



ROADS TO PROSPERITY

IN THIS SECOND OF A TWO-PART ARTICLE, PARVIZ TARIKHI TRACES THE PRACTICAL STEPS TAKEN TO IMPLEMENT A WEB GIS IN SUPPORT OF IRAN'S ROAD TRANSPORT NETWORK

MAIN IMAGE: New and improved highways are a top priority as domestic car ownership burgeons. Pictured here, Iran's first national car, the Samand - one of a range of Peugeot vehicles manufactured under license by Khodro.

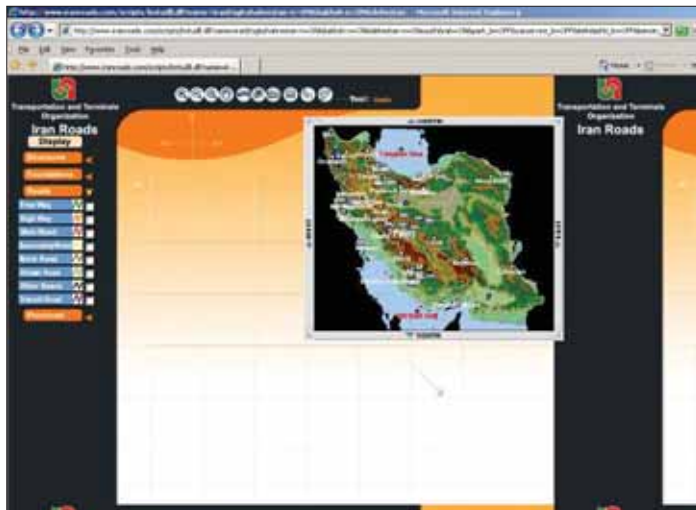
In the previous issue I sketched the background to a web-GIS development pursued by the Iranian Transportation and Terminals Organisation (ITTO) and its twin aims: to help transport officials manage the nation's road network and to disseminate information to road users that will enhance their driving experience and improve levels of safety.

Having gathered much new data from a nation-wide field survey, and having completed a requirements analysis, the programme proceeded to the second of its eight intended phases:

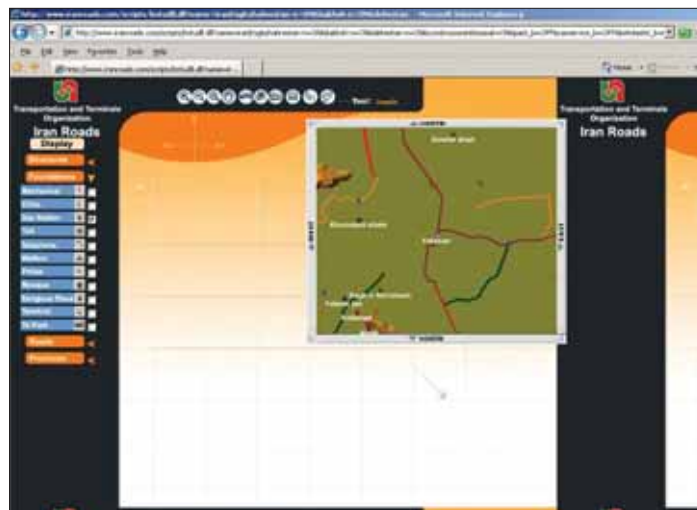
Conceptual Design: This phase included the design and development of a data model that described entities and their relationships. Since data were to be delivered through a central server, and as users would have access to raster formats, a medium client architecture was chosen that would provide users with access to interactive maps.

Software and hardware: Needless to say, suitable software was considered important for a successful implementation and a number of packages were assessed for cost, functionality, performance, and openness of hardware and operating system. As a result, ESRI's ArcIMS 3.1 web map server and the IMS extension for its MapObjects ActiveX control were selected for further evaluation.

Web GIS requires specific hardware configuration to cope with huge volumes of transferred data and to maintain a high Internet connection speed. A pilot project established that most of the data would be sent from map server to clients at speeds in excess of 128kbs



The User Interface.



Zoom-in view of gas stations in the vicinity of Isfahan.

and a dual processor server with 512 MB RAM was selected for this purpose.

Database design & construction: The primary purpose of this phase was to specify how the Web GIS would handle the required applications. Database design involved defining how graphics would be portrayed in terms of colour, weight, size, symbology and so on; how graphics and attribute files would be structured; determining active layers; establishing at what scale layers should be exposed; how GIS products would be presented based on map sheet layouts, report formats, etc., and what management access and security restrictions should be applied.

Selecting a source (document, map, digital file, etc.) for each entity and attribute, setting-up the actual database design (logical or physical design), defining the procedures for converting data from source media to the database, and defining procedures for managing and maintaining the database were the key ingredients within this process.

Database design was conducted in parallel with a pilot study and benchmarking.

Hardware/software acquisition: Given that the physical database design could not be completed until specific GIS hardware/software was selected, but also that GIS hardware/ software selection could not be finalised until the selected GIS can be shown to perform required functions on the data, all three activities - design, testing, and hardware/software acquisition - were often conducted concurrently.

System integration: At this point, the Web GIS hardware and software had been acquired and data conversion had been completed. The objective was then to integrate different components of the hardware and software; test them to make sure they worked as expected, and initiate all procedures necessary to use the GIS.

Application development: The initial requirement analysis phase had identified some applications of a fairly complex nature. However, the majority of the initial applications were straightforward and implemented using the basic functionality included with the Web GIS software.

More complex applications were not supported in this way and had to be programmed. Ease of use, user-friendliness, and keeping data transfer volumes in check were the critical issues here. Figs.2 and 3 illustrate the user interface developed using HTML, Java and Java Script.

The final step in implementing ITTO's Web GIS was to put the system to use. Ongoing support and services for end users, as well as system maintenance requirements, were all taken into account during this phase.

Web GIS in action

Web GIS development presents a number of challenges in terms of technology innovation, huge data transfer rates, and a vast increase in the number of non-specialist end users.

Due to high data transfer rates from server to client, high speed Internet connections are vital, as are high-speed processing systems, if users are to have rapid access to road data without limitations of time or place. The same considerations apply to the dissemination of information that will help travellers plan routes and efficiently manage their trips.

ITTO's Web GIS went online in Persian and English versions in late 2002 at www.iranroads.com. As anticipated, it employs a user friendly design whose basic functions include zoom in-out and pan; shortest path calculation; move; media; distance calculation; select and clear.

Information for Iran's 30 *Osthanas* or provinces - their road types, structures, height and weight restrictions - is all available from the site, both statistically and graphically, as are details of roadside facilities such as clinics, breakdown services, gas stations, telephone kiosks, police stations, mosques, terminals and

TIR-parks, all of which can be easily located.

With wider transportation needs in mind, the system has been set up in such a way that it could potentially support rail network information.

ITTO's Web GIS and the services it provides for a variety of Internet users represents the first step in implementing an Intelligent Transport System in Iran - one that is likely to be complemented by the provision of high-tech electronic pay tolls on a six-lane 98 kms freeway linking Kashan and Isfahan (Fig.4) that is now nearing completion.

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Aerial view of the new 98 kms Kashan-Isfahan freeway