

Dairyland Power Mobile GIS Deployment

Presenters:

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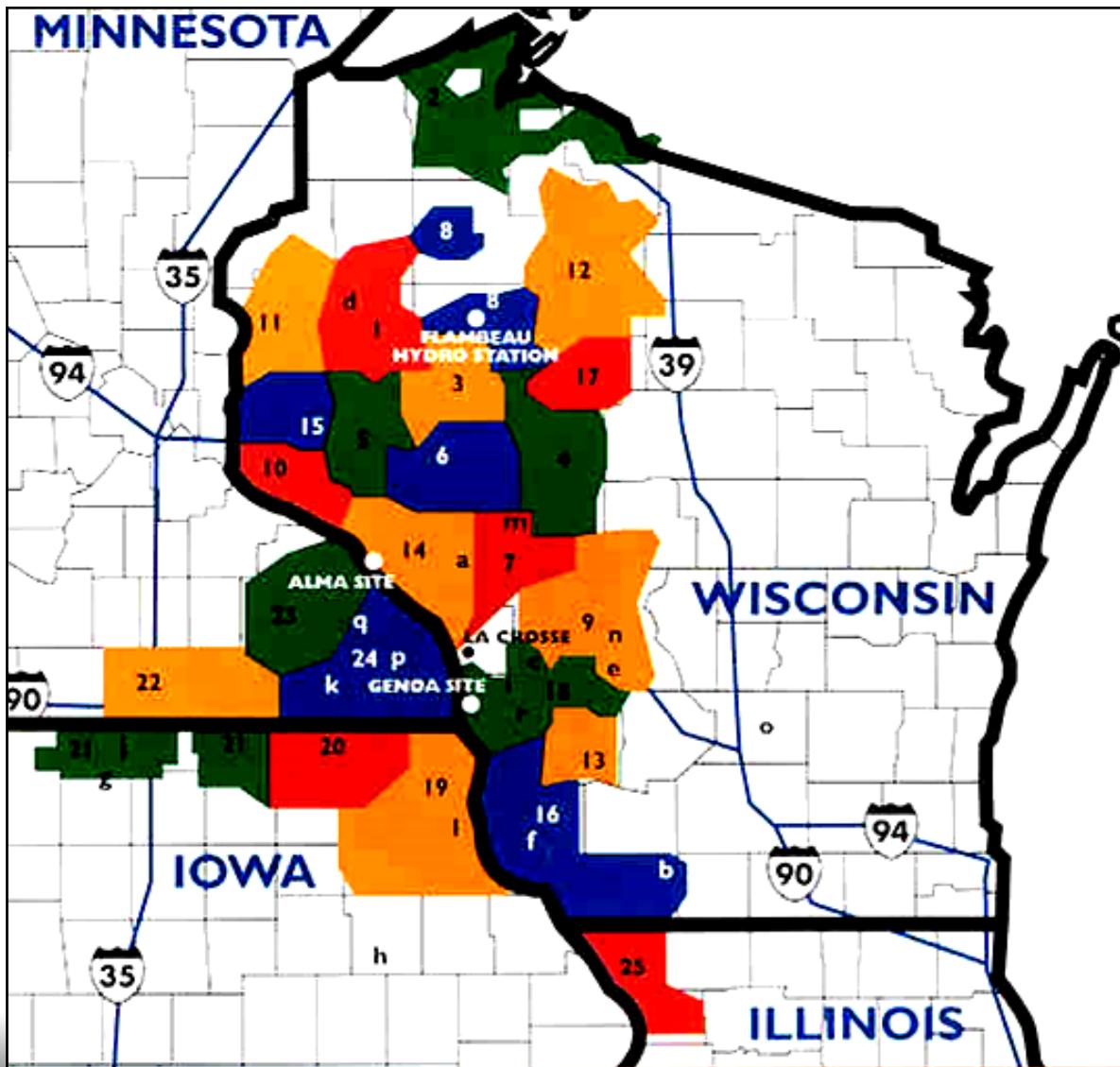


Dairyland Power Cooperative



- ▶ 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 1st 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 shows the Dairyland Power GIS Web Map Viewer interface. On the left, there's a sidebar with a 'Layers' section containing checkboxes for 'Feedback' (checked), 'Lightning Strikes' (unchecked), 'DPC Layers' (checked), 'Foreign Utility Layers' (checked), and 'Weather Underground Radar' (unchecked). Below this are buttons for 'Legend', 'Bookmarks', 'Find', 'Identify', 'Measurement', 'Draw', 'Editor', 'Print', 'Directions', and 'Google Street View'. At the top center is a search bar with the placeholder 'Enter an address or place'. In the top right corner are 'Help' and 'Basemaps' dropdown menus. The main area is a map of the Upper Midwest, specifically Minnesota and Wisconsin, showing a network of utility lines in red and green. Major cities like Minneapolis, St. Paul, Eau Claire, and Rochester are labeled. A red box highlights the 'Identify Features' tool. Overlaid on the map are several white boxes with red text: 'Search Tools', 'Identify Features', 'Measure Distances', 'Driving Directions', 'Google Street View', and 'Lightning Strike Data'. The bottom left of the map shows coordinates '1,231,162 X: -94.073 Y: 45.382'. The bottom right corner features the Esri logo and the text 'POWERED BY esri'.

Dairyland Power
COOPERATIVE

Dairyland Power GIS
Web Map Viewer

Help

Basemaps

Layers

Feedback

Lightning Strikes

DPC Layers

Foreign Utility Layers

Weather Underground Radar

Legend

Bookmarks

Find

Identify

Measurement

Draw

Editor

Print

Directions

Google Street View

Enter an address or place

St Cloud

Elk River

Ramsey

Minneapolis

St Paul

Lakeville

Fairbank

Mankato

Albert Lea

Austin

Mason City

Rochester

Winona

Eau Claire

Rice Lake

Decorah

Wausau

St. Paul

Search Tools

Identify Features

Measure Distances

Driving Directions

Google Street View

Lightning Strike Data

1,231,162 X: -94.073 Y: 45.382

POWERED BY esri

WebGIS Lightning Strikes

The screenshot displays a map of southern Minnesota, specifically the area around the Mississippi River, showing lightning strike locations and service areas. The map includes several towns and landmarks such as Elmo, Hudson, Lakeland, Afton, Hastings, Prescott, and Ellsworth. A legend on the left provides options for viewing feedback, lightning strikes, and service areas. The map interface includes a search bar, zoom controls, and a scale bar.

Dairyland Power GIS
Web Map Viewer

Enter an address or place

Layers

- Feedback
- Lightning Strikes
 - Within Lines Buffer
 - Lightning Strikes Within 500 Meter Buffer - 24-48 Hour History
 - Lightning Strikes Within 500 Meter Buffer - 14 Day History (Excludes most recent 24-48 hours)
 - Lightning Strikes Within 500 Meter Buffer - 15 to 30 Day History
 - Lightning Strikes Within 500 Meter Buffer - History (Outside 30 Days)
- Within Service Area
 - Lightning Strikes Within Service Area - 2 Hour History
 - Lightning Strikes Within Service Area - 4 Hour History
 - Lightning Strikes Within Service Area - 24-48 Hour History
 - Lightning Strikes Within Service Area - 14 Day History (Excludes most recent 24-48 hours)
 - Lightning Strikes Within Service Area - 15 to 30 Day History

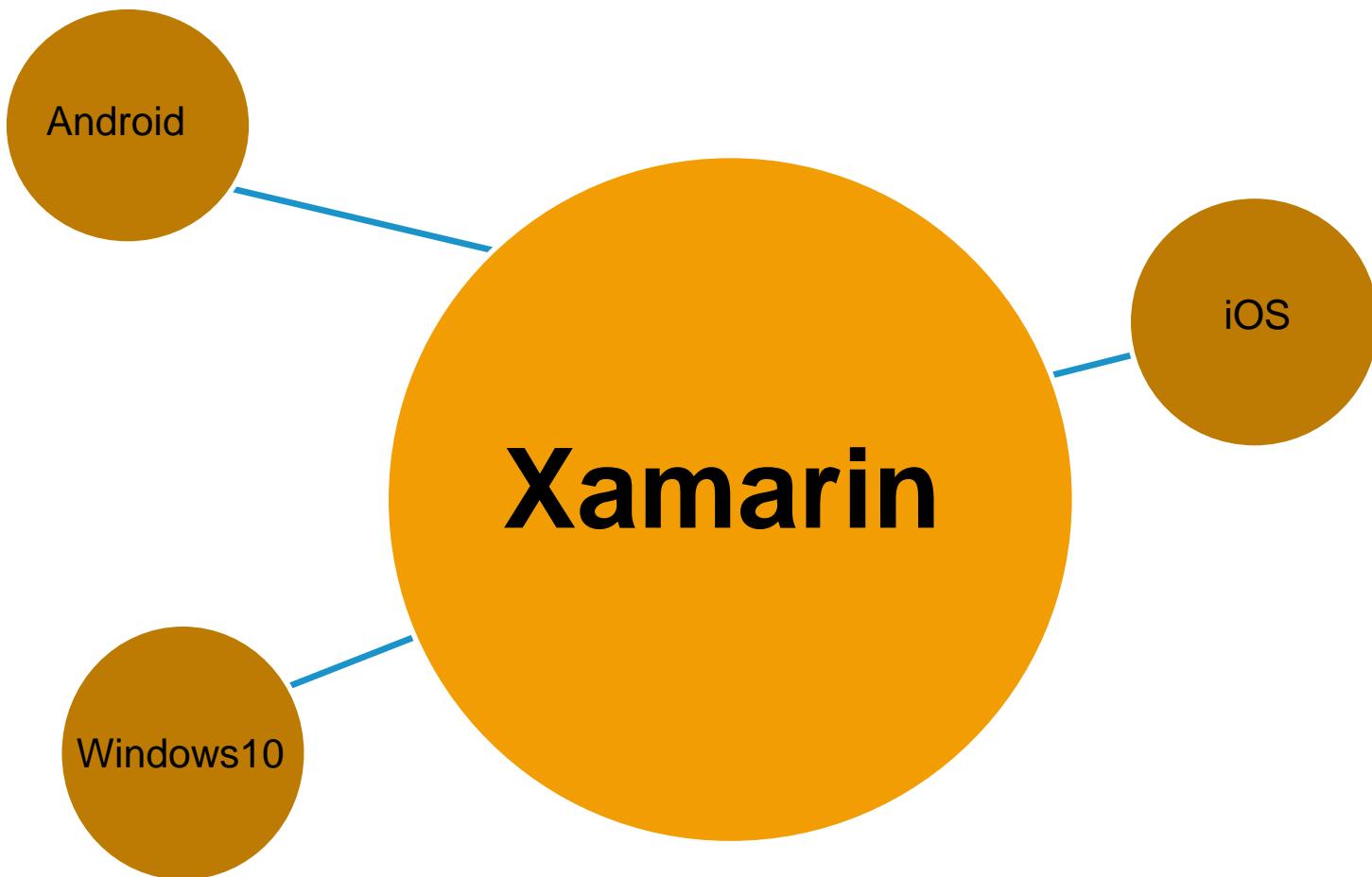
A New Mobile Idea

- 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

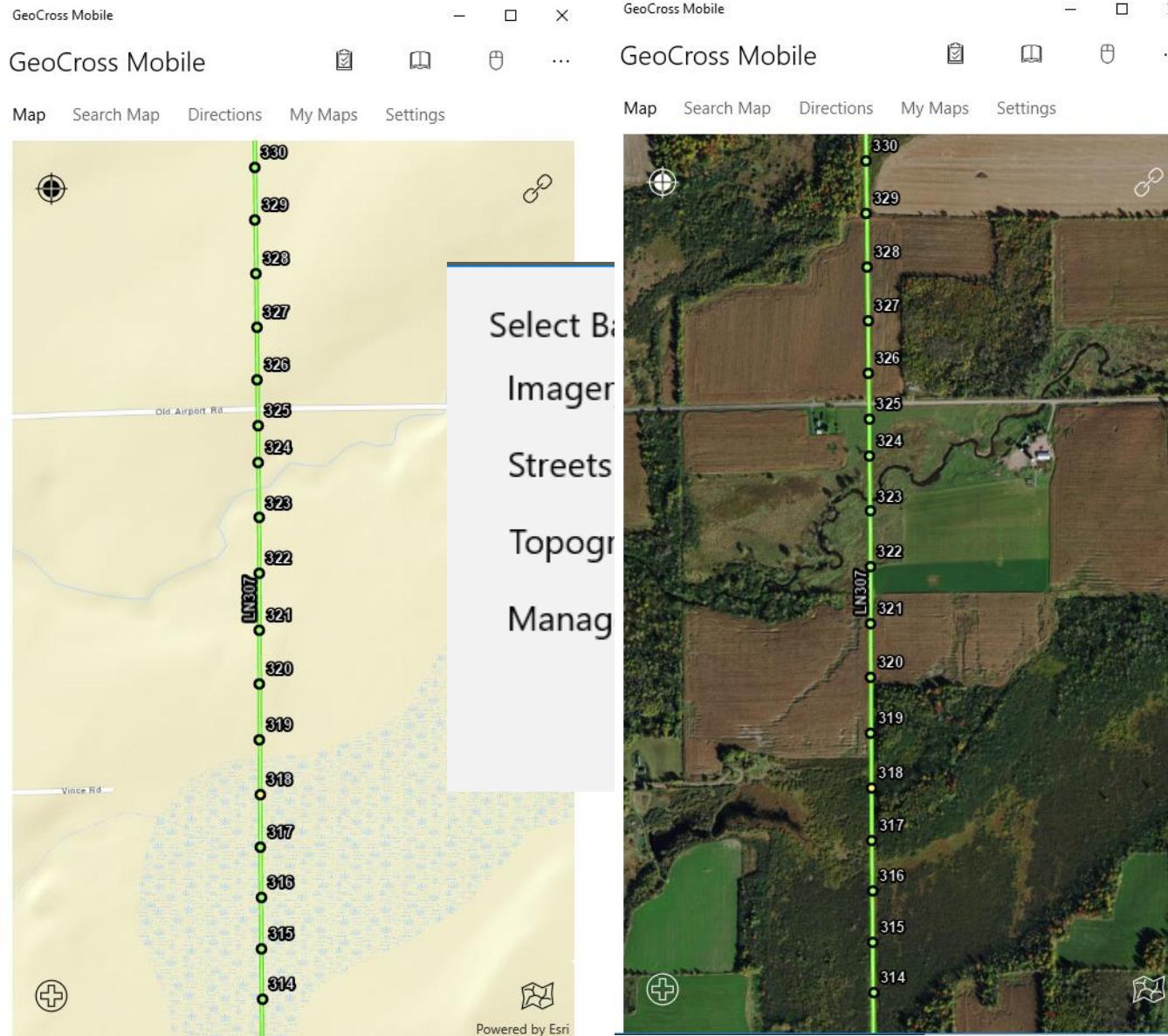
Ready, Set.....

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

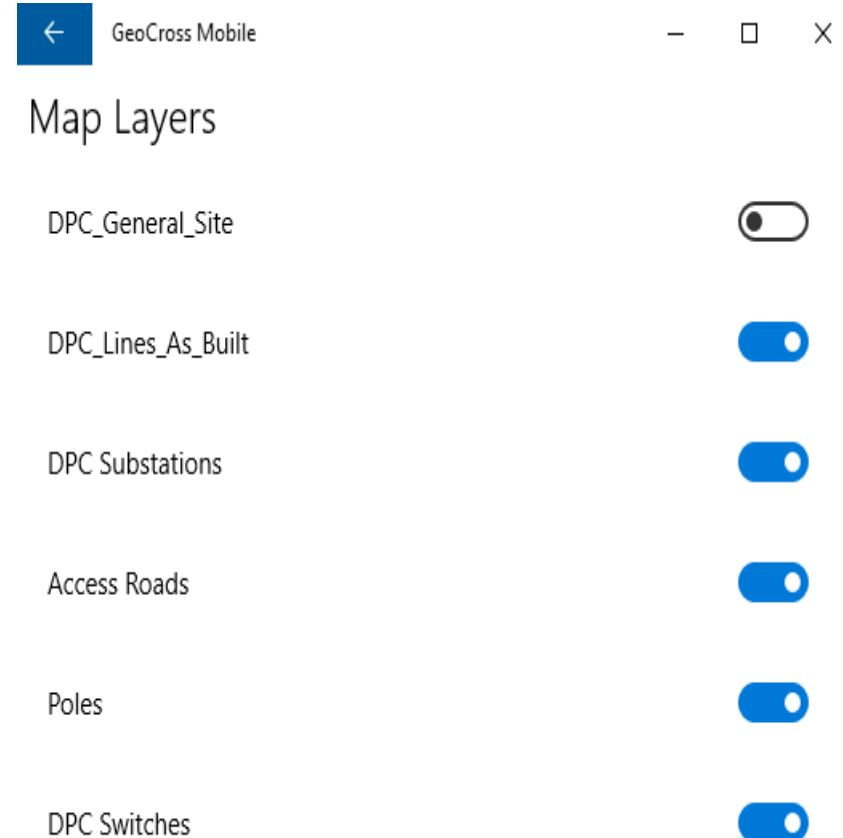
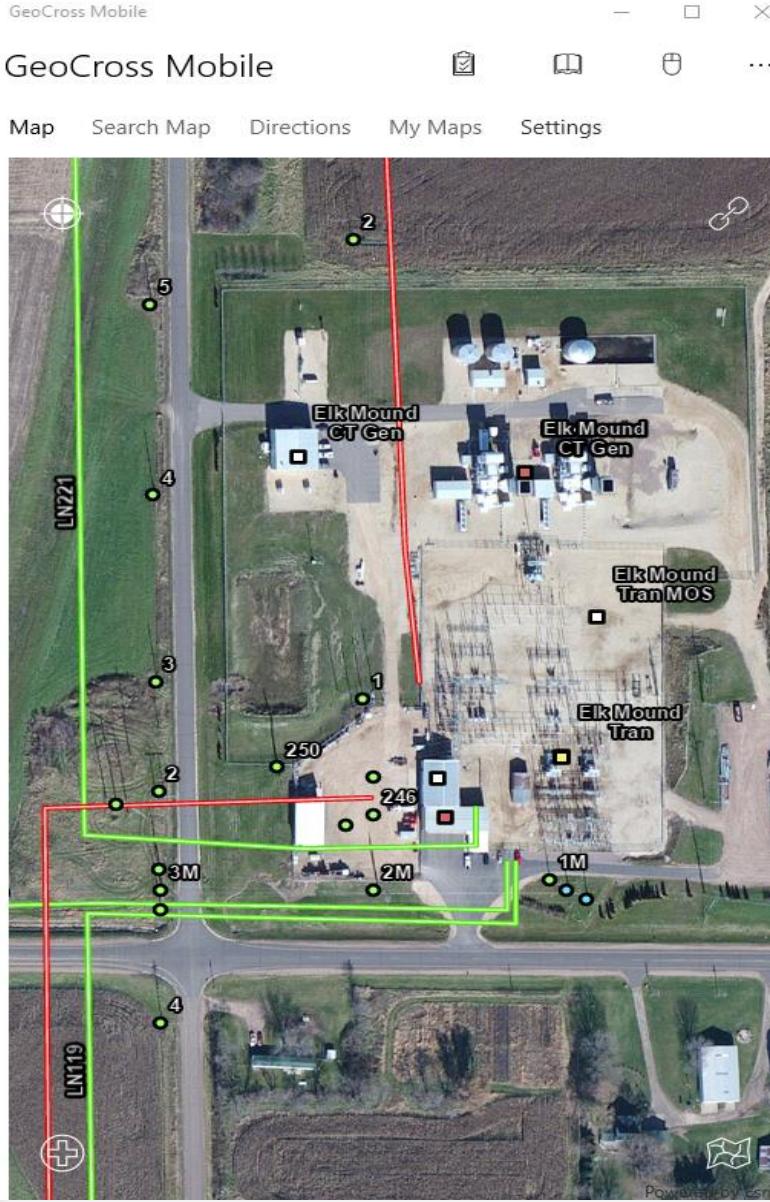
What is it?

- 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

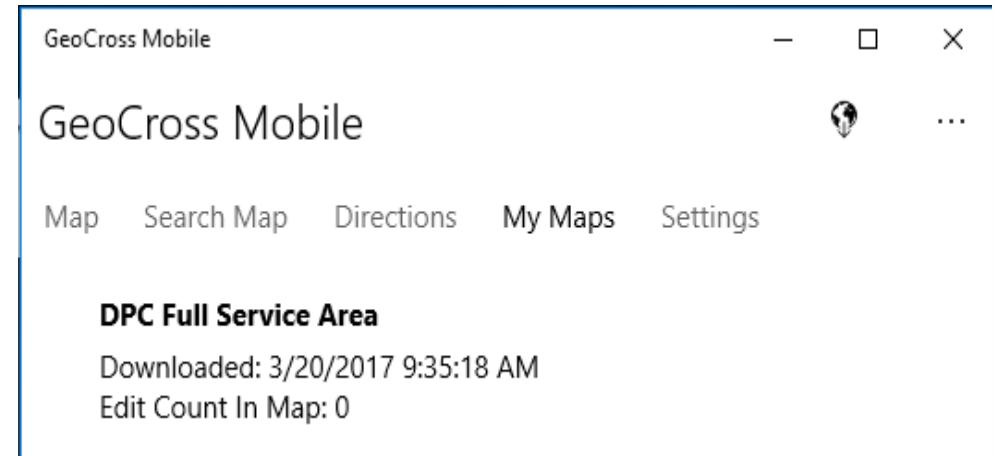
GeoCross



❖ Elk Mound Area



❖ Preloaded offline map of service area



- ❖ Create other offline maps for areas of interest

The screenshot shows the GeoCross Mobile application window. At the top, there's a header bar with the title "GeoCross Mobile" and standard window controls (minimize, maximize, close). Below the header is a search bar containing the text "LNS Area". Underneath the search bar is a "Level Of Detail" slider, currently set to a value of 10, with the text "Selected Level Of Detail: 10" displayed next to it. A button labeled "Estimate Basemap Size" is also present. The main content area displays two map entries:

- 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

At the bottom right of the main content area is a "Download Map" button with a globe icon.

❖ Easy updates for maps and application configurations

The image displays two side-by-side screenshots of the GeoCross Mobile application interface, illustrating its configuration options.

Left Window (Light Theme):

- General:** Includes "My Workplace Id", "Color Theme" (set to Light), "Default Start Page", and a "Map" dropdown set to "Map".
- Configuration:** Includes "Configuration Directory", "Set Configuration Url", and a red circle around the "Update Configuration" option.
- Data:** Includes "Basemaps Directory", "Update Basemaps", "Static Maps Directory", and a red circle around the "Update Static Maps" option.
- Location:** Includes "Location Display Mode" (Recenter) and "Enable GPS Tracking" (switched off).

Right Window (Dark Theme):

- General:** Includes "My Workplace Id", "Color Theme" (set to Dark), "Default Start Page", and a "Map" dropdown set to "Map".
- Configuration:** Includes "Configuration Directory", "Set Configuration Url", and a "Update Configuration" option.
- Data:** Includes "Basemaps Directory", "Update Basemaps", "Static Maps Directory", and a "Update Static Maps" option.
- Location:** Includes "Location Display Mode" (Recenter) and "Enable GPS Tracking" (switched off).

❖ First task – Substation Inspections

The screenshot shows a Windows-style application window titled "Substation Inspections". The window has a dark header bar with a back arrow and the title. Below the header are three main sections: "Site Info", "Inspection Info", and "Substation Info".

- Site Info:**
 - Substation #: T9
 - Site Name: Harmony Tran
 - Utility Served: DPC
- Inspection Info:**
 - Inspection Area: Harmony
 - Inspection Date: July 1 2016
 - Inspector Name: Jason Hovey
- Substation Info:**
 - Checklist (button, circled in red)
 - Circuit Breaker (button)
 - Maintenance (button)
 - Transformer (button)
 - History (button)

5 Separate data sets accessed from one inspection form

❖ First task – Substation Inspections

The screenshot shows a mobile application window titled "GeoCross Mobile" with a title bar and standard window controls. The main content area is titled "New Inspection". It contains several sections of inspection data:

- 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



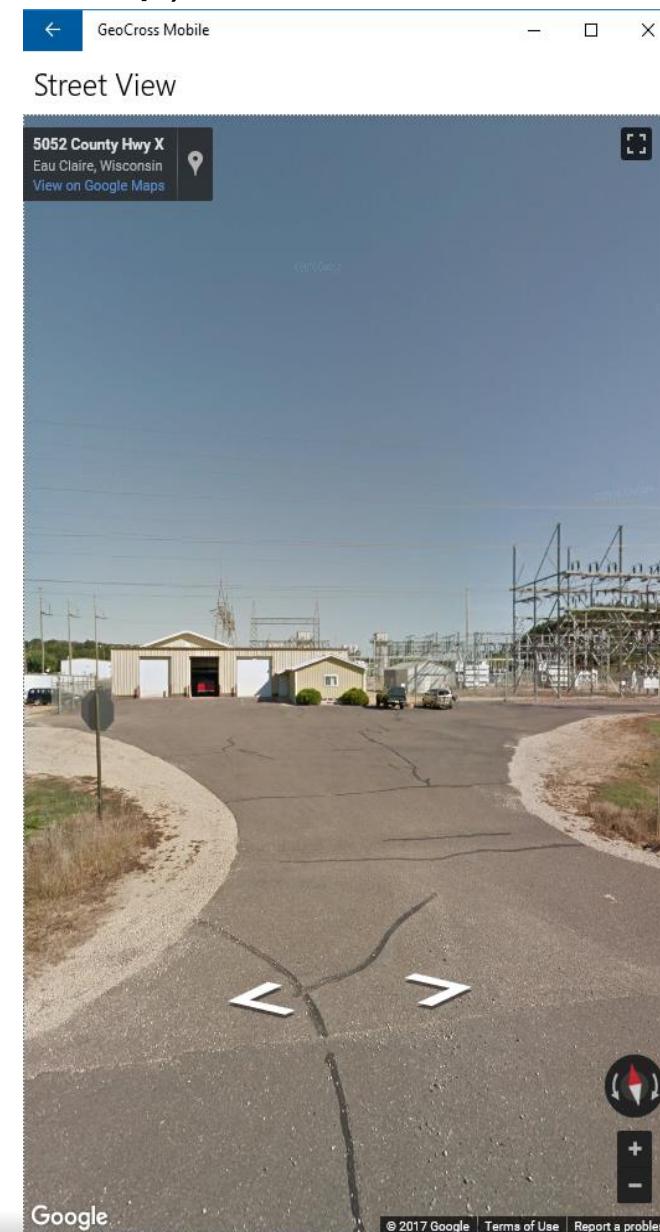
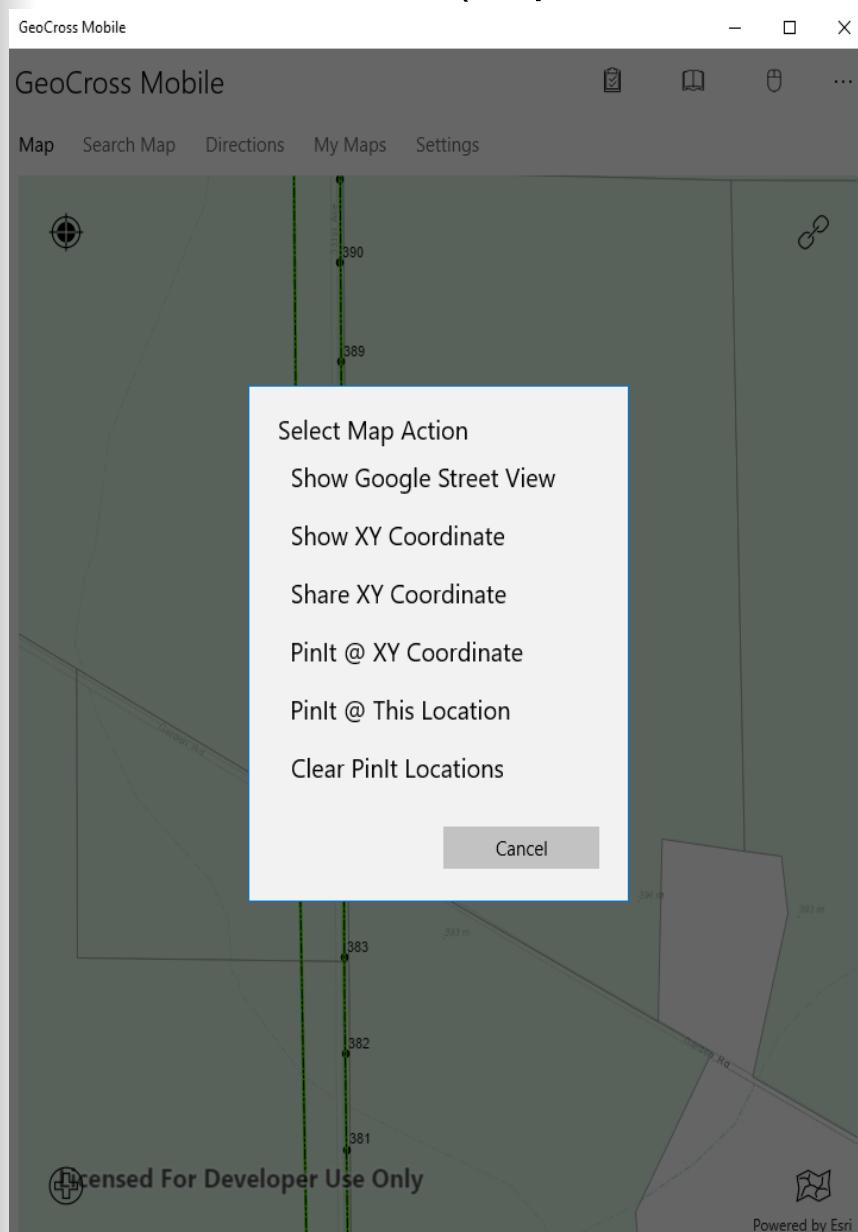
❖ First task – Substation Inspections

GeoCross Mobile

Circuit Breakers

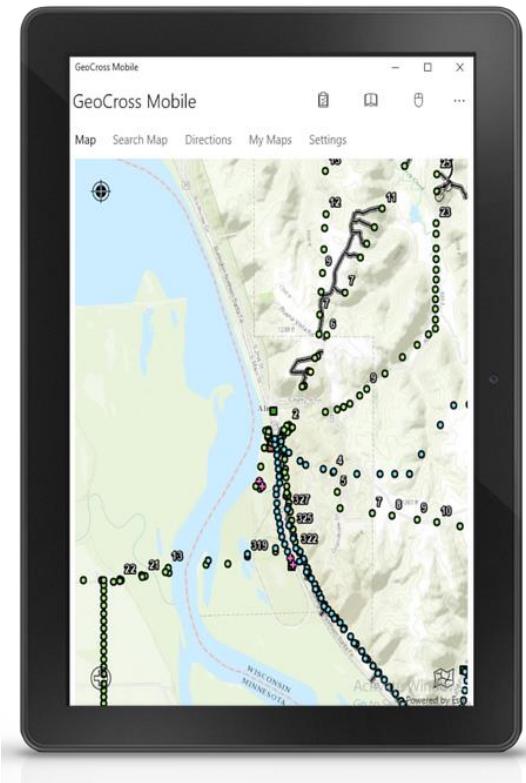
- Breaker #: 9QB7**
Substation #: T9
- Breaker #: 9NB8**
Substation #: T9
- Breaker #: 9NB2**
Substation #: T9
- Breaker #: 9NB1**
Substation #: T9
- Breaker #: 9NB7**
Substation #: T9, Counter: 353
- Breaker #: 9NB6**
Substation #: T9
- Breaker #: 9QB10**
Substation #: T9
- Breaker #: 9NB3**
Substation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



iOS



Android





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

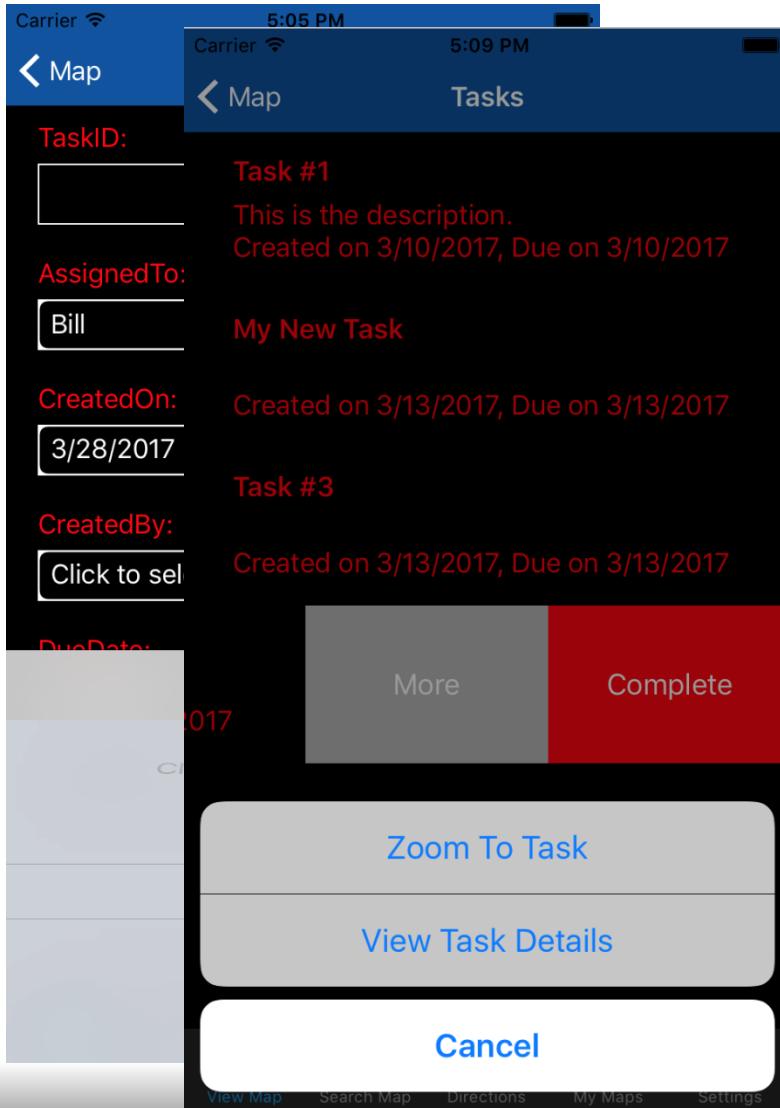
- ❖ Xamarin was the right tool for Dairyland
- ❖ Feedback from the field users was crucial
- ❖ Network setup more difficult than expected (VMware Tunnel)
- ❖ Production roll out is fluid due to the nature of field workers schedules. We need to be flexible.
- ❖ Training was pretty easy
- ❖ Xamarin/ArcGIS 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



- ❖ 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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