Chris Esser - Principal Performance Analyst

12/4/2024

Application of AI and Analytics for Pre-Problem Identification & Resolution Self Assessment

Xcel Energy

Agenda

- Background
- What worked well
- What we would do differently / Issues
- Next Steps

Background

Requirements	Old Approach	New Approach
• NRC Problem Identification & Resolution Inspection - Biannual • Station's **perform Self Assessment** prior to the inspection, leveraging NRC's inspection procedure	• **~10 people for one week** to perform assessment (400 hours) • **Assessment Checklist** contains **tasks** that **mimic** NRC **inspection manual** plus other **excellence objectives** • Small sample sizes	• Leverage AI to look at **entire dataset** and flag **issues** for **follow up** • Use **CAP Analytics** & AI **Topic Coding** to gauge CAP initiation health • Piloted in **February 2024** • INL performed **parallel assessment**

CAP Facts

4000 to 7000 Condition Reports (CR) written per year depending on station / outage year
Includes Conditions Not Adverse to Quality (NCAQ)

2000-3000 Activities (actions & evaluations) created per year

What Went Well / What we liked

Macro Lens of CAP Data

- Instead of small, random samples
- CAP Initiation Health through Analytics approach that can be built and run at any time

Machine Model vs Human (Actual) Matrix

- Instead of performing small, random samples, use AI to pinpoint where we should look

Pilot of INL's PI&R Inspection Toolset - Example

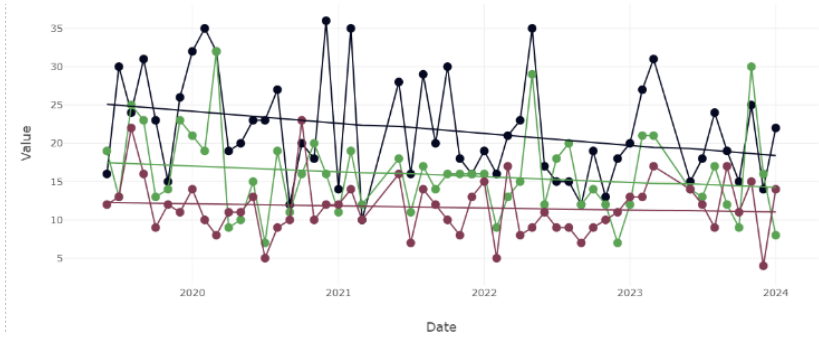
Objective: Verify complete, accurate, and timely documentation of identified problems in the corrective action program.

Old Method

- Review 20 CAPs for adequacy…
  - out of 3K-5K CAPs…
- Review 1 week of Operations Log, Work Orders, etc. to validate CAPs written on issues …
  - out of 52 to 76 weeks
- Interview 5 people across different functional areas…
  - out of 500 – 1000 personnel

New Method

- AI Topic codes of specific 'low threshold' issues that illustrate a healthy CAP threshold



- CAP Initiation Rates, normalized by work hours, and count of unique initiators, etc.

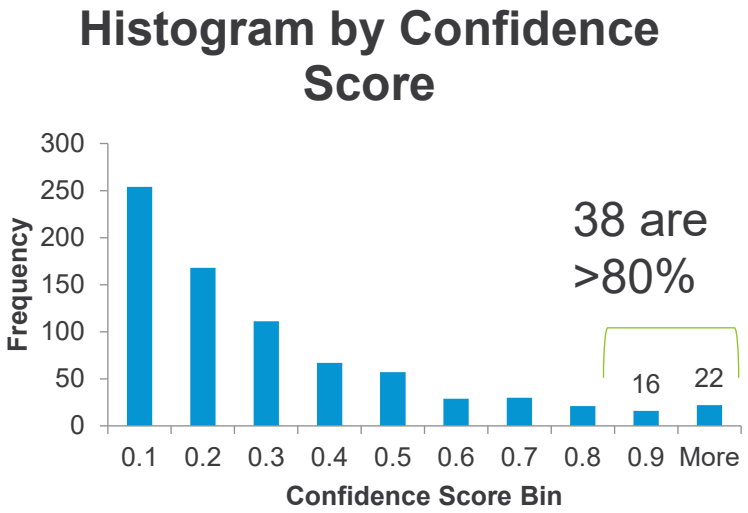
What We Would Do Differently / Issues

- Did not provide sufficient resources to investigate INL insight leads during the assessment week
- Machine Prediction assumptions without understanding underlying process 'rules' or nuances.
  - Missing CEs – Activity type only given to CAQ, NCAQ receive "OTHA" type
- The 'full data' approach resulted in lot of potential issues to investigate, more so than our small, random sample size in the self assessment checklist.
  - CAQ screening gaps – ~900 CRs potentially under-classified (next slide)
  - Work Request needed vs not – ~300 CRs flagged for investigation by AI model
  - **With this AI approach, the AI method created ‘more work’**
- Need to refine / pick best AI Topics codes, refine, and build trust in them

Condition Adverse to Quality (CAQ) AI Classifier

		Machine Prediction	
		CAQ	NCAQ
Human Prediction	CAQ	17%	3%
	NCAQ	17% (~900 CRs)	63%

That's a lot of CRs to review!



- Some issues were investigated further and others were 'false positives.'
- Opportunity to further refine the AI models
  - CRs on degraded conditions such as 'leaks' or trending
  - "FYI or Additional Information" CRs regarding a previous CAQ

Next Steps

- Incorporating select AI / Analytics approach in next Self Assessment
  - Staff to review deltas
- Transition some Self Assessment Objectives to be performed more periodically to catch trends / issues earlier and spread the burden over time
- Continue to refine Analytical and AI Classification models to minimize false positives
- Formally Build and deploy AI models within our CAP Software Suite

Sustaining National Nuclear Assets

lwrs.inl.gov