



---

**Metropolitan Sewerage District of Buncombe County, North Carolina**

**G. Herbert Stout Award Application**

**MSD Flex Viewer**

*January 2011*

# MSD Flex Viewer – G. Herb Stout Award Application

|                                                                                      |   |
|--------------------------------------------------------------------------------------|---|
| <b>PURPOSE</b> .....                                                                 | 3 |
| <b>WHY IS THIS IMPLEMENTATION OF GIS EXEMPLARY?</b> .....                            | 3 |
| <b>IMPLEMENTATION</b> .....                                                          | 3 |
| <b>DESCRIBE THE MOTIVATION FOR CREATING THE MSD FLEX VIEWER</b> .....                | 3 |
| <b>WHY WAS IT DEVELOPED?</b> .....                                                   | 3 |
| <b>WHAT PROBLEM WAS INTENDED TO BE SOLVED?</b> .....                                 | 3 |
| <i>Original Problem</i> .....                                                        | 3 |
| <i>Subsequent Problems</i> .....                                                     | 3 |
| <b>WHAT PROBLEMS WERE ACTUALLY SOLVED?</b> .....                                     | 4 |
| <i>Foreseen Consequences</i> .....                                                   | 4 |
| <i>Unforeseen Consequences</i> .....                                                 | 4 |
| <b>EXPLAIN THE IMPLEMENTATION PHASES AND DECISIONS</b> .....                         | 4 |
| <i>Phase 1 – Project Recommendation</i> .....                                        | 4 |
| <i>Phase 2 – Green Light to Proceed</i> .....                                        | 4 |
| <i>Phase 3 – Vendor Selection</i> .....                                              | 4 |
| <i>Phase 4 – Technical Specifications</i> .....                                      | 4 |
| <i>Phase 5 – Elicit Buy-In from Technology Leveraging Committee (Managers)</i> ..... | 5 |
| <i>Phase 6 – Creation of the Application Working Group (Users)</i> .....             | 5 |
| <i>Phase 7 – Development</i> .....                                                   | 5 |
| <i>Phase 8 – Beta Rollout and Testing</i> .....                                      | 5 |
| <i>Phase 9 – Addition of Operational Data and New External Site</i> .....            | 5 |
| <i>Phase 10 – Rollout of External and Updated Internal Sites</i> .....               | 5 |
| <i>Phase 11 – Ongoing Maintenance - Quarterly Development Cycle</i> .....            | 6 |
| <b>ORGANIZATIONAL IMPACT</b> .....                                                   | 6 |
| <b>HOW IS IT APPLIED WITHIN THE ORGANIZATION?</b> .....                              | 6 |
| <b>ULTIMATELY, WHAT DECISIONS / OPERATIONS ARE AFFECTED?</b> .....                   | 6 |
| <b>WHO ARE THE USERS?</b> .....                                                      | 6 |
| <b>PROVIDE GRAPHIC EXAMPLES OF SCREEN INPUT / OUTPUT</b> .....                       | 7 |
| <i>See Supporting Document – MSD_Flex_Viewer_Help.pdf</i> .....                      | 7 |
| <b>DESCRIBE THE QUANTITATIVE AND QUALITATIVE IMPACT</b> .....                        | 7 |
| <i>Quantitative Impact</i> .....                                                     | 7 |
| <i>Qualitative Impact</i> .....                                                      | 7 |
| <b>WHAT EFFECT HAS THERE BEEN ON PRODUCTIVITY AND/OR DECISION MAKING?</b> .....      | 7 |

# **MSD Flex Viewer – G. Herb Stout Award Application**

## **Purpose**

### **Why is this Implementation of GIS Exemplary?**

The MSD Flex Viewer is an exemplary application because it has positively changed the way MSD does business by allowing for organization-wide data sharing which has resulted in increased teamwork, efficiency and productivity. With this shift in philosophy, business processes are being streamlined and combined with the latest technologies. This common visual format allows for sharing of previously separate information across boundaries for the first time, thus sparking communications and ideas that had never existed before. From this new dialogue, MSD has raised its awareness of inefficiencies, created innovative solutions and embraced the MSD Flex Viewer as a new common platform for shared decision making. This new enterprise way of thinking ensures MSD's ratepayers continued outstanding customer service even in the face of economic downturn.

## **Implementation**

### **Describe the Motivation for creating the MSD Flex Viewer**

While boasting only 150 employees, MSD was utilizing 40 ArcGIS Desktop licenses across the organization. While this number shows MSD's commitment to utilizing GIS information, it also represents the degree to which each individual business unit was customizing its own data to fit its need and symbolizing existing data in a variety of methods. While committed to using GIS, the path that was being utilized was leading to frustration instead of productivity.

The results of this fragmented and individualized approach was a dissatisfied customer base and frazzled GIS staff. Problems occurred from different symbolizations of the same dataset throughout the organization. Resulting misinterpretations furthered the desire to remain individual units and blame other Divisions for problems. Often the GIS Department was blamed, in part, for misinterpretations of maps and resulting consequences within the organization.

### **Why was it Developed?**

The MSD Flex Viewer solution was chosen as the most cost effective and low resource consuming solution after consideration of several options to solve the issues discussed above. As mentioned earlier, MSD was deeply invested in GIS so discontinuing the access to the geospatial data was deemed unacceptable. The training of lesser technically skilled GIS staff to help handle these requests was not practical due to the long learning curve and existing data maintenance responsibilities. On the other hand, hiring more GIS staff, especially highly skilled technical staff, was not an option due to long-term costs. The next logical and ultimately chosen option and was to change the method by which GIS was serving data to our customers.

### **What Problem was Intended to be Solved?**

#### ***Original Problem***

The original problem that the MSD Flex Viewer intended to solve was standardization of data in a common delivery format. By solving this problem, the hope was that the data misinterpretations would diminish, customer satisfaction would rise, better decisions would be made and GIS support requests would subside.

#### ***Subsequent Problems***

While not the main focus, there were other issues that resolved themselves by addressing the original problem. Due to the increased popularity of using GIS information, concurrent desktop licenses would sometimes all be in use at the same time causing lock-out issues. Also, some users' trust in the data had been eroded. The consequence of

# **MSD Flex Viewer – G. Herb Stout Award Application**

this lack of trust was that users either stopped using the GIS system altogether or used it very sparingly. In this scenario, workflow efficiencies were never realized.

## **What Problems were Actually Solved?**

### ***Foreseen Consequences***

By implementing the MSD Flex Viewer application, all original and subsequent problems have been resolved. Users in all Divisions are looking at common data in a standardized format. Where there were misinterpretations and silos before, there are now common understandings and multi-faceted group discussions. Decisions are being made on consistent data and therefore bearing better results. Acknowledgements as to the positive support service customers are receiving from GIS are free flowing. Licensing conflicts are no longer an issue. User trust in the data is on the rise as reflected by the fact that more users are using the application than previous solutions. Last but not least, the GIS staff has been freed from the avalanche of GIS support requests to get to more important, if not more urgent, project requests.

### ***Unforeseen Consequences***

While considered a success for meeting all original requirements, the MSD Flex Viewer has also been acknowledged for more than a few unintended results. Due to the above-mentioned group discussions, this new approach to problem solving has accelerated an atmosphere of individuals being part of the whole and responsible for the good of the entire organization versus just individual compartments, smoothing over old rivalries that sometimes got in the way of efficient workflows. In a more technical vein, the MSD Flex Viewer's extremely fast access speed and graphically rich interface has enticed more than a few users into using GIS information. Another unexpected opportunity came when our existing external web site crashed. Instead of fixing the old site, the opportunity was taken to create a modified version of the internal MSD Flex View for our external web site. Also in turn, the reduced number of ArcGIS desktop installations has decreased the amount of time required to perform administration tasks such as upgrading software.

## **Explain the Implementation Phases and Decisions**

### ***Phase 1 – Project Recommendation***

While it was clear that the method by which GIS data was being served needed to be changed, it was not readily apparent how this change was to happen and by whom. The skills needed to develop this type of application were not on hand among existing MSD staff. Therefore the decision was reached to request approval to hire an outside firm for GIS web development. In parallel, internal GIS staff would begin the learning curve of how to support an application of this nature from the inside of the organization.

### ***Phase 2 – Green Light to Proceed***

All discussions and decisions about solutions and options up to this point had been made at the Engineering Division level as GIS is a Department in that Division. Before moving any further, approval from the General Manager was needed. The CIP Director, head of Engineering Division, brought the project up to the General Manager and after several discussions, received approval to proceed.

### ***Phase 3 – Vendor Selection***

Moving forward, several GIS web development firms were solicited to provide technical proposals and price quotes. After an internal initial review of this information, it was decided to work with True North Geographic Technologies, Inc. Successful previous experience with the Flex API for utility specific applications was the principal reason for choosing this particular vendor.

### ***Phase 4 – Technical Specifications***

Once the vendor was selected, a technical specification document was created in an iterative fashion between MSD and True North to define and address each of the items to be covered by the project. These specifications were

# **MSD Flex Viewer – G. Herb Stout Award Application**

then broken down to initial project work and additional phases for future projects based on dependencies that would be in place during the first phase of work. *See attached document – MSDBCFlexProposal.pdf*

## ***Phase 5 – Elicit Buy-In from Technology Leveraging Committee (Managers)***

After the technical plan of action was in place, the next step was to make sure the members of our Technology Leveraging Committee (TLC) were on board. The TLC is a formal group of Division Directors and Technology Staff from GIS, MIS, IT and the Wastewater Reclamation Facility. To ensure a smooth road, there were many demos and discussions to make sure that everyone was comfortable with the upcoming transition from ArcGIS Desktop to the MSD Flex Viewer.

GIS took the stance that no one would be forced off the ArcGIS Desktop because the belief was held that once users accessed the new application they would want to trade in their ArcGIS Desktop licenses. This underlying philosophy created curiosity and alleviated any angst about being forced into change thus creating an atmosphere that elicited unanimous approval to move forward. Once TLC buy-in was received, members were kept abreast of the project in recurring meetings.

## ***Phase 6 – Creation of the Application Working Group (Users)***

At the request of the General Manager, an Application Working Group (AWG) of end users was formed to provide feedback on development. The creation of this group and its interaction with the TLC guaranteed that all aspects of the organization were involved in the creation of the Flex Viewer. This combination of end user and management participation ensured that this application is truly for and by the employees of MSD.

## ***Phase 7 – Development***

Surprisingly, the initial development of the application only took about three months. Development decisions included which look and feel of the Flex API options we wanted, what tool widgets to implement, what data sets to include and last but not least how to configure the map services. Comparatively speaking, all the other decisions took less time than determining how to configure the map services. Decisions on dynamic versus cached services were new and required a MSD change of thought processes and learning curve. The time was well spent as the testing has resulted in a stable and fast performance platform for the MSD Flex Viewer application.

## ***Phase 8 – Beta Rollout and Testing***

After initial development, a beta version was rolled out to the TLC and AWG members for testing and feedback. An initial demo was held for users to get familiar with the new look and feel as well as follow up training classes. A period of a couple of weeks was marked off for users to test the site against their day-to-day workflows. There were a few comments about symbolization but overall the site was well received.

## ***Phase 9 – Addition of Operational Data and New External Site***

Since things had progressed so well to this point, MSD decided to tackle the next phase of Operational datasets and functionality such as CIP, Videos, Creek Crossings, etc. While in the midst of compiling these datasets into a workable format, a great opportunity fell into our lap. Our external .ADF web site died. Since the beta internal version of the MSD Flex Viewer had been so successful, as an organization it was decided to add to our existing project scope and create a modified external site for the public.

## ***Phase 10 – Rollout of External and Updated Internal Sites***

Fortuitously, both the new external Flex Viewer and the new Operational data and tools were rolled out to users at the same time. Again we utilized the TLC and AWG members for feedback and testing. Once consensus was reached at this level, all users were included in formal and one-on-one training sessions. Fulfilling the belief stated above in Phase 5, by the time ArcGIS Desktops were being updated to version 9.3.1, users from the General Manager to Field Crew staff were asking us to uninstall their ArcGIS Desktop software in order to use the Viewer instead. To the GIS staff and Management that was the culminating mark of a job well done.

# **MSD Flex Viewer – G. Herb Stout Award Application**

## ***Phase 11 – Ongoing Maintenance - Quarterly Development Cycle***

As a mark of success, the more users accessed the application the more ideas they had for new functionality. While excited to see so much positive user participation, a new methodology was needed for managing these requests. To answer this new influx a quarterly development cycle was instilled that has links to both TLC and AWG meetings. A spreadsheet of compiled requests is initially reviewed by GIS staff and prioritized based on a technical perspective. Then these priorities are reviewed by both the TLC and the AWG to create a final prioritized list that has organizational approval. This approved list is then used to direct the development workload for the next 3 months. *See Supporting Documents – Flex\_Quarterly.pdf and Flex\_Development.xlsx*

## **Organizational Impact**

### **How is it Applied within the Organization?**

The MSD Flex Viewer has both an internal and external version. The internal version is accessed through our Intranet. At this point, there is no login required. The external version is accessed from our main MSD web site. The main difference between the sites is that the Operational data and tools are available for internal access only. All employees who utilize computers have access to at least one or the other of these applications. The future vision includes a more secure access methodology with logins as well as a mobile component.

### **Ultimately, what Decisions / Operations are Affected?**

The MSD Flex Viewer has affected the very core of the organization in a positive way by providing easy, fast access to accurate data in a visually pleasing and intuitive format. Field crews utilize the application before heading out into the field for location assistance and notating the asset ids that they will be work on for entry into the Work Order System. The General Manager uses the Viewer as an information tool for making key management decisions on Collection System. MSD Engineers use the application to create maps of projects, presentations and reports on day to day sewer rehabilitation decisions as well as location information. The Drafting Department uses the Viewer for base information to be put on engineering plans. Live Flow Monitoring (SCADA) at Pump Stations is utilized by Engineers and Managers for making sure that our system can handle the increased flow from infiltration during wet weather events. The Finance office utilized the Viewer to research of billing issues potentially increasing revenues. Operators at the Wastewater Reclamation Facility use the Viewer to locate and map properties they visit for testing purposes. Similarly, the Industrial Waste staff use the Viewer to locate grease trap inspections and other industrial users. Field Supervisors use the Viewer to access Operational data for mobilizing crews.

Preventative Maintenance work such as CCTV videos is displayed on the Viewer for tracking and planning purposes. The Viewer shows Sanitary Sewer Overflows (SSOs) per fiscal year which is monitored closely due to environmental impacts. The Capital Improvement Program (CIP) projects are shown on the Viewer notifying field crews of proposed projects thus reducing duplicate work and possible fines from the State due to SSOs. The Viewer is used to create maps of the actual asset locations for field updates allowing us to continually update our system maps to reflect more accurate information. By checking the Special Provision and other Right of Way data on parcels, which has just recently been added to the Viewer, field crews are given a heads up about what agreements and conditions exist before they ever set foot on a property. System Summary Reporting such as how many miles, pump stations, manholes, etc. are now accessible organization-wide so that we report a consistent measure of our collection system. Last but not least, organization-wide the Viewer is used for handling Public Customer Inquiries.

### **Who are the Users?**

The users for the MSD Flex Viewer are diverse and spread throughout the entire organization from the General Manager to Field Crews to Operators. The reach of the application also extends to external customers such as home owners, realtors, surveyors, appraisers, plumbers, etc.

# **MSD Flex Viewer – G. Herb Stout Award Application**

## **Provide Graphic Examples of Screen Input / Output**

*See Supporting Document – MSD\_Flex\_Viewer\_Help.pdf*

## **Describe the Quantitative and Qualitative Impact**

### ***Quantitative Impact***

Before the implementation of this application MSD had 40 ArcGIS Desktops installations. Now we are down to 20 installations to date with 8 more to be uninstalled in the next 3 months. The monetary license saving of reducing our ArcGIS Desktops to 20 is approximately \$10,400 on a recurring annual basis. By using the MSD FLEX Viewer in a customer billing research project, the Finance Division found a one-time amount of approximately \$200,000 and an ongoing revenue stream of \$150,000 to date and the project is still going. The GIS Department notes a hourly times saving of approximately 10 hours for the GIS Analyst and 5 hours a week for the GIS Manager.

### ***Qualitative Impact***

End users feel more confident in using the data since this application has come along. There is also a sense of pride among users about how fast, graphically rich and intuitive the application is compared to other sites. The GIS staff has been very proud of this change and has received much recognition for their efforts which has boosted morale. Of special note here is the amount of time savings, collaborative effort and access to data is now available to the organization. Speed of decisions has improved in areas where data is available on the Viewer. Another follow up to this application's implementation is the fact it is now easier to see where there are holes in the data. Several data clean-up and creation efforts are underway now that the application is being used organization-wide.

## **What Effect has there been on Productivity and/or Decision Making?**

Due to the shifts towards collaboration, transparency of operations and data quality, MSD's productivity in key areas has definitely improved. Previously silo-oriented employees are coming together to discuss how data should flow between them and willingly changing processes to accommodate this new approach. A specific example is that our System Services Division and our Engineering Division are at the same table talking about how to share data between the two Divisions more efficiently using the Flex Viewer. Competitively, now that some departments have their data shown on the application, other departments want to partake in getting their data visible as well.

As verbalized by the General Manager, another big change is the fact that the Division Directors now use maps they have created to support their discussions as standard protocol. These and other examples of self-sufficiency in turn save time GIS staff thus allowing technical projects to be the major focus versus reactive support. As an example, a new project has been started, sparked from the success of the MSD Flex Viewer, called the 'Start at Map' project which is re-evaluating other software systems such as the Work Order Management System and Pipe Rating Programs to apply the same geospatial approach to these areas as well. Participating in projects that make such as positive impact has inspired technical staff. Thus creativity and morale are at an all-time high.

Due to this project, the Application Working Group (AWG) now meets quarterly to review and prioritize new development requests. These users became the new spokespeople for the MSD Flex Viewer. GIS employees were able to take a backseat in a support and development role instead of having to lead the charge for this application.

An amazing result to experience was the monitoring of a large wet weather event through our system using the real-time Flow Monitor graphs on the MSD Flex Viewer. The inundation could be watched by everyone using the Viewer as a spike moving through each of the monitors on its way to the Wastewater Reclamation Facility. Besides the ability to watch this information in real-time in a geospatial visual format, the resulting discussions were unique in that many more eyes and therefore perspectives were brought to the table to discuss issues and opportunities based on the event than ever were captured before.