Institution: University of Essex		
Unit of Assessment: 19 – Politics and International Relations		
Title of case study: Enhancing Conflict Prediction		
Period when the underpinning research was undertaken: 2007 - 2020		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s):	**Role(s) (e.g. job title):**	**Period(s) employed by submitting HEI:**
Tobias Böhmelt	Professor	2013 - present
Daina Chiba	Senior Lecturer	2013 - present
Kristian Skrede Gleditsch	Professor	2005 - present
Period when the claimed impact occurred: 2013 - 2020		
Is this case study continued from a case study submitted in 2014? N		

1. Summary of the impact (indicative maximum 100 words)

Academic research on conflict prediction at Essex involves ongoing collaborations and consultations with non-academic partners. Our research on prediction led to us being commissioned to provide monthly forecasts of armed conflict for the Political Instability Task Force (PITF), a US government-sponsored initiative on how to anticipate political instability. We have also participated in other events on forecasting with early warning/action initiatives from national and international organizations in the UK, Germany, and West Africa (ECOWAS). The ongoing interest and investment have shown that the specific prediction methods are helpful to the end users, even if the specific ways this informs their practice cannot be publicly disclosed.

2. Underpinning research (indicative maximum 500 words)

This case study is based on a large body of research conducted at the University of Essex on the causes of conflict and conflict modelling, and how these insights can be used to improve prediction of conflict as well as more fundamental contributions to the methodology of prediction and conflict research.

With regards to fundamental models of conflict distributions, Clauset, Young, and Gleditsch (2007) [R1] examined severity-frequency distributions in conflict, focusing on data of terrorist attacks and their lethality, and how terrorist attacks appear to follow a power law where the number of casualties is inversely proportional to frequency. Our results have been used to forecast the likelihood of future severe terrorist events, such as the risk of a new 9/11-magnitude attack over a decade.

Buhaug, Cederman, and Gleditsch (2014) [R2] show how out-of-sample prediction of civil war can be improved by paying particular attention to factors reflecting groups and potential actors (i.e., horizontal inequality and grievances), and how these outperform standard models of civil war that are based on country characteristics. This research project started in 2005, but applications to prediction and comparison with existing prediction models became a major focus in 2011. Based on the results in Buhaug et al. (2014) [R2], Chiba and Gleditsch (2017) [R3] extended the grievance and inequality forecast model with information from real time generated events data, providing dynamic monthly forecasts of conflict onset and termination. These form the basis for our sustained engagement with Leidos and the Political Instability Task Force, who receive monthly updated predictions.

Outside civil war and terrorism, Gleditsch and Ward (2013) [R4] show how focusing on issues and conflict management can improve out-of-sample forecasting of interstate disputes. Based on this, we were commissioned to write a report on forecasting models for interstate conflict for Leidos and PITF.

With regards to the duration of conflict and improving the methodology of prediction, Pilster and Böhmelt (2014) [R5] considered how out-of-sample forecasts can be used to evaluate models of the duration of insurgency campaigns, and applied their results to predict the duration of Syrian civil war. Chiba, Metternich, and Ward (2015) [R6] emphasized how predictions can be improved by integrating models of duration dependence, reflected in time to onset, duration, and recurrence

3. References to the research (indicative maximum of six references)

[R1] 2007. Clauset, Aaron, Maxwell Young & Kristian Skrede Gleditsch. "On the Frequency of Severe Terrorist Events." Journal of Conflict Resolution 51(1): 1-31, available at https://arxiv.org/pdf/physics/0606007.pdf

[R2] 2014. Buhaug, Halvard, Lars-Erik Cederman, & Kristian Skrede Gleditsch. "Square Pegs in Round Holes: Inequalities, Grievances, and Civil War." International Studies Quarterly 58(2): 418-431, available at https://doi.org/10.1111/isqu.12068

[R3] 2017. Chiba, Daina & Kristian Skrede Gleditsch. "The Shape of Things to Come? Extending the Horizontal Inequality Model to Prediction with Event Data." Journal of Peace Research 54(2): 275-297, available at https://doi.org/10.1177/0022343316684192

[R4] 2013. Gleditsch, Kristian Skrede & Michael D. Ward. "Forecasting is Difficult, Especially about the Future: Using Contentious Issues to Forecast Interstate Disputes." Journal of Peace Research 50(1): 17-31, available at https://journals.sagepub.com/doi/10.1177/0022343312449033

[R5] 2014. Pilster, Ulrich & Tobias Böhmelt. "Predicting the Duration of the Syrian Insurgency." Research and Politics 1(2): 1-10, available at https://journals.sagepub.com/doi/full/10.1177/2053168014544586

[R6] 2015. Chiba, Daina, Nils Metternich & Michael D. Ward. "Every Story Has a Beginning, Middle, and an End (But Not Always in That Order): Predicting Duration Dynamics in a Unified Framework." Political Science Research and Methods 3(3): 515-541, available at https://doi.org/10.1017/psrm.2014.46

4. Details of the impact (indicative maximum 750 words)

Academic research on improving out-of-sample conflict prediction with statistical models conducted by research at Essex has led to ongoing collaborations and consultations with various end-users.

The most direct impact of this research is a sustained commission to produce monthly forecasts of armed civil conflict onset by Leidos for the Political Instability Task Force (PITF) [S1, S2]. The PITF is a US government-sponsored initiative on how to anticipate political instability and violence that brings academics together with intelligence analysts, and Leidos is a private company contracted for the project which work extensively with the United States Department of Defence, Homeland Security, and the United States Intelligence Community. PITF uses the best available academic research and presents the findings available to practitioners from the US defence and intelligence communities. The PITF is widely known and many researchers participate in meetings or funded activities, although the specific ways the US government and the intelligence community use the findings are not made publicly available.

The monthly updates provided by Leidos are based on models that have emerged through the efforts to improve country-year forecasts of intrastate armed conflict (as defined by the Uppsala Armed Conflict Data project, a leading public data source, see https://ucdp.uu.se/downloads/#d3), by looking at indicators of groups, potential actors, and motives in Buhaug et al. [R2]. These led in the first place to a commissioned report on whether these forecasts could be improved further and be made more dynamic, now published as Chiba and Gleditsch [R3]. These models use machine-coded event data to update the initial risks as given by pre-existing structural covariates to produce

monthly risks of conflict onset and prospects for termination of disputes. The ongoing interest and investment indicate that the specific predictions and methods are helpful to end users, and we have been told that the models were among the best performing in their evaluation. A PITF manager has provided a letter to confirm our participation, although she cannot provide details on how the material has been used by the sponsor. The Research Director at Leidos, the main contractor for the US Political Instability Task Force states:

> "Your work has been extremely useful to us as we continue our efforts in instability analysis and forecasting. This is particularly true regarding the project you completed using event data to provide 6-month forecasts of civil war. The current work you are doing on spatial modelling of instability is likely to provide an essential piece to the puzzle we deal with when trying to understand the regional spread of instability." [S3]

Beyond our work with Leidos for PITF, we have also participated in various events on conflict forecasting with early warning/action initiatives from national and international organizations. There is a great deal of interest in more systematic approaches to prediction and a growing recognition that self-professed experts rarely provide specific predictions and do not have the ability to predict future events they often claim to do. As such, this line of research can help improve best practices for conflict prediction and risk assessment, which will facilitate making the world a better place or at least avoid the overconfidence that has contributed to many intelligence failures in the past. Gleditsch was invited to a consulting meeting for the UK Cabinet Office's Risk Assessment Unit. Gleditsch, Chiba, and Böhmelt have given presentations on conflict forecasting at the NATO Joint Analysis and Lessons Learned Centre [S4]. Gleditsch has given a talk on predicting transnational spillovers from civil war at the UK MOD. Finally, Gleditsch has participated in two workshops organized by the German Federal Ministry of Foreign Affairs, intended to inform their own prediction efforts PREVIEW. Gerhard Almer, head of division S05 Early Warning and Strategic Foresight states:

> "The research that you and colleagues have carried out on conflict prediction … has played a significant role in improving PREVIEW's conflict prediction approaches." [S5]

These meetings have included participants from many international institutions and regional organizations with early-warning or action units, including the Economic Community of West African States (ECOWAS), who invited Gleditsch to a workshop to evaluate and offer suggestions to improve their ECOWARN model in October 2019 [S6].

Finally, the original research on frequency-severity distributions in Clauset et al. [R1] continues to be used to estimate the likelihood of severe events (e.g., is a 9/11-magnitude attack an implausible "black swan," given the existing data on record?) and evidence for changes in conflict over time (see e.g. Peace by the Numbers: A Debate, and Retool AI to forecast and limit wars).

This research is used under conditions of secrecy attached to intelligence and military agencies. In the UK, the MOD Defence Science and Technology Lab (DSTL) has indicated that they have made extensive use of this body of research and that this was "useful," but they are unable to provide further details (including to us as researchers).

5. Sources to corroborate the impact (indicative maximum of 10 references)

[S1] Funding from PITF is acknowledged in Chiba and Gleditsch (2017: 296): "This research was conducted for the Political Instability Task Force, which is funded by the Central Intelligence Agency. The views expressed herein are the authors' alone and do not necessarily represent the views of the Task Force or the US Government." The PITF asks for this text to be used in published work (page 35).

[S2] The PITF affiliation of Chiba and Gleditsch is also mentioned in the following article (page 1414): https://doi.org/10.1017/S0007123418000443T

[S3] Testimonial from Leidos, main contractor for the US Political Instability Task Force.

[S4] Testimonial from NATO Joint Analysis for Lessons Learned Centre.

[S5] Testimonial from German Ministry of Foreign Affairs.

[S6] Invitation to workshop on “ECOWARN system assessment” on the early warning system of ECOWAS in Abuja, Nigeria 14-15 October 2019