figure 31 Employment – business leaders response group	57
Figure 32 Organisation category – business leaders response group.....	58
Figure 33 Work history – business leaders response group.....	58
Figure 34 Responses to question, ‘Does your organisation have a CISO employed?’	58
Figure 35 CISO reporting line.....	59
Figure 36 Soft skill familiarity – business leaders.....	59
Figure 37 Leadership familiarity – business leaders.....	59
Figure 38 Frequency table of soft skill relevance questions – business leaders response group	60
Figure 39 CISO agreement on demonstration of soft skills – business leaders response group	61
Figure 40 Frequency table of CISO leadership questions – business leaders response group	63
Figure 41 Scatterplot of relevanceBL_SK vs LeadershipBL_SK.....	65
Figure 42 Scatterplot of BL Q5.1 vs LeadershipBL_SK.....	65
Figure 43 Scatterplot of BL relevance vs Q7.1	66
Figure 44 Scatterplot of BLQ71 vs Q7.2.....	66
Figure 45 Scatterplot of RelevanceBL_SK vs Q5.1	67
Figure 46 Scatterplot of BL leadership vs Q71	67
Figure 47 Scatterplot of BL Q8.1 vs Q7.1	67
Figure 48 Scatterplot of relevanceBL_SK vs Q3.1	68
Figure 49 Scatterplot of BL Q1.6 vs Q7.1	68
Figure 50 Scatterplot of BL relevance vs Q7.2	69
Figure 51 Scatterplot of BL leadership vs Q7.2	69
Figure 52 Scatterplot of BL Q3.1 vs LeadershipBL_SK.....	70
Figure 53 Scatterplot of BL Q1.6 vs relevance	70
Figure 54 Scatterplot of Q6.1 vs LeadershipBL_SK	70
Figure 55 Normal distribution check – soft skill ‘courtesy’	78

Contributions by authors

Chapter / paragraph	Topic	Author(s)
1	Introduction & background	R. Smit & J.M.J. van Yperen Hagedoorn
2	Problem statement	R. Smit & J.M.J. van Yperen Hagedoorn
3	Research question	R. Smit & J.M.J. van Yperen Hagedoorn
3.1	The research question and scope considerations	R. Smit & J.M.J. van Yperen Hagedoorn
3.2	Main research question	R. Smit & J.M.J. van Yperen Hagedoorn
3.3	Sub research question	R. Smit & J.M.J. van Yperen Hagedoorn
4	Literature review	R. Smit & J.M.J. van Yperen Hagedoorn
4.1	Analysis of relevant papers	R. Smit & J.M.J. van Yperen Hagedoorn
4.2	Review of literature	R. Smit & J.M.J. van Yperen Hagedoorn
4.2.1	CISO soft skills viewed from a CISO perspective	J.M.J. van Yperen Hagedoorn
4.2.2	CISO soft skills viewed from a business leaders' demand perspective	R. Smit
5	Research method and process	R. Smit & J.M.J. van Yperen Hagedoorn
5.1	Research method	R. Smit & J.M.J. van Yperen Hagedoorn
5.2	Multisource research approach	R. Smit & J.M.J. van Yperen Hagedoorn
5.3	Research model	R. Smit & J.M.J. van Yperen Hagedoorn
5.4	Research process	R. Smit & J.M.J. van Yperen Hagedoorn
5.5	Research taxonomy of Delphi design choices	R. Smit & J.M.J. van Yperen Hagedoorn
5.6	Research ethics and privacy in data management	R. Smit & J.M.J. van Yperen Hagedoorn
5.7	Research target audience and content	R. Smit & J.M.J. van Yperen Hagedoorn
5.8	Reaching the target audience and researching the collected content	R. Smit & J.M.J. van Yperen Hagedoorn
5.9	Researching effort and balance	R. Smit & J.M.J. van Yperen Hagedoorn
6	Findings and discussion	R. Smit & J.M.J. van Yperen Hagedoorn
6.1	Findings literature relevant leadership position soft skills	R. Smit & J.M.J. van Yperen Hagedoorn
6.2	Findings literature CISO perspective	J.M.J. van Yperen Hagedoorn
6.3	Findings literature business leaders' perspective	R. Smit
6.4	Findings of job ads	R. Smit & J.M.J. van Yperen Hagedoorn
6.5	Findings of Delphi study CISO perspective	J.M.J. van Yperen Hagedoorn
6.5.1	Composition of the CISO response group	J.M.J. van Yperen Hagedoorn
6.5.2	Findings of Delphi study CISO perspective round one CISO response group	J.M.J. van Yperen Hagedoorn
6.5.3	Findings of Delphi study CISO perspective round two CISO response group	J.M.J. van Yperen Hagedoorn
6.6	Findings of gap analysis Delphi study CISO perspective and job descriptions	J.M.J. van Yperen Hagedoorn
6.7	Findings of Delphi study business leader's perspective	R. Smit
6.7.1	Composition of the business leaders response group	R. Smit
6.7.2	Findings of Delphi study business leaders' perspective round one	R. Smit
6.7.3	Findings of Delphi study business leaders' perspective round two	R. Smit
6.8	Findings of gap analysis Delphi study business leaders' perspective and job descriptions	R. Smit
6.9	Findings of meta-analysis	R. Smit & J.M.J. van Yperen Hagedoorn
6.10	Discussions	R. Smit & J.M.J. van Yperen Hagedoorn
6.10.1	What soft skills are relevant for leadership positions?	R. Smit & J.M.J. van Yperen Hagedoorn
6.10.2	What soft skills are relevant for a CISO?	J.M.J. van Yperen Hagedoorn
6.10.3	Which soft skills are expected by business leaders for the role of the CISO?	R. Smit
6.10.4	How do business leaders value the soft skills of a CISO?	R. Smit
6.10.5	What is a CISO leadership position?	J.M.J. van Yperen Hagedoorn
6.10.6	How does a CISO use soft skills for influencing business leaders / users / IT department?	J.M.J. van Yperen Hagedoorn
6.10.7	How do business leaders value the CISO soft skills for dealing with business leaders / users / IT department?	R. Smit
6.10.8	Does the CISO experiences a better leadership position with a certain set of soft skills?	J.M.J. van Yperen Hagedoorn
6.10.9	Do business leaders experience a better leadership position of the CISO with a certain set of soft skills?	R. Smit
6.10.10	How do the soft skills described in the job description relate to every day needed soft skills?	J.M.J. van Yperen Hagedoorn
6.10.11	Do employers see soft skills as a requirement in a job description?	R. Smit & J.M.J. van Yperen Hagedoorn
6.10.12	What soft skills positively influence the chief information security officer leadership position, in Dutch organizations with more than 500 employees?	R. Smit & J.M.J. van Yperen Hagedoorn
7	Conclusion and recommendations	R. Smit & J.M.J. van Yperen Hagedoorn
7.1	Conclusion related to research question	R. Smit & J.M.J. van Yperen Hagedoorn
7.2	scientific implication	R. Smit & J.M.J. van Yperen Hagedoorn
7.3	Practical implications	R. Smit & J.M.J. van Yperen Hagedoorn
7.4	Limitations	R. Smit & J.M.J. van Yperen Hagedoorn
7.5	Future research	R. Smit & J.M.J. van Yperen Hagedoorn

Addendum

Soft skills per Anne Mar

Table 31 Soft skills per Anne Mar

Category	Soft skill Progression
Communication Skills	<ol style="list-style-type: none"> 1. Verbal Communication 2. Body Language 3. Physical Communication 4. Writing 5. Storytelling 6. Visual Communication 7. Humor 8. Quick-wittedness 9. Listening 10. Presentation Skills 11. Public Speaking 12. Interviewing
Leadership Skills	<ol style="list-style-type: none"> 1. Team Building 2. Strategic Planning 3. Coaching 4. Mentoring 5. Delegation 6. Dispute Resolution 7. Diplomacy 8. Giving Feedback 9. Managing Difficult Conversations 10. Decision Making 11. Performance Management 12. Supervising 13. Managing 14. Manager Management 15. Talent Management 16. Managing Remote Teams 17. Managing Virtual Teams 18. Crisis Management
Influencing	<ol style="list-style-type: none"> 1. Facilitation 2. Selling 3. Inspiring 4. Persuasion 5. Negotiation 6. Motivating 7. Collaborating
Interpersonal Skills	<ol style="list-style-type: none"> 1. Networking 2. Interpersonal Relationships 3. Dealing with Difficult People 4. Conflict Resolution 5. Personal Branding 6. Office Politics
Personal Skills	<ol style="list-style-type: none"> 1. Emotional Intelligence 2. Self Awareness 3. Emotion Management 4. Stress Management 5. Tolerance of Change and Uncertainty 6. Taking Criticism 7. Self Confidence 8. Adaptability 9. Resilience 10. Assertiveness 11. Competitiveness 12. Self Leadership 13. Self Assessment 14. Work-Life Balance 15. Friendliness 16. Enthusiasm 17. Empathy
Creativity	<ol style="list-style-type: none"> 1. Problem Solving 2. Critical Thinking 3. Innovation 4. Troubleshooting 5. Design Sense 6. Artistic Sense
Professional Skills	<ol style="list-style-type: none"> 1. Organization 2. Planning

Category	Soft skill Progression
	3. Scheduling 4. Time Management 5. Meeting Management 6. Technology Savvy 7. Technology Trend Awareness 8. Business Trend Awareness 9. Research 10. Business Etiquette 11. Business Ethics 12. Diversity Awareness 13. Disability Awareness 14. Intercultural Competence 15. Training 16. Train the Trainer 17. Process Improvement 18. Knowledge Management 19. Writing Reports and Proposals 20. Customer Service 21. Entrepreneurial Thinking

Detailed overview analyzed job ads included with groundedness of codes

Table 32 Detailed overview analyzed job ads included with groundedness of codes

>> Groundedness of codes	Communications Gr=303; GS=8	Courtesy Gr=0; GS=0	Flexibility Gr=97; GS=19	Hard skills Gr=547; GS=1	Integrity Gr=116; GS=9	Interpersonal skills Gr=223; GS=20	Leadership Gr=261; GS=19	Positive attitude Gr=45; GS=10	Professionalism Gr=186; GS=29	Responsibility Gr=103; GS=9	Teamwork skills Gr=149; GS=7	Work ethics Gr=225; GS=25	Totals
VV Job ads													
2019-02-20 Aegon Chief Information Security Officer.docx Gr=11	1	0	1	4	0	2	5	2	0	0	4	2	21
2019-02-20 Blue Trail Interim Chief information Security Officer.docx Gr=12	1	0	0	5	0	3	2	0	0	0	0	1	12
2019-02-20 BVEB Chief Information Security Officer.docx Gr=13	1	0	1	8	0	1	2	0	1	0	2	1	17
2019-02-20 Computer Futures CISO.docx Gr=4	0	0	0	4	0	0	0	0	0	0	0	0	4
2019-02-20 TACS Chief Information, Security Officer WS.docx Gr=15	1	0	0	11	0	0	8	0	0	0	3	0	23
2019-02-20 Tennet CISO.docx Gr=16	4	0	0	11	1	2	5	1	1	1	2	2	30
2019-02-20 Veiligheidsregio Kennemerland - Haarlem Noord Chief information security officer Beveiligingsfunctionaris.docx Gr=27	6	0	1	16	2	2	7	1	2	0	5	0	42
2019-03-31 Adeptis Group Information Security Risk Compliance Officer.docx Gr=0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019-03-31 Aegon Chief Information Security Officer.docx Gr=12	2	0	3	5	0	3	4	1	0	0	1	3	22

>> Groundedness of codes														Totals
VV Job ads	Communications Gr=303; GS=8	Courtesy Gr=0; GS=0	Flexibility Gr=97; GS=19	Hard skills Gr=547; GS=1	Integrity Gr=116; GS=9	Interpersonal skills Gr=223; GS=20	Leadership Gr=261; GS=19	Positive attitude Gr=45; GS=10	Professionalism Gr=186; GS=29	Responsibility Gr=103; GS=9	Teamwork skills Gr=149; GS=7	Work ethics Gr=225; GS=25	Totals	
2019-03-31 BAM Infra Nederland Information Security Officer.docx Gr=21	3	0	2	13	1	0	3	0	2	2	4	2	32	
2019-03-31 Centraal Justitieel Incassobureau Chief Information Security Officer.docx Gr=11	3	0	0	5	1	2	0	1	0	0	2	2	16	
2019-03-31 CPI Governance Partner Cyber Security Privacy.docx Gr=13	5	0	0	6	0	6	4	1	0	0	0	0	22	
2019-03-31 CQure CISO een zorginstelling.docx Gr=22	7	0	0	11	1	2	2	0	2	0	2	6	33	
2019-03-31 cQure CISO middelgrote gemeente.docx Gr=15	2	0	0	9	0	1	1	1	2	0	3	2	21	
2019-03-31 Deloitte Chief Information Security Officer.docx Gr=26	4	0	0	16	0	3	7	3	0	0	3	0	36	
2019-03-31 IB P Security Officer CISO.docx Gr=13	1	0	3	6	1	1	1	1	1	1	3	1	20	
2019-03-31 Isatis Group BV Security and Privacy Officer medior en senior.docx Gr=10	2	0	0	8	0	0	0	0	0	0	0	1	11	
2019-03-31 MN Information Security Officer.docx Gr=0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2019-03-31 PGGM Senior Information Security Officer.docx Gr=0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2019-03-31 Place ICT Security Officer.docx Gr=7	2	0	0	4	0	0	0	0	0	1	0	1	8	

>> Groundedness of codes	Communications Gr=303; GS=8	Courtesy Gr=0; GS=0	Flexibility Gr=97; GS=19	Hard skills Gr=547; GS=1	Integrity Gr=116; GS=9	Interpersonal skills Gr=223; GS=20	Leadership Gr=261; GS=19	Positive attitude Gr=45; GS=10	Professionalism Gr=186; GS=29	Responsibility Gr=103; GS=9	Teamwork skills Gr=149; GS=7	Work ethics Gr=225; GS=25	Totals
VV Job ads													
2019-03-31 Provincie Flevoland Chief Information Security Officer Privacy Officer.docx Gr=18	1	0	0	12	0	2	1	0	2	1	2	2	23
2019-03-31 Werkorganisatie CGM Gemeente Mill en Sint Hubert Adviseur Informatiebeveiliging en privacybescherming.docx Gr=5	1	0	0	3	1	1	0	2	0	0	1	2	11
2019-04-28 Artsen zonder Grenzen Information Security Officer.docx Gr=16	4	0	0	9	1	2	1	2	2	1	0	2	24
2019-04-28 Brandweer Adviseur Informatieveiligheid.docx Gr=16	4	0	0	10	1	2	3	2	1	0	1	1	25
2019-04-28 CBG MEB Adviseur informatiebeveiliging en privacy.docx Gr=18	3	0	2	6	0	1	5	0	3	0	1	3	24
2019-04-28 CGI Nederland Chief Operational Security Officer.docx Gr=4	0	0	1	2	0	0	0	0	0	0	1	1	5
2019-04-28 Dictu Adviseur informatiebeveiliging.docx Gr=12	4	0	1	9	0	0	0	0	1	0	1	0	16
2019-04-28 Dignitas Adviseur informatiebeveiliging.docx Gr=16	4	0	0	11	0	0	1	0	1	0	2	2	21
2019-04-28 Gemeente Amsterdam Information Security Officer.docx Gr=17	3	0	1	8	1	0	4	2	2	0	2	1	24

>> Groundedness of codes	Communications Gr=303; GS=8	Courtesy Gr=0; GS=0	Flexibility Gr=97; GS=19	Hard skills Gr=547; GS=1	Integrity Gr=116; GS=9	Interpersonal skills Gr=223; GS=20	Leadership Gr=261; GS=19	Positive attitude Gr=45; GS=10	Professionalism Gr=186; GS=29	Responsibility Gr=103; GS=9	Teamwork skills Gr=149; GS=7	Work ethics Gr=225; GS=25	Totals
VV Job ads													
2019-04-28 Gemeente Bergen Adviseur Informatiebeveiliging.docx Gr=7	1	0	0	2	0	1	0	0	2	0	1	1	8
2019-04-28 Gemeente Den Helder Chief Information Security Officer.docx Gr=17	3	0	1	8	0	0	1	1	2	0	4	4	24
2019-04-28 Gemeente Deurne Chief Information Security Officer.docx Gr=13	2	0	0	6	0	0	4	1	0	0	1	3	17
2019-04-28 Gemeente Haarlemmermeer Adviseur Informatie Beveiliging.docx Gr=21	3	0	0	13	0	0	1	0	1	0	5	2	25
2019-04-28 Gemeente Medemblik Chief Information Security Officer.docx Gr=8	1	0	1	3	1	0	1	0	0	0	1	1	9
2019-04-28 ING Chief Information Security Officer.docx Gr=26	2	0	1	17	0	3	4	2	1	0	3	3	36
2019-04-28 Insite Security Adviseur Informatiebeveiliging.docx Gr=15	3	0	0	4	0	1	2	1	0	0	2	5	18
2019-04-28 Kennisnet Sr adviseur informatiebeveiliging.docx Gr=23	10	0	1	4	0	2	2	0	3	5	2	4	33
2019-04-28 KPMG Information Security ISMS Manager.docx Gr=24	3	0	0	11	0	2	6	0	2	0	4	0	28
2019-04-28 macee Adviseur Informatie Beveiliging.docx Gr=27	4	0	1	18	0	1	1	0	2	0	1	0	28

>> Groundedness of codes	Communications Gr=303; GS=8	Courtesy Gr=0; GS=0	Flexibility Gr=97; GS=19	Hard skills Gr=547; GS=1	Integrity Gr=116; GS=9	Interpersonal skills Gr=223; GS=20	Leadership Gr=261; GS=19	Positive attitude Gr=45; GS=10	Professionalism Gr=186; GS=29	Responsibility Gr=103; GS=9	Teamwork skills Gr=149; GS=7	Work ethics Gr=225; GS=25	Totals
VV Job ads													
2019-04-28 Ministerie van Algemene Zaken Adviseur privacy en informatiebeveiliging.docx Gr=8	2	0	2	3	0	0	2	0	0	1	0	2	12
2019-04-28 Ministerie van Defensie Adviseur Informatie Beveiliging.docx Gr=6	3	0	0	3	0	0	2	0	0	0	1	0	9
2019-04-28 Ministerie van VWS Adviseur informatiebeveiliging en privacy.docx Gr=50	4	0	5	5	2	4	8	0	10	5	1	5	49
2019-04-28 Servicepunt71 Chief Information Security Officer.docx Gr=51	7	0	3	11	4	5	5	0	1	5	5	7	53
2019-04-28 SLTN Inter Access Adviseur informatiebeveiliging.docx Gr=15	3	0	0	8	0	2	0	0	1	1	0	0	15
2019-04-28 Spaarne Gasthuis Chief Information Security Officer.docx Gr=34	3	0	2	7	1	3	4	0	5	1	4	6	36
2019-04-28 Talenter Adviseur privacy informatiebeveiliging.docx Gr=47	7	0	2	7	4	7	7	0	3	6	1	3	47
2019-04-28 Veiligheidsregio Kennemerland Chief information security officer beveiliging.docx Gr=61	10	0	1	14	5	5	10	1	5	1	6	4	62
2019-04-28 Veiligheidsregio Zuid-Holland Zuid Adviseur Informatieveiligheid.docx Gr=33	7	0	0	10	1	1	7	0	1	4	1	3	35

>> Groundedness of codes														Totals
VV Job ads	Communications Gr=303; GS=8	Courtesy Gr=0; GS=0	Flexibility Gr=97; GS=19	Hard skills Gr=547; GS=1	Integrity Gr=116; GS=9	Interpersonal skills Gr=223; GS=20	Leadership Gr=261; GS=19	Positive attitude Gr=45; GS=10	Professionalism Gr=186; GS=29	Responsibility Gr=103; GS=9	Teamwork skills Gr=149; GS=7	Work ethics Gr=225; GS=25	Totals	
2019-04-28 Waterschap Hollandse Delta Adviseur ICT beveiliging.docx Gr=0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2019-04-28 Werken voor Nederland Chief Information Security Officer.docx Gr=39	8	0	2	11	3	4	3	0	4	1	1	3	40	
2019-05-30 Argenta Information Security Officer.docx Gr=45	6	0	3	10	4	5	1	2	4	3	3	7	48	
2019-05-30 College ter Beoordeling van Geneesmiddelen Corporate information security officer privacy officer.docx Gr=81	12	0	5	8	5	10	9	1	8	9	0	18	85	
2019-05-30 Computer Futures Information Security Officer.docx Gr=0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2019-05-30 Cqure Adviseur Informatiebeveiliging.docx Gr=0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2019-05-30 Dignitas International Senior IT Security Consultant Senior Adviseur Informatiebeveiliging.docx Gr=30	3	0	2	5	2	1	4	0	5	0	3	8	33	
2019-05-30 Experis CISO Officer.docx Gr=25	2	0	2	5	1	2	10	0	2	0	1	0	25	
2019-05-30 Geldmaat Information Security Officer.docx Gr=22	1	0	0	5	6	3	1	1	3	2	0	0	22	
2019-05-30 Gemeente Brummen Informatiemanager	5	0	7	8	4	3	5	0	2	3	1	6	44	

>> Groundedness of codes															Totals
VV Job ads	Communications Gr=303; GS=8	Courtesy Gr=0; GS=0	Flexibility Gr=97; GS=19	Hard skills Gr=547; GS=1	Integrity Gr=116; GS=9	Interpersonal skills Gr=223; GS=20	Leadership Gr=261; GS=19	Positive attitude Gr=45; GS=10	Professionalism Gr=186; GS=29	Responsibility Gr=103; GS=9	Teamwork skills Gr=149; GS=7	Work ethics Gr=225; GS=25			
CISO.docx Gr=41															
2019-05-30 Gemeente Nieuwkoop Adviseur Informatisering.docx Gr=0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2019-05-30 Gemeente Westland Functionaris gegevensbescherming.docx Gr=0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2019-05-30 Gemeenten Achtkarspelen Tytsjerksteradiel Chief Information Security Officer.docx Gr=32	7	0	0	5	1	6	3	0	3	2	1	5		33	
2019-05-30 IBP BV Security Officer CISO.docx Gr=42	3	0	4	11	4	7	5	1	3	2	2	4		46	
2019-05-30 Interexcelent Chief Information Officer.docx Gr=41	8	0	1	8	8	6	1	0	8	3	2	1		46	
2019-05-30 Job Leads Beveiligingsfunctionaris.docx Gr=28	6	0	0	4	5	2	7	0	1	1	3	1		30	
2019-05-30 Job Leads Chief Inforation Officer.docx Gr=26	6	0	1	3	0	3	4	4	2	0	1	5		29	
2019-05-30 Kadaster Chief Information Security Officer.docx Gr=47	1	0	2	9	2	10	10	1	5	3	0	11		54	
2019-05-30 Min van EZ Klimaat en Landbouw Natuur en Voedselkwaliteit Adviseur Informatiebeveiliging en	5	0	2	4	2	7	2	0	2	2	2	3		31	

>> Groundedness of codes	Communications Gr=303; GS=8	Courtesy Gr=0; GS=0	Flexibility Gr=97; GS=19	Hard skills Gr=547; GS=1	Integrity Gr=116; GS=9	Interpersonal skills Gr=223; GS=20	Leadership Gr=261; GS=19	Positive attitude Gr=45; GS=10	Professionalism Gr=186; GS=29	Responsibility Gr=103; GS=9	Teamwork skills Gr=149; GS=7	Work ethics Gr=225; GS=25	Totals
VV Job ads													
privacy.docx Gr=29													
2019-05-30 Ministerie van BZK Coördinerend beleidsmedewerker informatiebeveiliging.docx Gr=30	2	0	4	2	2	5	4	1	4	4	4	4	36
2019-05-30 Ministerie van Infrastructuur en Waterstaat Senior adviseur informatiebeveiliging.docx Gr=47	9	0	2	7	4	8	5	0	10	1	4	5	55
2019-05-30 Ministerie van Volksgezondheid Welzijn en Sport Corporate information security officer.docx Gr=0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019-05-30 ROC Horizon College Adviseur informatievoorziening met aandachtsgebied security management.docx Gr=41	4	0	3	5	2	7	7	0	6	3	3	4	44
2019-05-30 Spaarne Gasthuis Chief Information Security Officer.docx Gr=21	3	0	1	5	2	6	3	0	3	0	2	1	26
2019-05-30 TPC Online Chief Information Security Officer.docx Gr=31	6	0	0	4	6	2	7	0	2	1	2	1	31
2019-05-30 Waterschap Hollandse Delta Functionaris voor de Gegevensbescherming.docx Gr=0	0	0	0	0	0	0	0	0	0	0	0	0	0

>> Groundedness of codes														Totals
VV Job ads	Communications Gr=303; GS=8	Courtesy Gr=0; GS=0	Flexibility Gr=97; GS=19	Hard skills Gr=547; GS=1	Integrity Gr=116; GS=9	Interpersonal skills Gr=223; GS=20	Leadership Gr=261; GS=19	Positive attitude Gr=45; GS=10	Professionalism Gr=186; GS=29	Responsibility Gr=103; GS=9	Teamwork skills Gr=149; GS=7	Work ethics Gr=225; GS=25	Totals	
2019-05-30 ZGT Chief Information Security Officer.docx Gr=26	3	0	4	5	1	1	0	0	2	4	3	3	26	
2019-06-30 jobleads de Chief Information Security Officer.docx Gr=26	7	0	1	5	0	5	3	1	5	0	2	3	32	
2019-06-30 Wesche en de Boer Chief Information Security Officer.docx Gr=36	10	0	3	7	2	6	2	1	4	4	3	7	49	
2019-06-30 Gemeenten Oldebroek en Hattem Chief Information Security Officer.docx Gr=31	3	0	3	8	2	5	0	1	6	4	2	3	37	
2019-06-30 Gemeente Leidschendam-Voorburg Chief Information Security Officer.docx Gr=29	2	0	1	2	3	5	4	1	4	4	3	2	31	
2019-06-30 Hogeschool Utrecht Corporate Information Security Officer.docx Gr=26	5	0	1	4	1	3	4	0	4	2	2	6	32	
2019-06-30 Fontys Chief Information Security Officer.docx Gr=26	4	0	0	5	3	6	4	0	5	2	3	5	37	
2019-06-30 Cqure CISO in een zorginstelling.docx Gr=35	7	0	0	5	3	4	5	0	6	5	2	5	42	
2019-06-30 Gemeente Amersfoort senior beleidsadviseur Informatiebeveiliging.docx Gr=0	0	0	0	0	0	0	0	0	0	0	0	0	0	

>> Groundedness of codes														
VV Job ads	Communications Gr=303; GS=8	Courtesy Gr=0; GS=0	Flexibility Gr=97; GS=19	Hard skills Gr=547; GS=1	Integrity Gr=116; GS=9	Interpersonal skills Gr=223; GS=20	Leadership Gr=261; GS=19	Positive attitude Gr=45; GS=10	Professionalism Gr=186; GS=29	Responsibility Gr=103; GS=9	Teamwork skills Gr=149; GS=7	Work ethics Gr=225; GS=25	Totals	
2019-06-30 Gemeente Doorn Chief Information Security Officer.docx Gr=32	8	0	1	6	3	6	2	3	3	0	3	2	37	
2019-06-30 VNG Corporation Chief Information Security Officer.docx Gr=12	2	0	0	2	0	3	2	0	2	1	2	2	16	
2019-06-30 Ministerie van Justitie en Veiligheid Adviseur informatiebeveiliging.docx Gr=19	3	0	5	3	2	3	2	1	3	0	0	6	28	
2019-06-30 4 freelancers Senior adviseur informatiebeveiliging.docx Gr=12	2	0	0	2	2	4	0	0	0	0	0	2	12	
2019-06-30 Experis CISO Officer.docx Gr=31	3	0	1	8	2	2	9	0	3	1	1	1	31	
2019-06-30 Insite Security Adviseur Informatiebeveiliging.docx Gr=0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Totals	303	0	97	547	116	223	261	45	186	103	149	225	2255	



HU Master of Informatics Thesis CISO soft skills CISO Perspectives

1. Welcome and introduction to the CISO soft skills CISO perspective

First of all we want to thank you very much for your interest in participating in our research. We, Richard Smit (1974) and Jeroen van Yperen Hagedoorn (1970), graduating the Masters of Informatics at the Utrecht University of Applied Sciences. Our graduation research is about the positive effects of soft skills on the leadership position of a Chief Information Security Officer (CISO) in Dutch companies with more than 500 employees.

Previous research has shown that, in addition to technical knowledge, the CISO must primarily possess soft skills to effectively support organizations, and therefore employees. Our aim of the research is to gain insight into which set of soft skills is most relevant. For our research, the CISO's view on soft skills is important.

The research, (a Delphi study), consists of two rounds of questions. Each round will take approximately 20 minutes of your time. Your response will be processed completely anonymously. During the survey you can pause and you will receive a reminder of picking up the survey at a later moment.

The first round consists of a broader collection of different opinions and insights. The second round consists of confirming the common denomination of the first round.

The first round of this study has 7 topics:

- Your current role
- Organisation information
- CISO position and team
- Soft skills relevance
- Soft skills ranking
- Leadership effect
- CISO recruitment

Finally, by completing the two survey rounds, you have a chance to win two Must Read books:

1 - work related: CISO COMPASS: Navigating Cybersecurity Leadership Challenges with Insights from Pioneers

2 - to relax and to learn: Phoenix Project A Novel about It, Devops, and Helping Your Business Win.

To win this prize you must complete the questionnaire completely, participate at the second round of this Delphi study and enter your e-mail address at the last page. Note: Your email address is stored separately from your response so that anonymity of the processed responses to the survey remains guaranteed.

If you have any questions or comments about the research, please contact us by telephone: +31 61 55 686 16 or email jeroen.vanyperen@student.hu.nl

Thank you again for participating in this study.

Jeroen MJ van Yperen Hagedoorn

2. Your current role

This section covers your current role and time in your role. These details are to understand what audience participates in the research. These details are anonymous.

Q1. Function: Which of the following best describes your role in the organization you currently work for?

- ☐ Chief Information Security Officer (Primary function)
- ☐ Chief Information Security Officer role (CISO as a role next to other roles/function)
- ☐ Information Security Officer (Primary function)
- ☐ Information Security Officer role (ISO as a role next to other roles/function)
- ☐ Other (please specify):

Comments:

Q2. Work history: how long have you held your current role?

- ☐ 1-2 years
- ☐ 3-5 years
- ☐ 6-10 years
- ☐ more than 10 years

Comments:

Q3. What is your highest education?

- ☐ PHD/Academic
- ☐ Master level/Academic
- ☐ Bachelor/Applied science
- ☐ High school
- ☐ Other (please specify):

Comments:

Q4. Do you have a security certification?(please select all that apply)

- ☐ CompTIA Security+
- ☐ CCNA Security
- ☐ CISA
- ☐ CCNP Security
- ☐ Certified Ethical Hacker (CEH)
- ☐ CISM
- ☐ Computer Hacking Forensic Investigator (CHFI)
- ☐ CRISC
- ☐ CISSP
- ☐ Certified Information Privacy Professional
- ☐ Other (please specify):

Comments:

Q5. What is your professional background prior to your CISO role?(please select all that apply)

- ☐ Information Management background (IM/Product owner/etc.)
- ☐ Technical background (IT/Infrastructure/Networking/etc.)
- ☐ Compliance background (Quality control/internal auditor/etc.)
- ☐ Other (please specify):

Comments:

3. Organisational information

Our research is limited to Dutch organisations. This could be an organisation entirely in the Netherlands, a Dutch organisation with international subsidiaries or Dutch subsidiary of an international organisation.

Q6. Are you employed in a Dutch organisation?

- ☐ Yes, a Dutch organisation
- ☐ Yes, a Dutch organisation with international subsidiaries
- ☐ Yes, a Dutch subsidiary of an international organisation
- ☐ No, not working for a Dutch organisation

Comments:

Q7. How many employees are working within your organization?

- ☐ <500
- ☐ 500 and more (in NL)
- ☐ 500 and more (in NL and other countries)

Comments:

Q8. What is the category of the organization you work for?

- ☐ Accommodation and food service activities
- ☐ Activities of households as employers; undifferentiated goods and service- producing activities of households for own use
- ☐ Agriculture, forestry and fishing
- ☐ Construction
- ☐ Consultancy, research and other specialised business services
- ☐ Culture, sports and recreation
- ☐ Education
- ☐ Electricity, gas, steam and air conditioning supply
- ☐ Extraterritorial organisations and bodies
- ☐ Financial institutions

- ☐ Human health and social work activities
- ☐ Information and communication
- ☐ Manufacturing
- ☐ Mining and quarrying
- ☐ Other service activities
- ☐ Public administration, public services and compulsory social security
- ☐ Renting and leasing of tangible goods and other business support services
- ☐ Renting, buying and selling of real estate
- ☐ Transportation and storage
- ☐ Water supply; sewerage, waste management and remediation activities
- ☐ Wholesale and retail trade; repair of motor vehicles and motorcycles
- ☐ Other (please specify):

Comments:

4. CISO position

These questions are focussed on your position in the organisation.

Q9. How are you as a CISO employed?

- ☐ Full time position
- ☐ Part time position, all hour as CISO role
- ☐ Combined role (i.e. combined with Privacy Officer)
- ☐ Other (please specify):

Comments:

Q10. Where are you, as the CISO, positioned in the organisational hierarchy?

- ☐ Direct report to Chief Executive Officer (Algemeen directeur / College voorzitter)
- ☐ Direct report to Chief Financial Officer (Financieel directeur)
- ☐ Direct report to Chief Information Officer (IT directeur / Directeur informatievoorziening)
- ☐ Direct report to IT manager or equivalent role
- ☐ Other (please specify):

Comments:

Q11. To whom do you report the security status?(please select all that apply)

- ☐ The board
- ☐ The Chief Executive Officer (Algemeen directeur / College voorzitter)
- ☐ The Chief Financial Officer (Financieel directeur)
- ☐ The Chief Information Officer (IT directeur / Directeur)
- ☐ The IT manager or equivalent role
- ☐ Other (please specify):

Comments:

Q12. Do you, as the CISO, have a team of security personnel or other direct reports that carry tasks related to securing your corporate information?

- ☐ Yes
- ☐ No

Comments:

5. CISO team

These details are to get an insight of how the average CISO's team is sized.

Q13. How many Security personnel or other direct reports that carry tasks of securing your corporate information are in the security team?

- ☐ 1-10
- ☐ 11-20
- ☐ 21-30
- ☐ More then 30

Comments:

6. Soft skills relevance

This section asks questions on the relevance of soft skills for the CISO.

The term soft skills is a very broad term and for this questionnaire we adopted the Cambridge Dictionary definition of soft skills:

"People's abilities to communicate with each other and work well together."

Q14. Do you agree with the following statements on soft skills?

	Extremely	Very	Moderately	slightly	Not at all	Do not know
Are you familiar with soft skills?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are soft skills relevant for the CISO?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you experience the effect of having soft skills when interacting with others in your organization?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you see the benefit of variations in soft skills for influencing different audiences (like: business leaders, the users or the IT department)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you appreciate working with different sets of soft skills for influencing different audiences (like: business leaders, the users or the IT department)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have you experienced a positive effect from using different sets of soft skills for influencing different audiences (like: business leaders, the users or the IT department)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are the soft skills needed different per type of organisation (i.e. education has different soft skill needs than financial institutions)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

Q15. Have you observed which group demands a better demonstration of CISO soft skills: business leaders, the users or the IT department?(please select all that apply)

- ☐ Business leaders
- ☐ The users in the organisation
- ☐ The IT department
- ☐ Other (please specify):

Comments:

Q16. From research we know that the soft skills are influenced by multiple factors. We have found in research, by Marcel Robles, that business leaders benefit from soft skills. The following soft skills are relevant in a leadership position: 1 - Communications 2 - Courtesy 3 - Flexibility 4 - Integrity 5 - Interpersonal skills 6 - Leadership 7 - Positive attitude 8 - Professionalism 9 - Responsibility 10 - Teamwork skills 11 - Work ethics. Would you add any other soft skills to this list?

Comments:

--

7. Ranking soft skills

In the previous question we showed the soft skills found by Marcel Robles in an alphabetic order. Could you rank these soft skills and your additional soft skills in the order of relevance.

Q17. We analyzed CISO job ads over the period of January - July 2019 published at the major Dutch recruitment websites. The analyses of these collected job ads show the following ranking of soft skills that are in demand by Dutch organisations. If you see the outcome of the ranking, would you change the order of relevance, viewed from your perspective? We also added your additional soft skills, so you are able to include these in the ranking.

Communications	<input type="text"/>
Leadership	<input type="text"/>
Work ethics	<input type="text"/>
Interpersonal skills	<input type="text"/>
Professionalism	<input type="text"/>
Teamwork skills	<input type="text"/>
Integrity	<input type="text"/>
Responsibility	<input type="text"/>
Flexibility	<input type="text"/>
Positive attitude	<input type="text"/>
Courtesy	<input type="text"/>
[question(11018909,88653862)]	<input type="text"/>
[question(11018909,88653863)]	<input type="text"/>
[question(11018909,88653864)]	<input type="text"/>
[question(11018909,88653865)]	<input type="text"/>
[question(11018909,88653866)]	<input type="text"/>

Comments:

Q18. In the analysed CISO job ads from Dutch organisations, we could match all the soft skills identified by Marcel Robles, except one: Courtesy. The research of Marcel Robles, US based, has identified courtesy as a one of the soft skills that positively effect a leadership position. Which statement could explain the absence of the need for the soft skill courtesy in Dutch CISO job ads

- ☐ Courtesy is embedded in the Dutch culture and therefor not a distinct soft skill
- ☐ Courtesy is part of every soft skill
- ☐ Courtesy is not a relevant soft skill for a Dutch CISO
- ☐ Courtesy is not a relevant soft skill for Dutch organisations
- ☐ Other (please specify):

Comments:

8. Leadership style and effect

A CISO has a leadership position. These questions are to get an insight in the leadership style and position of the CISO.

Q19. Leadership styles.

	Extremely	Very	Moderately	slightly	Not at all	Do not know
Are you familiar with variations in leadership styles?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

Q20. Which type of leadership style should a CISO have?

- ☐ Leadership by management position (leadership style based on a hierarchy position)
- ☐ Transactional leadership (leadership style based on rewards and controls in exchange for achieving previously defined governance goals)
- ☐ Transformational leadership (leadership style based on lead by good example and motivate followers to identify with them)
- ☐ Combination of Transactional and Transformational leadership
- ☐ Other (please specify):

Comments:

Q21. Do you agree with the following statements on CISO leadership and soft skills.

	Extremely	Very	Moderately	slightly	Not at all	Do not know
The CISO will function at her/his best when they have a leadership position.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The CISO should be able to demonstrate specific leadership styles in various situations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The CISO has a better leadership experience with soft skills.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The CISO should be able to demonstrate specific soft skills in various situations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

9. CISO recruitment

This last section is about your recruitment as the CISO.

Q22. Did you apply to your current role based on a job ad?

- ☐ Yes, I applied based on a job ad
- ☐ No, there was no job ad/I got informed in another way
- ☐ Other (please specify):

Comments:

Q23. Does your job description have a focus on soft skills? For the framing of soft skills we adopted the Cambridge dictionary definition: "People's abilities to communicate with each other and work well together." Hard skills are a list of skills an individual can learn in a school / training setting for job related skills. Examples for a CISO are: CISM / CISSP, Ethical hacking, Security budgeting, etc.

- ☐ Yes, soft skills required are clearly described in the job description
- ☐ Yes, although the soft skill required are not clearly described
- ☐ No, the required soft skills are not described
- ☐ No, the job description only lists the required hard skills

Comments:

Q24. Do you agree with the following statements on CISO recruitment.

	Extremely	Very	Moderately	slightly	Not at all	Do not know
Would you be involved in the recruitment process of the next CISO?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do soft skills have priority in selecting the best fit CISO?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is it relevant that the CISO job ad describes the soft skills needed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Would you be able to interpret the soft skills described?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q25. If you have two candidates when recruiting the next CISO:- one with the best-fit hard skills (i.e. security certifications and experienced in security technology used) that directly align with your type of business- the other with best-developed soft skills who would need additional training for understanding your type of business. Which candidate would you advise to be hired?

- ☐ The candidate with best fit hard skills
- ☐ The candidate with best developed soft skills, but trainable for hard skills
- ☐ None of these candidates
- ☐ Other (please specify):

Comments:

10. Thank you!

Thank you for your co-operation in the first round of this Delphi study.

We will process all the responses from you and your peers. After we have processed the responses, we will issue another survey to confirm the common denomination of the first round. We hope we can rely on your contribution in the second round.

Below you can add your email address if you want to participate in the draw for the two books:

1 - work related: CISO COMPASS: Navigating Cybersecurity Leadership Challenges with Insights from Pioneers

2 - to relax and to learn: Phoenix Project A Novel about It, Devops, and Helping Your Business Win.

This draw will be held at the end of the second round of our survey.

Thank you again for participating in our surveys.

Jeroen MJ van Yperen Hagedoorn

Q26. Please enter your email address:

Delphi Study round 1 CISO analysis

Due to the document size we included a separate file with the details of the analysis. For the content of the Delphi Study round 1 CISO analysis please see attached html file: Delphi Study round 1 CISO analysis.html.

For easy scrolling in the html file, you can select the simple view:





HU Master of Informatics Thesis CISO soft skills CISO Perspectives Round 2 Peer Validation

1. Welcome and introduction to the second round of the CISO soft skills CISO perspective study

Thank you again for your interest in participating in the second round of our research. We, Richard Smit (1974) and Jeroen van Yperen Hagedoorn (1970) graduating the Master of Informatics at the Utrecht University of Applied Sciences analysed your input from the first round. This second round of our graduation research is about the positive effects of soft skills on the leadership position of a Chief Information Security Officer (CISO) in Dutch companies with more than 500 employees.

The second round of our research (a Delphi study) consists of confirming the common denomination of the first round. This means that we will ask you if you agree with the outcome of the consensus of the first round on the same questions. The structure of most of the questions is:

show the captured input from round 1 (due to graphics we advise you to use a tablet or laptop/PC),

and ask if you agree with the consensus of the responders.

The second round of this study has five topics:

- Your position and organisation (again - we process this survey anonymously).
- Soft skills relevance
- Soft skills ranking
- Leadership effect
- CISO recruitment

Like the first round, the processing of this survey is entirely anonymously. During this survey, you can pause at any time, and you will receive a reminder of picking up the survey at a later moment.

Please do not forget. By completing this second survey round, you have a chance to win two Must-Read books:
1 - Work-related: CISO COMPASS: Navigating Cybersecurity Leadership Challenges with Insights from Pioneers
2 - To relax and to learn: Phoenix Project A Novel about IT, DevOps, and Helping Your Business Win.
To win this prize, you must complete the questionnaire entirely and enter your email address on the last page.

Note: Your email address is stored separately from your response so that the anonymity of the processed responses to the survey remains guaranteed.

If you have any questions or comments about the research, please contact us by telephone: +31 61 55 686 16 or email jeroen.vanyperen@student.hu.nl.

Thank you again for participating in this study.

Jeroen MJ van Yperen Hagedoorn

2. Organisational information

Our research is limited to Dutch organisations. This could be an organisation entirely in the Netherlands, a Dutch organisation with international subsidiaries or Dutch subsidiary of an international organisation.

Q1. Function: Which of the following best describes your role in the organization you currently work for?

- ☐ Chief Information Security Officer (Primary function)
- ☐ Chief Information Security Officer role (CISO as a role next to other roles/function)
- ☐ Information Security Officer (Primary function)
- ☐ Information Security Officer role (ISO as a role next to other roles/function)
- ☐ Other (please specify):

Comments:

Q2. Are you employed in, or working as a contractor for, a Dutch organisation?

- ☐ Yes, a Dutch organisation
- ☐ Yes, a Dutch organisation with international subsidiaries
- ☐ Yes, a Dutch subsidiary of an international organisation
- ☐ No, not working for a Dutch organisation

Comments:

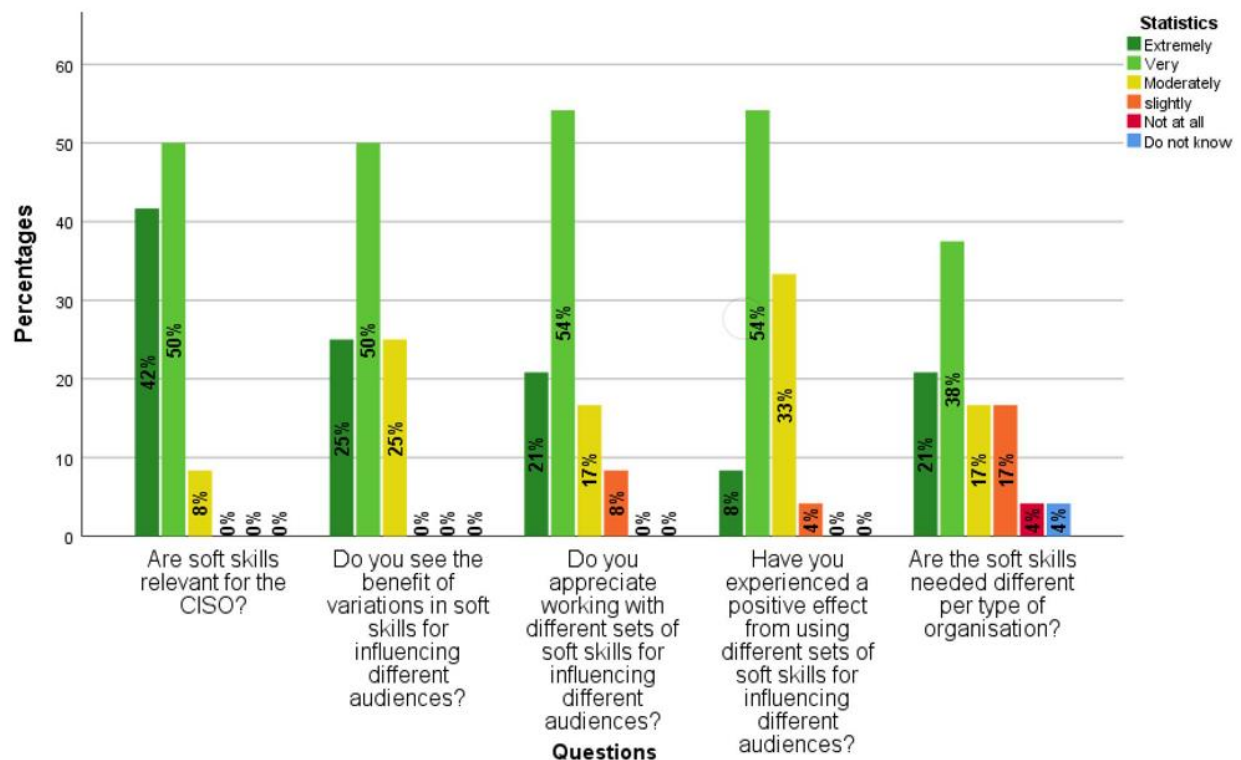
Q3. How many employees are working within your organization where you are employed in, or working/have worked for as a contractor?

- ☐ < 500
- ☐ 500 or more (office in NL only)
- ☐ 500 or more (in NL and other countries)

Comments:

3. Soft skills relevance (1 of 2)

Q4. In round 1, we asked you for your opinion on soft skills relevance. Below is the outcome of round 1:



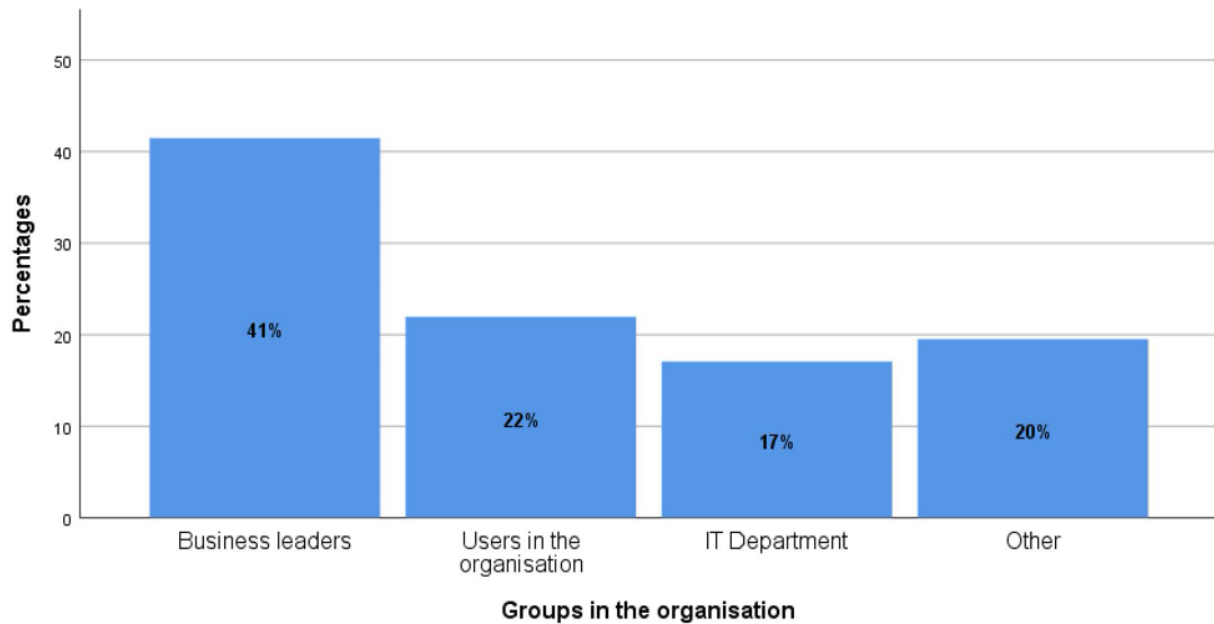
The majority of the responders selected Very as the best-fit answer. With the knowledge of the responses of your peers, we would like to ask you how much do you agree with the outcome of Very relevant. *

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Do you agree with the responders' consensus of Very relevant on the question: 'are soft skills relevant for the CISO?'.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you agree with the responders' consensus of Very relevant on the question: 'do you see the benefit of variations in soft skills for influencing different audiences (like: business leaders, the users or the IT department)?'.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you agree with the responders' consensus of Very relevant on the question: 'do you appreciate working with different sets of soft skills for influencing different audiences (like: business leaders, the users or the IT department)?'.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you agree with the responders' consensus of Very relevant on the question: 'have you experienced a positive effect from using different sets of soft skills for influencing different audiences (like: business leaders, the users or the IT department)?'.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you agree with the responders' consensus of Very relevant on the question: 'are the soft skills needed different per type of organisation (i.e. education has different soft skill needs than financial institutions)?'.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please elaborate on your answer (optional):

4. Soft skills relevance (2 of 2)

Q5. In round 1, we asked you if you have observed which group demands a better demonstration of CISO soft skills: business leaders, the users or the IT department? Below is the outcome of round 1 (please note that the question was choose all that apply):



Other = 33,3% (29,2% - all of the groups equal) With the knowledge of the responses of your peers, do you agree with the outcome that the Business leaders demand better demonstration of the CISO soft skills compared to the other groups? *

Do you agree with the outcome that the **Business leaders** demand better demonstration of the CISO soft skills compared to the other groups?

Strongly agree Agree Neutral Disagree Strongly disagree

☐ ☐ ☐ ☐ ☐

Please elaborate on your answer (optional):

5. Ranking soft skills (1 of 2)

Q6. We have asked you to rank the soft skill, researched by Marcel Robles, that business leaders benefit from and to add any soft skills if you found some that were missing. Below are the soft skills by Marcel Robles are ranked by means based on your responses. The ranking starts from most relevant to least relevant:

- 1 Communications
- 2 Leadership
- 3 Integrity
- 4 Interpersonal skills
- 5 Professionalism
- 6 Work ethics
- 7 Responsibility
- 8 Teamwork skills
- 9 Positive attitude
- 10 Flexibility
- 11 Courtesy

With the knowledge of the responses of your peers, do you agree with the ranking of the soft skills? *

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Do you agree with the ranking?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please elaborate on your answer (optional):

Q7. We asked you if any soft skills were missing from the soft skills found by Marcel Robles. Below are the additional soft skills that have been added by the responders (included with the number of recordings). We would like to know your opinion on the relevance of the additional soft skills. Please select the relevance soft skills below: *

	Extremely	Very	Moderately	Slightly	Not at all
Addressing accountability (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Be able to listen and hear (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Be humble (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Being Rational (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Convince (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Curious (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Decisiveness (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dedication (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Empathy (3x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Feeling security in heart and mind (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Interested (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Knowledge leader (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Patience (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Persuasion skills (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Extremely	Very	Moderately	Slightly	Not at all
Political wokeness (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Set the example (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Timeliness (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Understand the business (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

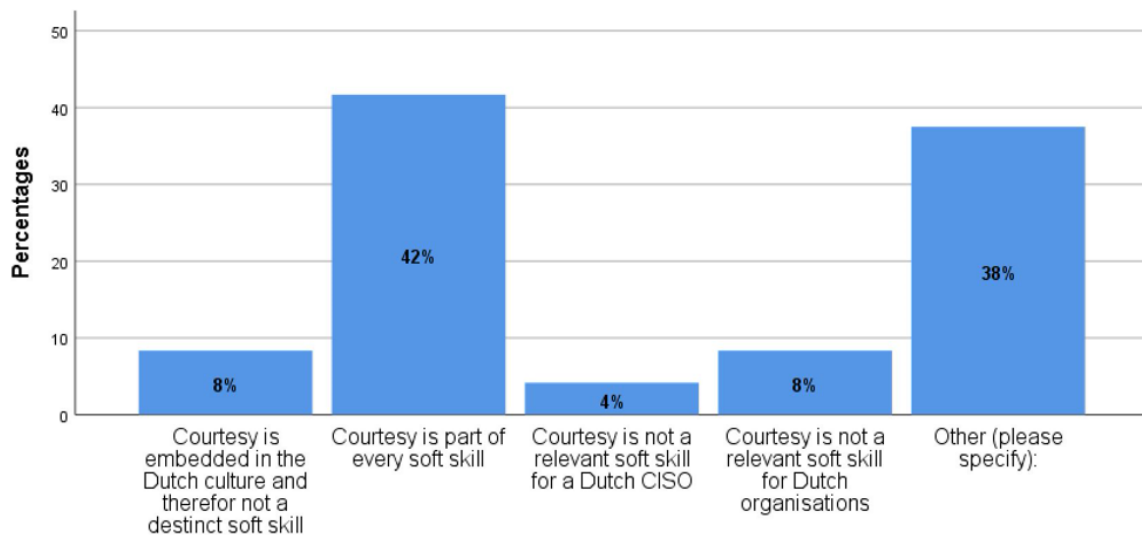
Please elaborate on your answer (optional):

6. Ranking soft skills (2 of 2)

Q8. In the preparation on the relevance of soft skills for the CISO, we analysed CISO job ads from Dutch organisations. From the CISO job ads, we could match all soft skills identified by Marcel Robles, except one: Courtesy. We asked which statement could explain the absence of the need for the soft skill courtesy in Dutch CISO job ads.

Below is the outcome from all of the responders: 41,7% of responder's states that **Courtesy is part of every soft skill**.

Question: In the analysed CISO job ads from Dutch organisations, we could match all the soft skills identified by Marcel Robles, except one: Courtesy.



Statements

Next to the original statements we added the additional statements supplied via the "other" option in the questionnaire. Below is the grouped response on the topic others:

Other: Courtesy could be less relevant for a Dutch CISO than the other soft skills

Other: Courtesy is not one of the strongest points of Dutch Managers.

Other: Courtesy is part of interpersonal skills Other: Courtesy is culture driven

Other: Courtesy is ALWAYS key. And it never hurts to be kind.

Other: Courtesy is seen as weakness

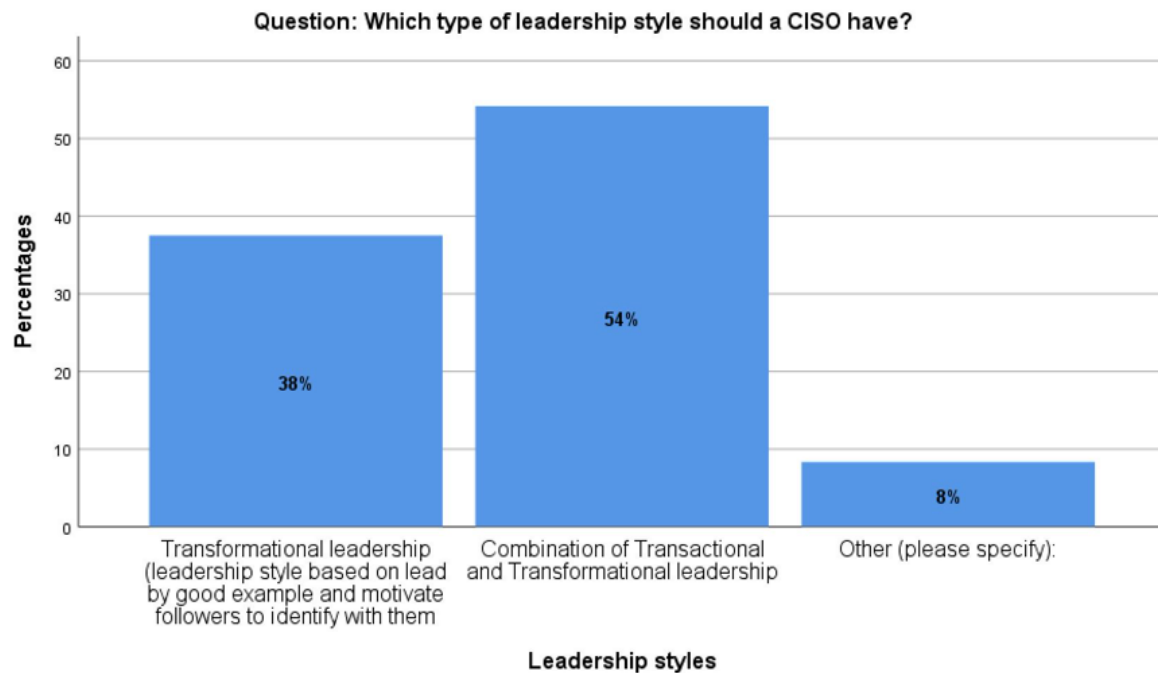
Do you agree with the with the consensus of the responders that **Courtesy is part of every soft skill for Dutch CISOs?** *

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Do you agree with the with the consensus of the responders that Courtesy is part of every soft skill?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please elaborate on your answer (optional):

7. Leadership style and effect (1 of 2)

Q9. In round 1, we asked your opinion on which type of leadership style a CISO should have? Find outcome of round one in the chart below: the majority of responders (54,2%) state that the **Combination of Transactional and Transformational leadership** is the most relevant leadership style a CISO should be able to demonstrate.



Do you agree with the consensus of the responders that the **Combination of Transactional and Transformational leadership** is the most relevant leadership style a CISO must have? *

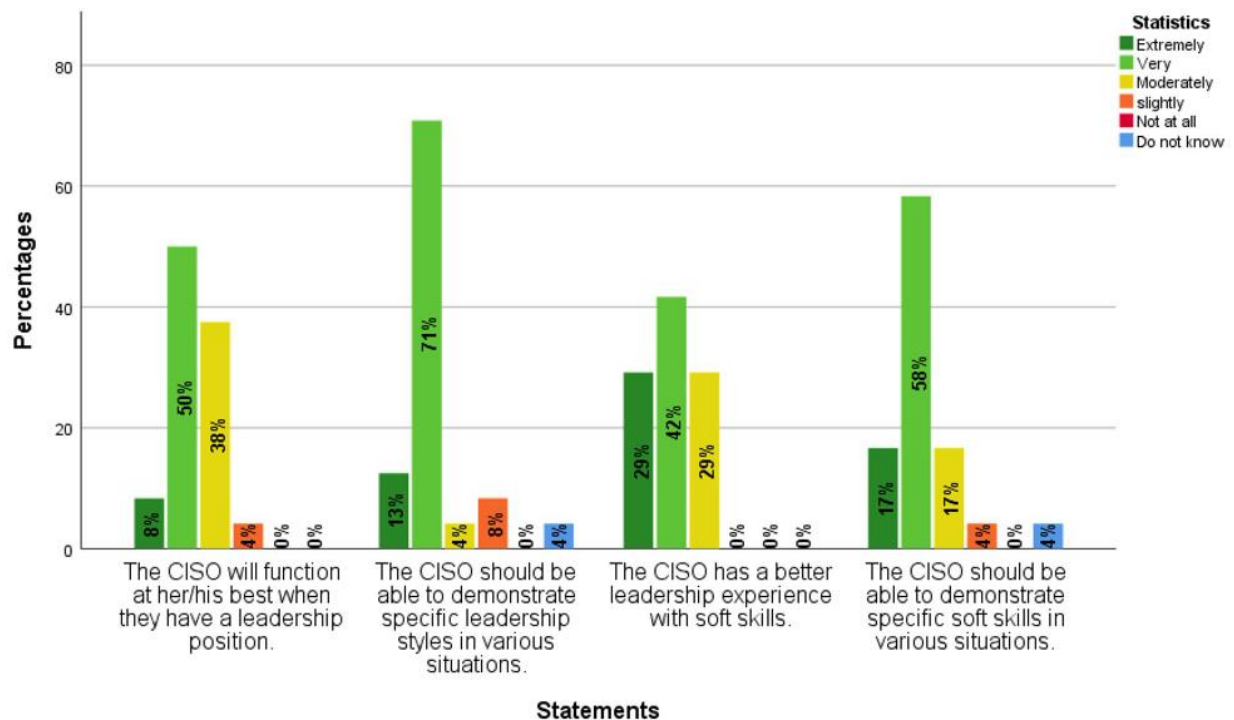
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Do you agree with the consensus of the responders that the Combination of Transactional and Transformational leadership is the most relevant leadership style a CISO must have?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please elaborate on your answer (optional):

8. Leadership style and effect (2 of 2)

Q10. In round 1, we asked you for your opinion on CISO leadership and soft skills.

The outcome is the majority of responders stated that all statements are Very relevant.



The majority of the responders selected **Very** as the best-fit answer. With the knowledge of the responses of your peers, we would like to ask you how much do you agree with the outcome of **Very** relevant. *

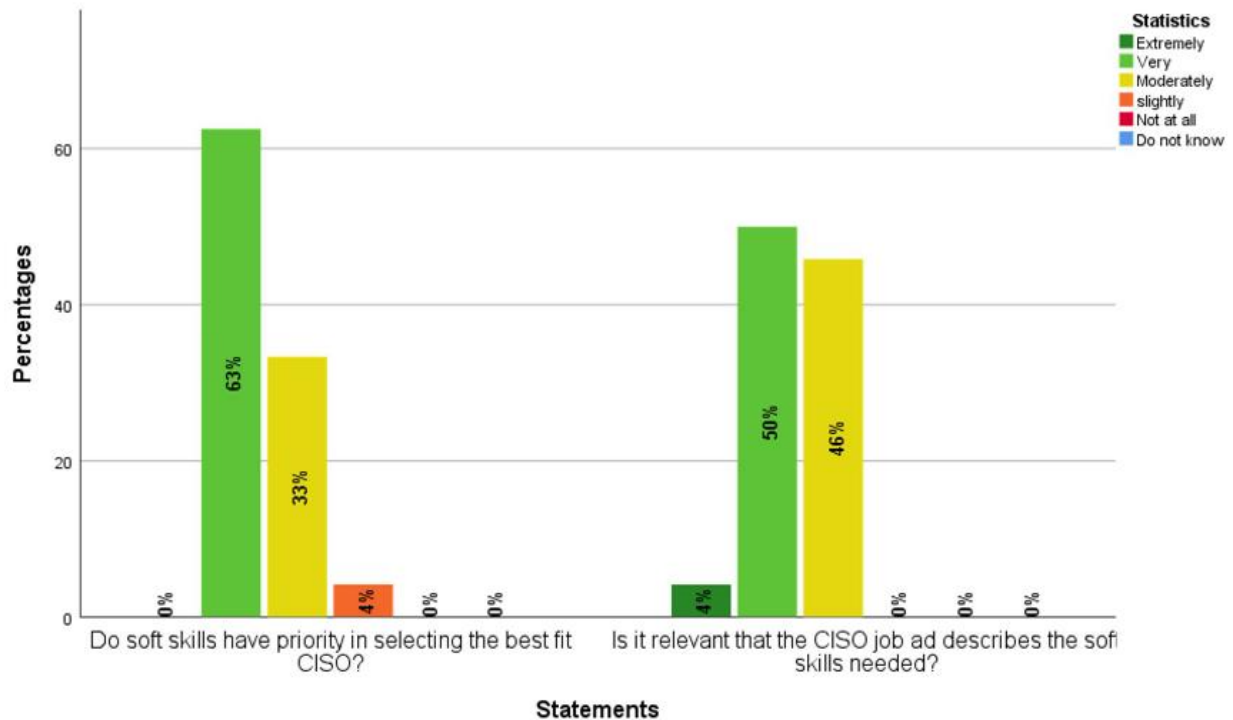
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Do you agree with the responders' consensus of Very relevant on the question: 'the CISO will function at her/his best when they have a leadership position?'.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you agree with the responders' consensus of Very relevant on the question: 'the CISO should be able to demonstrate specific leadership styles in various situations?'.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you agree with the responders' consensus of Very relevant on the question: 'the CISO has a better leadership experience with soft skills?'.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you agree with the responders' consensus of Very relevant on the question: 'the CISO should be able to demonstrate specific soft skills in various situations?'.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please elaborate on your answer(s) (optional)

9. CISO recruitment (1 of 2)

Q11. In round 1, we asked you for your opinion on statements on CISO leadership and soft skills.

The outcome is the majority of responders stated that all statements are **Very** relevant.



The majority of the responders selected **Very** as the best fit answer. With the knowledge of the responses of your peers, we would like to ask you how much do you agree with the outcome of **Very** relevant. *

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Do you agree with the responders' consensus of Very relevant on the question: 'do soft skills have priority in selecting the best fit CISO?'.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you agree with the responders' consensus of Very relevant on the question: 'is it relevant that the CISO job ad describes the soft skills needed?'.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please elaborate on your answer(s) (optional)

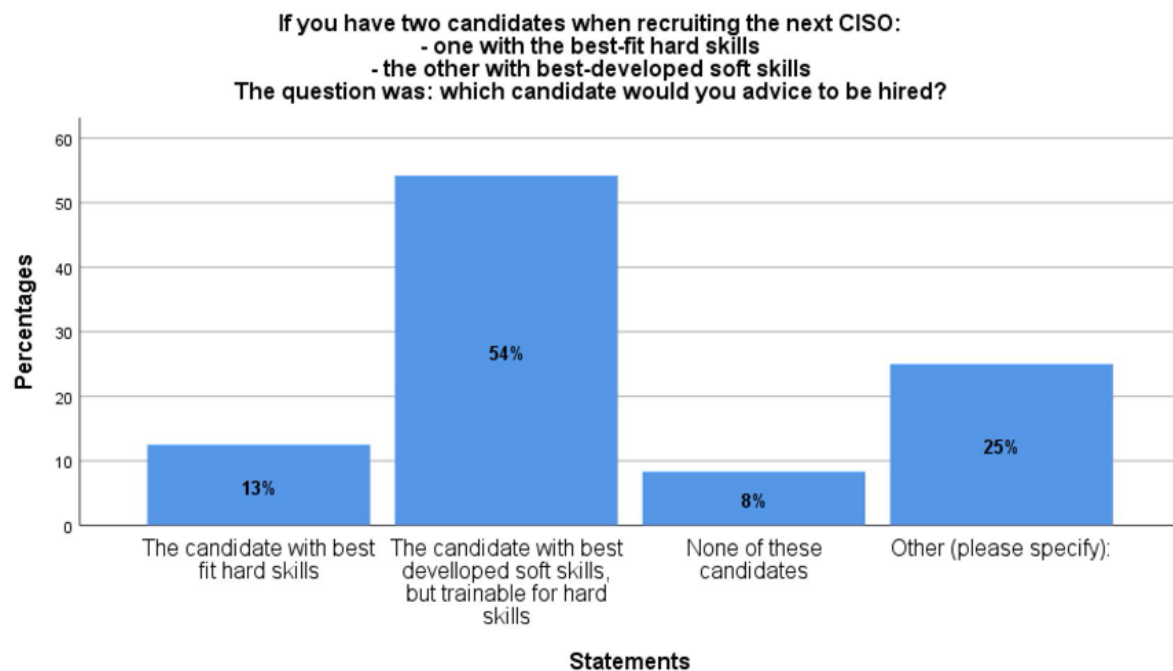
10. CISO recruitment (2 of 2)

Q12. In the first round of this survey, we described the following situation: 'if you have two candidates when recruiting the next CISO:

- one with the best-fit hard skills (i.e. security certifications and experience in security technology used) that directly align with your type of business
- the other with best-developed soft skills who would need additional training for understanding your type of business.

The question was: which candidate would you advise to be hired?'

The majority of the responders selected **the candidate with best-developed soft skills who would need additional training for understanding your type of** business as the best-fit answer. The majority of the answer option 'Other' can be grouped as 'It depends on the candidate'.



With the knowledge of the responses of your peers, we would like to know if you agree with the consensus of the responders that it is better to select the candidate with best developed soft skills, but trainable for hard skills. *

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Do you agree with the responders' consensus that it is better to select the candidate with best developed soft skills, but trainable for hard skills.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please elaborate on your answer(s) (optional)

11. Thank you!

Thank you for your co-operation with this second and last round of this Delphi study.
We will process all the responses from you and your peers.

Below you can add your email address if you want to participate in the draw for the two books:

- 1 - Work-related: CISO COMPASS: Navigating Cybersecurity Leadership Challenges with Insights from Pioneers
- 2 - To relax and to learn: Phoenix Project A Novel about It, DevOps, and Helping Your Business Win.

This draw will be held at the end of this survey.

Also, if you would like to receive a copy of our thesis report, please click the checkbox.

Thank you again for participating in our surveys.

Jeroen MJ van Yperen Hagedoorn

Q13. Would you like to receive a copy of the thesis report when available?

☐ Yes, send me a copy of the thesis report when available.

Q14. Please enter your email address:

Delphi Study round 2 CISO analysis

Due to the document size we included a separate file with the details of the analysis. For the content of the Delphi Study round 2 CISO analysis please see attached html file: Delphi Study round 2 CISO analysis.html.

For easy scrolling in the html file, you can select the simple view:





HU Master of Informatics Thesis CISO soft skills Business Leaders Perspectives

1. Welcome and introduction to the CISO soft skills Business Leaders perspective

First of all we want to thank you very much for your interest in participating in our research. We, Richard Smit (1974) and Jeroen van Yperen Hagedoorn (1970), graduating the Masters of Informatics at the Utrecht University of Applied Sciences. Our graduation research is about the positive effects of soft skills on the leadership position of a Chief Information Security Officer (CISO) in Dutch companies with more than 500 employees.

Previous research has shown that, in addition to technical knowledge, the CISO must primarily possess soft skills to effectively support organizations, and therefore employees. Our aim of the research is to gain insight into which set of soft skills is most relevant. For our research, it is not only the view from the CISO that is important. The business leaders of organizations also need a CISO that has the right set of competencies.

The research, (a Delphi study), consists of two rounds of questions. Each round will take approximately 20 minutes of your time. Your response will be processed completely anonymously. During the survey you can pause and you will receive a reminder of picking up the survey at a later moment.

The first round consists of a broader collection of different opinions and insights. The second round consists of confirming the common denomination of the first round.

The first round of this study has 7 topics:

- Your current role
- Organisation information
- CISO position and team
- Soft skills relevance
- Soft skills ranking
- Leadership effect
- CISO recruitment

Finally, by completing the two survey rounds, you have a chance to win two Must Read books:

- 1 - work related: A Leader's Guide to Cybersecurity: Why Boards Need to Lead--and How to Do It
- 2 - to relax and to learn: Phoenix Project A Novel about It, Devops, and Helping Your Business Win.

To win this prize you must complete the questionnaire completely, participate at the second round of this Delphi study and enter your e-mail address at the last page. Note: Your email address is stored separately from your response so that anonymity of the processed responses to the survey remains guaranteed.

If you have any questions or comments about the research, please contact us by telephone: +31 61 03 61 491 or email richard.smit@student.hu.nl

Thank you again for participating in this study.

Richard Smit

2. Your current role

This section covers your current role and time in your role. These details are to understand what audience participates in the research. These details are anonymous.

Q1. Function: Which of the following best describes your role in the organization you currently work for? These functions cover the most common Business Leader roles. If your role is not listed, please use the Other answer line.

- ☐ Chief Executive Officer (Algemeen directeur / College voorzitter)
- ☐ Chief Financial Officer (Financieel directeur)
- ☐ Chief Technology Officer (Technisch directeur)
- ☐ Chief Information Officer (IT directeur / Directeur informatievoorziening)
- ☐ Chief Operation Officer (Operationeel directeur)
- ☐ Other (please specify):

Comments:

Q2. Work history: how long have you held your current role?

- ☐ 1-2 years
- ☐ 3-5 years
- ☐ 6-10 years
- ☐ more then 10 years

Comments:

3. Organisational information

Our research is limited to Dutch organisations. This could be an organisation entirely in the Netherlands, a Dutch organisation with international subsidiaries or Dutch subsidiary of an international organisation.

Q3. Are you employed in a Dutch organisation?

- ☐ Yes, a Dutch organisation
- ☐ Yes, a Dutch organisation with international subsidiaries
- ☐ Yes, a Dutch subsidiary of an international organisation
- ☐ No, not working for a Dutch organisation

Comments:

Q4. How many employees are working within your organization?

- ☐ <500
- ☐ 500 and more (in NL)
- ☐ 500 and more (in NL and other countries)

Q5. In which category does the organization you work for operate?

- ☐ Accommodation and food service activities
- ☐ Activities of households as employers; undifferentiated goods and service- producing activities of households for own use
- ☐ Agriculture, forestry and fishing
- ☐ Construction
- ☐ Consultancy, research and other specialised business services
- ☐ Culture, sports and recreation
- ☐ Education
- ☐ Electricity, gas, steam and air conditioning supply
- ☐ Extraterritorial organisations and bodies
- ☐ Financial institutions
- ☐ Human health and social work activities
- ☐ Information and communication

- ☐ Manufacturing
- ☐ Mining and quarrying
- ☐ Other service activities
- ☐ Public administration, public services and compulsory social security
- ☐ Renting and leasing of tangible goods and other business support services
- ☐ Renting, buying and selling of real estate
- ☐ Transportation and storage
- ☐ Water supply; sewerage, waste management and remediation activities
- ☐ Wholesale and retail trade; repair of motor vehicles and motorcycles
- ☐ Other (please specify):

Comments:

4. CISO position

These questions are focussed on the CISO and the CISO position in your organisation.

Q6. Does your organisation have a CISO employed?

- ☐ Yes – Full position
- ☐ Yes – Combined role (i.e. combined with Privacy Officer)
- ☐ No
- ☐ Other (please specify):

Comments:

Q7. Where is the CISO positioned in the organisational hierarchy?

- ☐ Direct report to Chief Executive Officer (Algemeen directeur / College voorzitter)
- ☐ Direct report to Chief Financial Officer (Financieel directeur)
- ☐ Direct report to Chief Information Officer (IT directeur / Directeur informatievoorziening)
- ☐ Direct report to IT manager or equivalent role
- ☐ Other (please specify):

Comments:

Q8. To whom does the CISO report on the security status?(please select all that apply)

- ☐ The board
- ☐ The Chief Executive Officer (Algemeen directeur / College voorzitter)
- ☐ The Chief Financial Officer (Financieel directeur)
- ☐ The Chief Information Officer (IT directeur / Directeur informatievoorziening)
- ☐ The IT manager or equivalent role
- ☐ Other (please specify):

Comments:

Q9. Does your CISO have a team of security personnel, or other direct reports, responsible for tasks related to securing your corporate information?

- ☐ Yes

☐ No

Comments:

5. CISO team

These details are to get an insight of how the average CISO's team is sized.

Q10. How many Security personnel or other direct reports that carry tasks of securing your corporate information are in the team of the CISO?

- ☐ 1-10
- ☐ 11-20
- ☐ 21-30
- ☐ More then 30

6. Soft skills relevance

This section asks questions on the relevance of soft skills for the CISO employed in your organisation.

The term soft skills is a very broad term and for this questionnaire we adopted the Cambridge Dictionary definition of soft skills:

"People's abilities to communicate with each other and work well together."

Q11. Do you agree with the following statements on soft skills?

	Extremely	Very	Moderately	slightly	Not at all	Do not know
Are you familiar with soft skills?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are soft skills relevant for the CISO?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you experience the effect of a CISO equipped with soft skills interacting with others in your organization?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you see the benefit of variations in soft skills for influencing different audiences (like: business leaders, the users or the IT department)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you appreciate working with different sets of soft skills for influencing different audiences (like: business leaders, the users or the IT department)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have you experienced a positive effect from the CISO on using different sets of soft skills for influencing different audiences (like: business leaders, the users or the IT department)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are the soft skills needed different per type of organisation? (i.e. education has different soft skill needs than financial institutions)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

Q12. Have you observed which group(s) has the highest demand for the CISO to demonstrate soft skills: business leaders, the users or the IT department?(please select all that apply)

- ☐ Business leaders
- ☐ The users in the organisation
- ☐ The IT department
- ☐ Other (please specify):

Comments:

Q13. From research we know that the soft skills are influenced by multiple factors. We found that in research that business leaders benefit from soft skills. The following soft skills are relevant in a leadership position: 1 - Communications 2 - Courtesy 3 - Flexibility 4 - Integrity 5 - Interpersonal skills 6 - Leadership 7 - Positive attitude 8 - Professionalism 9 - Responsibility 10 - Teamwork skills 11 - Work ethics Would you add any other soft skills to this list?

Comments:

--

7. Ranking soft skills

In the previous question we showed the soft skills found by Marcel Robles in an alphabetic order. Could you rank these soft skills and your additional soft skills in the order of relevance.

Q14. Rank the soft skills listed in terms of relevance for the role as CISO. The top position is the most relevant and the bottom position is the less relevant. You can drag or enter the soft skill description to the correct position (Top (1) position is most relevant / bottom position (16) is less relevant)

Communications	<input type="text"/>
Courtesy	<input type="text"/>
Flexibility	<input type="text"/>
Integrity	<input type="text"/>
Interpersonal skills	<input type="text"/>
Leadership	<input type="text"/>
Positive attitude	<input type="text"/>
Professionalism	<input type="text"/>
Responsibility	<input type="text"/>
Teamwork skills	<input type="text"/>
Work ethics	<input type="text"/>
[question(10970194,88653619)]	<input type="text"/>
[question(10970194,88653620)]	<input type="text"/>
[question(10970194,88653621)]	<input type="text"/>
[question(10970194,88653622)]	<input type="text"/>
[question(10970194,88653623)]	<input type="text"/>

Comments:

8. Leadership style and effect

A CISO has a leadership position. These questions are to get an insight in the leadership style and position of the CISO.

Q15. Leadership styles.

	Extremely	Very	Moderately	Slightly	Not at all	Do not know
Are you familiar with variations in leadership styles?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

Q16. Which type of leadership style should the CISO have?

- ☐ Leadership by management position (leadership style based on a hierarchy position)
- ☐ Transactional leadership (leadership style based on rewards and controls in exchange for achieving previously defined governance goals)
- ☐ Transformational leadership (leadership style based on leading by good example and motivating followers to identify with them)
- ☐ Combination of Transactional and Transformational leadership
- ☐ Other (please specify):

Comments:

Q17. Do you agree with the following statements on CISO leadership and soft skills

	Extremely	Very	Moderately	slightly	Not at all	Do not know
The CISO will function at her/his best when they have a leadership position.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The CISO should be able to demonstrate specific leadership styles in various situations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The CISO experiences a better leadership position with soft skills.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The CISO should be able to demonstrate specific soft skills in various situations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

9. CISO recruitment

This last section is about the recruitment of the CISO.

Q18. Please answer the following questions on CISO leadership and soft skills in the recruitment of a CISO.

	Extremely	Very	Moderately	slightly	Not at all	Do not know
Are you involved in the recruitment process of the CISO?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do soft skills have priority in selecting the best fit CISO?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is it relevant that, the CISO job ad describes the soft skills needed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are you able, as a business leader, to articulate the expected CISO soft skills when recruiting a CISO?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Would you be able to determine the required soft skills when assessing the candidate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are soft skills different per type of organisation? (i.e. Education has different soft skill needs then Financial institutes)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

Q19. If you have two candidates when recruiting a CISO:- one with the best-fit hard skills (i.e. security certifications and experienced in security technology used) that directly align with your type of business- the other with best-developed soft skills who would need additional training for understanding your type of business. Which candidate would you prefer

- ☐ The candidate with best-fit hard skills
- ☐ The candidate with best-developed soft skills, but trainable for hard skills
- ☐ None of these candidates
- ☐ Other (please specify):

Comments:

10. Thank you!

Thank you for your co-operation in the first round of this Delphi study.

We will process all the responses from you and your peers. After we have processed the responses, we will issue another survey to confirm the common denomination of the first round. We hope we can rely on your contribution in the second round.

Below you can add your email address if you want to participate in the draw for the two books:

1 - work related: A Leader's Guide to Cybersecurity: Why Boards Need to Lead--and How to Do It

2 - to relax and to learn: Phoenix Project A Novel about It, Devops, and Helping Your Business Win.

This draw will be held at the end of the second round of our survey.

Thank you again for participating in our surveys.

Richard Smit

Q20. Please enter your email address:

Delphi Study round 1 business leaders analysis

Due to the document size we included a separate file with the details of the analysis. For the content of the Delphi Study round 1 business leaders analysis please see attached html file: Delphi Study round 1 business leaders analysis.html.

For easy scrolling in the html file, you can select the simple view:





HU Master of Informatics Thesis CISO soft skills Business Leaders Perspectives Round 2 Peer Validation

1. Welcome and introduction to the CISO soft skills Business Leaders perspective

Thank you again for your interest in participating in the second round of our research. We, Richard Smit (1974) and Jeroen van Yperen Hagedoorn (1970) graduating the Master of Informatics at the Utrecht University of Applied Sciences analysed your input from the first round. This second round of our graduation research is about the positive effects of soft skills on the leadership position of a Chief Information Security Officer (CISO) in Dutch companies with more than 500 employees.

The second round of our research (a Delphi study) consists of confirming the common denomination of the first round. This means that we will ask you if you agree with the outcome of the consensus of the first round on the same questions. The structure of most of the questions is:

show the captured input from round 1 (due to graphics we advise you to use a tablet or laptop/PC), and ask if you agree with the consensus of the responders.

The second round of this study has four topics:

Soft skills relevance

Soft skills ranking

Leadership effect

CISO recruitment

Like the first round, the processing of this survey is entirely anonymously. During this survey, you can pause at any time, and you will receive a reminder of picking up the survey at a later moment.

Please do not forget. By completing this second survey round, you have a chance to win two Must Read books:

1 - Work-related: A Leader's Guide to Cybersecurity: Why Boards Need to Lead--and How to Do It

2 - To relax and to learn: Phoenix Project A Novel about IT, DevOps, and Helping Your Business Win.

To win this prize, you must complete the questionnaire entirely and enter your email address on the last page.

Note: Your email address is stored separately from your response so that the anonymity of the processed responses to the survey remains guaranteed.

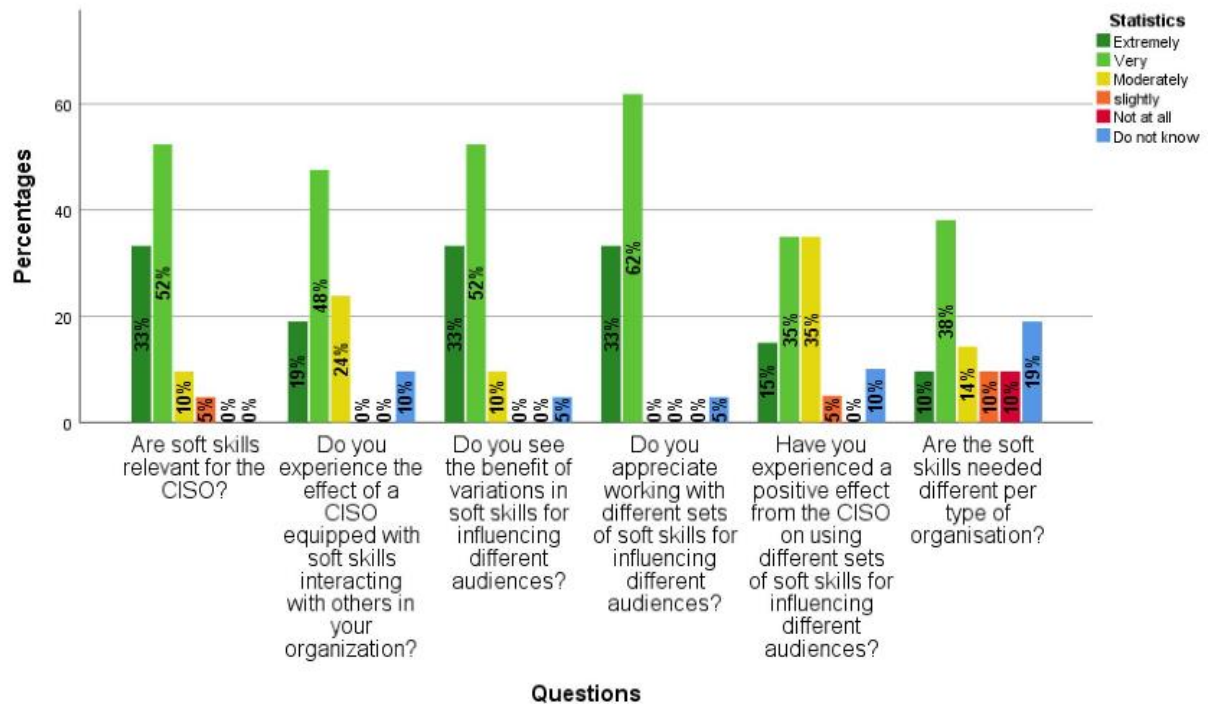
If you have any questions or comments about the research, please contact us by telephone: +31 61 03 61 491 or email richard.smit@student.hu.nl

Thank you again for participating in this study.

Richard Smit

2. Soft skills relevance 1 of 2

1. In round 1, we asked you for your opinion on soft skills relevance. Below is the outcome of round 1:



The majority of the responders selected **Very** as the best-fit answer. With the knowledge of the responses of your peers, we would like to ask you these questions again. *

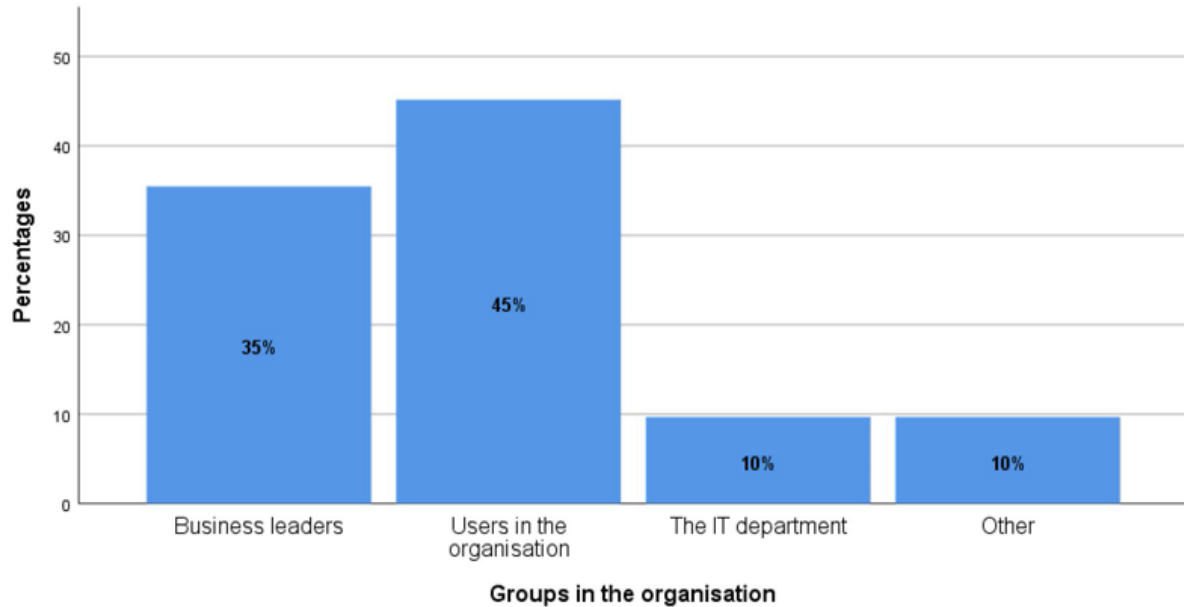
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Do not know
Do you agree with the responders' consensus of Very relevant on the question: 'are soft skills relevant for the CISO?'.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you agree with the responders' consensus of Very relevant on the question: 'do you experience the effect of a CISO equipped with soft skills interacting with others in your organization?'.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you agree with the responders' consensus of Very relevant on the question: 'do you see the benefit of variations in soft skills for influencing different audiences (like: business leaders, the users or the IT department)?'.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you agree with the responders' consensus of Very relevant on the question: 'do you appreciate working with different sets of soft skills for influencing different audiences (like: business leaders, the users or the IT department)?'.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The outcome on the question: 'have you experienced a positive effect from the CISO on using different sets of soft skills for influencing different audiences (like: business leaders, the users or the IT department)?' is in balance between Very and Moderately relevant. Therefore we would like to ask you the question again.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you agree with the responders' consensus of Very relevant on the question: 'are the soft skills needed different per type of organisation? (i.e. education has different soft skill needs than financial institutions)?'.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please elaborate on your answer (optional):

3. Soft skills relevance (2 of 2)

2. In round 1, we asked you if you have observed which group demands a better demonstration of CISO soft skills: business leaders, the users or the IT department? Below is the outcome of round 1 (Please note this was a "choose all that apply"):

Question: Have you observed which group(s) has the highest demand for the CISO to demonstrate soft skills: business leaders, the users or the IT department?



With the knowledge of the responses of your peers, do you agree with the outcome that the group of the **Users in the organisation** demand better demonstration of the CISO soft skills compared to the other groups?*

Do you agree with the outcome that the **Users in the organisation** demand better demonstration of the CISO soft skills compared to the other groups?

Strongly agree Agree Neutral Disagree Strongly disagree

☐ ☐ ☐ ☐ ☐

Please elaborate on your answer (optional):

4. Ranking soft skills (1 of 1)

3. We have asked you to rank the soft skill, researched by Marcel Robles, that business leaders benefit and to add any soft skills if you found some that were missing.

Below are the soft skills by Marcel Robles are ranked by means based on your responses. The ranking starts from most relevant to least relevant:

- 1 Communications
- 2 Leadership
- 3 Interpersonal skills
- 4 Professionalism
- 5 Integrity
- 6 Responsibility
- 7 Positive attitude
- 8 Flexibility
- 9 Teamwork skills
- 10 Work ethics
- 11 Courtesy

With the knowledge of the responses of your peers, do you agree with the ranking of the soft skills? *

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Do you agree with the ranking?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please elaborate on your answer (optional)

4. We asked you if any soft skills were missing from the soft skills found by Marcel Robles.

Below are the additional soft skills that have been added by the responders (included with the number of recordings).

We would like to know your opinion on the relevance of the additional soft skills.

Please select the relevance soft skills below: *

	Extremely	Very	Moderately	Slightly	Not at all
(Self)Esteem (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Accountability (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Being able to listen (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Business sense (understand the business needs of the organisation) (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Can-do mentality (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Charisma (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coaching (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Creative problem solving (being practical) (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Curiosity and learning desire (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Empathy (3x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Humility (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Involvement (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mediaton (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Persuasion (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Responsiveness (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

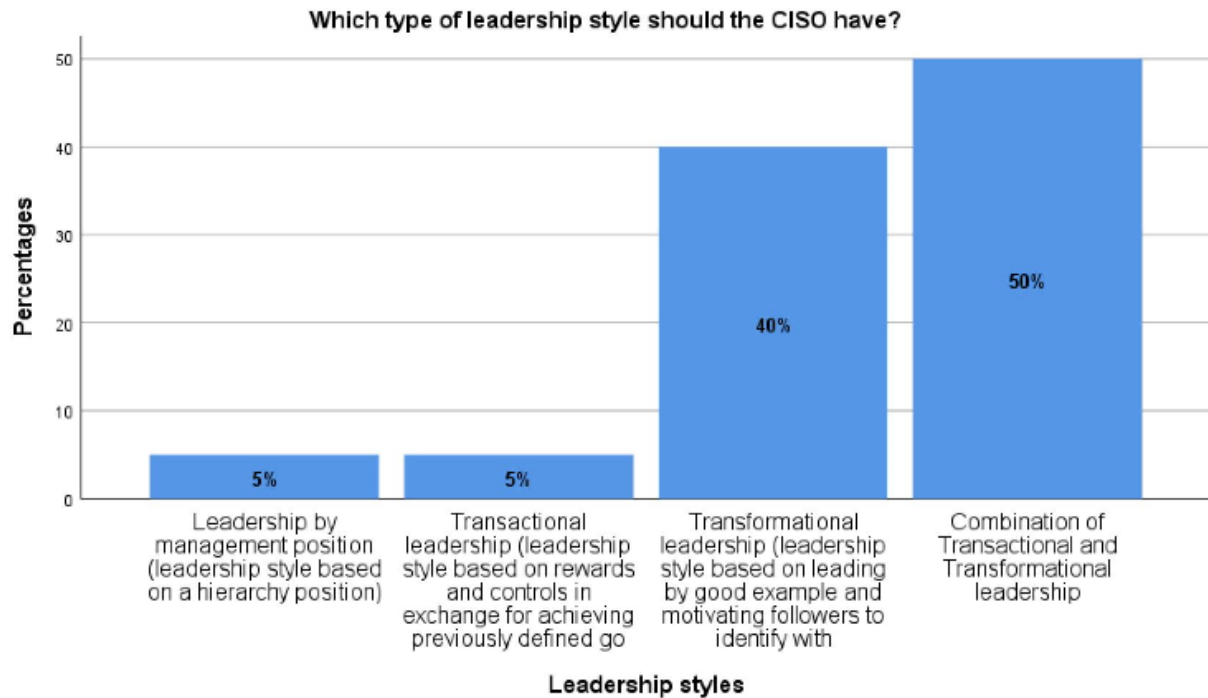
	Extremely	Very	Moderately	Slightly	Not at all
Results-driven (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Self-starter (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Story-telling (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Supportive (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Time management (timing) (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Visionary (1x)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please elaborate on your answer (optional):

5. Leadership style and effect (1 of 2)

Q5. In round 1, we asked your opinion on which type of leadership style a CISO should have?

Please find the outcome of round one in the chart below: the majority of responders (54,2%) state that the **Combination of Transactional and Transformational leadership** is the most relevant leadership style a CISO should be able to demonstrate.



Do you agree with the consensus of the responders that the **Combination of Transactional and Transformational leadership** is the most relevant leadership style a CISO must have? *

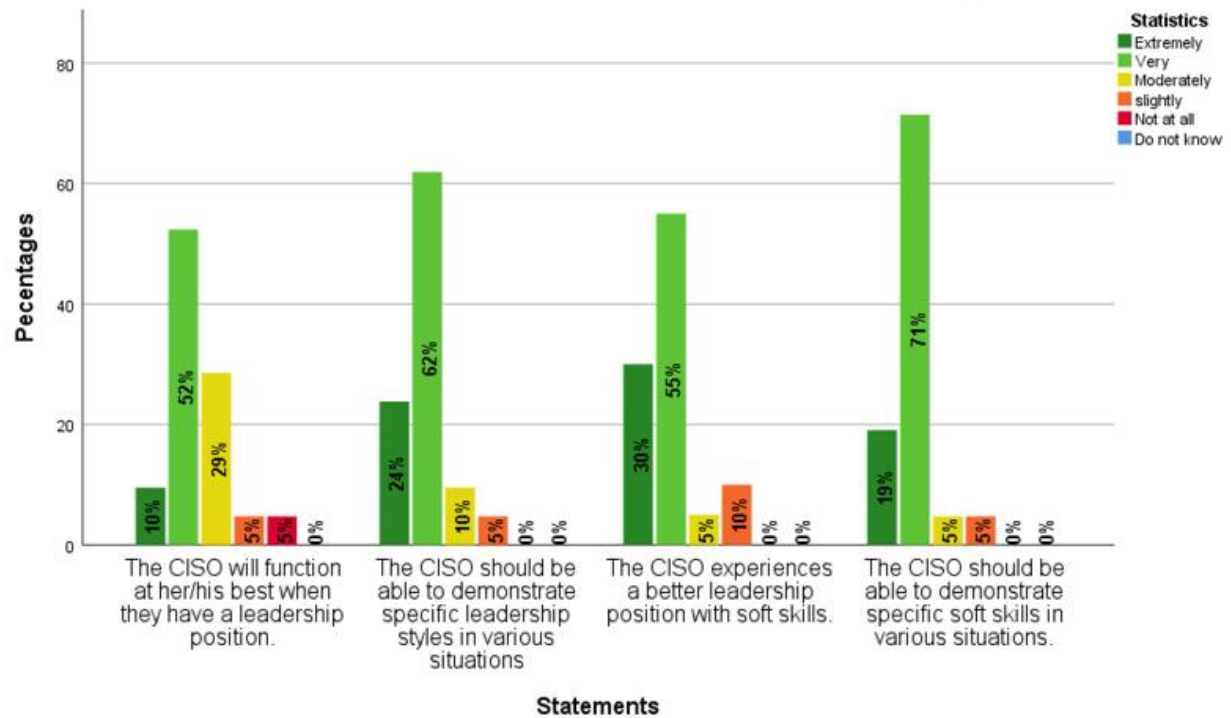
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Do you agree with the consensus of the responders that the Combination of Transactional and Transformational leadership is the most relevant leadership style a CISO must have?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please elaborate on your answer (optional):

6. Leadership style and effect (2 of 2)

Q6. In round 1, we asked you for your opinion on CISO leadership and soft skills.

The outcome is the majority of responders stated that all statements are **Very** relevant.



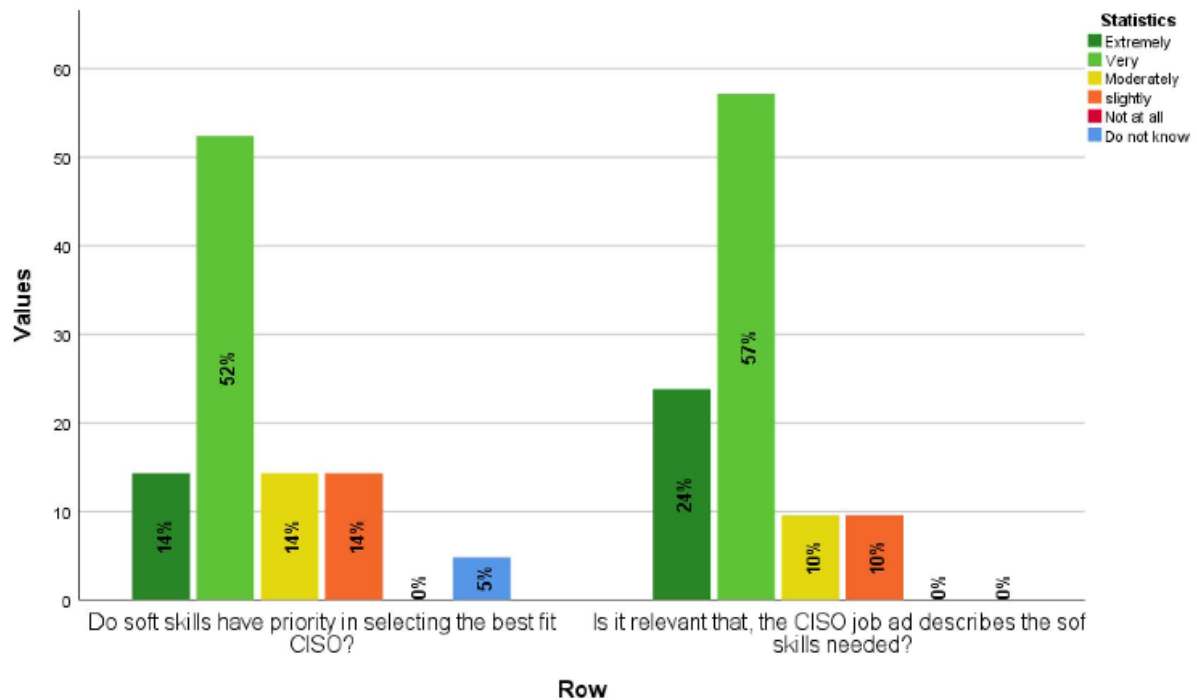
The majority of the responders selected **Very** as the best-fit answer. With the knowledge of the responses of your peers, we would like to ask you how much do you agree with the outcome of **Very** relevant. *

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Do you agree with the responders' consensus of Very relevant on the question: 'the CISO will function at her/his best when they have a leadership position?'.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you agree with the responders' consensus of Very relevant on the question: 'the CISO should be able to demonstrate specific leadership styles in various situations?'.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you agree with the responders' consensus of Very relevant on the question: 'the CISO experiences a better leadership position with soft skills?'.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you agree with the responders' consensus of Very relevant on the question: 'the CISO should be able to demonstrate specific soft skills in various situations?'.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please elaborate on your answer(s) (optional)

7. CISO recruitment (1 of 2)

Q7. In round 1, we asked you for your opinion on statements on CISO leadership and soft skills. The outcome is the majority of responders stated that all statements are **Very relevant.**



The majority of the responders selected **Very** as the best fit answer. With the knowledge of the responses of your peers, we would like to ask you how much do you agree with the outcome of **Very** relevant. *

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Do you agree with the responders' consensus of Very relevant on the question: 'do soft skills have priority in selecting the best fit CISO?'	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you agree with the responders' consensus of Very relevant on the question: 'is it relevant that, the CISO job ad describes the soft skills needed?'.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

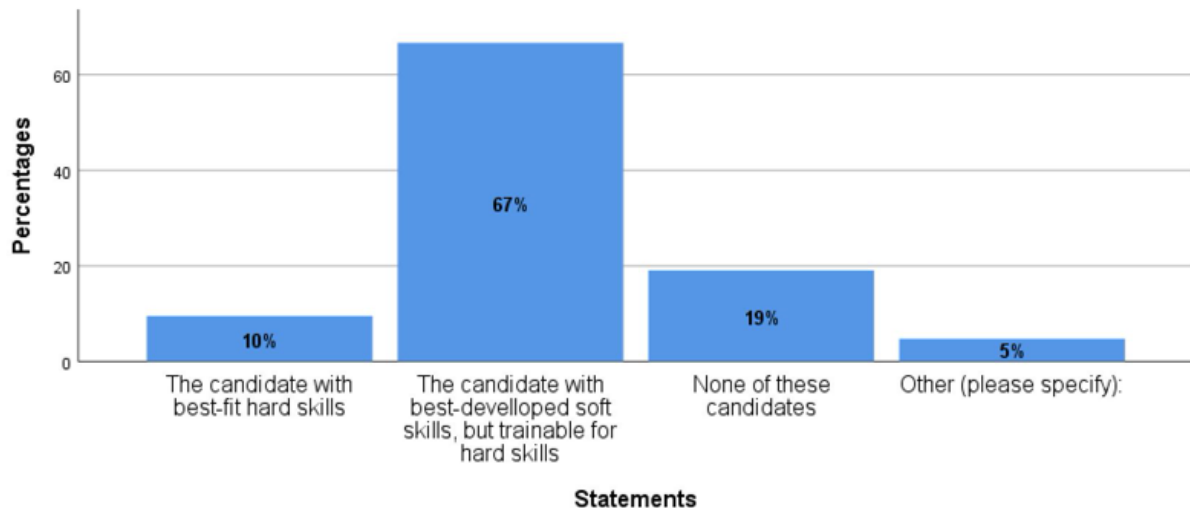
Please elaborate on your answer(s) (optional)

8. CISO recruitment (2 of 2)

Q8. In the first round of this survey, we described the following situation: 'if you have two candidates when recruiting the next CISO:

- one with the best-fit hard skills (i.e. security certifications and experience in security technology used) that directly align with your type of business
- the other with best-developed soft skills who would need additional training for understanding your type of business.

The question was: which candidate would you advise to be hired?'



The majority of the responders selected **the candidate with best-developed soft skills who would need additional training for understanding your type of business** as the best-fit answer. The majority of the answer option 'Other' can be grouped as 'It depends on the candidate'.

With the knowledge of the responses of your peers, we would like to know if you agree with the consensus of the responders that it is better to select **the candidate with best developed soft skills, but trainable for hard skills**. *

Do you agree with the responders' consensus that it is better to select **the candidate with best developed soft skills, but trainable for hard skills**.

Strongly agree Agree Neutral Disagree Strongly disagree

☐ ☐ ☐ ☐ ☐

Please elaborate on your answer(s) (optional)

9. Thank you!

Thank you for your co-operation with this second and last round of this Delphi study.
We will process all the responses from you and your peers.

Below you can add your email address if you want to participate in the draw for the two books:

- 1 - Work-related: A Leader's Guide to Cybersecurity: Why Boards Need to Lead--and How to Do It
- 2 - To relax and to learn: Phoenix Project A Novel about It, DevOps, and Helping Your Business Win.

This draw will be held at the end of this survey.

Also, if you would like to receive a copy of our thesis report, please click the checkbox.

Thank you again for participating in our surveys.

Richard Smit

Q9. Would you like to receive a copy of the thesis report when available?

☐ Yes, send me a copy of the thesis report when available.

Q10. Please enter your email address:

Delphi Study round 2 business leaders analysis

Due to the document size we included a separate file with the details of the analysis. For the content of the Delphi Study round 2 business leaders analysis please see attached html file: Delphi Study round 2 business leaders analysis.html.

For easy scrolling in the html file, you can select the simple view:



Delphi Study CISO and business leaders analysis T-test

Due to the document size we included a separate file with the details of the combined Delphi Study CISO and business leaders analysis T-test. For the content please see attached html file: Delphi Study CISO and business leaders analysis T-test.html.

For easy scrolling in the html file, you can select the simple view:

