Program

Lessons Learned from the BP MC252 Response
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MOBILE DATA COLLECTION MATRIX

There are an innumerable amount of possible data collection solutions.

Everything depends upon the current business environment, from funds available, current and planned IT infrastructure, operating costs, development costs etc. This matrix is meant to display the real complexity of the hardware/software solution
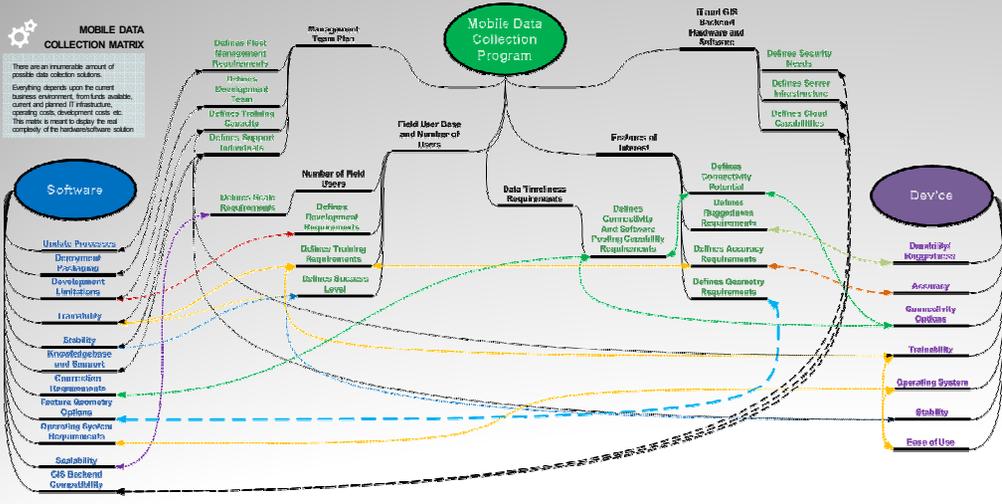
Professional Devices

Field

Office

Software

Device

	Deployment	Transition	Fully Operational
Management Plan • Fleet Management • Development Team • Training Support • Tech Support	**Limited** ✗ No Remote Management ✓ ESRI Team ✗ None ✗ None	**Complete** ✓ Remote Management ✓ ESRI Team ✓ Basic User Training ✓ 24 Hr Phone	**Complete** ✓ Remote Management ✓ Private Contractor ✓ Full Training w/ Follow-up ✓ 10 Hr Phone
User Base • Scale • Development • Training • Success	**Highly Variable** ✗ 375 Devices ✗ 25% Deployment ✗ No Customization ✗ Limited to None ✗ Limited	**User Base** ✓ 375 Devices ✓ 65% Deployment ✓ Limited Customization ✓ Full Training ✓ Moderate Success	**User Base** ✓ 500+ Devices ✓ 85% Deployment 15% Reserve ✓ High Customization ✓ Full Training ✓ High Success
Data Timeliness • Connectivity Requirements	**Immediate** ✓ Data Post within 12 hrs ✗ Limited Field Connectivity	**Immediate** ✓ Data Post within 12 hrs ✓ Improved Field Connectivity	**Immediate** ✓ Data Post within 12 hrs ✓ Backup Web App to Post
IT and GIS Backend • Security • Server Infrastructure • Cloud Capability	**IT and GIS Backend** ✗ Unsecured Services ✓ Virtual MS ✓ Cloud Capable	**IT and GIS Backend** ✗ Unsecured Services ✓ Virtual MS ✓ Cloud Backup	**IT and GIS Backend** ✓ Full PKI Token Authentication ✓ Virtual MS ✓ Cloud Backup
Features of Interest • Connectivity Potential • Ruggedness Need • Accuracy Need • Geometry Needs	**Off Shore/Min On Shore** ✗ Limited Satellite, Limited Cell, Limited Hard-line ✓ Extreme ✓ 2-5 meter ✓ Point, Polygon, Polyline	**Off/On Shore** ✓ Satellite, Limited-Improved Cell, Limited Hard-line ✓ Extreme ✓ 2-5 meter ✓ Point, Polygon, Polyline	**On Shore/Min Off Shore** ✓ Improved Cell, Improved Hard-line ✓ Extreme - Mid ✓ 2-5 meter Major, Limited <1 ✓ Point, Polygon, Polyline

INTRODUCTION

April to June 2010

The initial deployment began with 375 devices. Specifically 275 Trimble Nomads with the remainder consisting of Trimble Juno and Yuma devices. The software solution was ESRI's ArcMobile deployment supported by the then Beta version 10.0 ArcGIS Server Enterprise Advanced. The software was selected given its mobile multi roll out capability and virtual host deployment capability. The program was housed directly under the GIS department within the Situation Unit, but lacked personnel that were skilled in the device use, training, management and support. The pace was fast and stress was high. Projects were built and deployed rapidly, with minimal quality control for the scale. Staffing expertise was limited and training was left to the project managers. Device failure due to improper software libraries or conflicting code caused the program to appear weak and nearly failed. Project manager support was still overwhelmingly strong as the value was irrefutable. The Program simply needed better direction.

Initial data collection projects were a USFWS based wildlife observation project. This was a remote deployment where the user base was stationed out of a barge configured to operate as living quarters. Later referred to as a flosdel. Connectivity was largely an issue, especially in the early days. Operations were largely water based and were far from the land based cellular network from which the mobile devices were supposed to derive their network connectivity. As a result a mobile satellite internet connection was deployed to the barge for data posting ability. This was the first major project deployment, and due to programming errors and connectivity issues. The program was debriefed debriefs before the management team was present.

METHODS

June to Nov 2010

When Trimble learned of the struggles of the Program and garnered support for a device specialist team to be put in place for development support, project development direction, quality control/testing of projects, training and technical support for the fleet. The team essentially went through the Mobile Program Matrix and began to fill in the gaps, where they were the first of many gaps to be filled.

Major systemic issues were addressed first:

A remote management software solution that allowed remote management of the devices was put in place. This solution provided remote screen display, location tracking, project deployment and update capabilities, and trouble shooting aids. This improved the logistics of deployment, support and management of the devices greatly.

Incorporating a digest training course followed. Classes were often handled in as little as 30 minutes including a hands on training portion.

Project development management including testing of the project before deployment was interjected. The management team filtered the items that would require an inordinate amount of time to develop and potentially bog down the projects usability, transability, and overall success potential.

Environmental and core software issues were then exposed and addressed:

Connectivity was always an issue, especially along the remote barrier islands in the Gulf of Mexico. Creative solutions arose from strategically placed MiFi units to satellite internet services to hard-line installations.

ArcMobile was in Beta and thus room for rightful software issues. Errors in the source programming were common, causing many of the projects to have system based failures. In the end, ArcMobile Beta had undergone over 100 hot fixes for the Response. ArcMobile was unable to support collection of polygons or polylines natively. This was corrected by the development team, but not without the cost of much time.

Business level issues remained at this point:

The final hurdle was "Change Management". Many projects existed in a paper format before the "Trimble's" arrived. The team was perceived as changing everything, hence marginalizing the individuals. It was when the project managers fully endorsed the program and pushed that down to the leadership when that the program was accepted, endorsed and allowed to flourish.

Project mission creep occurred where additional tasks were attempted to be laid upon an existing project where the original intent of the project was muddled or lost entirely. Keep in mind, the strongest unit in a response will always be operations. This is part of the reasoning that a data coordinator should be incorporated towards the top of the organization chart, who can protect the sovereignty of a project.

Team Oversights:

Project managers rarely grasped the full concept of what GIS is and can do. A common ask was to collect data that could be hidden and automatically collected. The purpose of the data was often not fully understood. Data schematics changed without creation of a new table. Pivoted data was commonly created. This was an oversight by the management team that groups such as the Biological Assessment Team are now wading through, simply because intended use was either not checked or understood by the players at first time. Often a perceived immediate need overtook the long-term intended goal of the project. It is important to note that many of these projects functioned to provide regulatory compliance but were focused to provide short sighted situational awareness.

RESULTS

Nov 2010 to Current

Eventually, the program became comfortable. At peak, the program boasted 16 simultaneous projects at near 100% deployment of functional devices collecting more than 100,000 features per day. Unfortunately many devices were damaged and a repository of unfunctioning devices was deemed necessary. It was also at this time that the single device rooted issue was found. There was a modern driver issue that caused the loss of connection during normal use. The management team had been aware of the issue and found a workaround, but early on, were unable to recreate the problem for the Trimble development team. It was only after the projects became stable, and hence the program stabilized, that these issues were recreated in the development environment and resolved.

At this point, the management team had been reduced significantly and had been able to resolve the disparities within the matrix and leave with a sound functioning mobile data collection program.

CONCLUSIONS

Be wary of sales individuals. Consult a professional before purchase of devices or software

Purchase a software and hardware solution that fits your matrix needs
- These devices and software were purchase with simple criteria of rugged, connectable and scalable. Management, ground truthing of environmental variables, training needs, and extensibility of the software was largely overlooked.

Empower your management team to protect integrity of the data collection projects. This was one of the biggest issues that is not easily addressed. This is an ask to change the ICS org chart for emergency responses and forces the view of the organization to be a wholistic organization as opposed to the first responders only.

In a highly dynamic environment where the features of interest are unknown, select a software solution that is proven and provides easy flexibility and customization that might not require an advanced development team to implement.

Even after the implementation of all of these concepts, the team still missed the mark on some heavy issues that effected the only evidence of the projects existence, and that is the data. This is something that was regrettable, but not insurmountable. At the end of the day, the data manager just has to be creative in her query construction. At least she has useable data instead of a room full of paper documents!

CONCLUSIONS

Spills of national significance are a difficult thing to plan for, let alone execute. At the time of need, the decision to purchase ArcMobile and Trimble devices was made as it was. To use the term Trimble would be out of line, as the decisions was made using counsel from those that BP already had. Given that BP was an ESRI shop, a pure ESRI solution was logical. At the time, cloud based capability was just coming into the forefront and tech capabilities were still bourgeoning, hence the Beta software. The Trimble Nomad G Series was an excellent solution as it offered the most rugged solution available on the market, defensible professional grade GPS and modern connectivity for in the consumer grade phone offerings. Data collection solutions for consumer grade devices was also lacking — let alone ruggedness of those devices, or even their GPS accuracy.

In the end the device and software were not the major issues. Managers, tech support, trainers and developers were the weak point. Specialists in the world of mobile were required to make this work.

Given the high stress high dynamic environment, responders were constantly on the watch for security. It was always easier to bolster your position and importance of your job if it was protected by a highly specialized and intensive job. Putting individuals into a device that removes that as a point of use makes people feel vulnerable, unless their leadership is there to reassure them of that risks inspired.

Even though there was a previous failure, software hurdles, and strong push back due to change management, skilled individuals were capable of stepping up and delivering a viable program. These individuals then went from nearly complete failure to a program that exists to the day within the BP environment and at one time was slated to transcend the response to other BP functions.

The final lesson learned was to lean on your subject matter experts. That's what you pay them for.