USEA Webinar

Distribution System Digital Mapping

A case study on NRECA International's NESCO project in Bangladesh

NRECA International

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Content

1. Introduction to NRECA International
2. NRECA International's geospatial planning approach
3. Case Study - Digital mapping in the NESCO project
4. Coweta-Fayette Electric Cooperative Presentation

NRECA in the United States

- Electric cooperative utility trade association
- Established in 1942 to address common needs, such as access to financing, insurance, wholesale power, education and training, and advocacy in Washington, D.C.
- Member utilities contribute about $1 per meter in dues to NRECA
- NRECA affiliates fulfill functions such as insurance, pensions, marketing & branding, and international programs

NRECA International

Homestead Funds

Touchstone Energy® Cooperatives

CFC National Rural Utilities Cooperative Finance Corporation

ECBA ELECTRIC COOPERATIVE BAR ASSOCIATION

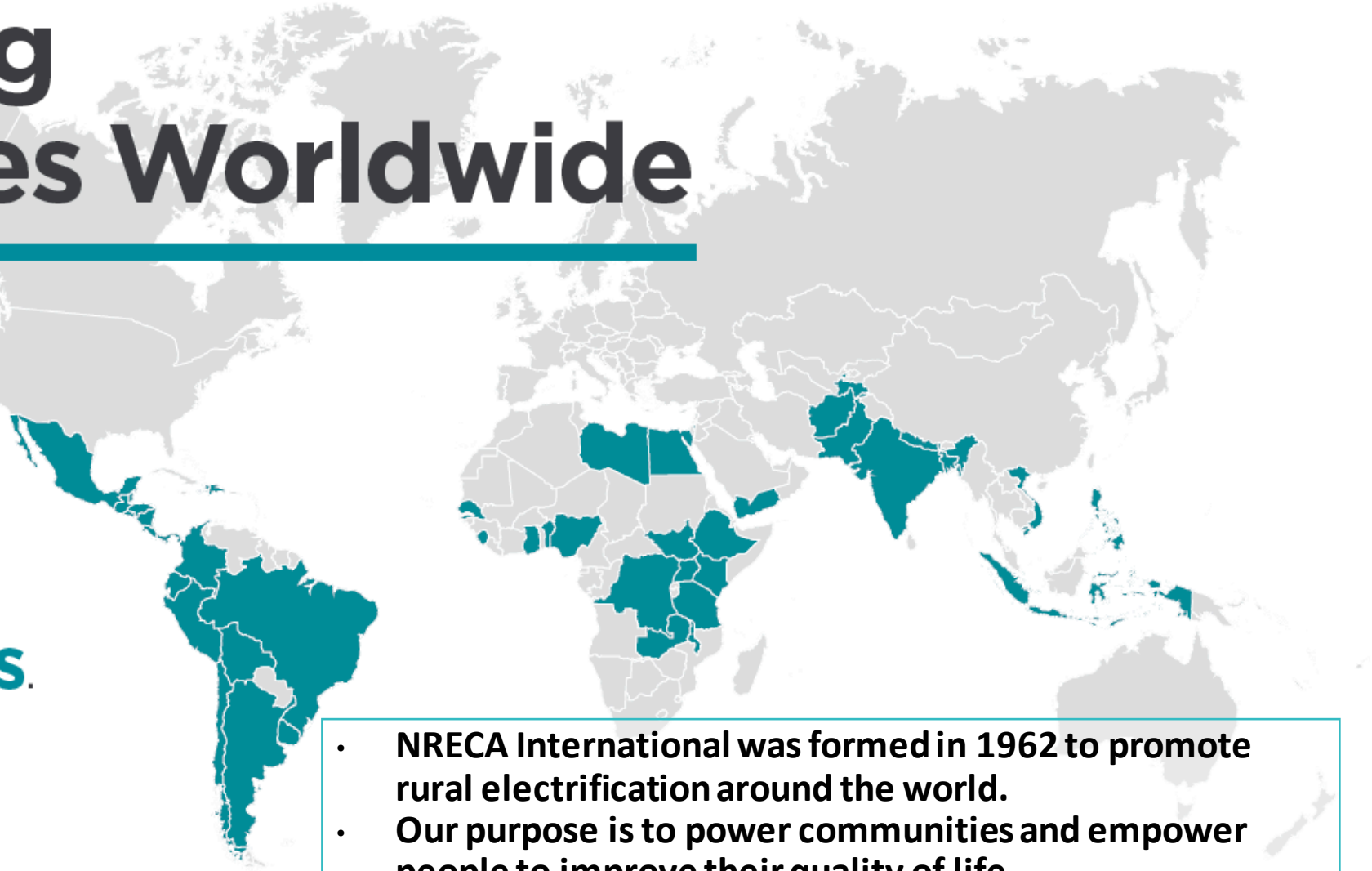
FEDERATED RURAL ELECTRIC INSURANCE EXCHANGE

Empowering Communities Worldwide

Powering communities and hope by creating **250 rural utilities** across the globe.

Serving **160 million** people in **48 countries**.

4× the number of U.S. rural co-op connections.



- **NRECA International was formed in 1962 to promote rural electrification around the world.**
- **Our purpose is to power communities and empower people to improve their quality of life.**
- **We've worked in 48 countries, focusing now on Sub-Saharan Africa**

NRECA International

NRECA's geospatial planning approach

- The platform was developed for GIS specialists and engineers to perform short, medium and long-term electrification planning
- Geospatial planning follows the steps that an electric utility planner typically runs manually, allowing for analysis at a greater scale more efficiently
- Manages all input data and results from a single, relational database (SQL)
- Provides bidirectional data channels for syncing data to and from the GIS and engineering platforms
- Produces reports and plans from the geodatabase in pdf and html (static and interactive)
- Integrates with financial analysis to prioritize projects based on cost per consumer, NPV, etc.

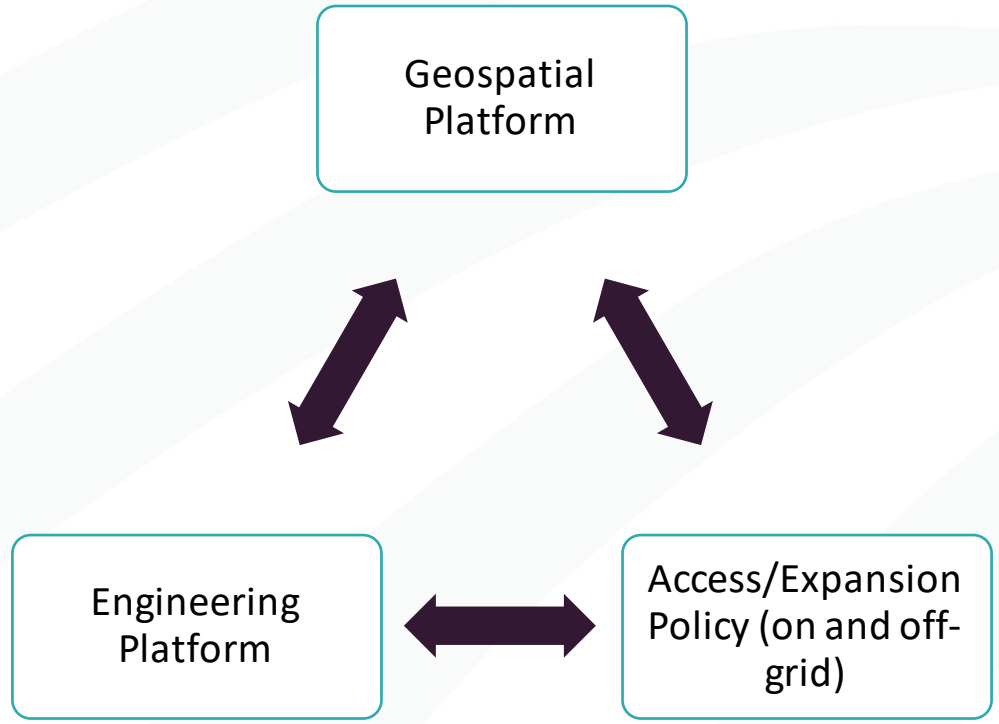
Why geospatial platforms are important

NRECA has purposely developed geospatial products with the intention of integrating the geospatial planning platform into annual and multi-year grid strengthening studies

Meaning that they are integrated with government and utility specific engineering analysis platforms

They replace a manual planning process, allowing a utility to analyze the financial and economical performance of each investment before committing funds

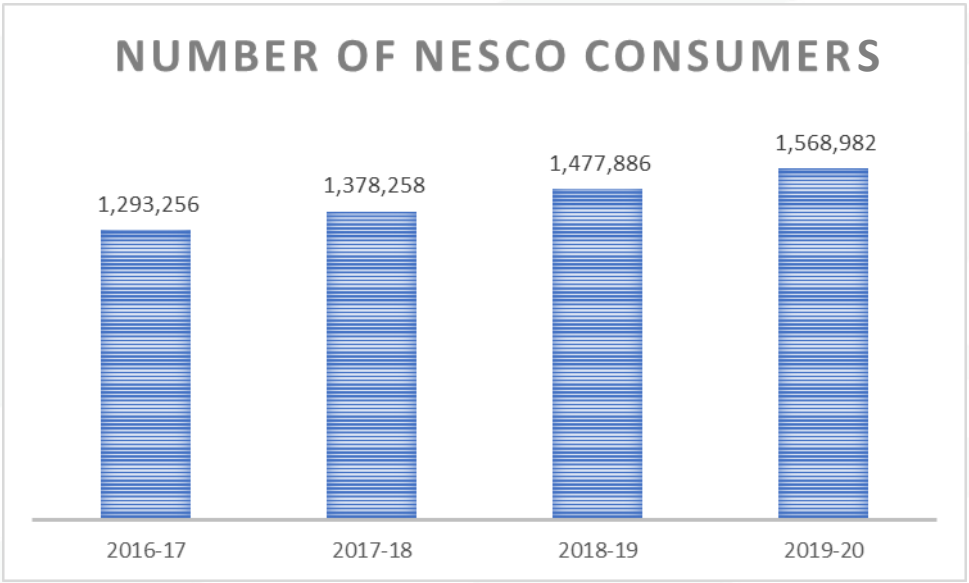
Geospatial platforms should be integrated into the engineering and policy planning process, not single use systems

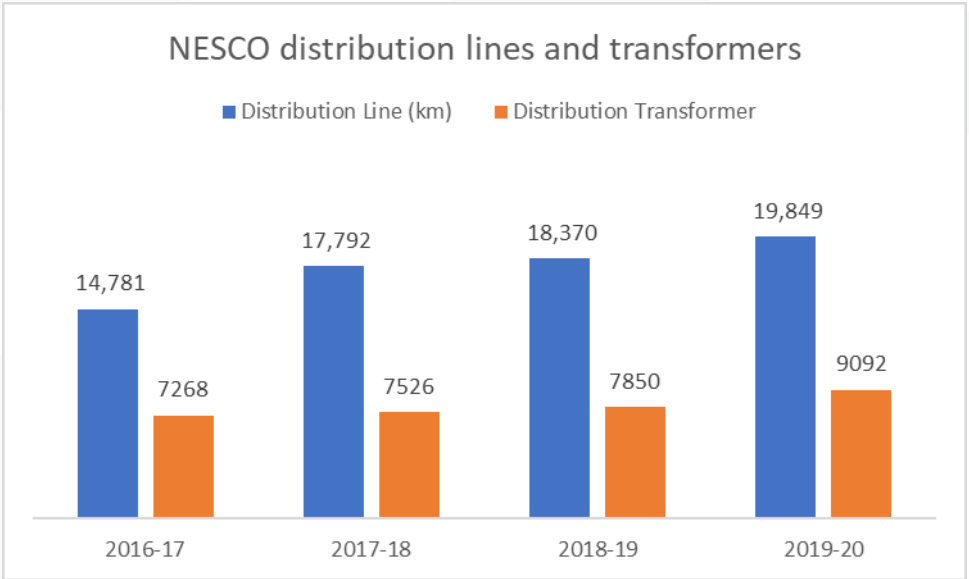


Case study on the NESCO project in Bangladesh

About NESCO

- Northern Electricity Supply Company Ltd (NESCO) is one of 86 distribution utilities in Bangladesh
- Operates 50 Sales and Distribution Division
- NESCO serves 1.57 million consumers (growth rate 92K/year)
- 19,849 km of Distribution line (growth rate 1,267 km/year line and 456 Tr/year)





Source: NESCO annual report 2019-2020

NESCO Geospatial Platform Intended Outcomes

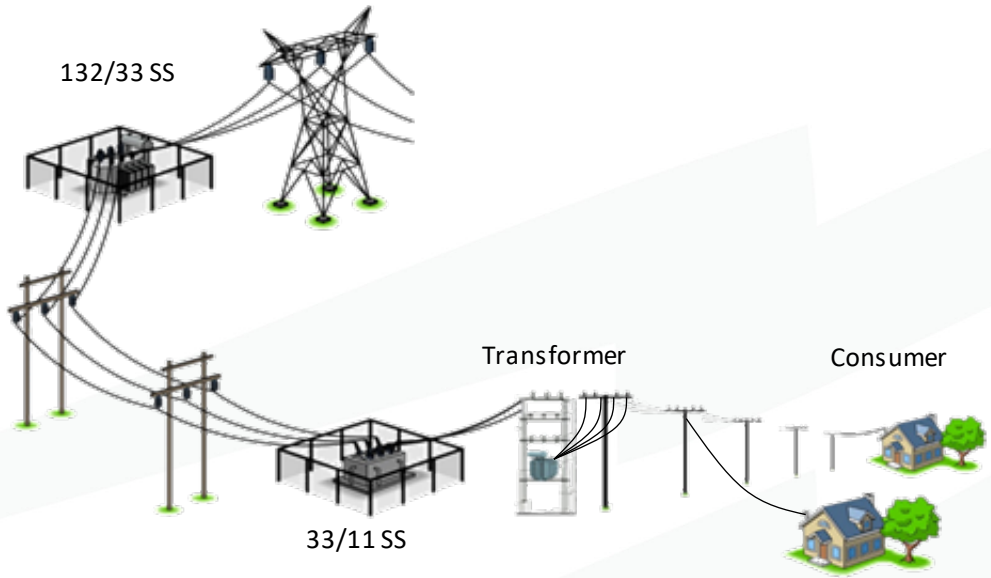
Overall GIS utilization

- Modernize planning, operations, maintenance, and customer service
- Reduce system losses, monitor distribution line outages, and provide a platform for asset management

NESCO GIS use cases

- Geolocate assets with attributes
- Network load flow (S&D level)
- GIS based customer information
- Outage management and restoration system
- Management of work orders

Project Scope and Methods



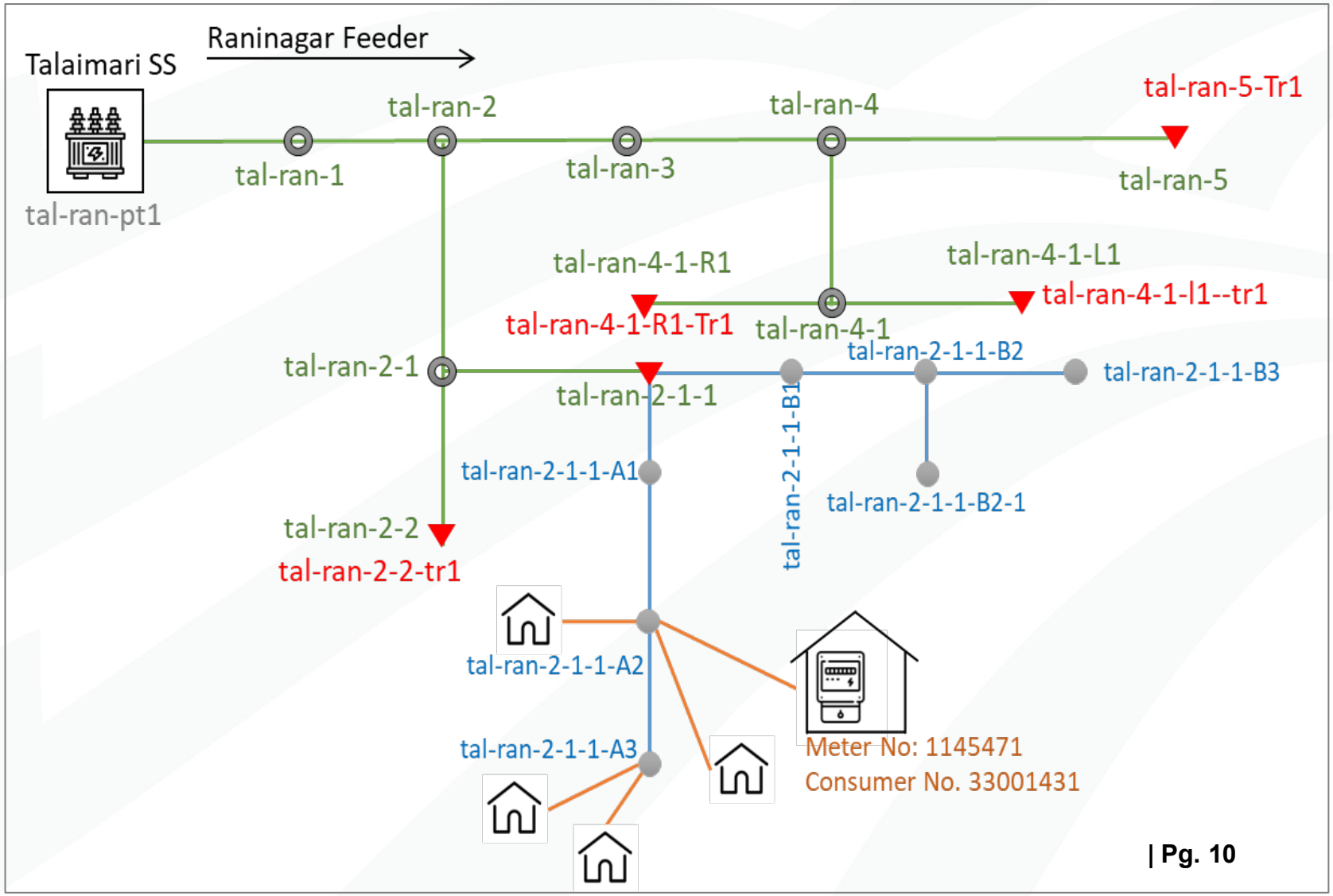
Scope:

- Primary substation to customer meter
- Ensuring precise GPS location

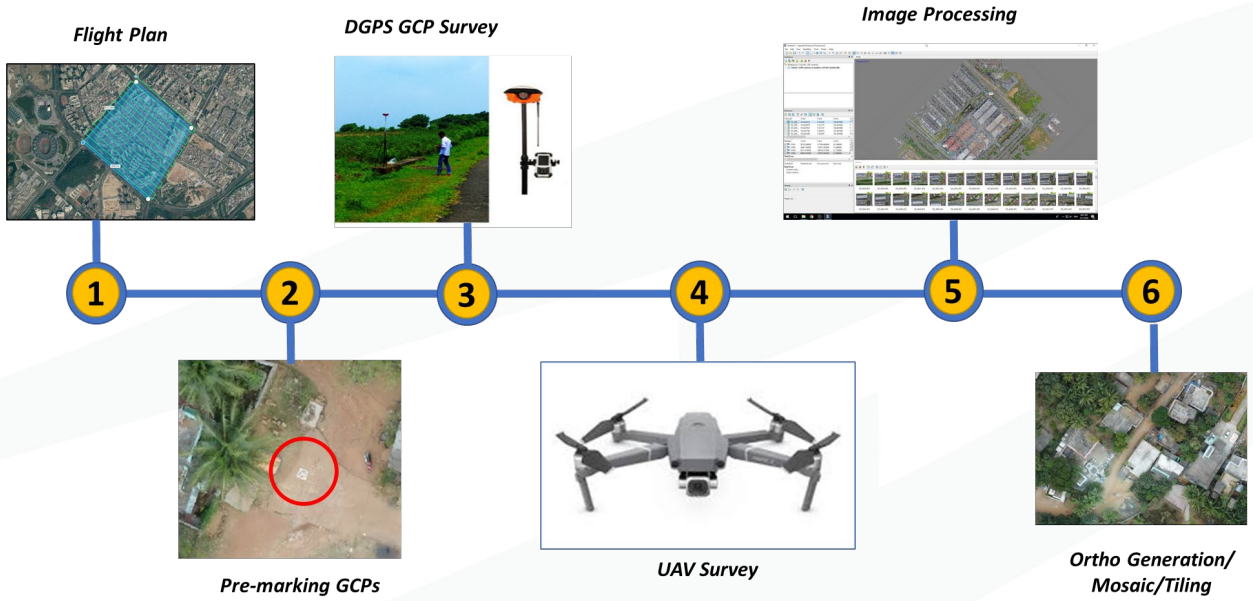
- Utility asset data
- Electrical networks
- Digital ERC
- Consumer locations

Key approach (1): linking customers to poles

- Pole and asset numbering
- Linking customers with poles



Key approach (2): UAV image capturing



- Higher quality images
- Up to date images
- Urban environment degrades satellite signals to the GPSs

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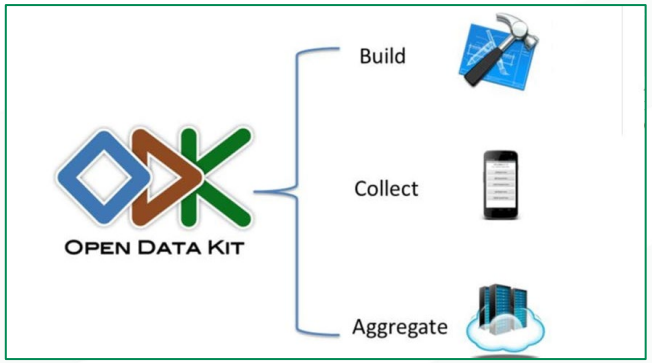
Geospatial data development tools

- Input
- ODK Collect
- OSMAnd
- Mergin
- Apache Tomcat
- Aggregate Server
- PostgreSQL & PostGIS
- QGIS

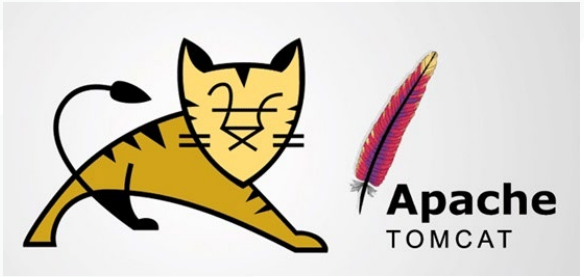


input

mergin

QGIS

Open source or low cost



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Data collection workflows

Tablet based data collection

- Preloaded geodata and attributes
- Drop down menus
- Offline capability

Online data storage and synchronization

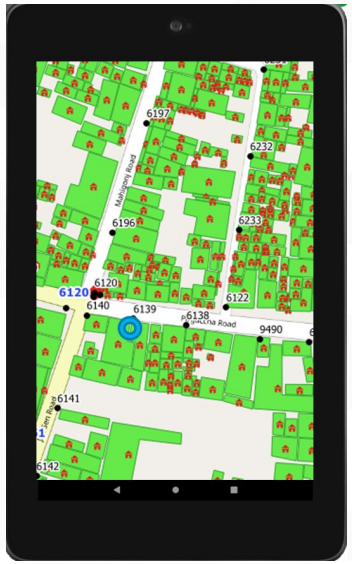
- Online data server
- Enumerators and inhouse GIS personnel use same database
- Bi-directional data synchronization
- Server data merging

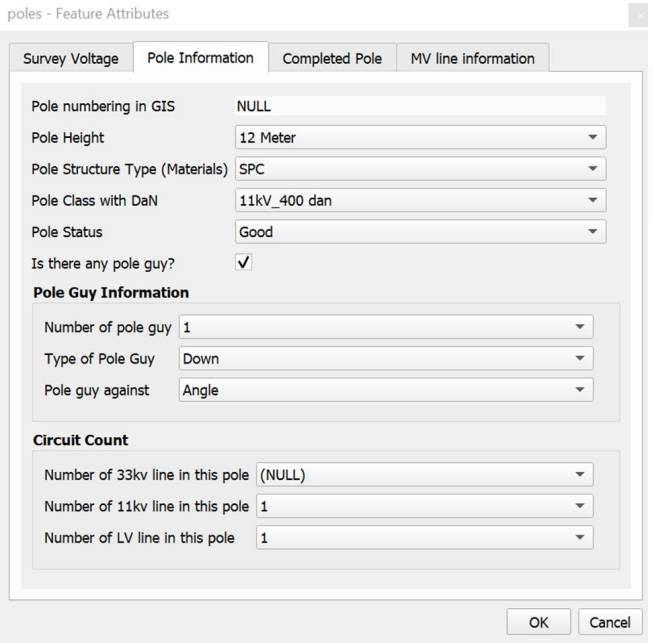
Two-way data quality checking

- 3 steps Data quality checking

NESCO Resource involvement

- Throughout the data collection process





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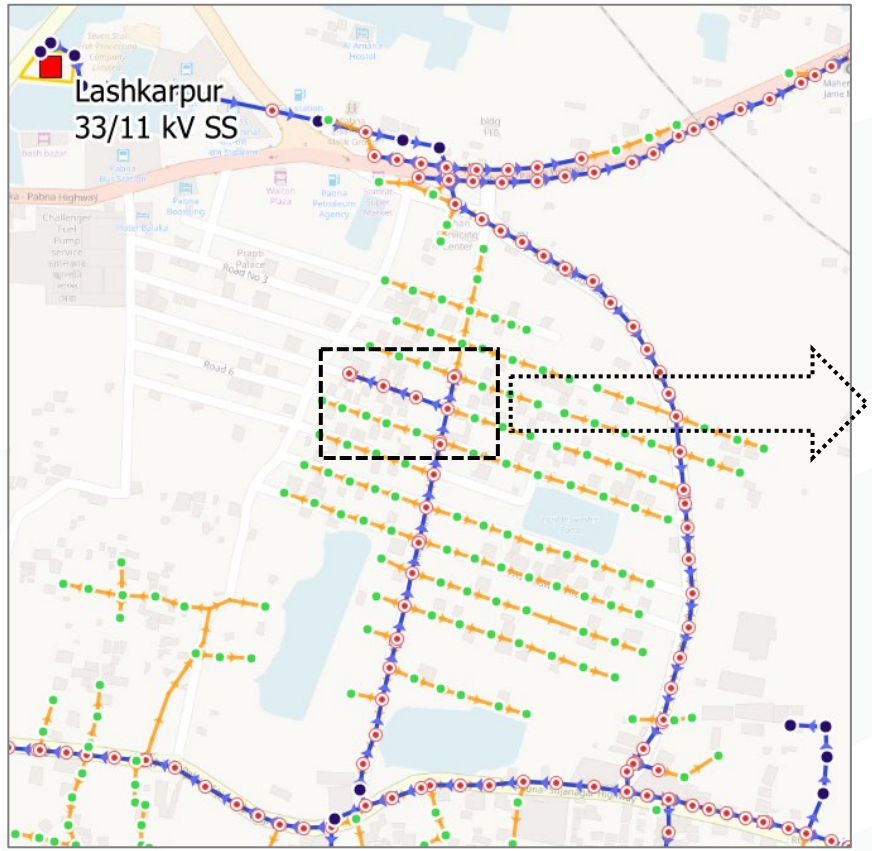
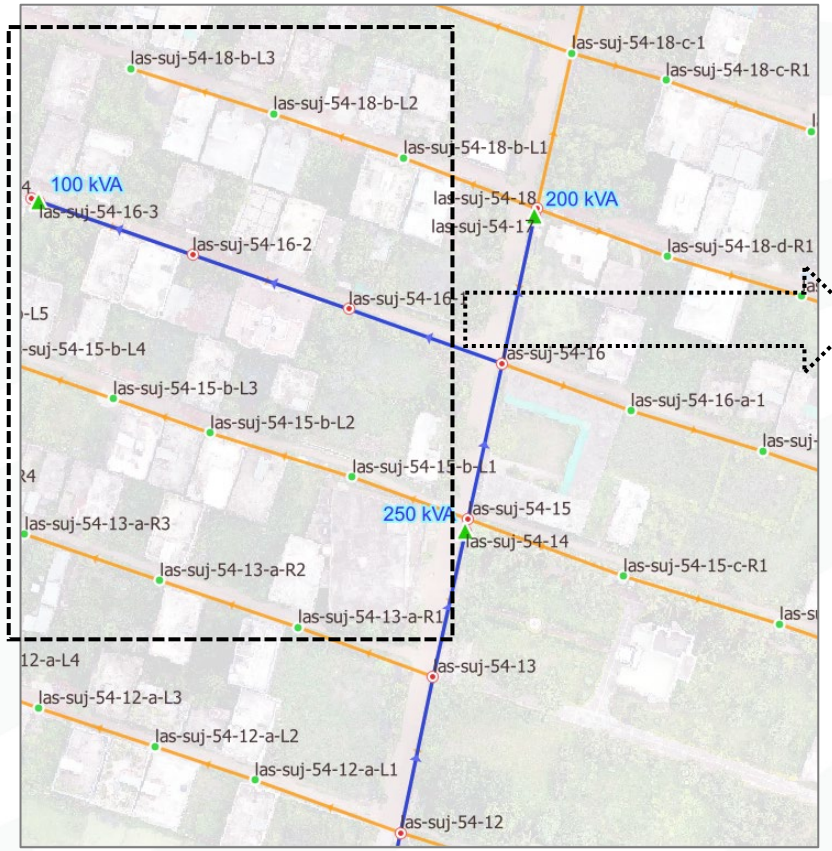
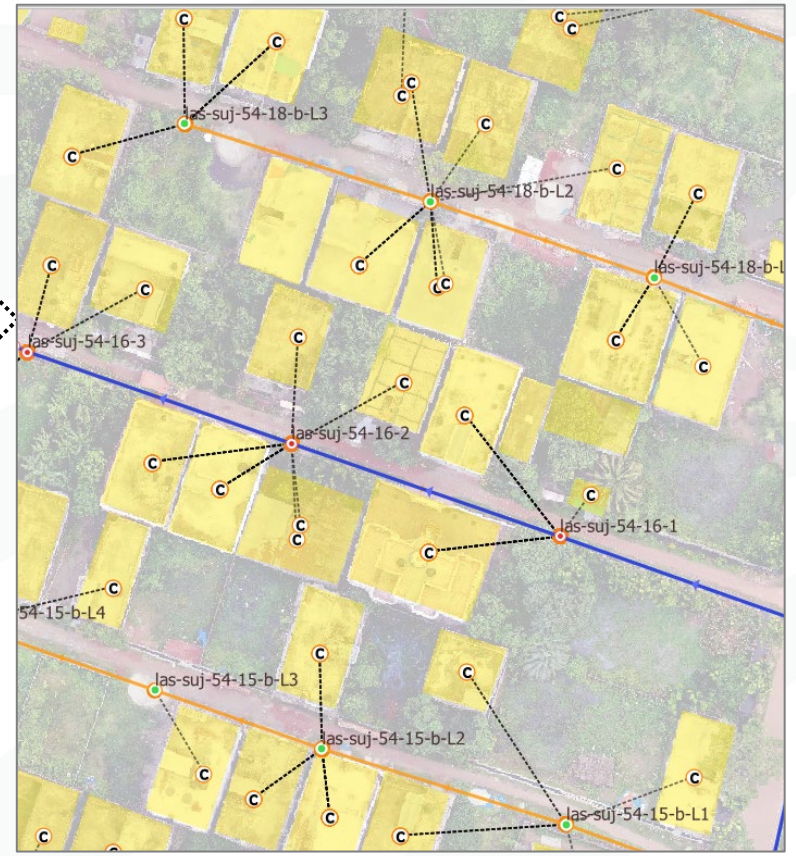
Geospatial outputs







- Digitized pole, equipment, MV, and LV line with attributes

- Unique number for each asset
- Equipment info –
  - Nameplate, maintenance and physical conditions

- Digitized consumer buildings
- Consumer meter locations
- Connected pole
- Service drop conductors

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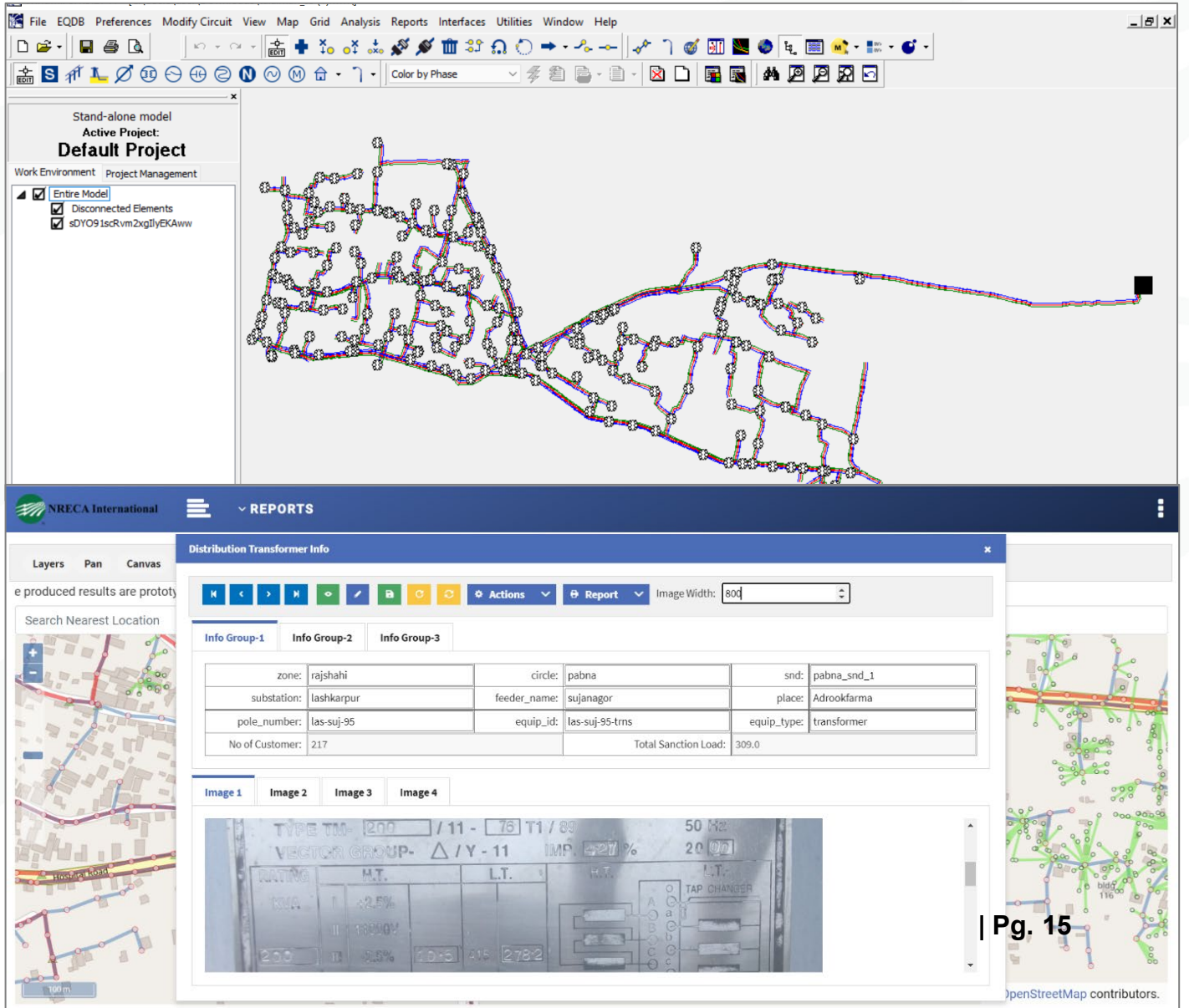
Application of geospatial data

- Data for electrical modeling
- Web visualization tools
  - Inspection
  - Queries
  - Quantification and planning
  - Budgeting
  - Trace network features upstream or downstream
- Complaint management system



Challenges when starting the geospatial platform

- Dense unplanned urban environment
- Utilities employ mainly manual record keeping practices
- Lack of maintenance information
- Local construction practices are variable
- Interaction with customers is complex
- Lack of updated information

Institutionalization of the geospatial platform

Key requirements for sustainability:

- Training
- Involvement
- Ownership
- Technology and equipment transfer

Coweta-Fayette Electric Cooperative Presentation (Jessica Williams)