

---

---

# Challenge as Opportunity: Applying Innovative Ideas to Local Government

— Mark Brown, Doreen Groth —  
Brett Black

---

---

## **Challenge as Opportunity | Slide 1**

(Doreen) Thank you, Joe for the introduction. Thanks to all of you for joining us this morning.

*Challenges* are an everyday part of our work in Independence Township. Like any other local government we are *challenged* to do more with less, share data across the organisation and modernize our system to better serve our residents and stakeholders. Mark and I are part of Independence Township's GIS team. *Together*, we *challenge* one another to innovate - using GIS and technology to solve problems.

With us is Brett from Leica Geosystems, the world leader in spatial measurement. Companies like Leica Geosystems and Esri have enabled us to transform our workflows - *as we will show you a little later*.

## About

Perpetuating  
existing  
workflows



Realizing the  
limitations



Enabling  
solutions

“The inertia of the status quo is so powerful that we'll often opt to live with a low-performing and dysfunctional situation rather than take the time needed to find a way out of it.”

Kristin Cox

Executive Director,  
Governor's Office of Management and Budget  
State of Utah

### **About | Slide 2**

(Mark) For many people Investing in new technology seems like a silver bullet - *cutting through the complexity* - and providing an immediate solution to the problem at hand. Only to realize, years later that the *so-called* solution is either underutilized, or not utilized at all. As Kristen Cox pointed out, “The inertia of the status quo is so powerful that we'll often opt to live with a low-performing and dysfunctional situation rather than take the time needed to find a way out of it.”

Sometimes you are caught up in your own processes - *perpetuating existing workflows*. And then something happens that overwhelms the current systems and exposes weak points - making the problems visible for everyone to see. Today we are going to talk about how a horrific act at one of our cemeteries opened our eyes to limitations of the existing structure. Also, how we used this event as a opportunity to rebuild from the bottom up, using technology to integrate disconnected systems, and completely change our workflow - *truly improving efficiency and transparency*. This project became a source for pride for our employees and serves as a model in all of our work.

We hope is that this presentation will encourage you to look closer at your own process, workflows, and technology.

## Our Community

North Central  
Oakland County,  
Michigan

40 miles  
northwest of  
Detroit

Community of  
About 35,000  
Residents



### ***Our Community | Slide 3***

[\(Doreen\)](#) The Charter Township of Independence is located in north central Oakland County, Michigan; 40 miles northwest of Detroit, about halfway between the cities of Pontiac and Flint.

# Overview

Esri & Leica Smart  
Community Grant  
Winner 2016

Granicus Digital  
Achievement Award  
Winner 2017

Esri UC presenters  
2018



## **Overview / Slide 4**

(Mark) We are a growing and thriving community with local businesses, developers, and citizens requiring increasing levels of effective, efficient, and accountable services from their local government.

# Technology

Technology is not the solution ...

... But technology can *ENABLE* the solution.

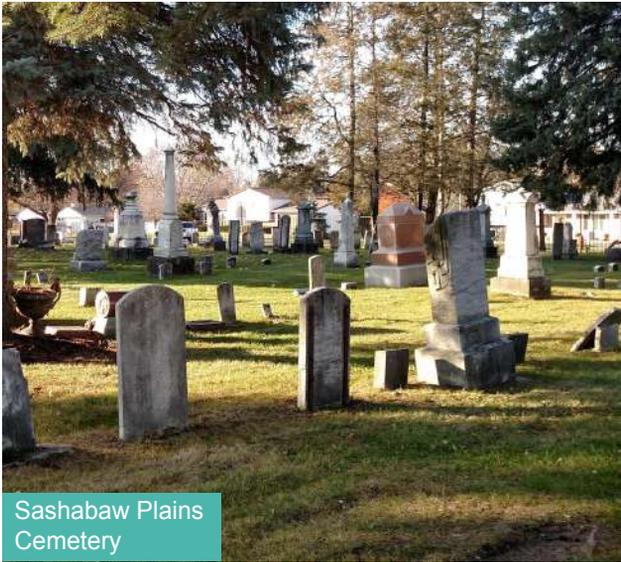


## **Technology | Slide 5**

(Doreen) Our GIS success story runs deep, and it's easy for us to forget that it was not always this way. Like other communities, Independence Township invests in technology as a way to make processes faster, simpler and more effective so employees can focus on their actual tasks.

Implementing new hardware and software is only part of the solution. Business processes - *called workflows* - are often completely overlooked when modernizing departments. There is not always a one-to-one translation between an analog and a digital process. Things that worked well in a paper-based world, no longer make sense in a digital environment. In these situations, technology gets blamed for implementation failures, even if the real issue was trying to apply a workflow that no longer fit the process. Many times parallel workflows get created - where the old process is continued and everything is duplicated in the new system. This only adds to employees' existing workload.

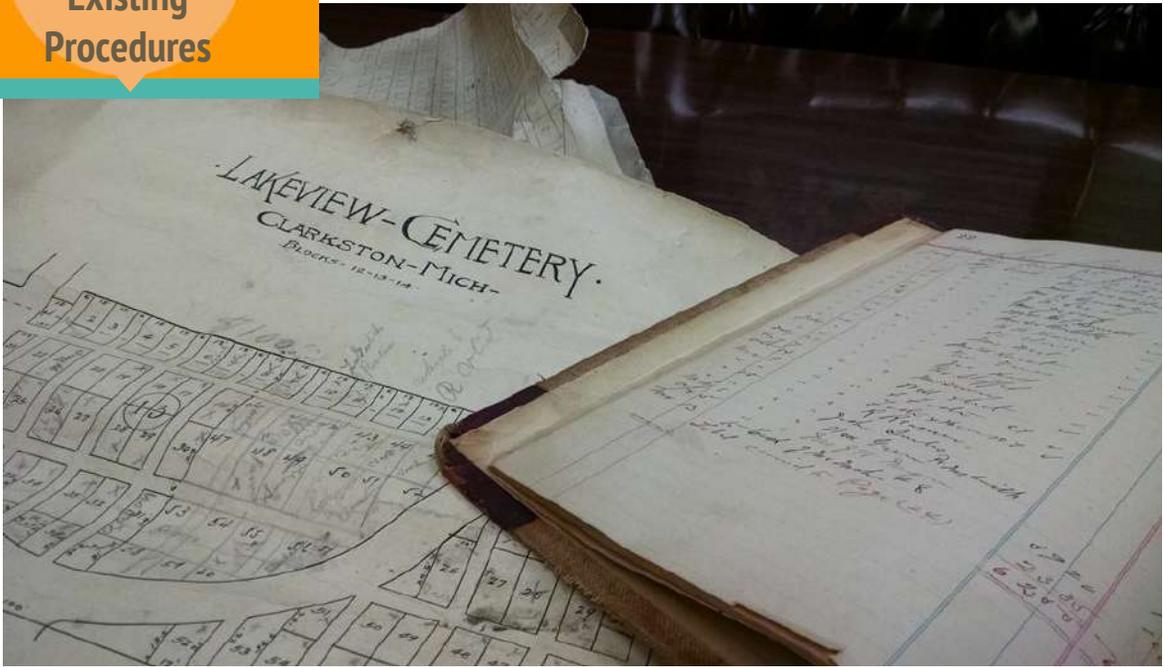
## Township Cemeteries



### ***Township Cemeteries / Slide 6***

(Mark) We could probably find a lot of examples that demonstrate this situation, but today we would like to highlight our cemeteries.

## Existing Procedures



### **Existing Procedures | Slide 7**

(Doreen) In 2008 the Township was not able to fill the Cemetery's Senior Maintenance position. Today, any DPW employee that is available may be assigned digging and set up for burial services.

Our DPW staff is located in separate buildings, with the Township office staff handling some of the various clerical duties for the cemeteries. The situation was aggravated by the fact that the workflows are not uniform between the cemeteries. Different kinds of documents, systems, and procedures were inherited by the DPW. Methods of record keeping changed several times over the years. In finding the right program to manage the burial sites, record keeping methods were strung together and silos of redundant information were unintentionally created. The lack of an authoritative data source made updating and maintaining the multiple versions of data very complicated. Staff also managed parts of the process differently, and the dissemination of critical information was hampered by insufficient communication between the field and the office crews.

## One Horrific Act

Total Damage  
in the Ten  
Thousands

### Officials picking up the pieces after vandalism at historic Independence Twp. cemetery



Independence Township public works department laborer Jeff Teal scans the damage done to a large headstone, which he said could weigh "every bit of 400 pounds," bearing the name Riker.

By [John Turk](#), *The Oakland Press*

POSTED: 08/24/15, 11:20 AM EDT | UPDATED: ON 08/25/2015

6 COMMENTS

#### **One Horrific Act | Slide 8**

(Mark) In August of 2015 the DPW was notified of vandalism at Sashabaw Plains Cemetery. Almost 30 headstones were broken, while others were shattered and scattered throughout the cemetery. Members of the DPW, and the community at large, were deeply disturbed by this act. It was not only disrespectful, but beyond understanding. When a detailed damage assessment was requested, the difficulties in estimating the scope of the incident using the existing data and systems were evident.

At this point, it was understood that the cemeteries deserved more attention and respect on our end.

# Taking Action



## ***Taking Action / Slide 9***

(Doreen) In collaboration with the Fire Department, high resolution orthoimagery of Sashabaw Plains Cemetery was obtained using a UAV and Drone2Map. Hand drawn maps were scanned and used to digitize blocks, lots, and graves within the cemetery property. The locations of the destroyed gravestones, and the inscription on the tombs, were compared with the information in the cemetery books.

# Profound on Many Levels



## Legend

- Damages equals 27
- Section 1, 3, 5, 6, 7
- Section 2
- Section 4
- Lots
- Graves

Nr	Section	Lot	Grave	Name
0	2	17	4	Green, Elizabeth
1	2	17	2	Voorhees, Jasper
2	2	33	4	Riker, Marcus W.
3	2	33	1	Riker, Aaron H.
4	2	47	2	Ayers, Archibald, Sr.
5	2	47	1	Ayers, Archibald, Jr.
6	2	36	3	Brown, Sally Ann
7	2	36	2	Brown, James F.
8	2	36	1	Msurnee, H. M. Brown
9	2	77	5	Petty, Catharine
10	2	42	4	Miller, Lizzie A.
11	2	42	3	Miller, John G.
12	2	45	3	Kraggs, Mary L.
13	2	45	2	Stephens, William
14	2	45	1	Stephens, Mary
15	2	41	5	Beardslee, Sarah
16	2	41	1	Beardslee, Jane
17	2	29	2	Gulick, Martha
18	2	32	2	Beardsley, Teiman N.
19	2	38	3	Vansyckle, Joseph
20	2	31	3	Trusdell, Phoebe
21	2	31	1	Trusdell, Augusta
22	2	35	1	Bailey, Robert
23	2	34	5	Riker, Rachel
24	2	1	6	Beardslee, Rebecca
25	4	30	5	Mares, John V.
26	4	26	3	Davis, William G.

## Profound on Many Levels | Slide 10

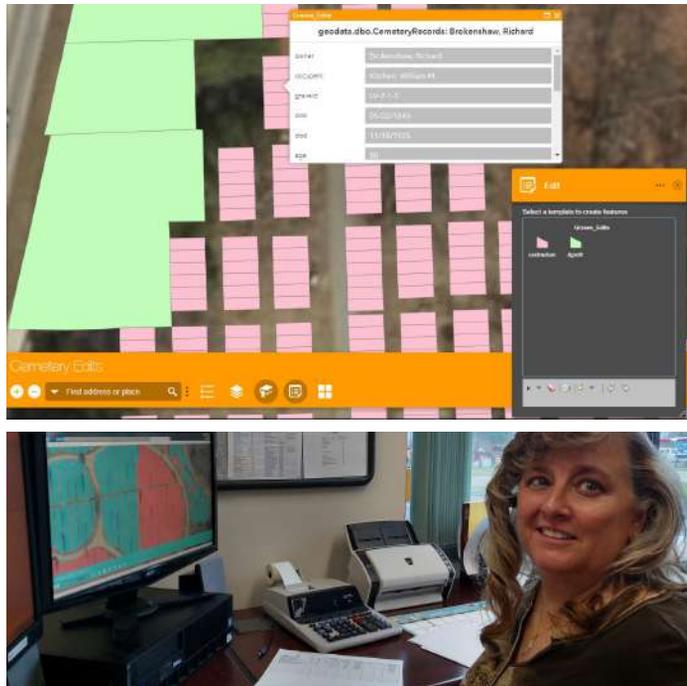
Status: Polish

(Mark) Finally, a map containing the necessary information was generated, allowing the contractor to begin with repairs and restoration.

## Recognizing the Benefits

GIS empowers, enhances, and extends our two most valuable assets

—  
People and Data

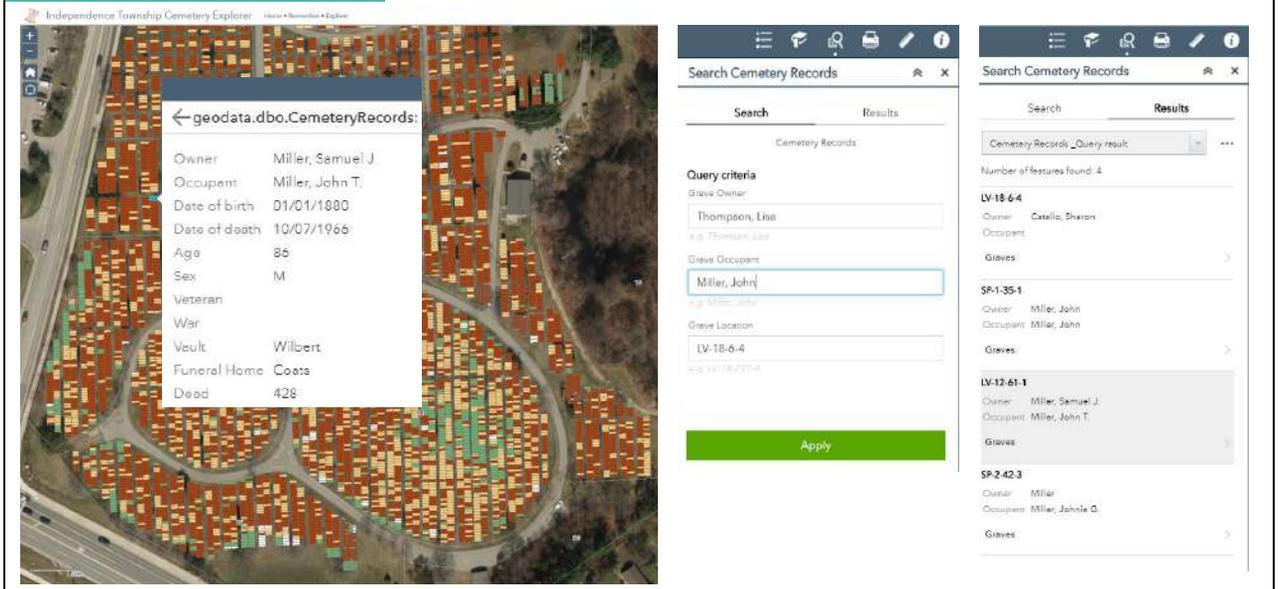


### **Recognizing the Benefits (1) | Slide 11**

(Mark) The office and field crew immediately recognized the benefits of seeing the data in a geospatial context. In an effort to be more proactive, another UAV flight was performed over Lakeview Cemetery. A cemetery database schema was developed and incorporated into Esri's *Local Government Information Model* for our recently purchased *ArcGIS for Server* environment. A lot of effort was put into mapping and data cleanup. All the existing cemetery data silos were migrated into the geodatabase.

Understanding that a system is only as good as the data, the office crew offered to maintain this part of the geodatabase. A web-based editing application was created, and the office crew continued their work verifying and consolidating the cemetery records, putting the authority and responsibility of the data into the hands of the office crew.

## Recognizing the Benefits



### **Recognizing the Benefits (2) | Slide 12**

(Doreen) Using *Web AppBuilder for ArcGIS*, a Cemetery Explorer was developed, and made accessible to all office and field workers. For the first time ever, a basic inventory management tool was in place, showing available sites for sale, graves purchased, or occupied in relation to their spatial distribution. The database schema includes a relationship between a non-spatial table and the primary feature layer, enriching it with additional information. Now, gravesites, owners, and deceased can easily be found using a search widget. Families of the recently deceased have questions better answered. Staff are able to make improved recommendations for additional grave purchases.

Beyond internal use, we have shared the cemetery data with the public on our Township's website.



# Esri and Leica Smart Communities Innovation Challenge

Mobile Government Edition



## The Winners Are...

- City of Wheaton Public Works Department, IL
- North Dakota Department of Health
- City of Seattle Department of Neighborhoods, WA
- Merrimack Valley Planning Commission, MA
- Columbus Consolidated Government Inspections & Codes Department, GA
- Lakewood Township Municipal Utilities Authority, NJ
- [Charter Township of Independence](#) Geospatial Information & Solution Office, MI
- Pueblo of Isleta Surveying and Mapping Division, NM
- Goodhue County GIS/Environmental Health, MN
- Missouri Department of Transportation

### **Grant Winners / Slide 13**

(Mark) In 2016 Esri and Leica Geosystems challenged communities by asking them to submit a grant proposal that brings innovative ideas into reality. The goal of the program was to foster transformational approaches that improve the productivity and efficiency of mobile field workers and back-office processes.

Looking to continue the momentum and energy surrounding our cemetery project, we submitted a proposal. We were honored that Independence Township was selected as one of the ten grant winners. We received a jumpstart package including \$15,000 in hardware, software, and services.

## Precision



## High-accuracy GNSS Solutions



### **Precision | Slide 14**

(Doreen) One of the hardware components that we received was a Leica Zeno 20 submeter GPS unit. With this high-precision unit - *in combination with Collector for ArcGIS* - the field crew is in the process of obtaining the location of all the markers in our cemeteries. These will be used as control points to lay out the blocks, lots, and graves as we update our data. Submeter accuracy will be essential during the winter months, when a thick blanket of snow covers the cemetery.

(Brett) ...

# High-accuracy GNSS Solutions

Handheld GNSS Device



Smart Antenna for BYOD



**Precision | Slide 15**  
(Brett)

# High-accuracy GNSS Solutions

## The Leica Zeno 20 (ZenoCollector)

- The handheld GNSS device utilized for the Esri and Leica Geosystems' Smart Communities Innovation Challenge
- L1/L2 GPS/Glonass GNSS device capable of 5cm accuracy or better
- Android OS to utilize the Esri Collector for ArcGIS app to streamline field collection and workflows from between the field and office
  - Familiar OS and apps to easily deploy to the workforce
- Able to upgrade to the pole kit to improve accuracy capability to 1cm



**Precision | Slide 16**

(Brett)

# High-accuracy GNSS Solutions

## The Leica GG04 plus Smart Antenna

- Bluetooth connect the GG04 plus to an Apple, Android or Windows device
- Sends high-accuracy positioning to the location manager or directly sends NMEA data to apps like Esri Collector for ArcGIS
- GPS, Glonass, Galileo, BeiDou, QZSS & SBAS
- Sub-meter to 1cm accuracy
- Fully ruggedized to work in harsh environments
- Backpack, Pole or Vehicle mounted



**Precision | Slide 17**

(Brett)

The cemetery project is a great  
template

... and gave us confidence to tackle  
other projects

***A Compelling Idea | Slide 18***

(Mark) By consolidating data and sharing information in real-time, we have transformed the existing fragmented structure into a single spatially aware system. For us, the cemetery project embodies a compelling idea and challenges the status quo. It has been a catalyst and a template for our other projects. It has showed us how to affect positive change in our work and in ourselves. What was once just a map, is now a useful tool to manage cemetery operation. Leveraging repeatable best practices, we can now develop standard operating procedures that outline expectations, methods, specifications, and workflows at all of our cemeteries.

The cemetery project gave us the confidence to tackle other projects in desperate need a workflow change.

## Expanding On an Idea

Looking at this workflow, the weak points and inefficiencies become obvious.



### Miss Dig

**From:** QCARS\_Pro@MissDig.org  
**Sent:** Thursday, June 07, 2018 1:13 PM  
**To:** Miss Dig  
**Subject:** MissDig (INDTWP.2018/06/07 400004 A81580891-00A NORM NEW LREQ

INDTWP 00004 MISSDIG 06/07/18 13:13:16 A81580891-00A NORM NEW GRID

\*\*\*\* Underground \*\*\*\*

Ticket : A81580891 Rcvd: 06/07/18 13:08 Oper: HK0 Rev: OCA  
Org Tkt : A81580891 Rcvd: 06/07/18 13:12 Oper: HK0

DigStart: 06/12/18 Time: 13:08  
TRK Ltr: 07/03/18 Time: 23:59 Positive response required: Y  
Resp Due: 06/12/18 Time: 13:09

Firm : PRO SHOT BASKETBALL Caller: KAREN HANSEN  
Phone : 248-495-3702 Ext: Fax :  
E-mail : khanzen77@icloud.com  
FldCnt: Number:  
Cell/Txt: 248-495-3702

County : OAKLAND Place : INDEPENDENCE /7

Grids : 4244DBE320C 4244DBE320D

Polygon: 42.744746/-83.340848 42.745251/-83.337185

: 42.744208/-83.340636 42.743714/-83.336973

Lot : Long:

Work Typ: INSTL BASKETBALL HOOP

Done For:

Address: 4115

Street: BINGHAMTON CT

1st x-st: Dir E of CLINTONVILLE RD

2nd x-st: Dir S of CLARKSTON RD

Subdivsn: OAKBURY

Sta Ltr: LOCATE PRI OP PROP

Boring : N On-going project: N

Members : ATTD CRGDIS CHARLCTV

Members : INDSANI INDTWR



### Expanding On an Idea | Slide 19

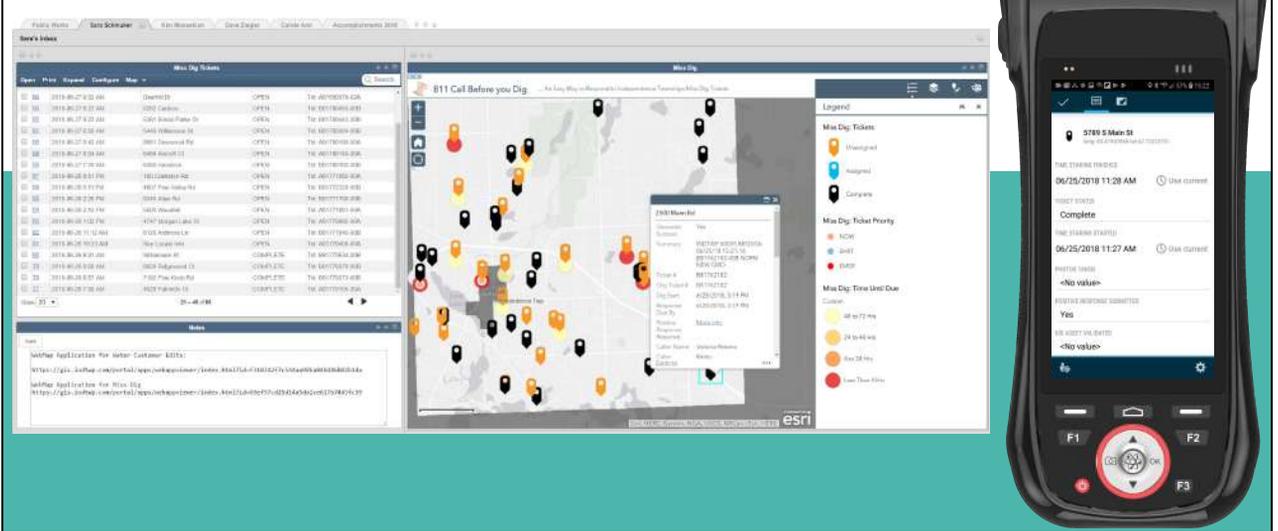
**(Doreen)** Our main responsibility at the DPW is water distribution, water treatment and sanitary sewer. Over time - *however* - we have had a lot of responsibilities added to our daily workload - *but not the manpower*. All those - *little* - time consuming things pull us away from the actual work.

Occasionally, other duties to our residents supersede normal day-to-day operations. The DPW responds to the 811 utility staking service - *MISS DIG*. In most states, utilities are required by law to stake their assets before any digging project has begun. Tackling this time consuming procedure and promptu responsibility was the next logical step for us.

**(Mark)** The DPW receives MISS DIG tickets in three different places. Tickets are sent to the main printer in the hallway - *where they hopefully do not getting lost in with that 100 page manual that was just printed*. They are also pushed to the "emergency" phone for after hours tickets. And just to be on the safe side, they even have a PC dedicated to MISS DIG email messages. However, even with all this in place, the tickets never seem to get the right crew member at the right time. The crew also rotates who is on MISS DIG duty every month, which adds to the complexity. Documentation for this process involves handwritten notes on the ticket printout.

Taking a step back and looking at this workflow, the weak points and inefficiencies become obvious.

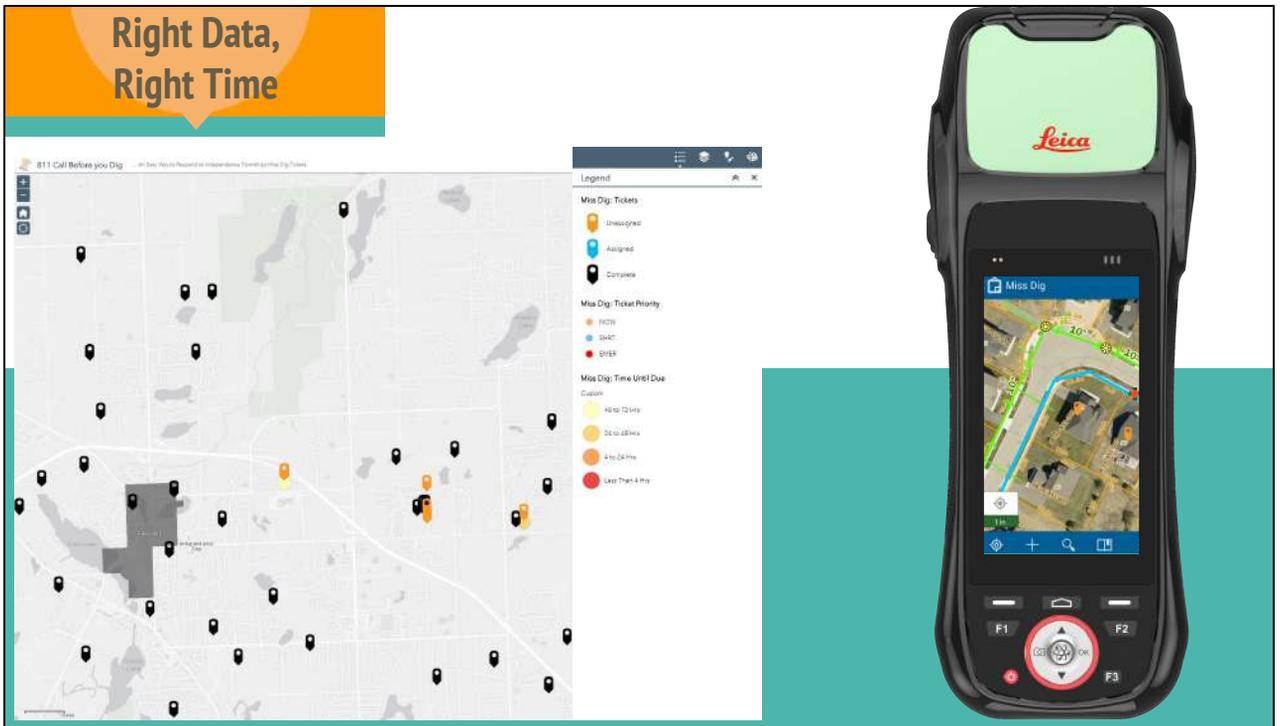
# Versatile Tools



## Versatile Tools | Slide 20

(Doreen) We looked at every step in the current process - start to finish.

Using the ArcGIS platform - we set out to build a GIS-based 811 ticket management system. Using Jupyter Notebooks - and with a little trial and error - we created a Python script that parses the MISS DIG email and breaks it down into the individual elements. Using the ArcGIS API for Python, we populate a feature service in our web GIS with the incoming ticket information. The same script also generates a service request in Cityworks. To keep things in sync, we run another script, that pushes status changes and labor information between the GIS and Cityworks. On the user interface side, we used an Arcade Expression that looks at the time tickets are due and creates a visual alert for our crews.



### ***Right Data, Right time | Slide 21***

(Mark) With GIS, we have been able to transform our workflow - *getting the right information to the right crew member, at the right time*. MISS DIG tickets are now populated in a feature service that all crew members can access in the field through Collector for ArcGIS. They see open tickets and assets within a single application on their phone. *Any* of them can respond to and complete a MISS DIG staking ticket. Emergency tickets can be addressed right away. Office staff can verify and close service requests directly inside Cityworks. And, instead of handwritten notes, the GIS now stores the authoritative record of our MISS DIG activity.

The crews immediately saw the value in this change. Rather than adding additional work to their existing workload - *the problem was tackled holistically*.

## Building on Momentum



### ***Building on Momentum | Slide 22***

(Doreen) Crews now have a new outlook. Their phones and GPS units, along with the GIS applications on them, are seen as tools in their traditional toolbox. The crews are eager to take ownership of *their* data. When they notice missing or out of place assets in the field, they are now able to correct the data themselves.

Here you see our crews using our Leica unit to collect curb box locations while out in the field doing hydrant flushing.

# Take Time to Understand Your System

## Use Technology to *Enable* the Solution

### ***Technology in the Right Place | Slide 23***

(Mark) In local government - *as in other industries* - you must not be afraid to address the real problem. It is *essential* to understand how work actually moves through a system. This requires thinking systematically rather than looking for a quick fix through buying technology. Look for your weak points and bottlenecks. Then design a solution that is enabled by technology.

**“ We can’t solve our problems with  
the same thinking we used when we  
created them ”**

- Albert Einstein -

**Quote | Slide 24**

(Doreen) As Albert Einstein said, “We can’t solve our problems with the same thinking we used when we created them.”

Thank you all for you time today.