

Early Warning?

A Review of
Conflict Prediction Models and Systems



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Chapter I. Overview

Improvements in anticipation, analysis and planning are all critical for successful engagement in international conflicts. Too often, policymakers are surprised or unprepared for the resulting chaos and violence that transpires when other societies disintegrate, and they typically respond with a series of reactive and non-integrated actions. Complex situations can be further exacerbated due to a delayed and ineffectual international response.

In attempting to redress this weakness in international interventions, practitioners and scholars have developed a variety of early warning models. These monitor longer-term, society-wide, structural variables to help forecast the complex dynamics that can result in conflict or instability, with the goal of providing policymakers with more time to take preventive actions before conflicts erupt.

National governments, multilateral organizations, universities, NGOs, think tanks, and private enterprises have created several dozen models designed to predict conflict and instability throughout the world. With a diverse set of methodologies, ranging from qualitative studies to complex regression and systems dynamics analyses, most identify factors, causes, or variables that are linked to the occurrence of conflict and instability.

For this report, the PCR Project at CSIS surveyed 30 publicly-available models and strategies that share a common objective—predicting conflict and instability. All are general in scope. The survey includes a cross-section of models from different types of sources—although not classified military or intelligence models—and attempts to digest the information into an accessible form for a broader audience.

This work was originally undertaken as part of the PCR study, *A Perilous Course: U.S. Strategy and Assistance to Pakistan*, which was funded by the Hewlett, Ford and Carnegie Foundations. The assumption for the Pakistan study was that if U.S. assistance is to be effective in a large aid-recipient state such as Pakistan, it must address the country's main drivers of conflict, instability, and extremism at the earliest possible stage.

Early Warning? offers a descriptive picture and analysis of more than 800 indicators used by these models. Indicators are the inputs, or data, that are entered and monitored on a regular basis, and which should be able to tell a story about the direction a country or part of a country is heading.¹ For this report, the indicators are grouped into a six pillar² classification system: (1) security, 2) governance, 3) justice and reconciliation, 4) economics, 5) social well-being, and 6) cross-cutting (with 28 sub-categories).

Although the paper outlines several key concerns about these models, and recommends ways to make these tools more valuable to decision makers, *Early Warning?* is a review rather than a

¹ For more information, see, for example, “Conflict Prevention – Early Warning Signs and Indicators,” Paul H. Nitze School of Advanced International Studies (SAIS), <http://cmtoolkit.sais-jhu.edu/index.php?name=cp-signs>.

² These categories were expanded upon from the Post-Conflict Reconstruction Task Framework which was developed by the AUSA/CSIS national Commission on Post-Conflict Reconstruction, May 2002, <http://www.csis.org/media/csis/pubs/framework.pdf>.

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critique. It seeks to describe common practices and biases. The PCR Project sought to answer a number of questions: Are there shared areas of focus across models? How great is the overlap among indicators? Do different sectors have different priorities and perspectives? What themes do they illuminate in the early warning field? Why is there a chasm between early warning and early action?

The authors hope that this survey encourages further research into the utility of predictive models. [Appendix C](#) and the Excel version of the [database](#) (available at www.pcrproject.com) provide instructions for practitioners and scholars who may wish to contribute to and strengthen this initial work. Many important questions beyond the scope of this survey beg further exploration. For instance, what are the assumptions about conflict that have informed the various models? These will naturally influence which indicators are chosen and how they are used. Currently, a number of scholars and policy makers are proponents of competing and sometimes contradictory theories as to which indicators will predict the onset of conflict and instability.³ In the words of Sean O'Brien, can factors “believed to explain some phenomenon...also be used effectively to predict both its occurrence and its nonoccurrence?”⁴

Further, even a well-designed model is only as good as the indicators it relies on. In-depth and reliable information is often difficult to find in conflict zones. To what extent have models succeeded in overcoming this challenge?

³ “Conflict Prevention – Early Warning Signs and Indicators,” Paul H. Nitze School of Advanced International Studies (SAIS), <http://cmtoolkit.sais-jhu.edu/index.php?name=cp-signs>.

⁴ Sean P. O’Brien, “Anticipating the Good, the Bad, and the Ugly,” *Journal of Conflict Resolution* 46, no. 6, (2002), 791-811.

Chapter II. Project Design

This section explains the methodology for selecting the 30 models and categorizing indicators, and discusses the challenges encountered in the process.

Table 1 contains the models chosen for the study, listed by organization and classified according to sector.

Table 1: Models by Category

National Government Models	International & Regional Organization Models	Academic, NGO, & Think Tank Models	Private Models
<u>BMZ</u>	<u>Clarke & UNOCHA</u>	<u>Claremont</u>	<u>BERI</u>
<u>Canadian Government & Carleton U</u>	<u>EU</u>	<u>Clingendael Institute</u>	Control Risks Group
<u>UK DFID</u>	<u>European Commission</u>	<u>FEWER</u>	EIU
<u>USAID DCHA/CMM</u>	<u>OECD</u>	<u>Fund for Peace</u>	IHS Energy Group
<u>USAID & Tulane</u>	<u>UNDP</u>	<u>Jenkins and Bond</u>	<u>International Risk</u>
	<u>UNDP SEE</u>	<u>MIT</u>	<u>PRS Group</u>
	<u>UNOCHA</u>	<u>SIPRI</u>	Standard & Poor
	<u>World Bank</u>	<u>Swisspeace</u>	
		<u>Tokyo NIR</u>	
		<u>U Maryland</u>	

Models designed to predict only a specific type of conflict and instability, such as refugee situations, were not included. Broader models predicting humanitarian disasters as well as political risk were, however, because they looked at conflict and instability as central to forecasting outcomes. In addition, the models included are well known within their sectors, with information on the models and indicators readily available.

There are many other models that are being used and developed. This study sought to identify a diverse mix.

Identifying Indicators

Because each model utilizes a different methodology, often with its own terminology, this study defines the term “indicator” broadly, recognizing as indicators all lists of factors, aspects of society, and variables that share a common function of helping to predict conflict and instability. As a result, all descriptions of factors related to root, proximate, or trigger causes of conflict, whether dynamic or static in nature, were included as indicators.

Indicator Classification and Category Selection

To organize the large volume of indicators present in the 30 models, the PCR Project created a [database of indicators \(Appendix B\)](#) that cites the original language of each indicator, along with the model name, author organization, and source.

The indicators were grouped into categories chosen to cover the breadth of topics associated with each pillar, to show which areas the indicators cover and which the models deem less important. Table 2 lists the categories by pillar. The categories are neutral phrases, to include both positive and negative indicator descriptions. For example, “vibrant civil society” and “lack of civil society” fall under the same category.

Choosing categories with little overlap and approximately the same breadth proved difficult. In order to keep to a limit of five categories under each pillar, some categories are broader than others.

Table 2: Categories by Pillar

1. Security	2. Governance	3. Justice & Reconciliation	4. Economics	5. Social Well-Being	6. Cross-Cutting
Accountability	Civic Participation	Effective & Unbiased Police	Inflation & Unemployment	Demographics	International Influence
External Defense	Formal Rules, Institutions, & Processes	Human Rights	Macroeconomic Stability	Displacement	Structural Inequalities
Civil-Military Relations	Local Governance	Independent Judiciary	Poverty & Existence of Informal Economy	Education	The Environment & Natural Resources
Internal Stability	Regime Effectiveness	Local Dispute Resolution Mechanisms	Resource Competition	Health	
Professionalism	Regime Legitimacy	Transitional Justice Mechanisms	Trade	Social Tensions	

Each indicator was assigned to the single category determined to be the best fit. Some indicators defied easy classification, as a certain amount of overlap between categories is unavoidable. For example, the indicator “History of ethnic tension” could be classified either under Social Well-Being: Social Tensions, or under Security: Internal Stability. In this case, the indicator was classified under Social Tensions as it did not necessarily suggest a strong possibility for short-term violence.

Because models have different numbers of total indicators, there is the potential for models with a large number of inputs to distort the overall tally of indicators. For example, one model could bias the total results toward the security category if it relied on 15 security-related indicators but only one or two in the other categories. Two options for resolving this would be 1) expanding the total number of models surveyed or 2) weighting the models to adjust for the number of indicators. [Appendix C](#) includes a guide to weighting the models.

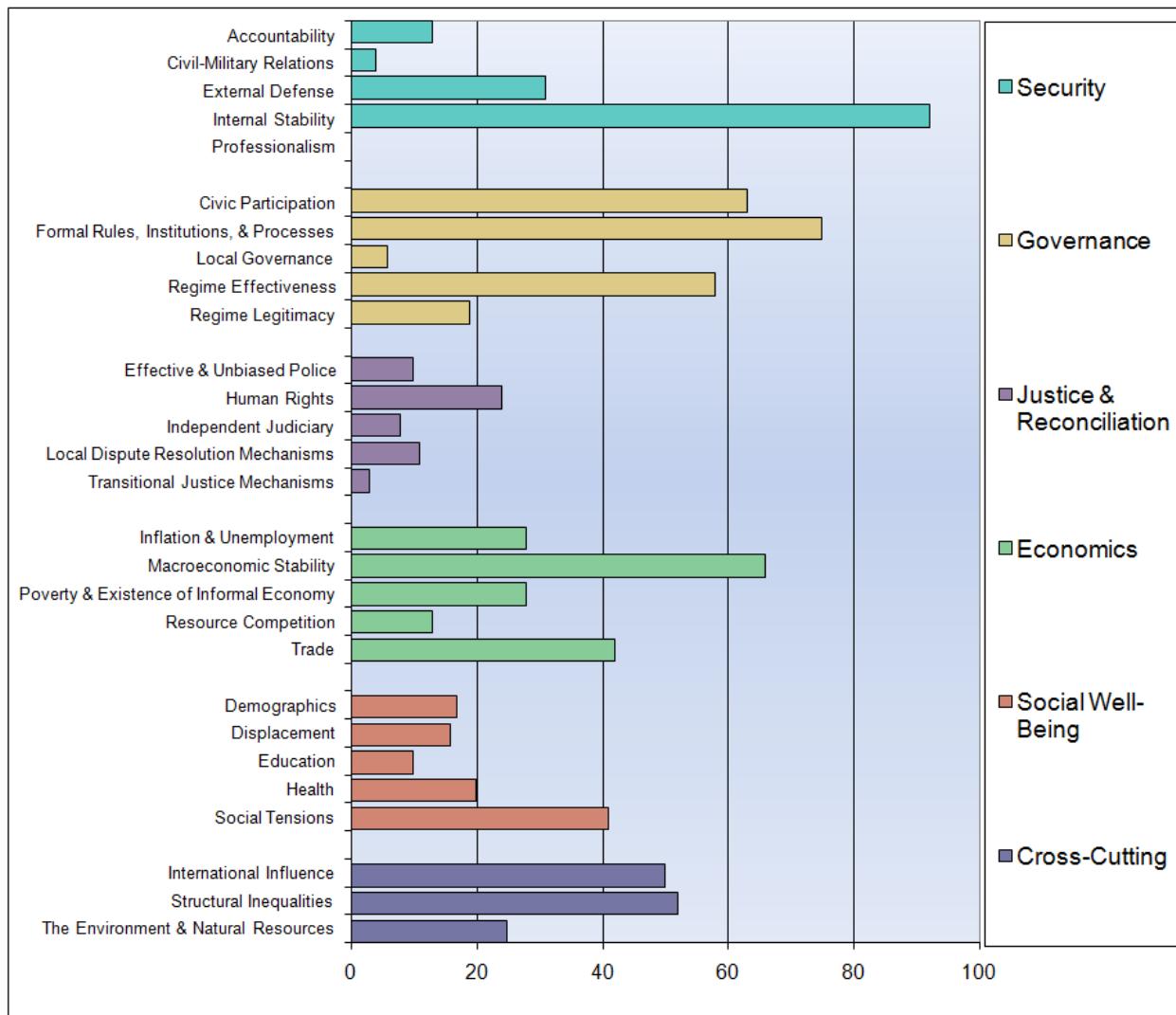
In this case, however, the distortion effects do not appear to be significant. Further, the project is not intended to be a statistical exercise but rather is a qualitative examination of similarities and differences between models.

Chapter III. Matrix of Indicators

The purpose of the matrix of indicators is to create a side-by-side comparison of the 30 early warning models by examining the inputs that each model uses. Figures 1 and 2 summarize the [database of indicators](#) and are helpful in answering questions about what information the models use to anticipate future events. How are the early warning models alike? How are they different? Do models produced by different types of organizations demonstrate biases towards certain types of indicators?

Figure 1 summarizes the distribution of indicators between categories. The highest number of indicators (221) fell into the Governance pillar and the fewest in Justice and Reconciliation (56). Internal Stability was the single category with the highest number of indicators (92) while Professionalism (0) had the fewest.

Figure 1. Total Distribution of Indicators



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Figure 2. Matrix of Indicators
 (PDF version in Appendix D, available at www.pcrproject.com)

Matrix of Indicators		National Gov't Models										Academic, NGO, & Think Tank Models										Private Models		Private Total		Grand Total	
		International & Regional Organization Models					Academic, NGO, & Think Tank Models																				
Pillars	Security	Accountability																									
		Civil-Military Relations	1	1	2	3	1	1	1	2	1	2							0					0	13		
		External Defense	2	1	1	4	2	4	4	6	3	2	4	5	1	15	2	1	2	1	6	31		4			
		Internal Stability	2	3	3	2	3	13	2	5	2	2	12	3	21	3	4	50	2	3	2	1	3	13	92		
		Professionalism									0							0					0	0			
		Security Total					22																	19	140		
		Civic Participation	1	2	3	2	8	2	1	4	2	5	8	3	25	1	1	12	2	1	7	3	1	1	29		
		Formal Rules, Institutions, & Processes	1	2	4	4	1	12	2	1	3	3	2	1	4	18	1	7	5	2	6	1	1	23	4	1	
		Local Governance					0							1		1		1		1		3	2		2		
		Regime Effectiveness	1	3	1	3	1	9	3		1	2	1	3	3	13	1	9	1	1	3	4	1	25	1	3	
		Regime Legitimacy					2				1				1		1	2	2	1	1	3	2	12	2	19	
		Governance Total					31									53								92		40	221
		Effective & Unbiased Police					0			1		2	3		6		1	1			2		1	1		2	10
		Human Rights					0	2	1	1	3	1	1	9	1	6	3		2	1	2	15			0	24	
		Independent Judiciary					1		1	1		2		1	5		1	1			2				0	8	
		Local Dispute Resolution Mechanisms					2		2	1	1	3		5				2	1		1	4			0	11	
		Transitional Justice Mechanisms												0			0		1		1		1		1	3	
		Justice Total					3								25									24		4	56

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Economics		Social Well-Being		Cross-Cutting		Total	
Inflation & Unemployment	1	2	1	4	1	10	1
Macroeconomic Stability	4	3	2	2	11	2	1
Poverty & Existence of Informal Economy	1	3	1	5	1	10	1
Resource Competition	2	1	1	4	1	2	1
Trade	3	1	2	6	4	1	3
Economic Total	26		63		39		45 177
Demographics	6		6		0	1	1
Displacement	1	2	1	4	1	2	3
Education	2	3	5		1	1	1
Health	6	6	12		1	2	5
Social Tensions	3	2	1	8	1	2	1
Social Total	35		20		42		7 104
International Influence	1	2	3	1	7	4	1
Structural Inequalities	2	1	2	1	4	10	1
The Environment & Natural Resources	1	2	1	4	1	1	1
Cross-Cutting Total	21		37		59		10 127

Private Sector Exceptionalism

The private sector models surveyed show some distinctions from the other groups of models. While the models used by national governments, international and regional organizations, and academics, NGOs, and think tanks had a fairly equal balance of indicators, the private sector models discounted the importance of certain categories. Overall, the private sector models have a narrower focus and rely on fewer indicators, placing more emphasis on economic indicators and less on social well-being, for instance. This is potentially because they were built with different objectives in mind. Most private sector models are geared toward corporations evaluating business and investment opportunities. Corporations and public policymakers may have different definitions of instability as well. One such model (IHS Energy Group) includes “environmental activism” as an indicator, and another (Control Risks Group) includes the “possibility of strike.” Between seven private sector models, there was only one indicator for civic participation compared to 62 for the other 23 models.

Availability of Data

Many categories with abundant data available are not highly represented in the models. This undercuts a critique that models tend to be biased towards available information, plugging in whatever data is available. There are two plausible explanations. First, experts creating the models do not find data in categories such as demographics, health, and education to be reliable. The figures are either too out of date or too static to make useful inputs. Second, model designers do not believe these categories are important for predicting conflict and instability, at least in the short term.

Although categories with abundant data do not necessarily dominate the models, on the other end of the spectrum, few indicators fall into categories where little data is available. Even categories that are broadly accepted as relevant to past conflicts, such as civil-military relations (4) and local governance (6), are hardly represented. Both examples lack much objective data and their complexity tends to befuddle subjective analysis by outside observers.

Abstract categories such as accountability (13), professionalism (0), and regime legitimacy (19) also rank on the low end. A good illustration is the much higher use of indicators measuring regime effectiveness (58) compared to regime legitimacy.

Short term vs. Long term

There is a detectable bias towards short-term indicators, underemphasizing long term structural factors. Poverty, human rights, demographics, displacement, education, and health are important factors for anticipating instability in a long-term time frame yet relatively few models rely on indicators in these categories. This observation suggests the models are geared towards anticipating near term crises rather than predicting long term trends.

Chapter IV. Conclusions and Recommendations

Proponents of early warning models claim a success rate in predicting conflict or instability of between 75 and 90 percent. Yet nevertheless, in interviews with decisionmakers in Washington, DC and other major capitals about the use of early warning models, PCR Project staff heard a similar refrain: such models have minimal value beyond confirming what is commonly known.

One official referred to the National Intelligence Council (NIC) “watch list” as “conventional wisdom watch.” It was clear from these conversations that few U.S. decision makers rely on such lists when it actually matters—either to take politically risky decisions to shift resources or to take preventive action in advance of a crisis. A country will usually receive more attention if the lights are flashing red, but at that stage it is too little, too late.

PCR Project research has identified six underlying reasons that could account for the reluctance of practitioners to rely on these models:

1. **Knowledge of conflicts is still rudimentary** – Big questions remain: what are the critical triggers of conflict? How are they perpetuated? How do they end? Scholars do not agree on basic assumptions, such as whether an open investment environment in a non-democratic state may be more conducive in the long term to democratization, or if a one-party state may be preferable to a democracy in deeply divided societies. As a consequence, different prediction models have different end-states in mind, and thus place a base value on very different issues. Accordingly, they focus on a number of often competing themes, such as international influence, civic participation, or individual versus community-level issues. Still others are interested in formal rules, institutions, mechanisms, and/or data and less on subjective matters, such as individual or community perceptions of the directions their lives and societies are heading.
2. **Models do not prioritize** - At the macro level, the models do not prioritize conflicts that impact the U.S. directly (or indirectly, by spill-over into neighboring states). At the micro level, they do not prioritize competing information and data in ways that make sense to policy-makers: Is infant mortality more important than unemployment? Would assistance that reduced infant mortality stabilize the state? Is a corrupt police force more problematic than macroeconomic instability? Does high military spending translate into a more professional military? At both macro and micro levels, these models do not adequately explain where the tipping point might be for each indicator.
3. **Baseline data is often unreliable** - In all conflict zones, it is extremely difficult to obtain accurate, real-time information: reporting is uneven, journalists often use unverified and anecdotal accounts, and data about population size and other indicators is usually dated and gathered in a non-rigorous manner. In fact, much of the data utilized in these models is not based on regularly updated field work, but rather on data entry by non-country experts, very far from the conflict zone. Two examples illustrate this point. In Afghanistan, the last census was conducted in 1979, yet this dated information is still used as the baseline by most international and national agencies, even though it is surely unreliable. Since the Somali state collapsed in January 1991, statistics have been impossible to accrue with accuracy given the insecurities on the ground and the lack of regular and reliable data collection, and because up to half of the population is nomadic. Thus, Somalia has not been included in the United

Nation Development Programme's (UNDP) global Human Development Index since 1997, even though, in recent years, data collection in some sectors has improved.⁵ Different organizations – both Somali and international – gather data in different ways, with no agreed methodology or reliable means for accumulating information over time. When the raw information is inaccurate, the implication for the models is obvious.

4. **Small pools of experts dominate interpretations** - It is nearly impossible to predict outcomes from chaotic and complex situations, and even the experts tend not to get it right any more than lay people do. In fact, experts often overlook information that goes against years of viewing a place in a certain way, while minority voices are typically ignored. Nor do these models help to predict or account for first time events, such as the fall of the Shah of Iran or the decline of the Soviet Empire or even 9-11.
5. **Weighting what really matters is difficult** - The models have difficulties distinguishing a real signal from noise (i.e., identifying and disaggregating unambiguous indicators of conflict and instability from other events in volatile countries). Forecasting is possible but establishing causation is more difficult. It is not clear why certain small events trigger larger collapse in some instances, and not in others. Researchers have also not yet determined how to test a country's resilience and ability to withstand competing domestic and international pressures, which will have a direct impact on triggers. Most computer-generated models simplify variables and mask assumptions (and, as noted, are often managed by people with little country expertise). There are competing theories about how small events can have big consequences, while the models do not indicate what to do about false positives. Related to this is how the conflict itself is defined, is it a situation of state implosion? Is it a failed state? An insurgency? A terrorist situation? A civil war? Is religion the cause of the fighting, or does it mask more complicated societal fissures? How the conflict is defined affects the response, and definitions are still too ambiguous, even amongst the experts.
6. **Models do not account for political will** - The real challenge is almost always how to get political actors to take risks. Generally, government officials have a naturally optimistic and can-do nature or they are reluctant to give higher-ups bad news, which prevents thinking of worst-case scenarios.⁶ This is especially the case when a measure of success is that *nothing happens*: hence the difficulties in convincing a reluctant Congress and the Executive to provide preventive funding and political support.

Given these underlying problems, how can these tools become more valuable to decision makers?

The concerns above are not intended to imply that forecasting and modeling are useless, but rather that they need to be built on different assumptions. While *Early Warning?* has made a start by testing and comparing a number of models, more rigorous analysis is necessary to determine which of the 30+ models (or aggregates of several) can provide greater precision and

⁵ In particular, see *Socio-Economic Survey 2002: Somalia. Report No. 1, Somalia Watching Brief, 2003*, UNDP with the World Bank.

⁶ Mary McCarthy, "The National Warning System: Striving for an Elusive Goal," *Defense Intelligence Journal* 3, no. 1 (1994): 5–19; Mary McCarthy, "The Mission to Warn: Disaster Looms," *Defense Intelligence Journal* 7, no. 2 (1998): 17–31; Samantha Powers, "Bystanders to Genocide," *Atlantic Monthly*, 288, no. 2 (September 2001): 84–108; Richard K. Betts, "Analysis, War, and Decision," *World Politics* 31, no. 2 (October 1978): 61–89; David Ignatius, "Expect the Worst in Iraq," *Washington Post*, February 7, 2007.

practical application. Moreover, these models need to be tested regularly by practitioners through scenarios and other simulation exercises.

The models should also be integrated with more subjective, qualitative data. For example, the PCR *Measures of Progress* methodology tries to circumvent the problem of imperfect information typical to conflict zones by combining and balancing a variety of sources.⁷ Through the monitoring of media, polls, and public sources as well as in-depth interviews conducted by CSIS staff and local researchers, the *Measures of Progress* tells the story of reconstruction that metrics alone cannot. Once the data are collected they are presented in a simple grid that policymakers can easily digest.

Given that policymakers may not react to any particular threat unless they are able to perceive what countermeasures might do and what negative results will arise from inaction, better cost-benefit analyses are required for all types of responses under consideration, which should also include accountability for those taking or not taking action.

Information gathering should privilege local networks on the ground more than data derived from bureaucracies. Thorough, direct research involving a broad range of local actors and observers is likely to remain the best way to inform any early warning – and make the results credible.

Finally, this type of analysis requires much more work than data-aggregation. The complexity of conflicts and the seriousness of their repercussions necessitate a more comprehensive, multi-disciplinary and integrated response.

⁷ The studies of Afghanistan and Iraq try to measure progress from the view of the people in each country. See Seema Patel with Steven Ross, *Breaking Point: Measuring Progress in Afghanistan* (CSIS, 2007), and Morgan Courtney, et al, *In the Balance: Measuring Progress in Afghanistan* (CSIS, 2005).

Appendix A. Early Warning Model Index

Model Name, Organization, Website/source
(See bibliography for more detailed information).

National Government Models

1. Spelten Model, German Ministry for Federal Cooperation and Development (BMZ), <http://www.idrc.ca/uploads/user-S/10596649641conflict-sensitive-develop.pdf>, p. 62.
2. Country Indicators for Foreign Policy (CIFP), Canadian government and Carleton University (Ottawa), <http://www.carleton.ca/cifp/descriptions.htm>
3. Conflict Assessment Guidelines, UK Department for International Development (DFID), <http://www.dfid.gov.uk/pubs/files/conflict-assess-guidance.pdf>
4. Conflict/Fragility Alert, Consultation and Tracking System (C/FACTS), USAID/DCHA Office of Conflict Management and Mitigation, http://pdf.dec.org/pdf_docs/PNADD462.pdf
5. Conflict Vulnerability Analysis (CVA), USAID and Tulane, <http://www.carleton.ca/cifp/docs/CVA.pdf>, p. 12.

International & Regional Organization Models

1. Early Warning Analysis for Humanitarian Preparedness and Conflict Prevention, Clarke & UNOCHA, <http://www.jha.ac/articles/a146.pdf>.
2. Conflict Prevention Network (CPN), European Union, <http://www.idrc.ca/uploads/user-S/10596649641conflict-sensitive-develop.pdf>, p. 30.
3. EC Checklist for Root Causes of Conflict, European Commission, http://ec.europa.eu/comm/external_relations/cfsp/cpcm/cp/list.htm
4. Development Assistance Committee (DAC) Guidelines, OECD, <http://www.oecd.org/dataoecd/15/54/1886146.pdf>.
5. Conflict-Related Development Analysis (CDA), United Nations Development Programme (UNDP), http://www.undp.org/bcpr/whats_new/CDA_combined.pdf.

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6. Regional Early Warning System for Southeastern Europe (REWS-SEE), UNDP SEE, <http://earlywarning.undp.sk/Reports/index.cfm?page=structuralAreas>.
7. Humanitarian Early Warning System (HEWS), United Nations Organization for (Book) Preventive Measures: Building Risk Assessment and Crisis Early Warning Systems, p. 208-209.
8. Conflict Analysis Framework (CAF), World Bank, [http://lnweb18.worldbank.org/ESSD/sdext.nsf/67ByDocName/TheConflictAnalysisFrameworkCAFIdentifyingConflict-relatedObstaclesDevelopment/\\$FILE/CPR+5+final+legal.pdf](http://lnweb18.worldbank.org/ESSD/sdext.nsf/67ByDocName/TheConflictAnalysisFrameworkCAFIdentifyingConflict-relatedObstaclesDevelopment/$FILE/CPR+5+final+legal.pdf).

Academic/NGO/Think Tank Models

1. The Politics of Fertility and Economic Development (POFED), Claremont Graduate University, (Powerpoint Presentation) http://www.logostech.net/client_projects/Sotirin/R&D/November_15_Capabilities_Workshop/Popp_DARPA.
2. Stability Assessment Framework (SAF), Clingendael Institute, http://www.clingendael.nl/cscp/research/saf/SAF_brochure.pdf, p. 26.
3. Forum on Early Warning and Early Response (FEWER), <http://www.reliefweb.int/library/documents/studman2.pdf>, p. 15.
4. Conflict Assessment System Tool (CAST), Fund for Peace, <http://www.fundforpeace.org/programs/fsi/fsindicators.php>.
5. Conflict Carrying Capacity (CCC), J. Craig Jenkins (Ohio State) and Doug Bond (Harvard), <http://www.pcr.uu.se/conferenses/Euroconference/jenkinspaper.doc>.
6. State Stability System Dynamic Model (SDM), Massachusetts Institute of Technology (MIT), (Powerpoint Presentation) http://www.logostech.net/client_projects/Sotirin/R&D/November_15_Capabilities_Workshop/Popp_DARPA.
7. An Internet Early Warning Indicators System for Preventative Policy, Stockholm International Peace Research Institute (SIPRI), http://web.sipri.org/contents/it/SIPRI_Early_Warning_WP1.pdf/download.
8. FAST Analytical Framework: Pakistan, Swisspeace, <http://www.swisspeace.org/uploads/FAST/AF/FAST%20Analytical%20Framework%20Pakistan%2006%20final.pdf>.
9. Futures for Global Interdependence Global Early Warning System (FUGI - GEWS), Tokyo National Institute for Research Advancement (NIRA), (Book)

EARLY WARNING? A REVIEW OF CONFLICT PREDICTION MODELS

- Preventive Measures: Building Risk Assessment and Crisis Early Warning Systems, p. 167.
10. Political Instability Task Force (PITF), U Maryland,
<http://globalpolicy.gmu.edu/pitf/pitfcode.htm#10>.

Private

1. Historical Research Ratings Package (HRRP), Business Environment Risk Intelligence S.A. (BERI), <http://www.beri.com/hrrp.asp>.
2. Control Risks Group (CRG) Ratings, Control Risks Group (CRG), (Book) The Handbook of Country and Political Risk Analysis, p. 373.
3. Country Risk Service (CRS), Economist Intelligence Unit (EIU), (Book) The Handbook of Country and Political Risk Analysis, p. 123.
4. Political Risk Ratings and Rankings Index, IHS Energy Group, (Book) The Handbook of Country and Political Risk Analysis, p. 367.
5. International Risk Approach, International Risk, <http://www.intlrisk.com/pdf/factsheets/pbras-eng.pdf>.
6. International Country Risk Guide (ICRG), PRS Group,
<http://www.prsgroup.com/icrg/riskdata.html>.
7. Standard & Poor's Ratings Group, Standard & Poor, (Book) The Handbook of Country and Political Risk Analysis, p. 225.

Bibliography

Ahmed, Adeel and Elizabeth V. Kassinis. "The Humanitarian Early Warning System: from Concept to Practice." Preventive Measures: Building Risk Assessment and Crisis Early Warning Systems. Ed. by John L. Davies and Ted Robert Gurr. Lanham: Rowman and Littlefield, 1998.

Basic Education and Policy Support (BEPS). Potentials for Peace: Mid-Term Evaluation of OTI's Program in Macedonia. 2003. http://pdf.dec.org/pdf_docs/Pdaby906.pdf.

Beers, David T. and Marie Cavanaugh. "Standard & Poor's Ratings Group: Sovereign Credit Ratings: A Primer." The Handbook of Country and Political Risk Analysis. Ed. by Llewellyn D. Howell. 3rd Edition. Syracuse, NY: The PRS Group, 2001.

Business Environment Risk Intelligence S.A. (BERI). "Historical Ratings Research Package User Guide." 2006. <http://www.beri.com/hrrp.asp>.

Clarke, John N. "Early Warning Analysis for Humanitarian Preparedness and Conflict Prevention." Journal of Humanitarian Assistance. January 24, 2004.
<http://www.jha.ac/articles/a146.pdf>.

Country Indicators for Foreign Policy. "Indicator Descriptions." 2006.
<http://www.carleton.ca/cifp/descriptions.htm>.

"Economist Intelligence Unit: Guide to Ratings." The Handbook of Country and Political Risk Analysis. Ed. by Llewellyn D. Howell. 3rd Edition. Syracuse, NY: The PRS Group, 2001.

European Commission. "European Commission Check-List for Root Causes of Conflict." 2006.
http://ec.europa.eu/comm/external_relations/cfsp/cpcm/cp/list.htm

Forum on Early Warning and Early Response (FEWER). "Conflict and Peace Analysis and Response Manual." 2nd Ed. July 1999.
<http://www.reliefweb.int/library/documents/studman2.pdf>

Fund for Peace. "The Twelve Indicators of Cast." 2006.
<http://www.fundforpeace.org/programs/fsi/fsindicators.php>

Gaigals, Cynthia, and Manuela Leonhardt. Conflict-Sensitive Approaches to Development - A Review of Practice. International Alert, Saferworld, and IDRC. 2001.
<http://www.idrc.ca/uploads/user-S/10596649641conflict-sensitive-develop.pdf>.

Goodhand, Jonathan, Vaux, Tony, and Roben Walker. Conducting Conflict Assessments: Guidance Notes. January, 2002. <http://www.dfid.gov.uk/pubs/files/conflict-assess-guidance.pdf>

Hagmeyer-Gaverus, Gerd and Mikael Weissmann. "Early Warning Indicators for Preventive Policy: A New Approach in Early Warning Research." Stockholm International Peace Research

EARLY WARNING? A REVIEW OF CONFLICT PREDICTION MODELS

- Institute. March, 2003.
http://web.sipri.org/contents/it/SIPRI_Early_Warning_WP1.pdf/download.
- Hallmark, Terry and Kevin Whited. "The IHS Energy Group's Political Risk Ratings and Rankings Index." The Handbook of Country and Political Risk Analysis. Ed. by Llewellyn D. Howell. 3rd Edition. Syracuse, NY: The PRS Group, 2001.
- Inter-Agency Standing Committee (IASC). "HEWS: Humanitarian Early Warning Service." 2006. http://www.hewsweb.org/home_page/default.asp.
- International Risk. "Political and Business Assessment Risk Services." 2006. <http://www.intl-risk.com/pdf/factsheets/pbras-eng.pdf>.
- Jenkins, Craig and Augustine Kposowa. "Conflict Carrying Capacity and Internal War in the Post-Cold War Era." Conference on Conflict Data, Dept. of Peace and Conflict Research, Uppsala University. June 8-9, 2001.
<http://www.pcr.uu.se/conferenses/Euroconference/jenkinspaper.doc>.
- Markwick, Sandy. "Control Risks Group (CRG)." The Handbook of Country and Political Risk Analysis. Ed. by Llewellyn D. Howell. 3rd Edition. Syracuse, NY: The PRS Group, 2001.
- Marshall, Monty G., Ted Robert Gurr, and Barbara Harff. "PITF Problem Set Code Book." Political Instability Task Force. January, 2001. <http://globalpolicy.gmu.edu/pitf/pitfcodes.htm#10>.
- OECD. "The DAC Guidelines: Helping Prevent Violent Conflict." 2001.
<http://www.oecd.org/dataoecd/15/54/1886146.pdf>.
- Onishi, Akira. "The FUGI Model as a Global Early Warning System for Refugees." Preventive Measures: Building Risk Assessment and Crisis Early Warning Systems. Ed. by John L. Davies and Ted Robert Gurr. Lanham: Rowman and Littlefield, 1998.
- Popp, Robert. "Pre-and Post-Conflict Stabilty Operations (P2COP) R&D Thrust." Powerpoint Presentation at CSIS. April 17, 2006.
http://www.logostech.net/client_projects/Sotirin/R&D/November_15_Capabilities_Workshop/Po pp_DARPA.
- PRS Group. "International Country Risk Guide: Data." 2006.
<http://www.prsgroup.com/icrg/riskdata.html>.
- Samarasinghe, Stanley, Donaldson, Brian, and Colleen McGinn. "Conflict Vulnerability Analysis: Issues, Tools, and Responses." Tulane Institute for International Development. 1999.
<http://www.carleton.ca/cifp/docs/CVA.pdf>.
- Swisspeace. "FAST Analytical Framework Pakistan." June, 2006.
http://www.swisspeace.org/uploads/FAST/AF/FAST%20Analytical%20Framework%20Pakistan%206_06%20final.pdf.

EARLY WARNING? A REVIEW OF CONFLICT PREDICTION MODELS

UNDP Bureau for Crisis Prevention and Recovery. "Conflict-Related Development Analysis." October, 2003. http://www.undp.org/bcpr/whats_new/CDA_combined.pdf.

UNDP SEE. "Structural Areas." 2006.
<http://earlywarning.undp.sk/Reports/index.cfm?page=structuralAreas>.

USAID DCHA/CMM. "Measuring Fragility: Indicators and Methods for Rating State Performance." June 2005. http://pdf.dec.org/pdf_docs/PNADD462.pdf.

Verstegen, Suzanne, Van de Goor, Luc, and Jeroen de Zeeuw. The Stability Assessment Framework: Designing Integrated Responses for Security, Governance, and Development. Clingendael Institute. 2005. http://www.clingendael.nl/cscp/research/saf/SAF_brochure.pdf

Weissman, Mikael. "Indicators for Country and Political Risk." 2005.
<http://www.sipri.org/contents/it/db/db3>.

Weissman, Mikael. "SIPRI Early Warning Indicators Database." Stockholm International Peace Research Institute. 2005. <http://www.sipri.org/contents/it/db/db2>.

World Bank. "The Conflict Analysis Framework (CAF): Identifying Conflict-related Obstacles to Development." Conflict Prevention and Reconstruction Notes. No. 5. October, 2002.
[http://lnweb18.worldbank.org/ESSD/sdvext.nsf/67ByDocName/TheConflictAnalysisFrameworkCAFIdentifyingConflict-relatedObstaclesDevelopment/\\$FILE/CPR+5+final+legal.pdf](http://lnweb18.worldbank.org/ESSD/sdvext.nsf/67ByDocName/TheConflictAnalysisFrameworkCAFIdentifyingConflict-relatedObstaclesDevelopment/$FILE/CPR+5+final+legal.pdf)