

Consider the case of a small island in the Caribbean, in which landsliding continues to have a devastating impact on infrastructure. Alternatively, consider planned efforts to evaluate the island's seismic hazard, to manage its natural resources or to perform an environmental impact assessment. These and similar engineering tasks utilize a large volume of data and require a high level of expertise for their solution. Problem-solving in this context can be facilitated by the application of two relatively recent technologies—knowledge-based expert systems (KBES) and geographic information systems (GIS). A KBES is a computer program which utilizes the knowledge and reasoning processes employed by a highly experienced professional to solve problems. A GIS is a computerized database management system which stores, analyses and displays spatial and non-spatial data. This latter technology has significantly increased the efficiency with which geographic data are handled.

Independently, these powerful technologies are having considerable impact in the developed world. Initially applied to the field of medicine, expert systems have expanded to most engineering disciplines. Similarly, GIS are now applied in a wide variety of fields, including natural resource management, environmental and land use planning, and hazard mapping. Both KBES and GIS have been applied independently to aid in solving engineering problems of the Caribbean region. Prototypes of expert systems have been developed for industrial process control, sugar processing, seismic and hurricane risk assessment and robotic applications, while GIS have been implemented in flood management, and are being developed in the fields of water resource management and flood plain mapping.

In the Caribbean, where there is still a shortage of professional expertise, maximum benefit can be derived when the two technologies are combined to create automated intelligent problem-solving tools. The integration of KBES and GIS creates knowledge-based GIS, in which the GIS facility performs the traditional data storage and manipulation function, while the expert system component contains the knowledge and procedures which are required to manipulate the GIS for data analysis and interpretation. The juxtaposition of knowledge and data creates a powerful self-contained tool, which expands the utility of the GIS, enabling its use by those who may be specialists in the problem domain but are non-expert GIS users.

There is currently an ongoing thrust by the Faculty of Engineering of the University of the West Indies to sensitize public and private agencies in the region to the application and potential benefits of these two systems. To date these efforts have been executed independently of each other. These important and challenging activities must continue aggressively. Simultaneously, they must be expanded to include similar programmes which demonstrate the benefits of integrating the two systems. The potential for knowledge transfer and information exchange is at our fingertips, and the region must ensure that it keeps in step with these exciting technologies.

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