BIOGRAPHICAL INFORMATION

Arthur Spencer
Executive Vice President
Geospatial Solutions Division, Intergraph Mapping and Geospatial Solutions

Specific Responsibilities

Arthur Spencer (Art) has over twenty years experience in the engineering, mapping, and geospatial industries and is currently the executive vice president responsible for the day-to-day operations of Geospatial Solutions within Intergraph Mapping and Geospatial Solutions. Geospatial Solutions includes vertical groups focused on three key industries: utilities and communications, local government, and transportation.

Art joined Intergraph in 1988 and has held various positions. For six years, he was based in Hong Kong and Singapore, where he directed regional sales support, marketing, systems consulting, and implementation services related to the utility and communications industries. Prior to that assignment, he was project manager and principal consultant for geospatial implementations using the FRAMME software platform.

Past Experience

Before joining Intergraph, Art practiced civil engineering and was responsible for the design of major airports, highways, land development, and drainage projects throughout the United States.

At Michael Baker, Jr. Inc., Art was Project Manager of geospatial system development, data conversion, and stereo mapping projects. He was responsible for daily management of mapping and conversion operations for large conversion projects lasting several years

As a Civil Engineering professional, Art was responsible for design tasks for major airports, highways, land development, and drainage projects. He managed field surveys, mapping, and engineering design operations.

Educational Information

Bachelor of Science, Industrial Technology; University of Southern Mississippi
Bachelor of Science, Civil Engineering; West Virginia Institute of Technology

Professional Memberships

Registered professional engineer in the states of Alabama and Mississippi.
Tau Beta Pi Engineering Honor Society
Alpha Chi Engineering Honor Society
Geospatial Information Technology Association (GITA)
Society of Cable Telecommunications Engineers (SCTE)
Telecommunications Industry Association (TIA)

OPTIMIZE WORK PROCESSES AND ROI – GO MOBILE!

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ABSTRACT

The value and benefit of the geospatial network models in which utilities and communications companies have invested for almost two decades are fully realized when this information is put in the hands of field workers – especially when it is in a workflow-based application or solution that is simple to use and understand. There is real incentive to do this – industry research notes that companies who lead in field personnel automation tend to be 25 percent more profitable than their counterparts.

When the deployment of a field application is successful; the impact on employee perception, attitude, and willingness to adopt related applications is tremendous. Competitive and revenue pressures are motivating the transformation of the role of mobile workers because the exploitation of mobile capabilities addresses these pressures by producing the requisite cost savings, productivity enhancements, and customer satisfaction.

In this paper we will give specific examples of mobile applications that extend and expand geospatial data throughout the enterprise and the benefits obtained by these applications. Examples include collections, street light inventory, pole tests, map books, locates, maintenance, service orders, construction, and trouble restoration.

COLLECTIONS

Collections is perhaps the most basic application that can be served by a mobile application. GIS data is not critical to the application, but a mobile collections solution can increase productivity of the field workers and provide timely feedback to customer and operational systems.

Without Mobile

Most utilities process collections via a paper ticket process. The tickets must be printed and distributed to the field crews. At the end of the day, receipts must be processed for paying customers, and shut off notices must be sent to non-paying customers. The paper shuffle associated with this process results in many labor hours of paper processing. The time lag

involved in updating Customer Information and Accounting Systems can result in shut offs of paying customers or delayed shut offs of non-paying customers – both of which cost the Utility money.

With Mobile

A mobile application can automate this process. Electronic forms can be configured to capture payment information, last meter reading, print a payment receipt, etc. – eliminating the need for paper tickets. Collections jobs can be transmitted to the mobile client via a dock-and-go process or wirelessly. Collections reconciliation information can be transmitted to the CIS and Accounting Systems at the end of the day or in real time wirelessly. These workflows greatly reduce the labor required for end of day payment reconciliation.

If the mobile application is wirelessly connected to primary systems, instant feedback on a customer's account status can be sent to the CIS. This prevents shut-offs when the customer has paid their bill to a field worker. This allows the shut-off crew to work on "real" jobs, and eliminates the need to restore power to mistakenly shut off customers. If a shut-off is necessary, the dynamic feedback allows an Outage System to "know" that the customer has been shut off for non-payment, so a trouble crew is not sent to restore an outage.

Mobile collections applications are suitable for PDA-type devices. Typically, a mobile printer is used to print payment receipts for customers. A street map on the application would further increase productivity by facilitating routing between job locations.

STREET LIGHT INVENTORY

Street light inventory is highly suitable for a basic mobile application. Field workers performing street light inventory typically capture inventory information such as pole type, serial number, light condition, etc. Some utilities capture the GPS coordinates of the street light, so that the GIS can be updated with accurate locations.

Without Mobile

Without a mobile application, most utilities conduct street light inventory via a paper-based process. Forms must be printed and distributed to field crews. Data captured on the forms must be manually entered into destination systems. The paper-based process requires many man-hours of data processing labor and introduces the chance for data entry errors.

With Mobile

In its simplest form, a street light inventory mobile application can consist of a text-based data capture form to capture inventory information such as pole type, serial number, light condition, etc. Mobile forms can be easily configured to capture all of the information required for an inventory without the need to process paper forms. Street light inventory

mobile applications are suitable for PDA-type and Win32-type mobile devices. A GPS-unit on the mobile device allows the field crew to verify geographic coordinates of the street light location for feedback to the GIS. A map on the mobile application facilitates routing and light location.

Street light inventory applications work well in dock-and-go workflows. The inventory information is not crucial to real time operations, so the information can be uploaded at the end of a shift. Some GIS systems include mobile applications that allow the field user to directly update the GIS via the field application and upload the updates at the end of their shift.

POLE TESTS

Similar to street light inventory, pole tests can be performed with mobile applications. Field workers performing pole tests capture test data, such as pole type, location, pole condition, guying type, guying condition, etc. Some utilities capture the GPS coordinates of the pole, so that the GIS can be updated with accurate locations.

Without Mobile

Without a mobile application, most utilities conduct pole tests via a paper-based process. Forms must be printed and distributed to field crews. Data captured on the forms must be manually entered into destination systems. The paper-based process requires many man-hours of data processing labor and introduces the chance for data entry errors.

With Mobile

The primary benefit of a mobile pole test application is eliminating the paperwork involved in pole testing. Another major benefit is the more timely feedback provided through a mobile application. Mobile forms can be created to capture the data associated with the pole test, such as pole type, location, pole condition, guying type, guying condition, etc. Mobile forms can be created with data validation to ensure that data entered by the field crew is valid for the given application.

As with street light inventory, pole test applications work well in dock-and-go workflows. Pole test data is not crucial to real time operations, so the information can be uploaded at the end of a shift.

MAP BOOKS

Field crews use map books to navigate to job locations and verify facility information. The map books contain accurate street maps as well as the electric facility model.

Without Mobile

Most field crews still work with bulky, paper-based map books. Utility companies go to great expense to update the map books for road openings, road closures, and new and decommissioned facility data. If updates are not conducted on a timely basis, field crews can be working from inaccurate data, which can result in job delays and, more importantly, risks to crew safety. Sophisticated GIS systems can easily print map book pages, but the Utility still has to update the proper pages and distribute them to its field crews.

With Mobile

A mobile application on a Laptop or Tablet device can easily replace bulky, paper-based map books. The mobile map book application can receive its data directly from the GIS, providing an immediate benefit to the investment in GIS data. Unlike paper-based systems, electronic map books can be easily updated to reflect changes to the Utility's facilities. Street maps in the map book application can facilitate job routing by automatically generating routes to job locations.

Map book mobile applications are well suited to dock-and-go operations. Map updates can be distributed when the mobile device is docked at the end of a shift. No real-time data connections are needed to realize the value from electronic map books. An interface with a GPS device that shows the current vehicle location on the electronic map can enhance the benefits of the system.

LOCATES

When performing locates, field crews verify locations of components in the electric facility model and mark the locations of underground equipment prior to digging.

Without Mobile

Without a mobile application, utilities are again faced with a paper-based workflow. Paper forms list the devices for location verification and "call before you dig" operations. The individual forms and maps must be printed and distributed to field crews. Captured data must be entered into the destination systems manually.

With Mobile

Utilities can expand on map book functionality by performing locates. Crews can verify facility location when a GPS unit is attached to the mobile device. This feedback can be sent back to the GIS to improve the accuracy of the GIS model. In addition, locates can be used to facilitate "call before you dig" operations, resulting in savings to the utility by preventing damage to the system and the required repair work. Locates on devices can be performed by

querying the device on the electronic map in the mobile application. If locations need to be updated, the data can be captured on the mobile device and uploaded at the end of a shift.

MAINTENANCE

Maintenance and inspection work is typically work that must be conducted periodically, but without a set due date. For example, a recloser must be inspected every two years, but the inspection can take place any time within those two years. As the time period draws to a close, unfinished maintenance increases in its priority level. Maintenance jobs are often worked as fill-in work when a crew has completed its assigned service orders for the day.

Without Mobile

Without a mobile application, the field crew is provided with a paper list of maintenance work to be performed. The crew can be dedicated to this work list, or it can work the orders as fill-in work. All data capture associated with the maintenance work is captured via a paper-based workflow.

With Mobile

Maintenance and inspections are well served by mobile applications. The crew's productivity is improved by having routing information to their job location via a street map. Facility data in the mobile application provides valuable information to the crew as they perform inspection and maintenance work. For inspections, the crew can verify the condition of the facility and compare the as-built state to the as-designed state. Any data updates can be sent to the GIS via a dock-and-go process.

Maintenance orders can be processed more efficiently via a mobile application. A set of maintenance jobs can be distributed to the field crews at the start of a shift. The crews can use the mobile application to generate a route to the job locations, query the map view for valuable facility information, and transmit their job status back to the central system. Maintenance work order forms can capture all of the data associated with maintenance order and transmit the data to all interested systems, including GIS, WMS, Equipment Inventory, HR, etc. Data captured can include: job start/end times, hours worked, facility condition, materials used, and follow-up work required. Primary benefits include increasing worker efficiency, eliminating paperwork, and timely, accurate feedback to interested systems.

SERVICE ORDERS

Processing of service orders requires a similar application to the one used by maintenance and inspection users. The primary difference between the applications is that service orders typically have a required appointment time that must be met by the service crew or a job

completion deadline that must be met, making scheduling and real-time feedback to interested systems more important.

Without Mobile

Without a mobile application, service orders are distributed to field crews via a paper-based workflow. Field supervisors spend many man-hours distributing the service orders to the field crews to minimize travel and balance the workload. Field crews work the service orders assigned to them and capture job completion data on paper forms that must be processed at the end of a shift. Crews can notify supervisors and dispatchers of job status via radio or cell phone.

With Mobile

The benefits associated with maintenance work are augmented by a mobile system that can schedule and distribute the work to field crews in such a way that appointment times and completion commitments are met. The dispatchers associated with the mobile system can be provided with alerts that warn them when an appointment time is in danger of being missed. In addition to the same benefits associated with processing the work described for maintenance and inspections, the added benefit of eliminating performance penalties for violating Service Level Agreements is provided by the mobile system. This can result in significant costs savings to the Utility.

Given a wireless link between the mobile application and the workforce management system, the field crew can update their job status in real time. Dispatchers can monitor the crew's progress and reassign work as necessary to insure that orders are worked as scheduled. Job completion data can immediately update interested systems and schedule required follow-up work.

CONSTRUCTION

Processing of construction orders requires a similar application to the one used by service order users. The primary difference between the applications is that construction orders typically have complex dependencies between tasks in the overall construction process. For example, the hole must be dug before the pole is set, or the foundation slab (pad) must be poured before the transformer is placed. Construction work orders often require updating the GIS facility model status from as-designed to as-built.

Without Mobile

Once again, without a mobile application, the utility is faced with a paper-based workflow with all the problems previously discussed. Complex job dependencies can be particularly hard to track without the assistance of a work or workforce management system.

With Mobile

With a mobile application, construction orders can be distributed to construction crews electronically. Complex work order dependencies can be managed by the source system. As the crew completes a construction task, the source system can automatically schedule and dispatch the next task in the sequence. Job closure forms can electronically capture all construction work order details, such as labor, materials used, completion date, follow-up work required, etc., and automatically distribute this information to interested systems (HR, WMS, GIS, etc.).

The mobile application can also be used to capture information that is used to update the GIS. As construction is completed, the crew can change the status of facility model data from as-designed to as-built. If there are discrepancies between the two, the field crew can provide the accurate update data to the GIS, increasing system accuracy for downstream applications such as outage management.

TROUBLE RESTORATION

Trouble restoration involves repairing devices in the electric facility network to restore outages. With this application, time literally is money for the Utility. The sooner power can be restored; the sooner revenue streams start to flow. Any increase in trouble crew productivity provides tangible benefits to the Utility's bottom line.

Without Mobile

Without a mobile application, trouble crews are dispatched trouble work via pager, over the private radio network, via cell phone, or via paper work orders distributed from regional repair depots. Job status, restoration, and job completion information is transmitted via radio or cell phone or captured on paper forms for later data entry.

With Mobile

The most sophisticated mobile application is probably Trouble Restoration. A Trouble Restoration application uses data from the As-Built GIS model to create an Operational Model that mirrors the actual state of the electric model. As trouble calls are received, the trouble restoration application analyzes the Operational Model to determine the probable outage device and dispatches a repair crew. The mobile application benefits by having a facility map on the mobile unit so that field crews can locate trouble locations, trace the network, query attribute data, etc. all in support of their restoration activities. A map also facilitates routing. An AVL application allows field crews to see the locations of other crews, enhancing restoration efficiency and improving safety.

The mobile trouble application can be configured with mobile forms that capture all data related to restoration activities, including outage/restoration times, hours worked, equipment

used, outage cause codes, etc. Immediate feedback from restoration crews through the mobile application allows the utility to accurately update the state of their network and to provide timely, accurate feedback to customer queries.

Due to the importance of real-time data to outage restoration operations, mobile outage applications benefit tremendously from real-time, wireless communications. While dock-and-go workflows can work, the real benefits are achieved via real-time communications.

SUMMARY

Mobile applications can greatly increase the value of the data captured in the Utility's GIS. By expanding the use of the data from engineering to operations, Utilities can eliminate paper work flows, increase operational productivity, and improve the accuracy of GIS data via feedback from the field. Benefits from mobile applications can start small with applications such as Map Books or Collections and progress to the major benefits provided by a fully integrated Mobile Trouble Restoration application.