

# Dairyland Power Mobile GIS Deployment

## Presenters:

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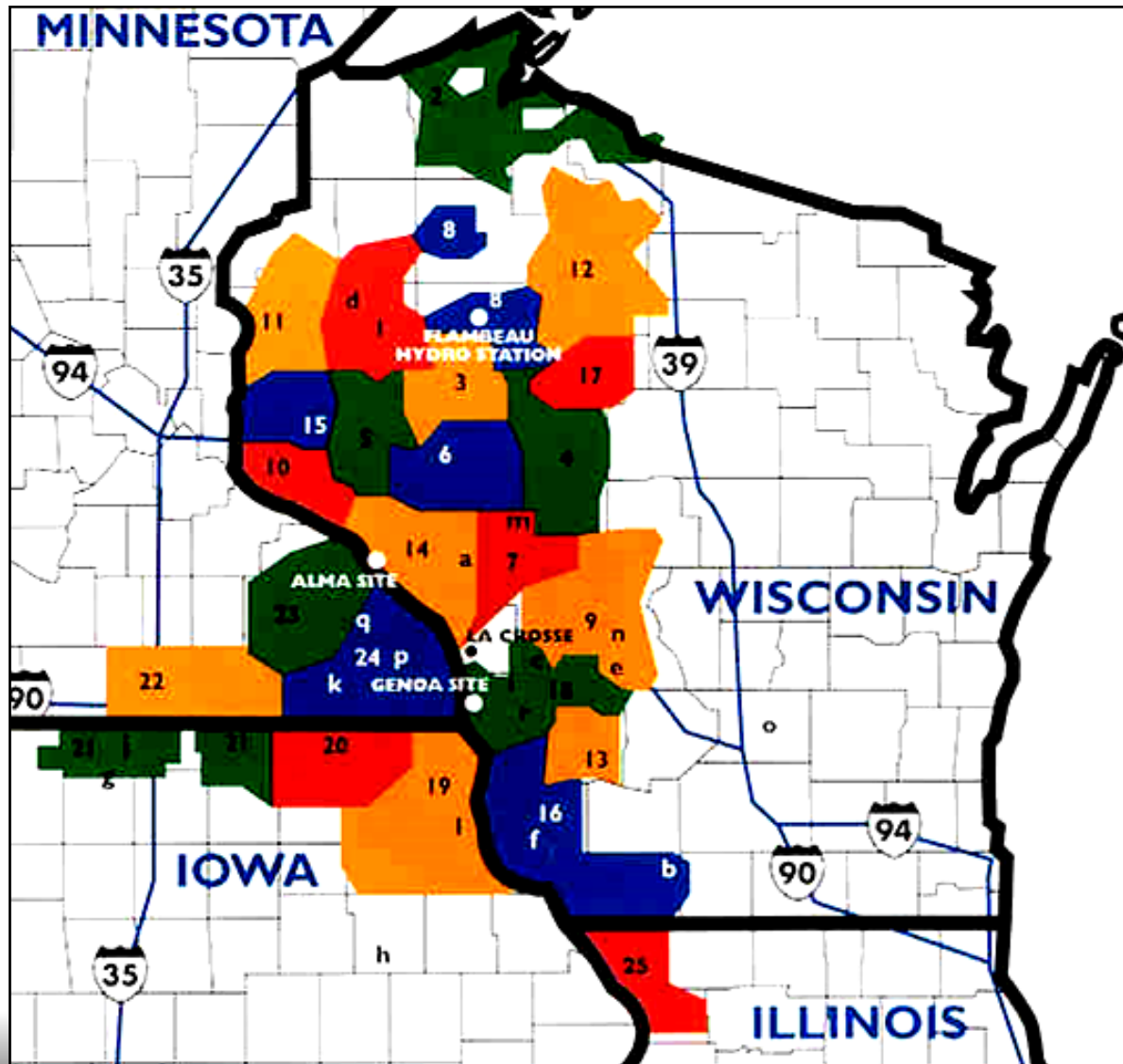


# Dairyland Power Cooperative



- ▶ 24 Member Co-ops
- ▶ 17 Municipal Members
- ▶ 600,000 People Served
- ▶ 1,372 MW Generating Capacity
- ▶ 3,191 Miles of Transmission Lines
- ▶ 291 Substations
- ▶ ~ 575 Employees

# Dairyland Power Service Territory



# DPC Mobile GIS, The Beginning

- Started with Pole inspections in the field
- Grass roots movement
- ArcPad was the 1<sup>st</sup> mobile application used
  - GoSync used to synchronize data in the field
  - Approx. 15 users
- Grew into more field use cases
  - Veg. Mgmt.
  - Transmission Maint.
  - Electrical Maint.
- Moved to ArcGIS Mobile on windows mobile devices
- Added a WebGIS application
- Devices: Juniper Archer, Trimble Juno, Mobile Mapper
- Has become a required tool by our field users

# ArcGIS Mobile Application

- Contracted New Wave Geographics for programming help
- Configuration tool created
  - Easy deployment
  - Easy synchronization
  - Easy Creation of custom forms
- DPC programmer worked with New Wave Geographics
- A tool was delivered to DPC that we could control and manage changes easily
- In place and working for almost 5 years

# WebGIS Application

The screenshot displays the Dairyland Power GIS Web Map Viewer interface. The top header includes the Dairyland Power Cooperative logo, the title "Dairyland Power GIS Web Map Viewer", a search bar with the placeholder "Enter an address or place", and a "Help" link. The left sidebar contains a "Layers" panel with checkboxes for "Feedback", "Lightning Strikes", "DPC Layers", "Foreign Utility Layers", and "Weather Underground Radar". Below the layers panel are buttons for "Legend", "Bookmarks", "Find", "Identify", "Measurement", "Draw", "Editor", "Print", "Directions", and "Google Street View". The main map area shows a satellite view of the St. Paul, MN region, overlaid with a network of green and red lines representing utility infrastructure. Numerous small black squares are scattered across the map, likely representing lightning strike data. A "Basemaps" dropdown menu is visible in the top right corner of the map area. At the bottom of the map, there is a scale bar and coordinate information: "1:2,311,162 X: -94.073 Y: 45.382". The Esri logo is in the bottom right corner of the map area.

**Search Tools**

**Identify Features**

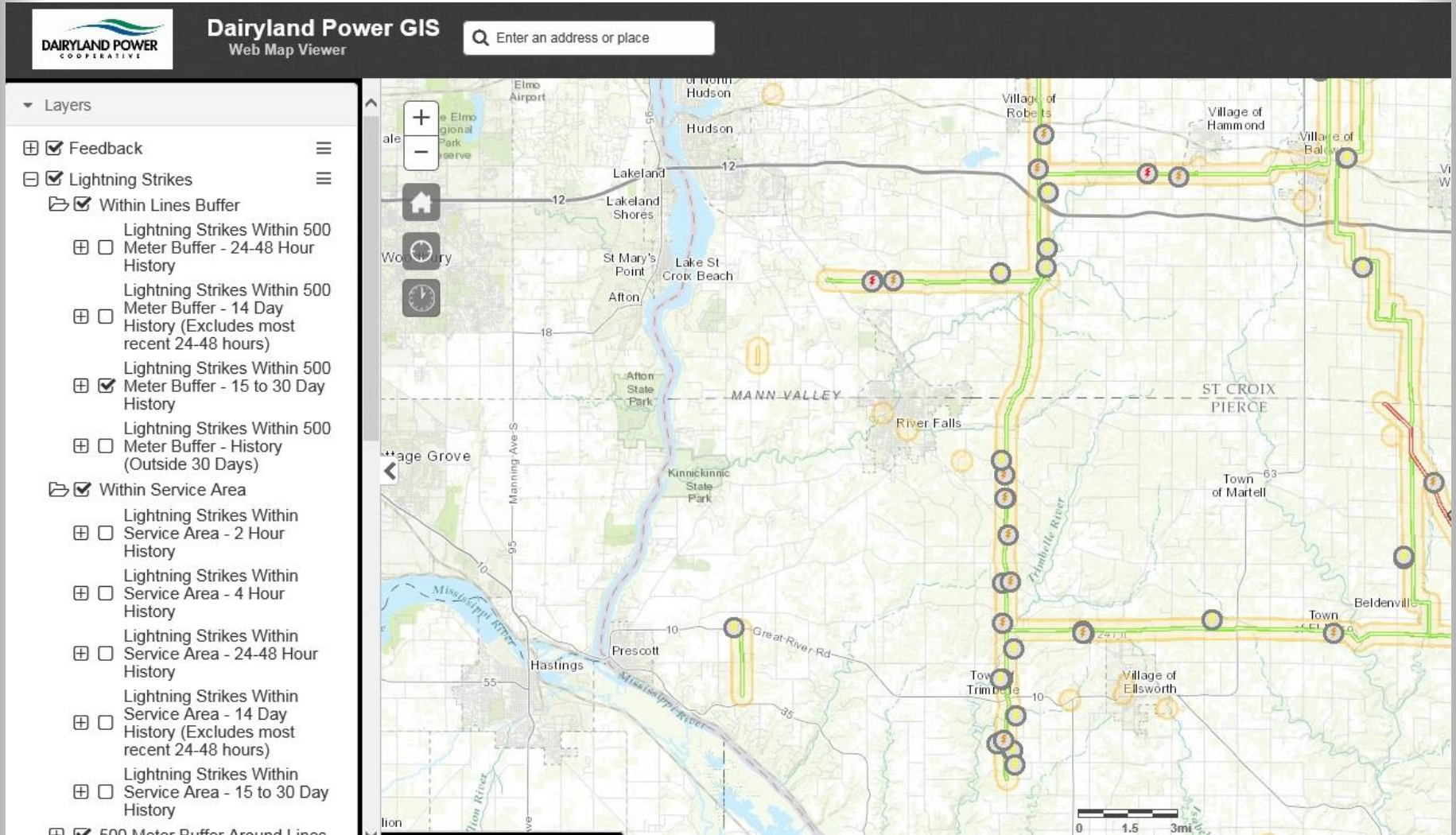
**Measure Distances**

**Driving Directions**

**Google Street View**

**Lightning Strike Data**

# WebGIS Lightning Strikes



# A New Mobile Idea

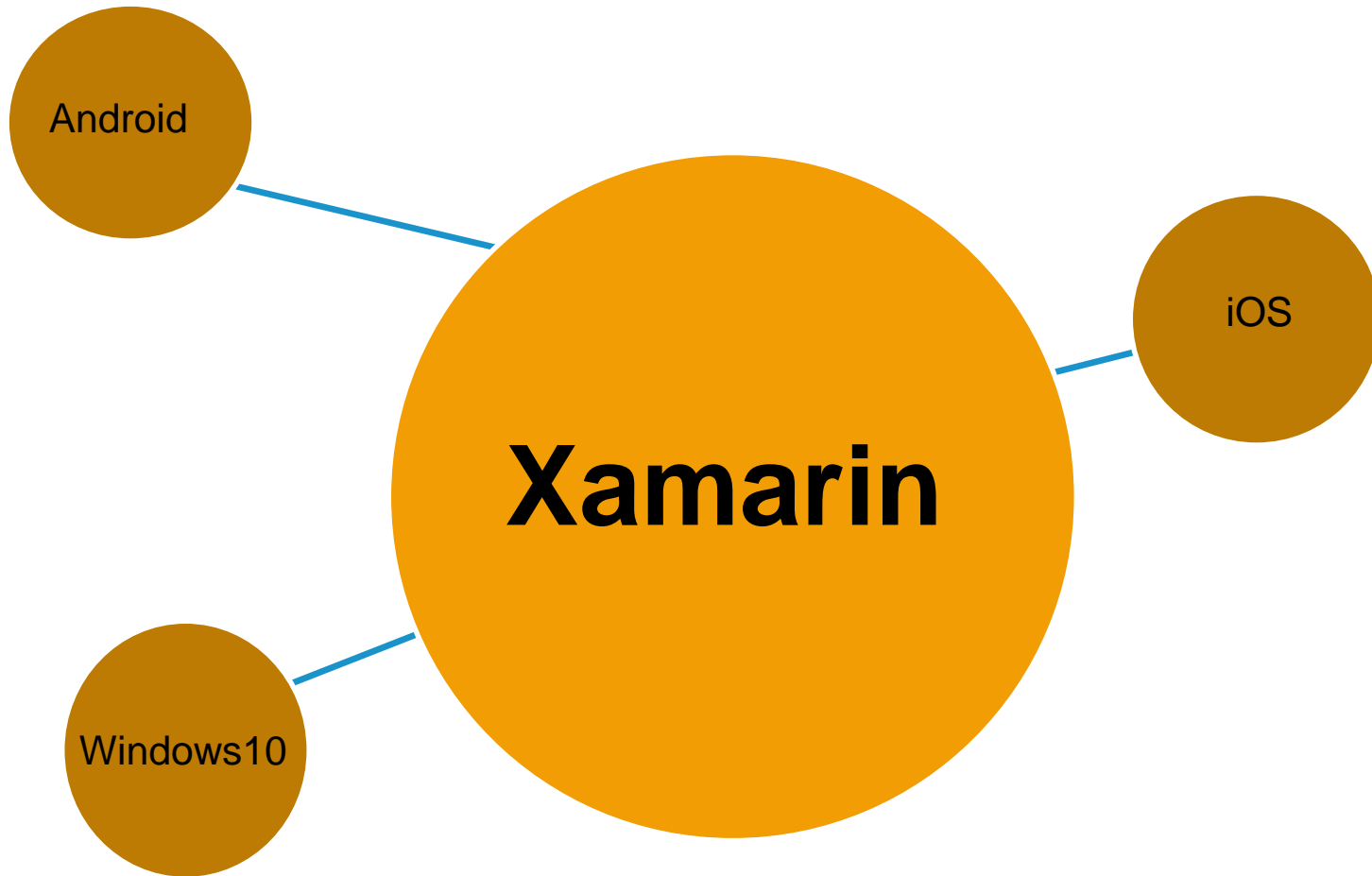
- Take our configuration philosophy to mobile phones and tablets
- Leverage ESRI products that are already in place at DPC
- Utilize already built code to deploy to multiple OS devices
- Keep using C# for all programming
- Create platform agnostic tool that we control
- Have the ability to create custom forms easily
- The ability to update new configurations, forms, and data remotely
- No connectivity required to view or edit GIS data
- Easily develop and maintain in-house future needs



# The Issues

- Programming for multiple OS platforms (Android, iOS, UWP)
- Applications which support a specific operating system or form factor
- Deployment is difficult to manage
- Free applications have limited functionality and force you to use specific platforms
- Paid applications are not configurable or extensible
- Testing on various devices is tough to manage
- Disconnected viewing and editing of GIS data can be complex
- Dairyland has limited resources

# The Solution



# Decisions, decisions..

## What is Xamarin?

- It's a development tool used to create mobile apps
- They are a company with 350+ employees, 15,000 customers, 1,400,000 developers

## Why choose Xamarin?

- One tool to rule them all...write once, deploy to any device  
Android, iOS, Windows
- Integrated within Visual Studio using C# (utilize existing skills)
- In 2016 Xamarin became free after being bought by Microsoft
- Partnered with ESRI in July of 2016, introduced Beta SDK



# GeoCross Mobile

## Ready, Set.....

- Full working product in five months (Oct-Feb) for three platforms
- Two programmers, one GIS specialist and one visionary

## What is it?

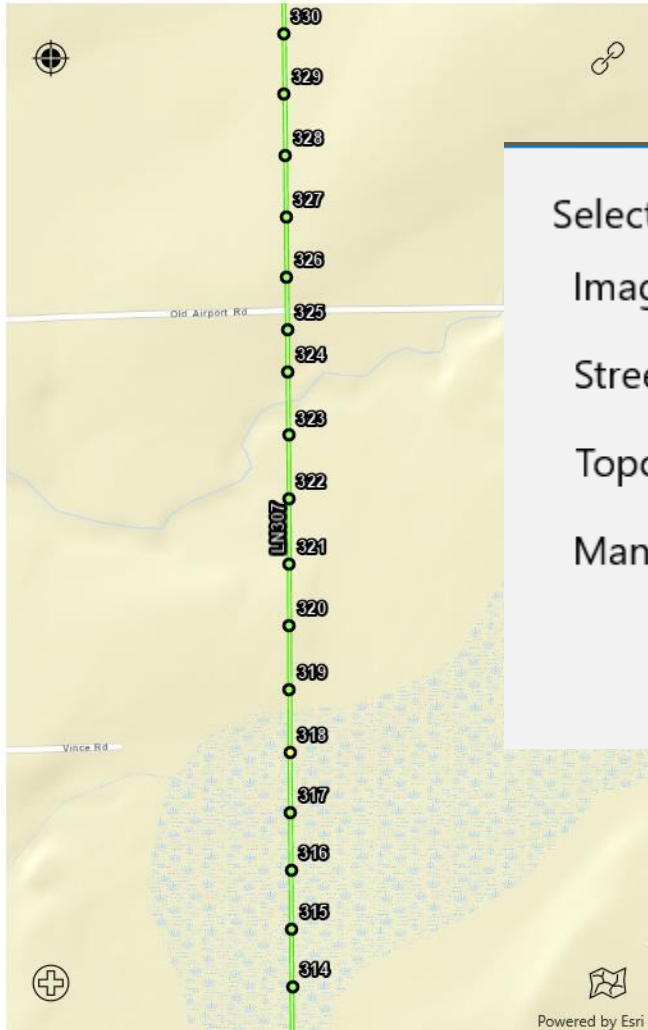
- Mobile Application with real time access to DPC information
- Can be accessed on DPC issued tablets, phones or laptops
- Robust options for viewing and editing data when out in the field
- “Preloaded” offline maps when in areas of low cellular strength

# GeoCross

GeoCross Mobile

GeoCross Mobile

Map Search Map Directions My Maps Settings



Select B:  
Imager  
Streets  
Topogr  
Manag

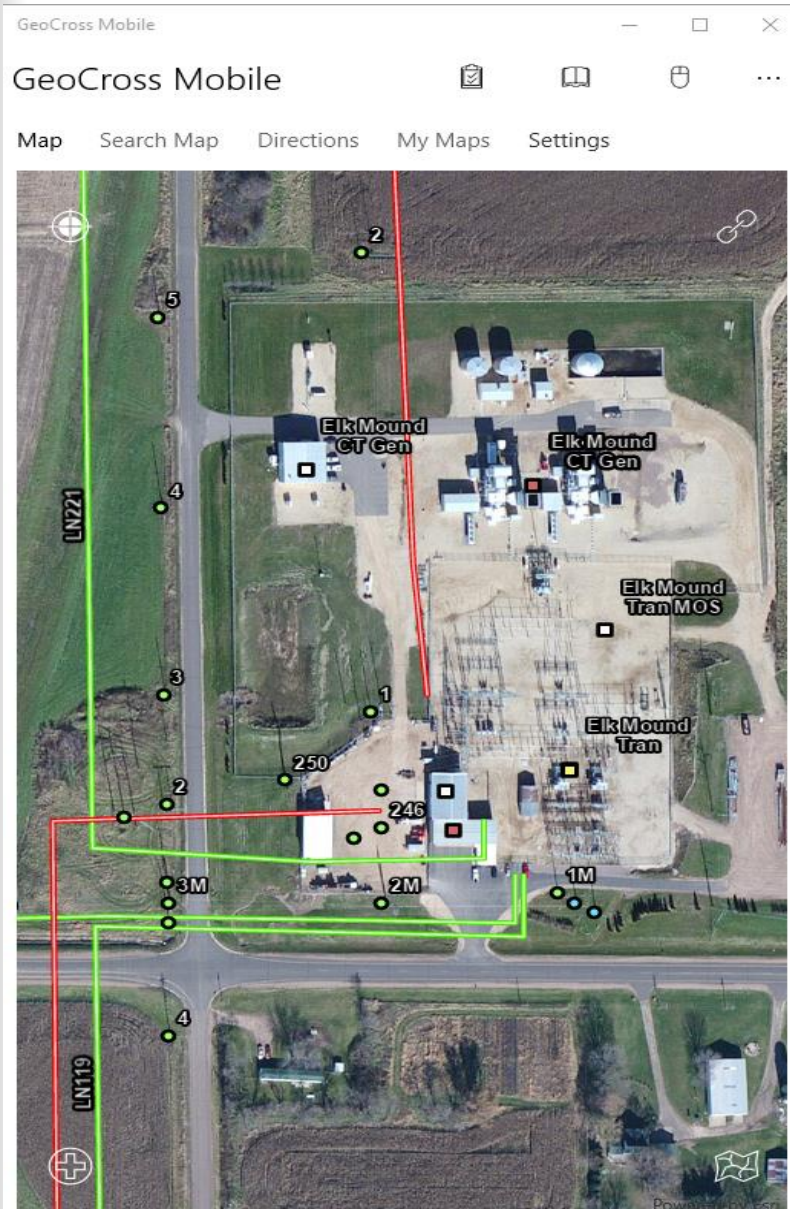
GeoCross Mobile

GeoCross Mobile

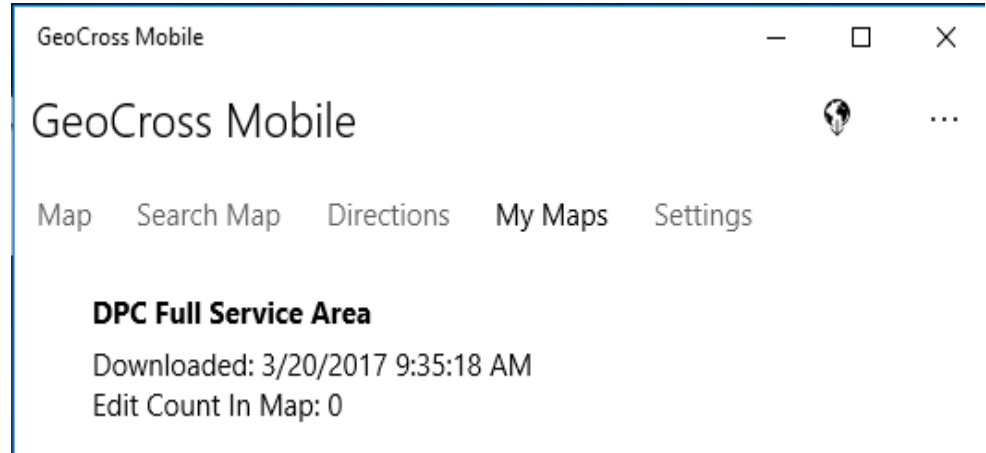
Map Search Map Directions My Maps Settings



# Elk Mound Area



# ◆ Preloaded offline map of service area



## ◆ Create other offline maps for areas of interest

The screenshot displays the GeoCross Mobile application interface. At the top, there are window control buttons (back, minimize, maximize, close) and the title "GeoCross Mobile". Below the title, the app name "GeoCross Mobile" is prominently displayed. A navigation bar contains the following options: "Map", "Search Map", "Directions", "My Maps", and "Settings".

The main content area is divided into two sections:

- DPC Full Service Area**  
Downloaded: 3/20/2017 9:35:18 AM  
Edit Count In Map: 0
- MyMap**  
Downloaded: 3/21/2017 9:29:42 AM  
Edit Count In Map: 0

On the right side, a "Download Map" dialog is open. It features a search input field containing "LNS Area". Below the search field is a "Level Of Detail" slider, with "Less" on the left and "More" on the right. The slider is positioned at a value of 10, with the text "Selected Level Of Detail: 10" displayed below it. At the bottom of the dialog, there are two buttons: "Estimate Basemap Size" and "Download Map".



# ◆ Easy updates for maps and application configurations

The image displays two side-by-side screenshots of the GeoCross Mobile application settings menu. The left screenshot shows the 'Light' theme selected in the 'Color Theme' dropdown, which is circled in red. The 'Update Configuration' and 'Update Static Maps' options in the 'Configuration' section are also circled in red. The right screenshot shows the 'Dark' theme selected in the 'Color Theme' dropdown.

**GeoCross Mobile**

Map Search Map Directions My Maps Settings

**General**

My Workplace Id >

Color Theme **Light** ▾

Default Start Page **Map** ▾

**Configuration**

Configuration Directory >

Set Configuration Url >

**Update Configuration** >

**Data**

Basemaps Directory >

Update Basemaps >

Static Maps Directory >

**Update Static Maps** >

My Maps Directory >

Network Dataset Directory >

Update Network Dataset >

**Location**

Location Display Mode **Recenter** ▾

Enable GPS Tracking

## First task – Substation Inspections

GeoCross Mobile

### Substation Inspections

**Site Info**

Substation #: T9

Site Name: Click to select value...  
Harmony Tran

Utility Served: Click to select value...  
DPC

**Inspection Info**

Inspection Area: Click to select value...  
Harmony

Inspection Date: July 1 2016

Inspector Name: Click to select value...  
Jason Hovey

**Substation Info**

Checklist Circuit Breaker

Maintenance Transformer History

5 Separate data sets accessed from one inspection form

## ◆ First task – Substation Inspections

GeoCross Mobile

New Inspection

**Main Info**

OUTDOOR TEMP  
38

HOT STICK TEST  
January 3 2016

INFRARED TEST  
January 3 2016

**Trans Info**

BUSHINGS OK	Yes
LEAKS EXIST	No
OIL LEVELS OK	N/A
RADIATORS OK	No
AUX COOLING OK	Yes
TANK PRESS OK	Yes

**Breaker Info**

BUSHINGS OK	Yes
LEAKS EXIST	No
OIL LEVELS OK	N/A
CONTROL CAB/GASKETS OK	N/A
HEATER OK	N/A

Text color based on  
“normal state” definition  
in configuration file

# ◆ First task – Substation Inspections

GeoCross Mobile

## Substation Inspections

**Site Info**

Substation #:  
T9

Site Name:  
Click to select value...  
Harmony Tran

Utility Served:  
Click to select value...  
DPC

**Inspection Info**

Inspection Area:  
Click to select value...  
Harmony

Inspection Date:  
July 1 2016

Inspector Name:  
Click to select value...  
Jason Hovey

**Substation Info**

Checklist **Circuit Breaker**

Maintenance Transformer History

# First task – Substation Inspections

GeoCross Mobile



## Circuit Breakers

Breaker #: 9OB7

Substation: GeoCross Mobile

Breaker #:

Substation:

Breaker 9NB7

Breaker #:

Substation:

Previous Counter: :

352

Breaker #:

Substation:

Counter Reading: :

353

Breaker #:

Substation:

Air Pressure: :

20

Breaker #:

Substation:

Breaker #:

Substation:

Gas Pressure: :

0

Breaker #:

Substation:

Test Ops:

1

Breaker #: 9NB4

Substation #: T9

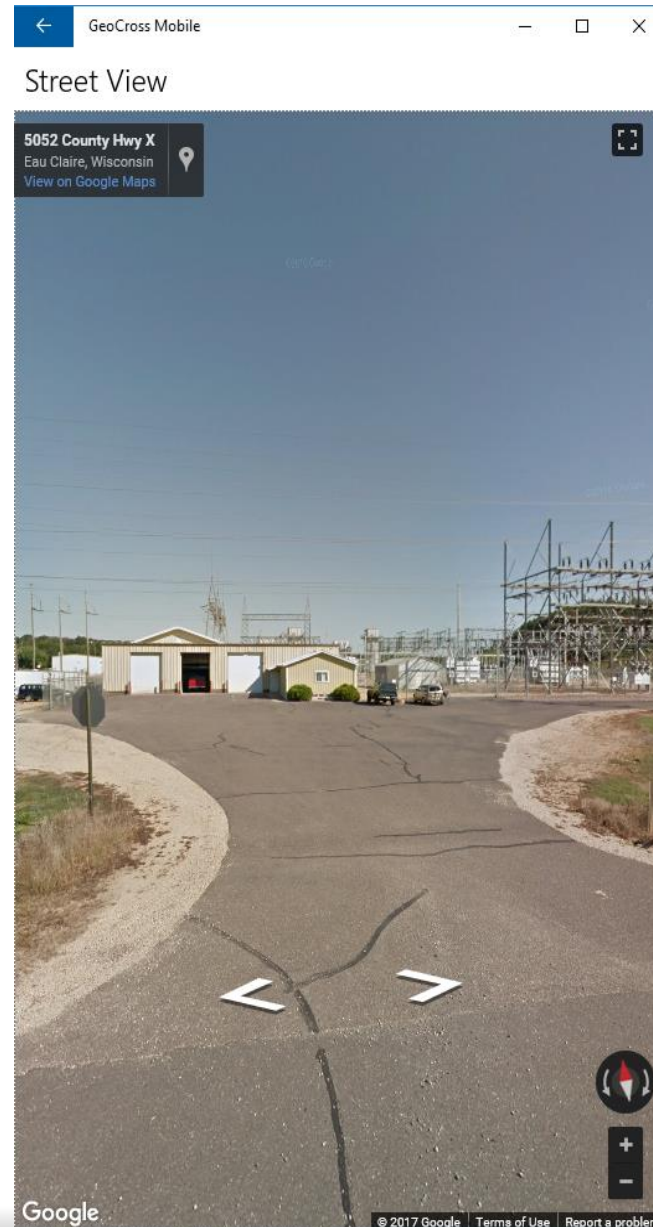
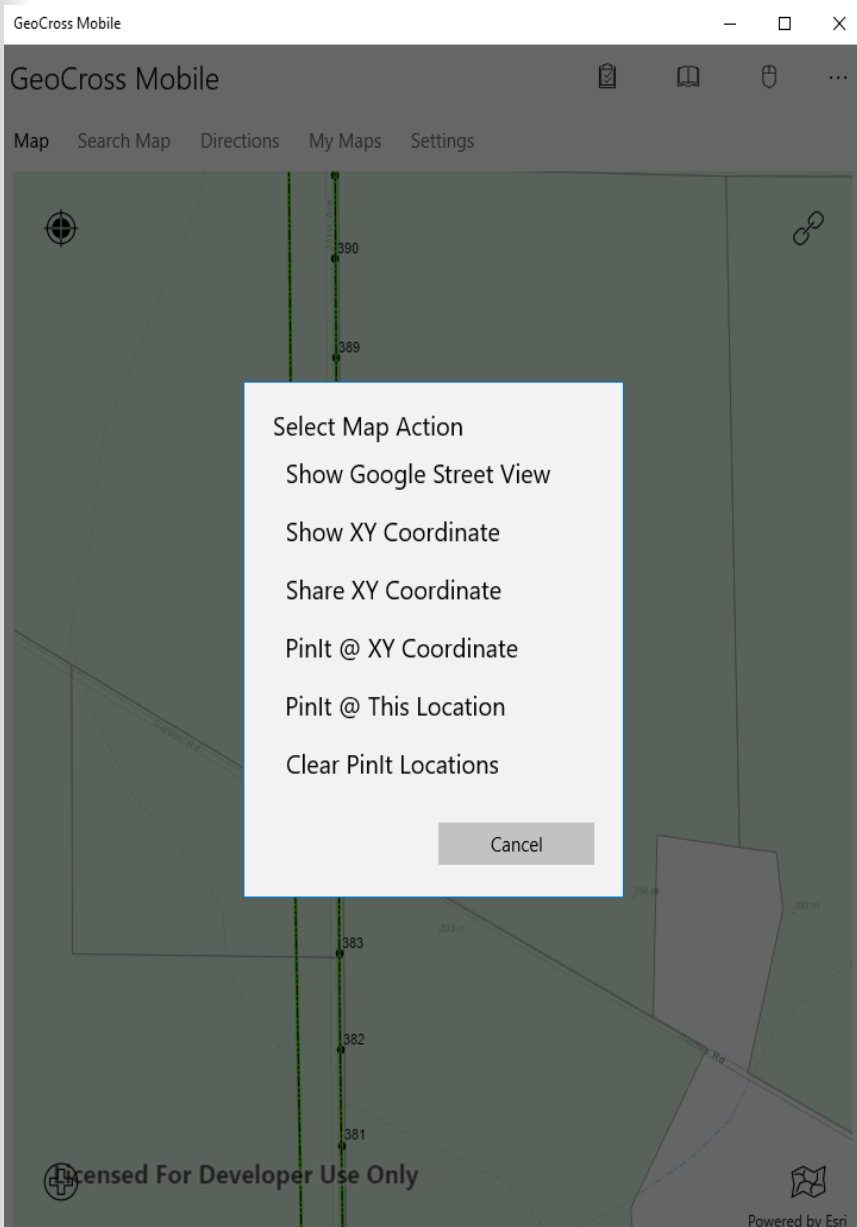
# First task – Substation Inspections

GeoCross Mobile

## Circuit Breakers

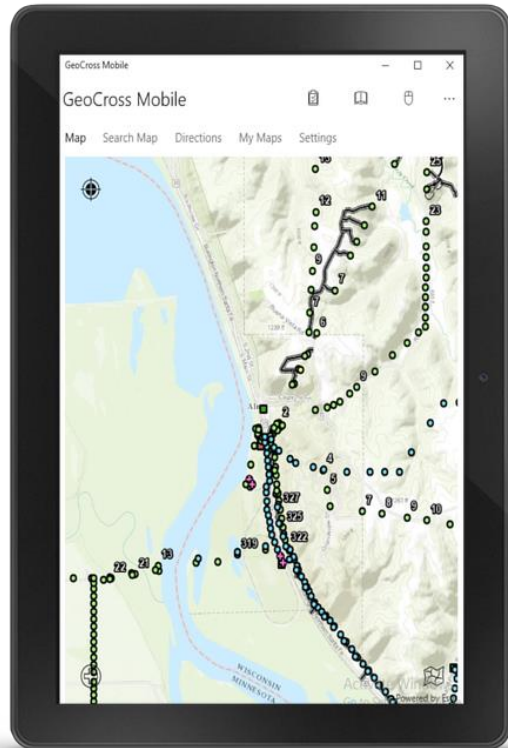
- Breaker #: 9QB7**  
Substation #: T9
- Breaker #: 9NB8**  
Substation #: T9
- Breaker #: 9NB2**  
Substation #: T9
- Breaker #: 9NB1**  
Substation #: T9
- Breaker #: 9NB7**  
Substation #: T9, Counter: 353
- Breaker #: 9NB6**  
Substation #: T9
- Breaker #: 9QB10**  
Substation #: T9
- Breaker #: 9NB3**  
Substation #: T9
- Breaker #: 9QB11**  
Substation #: T9
- Breaker #: 9QB8**  
Substation #: T9
- Breaker #: 9NB4**  
Substation #: T9

# “Pin It” feature (Tap and Hold on the Map)

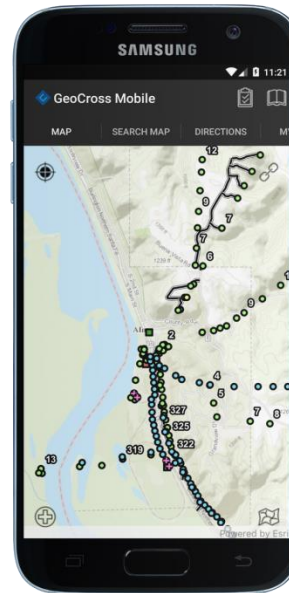


# GeoCross Mobile running on all 3 mobile platforms

Windows 10



Android



iOS







# GeoCross Mobile

## Benefits

- ◆ Ability to customize per job classification
- ◆ Simple forms based on domain definitions
- ◆ Create custom forms
- ◆ Easily update background data (i.e. new wetland info)
- ◆ Same look and feel across devices
- ◆ View and attach photos
- ◆ Choose whatever device works best in the field
- ◆ Simple navigation ability
- ◆ Disconnected editing and viewing of data
- ◆ One person supports “one” program for 50+ users

# What We Learned

- ◆ Xamarin was the right tool for Dairyland
- ◆ Feedback from the field users was crucial
- ◆ Network setup more difficult than expected (VMware Tunnel)
- ◆ Production roll out is fluid due to the nature of field workers schedules. We need to be flexible.
- ◆ Training was pretty easy
- ◆ Xamarin/ArcGIS SDK was our major decision driver
- ◆ Our partnership with New Wave Geographics was crucial
- ◆ Quickly create maps with forms for Non-Dairyland personnel
- ◆ Build it and they will come

# The Future

- ❖ Work ticketing functionality
- ❖ Telecom inspection/work ticket forms
- ❖ Monthly vehicle inspection forms
- ❖ Pole inspection upgrade
- ❖ Meter data testing inspection forms
- ❖ Vegetation Management upgrade
- ❖ Use Web app as dashboard

# The Future, Work Tickets

The image shows two overlapping mobile application screens. The background screen is a 'Map' view with a list of tasks. The foreground screen is a 'Tasks' detail view for a specific task.

**Map View (Background):**

- Carrier [signal] 5:05 PM
- Map
- TaskID: [input field]
- AssignedTo: [input field with 'Bill']
- CreatedOn: [input field with '3/28/2017']
- CreatedBy: [input field with 'Click to sel']
- DueDate: [input field with '017']

**Tasks View (Foreground):**

- Carrier [signal] 5:09 PM
- Tasks
- Task #1  
This is the description.  
Created on 3/10/2017, Due on 3/10/2017
- Task #2  
My New Task  
Created on 3/13/2017, Due on 3/13/2017
- Task #3  
Created on 3/13/2017, Due on 3/13/2017
- More (grey button)
- Complete (red button)
- Zoom To Task (blue button)
- View Task Details (blue button)
- Cancel (white button)

Bottom navigation bar: View Map, Search Map, Directions, My Maps, Settings

- ❖ Create tasks
- ❖ Assign tasks
- ❖ Complete tasks
- ❖ Works through GIS database
- ❖ Set alarms based on fields
- ❖ Set priorities
- ❖ Tasks show up in users task list
- ❖ Tasks disappear when complete
- ❖ Use “dashboard” to deploy



# In Conclusion

- ❖ What's great about the ESRI product suite, is they let you decide how you will solve business challenges.
- ❖ They do this by providing multiple tools to choose from, or the ability to create your own solution using SDK's
- ❖ GeoCross Mobile works for Dairyland
- ❖ It could work for others as well



# Thank You!

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