The development of security and safety measurement system for Senate Properties

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Laurea University of Applied Sciences **Abstract**

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This thesis was made for Senate Properties, a state enterprise under the Ministry of Finance, that manages the Finnish government's property assets and their efficient use. The main objective of the thesis is to develop a measurement system to get more specific information about the security and safety levels in different operational areas. By measuring systematically, the areas in need of better attention or potential problem areas can be discovered. Prior to the thesis project, the company has acquired information mainly from the service provider sources. Because of the complexity caused by collecting the information from several separate sources there is an urgent need for developing an easily manageable and uniform safety and security measurement system for Senate Properties.

The thesis development questions focus on finding out what kind of measurement can be used to measure the overall security and safety of the company, how the security metrics are created and what would be exactly the right security and safety measurements for the Senate Properties. Internal security measurement units were developed for security management and the principle of quality management. It is imperative, that security management is a natural part of the normal management of an organization. The result is more advanced quality management, because the company is better to meet customer needs and improve organizational efficiency.

The work used open interview, documentary analysis, case study and the development tasks as a research method to draw final conclusions. Each of these research methods had its own roles as the work progressed, and they referred directly to each other. This thesis was done as a development project, that resulted in many different security and safety measurement units as creating a brand-new tool for Senate Properties. Overall, the development work itself focused on how the company’s security and safety measurement units could be developed.

The project was successful because the findings were found to be particularly useful and were taken to the production phase. The Senate Properties’ own Security Unit highly praised the measurement system. Based on the results of the thesis, the introduction of internal security measurement units in the organization was planned. However, it includes many different activities, such as informing and training staff, collecting data, modifying information systems, redesigning, and analysing the reporting path. They were implemented by defining the introduction of measures, policies, and reporting methods.

Keywords: Security, security measurement, development

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1 Introduction

The topic of this thesis is the development of security and safety measurements for Senate Properties. The topic is interesting in many ways, as measuring security and safety levels provides information on where to go and how to work better in a systematic and planned way. Emphasizing the results for the company in question, is prioritized with much-needed measurement information. The topic feels natural, as it ranks well in my future job outlook as well as in my field of security and safety.

The topic of the thesis arose alongside the internship completed at the Senate Properties before this thesis. It was decided of doing a possible thesis, which clearly had a need for both the company and the researcher, and which would benefit both at the same time. The final tool of the thesis topic is limited to the use of internal security measurement in Senate Properties, which provides a good starting point for delimiting the topic and the expected results.

This thesis describes a process related to the development of safety and security measurements, that has been implemented for the company in question. The theory of safety and security measurements is largely addressed at a general level, while the subject areas are limited to the needs of the company and their perspective. The aim of the thesis is therefore to research and develop security and safety measurement units for the company in question, as well as to study its need and possible new dimensions and what kind of measurements should be used to measure these different areas.

The work image is largely focused on doing the project in question, so it is natural to combine the research part separately and the internal part of the work. The wishes and perspectives of the Senate Properties' Security Unit have been introduced in the work and its progress, and new conclusions have been drawn. When the situation is fully open, the only goal is to produce as much different data as possible with a company that can process it the way the company wants.

As the main sources and theoretical information, it is intended to use the Senate Properties' internal sources as security and safety measurements come into the company's internal use. From the perspective of the future, the thesis will certainly be beneficial to both parties, as the purpose is to research and develop a new and profitable operating model. As a result of the measurement, deficiencies can be identified, but at the same time giving good recognition. Regular measurement feedback motivates and helps to improve working methods and both security and safety levels of the organization.

2 Security and safety measurement

This section discusses important aspects of security, safety, and measurements. The first thing defined and addressed answers to the question of what the concept of security, safety and a measurement mean. When the theory of security and safety measurements has been described, the following subchapters handles with security measurement aspects and its definitions in more detail. Therefore, the reader must first understand what a security and safety measurement is. The second section opens organizational security and its various forms within companies. The aim is to observe these as accurately as possible, both verbally and figuratively. The legislation regarding this project and its forms of organizational security explains the company's security and safety measurement legislation, which also determines the company's normal operations. Consequently, the legislation also directly determines the company's security activities and restricts related measurements. In its security and safety operations, the company must comply with these laws, which make the regulations binding on certain actions.

When talking about the concept of safety, it is mainly equated with unintentional accidents, injuries and their prevention. Similarly, the concept of safety is also used in the event of an accident, such as a fire, traffic, work, home or product accident. The concept of security, on the other hand, includes intentional harm related to, for example, crime, terrorism or corporate security (Naumanen & Rouhiainen 2006, 9, 13; Waitinen 2016, 6).

A measurement is promptly defined method intended to gain complete information on how the success factor performance can be used (Lönnqvist & Mettänen 2003, 31). According to Saari (2006, 37) a measurement means the rules according to which a characteristic number is determined for a property of the object of measurement. Sometimes a measure and other synonym can be found in a meter for several of the measurement processes, such as the measurement object, the meter selected for the measurement and the measurement results. According to the Ministry of Finance (VAHTI 2/2016) measurement, reporting and auditing provide the information needed for management and the planning of strategies and operations, which can be used to cost-effective development of operations.

According to Henttonen (2000) safety have been measured retrospectively with accident, injury and damage statistics. However, it would be important to measure proactively. The goal of security and safety measurement is to prevent unwanted events. Proactive measurement is based on the fact, that the occurrence of accidents is influenced by different factors in the area. By monitoring and measuring the condition of technical systems, procedures, security or safety culture and security or safety management in these areas, accidents can be prevented and identified in time. Personal, environmental and property damage is required to be identified in advance by the company through legislation.

According to Henttonen (2000) measuring security and safety is effective when using proactive and reactive measurements. These measurements can be divided into quantitative and qualitative measurements. Quantitative and qualitative measurements can be guaranteed to be even more subjective or objective.

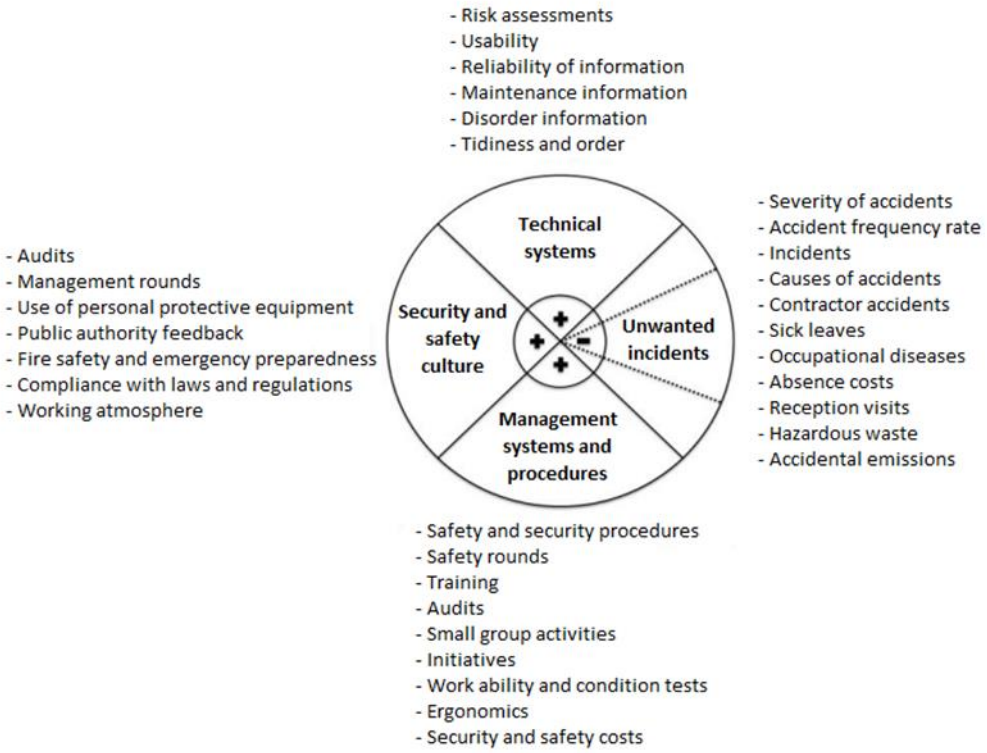


Figure 1: Modified version of Taija Henttonen's figure

The figure above presents examples of measurements in different areas of security and safety (Taija Henttonen 2000).

Measurements related to technical systems include, for example machines, equipment or processes risk assessments. Fault, maintenance and reliability data also provide measurable information related to technical systems. Technical systems can also be measured by looking availability of equipment and machinery. Also, the cleanliness and order of the organization's premises monitoring is one of the measurements related to technical systems (Taija Henttonen 2000).

Unwanted incidents can be measured by looking at what is happening in the organization the frequency, severity and causes of accidents, as well as accidents of contractors. In addition, incidents, occupational diseases, sick leaves and reception visits, as well as absence costs, can be recorded. Also related to hazardous waste and accidental discharges the review of events is an example of measurements related to unwanted events (Taija Henttonen 2000).

Management systems and procedures can be measured by looking at training, safety tours, and audits in the organization. It can also be viewed the number of small group activities, initiatives and security measures. Management systems and procedures can also be measured by acquiring knowledge of ergonomics and work ability and arranging fitness tests. The security and safety costs of an organization can also provide information management systems and procedures (Taija Henttonen 2000.)

Security and safety culture can be measured, for example, by arranging management rounds and audits. In organizations where the use of personal protective equipment is mandatory, the use may be controlled, and the results are used to measure safety culture. In addition, it is possible to review at how well the organization complies with laws and regulations as well as how good the organization is with fire safety and emergency preparedness. From these factors, the organization can receive feedback from the authorities, which can also be used to measuring security and safety culture. Security and safety culture can also be measured by looking at the general work atmosphere (Taija Henttonen 2000).

A wide range of information on the development of security and safety can be obtained by choosing different measurements, both reactive and proactive, but also qualitative and quantitative. When measuring, it is worthwhile to try to utilize the information accumulated in addition to normal operation (Taija Henttonen 2000).

2.1 Proactive measurements

Proactive measurement is for example, the level of safety before any accident has occurred. Proactive measurements measure what factors in the work environment or company can lead to accidents or unwanted events. Proactive measurements provide data that can potentially prevent accidents, incidents, or incidents (Herrera 2012, 29; Taija Henttonen 2000).

Proactive measurements include, the number of people who have received safety training, the number of risk assessments performed and compliance with legal requirements. Security rounds of senior management, personnel safety subordination and personnel safety attitudes can also be considered proactive. Safety is also measured proactively through the frequency of safety audits, health monitoring reports, workplace exposure measurement and the use of personal protective equipment (Taija Henttonen 2000).

2.2 Reactive measurements

A reactive measurement is thus a measure of statistics after accidents or incidents. In other words, unwanted events (Herrera 2012, 29; Taija Henttonen 2000). Reactive measurements are hazardous supplies and conditions of material damage. Responsive measurements also measure sick leave due to either an accident at work, an occupational disease and accidents

that have occurred. For companies, the responsive measure also includes customer complaints, criticism from the authorities and binding measures imposed by the authorities. Undesirable events can be measured by looking at the frequency, severity and causes of accidents, that occur in the organization, as well as the accidents of contractors (Taija Henttonen 2000).

2.3 Quantitative and qualitative measurements

The quantitative measurement provides numerical information. Quantitative measurements of safety are a measure of order and cleanliness, for example. The quantitative measurements also include work capacity. Accidents as well as sick leaves are quantitative measurements, which sick leaves can be measured by sick leave amounts as well as their cost and accidents are measured by frequency, severity and cost. Quantitative measurements also include risk assessment and safety training, like example how many people have participated or how often are the trainings scheduled to take place (Taija Henttonen 2000). According to Wayne Jansen (2009) more often, numeric values are used to represent rankings of the quantitative that are otherwise qualitative.

A qualitative measurement provides information about the causes of events as well as people's attitudes and thoughts. Qualitative measurements of safety are the causes of accidents and the reasons for sick leave. Work atmosphere, attitudes and commitment are also part of qualitative measurements (Taija Henttonen 2000). According to Wayne Jansen (2009), qualitative assignments can be used to represent quantitative measures of security properties.

2.4 Objective and subjective measurements

Objective measurements from quantitative point of view include, for example accident and sick-ness absences, occupational hygiene measurements, method audits, risk assessments and behavioural observations. Objective measurements of qualitative aspect include workplace surveys, accident investigations and the adequacy of safety training (Taija Henttonen 2000). According to Wayne Jansen (2009) some qualitative properties are intangible and not able to be captured via direct measurement. An attribute can be highly subjective such as beauty, scent or flavour in nature, varying widely among individuals.

Subjective of quantitative measurements are attitude and work atmosphere surveys, sanctions and complaints, internal reviews and incidents. Subjective of qualitative measurements are such as workplace observations, safety rounds and opinions of experts and authorities (Taija Henttonen 2000). According to Wayne Jansen (2009) measurable characteristics are assessed that are believed to correlate well with the quality in question in cases, where no quantity can be clearly identified, such as the taste of wine, either a panel of experts rates various qualities using a blind rating.

2.5 Organizational security

This chapter discusses, what organizational security means and its various subparagraphs related to this thesis. These aspects of security are described both so in writing and in figures, that provides a direct reference as well as a visual view of the intended context. The paragraph first seeks to clarify the definition of the whole, after described the operation of the case in more detail.

Organizational security is an entity that consists of the security of all operations inside the organization. Its areas include, for example, information security, occupational safety and health, personnel safety, property and premises security, fire and rescue safety, preparedness and crisis management, and management of irregularities and anomalies. The aspects of organizational security overlap and may have considerable interdependencies. Proper organizational security activities can protect important company values, such as the environment, reputation, information, people or property. The key task of organizational security is to improve productivity and increase the company's competitiveness (Confederation of Finnish Industries 2019j; Ministry of Finance 2016).

Smith & Brooks (2013, 226-229) suggest that the protection of assets through the application of organizational security will continue to be an important component of the national, corporate, and community structures and applications for the people of an entity. For the midterm forecasting of the safety and protection of the people, information and materials of these structures, the need for organizational security will be required. According to ISO (31000:2018) the organization should evaluate its current risk management practices and processes and assess any deficiencies and take the necessary corrective action. The components of the framework and the way in which they work together as a single entity should be tailored to the needs of the organization. Organizational structures differ depending on the organization’s complexity, goals and purpose.

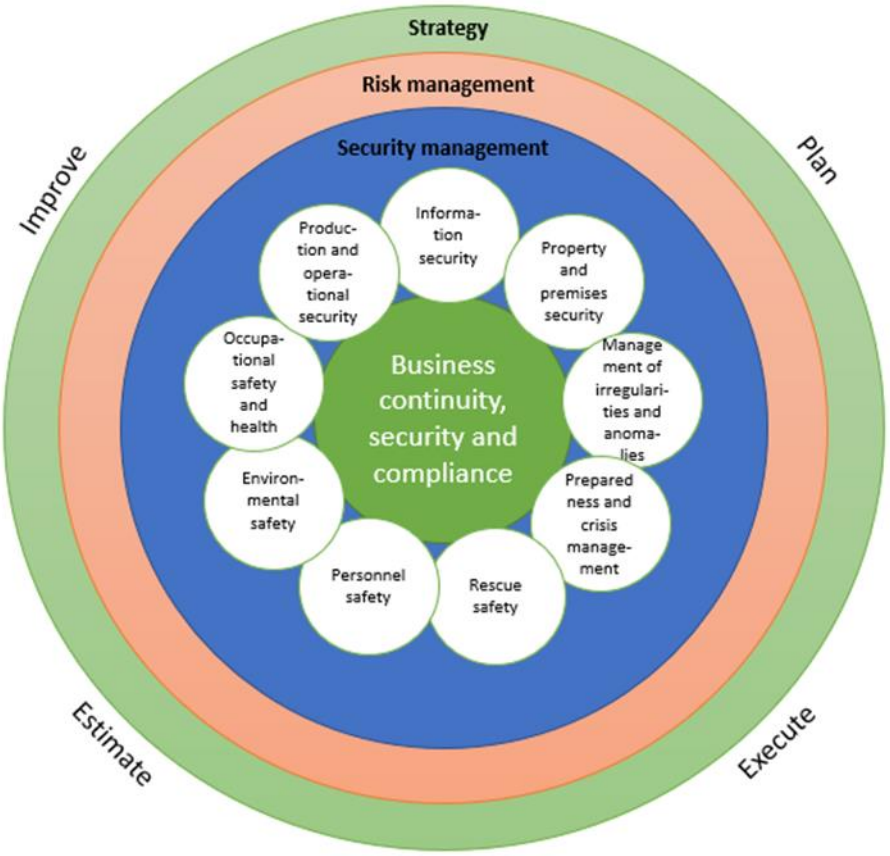


Figure 2: A modified version of Confederation of Finnish Industries' organizational security model

The figure above facilitates the review and perception of an organization's security field (Elinkeinoelämän keskusliitto 2019j).

2.5.1 Information security

According to the Ministry of Finance (Valtiovarainministeriö 2010), ensuring information security, maintaining and developing the level of success are key prerequisites for a functioning work community. Technical aids are used to promote security, but security is crucial to human action.

According to the Confederation of Finnish Industries (Elinkeinoelämän keskusliitto 2019d), complete security is impossible to achieve. Information security is divided into six different categories. The first of these categories is the evaluation of the meaning of the information, which includes determining the usability, integrity and confidentiality of the information and identifying critical information, such as authentication. The second category is the classification and processing of data. The category includes grading methods and handling instructions that can be implemented with a company-created grading system.

The third category is administrative information security, which includes security agreements and their settlement, access management and the use of confidentiality agreements. Fourthly, there exists data protection and privacy, which includes the processing of personal data, the protection of privacy at work and the protection of communications (Elinkeinoelämän keskusliitto 2019d).

The fifth category is technical information security, which includes firewalls, antispyware, data transmission protection, protection of main devices, utilization of encryption such as secret e-mail, backup, operational security, hardware and software security. Technical security should also con-sider mobile devices and the skills of the staff to use security in their own device (Elinkeinoelämän keskusliitto 2019d).

The last category is ensuring the continuity of systems and processes. This category includes the physical security of the environment, the development of perception, and the development of tolerance and recovery. For these, it is important to be aware of and be prepared for disturbances as well as continuous observation and log monitoring (Elinkeinoelämän keskusliitto 2019d).

The Ministry of Finance also recognizes the importance of protecting information and its value, as the goal is for organizations to improve the security of information materials, systems and networks and to develop the state's round-the-clock information security capability (Valtiovarainministeriö 2010).

2.5.2 Property and premises security

Issues related to the physical protection of the company's production and premises are essential for property and premises security. It can be divided into structural security and security control. Security control includes technical control, criminal alert systems, key and access control, security staffing, visitor and vehicle traffic control. Structural safety includes burglary protection such as locks, gates, fences, lighting and other items to be protected structural protection methods (Miettinen 2002, 14-15). According to the Confederation of Finnish Industries, the security of real estate and business premises should be protected in the most cost-effective way possible, however based on risk assessments. According to the Confederation of Finnish Industries, property and office security is divided into the following four categories: Classified Security and Classification of Premises, Structural Security, Security Surveillance and Contract Management. Their goal is to be able to create a safe and hassle-free business and work environment, and to bring valuable information and material to the company to prevent theft (Elinkeinoelämän keskusliitto 2019b).

2.5.3 Personnel safety

Personnel safety is an essential part of security for the company. It seeks to ensure the safety and operational capacity of individuals by protecting individuals and their backgrounds from accidents and crime. Personnel safety protects employees, customers and key personnel from crime and accidents (Elinkeinoelämän keskusliitto 2019a). Personnel risks refer to threats to the company's personnel or which the staff themselves pose to the company. Threats related to risks can come either from within the company or outside. Personnel safety is the activity of taking risks and threats managed (Kerko 2001, 260).

Issues related to customer and visitor safety should include, for example, security instructions, communications, insurance and alert and emergency services. Restriction of joint information, use of security technology and dealing with emergencies should be considered when securing key personnel (Elinkeinoelämän keskusliitto 2019a).

According to the Confederation of Finnish Industries, ensuring the availability of critical human resources for operations requires a focus on deputy staff and availability arrangements. Personnel safety also includes protecting activities by preventing, for example, infiltration by criminals or similar activities. These issues can be addressed and monitored by the system through high-quality and meticulous recruitment procedures, which also require security clearance during the process. It is a good prerequisite for the person selected to enter into a confidentiality agreement between the employee and the company when the situation begins (Elinkeinoelämän keskusliitto 2019a).

2.5.4 Occupational safety and health

Occupational safety is partly in the same category as personal integrity, but it sets them apart from their goals. According to the Confederation of Finnish Industries, the objective of occupational safety is safe work, the well-being of employees and consequently, a good and responsible corporate image. Occupational safety is governed by occupational safety legislation. (Elinkeinoelämän keskusliitto 2019f.) The Occupational Safety and Health Act obliges the employer to monitor the working environment, the state of the work community and the safety of working methods, as well as the impact of the measures taken on occupational safety and health. The employer must also identify the hazards arising from work, working hours, other working environments and working conditions, in which case he must have knowledge of accidents, occupational diseases and incidents. The employer must also provide its employees with the necessary training and safety guidance (Occupational Safety Act 738/2002).

Occupational safety is divided into three different categories. The first is the well-being of employees and their safe work, while preventing risks and having a good corporate image.

This category includes the protection against machinery, equipment and tools, such as sending spam and protecting them from third parties (Elinkeinoelämän keskusliitto 2019f). According to Occupational Safety and Health Act (738/2002) the employer is obliged to take care of the safety and health of employees at work by taking the necessary measures. The employer must plan, select, measure and take the necessary measures to improve working conditions. The employer must constantly monitor the work environment, the state of the work community and the safety of working methods.

The second category includes the Occupational Safety and Health organization, which includes, the Occupational Safety Committee, the Occupational Safety Officer, the Occupational Safety Officers, and the Occupational Safety Agents. The third category is an action plan with clear objectives. Goals may include, for example, continuous improvement in occupational health and safety, and the development of policies, conditions and tools (Elinkeinoelämän keskusliitto 2019f).

The work program should include training, measurements and statistics. The training includes a good orientation and the training required for the necessary occupational safety cards. Quantitative and qualitative measurements should be a good focus. The statistics include various accident modes and incident reports (Elinkeinoelämän keskusliitto 2019f). According to the Occupational Safety and Health Act the employer must provide the employee with sufficient information about the hazards of the workplace and ensure that, taking into account the employee's professional skills and work experience, the employee is provided with training and guidance to prevent work hazards. To avoid inconvenience or danger and in the event of various incidents or emergencies (Occupational Safety Act 738/2002).

2.5.5 Management of irregularities and anomalies

The ability to handle information security irregularities and anomalies must be balanced with the organization's operations and the requirements and risks associated with it. Statutory obligations must be considered when dealing with anomalies and irregularities related to information security (VAHTI 8/2017). Management of irregularities and anomalies help to prevent abuses, crimes, or other abnormal events that affect the company. The company uses these to protect its internal and external activities, personnel and assets. This section consists of three components, which the first focuses on adverse events affecting operations, personnel and property, the second on malpractice management, and the third on insurance (Elinkeinoelämän keskusliitto 2019h).

The aim of management of irregularities should be to detect, analyse and prevent adverse events affecting operations, personnel and property. Organization should try to come up with solutions and recover as soon as possible after any adverse events. Reporting and learning from events would be a good way to prevent events (Elinkeinoelämän keskusliitto 2019h). The

organization shall identify the information that must be collected for each deviation. About required to analyse and resolve the deviation or to meet any reporting requirements (VAHTI 8/2017).

According to the Confederation of Finnish Industries, the means of managing irregularities are preventive action, detection, internal audit and investigation, co-operation with the authorities and action in criminal cases. This is done with good planning and a ready strategy and technical solutions. When abuses occur, it is a good idea to make preliminary inquiries and then take the matter to the preliminary investigation on a case-by-case basis. Attorneys' crime can be prosecuted and righted by the company if they wish, while the authorities are not. In public prosecution, the prosecutor has the right to prosecute. Abuse management can also be used to look for insurance to secure financial activity in the event of a criminal risk (Elinkeinoelämän keskusliitto 2019h).

2.5.6 Preparedness and crisis management

Through preparedness and crisis management, the company seeks to identify and anticipate unexpected situations. In the event of a disruption, it is often necessary to react and make quick decisions, as situations are usually surprising. The company should recover as quickly as possible and maintain its ability to operate in situations where it is a matter of ensuring business continuity. Crisis management interacts with continuity planning (Elinkeinoelämän keskusliitto 2019g). Preparedness is an activity that ensures that tasks are performed as smoothly as possible, regardless of the situation. Preparatory measures include, for example, technical and structural advance preparation, risk assessment, continuity and contingency planning, exercises, training, and the reservation of facilities and critical resources. The areas of preparedness are planning, the practical preparations that precede it, their implementation, development and training (VAHTI 2/2016).

Preparedness and crisis management are divided into three categories, one of which is contingency planning. Continuity planning includes business risk assessment and alternative planning, production interruption and shutdown and development of planning and resilience. These can be viewed through profitability and can be contracted with various actors (Elinkeinoelämän keskusliitto 2019g).

The second category is crisis management, which includes prevention and evaluation. Recovery plans and learning are part of crisis management. In an acute crisis and an emerging crisis, prompt and correct response and communication are important (Elinkeinoelämän keskusliitto 2019g).

The third category of contingency planning includes the identification of obligations and the planning of production and operations. The contingency plan should expel the following

factors, such as human resources, energy supply, material storage, raw materials, machinery, equipment, repair, maintenance, spare parts, subcontracting and services to ensure the operation of the company. Contingency planning is particularly relevant to security-critical companies and contingency planning within the meaning of preparedness legislation is based on defence economic planning and security of supply in exceptional circumstances (Elinkeinoelämän keskusliitto 2019g).

2.5.7 Environmental safety

According to Wessberg environmental risk assessment is the starting point in environmental safety. By identifying environmental risks assessing them and the need for their management, the preconditions for the creation of a state of environmental safety are created (Wessberg 2007). In environmental safety, the aim is to consider ecological sustainability, meeting and anticipating the environmental expectations of our customers and society. Environmental safety consists of the principle of sustainable development, energy efficiency, careful environmental impact assessment, notification and authorization procedure, hazardous material handling and storage, environmental management system and action program, climate protection and emissions trading, water and soil protection, noise control and landscape protection. According to the Confederation of Finnish Industries, environmental safety means taking responsibility for the environment, continuously developing processes and best practices, raising staff awareness, commitment to the principles of standards, and open communication (Elinkeinoelämän keskusliitto 2019i).

2.5.8 Fire and rescue safety

Rescue safety includes a rescue plan, which can be found as a document, including points of fire safety and insurance. The emergency plan includes hazard forecasting, workplace specific arrangements, outdoor areas, disaster preparedness and response measures. All of these include clear instructions and a designated person in charge. Regular training such as fire safety and first aid is a good idea for the company. Big companies are good at in areas of security and access control (Elinkeinoelämän keskusliitto 2019c). According to Miettinen (2002, 197) rescue safety includes all of them to prevent and correct measures to manage the various accident risks of companies. These are for example fire, gas or liquid leaks, toxic emissions and radiation accidents. The main goal is to prevent potential accidents in advance and their personal injury and property damage. According to The Occupational Safety and Health Act (738/2002) workplace structures must be safe and for example, rescue routes and their markings must be appropriate. According to The Rescue Act (379/2011) the rescue plan must contain an explanation of the conclusions of the hazard and risk assessment and the safety arrangements of the building and the premises used in the operation. In addition to these, the rescue plan must include a description of the instructions given to residents and other persons

for the prevention of accidents and incidents. There are also other possible ones related to the site's self-preparedness the measures should be addressed in the rescue plan.

Fire safety includes repeated fire safety rounds, maintenance of rescue and extinguishing equipment and periodic inspections. Fire safety is taken care of in the company with an automatic fire alarm system and a rescue and extinguishing system. Companies usually have an automatic fire extinguishing system and smoke extraction system. Security and sign lights are considered in good order every safety round. It is a good idea for a company to take out insurance for accidents and to review and keep up to date with the insurance company's insurance policies and terms and conditions. (Elinkeinoelämän keskusliitto 2019c). According to the Rescue Act (379/2011) the owner and occupier of a building and the operator must contribute to the prevention of fires ignition and other hazards and be prepared for persons, property and to protect the environment in the event of danger. In addition, the owner and occupier of the building as well the operator shall, for his part, be prepared for extinguishing fires and other rescue measures to which they are capable of acting on their own and shall take measures to ensure escape in the event of fire and other incidents and to facilitate rescue operations.

According to the Confederation of Finnish Industries, rescue safety means the prevention of fires and other accidents, as well as the prompt and correct response in the event of an accident. Most important is the prevention, elimination, minimization and insurance of accident risks. The safety of a company must be considered by law and the supervision by the authorities is a must for every company (Elinkeinoelämän keskusliitto 2019c).

2.5.9 Production and operational security

According to the Confederation of Finnish Industries (Elinkeinoelämän keskusliitto 2019e), the aim of production and operational safety is to ensure safe products and services. The safety of production and operations falls into 7 different categories, which are divided as follows:

1. First category handles with product liability and safety including due diligence and notification obligations, supervisory authorities, risk assessment and markings.

2. Second category handles with safety of services.

3. Third chapter concludes payment transactions security.

4. Fourth category deals with safekeeping of valuables.

5. Fifth category deals with logistics routines, which includes transportation and warehousing such as shipping management and defining responsibilities.

6. Sixth category handles networks, while covering subcontractors and refrigeration suppliers as well as contract management.

7. The last and seventh category concludes insurance, which is important in many different areas, the most important of which are, in general liability insurance, property insurance and product insurance.

3 Methodology

Many different research methods were used for this thesis in order to gather the desired information on the topic. These research methods included open interview, documentary analysis, case study and development work to draw a definitive conclusion. Each of these research methods had their own roles as the work progressed, and they referred to each other available. The following subsections provide more detailed information on each of these test methods.

Senate Properties own websites had different information to be analysed. Senate Properties' own financial site provided financial calculations, which produced a lot of information related to quality management, such as sales and profit results of Senate Properties' internal security services. Also, Senate Properties' own security and safety service provided important information considering safety manners and calculating number of incidents. Based on these, information related to the company's internal security could be analysed.

My first task was to find out what is important and what is not considering this thesis and project. In addition, there were many other facts related to the company's business on the intranet, such as yearly sent customer satisfaction surveys and they were very comprehensive, while eyeing this thesis. Similarly, some information was also found on the websites of some external stakeholders.

The aim was to find out the background information based on which it is possible to map the risks of internal security. This was the starting point for the development of internal security measurement units. The findings were part of the research methods and working in the company at the same time made it easier to monitor the operation of the operating environment.

I was able to monitor the company's operating environment in real time and detect any changes related to internal security. These findings were relevant in considering the direction in which internal security measurements and their perspectives might take shape. I kept notes of my observations, in which I stated my thoughts and concrete measures regarding internal security.

3.1 Development work

According to Ojasalo, Moilanen & Ritalahti (2014, 1), development is desirable in every work atmosphere nowadays. Development creates both new ways of working and methods based on one's own needs. Statistics Finland (Tilastokeskus 2020) also pays attention to this point, because in their opinion research and development refer to the systematic activity of increasing knowledge and using knowledge to find new applications. The criterion is that the goal of the activity is something substantially new. Research and development activities include basic research, applied research and development work.

Development work and its process can be divided into six different categories or processes, which according to Ojalasalo et al. (2014, 41) are as follows:

1. Identifying the target for development and setting initial goals.

2. Familiarization with the development object in theory and practice.

3. Defining the development task and delimiting the development target.

4. Development of the knowledge base and design of approachable methods.

5. Implementation and publication of the development project in various forms.

6. Evaluation of the development process and results.

The aim of this development task was to develop security and safety measurements for Senate Properties, that could measure the current security situation of the company to the extent that measurable material could be found and to draw a future perspective for those areas where there is the greatest need. In order to get started in the development work and follow it to the end, it was chosen to use a development questions, that would guide the progress of the project.

The first development question was dealt with how measurement units related to the company’s security status could be developed. The aim of the development question was to get the direction of the thesis, with the help of which a new goal and the development question will rise to the next stage. After getting answers to the first question, it automatically provided more development questions such as what kind of measurements can be used to measure the overall security of Sen-ate Properties. This development question seeks to delimit the measurements so that only those measurements, that are suitable for measuring the security of the Senate Properties remain. Based on this question, it was possible to create the following question, which considered how to create a security and safety measurement unit. The

aim of the development question is to describe the process related to the development of security and safety measurements.

3.2 Documentary analysis

The documentary analysis was chosen as the research method, as the study examined the need for Senate Properties to develop measurements related to the security and safety situation, which mainly dealt with the internal security process in their own environment.

Documentary analysis is a research method in which research material is of interest that cannot be compiled by direct and immediate observations (May 2011, 208-211). Documentary analysis can also be used for the preliminary study of a research topic performed with another research method. The completed documents will help in the preliminary study of the new phenomenon, for from documents it is possible to get information about how others have acted and what information has been found on the subject in the past. Not collected in document analysis material through interviews or questionnaires, but uses ready-made, already available material previously published for other purposes (Anttila 2000, 254-258).

The goal of documentary analysis is the systematic analysis of documents and verbal and creating a clear description of the phenomenon under study. The material is dealt with by logical reasoning and through interpretation. The most obvious content of the material can be analysed and in addition, if necessary, also messages hidden in documents (Ojasalo et al. 2014).

In document analysis, the research process begins with the preparation of the material, from which the material proceeds through analysis and reduction to interpret the results and draw conclusions. The material the analysis uses either data-driven content analysis or theory-based and theory-guided content analysis. In practice, the research process begins with several of the pro-cessed material one-time reading, from which we move on to classify the material and seek to find connections theory chosen for use. Finally, we return to the theories used and aim to link classified material (Ojasalo et al. 2014).

3.3 Open interview

One research method used was an open interview to improve data collection. There are many interview templates, but the most appropriate interview template to take the project through was an open interview, as it is essential in this type of interview that the discussion is not tied to a strict format. In an open interview, the interviewer shapes the discussion back to the actual topic if there is reason to suspect that the topic has escaped. The interviewer is also free to ask for clarifications on the answers provided.

The purpose of the interview is, of course, to discuss in advance certain issues or themes decided by the researcher. Instead of asking the interviewer as specific questions as possible,

the interview proceeds as conversationally as possible and thus also provides space for the interviewee's experiences, opinions, arguments, and feelings. No attempt is made to provide ready-made answers to the questions posed by the interviewer according to the situation and the interviewee. The interviewee is able to speak freely (Eskola & Suoranta, 2014, 82-85).

Through an open interview, both parties interact linguistically and the interviewer strives to make the layout as open and natural as possible. An open interview is broadly reminiscent of an ordinary conversation in which only the topic is locked, otherwise by the time of the interview with its own weight (Hirsjärvi & Hurme, 2015, 47-48).

3.4 Case study

The features of the case study are to obtain a deep, varied and comprehensive picture of the case under study using different methods. In a case study, material can be gathered by observing or analysing written materials such as separate company reports. Material can also be collected through interviews such as a thematic interview, an open interview and a group interview. The case study is well suited to the development approach. The object of the research can be a company or a part of a company, the aim of the case study is to produce information about current phenomena and information about the operating environment (Ojasalo et al. 2014, 52-55).

According to Ojasalo et al., the most important thing is to find an approach method. There is a total of four approach methods, which are case studies, action research, constructive research and the production of innovations. If the purpose of the development task is to produce development suggestions for the company, the right approach is probably a case study (Ojasalo et al. 2014, 25-39). This case study approach was chosen to one of best suited the research methods for this thesis.

3.5 Main sources and obtaining information for this thesis

The main source for developing the measurements was to utilize Senate Properties' own data. The structure of the security management of Senate Properties is based on state administration guide-lines, such as the VAHTI guidelines and to a large extent this work has sought to utilize the Senate Properties' internal information in connection with the development of security and safety measurements. A lot of information has also been gathered from external sources as well as through various research methods such as open interview or documentary analysis.

4 The process of creating security and safety measurement units

The thesis began in connection with the internship in the Senate Properties, where the Senate Properties Security Director gave a topic from which he would like the thesis task to be done. The thesis became a development work, in which the purpose was to develop measurement units related to the company's security and safety situation. The thesis supervisor approved the topic. This was followed by getting to know the subject and gathering information, while researching and utilizing Senate Properties business material.

According to Lönnqvist et. al. (2003, 109) the necessary measurements and conclusions are made based on the measurement results. Because of that, defining the purpose is essential, as the measurement can only function if they are selected and used accordingly. Therefore, the same measurement methods or measurements can be used for different purposes in different organizations. In addition, reporting ensures the central role of the results, as information must be obtained for the right target group.

While started the process of developing security measurement system, it was clear that the aim of safety and security development and measurement is to prevent the risk from realizing in advance, and not to measure how many risks happened afterwards. The idea is however, that if risks no longer occur everyone would understand, that the security unit has done their job extremely well.

The course of the thesis was thought to go in such a way, that there would be four stages for the measurement process:

1. First, the sources are examined, so to clarify what can be measured.

2. The measurements are then developed and defined.

3. Analyse data such as measurements and eliminate bad or irrelevant ones.

4. Decide on the measurement model, style and reportage method.

In order to facilitate the subject areas of measurement, a structural diagram would be made, detailing all aspects.

4.1 Starting point

Senate Properties had some measurements at the beginning of this project, but their current condition was not comparable to the current outlook, with those measurements being a bit rudimentary and outdated. At the beginning of the project, it was considered whether to go further or leave the idea to float for the time being.

When planning the course of the project, steps and needs were defined to make it easier to access information and to focus the workload on the right path. Thus, doing unnecessary work would also be minimized, and the focus could be on the essentials.

In addition to the Senate Properties' Security Director interview, it was planned to interview also Chief Information Security Officer, the security unit's own experts depending on the topic, financial administration personnel if security measurements reflecting the economy and personnel of human resources in case of measurements related to training were also considered.

4.2 Mapping stage

In mapping stage, the main objective was to identify every factor related to Senate Properties' internal security and its components. The structure of areas was divided into five key sectors, which consisted of working environment, Senate Properties' own security services for customers, security culture, security management and precautionary observations.

Figure 3: Own version made to describe the Senate Properties' security and safety sectors

The figure above presents of Senate Properties' security and safety sectors, which contains many subsections that would be reviewed one by one and considered whether and how they could be measured in terms of safety.

Security measurements, which were part of working environment sector were observed first. This seemed like a natural place to start mapping, as it was already known that there was always a safety aspect to a workplace.

Regarding safety and security measurements related to the working environment, it was considered whether risks could be measured, for example, at the risk index level. Preparedness issues were also considered from the point of view of the working environment. In addition to these, it was in my mind to consider whether a measurement could be implemented in terms of, for example management of documented information or communication management, technical supervision, structural security, fire safety and policies and procedures.

After mapping out, what could be important to measure from the view of working environment I was able to move forward into next section. The second section, which was observed was Senate Properties' own security services. Such a things, which could be considered as a possible measurement were security level inspections and audits, number of needs assessments, consulting and design services, quantity and quality of training, business security concept and quality measurements considering all above.

The third sector was handling security culture of Senate Properties, where the measurements was thought to made for example management review rounds, customer feedback, audits, principles and policies, compliance with laws and regulations and working atmosphere.

The fourth sector observed security management and its possible measurement targets. It was highlighted, that important parts to observe of security management were number and quality of trainings, safety rounds, small group activities, costs of security and safety, monitoring, controlling, measuring and analysing processes.

The fifth and last sector observed preventive findings, where possible measurements was thought to be made of the number of accidents and their severity, number of incidents, threats and disorder information.

4.3 First version of measurement units

In the first version, I aim to make measurements in tabular form according to the topics listed in previous chapter. In practice, the aim was only to produce as many high-quality measurements as possible by using Microsoft Word and Microsoft Excel as a tool. Measurement structure was targeted to be constructed by as described in Table 1.

Phase	Action
1.	Measurable aspect of corporate security
2.	The name of the measurement
3.	Detailed description and explanation of the measurement
4.	Type of the measurement
5.	Target level of the measurement
6.	Measurement evaluation criteria
7.	Measurement data collection and evaluation frequency
8.	Data producer and place of storage
9.	Additional measurement information

Table 1: Measurement structure process for the company

However, as the client of the thesis was a company, I was not suitable to decide directly at this stage what was wanted to be shown and what would best serve the orientation and needs of the company. Therefore, the way forward would be to have the proto version ready and present it to the Senate Properties' Security Director and together we would exchange ideas on the way for-ward.

The measurements were largely created with the help of the Senate's own data sources, which were able to draw immediate conclusions. For many of the possible topics, there was no previous monitoring, which in practice immediately eliminated most of the proposed measurements.

In the first version, the measurements could be created from the following issues related to the work environment:

1. Measuring the security and safety level of business premises at the concern level

2. Measuring the security and safety level of business premises by location

3. Security leadership requirements

4. Measuring the information security of systems from the 10 most used systems in the Senate Properties

The measurements could be created from the following issues related to the Senate Properties' own security services:

1. Customer satisfaction measurement for security and other security services

2. Security revenue measurement

3. Security cost measurement

The possible measurements related to security culture of Senate Properties was decided at this point to put aside and concentrated more on next stage.

The measurements could be created from the following issues related to security management of the Senate Properties:

1. Measurement of security management maturity level

2. Security training

3. Development of security clearances

The measurements could be created from the following issues related to precautionary observations of the Senate Properties:

1. Security and information security anomalies

2. Accidents and their severity

3. Accident threat assessments

It was possible to create the first measurements and an example is described in Table 2.

Target	What is measured?	How to measure?	General requirements	Confidential information – security level IV	Confidential information – security level III	Confidential information – security level II	Results
X	Security level of business premises	By using the Senate Properties' own premises security principles and implementation guidelines	X	X	X	X	X

Table 2: An example from one of the first versions of security measurements

This example was chosen to describe realization of the security level of the premises in the properties. Due to confidentiality reasons target and results were marked as "X".

4.4 Elimination of poor measurement units

After the first measurement prototypes were completed, I was able to break the surface and re-think the aspect of the project again. Already at this point, I was able to make some observations that confirmed the presupposed assumptions.

I presented the first version to the Senate Properties' Security Director and to the Security Manager, who were pleased with the output. By consensus, we decided that the following subjects are not reasonably measurable and should have been dropped out at this point:

- Management of documented information

- Security leadership requirements

- Small group activities

- Measurement of security management maturity

4.5 Second version of measurement units

The second version of the project was much more mature, as it should be, while I tried to add tracking on timelines to measurements, which proved to be a good way to describe the trend in each case. I found yet another way to draw conclusions about things simply by tracking progress compared to the annual change in the same measurement as noticed in Table 3.

Target	What is measured?	How to measure?	Results in 2018-19	Results in 2019-20	Trend
X	Service satisfaction	By comparing Senate Properties' annual decision-maker satisfaction surveys	X	X	
					

Table 3: An example from one of the second versions of security measurements

This example was chosen to describe customer satisfaction with security and other security services provided by Senate Properties. Due to confidentiality reasons target and results were marked as "X". As an improvement over the first measurement versions, a trend pattern was added to this particular measurement.

First, the unnecessary measurements were dropped out, which refined the focus on existing measurements instead of trying to make as many good measurements as possible at the same time. The emphasis on the trend was well suited, especially when measuring customer satisfaction with security services of Senate Properties, which were immediately noticed for example, that only one area had deteriorated in annual follow-up and the popularity of all

others was raised from last year. With these results, it was possible to immediately identify where the areas had been successful.

In addition to these, new measurements were also developed at a continuous level in connection with meetings and interviews with experts in various areas of security. One of the measurements developed was also very necessary, which was left only as an internal document of the security unit after it described an important vulnerability, so it will be dropped out from this thesis.

4.6 Power BI

According to Microsoft (2020), Power BI is a business analytics service developed by Microsoft, that helps to create interactive visualizations and intelligence features for business with an interface, providing simple way for the user to create their own dashboards and reports.

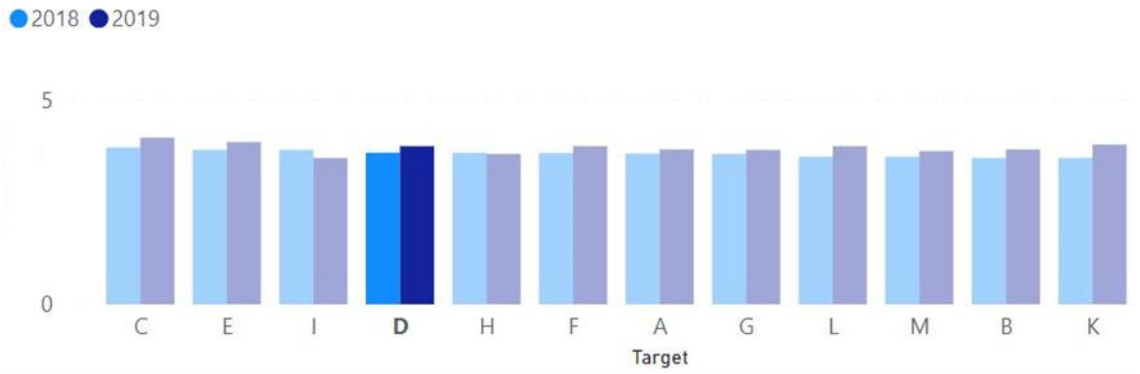
While developing the measurements, it was noticed on the Senate Properties' intranet on the Yammer website of the financial administration about the introduction of Power BI, which had previously received a little foretaste from colleague. After examining the application from the surface in more detail, the question arose as to whether that tool could be able to better describe safety and security measurements.

After proposing the matter to the Chief Security Officer, it was decided to change the describing style to that program, as it is superior in terms of features compared to simple documents that would always require a separate person to update that document. Power BI would enable more accurate monitoring and automation of the measurement, where the idea would be to collect information in addition to normal operations without straining the workforce anymore.

4.7 Third and final version of measurement units

When switched to Power BI, after the online basic training course, it was time to start compiling the measurements in excel format, so that Power BI could identify the units and be able to convert them to measurements within the program. The background work was done well, so it was easy to choose the best ones to follow from the measurements made and try to shape them into a new shape with the help of the program.

Visually, Power BI offers many different orientations and its own data is easily comparable to global patterns. However, this phase was omitted from the project bills because the intent was to produce only the Senate's internal security measurement unit.



Target	2018	2019
C	3,86	4,10
E	3,80	3,99
I	3,80	3,60
D	3,73	3,89
H	3,73	3,70
F	3,72	3,89
A	3,71	3,81
G	3,70	3,80

Figure 4: An example from one of the final versions of security measurements

This example was chosen to describe customer satisfaction with security and other security services provided by Senate Properties. Due to confidentiality reasons targets were marked as different letters and results are not real. Target “D” is highlighted, which provides additional information about the target. The visualization accurately displays the various annual results, allowing direct conclusions to be drawn about the orientation of the target.

4.8 Feedback

The purpose of the thesis and project was to develop the best possible and most comprehensive measurement unit for Senate properties, which would not only solve the need quickly, but could be used in the right way in the long run. The project was useful in many ways, as the company also received updated contexts measuring the security situation as quantity and quality increased.

While presenting the outcome for security unit, major changes were also brought in the middle of the project, as the general idea was only to develop it as far as possible. So, there was not so much to expect from beginning as to see if there was even a need for measurement or not.

One of the biggest changes was the move to Power BI, which allows company’s internal electronic data to be connected directly to security measurement units. The security unit as well

as even board of directors of the company can use this information not only for tracking, but also for anticipation and demonstrations. The more recent the information is, the more relevant it becomes to measurement, which can be used to predict possible future events.

4.9 Results

The aim was to find out how measurements related to the security and safety situation can be developed. The starting point of this project was, that there existed some rudimentary measurements of the Senate Properties, but they had not been updated and thus the measurements had become obsolete. The measurement was not monitored at a regular level, which, however, is one of the main elements of measurement functionality.

As a result, a separate security and safety measurement unit was developed for Senate Properties, most of which could be connected to Senate Properties' own systems, from which information could be causally linked. Good examples of these are, for example, direct links from accounting sites to security financial measurements and from the Senate Properties' own security and safety system to security measurements, such as incident reports. Thus, monitoring of measurements is greatly facilitated by the fact that the data comes directly in real time from somewhere, and there is no need to maintain it separately as separate files or specify a person who would have to update the data related to measurements. Real-time information is also better considering of being able to predict possible future events on a site-by-site basis.

In terms of measuring, responsibilities among personnel improved a lot, as the work resulted in the accountability of those who maintain a certain security or safety area. This is directly reflected in the measurement as it increases. At the same time, the monitoring and identification of security incidents developed, as they could be directly applied to systems whose results were visible during measurement.

5 Conclusions

The thesis was successful, because the research methods answered the research question and they achieved exactly what was wanted and expected. The objectives of the project were achieved by developing a new security and safety measurement system for the Senate Properties' internal use, that can be utilized as desired by the company. For reasons of confidentiality, the final products were not published, but a similar process could be performed. However, examples of these are the tables and figures presented above, which can be used as a foretaste of the subject.

One of the biggest challenges to this thesis was clearly that most of the material used for the work was in Finnish. The internal business language of the Senate is only in Finnish and little bit in Swedish, which limited this thesis slightly. The thesis succeeds well, and it progressed in a model way. It is highly recommended, that the measurement and its development will be continued to obtain relevant data and thereby also to utilize it.

The security measurement field is hard to research because easy results are not expected, and the likelihood is that not all aspects of the problems are resolvable. Furthermore, only some of those aspects that are resolvable may be able to be done satisfactorily, meeting expectations of repeatability, reproducibility, relevance, timeliness, and cost. It is also hard to find research or back-ground on security and safety measurement. There are different tools that can be used, but there is not much information about terms of security and safety measurements.

The progress of the project and the measurement of security and safety in the company will continue and it will be developed at regular intervals. The success of the automation of the measurement results will help in the analysis of the most relevant data for those results. However, measurements do not happen by itself and the creation of a measurement system alone does not help to solve the problem but requires continuous use in order to obtain any comparable result. Thus, the creation of a security and safety measurements system only solves the first problem and the correct data will only be obtained if the level of measurement is maintained. After all, the current measurements have been made largely from the results of the Senate Properties' internal archives, so it is possible to directly monitor on an annual basis where developments are heading. The security and safety measurement system is Power BI-focused, which is a visual application developed by Microsoft that can display the information as remarkably high quality. This same information can be included in customer meetings or construction sites, for example, as a mobile version that allows the information to be displayed, but not quite as well as the desktop version itself.

Employees also play a major role in measurement, as they are one of the largest groups of carriers to achieve measurement results. For example, if an employee knows that such activities are being pursued in the company, it will also have an immediate effect on the attitude to report problems. If there exists only one document somewhere deep in the company's folders, it may not encourage an employee to report potential problems. At the same time, if an employee is in some kind of trouble, such as even if the suspicion of hacking into a work computer is known, the employee could immediately report it through the right channel to the notification tool, which would immediately provide information to the security measurements. There are many topics just related to that tool, which, should all be opened when informing company's employees, so that the employee knows how to act as recommended.

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Figures

Tables

Appendices

Appendix 1: Open interview format

Interview questions conducted at Senate Properties. The following questions were asked in the open interviews conducted at the Senate Properties headquarters at Helsinki. The staff interviewed were all in security or ICT field and had professional knowledge on matters regarding security and safety.

- What does security and safety measurement mean? Is it an important or ignored thing?
- What kind of measurements can be used to describe or measure security and safety?
- How can measurement units related to the company's security status be developed?
- What kind of security measurement unit would be the best possible to serve Senate Properties?