Project for the Strengthening of Spatial Data Infrastructures in Member States and Territories of the Association of Caribbean States

Capacity Building Program

Geographic Information Systems

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The GIS Process

Geospatial Information processing begins and ends with the real world

Source: Aronoff (1991)
Topic 7: Web Based GIS Applications
Topic Outline

• Basic Concepts
• Web GIS Components
• Web GIS Architecture
• Software
• GeoPortals
• Caribbean web GIS examples
• Demo
Basic Concepts

• Internet
  – A massive network of networks; a networking infrastructure. It connects millions of computers together globally, forming a network in which any computer can communicate with any other computer as long as they are both connected to the Internet.

• World Wide Web
  – The **World Wide Web** (abbreviated as **WWW** or **W3** and commonly known as **the Web**) is a system of interlinked hypertext documents accessed via the Internet. With a web browser, one can view web pages that may contain text, images, videos, and other multimedia and navigate between them via hyperlinks.
Basic Concepts

• Internet vs World Wide Web
  – Many people use the terms Internet and World Wide Web interchangeably, but in fact the two terms are not synonymous. The Internet and the Web are two separate but related things.

• Web Mapping
  – Web mapping is the process of designing, implementing, generating and delivering maps on the World Wide Web.
Basic Concepts

• Web GIS
  – **Web GIS** is similar to web mapping but with an emphasis on analysis, processing of project specific geodata and exploratory aspects
  – Often the terms web GIS and web mapping are used synonymously, even if they don't mean exactly the same

• GIS Web Service
  – GIS resources packaged for distribution on the web
Web GIS

• A system to deploy and disseminate spatial data and associated attributes using the Internet
• It is an integration of GIS, WWW and Internet Technologies
• Access information/data without using desktop GIS software
• To make spatial information available for millions of people
• Hence, it is very useful way of disseminating spatial information to general public.
Web GIS Components

- **Client:**
  - Internet Browser such as Chrome, Mozilla Firefox etc

- **Internet Connection:**
  - Performance of a web mapping site largely depends on the
  - Higher the bandwidth better the performance

- **Web server**
  - Handle the requests from Web Browser (user) and Return the web page
  - Apache, IIS

- **Map Server – Generate the web products**

- **Meta Data**
  - data about the data
  - Including Server URL, Owner etc
## Software

<table>
<thead>
<tr>
<th>Category</th>
<th>Commercial</th>
<th>Free</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Systems</td>
<td>Windows</td>
<td>Linux</td>
</tr>
<tr>
<td>Database SW</td>
<td>ORACLE, MSsql</td>
<td>Mysql, Postgresql</td>
</tr>
<tr>
<td>Spatial Database SW</td>
<td>ORACLE Spatial</td>
<td>MySQL Spatial, PostGIS</td>
</tr>
<tr>
<td>RS/GIS Applications</td>
<td>ArcGIS, ERDAS, ENVI</td>
<td>ILWIS, GRASS, QGIS</td>
</tr>
<tr>
<td>Web GIS Applications</td>
<td>ArcIMS, ArcGIS Server/ArcSDE</td>
<td>MapServer, GeoServer</td>
</tr>
</tbody>
</table>
FOSS Architecture (OpenGeo)

USER INTERFACE

APPLICATION SERVER

DATABASE

GeoExt & OpenLayers

GeoWebCache

GeoServer

PostGIS
COTS Architecture (Esri ArcGIS)
GeoPortals

• Derived from the latin word “porta”, indicating a doorway
• A webportal is a website that functions as an entry point to the World Wide Web
• Web portals can be classified by their range of content
• A GeoPortal, as indicated by the prefix geo, is a portal that specializes in geospatial information
• A GeoPortal is a website that provides a single point of access to geospatial data, web services and other geospatially related resources.
• GeoPortals are an important and highly visible component of SDI, serving as the “face” of SDI.
UWI GeoPortal
http://uwi.maps.arcgis.com/home/

The UWI Spatial Data Infrastructure (SDI) is managed by the Geospatial Information Research and Innovation (GIRI) group which operates out of the Department of Geomatics Engineering and Land Management at The University of the West Indies, St. Augustine Campus, Trinidad. GIRI seeks to provide, through research and innovation, mechanisms for improving access to geospatial information by GIS professionals and decision makers throughout the Caribbean region. This Enterprise GIS Online Portal includes maps, geospatial data, analytical tools and web applications to help stakeholders use the power of GIS to make more informed decisions. You can even make your own maps!

For further information please contact: earl.edwards@sta.uwi.edu
UWI Enterprise GIS
Challenge

• More than 80% of all information used to manage the University’s assets have spatial characteristics (i.e. location-based).

• Information on assets are in the brains of employees who may be close to retirement or have retired.

• There is a need to have such institutional knowledge stored in a repository that can be easily accessed by all stakeholders to help them make more informed decisions in a timely manner.
Goal

The establishment of a Spatial Data Infrastructure (SDI) to support access to information related to the physical assets of the University of the West Indies, St. Augustine Campus.
Development Phases

- Phase 0 – SDI Planning and Design
- Phase 1 – Campus Basemap Creation
- Phase 2 – Feature Acquisition for Operational Layers
- Phase 3 – Building Information Modelling (BIM)
- Phase 4 – Web and Mobile Application Development
- Phase 5 – Digital City Modelling (3D Visualization)
- Phase 6 – Visualizing Information on Buried Assets (AR)
- Phase 7 – Lessons learnt and best practice documentation
Phase 1 Campus Basemap

- **Base Layers**
  - Buildings
  - Roads
  - Parking
  - Pavement Markings
  - Walkways
  - Sidewalks
  - Trees
  - Recreation Areas
  - Property Boundary
  - Cemetery
  - Perimeter Fence
  - Internal Fence

- **Annotation**
  - Building Numbers
  - Building Names
  - Place Names
Phase 1 Campus Basemap

- Google Maps
  - Lacks the level of details required
- Similar for other basemaps
Data Acquisition for New Campus Basemap
Phase 2 Feature Acquisition for Operational Layers

- **Features**
  - Crime Incidents
  - CCTV Cameras
  - Tenants
  - Hydrants
  - Light Poles
  - Utility Poles
  - Manholes
  - Muster Points
  - Underground Facilities –
    - Fibre
    - Water
    - Sewer
    - Electricity
    - Gas
    - Telephone
    - Storm water drainage

- Shuttle Route
- Benches
- Garbage Bins
- Fire extinguisher
- Nodes/Drops
- Water Mains
- Emergency Phones
- Points Of Interests
  - ATM
  - Bank
  - Food
  - Etc.
Phase 3 Building Information modelling

• Elements
  – Building Footprints
  – Building Floors
  – Building Floor Plan Lines
  – Building Floor Sections
  – Building Interior Spaces

• Required
  – Floor plans for buildings
  – Room numbering standardization
  – Attributes
Phase 3 Building Information modelling

• **Building Attributes**
  - Facility ID / Building ID
  - Long Name
  - Short Name
  - Building Number (UWI)
  - Building Address
  - Floor Count
  - Height
  - Floor Area

  - Material
  - Use
  - Replacement Cost
  - Condition
  - Access Type
  - Occupancy Level
  - Responsible Entity
  - Occupier
  - Opening Hours
  - Year Constructed
  - Roof Type
  - Photos

  - Architect (Team)
  - Drawing ID
  - Roof Elevation
  - Base Elevation
Building 064

Scan paper plans
Digitize in AutoCAD
Convert to feature class
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http://uwi.maps.arcgis.com/home
How do I get from Geomatics Engineering building to the Library?

1. Start at Geomatics North
2. Go northeast on Walkway
3. Turn right on Walkway and immediately turn left on Walkway
4. Turn right to stay on Walkway
5. Turn left to stay on Walkway
6. Finish at Library Main Entrance, on the left
• Provide support for Facilities Management
• Change how we visualize and manage our interior spaces
• Improve how students/visitors navigate the campus
Meet the UWI Campus GIS Interns

Alicia

Kimani

Joseph

Adam