

Operationalizing and Assessing “TRACE”

A Tool for the Rapid Assessment of Complex Emergencies

Final Report

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Virtual Research Associates, Inc.*

Virtual Research Associates, Inc. (VRA) was engaged in June 2001 to operationlize and empirically assess the TRACE (Tool for the Rapid Assessment of Complex Emergencies) model for the rapid assessment of potential and actual complex humanitarian emergencies (CHEs). The TRACE approach and our comparative assessment procedures are discussed in this final report, as are the results and conclusions from our empirical testing of the TRACE tool. TRACE is designed to facilitate systematic, rapid initial and ongoing assessments that are explicitly linked to windows of opportunity for specific actions to prevent, manage and provide relief in CHEs.

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The TRACE Approach

“TRACE” (Tool for the Rapid Assessment of Complex Emergencies) is a rapid assessment tool for use by analysts seeking real-time data necessary to identify, track and evaluate crisis situations that may evolve into or have already become CHEs. Virtual Research Associates, Inc. (VRA) first outlined the TRACE approach in the final report of a study that was completed in December 1999.¹ TRACE is designed for use in rapidly assessing a range of complex emergency situations, both natural and human-made in their origin.

The current² TRACE approach to rapid assessment begins with a triggering report of imminent, threatened or actual casualties, damage or destruction. An analyst or reporter, upon learning of a credible report, would first open a *TRACE*³ by noting the date and location of the emergency, and provide a brief title or name (Hurricane Andrew, for example) that characterizes it. For each TRACE that is opened, the analyst/reporter then completes one or more incident⁴ reports, beginning with a classification of each individual incident report as to the type of emergency it addressed. These basic types are listed below. The algorithms that we discuss in this study eventually need to be optimized for each of these categories, but for the present study we have focused on the conflict scenario.

Accidents, natural disasters and environmental degradation

Battles, armed attacks, insurrections, turmoil and fighting

Clinical symptoms of disease, illness and malnutrition

The analyst/reporter also enters for each incident report the start and, if applicable, end date of each reported incident or emergency situation as well as the location (we used the country level of analysis for this study). These dates may be quite precise, as in the case of accidents, natural disasters and other acute emergency episodes. On the other hand these date parameters may be crude estimates, particularly in the case of chronic conditions. And if the reported emergency has yet to happen, for example a threatened emergency situation, the date of threat is entered.

Finally, the status of the incident or situation is noted as completed, ongoing or contingent (threats and potential emergencies). Again, the dates for contingent emergencies reflect the date of the threat or warning. The projected date of the emergency itself is included in the urgency/time frame parameter discussed below.

¹ The report by VRA, “Mortality in Complex Humanitarian Emergencies: TRACE,” was submitted to the Center of Excellence in Disaster Management and Humanitarian Assistance, Tripler AMC, HI in December 1999.

² The current TRACE approach incorporates some modifications of the original, including in this case the reduction of the emergency types from five to four -- acute and chronic clinical symptoms have been combined.

³ We consider each *TRACE* to be a container to use for tracking the incident reports stemming from an emergency situation. Each TRACE contains one or more incident reports that contain the individual assessments based on media or other reports monitored by the analyst.

⁴ Our goal in his study remains to move from incident reporting to situation reporting, with prescribed reporting intervals calculated from actual historical data. In this way each TRACE would be tracked at regular intervals, to be determined dynamically by the type of emergency as well as its intensity. However, we decided to stay with an incident reporting protocol for this study, where the reporting intervals are driven solely by events, despite the lack of significant amounts of historical incident reports from which to develop the appropriate algorithms.

From this point the analyst/reporter begins to assess the intensity of the evolving situation (and possible complex humanitarian emergency or CHE) by rating eight basic parameters as outlined below for each incident that the analyst/reporter deems relevant and significant to a particular TRACE.⁵

- Geopolitical scope of the situation
- Urgency or time frame of impact
- Extent of external agitation or interference
- Extent of hostility or insecurity
- Extent of openness or cooperation of the relevant actors
- Extent of casualties
- Extent of displaced people
- Extent of property damage

As incident reports are posted to the system, the intensity or “status” of the TRACE is calculated as a single score or index that reflects a summation of the various parameters reported to date. This status score may be interpreted as the state of the emergency as it has evolved to date, provided, of course, that the driving events have been reported. Secondary information is also available on the status; specifically, we include notes on the trend and volatility to aid in the interpretation of the status index. We call this part of the software the “dashboard” and it is discussed further below. The presentation of secondary information for both the status and projection is not yet implemented in the Visualizer software.

A second score or index is also calculated from the TRACE incident reports. This second score represents a “projection” of the TRACE events into the future; that is, it offers an estimate of the likely intensity of the emergency situation a few (one to five) data intervals out. This TRACE intensity projection is calculated dynamically from the density and intensity of all incident reports posted to the TRACE. Secondary information here includes a confidence and probability scores, again to aid interpretation of the projection index.

Taken together these status and projection intensity scores offer a systematic, empirically based guide for the assessment of evolving emergency situations. These two indices are complemented by a third measure that is presented also as a TRACE summary measure. The third measure, a diagnostic histogram called current objective is collated from the numerous incident reports contained in the TRACES in an effort to encourage early thinking about specific opportunities for intervention to prevent, manage mitigate or recover from a disaster. The current objectives measure is presented as a backdrop to the status and projection indices. The presentation of current objectives information is not yet implemented in the Visualizer software.

Even though we do not use this third measure in any kind of quantitative analysis, we suggest that it is important to identify these windows for intervention opportunities earlier rather than later. In this way these early assessments may be employed in a diagnostic manner to explicitly link specific policy options to the appropriate phase of the evolving emergency situations. At the very least, we hope that such an explicit

⁵ Again we have modified the original list of TRACE parameters slightly in response to comments received from reviewers as well as operational considerations.

assessment of potential intervention objectives spurs a more thorough consideration of their optimum use in an emergency.

The TRACE approach field reporting procedures used to generate these scores is quick and simple, transparent, flexible and extensible. In addition to yielding informed estimates on volatile situations the system is self-documenting, with each field incident report viewable under its associated data trends graphs with just four mouse clicks.

The TRACE Parameters

The following section reviews the TRACE parameters that are used by analysts/reporters to write up incident reports. The initial selection follows that outlined in the original TRACE report (see footnote #1), but we also made significant changes as we progressed through several iterations of data development for the present study, particularly on the variables' operationalization and scaling. The lack of detail in the scales below may seem crude, especially to an area specialist. However, we have gone through numerous iterations with these scales using open source (Reuters) news reports on a variety of emergencies. We found that the more specific the scaling, the more empty data cells we ended up with, and this presented problems for our objective of establishing baselines and detecting changes over time as the emergencies evolved. The present challenge of developing open source trends data in real-time, as opposed to conducting post hoc analyses, dictates that the immediately available (and inevitably more crude) estimates be used rather than waiting for hindsight judgments.

Throughout the process of assessment we invoke the concept of “likely” effects as a way of encouraging the analyst/reporter to rate the situation or incident based on his or her entire knowledge (both specific and background) of the situation, knowledge that may not be included in the specific reports that pertain to this particular emergency. Thus if a credible report indicates multiple deaths caused by a bombing, the analyst/reporter is encouraged to code the report as such rather than waiting for eyewitness confirmation of the same.

Geopolitical Scope. The geopolitical scope indicator taps into the immediate impact of the emergency; specifically, the likely direct or primary effects, as opposed to the indirect or secondary (and tertiary) effects of the emergency situation. The scaling for geopolitical scope is as follows:

- 1 Localized event not likely to affect people outside the region of immediate impact
- 2 Contained event likely to affect a significant portion of the population of a single country
- 3 Widespread event likely to affect the entire population of a single country
- 4 Uncontained event, likely to affect populations beyond a single country

Urgency. The urgency or time frame indicator yields an assessment of available lead-time for possible intervention, be it preventive, preparatory, management and containment or recovery and rebuilding, whichever might be appropriate. Again, this assessment is contextual and specific to the capacity of the affected population and/or government to respond. For example, mudslides on the hills of Berkeley, California would likely be rated lower than the equivalent mudslides in Guatemala City. The scaling for urgency is as follows:

- 1 Impact likely to undermine local capacities without eventual (weeks to months) aid
- 2 Intermediate value used for low impact but ambiguous situations
- 3 Impact threatens to overwhelm local capacities without urgent (days to weeks) aid

- 4 Intermediate value used for high impact but ambiguous situations
- 5 Impact certain to overwhelm local capacities without immediate (hours to days) assistance

Current Objective. During the report entry process the analyst/reporter is asked to identify the phase of the emergency situation by way of noting the type of intervention likely to be most helpful in dealing with the disaster. We have identified four basic objectives that span the life cycle of a disaster situation from warning to onset to recovery. The specification of this window for intervention is solicited to call early attention to the appropriate responses that need to be considered. The four categories include the following:

- 1 Prevention, Preparedness and Evacuation (in advance of an emergency)
- 2 Management, Containment & Peacekeeping to control ongoing emergencies & provide security
- 3 Rescue, Relief and Recovery (in the immediate aftermath of an emergency)
- 4 Reconstruction and Reconciliation (restoration and rebuilding following an emergency)

External Agitation. The extent of external agitation or exacerbating interference indicator illuminates the extent to which outside parties should be considered in the assessment of the situation. It might be useful in the future to scale this variable bi-directionally so that positive as well as negative influences can be indicted. The scaling for external agitation is as follows:

- 1 Agitation and/or interference by outside parties is absent or minimal
- 2 Intermediate value used to accentuate a rating due to recent actions, statements or ambiguity
- 3 Agitation and/or interference by outside parties is moderate
- 4 Intermediate value used to accentuate a rating due to recent actions, statements or ambiguity
- 5 Agitation and/or interference by outside parties is high

Hostility. The extent of hostility or insecurity indicator taps into the security situation in which the affected population is located. It also indicates the degree of danger posed by hostilities that would confront a potential humanitarian relief or disaster management team. The scaling for hostility is as follows:

- 1 Except for the disruption of the disaster event itself, security is reasonably sound and stable
- 2 Intermediate value used to incrementally elevate the reasonably secure rating
- 3 Heightened security risk in a volatile situation; special precautions must be taken
- 4 Intermediate value used to incrementally elevate the heightened security risk rating
- 5 A dangerous situation in a hostile territory with no effective enforcement of law and order

Openness. The extent of openness or cooperation of the relevant actors, particularly the relevant sovereign regime and the specific government and non-governmental agencies charged with the managing disasters, indicates the extent to which the relevant parties are likely to be accommodating to any external intervention. The scaling for openness is as follows:

- 1 Relevant actors and authorities are cooperative and open, even in this emergency situation
- 2 Intermediate value used to accentuate a rating due to recent actions, statements or ambiguity
- 3 Relevant actors and authorities constrain many activities and restrict information or access
- 4 Intermediate value used to accentuate a rating due to recent actions, statements or ambiguity
- 5 Relevant actors and authorities tightly control the situation and are hostile to outside influence

Casualties. The magnitude of casualties' indicator is a qualitative measure that we chose (after much experimentation with actual data development and a lengthy debate) over the use of specific numbers. The present approach still allows for recording

of specific casualty numbers in the comments field, but our experience has been that the numbers that we are able to extract from current open source news reports are too often inaccurate, redundant, and/or non-comparable. In addition, news writers have a habit of summarizing “on the fly.” By this we mean that many of the numbers cited do not refer to the specific reported incidents; rather they periodically (but not systematically) sum various incidents over various geographical areas and across widely varying periods of time. The present approach draws upon the analyst/reporter’s expected knowledge of the relevant area, and encourages consistent, contextual judgments, with a “cut and past” documentation of any actual reported numbers included in the comments section. More experience with actual data development will allow us to articulate thresholds and baselines to better guide the analysts/reporters. The scaling for casualties is as follows:

- 1 Number of casualties is absent or minimal
- 2 Intermediate value used to accentuate a rating due to recent actions, statements or ambiguity
- 3 Number of casualties is moderate
- 4 Intermediate value used to accentuate a rating due to recent actions, statements or ambiguity
- 5 Number of casualties is high

Displaced People. Following the same logic, a qualitative measure of displaced people offers a reading on the magnitude of the refugee/IDP (internally-displaced people) problem. As with the casualty assessment, analysts/reporters are encouraged to note any specific counts in the comments section. The scaling for displaced people is as follows:

- 1 Number of displaced persons is absent or minimal
- 2 Intermediate value used to accentuate a rating due to recent actions, statements or ambiguity
- 3 Number of displaced persons is moderate
- 4 Intermediate value used to accentuate a rating due to recent actions, statements or ambiguity
- 5 Number of displaced persons is high

Property Damage. Finally, the extent of property damage is indicted by another qualitative assessment. It is scaled as follows:

- 1 Property damage is absent or minimal
- 2 Intermediate value used to accentuate a rating due to recent actions, statements or ambiguity
- 3 Property damage is moderate
- 4 Intermediate value used to accentuate a rating due to recent actions, statements or ambiguity
- 5 Property damage is high

The rapid field assessments these basic parameters of an emergency situation are designed to provide a quick sense rather than a precise evaluation of the evolving situations. Each assessment is made across no more than five scale values or levels from low to high, with intermediate categories used for ambiguous ratings as needed. The design of the TRACE instrument explicitly recognizes that oftentimes the analyst/reporter must make a quick assessment based on a paucity of credible information from the field. As noted above, to make the best of these practical constraints we have sought in the design of TRACE to facilitate systematic, self-documenting and interactive rapid assessments.

Some Considerations, based on actual use of the TRACE tool

Throughout this process of entering information into the TRACE tool (which we did with a web-based report entry, analysis and visualization software system customized for this purpose) the analyst/reporter is asked to make contextualized judgments. This

approach is designed to facilitate an intuitive level of assessment at a time (just before, during and after an emergency situation) when timely information on even the basic parameters (including even death counts) are oftentimes not accurate, at least in the open source media reports that we used in this study. For example, we conducted a human coding exercise of casualty counts in Colombia. We assessed five types of sources for the same two-month period early this year.

Two national dailies in the Spanish language

Approximately 30 regional sources (again in the Spanish) extracted from an electronic news publisher

A human rights NGO listing of violence (in Spanish and English)

The official (military and police) Colombian reports on violence (in Spanish)

The Reuters Business Briefing stories that we normally auto-parse or code (in English)

Our first conclusion from this exercise with Colombia is that identifying the number of casualties from any news source is fraught with obstacles like coverage, redundancy, ambiguity, error and competing claims. Note that this conclusion is reached by humans who know well the region and language involved. Our second conclusion is that at least in this case the government and independent (NGO) reports of casualties do not significantly differ. The main problem with these two sources is that they are always a few months (for NGOs) to a few years (for the government) behind, at least in terms of their availability in open sources. Our third conclusion is that the casualty counts determined by focused efforts (NGO and government) are approximately two orders of magnitude greater than those extractable -- by humans -- from national news reports regardless of the language or source. Our area specialist colleagues told us that unless one literally goes to the "police blotters" section of the local newspapers in Colombia, that this kind of information (reasonably accurate casualty counts on abductions, kidnappings, attacks, raids and the like) are simply not reported anymore due to media reporting fatigue. And in particular, this absence of reporting seems to be an increasing trend in Colombia even as the number of such incidents is going up (at the time of this study in the spring of 2001) by all anecdotal and expert accounts.

A collaborating area specialist colleague has characterized this (lack of casualty reports) problem by comparing it to the (lack of) comprehensive, single source, real-time media reporting on automobile accidents in the USA. Unless an accident is spectacular in some way (i.e. a celebrity or high number of people, or some other unusual circumstance is involved) it is not likely to be reported in the national level media.

We suggest that mortality reports for other regions that are experiencing chronic conflict situations pose a similar challenge to developing real-time casualty data. Indeed, we had to modify the original TRACE design in which we suggested the use of "mortality and casualty trigger" thresholds. Our current experience of using the TRACE tool suggests that one should not wait for a death or even an injury to begin tracking a situation, or in our language, initiating a *TRACE*. Area specialists can readily identify situations of pent-up pressure that can explode at any moment, and waiting until they do (escalate or explode) is simply not prudent if we are to have any chance of prevention. Even intervention strategies designed to mitigate, manage or contain an emergency are eroded by the lack of systematic tracking prior to the actual outbreak of hostilities.

In sum, obtaining reliable casualty, mortality, morbidity and even IDP/refugee statistics in real time is virtually impossible from open media sources. An ordinal level scale is about the best we can do. It should be emphasized that this scale is country (including a few sub-national and supra national cases) and context specific. An area expert monitoring Macedonia may rate the killing of a single police officer in January 2000 by an ethnic Albanian as high in terms of “scope of emergency,” “urgency,” and “external agitation” (the onset of the Macedonian conflict). Any Balkan expert would know that this is a significant event. The same values might register in Chechnya where 200 combatants and civilians were killed in a single clash. In other words, we must emphasize that the TRACE assessment process needs to be contextualized.

Another consideration for further examination is the unit-of-analysis to be tracked with the TRACE tool. To help make this limited study manageable we have held the unit of analysis at the country level (but see below for a note on how we handled Chechnya). It is clear that we need to move to any unit that is appropriate, both above and below the country. We ended up treating Chechnya, for example, as a country. This decision has implications for the “scope of emergency” parameter in particular and is nominally in conflict with the “country” parameter for each *TRACE* in that it implies that our unit-of-analysis is a country and not a region within a country. As for the need to deal with supra national (country) units, note that Kashmir is claimed by two states, India and Pakistan, and all divided states (e.g. North and South Korea) have similar competing claims.

The situation with Albania deserves a special mention. The vast majority of reports for Albania since 2000 actually refer to Kosovo or Macedonia. We believe that this is an artifact of the way in which Reuters indexes these entries, as they seem to rely upon proper nouns like Albania or adjectives like Albanian to generate their country code index. Obviously this approach is not efficient given that there are ethnic Albanians living in the former Yugoslavia and elsewhere in the Balkans.

Another major consideration of the TRACE approach is that it is extremely difficult to identify a specific start and stop date for the incident/situation reported in each report. Fighting by definition is pretty amorphous. The fighting in Chechnya is relatively consistent across time but there appear to be offensives and defensives. It is not clear how one should handle these. It is conceivable that one could file a single report for an on-going conflict of one year (e.g., they are in a perpetual state of killing one another).

Actually, we have had to modify the original TRACE approach in a fundamental way to achieve our goal of (variable) periodic situation reporting. Recall that the original TRACE approach called for daily, weekly and monthly reporting intervals for each sit report depending upon the severity of the situation. We had planned to use the scores generated for all prior sit reps to prescribe the next reporting interval. However, when confronted with the challenge of dealing simultaneously with chronic emergency situations spanning decades (typically these involve conflict or malnutrition and refugees) and acute episodes that last just minutes (an earthquake, for example), we had to modify the protocol so that we accounted for each and every major reported episode in any situation. In other words, the sit reps that we include in the *TRACES* for this study actually represent more incident-focused reports than situation-focused reports.

To be sure, the original design of the TRACE remains the goal. It is just that we need to establish more in depth incident baselines across different types of emergencies so we can properly prescribe the sit rep reporting intervals. Ironically, it appears that the

TRACE tool may be best suited for the chronic emergencies (battles, attacks or fighting and clinical symptoms of disease, illness or malnutrition) where the timely data development challenges seem to be toughest. This is not to say that timely and accurate information about accidents and natural disasters is readily available; rather the self-documenting and interactive analysis features of the TRACE tool seem to be particularly needed to detect the subtle inflections in long-term trends that signal potential escalation of a chronic emergency.

Finally, we have made little provision, for positive or ambiguous events/episodes. When the Taleban, for example, formally recognized Chechnya, it is difficult to code. Is such an event “localized” or “uncontained”? What is the impact of such an event? There really are no casualties, displaced or property damage yet it is agitating an already precarious situation. The best we can do for now is to provide an easy method for the analyst/reporter to comment at length on any sit rep. A full text indexing of the sit rep records will facilitate a systematic assessment of these comments, but only if analysts use standardized terms or concepts to call attention to these and other unusual situations.

Stepping Back: Human Security and the Limits of Humanitarian Intervention

Before moving on to the discussion of empirical data, it may be useful to review four major works that have been published recently. One of the four volumes, *Madness in the Multitude*, by Fen Osler Hampson, presents the three major camps of thinking on human security: human rights/rule of law, people safety/humanitarianism and sustainable development. The importance of this work transcends the lucid discussions of these contending bodies of thought. The book explicates and links the key elements of each of these three perspectives with the strategies and instruments, and the objects of security that flow from them. Particularly relevant to the present study is the definition of a threat to human security that emerges from the perspectives. Institutional capacity looms large as an indicator of threat from the rule of law camp. In the humanitarian safety perspective, on the other hand, armed conflict is seen as the leading indicator and threat to human security. The sustainable development perspective adds several more areas of threats to monitor, including environmental degradation, under development and the maldistribution of wealth.

The next work, *The Limits of Humanitarian Intervention*, by Alan J. Kuperman, challenges conventional wisdom on the Rwandan genocide; that is, had the political will to stop the genocide been present, the tragedy could have been largely averted. Using a counterfactual approach Kuperman systematically reviews the evidence of what we (he uses the USA in a hypothetical unilateral mode of behavior) knew, when we knew it, and what we could have done in the time frame necessary to stop the killing. By incorporating a thorough examination of the logistics of the required intervention with a comprehensive analysis of the scope and speed of the killing, he demonstrates conclusively that less than half of the people could have been saved by a timely intervention even assuming the USA had the political will to act unilaterally. The importance of timely open source intelligence (upon which his assessment is based) is underscored throughout this book.

A work by W. Ben Hunt, *Getting to War Predicting International Conflict with Mass Media Indicators*, does a good job of explaining the nuances of using open source mass media. He acknowledges that governments often use the media to shape public perception and to build support for their policies, yet he is able to show how analysts can

use the same media to anticipate situations of conflict provided they understand the tension between international secrecy and domestic support.

Finally, a case study by Andrew S. Natsios, on *The Great North Korean Famine*, sheds light on an emergency situation of epic proportions that could not be covered well by the media due to the North Korean government's constraints on independent reporting. His use of a multitude of different kinds of sources to triangulate various views on the situation is noteworthy, as is his attention to the unique cultural and historical context. His overall estimate, it should be noted, is 2.5 million deaths, or nearly ten times greater than the CRED estimates of just over 50,000 per year over five years.

Natsios also suggests that the least useful "lenses" to view the North Korean famine are the aggregated agricultural production figures and the public health measurements of malnutrition, morbidity and mortality. He cites three other lenses as more useful, including famine indicators of subtle coping behavior by individuals and groups, an economic model of family food purchasing power and market prices (first advanced by Amartya Sen) and a political analysis of the government's objectives during crisis. The embodiment of these five lenses is best found in the human expert. We suggest the expertise of such analysts be channeled into a systematic reporting protocol. Even with limited mass media information emerging from an isolated state, the analyst can make informed assessments that when done systematically can help illuminate the situation, and hopefully lead to better intervention strategies.

Comparative Empirical Assessments⁶

Following from the original TRACE approach, we sought in this study to develop real-time data across three levels of analysis: context, situation and events. Data at each of the levels serves different purposes. At the highest (context) level, the general parameters and structural attributes of a setting as a whole may have positive or negative influences on the strategic interests of the party conducting the assessment. The social, political and economic attribute data at this level change gradually over time, and help to identify the vulnerability of each country to emergencies. We have collated relevant structural data⁷ from various sources and have linked them to the TRACE graphical visualization display. The presentation of structural information is not yet implemented in the Visualizer software. These structural data provide a measure of vulnerability of the country in question that is helpful when interpreting the TRACE reports. We have not weighted the events data algorithms by these structural variables because they merely add a constant due to their relatively static values. In other words, these structural influences simply exacerbate the emergency situations tracked by the TRACE tool. Additionally, it should be noted that TRACE reports inevitably contain some structural information intrinsically because the reports collect reporters' perception conditioned by all their background knowledge of the country. For instance, abductions in Columbia are not

⁶ Parts of this section are excerpted from the original TRACE report.

⁷ We have collected structural data across several dozen variables that have been suggested in the literature as being potentially relevant to assessing country risk or vulnerability to instability that would exacerbate an emergency situation, for example, infant mortality, trade openness and level of democracy from the State Failures project. We also think that special attention should be placed on the rates of common criminal violence, which typically are not covered well in the international press; thus we recommend drawing upon databases of such crime statistics to supplement the more politically oriented State Failure structural variables.

viewed or perceived by reporters as severe as similar cases in USA; rather, these abductions have been likened to automobile accidents due to their seeming omnipresence.

The mid-level of data is more dynamic in nature than context level data. The emergency situation influences and constrains the operational theater where the crisis is unfolding. Traditionally, situational indicators include terrain and weather, as these will constrain any aid effort. Other indicators are used to identify the general parameters of the situation in terms, especially the major actors and their attributes. We encapsulate this middle level of analysis in the designation of TRACES. It may be useful to consider a TRACE as a container or envelope representing an emergency situation that is to be tracked over time with specific incident or situation reports.

The incident or sit reps that we collect in the TRACES are designed to facilitate planning for logistics support and operations. These data ideally are collected at the lowest appropriate level of analysis in real-time, and they represent the unfolding of the driving events of the crisis. These events data are time sensitive and more often than not specific to a particular aspect of the emergency.

To operationalize and empirically test the TRACE tool we add several more components to the comparative analysis. These include a database on mass disasters, auto-generated news events data and their accompanying indices of topics or issues. We have added the tracking of frequency counts of topics as filed by news agencies for two reasons. First we find that crude report counts appear to track the magnitude of an emergency quite well. Specific topics or issues addressed in the news media over time can be tracked by their respective report counts by topic. And second, Paul Hensel and Sarah McLaughlin Mitchell argue that a “focus on contentious issues independent from knowledge of the threat or use of military force . . . provides many potential benefits for both theory and policy, including the possibility of early warning before armed conflict breaks out and the possibility of a greater understanding of how issues may be managed or settled peacefully without the resort to violence.”⁸ Table 1 may help to clarify this multi-level approach.

We have completed manual entry data development using the TRACE instrument on ten cases identified by the sponsor for the period January 2000 through July 2001. Also, news-based event trends⁹ over the last decade for all seventeen countries listed by the sponsor have been generated by VRA’s natural language parsing (NLP) technology. Selected screen shots of both incident/sit reps and news media results were included in the interim report.¹⁰

For the parsing approach, we sought to identify precursors to instability and violence, and have examined the role of conflict carrying capacity (see Bond and Vogele 1995; Bond et.al. 1996 and Jenkins and Bond 2001). As for the manual assessments with the TRACE instrument, we have found that optimizing the TRACE tool for use with both chronic and acute cases is our most difficult challenge because the sensitivity required to monitor reports on acute cases may be washed out in a decade long struggle.

⁸ Cited from the abstract to their paper presented at a conference "Identifying Wars: Systematic Conflict Research and Its Utility in Conflict Resolution and Prevention," held in Uppsala, Sweden, June 2001).

⁹ See Jenkins and Bond (2001) for a discussion of the automated monitoring of events data approach, the conceptual framework (IDEA) for which is available on line at <http://vranet.com/idea>.

¹⁰ A CD that includes all data developed for this study accompanies the final report to the sponsor.

In short, we have sought a combination of approaches, both automated and manual, that can track the minor fluctuations in intensity over long periods of time while at the same time provide an accurate trace of developments in a rapidly changing situation. We suggest that this multi-pronged or triangulation approach will help mitigate some of the problems of report availability for under-reported areas.

Field Interviews, with IGO & NGO field security personnel

Over the course of the last four years or so, since we first started to articulate the TRACE approach, our research team has had numerous discussions with security personnel representing UN agencies, the US government, and non-governmental organizations. To be blunt, there has been a night and day change in the sense of importance of security matters since September 11, 2001.

Prior to that time, we had been engaged in protracted discussions with countless security representatives, who brought in to the interminable meetings various staff members from other parts of their organizations in an attempt to increase their security awareness and garner support for their mission. We suffered through a series of mostly polite conversations that inevitably died out as soon as the reality of day-to-day operations preoccupied their interests. Security was invariably relegated to a separate section of the organizations, with little clout and with even less financial resources.

Over the course of these discussions, we witnessed the rise (beginning in the mid-1990s just after Rwanda and Somalia) and then stagnation of field security awareness. The bottom line was that by 2001 securing funds for protecting field staff was clearly subordinated to relief and development assistance operations at every organization we visited. Especially at the UN the influences were as much political as financial—witness the controversy over the Brahimi report.¹¹ Vincenzo Bollettino's dissertation¹² chronicles the development at the UNICEF operations center.

In addition to the lack of political will and financial resources, a persistent and divisive tension seemed to exist between field and headquarters' personnel. Through two recent field trials (with UNICEF and World Vision) involving soliciting field personnel to provide systematic security incident and situation reports to headquarters or corporate offices, the issues of confidentiality and the added burden of reporting were voiced repeatedly. The fact that a staff member was mugged or raped need to be treated no less securely than private information as might be found in a personnel file. And traditional data security models proved inadequate when confronted with questions like, how do we report security incidents that may involve our superiors (as in corruption complaints)? But perhaps the loudest complaint heard in response to soliciting field reports was, why should we go above and beyond our duty and send off yet another report into a black hole [headquarters].

The challenge then, as we began to understand it was to integrate the security reporting task into standard operating procedures, to make the reports an integral part of their operational requirements, no less than the aid or relief efforts in which they were engaged. This lesson enabled us to design better rapid security report entry templates, but

¹¹ See http://www.un.org/peace/reports/peace_operations/.

¹² See "United Nations Staff Security: Testing the Role of Automated Reporting Systems with UNICEF" (a dissertation accepted by the Graduate School of International Studies, University of Denver, August 2001). Contact Enzo.Bollettino@vranet.com for further information.

we were not able to overcome the challenge of organizational inertia and funding. It took the attacks of 9/11 to do that.

Our recent (since 9/11) meetings with the same security personnel find at least one of them promoted, all of them more prominent in their organizations, and having funds for the first time to focus not just on security preparedness and training but on early warning and period field situation assessments as well. These same people, with an invigorated mandate (from above), now are more hardened to the perennial complaints received from the field personnel when asked to participate more actively in their own security. Indeed, we have read over the past month numerous comments from field personnel (in their sit reps) who are appreciative of the recent more strident efforts to protect field staff, organization assets and operations.

These ongoing discussions with IGO and NGO security personnel and field staff have influenced greatly the development of the TRACE tool. Sadly, the more profound impact on field security awareness has been spurred by the 9/11 attacks.

Steps in the Present Study

Before the presentation of empirical results, we offer here a chronological narrative of our activities in this study. We began this project with a literature review of complex humanitarian emergencies (see bibliography) and early warning in order to determine which indicators are suggested to dominate. In order to familiarize ourselves with the 17 cases identified by the sponsor, we also prepared “thumbnail sketches” of each case.

Next, we began to compile relevant structural data based on the literature review. The State Failure Project was perhaps the most useful in this regard. The structural database that we compiled contains more than 60 variables from such sources as the CIA Factbook, World Bank, Freedom House and the UN. The database spans 7 years (1995-2001) with data on as many as two hundred countries.

The primary thrust of the TRACE model involves compiling rapid field reports. We began by extracting out the reports for the selected countries from the Reuters Business Briefing® (RBB). Due to some ambiguity in the wording of the suggested countries (e.g., the Balkans, the Congo and Chechnya), we extracted all RBB reports for nineteen countries (listed below, with the asterisks indicating the eleven countries with completed TRACES):

1. * Afghanistan
2. * Albania
3. Angola
4. * Bosnia and Herzegovina
5. * Burundi
6. Croatia
7. Democratic Republic of the Congo
8. Ethiopia
9. * Guinea
10. Guinea Bissau
11. Indonesia
12. * Liberia
13. * Macedonia

14. * North Korea
15. Republic of the Congo
16. * Russia (Chechnya)
17. * Yugoslavia (Serbia and Montenegro)
18. Sierra Leone
19. * Sudan

Simultaneous with the TRACE assessments, we tweaked the IDEA¹³ events protocol to optimize the pickup on potential CHE-related actors and events and to minimize systematic errors. The reports were then auto-parsed and loaded into the VRA® Visualizer module for display.

A considerable amount of time and effort were spent refining the TRACE variables suggested in the original TRACE report through numerous iterations of data development. We found several variables redundant while other simply difficult, if not impossible to pick up in the majority of cases. Based upon discussions with field security personnel for IGOs and NGOs, we also added a variable that signals the likelihood of escalation due to external agitation. The current variable list is presented in the first section of this report.

In the final stage of this study we developed algorithms to generate a score for the current status as well as a projection into the future of each emergency situation being monitored. To do this we compared the various views of the emergency situations, as indicated by the complementary data streams discussed above.

Illustrations

We begin with a screen capture image of the TRACE container in Figure 1. After logging in, the user can view all existing TRACES. At this point also the user may edit an existing TRACE, or add a new one. Figure 1 shows the TRACE for internal conflicts in Afghanistan. This page is where an analyst begins the reporting process by starting a TRACE upon learning of an emergency situation that may evolve into a CHE. At the bottom of Figure 1, the first few incident/situation reports contained within this “Afghanistan intra-state conflict” TRACE are listed.

Figure 2 presents a TRACE report. Recall that we strive for periodic situations reports but we are using more of an incident report approach to help establish baselines for the various types of emergencies. Figure 3 presents a view of the country stability (CS) and forceful actions (FA) found in the parsed news reports for the period January 2000 through July 2001 in Afghanistan. Figure 4 presents the TRACE generated indicator vs. the news-based indicator (calculated from CS using 1-CS) for Afghanistan for the same period. These data are selected to illustrate that the differences and similarities between indicators based on field and media reports.

Empirical Results

Table 2 summarizes all of the time-series variables used in the analysis of this study. The TRACE parameters are grouped into three components: Damage, instability, and risk indicators.

¹³ Please see <http://vranet.com/idea> for an outline of the Integrated Data for Events Analysis (IDEA) protocol.

The risk indicator expressed in the average of External Agitation, Hostility, and Openness parameters provides the context level information (see Table 1). This is the reporter's perception of the state's vulnerability, and inevitably incorporates some of the structural context-level information. Since this property is not cumulative, we used the average of these values to represent the collective property.

The damage indicator is determined from Casualties, Displaced People, and Property Damage parameters. It determines the physical damage done by any given incident. Since this effect is cumulative, the sum of the values might be used as its collective property. However, for practical purposes, we want to use normalized (0-to-1-scaled) values instead of the simple summation of numbers with an arbitrary range. Here, we employ a method that we refer to as the weighted summation. It works in such a way that the weighing factor for each successive summation decreases gradually so that the sum never exceeds the limit of unity. The actual equation used here is: $\text{Sum}/(\text{Sum} + C)$ where C is an empirically derived constant used to dampen the slope of the rising summation score. This dampening of the summation, along with the practical advantage of normalized values, allows us to accommodate possible duplications in reporting, such as multiple incidents reported for a lengthy but single military clash.

In order to explain the present approach, let us begin with an example. Let us say that on a given month, one incident report was filed. It has an average damage value of 0.8. The next month, two reports were filed. The average damage scores were 0.7 and 0.7. And, the third month, scores of 0.6, 0.7, and 0.5 were recorded.

If we take the sum, we get 0.8 (for the first month), 1.4 (0.7 + 0.7; for the next month), and 1.8 for the third month. It is true that we want to take into account that there were more incidents in the most recent month, but we can't be sure if it is a result of over-reporting. In other words, we can't be sure if the raw frequency of incidents should be taken as is since the effect would be continuously cumulative. After all, as you can see in this example, the average of damage for the last month is lower than the second month. If we were focusing on the average, the last month would have scored the least of three. If we employ the weighted summation method, $\text{Sum}/(\text{Sum} + C)$, where C is set to 2, we get the following results:

For the first month, the weighted sum is $0.8/(0.8 + 2) = 0.29$

For the second month, the weighted sum is $1.4/(1.4 + 2) = 0.41$

For the last month, the weighted sum is $1.8/(1.8 + 2) = 0.47$

In this way, the trend is still going up just as in the case of simple summation, but doesn't move up too quickly and also never exceeds 1.0. For this study, we used the empirically derived value of 2 for C across all TRACE indicators. For normalizing the topic counts, we used the average monthly topic counts for 1999 as the value of C.

The instability indicator is the weighted sum of Geographic Scope and Urgency parameters. This represents the impact of the given incident. This is also cumulative, and therefore, the weighted sum is used to represent the collective property.

Finally, the combination of these composite indicators yields the composite indicator that we call TRACE. It is the average of the damage and instability indicators weighted by the risk indicators: $\text{TRACE indicator} = \text{Risk} * (\text{Damage} + \text{Instability})/2$. The plots of TRACE and its components are grouped together under the group name, TRACE, in the Graphs pane of the VRA Visualizer window. A sample plot is shown in Figure 5.

As discussed earlier, in order to operationalize and empirically test the TRACE tool, we added several more components to the comparative analysis. The counting all reports with topics (assigned by Reuters to each report) related to civil or military conflicts, riots, or demonstrations offers an estimation of the rise and fall of the incidence (or at least attention) of these issues over time. For Reuters reports, this topics count corresponds to the overarching topic code for civil conflicts, wars, riots, or demonstrations. We name this estimator of issues the topic-based indicator or simply, topics. For the events indicator, we choose to use the modified conflict carrying capacity, or the country stability (CS)—see Jenkins and Bond (2001). Since the scale of this index is opposite in direction to other indices, 1-CS is used for easier comparison with other indices.

The attached Excel spreadsheet presents all three (event, topic and TRACE) indicator data for the eleven countries investigated. Table 4 includes the correlation between all pairs of these three indicators. For some states, the number of reports is not adequately large for either or both the events and TRACE indicators. As a result, portions of the correlation matrix are not very reliable. We have highlighted the correlations that we deem to have adequate cell counts to make them meaningful. Note that even for those cases with adequate coverage on all indicators, the correlations are not high. This pattern of relatively low correlations reveals an empirical independence of the various measures. The three indicators are tapping onto different aspects of the evolving situation, and each has its own advantages and shortcomings.

For instance, the news events indicator that is based on our CS score focuses on the conflict dynamics within and between different sectors. CS is useful as an early warning indicator because of its sensitivity to the rise of conflicts between the government and civil sectors. However, it suffers from the drawback that it requires many more data points than the other two indicators, mostly because it measures a complex phenomenon. The topic indicator, on the other hand, yields a reliable baseline measure because its coverage is generally reasonable. The cost of this baseline is that the topics indicator is not specific to particular actors. Moreover, topics do not delineate well the hierarchy of multiple topics covered in any particular report. This limitation might be mitigated somewhat by creating a hierarchical index of topics for each report, but this approach depends upon the coherence of the reports, something that sometimes is lacking even in a high quality news feed. We suggest that TRACE indicator, being manually coded, could be the most reliable indicator, provided that time and resources were available. Still, the TRACE suffers from the same problems of inconsistency and biases inherent with all human coded indicators.

The best solution, therefore, is to monitor all three indicators, perhaps with the labor-intensive TRACE coding being reserved for high priority countries, as indicated by warnings on the events or topics indicators. In this way, the human analysts are being utilized most efficiently, following up on priority cases, and interpreting anomalies rather than monitoring volumes of data. We suggest then that a "triangulation" of indicators approach will ultimately prove to be the most cost-effective, accurate and useful strategy of monitoring.

Nevertheless we decided to examine how a single variable composite indicator, combined from all of the others by averaging them together, would track with the individual indicators. This procedure yields what we call the "composite" indicator.

Alternatively, we might have used different weighing factors when averaging the indicators together based on the reliability of each indicator, such as the number of reports, and this option remains viable for our ongoing work. The plots of the three component indicators and the resulting composite indicator are grouped together under the group name, Comparison, in the Graphs pane of the VRA Visualizer window. A sample plot is shown in Figure 4.

The resulting composite indicator is analyzed using 3-month and 6-month moving averages. The 6-month moving average, although it is significantly lagging, shows the general trend in stability of any given country quite well. Table 4 summarizes the overall trend of composite indicator for each country using a 6-month moving average. The results seem to agree with our understanding of the situation on the ground reasonably well.

The difference between the overall trend from the 6-month moving average and the composite indicator gives a rough estimate of where we are heading. In general, too much deviation from the mean (the trend line) results in a correction to the other direction. Figure 6 shows a sample of the analysis based on this observation. The figure shows the composite indicator for Yugoslavia along with its 6-month moving average and two additional lines above and below the moving average separated from the moving average by 2 standard deviations, or what are sometimes called “Bollinger” bands. The overall trend is toward a lowering of the volatility throughout the year 2000. During this period, the composite indicator is below the trend line. However, it isn’t significantly lower than the trend line, and therefore it does not correct to the other end of the trend line until the trend line reaches a plateau. On the other hand, the spike in the indicator in March 2001 reached the edge of the upper Bollinger band. This immediately is followed by correction to the other end of the trend line in the subsequent months.

Although the analysis with Bollinger band is useful, it is not a very consistent measure. Perhaps, the difference in the fast (3-month) and slow (6-month) moving averages might be a better measure in forecasting future trends. When the difference is the minimal and start to increase, it is time to look for increases in the composite index, or violence in the state. The precise timing, however, depends on the overall trend. If the overall trend is steady or moving slightly upward, the above statement holds quite well (Figure 7). On the other hand, if the overall trend is down, the timing of precaution should be moved toward the further future of the turning point (Figure 8, 9). It seems that the point where the fast moving average crosses the slow moving average from negative to positive might serve as a better timing point.

In several cases, the trend line seems to suggest seasonal variations. For instance, refer to the cases of Bosnia and Herzegovina and North Korea. Thus for a more accurate analysis, a seasonal correction may be required. However, the data time span for this study was too short to provide enough data for us to experiment with such corrections.

Conclusion

In this study we have integrated four measures of ongoing emergencies -- context, situation, events and issues (see Table 1) – in an attempt to “triangulate” the current status and anticipate the future as they evolve. The relatively low correlation among the various data streams on any particular emergency situation suggests that they are tapping into different aspects of the situation. We found that the combination of these different

indicators may serve as a reasonably well-behaved indicator. In addition, by using pairs of moving averages, we propose a potentially useful means of determining inflections in the risk trend based on the interaction, and in particular, on the crossing, of the two moving averages.

Before completing this discussion, some comments on possible problems of this approach is warranted as we have encountered cases where this approach simply does not work well. As exemplified in the case of North Korean famine, under reporting is a significant roadblock to this approach. Any time interval without any TRACE report would be completely meaningless. Although this problem can be usually overcome by using either a bigger time interval or better (including non-open source) intelligence, the solution may not be appropriate or not available in some cases. The fact that the composite index is not normalized to a range (such as 0 to 1) could pose a potential problem. At least, it will be difficult to determine the threshold value for any decision-making. With sufficient number of reports and therefore with a low value of uncertainty (e.g., 3 and 6 month moving averages in Figure 8), the inflection points of trend lines can be used in place the threshold values. However, if the uncertainty level is high due to under-reporting, the problem may prove to be difficult to resolve.

Barring significant under-reporting situations, we believe the TRACE approach outlined in this report can be used in accessing the current status of and the future projection of on-going emergencies, and provide systematic evidence to make informed judgments about potential interventions before they escalate into complex humanitarian emergencies.

VRA's web-based field event gathering system (the VRA® Knowledge Manager) has been refined in the course of this research for use on such emergencies. The system is capable of analyzing, integrating and visualizing the events data derived from the automated natural language parsing of news leads as well as the cataloguing the coded issues or topics. The TRACE composite status index and its moving average convergence and divergence are presented in the dashboard of the interactive software system to help summarize the current situation and to help facilitate informed analysis and decision-making. We suggest that the system's use in real-time monitoring of both news and field reports can contribute to a better tracking of emerging emergency situations that may escalate into full-blown CHEs.

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Miscellaneous Links to Websites

Transparency Intl.

<http://www.transparency.org/>

Part of a course syllabus out of Duke. Includes info on political risk.

<http://www.uwlax.edu/LS/PoliSci/manrique/pol443rc.htm>

IDP: good source for global stats on IDPs

<http://www.idpproject.org/>

Heidelberg Conflict Barometer

http://www.conflict.com/hiik/frame_en.html

Freedom House

<http://www.freedomhouse.org/>

Ten riskiest countries according to International Country Risk Guide (ICRG)

<http://www.prsgroup.com/commonhtml/toprank.html>

Copelan/O'Leary Risk Ratings

<http://www.prsgroup.com/commonhtml/toprank.html>

Table 1
Components of the Comparative Assessment

Context

Structural data or country attributes indicate risk propensity or vulnerability of countries to emergency situations.

Situation

The TRACE tool's *TRACES* serve to focus attention on potential CHEs by providing a protocol for systematic assessments over time; some TRACES may never evolve into CHEs in which case their constituent incident or periodic situation reports are simply stopped, and the "case" is closed.

Events, from field assessments

* *Incident and/or situation reports* provide structured, rapid assessments from the field, ideally using whatever information is available (we were limited in this study to open source media reports).

* We also drew from the *EM-Dat (the International Disaster Database)*, sponsored by the Centre for Research on the Epidemiology of Disasters or CRED and the U.S. Office of Foreign Disaster Assistance or OFDA, to provide baseline casualty counts for "mass disasters."

Events, from news reports

VRA has developed a frame parsing technology that auto-codes media reports into *events data*. These social, political, environmental and economic events data represent the "who does what to/with whom, when where why and how" of news leads. We are using output from the test cases to compare with the TRACE-based field assessments.

Issues

Frequency counts of reports by types of *topics or issues* as filed by news agencies are used as an indicator of media attention or international interest, which in turn we suggest is a proxy for the perceived relevance to or at least the likelihood of impact of any particular emergency situation upon the international community.

Table 2
Time-Series Used in the Analysis

	Name	Description	Definition
TRACE Indicators	Damage Intensity	Weighted sum of damage intensity (including threats)	[Casualties] + [Displaced] + [Property damage] for all TRACE reports with non-threatened status
	Damage Outcome	Weighted sum of damage outcome (excluding threats)	[Casualties] + [Displaced] + [Property damage]
	Instability Indicator	Weighted sum of instability parameters	[Scope] + [Urgency]
	Normalized Counts	Weighted sum of TRACE report counts	Count of TRACE reports
	Report Counts	TRACE report counts	Count of TRACE reports
	Risk Indicator	Risk indicator	[Agitation] + [Hostility] + [Openness]
	Threats	Weighted sum of damage parameters with threatened status	[Casualties] + [Displaced] + [Property damage] for all TRACE reports with threatened status
	TRACE Indicator	Combined TRACE indicator	[Risk Indicator] * (Average of [Damage Indicator] and [Instability Indicator])
	Conflict Indicator	Combined indicator for all TRACE reports for conflicts	Same as TRACE indicator, but for Battles, attacks or fighting alone
Related Indicators	News Indicator	News-based indicator (1 – Country Stability)	1 – [CS]
	Topic Indicator	Weighted sum of news report counts with relevant topics	Count of news reports with relevant topics
	Composite Indicator	Average of news, topic and TRACE indicators	Average of [News Indicator], [Topic Indicator] and [TRACE indicator]

Table 3
Correlation Between Different Indicators

Country	Count of Direct Actions	Count of TRACE Reports	TRACE vs. News	TRACE vs. Topic	News vs. Topic
Afghanistan	135	57	0.0421	0.0534	0.0988
Albania	107	14*	-0.1427	-0.3032	0.3048
Bosnia and Herzegovina	78	29	0.6852	-0.1795	0.1515
Burundi	49*	75	0.2098	0.0187	-0.0391
Guinea	20*	25	0.1960	0.2564	0.4041
Liberia	44*	10*	0.1962	0.1782	0.1593
Macedonia	136	31	0.6699	0.9449	0.6894
North Korea	35*	9*	0.3200	-0.1690	0.4676
Russia	612	102	0.5245	0.4648	0.1969
Sudan	74*	107	-0.0417	0.4254	-0.1126
Yugoslavia	219	51	0.6277	-0.0330	0.2332


* Counts lower than the threshold count that yields reliable indicator values. The threshold count for TRACE is the total number of intervals, 19, and for CS, it is 78, 4 times the total number of intervals, 19.

Table 4
Overall Trend of Composite Indicator Using 6-Month Moving Average

Country	Trend
Afghanistan	Gradually increasing
Albania*	Gradually increasing
Bosnia and Herzegovina	Steady with seasonal variations
Burundi	Fluctuating
Guinea	Reaching high towards the end of 2000 then decreasing
Liberia*	Fluctuating
Macedonia	Increasing drastically since 2001
North Korea*	Steady with seasonal variations
Russia	Gradually decreasing to reach a flat or slightly increasing stage
Sudan	Steady with slight increase toward the end of the study period
Yugoslavia	Gradually decreasing to reach a flat or slightly increasing stage

* With less than threshold count of TRACE reports

Figure 1
Content of a TRACE entry



TRACE

Tool for the Rapid Assessment of Complex Emergencies

- List TRACE's
 - By Date
 - By Reporter
 - By Country
- List Sit Reps
- Tools
 - User Settings
 - Display Settings
 - Events Display
 - TRACE Display
- Logout

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 Last Modified: 01/18/2002 15:39:05 GMT

*** Edit TRACE**

Update Delete Cancel Help

TRACE ID	103
Creator ID	VRA
Affected countries ?	Afghanistan
TRACE start date ?	7/31/2001
TRACE title ?	Afghanistan intra-state conflict
TRACE name ?	Afghanistan intra-state conflict
Notes ?	<div style="border: 1px solid gray; height: 50px;"></div>
+ Add Report	<p>Northern Alliance reports that 20,000 flee the Sang Charak district after the Taleban took over. (ID:82)</p> <p>Afghan tribe threaten jihad against the Taleban. (ID:83)</p> <p>Bombing of Kabul airport. (ID:86)</p> <p>Heavy fighting in the north. (ID:87)</p> <p>Northern alliance offensive (ID:91)</p> <p>Taleban threatens Russia. (ID:92)</p> <p>Taleban spring assault. (ID:93)</p> <p>Taleban makes territorial gains (ID:94)</p> <p>Threat of massive Taleban offensive. (ID:95)</p> <p>Break in ceasefire. (ID:96)</p> <p>Taleban cut oppositions supply line. (ID:97)</p> <p>military clash between Taleban and opposition forces. (ID:98)</p>

Figure 2
Content of a TRACE (incident / situation) report


 <p>TRACE</p> <p><i>Tool for the Rapid Assessment of Complex Emergencies</i></p> <p>List TRACE's By Date By Reporter By Country</p> <p>List Sit Reps</p> <p>Tools</p> <p>User Settings Display Settings Events Display TRACE Display</p> <p>Logout</p> <p><small>© 1996-2001 Virtual Research Associates, Inc. All rights reserved. Last Modified: 01/18/2002 15:39:05 GMT</small></p>	* Edit Report	
	Update Delete Cancel Help	
	Report ID	82
	Container TRACE	Afghanistan intra-state conflict
	Title of this report	Northern Alliance reports that 20,000 flee the Sang Charak district after the
	Country ?	Afghanistan
	Report date	1/28/2000
	Start date of reported incident	1/28/2000
	End date of reported incident	1/28/2000
	Type(s) of emergency ?	<input type="checkbox"/> Accidents <input type="checkbox"/> Natural Disasters <input type="checkbox"/> Clinical symptoms of disease, illness or malnutrition <input checked="" type="checkbox"/> Battles, attacks or fighting
	Status	<input type="radio"/> Completed <input checked="" type="radio"/> On-going <input type="radio"/> Threatened
	Geopolitical Scope ?	<input type="radio"/> Localized event not likely to affect people outside the region of immediate impact <input checked="" type="radio"/> Contained event likely to affect a significant portion of the population of a single country <input type="radio"/> Widespread event likely to affect the entire population of a single country <input type="radio"/> Uncontained event, likely to affect populations beyond a single country
Urgency ?	<input type="radio"/> Impact likely to undermine local capacities without eventual	

Figure 3
Conflict Carrying Capacity and Violence from News Media Reports

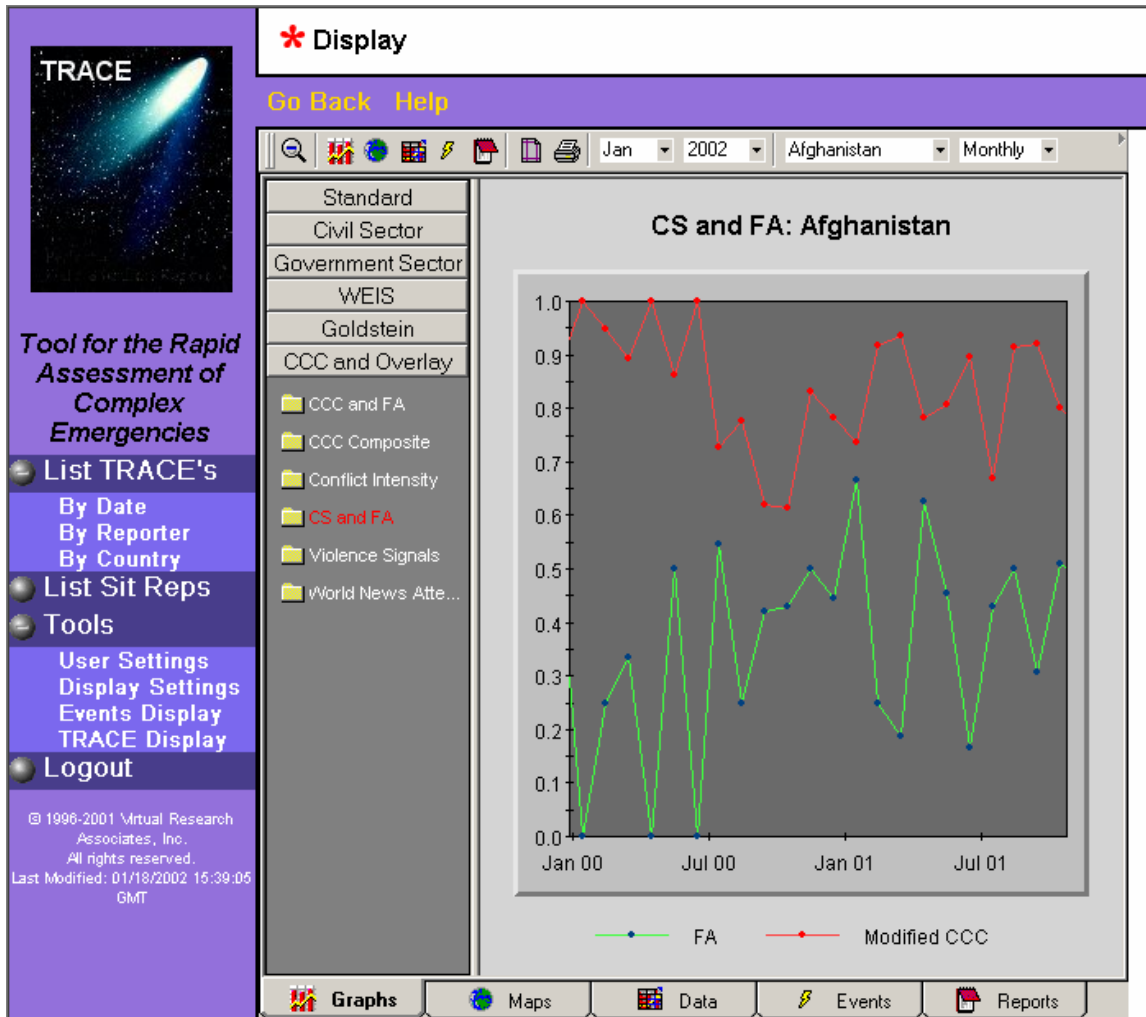


Figure 4
TRACE vs. News-Based Indicators

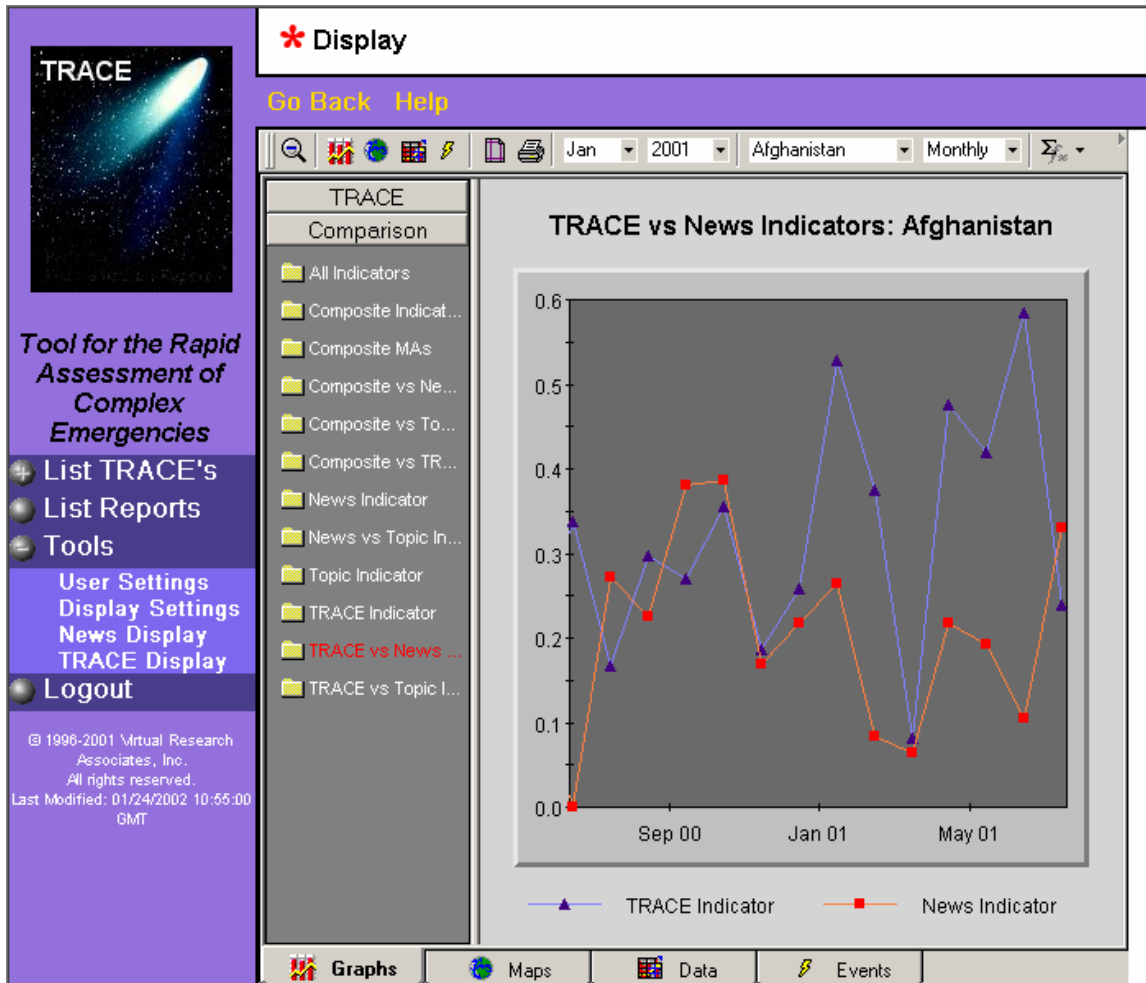


Figure 5
The Component Indicators of TRACE

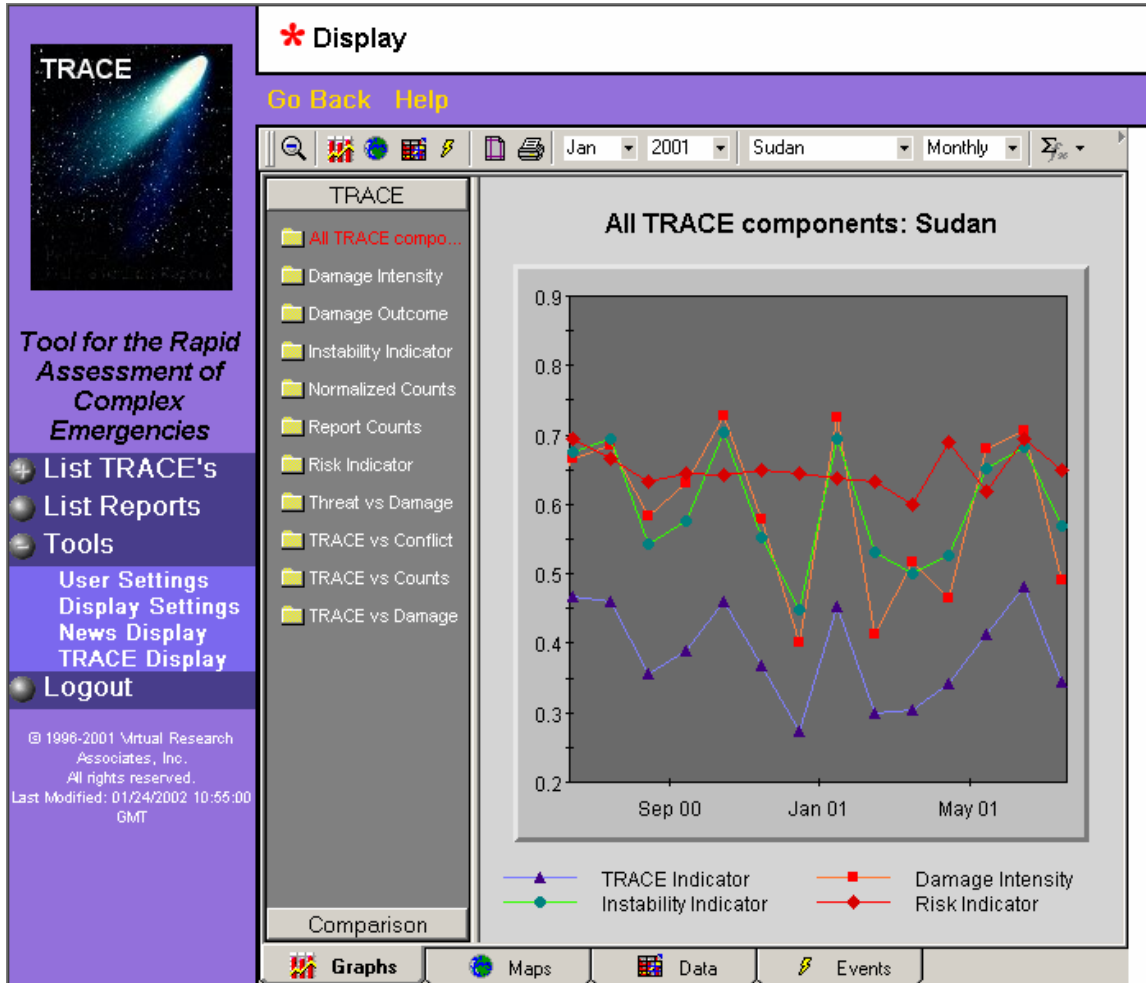


Figure 6
Analysis of Yugoslavia Using Bollinger Bands

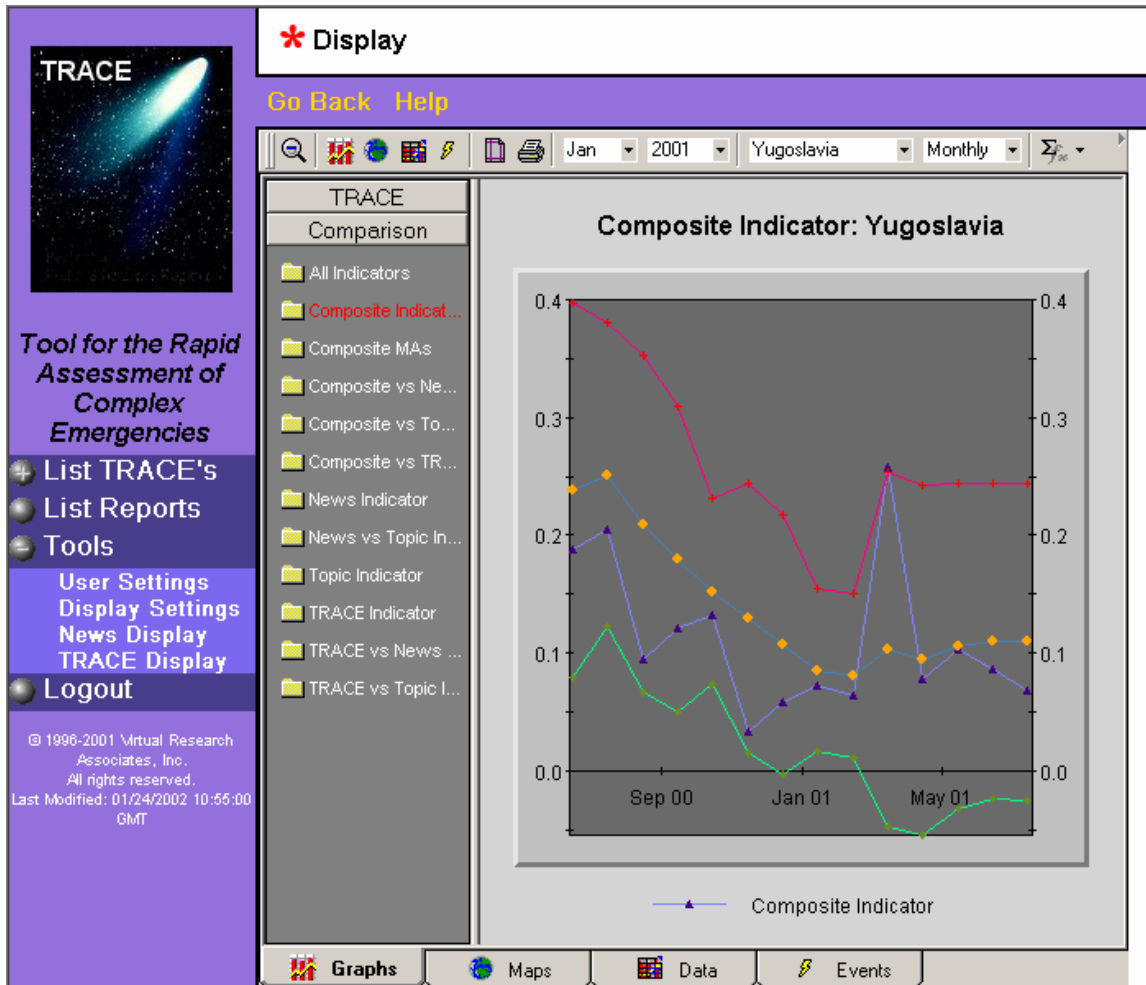


Figure 7
Timing of Precaution When the Overall Trend is Steady or Up

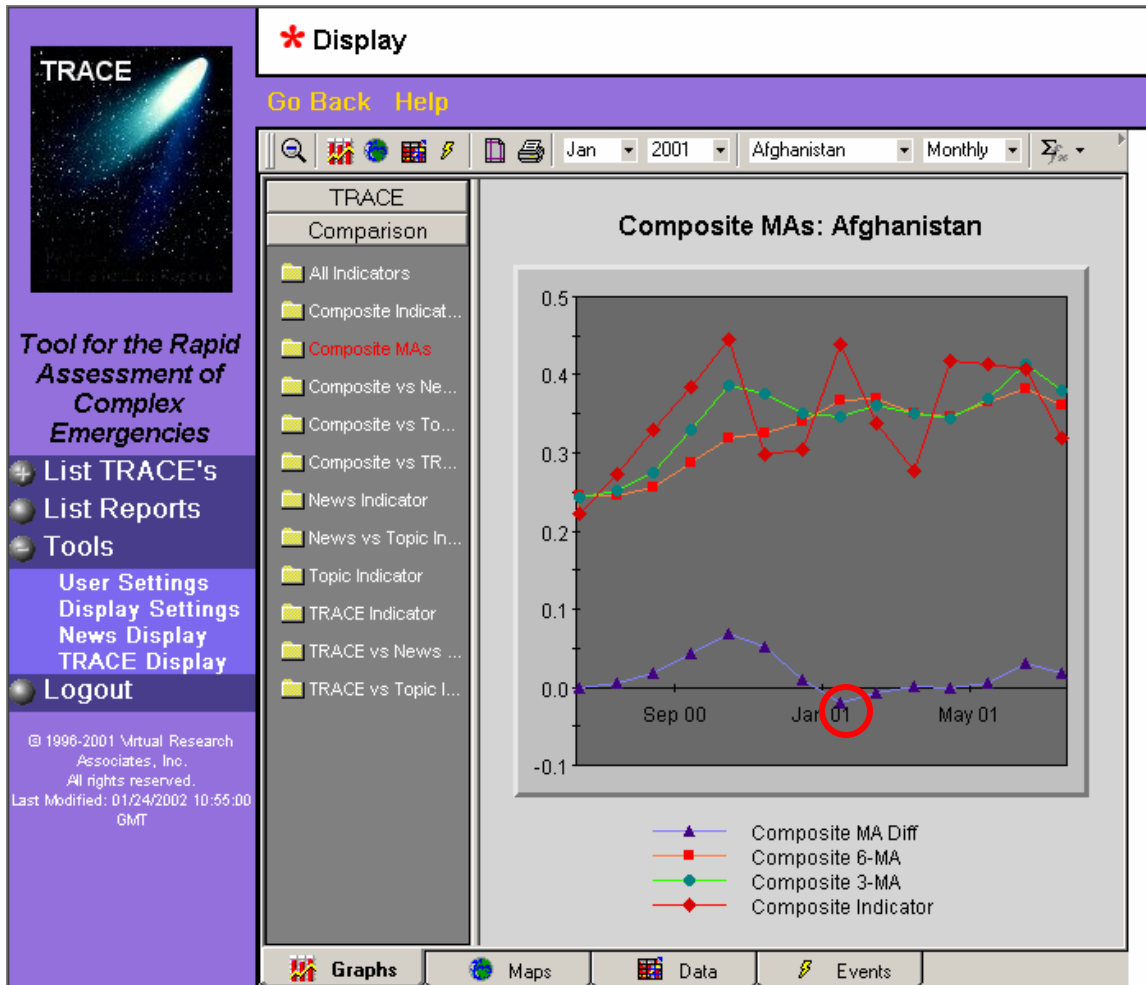


Figure 8
Timing of Precaution When the Overall Trend is Down

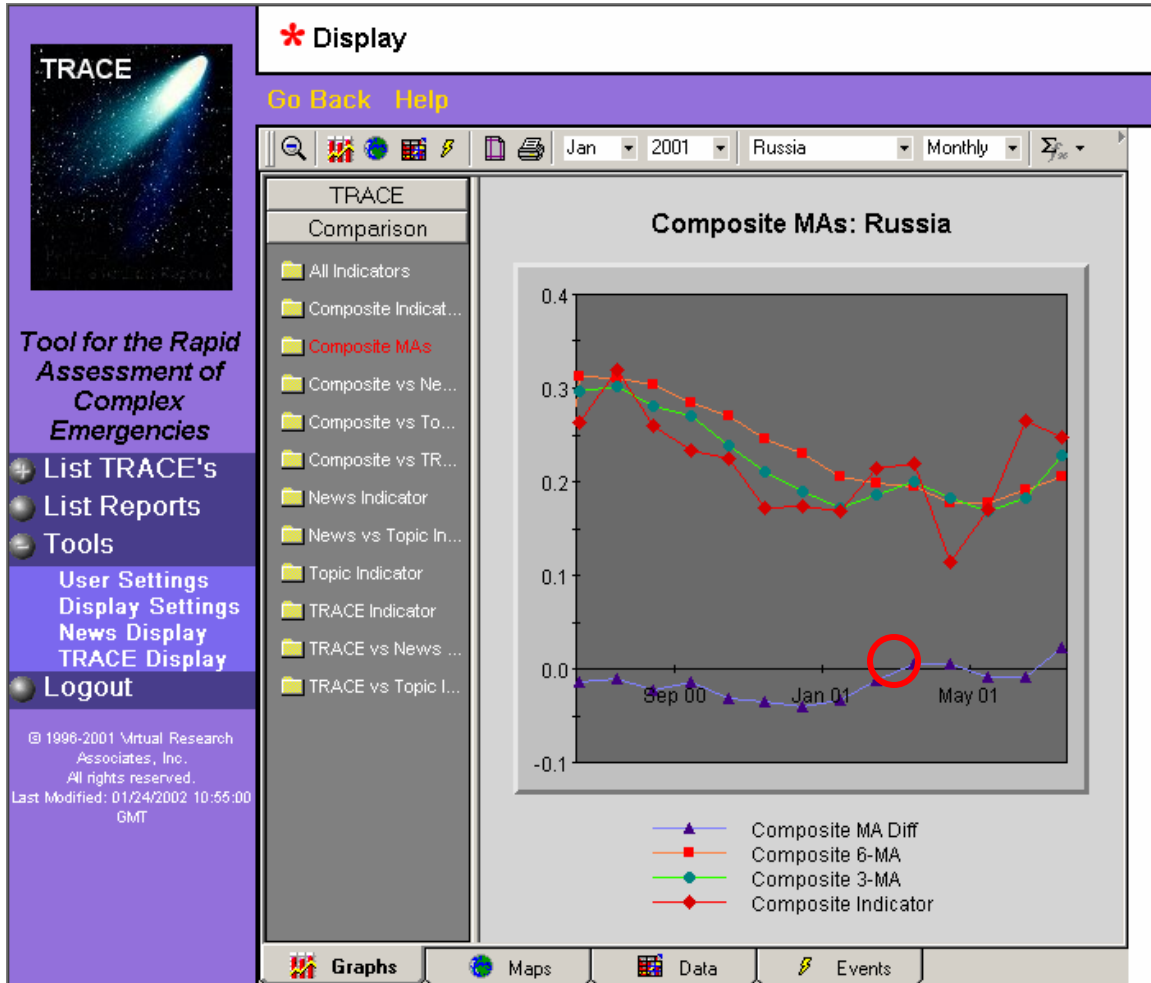


Figure 9
Timing of Precaution When the Overall Trend is down

