Geospatial Analytics in a Mobile Workforce Management System

Mobile Field Force Automation (MFFA) 2.0

"The combination of a workforce management system with mobile geospatial capabilities is a great starting point for more digitalization and innovation opportunities across the TNB business value chain."

Ir. Muhamad Had Kadir,
Project Leader, TNB Mobility Solution
Geospatial Analytics in a Mobile Workforce Management System
Tenaga Nasional Berhad is the largest publicly listed power company in Southeast Asia with US$ 27.3 billion worth of assets. Also known as Tenaga Nasional, or TNB, it serves over 9.2 million customers throughout Peninsular Malaysia. With TNB’s core activities in the generation, transmission, and distribution of electricity, providing effective customer service is a major concern when outages occur in the low-voltage areas of their network, that is, in those areas which locally impact their customers’ homes or businesses.

TNB is striving to become a top-ten global utility company and achieve RM20 billion in earnings before interest and taxes by 2025. With this goal, TNB needed to upgrade its mobility solution with geospatial technology to unlock the full potential of its asset management system.

The problem

With so many assets across its vast region (30 supervisors and 400 field crews supporting hundreds of tickets per day), ensuring the assets are repaired quickly when outages are reported has always been a top priority for TNB. Since the mobile field force began using mobile technology more than ten years ago, TNB has had a three-fold solution for maintaining its assets:

Outage Management System (OMS) for managing incidents or complaints. The process begins when the TNB Careline receives a call or text message from a customer that there is a power outage at a given location. The call-taker creates a ticket for tracking the incident and sends it electronically to a supervisor at the dispatch center, who locates and dispatches the appropriate field crew to the location.

Geospatial Information System (GIS) that routes the field crews – riding in GPS-equipped vehicles and carrying mobile devices – to their destinations by enabling the supervisors to identify the closest crews to the incident locations and by navigating the crews to the locations by the fastest routes.

Asset management database that maintains a tabular listing of all the assets by keeping records throughout their lifecycles. The database is updated whenever a status changes for an asset due to an event such as a repair. When a field crew notifies their supervisor of a change, such as fixing a power-line break, that information is entered into the database, changing the status of the appropriate power line asset from, for example, ‘in repair’ to ‘fixed.’

The problem? Although the average interruption times for TNB’s customers during outages was lower than they had been before the field force began using mobile technology over a decade ago, inefficiencies remained:

- If several customers call about the same incident, the calls are likely managed by separate tickets.
- The system generates maps that show the locations and statuses of the incidents, but does not compare incidents, or use the asset lifecycle histories for analytics.
- If management wants to see analytics such as the status of all open tickets, average response times during a given day or week, or by locations, there was no application to enable this.

The reason for the inefficiencies? The asset management database and the GIS function independently and do not communicate directly with each other. The GIS displays the incidents on the map with their current statuses obtained from OMS. Even though OMS notifies the asset database whenever a status for an incident changes, to trigger the asset’s database update, all the assets’ lifecycle histories remain locked away in the database.

Without the ability to view a map with corresponding charts that let you query the status, types of incidents, and asset lifecycle history, the existing analytics were too limited to enable workforce planning. The only option was to remain in reactive rather than proactive mode by responding to incidents when they occurred.

"Our assets and workforce are distributed over vast areas, making mobile solutions such as MFFA 2.0 critical components of our business operation."

Kamal Azharan Azman,
Manager Project Delivery - Operational Technology,
TNB Global Business Solutions

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Linking the Existing Asset Management and GIS to Enable Analytics

During Mobile Field Force Automation (MFFA) 2.0 project, Antaragrafik, a Hexagon Geospatial division Platinum Partner, implemented a solution for TNB that integrates its existing asset management with GIS. Software from Hexagon’s Geospatial division, specifically GeoMedia WebMap Professional and M.App Enterprise, enables TNB’s systems to query their data by using state-of-the-art analytics.

GeoMedia WebMap, a server product for web-based visualization of geospatial data, links the GIS features on the map with the rows of the asset management database. The incidents reported are entered into the asset management database, with GeoMedia WebMap enabling the geospatial context so that an asset or incident is simultaneously tracked in both the GIS and asset management databases. GeoMedia WebMap displays them on the map and then tracks them through their lifecycles within the asset database (changing from one state to another, such as from commissioning to defective to replacement).

The interactive Smart M.Apps that Antaragrafik Systems has developed for TNB let stakeholders view both comprehensive statistics and detailed information about specific incidents or areas. Results can be filtered based on multiple factors such as outage type or ticket status.

The geospatial dashboard charts display the category of the incidents, such as public lighting, individual lights, broken mast, or broken wire, that can be further queried on. M.App Enterprise makes the data much more meaningful by making the asset histories available for queries. The application also displays the historical and on-going incident information and statuses for a manager’s dashboard.

Now that historical data can be queried, managers can look for outage spikes during the year, or during the past several

“The geospatial dashboard helps us understand our operations better, so the suitable field crew with the proper skills and parts arrives at the correct location within the stipulated time.”

Zainal Ariffin b Abd Rahman, Project Engineer, TNB Mobility Solution
years, and see if the cause of any can be determined (such as, spikes during the rainy season) and address them proactively with the goal of fewer outages and lower costs during the next year’s rainy season. This map-centric dashboard enables easy scheduling of work, project tracking, and reporting. TNB now uses this solution to:

• Provide the workforce with a mobile application for effective work execution.
• Provide the work managers with scheduling capabilities for efficient work planning, monitoring, and controlling.
• Empower the heads of departments and asset owners to access statistical information, performance indexes, and prediction capability for better management decisions.

"Location intelligence provides valuable insights. The collection of latitude and longitude information of each asset or incident can be a powerful tool for those who know how to harness the data. This technology holds the key for TNB to digitally transform and energize our operations by allowing our field crews to work more productively and efficiently so that we can provide better value for our customers.", said Mohd Syafiq Md Azian, MFFA 2.0 Project Manager, TNB Mobility Solution.

To learn more, please visit the following pages:

M.App Enterprise
hexagongeospatial.com/products/smart-mapp/mapp-enterprise

Feature Analyzer Smart M.Apps
hexagongeospatial.com/products/smart-mapp/all-smart-mapps/mapp-analyzer-suite

GeoMedia WebMap
hexagongeospatial.com/products/power-portfolio/geomedia-webmap

The objectives of the system are to maximize asset performance, improve workforce productivity, and reduce cost. By utilizing the latest in mobile technology and analytics, MFFA 2.0 has hit all of its targets and more.

Hazlinamuliati Abd Hamid,
Head of Project Delivery - Operational Technology, TNB Global Business Solutions
Hexagon is a global leader in sensor, software and autonomous solutions. We are putting data to work to boost efficiency, productivity, and quality across industrial, manufacturing, infrastructure, safety, and mobility applications.

Our technologies are shaping urban and production ecosystems to become increasingly connected and autonomous — ensuring a scalable, sustainable future.

Hexagon’s Geospatial division creates solutions that deliver a 5D smart digital reality with insight into what was, what is, what could be, what should be, and ultimately, what will be.