

GIS OBSTACLES AND OPPORTUNITIES FACING CARIBBEAN UTILITIES

ABSTRACT

This paper comments on the major obstacles and opportunities facing Caribbean utilities interested in implementing Geographic Information Systems (GIS) technology. The obstacles include the inadequate addressing systems within the islands; outdated or inaccurate source maps and data; the lack of coordination between various sectors in terms of data-sharing; insufficient awareness of the value and benefits of GIS and the typically low level of funding allocated for GIS projects. The opportunities include satellite imagery; Global Positioning Systems (GPS); wireless technologies and data sharing via the Internet. Particular reference is made to the web-based GIS system which the author has implemented in The Barbados Light & Power Co. Ltd., the sole electric utility in the island of Barbados.

INTRODUCTION

GIS – these days in Barbados, **GIS** stands for **G**overnment **I**nformation **S**ervice. As an electrical engineer, I also note that in electrical engineering circles, **GIS** stands for **G**as **I**nterrupted **S**witch. However, I trust that you all are aware that, at least for the purposes of my talk, **GIS** stands for **G**eographic **I**nformation **S**ystems. I also trust that my talk will provide a **GIS** – that is, a **G**enuinely **I**nteresting **S**ession. I also trust that my talk will not make you **GIS** – that is, **G**o **I**nto **S**leep.

The title of my paper is *GIS Obstacles and Opportunities Facing Caribbean Utilities*. Its purpose is to warn the unwary of the obstacles that lurk, but also to point out, that now, as never before, in terms of the opportunities for a harvest to be reaped, **GIS** also stands for **G**rapes **I**n **S**eaSon. I am an employee of the Barbados Light & Power Co. Ltd. (BLPC), the sole electric utility of Barbados, but my presentation will relate to the implementation of GIS in all Caribbean utilities, whether gas, electric or water, and hence will be **GIS** - **G**eneric **I**n **S**tructure.

THE OBSTACLES

We shall first look at the obstacles to GIS which face Caribbean utilities. There are several obstacles common to all utilities worldwide, such as: limited human and financial resources, the fast pace of changes in technology which can quickly render obsolete any system developed; the data acquisition and data maintenance challenges, and an organisation's natural resistance to change – that is, its internal inbuilt inertia which creates an unwillingness to move out of its comfort zone of old business practices and change to embrace new technology and ideas. However, in terms of Caribbean utilities, there are three obstacles in particular which I wish to highlight; these are:

1. The woefully inadequate addressing systems within the islands;
2. The outdated or inaccurate source maps and data;
3. The lack of coordination between various sectors in terms of data-sharing;

Let me address these issues in turn.

First, the poor addressing protocol within the islands. The postmen in Barbados, and other islands are what we would refer to in the vernacular here in Barbados as “boss-men”. They can take an address such as Mavis Clarke, Long Gap, St Michael, and unerringly know which house in Long Gap Mavis Clarke lives, no matter how long “Long Gap” is. For those of you who are not resident in Barbados, I should mention that Long Gap really is an address in Barbados and the Gap, or road, really is long. In other words, here in Barbados it is the exception rather than the rule for an address to be something like number 20 Long Gap. More often than not it is simply “Long Gap”.

This poses problems, not so much to our postmen who have an encyclopaedic knowledge of where people live and who, if genuinely stuck in locating someone, can rely on neighbours who have similar knowledge to help them out, but in particular it poses problems to the GIS implementor. Here **GIS**, instead of standing for **Geographic Information System**, would more stand for **Geographically Ignorant System**, because if Mavis Clarke is simply tagged to “Long Gap”, how can she, or her house, or her business, or, more to the point, her electric or water meter, be accurately placed on a map?

The second obstacle I wish to highlight is the high level of outdated, or more precisely, inaccurate, source maps and data. Case in point: here in Barbados the Lands and Surveys maps we work with on a regular basis are about 20 years old. Changes to our old roads, and the latest new roads, are absent. Several large new housing developments are missing altogether. Once again, implementing GIS here would be implementing a **GIS** which would stand for a **Geographically Ignorant System**.

The next obstacle to be mentioned is the lack of coordination between various sectors in terms of data-sharing. Again, taking Barbados as a typical example, several public and private organizations have independently developed their own GIS maps and databases, but those maps and databases are not being shared. This leads to duplication of effort, and is a waste of our precious limited resources re time, manpower, and money.

In the computer industry there is a networking law which states that the value of data in a network increases proportionally as the square of n , where n is the number of computers in the network. I wish to point out that a corollary to this is that the value of GIS to a country increases as n squared, where n is the number of organizations or databases linked or contributing to the GIS. The converse is that the value of a GIS decreases as the square of n , where n is the number of organisations or databases which are **not** linked or contributing to that GIS, but which can be.

THE OPPORTUNITIES

Okay, having injected a measure of gloom with my list of the major obstacles which face utilities in the GIS community, I wish to now spend the remainder of my talk looking at the opportunities which are there for the taking.

Obstacles are but the bedrock of opportunity. Utilities in particular are adept in taking advantage of opportunities fashioned from obstacles. For example, the obstacle of darkness at night provides electric utilities with the opportunity of providing customers with a product that lights their homes, businesses and streets. Similarly, the obstacle of limited accessibility to nature's most prized liquid gives water utilities the opportunity of piping water into areas of need. Hence utilities should view obstacles faced in implementing GIS as merely a foundation on which to build as they seize new opportunities to fulfill their primary mission of providing excellent customer service.

We turn first to the inadequate addressing system within the islands. This problem is compounded for the utility which aims to keep track electronically of the location of its customers and facilities, whether they be poles, substations, switches, cables or pipes. Four possible ways to do this are (1) Proprietary Grids; (2) GPS Technology; (3) Satellite Imagery; and (4) Wireless Technologies.

At BLPC the first course has been chosen – the use of a proprietary Grid-based system where a gridnumber reflects the position of a customer or facility down to a certain desired level of accuracy. The BLPC grid, established in-house in the early 1980's, goes down in accuracy to squares roughly 10 metres by 10 metres. Tying customers and facilities to this grid in computer databases enables georeferenced polenumbering which uniquely identifies and locates each pole position, and which facilitates automatic data maintenance procedures for the GIS. Polenumbering is in use not only in the electric utility of Barbados, but in the electric utilities of Aruba, Bermuda, Cayman Islands, Dominica, and Grenada, while Jamaica, St Lucia, Antigua, BVI and St. Vincent also plan to use polenumbering in the near future. Such polenumbers could also assist Caribbean countries in building national GIS databases.

Then there is Global Positioning Systems or GPS technology. Developed by the US Department of Defence in the latter part of the last century, this is based on a system of satellites providing radio signals over the earth which give receiving devices their position in terms of latitude, longitude and height, to a high level of accuracy. Utilities can take modern GPS receivers in the field to not only accurately geolocate their facilities, but to simultaneously enter information about those facilities, and then to subsequently download that information to a GIS database, as my electric utility colleagues are presently doing in Antigua, the Cayman Islands, Dominica, Grenada, Jamaica, and St. Vincent. One pressing need in Barbados and other islands is for a national Government-backed GPS base station to improve the accuracy of GPS receivers; both the public and the private sectors would greatly benefit from such stations.

A third method available for overcoming the poor addressing systems in the islands is the appropriate use of satellite imagery. If such images are accurately orthorectified with the existing grids in use, such as the British West Indies grid, or in our case the Barbados National Grid, then they can be used to geo-reference a utility's customers or facilities. This method will grow in important with time due to the ever-increasing high resolutions of commercial satellite imagery, which has already reached 1 metre per pixel in the case of the IKONOS satellite and 61 cms a pixel in the case of the QUICKBIRD satellite.

Cloud cover problems can be overcome through the use, over time, of multiple images, and the high amount of computer storage capacity needed to handle the images is fast becoming a non-issue thanks to the way such storage devices are rising in capacity and dropping in cost.

Satellite pictures can also address the second obstacle facing Caribbean utilities with respect to GIS, namely outdated or inaccurate source maps and data. For example, here in Barbados BLPC has incorporated the use of satellite images in its GIS as a backdrop to the roads on the outdated maps which the utility digitized, and the satellite images are thereby enabling the GIS users to spot recent changes in roads and building footprints. For utilities struggling with outdated maps, satellite imagery is a **GIS – a Genuinely Interesting Solution**.

The fourth method of locating customers and/or facilities is only now coming into vogue, namely that of wireless technologies such as Radio Frequency Identification (RFID) tags, and ultra-wideband and Local Position Systems (LPS). It is quite possible that in the future such technologies will mean that when a street light or electric transformer is placed on a pole, or an electric or water meter is installed by a home, that installed utility device will automatically and wirelessly report its position and condition (such as its electrical, gas or water pressure status) back to the main GIS computer at the utility's headquarters. For the sake of those utility GIS managers who presently grapple with the thankless task of trying to get utility personnel to maintain the accuracy of their GIS databases, let us hope that such technologies will be **GIS - Growing In Strength**.

We come to the resolution of the third problem mentioned, i.e. the lack of coordination between various sectors in terms of data-sharing. At BLPC this obstacle is overcome through the use of web-based software enabling any computer user in any department to access the GIS. I wish to propose that in like fashion there should be free data sharing at national, regional and global levels between the GIS databases of Government ministries, emergency response agencies, and utilities via web-based technologies with appropriate levels of security, where each utility and organization linked will be responsible for maintenance of its own dataset. This is already beginning to happen through initiatives being launched by the Meso-American and Caribbean Geospatial Alliance (MACGA) and the Global Spatial Data Infrastructure organization (For further information check websites <http://edcintl.cr.usgs.gov/macga/index.php>, www.gsdi.org, and related links). As a precursor of what I see coming about in the future in terms of open data-sharing to the mutual benefit of all, I wish to draw your attention to how Dominion, a US-based electric utility serving 5 million customers over nine States, currently exports their GIS maps to the Internet and updates them every 10 minutes with information on how many customers are out of supply and roughly where these customers are located. See http://www.dom.com/news/outage_map.jsp. During hurricane Isabel in September last year these outage maps proved popular and of value to the media in terms of tracking the effects of the hurricane and the speed of restoration of electricity supply after the hurricane. Here in the Caribbean, given our similar vulnerability to hurricanes, perhaps we should give some thought to establishing similar online maps.

CONCLUSION

This paper has sought to list and identify some of the key obstacles and opportunities facing Caribbean utilities in their quest to implement GIS systems. In that respect, I trust that the members of its audience have been **GIS – Genuinely Interested Students**.

In closing however, there is one more obstacle I wish to mention, namely that there is insufficient awareness of the high value and potential benefits of GIS. The primary goal of this URISA conference is to address this very problem here in Barbados and the wider Caribbean. Low awareness of the promise and potential of GIS leads to handicapped GIS projects which struggle due to inadequate funding and manpower. Utilities typically spend millions of dollars on their infrastructure but comparatively little on the GIS systems which can significantly monitor, assess, analyze and improve the management of that infrastructure.

I believe that the primary opportunity available to combat this obstacle of insufficient awareness of the value of GIS is talks such as this one. In other words, GIS needs more positive publicity. The success stories of GIS are not being publicized enough, but thankfully this is changing. I note with pleasure that at this URISA conference several utilities have come forward, both in the electrical and water arenas, to let the public know of the good work they are doing in the area of GIS. Such publicity is one of the greatest weapons we have in the fight to get those who hold purse-strings to **GIS - Give In Support**.

Dr. Philip Corbin BSc., MSc., Ph.D., C.Eng., MIEE
Computer Engineering Analyst, The Barbados Light & Power Co. Ltd.
E-mail: philip.corbin@blpc.com.bb

About the Author: Dr Philip Corbin

Barbadian by birth, Dr. Corbin pursued degrees in electrical engineering at Southampton University (B.Sc. 1975-78) and the University of Manchester Institute of Science and Technology (M.Sc. 1981-82; Ph.D. 1982-84). He has been employed by the Barbados Light & Power Co. Ltd. in the capacity of Trainee Engineer (1978-79) and Distribution Engineer (1979-81) in the Distribution Department, and as Computer Engineering Analyst attached to the Planning (1984-2000) and Information Systems Departments (2000-present). From 1989-1992 he supervised the implementation of the Company's GIS. Since then, he has managed the ongoing enhancement of the GIS via data-gathering surveys, the linking to other systems (e.g. the Company's Facilities Management, Customer Information, Distribution SCADA, Work Management and Job Estimating systems), and creating a web-based 'MapView' front-end interface accessible to all staff on the Company's Intranet.