CHANGES TO THE DISASTER DATABASE PROJECT

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A Disaster Database Project Configuration Document

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This white paper addresses and documents the reasons for and form of possible changes to the existing Disaster Database Project as part of its evolution.

MOTIVATION FOR CHANGE

As currently structured, the Disaster Database Project has proven to be an effective tool for basic student research and for quick reference by faculty members. However, the growth in size of the database suggests the need for improved search capabilities and for additional reports. At the same time methods of analysis, such as those suggested in the analysis of conflict by Bloomfield and Moulton (1997) and Dupuy (1985), offer the potential for driving other disaster analytical tools from the database.

INTRODUCTION OF GEOLOCATION

There are a wide variety of possible options for the introduction of geolocation of disaster events using the Disaster Database Project. The key issues are the fineness of the geographic information that might be available and the ability to display that data in a useful way.

We already have a crude geolocation capability allowing sort by country, region (for those events that spill over national borders), or ocean. However, data is not currently exported to any type of graphical display, and thus depends on the user’s ability to visualize spatial relationships.

Unfortunately two characteristics of available disaster data would seem to limit the ability to geolocate events. First, few events are reported in an accepted geographic coordinate system (such as latitude and longitude, Universal Transverse Mercator, or GEOREF). More often events are “approximately 50 miles southwest of Kandahar,” requiring first the location of Kandahar and then an extrapolation as to the likely location of 50 miles southwest as a position report. Even those that are reported by latitude and longitude, such as earthquake epicenters and vessel sinkings, require considerable search activity to locate the positions.

Second, disaster events often are characterized by large impact areas. If the Mississippi, Limpopo, or Yangtze Rivers flood, the impact covers a broad area, measured in the thousands of square miles. How do we geolocate the flood to a single coordinate position?

In an ideal architecture, I see three ways to export disaster location data that would increase the usefulness of the Disaster Database Project. Two of these increase the value by displaying approximate relationships in a gross and political sense or in a relative spatial sense.
(1) Creation of a display that would show the count of disaster events, either in aggregate or by a specific type, superimposed on a country and ocean map. This would show only the grossest relationships, primarily based on political boundaries.

(2) Creation of a display that would show approximate locations within a grid system for events. This approach would show relative spatial relationships and density of events.

(3) Linking to a geolocation system that allows the placement of a specific event on a small scale map display with a fine level of detail and the capability to zoom to a large scale display.

The grid system that seems most easily used for a grid display is the Maidenhead Grid, created by the amateur radio community for use in locating radio stations. Maidenhead grids are 1 degree of latitude (60 nautical miles) by 2 degrees of longitude (120 nautical miles at the equator, decreasing as the latitude increases) and are identified by two letters and two numbers (American Radio Relay League 2001). Grids are typically displayed in a Mercator projection.

TWO CLASSIFICATIONS OF CLASSES OF EVENTS

The existing database uses three classes of disaster events, Natural Disasters, Human Systems Failures, and Conflict Based Disasters, as suggested by Green and McGinnis (2002). However, Missal (2003) suggests the importance of classifying disasters by both the traditional causation method and by characterizing impact. This appears to be almost a unique approach to disasters, linking the cause with the way in which that cause is most felt, and should be incorporated in the design of the Disaster Database Project. This would require the installation of a second event class field for Impact Class and the labeling of the existing field for Causation Class, in the place of Class of Event. Although the impact taxonomy is not established, the following may be useful categories:

- Populations (including people, domestic animals, and society, economics, politics, and culture)
- Infrastructure (the built environment and transportation systems)
- Environment (impacts primarily on geography, flora, fauna excluding domestic animals)

PHASES

Bloomfield and Moulton (1997) strongly emphasize the importance of phases in understanding international conflict as it is examined using the CASCON conflict modeling software. There is one generally accepted model of disaster phases, a circular progression of mitigation, preparedness, response, and recovery (United States 1989). However, this is a programmatic model that makes sense for federal funding initiatives, but not for an examination of disaster causation, impacts, and response. In 2001, based on work by a variety of authors, I suggested a disaster-centric phasing, as well as response phases. These schema, however, do not completely capture the needs of the database which attempts to divide what may be a limited amount of information about a specific event into causation, impact, and response. Neither does the current structure of the Disaster Database Project, which uses a two phase approach, Description and Response.
For future use, I suggest the identification of five phases, not all of which will be present in each event, and for not all of which data may be available. The first three phases combine a number of possible phases and are disaster centric. The last two phases are human disaster management processes centric.

- Phase I - Prodrome (describing the presence of events which readily identified the possible development of this event, even if such ready identification only occurs in retrospect)
- Phase II - Development (the sequence of events that lead immediately to the disaster event)
- Phase III - Impact (the primary and secondary sequences of disaster events during which the disaster makes itself felt on populations, infrastructure, and the environment)
- Phase IV – Response (actions undertaken to control life, protect property, restore critical services, and control the disaster)
- Phase V – Recovery (actions taken over time to restore the impact area to normal function and to reconstruct or develop).

CODING EVENT TYPES AND EXPANDING SEARCH CAPABILITY

Currently event types in the Disaster Database Project are described in plain text – with the capabilities of modern databases it appears practical to continue this for the major type description. When the databases was first constructed we assumed that two additional fields might assist search activity – Associated Events and Linked Events fields – but that searching in these fields could be done productively by returning to the main menu and querying either a new type (based on the Associated Events) or a specific event by name (Linked Events). This remains valid for Linked Events, those in which different significant impacts with a basic shared causation are described as two events.

However, for Associated Events, this is not the case. These events are described in a single database entry, but have effects of a variety of types. As a result an examination of event A1 may show two or three cases of A type events in the database. Associated Events listed for A1 might be types B and C. A search of those classes reveals incidents B1, B2, B3, C1, and C2. However, event D7 and G12 might also list B as an Associated Event; with the current search architecture D7 and G12 would only be located as sharing characteristics with event A1 by happenstance of the researcher stumbling across them.

This suggests that it may be productive to improve the search capabilities by:

1. restructuring the existing fields as necessary to allow a search of Associated Events. At the same time an advanced search should allow a search for a specific type of event to locate events classed as both a primary and an associated event. At present it seems productive to have two levels of search by type – a primary type search to capture events that are clearly distinguished as being of a type and a primary plus associated event search to capture all related events.
(2) Introducing a simple three-letter coding system for all event types. The more letters that must be typed in describing an event, the greater the chance of a purely typographical error that could exclude an event from a search. Entry of the primary type for the event would still be based on a pull-down menu, but Associated Events would be loaded as the three-letter designators.

FACTOR IDENTIFICATION

Bloomfield and Moulton’s (1997) CASCON model depends heavily on the identification of factors in each phase that contribute to or retard the development of a conflict. Although it is too early to identify how such a factor set could be used in a disaster analysis system developed from the Disaster Database Project, it seems that identifying and coding for a factor set is almost certainly a productive tool. Such factors should identify causation (Phases I and II), effects (Phase III), and response actions (Phases IV and V). The existing descriptions of the events and the response should provide a basis for the initial development of a list of factors.

Although CASCON uses a complex method to rate the impact of each factor, it would seem that a relatively simple scale may suffice:

- 1e - increases the impact of the cause or effect
- 1r - decreases the effectiveness of the response
- 2e and 2r - has no obvious effect
- 3e - decreases the impact of the cause or effect
- 3r - increases the effectiveness of the response
- 0e or 0r - confirmed as not being a factor for this event
- X - unable to assess

The logic of this scale is that an increase in impact and a decrease in the effectiveness of the response will both lead to greater costs, loss of life, property damage, environmental impact, etc. Similarly a decrease in impact and an increase in effectiveness of response should reduce costs, loss of life, property damage, etc.

The end desired output will be the ability to determine for each event whether a particular factor was involved and to what extent that factor contributed to the outcome. In the short term, presence of factors could be identified in the phase narrative by inserting the factor number and the rating in parentheses in the text.

ABILITY TO TOTAL NUMERIC FIELDS AS REPORTS

The database has recorded a sufficient number of disasters to start to be useful for the development of certain numerical data. The development of a report that could provide basic data on fields such as number killed, injured, and displaced, area covered, and number of buildings involved would be useful. Ideally such reports should give the user the capability to do a gross summation of all cases in the database and a fine summation of a specific combination of class and event type or class, event type, and country, or any combination for a specific year.
WORKS CITED


