GIS (Geographic Information System)

Technology used to capture, store, analyze, and display geographic data. It combines maps with data, allowing users to visualize spatial relationships and patterns.

Basic Components of GIS

1. **Hardware** – Computers, GPS devices, and servers that run GIS software.
2. **Software** – Programs like ArcGIS, QGIS, and Google Earth that process and analyze spatial data.
3. **Data** – Includes spatial data (maps, coordinates) and attribute data (descriptive information about locations).
4. **People** – GIS professionals, researchers, and analysts who use GIS for decision-making.
5. **Methods** – The workflows and techniques used to collect, manage, and interpret GIS data.

Types of GIS Data

1. **Vector Data** – Represents features with points (e.g., cities), lines (e.g., roads), and polygons (e.g., country boundaries).
2. **Raster Data** – Grid-based data, like satellite images or elevation models, where each pixel contains information.

Common Uses of GIS

- **Urban Planning** – Designing cities, transportation networks, and zoning.
- **Environmental Management** – Monitoring deforestation, water resources, and climate change.
- **Disaster Management** – Tracking hurricanes, wildfires, and floods.
- **Navigation & Logistics** – Optimizing routes for deliveries and transportation.
- **Public Health** – Mapping disease outbreaks and healthcare facilities.

GIS Use in Identifying Unmarked Burials at Residential Schools

GIS has become a critical tool in the search for unmarked graves at former residential school sites, helping Indigenous communities, archaeologists, and researchers locate, document, and analyze burial sites. Here's how GIS plays a role in this important work:

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1. Ground-Penetrating Radar (GPR) & GIS Integration

- **GPR surveys** are commonly used to detect anomalies beneath the surface.
- GIS is used to map GPR findings and overlay them with historical records, aerial photos, and other spatial data.
- This helps researchers pinpoint areas of interest for further investigation.

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2. Historical Map & Archival Data Analysis

- Old maps, school blueprints, and archival records are digitized and georeferenced in GIS.
- Comparing historical and modern maps helps identify changes in land use that may indicate burial sites.
- GIS allows layering of Indigenous oral histories, witness accounts, and survivor testimonies over spatial data.

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3. Aerial & Satellite Imagery

- **High-resolution satellite imagery** and **LiDAR (Light Detection and Ranging)** are used to detect subtle landscape changes, such as depressions or disturbances in the ground.
- Thermal imaging and multispectral analysis can highlight soil disturbances indicative of graves.

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4. Spatial Analysis & Predictive Modeling

- GIS helps create predictive models by analyzing factors like soil composition, vegetation changes, and proximity to historical school buildings.
- These models guide search efforts, making the process more efficient.

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5. Community Involvement & Data Sharing

- GIS platforms allow Indigenous communities to **control and manage** data related to burial sites.
- Secure GIS databases ensure that sensitive cultural and historical information is **protected**.
- Community-driven GIS projects integrate traditional knowledge with scientific methods.

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6. Legal & Advocacy Support

- GIS-generated maps serve as **evidence** in legal cases and reconciliation efforts.
- Clear visualizations help policymakers and the public understand the scale of the issue.
- GIS supports calls for further investigations and protection of burial sites.

Real-World Example: GIS in Canada's Residential School Investigations

- Indigenous communities and research teams in Canada have used **GIS and GPR** to confirm the presence of unmarked graves at former residential schools, including sites in British Columbia, Saskatchewan, and Manitoba.
- The Truth and Reconciliation Commission of Canada (TRC) has recommended the continued use of GIS technology in uncovering and memorializing these burial sites.

Challenges & Ethical Considerations

- **Respect & Sensitivity:** GIS must be used in ways that respect the wishes of Indigenous communities.
- **Data Ownership:** Indigenous-led GIS projects ensure that data remains under community control.
- **Accuracy & Verification:** Ground-truthing through physical investigation is required to confirm GIS findings.

GIS is proving to be an invaluable tool in the ongoing work of **truth, reconciliation, and justice** for Indigenous communities.