PowerOn/Smallworld Integration for Disaster Recovery Outage Packages

Mark Field, Field Consulting and Services, Inc. (FCSI)
Theresa Sampson, SECO Energy (SECO)

Keywords:

Disaster Recovery, Plotting, Outage, PowerOn Integration, Circuit Isolation

ABSTRACT: PowerOn and Design Manager provide excellent solutions for their target uses. However there are times when data from both systems are needed to provide a full understanding of the status of your network. This paper will demonstrate how SECO uses the predictive data from PowerOn to isolate the circuit and outage route within Smallworld and automatically create PDF files. This process is an automated process so hundreds of PDFs for each predictive outage can be created in a matter of minutes. We will also discuss the nightly process of developing the PDFs and distributing them to the crews during disaster recovery.

In preparation for hurricane Dorian, SECO wanted an automated process to provide paper maps, PowerOn Ticket Information, and PDFs of outages reported to crews. Experience with Hurricane Irma in 2017 showed that the current process of relating outages to crews from different companies was not efficient and needed to be more effective.

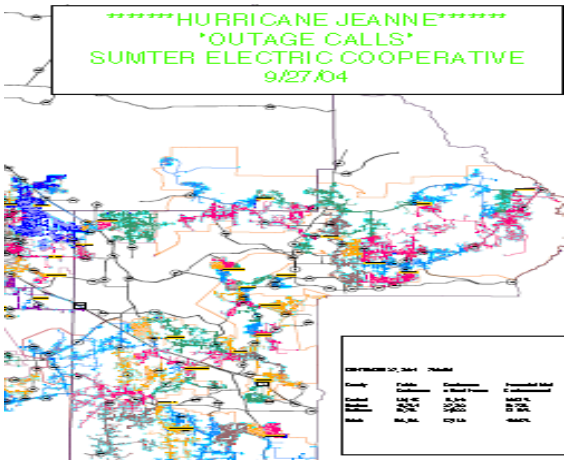
1 Introduction

Central Florida sees its fair share of severe weather. From the occasional hurricane to seasonal storms producing tornados and high winds, SECO must respond quickly to restore power to all its members.

After large spread disasters, SECO is blessed with support from around the country. However these crews are not familiar with the service area. SECO serves over 211,000 members spanning over 2000 square miles. Organizing the response to wide spread outages becomes key to the fastest restoration. After the initial survey and repair of larger capacity lines, identifying localized outages of 1000 members or less becomes the highest priority.

1.1 Previous Methodology

With each storm SECO improves its response with the addition of new tools. In 2004 for hurricanes Charley, Francis, and Jeanne, large area plots were created.



The data provided was good, but at too high of a level for crews to understand what devices were affecting which members. When Irma hit in 2017, more wide spread damage was done and more specific information had to be given to the crews. So PowerOn Restore Dispatcher tickets were generated along with a simplified map of the area referenced by the ticket.

NS Trouble:563919-1 Priority: 0

First Trouble Call

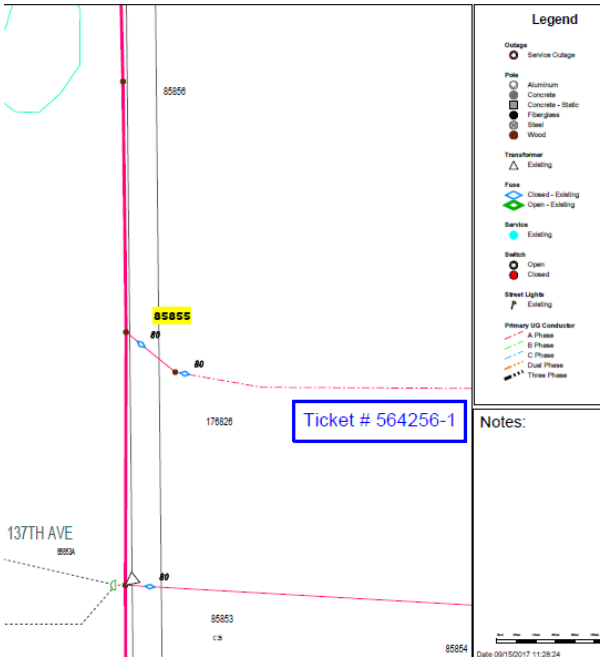
Customer Name	WILLIAM F FIELD	Location	1357 C3 01344 84531 @ 2468 SW 40 WAY BUSHNELL FL	Contact#	(352) 303-000
Customer Account#	99912345		Premise		
Meter Number	9999 6347		Meter Location	null	
Contact Name	FIELD, WILLIAM				
ACCT PH#	352-30300				

Order Summary

Symptoms Description	Power Out		
Instructions	null		
Substation	Bushnell		
Feeder#	BU8		
Device	Customer 99912345		
Device Location	1357 C3 01344 84531 @ 2468 SW 40 WAY BUSHNELL FL		
Area	SDO Crews		
Predicted Customers Affected	1	#of Calls	3
Crew(s) Assigned	null		

Trouble Calls With Comments

Account Name	Account Ph#	Address	Trouble Code	Call Time	Contact#	Cust. Type
WILLIAM FUR FIELD	352-30300	1357 C3 01344 84531 @ 2468 0 SW 40 WAY BUSHNELL F L	PO	9/14/2017 2:02:51 PM	(352) 303-000	Non-Critical



This ticket/map combination was an improvement, but they were extremely time consuming to produce. There were many instances where a crew restored service to a ticket area that was later submitted to another crew. This caused unnecessary time and confusion due to out of date information. A better solution had to be developed.

2 System Architecture

SECO utilizes Design Manager 4.3 and PowerOn Restore 4.2. The electric dataset utilizes the older Cornerstone datamodel with modifications designed, developed, and maintained by SECO.

3 Why Paper?

The question commonly asked is "Why do we need a static map in the form of paper or electronic such as PDF?" The answer is that during a disaster there is no guarantee that there will be any type of power or communication out in the work area. Paper is the best solution to ensure that crews have the data they need. Paper can be handed out to the crews at the beginning of each shift much easier than other media. Electronic data are being used more, but can be unreliable due to the inability to update the data and potential power limitations.

4 Goals

4.1 Use PowerOn Restore Data

PowerOn Restore data will be used to define what information is provided on the outage maps. The following information will used.

- predicted facility
- incident id
- order reference
- predicted members affected
- calls
- feeder
- dispatch area

4.2 Use Smallworld Design Manager Data

The maps will be generated from Smallworld because of the network data available. Other data held within Smallworld will be used to provide critical information on the outage maps such as the following.

- Isolate affected circuit & area
- Isolate & highlight service locations that are predicted out
- Identify device that is out based on facility information provided by PowerOn
- Provide address and basic direction to predicted device from nearest reported outage
- Provide list of "Special Interest" customers with contact information

4.3 Highly Automate Process

A disaster is just that: A DISASTER. Large sections of the service area may be damaged and/or without power. The number of reported outages will be extremely high. This mandates that the process of creating outage maps be highly automated and generated in a timely fashion. Every night between 12 and 3 AM, packets will be generated for the next day's work by the crews. These packets will be distributed to the crews each morning in paper and/or electronic form.

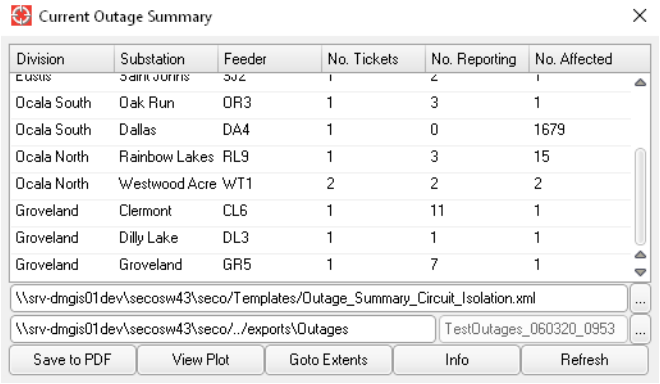
4.4 Configurable

SECO performs ongoing reviews of current processes. These reviews may identify changes that are required to provide better data to the crews.

5 Technical Approach

5.1 Interface

This is the interface.



At this point the ticket information from PowerOn has been read and grouped by Feeder.

The user just selects which Feeders to generate PDFs for and hits the “Save to PDF” button. Simple enough so any user can create the data at any time it is needed.

5.2 Layout Template

A layout template would be used as the basis of the outage maps. These templates have several dynamic elements that are used to identify the placement of the information on the page. These elements utilize data provided by an engine that loops over information in each ticket from PowerOn.

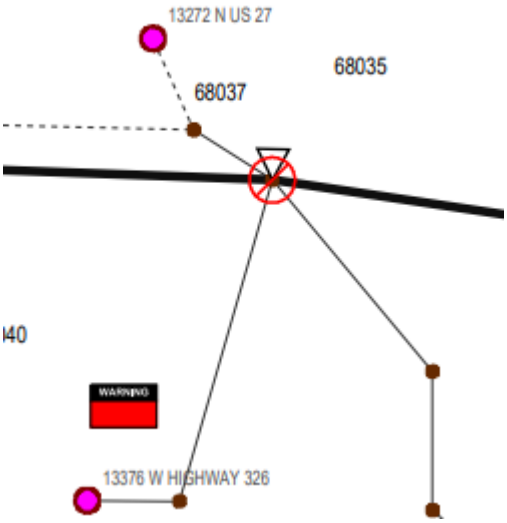
5.2.1 Circuit Viewport Element

FCSI developed a Circuit Isolation Viewport element for SECO. This isolates the data associated with the selected Circuit. This viewport also shows conductor not part of the selected circuit in smaller styles. This is demonstrated in the following figure.

The thin red conductor with the yellow highlight is part of a different circuit. Its style is thinner and the devices on that circuit are not shown. For Outage Maps, the view bounding box of the viewport is determined by the device and reported outages from PowerOn. These “endpoints” on the network are passed into the Smallworld network follower, where specialized FCSI functionality does a multi-point shortest path determination which takes only several seconds to process hundreds of endpoints on the network. This ensures the complete route from outage device to all outages are shown within the viewport.

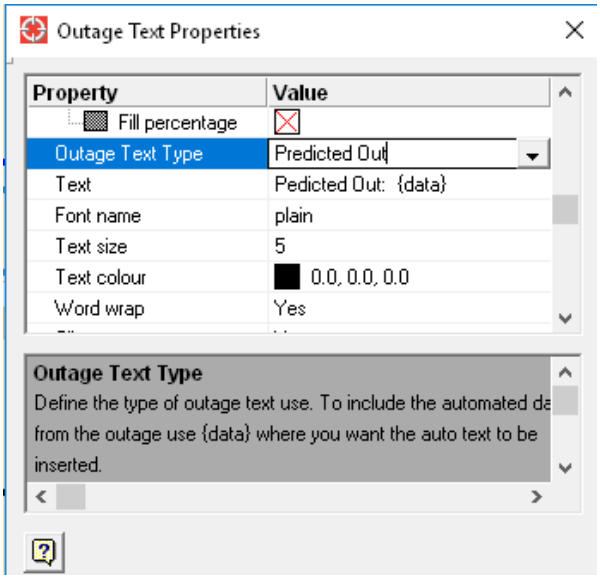
5.2.2 Outage Device Viewport Element

The Outage Device Viewport’s view bounding box is centered to the predicted outage device. A red circle with line indicates the predicted location from PowerOn. This viewport also isolates data to the circuit the outage is on.



5.2.3 Outage Text Element

The Outage Text element allows the user to define where to place different information about the outage ticket. This is an example editor of the Outage Text element.



You can see that there is help for the user for the type of outage text to be displayed. These are the options currently available.

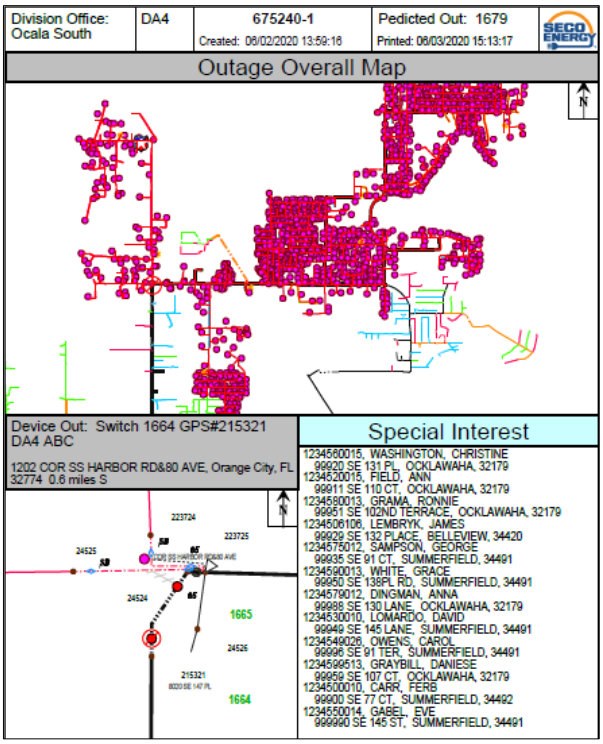
- Division
- CID
- Order Reference
- Creation Time
- Number Predicted Out
- Device Description
- Device Address
- Special Interest

Special Interest is a list of customers that require notification of restoration. The Special Interest Outage Text supports a defined list of data types such as names, address data, and contact information. The help defines the format to be used to show the different elements.

6 Examples of Generated Data

6.1 Outage Map

As shown, the Outage Map provides the details required for the field crews to quickly understand the outage and effectively understand the network they are working on.



The top line provides details of the ticket and the number affected. The Overall Map shows the network from device to those affected. It also shows nearby conductors for reference and possible energizing opportunities. The Device information provides basic address and heading to the device that is out as well as providing more details in the vicinity of the device. The Special Interest section shows the names and addresses that need to be notified.

A PDF file is automatically created for each ticket in the selected Feeder with no additional user interaction. These PDFs are placed in a folder structure with the Division name as the top folder and the Feeder name as a subfolder. At this point the PDS can be batch printed or any part of the directory structure can be distributed to whoever needs electronic copies.

6.2 Customers Out csv

When the tickets are retrieved from PowerOn, a CSV file is created containing all the customers that are out of service. This CSV file is used by various personnel for other processes such as providing regulatory data and automated notifications. Data contained in this file includes customer account information, service address, and contact information.

CUSTOME	ACCOUNT	HOUSE_NI	STREET_N	LAST_NAI	FIRST_NAI	PHONE_A	PHONE_N	INCIDENT	CITY
12345	12345	14095	123 SE 91S	FIELD	DONALD	352	5551234	262970	SUMMERFI
23456	23456	9815	234 SE 140	GRAMA	ALVIN	352	5551234	262970	SUMMERFI
34567	34567	9815	345 SE 140	SAMPSON	ALVIN	352	5551234	262970	SUMMERFI
45678	45678	9251	567 SE 140	OWENS	ANNE	352	5551234	262970	SUMMERFI
56789	56789	10861	678 SE 131	DINGMAN	MICHELLE	352	5538091	262970	OCKLAWAI

6.3 Outage Ticket CSV

A second CSV file is also created when the tickets are read from PowerOn. This CSV contains information about all the current tickets in PowerOn. This provides other departments a basic spreadsheet view of all the PDFs created. This file contains more backoffice data of the tickets than what is shown on the Outage Maps.

ORDER_RE	STATUS	CREATION	COMMENT	MEMBERS	PHASES	CAUSE_ST	DURATION	ETR	INCIDENT_	ORDER_ID	DEVICE_X	DEVICE_Y	DISPATCH	CALLS	FACILITY	FEEDER	MIN_X	MIN_Y	MAX_X	MAX_Y	NORMAL_	NOR
669268-1	assigned	########	unset	1	C		148259	########	262927	247043	2.11E+08	4.65E+08	Grovelanc	7	UG Tx GPS	GR5	2.11E+08	4.65E+08	2.11E+08	4.65E+08	GR5	Grov
669262-1	assigned	########	unset	1	C		142640	########	262929	247045	1.94E+08	4.78E+08	Suntervil	1	Customer	BU1	1.94E+08	4.78E+08	1.94E+08	4.78E+08	BU1	Bush
669263-1	assigned	########	unset	1	A		142599	########	262930	247046	1.96E+08	4.71E+08	Suntervil	1	Fuse GPS	WE3	1.96E+08	4.71E+08	1.96E+08	4.71E+08	WE3	Web
669265-1	assigned	########	unset	1	B		142544	########	262932	247048	1.74E+08	5.24E+08	Ocala Sou	3	Customer	OR3	1.74E+08	5.24E+08	1.74E+08	5.24E+08	OR3	Oak
673254-1	new	########	unset	1	C		19879	########	262957	247081	2.29E+08	4.52E+08	Grovelanc	11	Customer	CL6	2.29E+08	4.52E+08	2.29E+08	4.52E+08	CL6	Cler
673255-1	new	########	unset	1	C		18543	########	262958	247082	2.04E+08	5.09E+08	Villages	1	Customer	LE4	2.04E+08	5.09E+08	2.04E+08	5.09E+08	LE4	Lake
673257-1	new	########	unset	1	B		18014	########	262960	247084	1.71E+08	4.99E+08	Inverness	1	OH Tx GPS	GI1	1.71E+08	4.99E+08	1.71E+08	4.99E+08	GI1	Gosp
673258-1	new	########	unset	1	C		17239	########	262961	247085	2.56E+08	5.1E+08	Eustis	2	Fuse GPS	SI2	2.56E+08	5.1E+08	2.56E+08	5.1E+08	SI2	Sain
673259-1	new	########	unset	1	C		17113	########	262962	247086	1.88E+08	4.94E+08	Suntervil	1	Customer	LP2	1.88E+08	4.94E+08	1.88E+08	4.94E+08	LP2	Lake
674248-1	new	########	unset	1	C		12648	########	262963	247087	2.05E+08	4.77E+08	Grovelanc	1	Customer	DL3	2.05E+08	4.77E+08	2.05E+08	4.77E+08	DL3	Dilly
674243-1	new	########	unset	15	C		9011	########	262967	247090	1.59E+08	5.3E+08	Ocala Nor	3	Fuse GPS	RL9	1.59E+08	5.3E+08	1.59E+08	5.31E+08	RL9	Rain
674244-1	new	########	unset	1	A		8948	########	262968	247091	1.61E+08	5.31E+08	Ocala Nor	1	Customer	WT1	1.61E+08	5.31E+08	1.61E+08	5.31E+08	WT1	Wes
674245-1	new	########	unset	1	C		6629	########	262969	247092	1.62E+08	5.36E+08	Ocala Nor	1	Customer	WT1	1.62E+08	5.36E+08	1.62E+08	5.36E+08	WT1	Wes
675248-1	in_progre	########	unset	1679	ABC		1189	unset	262970	247093	1.98E+08	5.18E+08	Ocala Sou	0	Switch 16	DA4	1.97E+08	5.16E+08	2.03E+08	5.21E+08	DA4	Dall

7 Author Biographies

MARK FIELD is the founder and president of FCSI. He has nearly 30 years of experience with GIS related technologies, 20 of which specifically on Smallworld. He has developed many plug-ins and processes to support increasing ROI of Smallworld users.

THERESA SAMPSON is the Geospatial Administration Specialist at SECO Energy in the Engineering Department. She has over 20 years of experience at SECO Energy in the Geospatial Services as Administrator for Design Manger and PowerOn. She has been a key player in converting their historical AutoCAD GIS system to their current GE Smallworld products as well as day to day PowerOn Network Model Administration.