Fundamental of GIS Concept Review

Geospatial Information Systems (GIS) and Environment Data Portal Training

June 29 to July 3, 2026

Tanoa International Hotel

Nadi, Fiji

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Spatial Analysis Specialists Protected Areas- SPREP

Nadi, Fiji

Outline

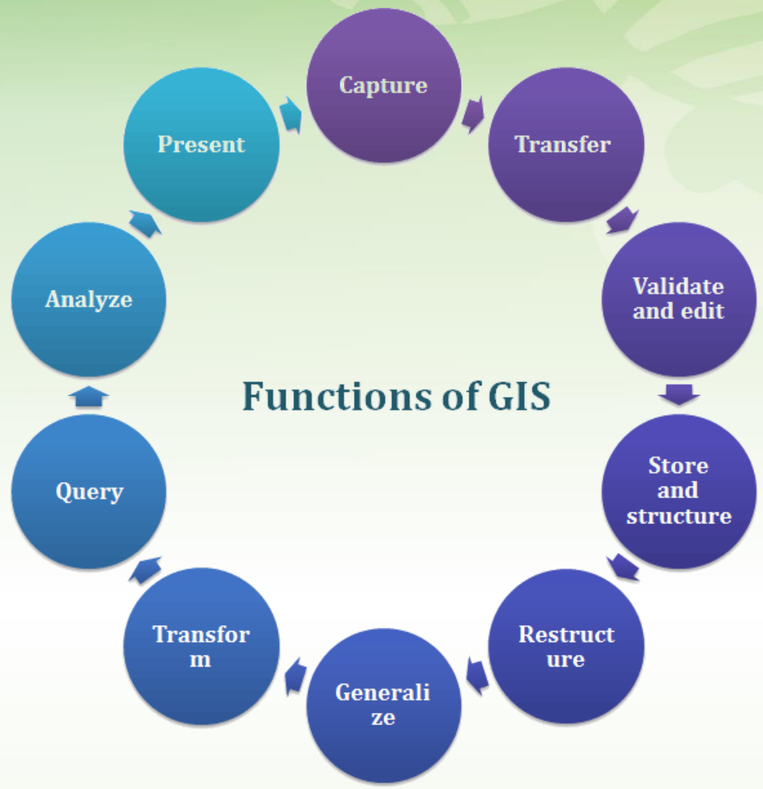
- GIS Overview
  - What is GIS?
  - Main Components.
  - Key functions
- Spatial Data Sources & Types
- GIS Software Options

G.I.S - What is it?

- GIS, or Geographic Information System, is a computer-based system used to collect, store, analyze, and display data linked to locations on a map.
- Simply put, it helps people understand “where” things are and how different places or patterns are connected.

KEY FUNCTIONS

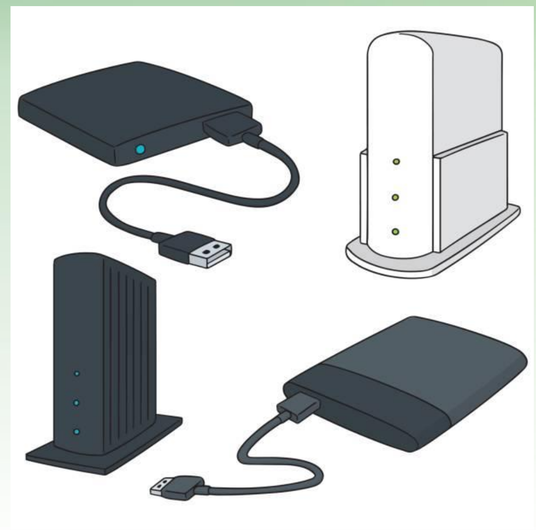
1. **Data capture -** Tools and methods for integrating data into a common format to be analysed
2. **Data Management -** Store and manage data with effective dataa management
3. **Spatial Analysis -** allows to interpolate, buffer & overlay operation across places
4. **Outputs /Results -** Visual presentations of outputs.



THE 5 KEY COMPONENTS

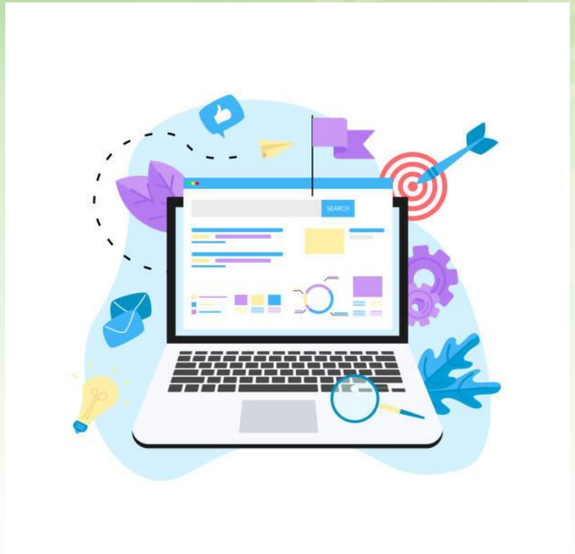
1. **Data -** Surveys, Sensors, maps, records
2. **Hardware** - Computer, scanner, GPS .etc
3. **Software -** ESRI, QGIS, Web-based apps
4. **Applications /Methods** – Route finder, overlaying etc
5. **People -** Data manager, analyst, users ..etc

DATA FOR GIS USE



❖Local Drive

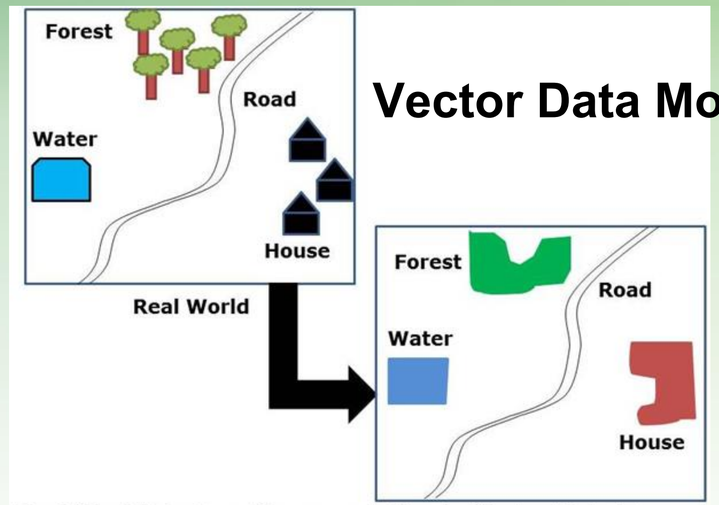
❖Server (Local or Cloud)



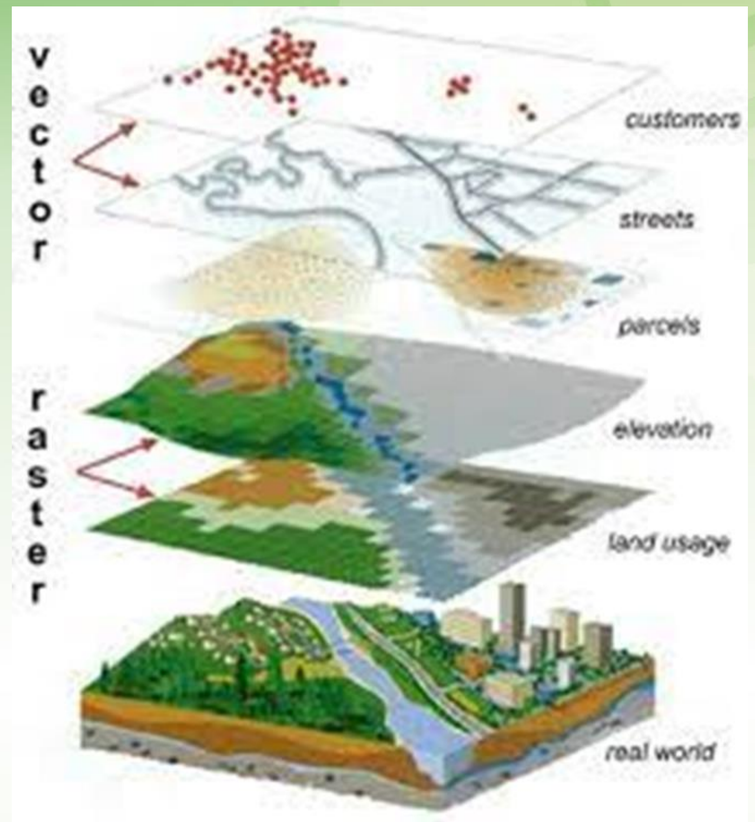
❖Other online platforms
- UNBiodiversity Lab
- Allen Coral Atlas

SPATIAL DATA MODELS

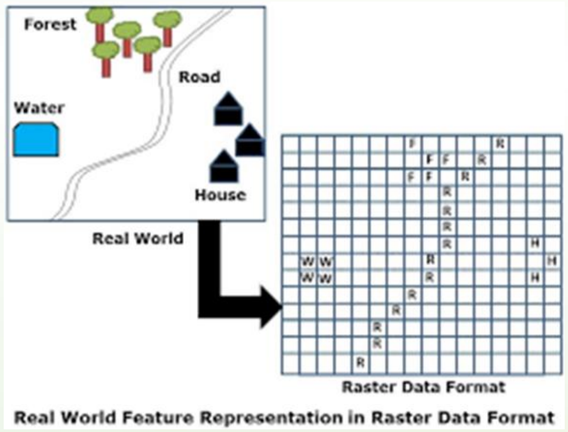
Vector Data Model



Real World Feature Representation in Vector Data Format



Raster Data Model

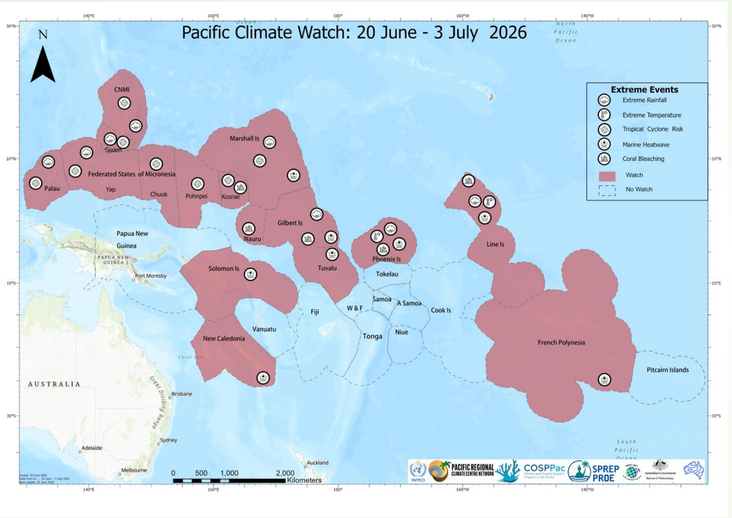


Real World Feature Representation in Raster Data Format

ATTRIBUTES

- In the raster models, the cell value (Digital Number) is the attribute.
- For vector data, attribute records are linked to point, line & polygon features.
- Multiple attributes per feature.
- Vector features are linked to attributes by a ID.

Countries_Territories	ExtremeRainfall	ExtremeTemp	Tropical_Cyclone	Marine_HeatWave	CoralBleachi	Watch 11 June 2026
American Samoa	Normal	Normal	Normal	Normal	Normal	0
FSM-Chuuk	ER - central	Normal	TC	Normal	Normal	1
Commonwealth of the Northern Marianas	ER-eastern	Normal	TC	Normal	Normal	1
Cook Islands	Normal	Normal	Normal	Normal	Normal	0
Fiji	Normal	Normal	Normal	Normal	Normal	0
French Polynesia	Normal	Normal	Normal	MHW- north and south	Normal	1
Gilbert Islands	ER	Normal	Normal	MHW- south	CB -souteast	1
Guam	Normal	Normal	TC	Normal	Normal	1
FSM-Kosrae	Normal	Normal	TC	Cancel	CB - eastern	1
Line Islands	ER-nrothern	ET -northern	Normal	MHW - northern	CB -northern	1
Nauru	ER	Normal	Normal	Normal	CB	1
New Caledonia	Normal	Normal	Normal	MHW - southern	Normal	1
Niue	Normal	Normal	Normal	Normal	Normal	0
Palau	ER - central	Normal	Normal	Normal	Normal	1
Papua New Guinea	Normal	Normal	Normal	Normal	Normal	0
Phoenix Islands	Normal	ET -northern	Normal	MHW - northern	CB -Central	1
Pitcairn Islands	Normal	Normal	Normal	Normal	Normal	0
FSM-Pohnpei	Normal	Normal	TC	Normal	Normal	1
Republic of the Marshall Islands	ER-northern	Normal	TC	MHW -Central	Normal	1
Samoa	Normal	Normal	Normal	Normal	Normal	0
Solomon Islands	Normal	Normal	Normal	MHW - eastern	Normal	1
Tokelau	Normal	Normal	Normal	Normal	Normal	0
Tonga	Normal	Normal	Normal	Normal	Normal	0
Tuvalu	Normal	Normal	Normal	Normal	Normal	0
Vanuatu	Normal	Normal	Normal	Normal	Normal	0
Wallis & Futuna	Normal	Normal	Normal	Normal	Normal	0
FSM-Yap	ER -Southern	Normal	TC	Normal	Normal	1



This vector layer is for the EEZ boundary of the Pacific Island Countries
Each country has a row in the attribute table.
In this visual four EEZ are highlighted ion the attribute table which are reflected on th
map.

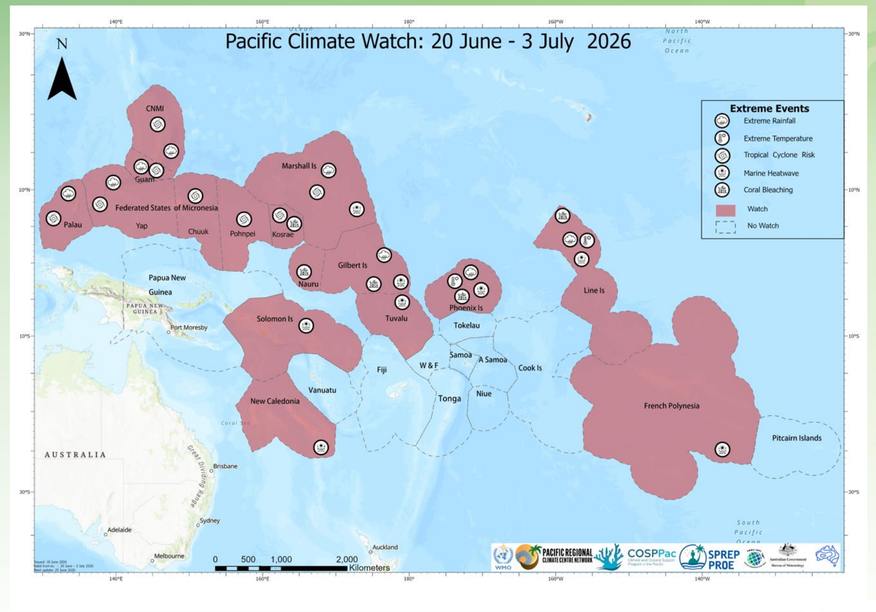
Acquiring Spatial Data

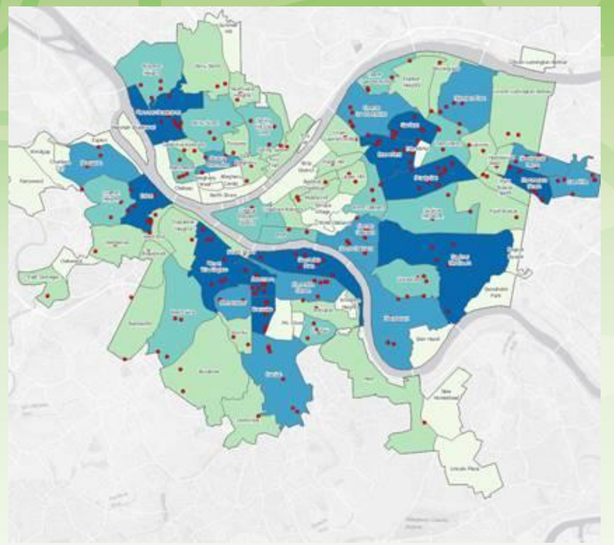
- Before analysis can begin, data must be input into the system. This process is often the most time-consuming.
- **Digitizing**: Converting hardcopy maps to digital files.
- **Remote Sensing:** Using satellites and drones to capture imagery.
- **GPS Surveys:** Collecting precise coordinates in the field.

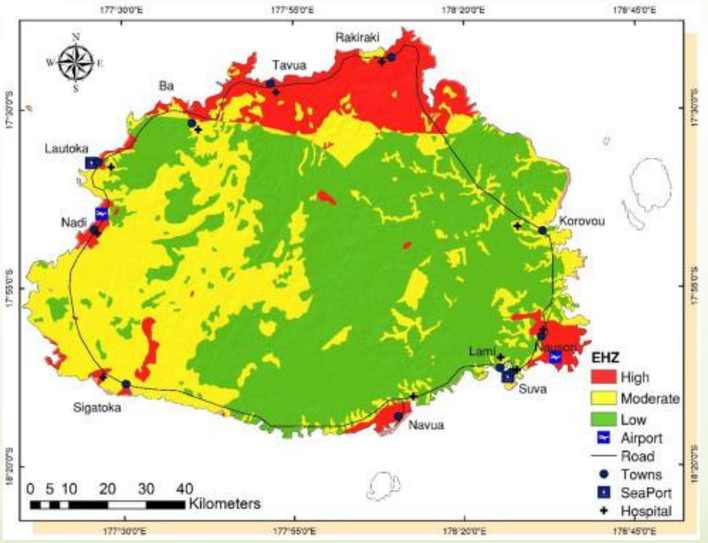
VIUALIZATION

Uncovering Patterns

- GIS is not just for making maps; it's for analyzing relationships. Spatial analysis allows us to overlay different layers to find suitable sites, calculate distances, and model "what if" scenarios.
- Common analyses include buffering (finding what's nearby), network analysis (routing), and surface analysis (elevation/slope).







Spatial Data Sources and Types

- Data or information that identifies the geographical location of features and boundaries.
- Represents real world objects
- On earth, such as natural and constructed features like ocean, lake, pond (e.g. roads, land use, elevation, trees, waterways, etc)
- Usually stored as coordinates and topology
- Data that can be mapped

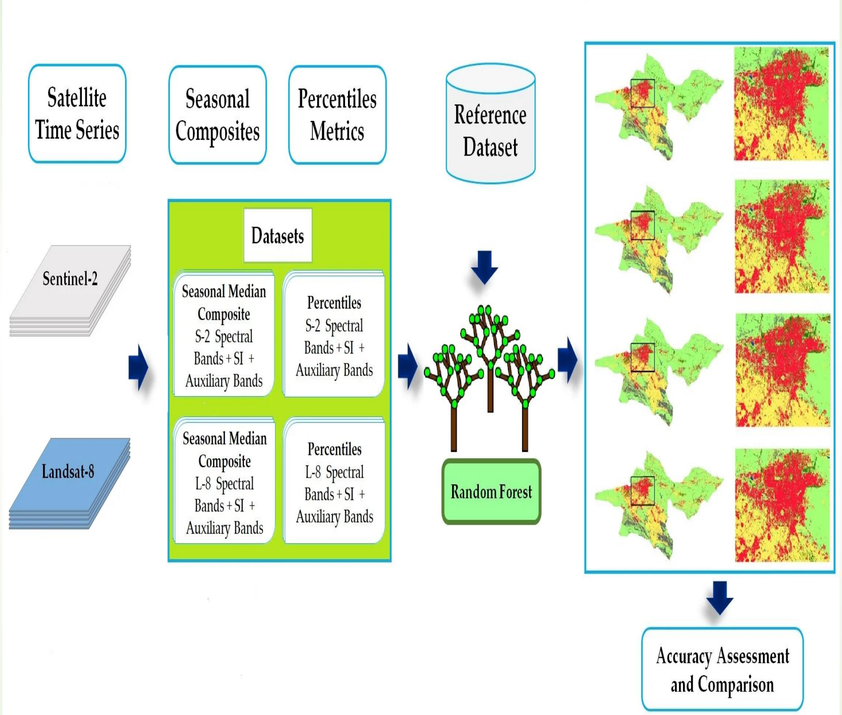
Spatial Data Collection Methods

An overview of modern techniques including Remote Sensing, Field Surveys, and Digital Conversion.

Remote Sensing

Data collected from a distance without physical contact, providing broad-scale environmental insights.

- **Satellites (e.g., Landsat, Sentinel):**
  Global monitoring of land cover, temperature, and vegetation health.
- **Aerial Photography & Drones:**
  Capturing high-resolution imagery for detailed local mapping.
- **LiDAR (Light Detection and Ranging):**
  Generating high-accuracy 3D point clouds for terrain analysis.



Field Surveys & Field Data Collection

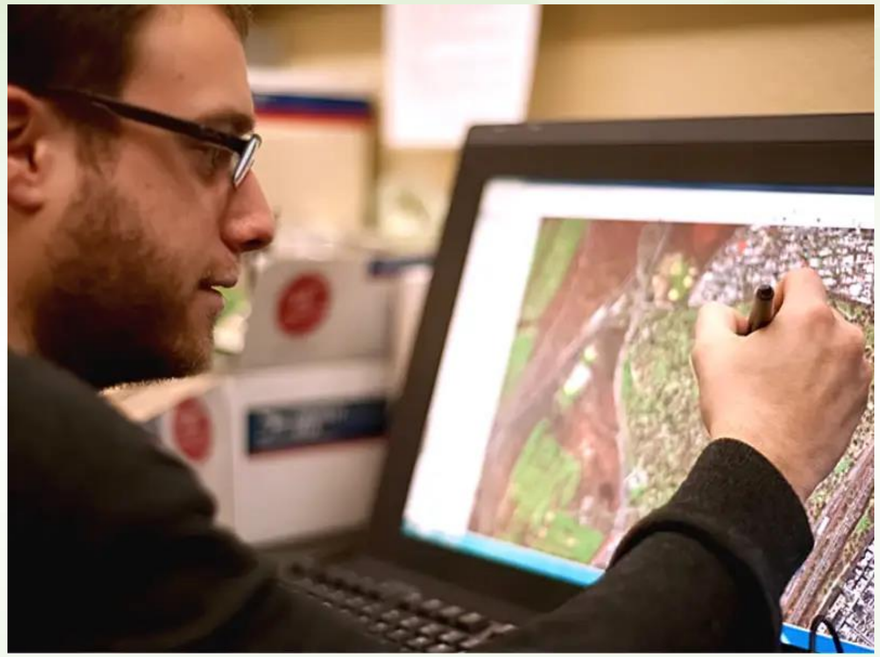
- Direct measurement and data collection on the ground to validate remote data or establish precise boundaries.
- **GPS (Global Positioning System):** Collecting precise spatial coordinates for features and waypoints.

Smart Devices

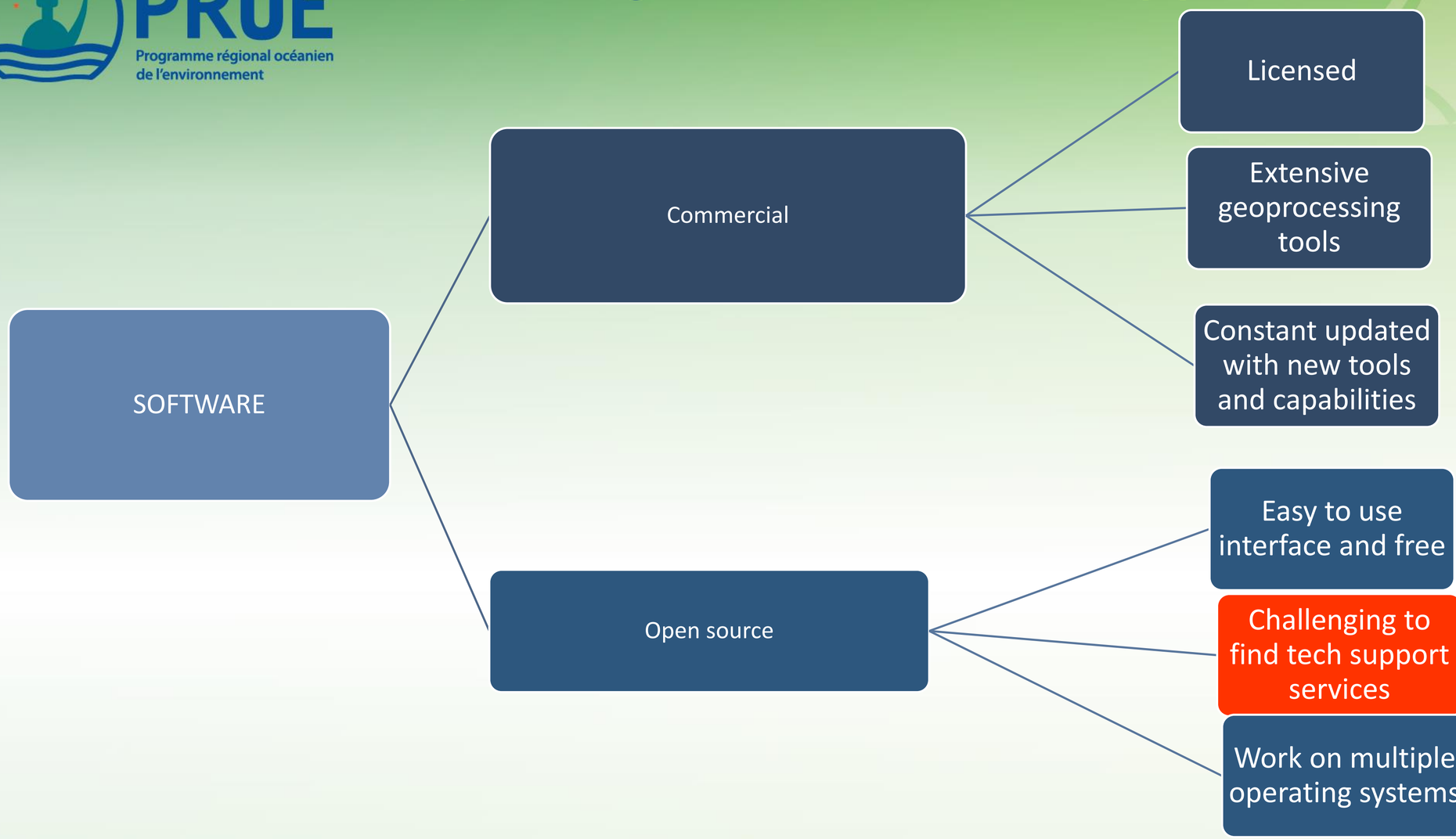
- Qfield
- Kobotool

Existing Data & Digitization

- The process of converting non-spatial or analog data into usable digital spatial formats.
- **Paper Maps & Charts:**
  Digitizing historical features by scanning and georeferencing raster images.
- **Census Data:**
  Geocoding tabular addresses to create spatial point layers.
- **Public Databases:**
  Leveraging open-source data from government agencies (e.g., roads, administrative boundaries).



Exploring GIS Software/Applications



ArcGIS

QGIS