URISA EXEMPLARY SYSTEMS IN GOVERNMENT AWARD

City of Perrysburg, Ohio

A. System

1. Name of System and ESIG Category
   Single Process System
   Sidewalk Maintenance and Repair Tracking application

2. Letter from the Executive Administrator
   See Appendix A

3. One Page Summary
   Every year the City of Perrysburg Planning and Zoning Division repairs and replaces sections of uneven and broken sidewalks throughout the City. These sidewalks, if left in disrepair can create an extremely hazardous environment for the citizens who use them and may lead to serious injuries and potential lawsuits if a resident were to trip and fall. In years past, identifying sidewalks in need of repair was accomplished reactively after citizen complaints. Information on the sidewalks (length, width, cause of disrepair, etc.) was collected in the field using paper and pencil. This information was later entered into a spreadsheet which was then given to contractors in order to fix the sidewalks.

   In November of 2013, the City of Perrysburg began an initiative to re-envision the way it collected information on City sidewalks in order to increase efficiency and provide a more timely, cost effective service to the public. The result of this effort, dubbed the Sidewalk Maintenance and Repair Tracking application which combines the power of existing geospatial data technologies already possessed by the City with the simplicity of an iPad to facilitate the proactive identification and repair of uneven and broken sidewalks.

   This application is exemplary because it uses simple off-the-shelf technology to provide significant improvements and new capabilities over the previous method. These improvements and new capabilities include reduced data entry time, zero data duplication, improved data validity using techniques that are transparent to the user, seamless integration of pictures using database attachments, spatial analysis of the data to identify problem areas, and the ability to monitor the progress of data collection and subsequent repairs through the use of a web mapping application provided to the contractors. All of these improvements and new capabilities lead to improved productivity, better informed decisions, more efficient use of tax payer dollars, and ultimately a safer environment for the citizens of Perrysburg.

4. User Testimonials
   See Appendix B
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B. Jurisdiction

1. **Name of Jurisdiction**
   City of Perrysburg, Ohio

2. **Population Served by the Organization**
   21,161 as of 2012 U.S. Census Bureau Population Estimate

3. **Annual Total Budget**
   $24,000,000 (FY2013)

4. **Name, Title, and Address of Chief Elected official**
   Michael Olmstead
   Mayor
   201 W Indiana Ave, Perrysburg, Ohio 43551

5. **Name, Title, Address, Telephone, Fax, and Email for Contact Person for System**
   Ian Dunn
   Software Specialist
   201 W Indiana Ave, Perrysburg, Ohio 43551
   419-872-7893
   419-872-8019
   idunn@ci.perrysburg.oh.us
C. System Design

1. What motivated the system development?
The Sidewalk Maintenance and Repair Tracking application development was motivated by the need to proactively collect the locations of Perrysburg sidewalks in need of repair in a more efficient manner. In the past, the Planning and Zoning Division had collected this information in the field, using paper and pencil and then entered the data into a spreadsheet back at the office. With the City of Perrysburg’s recent deployment of ArcGIS Server, the Planning and Zoning Administrator saw the perfect opportunity to re-imagine the way Perrysburg maintained its sidewalks in order to offer a higher level of service to the public.

2. What specific service or services was the system intended to improve?
The Sidewalk Maintenance and Repair Tracking application was intended to improve the way the Planning and Zoning Division conducted the sidewalk inventory and repair process. The improvements can be seen in multiple aspects of the program. The first and most notable improvement is the amount of sidewalks inventoried. All 300 miles of Perrysburg sidewalks were assessed which led to over 2,000 individual locations being identified as needing repair. Compare this to years past where only 200 locations were identified. The second improvement was that of the data itself. Data integrity was greatly increased by reducing the amount of places where errors in data entry could occur. This system was designed to improve on a specific workflow used by the Planning and Zoning Division but ultimately, this system will improve the quality of life in the City of Perrysburg by reducing the number of trip hazards around the City.

3. What, if any, unexpected benefits did you achieve?
The most significant unexpected benefit from the development and use of this system was the visibility that it provided to the relatively new GIS capabilities of Perrysburg. The City of Perrysburg has only had ArcGIS Server for approximately 9 months and during that time frame there have been some City Divisions who were skeptical of the practical application of a web based GIS. The Sidewalk Maintenance and Repair Tracking application was able to demonstrate the practicality of a web based GIS and illustrate how it can be used to improve upon everyday workflows. Since the roll out of the system, there have been multiple City Divisions requesting the creation of geospatial applications to aid in their day to day activities.

4. What system design problems were encountered?
Initial system design problems were encountered during the development of the sidewalk repair feature class. The Planning and Zoning Division wanted to identify the party responsible (City or Homeowner) for the repairing the sidewalk based on the reason for the sidewalk needing repaired without having to manually enter it while creating a new feature. For example a sidewalk that was cracked because of a City owned street tree would be the responsibility of the City whereas the sidewalk being cracked because of a private tree would be the responsibility of the homeowner. This was accomplished through the use of subtypes, domains, and default values. Subtypes were used for the “Cause” field of the sidewalk disrepair and a default value of either
“City” or “Private” was applied to the “Responsible Party” field for each subtype depending on the cause of disrepair. Domains were used for the “Responsible Party” field.

The problem ensued when the data was exported out of ArcGIS for use in the Planning and Zoning Division. All values for the subtypes would revert back to their numerical codes when exported out of ArcGIS. Through discussions with the Planning and Zoning Administrator it was determined that the problem would be resolved two ways. The first is that the Software Specialist would create a web mapping application that the Planning and Zoning Division could use to interact with their data. The second solution would be to have the Software Specialist create a report in ArcGIS Desktop when needed by the Planning and Zoning Division which would replace the need to export the data from ArcGIS into Excel.

5. What differentiates this system from other similar systems?

Even though this system uses generic off-the-shelf components such as the ESRI app for iPad, there was a considerable amount of custom development that went into the creation of the system. The majority of this development occurred on the database side and was required to ensure proper database maintenance as well as to execute certain geoprocessing tasks on the data. The database maintenance was integral to the continuing functionality of the web mapping service due to the high volume of editing being done. The maintenance tasks included compressing the database, updating all database statistics, and rebuilding all database indices. Database replication was also performed on the data. A replica database was created during the beginning of the project and the live edit database was synchronized nightly with this replica. The purpose of the replica was to provide the ability for edits to be made to the data in ArcGIS Desktop (if needed) without having to stop the published map service that was being used in the field.

Geoprocessing tasks were created to perform field calculations that calculated the square footage of the sidewalk. Instead of having the user make the calculations in the field which would slow them down and create a potential error, all the user was required to do was enter the length and the width of the sidewalk section and the geoprocessing task did the rest. All of these processes were combined into a Python script that was automated to run nightly. Without this automated script all of the above would have had to be completed by hand at least weekly if not more often.
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D. Implementation

1. **What phases did you go through in developing the system?**

   There were four phases that the City went through in the development of this system – initial planning, database design, application development and testing, and application deployment. The first phase was the planning phase. The planning phase consisted of meeting with the Planning and Zoning Division to gather requirements for the project such as database layout, usage scenarios, and what the final product would be. The second phase was the database design phase. In this phase the sidewalk repairs feature class was developed along with the required domains and subtypes. The automated Python scripts used for database maintenance and geoprocessing tasks were also created in the database design phase.

   Once the feature class was created and approved by the Planning and Zoning Administrator, the application development and testing phase could begin. The web mapping application was originally developed using the javascript api. After significant user testing, issues with the geolocation ability of the javascript api forced an application redesign which led the use of the off-the-shelf ESRI iPad app to display and edit the data. The final phase in the development was the application deployment. The application was deployed in November, 2013.

2. **Were there any modifications to the original system design? Why? What?**

   The original system was designed to use a custom javascript web mapping application that would be accessed from an iPad. The final product however utilized the ESRI iPad app. This reason for designing a custom javascript application was simplicity. The Planning and Zoning Division wanted to keep things as simple as possible for the user. The javascript application was going to have a side panel that listed the possible reasons for the sidewalk disrepair. All the user had to do was select the cause of sidewalk disrepair and select the location. After testing the application, users expressed the desire to record the point based on their GPS location. In attempts to add the ArcGIS javascript api geolocation functionality it was discovered that the geolocation functionality only works with basemaps published using the WGS 1984 Web Mercator projection. The City of Perrysburg basemaps are all published using the NAD 1983 State Plane Ohio North projection. Given the fact that there was a considerable amount of pertinent information on the City’s basemaps, it was not possible to use a generic ArcGIS basemap.

   The alternate option was to use the ESRI iPad app. This app is free to download from the Apple App store and can be used two ways. First, mobile maps can be created using JSON. A connection is made in the ESRI iPad app to the ArcGIS Server where the JSON map is stored and then map can be used. This process is time consuming and not very flexible. The second option, using a map created in ArcGIS Online provided the easiest implementation and the most flexibility. Using the ESRI iPad app with maps created in ArcGIS Online provided the functionality needed such as easily taking pictures through the iPad camera and storing them as database attachments, easy to use feature creation from the user’s GPS location, and an intuitive easy to use interface.
E. Organizational Impact

1. What user community does the system serve and how?
   In the end, the Sidewalk Maintenance and Repair Tracking application serves the residents of the Perrysburg community by providing for the fast and efficient inventory and repair of sidewalks that might be hazardous to those using them. In a more direct manner, the Sidewalk Maintenance and Repair Tracking application serves the City of Perrysburg Planning and Zoning Division. The application gives Planning and Zoning Division the ability accurately inventory every sidewalk in the City and prioritize which sidewalks need repaired first while at the same time providing the ability to easily identify and track the repairs that the private contractors are doing.

2. What are the ultimate decisions/operations/services being affected?
   The ultimate service being affected is the service that the City of Perrysburg is able to provide to the public. The Sidewalk Maintenance and Repair Tracking application is a tool that allows Perrysburg to use tax payer dollars more efficiently while increasing the level of pedestrian safety around the City.

3. What were the quantitative and qualitative impacts of the system?
   The major quantitative impact of the system was a dramatic increase in the productivity of the data collectors. There was a 1000% increase in data points collected between last year and this year. This increase was not simply a case of quantity over quality either. The major qualitative impact was that the data collected is of much higher quality than the data collected last year. This is due in part to the fact that the data was collected directly to the database and there were measures put in place to ensure data validity. Even small mistakes like misspellings were eliminated primarily through the use of domains.

4. What effect has the system had on productivity?
   Productivity has skyrocketed while using the Sidewalk Maintenance and Repair Tracking application. Prior to its implementation, members of the Planning and Zoning Division were only able to collect data on approximately 150 – 200 sidewalk locations in need of repair. This data collection was mostly done in response to citizen complaints about the condition of the sidewalks. With the implementation of the Sidewalk Maintenance and Repair Tracking application, over 2,000 locations have been collected in the same time frame.

5. What, if any, other impacts has the system had?
   Due in large part to the success of the Sidewalk Maintenance and Repair Tracking application many other City divisions have expressed interest in collecting data using iPads. The Public Utilities and Public Service Division both have plans to implement iPad data collection/editing using the framework of the Sidewalk Maintenance and Repair Tracking application. This application was the perfect project to demonstrate the City’s relatively new GIS capabilities.
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6. How did the system change the way business is conducted with and/or service delivered to clients?

Prior to the Sidewalk Maintenance and Repair Tracking application, sidewalk locations in need of repair were gathered reactively. Locations would not be inventoried until a citizen called to complain about a sidewalk that needed repaired. Now, with the implementation of the Sidewalk Maintenance and Repair Tracking application, sidewalk locations in need of repair can be gathered proactively and action can be taken to repair the sidewalk before a citizen can complain. Perhaps the most significant change in the way business is conducted was the way the actual sidewalk data was collected.

Before the Sidewalk Maintenance and Repair Tracking application, data on sidewalk locations was gathered using pencil and paper. Upon return to the office, the data was then entered into a Microsoft Excel spreadsheet where it was stored. When it came time for contractors to fix the sidewalks, the spreadsheet was printed out and given to each contractor. The Planning and Zoning Division would sign off on each line off the spreadsheet once the work was completed. These signed spreadsheets are then kept as record of the work.

With the implementation of the Sidewalk Maintenance and Repair Tracking application, data in the field is collected using the ESRI iPad app. Data is stored in the database as soon as it is collected thus reducing the time it takes to collect and store data as well as reducing the potential for errors. Data can also be validated as it is collected ensuring additional data integrity. The Sidewalk Maintenance and Repair Tracking application also makes it easier to track the work of the contractors. A contractor now has the ability to view a web map of the sidewalk locations allowing them to better distribute their resources and fix the sidewalks more efficiently. These repairs can be tracked in real time using the web map so the progress of the contractors can be continuously monitored and digitally signed off on by an inspector.
F. System Resources

1. What are the system’s primary hardware components?
   - HP ProLiant Server DL360p Gen8 Server running Windows Server 2008 R2 and Windows IIS 7.5
   - HP Compaq 8200 Elite Desktop PC running Windows 7
   - VMware virtual machine running Windows SQLServer 2008 R2
   - iPad Mini running iOS 7

2. What are the system’s primary software components?
   The Sidewalk Maintenance and Repair Tracking application uses a fairly standard deployment of ArcGIS software. There is the ArcGIS Desktop Standard 10.1 software which was used to create the sidewalks feature class and publish it to ArcGIS Server. Windows SQLServer 2008 R2 was used to to store the geodatabase containing the sidewalk repairs feature class. A single instance of ArcGIS Server Standard Enterprise 10.1 is used for hosting the map service and the ESRI iPad application was deployed on an iPad mini to collect and edit the data. There were no customizations made to any of the software.

3. What data does the system work with?
   The system works with the sidewalk repairs feature class that is stored in a SDE geodatabase. This dataset was created specifically for this project. The system also uses cached basemaps that include the following datasets:
   - 2012 Wood County Orthoimagery
   - Wood County Parcels
   - City of Perrysburg Address Points
   - City of Perrysburg Road Centerlines
   - Jurisdictional Boundaries

4. What staff resources were required to implement the system?
   The Sidewalk Maintenance and Repair Tracking application was implemented by the Software Specialist in approximately 40 hours.

5. Comment on anything unusual about the resources used to develop your system.
   All resources used to develop the Sidewalk Maintenance and Repair Tracking application were already possessed by the City. There were no extra costs to develop and complete this project, nor are there any extra costs other than staff time to maintain the application going forward.
April 11, 2014

Dear URISA Education Manager,

I am hereby authorizing the City of Perrysburg to submit an application for a URISA Exemplary Systems in Government (ESIG) Award. The City of Perrysburg is applying for an ESIG award in the Single Process System category for the City’s “Sidewalk Maintenance and Repair Tracking” application. This application has given Perrysburg the capability to more efficiently use our resources to find, track and fix potentially hazardous sidewalks throughout the City of Perrysburg.

Sincerely,

Bridgette A. Kabat
City Administrator
Appendix B – User Testimonials

Brody Walters
Planning and Zoning Division Administrator

Wayne Eilers
Data Collector

Terry Harris
Data Collector
City of Perrysburg, Ohio

City of Perrysburg
Division of Planning and Zoning
201 West Indiana Avenue
Perrysburg, Ohio 43551-1582
(419) 872-8060 • Fax (419) 872-8019
www.ci.perrysburg.oh.us

April 8, 2014

User Testimonial for the Sidewalk Maintenance and Repair Tracking Application

Ms Keri Brennan
URISA Education Manager

Dear Keri,

I am writing to endorse the GIS work that Ian Dunn has recently completed to assist my division in the location, inventory and maintenance of sidewalk repairs. Ian has developed a program with a simple, easy to use interface that has significantly reduced the time that it takes to identify sidewalk repairs while at the same time virtually eliminating errors associated with data entry. Not only has the graphic user interface allowed individuals with no previous experience to operate the program, the extension of this application to a format compatible with Apple iPads has allowed my workers to easily walk the city sidewalks and record entries with minimal equipment. Overall, this application will save time generating sidewalk repair lists, minimize or eliminate data entry errors, and will allow data to be manipulated and sorted through the use of the associated database that manages all entries. Because this application is new to my office it has only been used for the current construction season. Going forward, it is anticipated this application will be used on a regular basis throughout the year as sidewalk repairs become necessary and repairs are in progress.

Sincerely,

Brodin L. Walters
Administrator
Planning & Zoning
URISA EXEMPLARY SYSTEMS IN GOVERNMENT AWARD

City of Perrysburg, Ohio

City of Perrysburg
201 W Indiana Avenue
Perrysburg, OH 43551-1582
Phone (419) 872-7693
www.ci.perrysburg.oh.us

Name       Wayne E. Eilers
Date       April 7, 2014

User Testimonial for the Sidewalk Maintenance and Repair Tracking Application

I have just finished inspecting all the sidewalks within the city limits of Perrysburg, Ohio, determining that they are in a safe and proper condition. When finding a defective piece of sidewalk, we must record the exact location of it by house number and street name, type of defect, such as one section raised higher than the other creating a trip hazard or just deterioration. We must also record who is responsible to repair it, the homeowner or the City, and to record the length and width of the defective area. The Sidewalk Maintenance Program in GIS that I used saved many weeks of work compared to recording the required information on paper by hand written or typing it in a 1-Pad letter by letter. The GPS position on the 1-Pad that I used instantly gave me the house address and street name. The program listed all street names within the city and by scrolling through the alphabetized street names and by tapping on the correct name, it automatically recorded it. This possibly saved many spelling errors that may have been made if written in by hand. The program also listed the many different types of defective conditions and responsible party. By tapping on the one you wanted, it automatically recorded it for you and again saved you time rather than printing it all out by hand. When finished entering all the information of a specific defect at a specific location, tap the exact location on the map and it will leave the defect type mark at the proper location. This way you can look at the city map and see where all the defect locations are at once. There is also an error mode that you can go back and change an entry if you feel that there is improper data listed at a previous recorded address. We did not loose inspecting time at the end of the day by going to the supervisor’s computer to download the daily information. It was automatically loaded to his computer at the same time an entry was updated on mine.

This was the first time I used this program and it was very easy to learn. I would want to use this program again if I to do another sidewalk inspection.

Wayne E. Eilers
Name  Terry A. Harris
Date  April 10, 2014

User Testimonial for the Sidewalk Maintenance and Repair Tracking Application

To Whom it May Concern,

October of 2013 Wayne Eilers and I were asked to participate in checking the sidewalks of The City of Perrysburg. These checks were to make sure there were no trip hazards, deterioration of the concrete or any difficulty for the citizens who walk them for exercise or pleasure.

We were asked to come to the Municipal building for a demonstration of the IPad and shown the map of Perrysburg that was installed on the IPad. Ian Dunn was very helpful in getting us started. He instructed us to mark the location, indicate the reason for the flaw and the size of the repair that may be needed. Each located problem was painted with two dots and kept in the memory of the program that was on the IPad.

We had questions early on and Ian was the best help we could ever hope for in solving and showing us short cuts to speed our operation. Ian was always available to us for any questions we had.

We sincerely hope what we accomplished will help the City of Perrysburg. Thank you for the opportunity to provide this service.

Yours truly,

Terry A. Harris