

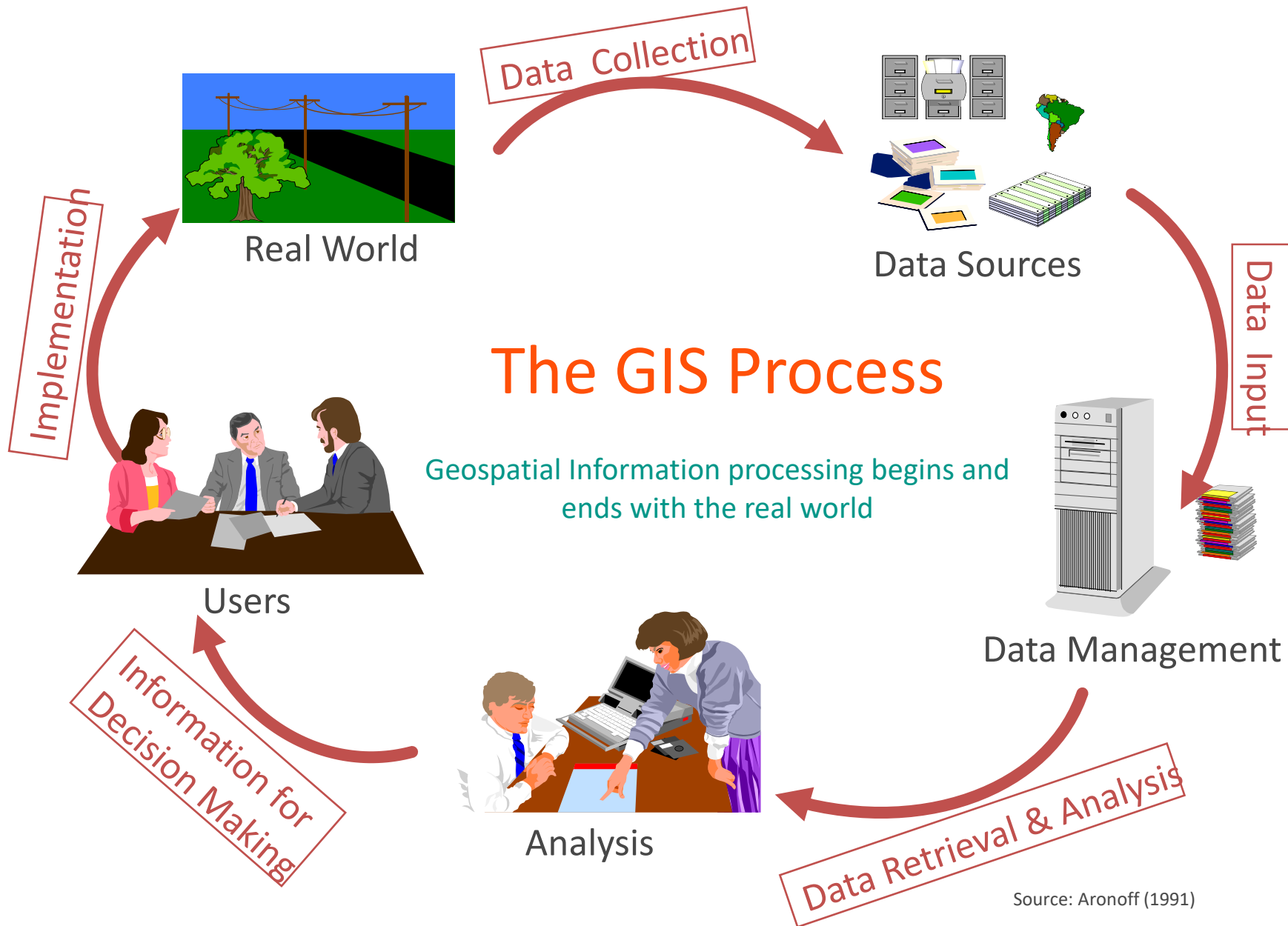
Project for the Strengthening of Spatial Data Infrastructures in Member States and Territories of the Association of Caribbean States

Capacity Building Program

Geographic Information Systems

Dr Earl Edwards

Ms. Valrie Grant, MSc.



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.

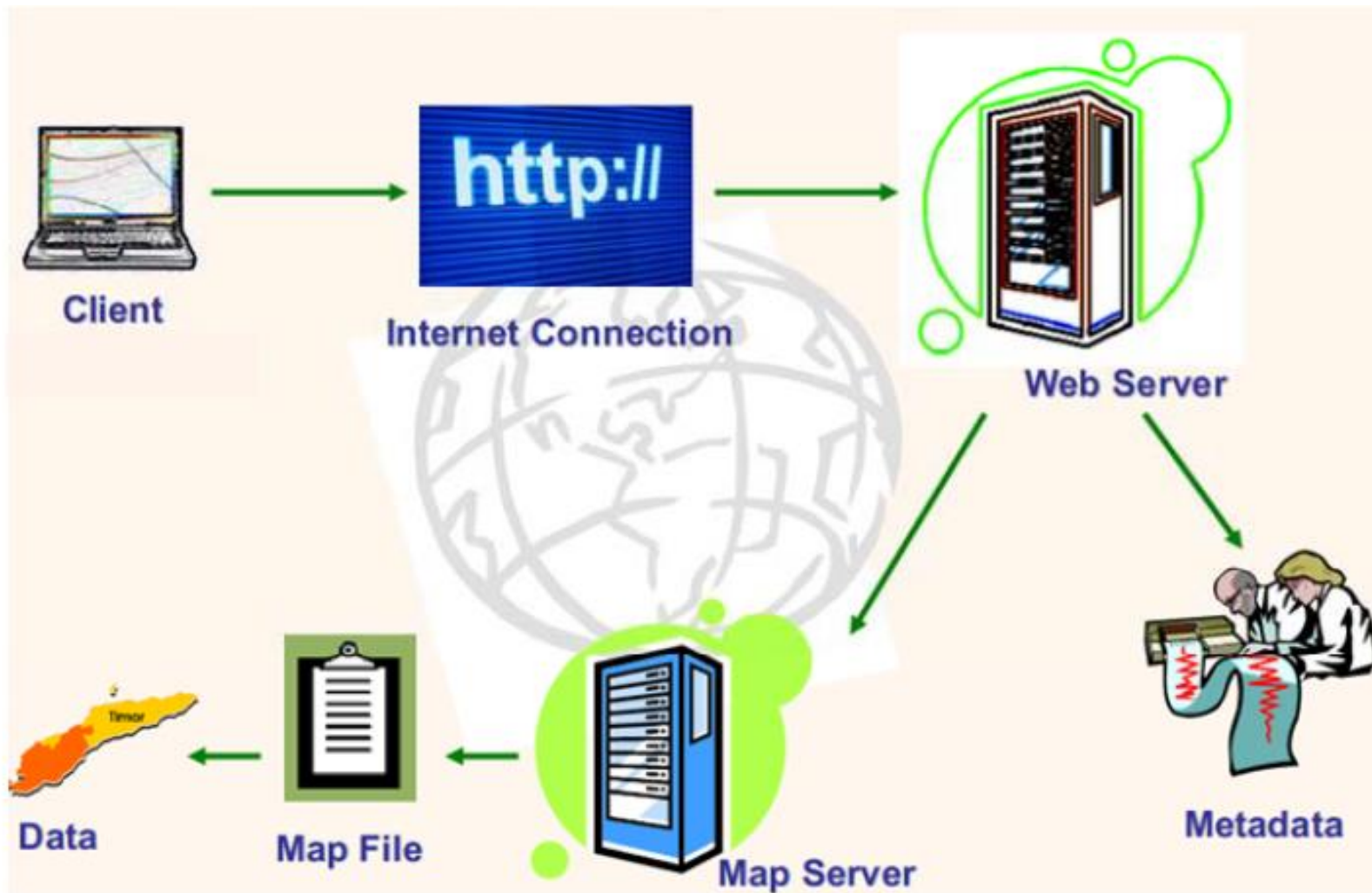
Basic Concepts

- 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.

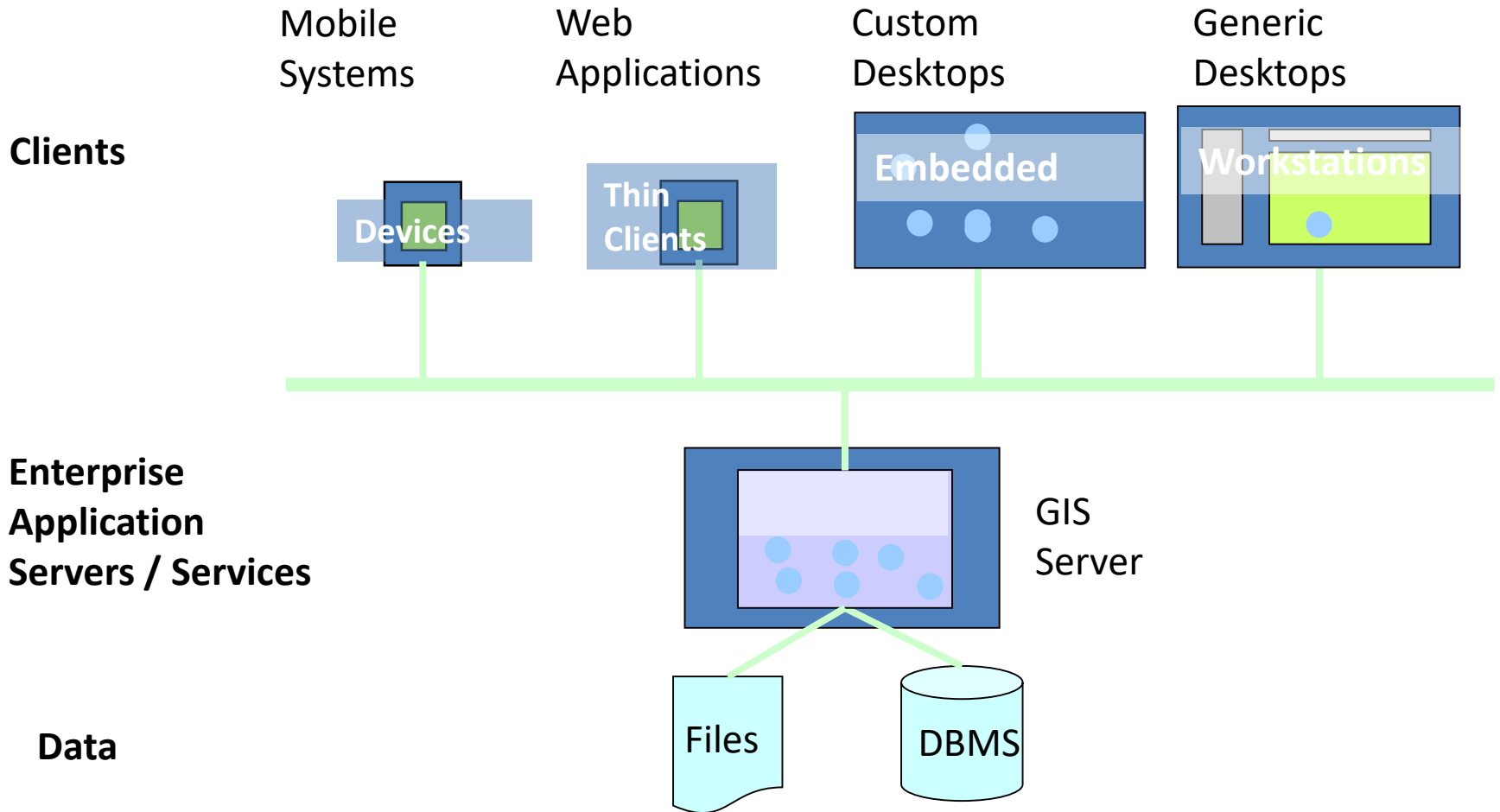
Web GIS Components























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

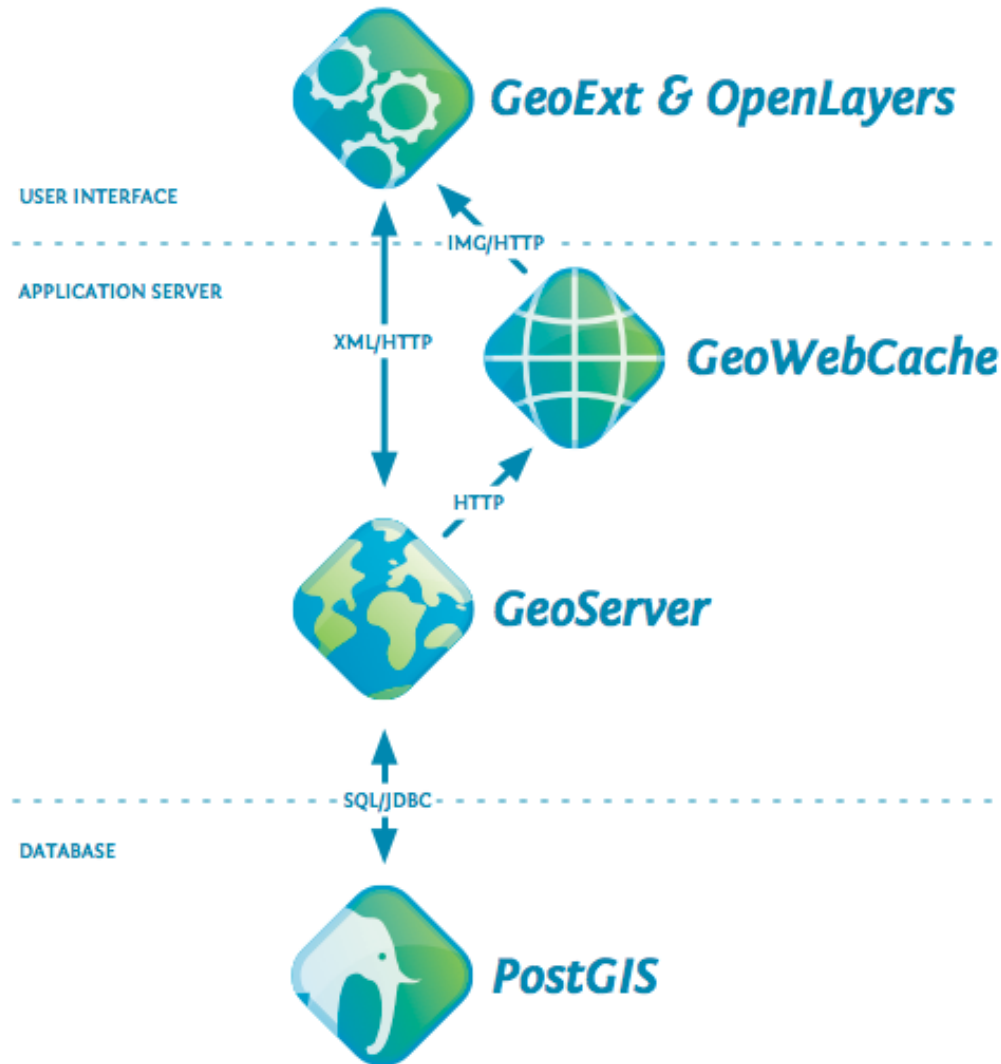
Web GIS Architecture



Software

Category	Commercial	Free
Operating Systems	Windows 	Linux 
Database SW	ORACLE , MSsql  	Mysql , Postgresql  
Spatial Database SW	ORACLE Spatial 	MySQL Spatial, PostGIS 
RS\GIS Applications	ArcGIS, ERDAS, ENVI   	ILWIS, GRASS, QGIS   
Web GIS Applications	ArcIMS  ArcGIS Server/ ArcSDE 	MapServer, GeoServer   Mapbender, OpenLayers  

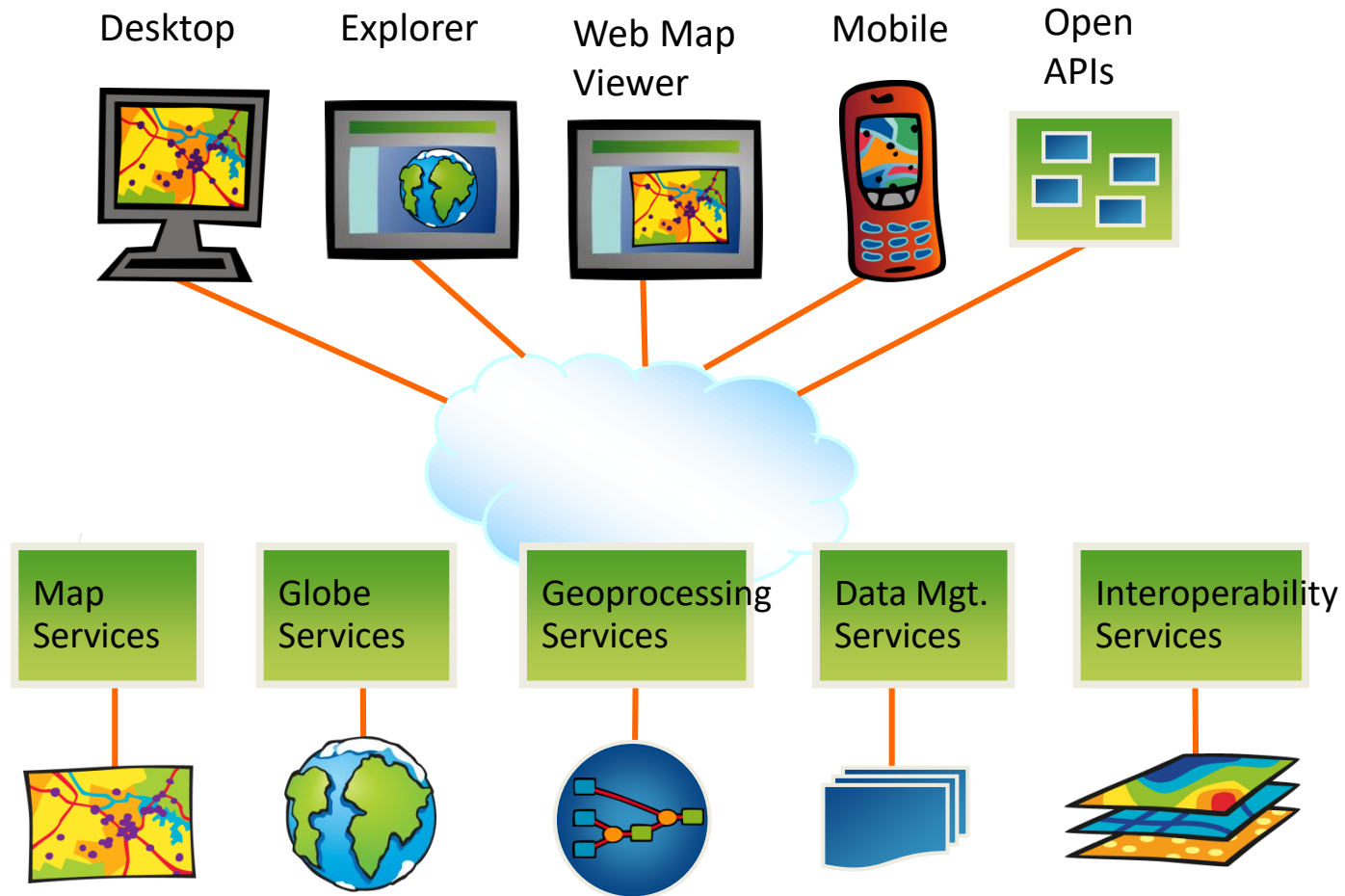
FOSS Architecture (OpenGeo)



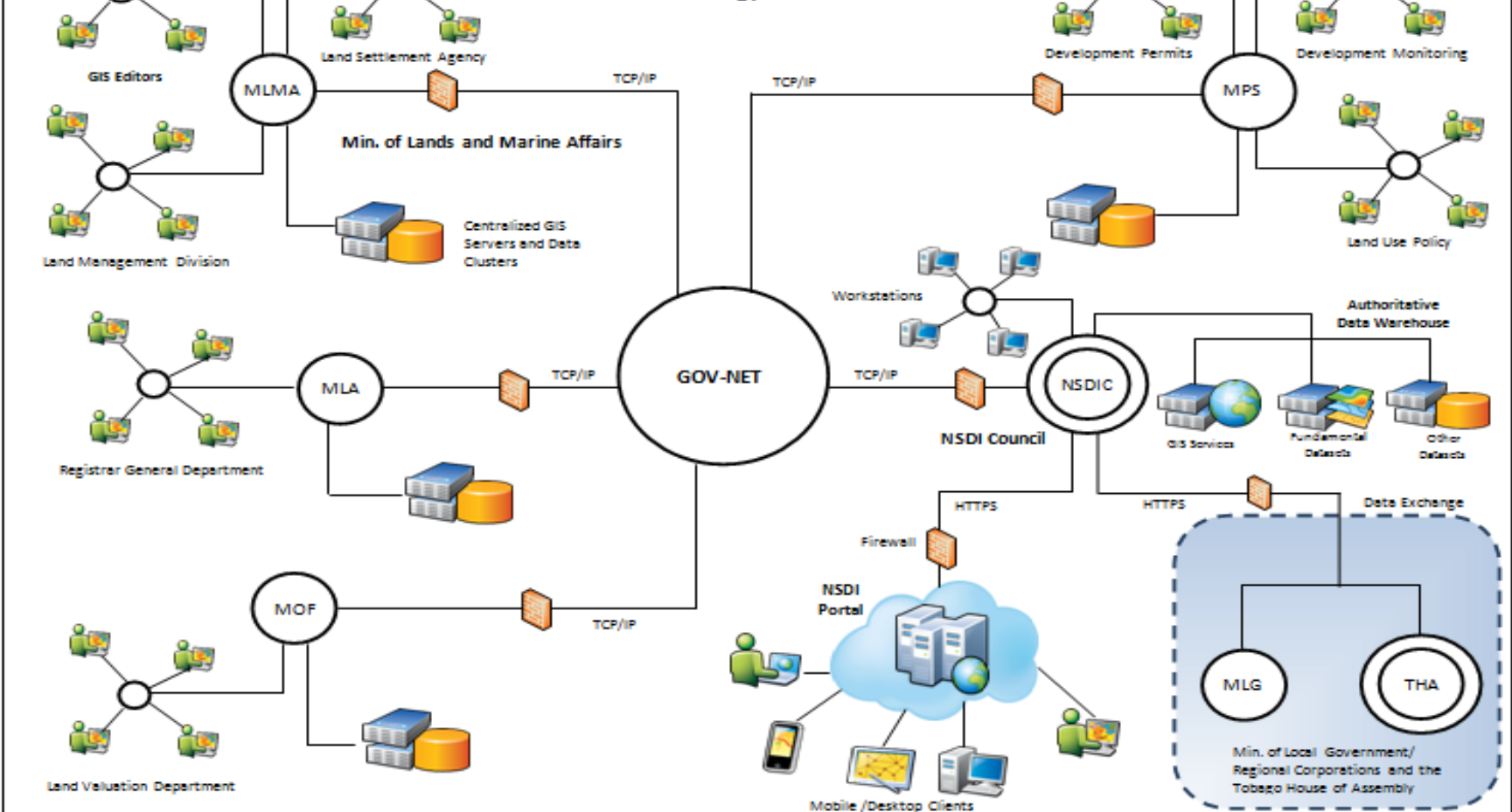
COTS Architecture (Esri ArcGIS)



ESRI ArcGIS Web Services



National Spatial Data Infrastructure Technology Architecture



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/>

[Home](#) [Gallery](#) [Map](#) [Scene](#) [Groups](#)

 [Sign In](#)



UWI Enterprise GIS Online

[UAV Campus Video](#)

[Manzanilla Disaster](#)

[The University of the West Indies, St Augustine Campus](#)

[Education City v1.2](#)

[UWI UAV Ortho](#)

[The City of Port-of-Spain](#)

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

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UWI Enterprise GIS



Association of Caribbean States
Asociación de Estados del Caribe
Association des Etats de la Caraïbe

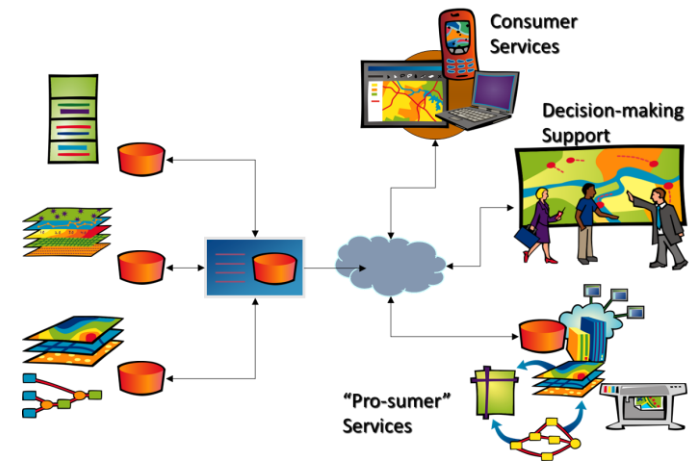
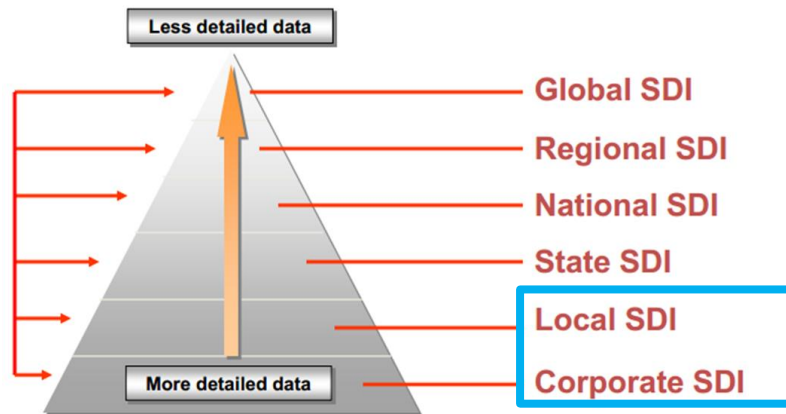


Challenge

- 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

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.

ArcGIS Pro - EducationCity-ArcPro - UWI Campus

PROJECT | MAP | INSERT | ANALYSIS | VIEW | EDIT | SHARE | LAYER | APPEARANCE

Clipboard | Navigate | Layer | Selection | Inquiry | Labeling

Contents

UWI Campus

- Tenants
- CampusGIS_Operational_v.
- Access Point
- Bench
- Bins
- CCTV
- Hydrant
- Light Pole
- Manhole
- Sign Post
- Utility + Light Pole
- Utility Pole
- Fibre Optic Line
- JFK_Route

1:1,206 | 20P 675014 1176992 | Selected Features: 0



Association of Caribbean States
Asociación de Estados del Caribe
Association des Etats de la Caraïbe



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

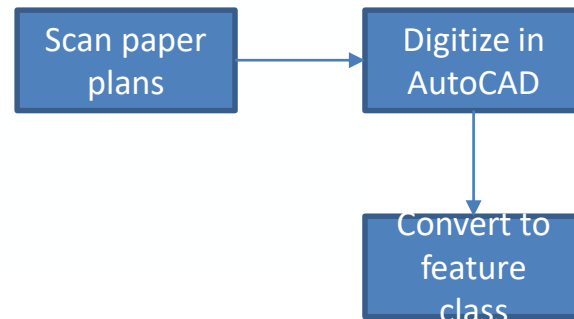
- Facility ID / Building ID
- Long Name
- Short Name
- Building Number (UWI)
- Building Address
- Floor Count
- Height
- Floor Area
- Material
- Use
- Replacement Cost
- Condition
- Access Type
- Occupancy Level
- Responsible Entity
- Occupier
- Opening Hours
- Year Constructed
- Roof Type
- Photos
- Architect (Team)
- Drawing ID
- Roof Elevation
- Base Elevation

Building 064



Building Interior Spaces

- Classroom
- Closet
- Conference Room
- Corridor
- Kitchen
- Maintenance Closet
- Office
- Research Room
- Restroom
- others



Development Phases

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UWI Enterprise GIS Online

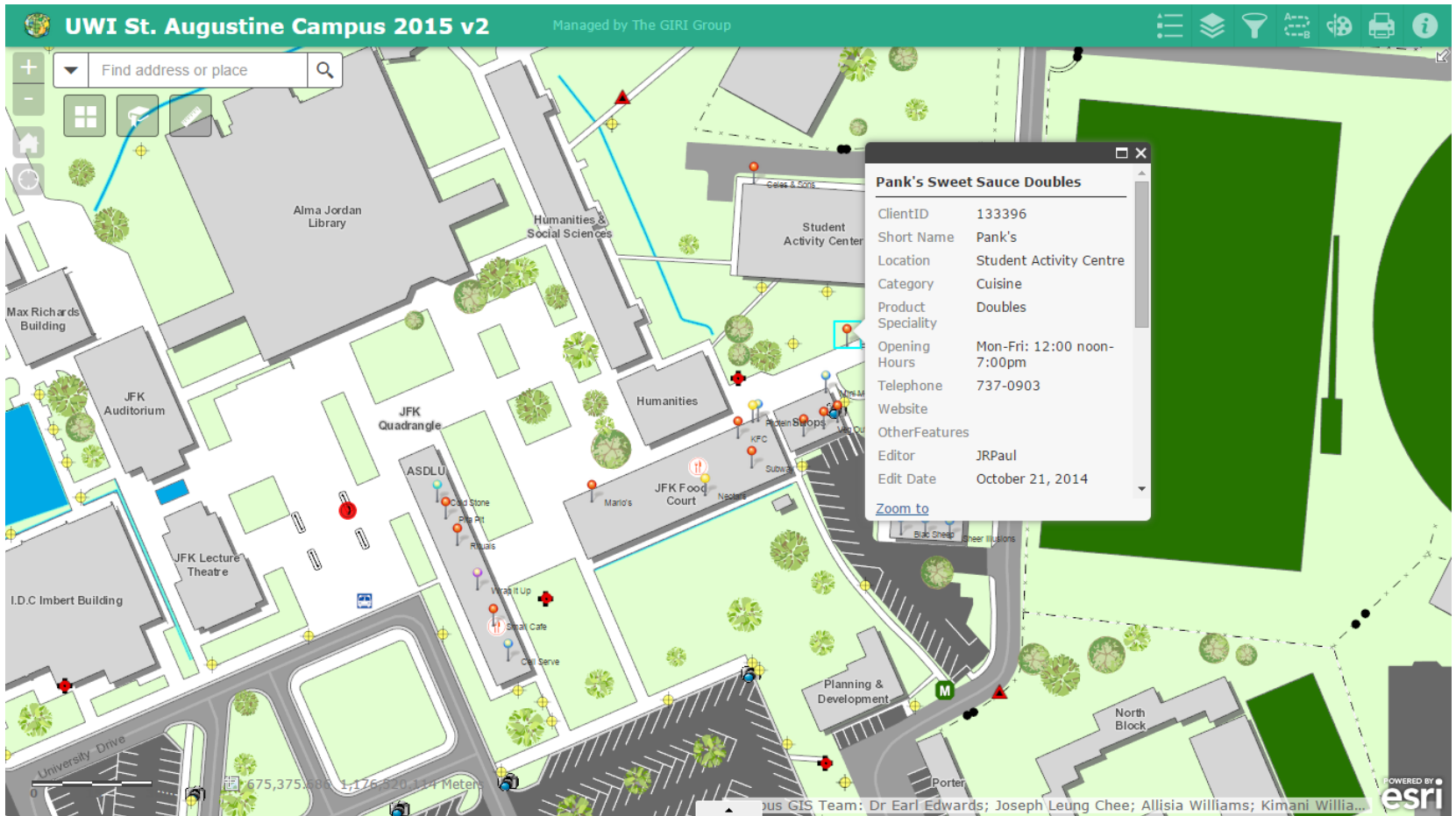
UAV Campus Video
Manzanilla Disaster

The University of the West Indies, St Augustine Campus
Mt Hope Campus 2015 v1
Campus Interactive Web Map
Manzanilla Damage Assessment

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<http://uwi.maps.arcgis.com/home>



How do I get from Geomatics Engineering building to the Library?

The screenshot shows a GIS application interface for the UWI St. Augustine Campus. The map displays various buildings and a blue route starting from 'Geomatics North' (point A) and ending at the 'Library Main Entrance' (point B). The route is 280.59 meters long and takes 5 minutes. The interface includes a search bar, a scale bar, and a directions panel on the right.

UWI St. Augustine Campus 2015 v2 Managed by The GIRI Group

Find address or place

Directions

A Geomatics North
B Library Main Entrance

ADD DESTINATION
SHOW MORE OPTIONS

GET DIRECTIONS CLEAR

280.59 meters · 5 minutes

ZOOM TO FULL ROUTE

1. Start at Geomatics North
2. Go northeast on **Walkway**
15.08 m
3. Turn right on **Walkway** and immediately turn left on **Walkway**
49.8 m 1 minute
4. Turn right to stay on **Walkway**
146.07 m 2 minutes
5. Turn left to stay on **Walkway**
69.64 m 1 minute
6. Finish at Library Main Entrance, on the left

Map labels: Temporary Classroom Building #2, Geomatics Engineering & Land Management, Systems Laboratory, Max Richards Building, Electrical & Computer Engineering, Hazardous Chemical Store, Chemical Engineering Laboratories, Central Air-Conditioning, Engineering Services, Central Stores & Purchasing, Kenneth S. Julien Building, Max Richards Building, Alma Jordan Library, Lecture Theatre, Management Studies, Learning Resource Center, JFK Auditorium, JFK Quadrangle, ASDLU.

Scale: 0 30m 675,124.778 1,170.561 682 Meters

Map GIS Team: Dr. Earl Edwards; Joseph Le

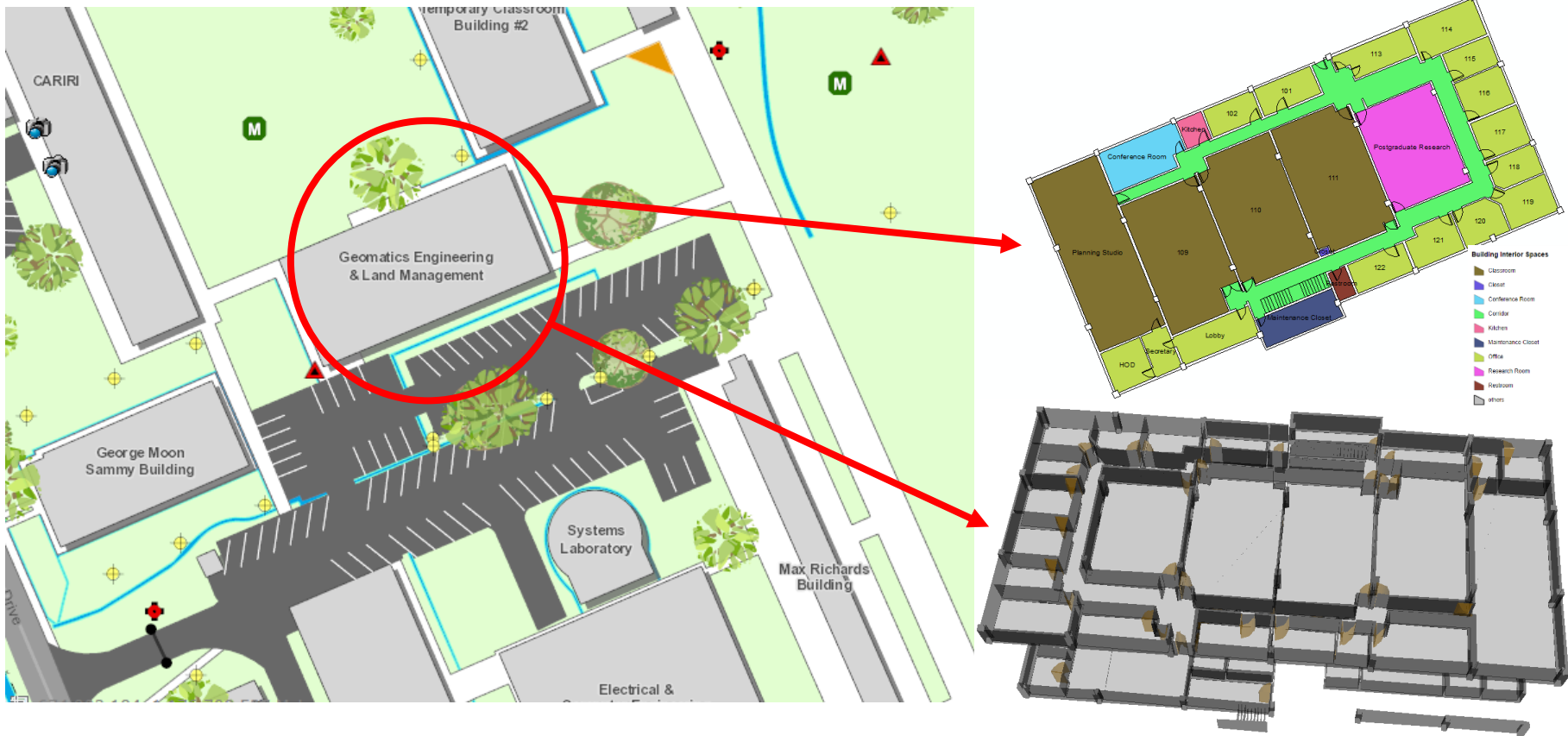
- Provide support for Facilities Management



Legend

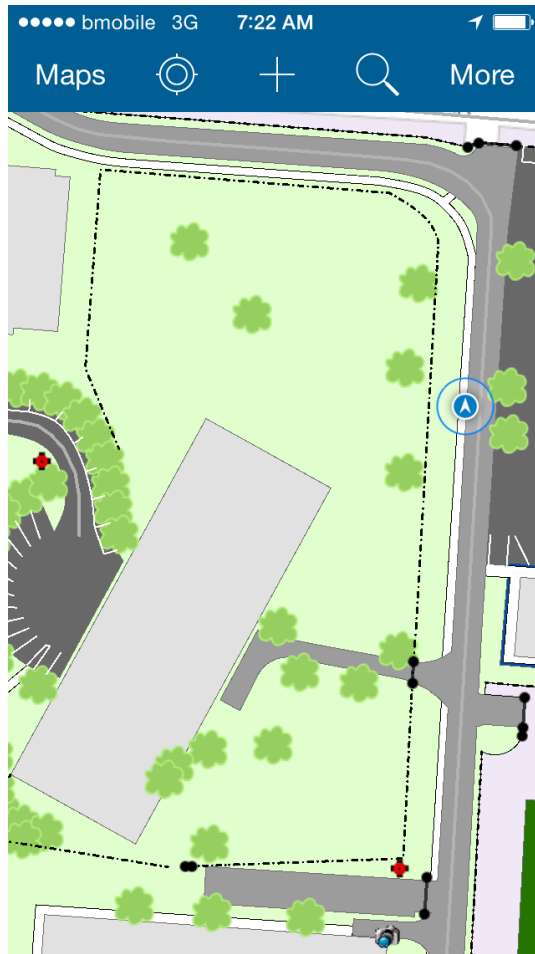
- Shuttle Stop
- Bins
- CCTV
- Emergency Phone
- Gate Post
- Hydrant
- Light Pole
- Manhole
- Muster Point
- Sign Post
- Utility + Light Pole
- Utility Pole
- Fibre Optic Line
- Road Centerline
- Fence
- Gate
- Recreation Lines
- Wall
- Bench Base
- Recreation Area
- Carpark
- Road
- Building
- Cemetery
- Walkway/Sidewalk
- Drain
- Ponds/Pool
- Main Campus

- Change how we visualize and manage our interior spaces

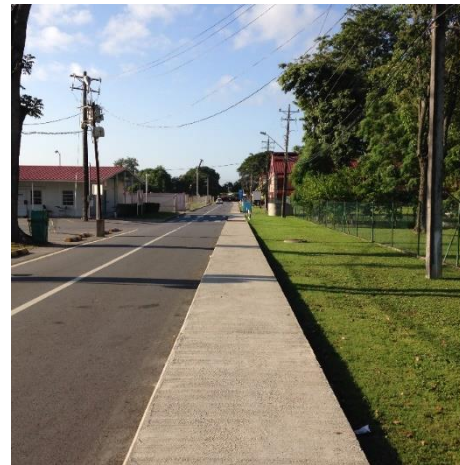


- Improve how students/visitors navigate the campus

iPhone 5
ArcGIS Collector



Looking forward



Looking backward

Meet the UWI Campus GIS Interns

Alicia



Joseph



Kimani



Adam