Abstract

The interaction with and interpretation of digital geographic information are usually complicated and cumbersome tasks. Complex Geographic Information System(GIS) databases and software require highly trained technicians to provide information to non-technical decision makers. The growing needs of community planners along the US/Mexico border demand more immediate access to important geographic information. The problem is compounded by a Spanish/English bilingual environment. This project provides an initial solution with an ArcView2 based geographic user interface. The interface provides the meaningful display and analysis of geographic data. The functionality of the interface focuses on industrial hazardous material release and emergency response planning in the Ambos Nogales US/Mexico border community.

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Dedicated to my wife Edurne and son Nicholas
for all their help, patience and support.

Introduction

Rising interest in Mexican/US. border environmental issues has led the governments to agree to cooperative research and policy regarding border problems. This agreement has led to the access and production of extensive human and physical geographic information in digital form. These data are very comprehensive and complex in nature. The meaningful interaction with the digital information can prove to be a very difficult task. The international aspects of the border situation creates further cultural and linguistic issues on perceptive and interpretive levels (Mark and Egenhofer, 1995).

The involvement of the University of Utah Geography department in the border project has generated quality research and information (Hepner, 1995). This geographic data is in the form of Arc/Info data formats. Arc/Info is a Geographic Information System (GIS) software developed by Environmental Systems Research Institute (ESRI). The categorical extent of the data comprises many different layers. The layers include road networks, shelter, school and hospital locations, census and land use information, and topographic information.

Municipal and federal officials on both sides of the border have common interests in the collaboration of border community planning issues. The basic needs of the interested parties are the access and meaningful interaction with the available data. This technical project addresses these needs by providing a customized ArcView version 2 (ArcView2) Border Evacuation Interface (BEI) to interact with the existing geographic information. ArcView2 is an ESRI desktop GIS product. It is a powerful tool that gives the ability to explore, query and analyze geographic data produced by Arc/Info (ESRI, 1994a). The BEI facilitates the display and query of complex geographic data layers pertaining to the Ambos Nogales border region. The focus of functionality is on interpretation of data and analysis pertaining to industrial hazardous material release and emergency evacuation response planning.

The BEI utilizes the ArcView2 Avenue programming language to provide the customized functionality. Arc/Info network and grid analysis research is utilized to provide scenarios for evacuation zone identification, evacuation path generation and shelter allocation. Dynamic capabilities allow the query, display and report of affected schools/hospitals, shelters, roads and population within evacuation zones.

The interface is written in both English and Spanish. The bilingual nature of the BEI will enable decision makers in both countries to share the same information. The sharing of information make possible more effective emergency response planning and cooperation between the border communities. The current application is not intended as a decision support tool. It should only serve as an aid in the communication of data and complex analytical concepts. Future development of the interface with ArcView3 could possibly include more dynamic features to support decision making.

Objectives

The purpose of this research is to meet four basic objectives. First and foremost is to show how a GIS interface can facilitate the interaction with and analysis of complex digital geographic information.

Secondly, the interface must be designed in a matter that is mechanically and conceptually meaningful to both English and Spanish speaking users.

The third intent of the research is to provide static and dynamic emergency hazardous release response analysis. Various release response scenarios could provide assistance in response planning and disaster mitigation analysis.

The fourth objective is to illustrate the potential usefulness of such an interface for the analysis of other scenarios.

The human problem

The situations encountered in most border communities are categorically similar. The typical sister border cities interact economically and culturally as one community, but are separated by the individual countries federal and local laws (Herzog, 1990). The differences in environmental regulations have increased industrial development and population densities in the Mexican border communities. This situation is leading to unhealthy living conditions and an increased exposure to intentional and accidental industrial hazardous material release (Bowen et al., 1995), (Lowry, 1994), (Hepner and Finco, 1995).

The economic, cultural and ecological interaction of the border communities requires that a higher level of cooperative planning be obtained. The impact of hazardous material release in areas of high population density could be potentially disastrous (Cannon, 1995), (Lowry, 1994) .

The recent cooperation between the two governments in addressing the problem has made international community planning possible (EPA, 1991), (Kamp, 1991). It would be beneficial that both sides interact with the same information on the same conceptual level. The bilingual aspects of these needs present some interesting issues. Language influences how humans perceive, conceptualize and reason about spatial characteristics and interrelationships. The differences between languages introduce complex interpretive uncertainties. The problem is compounded when cognitive powers attempt to describe and model observed spatial characteristics (Mark and Egenhofer, 1995), (Driever, 1990).

The technical problem

The recent attention to GIS interface design has produced increased focus on human-computer interaction (Mark and Gould, 1991),(Gould, 1989). This focused attention has produced many ideas on interaction and interpretation of attributed spatial data. It is crucial to identify and define a structured set of GIS coverages that will define the interface functionality (Volta and Egenhofer, 1993).

Much of the available digital geographic information for the border region is in Arc/Info raster and vector data format. These data contain information describing many different categories of information. The definition of the data must not only account for its physical characteristics, but also how humans interact with geographic information on a cognitive level (Mark and Gould, 1991). A set of rules must define how the interface is used for data interaction and analysis. These rules must also adhere to basic human interface design principles. The spatial and non-spatial data must be properly and meaningfully represented to the user (Volta and Egenhofer, 1993). The most basic design principles can be taken advantage of and applied to a bilingual interface environment (Apple, 1992).

Literature Review

Bilingual Space

The interpretations of spatial relations between Spanish and English can be quite different. These differences often uncover many similarities. This is illustrated in the study of 32 native speakers of English and 19 native speakers of Spanish by Mark and Egenhofer (1995). The English speakers were asked to draw examples of 64 spatial relation descriptions of roads and parks. The Spanish speakers, however, were

asked to draw only 43 examples of the same spatial relations. Although the differences in descriptions varied, the authors concluded:

> " ...2522 of the 2856 drawings (88%) fell into just 5 spatial relations, roughly equivalent to 'inside', 'outside' (disjoint), 'enters', 'crosses', and 'goes to'. Evidently there are many ways in English and Spanish to express relations approximately corresponding to the English inside, outside, enter, cross and goes-to, and relatively few verbal compact ways to express other spatial relations between roads and parks, perhaps lines and regions in general. The topological results suggest that English and Spanish are very similar in the ways they express road-park spatial relations..." (Mark and Egenhofer, 1995)

Although this study only pertains to roads and parks, the same ideas can be applied to similar relationships in other types and categories of geographic information.

The potential similarities and dissimilarities that languages generate can be alarming. The similarities might indicate that spatial relations are categorized independently from language (Mark, 1995). The dissimilarities would then reveal the distinction in how language defines the categories.

Despite the similarities, there are significant differences between Spanish and English in the classification of spatial type and use. Linguistics determines how a language defines and communicates information. The information has to have a carrier which is able to transmit and store messages (Lindholm and Sarjakoski, 1992). This idea applies to the display and conceptual interpretation of spatial relations. Linguistic diferences between spatial relations are addressed by Driever's concept of 'Linguistic Relativity'. "Linguistic relativity holds that people living in different environments develop specialized vocabularies reflecting their experiences and needs... words, thought and reality are related or correlated principally through the medium of culture." Driever continues, " The principal of linguistic relativity provides a geographically oriented methodology for obtaining a deeper understanding of why a language has evolved as it has." (Driever, 1990). Culture affects how one views the world around them and also defines how environmental danger is perceived. The differences in cultural standards of living directly influence the general awareness of how language communicates what is perceived as a hazardous threat.

Figure 1, the "Semiological Triangle", graphically represents Driever's philosophy of "Linguistic Relativity".

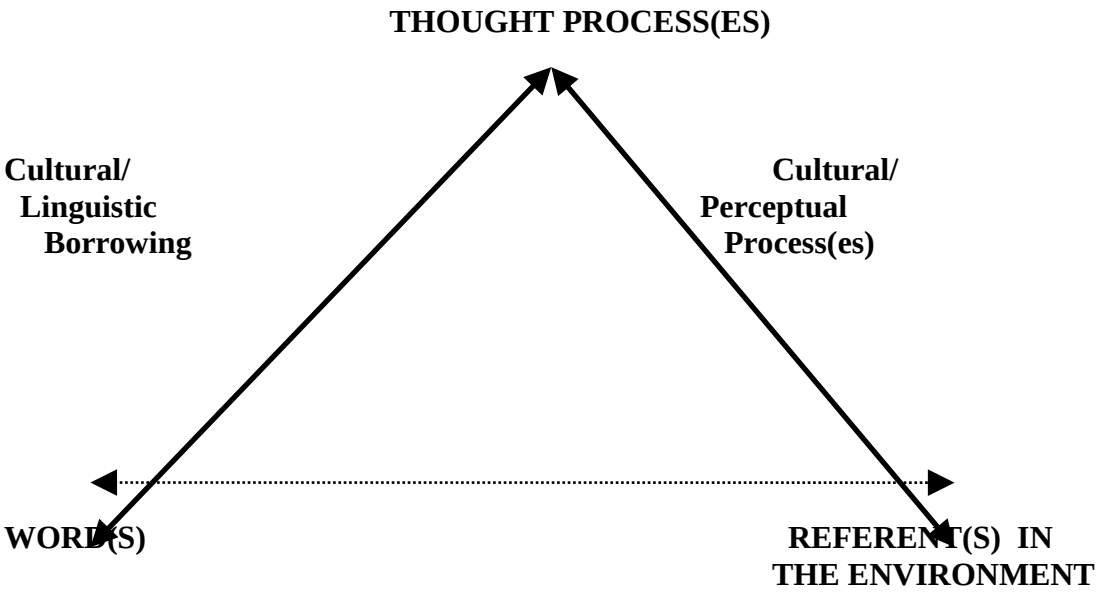


Figure 1. Semiological triangle for the study of linguistic relativity (Driver, 1990).

The general idea behind Driever's concept is that not only language, but cultural surrounding is a significant influence on how an individual conceptualizes and rationalizes their geographic surroundings. This concept directly influences not only how an individual perceives their immediate geographic surrounding but also how it is described. This geographic, linguistic philosophy is one of the basic principles addressed and communicated by the BEI.

The "Semiological Triangle" communicates that the conceptualization of information is performed by higher thought processes than the actual verbalization of speech (Driever, 1990), (Mark, 1995),(Mark and Egenhofer, 1995) . This is represented by the top of the triangle. No matter how many different ways there are to communicate a concept, the translation can never account for the effects of culture on how an individual conceptualizes their geographic surroundings (Driever, 1990). The conceptualization of observations are directly affected by cultural perceptions. This is represented by the right portion of the

triangle. Thought processes translate the observations with language into words which describe the observations. This is represented by the left portion of the triangle. The solid lines represent the direct relationships between observations, culture, thought process, culture and verbalization (Driever, 1990). The dotted line represents the indirect relationship between observations and their descriptions. Most importantly, the dotted line represents the difficulty in communicating geographic concepts in a bilingual context.

The importance of linguistic triangles relies more on the communication of information than the conceptualization of ideas. Initial short term training courses regarding the nature of environmental and occupational health hazards have provided important information to Mexican health inspectors (Lee, 1995). The continued education of officials and the general population will eventually lead to a higher respect and cultural understanding for environmental health hazards. The current differences in cultural awareness between interested American and Mexican parties, however, need to be addressed by simplified interface interaction and design.

Another common problem with most GIS's is the manner in which data are queried. Many traditional query techniques focus on data structures to improve retrieval of spatial information. While these techniques have proven effective, the use of newer strategies improve speed and provide validation. A newer query method is the use of spatial constraints in the analysis process. Spatial constraints not only speed up the response time by pre-defining specific object areas and attribute categories of interest, but also help in assessing the consistency and validity of a spatial query. The consistency is measured by the absence of logical contradictions among the different constraints. (Egenhofer, 1994)

Another general problem of most GIS's is that they do not take into account the human side of computer interaction. Many systems have been designed to be so complicated that extensive time and money are involved in training (Volta and Egenhofer, 1993), (Mark and Gould, 1991).

There are many different methodologies of GIS interface design, but all have common principles and characteristics. The most important interface design principle is the "Metaphor". The knowledge that the people have about the world around them can be used on a computer desktop to portray different actions, features, concepts and descriptions (Apple, 1992), (Gould, 1989). These metaphors are represented on the computer by small pictures or 'icons' that depict a certain action or feature. This idea can be

illustrated by the use of file cabinet and folder icons to represent directory organization of computer files or by a stop sign icon to indicate stopping a running query. These types of metaphors can help transcend the communication barriers caused by language differences (Apple, 1992). The issue of language is not the only concern when working in an international setting. The impact of culture on how basic objects are visualized can dramatically change intended symbols and graphics. According to Apple Computer Inc. , "It's much easier to include ... compatibility from the beginning of the development process than to try to incorporate support ... after your product is complete (1992)."

Direct manipulation of data and objects are also good approaches to simplifying user interaction. A file, icon, or object can be visually selected with a pointing device, typically a mouse, and physically clicked, opened and/or dragged to produce a certain result (Apple, 1992), (Mark and Gould, 1991). This manipulation helps give the user the feel that they are directly controlling the actions displayed on the computer desktop. Direct manipulation is another important tool for creating bilingual interface designs.

The use of text pull down menus helps categorize different groups of functionalities (Mark, 1991). The menu offers the ability to execute a desired action by the selection of a text keyword. The keyword used must be carefully selected to represent the intended functionality. The interpretation of these keywords can prove to be a delicate task and often causes confusion. Text can also grow very large when translated. Spanish text can often become up to 50% larger than the original English version. One must account for the difference in space when designing an interface layout (Apple, 1991).

Command line interpreters and form fill-in have been popular mediums for interacting with existing GIS interfaces (Mark, 1991). The necessity to supply a specific parameter and/or argument does not comply to the desired simplicity of a bilingual interface in a border environment. It is more effective to utilize the design principles of metaphors, direct manipulation, and menu selection. This idea gives the functionality of "What you see is what you get". All functionality are directly represented on the desktop and/or in pull down menus. The user is given complete control in identifying, initiating, and controlling specific actions (Apple, 1991).

Current Activities

Public awareness of community vulnerability to industrial hazardous material release has increased in recent years. This increased awareness has led to the research and development of many

theories and models addressing the subject. Lowry (1995) identifies the importance and current status of community vulnerability analysis studies. The current studies of Cannon (1996) have revealed many interesting activities regarding the research of emergency response analysis and GIS interface integration. The current trend seems to indicate that existing systems are designed for specific high end user analysis.

Environmental Systems Research Institute (ESRI) has recently undertaken the two fold task of developing a tool, Arcview, to interface with complex geographic spatial and non-spatial data (ESRI, 1994a). A second task has been the development of support for hazardous and solid waste management and emergency response planning (ESRI, 1993). These developments seem to conform to non-specific interface design and analysis functionality. They do provided the ability for experienced end-user customization (ESRI, 1994b).

Language Translation

Authoritative sources of translation are an important factor in the development of a meaningful user interface. The different Spanish language references offer many different perspectives into the representation and description of geographic spatial concepts and relationships.

Batini's book "Diseneo conceptual de bases de datos: Un enfoque de Entidades-Interrelactiones" (1994) focuses on the specifics of database design and entity interrelations. It is a very technical look at the complex relationships of data in general. It offers some unique explanations of object interrelationships. The information in this book provides excellent examples of complex relationships described in Spanish.

The "Diccionario tecnico" (Malgorn, 1990), "Diccionario de Informatica" (Olvetti, 1993) and the "Transboundary resource inventory glossary" (Texas, 1995) all contribute important English-Spanish and/or Spanish-English translation references. These books provide the comparison to and validation of personal knowledge. The combined resources offer bilingual information on spatial, computer, environmental, cartographic and hazard vocabulary usage.

The "Geographia General" (Valenti, 1986a & 1986b) series is a two part text book. The first part covers physical geography and the second part covers human geography. These books supply important correlation between geographic terms and concepts.

Project Methodology

The main concern of this project is the development of a bilingual user interface to geographic information for industrial hazardous release and emergency response planning. The interface is designed to facilitate the display and analysis of existing digital geographic data for the Ambos Nogales US/Mexico border region. The basic interface functionality could be applied to other border regions with identical data type and format.

Environmental System Research Institute's (ESRI) Arcview Version 2 (ArcView2) desktop GIS product is used as the basis for the geographic user interface. ArcView2 is a powerful tool that gives the ability to explore, query and analyze geographic data (ESRI, 1994a). It provides the fundamental foundation for organizing interface functionality into specific classes and relationships. This style of organization makes Arcview2 an object-oriented system. Object Orientation is not a new idea, but has recently become of topic of increased interest and application. The concepts of Object Orientation can be applied to two basic categories: Object Oriented Interfaces and Object Oriented Programming. ArcView2 utilizes both of these categories.

The Object Oriented User Interface

The ArcView2 graphical user interface is organized into specific classes. The class hierarchy dictates the inheritance relationships between specific objects. (Definition of inheritance). These relationships directly control the available functionality given to the end user at any specific time. Figure 2 illustrates the basic object classes and relationships of the ArcView2 graphical user interface.

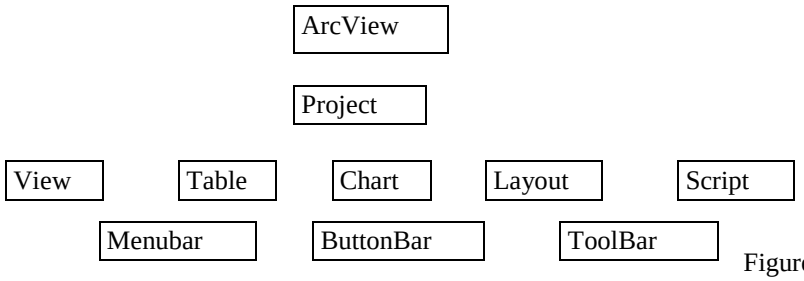


Figure 2. Basic ArcView2 class relationships

The superclass object is the application itself. All other objects inherit functionality from the ArcView class. The methods of the ArcView class are mostly related to creating, opening and maintaining a project window. Within the project window reside all other application object classes. The remainder of application objects are of class document or control. The document class organizes documents into functional categories. The nature of these categories explicitly define their inherent functionality. This inherent functionality of a document class dictates what controls classes can be applied to a specific document class at any given time. The control provided by this object oriented design provides a more natural, intuitive approach to interface use.

The provided example of ArcView class hierarchy only illustrates the very basic object definitions and class relationships. Each document and control class has its own particular set of subclasses and those subclasses have their own subclass, etc. The bottom level classes which have no subclass of their own represent the most basic functionality of the ArcView2 interface.

Object Oriented Programming

The nature of the ArcView2 interface not only makes it very functional, it also makes it customizable. This fact alone is what makes the generation of a specifically designed interface possible. A View document can be altered to contain new control objects, i.e. add a button, tool or menu item. Each new control object has it owns set of methods. The methods of any interface control object are defined by Avenue. Avenue is a object-oriented scripting language and allows users to program specific analysis, query, and display functions (ESRI, 1994b). Avenue can be thought of as a object oriented macro language. All interface object's methods are defined by Avenue scripts. Existing scripts can be studied and altered or user designed scripts can be added into the ArcView object class hierarchy.

The development of the Border Environment Interface required the introduction of a whole new class of objects. This set of objects includes the addition of interface and programming objects. These new objects are designed to inherit from the View document object. The new object class is named "Nog" and its relationship to the View object class hierarchy is illustrated in Figure 3.

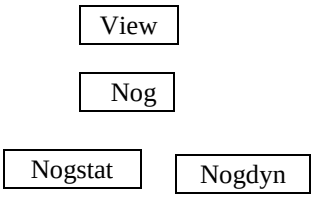


Figure 3. Nog subclass inheritance relationship

The framework provided by ArcView2 enables the Nog class and its subclasses to inherit the characteristics of the View class. Specific View class attributes are automatically available to the Nog class, i.e. map extent, active themes, selected sets, drawing symbols etc. The BEI components are also inaccessible unless the View document class is the current active object.

ArcView Bilingual Compatibility

The basic nature and abilities of ArcView2 and the Avenue macro language directly define the possibilities and limitations of a bilingual interface. The ability to easily attach help tags to any object simplifies the bilingual nature of the BEI. Research and development of the interface led through many different uses of tool and button metaphors. Metaphors fail to accurately depict the description of less common functionality without the help of descriptions from on-line help tags. The BEI relies mostly on menu keywords. These keywords are also accompanied with their on-line help tags. The menu keywords and their help tags are easily translated while the functionality and flow of the application remains unchanged.

Nature and Source of Data

ArcView is designed to display and analyze Arc/Info format coverages. Coverages store spatial and attribute data. These coverages are grouped into categories. A categorical coverage is defined by Volta and Egenhofer (1993) as a set of data that organizes spatial domains according to the properties of pre-defined attribute domains. The perceptive and physical changes of an attribute domain will alter the characteristics of the spatial domain. A category would therefore group the attribute characteristics of a spatial domain, i.e., land use, population, terrain etc. Arcview presents these data categories to a user as "themes". The themes define how ArcView2 represents the spatial data on the display.

The BEI utilizes themes based on existing Arc/Info coverages containing categorized geographic data pertaining to the Ambos Nogales border region of Nogales, Arizona (USA) and Nogales Sonora

(Mexico). The data have been generated as part of ongoing and completed research at the University of Utah's Department of Geography.

The nature of the different research resulted in many forms and versions of categorized data. Display and analysis functionality directly rely on the nature and content of this geographic data, both graphical and tabular.

A discrete set of coverages was identified in order to ensure reliable and consistent results. The name, type, and source of each coverage that is used are listed below. All coverages are in UNIX workspace, Arc/Info format.

Roads

The roads coverage contains different road types in attributed arc and route features. It also contains evacuation path route classes and network centers. The attribute characteristics of this coverage range from street direction and speed limit to average capacity and distance. This coverage is the source for the "Roads" theme and all evacuation path themes. The roads coverage was copied from the coverage "net". (Cannon, 1996)

Schosp

The schosp represents all schools and hospitals. The coverage contains attributed point features. The attributes include location, type, and enrollment or capacity. Many schools or hospitals might also be designated shelters. This coverage was copied form the archive schosp coverage. (Lowry, 1994)

Shelters

The shelters coverage contains point data depicting the locations of identified evacuation shelters. The shelters are described by name, type, address and capacity. The points where generated from the network centers information contained in the "net1" coverage. The "Shelters" theme uses this coverage for its data source.

Industry

The industrial coverage contains point attribute features. The attributes consist of: name and number of employees. This coverage was copied from the archive industry coverage. (Bowen, 1995)

Census

The census coverage contains polygon attribute features with census attribute data. This coverage was copied from the archive census coverage .(Lowry, 1994)

Evacuation zones

All evacuation zone are graphical polygon data; The nature of the different classes of evacuation zones is discussed individually in the description of the interface.

The correct operation of BEI requires that the appropriate ArcView themes are properly defined. This process has been automated by the interface. The "Add default BEI Themes" tool,  , adds all required default themes for the user. The use of the interface also produces many resulting themes and tables. The "Add default BEI Themes" tool can also be used to reset the interface. Any existing tables and/or themes are deleted before the default themes are added.

Interface Functionality

The main intent of the BEI is to provide easy access for the review and analysis of the above mentioned data sources. It is specifically designed as a tool for the display of airborne industrial hazardous release and emergency response planning information. The interface structures the way in which a user interacts with the data and retrieves information.

There are two basic components of the interface. The first component, or "Scenario" component, utilizes evacuation pathway allocation research to provide a scenario that demonstrates the abilities of Arc/Info Network analysis. These abilities include the display of evacuation route and shelter allocation scenarios based on a sample airborne hazardous release site. This display ability relies on the results of previous research and should only serve as an example. This type of interface functionality provides a static view of the analytical capabilities of Arc/Info.

The second component, or "Dynamic" component, of the interface provides the ability to generate and display concentric evacuation zones and/or display Arc/Info Grid generated evacuation zones. The dynamic generation of concentric circles, although simple, offers valuable information to response planners. It also accounts for the cultural differences in what is perceived as an environmental hazard. Simple user defined input will allow for the user to directly influence the nature of the analysis. The Grid generated evacuation zones provide another static view of Arc/Info functionality.

In each component, specific theme features are identified based on the use of an identified evacuation zone. The spatial relationships between the different data categories allow for dynamic overlay and display capabilities. These spatial qualities offer valuable information even though they rely on the simplest spatial relations.

The interface is controlled by key word menus. Single words or small phrases are used to describe a menu item's functionality. These menus have been added to the standard ArcView2 interface. Figures 4a and 4b show the "Scenario" and "Dynamic" key word pull-down menus.

The use of the BEI requires basic computer literacy levels. Users must be familiar with ArcView2 and an ArcView2 computer operating environment: Windows, UNIX, Macintosh.

Figure 4a. Dynamic keyword menu.

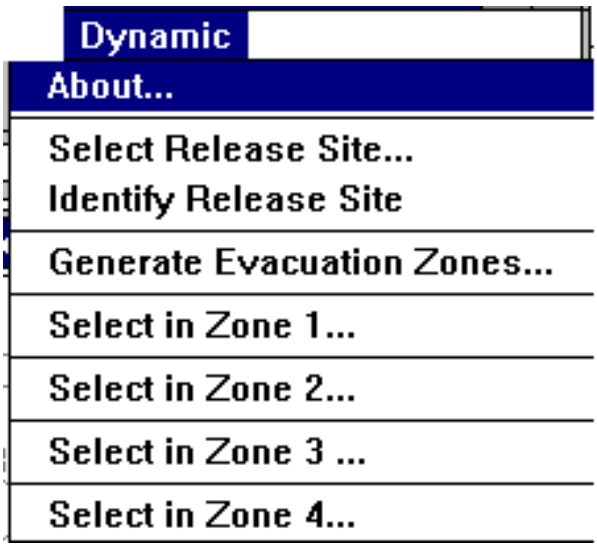
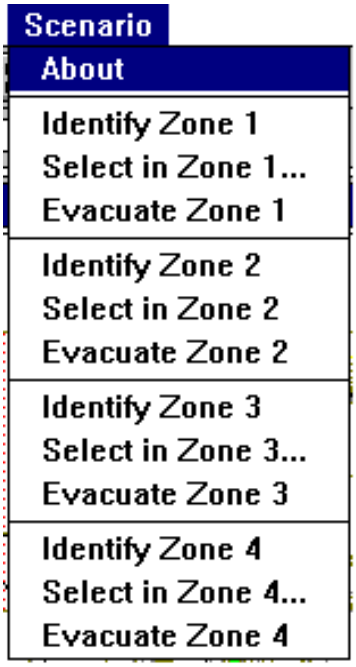


Figure 4b. Scenario keyword menu.



General Interface Functionality

Both scenario and dynamic components of the BEI share the same general concepts. Affected shelters, schools, hospitals, roads, and population are reported based on evacuations zones. The evacuation zones are generated around industrial hazardous release sites. Each component starts with the identification of a release site. The release site in the scenario component is pre-defined and automatically identified to the user. The release sites in the dynamic component are pre-defined or can be defined by user interaction. When a release site is identified it is graphically highlighted and a tabular report is produced, see Figure 5.

Evacuation zones are identified in both components of the BEI. The first zone always identifies the immediately affected area. Each additional zone identifies increasingly larger areas. The evacuation zones are designed to prioritize evacuation efforts. The word "Zone" is used as a key word within the interface. Its definition must not be confused with other types of zones, i.e. land use zoning. The definition of "Zone" and its use by the BEI are covered in the users manual.

Figure 5. Example Release Site tabular identification.

The basic spatial and topological relationships between the different categories of data can provide valuable and insightful information. This information is obtained by simple comparative queries. Both components

of the BEI use simple comparative overlay operations. This allows for the graphical display of locations and tabular report of specific feature types that fall within a particular evacuation zone. The content of the tabular reports directly rely on the contents of the data sets. These feature types are (by theme name): Roads, Schools/Hospitals, Shelters and Census. Whenever a zone has been identified, the user has the option to identify the affected theme types and produce reports with the menu shown in Figure 6.

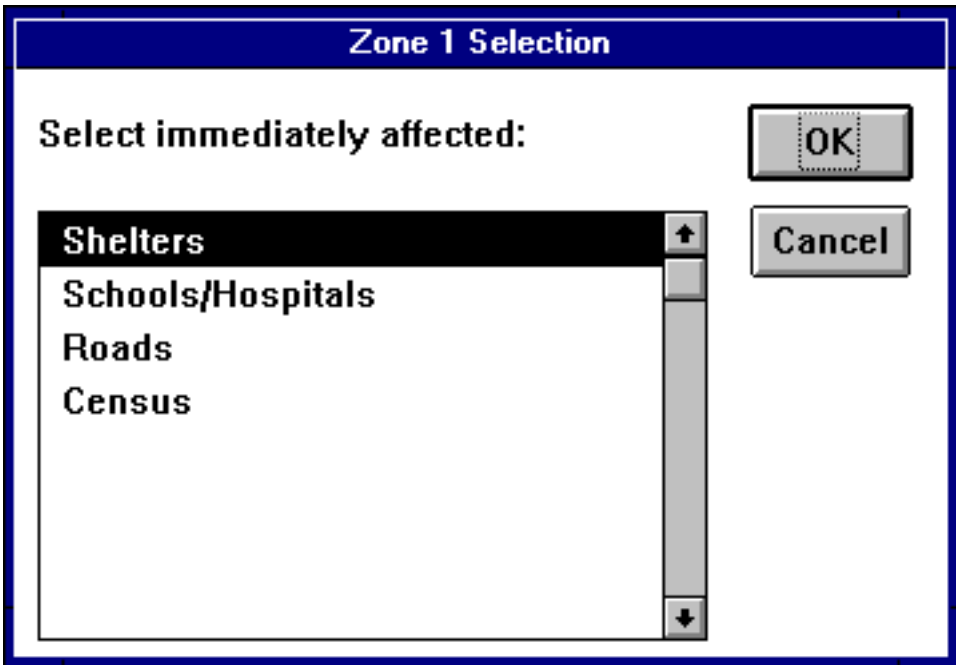


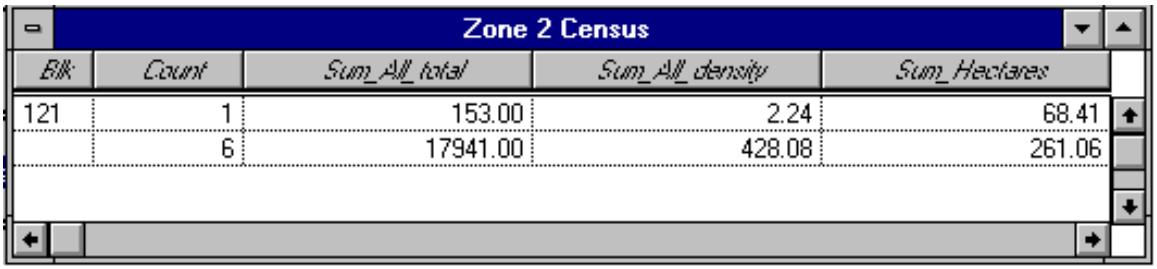
Figure 6. Select by zone menu

Each selection will graphically highlight the affected elements of the selected theme. Depending on theme type, an appropriate tabular report is generated. The roads and census options produce tabular summaries of selected features. Figures 7 and 8 show examples of road and census tabular summaries.

Zone 1 Roads

Street	Count	Sum_Miles	Ave_Mph
Abasolo	8	0.46	12.00
Aguirre	1	0.07	12.00
Allende	8	0.48	12.00
Bulevard del Ensueno	7	0.41	12.00
Calle Ingenieros	6	0.33	12.00
Calle Martinez	1	0.12	12.00
Calle San Martin (Padre Nacho	1	0.04	12.00
Camino Viera	4	0.31	12.00
Camino Virgen Sur	3	0.54	12.00
Camino de Pastores	1	0.34	12.00

Figure 7. Roads tabular summary.
Columns not shown: Ave_Volume, Ave_Capacity and Sum_Time_min.

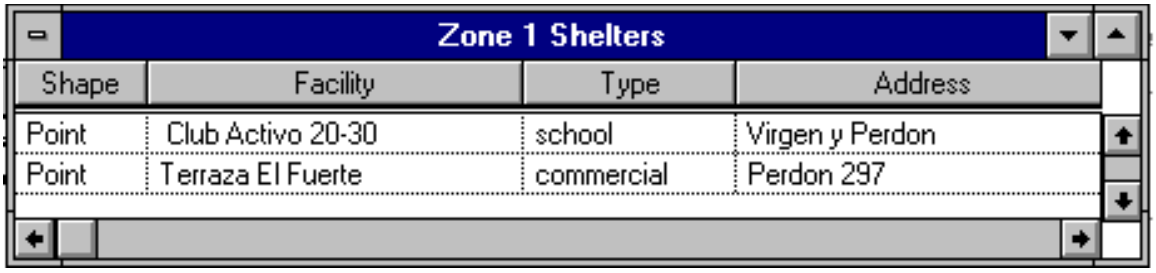


Zone 2 Census

Blk	Count	Sum_All_total	Sum_All_density	Sum_Hectares
121	1	153.00	2.24	68.41
	6	17941.00	428.08	261.06

Figure 8. Census tabular summary.

The Schools/Hospitals and Shelters options produce tabular lists of selected features. Figures 9 and 10 show examples of shelter and school/hospital tabular lists.

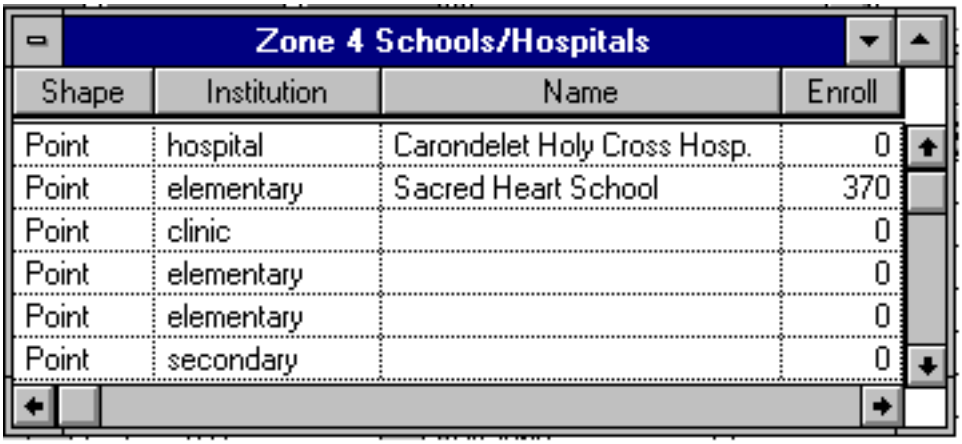


Zone 1 Shelters

Shape	Facility	Type	Address
Point	Club Activo 20-30	school	Virgen y Perdon
Point	Terraza El Fuerte	commercial	Perdon 297

Figure 9. Shelter tabular report.

Figure 10.



Zone 4 Schools/Hospitals

Shape	Institution	Name	Enroll
Point	hospital	Carondelet Holy Cross Hosp.	0
Point	elementary	Sacred Heart School	370
Point	clinic		0
Point	elementary		0
Point	elementary		0
Point	secondary		0

Schools/Hospitals tabular report.

There are no strict rules regulating the flow of the scenario. Certain functionality are simply dependent on the existence of a particular condition, i.e. Zone1 must be identified before affected themes

can be selected within it. Simple rules like this are displayed to the user when necessary in the form text message menus shown in Figure 11.

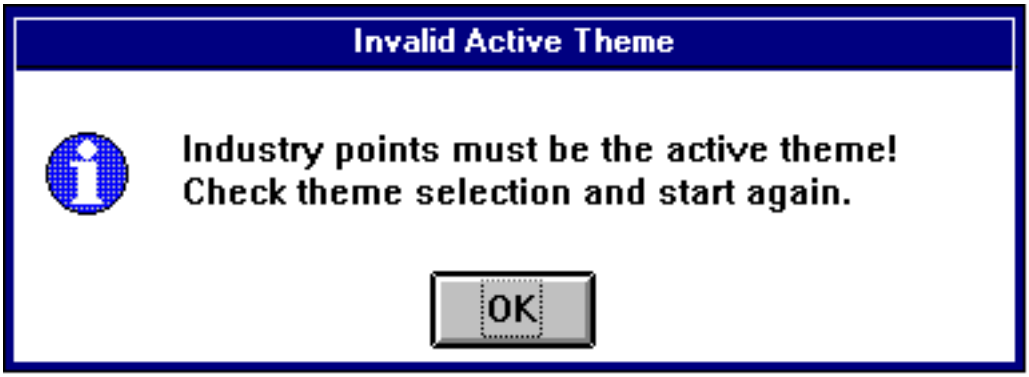


Figure 11. Sample message menu

The text messages are all combined in a single Avenue script. This allows for the easy translation of all messages from English to Spanish.

The two components of the BEI share functionality. They are, however, very different in nature. The following sections explain the two different interface components in detail.

Evacuation Scenario Component

The evacuation scenario is based on the results of evacuation route and shelter allocation research done by Cannon (1996). His work built on the data and results of Lowry's vulnerability assessment research (1994). Cannon uses street network information and shelter point location to spatially allocate people to shelters and identify evacuation paths. The network analysis presumes the airborne release of a hazardous material from a pre-defined site.

The scenario is initiated using the "Scenario" menu key word pull-down fig 3b . The first action will be to identify zone 1 with the "Identify Zone1" keyword option. The identification takes place in graphical identification of the release point and Zone1 perimeter. A table also identifies information about the sample release site, see Figure 5. Once Zone1 is identified, or any other zone, the user has the option to identified affected themes inside of the zone, identify evacuation pathway and shelter allocations or identify other zones.

There are four different evacuation zones in the scenario. The first zone is a circular area of radius x around the sample release point. This zone defines the immediate evacuation area. The next three zones comprise different sections of a cone shaped polygon. The cone depicts generalized airborne mass movement research results based on southern prevailing winds, see Figure 12 (Hepner and Finco, 1995). The cone's shape and aerial dispersion does not take into account the factors of time or wind speed.

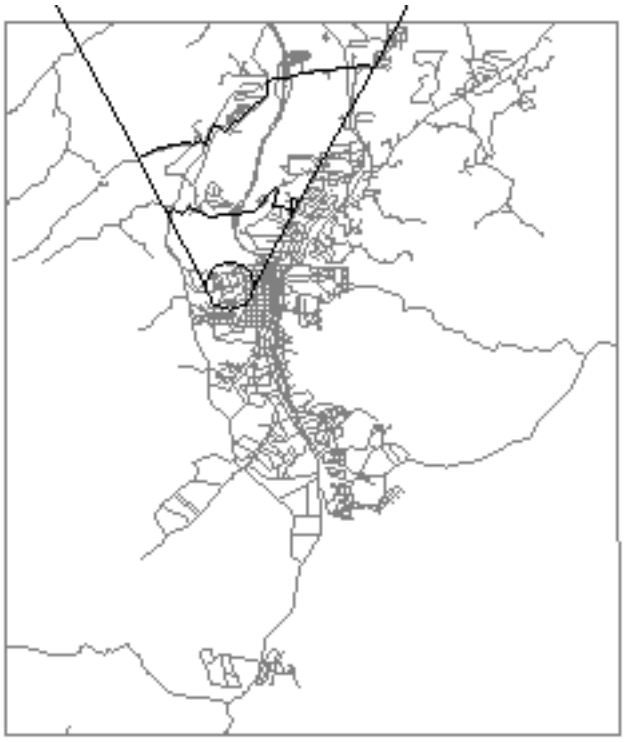


Figure 12. Scenario evacuation zones

Dynamic Analysis Component

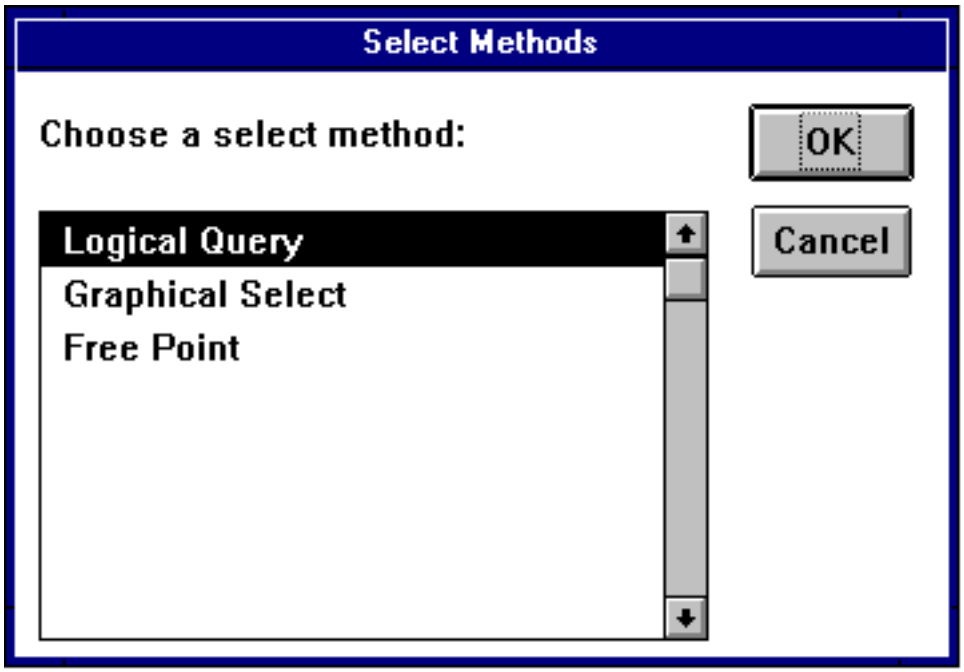
The intent of this component is to offer a greater amount of flexibility to the user in defining evacuation zones. This component does not offer evacuation path identification and shelter allocation capabilities. It does, however, allow the user to interactively select a release site and define concentric evacuation zones. The dynamic component also provides examples of evacuation zones generated from the effects of terrain and wind on airborne mass movements. Three different wind conditions are used to display the evacuation zones around a pre-defined release point. The different methodologies for zone generation are discussed in detail.

The dynamic component of the BEI is controlled by the “Dynamic” keyword entry in the View document menu pull-downs. An “About” option will display a text menu briefly describing the component’s intended use and functionality, see Figure 4a.

The user will begin the analysis by identifying a hazardous release location, this is initiated by selecting the “Identify Release Point...” , see figure 4a. This initiates the “Select Method” choice menu, Figure 13. This menu is used to determine the way in which the release point is identified. There are three options for identifying a release point: Logical Query, Graphical Selection, Free Point. The selected option will determine the type of select tool that is presented to the user. These tools are existing ArcView2 tools that the user is able to use without actually knowing about the tools existence and/or intended use.

The “Logical Query” option will initiate the query builder. A logical query is used to identify the release point from the “Industry” theme based on industry name and/or number of employees.

Figure 13.



Dynamic release point select methods menu.

The “Graphical Select” option initiates a set of cross-hairs. The cross-hairs are used to select the release point from the “Industry” theme by pointing or drawing a box. The “Free Point” option is used when a release point does not coincide with an actual industry site location. This option is designed for the

identification of hazardous release that does not happen at an industrial site, i.e. transport traffic accident. If the release site is an actual industrial site, the name and number of employees is reported in tabular format, Figure 4.

Once the site has been identified, the user must initiate the generation of four evacuation zones. The “Generate Zones...” keyword will display the “Evacuation Zone Generation” menu, see Figure 14. The evacuation zones are generated by the selection of one of four options. These options are Circles, No Wind, South Wind and West Wind.

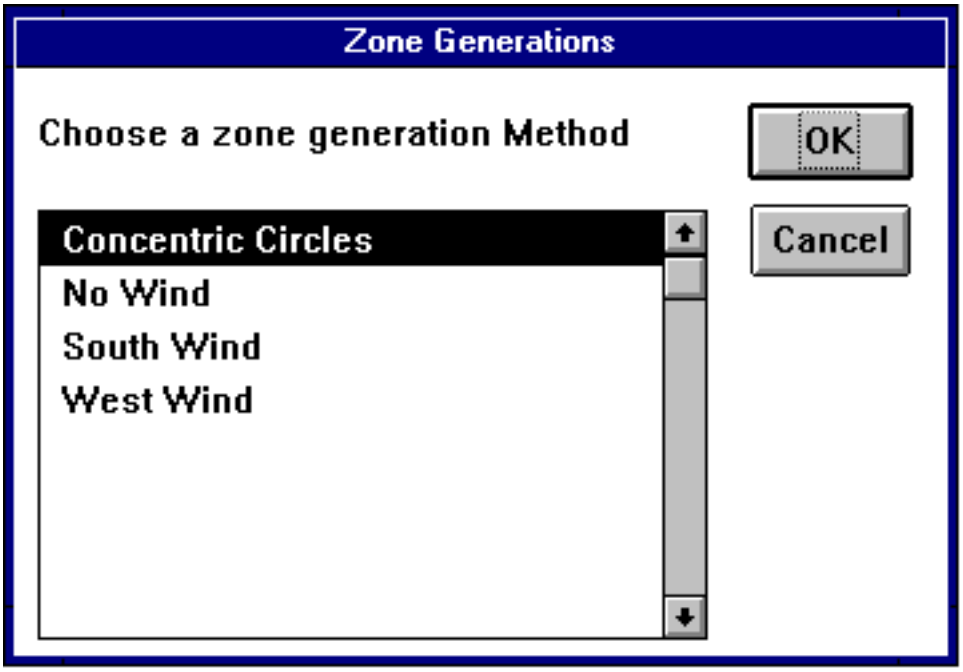


Figure 14. Zone Generations menu.

The selection of keyword “Circles...” initiates the “Radius Definition” menu, see Figure 15.

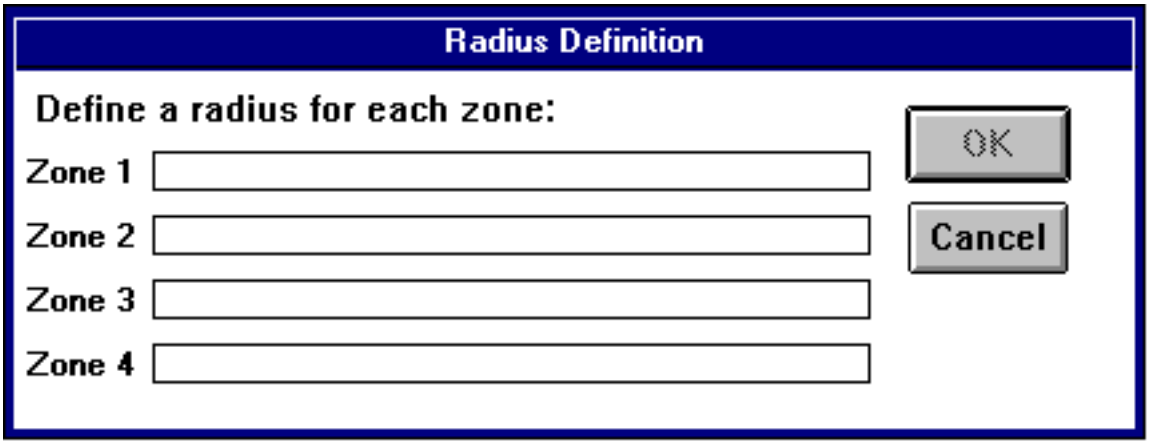


Figure 15. Concentric circle radius definition menu.

This option involves the definition of a set of concentric circles as the four evacuation zones. Each outer zone's affected area is defined by the area it defines between itself and the next inner zone. The concentric circles methodology, although simple, provides a quick, effective means to dividing the surrounding population into manageable evacuation zones. Figure 16 shows an sample of evacuation zones defined by concentric circles.

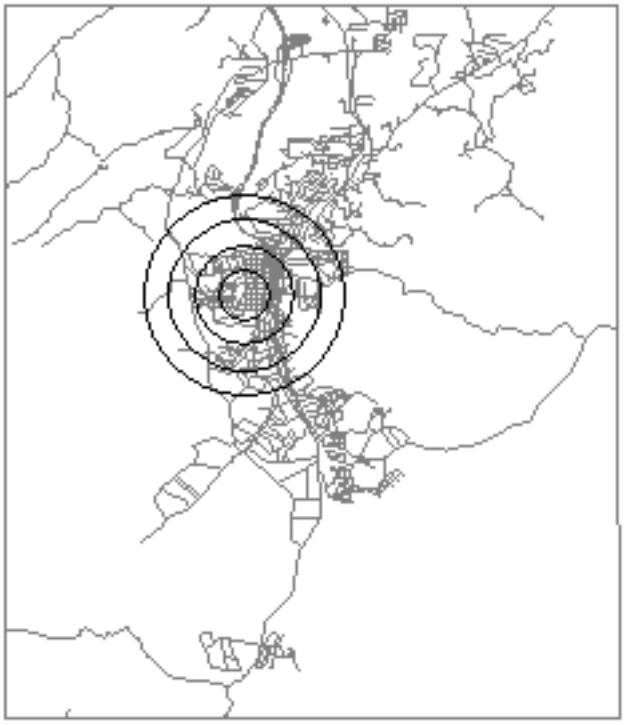


Figure 16. Concentric circle evacuation zones.

The options, “No Wind, South Wind, and West Wind” are defined around a pre-defined release site from existing research analysis of airborne hazardous release movement tendencies (Hepner and Finco, 1995). This research utilizes raster based analysis to predict not only the effects of wind but also of terrain on the movement of an airborne release. The three different wind options represent prevailing wind conditions of the Ambos Nogales region.

The raster based analysis was performed using ESRI’s Arc/Info Grid module. Arc/Info grids are raster based data sources(ESRI,). A grid with cell values representing elevation was used to model the topographical conditions of the Ambos Nogales region. Grids representing the growth of an airborne release mass were generated using the elevation grid as an impedance surface. The three prevailing wind conditions were used in separate scenarios. Each scenario resulted in the generation of 12 grids which illustrate the analytical growth of an airborne release based on wind condition and terrain. The numbers 1, 4, 8 and 12 grids were used for each scenario to generate the polygon boundaries of four evacuation zones. Figure 17 shows the evacuation zones defined by the “South Wind” zone generation selection. The polygon boundaries are then used to selected the effected themes described in “General Functionalities”.

The use of these grid generated evacuation zones only provides an example of dynamic evacuation zone generation. Although represented in the dynamic component of the BEI, the release site is a fixed position and can not be altered.

The functionality offered by the BEI should only serve as a general examples. Most results are simple examples of the capabilities of higher Arc/Info GIS functionality. The complex spatial allocation, network and grid analysis capabilities required to obtain these result are not possible in the standalone Arcview2 environment. The recent release of ArcView3 could provide interesting possibilities in future research. ArcView3’s addition of a network analyst extension could provide dynamic evacuation path and shelter allocation. The spatial analyst might dynamically generate airborne release pathways.

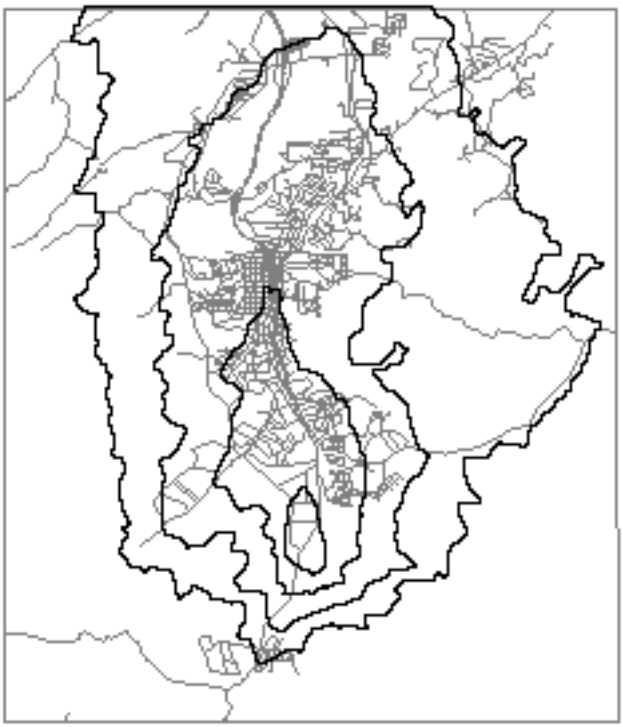


Figure 17. Evacuation zones generated by the affects of terrain and a prevailing south wind.

Technical Notes

The nature of the border environment does not allow for the design and implementation of a complex client/server application. The interface is designed as a standalone application. Since it can not rely on any other application, the interface is limited to the inherent functionality of Arcview2 and the Avenue scripting language. The author does not assume that this interface will be widely used. It is still important, however, to design a tool that could be easily implemented in an environment of limited resources. The general necessities need to run the BEI are listed below. A more detailed description is offered in the user's manual. See appendix A.

Software: Licensed copy of ArcView version 2.1x running on Windows 3.11, Windows '95, Window NT, Macintosh or any Arcview supported UNIX platform. Initial testing shows that the interface project will also work with ArcView version 3.x.

Data Formats: UNIX Arc/Info workspace feature coverages and ArcView shape files. The UNIX workspaces can be copied to PC and Macintosh file systems.

Hardware Specifications: compliance with Arcview2 disk and memory requirements and an additional 20 megabytes of disk space for project interface, digital geographic data, and documentation.

Bilingual Results

The ultimate purpose of the BEI is to help transcend the boundaries presented by language and culture. It is fundamental that the underlying concepts presented in this research are addressed by application functionality and intended use. The following sections relate the most important concepts addressed.

Categorization of Information

The development of the BEI required that the information be presented in a manner that allows for the meaningful interaction of both English and Spanish speaking users. The translation of the interface and documentation assumes an understanding of the interface's intended functionality. Any user should be familiar with the addressed nature of the US/Mexico border environment. This assumption relies on the concept that information is categorized independently from language (Mark, 1995),(Mark and Egenhofer, 1995). The translation focused on the correct distinctions in how language labels the information rather than how language categorizes it.

An example categorization is the BEI's use of evacuation zones. Any user should be familiar with the concept of an evacuation zone. The generation and use of evacuation zones is the basis behind the BEI's functionality. The users manual does not spend great length in defining what is an evacuation zone. The concept is simply labeled with the appropriate translation. The application uses the label to associate it with applied actions, i.e., identifying, evacuating, etc.

Observation and Communication

The categorization of geographic information by the BEI not only relies on the familiarization of the surrounding environment, but also depends on the linguistic concept of how language communicates information. This concept is again illustrated by Driever's "Semiological Triangle", Figure 18.

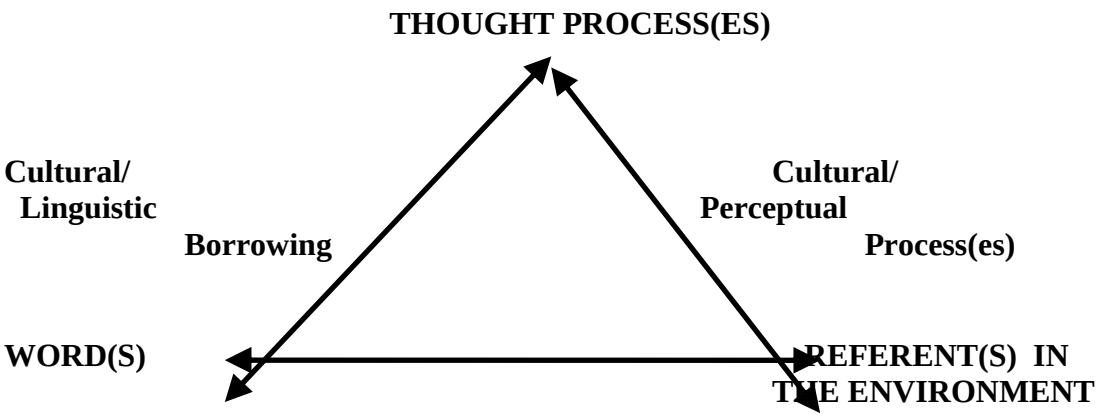


Figure 18. Semiological triangle for the study of linguistic relativity (Driver, 1990).

The general idea behind Driever's concept is that not only language, but cultural surrounding is a significant influence on how an individual conceptualizes and rationalizes their geographic surroundings. This concept directly influences not only how an individual perceives their immediate geographic surrounding but also how it is described. This geographic, linguistic philosophy is one of the basic principles addressed, communicated and achieved by the BEI.

The BEI addresses that fact that conceptualization of information is performed by higher thought processes than the actual verbalization of speech (Driever, 1990), (Mark, 1995),(Mark and Egenhofer, 1995). The relationships represented by the triangle now have greater significance. The solid lines of the triangle represent the direct relationships between observations, culture, thought process, culture and verbalization (Driever, 1990). The dotted line in Figure 1. represents the indirect relationship between observations and their descriptions. It also represents the difficulty in communicating geographic concepts in a bilingual context. The solidification between observation and verbalization in Figure 17 represents the relationship addressed by the BEI to help meaningfully communicate geographic industrial hazardous release information across a bilingual platform.

Project Translation

ArcView2 provides a convenient foundation for the bilingual communication of information. The key word menus offer simple descriptions of interface functionality. The key words where easily translated to preserve the presentation of intended use.

The translation of message boxes and interactive menus proved more challenging than the menu key words. This included the theme naming conventions. The same meaning had to be maintained after an action was initiated by a menu key word. The English theme name "Census" and Spanish theme name "Poblacion" provide an example. Census has an accepted meaning in English that infers information about population. The literal translation in Spanish, "censo", does not have this distinct inference. A "censo" in Spanish is conceptually translated to English as "survey". The Spanish word, "poblacion", or population in English was used as the theme descriptor in the Spanish project. The attention to the difference in literal translations is an important component of the BEI's ability to accurately communicate bilingual geographic concepts.

Users Manual Translation

The most difficult translation task was creating English and Spanish users manuals. The BEI is designed to be simple and easy to use. The end users must still be provided with information on basic assumptions, concepts and descriptions of the intended interface functionality. The manuals must communicate geographical and analytical concepts while maintaining their meanings across a bilingual platform.

The English manual was created first. It defined the basic structure of how the information was presented to the user. The Spanish manual was able to inherit the same basic structure, but the communication of concepts had to be simplified. The translation process is not performed word for word, or sentence for sentence. The concepts presented by each section in the manual had to be taken as a whole and then described in Spanish. This process led to the simplification of many descriptions. The simplification was mostly due to available vocabulary. The English version tends to use more technically specific words. The Spanish manual must account for a lack of technical equivalents by simplifying.

This simplification process is illustrated by the translation of the sentence, "Arc/Info Network and Grid analysis research is utilized to provide scenarios for evacuation zone identification, evacuation path generation and shelter allocation." The equivalent Spanish sentence eliminates the word scenario and groups its functionality into a general label. It simple states, "Los modulos Grid y Network de Arc/Info son utilizados para producir informacion analitica." The simplification process does lose some detail of descriptions, but avoids any unnecessary confusion. The author realizes that some of the simplification

process is a result of Spanish being a second language. Many concepts that are easily describe in English do not come as easy in Spanish.

The use of English ArcView terms, i.e. view, theme, project, etc., was unavoidable. There does exist an ArcView2 Spanish version. The author was unable to obtain a copy to verify keyword translations. The English key words were used in order to avoid any unnecessary confusion. The user is simply made aware of this fact in the manual.

Conclusion

The BEI could possibly be used as a tool to aid in the decision making process for the implementation of emergency response plans along the US/Mexico border. The static nature of the data and the ArcView2 analytical abilities, however, do not suggest that the interface should be used as anything more than an example. More than an example could be furnished with future data and interface development. The addition of network and spatial analyst extensions in the recently released ArcView3 might provide many exciting possibilities. ArcView3's Spatial Analyst could possibly generate dynamic evacuation zones using the affects of wind and terrain around any user defined release point. The Network Analyst could then be used for dynamic evacuation route identification and shelter allocation from any evacuation zone.

The enhancement of data content would increase the amount and accuracy of information provided to the end user. All data layers should be completely attributed and free of discrepancies. The industrial sites coverage could contain more attribute information. Raw materials and their hazardous bi-products of each industrial site would provide valuable information. This information could be used in the identification of the possible nature of a hazardous release. It could also be used in defining a potential risk ranking among the different industrial locations .

The school/hospital coverage has many missing attributes. It could also be attributed with address and contact information. The shelter coverage could be attributed with contact information. There are also discrepancies between these two coverages. A shelter attributed as a school does not appear in the schools/hospitals coverage. These coverages could be combined and an attributed added to qualify if a certain feature is a shelter.

The nature of the network analysis that generates evacuation paths could be slightly modified. The existing roads coverage has each evacuation path as its own individual Arc/Info route feature class. Each evacuation zone has four or more separate evacuation routes classes depending on the applied percent of traffic impedance. This make it cumbersome to display and interpret the evacuation paths of a single evacuation zone. The route feature classes could be grouped by zone. Attributes could be added that define the impedance of an individual evacuation route within the feature class. There is one route class in the existing roads coverage the represents all evacuation paths for Zone 1. These paths are represented by one route feature and do not allow for classification based on impedance.

The development of the BEI demonstrates the usefulness of a GIS interface to meaningfully interact with complex data and spatial relations. The results of the development also provide further insight into the ability to share geographic concepts and data in a bilingual context. The development of this issue will maintain continued importance in existing and future US/Mexico border environment cooperative agreements. The rapid population and industrial growth in the border environment is increasing the need to understand and recognize the complex spatial relationships involved in the border environment. The use of GIS opens a new view into the way geographic space is represented and visualized. Graphical user interfaces allow easier analysis of these representations. The future of the border situation will undoubtedly demand increased research activity and applied results in the analysis, development and sharing of geographic data .

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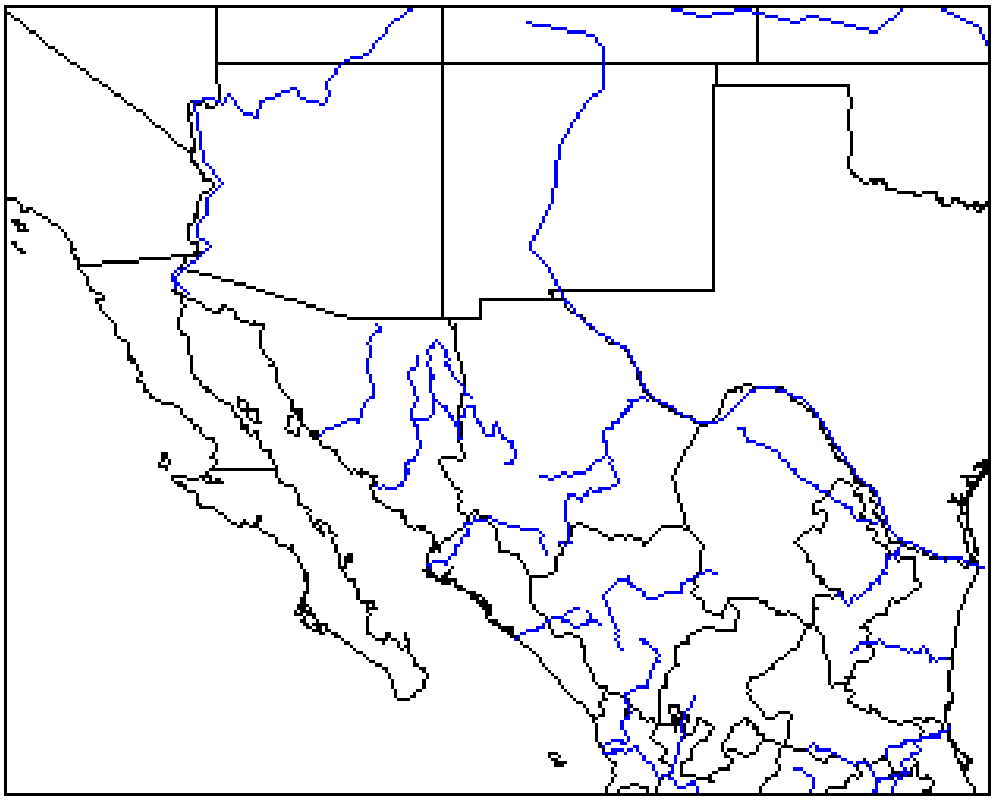
Appendix A - English Users Manual

Users Manual

Border Evacuation Interface (BEI)
Version 1.0
English Edition



The Border Evacuation Interface (BEI) is a prototype ArcView version 2 interface. Its functionality address airborne industrial hazardous release and emergency response planning in US/Mexico border communities.

Documentation and Programming by
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University of Utah

Table of Contents

What is the Border Evacuation Interface (BEI)

Municipal and federal officials on both sides of US/Mexico border communities have common interests in the collaboration on emergency response planning issues. The basic needs of the interested parties are the access of and meaningful interaction with available geographic data in digital form. The BEI utilizes Environmental Systems Research Institute's ArcView version 2 (ArcView2) to interact with the existing geographic information. ArcView2 is a desktop GIS product. It is a powerful tool that gives the ability to explore, query and analyze geographic data produced by Arc/Info.

The BEI facilitates the display and query of complex geographic data layers pertaining to the Ambos Nogales border region. The focus of functionality is the interaction with and interpretation of data and analysis pertaining to industrial hazardous material release and emergency evacuation response planning.

The BEI utilizes the ArcView2 Avenue programming language to provide the customized functionality. Arc/Info network and grid analysis research is utilized to provide scenarios for evacuation zone identification, evacuation path generation and shelter allocation. Dynamic capabilities allow the query, display and report of affected schools/hospitals, shelters, roads and population within evacuation zones.

The interface is written in both English and Spanish. The bilingual nature of the BEI will enable decision makers in both countries to share the same information. The sharing of information makes possible more effective emergency response planning and cooperation between border communities

Intended Use

The static nature of the data and ArcView2 analytical abilities do not suggest that the interface should be used as anything more than an example**.** The current application is not intended as a decision support tool. It should only serve as an aid in the communication of complex data and analytical concepts.

Requirements for Use

Operating system requirements

The BEI can be used with any operating system supported by ArcView. These are currently UNIX, Windows, Windows 95, Windows NT and Macintosh.

Software requirements

The BEI does not include ArcView. Any user must have a licensed, working copy of ArcView version 2.1x in order to utilize the application.

Hardware requirements

20 megabytes of free disk space is the minimum recommended value. The application comes with an ArcView project (100 kilobytes) and the sample set of Arc/Info coverages (10 megabytes). The interface creates output tables and shape files. These files can take up to 5 megabytes of space.

Terminology

The understanding of certain terminology is assumed by the BEI. A user must understand basic ArcView2 terms, i.e. theme, view, project. Use of the BEI also requires basic computer use skills. Users must be familiar with a computer operating environment: Windows, UNIX, Macintosh; and understand its basic terms and elements: mouse operations, open file, start program, copy from floppy, etc.

The BEI uses the word "Zone" in a specific context. "Zone" is used to identify an evacuation zone. A "Zone" is delimited by a polygon around a hazardous release site. "Zone 1" always identifies the immediately affected area. The use of "Zone" should not be confused with other types of zones, i.e. land use, population, political, etc.

Installation

The BEI comes in a compressed archived format. The type of format depends on the type of operating system: UNIX- tar format, Windows- zip format, Macintosh- binhex format. The principles of the installation process remain the same for each operating system. Perform the following steps as allowed by your specific operating system.

*** You only need to perform the following steps once. ***

1. Create a directory in your file system to serve as the location of the BEI ArcView project and sample data. Remember this path name as you will need it later.
2. Copy the archive file into the new directory
3. Extract the contents of the archive file.

    UNIX- tar xvf bei.tar

    DOS- pkunzip -r bei.zip

    Windows- use pkunzip application.

    Macintosh- use binhex application.

The extraction process creates the following files and directories.

- bei.apr; ArcView project file.
- industry, roads, shelters, sch_hosp, census, zones, info;

Arc/Info coverage directories.

4. Configure operating system specifics by editing the configuration script. This is done with the following steps.

4a. Start ArcView and open the bei.apr project file.

4b. Activate the Scripts user interface by selecting the 'Scripts' icon from the project window. This will list all Avenue scripts that comprise the BEI application.

4c. Open the "Nog.Config" script by selecting it from the list and double-clicking. This will open the Nog.Config script with the script editor. Follow the instructions outlined in the script header.

4d. When you are done editing the script it must be compiled. Use the compile icon,  , to do this. The icon should gray out with a successful compilation. If you encounter errors check to make sure that there are no typographic errors and that all instructions have been followed.

4c. Save and close the project.

You are now ready to use the Border Evacuation Interface!

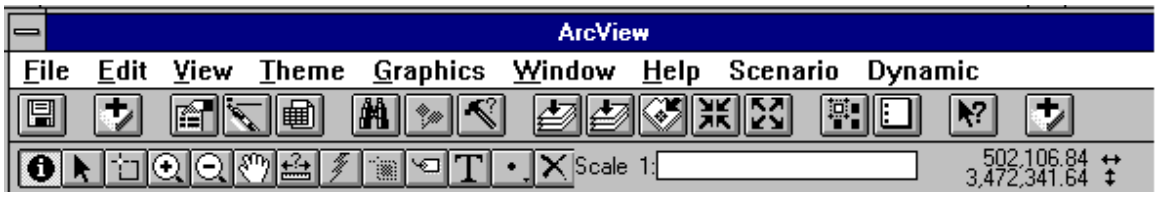
Starting the application

Opening the project

The application is accessed from ArcView. Start ArcView as you normally would and open the bei.apr project. This project serves as the master application project. When you open the project always save it to another name before performing any tasks. Use the "Save project as.." option in the ArcView "File" menu to do this. You will always be able to go back to the original default project while saving different query and display results in other projects.

Creating a view

The default project comes with no defined themes. Activate the "View" document interface by selecting the "Views" icon in the project window and pressing "New". When the "View" document user interface is active it should look like:



Adding default themes

The default themes are added using the "Add default BEI themes..." icon,  . Be aware that there are two icons that add themes. The one on the left side of the interface is the generic ArcView add theme icon. The one on the right adds specific themes for the BEI. Make sure to use the one on the right when using the BEI. Also pay attention to the on-line help strings that describe a particular tool's functionality.

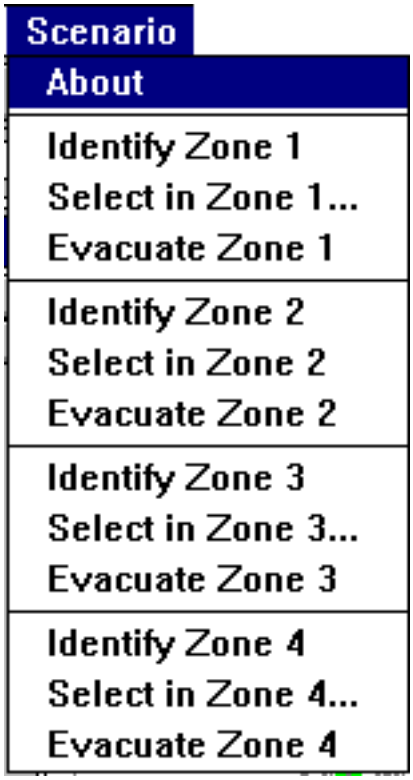
By simply pressing the right  icon, the "Roads", "Shelters, "Schools/Hospitals", "Census" and "Industry themes are automatically added. Default symbols are used when creating the legend. Advanced users can alter theme appearance by editing the legend.

BEI Functionality

Once a "view" has been created and the default themes added you are ready to use the evacuation functionality provided by the BEI. The BEI is divided into two separate components. These component are represented by the "Scenario" and "Dynamic" menu keywords in the "View" document user interface.

Scenario component

The "Scenario" component utilizes evacuation pathway allocation research to provide a scenario that demonstrates the abilities of Arc/Info network analysis. This includes evacuation zone generation and the display of evacuation route and shelter allocation based on a sample airborne hazardous release site. This display ability relies on the results of previous research and should only serve as an example. The scenario component provides a static view of the analytical capabilities of higher GIS functions.



Selecting the "Scenario" menu keyword initiates a pull down menu. While keeping the mouse button pressed, a selection can be made from the menu by dragging to the desired menu item. There are three basic operations that can be performed within the scenario component. You can identify an evacuation zone, select affected features within an evacuation zone, and identify evacuation routes and allocated shelters for an evacuation zone .

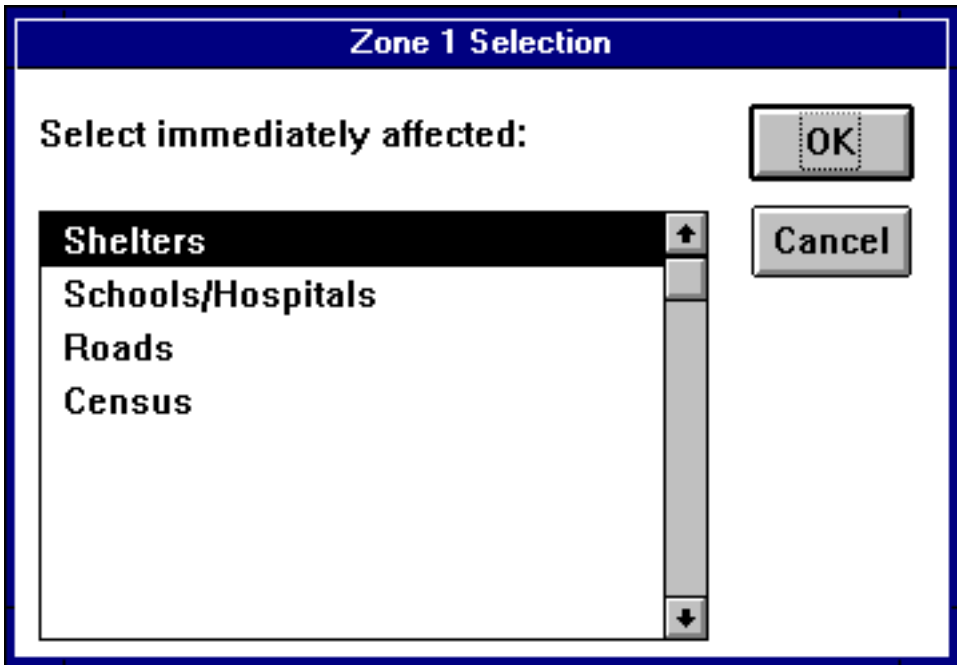
<u>Identifying evacuation zones.</u>

The "Identify Zone..." menu items identify evacuation zones. The "Identify Zone 1..." menu item will also identify the sample release

site by graphically highlighting the point from the “Industry” theme. Each zone is added as a polygon theme. The polygon boundaries represent the limits of each evacuation zone.

Selecting affected features within an evacuation zone

Once a zone has been identified, affected features from the “Shelters”, “Schools/Hospitals” “Roads” and/or “Census” themes can be identified. Select the “Select in...” menu item for a zone that has been identified. This initiates the “Zone Selection” menu.



Select the theme of interest from the menu and select “OK’. This will graphically highlight the features from the selected theme that fall within or pass through the identified evacuation zone. A tabular report is also produced that identifies the features. Report names always contain the zone name and selected theme name, i.e. “Zone 1 Roads”.

Evacuating a Zone

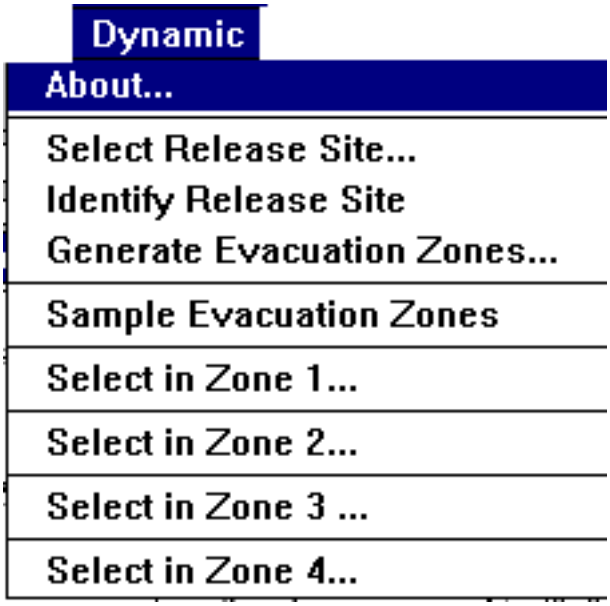
Evacuation information for a particular zone can be displayed on the graphics screen and included in tabular reports. Evacuate a zone by selecting the “Evacuate Zone...” menu item for a zone that has been identified. This will highlight the allocated evacuation routes and shelters for the selected zone and produce tabular reports.

Dynamic component

The intent of this component is to offer a greater amount of flexibility to the user in defining evacuation zones. This component does not offer evacuation path identification and shelter allocation capabilities. It does, however, allow the user to interactively select a release site and define

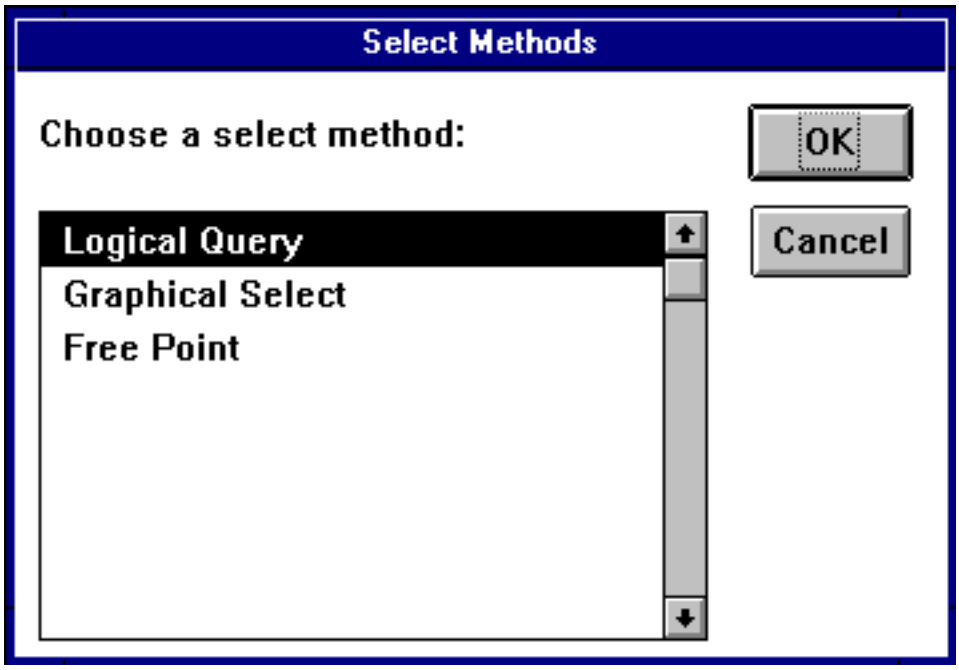
concentric evacuation zones. The dynamic component also provides samples of evacuation zones generated from the effects of terrain and wind on airborne mass movements. Three different wind conditions are used to display the evacuation zones around a pre-defined release point.

Selecting the "Dynamic" menu keyword initiates a pull down menu. While keeping the mouse button pressed, a selection can be made from the menu by dragging to the desired menu item. There are three basic operations that can be performed within the scenario component: selecting and identifying a release site, generating evacuation zones and selecting affected features within an evacuation zone.



Selecting a release site

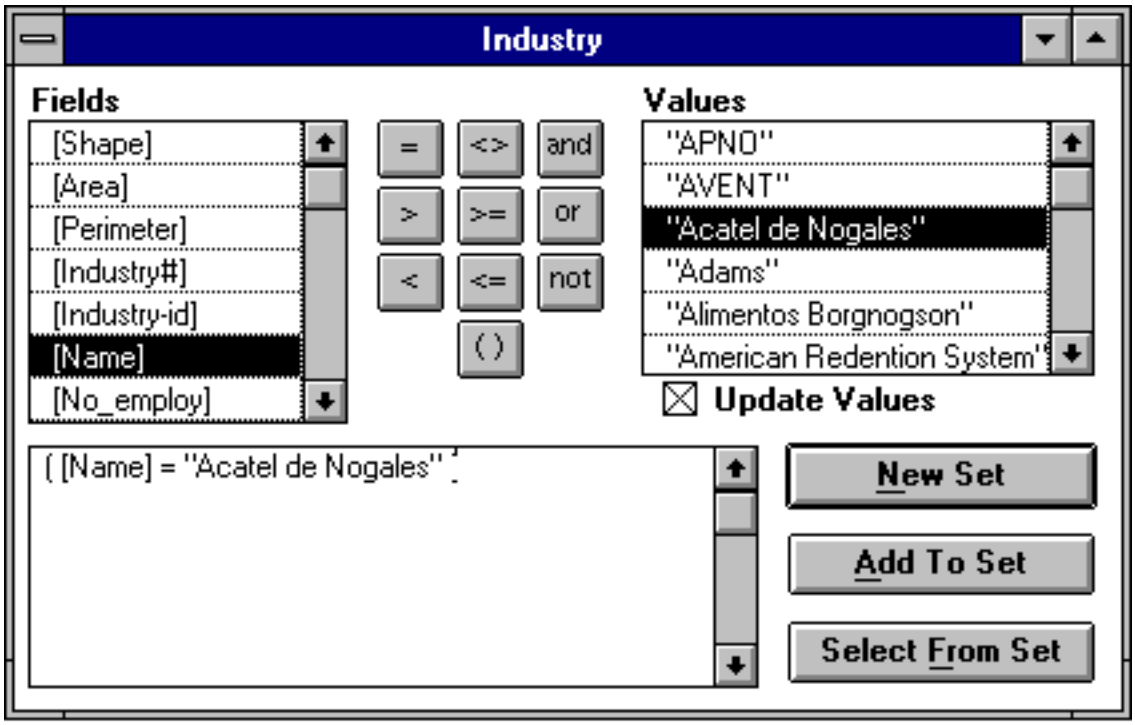
Part of the dynamic component allows concentric circle evacuation zones to be generated around a user defined point. This point is identified by selecting the "Select Release Site..." menu item. This initiates the "Select Methods" menu.



This menu provides three different ways for selecting a hazardous release site.
The selected method determines the next course of action.

Logical query

This initiates the ArcView query generator. Queries can select industrial locations based on name and/or number of employees.



Graphical Selection

The graphical selection option initiates a cross hair tool. Use the cross hairs to select an industrial site. Do this by pointing and clicking the desired industrial feature.

Free Point

The free point option is used to identify a release site that does not coincide with an actual industrial location. This option initiates a cross hair tool. Simply position the cross hairs over the desired point and click the mouse button. An on-line message will report the coordinates of the identified point.

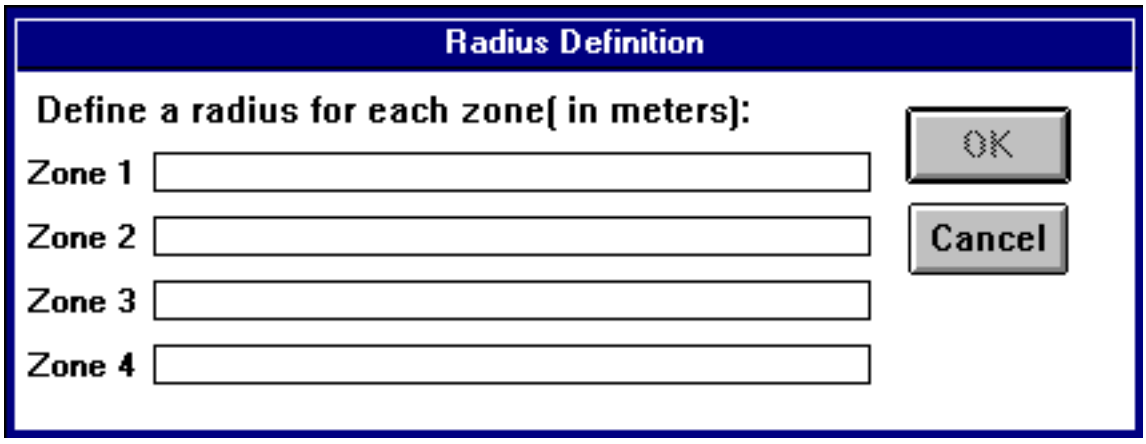
Identifying the selected release site

If the selected release site is an actual industrial location the “Identify Release Site...” menu item will generate a tabular report identifying the name and number of employees of the selected location. This option does not apply when using the “Free Point” option.

Generating Concentric Circle evacuation zones

Selecting the “Generate Evacuation Zones...” menu item initiates the

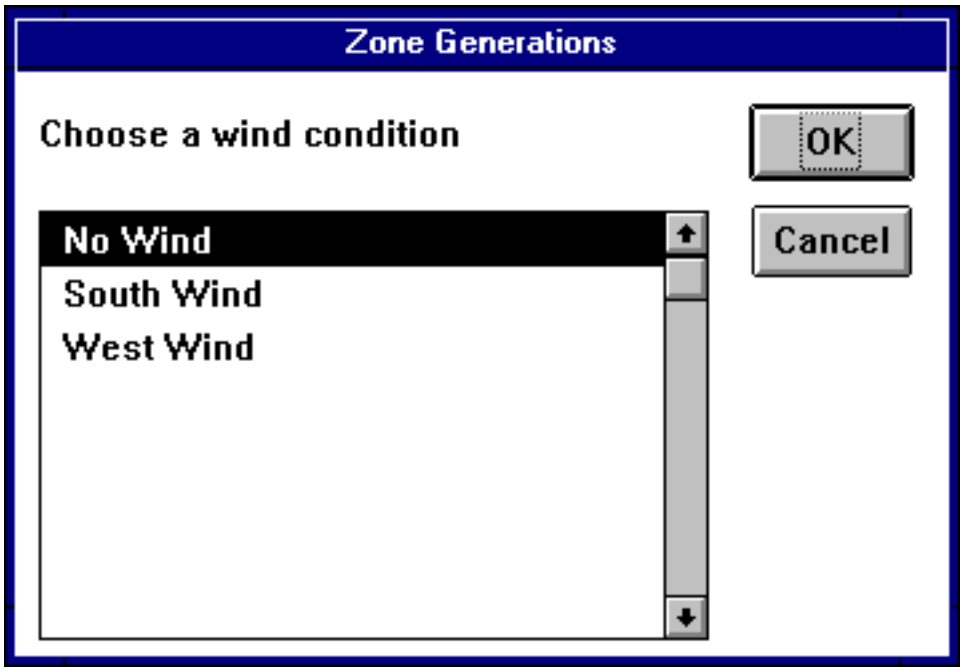
"Radius Definition" menu. This option allows for the dynamic generation of concentric circle evacuation zones around a user defined release point. Selecting this option initiates the "Radius Definition" menu.



Enter the desired radius for each zone in meters. Make sure that each outer zone's radius is greater than the next inner zone. When the radius values have been entered select the "OK" button and the zones will be displayed on the screen.

Sample Evacuation Zones

The menu keyword "Sample Evacuation Zones" intiates the menu:

The 

three options "No Wind", "South Wind", and "West Wind" provide examples of dynamically generated evacuation zones around a predefined site based on the effects of wind and topography. The evacuation zones were generated from the research and analysis of airborne hazardous release movement tendencies.

This research utilizes raster based analysis to predict the effects of wind and terrain on the movement of an airborne release.

The raster based analysis was performed using ESRI's Arc/Info Grid module. Arc/Info grids are raster based data sources. A grid with cell values representing elevation was used to model the topographical conditions of the Ambos Nogales region. Grids representing the growth of an airborne release mass were generated using the elevation grid as an impedance surface.

The use of these grid generated evacuation zones only provides an example of dynamic evacuation zone generation. Although represented in the dynamic component of the BEI, the release site is a fixed position and can not be altered.

Selecting affected features within an evacuation zone

The general functionality of selecting affected features within an evacuation zone is the same as outline in "Selecting affected features within an evacuation zone" section in the scenario component. Refer to this section for details of this functionality.

Future Application Development

The BEI could possibly be used as a tool to aid in the decision making process for the implementation of emergency response plans along the US/Mexico border. The static nature of the data and the ArcView2 analytical abilities, however, do not suggest that the interface should be used as anything more than an example.

Most results simply illustrate the capabilities of higher Arc/Info GIS functionality. The complex spatial allocation, network and grid analysis capabilities required to obtain these result are not possible in the standalone Arcview2 environment.

The recent release of ArcView3 could provide interesting possibilities in future research and application development. The addition of network and spatial analyst extensions might provide many exciting possibilities. ArcView3 spatial analyst could possibly generate dynamic evacuation zones using the affects of wind and terrain around any user defined release point. The network analyst could then be used for dynamic evacuation route identification and shelter allocation from any evacuation zone.

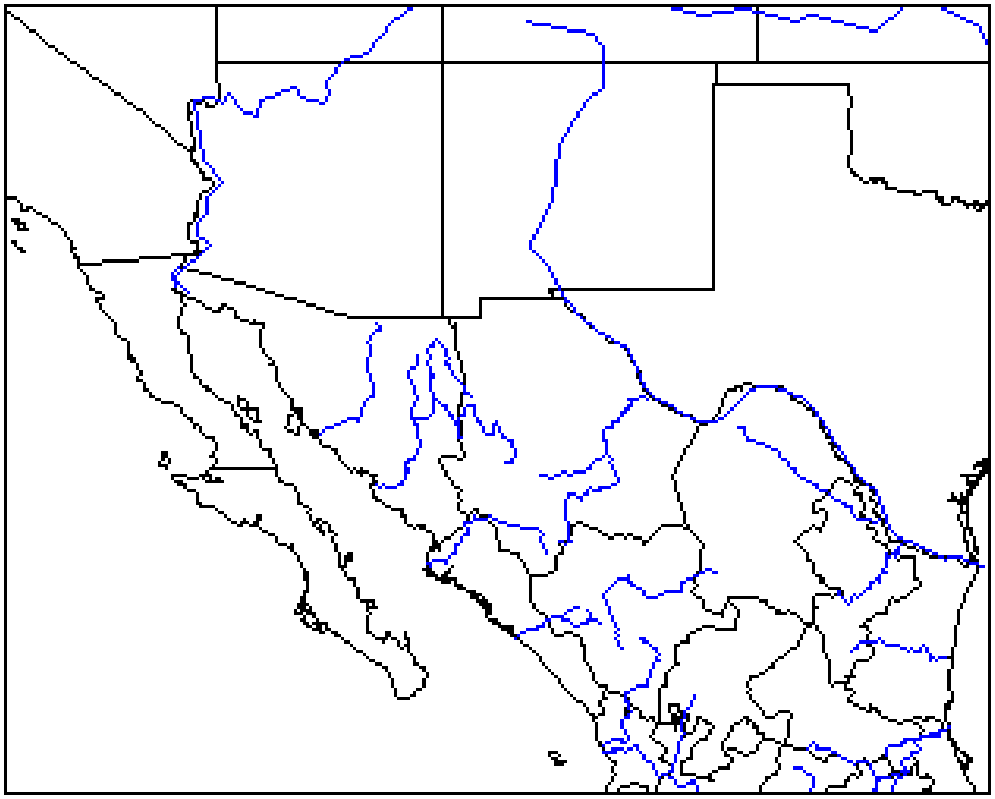
Disclaimer

The author nor the University of Utah Geography Department take any responsibility in applied use of the BEI.

Appendix B - Spanish Users Manual

Manual del Usuario

Border Evacuation Interface (BEI)
(Interfase de Evacuación de la Frontera)
Versión 1.0
Edición en Español



Interfase de ArcView2 especializada en emisiones de desechos industriales volátiles y planeación para la evacuación en casos De emergencia en la región de Ambos Nogales en la frontera EU/México.

Documentación y Programación por
Eric K. Swartling
Departamento de Geografía
Universidad de Utah

Indice General

Qué es la Border Evacuación Interface(BEI)

Oficiales federales y municipales de ambos lados de las fronteras de México y los Estados Unidos, tienen intereses comunes en la cooperación para el desarrollo de planes de evacuación en emergencias. La necesidad básica de los interesados es el acceso a información geográfica en forma digital. La BEI utiliza el programa ArcView versión 2 (ArcView2) de Environmental Systems Research Instititute (ESRI) para establecer una relación con la información geográfica existente. ArcViev2 es una herramienta muy poderosa que tiene las habilidades de explorar, hacer queries y analizar información geográfica utilizada en Sistemas de Información Geográficas (Geographic Information Systems (GIS)).

La BEI facilita la visualización e investigación de las capas de información geográfica complejas pertenecientes a la región de Nogales, Arizona y Nogales,Sonora (Ambos Nogales). El énfasis de la funcionalidad es la interacción e interpretación de la información perteneciente a las emisiones de desechos industriales peligrosos y a los planes de evacuación en emergencias.

La BEI utiliza el lenguaje de programación Avenue de ArcView2. Los modules Grid y Network de Arc/Info son utilizados para producir información analítica. La BEI utiliza esta información para mostrar los escenarios diferentes. Los escenarios identifican las zonas de evacuación, rutas de evacuación y localización de refugios. Otras funciones proveen la visualización e identificación de escuelas, hospitales, refugios, carreteras y población afectada dentro de una zona.

La interfase esta escrita en Español e Inglés. El aspecto bilingüe de la BEI ayudará al compartir la misma información entre las personas que toman las decisiones en ambos países. Mediante el intercambio de información es posible hacer que los planes de evacuación en emergencias sean mas efectivos y mejorar la cooperación entre ambas comunidades.

Propósito para su Utilización

La característica estática de la información geográfica y las limitaciones analíticas de ArcView2 sugieren que la interfase se debe usar simplemente como un ejemplo. La aplicación no se debe usar para tomar decisiones. Debe servir solamente como una ayuda en la comunicación de información geográfica compleja y análisis de conceptos.

Requerimientos para el uso de BEI

Requerimientos de Sistema Operativo

Se puede usar la BEI con cualquier sistema operativo soportado por ArcView. Estos son UNIX , Windows, Windows 95, Windows NT y Macintosh.

Requerimientos de Software

La BEI no incluye el programa ArcView . El usuario tiene que tener su propia copia de ArcView versión 2.1x con su respectiva licencia para poder utilizar la aplicación.

Requerimientos de Hardware

Espacio mínimo de 20 Mb en disco duro. La aplicación consta de un project de ArcView (100 Kb) y los archivos de datos geográficos de Arc/Info (10 Mb). La interfase crea archivos que pueden utilizar hasta 5 Mb de espacio.

Terminología

Se asume en la BEI el conocimiento de cierta terminología técnica.
El usuario debe conocer la terminología básica de ArcView2. Este documento utiliza los términos de ArcView en Inglés: theme , view, project, table. etc. La BEI también requiere que el usuario tenga un conocimiento de su propio sistema operativo: Windows, UNIX, Macintosh.

La BEI usa la palabra "Zona" en un contexto especifico . "Zona"es usada para identificar una zona de evacuación. Una "Zona" es determinada por un polígono alrededor de un sitio de emisiones peligrosas. "Zona 1" siempre identifica el área afectada mas cercana. El uso de la palabra "Zona" no se debe confundir con otros tipos de zonas, i.e. agricultura, política, población, etc.

Instalación

La BEI se encuentra en un archivo de formato condensado. El tipo de formato depende del tipo de sistema operativo: UNIX- tar format, Windows- zip format, Macintosh- binhex format. Los principios para el proceso de instalación son los mismos para cada sistema operativo.

Usted solo necesita seguir los siguientes pasos una sola vez

1. Crear un directorio en su sistema de archivos para depositar los archivos de datos de la BEI. Recuérdele el nombre de este directorio porque lo necesitará en el paso cuatro.
2. Copiar el archivo en el directorio nuevo .
3. Extraer el contenido del archivo.

   UNIX- tar xvf bei.tar

   DOS-pkunzip aplicación.

   Windows- utilizar plunzip

   Macintosh- binhex

   El proceso de extracción crea los siguientes archivos y directorios.

- esp.apr; archivo del project de ArcView
- industrias ,carreteras, refugios ,esc_hosp,población,zonas,info;
  directorios de Arc/Info coverages.

4. Configuración especifica pare el sistema operativo. Esto se logra con los siguientes pasos.

4a. Comenzar ArcView2 y abrir el project "esp.apr" . El project esta situado en el directorio nombrado en el paso uno.

4b. Elija el icono de "Scripts" en la ventana de project.. Esto le enseñará todos los "Scripts" de Avenue.

4c. Elija el script "Nog.config" de la lista y doble click. Esto abrirá el Nog.Config script en el editor de scripts. Siga las instrucciones señaladas en los comentarios.

4d. Cuando usted haya acabado de modificar el script de configuración hay que guardar los cambios. Utiliza el icono,  , para hacer esto. El icono debe cambiar a gris cuando el "Script" haya sido bien guardado. Si cuando lo vaya a guardar encuentra errores, asegurase que no son errores tipográficos y que todas las instrucciones han sido seguidas adecuadamente.

4c. Guarde y cierre el project.

Ahora, usted esta listo para utilizar la Border Evacuation Interface!

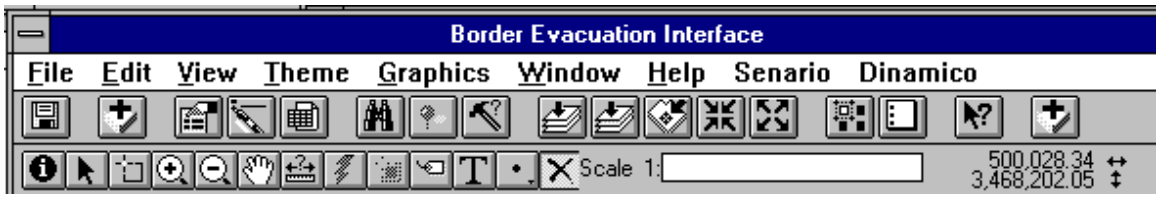
Comenzar la Aplicación

Apertura del project.

A la BEI se accede por ArcView2. Comience ArcView2 y abra el project esp.apr que esta en el directorio identificado por los pasos de instalación. Este project funciona como el project principal. Cuando usted abre el project siempre guárdelo con otro nombre antes de utilizarlo . Utiliza la opción "Save projects ..." en la menú de "File". Usted siempre podrá volver al project original mientras guarde resultados específicos en otros projects.

Creación de un View

El project principal viene sin ninguna themes definido. Elija el icono de "View" en la ventana del project. Esto activa la interfase del usuario de view. Hacer un view por elegir el icono "New". Cuando la interfase del usuario "View" esta activa debe aparecer así:



Añadir los Themes Necesarios

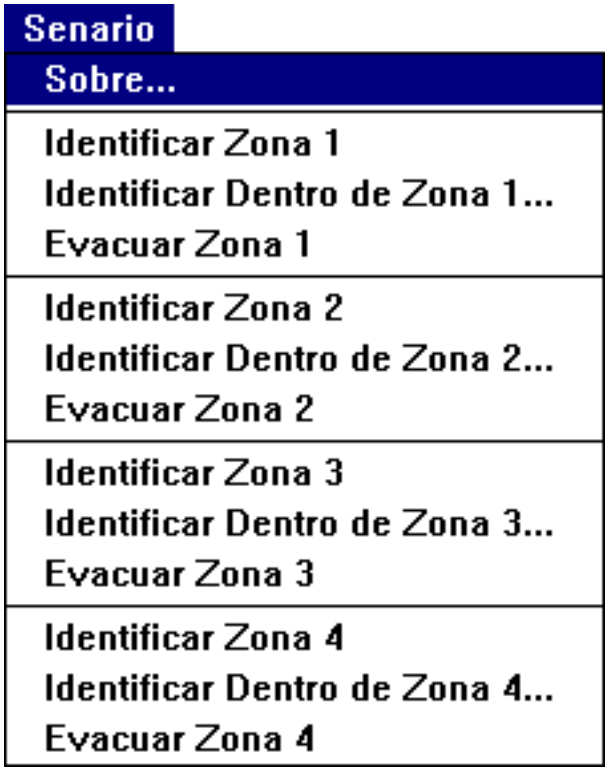
Las themes principales son añadidos usando el icono “Add defaut BEI themes...”,  , .Notase que existen dos iconos que añaden themes. El icono del lado izquierdo es el de la interfase genérica de ArcView “ add theme” . El icono del lado derecho añade themes especificas para la BEI. Asegurase de usar el del lado derecho cuando utilice la BEI. Ponga atención a los mensajes de ayuda que aparecen el la ventana principal. Estos describen la función de un icono especifico. Simplemente presionado el icono derecho,  , las themes “Carreteras, Refugios , Escuelas/Hospitales, Población y Industria son añadidas automáticamente. Símbolos predefinidos son aplicados a la legend principal. Los usuarios avanzados pueden modificar la legend para cambiar su apariencia.

Funcionalidad de la BEI

Una vez que una view ha sido creada y las themes principales añadidas, usted esta listo para usar la función de evacuación creada por la BEI. La BEI esta compuesta por dos componentes diferentes . Estos componentes están representados por las palabras “Escenario”y “Dinámico” en la interfase del usuario de view.

Componente del Escenario

El componente del escenario utiliza datos analíticos de las investigaciones de identificación de rutas de evacuation en emergencias. Estos datos proveen un escenario que muestra las habilidades de Arc/Info para el análisis de redes de transportación. Un sitio ejemplar de emisiones de desechos industriales volátiles es utilizada para la generación de zonas de evacuación, la identificación de rutas de evacuación y sus refugios adecuados. Las zonas de evacuación identifican las partes afectadas de las capas diferentes de información. Estas habilidades de identificación y visualización se basan en los resultados de investigaciones previas y deben servir solo como ejemplos. El componente del escenario provee una vista estática de las capacidades analíticas mas especializadas de Arc/Info.



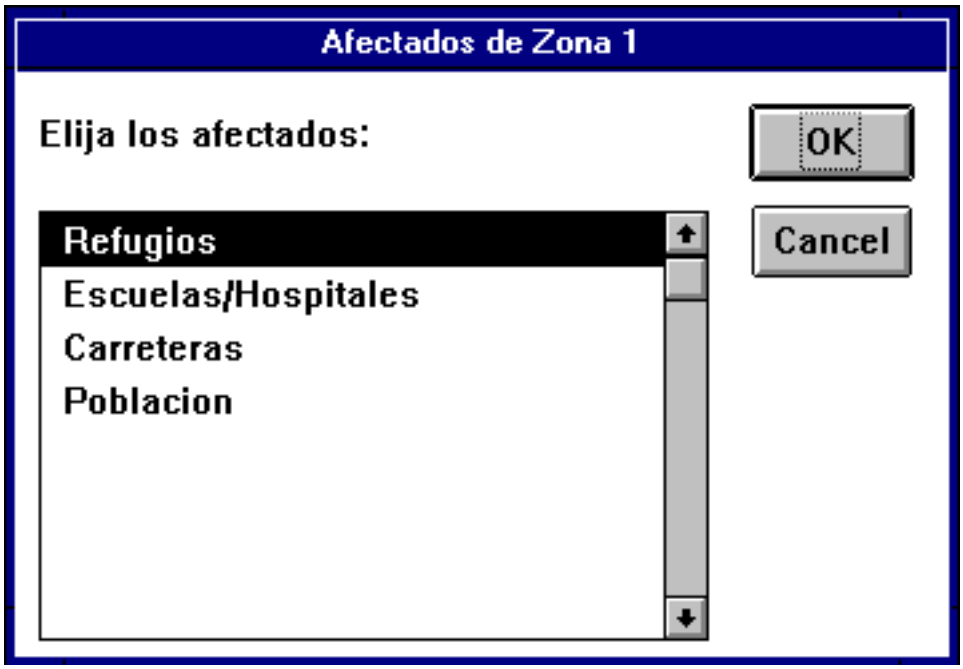
La selección de la palabra “Escenario” de la interfase del usuario de view se crea una ventana. Hay tres operaciones básicas que se pueden hacer con la ventana del componente escenario. Usted puede identificar una zona de evacuación , seleccionar partes afectadas dentro de una zona de evacuación, identificar rutas de evacuación y los refugios adecuados para una zona de evacuación.

Identificar zonas de evacuation

Las frases “Identificar Zona...” identifican las zonas diferentes de evacuación. La frase “Identificar Zona 1” también identifica la fuente de emisiones de desechos industriales. Cada zona de evacuación es añadida como un theme de polígono. Los polígonos representan los limites de cada zona de evacuación.

Identificar las Partes Afectadas Dentro de una Zona de Evacuation

Una vez que una zona ha sido identificada , las partes afectadas como “Refugios”, “Escuela/Hospitales” “Carreteras”y “Población” pueden ser identificadas. Elegir la opción“Select in...” para una zona que ya esta identificada. Esto presentará la ventana “Afectados de Zona”.



Seleccione el theme de interés de la ventana y elija “OK”. Esto identifica las partes del theme elegida que están dentro o pasan atreves de la zona. Un listado es producido que contiene los datos de las partes afectadas. Los listados siempre tiene el nombre de la zona y el theme elegida,por ejemplo, ie “Carreteras de Zona 1”

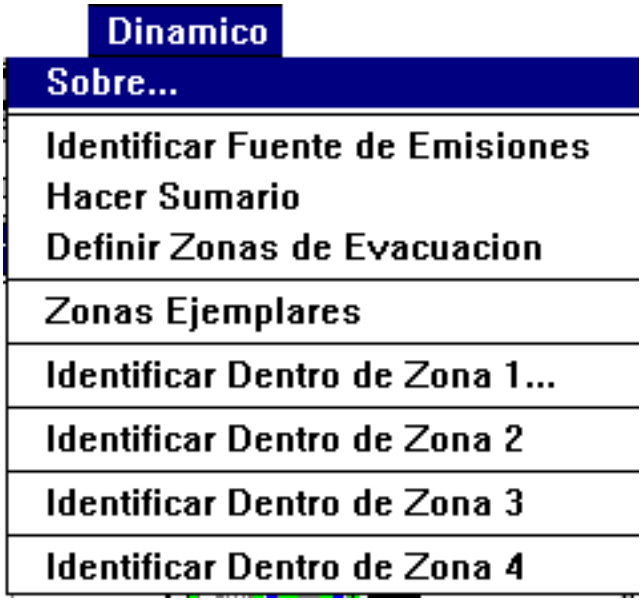
Evacuar una Zona

Se pueden identificar las rutas adecuadas de evacuación para cada zona de evacuación. Elija la frase “Evacuar Zona” para una zona que ya esta identificada. Esto identifica los caminos de evacuación, sus refugios adecuados y produce un listado.

Componente Dinámico

Este componente ofrece al usuario la flexibilidad de definir las zonas de evacuación. El componente dinámico no ofrece la funcionalidad de identificar rutas de evacuación ni refugios adecuados. Sin embargo, le ofrece, al usuario la habilidad de elegir una fuente de emisiones de desechos industriales peligrosos y definir zonas de evacuation por medio de círculos concéntricos.

El componente dinámico también provee ejemplos de zonas de evacuación creada a partir del movimiento de emisiones contaminantes sujeta a los efectos del terreno y viento. Tres diferentes condiciones de vientos son utilizados para mostrar las zonas de evacuación alrededor de un sitio especifico de emisiones.

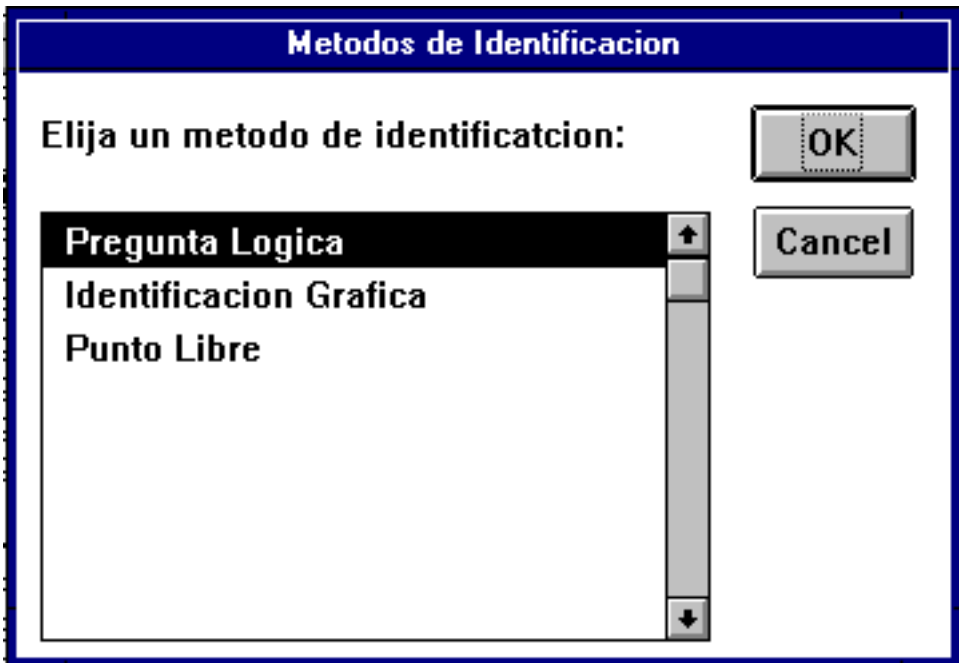


La selección de la palabra "Dinámico" en la interfase del usuario de view crea una ventana. Hay tres operaciones básicas que se pueden hacer dentro del componente dinámico: identificar una fuente de emisiones de desechos industriales peligrosos, definir zonas de evacuación e identificar las diferentes partes dentro de una zona de evacuación.

Identificar una Fuente de Emisiones

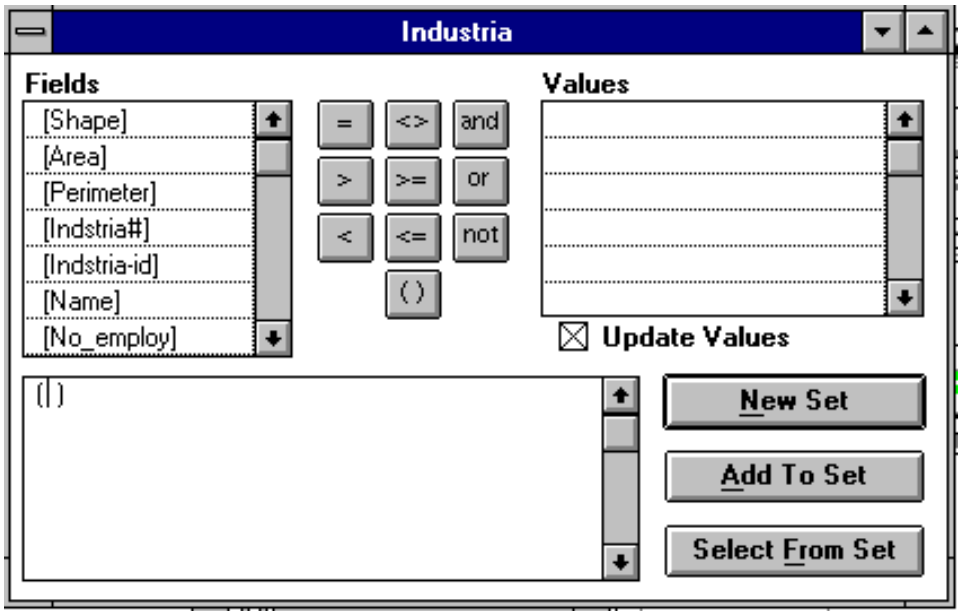
Una función del componente dinámico consiste en dejar al usuario crear zonas de evacuation mediante círculos concéntricos alrededor de un sitio identificado por el mismo. Elija la frase "Identificar fuente de emisiones..." para identificar un sitio de emisiones. Esto abre la ventana " Métodos de Identificar"

Este



menú le provee tres maneras diferentes para identificar un sitio de emisiones de desechos industriales peligrosos. El método seleccionado determinará el siguiente paso a seguir.

Query Lógico



Esto inicia la ventana para hacer preguntas geográficas lógicas. Una query lógico puede identificar sitios industriales por el nombre y numero de empleados.

Identificación Gráfica

Esta opción de selección inicia una herramienta de identificación manual. Utiliza el ratón para apuntar la cruz al sitio deseado y apriete el botón para identificar un sitio industrial.

Punto Libre

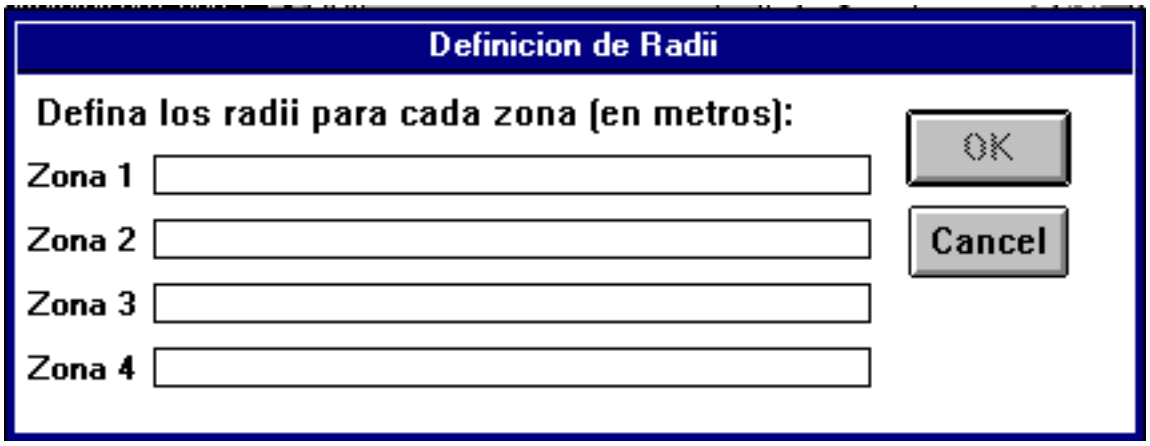
La opción de punto libre es utilizada para identificar un sitio de emisiones que no coincide con un sitio industrial. Esta opción inicia una herramienta con una cruz. Simplemente ponga la cruz sobre el punto deseado y apriete el botón del ratón. Un mensaje en la ventana principal dará las coordenadas del punto identificado.

Identificación de la Fuente Emisora

Si la fuente de emisiones coincide con un sitio industrial actual, la frase "Identificar la Fuente de Emisión" genera un listado que identifica el nombre de la compania y numero de empleados. No es posible utilizar esta opción cuando la fuente de emisión haya sido identificada con el método de "Punto Libre" .

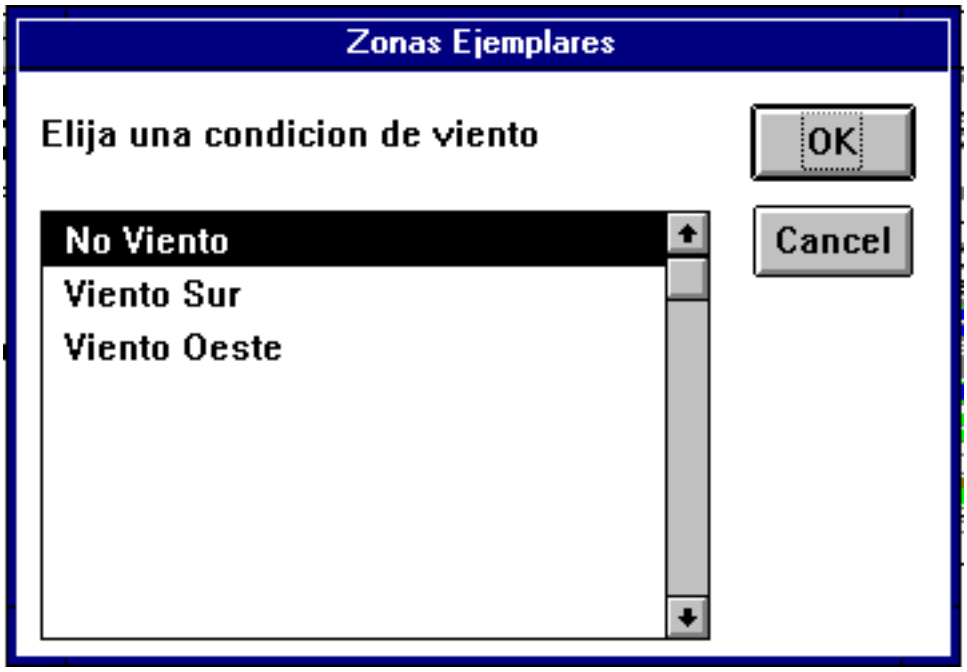
Definir las Zonas de Evacuación Mediante Círculos Concéntricos

Seleccionando la frase “Hacer Zonas de Evacuación’” crea la ventana “Definiciones de Radios”. Esto ofrece al usuario la habilidad de generar zonas de evacuación mediante círculos concéntricos alrededor de la fuente de emisiones identificada en los últimos pasos.



Introduzca los valores en metros para cada zona de evacuación. Asegurase de que el radio de una zona exterior sea mas grande que el radio de la zona interior. Cuando los valores de los radios hayan sido definidos pulse el botón “OK” y las zonas aparecerán en la ventana gráfica.

Zonas Ejemplares de Evacuación

La  frase Zonas Ejemplares de Evacuación Ó inicia la ventana Zonas Ejemplares.

Las tres opciones NO VIENTO, VIENTO SUR , y VIENTO OESTE proveen ejemplos de zonas de evacuación creadas dinamicamente alrededor de una fuente de emisiones predefinida basada en los efectos del viento y la topografía. Las zonas predefinidas de evacuación han sido creadas mediante la investigación y el análisis de las tendencias del movimiento de emisiones de desechos industriales volátiles. Esta investigación utiliza el análisis geográfico basado en modelos raster para predecir los efectos del viento y la topografía en el crecimiento y movimiento de las emisiones contaminante. Para el análisis se utilizo el modulo Grid de Arc/Info. Un grid es un tipo de formato raster para los datos. Un grid en el que el valor de los cuadros representa altura fue utilizado para representar el aspecto topográfico de la región de Ambos Nogales. Otros grids que representan el crecimiento de una emisión volátil fueron generados utilizando el grid de altura como un superficie de resistencia.

Estas zonas creadas con las funciones de Arc/Info solo representan ejemplos de la generación dinámica de zonas de evacuación.

Identificar las Partes Afectadas Dentro de una Zona de Evacuation

La función de identificar partes afectadas dentro de un zona de evacuación es la misma que la descrita en la sección “Componente de Escenario”. Refiérase a esta sección para detalles sobre esta función.

El Desarrollo Futuro de la BEI

La BEI podría ser utilizada como una herramienta auxiliar para la toma de decisiones en el proceso de implantación de planes de emergencia a lo largo de la frontera de México y Los Estados Unidos. Sin embargo, El aspecto estático de la información y las habilidades analíticas de ArcView2 sugieren que la interfase solo debe de ser utilizada como un ejemplo.

La mayoría de los resultados simplemente ilustran las capacidades y funciones mas especializadas del análisis geográfico. Las capabilidades de análisis complejos de Grid y Network no son posibles en el ambiente computacional de ArcView2. La reciente publicación de Arcview versión 3 podría proveer interesantes posibilidades en alguna futura investigación o aplicación. Las habilidades de análisis de Network y Grid igualmente proveerán muchas posibilidades de desarrollo.

Deslinde de Responsabilidades

Ni el autor ni el Departamento de Geografía de la Universidad de Utah asumen ninguna responsabilidad en el uso o aplicación de la BEI.

Appendix C - Avenue Code

```
' Nog.Config
' This script sets up operating system specifics
' and location of project and data
' Must be defined by user

' Unix path example
' _srcPath = "/home/data/ws.nogales/"
' _osSep = ="/"

' DOS path example
 _srcPath = "d:\users\eswar\nogales\"
 _osSep = "\"

' Macintosh path example
'_srcPath = "hard-drive:Nogales:"
'_osSep = ":"

' set up variable for active view
_nogView = av.GetActiveDoc
```

```
' Nog.TableMake
' creates a table based on passed argument
' the varialbe _anFtab needs to be set by the calling script.
' _anFtab represents the selected set of records we are outputting.
' This script creates lots of output files tha don't get deleted.
' Consider creating Vtabs instead of Ftabs. Try using temp file request
' when creating the .dbf files.

inputName = Self

' outputs summary of roads. Works for any selected set of roads
if ( inputName = "Roads") then
 sumfield = _anFtab.FindField("Street")
 field1 = _anFtab.FindField("Miles")
 field2 = _anFtab.FindField("Mph")
 field3 = _anFtab.FindField("Volume")
 field4 = _anFtab.FindField("Capacity")
 field5 = _anFtab.FindField("Time_min")
 outfilename = _tableName.AsString+"rds"
 outfile = outfilename.AsFileName
 outVtab = _anFtab.Summarize(outfile,info,sumfield,
  {field1,field2,field3,field4,field5},
  {#VTAB_SUMMARY_SUM,#VTAB_SUMMARY_AVG,
  #VTAB_SUMMARY_AVG,#VTAB_SUMMARY_AVG,#VTAB_SUMMARY_SUM})
 outTable = Table.Make(outVtab)
 outTable.SetName(_tableName++"Roads")
end

' outputs list of selected schools/hospitals
' This acually creates a shape file???!!!
if (inputName = "Schools/Hospitals") then
 "Make a temporary table to store selected info, offer to print
```

```
 "Delete table when done
 outfilename = _tableName.AsString+"sch"
 outfile = outfilename.AsFileName
 outFtab = Ftab.MakeNew(outfile,point)
 outTable = Table.Make(outFtab)
 outTable.SetName(_tableName++"Schools/Hospitals")
 ' create outFTab fields from _anFTab fields
 inFieldList  = _anFTab.GetFields
 outFieldList = inFieldList.DeepClone
 outFieldList.Remove(0)  ' omit the shape field...
 outFTab.AddFields({outFieldList.Get(4),outFieldList.Get(5),outFieldList.Get(6)})

 recSel = _anFtab.GetSelection
 ' Populate records 1,2,3 in tmpFtab from 5,6,7 in the inFtab
 ' for each selected element
 for each recNum in recSel
  newRec = outFtab.AddRecord
  x = 0
  for each outField in outFieldList
   x = x + 1
   inField  = inFieldList.Get(x)
   if ( x >= 5 ) then
    outFTab.SetValue(outField, newRec, _anFTab.ReturnValue( inField, recNum ) )
   end
  end
 end
end

' output list of selected shelters
' This atually creates a shapefile ???!!!
if (inputName = "Shelters") then
 outfilename = _tableName.AsString+"shlt"
 outfile = outfilename.AsFileName
 outFtab = Ftab.MakeNew(outfile,point)
 outTable = Table.Make(outFtab)
 outTable.SetName(_tableName++"Shelters")
 ' create outFTab fields from _anFTab fields
 inFieldList  = _anFTab.GetFields
 outFieldList = inFieldList.DeepClone
 outFieldList.Remove(0)  ' omit the shape field...
 outFTab.AddFields({outFieldList.Get(11),outFieldList.Get(12),outFieldList.Get(13)})

 recSel = _anFtab.GetSelection
 ' Populate records 1,2,3 in outFtab from 11,12,13 in the inFtab
 ' for each selected element
 for each recNum in recSel
  newRec = outFtab.AddRecord
  x = 0
  for each outField in outFieldList
   x = x + 1
   inField  = inFieldList.Get(x)
   if ( (x >= 12) and (x <= 14)) then
    outFTab.SetValue(outField, newRec, _anFTab.ReturnValue( inField, recNum ) )
   end
  end
 end
```

```
end

' output identification on sample release site
' Makes a shape file ???!!!
if (inputName = "Release") then
 recSel = _anFtab.GetSelection

 ' Make a table to write selected info to, offer to print
 outfile = "release".AsFileName
 outFtab = Ftab.MakeNew(outfile,point)
 outTable = Table.Make(outFtab)
 outTable.SetName("Release Site")
 ' create tmpFTab fields from indTab fields
 inFieldList  = _anFTab.GetFields
 outFieldList = inFieldList.DeepClone
 outFieldList.Remove(0)  ' omit the shape field...
 outFTab.AddFields({outFieldList.Get(4),outFieldList.Get(5)})

 ' Populate records 1 and 2 in tmpFtab from ,5 and 6 in the tmpFtab
 ' for each selected element
 for each recNum in recSel
  newRec = outFtab.AddRecord
  x = 0
  for each outField in outFieldList
   x = x + 1
   inField  = inFieldList.Get(x)
   if ( x >= 5 ) then
    outFTab.SetValue(outField, newRec, _anFTab.ReturnValue( inField, recNum ) )
   end
  end
 end
end

' census table creation
if (inputName = "Census") then
 sumfield = _anFtab.FindField("Blk")
 field1 = _anFtab.FindField("All_total")
 field2 = _anFtab.FindField("All_density")
 field3 = _anFtab.FindField("Hectares")
 tmpfile = _zoneName+"cns"
 tmpfilename = tmpfile.AsFileName
 outVtab = _anFtab.Summarize(tmpfilename,info,sumfield,
  {field1,field2,field3},
  {#VTAB_SUMMARY_SUM,#VTAB_SUMMARY_SUM,#VTAB_SUMMARY_SUM})
 outTable = Table.Make(outVtab)
 outTable.SetName(_tableName++"Census")
end

'Add outTable to the view
av.GetProject.AddDoc(outTable)
outTable.GetWin.Open
av.UseWaitCursor
```

```
'Nogdyn.CircleMake
'
```

```
' This script makes a set of four circles based an a list of radii

radiusList = SELF

'Fist remove any shapes from the graphic list
existingGraphics = _nogView.GetGraphics
for each graphicId in existingGraphics
 existingGraphics.RemoveGraphic(graphicId)
end

if (radiusList.Count <> 4) then
 av.run("Nogdyn.Mesg","InvalidRadiusList")
 exit
end

' extract zone radii from radius list
zone1Rad = radiusList.Get(0)
zone2Rad = radiusList.Get(1)
zone3Rad = radiusList.Get(2)
zone4Rad = radiusList.Get(3)

'Check for validity of zone radii. Each zone radiu ust be bigger than
' The next inner zone
'if ((zone4Rad < zone3Rad) or (zone3Rad < zone2Rad) or (zone2Rad < zone1Rad)) then
' av.run("Nogdyn.Mesg","InvalidRadiusList")
' exit
'end

' Create a circle from each radius around _toX, _toY.
' set the drawing properties and add them to graphic list
zoneGraphics = _nogView.GetGraphics
zoneList = List.Make

_zone1Circle = Circle.Make(_toX@_toY,radiusList.Get(0).AsNumber)
zone1Shape = GraphicShape.Make(_zone1Circle)
zoneList.Add(zone1Shape)

_zone2Circle = Circle.Make(_toX@_toY,radiusList.Get(1).AsNumber)
zone2Shape = GraphicShape.Make(_zone2Circle)
zoneList.Add(zone2Shape)

_zone3Circle = Circle.Make(_toX@_toY,radiusList.Get(2).AsNumber)
zone3Shape = GraphicShape.Make(_zone3Circle)
zoneList.Add(zone3Shape)
_zone4Circle = Circle.Make(_toX@_toY,radiusList.Get(3).AsNumber)
zone4Shape = GraphicShape.Make(_zone4Circle)
zoneList.Add(zone4Shape)

'Set up a symbol to draw zones circles
'circleSym = symbol.Make(#SYMBOL_FILL)
circleSYm = zone4shape.GetSymbol
'iColor = Color.GetRed
'iColor.SetTransparent(true)
oCOlor = Color.GetBlack
'circleSym.SetColor(iColor)
circleSym.SetOLcolor(oCOlor)
```

```
for each zoneCircle in zoneList
 zoneCircle.SetSymbol(circleSym)
 zoneGraphics.Add(zoneCircle)
end

_zselectCircles = true
```

```
' Nogdyn.CircleSelect
' Identifies themes from zone concentric circle shapes

inpTheme = _nogView.FindTheme(SELF)
inpTheme.SetActive(true)

'msgBox.Info(_zoneName,"")
if (_zoneName = "Zone 1") then
 inpTheme.SelectByShapes({_zone1Circle},#VTAB_SELTYPE_NEW)
end

'Zone2 selection, must unselect anything in zone 1
if (_zoneName = "Zone 2") then
 inpTheme.SelectByShapes({_zone2Circle},#VTAB_SELTYPE_NEW)
 zone2Ftab = inpTheme.GetFtab
 zone2Bitmap = zone2Ftab.GetSelection

 inpTheme.SelectByShapes({_zone1Circle},#VTAB_SELTYPE_NEW)
 zone1Bitmap = inpTheme.GetFtab.GetSelection
 for each SelRec in zone1Bitmap
   zone2Bitmap.Clear(SelRec)
 end
 zone2Ftab.SetSelection(zone2Bitmap)
end

' Zone 3 selection, unselect in 2 and 1
if (_zoneName = "Zone 3") then
 inpTheme.SelectByShapes({_zone3Circle},#VTAB_SELTYPE_NEW)
 zone3Ftab = inpTheme.GetFtab
 zone3Bitmap = zone3Ftab.GetSelection

 inpTheme.SelectByShapes({_zone2Circle},#VTAB_SELTYPE_NEW)
 zone2Bitmap = inpTheme.GetFtab.GetSelection
 for each SelRec in zone2Bitmap
   zone3Bitmap.Clear(SelRec)
 end

 inpTheme.SelectByShapes({_zone1Circle},#VTAB_SELTYPE_NEW)
 zone1Bitmap = inpTheme.GetFtab.GetSelection
 for each SelRec in zone1Bitmap
   zone3Bitmap.Clear(SelRec)
 end

 zone3Ftab.SetSelection(zone3Bitmap)
end

if (_zoneName = "Zone 4") then
```

```
 inpTheme.SelectByShapes({_zone4Circle},#VTAB_SELTYPE_NEW)
 zone4Ftab = inpTheme.GetFtab
 zone4Bitmap = zone4Ftab.GetSelection

 inpTheme.SelectByShapes({_zone3Circle},#VTAB_SELTYPE_NEW)
 zone3Bitmap = inpTheme.GetFtab.GetSelection
 for each SelRec in zone3Bitmap
   zone4Bitmap.Clear(SelRec)
 end

 inpTheme.SelectByShapes({_zone2Circle},#VTAB_SELTYPE_NEW)
 zone2Bitmap = inpTheme.GetFtab.GetSelection
 for each SelRec in zone2Bitmap
   zone4Bitmap.Clear(SelRec)
 end

 inpTheme.SelectByShapes({_zone1Circle},#VTAB_SELTYPE_NEW)
 zone1Bitmap = inpTheme.GetFtab.GetSelection
 for each SelRec in zone1Bitmap
   zone4Bitmap.Clear(SelRec)
 end

 zone4Ftab.SetSelection(zone4Bitmap)
end

inpFtab = inpTheme.GetFtab
inpFtab.UpdateSelection
return inpFtab
```

```
'Nogdyn.IdReleasePnt
'Identifies release point

selMethod = SELF.GetTag
'msgBox.info(selMethod,"")

' If selection is an indstrial site,
'make sure only one is selected

if (selMethod = "Free") then
 av.run("Nogdyn.Mesg","IndFreePoint")
else
 _indFtab.UpdateSelection
 ' check to see number of selected points
 numSel = _indFtab.GetSelection.Count
 if (numSel = 0) then
  av.run("Nogdyn.Mesg","IndSelectNone")
  exit
 end
 if (numSel > 1) then
  av.run("Nogdyn.Mesg","IndSelectMany")
  exit
 end

 ' set the _toX and _toY
 shapeField = _indFtab.FindField("Shape")
```

```
 for each recNum in _indFtab.GetSelection
  indShape = _indFtab.ReturnValue( shapeField, recNum )
  _toX = indShape.GetX
  _toY = indShape.GetY
 end
 'msgBox.info(_toX.AsString++_toY.AsString,"")
 ' make the table identifying the release point
 _anFtab = _indFtab
 _tableName = "Release"
 av.run("Nog.TableMake","Release")
end
```

```
' Nogdyn.Mesg
' This script contains all menus for dynamic component

mesg = SELF

' Select method choice menu
if (mesg = "SelectMethod") then
 choiceList = {"Logical Query","Graphical Select","Free Point"}
 selMethod = msgBox.ListAsString(choiceList, "Choose a select method:","Select Methods")
 return selMethod
end

' Industry theme can not be found
if (mesg = "IndThemeNone") then
 text1 = "The Industry theme can not be found!"
 text2 = "Check theme setup and try again..."
 msgtext = text1+NL+text2
 msgBox.Info(msgtext,"Theme Not Found")
end

' No Industry sites selected
if (mesg = "IndSelectNone") then
 text1 = "No industrial site was selected."
 text2 = "Select again..."
 msgtext = text1+NL+text2
 msgBox.Info(msgtext,"Nothing Selected")
end

' More than one Industry site selected
if (mesg = "IndSelectMany") then
 text1 = "More than 1 industrial site was selected"
 text2 = "Only one site can be selected to generate"
 text3 = "evacuation zones."
 text4 = "Select again..."
 msgtext = text1+NL+text2+NL+text3+NL+text4
 msgBox.Info(msgtext,"Too Many")
end

' Release site is a free point
if (mesg = "IndFreePoint") then
 text1 = "No identification possible when using select method 'Free Point'"
 text2 = "Either select again or proceed to 'Generate Evacuation Zones...'"
 msgtext = text1+NL+text2
```

```
 msgBox.Info(msgtext,"Unable To Identify")
end

' No zone orgin exists
if (mesg = "ZoneOrginNone") then
 text1 = "No zone orgin has been identified".
 text2 = "Use 'Select Release Site...' before generating evacuation zones..."
 msgtext = text1+NL+text2
 msgBox.Info(msgText,"Undefined Zone Orgin")
end

' Zone generation choice menu
if (mesg = "ZoneTypes") then
 choiceList = {"Concentric Circles","No Wind","South Wind","West Wind"}
 zoneType = msgBox.ListAsString(choiceList,"Choose a zone generation Method","Zone Generations")
 return zoneType
end

' menu to define circle radii
if (mesg = "CircleRadius") then
 zoneList = {"Zone 1","Zone 2","Zone 3","Zone 4"}
 radiusList = msgBox.MultiInput("Define a radius for each zone( in meters):","Radius
Definition",zoneList,{})
 return radiusList
end
```

```
' Nogdyn.SelectMethod
'This script controls the selection of an industrial release site

av.run("Nog.Config","")

'av.run("Nogdyn.Mesg","Reset")
' run the clean up
'av.run("Nogdyn.ThemeDelete","")

'Make sure the Industry theme is present
'If present make it only active theme
indTheme = _nogView.FindTheme("INDUSTRY")
if (indTheme = nil) then
 av.run("Nogdyn.Mesg","IndThemeNone")
 exit
else
 for each themeName in _nogView.GetThemes
  themeName.SetActive(false)
 end
 indTheme.SetActive(true)
end

' clear any selected features in _indTheme
_indFtab = indTheme.GetFtab
_indFtab.GetSelection.ClearAll
_indFtab.UpdateSelection

'prepare menu choice tag to be altered
 dynMenu = av.GetActiveGUI.GetMenuBar.GetControls.Get(7)
```

```
 menuChoice = dynMenu.GetControls.Get(1)

' Prompt user for selection method
selMethod = av.run("Nogdyn.Mesg","SelectMethod")

'Select industrial release site using selected method
if ( selMethod = "Logical Query") then
 av.ShowMsg("Select release site with a logical query")
 if (indTheme.Is( FTHEME)) then
  indTheme.BuildQuery
 end
 menuChoice.SetTag("")
end

if ( selMethod = "Graphical Select") then
 av.ShowMsg("Select release site with mouse by pointing...")
 Toolcntrls = av.GetActiveGUI.GetToolBar.GetControls
 SelectButton = Toolcntrls.get(ToolCntrls.Count - 1)
 SelectButton.Select
 SelectButton.SetApply("View.SelectPoint")
 menuChoice.SetTag("")
end

if ( selMethod = "Free Point") then
 av.ShowMsg("Identify a free point release site by pointing and clicking")
 Toolcntrls = av.GetActiveGUI.GetToolBar.GetControls
 SelectButton = Toolcntrls.get(Toolcntrls.Count - 1)
 SelectButton.Select
 SelectButton.SetApply("Nogdyn.SelectFree")
 menuChoice.SetTag("Free")
end
```

```
'Nogdyn.SelectFree
'This script identifies a free point as an
'industrial release site

p = _nogView.GetDisplay.ReturnUserPoint

' draw the point ???

'set _toX and_toY variables
_toX = p.GetX
_toY = p.GetY

text1 = "Free Point("+_toX.AsString+","+_toY.AsString+")"
text2 = "Proceed to 'Generate Evacuation Zones...', or"
text3 = "select another free point."
av.ShowMsg(text1++text2++text3)
```

```
' Nogdyn.ZoneAdd
'Add grid generated evacuation polygons
'zoneList list of zone names
```

```
'Nogdyn.ZoneAdd
'
' Add grid generated evacuation zones and moves them to
' orgin _toX,_toY

av.ShowMsg("Generating evacuation zones...")
av.UseWaitCursor
av.SetStatus(0)
progress = 0
for each zoneName in _zoneList
 srcPath = _srcPath+"zones"+_osSep+zoneName++"polygon"
 srcstring = srcPath.AsString
 msgBox.info(srcstring,"")
 'zoneSrc = SrcName.Make(srcstring.AsString)
 zoneTheme = Theme.Make(srcstring.AsSrcName)
 _nogView.AddTheme(zoneTheme)
 ' Set a new name for the theme...
 zoneTheme.SetName(zoneName)
 zoneLeg = zoneTheme.GetLegend
 zColor = Color.GetRed
 zColor.SetTransparent(true)
 zOColor = Color.GetRed
 'z2Leg.GetSymbols.Get(0).SetOLColor(zOColor)
 zoneLeg.GetSymbols.Get(0).SetColor(zColor)
 zoneTheme.UpdateLegend

 'now move the polygon before drawing
 ' select the polygon
 _nogView.SetEditableTheme(zoneTheme)
 zoneTheme.SetActive(true)
zoneFtab = zoneTheme.GetFtab

' move the polygon
'zoneSel = zoneFtab
'zoneField = zoneFtab.FindField( "Shape" )
'for each recNum in zoneSel
' fromShape = zoneFtab.ReturnValue( zoneField, recNum)
' fromXY = fromShape.ReturnCenter.AsString
' fromX = fromXY.extract(1).AsNumber
' fromY = fromXY.extract(2).AsNumber
' moveX = _toX - fromX
' moveY = _toY - fromY
' toShape = fromShape.Move(moveX,moveY)
' zoneFtab.SetValue(zoneField, recNum, toSHape)
'end
'zoneFtab.Flush
zoneTheme.SetVisible(true)
av.ShowMsg("Generating evacuation zones...")

progress = (progress + 24)
av.SetStatus(progress)

'_zoneTheme = zoneTheme
end
av.SetStatus(100)
_nogView.Invalidate
```

```
'Nogdyn.ZoneGen.Drv
'This script controls the selection and initiation of
' dynamic evacuation zones

' make sure we have a selected point
if ((_toX = nil) or (_toY = nil)) then
 av.run("Nogdyn.Mesg","ZoneOrginNone")
 exit
end


zoneType = av.run("Nogdyn.Mesg","ZoneTypes")

if (zoneType = "Concentric Circles") then
 radiusList= av.run("Nogdyn.Mesg","CircleRadius")
 av.run("Nogdyn.CircleMake",radiusList)
 exit
end

if (zoneType = "No Wind") then
 _zoneList = {"nwzone1","nwzone2","nwzone3","nwzone4"}
end

if (zoneType = "South Wind") then
 _zoneList = {"swzone1","swzone2","swzone3","swzone4"}
end

if (zoneType = "West Wind") then
 _zoneList = {"wwzone1","wwzone2","wwzone3","wwzone4"}
end

if ( zoneType = nil) then
 exit
end

av.run("Nogdyn.ZoneAdd","")
_zselectCircles = false
```

```
'Nogdyn.ZoneSel
'

inpTheme = _nogView.FindTheme(Self)
selTheme = _zoneTheme

if (_zoneNumber = 1) then
 zone1Name = _zoneList.Get(0)
 msgBox.info(zone1Name.AsString,"")
 zone1Theme = _nogView.FindTheme(zone1Name)
 inpTheme.SelectByTheme(zone1Theme,#FTAB_RELTYPE_INTERSECTS,0,#VTAB_SELTYPE_NEW)
end

if (_zoneNumber = 2) then
 zone2Name = _zoneList.Get(1)
```

```
 zone2Theme = _nogview.FindTheme(zone2Name)
 inptheme.SelectByTheme(zone2Theme,#FTAB_RELTYPE_INTERSECTS,0,#VTAB_SELTYPE_NEW)
 zone2Ftab = inpTheme.GetFtab
 zone2Bitmap = zone2Ftab.GetSelection

 zone1Name = _zoneList.Get(0)
 zone1Theme = _nogView.FindTheme(zone1Name)
 inptheme.SelectByTheme(zone1Theme,#FTAB_RELTYPE_INTERSECTS,0,#VTAB_SELTYPE_NEW)
 zone1Bitmap = inpTheme.GetFtab.GetSelection
 for each SelRec in zone1Bitmap
  zone2Bitmap.Clear(SelRec)
 end

 zone2Ftab.SetSelection(zone2Bitmap)
end


if (_zoneNumber = 3) then
 zone3Name = _zoneList.Get(2)
 zone3Theme = _nogview.FindTheme(zone3Name)
 inptheme.SelectByTheme(zone3Theme,#FTAB_RELTYPE_INTERSECTS,0,#VTAB_SELTYPE_NEW)
 zone3Ftab = inpTheme.GetFtab
 zone3Bitmap = zone3Ftab.GetSelection

 zone2Name = _zoneList.Get(1)
 zone2Theme = _nogView.FindTheme(zone2Name)
 inptheme.SelectByTheme(zone2Theme,#FTAB_RELTYPE_INTERSECTS,0,#VTAB_SELTYPE_NEW)
 zone2Bitmap = inpTheme.GetFtab.GetSelection
 for each SelRec in zone2Bitmap
  zone3Bitmap.Clear(SelRec)
 end

 zone1Name = _zoneList.Get(0)
 zone1Theme = _nogView.FindTheme(zone1Name)
 inptheme.SelectByTheme(zone1Theme,#FTAB_RELTYPE_INTERSECTS,0,#VTAB_SELTYPE_NEW)
 zone1Bitmap = inpTheme.GetFtab.GetSelection
 for each SelRec in zone1Bitmap
  zone3Bitmap.Clear(SelRec)
 end

 zone3Ftab.SetSelection(zone3Bitmap)
end

if (_zoneNumber = 4) then
 zone4Name = _zoneList.Get(3)
 zone4Theme = _nogview.FindTheme(zone4Name)
 inptheme.SelectByTheme(zone4Theme,#FTAB_RELTYPE_INTERSECTS,0,#VTAB_SELTYPE_NEW)
 zone4Ftab = inpTheme.GetFtab
 zone4Bitmap = zone4Ftab.GetSelection

 zone3Name = _zoneList.Get(2)
 zone3Theme = _nogView.FindTheme(zone3Name)
 inptheme.SelectByTheme(zone3Theme,#FTAB_RELTYPE_INTERSECTS,0,#VTAB_SELTYPE_NEW)
 zone3Bitmap = inpTheme.GetFtab.GetSelection
 for each SelRec in zone3Bitmap
  zone4Bitmap.Clear(SelRec)
```

```
 end

 zone2Name = _zoneList.Get(1)
 zone2Theme = _nogView.FindTheme(zone2Name)
 inptheme.SelectByTheme(zone2Theme,#FTAB_RELTYPE_INTERSECTS,0,#VTAB_SELTYPE_NEW)
 zone2Bitmap = inpTheme.GetFtab.GetSelection
 for each SelRec in zone2Bitmap
  zone4Bitmap.Clear(SelRec)
 end

 zone1Name = _zoneList.Get(0)
 zone1Theme = _nogView.FindTheme(zone1Name)
 inptheme.SelectByTheme(zone1Theme,#FTAB_RELTYPE_INTERSECTS,0,#VTAB_SELTYPE_NEW)
 zone1Bitmap = inpTheme.GetFtab.GetSelection
 for each SelRec in zone1Bitmap
  zone4Bitmap.Clear(SelRec)
 end

 zone4Ftab.SetSelection(zone4Bitmap)
end

inpTheme.SelectByTheme(selTheme,#FTAB_RELTYPE_INTERSECTS,0,#VTAB_SELTYPE_NEW)

inpFtab = inpTheme.GetFtab
inpFtab.UpdateSelection
return inpFtab
```

```
' Nogdyn.ZoneSelDrv
' This script controls selecting for all zones

_zoneNumber = SELF.GetTag.AsNumber

if (_zselectCircles = false) then

 _zoneName = _zoneList.Get(_zoneNumber - 1)
 _zoneTheme = _nogView.FindTheme(_zoneName)

 if (_zoneTheme = nil) then
  av.run("NogStat.Mesg","ZoneNone")
  exit
 end
else
 _zoneName = "Zone"++_zoneNumber.AsString
end

' start interactive selection by themes of interest
menuStat = true
while (menuStat = true)
 selOption = av.Run("Nogstat.Mesg","ZoneIdList")
 if (selOption = nil) then
  menuStat = false
 end
 if (selOption = "Shelters") then
  if (_zselectCircles = true) then
   _anFtab = av.Run("Nogdyn.CircleSelect","SHELTERS")
```

```
  else
   _anFtab = av.Run("Nogdyn.ZoneSel","SHELTERS")
  end
 end
 if (selOption = "Schools/Hospitals") then
  if (_zselectCircles = true) then
   _anFtab = av.Run("Nogdyn.CircleSelect","SCH_HOSP")
  else
   _anFtab = av.Run("Nogdyn.ZoneSel","SCH_HOSP")
  end
 end
 if (selOption = "Roads") then
  if (_zselectCircles = true) then
   _anFtab = av.Run("Nogdyn.CircleSelect","ROADS")
  else
   _anFtab = av.Run("Nogdyn.ZoneSel","ROADS")
  end
 end
 if (selOption = "Census") then
  if (_zselectCircles = true) then
   _anFtab = av.Run("Nogdyn.CircleSelect","CENSUS")
  else
   _anFtab = av.Run("Nogdyn.ZoneSel","CENSUS")
  end
 end

 if (selOption <> nil) then
  menuStat = false
 end
end

_tableName = _zoneName
av.Run("Nog.TableMake",selOption)
```

```
' Nogstat.IdReleasePnt
' This script selects the industrial release point, displays a table, offers to
' prints the table and adds the zone1 buffer theme.

indTheme = _nogView.GetActiveThemes
if (indTheme.Count <> 1) then
 return 1
end
indTheme = _nogView.GetActiveThemes.Get(0)
indFtab = indTheme.GetFtab
if ((indTheme.GetSrcName.GetSubName = "point").Not or
    (indFtab.FindField("Name") = nil)) then
    return 1
end

indBitMap = indFtab.GetSelection
indBitMap.ClearAll
indFtab.UpdateSelection

'Select and highlight the sample release point
qstring  = "([Name] = ""Transformadores de Nogale"")"
```

```
'qstring = "([No_employ] > 25)"
indFtab.Query(qstring,indBitMap,#VTAB_SELTYPE_NEW)
if (indFtab.GetSelection.Count = 0) then
 return 2
end
' Have got to be able to force a view update inside of script execution
'indFtab.Flush
'indTheme.UpdateLegend
'av.run("Nog.Pause","5")
'exit

_anFtab = indFtab
_tableName = "Release"
av.run("Nog.TableMake","Release")
return 0
```

```
' Nogstat.Mesg
' this script holds all mesages for static demo

mesgNum = Self

''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''''
' All messages for scenario

' ???
if (mesgNum = "Zone1Sel0") then
 msgtxt = "The step identifies imediate evacuation zone."+NL+
 "All roads, schools, hospitals and shelters are identified."+NL+
 "Do you want to continue?"
 cont = MsgBox.YesNo(msgtxt,"Continue Scenario?",true)
 if (cont = false) then
  exit
 end
end

' start-up message, industry theme not active
if (mesgNum = "Zone1Sel1") then
 msgtxt = "Industry points must be the active theme!"+NL+"Check theme selection and start again."
 MsgBox.Info(msgtxt,"Invalid Active Theme")
 exit
end

if (mesgNum = "Zone1Sel2") then
 msgtxt = "No site selected!"+NL+"Check theme setup and start over"
 MsgBox.Info(msgtxt,"Nothing Selected")
 exit
end

' message for zone already identified, all zones
if(mesgNum = "ZoneExists") then
 mesgtext1 = _zoneName.AsString
 mesgtext = mesgtext1++"has already been identified."
 MsgBox.info(mesgtext,"Theme exists")
end
```

```
' message for zone not identified, all zones
if (mesgNum = "ZoneNone") then
 mesgtext1 = _zoneName.AsString
 mesgtext2 = mesgtext1++"theme not found!"
 mesgtext3 = "Identify"++mesgtext1++"before selecting."
 mesgtxt = mesgtext2+NL+mesgtext3
 MsgBox.info(mesgtxt,"Theme not found")
end

' choice menu for static zone selecting
if (mesgNum = "ZoneIdList") then
 optionList = "Shelters Schools/Hospitals Roads Census".AsList
 option = MsgBox.ListAsString(optionList,"Select immediately affected:",_zoneName++"Selection")
 return option
end
```

```
'NogStat.PathSelDrv
'Controls adding of evacuation paths

pathName = SELF.GetTag
av.run("Nog.Config","")

'set up source strings
if (pathName = "Path 1") then
 srcstring = _srcPath+"roads" ++ "route.path25"
 end

if (pathName = "Path 2") then
 srcstring = _srcPath+"roads" ++ "route.path30"
end

if (pathName = "Path 3") then
 srcstring = _srcPath+"roads" ++ "route.path20"
end

if (pathName = "Path 4") then
 srcstring = _srcPath+"roads" ++ "route.path23"
end

' call script to highlight allocated shelter(s)
' and make a tabular report
av.run("Nogstat.ShelterId",pathName)

'Check to see if theme exists
if (_nogView.FindTheme(pathName) = nil) then
 ' Add the path to the view
 pathTheme = Theme.Make(srcstring.AsSrcName)
 _nogview.AddTheme(pathTheme)
 pathTheme.SetName(pathName)
 pathleg = pathTheme.GetLegend
 pathColor = Color.GetYellow
 pathLeg.GetSymbols.Get(0).SetCOlor(pathColor)
 pathTheme.UpdateLegend
 pathTheme.SetVisible(true)
 _anFtab = pathTheme.GetFtab
```

```
 _tableName = PathName
 'av.run("Nog.TableMake","Roads")
end
```

```
'Nogstat.ShelterId
'
'This script identifies allocaed shelters based on
'a pathname

pathName = SELF

if (pathName = "Path 1") then
 querystring = "([Facility] = ""CETIS"") or ([Facility] = ""Senderos"") or ([Facility] = ""Club Activo 20-
30"") or ([Facility] = ""Juan Enrique P."") or  ([Facility] = ""Harlow's"") or ([Facility] = ""Franciso
Madero"") or  ([Facility] = ""Centro Cristiano"") or ([Facility] = ""Casino de Nogales"") or ([Facility] =
""Purisima Concepcion"") or ([Facility] = ""CUM"")"
end

if (pathName = "Path 2") then
 querystring = "([Facility] = "" Pierson School"") or ([Facility] = ""Sacred Heart School"") or ([Facility] =
""Capins El Paso Store"")"
end

if (pathName = "Path 3") then
 querystring = "([Facility] = ""A.J. Mitchell School"") or ([Facility] = ""American Motor Hotel"") or
([Facility] = ""Walter Holm"")"
end

if (pathName = "Path 4") then
 querystring = "([Facility] = ""Capins El Paso Store"") or ([Facility] = ""American Motor Hotel"") or
([Facility] = ""Walter Holm"") of ([Facility] = ""Challenger Elementary"")"
end

'set shelter theme and query
shTheme = _nogView.FindTheme("SHELTERS")
shTheme.GetFtab.GetSelection.ClearAll
shTheme.GetFtab.UpdateSelection
shBitmap = shTheme.GetFtab.GetSelection
shTheme.GetFtab.Query(querystring,shBitMap,#VTAB_SELTYPE_NEW)
shtheme.GetFtab.UpdateSelection
_anFtab = shtheme.GetFtab

' make table for selected shelters
_tableName = pathName
av.run("Nog.TableMake","Shelters")
```

```
' Nogstat.ZoneIdh
' Controls adding of zone themes. Top level script for scenario

' set up environment
av.run("Nog.Config","")

' get zone name based on passed tag
_zoneName = SELF.GetTag
```

```
'check to see if zone already has been identfied
if (_nogView.FindTheme(_zoneName) <> nil) then
 av.run("Nogstat.Mesg","ZoneExists")
 exit
end

'set up source strings
if (_zoneName = "Zone 1") then
 srcstring = _srcPath+"zones\zone1" ++ "polygon"
 status = av.run("Nogstat.IdReleasePnt","")
 if (status = 1) then
  av.Run("Nogstat.Mesg","Zone1Sel1")
  exit
 end
 if (status = 2) then
  av.Run("Nogstat.Mesg","Zone1Sel2")
  exit
 end
end

if (_zoneName = "Zone 2") then
 srcstring = _srcPath+"zones\zone2" ++ "polygon"
end

if (_zoneName = "Zone 3") then
 srcstring = _srcPath+"zones\zone3" ++ "polygon"
end

if (_zoneName = "Zone 4") then
 srcstring = _srcPath+"zones\zone4" ++ "polygon"
end

' add the zone theme
zoneSrc = SrcName.Make(srcstring)
zoneTheme = Theme.Make(zoneSrc)
_nogView.AddTheme(zoneTheme)
' Set a new name for the theme...
zoneTheme.SetName(_zoneName)
zoneLeg = zoneTheme.GetLegend
zColor = Color.GetRed
zColor.SetTransparent(true)
zOColor = Color.GetRed
'z2Leg.GetSymbols.Get(0).SetOLColor(zOColor)
zoneLeg.GetSymbols.Get(0).SetColor(zColor)
zoneTheme.UpdateLegend
zoneTheme.SetVisible(true)
_zoneTheme = zoneTheme
```

```
'Nogstat.ZoneSel
' select input theme by zone polygon
' inp is wat we want to select on
' sel is what we are selecting with

inpTheme = _nogView.FindTheme(Self)
```

```
selTheme = _zoneTheme
selFtab = selTheme.GetFtab

selBitMap = selFtab.GetSelection
qstring = "([Area] < 5000000)"
selFtab.Query(qstring,selBitMap,#VTAB_SELTYPE_NEW)
selFtab.UpdateSelection

inpTheme.SelectByTheme(selTheme,#FTAB_RELTYPE_INTERSECTS,0,#VTAB_SELTYPE_NEW)

qstring = "([Area] < 10)"
selFtab.Query(qstring,selBitMap,#VTAB_SELTYPE_NEW)
selFtab.UpdateSelection
inpFtab = inpTheme.GetFtab
return inpFtab


"make a shape out of selTheme polygon and select from the shape
"there is only one poly (minus bnd poly), make sure it is selected.
'if (selFtab.GetNumRecords <> 1) then
' return 1
' exit
'end
'
'recSel = selFtab.GetSelection
'for each recNum in recSel
' shapeField = selFtab.FindField( "Shape" )
' valShape = selFtab.ReturnValue( shapeField, recNum)
'end
'inpTheme.SelectByShapes({valShape},#VTAB_SELTYPE_NEW)
```

```
' Nogstat.ZoneSelDrv
' This script controls selecting for all zones

_zoneName = SELF.GetTag

'need to check if theme name exists before doing this
_zoneTheme = _nogView.FindTheme(_zoneName)

if (_zoneTheme = nil) then
 av.run("NogStat.Mesg","ZoneNone")
 exit
end

' start interactive selection by themes of interest
menuStat = true
while (menuStat = true)
 selOption = av.Run("Nogstat.Mesg","ZoneIdList")
 if (selOption = nil) then
  menuStat = false
  exit
 end
 if (selOption = "Shelters") then
  _anFtab = av.Run("Nogstat.ZoneSel","SHELTERS")
 end
```

```
 if (selOption = "Schools/Hospitals") then
  _anFtab = av.Run("Nogstat.ZoneSel","SCH_HOSP")
 end
 if (selOption = "Roads") then
  _anFtab = av.Run("Nogstat.ZoneSel","ROADS")
 end
 if (selOption = "Census") then
  _anFtab = av.Run("Nogstat.ZoneSel","CENSUS")
 end
 if (selOption <> nil) then
  menuStat = false
 end
end

_tableName = _zoneName
av.Run("Nog.TableMake",selOption)
```
