Early Warning Indicators for Preventive Policy
- a new approach in Early Warning research.

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Executive summary

This working paper presents the preliminary findings from the pilot-project 'Early Warning Indicators for Preventive Policy' at the Stockholm International Peace Research Institute which was launched in late 2002. The pilot phase of the project will run for twelve month and is funded by the Swedish Ministry for Foreign Affairs.

The project combines a monthly survey that retrieves events data from experts with country framework data and Internet technology, thus breaking new ground in the field of conflict early warning research. Processing both survey and statistical data using a well-designed statistical conflict forecasting model allows for the creation of indexes that reflect negative national and regional developments in the social, political and economic sectors. The results are made available on the Internet in the form of country-specific and regional reports, with the possibility for users to customise the system for their own needs.

The research team

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I. Early Warning Indicators for Preventive Policy

There is no such a thing as a 'sudden crisis', only a lack of information or analysis. At present, there is no generalised global monitoring mechanism to allow for the early identification of negative developments within countries or regions. Some commercial systems exist, but these have a limited geographical coverage. Unfortunately these systems offer little transparency about their applied methodologies, and their rate of success in predicting conflict varies.[1] Media reporting is usually focused on crisis situations, times when developments have already gone off course. It therefore tends to be an ineffective way to keep track of negative developments. New information sources and methods must be applied to fill the gap and provide a basis for policy making which allows an early counteracting of negative developments.

Traditionally, three methods or models are generally used to monitor and forecast developments in countries and in crisis regions: First, there is the database model based on statistical indicators, often time series data, provided on an annual basis by international organisations such as the World Bank and the United Nations. Early warning systems based on these indicators have been applied, for example, by the United Nations Development Programme and the United Nations Department for Humanitarian Affairs. Secondly, there are models that use expert knowledge to forecast trends. The expert model bases its information on questionnaires and interviews, thus creating a separate set of indicators. Expert models usually obtain information from a wide range of informants in a regular, quick and standardised way. Information sources include research institutes, embassies, non-governmental organisations (NGOs), 'fact-finding missions' and local networks. Thirdly, there are a number of news-wire monitoring/analysis systems that assess the risk of conflict through systematic machine coded coverage of news services such as Reuters.
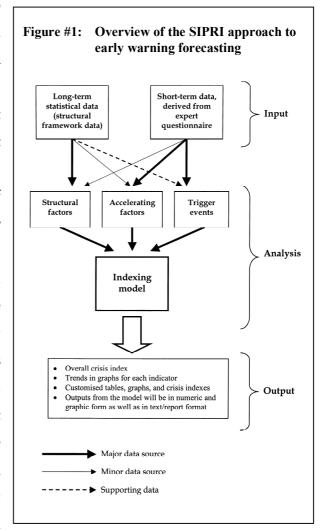
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[1] Linder, Anja and Santiso, Carlos, *Assessing the Predictive Power of Country Risk Rating*, SAIS Working Paper Series, WP/02/02, Washington, DC: The Johns Hopkins University, 2002.

II. The SIPRI forecasting model

SIPRI's new approach (figure 1) combines the database and the expert model, thus increasing the accuracy of forecasts by including both short- and long-term data in the analysis. The statistical long-term data are to a great extent drawn from the SIPRI Internet portal 'Facts on International Relations and Security Trends (FIRST)', which provides immediate access to high-quality statistical data from a wide range of sources.[2] For an extended forecasting model, however, short-term development data are essential. Such data cannot be obtained from country statistics, but only through observation of daily political, economic, and other events. This information is collected through a regular internet-based questionnaire. Each month the questionnaire is answered by selected local experts.[3] Its design is crucial, and in-depth research has been undertaken in order to select those short-term indicators that are best suited to measure changes in areas such as political and economic performance, ethnic issues, and human rights. The questionnaire has been kept short and consists of about 30 questions. All but one question is quantitative, using a scale from 1 to 9. The one qualitative question is of a general nature and reflects the respondent's overall judgement of the local situation.

Figure #1: Overview of the SIPRI approach to early warning forecasting

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[2] Free of charge, located at http://first.sipri.org/.
[3] For an illustrative example visit http://projects.sipri.org/ewi/.

So far the project has compiled a preliminary list of over 1200 potential early warning indicators. The list has been entered into a database system.[4] Preliminary nine main indicator categories and 35 sub-categories are used (table 1).This database is the main tool in the operationalisation process of both the indexing model and the questionnaire, a process which is carried our in close cooperation with local experts in order to secure local input at all levels of the model and questionnaire development. The categories and sub-categories are the framework used for all three types of conflict indicators presented below.

The collected data will be used in the forecasting model as follows (Illustrated in figure 1): Most structural indicators are derived from the framework data, with limited support from the questionnaire. The questionnaire is the main source of information for accelerators; framework data are sparsely used in this area. Data on trigger events are obtained solely from the questionnaire, although framework data is important for assessing the impact of these events.

Table #1: Preliminary indicator categories

Main category:	Sub-category:
1. Justice and human rights	1:1. Justice and the rule of law
	1:2. Human rights
	1:3. Civil society and media
	1:4. Intervening variables
2. Socio-cultural factors	2:1. Ethnic tension and division
	2:2. Political exploitation of ethnic, cultural and identity differences
	2:3. Structural and historical factors
3. Internal security setting	3:1. Demographic/population pressure
	3:2. Non-economic social development and regional inequalities
	3:3. Criminalisation
	3:4. Violence, cohesion, and internally displaced people/refugees
	3:5. History of armed conflict and structural instability
	3:6. Lack of tools and institutions of conflict prevention, management, and resolution.
	3:7. Regime type and media
4. Geopolitical setting	4:1. Regional and international setting
	4:2. International linkage
	4:3. External (territorial) disputes
	4:4. External support and intervention

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[4] This database will be made available on the project webpage, http://projects.sipri.org/ewi/.

5. Military and security	5:1. Arms, small arms
	5:2. Military expenditure
	5:3. Military forces and control
	5:4. Non-state controlled armed forces
6. Environment and resource management	6:1. Environmental disaster and general scarcity of natural resources
	6.2. Resource management
	6:3. Problematic resources (eg oil, diamonds, and gold)
	6:4. Competition over (scarce) resources (eg water)
7. Governance and political stability	7:1. State/regime legitimacy
	7:2. Governance
	7:3. Political stability, opposition- and elite groups
	7:4. Regime type
	7:5. Corruption
8. Socio-economic factors	8:1. Social development and equality
	8:2. Economic performance and wealth
	8:3. Economic stability and performance
9. Regional and country specific variables	---

Data analysis model

Successful processing of information rests on three pillars. The first is relevance, which the SIPRI model helps to ensure through a well-designed questionnaire and carefully selected indicators. The second is timing. Using Internet technology in combination with an electronic questionnaire and immediately storing the retrieved information in a database makes it possible to process large amounts of information almost instantly. The third pillar is the use of appropriate analytical tools. The project's approach to this component is to use a sophisticated conflict index model. This model includes three different types of conflict factors: Structural factors (pre-conditions for conflict), accelerating factors (factors that increase the significance of the structural factors, and other changes that increase the likelihood of conflict), and trigger events (immediate events that have the potential to move a high risk situation into active conflict or crisis).

Structural factors work as the foundation on which accelerating factors are strongly dependent. Trigger events are in turn dependent on accelerating factors. They are dependent on structural factors only to a limited extent.

For each of these factors, a division is made between general and specific indicators. General indicators are conflict indicators that have a general applicability in all regions and all sorts of setting, such as ethnic oppression, violation of fundamental rights, and major income disparities. Specific indicators are those that have a relatively higher importance in a specific regional or country setting, for example colonial heritage and customs based on local culture and religious beliefs which have a different impact on the risk of conflict in different settings.

When calculation the level of structural risk, the model also accounts for intervening variables that have a preventive effect. With regard to accelerating factors, a number of de-accelerating factors have been identified and accounted for. In a similar way, when assessing the impact of trigger events the structural pre-conditions both in regard to structural and accelerating factors is taken into account. Depending on the setting, particular trigger events can have varied impact. The results can range from a disturbance to a violent conflict.

To arrive at the total regional/country index the sum of all weighted composite indicators, one for each sub-category (table 1), is calculated. In a simplified way the model can be explained by the following relationship:

$$\text{INDEX}_{total} = (\sum SF_a * w_a) - (\sum IV_b * w_b) + (\sum AC_c * w_c) - (\sum DA_d * w_d) + (\sum TR_e * w_e)$$

a to *e* = represents the number of composite indicators.

w = weighting of the specific composite indictor

SF = Structural Factor

IV = Intervening variable

AC = Accelerating factor

DA = De-accelerator

<u>Result presentation</u>

All output will be published on the Internet and considerable effort will be put into making the output user-friendly. The goal is to provide as much customisation of the results as possible. It should be emphasised that all input data will instantly be included not only in the indexing database but also in the output. Trends for each indicator and indicator category will be shown in graphs, and it will be simple to compare different indicators and/or countries or regions. An overall 'conflict index' will be available for both regions and countries. It will be possible for the user to redesign the weighting and selection of indicators according to his or her own needs and instantly obtain customised output.

It will be possible to obtain the output in numeric and in graphic form as well as in text/report format. The latter will be created automatically in accordance with a set of templates, so no human input will be needed. All answers to the qualitative question in the questionnaires will also be made available. In-depth reports based on the findings of the system will be published on the Internet.

III. Further developments

This chapter has presented the preliminary findings from a one-year pilot-project which will run for twelve months with a focus on West Africa. At the next stage, the project will be expanded both in scope and in quality. The focus will move from West Africa to cover the whole world, although there will still be an emphasis on the input and involvement of local experts. Quality will be enhanced by systematic and continuous empirical testing of the model. Further empirical testing is needed to better validate and fine-tune the model, and this will be an important part of the project's next phase. Since this system largely depends on the information obtained from a specific questionnaire and the trends in that data, it will not be possible to fully test the model until the questionnaire has been in operation for at least six to twelve month.