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Situational Awareness of Decision-Makers in Different Phases of Crisis Management

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Abstract:

Purpose: *The research aims to determine how different levels of situational awareness among decision-makers influence the effectiveness of their decisions across various phases of crisis management. The article examines the three levels of situational awareness—perception, comprehension, and projection—and evaluates their significance in each phase of a crisis, as well as their impact on decision-making accuracy under uncertainty and time pressure.*
Design/Methodology/Approach: *The study is structured around the following central research question: Which level of situational awareness is most critical in the different phases of crisis management? The research problem is examined to verify the hypothesis that perception constitutes the most important element of situational awareness in all phases of crisis management in terms of decision effectiveness. The research draws on M. R. Endsley's three-level model of situational awareness and employs a qualitative case study of the 1986 Chernobyl nuclear power plant disaster.*
Findings: *The results indicate that the relative importance of each level of situational awareness (SA) shifts dynamically depending on the phase of crisis development. Decision effectiveness throughout the crisis management cycle depends on striking an appropriate balance among the three SA levels. Although perception is fundamental, it is not always sufficient for effective and accurate decision-making. It should be noted that the findings cannot be generalized to all crisis situations, as these differ in dynamics, causal structures, complexity, and decision-making contexts. The Chernobyl disaster represents a sudden and violent technological crisis in which rapid response was crucial. By contrast, in other types of crises—such as natural disasters, epidemics, or social and economic crises—the decision-making process unfolds more gradually and entails different priorities. Consequently, the significance of each SA level varies depending on the type of threat, the availability of information, and existing time constraints. In summary, the results may be partially generalized: effective crisis management requires situational awareness built on the synergy*

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of all three levels. Nevertheless, the precedence of one SA level over another may vary depending on the type of crisis and prevailing conditions. Perception appears to be crucial in the initial phases of sudden and dynamic crises—such as industrial disasters or terrorist attacks—whereas comprehension or projection may play a greater role in long-term crises, including climate-related events.
Practical implications: *The findings have significant practical implications and may serve as a foundation for training programs dedicated to crisis-management decision-making authorities. The analysis identifies which SA levels are most critical in specific phases of crisis management and for particular decision-making roles. Training programs enriched with modules targeting specific SA levels could substantially enhance the quality and effectiveness of crisis management and strengthen the institutional resilience of security systems.*
Originality/Value: *The novelty of this research stems from its holistic examination of decision-makers' situational awareness across the entire crisis management cycle, and from its application of the M. R. Endsley model to a case study of a real-world disaster with global consequences. Its value lies in empirically demonstrating the relationship between situational awareness levels and decision effectiveness, and in identifying the cognitive mechanisms that shape effective action under conditions of uncertainty and risk.*

Keywords: *Crisis management, decision-making, uncertainty.*

JEL codes: *D81, H12.*

Paper type: *Research article.*

1. Introduction

Modern crisis management systems aim to maintain high levels of situational awareness grounded in objective information about emerging threats and appropriate countermeasures. Inadequate or incomplete situational awareness significantly restricts the ability to use available resources and measures effectively in responding to emerging needs and threats. Situational awareness becomes especially critical under conditions of uncertainty, when decision-makers face an overload of information that is difficult to process, and when operational integrity is at risk.

In such circumstances, a misjudgment of the situation—and the decisions that follow—may increase the likelihood of ineffective actions and undesirable consequences (Encyklopedia Bezpieczeństwa Narodowego). The actions undertaken by crisis management authorities must be designed to ensure effectiveness—namely, to maintain an adequate level of security and ultimately protect the population.

Such effectiveness can be achieved by preventing crises, maintaining readiness, responding rapidly when a crisis occurs, and possessing the capability to manage its aftermath and facilitate recovery.

Each phase of crisis management requires authorities to make decisions based on current operational information. This information includes the availability of resources and response measures, assessments of the current threat level, and applicable legal regulations. Such decision-making is impossible without experienced and well-trained professionals.

Therefore, the key factor influencing decision quality is situational awareness (SA). Endsley defines SA as ‘the perception of the elements in the environment (...), the comprehension of their meaning, and the projection of their status in the near future’ (Endsley, 1995, p. 36). This leads to the central research question: Which level of situational awareness is most critical in the different phases of crisis management? The research problem is examined to verify the hypothesis that perception constitutes the most important element of situational awareness in all phases of crisis management in terms of decision effectiveness.

The objective of this paper is to determine the relative importance of each SA level for decision effectiveness across all phases of crisis management. To achieve this objective and verify the hypothesis, the paper analyses the explosion at the Chernobyl nuclear power plant and the subsequent forced evacuation of the nearby city of Pripyat. This enables an evaluation of the components of decision-makers’ situational awareness across the phases of crisis management and demonstrates the impact of SA on decision effectiveness.

2. Situational Awareness Model

The concept of awareness is inherently ambiguous. The term derives from the Latin ‘conscientia’, composed of con (‘with’) and scientia (‘knowledge’) (Hennig, 2007, pp. 455-484). This etymology suggests that awareness may refer to knowledge of a particular situation or event. The PWN Encyclopedia defines this term in more detail as “the highest level of regulation of human behavior; specifically, an internal ability for the direct cognition of the environment, oneself, and one’s relationship with the environment, occurring on three levels: perceptual, conceptual-verbal, and self-awareness” (Borowska-Mostafa, 2012, p. 1022).

Another perspective is offered by D. Chalmers, who defines awareness as a state of being conscious of something. More specifically, awareness entails the ability to directly perceive, recognize, experience, and be conscious of events (Chalmers, 1997, p. 225). These definitions emphasize the process of perception, which significantly influences the level of situational awareness.

Situational awareness is increasingly used in the context of crisis management. Caden Kennedy notes that SA refers to knowledge of the environment and its underlying processes (Kennedy, 2016, p. 6). This knowledge must be continuously updated and analyzed, and all information should be verified before action is taken—that is, prior to decision-making (Grima *et al.,* 2020).

Therefore, situational awareness is essential for identifying existing and potential threats. It also plays a critical role in developing mitigation measures, which is fundamental to decision-making in crisis situations. When a threat emerges, it is crucial to understand its nature and define a course of action that ensures safety and support. For this reason, situational awareness should be regarded not merely as a skill, but more importantly as an ability to think logically and rationally.

Numerous scholars identify four fundamental components of situational awareness: (1) gathering operational information; (2) integrating data with existing knowledge to form a coherent mental model of the situation; (3) using this model to gain perception during data processing; and (4) projecting possible future events (Dominguez, Vidulich, Vogel, and McMilan, 1994, pp. 17-28).

In light of the above, situational awareness can be understood as a continuous process of gathering and analyzing operational information, integrating it with existing knowledge, and using the resulting operational picture to accurately perceive and project how a situation may evolve.

Endsley's three-level model of situational awareness (Figure 1), which is applied in this case study, is one of the most frequently cited frameworks in the field. The model conceptualizes situational awareness as a cognitive construct composed of three levels:

- Level 1 – Perception: noticing and identifying key elements of the environment;
- Level 2 – Comprehension: interpreting this information in relation to goals and threats;
- Level 3 – Projection: forecasting the development of the situation and the consequences of possible actions (Endsley, 1995, p. 36).

Situational awareness is indispensable for effective crisis management. It encompasses an understanding of both immediate and broader surroundings, as well as the recognition of factors that may pose security threats.

An individual's knowledge, experience, and competencies enable proper interpretation of events within the operating environment and assessment of the prevailing security level.

Because crisis situations are dynamic and unpredictable, maintaining a high level of situational awareness is challenging. A key challenge, therefore, is determining which level of situational awareness is most critical in the various phases of crisis management and throughout the process as a whole. Moreover, SA must be continuously maintained and improved throughout the duration of a crisis.

3. Crisis Situation Development Stages and Crisis Management

Crisis management has been defined extensively in the literature; however, the definitions proposed by P. Sienkiewicz and P. Górny (2001), as well as the one formulated by M. Armstrong, are particularly noteworthy. The former describe crisis management as a set of systematic actions involving a continuous decision-making process, ranging from prevention strategies to system stabilization.

The authors employ a universal systemic analysis methodology and define crisis management as: "[...] (*crisis management*) a decision-making process designed to select reasonable strategies to counteract real and/or potential crisis situations; the method of managing particular resources of a system that ensure the return to a *normal* state after a crisis or to maintain that state, despite the occurrence of crisis situation symptoms" (Sienkiewicz and Górny, 2001; Thalassinos *et al.,* 2023).

Armstrong's definition (1997) incorporates praxeology into crisis management, emphasizing decision-making, dynamics, and time constraints, without distinguishing between types of institutions or crises. Armstrong highlights both the role of the decision-making authority and the decision-making process, defining crisis management as: "[...] the process of dealing with a pressurized situation in a way that plans, organizes, directs and controls a number of interrelated operations and guides the decision-making process of those in charge to a rapid but unhurried resolution of the acute problem faced by the organization. [...] To sum up, crisis management is no more than good management under pressure" (Armstrong, 1997, pp. 194-198).

Thus, effective crisis management is fundamentally a matter of sound management under pressure. It is worth noting that "management is a set of activities (including planning, decision-making, organizing, directing, and controlling) directed at organization's resources (human, financial, physical, and information), with the aim of achieving organizational goals effectively and efficiently in the changing environment" (Griffin, 2005, pp. 36-39). No phase of the management process is possible without decision-making.

Although Griffin lists decision-making among several managerial activities, planning, organizing, directing, and controlling, all fundamentally depend on it. At the same time, accurate decision-making is impossible without adequate situational awareness—that is, the ability to perceive, comprehend, and project a dynamically changing situation. Situational awareness forms the foundation of sound decision-making and, consequently, of effective management.

Even well-designed management processes and procedures may prove ineffective without a shared operational picture and an understanding of the relationships between actions and their potential consequences. In other words, describing crisis management as 'good management under pressure' underscores the interdependence between its effectiveness and decision-makers' situational awareness, which enables rapid and accurate responses to emerging threats.

Regardless of the definition applied, crisis management consists of a sequence of structured actions implemented during successive stages of a crisis. To better understand the relationship between crisis management phases and the dynamics of crisis development, it is useful to compare these two dimensions. Each crisis management phase—from preparation to recovery—corresponds to a specific stage of crisis development, characterized by shifts in objectives and in the role of decision-makers.

The ability to perceive, comprehend, and project a situation—that is, to maintain an adequate level of SA—is essential for effective responses and for protecting the population. Table 1 compares crisis management phases with corresponding stages of crisis development, outlining their characteristics and the relative importance of SA for effective action. This comparison allows one to better understand the processes of crisis management and the shifting priorities associated with different threat levels.

Table 1. *Objectives and decision-makers' roles in different phases of crisis management and stages of crisis development.*

Crisis management phase	**Stages of crisis development**	**Characteristics of the stage**	**Description of the stage**	**Objectives**	**Role of Decision-Makers**
Phases prior to threat occurrence: preparation and prevention	stabilization	- no symptoms of threat - no concern among stakeholders	The situation remains under control, and the system functions in a state of relative balance. Full planning and preventing capability.	Maintaining system stability; identifying potential threats; planning preventive measures; improving procedures.	Decision-makers focus on planning and policy-making, coordinating preparations, supervising training, and developing emergency plans.
	activation	- early symptoms of a threat exceeding	Initial signs of a threat become visible,	Early detection and mitigation; activation of	Decision-makers initiate actions, determine readiness levels,

		acceptable thresholds and surpassing tolerance margins	prompting organizational and informational measures to prepare for potential institutional response.	monitoring systems; information exchange; mobilization of crisis response structures.	establish crisis management teams, and verify or update emergency plans.
Response phase	escalation	- actual threat occurrence - depletion of resources needed for response and protection	Threat intensity increases and begins to spread to additional areas or systems. Rapid mobilization and prompt decisions are required.	Minimizing consequences; protecting lives and property; coordinating operational activities.	Decision-makers act as operational leaders, making rapid decisions under time pressure, coordinating rescue operations, and managing resources.
	culmination	- the peak level / intensity of the threat - engagement of auxiliary resources - actions aimed at minimizing consequences (e.g., evacuation, deployment of reserves, specialized equipment)	Period of maximum tension when the situation is most hazardous. Decisions must be made quickly, often with insufficient or imperfect data.	Ensuring continuity of rescue operations; minimizing losses; protecting human life.	Decision-makers serve as crisis leaders, making strategic decisions, maintaining communication across structures, and sustaining team morale.
Recovery phase	de-escalation	- threat subsides - aftermath management - support to restore living conditions (social and humanitarian aid; damage assessment)	The threat recedes, the situation stabilizes, and activities shift toward restoring essential services and assessing damage.	Limiting secondary effects; restoring critical infrastructure; providing social and humanitarian assistance.	Decision-makers coordinate the restoration process, set repair priorities, allocate resources, and manage inter-institutional cooperation.

	restoration	- long-term management of crisis consequences - return of population to homes; completion of repairs; resumption of routine activities in altered conditions due to the recent events	The system gradually returns to balance, rebuilding social, organizational, and economic structures. Lessons learned are integrated into future preparedness.	Restoring full system functionality; analyzing experience; improving procedures based on lessons learned.	Decision-makers serve as analysts and reformers, evaluating previous actions, implementing recommendations, and updating crisis management plans.

Source: *Author's own elaboration based on S.J. Rysz, Zarządzanie kryzysowe zintegrowane, Difin, Warszawa 2020, pp. 49-50.*

As shown above, the pre-threat phases (stabilization and activation) are dominated by planning, analysis, and prevention. In contrast, during the response phase (escalation and culmination), the key factors are rapid operational actions, inter-institutional coordination, and the ability to manage the crisis under uncertainty and time pressure.

In the recovery phase (de-escalation and restoration), the primary objectives are to restore system operability, address the aftermath, and implement lessons learned. The importance of decision-makers' experience, communication, and adaptive skills increases as the crisis progresses through subsequent phases. Their role shifts from that of planning and strategic experts, to operational leaders, and ultimately to coordinators and analysts.

These transformations provide evidence that the effectiveness of crisis management is inseparable from situational awareness and from the ability to adapt decision-making priorities to the current stage of crisis development.

4. Case Study: The Chernobyl Nuclear Power Plant Disaster and Pripyat Evacuation

To illustrate the theoretical implications of decision-makers' situational awareness (SA) in crisis management, it is necessary to examine a real, complex, and multi-stage crisis with international consequences.

The case analyzed is the Chernobyl nuclear power plant disaster of April 26, 1986, and the subsequent evacuation of the city of Pripyat.

This event makes it possible to trace changes in decision-makers' situational awareness and the effectiveness of their decisions across the successive stages of the crisis—from stabilization, through activation, escalation, and culmination, to de-escalation and restoration. This section presents the case in detail, linking each stage of crisis development with the corresponding level of decision-makers' situational awareness and identifying which SA level most strongly influenced decision effectiveness under time pressure, including protective measures.

4.1 Stabilization Stage

In the period preceding the Chernobyl disaster, the system appeared relatively stable: there were no direct signs of threat, and operations proceeded routinely. However, this stage already revealed fundamental weaknesses in the technological and organizational design of the system, increasing the potential risk. The RBMK reactors (a class of graphite-moderated nuclear power reactor) were characterized by instability at low power levels, a slow response of the SCRAM emergency system, and the absence of a containment structure, all of which made them particularly susceptible to failure.

The decision to use these reactors rather than the previously planned, safer water–water energetic reactors (WWER) was driven by technical and economic considerations—notably their ability to rapidly increase power output and achieve higher efficiency indicators (Tynka, 2025, pp. 17-18).

Despite being aware of these technological limitations, decision-makers favored the RBMK design for economic and technical reasons. Its capacity for rapid power increase and higher energy output metrics outweighed safety considerations. Operational structures functioned routinely and showed no signs of malfunction; there were no visible security concerns, and confidence in full control over technological processes prevailed.

4.2 Activation Stage

On the night of April 25-26, 1986, the Chernobyl nuclear power plant conducted an emergency reactor backup test. Despite previous failures of similar tests, decision-makers approved repeating the experiment using the same procedures. During the test, there was a sudden decrease in the reactor's power, which the night shift attempted to stabilize; however, contrary to safety protocols, the reactor was not shut down; instead, the control rods were withdrawn, leading to an uncontrolled power surge.

Additionally, the emergency shutdown signal had been disabled, and despite detecting an intensified nuclear reaction, the experiment was continued. At 01:23:39, the test was executed, and within less than a minute it triggered a thermal explosion of the reactor. The explosion scattered fragments of radioactive graphite and released vast quantities of radioactive material into the atmosphere, soil, and water. At 01:28, firefighting units were notified and immediately began extinguishing the fire.

However, the first-response units were unaware that they were operating right in the epicenter of radioactive contamination. They operated without protective equipment, surrounded by fragments of nuclear graphite and destroyed reactor fuel rods. For the next several hours, additional units assisted in rescue operations, acting with great dedication but unaware of the real danger.

The central authorities of the USSR did not inform the population for more than 48 hours, delaying protective measures and exposing thousands of people to radiation. (Tynka, 2025, pp. 31-39).

4.3 Escalation Stage

Escalation began once the full scale of the disaster became known. At that time, radiation levels surged and there was a rapid expansion of contamination to surrounding areas, including Ukraine, Belarus, and parts of Europe. The USSR authorities mobilized the army, reserve forces, and technical personnel to conduct emergency operations.

These actions took the form of military-rescue operations and included firefighting, building and soil decontamination, debris neutralization, and sealing the reactor chamber. As the operation progressed, it became evident that the reactor core was still burning, and the radiation level rendered any longer presence of people in the vicinity of the reactor impossible. High radiation doses caused severe health effects among the liquidators, and shortages of protective equipment, combined with inadequate information, amplified the organizational chaos (Tynka, 2025, pp. 67-69).

4.4 Culmination Stage

After the core explosion on April 26, the crisis reached its peak. Although the fire in the buildings had been contained, the core’s moderator was still ablaze and emitting vast quantities of radionuclides. Under severe time pressure, on April 27 the authorities began the evacuation of Pripyat, which commenced at 14:00 and ended roughly at 16:30, resulting in the evacuation of approximately 49 thousand people.

At the same time, decision-makers mobilized reserve and auxiliary resources (military, aviation, engineering units, medical services), and introduced specialized equipment, such as helicopters, specialized vehicles, and decontamination equipment. Ten days after the accident, a critical risk was identified—a body of water beneath the melting core. The possible contact of the melted core with that water could lead to a violent steam explosion of continental magnitude.

Several thousand tons of sand, lead, clay, and neutron-absorbing boron were dropped directly into the reactor to prevent the explosion. The helicopter pilots flew over the epicenter, where radiation level was highest; many were losing consciousness during the flights. Within the next several days, emissions began to decline (Tynka, 2025, pp. 45-49, 61-63).

4.5 De-Escalation Stage

After radiation levels decreased and the reactor meltdown was contained, the de-escalation stage began. The focus shifted from suppressing the immediate crisis to managing its aftermath and protecting the population. In mid-May, the government issued an ordinance restricting movement within the contaminated zone. The evacuation of nearby villages within a 10-km radius began on May 2, and later it was expanded to the newly formed Chernobyl Nuclear Power Plant Zone of Alienation with fences, restricted access, no-go zones, and continuous surveillance.

Authorities then undertook extensive decontamination efforts, including removing asphalt and soil, washing and chemically treating building facades, replacing roofs, and spraying radioactive dust with polymerizing fluid to entrap it. The mobilization of military and reserve forces occurred on a large scale and was initially chaotic; dosimetry specialists subsequently produced the first radiation maps.

When robotic electronics failed in the high-radiation environment, decision-makers formed the so-called ‘bio-robot’ squads—soldiers who could enter highly irradiated zones for limited periods to remove the most dangerous debris. At the same time, medical and social aid had been established, providing food and water, and authorities begun assessing damage (Tynka, 2025, pp. 70-73, 82-87).

4.6 Recovery Stage

The recovery stage began after decontamination efforts and the stabilization of the radiation crisis. Efforts focused on the long-term safeguarding of the zone, decontamination maintenance, and rebuilding the radiation safety system. These actions included engineering works as well as implementation of institutional and technical means of risk supervision.

Authorities decided to erect a sarcophagus over the destroyed reactor, completed on November 30, 1986, and to maintain the Chernobyl Nuclear Power Plant Zone of Alienation under constant surveillance. Several years later, between 2012 and 2019, the New Safe Confinement (NSC) was erected over the destroyed reactor, which provides a solid boundary on the emission of radionuclides, with estimated service life of 100 years.

These measures aimed to ensure long-term environmental safety, radiation control, and the protection of future generations (Tynka, 2025, pp. 88-92).

Table 2. *Importance of situational awareness levels in relation to decision-making effectiveness: the Chernobyl nuclear power plant disaster case study.*

Stages of crisis development	Situational awareness levels—case study of the Chernobyl nuclear power plant disaster			Decision-making effectiveness	Importance of situational awareness levels in relation to decision-making effectiveness
	Perception	**Comprehension**	**Projection**		
Stabilization	**High:** Decision-makers and technical personnel were aware of the RBMK reactor's structural design limitations, previous test failures, and increasing deviations from safety parameters.	**Low:** This level was constrained by routine and overconfidence in the procedures in place. Decision-makers did not analyze the potential consequences of an RBMK test failure, concluding that the operation was being conducted under controlled conditions.	**Low:** In this phase, no negative scenarios were projected. The test was considered a technical formality, and there were no emergency or alternative procedures in place for a sudden change in the reactor's parameters.	**Ineffective:** Decisions in the stabilization stage, such as test authorization, choosing the RBMK reactor over WWER, and the approval of procedures, were considered rational and correct. In reality, however, those decisions initiated a chain reaction of erroneous choices that caused subsequent threat escalation. Decision-makers operated under a false sense of security, unaware that the structural limitations of the reactor and the lack of proper safety confinement could prove fatal in the event of a failure.	**Comprehension was the most important element of situational awareness**, since the correct interpretation of known data about the reactor and the possible outcomes of the planned test would have helped to recognize the risk at an early stage. **Projection was the least important**, because the situation was perceived as stable and risks were regarded as only theoretical. A lack of critical thinking and excessive trust in technical procedures left the threat unidentified until it was too late.
Activation	**High:** Decision-makers and technical personnel were aware of the RBMK reactor's structural design limitations, previous test failures, and increasing	**Low:** The operators were driven by pressure to conduct the test and by their belief in their ability to control the situation, which is why they neglected anomalies in the reactor's parameters	**Low:** The personnel were unable to predict the consequences of further power reduction and maneuvering of the	**Ineffective:** The decisions to continue the test despite exceeded safety parameters, to manually maneuver the control rods, and to disable the emergency system were profoundly flawed and ineffective, directly leading to the disaster. Those decisions	**Comprehension was the most important element of situational awareness**, because the incorrect interpretation of known information about the risks, the reactor's design, and the exceeded safety parameters led to the decision to proceed with the test.

	deviations from safety parameters.	along with other warning indicators.	control rods, which led to a complete loss of control over the nuclear chain reaction.	stemmed from an incorrect assessment of the situation, a lack of procedural discipline, and an overestimation of system capabilities.	**Projection was the least important**, since erroneous decisions had already been made earlier—during data interpretation and situation assessment.
Escalation	**Average:** Perception was only partial and limited to visible symptoms: fire, smoke, and the explosion. Firefighters saw the damage, but did not recognize it as the result of a nuclear failure. The level of perception increased once reconnaissance provided more data about the situation. Perception at the administrative level was technically complete (the authorities had the measurement data).	**Average:** Rescue teams understood the nature of the situation only after a delay—the realization that they were dealing with a nuclear disaster came only after several hours into the operation. The comprehension of the situation among higher authorities was deliberately diminished. The government knew about the magnitude of the disaster, but chose to downplay the crisis in an attempt to maintain social stability and protect its own image.	**Low:** There were no real projections of the disaster's effects. Neither rescuers nor politicians were able to predict the consequences of a late evacuation or of misinforming the population. The delay in providing the actual data led to an uncontrolled spread of contamination and higher levels of exposure.	**Negligent / partially ineffective** (inadequate to the real threat): The rescue operation of firefighting units was brave, but had disastrous consequences—the fire was extinguished, but it cost the lives and health of rescuers who operated without proper safety equipment and who were unaware of the real threat. The decisions of central and local government regarding issuing a warning to society, evacuation, and protective actions were late and superficial, leading to much more severe consequences of the exposure.	**Perception was the most important element of situational awareness**, because the ability to correctly recognize and identify the first evidence of the threat was paramount in deciding on the most effective rescue and protection actions. Both rescue squads and decision-makers had access to the relevant data, but they could not recognize its meaning, and, as a consequence, they neglected the real threat. This level also had a direct impact on comprehension. **Projection was the least important at that moment**, since actions were quick and focused on extinguishing the fire and containing the situation locally, rather than on forecasting regional and global outcomes of the crisis.

Culmination	**High:** Perception at that stage was complete and clear. Rescue units and government authorities were fully aware that they were dealing with a nuclear disaster. The core meltdown, the reactor fire, and the surge in radiation levels made the critical nature of the crisis evident.	**High:** Threat comprehension was at its peak. Decision-makers were aware that further delaying effective actions could lead to irreversible global consequences. That awareness influenced the decision to deploy sorption agents and to carry out the evacuation.	**High:** The projection level was high, though it was based on approximations and partial data. The experts were predicting possible scenarios—including a steam explosion—and initiated preventive actions. Projecting the outcomes of the rescue operation became a key element of the decision-making process.	**Effective and accurate:** The decisions made during the culmination stage were the most critical, and at the same time they were the most accurate in the crisis management cycle. The evacuation of the city of Pripyat, although late, was successful and conducted in an orderly manner. Spraying sorption and cooling agents proved effective in limiting radiation emissions and extinguishing the fire in the reactor. Despite the extreme conditions, the decision to mobilize military and specialized assets enabled the rescue operation to continue. Even with massive casualties, those decisions stopped the escalation of the crisis and helped to save many from the secondary effects of the disaster.	**Comprehension was the most important element of situational awareness**, since the accuracy of rescue decisions depended on proper threat interpretation and assessment. Understanding the potential consequences of the contact of the melted core with a body of water and the effects of radioactive emissions assisted in taking appropriate actions that prevented a global catastrophe. **Perception was the least important element at that moment**, because the real threat was clearly visible and did not require further reconnaissance, but rather immediate action. This stage required the ability to act quickly with limited projection data and to make strategic decisions under time pressure.
De-escalation	**High:** The threat was definitively identified and confirmed by radiation measurements. The authorities had more precise contamination data, and information	**Average / High:** Threat comprehension was even more detailed at that stage. The actions were initially taken under time pressure and with limited knowledge of the long-term effects of radiation;	**Average:** The decisions were mostly reactive, focused on ad hoc mitigation measures and providing safety. Decision-makers	**Average / High:** Decontamination: The decision on an extensive decontamination operation was accurate and necessary, although its effectiveness was only partial due to changing weather conditions and fallout. The process was long and required constant adjustments, yet this	**The most important element was projection**—planning resettlement, developing food policy, organizing decontamination, and managing fire and water risks. **The least important element was perception**—data were already available; planning

	about its spatial distribution enabled more accurate decontamination.	however, as the operation progressed, the decision-makers became more aware of the health, environmental, and technical consequences of the disaster. They realized that the most contaminated areas needed isolation and that the zone had to be placed under restricted access, which was a breakthrough and a step toward effective crisis management.	introduced operational planning, involving permanent evacuation, erecting protective infrastructure, and projecting long-term health consequences. Projection became more prominent, although its quality was limited by insufficient data and a lack of experience.	decision helped to reduce secondary exposure significantly. Evacuation: The evacuation of the population from the most contaminated area was appropriate and life-saving. In May 1986, the Exclusion Zone was expanded to a 30 km radius, greatly reducing the number of potential casualties. Even though these decisions were late, the actions that followed were conducted efficiently and in an orderly manner. Military and specialist personnel mobilization: The decision to deploy military, reserve forces, engineers, and dosimetry specialists proved to be essential in preserving operational continuity and safety. Operationally, the actions were effective, though at the price of rescuers' health.	and prioritizing became crucial.
Restoration	**High:** At this stage, detailed contamination maps and dosimetry results were available, and a radiation monitoring system was in place, which enabled full threat	**High:** Decision-makers became aware that the contamination is permanent and requires years-long supervision, along with engineering and organizational protective measures. Knowledge	**High:** Projection was crucial at that stage. It comprised long-term planning (including the erection of the NSC), the	**High:** - Erecting the sarcophagus over the reactor (1986): The decision to immediately begin the construction of the reactor's confinement structure was accurate for short-term needs. As years passed, it required maintenance works.	Projection was the most important element of situational awareness, since the durability and effectiveness of the security measures put in place were a product of the ability to make long-term predictions and to plan engineering actions. Comprehension also

	comprehension. Permanent environmental and medical supervision facilitated the assessment of changes over time, and the resulting data were credible and updated regularly. Perception became systematic, based on actual data and technology rather than on intuition.	about the long-term environmental and health consequences was fundamental in making the decision to maintain the Exclusion Zone, carry out regular surveys, and sustain monitoring activities. The authorities understood that returning to the pre-crisis state in the area was not possible, and that the priority was to provide proper reactor shielding and nuclear education.	development of radiological protection policies, and simulations of the spread of radionuclides over the decades following the disaster. Owing to correct predictions of construction degradation processes and environmental changes, the re-escalation of the threat could be prevented. Projection became fundamental in security policy for future generations.	- New Safe Confinement (2012-2019): The construction of a modern-type sarcophagus was the result of conclusions drawn from previous experience, and is a model of a decision based on risk analysis and long-term planning. The NSC significantly increased industrial and environmental safety by providing long-term control over the reactor's state. - Sanctioning the Exclusion Zone: The decision to maintain and formally manage the Zone was very effective. It enabled control over radiation levels and prevented secondary emissions.	played a major role, because it was needed for social and political acceptance of operational continuity. Since the threat was well understood, and the challenges were of a strategic rather than diagnostic nature, the least important was the perception level.

Source: *Author's own elaboration based on Tynka, B. 2025. Sekrety Czarnobyla. Księży Młyn.*

The results of the analysis shown in Table 2 indicate that the relative importance of each level of situational awareness (SA) shifts depending on the phase of crisis development. It must be emphasized that the analyzed case study revealed a consistently high level of perception.

With regard to action effectiveness, during the preparation and prevention phases, the comprehension of the data at hand was the most important factor for decision-makers. Overall, it can be assumed that in the analyzed phases of crisis management the first and second levels of situational awareness of decision-makers were the most important for an accurate decision-making process.

However, without knowledge about certain events, one cannot interpret them correctly. During the pre-threat phases, the most important element of situational awareness is to collect as much data as possible on threats that have not yet emerged and to interpret them properly.

Perception alone is insufficient, as the case study shows, since even though the decision-makers saw the symptoms of a threat, they could not read them correctly or predict the possible outcomes of their own actions. A high level of perception was not enough, and the described actions of that stage are considered ineffective.

The authors' view on the decisive levels of situational awareness at the beginning of the response phase, corresponding to the escalation stage, is that the most important are perception (level 1) and comprehension (level 2). This stage allows for the analysis of the actions of the authorities and on-site decision-makers in reference to decision effectiveness.

The government deliberately acted as if it did not comprehend the situation and pretended that there was no information available, in an attempt to maintain social stability and protect its own image. At that stage, the behavior of rescue operation commanders served as a viable indicator for the analysis.

Their perception was only partial and limited to visible symptoms: fire, smoke, and the explosion. Firefighters saw the damage, but did not recognize it as the result of a nuclear failure. They arrived on site unaware of the magnitude and nature of the accident. They did not have the protective and specialized equipment required for the operation. They were as efficient in their actions as they possibly could be. Out of twelve firefighters, six died in action.

Average perception influenced the comprehension level, which could not be higher than average. This affected their decisions, which were only partially effective. The next stage of the response phase in the analyzed case study indicates that all SA levels were high, which directly translated into decision-making effectiveness.

In general, at that stage comprehension is the most important element of situational awareness, since the accuracy of rescue decisions depends on proper threat interpretation and assessment. Perception is arguably the least important element, because the real threat was clearly visible and did not require further reconnaissance, but rather immediate action.

Moreover, during the recovery phase (de-escalation, restoration) the leading level of situational awareness is projection (level 3), which, as the case study showed, enabled long-term planning of actions, such as decontamination, creating the Exclusion Zone, or the construction of the NSC. A high level of projection was essential for the sustainability of the rescue operation effects and the prevention of secondary threat emergence.

5. Conclusions

The results of the analysis indicate that the relative importance of each level of situational awareness (perception, comprehension, projection) shifts dynamically in terms of decision effectiveness depending on the phase of crisis development.

During the pre-threat phases (preparation and prevention), perception and comprehension were the most important. Perception allowed the identification of threat indicators; however, even a high level of perception was insufficient for making accurate decisions—the data were not processed properly, leading to false conclusions or a lack of conclusions about possible consequences. This confirms the assumption that a high level of perception does not guarantee effectiveness if it is not accompanied by high comprehension. In these phases, SA levels are interconnected and essential for accurate decision-making.

The response phase features a noticeable shift in the importance of SA levels. At the beginning of this phase, when information is chaotic and decisions are made under time pressure, perception and rapid recognition of threat indicators are the most important. They enable the conduct of a fast rescue operation, even with limited comprehension and incomplete data.

However, during the second stage (crisis culmination), when the threat is fully defined, comprehension becomes the leading SA level, enabling proper evaluation of the disaster, its scale, possible consequences, and priority actions. At that stage, the importance of perception subsides, since the threat is apparent and the situation requires action rather than analysis. Furthermore, the recovery phase requires a high level of projection, which fosters long-term planning and prevents the threat from re-emerging. The high level of situational awareness projection translated into effective mitigation actions, such as area decontamination, establishing the Exclusion Zone, or the construction of the NSC.

Referring to the hypothesis: ‘Perception constitutes the most important element of situational awareness in all phases of crisis management in terms of decision effectiveness’—one may argue that it has been confirmed only partially when compared with the results of the case study. Since perception constitutes the entry point for the two other levels of situational awareness, it is fundamental in every phase of crisis management. Without accurate identification of threat elements, it is impossible to comprehend them or project possible outcomes.

However, the Chernobyl nuclear power plant disaster case study proves that the role of perception is not always the most important or leading. During stabilization and activation phases, the high level of perception was insufficient—comprehension of available information proved to be essential.

Although in those phases perception is the main SA level, it is insufficient on its own, since without it comprehension is not possible. During the first stage of the response phase, perception was crucial; at the second stage, the significance shifted to comprehension. On the other hand, the recovery phase favored the projection level. Therefore, it can be accepted that decision effectiveness throughout the crisis management cycle depends on striking an appropriate balance among the three SA levels. Although perception is fundamental, it is not always sufficient for effective and accurate decision-making.

It should be noted that the findings cannot be generalized to all crisis situations, as these differ in dynamics, causal structures, complexity, and decision-making contexts. The Chernobyl disaster represents a sudden and violent technological crisis in which rapid response was crucial.

By contrast, in other types of crises—such as natural disasters, epidemics, or social and economic crises—the decision-making process unfolds more gradually and entails different priorities. Consequently, the significance of each SA level varies depending on the type of threat, the availability of information, and existing time constraints.

In summary, the results may be partially generalized: effective crisis management requires situational awareness built on the synergy of all three levels. Nevertheless, the precedence of one SA level over another will vary depending on the type of crisis and prevailing conditions. Perception appears to be crucial in the initial phases of sudden and dynamic crises—such as industrial disasters or terrorist attacks—whereas comprehension or projection may play a greater role in long-term crises, including climate-related events.

References:

Armstrong, M. 1997. Jak być dobrym menadżerem. Dom Wydawniczy ABC.

Borowska-Mostafa, D. 2012. Encyklopedia PWN A-Z Oryginalna Azetka. Wydawnictwo Naukowe PWN SA.

Chalmers, D. 1997. The Conscious Mind: In Search of a Fundamental Theory. Oxford University Press.

Dominguez, C., Vidulich, M., Vogel, M.E. , McMilan, G. 1994. Situation awareness: Papers and annotated bibliography. In: Human System Center (pp. 17-28).

Encyklopedia Bezpieczeństwa Narodowego. Available at: https://encyklopedia.revite.pl/articles/view/598.

Endsley, M.R. 1995. Toward a Theory of Situation Awareness in Dynamic Systems. In: Human Factors, 37(1).

Griffin, R.W. 2005. Podstawy zarządzania organizacjami. Wydawnictwo Naukowe PWN.
Grima, S., Spiteri, J.V., Thalassinos, E. 2020. Risk management models and theories. Frontiers in Applied Mathematics and Statistics, 6, 8.
Harper, A., Mustafee, N., Pitt, M. 2022. Increasing situation awareness in healthcare through real-time simulation. In: Journal of the Operational Research Society, 74(11), 2339-2349. https://doi.org/10.1080/01605682.2022.2147030.
Hennig, B. 2007. British Journal for the History of Philosophy, 15(3), 455-484.
Kennedy, C. 2016. Situational Awareness: The Urban Preppers Ultimate Guide to Situational Awareness and Survival Paperback. In: CreateSpace Independent Publishing Platform. USA.
Kunikowski, J. 2002. Wiedza i edukacja dla bezpieczeństwa. Fundacja Rozwoju Edukacji Europejskiej i Bezpieczeństwa.
Rysz, S.J. 2020. Zarządzanie kryzysowe zintegrowane. Difin.
Salmon, P.M., Stantion, N.A., Walker, G.H., Jenkins, D.P. 2009. Distributed Situation Awareness: Theory, Measurement and Application to Teamwork. In: Ashgate Publishing Limited, p. 11.
Sarter, N.B., Woods, D.D. 1991. Situation Awareness: A Critical but Ill-Defined Phenomenon. In: International Journal of Aviation Psychology, 1(1), 45-57.
Sienkiewicz, P., Górny, P. 2001. Analiza systemowa sytuacji kryzysowych, pp. 27-42. In: Zeszyty Naukowe Akademii Obrony Narodowej, 2001/4. Akademia Obrony Narodowej.
Słownik terminów z zakresu bezpieczeństwa narodowego. 2002. Akademia Obrony Narodowej.
Thalassinos, E., Kadłubek, M., Norena-Chavez, D. 2023. Theoretical essence of organisational resilience in management. In Digital Transformation, Strategic Resilience, Cyber Security and Risk Management (pp. 133-145). Emerald Publishing Limited.
Tynka, B. 2025. Sekrety Czarnobyla. Księży Młyn.
Wróblewski, R. 1996. Zarys teorii kryzysu: zagadnienia prewencji i zarządzania kryzysami. Akademia Obrony Narodowej.