Expanding GIS Beyond Maps and Geographic Databases

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What is GoTo TRAILS?

- Online trail management and communication toolset centered around ArcGIS Online webmaps
- **Goal #1**: To augment the information needs and everyday activities of trail planners, managers, and users in a 48-county region inclusive of portions of 4 states (PA, OH, WV, NY)
- **Goal #2**: To efficiently overcome vast distances, strengthen available resource capacities, and equalize various levels of understanding/familiarity with GIS
- **Key components**: web portal, interactive ArcGIS Online maps, mobile app
History of GoTo TRAILS

Sharing a Common Vision of a Connected Trail Network, Connected Communities.
History of GoTo TRAILS

• Regional trail planning project led by a partnership between the Pennsylvania Environmental Council (PEC) and the Rails-to-Trails Conservancy (RTC)

• Outgrowth of Industrial Heartland Trails Coalition (IHTC) initiative
  o Initial coalition formed in 2012
  o Partnership to develop a 1,450-mile-long multi-use trail system in the industrial heartland of America by 2033

• Intended as a tool to assist regional trail planning partners in more easily planning new trail sections and filling in trail gaps
Other Partner Organizations

- National Park Service (Rivers, Trails, and Conservation Assistance Program), the Benedum Foundation, the George Gund Foundation, Friends of the Riverfront, Pennsylvania Department of Conservation and Natural Resources, Ohio Department of Natural Resources, Great Ohio Lake-to-Greenway Coalition, and others
GoTo TRAILS, a Trail-Centered Web App

• Began as series of customized “sandboxes” (trail-specific ArcGIS Online webmaps) for individual trail development groups to plan routes/alignments and to make digital and hard-copy maps to share with other trail constituents/advocates

• Constantly-updated and editable basemaps with data for more than 7,000 miles of land trails, water trails, and on-road bike routes across the U.S.

• Based on the differences in the needs of a variety of users, GoTo TRAILS has grown into three different toolboxes, known as **Planner**, **Explorer**, and **Manager**
GoTo TRAILS Planner

- **Planner** – for trail planners (a set of tools to document existing trail facilities and to conceptualize, evaluate, and share potential trail corridors and community connections)
GoTo TRAILS Explorer

- **Explorer** – for trail users (find trails and on-road bike routes, identify points of interest, determine the availability of local services, check the weather, and plan itineraries)
GoTo TRAILS Manager

Hello Andrew:
Welcome back to GoTo TRAILS Manager!
What is GoTo TRAILS Manager?

• Web app that allows trail managers/operators and workers to:
  o Report problems along trails
  o Manage assets such as bridges, benches, pavement, receptacles, restrooms, pavilions, etc.
  o Mark and broadcast detours and closures
  o Create work orders
  o Estimate costs for construction and maintenance
  o Administer volunteer efforts

• “One-stop shop” for trail organizations to use and store all the information and resources they may need for the management, construction, and maintenance of their trails
GoTo TRAILS Manager: Objectives

- Create GIS-based applications tailored to individual users that have utility both in the office and out in the field.
- Leverage existing GIS capabilities by integrating ArcGIS Online maps with non-geographic databases to facilitate a level of usability beyond what is available with geographic databases alone.
- Use already-available technologies to minimize costs and incentivize adoption.
- Supplement resource limitations/capacities with a ready-built tool (many trail managers have limited familiarity with GIS, let alone computer programming and database development).
A Marriage of Technologies...

• Some types of information are not as appropriately handled through geographic databases
• Maintain parallel databases without using a single line of programming code
• Integrated solution to serve custom data to various types of users, who access the GoTo TRAILS platform from a wide range of devices
• ArcGIS Online + FileMaker platforms
  o Geographical data + non-geographical data
GoTo TRAILS Manager: Overview

- **Structure:**
  Piggyback ArcGIS onto the FileMaker database platform

- **Privilege levels:**
  Group Administrator, Group Leader, Volunteer

- **User profiles:**
  Trail organizations and “home” trail designations

- **Resource management:**
  Financial, Physical, Human, Time, etc.
ArcGIS Online Webmap: An Overview

• Used as a reference for multiple functions in Manager
  o Measurements, location, icon placement, etc.
• Embedded in the FileMaker layout, which itself is displayed in your device’s browser
• Webmaps/map data are not connected to the FileMaker database
• Manager tools do not edit linework, unlike with Planner
• Inputs such as work order information, project estimator inputs, etc. are independent of the webmap
FileMaker: An Overview

- Database platform that allows users to create graphical, interactive layouts with input boxes, buttons, etc. that save directly to a more traditional database of tables
- Adds functionality to existing solutions provided through ArcGIS Online, without having to learn PHP, SQL, ArcGIS JavaScript API, etc.
- GoTo TRAILS Manager built using FileMaker Pro and deployed as a web app through FileMaker WebDirect
- Why WebDirect?
  - Can handle up to 500 users simultaneously
  - Runs FileMaker applications through any web browser (whether desktop or mobile), layouts and all
  - HTML, CSS, JavaScript, HTTPS all handled through WebDirect
  - No computer programming knowledge required
  - Depends on internet connection (cellular service or wi-fi) for initial launch but once connected will cache any data inputted offline or on a spotty connection until connection re-established
  - Level of security/login capability through FileMaker (back-end) not readily available with ArcGIS Online (front-end)
ArcGIS Online:  
– webmaps embedded within browser

FileMaker:  
– WebDirect

GoTo TRAILS: Data Flow

PLANNER

EXPLORER

MANAGER

geographic data

non-geographic data
GoTo TRAILS Manager: Tools

- Work Orders
- Broadcasts
- Project Estimator

- Report a Problem
- Set Trail Alerts
- Manage Assets
Work Orders

• Allows administrators and leaders to manage work orders and construction efforts and to track progress
• Includes form to organize all the necessary information to start, maintain, and complete a project
• Features embedded ArcGIS map to find and enter the coordinates/location of the work order
• Select the number of volunteers or workers needed to complete a task and automatically distribute email notifications
• Identify start times, tools needed, materials needed, etc.
Work Orders, continued

GoTo TRAILS Manager mobile v1.0

Overview Info Images Map Weather

Work Order #

Work #

Trail Name:

Description

Work Description:

Start Date ___________ End Date ___________

Group Name ___________ Work Group: ___________

Leader ___________ Leader: ___________

NEW WORK ORDER SAVE WORK ORDER

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Work Order Sheet

Great Allegheny Passage

<table>
<thead>
<tr>
<th>Work Order Number</th>
<th>1234</th>
<th>Creation Date</th>
<th>11/22/2016</th>
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</thead>
<tbody>
<tr>
<td>Date of Work Effort</td>
<td>11/22/2016</td>
<td>End Date</td>
<td>11/24/2016</td>
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<tr>
<td>Work Order Description</td>
<td>astthevwe</td>
<td>Meeting Time</td>
<td>9:30 AM</td>
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</tbody>
</table>

Trail Owner: Allegheny Trail Alliance
Maintained By: Friends of the Riverfront

Work Order Status: ○ Final ○ In Progress ○ Under Review
Construction Status: ○ Finished ○ In Progress ○ Not Started

Start Location (Northing Coordinates)
Start Location (Eastings Coordinate)
Start Location (Mile Marker)
End Location (Mile Marker)
Cooler Temperature (°F)
Warmest Temperature (°F)

Standard Hand Tools Required ○ Yes ○ No
Gasoline Powered Tools Required ○ Yes ○ No
Off-Site Construction Materials Needed ○ Yes ○ No

Off-Site Material Order/ Delivery Status

Total Number of Workers Needed
Estimated Total Person-Hours
Actual Total Person-Hours

Work Group Name
Dream Team

Work Group Leader
Name: Chris Simmons
Status: Volunteer
Hours Worked

General Notes/Comments
• **Report a Problem** – shows any problems or issues that have been reported by Manager users
  - Pinpoint rough pavement areas, graffiti, washouts, fallen trees, dead animals, etc. using ArcGIS icons
  - Touchable/clickable feedback with ArcGIS Online pop-up info windows
  - Select location, place icon, fill in description, date, coordinates, etc.
• **Set Trail Alerts** – display ongoing issues such as closures or caution advisories
• **Manage Assets** – organize and display all the assets along your trail
  - For trail organizations to guide maintenance and future asset construction while helping trail users find and anticipate trail features
*Ability to report is for those who have downloaded the app and are a part of the trail organization.
Project Estimator

• Worksheet to estimate costs of trail construction/maintenance projects
• Select improvement materials such as drainage pipes, concrete pavements, asphalts, other construction essentials
• Instantly computes the unit of measurements and provides an estimated unit cost
• Calculates needed quantities of materials and final cost estimate
• Example of tool not tied to geographic database
Project Estimator, continued

GoTo TRAILS Manager mobile v1.0

Overview  Specs

<table>
<thead>
<tr>
<th>Project Estimate ID #</th>
<th>115</th>
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<tbody>
<tr>
<td>Date created</td>
<td>4/19/2017</td>
</tr>
<tr>
<td>Date modified</td>
<td>4/19/2017</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Trail Name</th>
<th>Three Rivers Heritage Trail</th>
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</thead>
<tbody>
<tr>
<td>Project Estimator</td>
<td>Colin Hall</td>
</tr>
<tr>
<td>Project Estimate Name</td>
<td>Test 1</td>
</tr>
</tbody>
</table>

Estimate Status: In Progress

Grand Total $1,320.00
### Friends of the Riverfront

**Worksheet**

<table>
<thead>
<tr>
<th>Improvement Name</th>
<th>Unit of Measurement</th>
<th>Length</th>
<th>Width</th>
<th>Quantity</th>
<th>Unit Cost</th>
<th>Subtotal Cost</th>
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</thead>
<tbody>
<tr>
<td>Concrete pavement, 8&quot; depth with no reinforcement</td>
<td>SF</td>
<td>15.00</td>
<td>4.00</td>
<td>60.00</td>
<td>$18.00</td>
<td>$1,080.00</td>
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<td>16.00</td>
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**Total Cost** $1,320.00
Lessons Learned

• Goal with the project was to create a way to keep track of 120 different trail groups...
  o Requiring all of them to provide us regular updates via email, phone, etc. was impractical
  o Manager provides tools to make trail groups’ routine tasks easier while allowing them to simultaneously and automatically provide regular updates
  o To achieve what we want, Manager needs to achieve what trail groups want
Lessons Learned, continued

- Learning and adoption will take time...
  - Adoption has required more “train the trainers” moments than initially planned but has led to good direct feedback
  - A large number of trail volunteers are over 65 years old, and using a smartphone as a trail management tool has been a learning curve for some
  - On-the-ground/in-the-field demonstration sessions for volunteers have helped greatly with familiarization and have increased use of the tool
  - Younger volunteers will need to serve as ambassadors
- Tradeoffs between usability, technology, operations, and resources:
  - Universally accessible on multiple operating systems
  - No programming/coding needed
  - Can be slower than a native app
  - Requires internet connection (cellular data or wi-fi) on launch but does not require steady internet connection after launch
Thank You!

Connecting Trails, People and Places
GoTo TRAILS provides a digital map, whiteboard and forum for trail planners, builders, enthusiasts and explorers to find trail-related information and share ideas for connectivity.

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