

ESRI Collector App

Ian Kidner, GISP

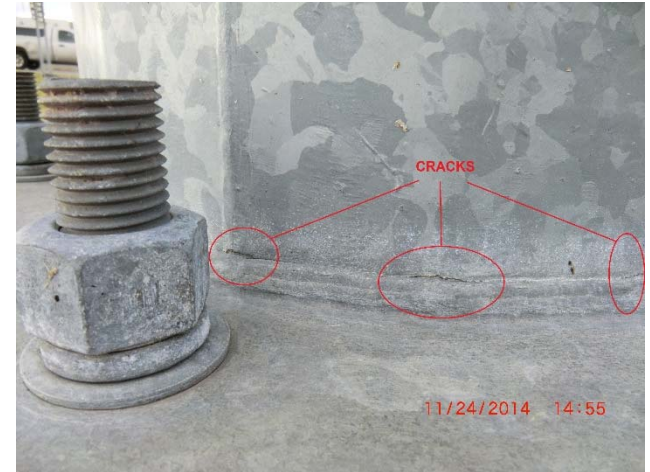
GIS Systems Administrator
Office of Technical Services



Backstory

Problem: High Mast Tower Lighting

- November 2014 – Structure failure along I-71
- Need to inventory/inspect structures statewide
- GIS team engaged to provide solution – fast!



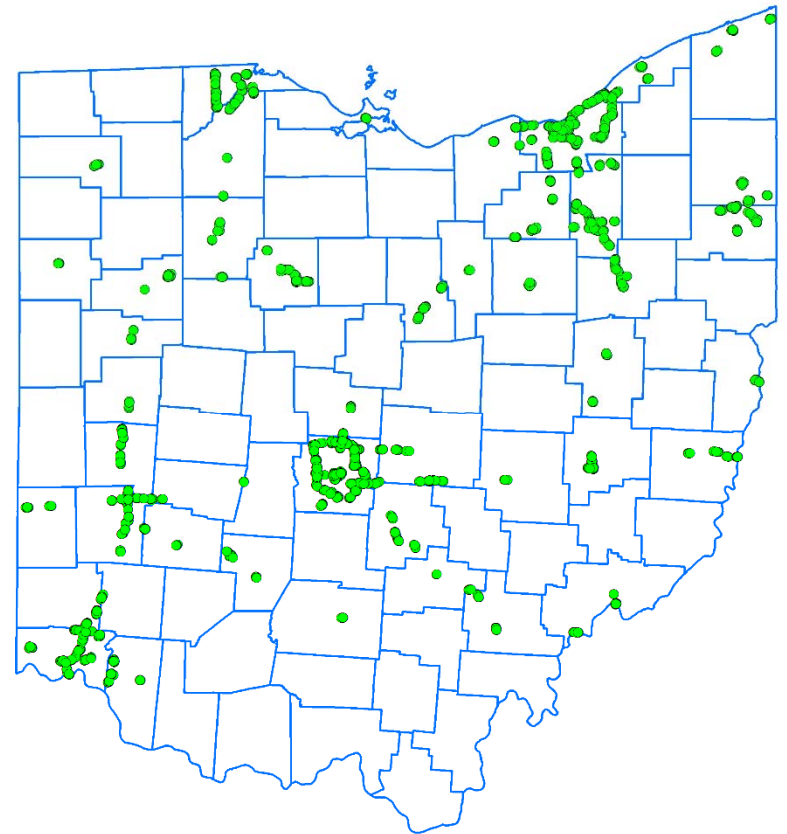
Backstory

Solution

- Developed & tested ArcGIS Collector in 1.5 weeks
- Entirely AGOL hosted
- Trained 150+ field technicians
- 12/15/14 – 1/15/15
 - inventoried 5K+ structures statewide



Utilized iPhones
already available



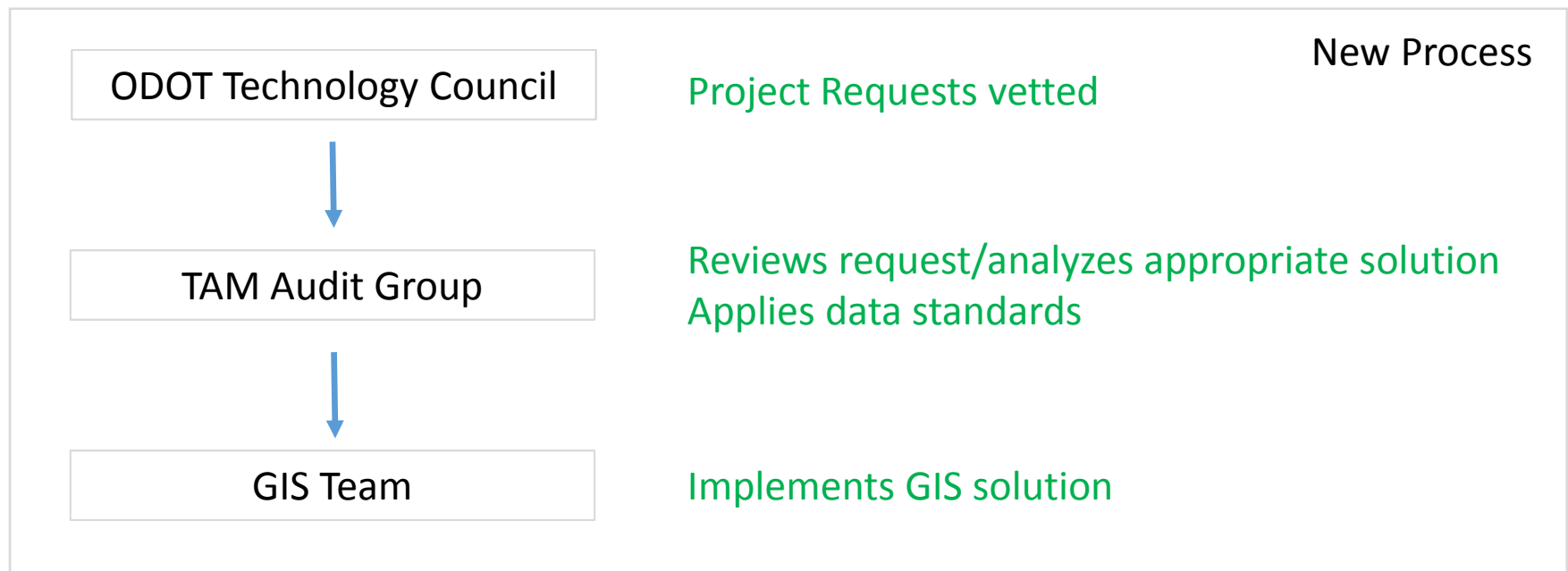
Backstory

Results

- Successfully identified risk assets
- Expanded agency GIS exposure
- Requests to utilize Collector for other items

Anticipated Usage at ODOT

- 400+ devices
- 400 – 600 users



Collector Project

Scope

- Implement ESRI Collector software & infrastructure
- Identify ODOT approved mobile device
- Create inventory collection process workflow
- Create asset condition inspection workflow
- Create QA/QC workflow
- Provide basic reporting & analytics
- Pilot 2 asset datasets (Culvert, BMP)

Out of Scope

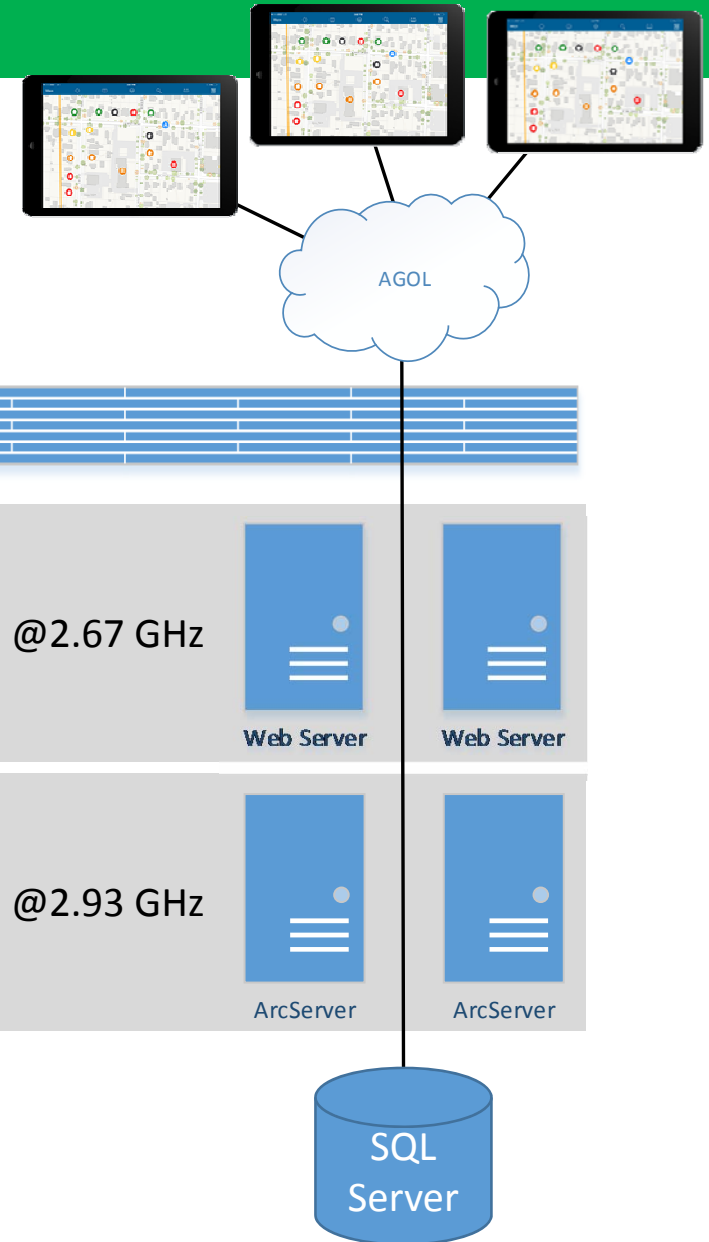
- Integration with existing ODOT applications

Collector Project

Architecture

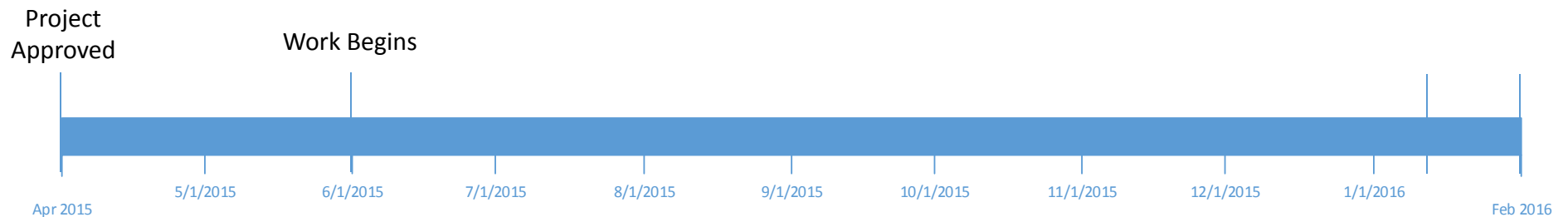
Web Server RAM doubled (to 8GB) during testing due to poor performance

Full AGOL hosting will not facilitate easily movement of data or system integration in the future



Collector Project

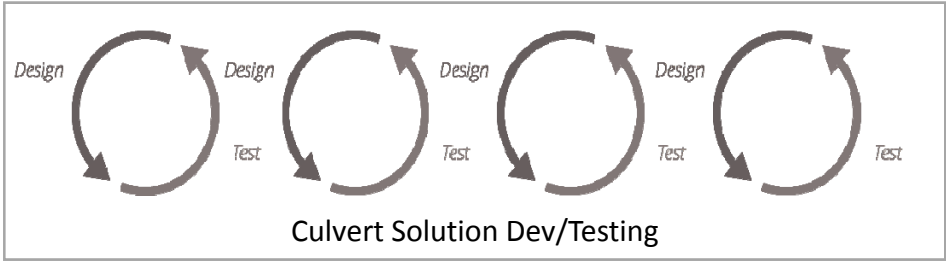
Timeline



Initial System Testing

Pilot

Asset Requirement Gathering



Discovered performance issues causing requirement changes & numerous instances of rebuilding the solution

Collector Project

Culvert Requirements: High Level - initial

- Single-Sign-On (ADFS)
- Inventory Feature Class, Inspection related table
- 4G – post as you go
- Attach condition pictures (5 or more) to inspection table
- SQL Server constraints & on-commit triggers

Collector Project

Culvert Requirements: High Level - initial

- ✓ • Single-Sign-On (ADFS)
- ✓ • Inventory Feature Class, Inspection related table
- ✗ • 4G – post as you go
- ✗ • Attach condition pictures (5 or more) to inspection table
- ✗ • SQL Server constraints & on-commit triggers

Collector Project

Culvert Requirements: High Level - initial

• 4G – post as you go

- Poor 4G coverage in certain areas of the state
- If user accidentally signs out of Collector, unable to sign back in until internet connection is available

Collector Project

Culvert Requirements: High Level - initial

- ✘ • Attach condition pictures (5 or more) to inspection table

Inconsistent performance on ability to post attachments to database

- Sometimes due to poor 4G
- Sometimes due to number of photos / amount of data
- Performance differences on Android vs iOS
- **Architecture concern with picture attachments being stored as BLOB**



In Esri Technology, Government, Location Intelligence, Open Source

ODOT reveals workaround for using FILESTREAM & Collector with large datasets

By Scott Fierro, Dustin Brown

In this article, experts from the Ohio Department of Transportation provide a detailed workflow example, with step by step instruction, for using FILESTREAM with Collector for ArcGIS to gather, manage and store extremely large datasets in the best ways possible for performance, management and scalability, in line with current industry best practices.

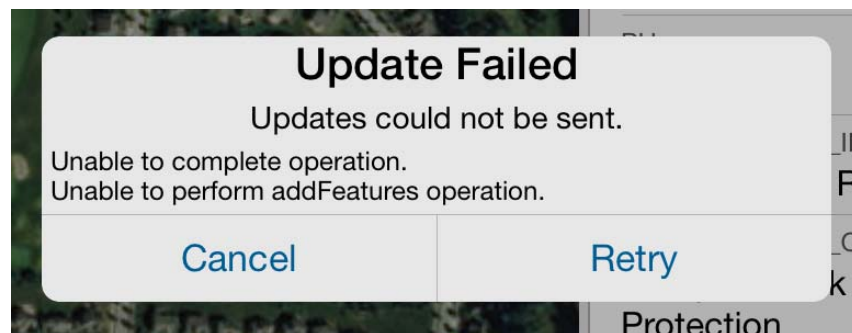
Collector Project

Culvert Requirements: High Level - initial

- ✘ • SQL Server constraints & on-commit triggers

Constraints & On-Commit Triggers developed as conditional logic workaround

- Received sporadic errors in Collector app when constraints and/or triggers implemented
- Limited error messaging made it difficult to know cause
- Ultimately removed these items



Collector Project

Culvert Requirements: High Level – Refined

- Single-Sign-On (ADFS)
- Inventory Feature Class, Inspection related table
- Attach condition pictures (5 or more) to inspection table
- Offline Sync

Collector Project

Culvert Requirements: High Level – Refined

- ✓ • Single-Sign-On (ADFS)
- ✓ • Inventory Feature Class, Inspection related table
- ⚠ • Attach condition pictures (5 or more) to inspection table
-Increased WebServer RAM – curious about scalability
- ⚠ • Offline Sync

Attachments & Offline sync worked.....
.....until about 500 attachments occurred
within a work area

Work Area = Ohio County = 1,000+ culverts

- Minimum 5 pics per inspection
- Work area will eventually have 5,000+ picture attachments (probably more)



Collector Project

Culvert Requirements: High Level – Current

- Single-Sign-On (ADFS)
- Inventory Feature Class, Inspection related table
- Offline Sync (no attachments)

Collector Project

Culvert Requirements: High Level – Current

- ✓ • Single-Sign-On (ADFS)
- ✓ • Inventory Feature Class, Inspection related table
- ✓ • Offline Sync (no attachments)

- Initial tests demonstrate acceptable system stability
- Official pilot test of solution to determine viability

Collector Project

Culvert Pilot Results

ID	Category	Success Criteria	Results
1	Inventory	Able to locate 90% of existing Culverts	100%
2	Inventory	Able to add 95% of new Culverts to existing inventory – device success	100%
3	Inventory	Able to add 95% of new Culverts to existing inventory – Sync success	100%
4	Inventory	All characteristics of a Culvert captured in the application	Pass
6	Inspection	Able to add 95% of new Culvert inspections	100%
7	Inspection	All inspection criteria covered in the application	Pass
8	Inspection	Able to add 95% of new Culvert modifications	100%
9	Collector App / Solution	Offline Map Preparation – record sync occurs within 3 minutes, 90% of the time	55sec / 100%
11	Collector App	Pilot testers collect a minimum of 40 records during the pilot test	20
12	Collector App / Solution	Record Sync occurs within 3 minutes, 90% of the time	51sec / 97%
13	Viewer	Able to view new and existing records in Culvert Viewer application	Pass
14	Viewer	Able to find records based on user ID	Pass

Collector Project

Other Technical Issues

Float Data Type Precision	Values with higher precision entered in Collector App change precision in SQL Server
AD Credentials (Android)	Credentials cached; not able to sign out/switch user (LG Gpad)
ADFS Credentials	After Nov. '15 AGOL update, had to re-create outside server exceptions
Multiple AD Domains	ArcServer/AGOL unable to consume multiple identity stores – issue for internal/external personnel
Cannot Create Feature	<p>Error: Underlying DBMS error [[Microsoft][SQL Server Native Client 11.0][SQL Server]There are no rows in the current fetch buffer.] [Collector.Collector.CULVERT_INVENTORY_PILOT]</p> <p>Fix: ALTER DATABASE MyDatabase SET OFFLINE WITH ROLLBACK IMMEDIATE Go ALTER DATABASE MyDatabase SET ONLINE Go</p>

Collector Project

Other Technical Issues

Subtypes-Related Tables	Domain default values do not display in Collector
Input "Hints"	Set in AGOL change can be changed in iOS
Record posting failure	If errors occur on posting, it is not clear to end-user that records did not sync

Collector Project

Wish List

- Better control for offline records sync
 - More concise work area
 - Choice to download attachments
- Conditional logic at app level
 - Would vastly improve data integrity
- REST integration
 - Harvest data from other REST based on location
 - Reduce field input requirements, minimize data entry error
- LRS integration

Collector Project

Summary

- Works well in certain conditions
 - Not all DOT work occurs in ideal conditions
- Good configurable tool
 - Would be great with higher level database functions
- BMP next pilot
- Developing plan for Culverts move to production

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