KRITIS (CRITICAL INFRASTRUCTURE) AND CURRENT THREATS: CHALLENGES AND OPPORTUNITIES FOR PUBLIC ADMINISTRATION IN MODERN CRISIS MANAGEMENT

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Abstract: The protection of critical infrastructure (KRITIS) has become a key responsibility of public administration, particularly in the context of large-scale events such as football matches. Ensuring security in these settings is not only a question of law enforcement but also a complex administrative challenge that requires strategic coordination, crisis preparedness, and innovative solutions. Rising threats, including stadium violence, terrorism, and evolving security risks, necessitate an adaptive and forward-thinking approach from authorities.

This paper explores the role of public administration in safeguarding critical infrastructure, with a particular focus on football stadiums as high-risk venues. By examining contemporary threat scenarios, institutional security strategies, and the integration of emerging technologies, this study highlights how government agencies manage both preventive and reactive measures. The discussion also considers the ethical and legal implications of security policies, as well as the importance of cross-sector collaboration between law enforcement, sports organizations, and technological partners.

The findings emphasize that effective crisis management in public administration extends beyond traditional policing efforts. It requires a holistic strategy that combines regulatory frameworks, advanced surveillance technologies, and community engagement to build resilience and mitigate risks. In an era of increasing security concerns, fostering adaptable and socially responsible approaches is essential to maintaining the safety and functionality of critical infrastructure.

Keywords: Public Administration, Critical Infrastructure, Crisis Management, Security Architecture, Football Stadiums, Terrorism, Violence Prevention, Risk Assessment, Digital Security, Law Enforcement Strategies

1   Introduction

In recent years, the security architecture in Germany has changed significantly due to new and evolving threats (Hofmann 2017: 15). Violence in football stadiums in particular poses a significant challenge, as it not only jeopardises the safety of spectators, but also the integrity of critical infrastructures that are essential for the smooth running of such major events (Bavarian State Ministry of the Interior 2024). Ensuring security at football matches is therefore a key concern for sport, society and politics. Current threats, including the rise of terrorism (Kubera et al. 2019: 216), physical violence as a result of clashes between fan groups and conflicts with the police (Kubera et al. 2019: 55) and the use of pyrotechnics (Kubera et al. 2019: 69), have a significant impact on the security architecture. These challenges pose crucial tasks for public administration in modern crisis management. Clubs invest considerable resources to create a safe experience for spectators, while police and security forces are faced with the challenging task of securing both large and small events. A carefree football experience requires customised security measures and comprehensive strategic planning. To work successfully, the social, administrative, technical and legal fields must work closely together (Kubera & Kugelmann 2019: V).

1.1   Problem definition and objective

The increase in violence in German football stadiums poses a serious threat to public safety and requires public authorities to realign their security strategies (Duttler et al. 2019: 48). The challenges include not only the protection of spectators, but also the need to rethink existing security architectures in the face of complex social and cultural dynamics. The violence, which manifests itself both in ritualised aggro displays during matches and in brutalised violence outside the stadiums, is often an expression of collective identities within the Ultra scene (Pilz 2024: 4–5). This requires an in-depth understanding of the social mechanisms behind these violent phenomena. A key challenge is the development of innovative security measures, both preventative and reactive. A proactive approach is crucial to not only react to existing problems, but to prevent them in advance (Karsten 2021: 133). This requires close co-operation between security authorities, associations and the community. However, the integration of new technologies to improve the security architecture also brings with it ethical and data protection challenges that must be taken into account by the public administration. An excessive focus on surveillance could also jeopardise citizens' trust in the administration. The aim of this thesis is to show how integrated crisis management can improve the security situation in football stadiums and at the same time create opportunities for public administration to strengthen its resilience. By analysing the interactions between security measures and societal expectations, the

thesis contributes to the understanding of the role of the state in ensuring public safety. The challenges posed by fan violence and the security needs of citizens offer both starting points for innovative solutions and opportunities for critical reflection on ethical security practices.

1.2   Methodology and structure of the work

In order to achieve this goal, the present work is based on a comprehensive literature search using various databases such as JSTOR, MDPI, EBSCO, publications of the German Federal Government and Google Books. The search terms used include "violence in football stadiums", "crisis management in sport" and "security architecture in infrastructures", supplemented by specific terms such as "hooliganism and prevention", "risk management in sport" and "fan behaviour and security". In addition, terms such as "crisis management in the sports environment" and "technological innovations in security architecture" are included in the research. The selection of literature is based on two main criteria, whereby the topicality and availability of the literature in German and English are decisive. On this basis, the work is divided into several consecutive chapters that provide a comprehensive understanding of the security architecture in football stadiums. Firstly, the second chapter explains the basics of this security architecture. In particular, the definition of critical infrastructure is discussed, which is essential for understanding the different security concepts and the importance of local authorities in this context. Building on this, the third chapter provides an in-depth analysis of current threats from violence in order to identify security risks and illustrate how these threats play out in practice using relevant events. Crisis management is discussed in the fourth chapter. This topic is of central importance as it sheds light on the coordination between authorities and sports clubs as well as the influence of technological innovations on the effectiveness of security measures. The challenges of modern crisis management are addressed in the fifth chapter, focussing on incident management and the security architecture. Finally, the most important findings are summarised in the sixth chapter and recommendations are made that should serve as a guide for future strategies in public administration.

2   Basics of security architecture in football stadiums

This chapter describes the security architecture in football stadiums, which consists of risk analyses, the training of security personnel and emergency plans. These elements are crucial for a holistic security concept that ensures a safe stadium environment. The architecture includes preventative measures such as risk assessments and training as well as reactive strategies to respond quickly to threats, including coordination with emergency services and the mobilisation of emergency services. Together, they form a comprehensive security concept for

secure events (Kugelmann 2019: 326). The definition of critical infrastructures (2.1), specific security concepts (2.2) and the role of local authorities (2.3) are discussed in more detail below.

2.1 Definition of critical infrastructures (Kritis)

Critical infrastructures (KRITIS) are essential facilities and systems that are of great importance to the functioning of the community. Their failure can result in significant supply bottlenecks and threats to public safety (Voßschmidt 2020: 12–13). These infrastructures include in particular the areas of 'energy (energy supply) and water supply (water)', transport (transport and traffic)', telecommunications (IT and TC)' and 'healthcare (healthcare) (Fiedrich & Lukas 2022: 629–630).

In Germany, the protection of critical infrastructures is considered extremely important and the responsibility for the security of these facilities lies primarily with the operators themselves (Federal Ministry of the Interior 2024). The Implementation Plan for Critical Infrastructures (UP KRITIS) was created to promote cooperation between the state and industry. Legal obligations for operators are only envisaged where necessary, with the focus being on cooperation based on trust. The comprehensive strategy aims to increase both the protection and security of critical infrastructures while also taking international circumstances into account (Voßschmidt 2020: 12–13). The next subchapter deals with the specific security concepts in football stadiums.

2.2 Security concepts in football stadiums

The National Concept 'Sport and Safety' (NKSS) is a key instrument for promoting cooperation between various stakeholders such as the police, local authorities, clubs and fan projects. The 2012 revision places particular emphasis on dialogue with peaceful fans and the fight against violence (Ministerium des Innern NRW 2024). The NKSS pursues a dual strategy that supports peaceful fans on the one hand and implements clear measures against violent behaviour and the misuse of pyrotechnics on the other. The key components of the security concepts include security at events, the responsibility of the clubs and the requirements for security officers and security services. A key objective of these measures is to ensure the safety of all those involved, including visitors, players and employees (Kugelmann 2019: 298). This includes risk assessments, effective access controls and the continuous training of security staff. Emergency plans, communication protocols and modern monitoring systems support the early detection of potential incidents (Werner & Kubera 2019: 388). As part of the Union of European Football Associations (UEFA) European Championship 2024 (EURO 2024), security was ensured through cooperation between security authorities, EURO 2024 GmbH and the host cities. A national security concept and international cooperation channelled coordinated measures. The

security measures during the tournament proved to be effective, as emphasised by Minister Nancy Faeser and Minister Reul. Despite a few incidents, the tournament was largely peaceful. The high police presence, supported by 22,000 federal police officers and 13,000 helpers from the Federal Agency for Technical Relief, as well as flexible border controls contributed to security. In addition, a large number of volunteers created a positive atmosphere and supported over 70,000 fans. The International Police Cooperation Centre (IPCC) also pursued the task of evaluating and managing all security-relevant information in order to ensure an optimal exchange of police data at a nationwide level (Land NRW 2024).

2.3 The role of municipalities in the security architecture

This chapter looks at the key importance of municipalities for the security architecture, as they make a decisive contribution to the implementation of local security measures. According to the German Basic Law (GG), municipalities are authorised and obliged to regulate local matters independently, including financial matters. They take on both voluntary and legally binding tasks. Voluntary tasks include the provision of public transport and the maintenance of green spaces. In security-relevant situations, such as major football events, local authorities organise shuttle services and create safe areas to increase the feeling of security. During fan marches, the police help to de-escalate conflicts between rival groups. Local authorities are also responsible for traffic management, road traffic control, fire services and disaster control. The legal obligation to avert danger emphasises the central role of municipalities in security concepts for such events (Kubera et al. 2019: 177). Municipalities play an essential role in the security architecture, as they know and take into account local conditions and needs in order to develop customised security strategies. The next chapter examines the current threats of violence in football stadiums, which continue to pose a serious challenge despite these security measures.

3 Current threats of violence in football stadiums

Football brings people from different social backgrounds together. Nevertheless, despite the positive values such as respect and fairness, there is a worrying reality of aggression, violence and discrimination in sport. This manifests itself in incidents that often require police intervention and pose a challenge for organisers and security authorities (Bavarian State Ministry of the Interior 2024). Violence in football is historically and socially rooted and manifests itself in various forms - from verbal provocation to physical altercations. Hooligans and increasingly violent Ultras in particular contribute to conflicts that can also endanger innocent

bystanders (Pilz 2024: 2–6). Hooligans are people who deliberately seek out violent confrontations in the vicinity of sporting events and are prepared to accept serious injury in the process. Their main interest is not in the sporting events themselves, but in the adrenaline-fuelled 'thrill' of violence (Polizeiliche Kriminalprävention 2024a). In contrast, Ultras are passionate supporters of a sports team who feel like true fans and are characterised by an organisational structure. They initiate special actions during events and often have special access rights such as quotas for tickets and storage rooms for fan merchandise (Polizeiliche Kriminalprävention 2024). The problem of these violent confrontations leads to a stigmatisation of the entire fan cult and represents a considerable challenge for society (Rudolph et al. 2017: 13).

3.1 Security risks and threats in football stadiums

This chapter examines the increasing security risks and the current security situation at football stadiums. According to the annual report of the Central Information ma tionsstelle Sporteinsätze (ZIS) for the 2022/23 season, there are worrying trends in the security situation at football events in Germany. The analysis of 1,157 matches identified 13,608 people with a potential for violence, which corresponds to an increase of 1.75 % compared to the 2018/19 season. The number of injuries rose to 1,176, which corresponds to an increase of 4.35 %. The police also initiated 6,549 criminal proceedings, 107 of which related to politically motivated offences. In contrast, measures involving deprivation of liberty fell by 22.8 % to 8,101. The workload of the police increased to over 2.4 million hours (+9.7 %). This development indicates a deterioration in the security situation in football, despite the return to unrestricted match operations after the coronavirus pandemic (Polizei NRW 2023). Security risks in football stadiums are evident both on match days in the form of crowd trouble and rivalries between fan groups and outside of matches in the form of power struggles for certain areas and assaults, as shown in Table 1.

Table 1: Form and intensity of the use of violence

Matchday-related violence:	**Pitch invasion:** Ritualized aggressive displays influenced by the game dynamics, fan behavior, and police actions.
	Train ambush: Planned, direct confrontations involving the use of blunt weapons.
Non-matchday violence:	**Gang-like altercations:** Direct confrontations, sometimes coincidental, involving fights and robbery (e. g., phones, jackets).
	Private property attacks: Planned, direct confrontations using blunt firearms, targeting private homes or gatherings.

Source: Self-created in reference to Pilz 2024: 4

The brutalisation of violence poses a serious threat that requires preventative security measures (Pilz 2024: 4). In light of these challenges, the upcoming UEFA EURO 2024 in Germany is another critical touchstone for public safety, as Moody (2024) emphasises. The tournament attracts millions of fans and poses significant security challenges, particularly through potential terrorism threats and the risk of hard-to-identify lone offenders. Comprehensive measures such as access controls, bag checks and body searches are planned in the stadiums to ensure the security of the event. The uncontrollable fan zones, which can attract up to twelve million visitors, also pose additional challenges. A national security concept with border controls and international cooperation aims to optimise the protection of fans during the tournament. The security authorities emphasise that protection during the event is a top priority (Moody 2024). Against this backdrop of current security challenges, the next chapter looks at crisis management. Effective risk mitigation approaches are presented that can help to improve security at major sporting events.

3.2 Case studies of relevant security incidents

In the current Bundesliga season, there are frequent clashes between Ultras and the police, with a lack of communication identified as the main cause, as fan researcher Harald Lange notes (Poppe 2024). Violence escalated in 17 matches, including the Lower Saxony derby, including flares being thrown onto the pitch. Critics call for a ban on pepper spray in the stadium and warn of escalating police operations. While fan support organisations offer legal advice, experts consider an increased police presence at high-risk matches to be necessary, but see difficulties in identifying problematic players. Instead, Oliver Wiebe from the Dachverband der Fanhilfen calls for a dialogue-based approach to conflict resolution (Poppe 2024). Historical incidents, such as the 1972 Olympic bombing and the attack at Centennial Olympic Park in 1996, make it clear that major sporting events are the target of terrorist attacks (Birlinger & Zimic Zare 2022). The Islamic State (IS) attack in Paris in 2015 and the attacks on Swedish football fans in Brussels also heighten security concerns. Experts warn that attacks on targets such as stadium entrances are becoming increasingly likely (Reith 2024). The 1972 Munich bombing was a turning point in security policy for major sporting events. Since then, academics have sought a better understanding of terrorist threats in order to develop preventative measures, as major sporting events convey politically relevant values and remain attractive targets for terrorism (Birlinger & Zimic Zare 2022: 490).

The analysis of the current threats of violence in football stadiums shows that security during UEFA EURO 2024 poses a significant challenge. Effective crisis management is therefore essential in order to meet the complex security requirements. Central crisis management

measures and strategies for minimising risk and responding efficiently in the event of an emergency are examined in more detail in the following chapter.

4 Crisis management in the context of football stadiums

Crisis management in football stadiums is crucial, as crowds of people at events such as UEFA EURO 2024™ harbour potential risks (Duttler et al. 2019: 37). In view of these risks, rapid intervention is necessary in the event of crisis situations (Federal Ministry of the Interior 2023: 27). Effective crisis management requires close cooperation between authorities, sports clubs and security services, with the district administration playing a central role as the lower disaster control authority. Quick decision-making and effective communication are of great importance in stadiums, with organisational structures and technological solutions being crucial for efficiency. A modern IT infrastructure improves communication and information processing, which is why both a solid basic organisation and innovation potential are necessary in order to respond to current threats. Crisis management can be optimised through coordinated cooperation between the administration and security services (Franke 2018: 203–206). This cooperation between security authorities and sports clubs is examined in more detail in the following chapter.

4.1 Coordination between authorities and sports clubs

In terms of football security, the police play a central role in identifying security risks, particularly in dealing with rioters and hooligans who pose a threat to the public. Security actors, including the police and football clubs, are legally obliged to take effective precautions to avert danger (Duttler et al. 2019: 46–47). In Germany, the crisis network, which is coordinated by the Federal Office of Civil Protection and Disaster Assistance (BBK), is relatively limited. At state level, the regional disaster task forces are important as they coordinate the emergency services in the event of major disasters. Citizens show a high level of interest in their work due to their involvement or participation, for example in the volunteer fire brigade. Despite some criticism, the emergency services impress with their excellent technical equipment and professional execution in the event of accidents (Liebold 2018: 234–235). Effective coordination requires the promotion of self-regulation within the fan scenes to prevent violence. Regulatory institutions support these efforts and help to minimise conflicts. Transparent communication of police actions by conflict officers is essential in order to avoid misunderstandings. The National Concept 'Sport and Security' promotes a balance between repression and prevention. In addition, fan projects and fan counsellors strengthen the connection between clubs and fans, while

modern stadium concepts create a safe and positive environment (Pilz 2024: 6–7). Technological innovations such as the Modular Warning System (MoWaS) and simulation software are examined in more detail in section 4.2, as they make a decisive contribution to optimising security measures, particularly at UEFA EURO 2024.

4.2 Innovation potential and technological deployment

A rapid response is crucial in crisis situations, which is why all UEFA EURO 2024 venues will be connected to the MoWaS federal warning system to enable immediate warnings and reports (Federal Ministry of the Interior 2023: 27). This ensures that all connected warning devices can be activated quickly and warning multipliers can be targeted to pass on the information via various channels. In addition, all UEFA EURO 2024 venues will have access to the federal warning system. The Federal Office of Civil Protection and Disaster Assistance is equipping the venues with the necessary technology, financed by 209,000 euros from the Federal Ministry of the Interior and Homeland (BMI). In addition, local emergency services receive training on how to use these technologies effectively (Federal Office of Civil Protection 2024). At the same time, the Stuttgart police are working with research institutions on the ESCAPE project to develop software for simulating evacuations in large areas in order to optimise security at major events based on evidence (Stuttgart Police Headquarters 2022). The follow-up project ESCAPE PRO is testing this software in order to subdivide simulation areas into critical and less critical zones, which increases the efficiency of evacuation assessments (Hamburg Police 2024). During UEFA EURO 2024, the software will be used in the ten host cities to analyse the flow of people. In addition to the 'crowd:it' software from accu:rate GmbH, police personnel and emergency services will also be trained in tactical deployment tactics (Hamburg Police 2024). The combination of MoWaS and evacuation simulations provides an effective mechanism that improves the safety and care of spectators. Spectators have the opportunity to make complaints directly via QR codes. With these QR codes, viewers can quickly access information and easily get in touch to communicate their concerns or complaints. A secure online form and the option to report complaints by email or telephone are also available. Posters in the stadiums provide information about this mechanism and how to use the QR codes. Trained teams are also available on match days to provide rapid assistance if necessary. This helps to increase the safety and well-being of spectators during major events (UEFA 2024). However, these innovative approaches to crisis management pose challenges, which are discussed in detail in chapter 5.

5 Challenges in modern crisis management

Modern crisis management centres on a wide range of challenges resulting from global networking and complex threats. These challenges require an early root cause analysis and raise the concept of resilience, which aims to strengthen the resilience of individuals and societies in order to respond appropriately to crises. The political discussion on the equitable distribution of resources is crucial for effective crisis management, especially in relation to violence in football stadiums (Jäger et al. 2018: XIII–XVI). One concrete example is the UEFA EURO 2024™, which requires close cooperation between the federal government, federal states, local authorities, event organisers and security authorities. The focus is on police emergency response to prevent hooliganism and prepare for incidents. In addition, increased cyber and information security is necessary to minimise the risk of cyber attacks. The BBK offers comprehensive training programmes for civil defence, while the IPCC aims to promote international police cooperation. A multi-layered strategy is essential to ensure the security and smooth running of UEFA EURO 2024™ (Federal Ministry of the Interior 2023: 9).

5.1 Incident management and response strategies

This chapter examines in detail the incident management and response strategies that will be relevant in football stadiums during UEFA EURO 2024. The focus is on the security measures required to ensure the safety of attendees while providing a positive experience. Organisers are obliged to take appropriate measures to minimise avoidable risks, which is considered a duty of care. The aim is to ensure the highest safety standards, which requires risk analyses and preventive action to identify hazards at an early stage. It must be ensured that the safety precautions do not compromise the inviting character of the events and that a balance between accessibility and safety is maintained (Bezold & Von Glahn 2023: 237).

5.2 Challenges for the security architecture

This chapter examines the complex challenges facing the security architecture in the personnel management of major sporting events. Especially during major events such as the UEFA EURO 2024, careful planning and effective coordination is of paramount importance to ensure smooth operations and manage unexpected events. Schwarz and Smolareck (2023: 50–51) emphasise that challenges such as planning manpower, securing required skills and meeting budgets and legal requirements are paramount. Unexpected challenges must also be dealt with promptly, making an efficient HR management strategy essential (Schwarz & Smolareck 2023, pp. 50–51). At football events, the security architecture faces particular challenges due to developments in the hooligan and ultras scenes. Acts of violence are increasingly occurring independently of matches, making the security situation more complex. Preventative measures and

close co-operation between the police, clubs and fan projects are essential. The balance between repression and the creation of free spaces for Ultras is crucial in order to both reduce violence and positively promote fan culture (Pilz 2024: 4–6). In the run-up to UEFA EURO 2024, the war in the Middle East and the security situation in Germany pose additional challenges. Federal Minister of Justice Marco Buschmann emphasises that complete security is unrealistic, but that the authorities are maximising their efforts to create a safe environment during the tournament. The tense situation following the Hamas massacre on 7 October requires increased vigilance against potential threats (Reith 2024).

6   Conclusion and recommendations for public administration

Analyses of threats of violence in football stadiums show that they pose a serious threat to public safety (Duttler et al. 2019: 48). To overcome these challenges, close cooperation between the police, football clubs and local authorities is essential. An innovative security approach such as MoWaS supports preventative responses to crisis situations (Federal Ministry of the Interior 2023: 27). Conflicts between hooligans and Ultras are particularly problematic and require a stronger security architecture and preventative measures such as fan projects. A targeted police presence helps to de-escalate conflicts and at the same time supports the fight against crime. At the same time, the public administration must strike a balance between security measures and freedom for peaceful fans. In order to increase the resilience of critical infrastructures, comprehensive protection concepts are required that combine preventive and reactive measures (Fiedrich & Lukas 2022: 636–637). Proactive security concepts are crucial in order to strengthen fan confidence and prevent violent behaviour. A collaborative approach involving all key stakeholders is also necessary to successfully overcome the challenges in the football sector (Pilz 2024: 4–7). The implementation of these measures helps to reduce risk-promoting factors and increase public safety at football events.

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