

Predict and Prevent: The Art and Science of Proactive Design



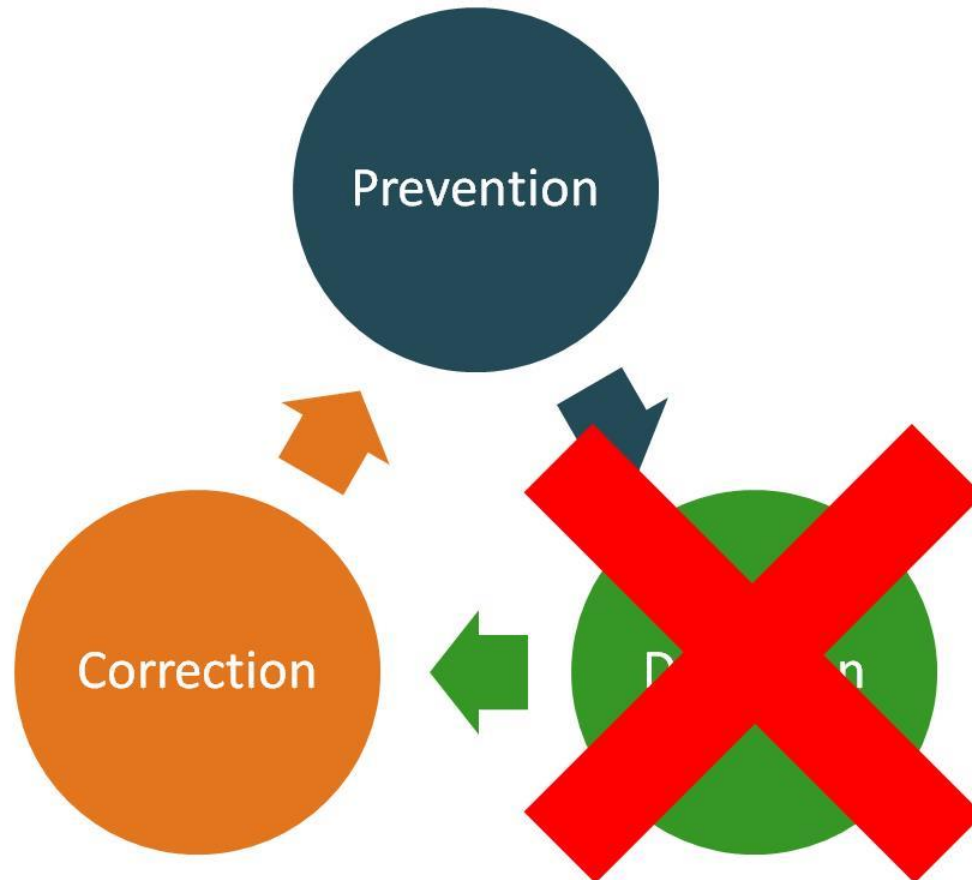
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NERC Human Performance Conference

Monika Bay

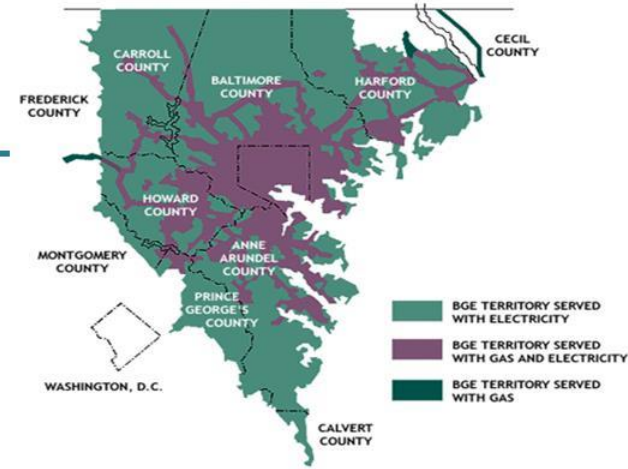
March 28, 2017

What if you cannot detect something that can kill you?



BGE by the numbers

- Oldest utility in the United States
- Merged into Exelon 2012
- Approximately 3,300 employees (includes ~ 1,100 field workers)



	Electric	Gas
Service Territory	2,300 sq miles	3,057 sq miles
Customers	1,241,126	655,055
Transmission (500/230/115 kV)	1,292 miles	164 miles
Distribution Miles (4/13/34 kV)	25,159 miles	7,054 miles
Stations	244 substations	12 gate / 651 regulator



Our journey into proactive risk management



What we **can** see...
yesterday's events

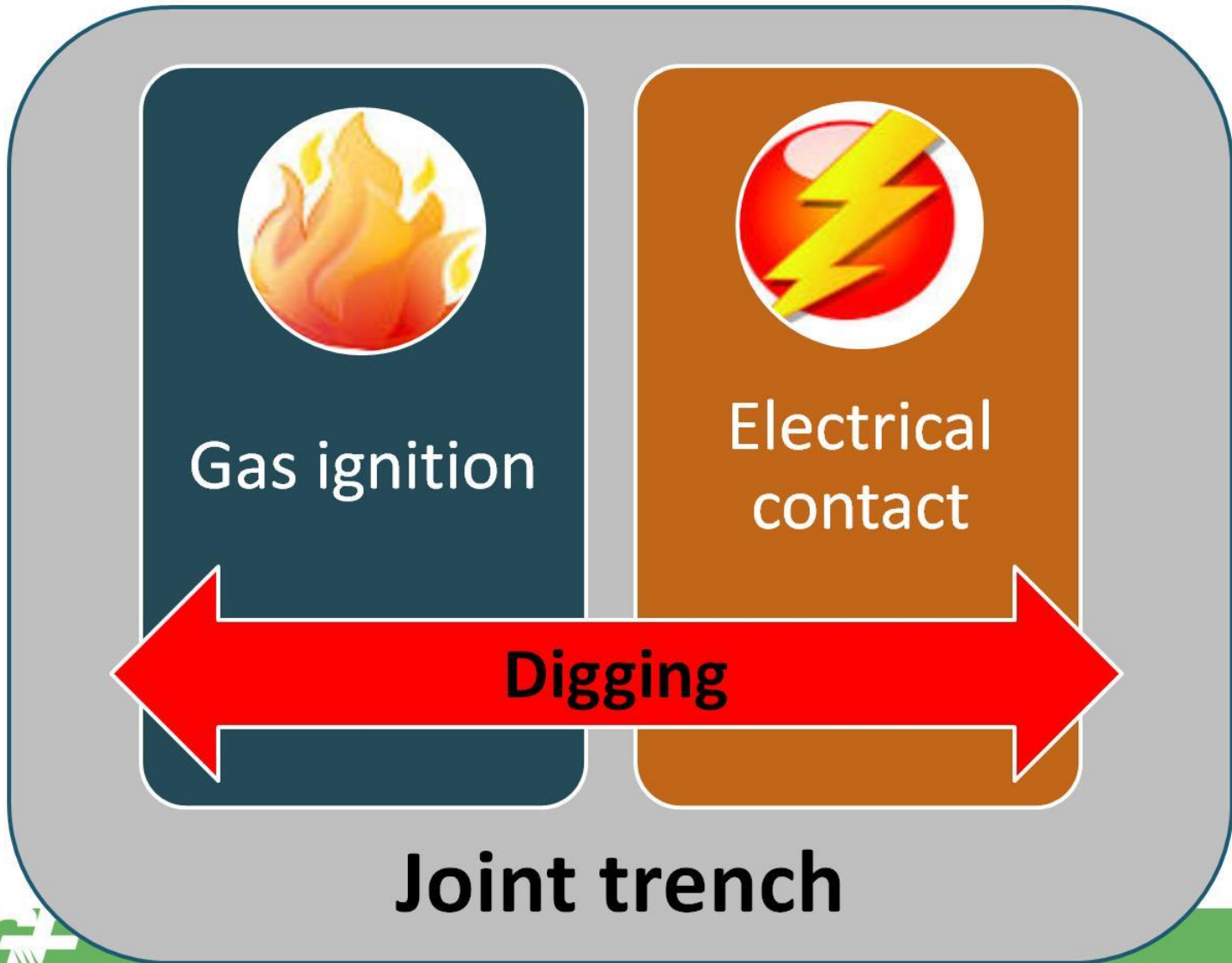
What we **can't** see...
tomorrow's events

The STPRA* risk modeling process

- Predicts how failures can occur
- Shows how systems and behaviors are interconnected
- Assigns probabilities so we can quantify the risk
- Points to the primary risk drivers
- Helps us evaluate what's changeable
- Helps us develop interventions that actually reduce the risk



Among the highest risks we've identified



What the risk looks like



What the risk can lead to



What the risk can lead to



What the risk can lead to



What we can't detect can kill us



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Risk intervention

- Develop solution to detect presence of cable fault **PRIOR** to digging



78% RISK REDUCTION!



The other risk we uncovered



The other risk we uncovered



The other risk we uncovered



The problem is even bigger than we thought!

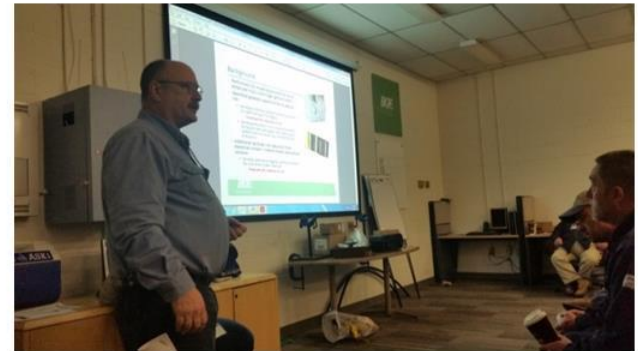
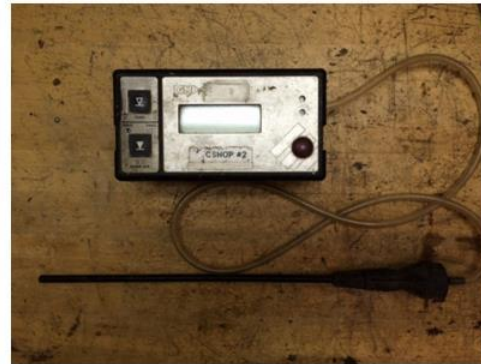


Left to right:

- (Y) Plastic tubing 1"
- (Y) 500 neutral
- (Y) 2/0 neutral
- (Y) Plastic tubing 1/2"
- (B) Plastic tubing 1/2"
- (B) 500 hot leg
- (B /YS) 3/0 neutral
- (Y) Plastic tubing 3/4"
- (B/YS) 500 neutral
- (B/YS) Plastic tubing 1/2"
- (B/YS) 2/0 neutral
- (B) 2/0 hot leg
- (B) 4/0 hot leg
- (Y) Steel tubing 1/2"
- (B) 350 hot leg

It's about detection and prevention!

- Fault detection solution for gas workers
- Gas detection solution for electric workers
- Cross discipline training on asset identification techniques and associated gas / electric hazards



Using risk modeling techniques to **detect** and address risk before something bad happens

Scenario	Greatest vulnerability	Primary intervention	Risk reduction projected	Risk reduction actual
Backing collisions <i>(demo project)</i>	Switchtasking	STOP SCAN PRIMARY	66%	86%
Gas ignition – trench	Inability to detect electric fault	Intrinsically safe volt meter	78%	
Electrical contact – trench	Aggressive digging	Soft dig tools	54%	
Electrical contact – OH distribution	Wrong mental model	Anticipatory threat mgt	35%	
Line of fire	Risk monitor does not fire	Anticipatory threat mgt	52%	49%



Questions

