

Mobile based solution for Market Planning

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Abstract:

RJIL is in the process of rolling out its pan-India 4G services using wireless and wire-line broadband access. In order to provide uniquely differentiated customer service experience and to manage its inventory & network, accurate landbase mapping with address attribute is of vital importance. At RJIL, existing landbase and business data required for market planning was developed using conventional paper map based survey, a process which is not sustainable in commercial operations. Therefore, an integrated mobile GIS based solution orchestrated by industry standard workflow engine has been implemented to automate the survey process using Esri Geo-Database.

The solution consists of three components: BPM engine, web application and ArcGIS for Mobile on Android Platform. This integrated solution enables capturing landbase features and business data even when mobile data network is not available in the survey area i.e. in disconnected editing mode. It also provides advanced editing operations like add, split, merge, move and delete which are very necessary to align the geo-database with ground reality.

Using digital maps in the field in disconnected mode, dependency on paper based workflows are eliminated, thereby improving both process efficiency and data accuracy. It has also reduced the dependency on GIS skilled resources substantially.

About the Author:



Yestha Bhatt, a branch engineering professional with 8 + years of experience, is a Manager at Reliance Jio Infocomm Ltd., Mumbai. She has handled product management and business requirement analysis for a major Indian telecom provider in the past. Her paper presented in ESRI India User Conference at Delhi has received First prize in 2008 and second prize in 2013. Her paper presented in ESRI International User Conference at San Diego 2014 was well appreciated.

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Introduction

Reliance Jio Infocomm (RJIL) is the only the telecom company to have been allotted pan-India high-speed wireless broadband spectrum. It will offer fixed and 4G LTE (Long Term Evaluation) wireless broadband Internet services in over 850 towns of India as well as covering 50% of the rural India. The wireless and Wireline services will be provided to customers through LTE, WiFi, and FTTH (Fibre to the Home/Building/Premise). With availability of numerous internet-based applications, India is witnessing a tremendous increase in data usage and heavy demand for high speed internet – both in consumer and commercial segments. It’s a great opportunity for Reliance Jio to reimagine the digital landscape of India with its 4G and Fiber-to-the-home (FTTH) services. Accurate landbase on Enterprise GIS platform is a vital system in quick roll-out and providing best in class customer experience. Further, in order to plan an optimal FTTH network plan, it is necessary to know demand per building. This also helps to roll-out high demand potential areas on priority.

At RJIL, existing landbase and business data required for market and network planning was developed using conventional paper map based survey, a process which is not sustainable for last mile network planning and market planning due to size of the country, scope and aggressive schedule of project. Third party landbase survey databases available in the market have their own limitations of accuracy and adequacy of information, and therefore they do not necessarily provide a dependable basis for network planning.

Therefore, an integrated mobile GIS based solution orchestrated by industry standard workflow engine has been implemented to automate the survey process using Esri Geo-Database. The solution consists of three components:

1. BPM engine: To orchestrate the end to end work process
2. ArcGIS Server web application for viewing and assignment of grids
3. ArcGIS for Mobile on Android Platform for conducting survey

This integrated solution enables capturing landbase features and business data even when mobile data network is not available in the survey area i.e. in disconnected editing mode. It also provides advanced editing operations like add, split, merge, move and delete which are very necessary to align the geo-database with ground reality.

High Level Workflow

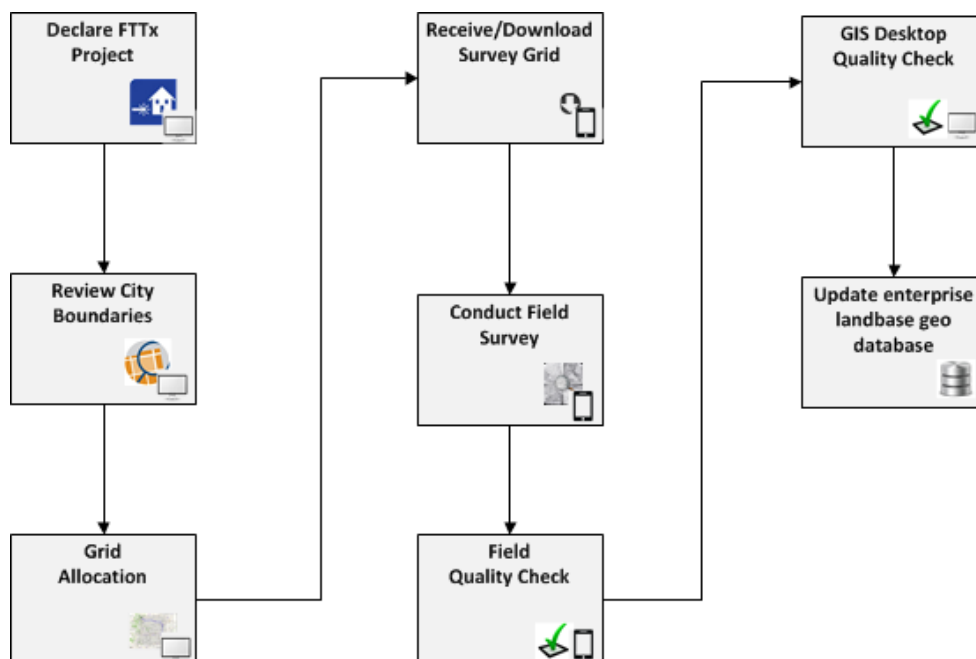


Figure 1: High Level Workflow for market planning and last mile network planning

User Groups

There are eight major user groups consisting of more than 2000 users located across India. This application is accessible to both employees and contractors. Users are centrally handled through user management system created on basis of functionality, geography and hierarchy.

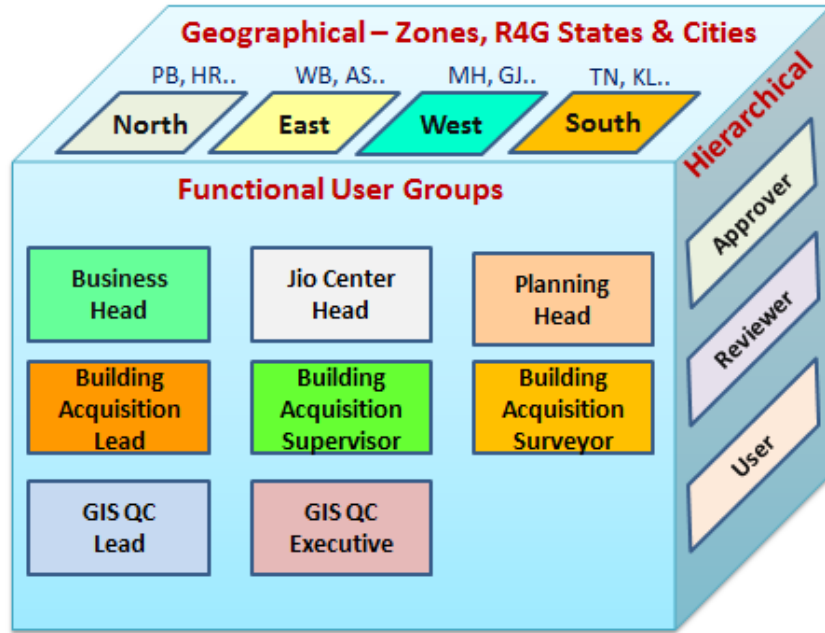


Figure 2: User Groups

Milestone

The mobile based application build on top of ArcGIS for Mobile on Android Platform consist of seven major milestones covering different stages executed by defined work-groups. This mobile application covers the following major milestones as shown:

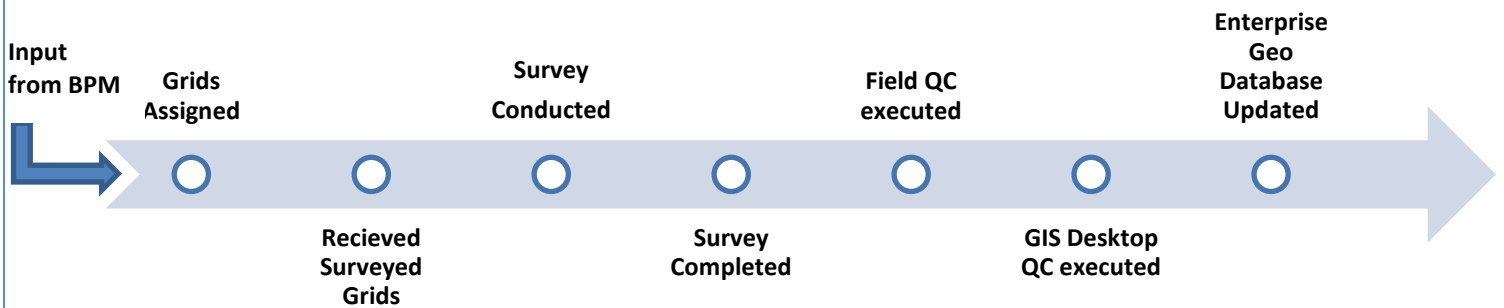


Figure 3: Major Milestones

Detailed Steps

As shown in figure 4, survey activities using mobile based GIS solution is executed in the following manner

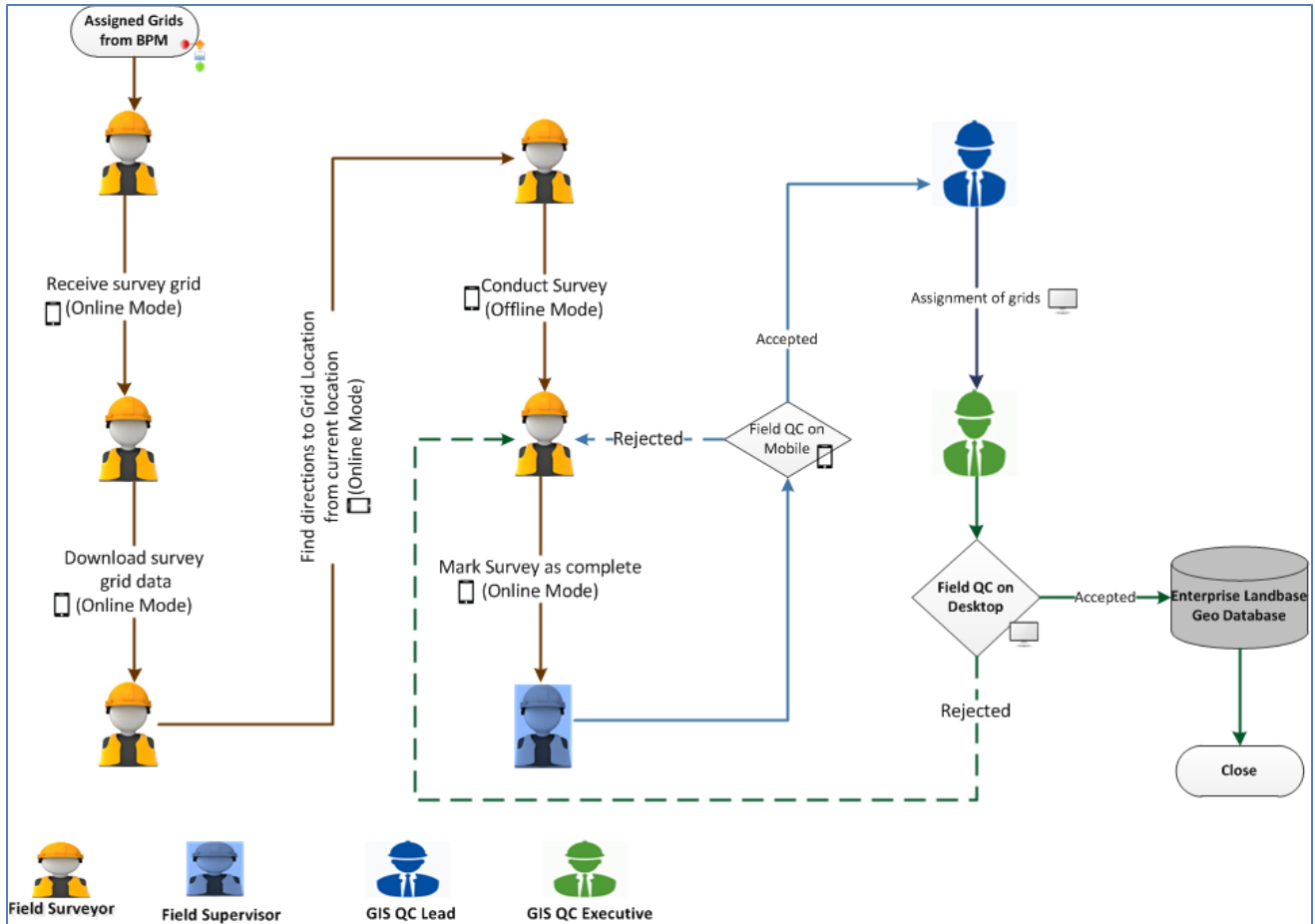


Figure 4: Detailed Workflow

A. Grid Assignment

- (i) Launch of city, review of city boundaries and assignment of survey grids to surveyor is executed through BPM and GIS web based solution.

B. Download and View tasks

- (i) The field supervisor assigns the grid to the surveyor through tablet based on the spatial location.
- (ii) The field surveyor logs in to view the list of assigned grids and the number of buildings within the grid.
- (iii) User downloads the grids in online mode and finds the shortest path to reach the nearest grid.

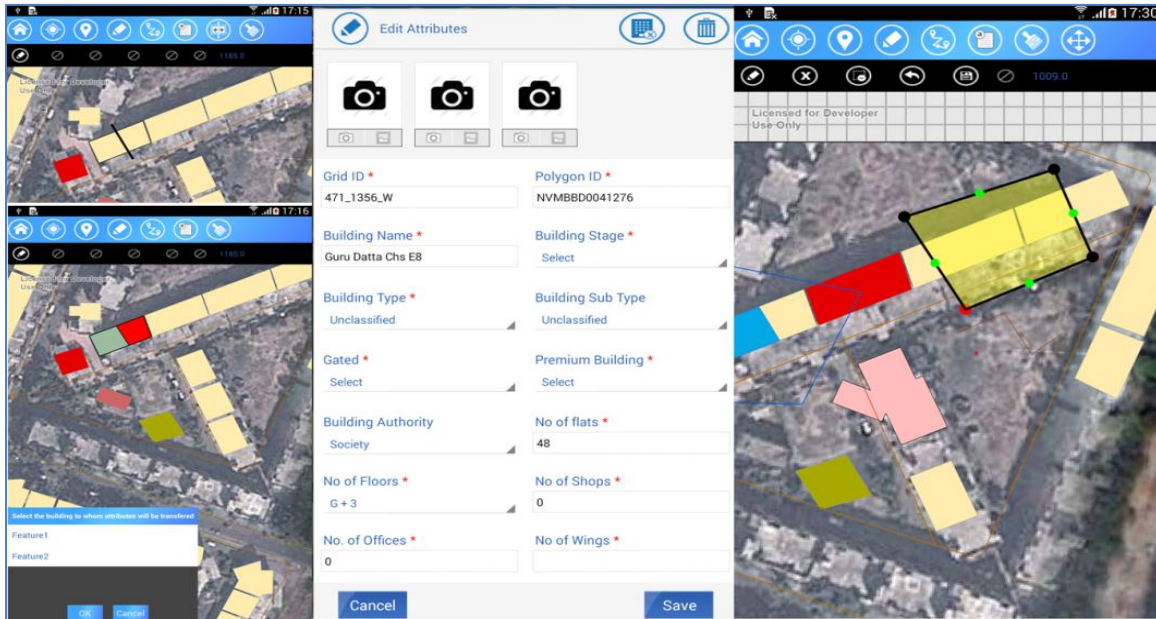


Figure 5: Download and View Tasks

C. Conduct Survey

- (i) The field surveyor creates, edit, merge or modify the buildings in the editable mode and marks building of interests. (BOIs) as per guidelines from business
- (ii) In addition to buildings, user creates complex, boundaries, entry points, landmarks, major roads and exclusion areas as applicable.
- (iii) User edits attributes of the features in the attribute editor available with pre-defined validations to improve the data quality.
- (iv) User uploads multiple photographs for the surveyed features such as building, entrances etc.
- (v) On completion, user synchronizes in online mode the updated data with the survey database and marks the grid as complete.

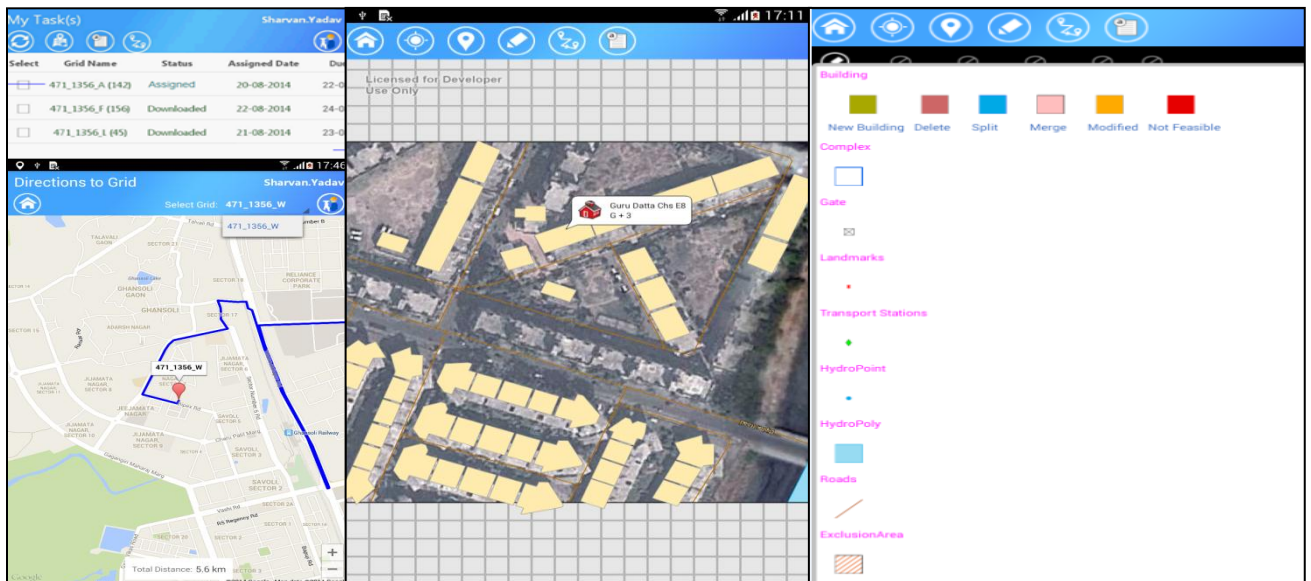


Figure 6: Conduct Survey

D. Quality Check and Feedback on Mobile

- (i) The field supervisor views the list of assigned grids for quality check on the tablet with the count of spatial edits performed in each grid.
- (ii) User views all the assigned grids for survey on dashboard for easy management and analysis of work completion and in-progress
- (iii) User makes the necessary spatial or attributes edits based on QC.
- (iv) Users Assigns the grid to GIS QC Lead for further QC process to be executed using ArcGIS Desktop.

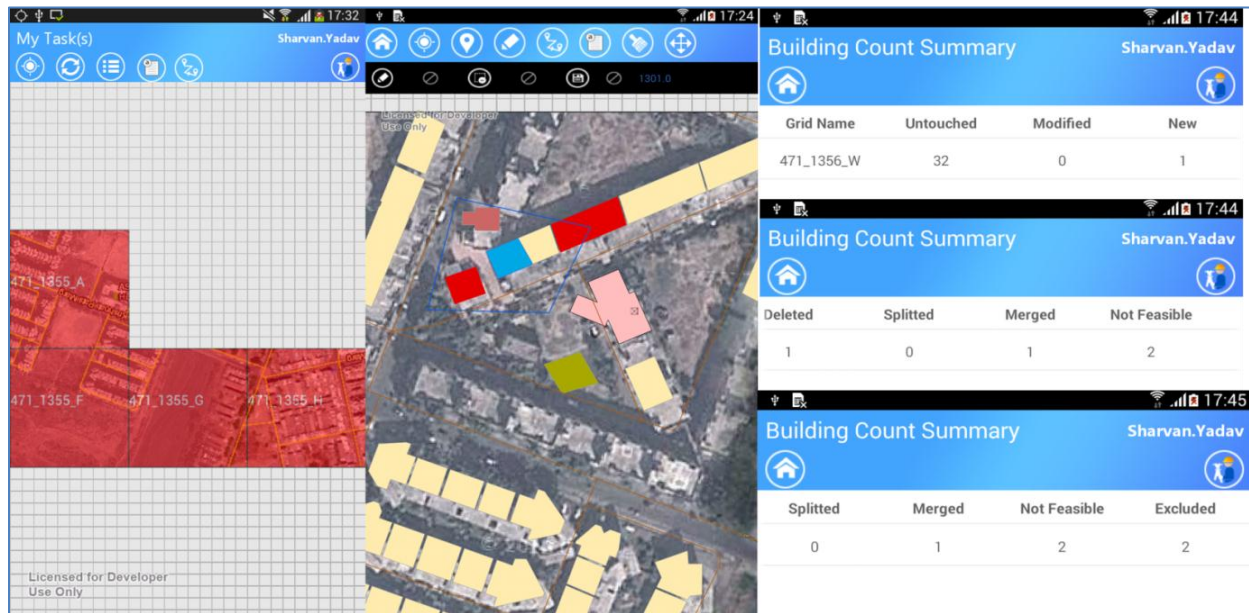


Figure 7: Quality Check on Mobile

E. Quality Check and Feedback on Desktop

- (i) GIS QC Lead assigns the grids to GIS executives using BPM
- (ii) GIS QC team performs QC on ArcGIS desktop and provides feedback.
- (iii) Based on the QC findings, user migrate the surveyed data into enterprise landbase Geo database.

Functionalities

- (i) Management of survey process and Work allocation to various user groups based on the milestones using BPM
- (ii) User authentication using Active Directory and IMEI number
- (iii) Advance editing functionalities like add, split, merge, move, delete and BOI identification
- (iv) Customized attribute window with pre-defined validations for data accuracy
- (v) Finding the shortest path to the nearest assigned grid using maps in connected mode.
- (vi) Attaching photographs for the surveyed features and tracking mechanism for location verification of attaching the site photographs with respect to the associated site location
- (vii) Dashboard for display of assigned tasks with summary of edited features based on the type of editing performed

Integration

- (i) Integration with BPM solution (Business Process Management) to automate and manage the business process within the organization covering NHQ, State HQ and field crew of survey features dispersed over 800 cities of India.

Conclusion

- (i) Dependency on paper based workflows is eliminated by using digital maps in the field in disconnected mode
- (ii) Process efficiency is increased
- (iii) Data accuracy is increased
- (iv) Dependency on GIS skilled resources substantially reduced

Challenges

- (i) ArcGIS for mobile is still evolving :
 - a. Disconnected Editing API were released half way during development
 - b. Version editing is unavailable
 - c. Several APIs for complex editing tasks were not available during development phase
- (ii) Scarcity of skilled resources and limited app developer ecosystem

Future Work

- (i) Version Workflow in disconnected editing mode
- (ii) Geo-tagging the building photographs