

# Symposium On Crisis Early Warning

Symposium Report  
2025



Center for  
**Crisis Early Warning**

der Bundeswehr  
Universität  **München**

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### 1. Introduction

Over the past decades, global risks have become increasingly interdependent. Armed conflict, climate-related disasters, cyber threats, and disinformation now interact in complex ways, amplifying humanitarian, economic, and political consequences worldwide (World Economic Forum 2025; Polchar and Santamaria 2025). These interconnections blur the boundaries between security, environmental, and technological domains, creating challenges that no single actor or sector can address alone (Conceição et al. 2024; European Commission 2024). In this context, early warning has become a vital operational instrument for crisis prevention and coordinated response, translating analytical insights into timely action and strengthening institutional preparedness (UN OCHA 2025; World Bank and GFDRR 2024; Polchar and Santamaria 2024).

The Center for Crisis Early Warning (CCEW) at the University of the Bundeswehr Munich has long operated at the interface of conflict research, data innovation, and policy application. In response to the growing demand for more actionable early warning, this year's Symposium held in Berlin on September 17–18, 2025, under the title *“The Potential of Data, AI & Interdisciplinary Analysis in Situational Awareness and Decision Making”*, brought together experts from academia, government, and international organizations. It highlighted how data science, artificial intelligence (AI), and interdisciplinary collaboration can improve crisis response and decision-making. Recent studies show that integrating large-scale text, geospatial, and administrative data enhances the ability to identify weak signals and emerging

risks across regions (Hegre et al. 2019; Mueller and Rauh 2022). At the same time, advances in machine learning and natural language processing (NLP) are transforming how complex information is analyzed and communicated in both conflict and climate-security contexts (Chadefaux 2017; Kramar et al. 2024). Together, these developments shaped the Symposium's focus on advancing interdisciplinary exchange, showcasing data-driven approaches, and discussing how early warning can better support policy and operational needs.

Unlike previous editions organized solely by the CCEW, the 2025 Symposium on Crisis Early Warning was co-organized with the German Federal Foreign Office (FFO). This partnership marked a significant step toward deepening the connection between research and policy practice. The event fostered a closer exchange between researchers, data specialists, and decision-makers, with an expanded scope, integrating academic and policy-oriented panels and interactive workshops.

### 2. Structure and Content

The 2025 Symposium on Crisis Early Warning unfolded over one and a half days of dynamic policy dialogue, academic exchange, and applied workshops. It was opened with welcoming remarks from high level representatives of the FFO and the CCEW. The keynote speakers emphasized the growing strategic importance of early warning for coordinated crisis prevention and response. The opening session framed the Symposium around a central question: In an era of “perpetual crises,” is early warning still feasible, and how can it remain credible? Participants underscored that analytical

innovation must be accompanied by institutional adaptation – especially in bridging the gap between analysis and action. The tone of the opening sessions reflected a shared understanding that models and data cannot replace human judgment but can significantly enhance the timeliness and quality of decision-making when properly integrated into organizational workflows.

Following the opening session, four **Research Panels** showcased ongoing advances in quantitative, computational, and methodological innovation in crisis early warning.

**Panel one** examined the application of large language models (LLMs) for structuring and processing text-based information in early warning systems. Contributions demonstrated how LLMs can extract conflict event data from historical, multilingual media sources, design modular LLM pipelines to support analytical workflows, and build datasets based on government-issued information. The panel highlighted LLMs' potential to generate new structured data sources and foster greater methodological transparency.

**Panel two** focused on enhancing the analytical robustness and timeliness of forecasting models. Presentations introduced dynamic pattern recognition systems for predicting conflict and migration risks, as well as machine learning-based nowcasting techniques that adjust for reporting delays. These innovations aim to improve the temporal precision, reliability, and real-time usability of early warning models.

In the afternoon, both the **FFO** and **CCEW** offered a series of practical seminars focused on proactive analysis and data-driven methodologies. Sessions on forecast modeling, cyber threats, and anticipatory analysis enabled participants to exchange hands-on insights into predictive analytics, risk monitoring, and crisis communication.

The first day concluded with the **Policy Panel one** – “**How to Warn? Lessons and Best Practices**,” featuring speakers from the **United Nations Development Programme (UNDP)**, the **European External Action Service (EEAS)**, the **World Health Organization (WHO)**, and the **Federal Ministry of Defence (MoD)**. The discussion emphasized the critical importance of communication, institutional trust, and inter-agency coordination to ensure that early warning translates effectively into early action.

The second day shifted focus toward empirical research and applied experimentation. **Panel three** investigated predictive models for conflict onset and recurrence, focusing on temporal patterns in collective action, variable importance, and model performance evaluation. The panel showcased different forecasting methods, including analysis-based machine learning algorithms and probabilistic prediction models, to

better understand the persistence of violence and state fragility.

Participants then joined three parallel seminars dedicated to emerging themes: assessing central risk factors, exploring the use of LLMs in disinformation and information warfare, and testing new methods for text data extraction. These sessions deepened participants' methodological and technical understanding and prompted reflection on ethical and governance challenges in applying AI to conflict contexts.

The afternoon's **Policy Panel two** featured speakers from the **World Food Program (WFP)**, the **Armed Conflict Location & Event Data Project (ACLED)**, and the **Potsdam Institute for Climate Impact Research (PIK)**. The panel underscored the importance of open, interoperable datasets for effective crisis monitoring while warning against the growing fragmentation of global data ecosystems.

The Symposium concluded with **Panel four**, which highlighted how emerging data sources from satellite imagery to geospatial indicators and new social datasets can refine the spatial and temporal granularity of crisis monitoring and early warning analysis.

### 3. Participation and Engagement

The 2025 Symposium on Crisis Early Warning brought together more than 120 participants from government institutions, academia, international organizations, and the private sector. The event fostered a unique interdisciplinary exchange among experts working on data-driven conflict analysis, foresight methodologies, and policy implementation. Representatives from the **FFO**, the **MoD**, and the **CCEW** were joined by researchers and practitioners from across Europe, Asia, and North America, reflecting the increasingly global scope of crisis early warning efforts. The limited group sizes in seminars encouraged genuine dialogue and peer learning, while panel discussions created space for lively debate on both conceptual and operational challenges.

Each research panel brought together three speakers from diverse academic and professional backgrounds. Panel chairs encouraged interactive discussion, and audience members frequently contributed analytical reflections and case-specific insights. Several exchanges continued informally during coffee breaks and the evening reception, fostering new connections and collaborative ideas. Seminars and small-group workshops provided a more focused environment for experimentation and reflection, with up to 25 participants engaging in guided exercises that combined conceptual forecasting with practical data analytics.

### Special Focus on Engagement: Seminars during the Symposium on Crisis Early Warning

One seminar on **data-driven anticipatory action** explored how forecasting tools can support humanitarian preparedness and crisis prevention. The discussion illustrated how proactive analysis enables institutions to plan budgets, pre-position resources, and act preventively in high-risk contexts. Participants emphasized that integrating local community data significantly improves forecast accuracy and contextual awareness. At the same time, they noted that existing conflict datasets often overlook small-scale or informal actors, limiting overall coverage. The group agreed on the need for stronger knowledge-sharing mechanisms to exchange forecasting practices across regions and institutions.

Another session on **hybrid threats and early warning** examined the intersection of cyber activity, critical infrastructure exposure, and geopolitical escalation. Participants compared different analytical approaches, ranging from monitoring web traffic anomalies to mapping energy networks and communication flows. They concluded that cyber indicators alone rarely provide sufficient early warning and must be triangulated with other data sources such as satellite imagery, intelligence reports, and behavioral analysis. The discussion also pointed to the “small-numbers problem” in cyber incident datasets, underscoring that interpreting such data requires contextualization, domain expertise, and analytical caution to avoid false signals.

A third seminar, **Improving Data Sources (“Pimp My Dataset”)**, addressed the practical challenges of building and refining crisis datasets. Participants reviewed their typical data sources – open media feeds, monitoring platforms, administrative data, and social media – and identified recurring information gaps such as attacks on education and health infrastructure, gender-disaggregated data, and non-traditional event types like judicial erosion or mobility disruptions. Proposed improvements included mobile and transport data partnerships, better integration of document-based sources, and human-in-the-loop annotation pipelines to enhance data quality. Discussions also raised concerns about AI-generated noise, the decline of local journalism, and fragmented research efforts. Many participants agreed that more collaboration and shared data pipelines would improve consistency and comparability across projects.

The seminar on **disinformation and the use of AI** focused on how generative models can both amplify and counter disinformation. In a guided exercise, participants examined how modern language models reproduce misleading narratives, how safeguards function, and where they fail. The conversation highlighted that producing false content has become faster and cheaper,

fueling an arms race between manipulation and detection. Participants emphasized that defending against disinformation requires not only technical solutions but also stronger media literacy, provenance verification, and coordinated institutional responses. A key insight was that most disinformation builds on existing social grievances rather than fabricating entirely new narratives, complicating detection and mitigation efforts.

Two further seminars explored strategic foresight through a case study and examined key risk factors relevant to crisis early warning. By bringing together participants from social science, data science, and policy operations, the **The Symposium Team**, composed of members from the **CCEW** and **FFO**, ensured that discussions across all seminars integrated both analytical and operational viewpoints.

## 4. Key Learnings and Insights

Across both days, a clear message emerged: The effectiveness of crisis early warning depends less on any single technology and more on how different methods, disciplines, and institutions work together. Participants repeatedly emphasized that predictive models are only valuable when their insights can be understood, trusted, and acted upon. Human judgment, institutional coordination, and transparent communication remain essential to turn forecasts into meaningful action.

Discussions also underlined the importance of clarity and transparency. Models and AI tools need to communicate not just results but also their assumptions and uncertainties. When analysts explain how and why predictions are made, decision-makers are better equipped to interpret them and integrate them into planning.

Another strong theme was the use of AI. Participants agreed that as machine learning and LLMs become more powerful, questions of bias, validation, and ethical oversight must be taken into consideration. Technology can support early warning, but it cannot replace the accountability and contextual awareness that come from human expertise.

Finally, the Symposium highlighted how valuable local and cross-sector perspectives are, especially in the field of conflict prevention. Forecasts informed by regional knowledge and practical experience were often seen as more relevant and actionable. Many participants pointed out that collaboration between researchers, policymakers, and practitioners, both during sessions and informal exchanges, was one of the most rewarding parts of the event.

In short, the Symposium showed that successful early warning is not about prediction alone. It is about building connections between data and people, science and policy.

## 5. Challenges and Areas for Improvement

The 2025 Symposium received highly positive feedback while also revealing lessons for future editions. Insights were drawn from participant discussions, exchanges with panel chairs and speakers, and internal reflections within the organizing team.

Participants agreed that the Symposium effectively balanced analytical depth with policy relevance. They highlighted the diverse program, integration of panels and seminars, and numerous opportunities for informal exchange. The event's inclusive atmosphere and interdisciplinary design were noted as major strengths.

At the same time, several areas for improvement were identified. One recurring theme was the need for more time for interaction and discussion. Suggestions included extending Questions-and-Answers sessions, adding breakout formats, or allocating more space for collaborative exercises. Another theme concerned the translation of analytical results into operational practice. Participants recommended incorporating demonstrations or case-based examples to better connect research with policy application. Expanding participation was also encouraged, particularly by including more representatives from operational and field-based organizations. Participants proposed creating a shared digital platform for presentations, datasets, and methodological tools to sustain collaboration beyond the two-day event.

Several broader challenges were also identified: coordinating across disciplines remains demanding; balancing technical innovation with accessibility is critical; and maintaining engagement between events is

essential to transform analytical advances into practical decision support.

Looking ahead, addressing these challenges will help strengthen both the content and impact of future editions. Preserving the Symposium's interdisciplinary focus and participatory approach will remain key, while expanding time for dialogue and developing mechanisms for continuous exchange could further enhance collaboration between attendants and the CCEW.

## 6. Conclusion

Overall, the fifth edition of the Symposium on Crisis Early Warning was a success. It provided a constructive platform for exchange between researchers, policymakers, and practitioners working on crisis anticipation and response. Over two days of discussions, participants explored practical ways to connect analytical work with operational needs and to strengthen cooperation across institutions and disciplines.

Organized in cooperation by the CCEW and the FFO, the event highlighted the value of sustained collaboration between analytical and policy communities. Its discussions and outcomes ranging from methodological insights to operational practices reflected a shared commitment to improving the practical use of crisis early warning.

The organizers thank all contributors, partners, and participants for their valuable engagement and insights. The exchange and discussions in Berlin will continue to shape ongoing research and collaboration in support of more effective early warning practice.

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