



Outage Validation Process

Generating Efficiency Through Simplicity and Innovation

Dan Butcher

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Confidential Information



The Journey



The Problem

Outage Validation Process

- Required by PUC to ensure accuracy of KPIs
 - System Average Interruption Frequency Index SAIFI
 - Number of Interruptions
 - Customer Average Interruption Duration Index CAIDI
 - Average amount of time when interruptions occur
- Event created for every electrical interruption. Every event has at least 1 customer interruption for at least 5 minutes
- PECO averages about 15,000 events, but the system generates many more
 - Ex. nested, cancelled, etc. which also need evaluated
- The Outage Management System (OMS) estimates the number of customer interruption, start time and end time based on available information

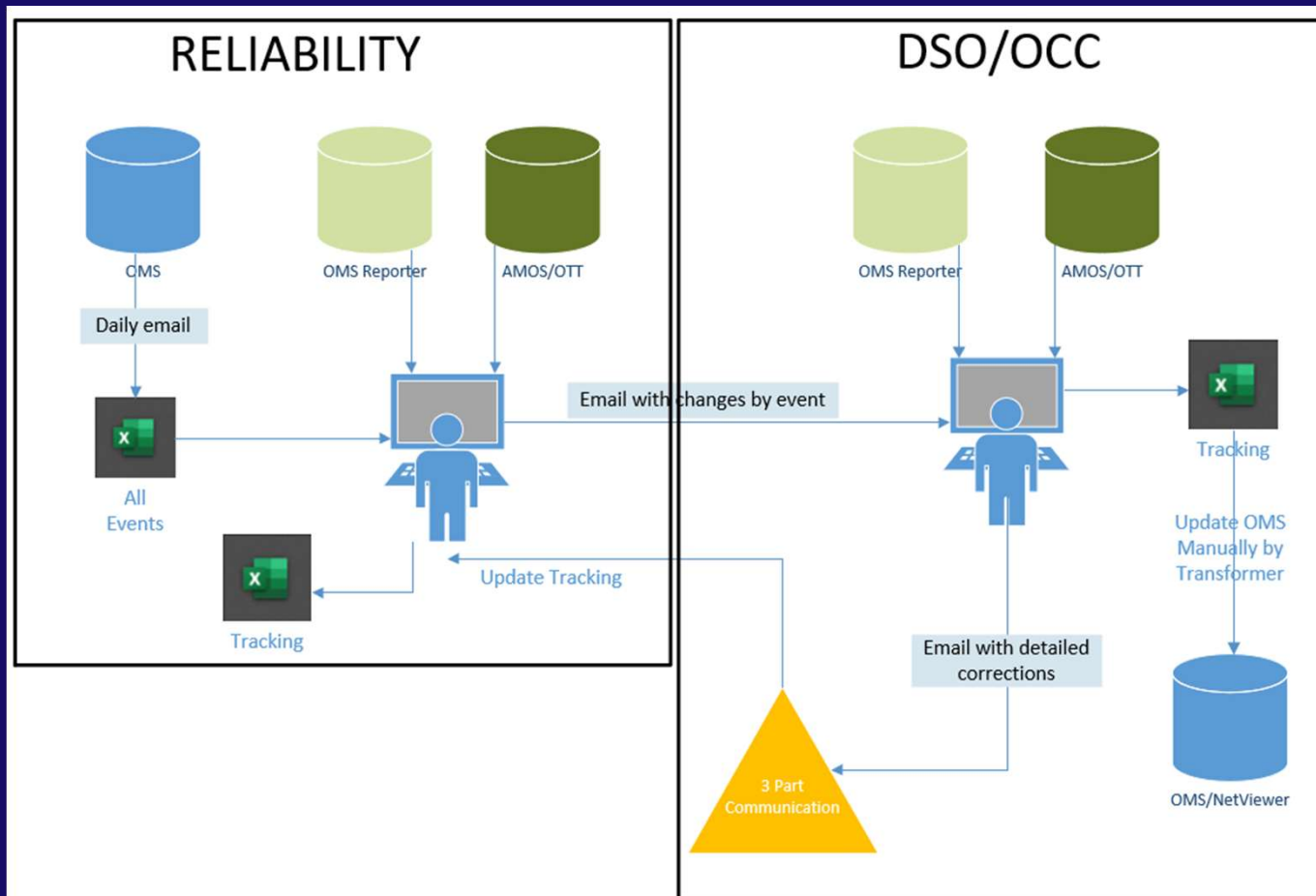
The Old Process

First Scrub

- Reliability organization
 - Receives daily email with Excel attachment for all events from previous day
 - Evaluates every event across multiple systems
 - Writes an email for every event with detailed instructions to fix the errors and sends to DSO/OCC analysts
- DSO/OCC analysts
 - Review every email, re-evaluate every event,
 - Make manual corrections in OMS and send an email to Reliability to detail any variation in recommended changes.

Second Scrub completed by another DSO/OCC analyst to make further corrections, second check and refine

Old Process Diagram



The Rub

The process was outdated

1. Extremely manual
2. Very time consuming
3. Prone to error
4. Relied on email communication for every event
5. Both organizations completed the same manual tasks
6. Apply generally agreed upon business rules manually
7. Users piece together information from multiple data sources
8. OMS writeback was time consuming, unforgiving and cumbersome

Example Old Process Email

```
Hi Dan/Kevin,
Please change the RT to 02:08 (8/5) for transformers
  D_218BA5
  D_2281D1_6368
  E_2188E7

This is nested with M22080500008 and M22080500009 LINFIELD_000 for transformer D_2188E83492 . Please remove M22080500008 and M22080500009 and change the RT to 02:08 (8/5).

This is nested with M22080500001 LINFIELD_000 for transformer D_2188F78377 . Please remove M22080500001 and change the RT to 02:08 (8/5).

This is nested with M22080400239 LINFIELD_000 for transformer D_2188H50675 . Please remove M22080400239 and change the RT to 02:08 (8/5).

This is nested with M22080500006 LINFIELD_000 for transformer D_21C8A77415 . Please remove M22080500006 and change the RT to 02:08 (8/5).

This is nested with M22080400243 LINFIELD_000 for transformer E_2188D5 . Please remove M22080400243 and change the RT to 02:08 (8/5).

This is nested with M22080400241 LINFIELD_000 for transformer E_2188D83921 . Please remove M22080400241 and change the RT to 02:08 (8/5).

Please change the ST to 20:28 (8/4) weighted average and RT to 22:32 (8/4) weighted average for transformer E_21D8C5

This is nested with M22080400240 LINFIELD_000 for transformer D_2188883032 . Please remove M22080400240 and change the RT to 02:52 (8/5).

Please change the RT to 00:01 (8/5) weighted average for transformer D_21B8E58519

Please change the RT to 00:05 (8/5) weighted average for transformer D_21C7D83391

This is nested with M22080400371 LINFIELD_000 for transformers
  D_21C7E84232 please change the RT to 00:00 (8/5) weighted average
  D_21C7H53805
  D_21C7H66335 please change the RT to 00:16 (8/5)
  D_21D7A55114 please change the RT to 00:16 (8/5)
Please remove M22080400371

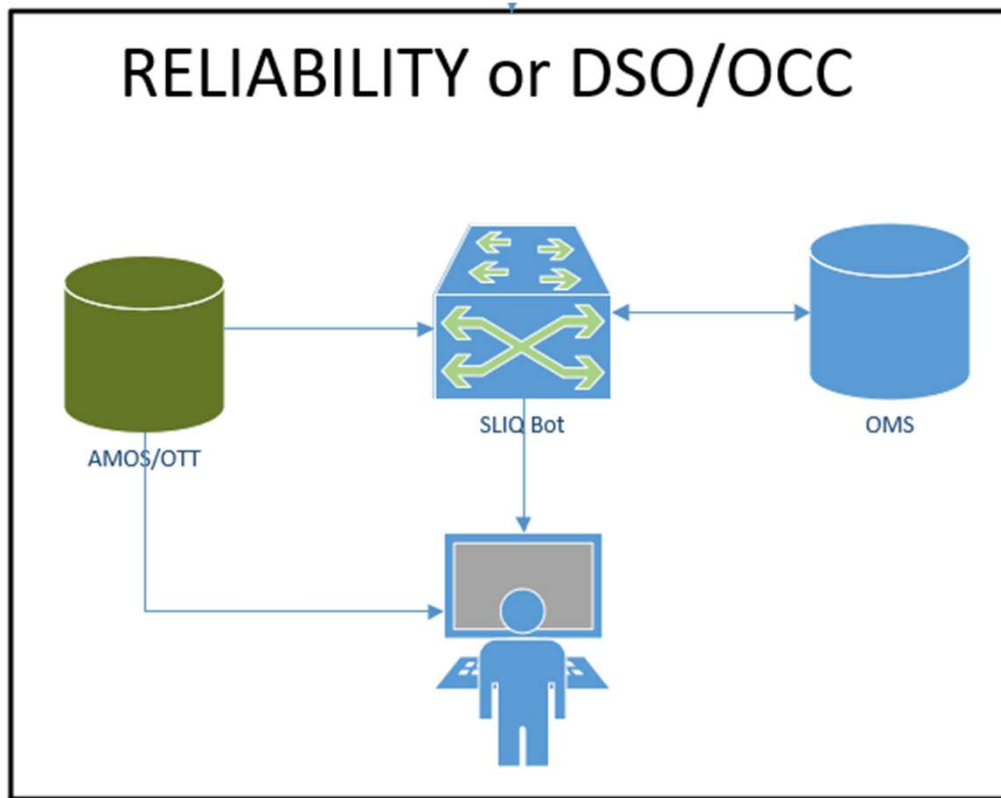
This is nested with M22080400380 LINFIELD_000 for transformer D_21C8A24563 . Please remove M22080400380 and change the RT to 3:11 (8/5).

This is nested with M22080400242 LINFIELD_000 for transformer D_22B1C24744 . Please remove M22080400242 and change the RT to 3:06 (8/5).

Please change the RT to 23:22 (8/4) weighted average for transformer E_22B1D15303
```

Solution: Outage Validation / SLIQ Bot

New Process Diagram



OHS Daily Event Report for Events Closed 3/26/24

Event Closed Data Picker:

OHS Daily Event Report | Suspension Details | Withdrawal Table | Resolution Summary

Enter Changes for Parent Event: P24030800146 Circuit: PENTRIDGE_013

OTT Bot	Section	AMOS Transmittal	OHS Description	Change Desc	Tag Control SW ID	Suspension Tag ID	OHS Event Start	Suggested Start	OHS Event End	Suggested End	Reviewed	Bank or Inval OTT
	PENTRIDGE_013	E_12P420281	ABC	1	1	1	03/26/24 18:46:04	03/26/24 18:46:04	03/26/24 20:28:00	03/26/24 20:28:00	<input type="checkbox"/>	
	PENTRIDGE_013	E_12P420279	ABC	1	8	8	03/26/24 18:46:04	03/26/24 18:46:04	03/26/24 20:28:00	03/26/24 20:28:00	<input type="checkbox"/>	
	PENTRIDGE_013	E_12P420282	ABC	1	2	2	03/26/24 18:46:04	03/26/24 18:46:04	03/26/24 20:28:00	03/26/24 20:28:00	<input type="checkbox"/>	
	PENTRIDGE_013	E_12P420283	ABC	1	5	5	03/26/24 18:46:04	03/26/24 18:46:04	03/26/24 20:28:00	03/26/24 20:28:00	<input type="checkbox"/>	
	PENTRIDGE_013	E_12P420284	ABC	1	10	10	03/26/24 18:46:04	03/26/24 18:46:04	03/26/24 20:28:00	03/26/24 20:28:00	<input type="checkbox"/>	
	PENTRIDGE_013	E_12P420285	A	1	10	10	03/26/24 18:46:04	03/26/24 18:46:04	03/26/24 20:28:00	03/26/24 20:28:00	<input type="checkbox"/>	
	PENTRIDGE_013	E_12P420286	A	1	8	8	03/26/24 18:46:04	03/26/24 18:46:04	03/26/24 20:28:00	03/26/24 20:28:00	<input type="checkbox"/>	
	PENTRIDGE_013	E_12P420287	A	1	10	10	03/26/24 18:46:04	03/26/24 18:46:04	03/26/24 20:28:00	03/26/24 20:28:00	<input type="checkbox"/>	
	PENTRIDGE_013	E_12P420288	A	1	10	10	03/26/24 18:46:04	03/26/24 18:46:04	03/26/24 20:28:00	03/26/24 20:28:00	<input type="checkbox"/>	
	PENTRIDGE_013	E_12P420289	B	1	47	47	03/26/24 18:46:04	03/26/24 18:46:04	03/26/24 20:28:00	03/26/24 20:28:00	<input type="checkbox"/>	
	PENTRIDGE_013	E_12P420290	B	1	40	40	03/26/24 18:46:04	03/26/24 18:46:04	03/26/24 20:28:00	03/26/24 20:28:00	<input type="checkbox"/>	
	PENTRIDGE_013	E_12P420291	B	1	28	28	03/26/24 18:46:04	03/26/24 18:46:04	03/26/24 20:28:00	03/26/24 20:28:00	<input type="checkbox"/>	

1-28/28

Benefits

- Efficient process eliminates 25,000+ email communications annually between orgs
- SLIQ Bot correctly predicts over 80% of all corrections
- Generally agreed upon business rules automated into SLIQ Bot suggestions for event start time, duration and customer interruptions
- SLIQ Bot analyzes nested outages, recommends changes to all events and allows user to drill in
- Cuts time in half for daily processing saving approximately one FTE per year
- User validates SLIQ Bot suggestions and submits changes directly to OMS from the Bot
- Flexibility for making corrections by circuit, step, phase, section, start time, end time
- Bulk change feature allows time savings versus old process where user had to select each transformer
 - User could only select multiple transformers if they had the exact same start and end time, otherwise lose selection and start over
- SLIQ Bot Audit & Statistics Dashboard provides detailed analytics for all corrections made to OMS events
 - Tracks what and when changes were made by whom

Future Improvements

Continuous Improvement

- Goal: 90%+ correct predictions
- Improve user experience for single source analytics
 - Optimize run times to handle more users, especially during storm events
 - General User Interface enhancements
- Agile Development yields working solutions
- One of 40+ solutions I've delivered across Electric, Gas, Customer Operations as well as BGE and PHI.
 - Storm Live Interactive Qlik, Crew Productivity, Manhole-Circuit Safety, CAIDI, ETR, Event, Gas Leaks, OMS Reporting, etc

