Practices, Principles and Promises of Conflict Early Warning Systems

Tim Sweijs and Joris Teer
February 2022

Annex

**The Hague Centre
for Strategic Studies**

Practices, Principles and Promises
of Conflict Early Warning Systems – Annex

Authors:

Tim Sweijs and Joris Teer

Contributors:

Simon van Hoeve, Giorgio Berti, Joris van Schie, Jelle van der Weerd
and John Michaelis

Table of Contents

Appendix A: Meta overview of surveyed Early Warning Systems (EWS)

Table 1 EWS: an overview of key characteristics[1]

Organisation	EWS	1. Contingency type	2. Geographical scope	3. Time Horizon	4. Level of Analysis	5. Effects	6. Drivers	7. Purpose
1. European Union (EU)/ European Union External Action Service (EEAS)2	EU Conflict Early Warning System (EU CEWS)	Probability and intensity of violent conflict. Does not predict, but provides a risk assessment.	All non-EU countries	Up to 4-years into the future	Quantitative analysis on the country-level (i.e., a global horizon scan). In-depth qualitative (including intelligence-based) assessment on the country and sub-national levels.	Immense human suffering and huge economic and social costs.[3]	Structural political, security, social, economic, geographic and demographic risk factors that frequently correlate with the eruption of violence. Excludes quantitative analysis of immediate risk factors or "trigger" events.	Early identification and assessment of structural risk factors often related to conflict, in order to take upstream conflict prevention measures (i.e., early preventive action). Explicitly states that conflict prediction is not a goal.
2. The Netherlands' Interdepartmental Working Group on Early Warning and Early Action (EWEA).	The Risk Monitor predicts whether conflict will escalate in the near future. The Security Monitor is a visualisation of conflict data.[4]	Violent conflict	Almost global	Near future	Country			
3. International Crisis Group (ICG)	Crisis Watch	Violent conflict, including state-based, non-state conflict and one-sided violence.	Global (i.e., 80 countries)	Close to real-time "nowcasting"[5] and specific *conflict risk alerts* about the escalation of violence and opportunities for resolution alerts in the immediate future.[6]	Country	Primary effects: fatal casualties. (Examples of) Secondary effects: food insecurity, displacement.[7]	Broad qualitative political, security, social, economic, geographic and demographic trends including immediate and structural factors.[8]	To achieve an overview of security and political developments providing a bird's-eye view of ongoing conflict trends, risk of escalations and possibilities for peace, in order to help decision-makers prevent and resolve deadly violence in close to real-time.[9]

1   "Catalogue of Predictive Models in the Humanitarian Sector – The Centre for Humanitarian Data," UN OCHA, accessed December 22, 2020, https://centre.humdata.org/catalogue-for-predictive-models-in-the-humanitarian-sector/.
2   Launched in 2014.
3   EEAS.
4   Melle Brinkman, "EU cooperation on Early Warning Early Action," De Veiligheidsdiplomaat (Ministerie van Buitenlandse Zaken, May 3, 2021), https://magazines.rijksoverheid.nl/bz/veiligheidsdiplomaat/2021/03/05.
5   "Catalogue of Predictive Models in the Humanitarian Sector – The Centre for Humanitarian Data."
6   "Avoiding a Bloodbath in Ethiopia's Mekelle | Crisis Group," accessed December 22, 2020, https://www.crisisgroup.org/africa/horn-africa/ethiopia/avoiding-bloodbath-ethiopias-mekelle.
7   "Avoiding a Bloodbath in Ethiopia's Mekelle | Crisis Group."
8   "About CrisisWatch," Crisis Group, July 28, 2016, https://www.crisisgroup.org/about-crisiswatch.
9   "About CrisisWatch."

Organisation	EWS	1. Contingency type	2. Geographical scope	3. Time Horizon	4. Level of Analysis	5. Effects	6. Drivers	7. Purpose
4. Uppsala Conflict Data Programme (UCDP)	Violence Early-Warning System (ViEWS)[10]	Armed conflicts (i.e., state-based conflict), violence against civilians and between non-state actors, and forced population displacements.[11]	Continental, Africa	From 1 month up to 36 months	Country-level down to lower community level cluster, which divide the African continent into squares of 0.5 longitude and 0.5 latitude.	Conflict-induced humanitarian disasters[12]	Structural factors ranging from history of conflict to political institutions, timing of elections, economic development, natural resources, demography, geographic proximity and conflict.[13]	Pioneering, developing, testing and continuously improving and open to the academy and the international community, and data-driven EWS based on data. The EWS predictive performance is publicly assessed, transparent and replicable. Furthermore, it provides alerts that specify actor and location.[14]
5. United Nations Office for the Coordination of Humanitarian Affairs (UN OCHA)	Country-specific Anticipatory Action Framework pilot programmes (in partnership with specific local organisations, regional organisations and other UN bodies).	Large-scale natural hazards (i.e., droughts[15] and floods[16]) and food insecurity[17]	Somalia, Ethiopia, Chad, Malawi and Bangladesh[18]	Approximately 12-days (for floods) up to several months for droughts.	Country-level and the sub-national level.	Primarily food insecurity.[19] Also displacement, violent conflict.	Various meteorological and geographical indicators.	Immediately releasing a pre-agreed sum of funds for launching anticipatory humanitarian action (e.g., distributing assistance in the form of cash, livestock feed, storage drums, hygiene, and health kits)[20] by UNOCHA in cooperation with other organisations (e.g., ICRC and UN CERF) if a pre-determined risk threshold has been reached.
6. Danish Refugee Council (DRC) & International Business Machines Corporation (IBM) 21	Foresight Model (previously called the Mixed Migration Forecasting)	Forced displacement (refugees and asylum seekers outside a given country and the internally displaced within the same country).[22]	Afghanistan, Myanmar (initial focus), the Sahel Region (recently added).[23]	1-3 years[24]		Does not specify	Macro-level indicators i.e., national level aggregates. Excludes proximate or micro-level indicators.[25]	Predicts the size of forced displacement; provides insight into the drivers of migration and what-if approaches allowing clients to isolate causes (and subsequently measure effect). Allows the main office to prioritise attention and interventions (including investment). Provides response options. Supports annual, country-specific strategic planning.[26]

---

10 Launched in 2017.

11 Department of Peace and Conflict Research, "About ViEWS - Department of Peace and Conflict Research - Uppsala University, Sweden" (Uppsala University, Sweden), accessed November 26, 2020, https://www.pcr.uu.se/research/views/about-views/.

12 Department of Peace and Conflict Research, "Objectives - Department of Peace and Conflict Research - Uppsala University, Sweden" (Uppsala University, Sweden), accessed December 22, 2020, https://www.pcr.uu.se/research/views/about-views/objectives/.

13 Department of Peace and Conflict Research, "Methodology - Department of Peace and Conflict Research - Uppsala University, Sweden" (Uppsala University, Sweden), accessed November 26, 2020, https://www.pcr.uu.se/research/views/methodology/.

14 "To develop, test, and iteratively improve a pilot Violence Early-Warning System (ViEWS) that is rigorous, data-based, and publicly available to researchers and the international community." Department of Peace and Conflict Research, "About ViEWS - Department of Peace and Conflict Research - Uppsala University, Sweden." "Provide alerts that are location- and actor-specific and most importantly, be transparent, replicable and publicly available, including public assessments of predictive performance." Department of Peace and Conflict Research, "Objectives - Department of Peace and Conflict Research - Uppsala University, Sweden."

15 Somalia pilot was launched in 2019H2. Additional pilots were launched in Ethiopia, Chad and Malawi in 2020. UN CERF, "Anticipatory Action Update," June 1, 2020, https://cerf.un.org/sites/default/files/resources/Anticipatory%20Action%20Update.pdf.

16 In Bangladesh pilot was launched in 2020H1. UN CERF.

17 UN CERF.

18 UN CERF.

19 UN CERF, "Anticipatory Action Update."

20 UN CERF, "Anticipatory Action Update."

21 R. Nair et al., "A Machine Learning Approach to Scenario Analysis and Forecasting of Mixed Migration," *IBM Journal of Research and Development* 64, no. 1/2 (January 2020): 1–7, https://doi.org/10.1147/JRD.2019.2948824; OCHA, "MODEL CARD: DRC Foresight Model" (OCHA, July 2020), https://data.humdata.org/dataset/2048a947-5714-4220-905b-e662cbcd14c8/resource/be6ab2c8-f3c4-4045-9acf-529f6091c253/download/drc-model-card.pdf.

22 "Catalogue of Predictive Models in the Humanitarian Sector – The Centre for Humanitarian Data."

23 Leonardo Milano, "Reviewing the Danish Refugee Council's Foresight Model – The Centre for Humanitarian Data," accessed December 22, 2020, https://centre.humdata.org/reviewing-the-danish-refugee-councils-foresight-model/.

24 "Catalogue of Predictive Models in the Humanitarian Sector – The Centre for Humanitarian Data."

25 OCHA, "MODEL CARD: DRC Foresight Model."

26 OCHA, "MODEL CARD: DRC Foresight Model," 1–2.

Organisation	EWS	1. Contingency type	2. Geographical scope	3. Time Horizon	4. Level of Analysis	5. Effects	6. Drivers	7. Purpose
7. The Federal Republic of Germany (FRG) Ministry of Foreign Affairs (MFA)	PREVIEW	Increased crisis potential	Almost global		Country		Structural indicators; Qualitative analysis	
8. The Hague Centre for Strategic Studies (HCSS)	HCSS Political Instability Monitor	Intra-state violent conflict (with a minimum of 25 fatal casualties p/a).	Global	1-month, six-months, and 12-months.	Country, sub-national (first administrative region)	N/A	1700 political, security, social, economic, geographic and demographic indicators of both structural and immediate trigger events.	Conflict prediction
9. African Union (AU)	Continental Early Warning System (CEWS)	Violent Conflict	Continental; Africa	Short, medium and long-term. These time frames are non-specific[27] and vary by case and country.	Local, country, cross-border/transnational		Uses both structural and dynamic/event-indicators. For structural indicators from in-house capacity, the CEWS uses the Indicators and Profiles Module, which consists of structural data organised on the country-level and Africa Prospect and conducts periodical vulnerability assessments on the basis of economic and geographic indicators.[28] For events or "dynamic indicators", it uses the indicators used by the Africa Media Monitor (AMM), the Africa Reporter, and Live-Mon. These are supplemented by indicators from the Economic Intelligence Unit, Oxford Analytica and BBC Monitoring.[29]	To anticipate and prevent conflicts on the continent. To provide timely information on evolving violent conflicts based on specifically developed indicators.[30]

27   David Lindgren, "Satellites and Their Potential Role in Supporting the African Union's Continental Early Warning System," in *Space Fostering African Societies: Developing the African Continent through Space, Part 1*, ed. Annette Froehlich, Southern Space Studies (Cham: Springer International Publishing, 2020), 195–205.

28   Alexander Noyes and Janette Yarwood, "The AU Continental Early Warning System: From Conceptual to Operational?," *International Peacekeeping* 20, no. 3 (June 1, 2013): 252–53, https://doi.org/10.1080/13533312.2013.838393.

29   Charles Mwaura, "Operationalization of the Continental Early Warning System of the AU."

30   AFCONE, "The Continental Early Warning System (CEWS) - African Union - Peace and Security Department," African Union,Peace and Security Department, November 23, 2015, http://afcone.peaceau.org/en/page/28-continental-early-warning-system-cews.

Organisation	EWS	1. Contingency type	2. Geographical scope	3. Time Horizon	4. Level of Analysis	5. Effects	6. Drivers	7. Purpose
10. Intergovernmental Authority on Development (IGAD)	Conflict Early Warning and Response Mechanism (CEWARN)	60 high priority wide-ranging typologies and themes of violent conflict ranging from gender-based violence to land grabbing to drought.[31] Originally operational from 2002 to 2012, CEWARN focused on pastoral cross-border conflicts.[32]	Djibouti, Eritrea, Ethiopia, Kenya, Somalia, South Sudan, Sudan and Uganda	Focuses on short, mid-and long-term timeframes which are not defined in detail.	Local, country, cross-border clusters	Does not specify	Does not specify. From 2002-2012 focused on 52 socio-political indicators[33] which are divided into short and long-term indicators and can include socio-cultural factors, internal security setting, environmental and resource management.	Information sharing on conflicts, migrants and natural disasters between participating countries. Jointly studying signs of emerging violent conflict to develop options for response, which are then communicated to all IGAD member states.[34]
11. Economic Community of West African States (ECOWAS)	ECOWAS Warning and Response Network (ECOWARN)	Intra-state violence such as ethnic, religious or electoral violence.	Benin, Burkina Faso, Cape Verde, The Gambia, Ghana, Guinea, Guinea-Bissau, Ivory Coast, Liberia, Mali, Niger, Nigeria, Senegal, and Sierra Leone.	Does not specify	Local, regional, country, cross-border	Does not specify	94 pre-defined indicators are used as a grid to analyse risks and rapidly detect security trends in a given area.[35] Uses open information sources and not "intelligence or counter-intelligence reports" in order to respect state sovereignty.[36]	Data collection for the purpose of EW.[37] Informing member states and ECOWAS' decision-making by providing incident and situation reports, daily highlights, country profiles, policy briefs, monthly and quarterly reports.[38]

31   IGAD, "CEWARN Regional Report," Regional Report on the Karamoja Cluster (Addis Ababa: Inter Governmental Authority on Development, April 2006), https://www.cewarn.org/index.php/reports/archived-early-warning-reports/cluster/karamoja-1/47-clstr-krj-jan-apr06/file.

32   Phillip Apuuli Kasaija, "The Intergovernmental Authority on Development's Conflict Early Warning and Response Mechanism," *African Security Review* 22, no. 2 (June 1, 2013): 11–25, https://doi.org/10.1080/10246029.2013.792547.

33   OECD, "Conflict and Fragility Preventing Violence, War and State Collapse THE FUTURE OF CONFLICT EARLY WARNING AND RESPONSE," 2009, https://www.oecd.org/dac/conflict-fragility-resilience/docs/preventing%20violence%20war%20and%20state%20collapse.pdf.

34   "Information of conflicts, migrants and natural disasters is shared between participating countries in a transparent manner. Information about potentially violent situations are jointly analysed to develop case scenarios and optimal responses. The analysis, data and response options are also communicated to all IGAD member states". Catalogue of Predictive Models in the Humanitarian Sector – The Centre for Humanitarian Data," accessed December 22, 2020, https://centre.humdata.org/catalogue-for-predictive-models-in-the-humanitarian-sector/.IGAD, "CEWARN Regional Report."

35   OECD, "Interview with Mr. Augustin Sagna," The ECOWAS Early Warning and Response Network, May 2009, http://www.oecd.org/swac/theecowasearlywarningandresponsenetwork.htm.

36   OECD, "Interview with Mr. Augustin Sagna."

37   Herbert Wulf and Tobias Debiel, "Conflict Early Warning and Response Mechanisms: Tools for Enhancing the Effectiveness of Regional Organisations? A Comparative Study of the AU, ECOWAS, IGAD, ASEAN/ARF and PIF," Working Paper, Regional and Global Axes of Conflict (Institut fur Entwicklung und Frieden, May 2009), http://eprints.lse.ac.uk/28495/1/WP49.2.pdf.

38   OECD, "Interview with Mr. Augustin Sagna."

Appendix B: In-depth overview of two EWS

1. Organisation

United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA)

a. type	b. particulars
Country-specific Anticipatory Action Framework pilot programmes (in partnership with specific local organisations, regional organisations and other UN bodies)	UNOCHA and a variety of partners (depending on geography and type of natural hazard) have experimented with pilot schemes for EW and automatic translation to EA since 2019. These efforts include a predictive model or forecast; a pre-agreed sum of funds necessary for launching anticipatory humanitarian aid efforts; pre-agreed trigger thresholds for the release of these funds; and UNOCHA analyst review and verification of whether the risk thresholds have been reached.

2. CEWS

a. objectives	b. audience	c. scope		d. level of analysis	e. time horizon	f. indicators			g. methods		h. predictive performance	i. explanatory power	j. CEWS products
		I. thematic	II. geographical				I. data sources	II. tools	III. analytical techniques	IV. data update frequency			
Alerting local populations of large-scale natural hazards (i.e., floods and droughts), releasing pre-agreed aid efforts and amount of funds immediately when a threshold level of risk is reached.	Populations at risk of floods in Bangladesh and of droughts in Somalia, Ethiopia, Chad and Malawi.	Large-scale natural hazards (i.e., droughts[39] and floods[40]) and indirectly food insecurity[41]	Somalia, Ethiopia, Chad, Malawi and Bangladesh[42]	Country-level and the sub-national level.	Approximately 12-days for floods up to several months for droughts	Meteorological and climatological indicators	Weather and Climate data	A predictive model or forecast; pre-arranged financing based on triggers; and a pre-agreed action plan.	In the Bangladesh pilot: Trigger 1: The European Commission's Global Flood Awareness System (GloFAS) predicting a high probability (50%) of severe flooding in Bangladesh. Trigger 2: The Government of Bangladesh's Flood Forecasting and Warning Centre (FFWC) forecasting the water level would cross the Government-defined "danger level" of +0.85 meters.	Constant during Monsoon season in Bangladesh.	The Bangladesh pilot successfully predicted a monsoon flooding.	Not applicable, as the pilots predict large-scale natural hazards	Urgent warning message

3. Embedding CEWS in decision-making cycle

a. from CEWS product to Early Warning (EW)	b. from Early Warning (EW) to Early Action (EA)
Analysts of UNOCHA and partner organisations verify the results of the CEWS-product and then issue a warning to local populations and inform agencies of impending harm.	Immediately releasing a pre-agreed sum of funds for launching anticipatory humanitarian action (e.g., distributing assistance such as cash, livestock feed, storage drums and hygiene, dignity and health kits action)[43] by OCHA in cooperation with other organisations (e.g., ICRC and UN CERF) if a pre-determined risk threshold has been reached.

4. Key challenges

N/A

5. Risks and ethical considerations

EW on large-scale natural hazard comes with fewer risks than EW on violence, due to the lack of a political dimension and relatively straightforward aid efforts.

39 Somalia pilot was launched in 2019H2. Additional pilots were launched in Ethiopia, Chad and Malawi in 2020. UN CERF, "Anticipatory Action Update."
40 In Bangladesh pilot was launched in 2020H1. UN CERF.
41 "Catalogue of Predictive Models in the Humanitarian Sector – The Centre for Humanitarian Data."
42 UN CERF, "Anticipatory Action Update."
43 "Catalogue of Predictive Models in the Humanitarian Sector – The Centre for Humanitarian Data."

1. Organisation

Uppsala University Conflict Data Programme (UCDP)

a. type	b. particulars
Academic Institution	Part of the Department of Peace and Conflict Research that provides mostly open-source data. ViEWS develops, tests and iteratively improves a Violence Early-Warning System (ViEWS) that is rigorous, data-based, transparent and publicly available to researchers and the international community.

2. CEWS

Violence Early Warning System (VIEWS)

a. objectives	b. audience	c. scope		d. level of analysis	e. time horizon	f. indicators		g. methods				h. predictive performance	i. explanatory power	j. CEWS products
		I. thematic	II. geographical				I. data sources	II. tools	III. analytical techniques	IV. data update frequency				
To predict the risk and likely severity for the three forms of political violence recorded by the UCDP. [44]	Open source: Academic institutions, International, NGOs, political decision-makers including the Swedish Foreign Office, the EU External Action Service and the United Nations.	Armed conflict involving states and rebel groups, armed conflict between non-state actors, violence against civilians and the application of these to specific actors, sub-national geographical units and countries.	Africa	Country-level down to lower community level clusters, which divide the African continent into squares of 0.5 longitude and 0.5 latitude.	1-36 months	Various thematic conflict-based indicators divided into the following themes: Conflict history, Demography, Economy, Institutions, Protests.	UPCD Programmer, which records every conflict-related death manageable. World Bank indicators, PRIO GRID, ACLED.	Machine learning and Artificial Intelligence	Random Forest Algorithms Python and R software Out-of-sample testing [45]	UCDP Candidate Events on a monthly basis	N/A	N/A	Risk on the geospatial map is quantified as a percentile, whilst the forecast is measured from 0-1. The monthly forecasts published by ViEWS do offer a degree of insight and explanatory factors, however, given the scope of the task, it is often limited to paragraphs as opposed to in-depth reports.

3. Embedding CEWS in decision-making cycle

a. from CEWS product to Early Warning (EW)	b. from Early Warning (EW) to Early Action (EA)
Conflict scholars reviewing the geospatial map and attached data.	N/A

4. Key challenges

Does still produce a product with incomplete data and as a result has to use the Amelia II package in R as part of a data "imputation model". It is impossible to receive and record truly accurate conflict data.

5. Risks and ethical considerations

As results are released malicious actors can use them to identify hotspots of dissent and initiate collective actions.

---

44   "About ViEWS - Department of Peace and Conflict Research - Uppsala University, Sweden" (Uppsala University, Sweden), accessed November 26, 2020, https://www.pcr.uu.se/research/views/about-views/.

45   "Combining Models: Ensembles in ViEWS - Department of Peace and Conflict Research - Uppsala University, Sweden" (Uppsala University, Sweden), accessed November 26, 2020, https://www.pcr.uu.se/research/views/methodology/combining-models/.

Appendix C: Semi-in-depth overview of additional EWS on the basis of a review of the literature and primary sources

Examples of additional initiatives in support of Early Warning System (EWS)

Organisation	EWS	General information
Intergovernmental Authority on Development (IGAD)	Conflict Early Warning and Response Network (CEWARN)	IGAD is an eight-country development bloc situated in the Horn of Africa and the Nile Basin. CEWARN was founded in 2002. CEWARN's mandate – since the launch of the CEWARN Strategy Framework 2012-2019 – is to receive and share information regarding a wide range of violent conflicts and other events detrimental to human well-being; analyse and share the analysis of that information; develop scenarios and design avenues for response including the right to share these; and to conduct studies of particular forms of conflict in different geographical areas within the IGAD regions. Its member states prioritised in total 60 high priority and wide-ranging typologies/themes that CEWARN should focus on ranging from gender-based violence, to land grabbing to drought. From 2002 to 2012, CEWARN limited its focus to cross-border pastoral conflicts in three geographical clusters, namely the Karamoja cluster, the Dikhil cluster and the Somali Cluster.[46] CEWARN makes use of both, quantitative and qualitativeanalytical tools, using open sources and a system of field monitors. The information and data it collects are divided into five themes: security; governance; environment; economy; and socio-cultural issues.[47] It operates on three levels: the local level, the national level and the regional level. At the local level Field Monitors (FM) complete data collection in the areas of reporting. They report to the CEWARN country coordinators at the national level, who analyse information and code information into reports. They inform national-level Conflict Early Warning and Early Response Units (CEWERU) of their findings, enabling them to initiate a response to prevent (the escalation of) conflict. The National Research Institutes subsequently reports to the CEWARN Unit that operates on the regional level. This body is responsible for coordination, monitoring and quality control of the activities completed and the information produced at the national and local levels.[48] From here it is passed on to the necessary intergovernmental or national bodies to implement policy to prevent an escalation in conflict. It reports to IGAD's Technical Committee on Early Warning in Addis Ababa. *CEWARN Reporter*, a software application created by CEWARN tracks, categories and analyses large volume of conflict EW data from its member states.[49] CEWARN's CEWS products consist of incident reports, which authorised persons can access online and situation reports, which are produced at the country-level and policy briefs to aid policymakers in response.[50] CEWARN is part of the wider African Peace and Security Architecture (APSA), as it is linked to the AU's Continental Early Warning System (CEWS).[51]

Additional Early Warning System (EWS) of interest

The Alan Turing Institute	Global Urban Analytics for Resilient Defence (GUARD)	GUARD aims to "automate the identification of future conflict areas (on a regional or city level) for high fidelity analysis and policy/action advice" funded by the United Kingdom Ministry of Defence. The programme complements existing defence and security intelligent data systems in order to 1. "Improve consistency and reducing expenditure, 2. Improve understanding of causal mechanisms by quantifying interaction effects" and 3. "transform network theory into military actionable tasks".[52,53]
International Federation of Red Cross and Red Crescent Societies (IFRC/ICRC)	Community early warning systems: guiding principles[54]	The ICRC does not have a centralised EWEA system, but rather it facilitates and aids in the implementation of warning across the globe. These warning systems vary drastically in size, capacity and purpose. For example, it has implemented a hurricane EW for small Caribbean communities and a regional earthquake EW system in Peru.[55,56]

46   IGAD, "CEWARN Regional Report."
47   Office of the Special Adviser on Africa and United Nations Secretariat, "Mapping Study of the Conflict Prevention Capabilities of African Regional Economic Communities," November 2018, 103, https://www.un.org/en/africa/osaa/pdf/pubs/2019mappingReport.pdf.
48   IGAD, "CEWARN Regional Report."
49   Office of the Special Adviser on Africa and United Nations Secretariat, "Mapping Study of the Conflict Prevention Capabilities of African Regional Economic Communities," 103.
50   Office of the Special Adviser on Africa and United Nations Secretariat, "Mapping Study of the Conflict Prevention Capabilities of African Regional Economic Communities," 103.
51   IGAD, "CEWARN Regional Report," 9.
52   "Global Urban Analytics for Resilient Defence," The Alan Turing Institute, accessed December 22, 2020, https://www.turing.ac.uk/research/research-projects/global-urban-analytics-resilient-defence.
53   "to automate the identification of future conflict areas (from a region to within a city) for high fidelity analysis and policy/action advice". "Global Urban Analytics for Resilient Defence."
54   International Federation of Red Cross and Red Crescent Societies, "Community Early Warning Systems: Guiding Principles" (Geneva, 2012), https://www.ifrc.org/PageFiles/103323/1227800-IFRC-CEWS-Guiding-Principles-EN.pdf.
55   International Federation of Red Cross and Red Crescent Societies.
56   International Federation of Red Cross and Red Crescent Societies, "Forecast Based Financing: The FBF Experience in High Andean Communities in Peru, Cold Waves and Snowfall," 2016, https://www.forecast-based-financing.org/wp-content/uploads/2019/02/Puno-Peru-Heladas-y-Nevadas_doc-Tecnico_English.pdf.

Appendix D: Technology survey: data, tools, methods

The table below outlines the different contingencies and provides a non-exhaustive list of examples for each contingency. The examples are structured along each segment of the contingency cycle (anticipate, understand and evaluate) with each of the items categorized as D (**D**ata), T (**T**ool) or M (Analytical **M**ethod).

Contingency	Examples	Anticipate ex ante	Understand during	Evaluate ex post
Conflict	International armed conflict Internal armed conflict Inter-ethnic & inter-religious conflict Civil Strife Political Violence Terrorism	**Sentiment analysis (M)** HootSuite (T) Meltwater (T) Qatalog (T) Shodan (T) **Geospatial (M)** NASA (T & D) ESA (T & D) Missing Maps (T & D) Planet Labs Inc (T&D) OpenStreetMap (D) SPACEKNOW (T&D) **Media monitoring (M)** Event Registry (T) European Media Monitor (T) BBC Media Monitoring (T) **Social network analysis (M)** Harvester (T) Metagoodfil (T) Recorded Future (T) **Image processing (M)** AnyVision (T) EyeWitness (T) **Indexes (M)** ACLED (D) GTD (D) PITF (D) RDWTI (D) Fragile State Index (D) Global Conflict Risk Index (D) **Prediction tools (T)** UCDP (T&D) ICEWS (T&D) GDELT (T&D) SPEED (D) ViEWS (T&D)	**Sentiment analysis (M)** HootSuite (T) Meltwater (T) Qatalog (T) Shodan (T) **Geospatial (M)** NASA (T & D) ESA (T & D) Missing Maps (T & D) EOS (T&D) SPACEKNOW (T&D) **Media monitoring (M)** Event Registry (T) European Media Monitor (T) BBC Media Monitoring (T) **Social network analysis (M)** Harvester (T) Metagoodfil (T) Recorded Future (T) **Image processing (M)** AnyVision (T) EyeWitness (T) **Indexes (M)** ACLED (D) GTD (D) PITF (D) RDWTI (D) **Prediction tools (T)** UCDP (T&D) ICEWS (T&D) GDELT (T&D) SPEED (D) ViEWS (T&D)	**Sentiment analysis (M)** HootSuite (T) Meltwater (T) Qatalog (T) Shodan (T) **Geospatial (M)** NASA (T & D) ESA (T & D) SPACEKNOW (T&D) Missing Maps (T & D) EOS (T&D) **Media monitoring (M)** Event Registry (T) European Media Monitor (T) BBC Media Monitoring (T) **Social network analysis (M)** Harvester (T) Metagoodfil (T) Recorded Future (T) **Indexes (M)** ACLED (D) GTD (D) PITF (D) RDWTI (D) **Prediction tools (T)** UCDP (T&D) ICEWS (T&D) GDELT (T&D) SPEED (D)
Natural Resources & Humanitarian Disasters	Flooding, earthquakes, hurricanes, tornadoes, severe climate and weather conditions, famine and food scarcity, diseases	**Geospatial (M)** NASA (T & D) ESA (T & D) Missing Maps (T & D) EOS (T&D) UNOSAT (D) Resource watch (T&D) Climate Watch (T&D) PREPData (D) Forest Atlases (T&D) Planet Labs Inc (T&D) SPACEKNOW (T&D) **Crowdsource + survey** KoboToolbox (T) **Index (D)** Humanitarian Data Exchange (D) Environmental Democracy Index (D) FEWS Net (T&D) CHIRPS (D) mVam (T&D) **CDR (M)** Flowminder (T&D)	**Geospatial (M)** NASA (T & D) ESA (T & D) Missing Maps (T & D) EOS (T&D) UNOSAT (D) Resource watch (T&D) Climate Watch (T&D) PREPData (D) Forest Atlases (T&D) Planet Labs Inc (T&D) SPACEKNOW (T&D) **Crowdsource + survey** KoboToolbox (T) **Media monitoring (M)** Event Registry (T) European Media Monitor (T) BBC Media Monitoring (T) **Index (D)** Humanitarian Data Exchange (D) Environmental Democracy Index (D) FEWS Net (T&D) CHIRPS (D) mVam (T&D) **CDR (M)** Flowminder (T&D) LirneAsia (T&D)	**Sentiment analysis (M)** HootSuite (T) Meltwater (T) Qatalog (T) **Geospatial (M)** NASA (T & D) ESA (T & D) Missing Maps (T & D) EOS (T&D) UNOSAT (D) Resource watch (T&D) Climate Watch (T&D) PREPData (D) Forest Atlases (T&D) Planet Labs Inc (T&D) SPACEKNOW (T&D) **Crowdsource + survey** KoboToolbox (T) **Index (D)** Humanitarian Data Exchange (D) Environmental Democracy Index (D) FEWS Net (T&D) CHIRPS (D) mVam (T&D) **CDR (M)** Flowminder (T&D) LirneAsia (T&D)

Contingency	Examples	Anticipate ex ante	Understand during	Evaluate ex post
Governance	Rule of law, good governance, corruption, transparency, crime, political access	**Sentiment analysis (M)** HootSuite (T) Meltwater (T) Qatalog (T) **Media monitoring (M)** Event Registry (T) European Media Monitor (T) BBC Media Monitoring (T) **Social network analysis (M)** Harvester (T) Metagoodfil (T) Recorded Future (T) **Image processing (M)** AnyVision (T) EyeWitness (T) **CDR (M)** Flowminder (T&D)	**Media monitoring (M)** Event Registry (T) European Media Monitor (T) BBC Media Monitoring (T) **Social network analysis (M)** Harvester (T) Metagoodfil (T) Recorded Future (T) **CDR (M)** Flowminder (T&D) LirneAsia (T&D)	**Sentiment analysis (M)** HootSuite (T) Meltwater (T) Qatalog (T) **Crowdsource + survey** KoboToolbox (T) **Social network analysis (M)** Harvester (T) Metagoodfil (T) Recorded Future (T) **CDR (M)** Flowminder (T&D) LirneAsia (T&D)
Human Rights & Social Justice	Education, gender & sex rights, discrimination, children's rights	**Sentiment analysis (M)** HootSuite (T) Meltwater (T) Qatalog (T) **Crowdsource + survey** KoboToolbox (T) **Media monitoring (M)** Event Registry (T) European Media Monitor (T) BBC Media Monitoring (T) **Social network analysis (M)** Harvester (T) Metagoodfil (T) Recorded Future (T)	**Crowdsource + survey** KoboToolbox (T) **Media monitoring (M)** Event Registry (T) European Media Monitor (T) BBC Media Monitoring (T) **Social network analysis (M)** Harvester (T) Metagoodfil (T) Recorded Future (T)	**Sentiment analysis (M)** HootSuite (T) Meltwater (T) Qatalog (T) **Crowdsource + survey** KoboToolbox (T) **Media monitoring (M)** Event Registry (T) European Media Monitor (T) BBC Media Monitoring (T) **Social network analysis (M)** Harvester (T) Metagoodfil (T) Recorded Future (T)
Migration	Internal and international displacement, refugee flows	**Prediction tools (T)** UCDP (T&D) ICEWS (T&D) GDELT (T&D)	**Geospatial (M)** NASA (T & D) ESA (T & D) Missing Maps (T & D) EOS (T&D) UNOSAT (D) PREPData (D) Planet Labs Inc (T&D) OpenStreetMap (D) **Media monitoring (M)** Event Registry (T) European Media Monitor (T) BBC Media Monitoring (T) **CDR (M)** Flowminder (T&D) LirneAsia (T&D)	**Sentiment analysis (M)** HootSuite (T) Meltwater (T) Qatalog (T) **Geospatial (M)** NASA (T & D) ESA (T & D) Missing Maps (T & D) EOS (T&D) UNOSAT (D) PREPData (D) Planet Labs Inc (T&D) **Media monitoring (M)** Event Registry (T) European Media Monitor (T) BBC Media Monitoring (T) **CDR (M)** Flowminder (T&D)

Appendix E: Sample of an effective EW Memo

RE: WARNING: High Risk of Riots/Battles in the St. Mikael Island Chain
TO: JOHN. Q. DOE, Deputy Minister of Defence, Landistanland
FROM: Lt. JIM. P. DOWE, Head of Strategic Forecasting, Dept. of Defence
14:43 Jan. 4th, 2021.

WARNING: On 12:04 Jan 4, our EWS 'Global Risk System' escalated the nation-state of St. Mikael to a **CODE RED** alert for the ONSET OF POLITICAL VIOLENCE, specifically riots/battles, in the upcoming 72-hours. EW-analyst review of the model confirmed the escalation. External organisations such as ICG have also issued alerts for St. Mikael in the past 24 hours.[57] Currently, a large group of Landistanland nationals are on the island state due to an annual training session for the Landistanland Olympic water polo team.

CONTEXT:

- The risk alert followed the island's election results, which reported the unpopular incumbent president winning 96% of the popular vote of their 3 Jan. 2021 election.
    - St. Mikael has a history of election tampering. Their 2017 election was widely suspected by international observers to have been unfairly influenced by the winning party.[58]
- Landistanland has experienced massive protests by local emergency services throughout Dec. 2020 and Jan. 2021.
    - Our EWS 'Global Risk System' decreased the social and political stability score of St Mikeal from level-7 to level-4 (out of 10) following the turbulent election campaign throughout November 2020.

ANTICIPATED EFFECTS:

- We anticipate that Landistanland citizens on St. Mikael are in danger, as:
    - Current protests will likely evolve into widespread protests, which have a high chance of devolving into riots/battles.
    - There is a real possibility that St Mikael's emergency services may not be properly equipped to deal with this emergency, considering their own state of protest against the government.

RECOMMENDATIONS:

1. Advise any Landistanland citizens to leave the region ASAP. Contact regional allies to see if we can borrow any of their equipment for emergency evacuation purposes.
2. Activate the "Compatriots Abroad Emergency Fund", which will automatically make $350,000 available for any emergency extraction of Landistanland abroad.
3. Communicate with St. Mikael's regional neighbors and offer to contribute to any emergency humanitarian efforts planned for St. Mikaelian citizens.

---

57   [Sample Citation]
58   [Sample Citation]

The Hague Centre
for Strategic Studies