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Risk Analysis and Soft Targets

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Abstract

Not only soft targets but also security significant objects of the municipality have been a frequently discussed topic in recent years in the field of security. With the increasing number of attacks abroad, there is a need to focus more on this issue and their security in the Czech Republic as well. For this reason, it is necessary to prepare analyses and to look for deficiencies in the security of objects, and to seek solutions. This article focuses on the risk analysis of the Hvezda cinema in Uherské Hradiště and aims to describe the risks associated with it.

Keywords: Analysis; object; risk; shooter.

1. Introduction

From the point of view of commercial security, the Hvezda cinema is an important facility with a relatively large number of people concentrated in one place. This object can be classified as one of the most important security objects in the city. From the point of view of population protection, it can also be considered a soft target. Soft targets are defined according to the terminological dictionary (2016) as "publicly frequented places, easily attacked objects or places of non-military character that are not permanently guarded by armed forces or in any other way, or not guarded at all". Their issues are addressed in the works of, for example, Slivkova et al. (2017) or Splichalova et al. (2020). All information about the object is available on the cinema's website (c2023). Places with a higher tendency of accumulation of citizens should be given more attention, not only for fire safety reasons but also for social and other reasons, as well as given the permanent pressure-resistant shelter built for the civilian population. In the environment

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described above, pathological phenomena can easily arise, particularly related to crowd psychology. To cope with the risks arising from the threats described above, in particular fire and crowd psychosis, it is necessary and obligatory for the facility manager to have documents drawn up which include a security assessment of the facility based on risk analysis, including a fire evacuation plan and operating rules. Further prerequisites for the successful and, in particular, safe operation of the facility are regular training of employees in fire protection and occupational health and safety. According to Senk (2015), also defining roles for the protection of safety areas, nodal points, and protected zones contribute significantly to the clear identification of responsibilities, the definition of duties, and the delegation of authority of the employees and management staff of a given facility.

The Hvezda cinema building is located just a few hundred meters east of the center of Uherské Hradiště. It is located in a popular relaxation zone of a composed area of urban greenery - Smetana's Orchards.

The Hvezda cinema forms a border between the northern part of the city park and the square Míru, with the back of the building facing directly into the park. On the south side of the building, apart from the park, it is de facto adjacent to the Miroslav Valenta football stadium and the adjacent Na Krčku pub. To the southeast, the Slovácká Slávie sports hall and the Emílie Zátopková Athletic Stadium are also nearby. Approximately 250 meters east of the building is the Sportovní Primary School with the adjacent Aquapark and skatepark. About 100 meters behind the primary school, further east, is the ice rink.

To the west, at a distance of about 80 meters from the Hvezda cinema, stands the Slovácké Galerie building, which is directly connected to the rock Club Peace according to the Memorial catalog (2023).

For better orientation, a map composition was made using the modeling method, which is defined as a method of describing reality. Figure 1 thus shows a map of the risks near the Hvezda cinema. This map was made using QGIS software, version 3.28 Firenze. Modeling and working with map data is used in many scientific works. Examples include Rehak et al. (2016), Vichova et al. (2017), and Dzermansky et al. (2022).

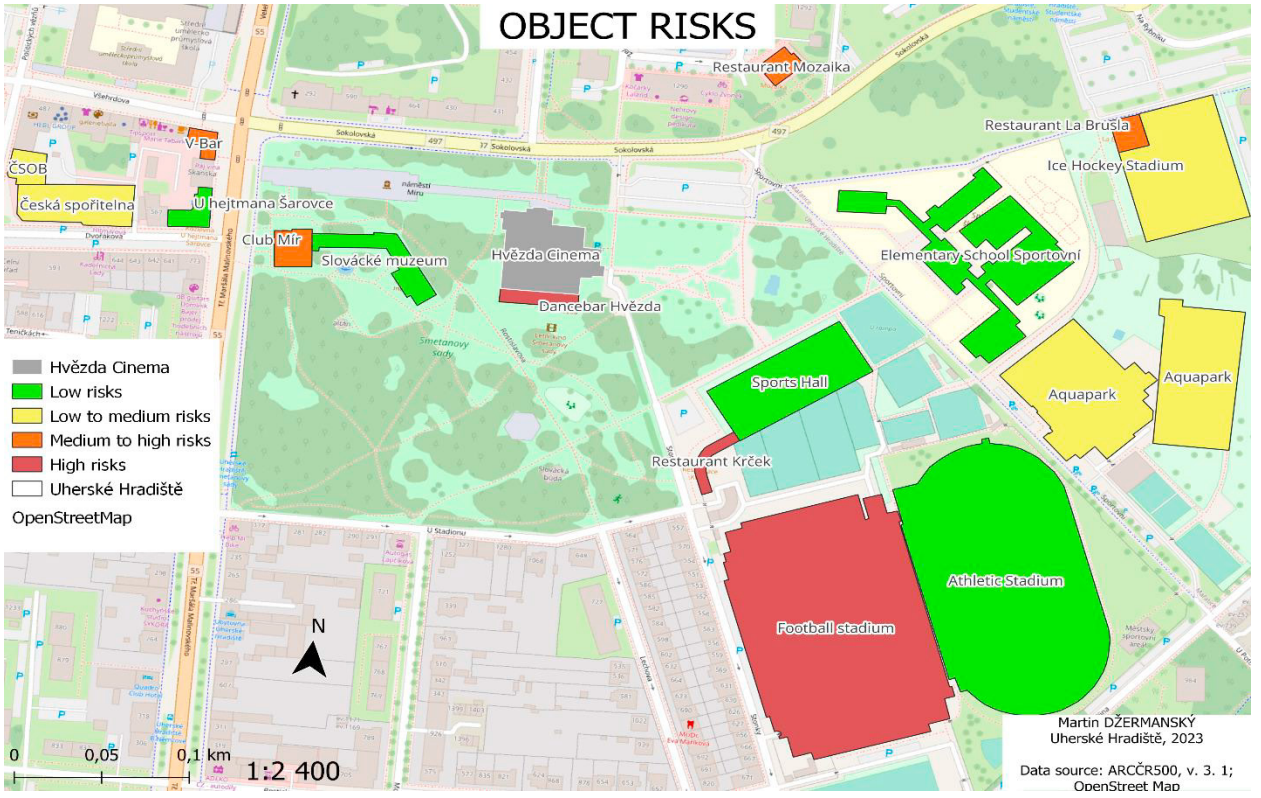

Fig. 1. Map of risks and dislocation.

1.1. Description of the object

The building is divided into two separately functioning parts due to the lease of the premises. The main part consists of the cinema premises and part of the basement is rented to operate the Dancebar Hvezda nightclub, which is managed by its operator.

The leased premises are not dependent on the operation of the cinema as they have their entrance and are therefore fully segregated including within the alarm and electrical fire alarm systems. Only a part of the basement (corridor), used as an emergency exit, can be considered a common area. Normally, this entrance serves as a barrier-free entrance for people with physical disabilities.

The primary purpose of the Hvezda cinema building is the organization of cultural and social events, including film screenings, theatre performances, music concerts, art exhibitions, and openings.

The Hvezda Cinema building was designed as a fallout shelter, located in the screening room in the basement of the building. This shelter has been preserved despite extensive reconstruction and could serve its purpose in the event of a nuclear accident or attack.

An ancillary purpose of the building is the operation of a nightclub, which gives rise to additional legal requirements arising from the risks associated with this operation. Information is contained in the Guide (2022).

1.2. Business processes

Hoyle (2017) describes business processes as interrelated activities through which inputs are transformed into desired outputs. These processes can be interrelated, therefore the output of one process can be the input of another process. A graphical representation of the flow of processes, their inputs, outputs, and interactions are called process maps. There are 3 main categories of processes - core, support, and control processes.

Process performance indicators belong to the group of Key Performance Indicators (KPIs). The indicators are described in the work by Janosec (2010). This group, including economic, quality, IT service, inventory, or quality indicators, is conceived as a complement to the so-called KPIs. While KPIs show how well processes are working, KPIs show how well results and objectives are being achieved.

Within the Hvezda cinema facility, process performance indicators include time (how long the operation takes), cost (efficient use of resources), quality (whether the result meets the requirements), visitor service (whether visitor expectations are met), growth (whether the number of visitors is increasing), finance (whether revenue and profit are increasing), feedback (positive/negative visitor reviews)

1.3. Risks

Risk is a term that refers to an uncertain outcome with a possible undesirable condition. Risk means a threat, a potential problem, a danger of harm, the possibility of failure and setbacks, damage, loss, or destruction. Risk, therefore, expresses a degree of uncertainty, i.e. the probability of achieving an outcome that is different from the expected one.

According to Rejtspis (2004), risk can also be expressed as the mathematical probability that health damage, illness, or death will occur under certain defined conditions. Quantitatively, it ranges from 0 - harm will not occur, to 1 - harm will occur in all cases.

According to the Department of the Interior's Glossary of Terms (2016), risk can be broken down into several perils, such as energy, environmental, resource, cyber, or even food.

2. ETA analysis

The ETA (Event Tree Analysis) method is usually abbreviated as ETA. According to List: Overview of methodologies for risk analysis (2004), it is a causal analytical technique used to evaluate the process and its events leading to a possible accident.

Considering the object of the Star Cinema, 3 types of scenarios will be analyzed as active shooter attack, placing a dangerous object indoors and attack by vehicle raid on the group.

The system of measures in the Hvezda cinema building against the above-mentioned scenarios is based on the nature of the building as a whole as well as on the characteristics of the individual parts of the building concerning the presence of personnel, elements of the alarm security system, and the CCTV system.

Measures against an active shooter attack

There are currently no special measures to protect against an armed person entering the interior of the building. The only protection consists of programmable security doors. The doors can be left in security mode outside opening hours when only staff is in the building or when no more visitors are expected (after the last screening/performance has started). In this case, people can leave the cinema premises without restriction, but as soon as they leave the building, the doors are automatically locked from the outside and uninvited visitors cannot enter without the use of brute force.

Precautions against placing a dangerous object inside the building

There are also no measures to prevent the placement of a dangerous objects inside the Hvezda cinema building. As in the case of an active shooter, the possibility of an intruder entering is greatly reduced by the regime measures based on programmable entrance doors. When the public has free access to the building, the movement of persons within the building is restricted to the minimum necessary through doors with both security hardware and cylinders. In addition, the movement of people is monitored by a member of staff (projectionist) who continuously checks the situation in the box office, the foyer, and the projection room.

Measures to prevent vehicles from running into the group

Due to the physical dislocation of the building, the risk of an emergency due to a vehicle collision or deliberate vehicle attack is almost impossible. The building stands on a concrete bed and is thus elevated to a height of about two meters on all sides compared to the surrounding terrain. This elevation then forms a gallery that serves as a terrace for the café in summer and also forms an intermediate step to another staircase leading to the main and side entrances to the building. Due to the angle of the staircase, the vehicle would have to have an extremely high chassis to be able to climb the staircase. Theoretically, therefore, the vehicle could climb the stairs but only at a very low speed. Therefore, this scenario does not need to be addressed or safety measures designed given the parameters of the building.

3. Active shooter attack analysis

In this thesis, an example of an active shooter attack analysis is chosen because of the most common incidents in the world. An active shooter can enter the Star cinema building most easily through the main entrance if it is accessible from both sides at the time of the attack. Depending on the chosen time of the attack, he/she may use the crowd accumulating at the box office before the screening/show begins to his/her advantage. Should he choose a time when the audience is already seated in the screening room, he will gain the advantage of a high concentration of targets in a "small" area at the cost of a higher probability of detection by staff. The box office, including the information center, is located directly opposite the main entrance, and therefore the staff member has a good view of what is happening and the people entering the building.

There are also alternative ways of infiltrating the building, for example through the roof (this applies in summer when the door to the dome (respiring) is open for ventilation). The last possibility is to use a side entrance or an entrance for disabled persons (wheelchair access), which would, however, require overcoming the security door fittings or the participation of an accomplice (the door is fitted with panic fittings on the inside.From the attacker's point of view, it would be most advantageous to penetrate directly into the screening room, where there are 2 escape

exits, but there are minimal obstacles to hit soft targets. The Event Tree Analysis (ETA) describes the sequence of events leading up to the attack from the source (called the initiating) event. Each event represents a notional "branching" of the event tree into two additional branches - positive and negative. By applying security measures to each event, the probabilities of the events change, creating alternative trees. The result is a graph comparing the situation before and after the application of the measures, based on which the most appropriate measure can be selected. Figure 2 shows the initial, i.e. original, the situation before the measures were implemented.

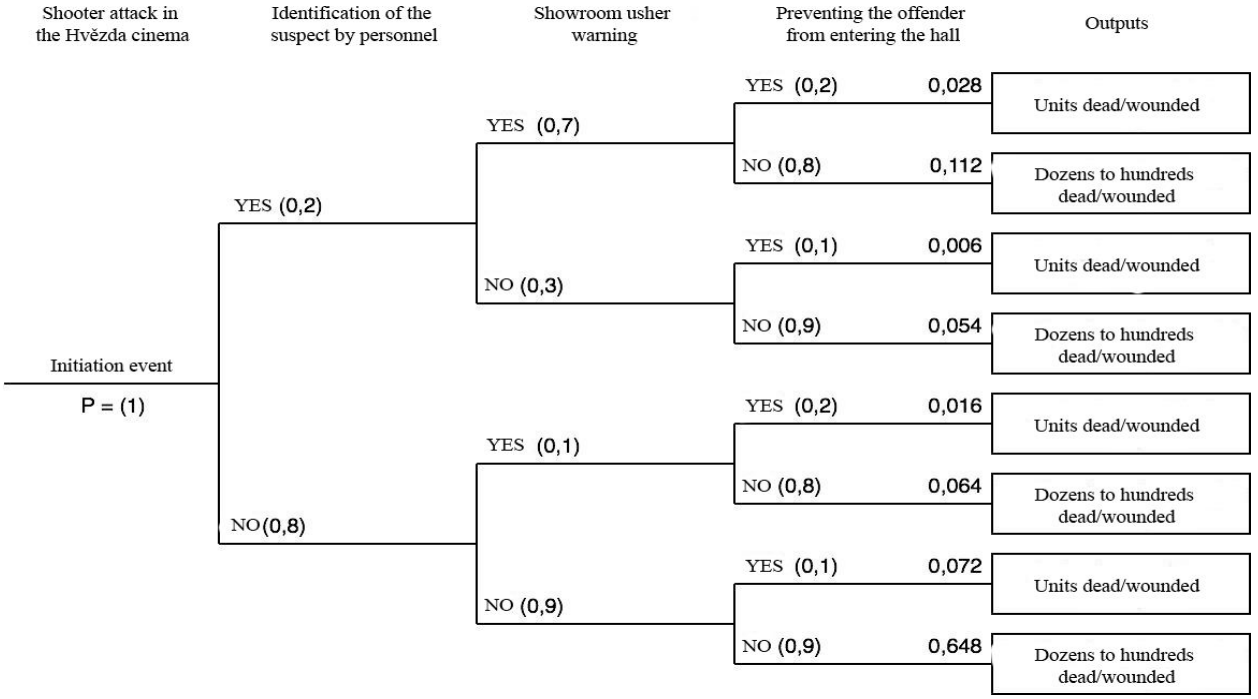

Fig. 2. Event tree - the active shooter - before measures are introduced.

Table 1 shows the scenario descriptions in the percentage of their probability of occurrence.

Table 1. Description of the scenario (active shooter) to the probability of their occurrence in %.

# Scenario	Scenario description	P [%]
1	The suspect was identified, the usher alerted, shelter in place, units dead/injured (cashier, bar attendant)	2,8
2	Suspect identified, usher alerted, no shelter in place, dozens to hundreds dead/injured	4,8
3	Suspect identified, usher not alerted, cover-up conducted, units dead/injured (cashier, bar attendant)	0,6
4	Suspect identified, usher not warned, no cover-up, dozens to hundreds of dead/hurt	5,4
5	The suspect was unidentified, the usher alerted, shelter in place, units dead/injured (cashier, bar attendant)	1,6
6	The suspect was unidentified, the usher alerted, no cover-up, and tens to hundreds of dead/injured	6,4
7	The suspect is unidentified, the usher was not warned, shelter is in place, and units dead/injured (cashier, bar attendant)	7,2
8	The suspect was unidentified, the usher was not warned, the cover-up was not carried out, and tens of hundreds dead/were injured	64,8

Based on the expert assessment, the following safety measures were proposed in an attempt to counteract the negative impact and prevent an active shooter attack.

Measure 1: Installation of a metal object detector

Placing a detector at the entrance to the Hvezda Cinema building would rapidly increase the likelihood of successfully detecting a suspicious person bringing a dangerous object (weapon) into the building. Figure 4 shows the event tree.

Measure 2: Emergency button to signal an emergency

The button would be located on the information center directly under the desktop of the head cashier, who would also be the person responsible for initiating it if a suspicious person is detected entering. This would immediately inform the rest of the cinema staff (especially the usher and projectionist), who can react immediately to an emergency.

Measure 3: A system to quickly lock the auditorium in case of an emergency

The system would consist of a control unit, emergency buttons, and electronic locks on all entrance double doors leading into the screening room. The emergency buttons would be concealed and sealed against accidental pressing. Unlocking would only be possible from inside the auditorium. As in the baseline, a probability table of scenarios for the application of measure 1 was produced. These scenarios are shown in Table 2.

Table 2. Probability of scenarios after application of measure 1.

# Scenario	Scenario description	P [%]
1	The suspect was identified, the usher alerted, shelter in place, units dead/injured (cashier, bar attendant)	22,4
2	Suspect identified, usher alerted, no shelter in place, dozens to hundreds dead/injured	33,6
3	Suspect identified, usher not alerted, cover-up conducted, units dead/injured (cashier, bar attendant)	1,4
4	Suspect identified, usher not warned, no cover-up, dozens to hundreds of dead/hurt	12,6
5	The suspect was unidentified, the usher alerted, shelter in place, units dead/injured (cashier, bar attendant)	0,6
6	The suspect was unidentified, the usher alerted, no cover-up, and tens to hundreds of dead/injured	2,4
7	The suspect is unidentified, the usher was not warned, shelter is in place, and units dead/injured (cashier, bar attendant)	2,7
8	The suspect was unidentified, the usher was not warned, the cover-up was not carried out, and tens of hundreds dead/were injured	24,3

The second proposed measure was made by using ETA aanalysis – the active shooter. As in the previous examples, the event tree is used, in which specific values are described. The probability is subsequently shown in Table 3

Table 3. Probability of scenarios after application of measure 2.

# Scenario	Scenario description	P [%]
1	The suspect was identified, the usher alerted, shelter in place, units dead/injured (cashier, bar attendant)	2,8
2	Suspect identified, usher alerted, no shelter in place, dozens to hundreds dead/injured	4,8
3	Suspect identified, usher not alerted, cover-up conducted, units dead/injured (cashier, bar attendant)	0,6
4	Suspect identified, usher not warned, no cover-up, dozens to hundreds of dead/hurt	5,4
5	The suspect was unidentified, the usher alerted, shelter in place, units dead/injured (cashier, bar attendant)	1,6
6	The suspect was unidentified, the usher alerted, no cover-up, and tens to hundreds of dead/injured	6,4
7	The suspect is unidentified, the usher was not warned, shelter is in place, and units dead/injured (cashier, bar attendant)	7,2

8	The suspect was unidentified, the usher was not warned, the cover-up was not carried out, and tens of hundreds dead/were injured	64,8

The last proposed measure number 3 was calculated by using ETA analysis and results are shown in the Table 4.

Table 4. Probability of scenarios after application of measure 3.

# Scenario	Scenario description	P [%]
1	The suspect was identified, the usher alerted, shelter in place, units dead/injured (cashier, bar attendant)	11,2
2	Suspect identified, usher alerted, no shelter in place, dozens to hundreds dead/injured	2,8
3	Suspect identified, usher not alerted, cover-up conducted, units dead/injured (cashier, bar attendant)	1,2
4	Suspect identified, usher not warned, no cover-up, dozens to hundreds of dead/hurt	4,8
5	The suspect was unidentified, the usher alerted, shelter in place, units dead/injured (cashier, bar attendant)	4,8
6	The suspect was unidentified, the usher alerted, no cover-up, and tens to hundreds of dead/injured	3,2
7	The suspect is unidentified, the usher was not warned, shelter is in place, and units dead/injured (cashier, bar attendant)	36,0
8	The suspect was unidentified, the usher was not warned, the cover-up was not carried out, and tens of hundreds dead/were injured	36,0

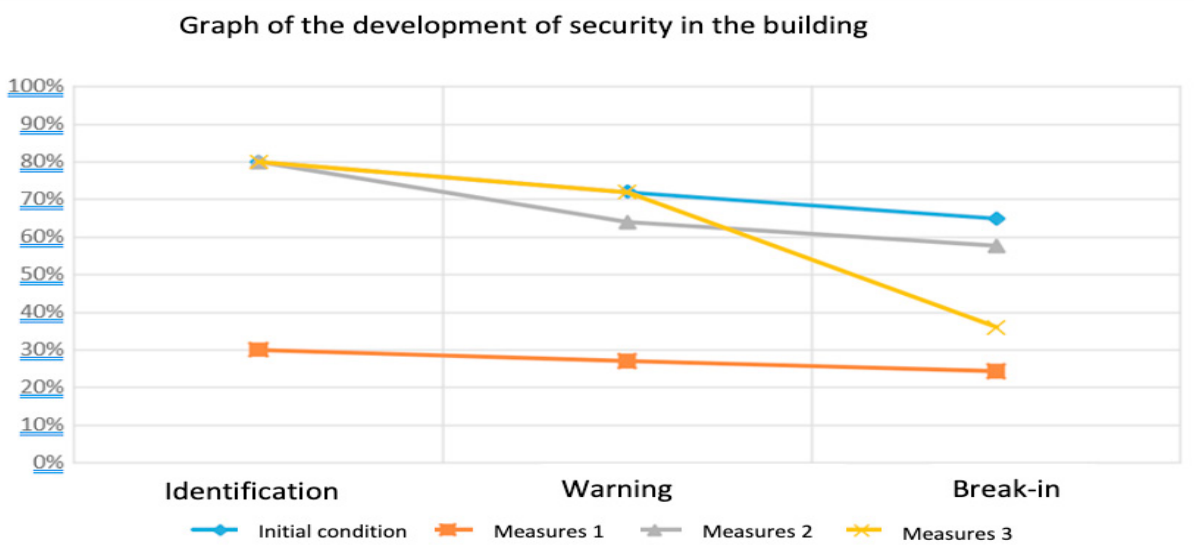

Fig. 3. Development of the security situation (shooter) to the proposed measures

From the analyses performed, the subsequent result of the ETA analysis for the active shooter attack scenario follows. The evolution of the probability of the initial state events to their evolution after the integration of the three proposed measures can be observed in the graph, each measure is implemented separately. From the graph, measure 1 - installing a frame detector - emerges as the most effective measure.

4. Conclusion

The purpose of the article was to present findings related to the Hvezda cinema building in Uherské Hradiště to identify, assess and document the risks associated with an active shooter attack. For this purpose, risk analysis, specifically ETA analysis, was used. Geographic information systems were used to preview the dislocation of the Hvezda cinema. The resulting map compression was produced using QGIS software, version 3.28 Firenze.

In the case of an active shooter, installing a frame metal object detector proved to be the most effective solution for protection and attack prevention. The other measures are more of an extension and therefore would only achieve a better security rating if the previous measures were implemented.

As the various strategic and conceptual materials also point out, this issue still needs to be addressed. Therefore, it is important to carry out analyses of potentially vulnerable objects and buildings that may become easy targets for attacks. The limiting elements of this work are the internal materials of the facility, which restrict a more detailed analysis and thus the design of more specific design measures. The paper highlights the importance of securing all security-significant facilities and soft targets. The issue of clustering a large number of people in one place can be a target not only for terrorist attacks but also for example for amok. In future research, the authors aim to compare other security significant objects and compare security types.

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