Technical and operational requirements of a camera monitoring centre for an art exhibition

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2019 Laurea

Laurea University of Applied Sciences

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Degree Programme in Security Management
Bachelor's Thesis
December, 2019

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Abstract

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Abstract

This thesis project originated from an oncoming high-profile art exhibition for the Didrichsen Art Museum. This high-profile exhibition required that a camera monitoring centre would be built on site, and the museum management needed consultation for its design. The research goal was to find out what technical and operational requirements needs to be taken into consideration during the design process of a camera monitoring centre for an art exhibition.

The thesis was conducted as a case study and the method was desk research that was supplemented with first-hand observations and consultations. Inductive content analysis was then used to analyse the findings. Desk research was chosen because relevant existing material provided by the Didrichsen Art Museum was effective in answering the research question. Inductive content analysis was a fitting method for analysing the material and using it to determine a design process.

The literature used in this thesis included: European standards for alarm receiving centres, legislation and art museum security related literature. The European standards for alarm receiving centres was the primary literature source for this thesis, since it contains valuable guidelines that can be followed to build a working alarm receiving centre. The legislation mainly determined necessary emergency exits and fire safety within the centre, as well as personal data handling procedures. The literature concerning art museum security provided helpful knowledge of relevant research and best practises on the subject.

The findings concluded that the design process of a camera monitoring centre for an art exhibition has to be approached from three different angles. Minimum technical and operational requirements, optimal goals to aim for, and specific needs from the museum's and exhibition's perspective should all be considered. Every design of camera monitoring centres for museums should be done on a case-by-case basis, since there are many variable factors that affect the design. The thesis explored a general framework on how the design process should be approached.

Keywords: museums, security, camera monitoring

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Tiivistelmä

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Vuosi 2019 Sivuja 31

Tiivistelmä

Tämä opinnäytetyö perustuu Didrichsenin taidemuseon kanssa tehtyyn yhteistyöhön tulevaan huomattavaan taidenäyttelyyn liittyen. Taidenäyttely vaati kameravalvomon suunnittelemista, johon taidemuseo tarvitsi opastusta. Työn tavoitteena oli selvittää mitä teknisiä ja toiminnallisia vaatimuksia kameravalvomon suunnittelussa tulee ottaa huomioon.

Opinnäytetyö suoritettiin tapaustutkimuksen muodossa ja pääasiallisena tutkimusmenetelmänä käytettiin aineistotukimusta. Aineistotutkimukseen päädyttiin, sillä Didrichsenin taidemuseolta saatu materiaali soveltui hyvin tutkimuksen tavoitteeseen. Havaintoja ja konsultaatioita käytettiin myös tiedonkeruumenetelminä. Tuloksien analysointi auttoi kameravalvomon suunnitteluprosessin kehittämisessä.

Opinnäytetyössä käytetty kirjallisuus koostui eurooppalaisista standardeista hälytyskeskuksille, lainsäädännöstä, sekä museoiden turvallisuuteen liittyvistä lähteistä. Eurooppalaiset hälytyskeskuksien standardit sisälsivät hyvin käyttökelpoisia ohjeita, joita voitiin soveltaa kameravalvomon suunnitteluprosessiin. Lainsäädäntö koski hätäuloskäyntejä, paloturvallisuutta, sekä henkilötietojen käsittelytapoja. Museoiden turvallisuuteen liittyvistä lähteistä saatiin sovellettavia alan käytäntötapoja sekä hyödyllistä tietoa museoiden turvallisuusmenetelmistä.

Tuloksena selvitettiin, että huomattavaan taidenäyttelyyn soveltuvan kameravalvomon suunnitteluprosessia on lähestyttävä kolmesta eri näkökulmasta. On huomioitava tekniset ja toiminnalliset vähimmäisvaatimukset, optimaaliset saavutettavissa olevat tavoitteet, sekä museon ja näyttelyn omat rajoitteet ja vaatimukset. Jokainen suunnitteluprosessi on tehtävä tapauskohtaisesti erikseen, sillä museosta ja näyttelystä riippuvat muuttuvat tekijät vaikuttavat suunnitteluprosessin lopputulokseen.

Avainsanat: museot, turvallisuus, kameravalvonta

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1 Introduction

As presented by Bastion Security, camera surveillance is a great way for museums to prevent and catch thieves, prevent vandalism, and otherwise classify activity and behaviour within the premises. Modern IP (Internet Protocol) cameras are easy to install with minimal wiring, and they can be positioned in such a way that they can be used to monitor the whole museum venue. The cameras can be accessed remotely over the internet, which enables remote viewing and surveillance of the premises from a camera monitoring centre that is in a different location than the museum itself. (Bastion Security 2019). According to Centre for the Protection of National Infrastructure or CPNI for short, another option for the location of camera monitoring centre is within the supervised museum venue. This option reduces response time for counter measures against vandalism, theft etc. and maximises security. (CPNI 2016, 32). For these reasons it can be a good idea to set up a camera monitoring centre (also called a control room) within the monitored museum venue. A camera monitoring centre is a room with guard(s) dedicated for monitoring the determined premises using camera surveillance systems which are preferably integrated with other alarm systems. A camera monitoring centre forms the centre for a site's security, and this centre is constantly receiving and sharing information with other guards and from camera monitoring feeds. (CPNI 2019).

According to CPNI, comprehensive design of the camera monitoring centre requires that consideration is given to: the personnel, physical layout, implementation, systems, policies, response, and resilience. (CPNI 2019). Out of these elements this thesis will focus on the physical requirements of the camera monitoring centre, specifically meaning the physical layout and systems, and in certain cases to the response and resilience parts as well. Additionally, the thesis will discuss related operational elements and requirements such as camera surveillance and database management procedures. It should be noted that this thesis will not disclose any detailed information concerning the exhibition or the security controls within the museum.

1.1 Case company

The Didrichsen Art Museum is a privately owned art museum located by the sea in Kuusisaari, Helsinki. The museum is amongst the most popular art museums in Helsinki and is open from Tuesdays to Sundays. The museum is a combination of the former private home built for the Didrichen family in 1958, and of the extended building built in 1964. Two to three different exhibitions are displayed in the museum annually, and it also has a surrounding sculpture park open around the clock. The museum is visited by 30 000-60 000 visitors annually. (Didrichsen 2019).

The Didrichen museum property consists of the parking space, museum building and the yard, and of the beach area. The total property area is roughly under 0,7 hectares. The museum has neighbouring residence houses both on the north-eastern and south-western beach side. The embassies of Bulgaria, Germany, Hungary, Indonesia, Japan, and South Korea are located nearby, which contributes to the low response time for authorities in the area. (Ministry for Foreign Affairs of Finland).

As explained by Didrichsen Art Museum's curator Otto Selén, each exhibition held by Didrichsen Art Museum requires a new risk analysis and adequate security measures to ensure the security of the artworks. (Selén, O. 2019). According to the Confederation of Fire Protection Association Europe's (or CFPA-E for short) guidelines, different exhibitions require different levels of security arrangements depending on factors such as the value of the artworks, the size of the exhibition, political or religious relevance of the exhibition, and the anticipated public attention and interest of the exhibition. High-profile exhibitions require stricter security policies and arrangements, since well known artworks also attract more unwanted attention from art thieves and vandals. (CFPA 2012, 8). An example of a previous high-profile exhibition in the Didrichsen Art Museum that required high levels of security measures was Edvard Munch's "The Dance of Life"- exhibition, which was displayed during the years 2014-2015. Preparation for this exhibition lead to large scale implementation of security measures and architectural re-design. The parking space was also expanded and trees were cut down for aesthetic purposes. (Didrichsenmuseum 2019).

1.2 Research question and the goal of the project

The research question was formed when the thesis worker was commissioned by the Didrichsen Art Museum management to help design a camera monitoring centre for the museum. Figure 1 below demonstrates how the need for the thesis was born from the perspective of the museum.

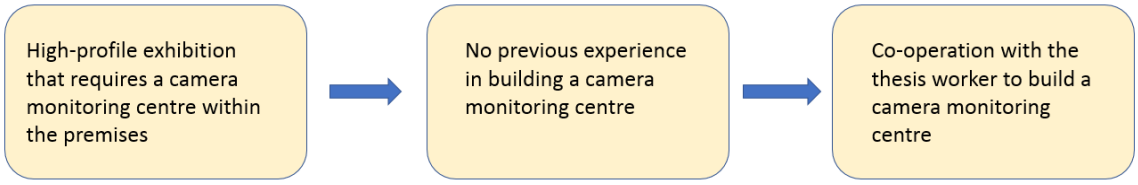

Figure 1: Need for the thesis project

The research question needed to answer that: how can a camera monitoring centre be designed in such a way, that it adequately meets the necessary requirements and is also tailored for Didrichsen Art Museum's specific case. This was then turned into a following question:

How should a camera monitoring centre that is located on site of the museum be designed, so that it meets all the necessary requirements and the specific needs of an upcoming high-profile exhibition?

The usual procedure for camera monitoring centres or alarm receiving centres is to have them be located in a completely different location than the monitored premises. The premises are then monitored from the camera monitoring centre by outsourced surveillance service providers. The surveillance service provider responds to triggered alarms by for example sending guards to the location to verify the alarm. (FCM 2017). For the upcoming high-profile exhibition, however, the Didrichsen Art Museum's management wanted to have an on-site camera monitoring centre be designed that would be located within the monitored premises. (Selén, O. 2019).

The museum management desired guidelines on how to build and design a camera monitoring centre, since they had no previous experience on the particular subject. The management had a set a room that would be used as the centre, but besides that there were no other prerequisites set. The guidelines aimed to make a distinction between what was required, and what were optional suggestions for camera monitoring centres. The museum management also inquired if it would be possible for the thesis worker to research ways to make the working conditions more comfortable for the guard(s) within the camera monitoring centre. It was agreed that this subject would also be briefly touched, but the major task would still be on

the technical and operational requirements of the camera monitoring centre. The goal was to approach the guidelines from three different angles: what are the minimum requirements, what are high standards to aim for, and what does the museum want from the camera monitoring centre? The thesis describes the process of how the guidelines were created. The scope of the thesis is that it's done to explore specifically requirements of a Finnish camera monitoring centre that is designed to be located on the site which it's used to monitor.

1.3 Definitions

Annunciation equipment: equipment that indicate the status of an alarm. (SFS-EN 50518-2: 2014, 9).

Camera monitoring centre: a room with guard(s) dedicated for monitoring the determined premises using camera surveillance systems which are preferably integrated with other alarm systems. The location of the camera monitoring centre can be on the monitored site or on a completely remote location. Camera monitoring centres discussed in this thesis are in the monitored site. Other terms for a camera monitoring centre include control room or alarm receiving centre.

EDR /emergency door release: a mechanical device that can be used to override electrical locking in case of an emergency.

State indemnity: A model of insurance where the government bears the financial risk regarding costs of claims. (NTMA 2019).

1.4 Methods

This thesis was done by using the Didrichsen Art Museum's upcoming high-profile exhibition as a case study for exploring how camera monitoring centres could be built for other similar situations. Already existing theory on the subject was used as the framework. A large part of the thesis was done as a desk research, which as defined by Prachi Juneja is research that consists of collecting data from existing resources. The advantage of desk research is that it's both cheap and quick. Desk research can be divided into internal desk research and external desk research. The external desk research can be further divided into data gathered online, government published data, and customer data research. (Juneja, P). The research conducted on this thesis consisted mainly of internal desk research, data gathered online, and government published data. Internal desk research refers to research on data within the organization (the museum in this case). This data consisted of reports of security preparedness on previous exhibitions, fire security, documents regarding the museum's camera and intruder alarm systems etc. Online desk research consisted of relevant and reliable standards for camera monitoring centres and camera surveillance, studies regarding working

conditions/ergonomics etc. Government published data consisted of legislation, and also of government approved standards on camera monitoring centres.

A disadvantage of desk research is that the gathered data will unlikely completely match the problem it's sought for since it was originally gathered for another purpose. The usability of this secondary gathered information should be, for this reason, evaluated very critically. (K, Dingemanse 2014). For this reason, the research was further supplemented with the use of first-hand observations and first-hand consultations. First-hand observations were made of the museum venue and the allocated camera monitoring centre. First-hand consultations were asked from the museum management staff. Overall, desk research was chosen because relevant existing material provided by the Didrichsen Art Museum was effective in answering the research question. According to an article on ATLAS.ti regarding observational research, observations can be divided into either naturalistic observations or participant observations. Naturalistic observations are done in way were the researcher does not intervene with the environment he or she is studying. In participant observations the researcher joins the studied environment. Usually observations are used to study behaviour and change. (ATLAS.ti). The first-hand observations done for this thesis were participant observations, since the thesis worker participated in the planning of the change for the environment (in this case the room allocated to be the camera monitoring centre).

The gathered information was then analysed by using inductive content analysis method. As explained in an article by Shane Hall on inductive content analysis, this method is a qualitative research method that can be used "to develop theory and identify themes by studying documents, recordings and other printed and verbal material". Inductive content analysis is a great tool for areas of which there is only few or no previous studies. (Hall, S). Existing studies related to on-site camera monitoring centres for art exhibitions were limited, which is why inductive content analysis was chosen. First-hand observations and consultations combined with the museum's own documentation were used to create a design process, on which there was little previous public research made on. Inductive content analysis was a fitting method for analysing the material and using it to determine a design process.

2 Factors affecting the technical and operational requirements

The factors/actors that affect the requirements and suggestions for the camera monitoring centre are: the European standard SFS-EN 50518 monitoring and alarm receiving centre parts 1-3, UK's Centre for the Protection of National Infrastructure's (CPNI) guidelines for control rooms, legislation, terms for state indemnity set by the Ministry of Education and Culture, and requirements set by the art lender(s). These factors formed the theoretical framework of the thesis. These factors/actors can be then divided into two groups: mandatory requirements and optional requirements. Mandatory requirements consist of the legislation (the laws related to safety and security, and data protection laws), requirements set by the art lender(s), and finally of the requirements set by the Ministry of Education of Culture for the state indemnities. Optional requirements or "suggestions" are determined by the standard group SFS-EN 50518 parts 1-3, as well as the similar guidelines offered by CPNI on camera monitoring centres.

Alarm receiving centres can be approved by certificate approving companies with the proper accreditations. Requirements for approval are set by Finance Finland, which is an organization that represents the interests of banks, insurers, pension companies, fund management companies, securities dealers and finance houses. The organization strives to openly and transparently bring forth the interests of financial industries when related legislative processes take place. (Finance Finland 2019). If an alarm centre gets certified, then they have proved to have adequate level in quality of operations, reliability, and personnel ability. The standard SFS-EN ISO 9001 is used to measure the quality of systems, and the standard group SFS-EN 50518- (1-3) is used to assess the operational and technical qualities. (Alarm receiving centres 2019). This standard group is used to uphold a quality for alarm receiving centres, which are not completely synonymous with the on-site camera monitoring centre that was being designed in this project. As described in First County Monitoring's website, alarm receiving centres are used as the base for operations for surveillance service providers. These surveillance service providers are separate companies from the organizations whose premises they supervise. Surveillance service providers handle the surveillance of multiple clients from a single secure location known as the alarm receiving centre. (FCM 2017.) In Finland for a surveillance service provider to operate from an approved alarm receiving centre, they need to have the centre be approved by an accredited certification provider. This certification ensures that the centre complies with the standard group SFS-EN 50518 parts 1-3. (Alarm receiving centres 2019). The camera monitoring centre designed in this project on the other hand is located on the supervised premises and is run by the museum itself, which is why the centre does not need to be certified. Keeping this in mind, there is still a large overlap between alarm receiving centres run by surveillance service providers and on-site camera monitoring centres run by the organizations themselves. That is why these standards were useful and applicable for this design process.

2.1 European standard for monitoring and alarm receiving centre

The European standard SFS-EN 50518 monitoring and alarm receiving centre parts 1-3 proved to be the centre for theoretical framework of this thesis. The standards were approved by CENELEC in 2013. CENELEC is the European Committee for Electrotechnical Standardization and it prepares standards accepted in 34 European countries (including Finland) in the electrotechnical engineering field. (CENELEC 2019). The “SFS” part in the name of standard refers that the standard is nationally used, and the “EN” means that it is an European standard as well. (FINAS 2016). The standard group SFS-EN 50518 1-3 was created in 2014, but they have since been approved in 2019 by Finance Finland to still be valid. The first standard is about location and construction requirements. Second standard is about the technical requirements, and the last standard is about procedures and requirements for operations.

2.1.1 Standard SFS-EN 50518-1 Location and construction requirements

This standard defines the minimal requirements for the design, construction and operations for premises where alarm signals are received and monitored. (SFS-EN 50518-1: 2014, 13). This standard focuses on: proper site selection (includes location and risk assessment), construction (entrance lobby, locking, emergency exit, facilities etc.), alarm systems (external attack, fire, personnel safety etc.), and power supplies. The locking, emergency exits, and power supplies are the main points of this standard that can be applied to the design of an on-site camera monitoring centre. Figure 2 demonstrates the interconnection of technical factors and human elements in a camera monitoring centre. The chain of events begins when the monitoring systems detect a signal from the monitored premises (although the signal does not have to be originated from the monitoring system and can also be simply a situation detected by the guard). The systems then process the signal and notifies the guard of it. After this the guard evaluates the signal and situation with the help of technical tools such as radio communication with other guards on site and live camera feeds of the venue. The “private guard” and “key holder” indicated in the figure below is substituted to a single guard when discussing an on-site camera monitoring centre. This guard then reacts to the situation based on his/her evaluation of the situation and protocols that have been agreed upon beforehand.

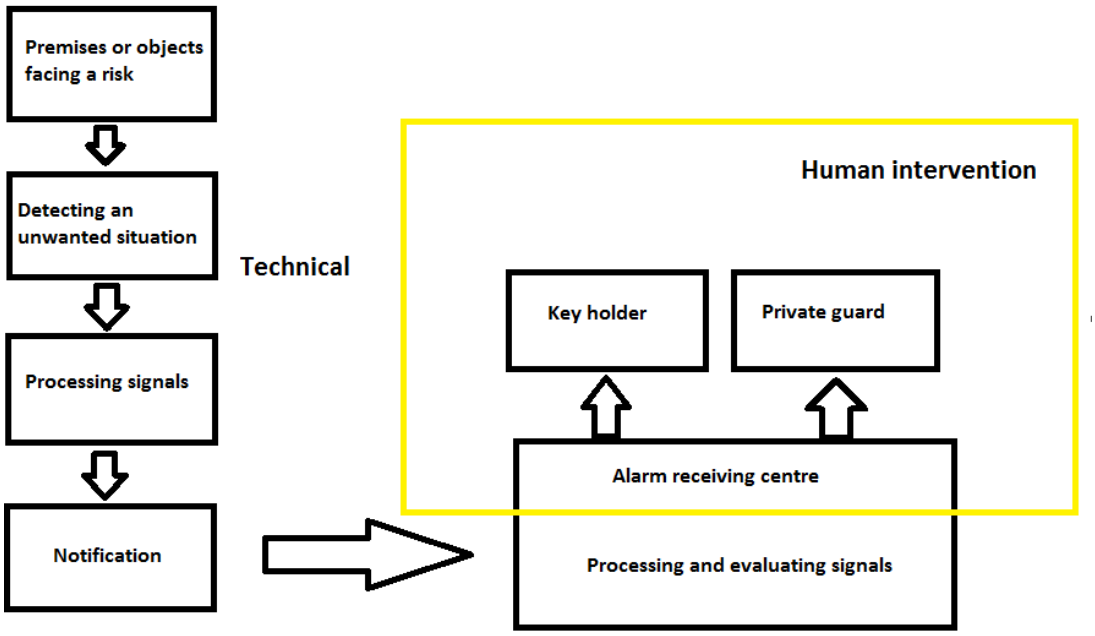

Figure 2: Diagram of the alarm receiving process (SFS-EN 50518-1: 2014, 11)

2.1.2 Standard SFS-EN 50518-2 Technical requirements

This standard defines the technical requirements of an alarm receiving centre. Functional performance and performance assurance are also a part of the standard. (SFS-EN 50518-2: 2014, 9). There are clear time frames for maximum time used for alarm processing. Contingency power supply and equipment, testing, data storage, and communication requirements are all also very clearly defined in this standard. Database storage and management, testing of equipment, and continuation of operations are the main points that can be applied to the design of an on-site camera monitoring centre.

2.1.3 Standard SFS-EN 50518-3 Procedures and requirements for operation

This standard defines the minimum procedural requirements for operations of an alarm receiving centre. (SFS-EN 50518-3: 2014, 9). This standard focuses on the staffing, security background checks, training, emergencies, and signal handling within the alarm receiving centre. Out of the three standards, this one is the least applicable for the design of an on-site camera monitoring centre. This standard mainly focuses on the procedures on how surveillance service providers need to ensure the integrity of their operations and handling of client data. The only point that can be applied to the design of a camera monitoring centre is how the database should be managed.

2.2 Legislation

The legislation affecting the camera monitoring centre can be divided into three different groups: legislation affecting whether the museum is eligible to receive the support of the state indemnities, the legislation affecting the occupational safety within the centre, and lastly data protection law affecting how all the gathered data is used and retained. Complying with legislation is the very minimum requirement that a camera monitoring centre needs to pass. The legislation affecting the occupational safety within the camera monitoring centre revolves around the Rescue Act (379/2011) and Occupational Safety and Health Act (738/2002).

The goal of the Rescue Act is to improve safety and to reduce accidents. In case an accident occurs, the law also aims to ensure the safety of people and mitigation of damages to humans, assets and environment. (Rescue Act 379/2011, 1 §). For the camera monitoring centre, this law affects the ventilation, emergency exits, locking, openings, fire resistance, and fire and gas alarms. Section 10 of the law states that the fire and gas alarm equipment need to be kept functional and routinely checked and maintained. Section 13 states that ventilation also needs to be cleaned and maintained so that they do not pose a risk for a fire. Section 14 states that the owner of the building has to take action to ensure safe evacuation from the building during a fire or other emergencies. This part is important for the camera monitoring centre, since the standard SFS-EN 50518-1 recommends that the entrance for the centre has two interlocked doors. The reason for this is that the access to the centre can in this way be controlled more strictly by the personnel within the centre, but this also creates the risk of personnel getting stuck in the area during a fire or other emergency. Due to this reason, in the entrance area there needs to be a mechanical way to force the door open that leads outside. Similarly, there needs to be a similar way to force the door open to the entrance area from within the centre.

The goal of the Occupational Safety and Health act is “to improve the working environment and working conditions in order to ensure and maintain the working capacity of employees as well as to prevent occupational accidents and diseases and eliminate other hazards from work and the working environment to the physical and mental health, hereinafter referred to as health, of employees.” (Occupational Safety and health Act 738/2002). Chapter 2 Section 10 gives the employer the responsibility of assessing and analysing the risks in the workplace. The employer is responsible for minimizing any hazards that can cause risk to employee’s health. Chapter 2 Section 12 states that already during the planning and designing phase of a new work environment/place, all risks for safety and health must be taken into consideration. This chapter broadly defines how safety of the employees needs to be taken into consideration.

Occupational Safety and Health Act Chapter 5 Section 24 states that proper ergonomics needs to be maintained in the workplace. Auxiliary equipment should be used to ease the job when necessary. Structures (e.g. chairs and desks) should be adjustable whenever possible in order to create flexibility for the employee to adjust their posture. Chapter 5 Section 30 states that "An employee performing night work shall, when necessary, be provided with an opportunity to change tasks or move over to daywork if this is possible in consideration of the circumstances". Working as a guard in a museum unavoidably requires working during the night, but the amount of night shifts per person should be kept to the minimum. This chapter focuses mostly on the wellbeing of the employees rather than on any immediate occupational hazards.

The Data Protection Act (1050/2018) came into effect on 1.1.2019 in order to fulfil the national application of the European Parliament's General Data Protection Regulation. For camera monitoring centres, the Data Protection Act affects how personal data is processed and collected. According to the Office of the Data Protection Ombudsman, recorded image and sound constitutes as personal data if any individual can be identified from them. The length of which the recordings are saved for does not affect whether or not they are considered to be personal data. (Data Protection 2019).

2.3 Terms for state indemnity set by the Ministry of Education and Culture

The Ministry of Education and Culture helps Finnish art museums financially by insuring exhibitions that are non-commercial by nature. The goal of this Ministry's state indemnity support program is to promote international and local exhibition activity and cultural exchange. (Minedu 2019). Exhibitions that are supported by the program have to be deemed as culturally significant, and each application is reviewed on a case-by-case basis where cultural and artistical perspectives are taken into consideration alongside security measures and risk assessment. (Miniedu 2017, 4).

Didrichsen's incoming art exhibition is also part of this same program, but to be able to qualify for financial support, the museum has to pass all fire and other safety requirements. The terms for insurance include a deductible that starts from 20 000 euros and scales up to 200 000 euros depending on the total value of the insurance. The point of this is to highlight the museum's own primary responsibility for the safety of the artworks. If small-scale damages occur to the artworks, then it's financially in the museum's own best interest to sort the damages out with their own insurance without using the insurance provided by the program. (Miniedu 2017, 5). Application for state indemnities also requires that the premises satisfy requirements such as: an up-to-date rescue plan, operational intruder detection system that is adequate in quality, automatic fire alarm system, and recording camera surveillance system.

(Miniedu 2017, 18). The state indemnities are backed up by two legal regulations: the Act on State Indemnity for Art Exhibitions (411/1986), and the Decree on State Indemnity for Art Exhibitions (445/1986).

2.4 Requirements set by the art lender(s)

The lender(s) who lend their artworks for Didrichsen Art Museum also demand certain requirements to be fulfilled. The reasoning for this is that the lender(s) want their artworks returned after the exhibition with no damage done to them and demanding a certain level of security will help keep the artworks safe and intact. These requirements regarding the specific high-profile exhibition led to the decision to create an on-site camera monitoring centre in the first place. In this case these requirements were mainly operational rather than technical. (Selén, O. 2019).

3 Technical and operational requirements

The technical requirements in this context mean the requirements for the camera surveillance regarding the location, construction, locking, surveillance, alarm systems, ventilation, lighting and temperature, and power supply. The operational requirements consisted of database management, equipment testing, ergonomics, camera surveillance procedures and shift work. Regarding the camera monitoring centre, there are technical and operational requirements as well as suggestions that are both explored in this chapter.

3.1 Location

The first step in the process of creating a camera monitoring centre is to determine its location. Completing a risk assessment should be done when choosing the location. (SFS-EN 50518-1: 2014, 21). The risk assessment takes into consideration the risk for fire, explosion, flood, and vandalism. According to the standard, other organizations nearby should also be taken into consideration and their risk level for previously mentioned threats. In the case of Didcrichsen museum, the small (around 40 hectares) island of Kuusisaari has multiple buildings that can attract unwanted risks. These buildings consist of the already previously mentioned embassies of Bulgaria, Germany, Hungary, Indonesia, Japan, and South Korea. Alongside the embassies, there is also another museum close by named Villa Gyllenberg.

3.2 Construction

The construction (also known as the shell of the centre) needs to be at an adequate level so that structural security of the camera monitoring centre can be ensured. The floors, walls, ceilings, entry and exit doors, ventilation inlets/outlets, entry points for cables and pipes, glazed areas and transfer hatches can all be classified as the shell of the camera monitoring centre. The purpose of the shell is to provide resistance against physical attacks. (SFS-EN 50518-1: 2014, 21). The monitoring and alarm receiving centre- standard part 1 provides

minimum requirements for the thickness (amount varies depending on the material used) of outer shell walls, floors and ceilings. According to the same standard, the minimum fire resistance that the shell of the centre shall provide can never be less than 30 minutes.

3.2.1 Entrance

According to the standard SFS-EN 50518-1, the entrance of the camera monitoring centre should have two doors (with maximum height of 2,5 m and width of 1,1 m). The floor area between the two doors can have a maximum area of 6 m^2. The doors should stay locked in order to prevent them from both being opened simultaneously. This principle allows for better access control of the camera monitoring centre. Doors that are locked and are a part of an escape route need to have an emergency door release (EDR for short) on them. The EDR can be used to mechanically override the electronic locking during an emergency. The EDR should be positioned at a minimum height of 900 mm from the floor but no higher than 1350 mm, and within 1500 mm from the door. This positioning ensures that it's easily accessible during emergency situations. (Association of Building Compliance 2018, 9). The image below visualizes the entrance lobby design principle recommended in the standard SFS-EN 50518-1.

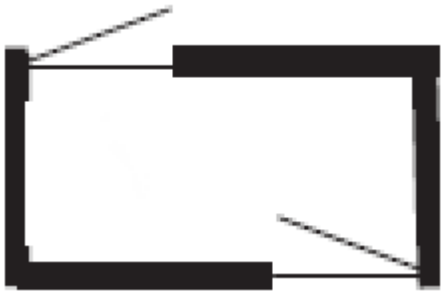

Figure 3: Theoretical picture of an entrance lobby

3.2.2 Glazed areas, doors and walls

The standard SFS-EN 50518-1 states that the glazed areas should have a classification P6B against physical attacks and classification BR 3-S against bullet attacks. (SFS-EN 50518-1: 2014, 25). P6B is a classification from the European Standard EN 356 : 1999 : "Glass in building- Security glazing- Testing and classification of resistance against manual attack". The P6B rating means that the glass can take a minimum of 30 – 50 axe strikes before creating an opening. The classification BR 3-S is from the standard EN 1063 : 1999, and it states that the glass can withstand shots from a handgun 0.357 Magnum. The "S" in "BR 3-S" means that splinters of glass might fly when the glass is shot at. When shot at, the glass is designed to break and flex, which can result in small particles of glass flying off from the rear. (Pilkington 2019).

According to the standard SFS-EN 50518-1, the doors leading into the camera monitoring centre should have a minimum rating of RC3 from the standard SFS-EN 1627 classification system. (SFS-EN 50518-1: 2014, 21). The RC3 rating means that it is designed to withstand a moderately experienced burglar equipped with screwdrivers, crowbars, small hammers, hand drills and simple tools. RC3 classified doors also withstand 6 kN (or 600kg) of exerted force. (Metal quartz 2019). The table below demonstrates the standard SFS-EN 50518 part 1's suggested optimal requirements for the resistance against physical attacks that any outer walls should provide.

Construction elements	Materials	Thickness
Walls of the shell of the ARC and the walls of the entrance lobby (see Annex B)	Solid masonry	≥ 200 mm
	Cast concrete	≥ 150 mm
	Reinforced concrete	≥ 100 mm
	Solid steel	≥ 8 mm
Internal walls	No requirement	No requirement
Floors and ceilings	Cast concrete	≥ 150 mm
	Reinforced concrete	≥ 100 mm

Figure 4: Minimum resistance against physical attacks (SFS-EN 50518-1: 2014, 21)

3.2.3 Ventilation inlets/outlets and entry points for cables and pipes

According to the standard SFS-EN 5018-1, any clearance around service cables, pipes, or ventilation inlets/outlets should not exceed 1.5 mm. Otherwise these clearances should be filled with material that complies with the requirements for the resistance of the walls. The Rescue Act's section 13 states that ventilation also needs to be cleaned and maintained so that they do not pose a risk for a fire. The image below visualizes the maximum allowed clearance around any cables, pipes etc.

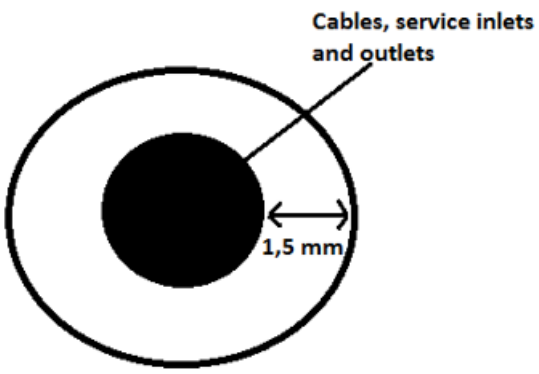

Figure 5: Theoretical picture of the maximum allowed clearance around cables, pipes, and service inlets/outlets

3.3 Surveillance and locking

According to the standard SFS-EN 50518-1, “surveillance shall be provided so that all approaches to the building in which the centre is located can be monitored from within” (SFS-EN 50518-1: 2014, 31). The standard further explains that the reason for the surveillance to exist is to enable the staff within the camera monitoring centre to identify people before permitting them entry to the entrance lobby, and to view any activity inside the entrance lobby. Camera surveillance of the transfer hatch/chute should also be provided. Transfer hatch/chute is a “facility to transfer keys, documents, or other objects”. (SFS-EN 50518-1: 2014, 19).

Locking of the camera monitoring centre can be divided into electromechanical and mechanical locks. The standard SFS-EN 50518-1 states that the doors leading to and out of the entrance lobby should be secured using electromechanical locks. The screws should be protected in such a way that prevents outside tampering. Mechanical locks should be used to secure any inner doors within the camera monitoring centre. (SFS-EN 50518-1: 2014, 25).

3.4 Database management

According to the standard SFS-EN 50518-3, database management covers storing, organizing, controlling, managing, and retrieving all data gathered by the alarm transmission equipment. (SFS-EN 50518-3: 2014, 13). The database management systems should be maintained within the camera monitoring room, so that they are safe from external threats and unauthorized users. There needs to be clear guidelines for the guards on how to deal securely with confidential data. If the camera monitoring system is integrated with other alarm systems (e.g. fire alarm or glass break detection), then each system should have its own individual record which details its record history, signal activity, and of the guards’ responses. There should be a procedure in place that describes how recording, protection, authorization, retrieving, disposal and retention of data is being handled. All recordings need to be safely stored, and electrically stored data needs to have proper backup procedures. All data regarding external communications needs to be retrievable. A log of the guards’ actions/responses containing information of all routine testing, maintenance and emergency repairs needs to be maintained. (SFS-EN 50518-2: 2014, 13).

As described in the Camera surveillance guide by Finance Finland, camera recordings need to be handled with proper procedures that ensure that they are only used for their intended purposes. The recordings need to be protected in a way that prevents unauthorized people from accessing them. Handing over camera recordings should be done using secure data handling procedures by using for example CD discs or USB memory sticks. Primary reason for handing recordings over is to give them to the police for investigation. This process of handing

recordings over should be properly documented in order to avoid any issues regarding liability. (Camera surveillance guide, 46).

The Data Protection Act states that all recorded images and sounds that can be used to identify a person is considered as personal data. According to the Office of the Data Protection Ombudsman, the use of all personal data must be justified and planned. The lengths of how long the personal data is stored must be documented, and the data can be stored only for as long as is necessary for its intended purpose. (Data protection 2019). The personal data gathered in a camera monitoring centre can be categorized as: recordings of camera footage, user actions (access control, logging on to systems etc.), and external communication (mainly with police or other authorities). The standard SFS-EN 50518-2 suggests that all data regarding external communications should be archived for at least three (3) months. All logs regarding user actions should be archived for two (2) years. (SFS-EN 50518-2: 2014, 19).

3.5 Reliability of operations and equipment testing

As the standard SFS-EN 50518-2 states, there should be a contingency plan ready in case the camera monitoring centre is put out of action. The plan should account for any reasonable expectable occurrence that can hinder the operations of the camera monitoring centre (e.g. fire, criminal attack). (SFS-EN 50518-2: 2014, 19). The equipment in the camera monitoring centre should be tested either daily or weekly depending on the equipment. The equipment that needs to be tested daily for proper functioning are the alarm receiving equipment, annunciation equipment, and communications systems. The equipment that needs to be tested weekly is the power supply and the alarm systems of the camera monitoring centre. The results of the testing need to be recorded. All equipment that have a part in displaying, receiving, or transmitting alarm signals need to have back-up equipment that can be used as a replacement within one (1) hour from the detection of the fault. (SFS-EN 50518-2: 2014, 17).

3.5.1 Back-up power supply

The back-up power supply should have enough capacity to supply all communications, signal transmissions, surveillance and its recordings, and ventilation and lighting for the camera monitoring centre for a minimum of 24 hours. Additionally, the back-up power should be able to power the above-mentioned operations on a demand of 1,5 times the average power consumption. (SFS-EN 50518-1: 2014, 31). UPS (uninterruptable power supply) should be used if the primary operations of the camera monitoring centre cannot be performed due to insufficiently low voltage. When the voltage returns to sufficient levels, the main power supply should turn back on automatically and the UPS should recharge. In case the back-up power is supplied via a generator, there needs to be sufficient amount of fuel for the minimum uptime of 24 hours of the above-mentioned operations. (SFS-EN 50518-1: 2014, 33).

3.6 Ergonomics

Ergonomics is, as described by Dohrmann Economics, the "process of designing or arranging workplaces, products and systems so that they fit the people who use them." Ergonomics is a scientific branch of its own and it uses data from other scientific disciplines such as: anthropometry (study of body sizes and proportions), biomechanics (study of muscles, levers and strength), applied psychology (learning, errors), social psychology (groups and communication and behaviors within them), and environmental physics (lighting, noise, temperature, sensation). Not only is it required by the Occupational Safety and Health Act Chapter 5 Section 24 to enable employees to have proper ergonomic working conditions, but according to Dohrmann Consulting it also leads to more productive work. Proper application of ergonomics when designing workplaces leads to more comfortable and productive workplaces where human limitations and abilities are taken into consideration. (Dohrmann Consulting 2014).

3.6.1 Lighting and temperature

It is important to have lighting that best suits the job. Higher levels of lighting are better suited for written work, whereas viewing monitors is best done in lower lighting. Surfaces within the camera monitoring centre should be non-reflective since this reduces fatigue done to the eyes. Reducing eye fatigue is especially important in these kinds of monitoring jobs where a large portion of the work shift is spent sitting and monitoring screens. Reflective surfaces can a have a large compounding effect on eye health during a long shift. (CPNI 2016, 40). It's advisable that the refresh rates of the monitors should be over 50Hz to prevent the screen from flickering, which in turn causes eye fatigue. Regular breaks from staring at the screen are also important for reducing eye fatigue. (CPNI 2016, 47). Ideal temperature is different for every employee. For this reason, it's a good idea to have the temperature adjustable for the employees within the camera monitoring centre. Correct temperature is important for enabling employees to perform at their peak. Too cold temperature can affect the sensitivity of touch, whereas too warm temperature might cause tiredness and higher risk of falling asleep (especially in monotonous monitoring jobs). (CPNI 2016, 41)

3.7 Shifts

Shift work might not be ideally suited for everyone, and it might have a negative effect on the quality of work. It's important for the supervisors to understand that adaptation to different work shifts differs from person to person. CPNI indicates that best work performance can be achieved with 8-hour shifts, but 12-hour shifts can also work depending on how each employee deals with stress and recovers from fatigue. A good practice of shift rotation is to let guards adjust more easily to the changing time slots. In practice this could mean: two (2) early shifts followed by two (2) late shifts, and then finally two (2) night shifts. (CPNI 2016,

76). Continuous night shifts in succession should be kept to a minimum, since this can have a negative effect on health and it's also mentioned in the Occupational Safety and Health Act. National Sleep Foundation also advises against employees working continuous night shifts, since this can have a negative effect on health in the form of e.g. increased risk of different types of cancers and heart diseases. (National Sleep Foundation 2019).

When the shift is being handed over to another guard, it's a good practice to have the guards' shifts overlap slightly, so that the guard with the previous shift can adequately inform the incoming guard of any important information. Important information that should be handed over includes: incidents/occurrences that have happened during the shift or are still happening, technical issues, and suspicious activity within the venue. Highest level of vigilance and alertness can be achieved by keeping the tasks to a minimum of 20-30 minutes long at a time. (CPNI 2016, 84). According to a study on the effects of boredom on vigilance performance, all peoples' (including those with less proneness for boredom as a trait) state of vigilance gets negatively affected already after 10 minutes of performing monotonous tasks such as camera surveillance. (Kass, Vodanovich, Stanny & Talyor 2001). Alongside the negative effect of boredom on vigilance, another human limitation that should be acknowledged is the sudden transition from underload to overload. This means a change from tedious activities or time when nothing significant is happening, to suddenly a situation which exceeds the guards' ability to complete the demand which the situation has brought. This sudden change can be overwhelming for human cognition which then leads to stress and irrational decision making. This behaviour is more common amongst less experienced guards. (CPNI, 14).

3.8 Camera surveillance

As presented by CPNI, the camera monitoring system should have clearly defined and documented purposes, which in most museums' cases are to detect intruders, support guard(s) and to classify activity within the premises. (CPNI 2016, 42). Clear purpose for camera footage recordings is also required by the Data Protection Act.

Camera surveillance is an important tool for helping the guards "on the ground" (a term used for the guards that are present in the museum). The guard in the camera monitoring centre can inform the guards on the ground of any suspicious activity or other important incidents. Effective communication between the guard in the camera monitoring centre and the guards on ground requires: radio communication, established and collectively agreed language/terms, and clear and collectively agreed locations in the premises. With these basics, guards in the camera monitoring centre can inform the guards on site about e.g. a man with a blue shirt in room A near painting 3 is acting suspiciously. The exact terminology used to differentiate the suspect/room/artwork is not relevant, as long as it is clear and consistent with language that has been agreed collectively beforehand. (CPNI, 6). Suspicious activity and incidents observed by the guard within the monitoring centre needs to be noted down alongside

with a timestamp of when the occurrence took place. The log of suspicious activity and incidents can be made on paper or a text file. (CPNI 2016, 49).

To be able to detect an intruder, the image of the target must be a minimum of 10% of the screen height. Recognizing someone from the image requires 50% of the screen height and identifying someone requires 100% of their image as the height of the screen. Each camera image should be viewed at least once every five minutes in order to maintain proper surveillance quality. Depending on the area, some areas with more people require more active surveillance compared to quitter areas. (CPNI 2016, 42). The amount of camera feeds a guard can effectively monitor and process at the same time depends on both the types of cameras used, and on the activity within the monitored area. The two different types of cameras that can be used are fixed cameras and Pan Tilt Zoom (PTZ) cameras. Fixed cameras are fixed in their location and always show the view they are set to show. Advantage of a fixed camera is that the guards can't lose the optimal view the camera was originally set for by moving it. The second type of camera that can be used is the PTZ camera which is more versatile compared to the fixed camera, since it's able to change the viewing direction and zoom in and out. The weakness of a PTZ camera is that guard monitoring the feed might lose the optimal viewing direction after adjusting the camera. The PTZ camera can also be distracted by someone with malicious intents, leaving some other parts of the view blind for the guard. Monitored areas can be classified as either so busy and vulnerable, or passive and nothing should be happening there. Depending on the activity of the monitored site and the camera type used, the range of camera feeds a guard can effectively monitor is 5-50. (CPNI 2016, 44).

Guard(s) monitoring the camera feeds benefit from the screen being further away compared to basic word processing work. If the screen is too far away, the guard may miss a significant detail in the image. If the screen is too close, part of the screen is in the guard's peripheral vision which also can cause the guard to miss significant details. A good general rule is that the display should be placed at a distance of three to five times the screen's diagonal length. It's important to not overload the guard(s) by having too many screens that have to be monitored over long periods of time. (CPNI 2016, 40). Usually it's recommended that the maximum amount of screens at a desk is three. In a camera monitoring centre the three screens can be distributed by dedicating one of them for camera monitoring, one for alarms from detectors, and the third one for reviewing recorded footage. In cases where many cameras need to be monitored at the same time, the screens for alarm detectors and for reviewing recorded footage can be merged into one screen, freeing the extra screen for more camera monitoring potential. (CPNI 2016, 25). The three displays should only be used for their intended purposes, and other jobs such as checking e-mails should be done on another screen.

A video wall can be considered as a tool in the camera monitoring centre. A video wall is an arrangement of monitors that provides a largescale and high-resolution display surface.

(Cinemassive 2019). A video wall can be a useful complimentary tool for especially supervisor overview and incident management purposes. It should not be used, however, as the primary tool for monitoring. When guard(s) need to monitor an image, it should be viewed by them on a workstation monitor in order to avoid any discomfort related with viewing the video wall for longer periods at a time. A video wall can also be a distraction for the guard(s) if it is placed improperly. (CPNI 2016, 38).

4 Process of the thesis

The thesis aims to show the thought process that the thesis worker had in mind when creating the guidelines for the camera monitoring centre. The creation of the guidelines were approached from three different angles which were the following: the minimum technical and operational requirements, highest achievable level in the from of complying with standards, and the museum's perspective on what the camera monitoring centre should be like. Combining these three perspectives led to the guidelines.

The thesis started by determining which were the minimum requirements. Legislation was the first thing that had to be taken into consideration, and after that the requirements for state indemnity set by the Ministry of Education and Culture. Information regarding these were readily available online. The next step was to find out what where the global/European/Finnish standards that could be applied for the camera monitoring centre. The European standards SFS-EN 50518 parts 1-3 were applicable for these guidelines. Although the alarm receiving centres that these standards are used on are not synonymous with the on-site camera monitoring centres that were focused on in this thesis, the large similarities between the two made the application of the standards possible for the guidelines. Third step was to find out by consulting the museum's curator Otto Selén that what the museum needed from the camera monitoring centre. This consultation combined with observations of the museum venue and the designated room that would become the camera monitoring centre, as well as studying relevant documentation given by the museum resulted in the realization of what was possible and expected from the camera monitoring centre.

These steps resulted in creating guidelines for the design of an on-site camera monitoring centre that explained what was required, as well as what were some potential standards that could be aimed for. The guidelines were made with the specific circumstances of Didrichen Art Museum and the specific upcoming art exhibition in hand, which means that it is not applicable as it is for other situations. Even though the specifics are not applicable, the process itself of creating the guidelines can be taken from this thesis and applied to other similar situations.

5 Results

The research's aim was to answer the question: how can a camera monitoring centre be designed in such a way, that it adequately meets the necessary requirements and is also tailored for Didrichsen Art Museum's specific case? This question was answered, but since the results are confidential, another similar question was chosen which was also answered. The particular question was: **How should a camera monitoring centre that is located on site of the museum be designed, so that it meets all the necessary requirements and the specific needs of an upcoming high-profile exhibition?**

The first step for answering this question is to understand the desired level of effectiveness and security of the camera monitoring centre from the museum's perspective. Designing a camera monitoring centre that passes the bare minimum requirements means that it only needs to comply with legislation concerning occupational safety, ergonomics and shift work, and proper handling of personal data. The legal requirements stay constant disregardless of any other circumstances.

A step above complying with the legal requirements is to fulfil the requirements for state indemnities and those set by the artwork lenders. These two are requirements are important to fulfil; for state indemnities on financial basis and for fulfilling the lenders' requirements it's to gain artworks that can be exhibited. These exact requirements may change depending on factors such as who are the lenders, the size of the exhibition, other security systems etc.

The highest reasonable level of security and effectiveness of operations of a camera monitoring centre can be achieved by complying with the standard group of SFS-EN 5018 parts 1-3. If the goal of the museum is to comply with this standard group, then the process of designing the camera monitoring centre should start as soon as the whole museum building is being designed. This is because of the standards set requirements regarding the constructional elements such as the thickness and material of the walls, which are impractical if not completely impossible to change after the whole building has been built. As explained by CPNI, the earlier the design of the camera monitoring centre is being considered, the higher is its level of security and value for money. (CPNI 2016, 13).

The desired level of security and possible compliance with standards should always be reflected on the museum's own capabilities and possibilities on fulfilling that level. The aspects of: legal requirements, lenders' requirements and requirements for state indemnities, high standards to potentially aim for, and lastly the museum's own capabilities and desires should be combined and taken into consideration. This combination results in guidelines that can be used to design a camera monitoring centre.

6 Conclusion

In conclusion, the research question: **How should a camera monitoring centre that is located on site of the museum be designed, so that it meets all the necessary requirements and the specific needs of an upcoming high-profile exhibition?** was looked into and answered. The research question aligned with the objective of the actual guidelines presented to the museum, while not going into any confidential specifics. It was concluded that every case of designing camera monitoring centres revolves on a few constant factors, but also on multiple variable factors. Due to these variable factors, every design process of an on-site camera monitoring centre for museums needs to be evaluated on a case-by-case basis. The thesis demonstrated on what factors the project of designing an on-site camera monitoring centre was based on, and what were the technical and operational requirements that needed to be considered.

The thesis relied mostly on already existing literature e.g. legislation and standards for camera monitoring centres. The research portion in the form of first-hand observations and consultations of the Didrichsen Art Museum's management served to supplement this existing literature. The desk research methodology was chosen since the existing material provided by Didrichsen Art Museum was very applicable to the research goals and process. Inductive content analysis proved to be useful in analysing gathered content and determining a design process based on it.

References

Printed sources

SFS-EN 50518-1: 2014. Monitoring and alarm receiving centre - Part 1: Location and construction requirements. SESKO.

SFS-EN 50518-2: 2014. Monitoring and alarm receiving centre - Part 2: Technical requirements. SESKO.

SFS-EN 50518-3: 2014. Monitoring and alarm receiving centre - Part 3: Procedures and requirements for operation. SESKO.

Electronic sources

Act on State Indemnity for Art Exhibitions 411/1986. Set on 30.5.1986. Accessed 19.8.2019. https://www.finlex.fi/fi/laki/ajantasa/1986/19860411

Alarm receiving centres. 2019. Approved Monitoring and Alarm Receiving Centre. Accessed 22.7.2019. http://www.finanssiala.fi/vahingontorjunta/dokumentit/Halytyskeskukset.pdf

Association of Building Compliance. 2018. Code of Practice for Electro mechanical Controlled Locking Devices on Egress Doors. Accessed 30.8.2019. http://www.abciqp.org.nz/_literature_192247/Electro_mechanical_locking_device_code_of_practice

ATLAS.ti. What is Observational Research? Accessed 10.9.2019. https://atlasti.com/observational-research/

Bastion Security. 2019. Video Surveillance for Museums. Accessed 10.7.2019. https://www.videosurveillance.com/museums.asp

Camera surveillance guide. Finance Finland. Accessed 2.9.2019. http://www.finanssiala.fi/vahingontorjunta/dokumentit/Kameravalvontaopas.pdf

CENELEC. 2019. Who we are. Accessed 11.7.2019. https://www.cenelec.eu/aboutcenelec/whatwedo/index.html

CFPA. 2012. Security Guidelines for Museums and Showrooms. Accessed 9.9.2019. https://www.apsei.org.pt/media/recursos/documentos-de-outras-entidades/CFPA-guideline-security/guidelines_museums_05-2012-s_1381921028.pdf

Cinemassive. 2019. Video Wall System Basics. Accessed 21.9.2019.
https://www.cinemassive.com/video-wall-basics/

CPNI. Considerations in Control Room Security Personnel Capability for Major Events: A Human Factors Perspective. Accessed 24.8.2019.
https://www.cpni.gov.uk/system/files/documents/17/4b/control-room-security-personnel-capability-major-events.pdf

CPNI. 2016. CPNI Control Rooms Guidance. Accessed 15.7.2019.
https://www.cpni.gov.uk/system/files/documents/73/38/Control%20Rooms%20Guidance%20Dec%202016.pdf

CPNI. 2019. Control Rooms. Accessed 4.9.2019.
https://www.cpni.gov.uk/control-rooms

Data Protection. 2019. Data Protection. Accessed 28.9.2019.
https://tietosuoja.fi/en/faq-camera-surveillance

Decree on State Indemnity for Art Exhibitions 445/1986. Set on 6.6.1986. Accessed 19.8.2019.
https://www.finlex.fi/fi/laki/ajantasa/1986/19860445

Didrichsen. 2019. The Didrichsen Art Museum. Accessed 9.7.2019.
https://www.didrichsenmuseum.fi/architecture/the-didrichsen-art-museum/

Didrichsenmuseum. 2019. Didrichsenin taidemuseo. Accessed 9.7.2019.
https://www.didrichsenmuseum.fi/museo/

Dohrmann Economics. 2014. What is Ergonomics? Accessed 23.8.2019.
https://www.ergonomics.com.au/what-is-ergonomics/

FINAS. 2016. Certification bodies. Accessed 23.9.2019.
https://www.finas.fi/sites/en/accreditation/activity/Pages/Certification-bodies-.aspx

Finanssiala. 2019. About us. Accessed 22.7.2019.
http://www.finanssiala.fi/en/about-us/Pages/default.aspx

FCM. 2017. What is an Alarm Receiving Centre? Accessed 23.9.2019.
https://www.firstcountymonitoring.co.uk/article/what-is-an-alarm-receiving-centre

Hall, S. "What Is Inductive Content Analysis?" Accessed 23.9.2019.
https://smallbusiness.chron.com/inductive-content-analysis-24666.html

Juneja, P. Customer Relationship Management. Accessed 10.9.2019.
https://www.managementstudyguide.com/desk-research.htm

Kass, Vodanovich, Stanny & Talyor. 2001. Watching the clock: Boredom and vigilance performance. Percptual and Motor Skills, 92(3, Pt 2), 969-976.

K, Dingemanse. 2014. Scibbr. How to perform desk research. Accessed 11.9.2019.
https://www.scribbr.com/dissertation/perform-desk-research/

Metal Quartz. 2019. Burglary-Resistant RC3 – RC4 – RC5. Accessed 26.8.2019.
https://www.metalquartz.com/en/performances/burglary-resistance/

Miniedu. 2017. State Indemnity for Art Exhibitions: Guide for applicants. Accessed 18.7.2019.
https://minedu.fi/documents/1410845/3956635/State+indemnity+for+Art+Exhibitions_guide+for+applicants+30092017.pdf/2c2b54cc-4bc0-423d-87db-9abf99580f85/State+indemnity+for+Art+Exhibitions_guide+for+applicants+30092017.pdf

Minedu. 2019. State Indemnities for Art Exhibition. Accessed 17.7.2019.
https://minedu.fi/en/state-indemnities-for-art-exhibition

Ministry for Foreign Affairs of Finland. 2019. Representation of foreign states in Finland or in the nearest country to Finland. Accessed 20.8.2019.
https://um.fi/representation-of-foreign-states-in-finland-or-in-the-nearest-country-to-finland

National Sleep Foundation. 2019. Living & Coping With Shift Work Disorder. Accessed 10.8.2019.
https://www.sleepfoundation.org/shift-work-disorder/what-shift-work-disorder/living-coping-shift-work-disorder

NTMA. 2019. State Indemnity. Accessed 16.9.2019.
https://stateclaims.ie/about-our-work/state-indemnity

Occupational Safety and Health Act 738/2002. Set on 23.8.2002. Accessed 20.8.2019.
https://www.finlex.fi/en/laki/kaannokset/2002/en20020738_20060053.pdf

Pilkington. 2019. Glass and Manual Attack. Accessed 26.8.2019.
https://www.pilkington.com/en-gb/uk/architects/glass-information/functions-of-glass/mechanicalfunctionsofglass/glass-and-manual-attack

Rescue Act 379/2011. Set on 29.4.2011. Accessed 20.8.2019.
https://www.finlex.fi/fi/laki/ajantasa/2011/20110379?search%5Btype%5D=pika&search%5Bpika%5D=pelastuslaki

Unpublished sources

Selén, O. Didrichsen Art Museum's curator. Didrichsen Art Museum. 29.5.2019. Personal interview.

Figures