

Critical Infrastructure Protection Standards Update

NPCC Spring Workshop

May 23, 2019

Agenda

- CIP Modifications SDT
- BCSI SAR
- Incident Reporting and Response Planning
- Communications between Control Centers
- Low Impact
- Supply Chain Risk Management
- Communications (TOP-001 & IRO-002)

CIP Modifications SDT

- A Case For Change
 - Webinar on April 24 (posted on NERC web site)
 - Whitepaper coming
- Virtualization
 - Industry response
 - Encourage review & participation
- New posting (November?)

BCSI SAR

- BCSI = BES Cyber Systems Information
- SAR = Standards Authorization Request
- Explicitly allow BCSI in the cloud
- CIP-004 & maybe CIP-011

Incident Reporting and Response Planning

- CIP-008-6
- FERC Order 848 – pending regulatory approval
- Reportable Cyber Security Incident
 - See NERC Glossary
 - Entity defines “attempt to compromise” (Part 1.2)
- ICS-CERT & E-ISAC
- Mature cyber security program probably includes PCAs

Communications between Control Centers

- CIP-012
- FERC NOPR (Notice of Proposed Rulemaking)
- Control Center definition for this Standard
- Responsible Entities
 - BA, GOP, GO, RC, TOP, TO
- For “real-time data specification elements”
see TOP-003 and IRO-010

Low Impact

- CIP-003
- Applicable January 1, 2020
 - Program must be in place by January 1, 2020
- Transient Cyber Assets & Removable Media
- Can leverage High / Medium

Supply Chain Risk Management

- CIP-013, CIP-005 and CIP-010
- FERC Approved
- July 1, 2020
- proposed Compliance Implementation Guidance
 - NATF

Communications

(TOP-001 & IRO-002)

- CMEP Practice Guide
<https://www.nerc.com/pa/comp/guidance/CMEPPPracticeGuidesDL/CMEP%20Practice%20Guide%20TOP-001-4%20and%20IRO-002-5%20Redundant%20and%20Diversely%20Routed.pdf>
- Determinations of "Redundant" and "Diversely Routed"
- TOP-001-4 R20, R21, R23 and R24
- IRO-002-5 R2 and R3

Questions



NERC

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

Align Project

May Project Update

May, 2019

RELIABILITY | ACCOUNTABILITY



- Align Project Roles
- Align Release Overview
- Align Release 1 Key Milestones
- Align Release 1 What to expect
- Align Release 1 Key Process Improvements
- Baseline CRA Summary Results
- Align Release 1 Training Schedule
- Align Communications Approach
- Q&A

Align Project: Project Roles

The Align project has engaged a multitude of working groups to help ensure the strategic direction, design, functionality, and delivery of the Align tool meets, or exceeds, the business needs of all impacted end-users

Steering Committee



NERC & Regional leaders responsible for establishing Align's strategic direction and defining major process changes

Project SMEs



NERC & Regional employees with subject matter expertise in CMEP processes. SMEs influenced Align processes by participating in process harmonization sessions

Core Team



NERC & Regional employees, in consultation with Deloitte, responsible for the day-to-day management, execution and deployment of the Align Tool

Change Agents

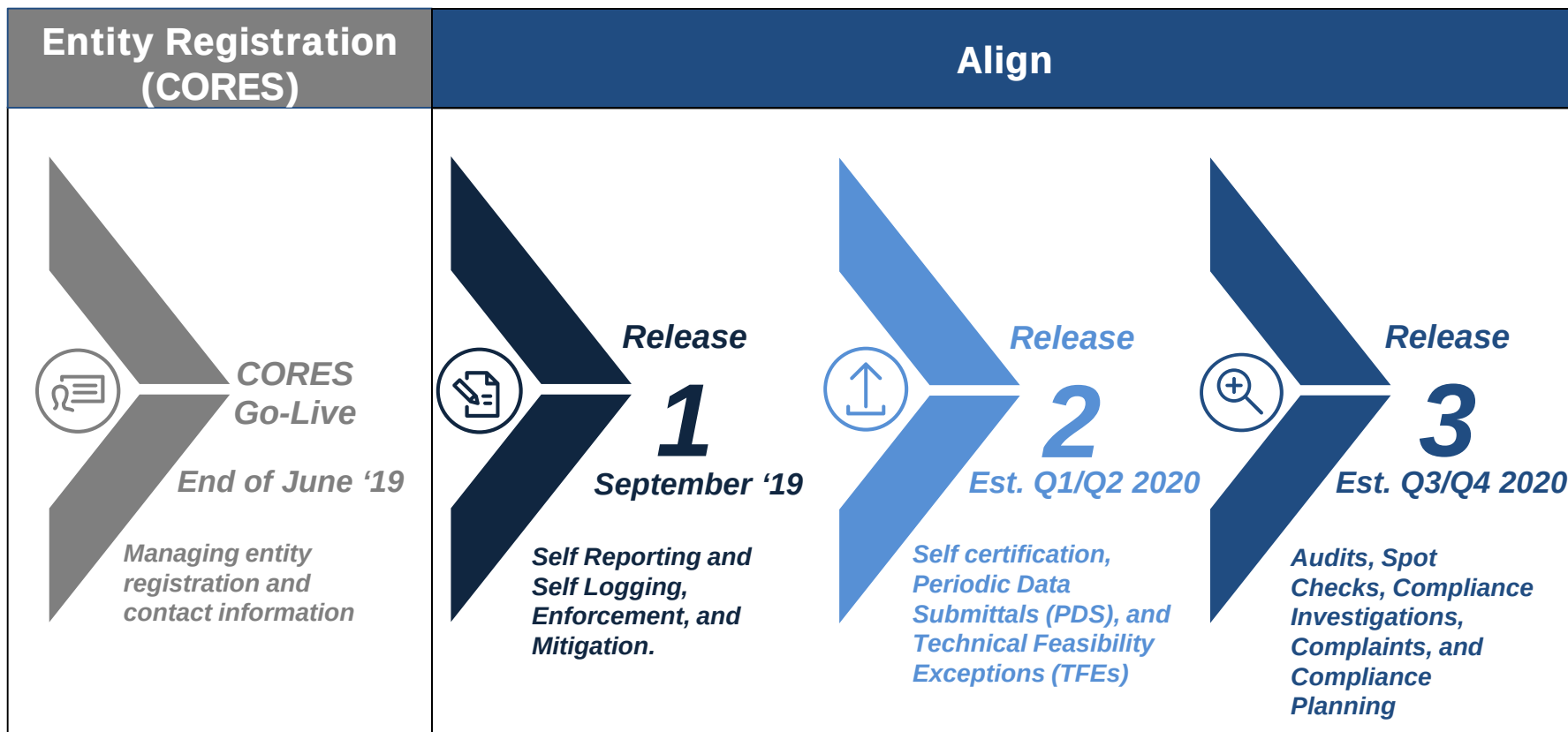


NERC & Regional employees responsible for promoting Align by helping ensure that Regional & registered entities are ready for production releases

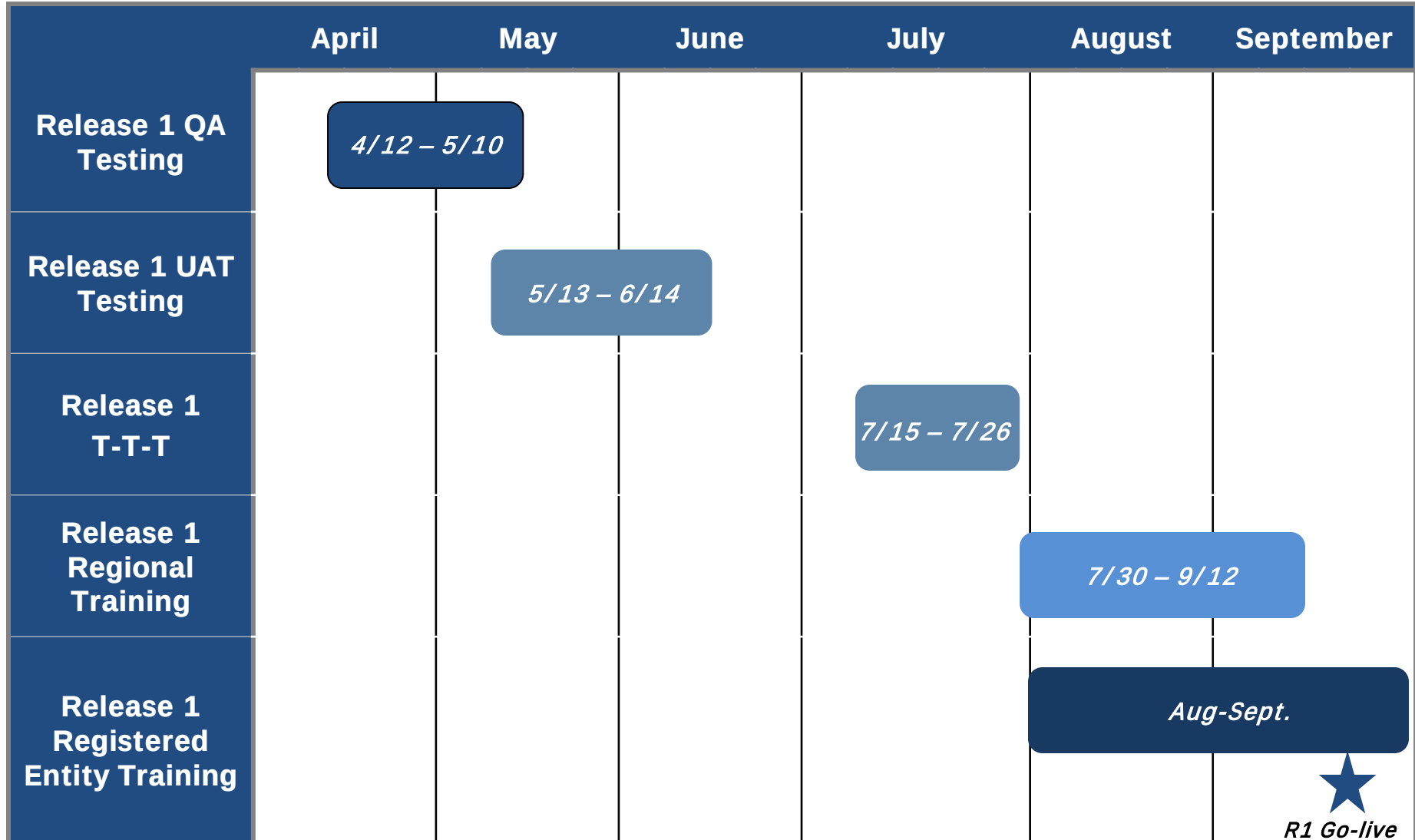
Trainers (NERC, Regions)



NERC & Regional employees responsible for Align training delivery. Regional trainers will deliver training to their region with support from Core team and NERC SMEs



Align Release 1 Milestones



Stakeholder Groups

Portal Users

Registered Entities

Regional Entities

NERC

CORES Functionality

- Create/submit new entity registration request
- Manage registration information/scope
- Review/edit registration requests submitted by Portal Users/Registered Entities
- Approve/return registration requests submitted by Portal Users/Registered Entities
- Generate reports on registration information
- Review/edit registration requests submitted by Regional Entities
- Approve/return registration requests submitted by Regional Entities
- Generate reports on registration information
- Generate registration letters for registered entities

Align Release 1: What to expect as a registered entity?

Stakeholder Group

Registered Entities



Release 1 Functionality

- Create and submit Self-Reports and Self-Logs
- Create and manage mitigating activities (informal) and Mitigation Plans (formal)
- View and track Open Enforcement Actions (EAs) (resulting from all monitoring methods)
- Receive and respond to Requests for Information (RFIs)
- Receive notifications and view dashboards on new/open action items
- Generate report of standards and requirements applicable to your entity
- Manage user access for your specific entity

Align Release 1: What to expect as a Regional Entity?

Stakeholder Group

Regional Entities

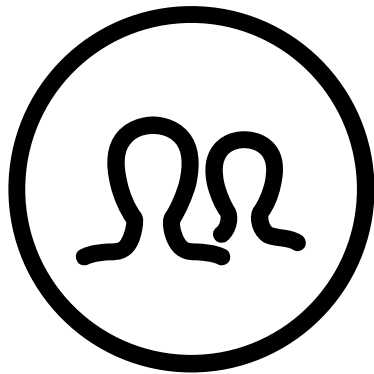


Release 1 Functionality

- Receive Self-Reports and Self-Logs from entities
- Manually create findings that result from any monitoring method (Audits, Spot Checks, Investigations, PDS, Self-Certifications, Complaints)
- Perform Preliminary Screens, PNC Reviews, and disposition determinations for each PNC/EA
- Send and received responses to RFIs
- Trigger notifications such as NAVAPS, NOCV, CE Letter, FFT Letter, and Settlement Agreements
- Receive, review, and approve mitigating activities (informal) and Mitigation Plans (formal)
- Receive notifications and view dashboards on new/open action items
- Generate report of Standards and Requirements applicable to a registered entity

Stakeholder Group

NERC Users



Release 1 Functionality

- Perform oversight of the Regional Entities activities
- View dashboards on new/open action items
- Create reports required by FERC related to Enforcement and Mitigation activities
- Generate report of Standards and Requirements applicable to a registered entity

Release 2 Functionality **Est. Q1/Q2 2020**

- Technical Feasibility Exceptions (TFE)
- Periodic Data Submittals (PDS)
- Self-Certifications

Note: A strategy is being developed for how these monitoring methods will be managed in the gap between Releases

Release 3 Functionality **Est. Q3/Q4 2020**

- Compliance Planning (Risk, CMEP Implementation Plan, Inherent Risk Assessment, Internal Controls Evaluation, Compliance Oversight Plan)
- Compliance Audit
- Spot Check
- Compliance Investigations
- Complaints

Current State

Future State

System Forms

- Inconsistencies in forms across regional legacy systems



- Standardized forms throughout the system will significantly increase consistency in processes

Standards

- Manual and cumbersome process to navigate to multiple channels to pull a report of standards and requirements



- Ability to generate a report of standards and requirements applicable to your entity

RFIs

- RFIs are sent manually by Regions, outside of current systems, creating inconsistency in the user experience



- Receive and respond to RFIs in a single, consistent tool

The benefits listed highlight key process changes, and do not reference every captured process improvement of the Align tool.

Current State

- Results in Mitigation Plans being used more often than necessary (e.g., for minimal risk compliance exceptions), creating unnecessary work and complexity

Future State

- All mitigation will begin as mitigating activities by default, with the ability to escalate to a formal Mitigation Plan when necessary, simplifying the process and reducing level of effort

*Mitigation Plans/
Mitigation
Activities*

The benefits listed highlight key process changes, and do not reference every captured process improvement of the Align tool.

Tracking

Current State

- Tracking of non-monetary sanctions and other activities agreed to during settlement (e.g., above and beyond activities) is limited



Future State

- Introduction of an “obligations” section of the record to capture and track settlement activities similar to mitigating activities

The benefits listed highlight key process changes, and do not reference every captured process improvement of the Align tool.

The baseline change readiness assessment was sent to ~5,500 stakeholders to measure readiness for the Align Implementation across five dimensions and identify areas where additional training, communication, and audience engagement activities are required to drive adoption of Align.

Survey

1,178 Respondents
~ **20 % Response Rate**

Respondent Type

NERC Employee – 3% (38)
Regional Entity – 19% (228)
Registered Entity – 72% (845)
Other – 6% (67)

If Regional Entity...

NPCC – 7% (15) WECC – 20% (45)
SERC – 16% (37) MRO – 13% (30)
RF – 21% (47) FRCC – 4% (9)
Texas RE – 20% (45)

If Registered Entity, which region...*

NPCC – 14% (159) WECC – 20% (234)
SERC – 24% (283) MRO – 12% (137)
RF – 16% (184) FRCC – 4% (43)
Texas RE – 11% (129)

Primary CMEP Focus Area*

Compliance Planning – 28%
Compliance Mntnrg – 35%
Mitigation – 22%
Enforcement – 15%
Not Involved – 0%

Key Results: Executive Summary Results

47 % of respondents

Indicated that they are familiar with the Align project

21 % Strongly Agree 38 % Agree

that they understand the business need and value of the Align project

357 Respondents

selected email/NERC newsletters as their preferred method for receiving Align information

6 % Strongly Disagree 16 % Disagree

that they are aware of the general changes being introduced by Align

Align CRA: Key Takeaways

Overall, the baseline change readiness assessment (CRA) yielded expected results for this stage of the project. Respondents stated the need for further awareness around what's changing. Below represent additional key takeaways from the baseline CRA:

1

Vision is fairly strong at this point in the project. **Respondents understand the business need** and why NERC is investing in Align, but are **unclear what changes will result** from the implementation.

2

A majority of respondents feel **NERC & RE leadership are committed** to the success of Align, but a **large portion remain undecided**, suggesting there is more emphasis needed.

3

Respondents voiced that **further communications and training** are required to understand changes needed for daily operation after the Align implementation.

OCM Actions

- Increase awareness of Align benefits in future comms by clearly articulating the Align value proposition around efficiency gains
- Place additional emphasis on making NERC and Regional Entity Leadership vocal champions of the Align project in future communications and change management efforts
- Efforts to increase awareness of specific Align changes are already underway, but continuing to inform end users of process changes must continue leading up to Go-live.
- Publish the training schedule and approach broadly to address end user concern around training timing

Release 1 Training Schedule – Registered Entities

Audience	Region/ Company	Training Date(s)
Registered Entities	RF	- September 10 - September 12
	SERC/FRCC	- August 13 - August 20
	WECC	- August 27 (CO) - August 29 (CA) - September 5 (SLC) - September 10 (OR) - September 12 (WA)
	MRO	- September 4 - September 10
	NPCC	September 11
	Texas RE	August 28

The Align Project communication approach leverages multiple communication and engagement efforts that aim to provide out various stakeholder groups key project knowledge in their channel of choice

Align Communication Vehicles

- NERC.com Align Project Page ([Click Here](#))
- Align FAQs (housed on NERC.com)
- CMEP Regional Workshops
- NERC News
- Compliance Monitoring Group Updates
- Trade Meetings
- Regional Communication Outreach
 - ***Added based on CRA Feedback***
- Align Project Newsletter
 - ***Added based on CRA Feedback***



Questions and Answers



NPCC 2019 Spring Compliance and Standards Workshop

NAGF Overview and Initiatives

Wayne Sipperly
NAGF Executive Coordinator
wsipperly@generatorforum.org

Agenda



- **NAGF Overview**
- **Collaboration: Groupsite**
- **NAGF Working Groups and Members**
- **Current Activities and Initiatives**
- **How to join the NAGF**
- **Questions**

Who/What is the NAGF?



The NAGF is an independent, member-driven, non-profit organization of generator owners and operators, focused on NERC and other grid reliability issues.

The NAGF's mission is to promote the safe, reliable operation of the generator segment of the bulk power system through generator owner and operator collaboration with others who have a vested interest in the reliable operation of the bulk power system.

NAGF Value Proposition



Helping electric generator owners and operators to successfully navigate the changing energy sector, with a focus on reliability, resiliency and the regulatory environment.

*The NAGF is an independent, member driven organization whose collective knowledge and expertise conveys significant influence to regulators and the industry. The NAGF communicates the technical capabilities, constraints, and economics of generator equipment to inform and **help guide reliability policy**. The NAGF provides member companies with multiple information resources and open source peer collaboration to address the challenging issues facing the industry.*

Key NAGF features:

- *Generator technology and ownership model agnostic.*
- *Multiple information sharing resources for our members.*
- ***Regulatory policy influence for the generation sector.***

Collaboration: Groupsite

[SUMMARY](#)[COMMUNICATE ▾](#)[SHARE ▾](#)[NETWORK ▾](#)[WORKING GROUPS ▾](#)[MORE ▾](#)[MY SETTINGS ▾](#)[HELP ▾](#)Notifications **481**

NAGF Annual Meeting - save the date

Our 9th Annual Meeting and Compliance Conference will be held from noon on October 15th through noon on October 17th in NERC's Atlanta Offices. Details to follow...

[NERC's Atlanta Travel Guide](#)

Everything ▾

SEARCH

Go



Create a site like this for other groups you're involved with. [Signup Free »](#)

Welcome to the North American Generator Forum

The North American Generator Forum (NAGF) was founded in 2009 as a vehicle for utility and non-utility owned generator owners and/or operators to address issues related to registration, compliance, standards development and other NERC-related topics. In 2013, the North American Generator Forum, Inc. became a non-profit, dues-based corporation.

We provide entities who are generator owners and operators in North America a means to collaborate and communicate with FERC, NERC, the Regional Entities, the Canadian Provinces and other organizations with missions similar to ours, with the ultimate goal of improving the reliability of the bulk power system.

More information is available at: <http://generatorforum.org/>

REQUEST TO JOIN BY CLICKING HERE

[RECENT ACTIVITY](#) [ALL](#) [DISCUSSIONS](#) | [DISCUSSIONS](#) | [NETWORK](#) | [MORE ▾](#)

Show: [All](#) | [Today](#) | [This Week](#) | [Since My Last Update](#) (Digest)

THIS GROUP CONSISTS OF

**555**

Group
Members
you can
connect with

**250**

Discussions
you can
join

**708**

Files
you can
download

UPCOMING EVENTS



RF Spring Workshop

Wednesday, May 1 2019 9:00AM EDT

Friday, May 3 2019 6:00PM EDT



Standard Review Team

Wednesday 10:00AM - 11:00AM CDT

NAGF Working Groups



- Peer Review
- Security Practices / CIP
- Standards Review Team
- Variable Resources

NAGF members



AMEA	Clearway Energy	FMPA	NAES Corporation	Scrubgrass Gen Plant
APGI	Dominion Energy	FPL	NYP&A	SCE&G
Ameren Missouri	DTE Energy	Great River Energy	NextEra Energy	Southern Company
American Electric Power	Duke Energy	Indeck Energy	North Carolina Electric	Southwest Generation
AECI	E.ON	Independence P & L	NOVA Scotia Power Inc.	SunPower
Austin Energy	EDR Renewables	Ingleside Cogen, LP	NCPA	Sunflower Electric
Avista Corp	ENGIE	Invenergy	NRG	Talen Energy
Basin Electric Power	Entergy	Lakeland Electric	PG&E	TVA
Black Hills Corporation	Essential Power	Lewis County PUD	Pattern Gulf Wind	Tri-State G&T
BP Wind	EthosEnergy	LG&E and KU	Pattern Energy Group	TEP
Braintree Electric Light	Eversource	MMWEC	Penobscot Energy	US BR
Capital Power	Exelon Generation	MidAmerican Energy	ProEnergy Services	US SBU
CCI Rensselaer	First Energy Corp.	Minnesota Power	PSGC	WEC Energy Group
Chelan County PUD	FirstLight Power	Muscatine Pwr & Wtr	Santee Cooper	Xcel Energy

NAGF's dual focus



- Compliance with existing Standards
 - ✓ “The here and the now”
 - ✓ Collaborative efforts
 - ✓ Best Practice sharing
 - ✓ Discussion boards, file cabinet, etc. on Groupsite

- Shaping policy
 - ✓ Helping paint the futurescape
 - ✓ Ensuring the unique perspective of the generation segment is understood and accounted for.
 - ✓ Improve “first time success” of new regulations

Activities and Initiatives



➤ FERC Communications

- ✓ FERC Technical Conference – March 28, 2019:
 - o Discussed current cyber and physical security practices for protecting energy infrastructure
 - o Need for additional security investments
 - o Cost recovery and incentives
 - o Post-Technical Conference Comments
 - ❖ NAGF working with members to develop comments for submittal
 - ❖ NAGF Security Practices/CIP Working Group leading the development of comments
 - ❖ Submittal to FERC by May 27th
- ✓ Meeting with FERC Commissioners
 - o Pending

Activities and Initiatives

(continued)



➤ NERC Communications:

- ✓ NAGF Survey Results shared with NERC:
 - o Application of PRC-025 for inverter based generators
 - o Project 2017-01 Modifications to BAL-003-1.1

- ✓ NAGF Standards Review Team (SRT) Working Group
 - o Submit comments as part of NERC Balloting and Commenting process
 - o Periodic Standard Reviews
 - o NERC Projects

Activities and Initiatives

(continued)



➤ NERC Communications:

- ✓ PRC-005-6 and Digital AVR Protective Function Testing
 - o Issue focused on testing of Automatic Voltage Regulator (AVR) protective functions and applicability of PRC-005-6:
 - ❖ Clarification needed based on NAGF membership feedback and differing interpretations
 - ❖ Reviewed SERC and WECC historical guidance
 - ❖ Open questions regarding scope of applicability to AVR protective systems , testing, crossover compliance with PRC-019 and MOD-026
 - o Draft SAR under development:
 - ❖ Clearly limit scope of AVR protective functions to elements that open a breaker directly, via lockout, or tripping aux relays
 - ❖ Provide acceptable methods of testing
 - ❖ Evaluate cascading applicability to other NERC Standards

Activities and Initiatives

(continued)



➤ NERC Communications:

- ✓ PRC-025-2 Applicability and Implementation
 - o NAGF members have raised the following questions regarding implementation of PRC-025-2 Attachment 1:
 - ❖ How to obtain maximum gross Real Power capability for non-Utility Generators (NUGS)
 - ❖ Use of the term “exclusively” for lines that are used to export energy directly from the BES generator to the transmission system
 - ❖ If alternate relay settings (i.e. less than criteria in Table 1) looking from grid into plant are acceptable when direction relays are used to distinguish loadability direction
 - o Conference Call held with NERC to discuss issues/questions in early April 2019
 - o NERC Special Protection and Control Subcommittee (SPCS) currently reviewing the issues presented by the NAGF

Activities and Initiatives

(continued)



➤ NERC Communications:

- ✓ NAGF Standardized Procedure Templates for Generator Low Impact Cyber Systems
 - o Developing generic Low Impact procedures for CIP-003-7/8:
 - ❖ Physical Security
 - ❖ Electronic Access
 - ❖ Transient Cyber Assets and Removable Media
 - ❖ CIP Exceptional Circumstances
 - o Shared draft procedures with RE's and NERC for review/comment
 - o Provides NAGF members with a template for developing low impact procedures.
 - o Investigating a similar effort for developing generator relay mis-operations procedure template (PRC-004-2)

Activities and Initiatives

(continued)



➤ NERC Communications:

- ✓ Inverter-based Resource Performance Task Force (IRPTF)
 - NERC Reliability Guideline: BPS-Connected Inverter Based Resource Performance
- ✓ Continuing Work
 - IRPTF working on *Reliability Guideline: Improvements to Interconnection Requirements for BPS-Connected Inverter-Based Resources* for clarifying interconnection requirements regarding newly interconnecting inverter-based resources.
 - IEEE working on development of a new performance standard P2800 – Interconnection and Interoperability of Inverter-Based Resources Interconnecting with Associated Transmission Electric Power Systems
- ✓ Example of industry proactively working with the Regulators and inverter manufacturers to solve issues without new Standards.

Activities and Initiatives

(continued)



➤ NERC Communications:

- ✓ NERC Electric Gas Working Group (EGWG)
 - o Technical stakeholder group focused on the need to effectively assess and plan for fuel disruption risks in the Bulk Power System.
 - o NAGF to provide information regarding generator operation, economics, fuel procurement, and other supporting information as requested.
 - o Kickoff conference call held April 4th:
 - ❖ Confirmed EGWG work plan, schedules/timeline, and participant expectations
 - o Call held May 2nd to review draft guideline comments and develop sub teams to work on various provisions of the guideline
 - o In person meeting scheduled for May 22-23 in Washington D.C.

Activities and Initiatives

(continued)



➤ Regional Entity (RE) Communications:

- ✓ Increasing presence at RE meetings:
 - o SERC 2019 Spring Joint Meeting of the Standards Committees
 - o NPCC – Spring/Fall Workshops & DER Forum
 - o Distribution of NAGF Information Flyers at RF, SERC, and TRE compliance workshops
 - o Additional opportunities under discussion

- ✓ RE News Letters
 - o Update of key NAGF activities included in periodic RE news letters:
 - o RF
 - o SERC
 - o TRE

Activities and Initiatives

(continued)



➤ Regional Entity Communications:

- ✓ NPCC Distributed Energy Resources (DER) Forum
 - o Opportunity for open discussion of DER issues, enhance awareness, understand impacts to the BES, and facilitate the integration of DER
 - ❖ Second day of future NPCC RSC meetings
 - ❖ Kickoff meeting held May 16th
 - o Key Issues:
 - ❖ Impacts on NPCC UFLS-UVLS programs
 - ❖ Potential to impact the “Reliable Operation” of the BES/BPS
 - ❖ Coordinate interoperability between Transmission and Distribution for DER

Activities and Initiatives

(continued)



➤ **2019 NAGF Annual Meeting & Compliance Conference**

- o October 15-17, 2019 @ NERC's Offices, Atlanta

➤ **2018 NAGF Annual Meeting & Compliance Conference**

- ✓ NERC CEO Jim Robb Keynote Address
- ✓ Dual Track Presentations for O&P and CIP:
 - o PRC-025, PRC-026, and PRC-027
 - o PFR Inner & Outer Loop Controls
 - o NAGF Supply Chain White Paper
 - o Project 2016-02 CIP Modifications
 - o CIP Low Impact Implementation Experience
 - o NPCC Physical and Cyber Security Outreach update

Activities and Initiatives

(continued)



➤ NAGF Internal Controls Evaluation Webinar

- ✓ Developed based on member's interest and request
- ✓ NAGF members only; no NERC or RE representatives to enable frank and open discussion
- ✓ Discussed how the ICE process works and outcomes
- ✓ Members shared their ICE experience with various RE's:
 - o Small Generators (20-100 MW) connected at 115kV
 - o Standards reviewed as part of Inherent Risk Assessment (IRA) for GO/GOP registrations
 - o Reduction in audit scope

Joining the NAGF



Visit our website: <http://nagf.groupsite.com/>

Click on: **REQUEST TO JOIN BY CLICKING HERE**

-Or-

Send an email requesting membership to:
wsipperly@generatorforum.org

Q & A

NPCC Event Analysis

Year-to-date 2019 Update

May 23, 2019

EA Program Qualifying Events as of 03/11/19

	NERC			NPCC	
	Total	2019		Total	2019
Category 1	1085	26		159	5
Category 2	170	0		24	0
Category 3	18	0		7	0
Category 4	4	0	SW Winter Weather (2011) SW Blackout (2011) Derecho (2012)	0	0
Category 5	4	0	Hurricane Sandy (2012) Polar Vortex (2014) Hurricane Harvey (2017) Hurricane Irma (2017)	1	0
Total	1281	26		191	5
Category 0	3203	37		501	3
Grand Total	4484	63		692	8

Lessons Learned metrics

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
ERO Team*	0	0	0	0	0	0	0	0	0	1	1
FRCC	0	0	0	1	3	1	2	0	0	0	7
MRO	0	2	2	0	3	1	2	0	3	0	13
NERC	23	1	0	0	1	0	0	1	0	0	26
NPCC	0	5	2	5	4	10	6	2	4	0	38
RF	0	3	1	3	4	1	1	1	5	0	19
SERC	0	1	0	1	1	1	0	0	0	0	4
TRE	0	5	8	1	2	1	1	2	0	0	20
WECC	0	5	5	3	1	1	1	3	3	1	23
Total	23	22	18	14	19	16	13	9	15	2	151

Most Recent Lessons Learned

published to date

- 2 NERC LLs published to date in 2019
 - 2 on Transmission Facilities
- 15 NERC LLs published in 2018
 - 1 on Generation Facilities
 - 6 on Communications
 - 7 on Transmission Facilities
 - 1 on Relaying and Protection Systems

Need for Lessons Learned

- Lessons learned are the cornerstone of the EA Program. Without them there can be no knowledge transfer and in turn no avoidance of similar events. Doing so increases both reliability and resilience.
- Please, while reporting on events through the EAP, consider drafting a Lesson Learned.
- Lessons that you may consider intuitively obvious, may not be obvious to others.

Need for Lessons Learned

Lessons learned provide two benefits:

- First by making us aware of possible latent system conditions that otherwise would not be known until they occur.
- Awareness is key. If a lesson learned, no matter how simple, raises awareness to a particular system condition / scenario allowing others to self check their specific situation with regard to those triggers, incidents may be avoided.

Need for Lessons Learned

- Leverage this information.
- For those of you who systematically review the Lessons Learned as NERC posts them, I commend you.
- There have been incidents where events have occurred that could have been avoided had the entity read the Lessons Learned that pertain to their area of responsibility.

The Need for Lessons Learned

- The second benefit Lessons Learned bring is the avoidance of complacency.
- Complacency makes highly educated and trained personnel forget their training and act without checks and balances, which were put in place for a reason.
- Avoid Complacency by reviewing the published Lessons Learned and asking yourself how would your system have fared under the same circumstances.

Review of the EAP Process Manual

Presently the EAP process is undergoing a scheduled review to either adjust, retire and/or add:

- Revised language of certain categories to make them less ambiguous.
- New categories to capture the latest inverter-based events
- and a general recalibration of the process.

When completed it is contemplated that a WebEx will be provided for industry to explain the changes proposed.

Questions

???

Entity Misoperation Risk Index Score (Entity MRI Score)

Spring 2019 NPCC Compliance and Standards Workshop

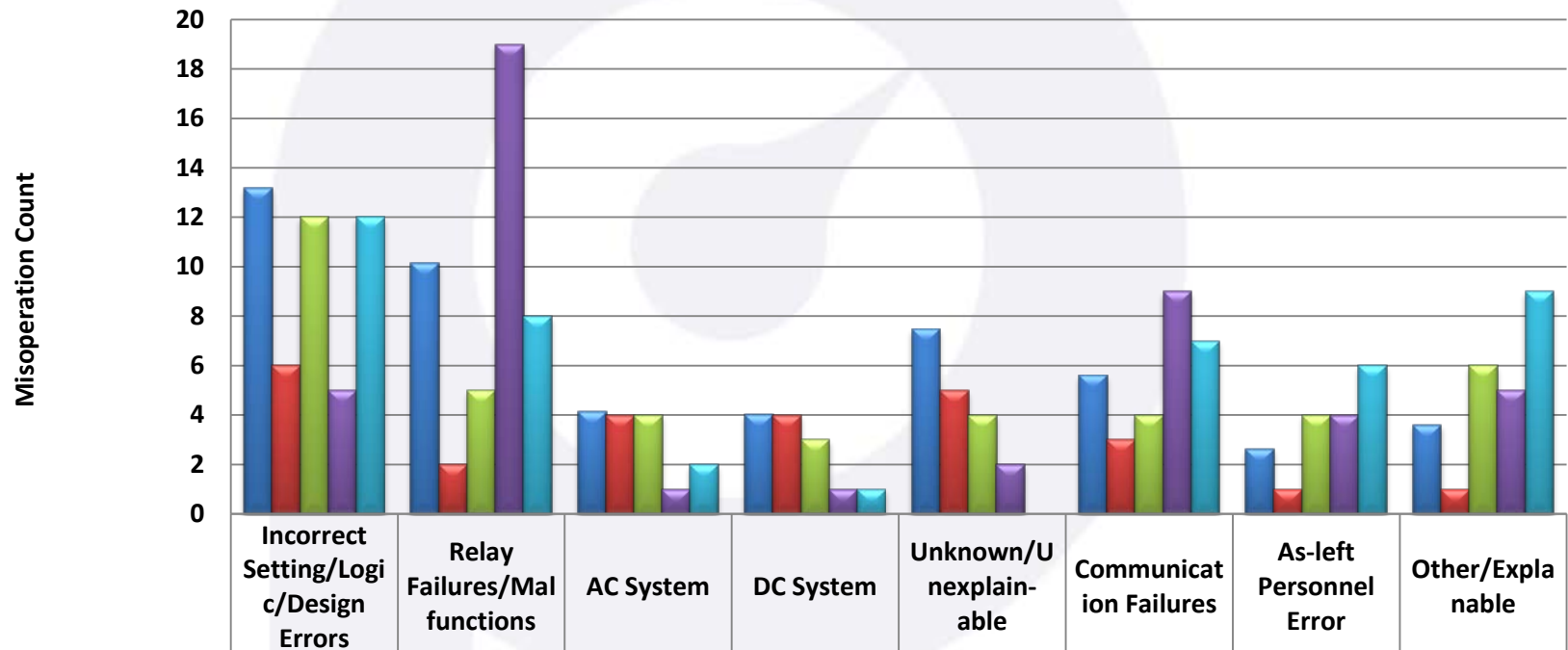
Rafael Sahiholamal

Senior RAPA Engineer

System Protection Working Group (SP-7)

- Maintain a record of all reviewed misoperations
- Review the analysis of misoperations of protection systems on the bulk electric system including SPS/RAS
- Calculate statistic of protection system misoperations
- Work with the NPCC Event Analysis Team
- Share lessons learned with Members and industry from review of misoperations
- Recommend NPCC additions to the NERC reporting template

NPCC Protection System Misoperations by Cause



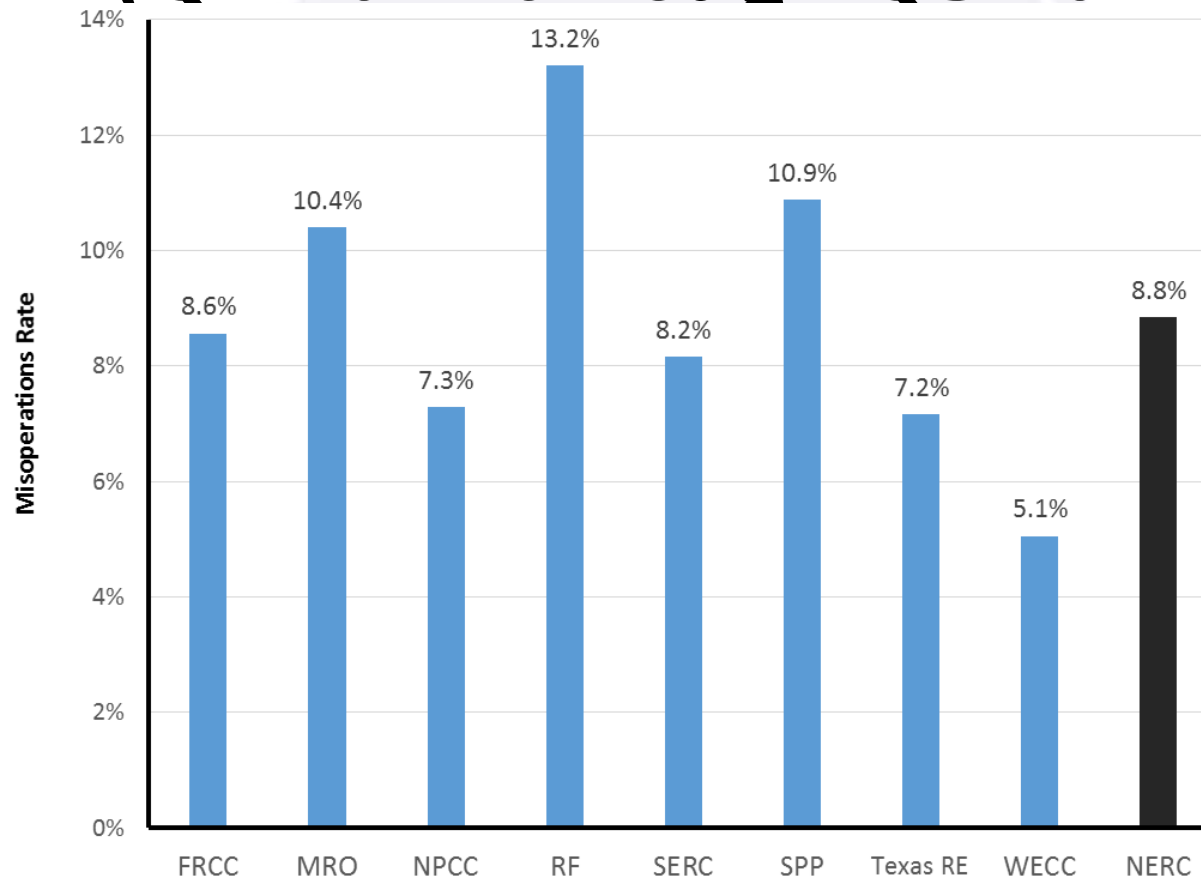
Quarterly Avg Since 2011	13	10	4	4	7	6	3	4
2017 Q1	6	2	4	4	5	3	1	1
2017 Q2	12	5	4	3	4	4	4	6
2017 Q3	5	19	1	1	2	9	4	5
2017 Q4	12	8	2	1	0	7	6	9

Misoperation Rate Calculation

$$\text{Misoperation Rate} = \frac{\text{Total Misoperation count}}{(\text{Total correct Operation count}) + (\text{Total Misoperation count})}$$



Five-Year Misoperation Rate by Region (Q4 2012 through Q3 2017)

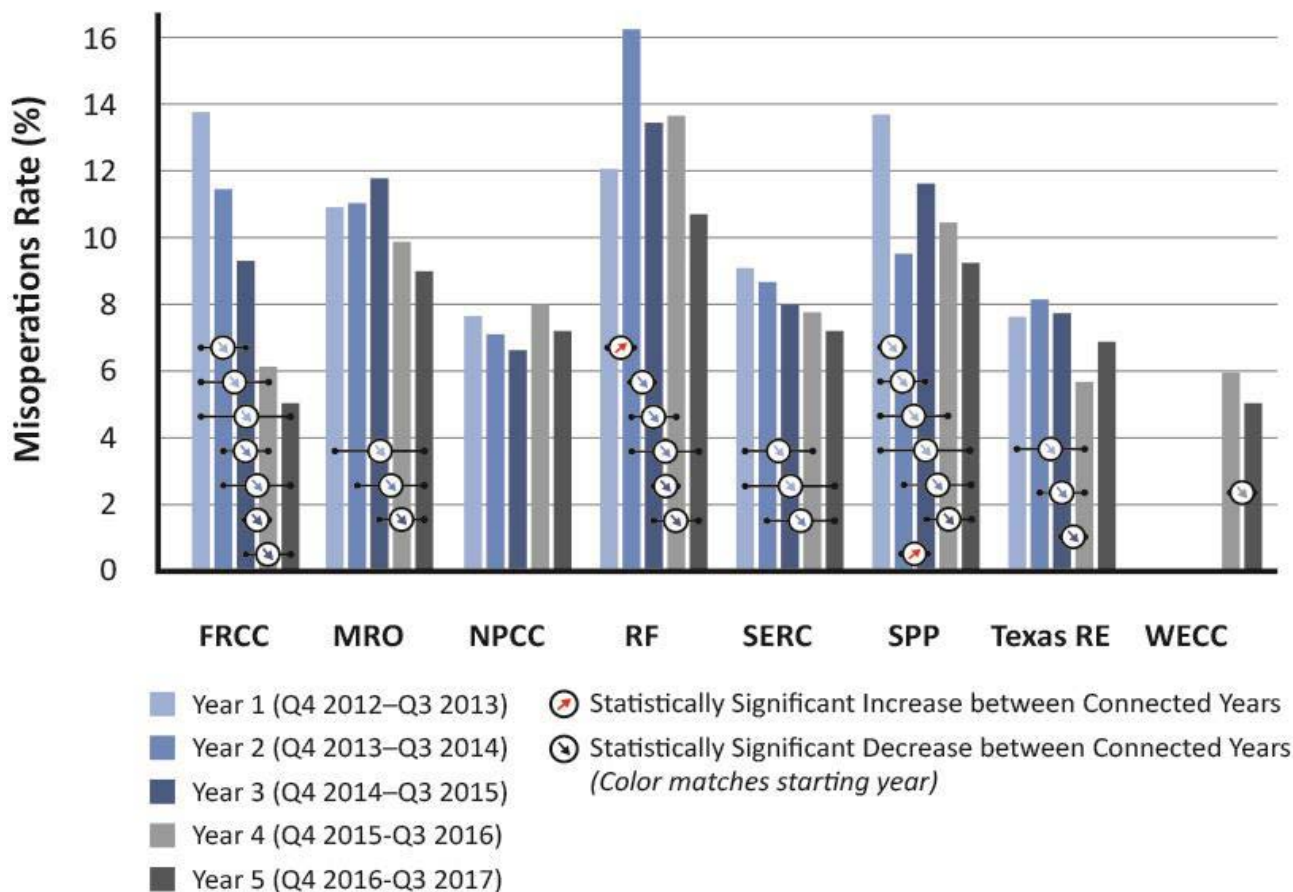


State of Reliability Report 2018:

https://www.nerc.com/pa/rapa/pa/performance%20analysis%20dl/nerc_2018_sor_06202018_final.pdf

NPCC's rate was calculated based on the Q1 2013 through Q3 2017 data. WECC's rate was calculated based on the Q2 2016 through Q3 2017 data

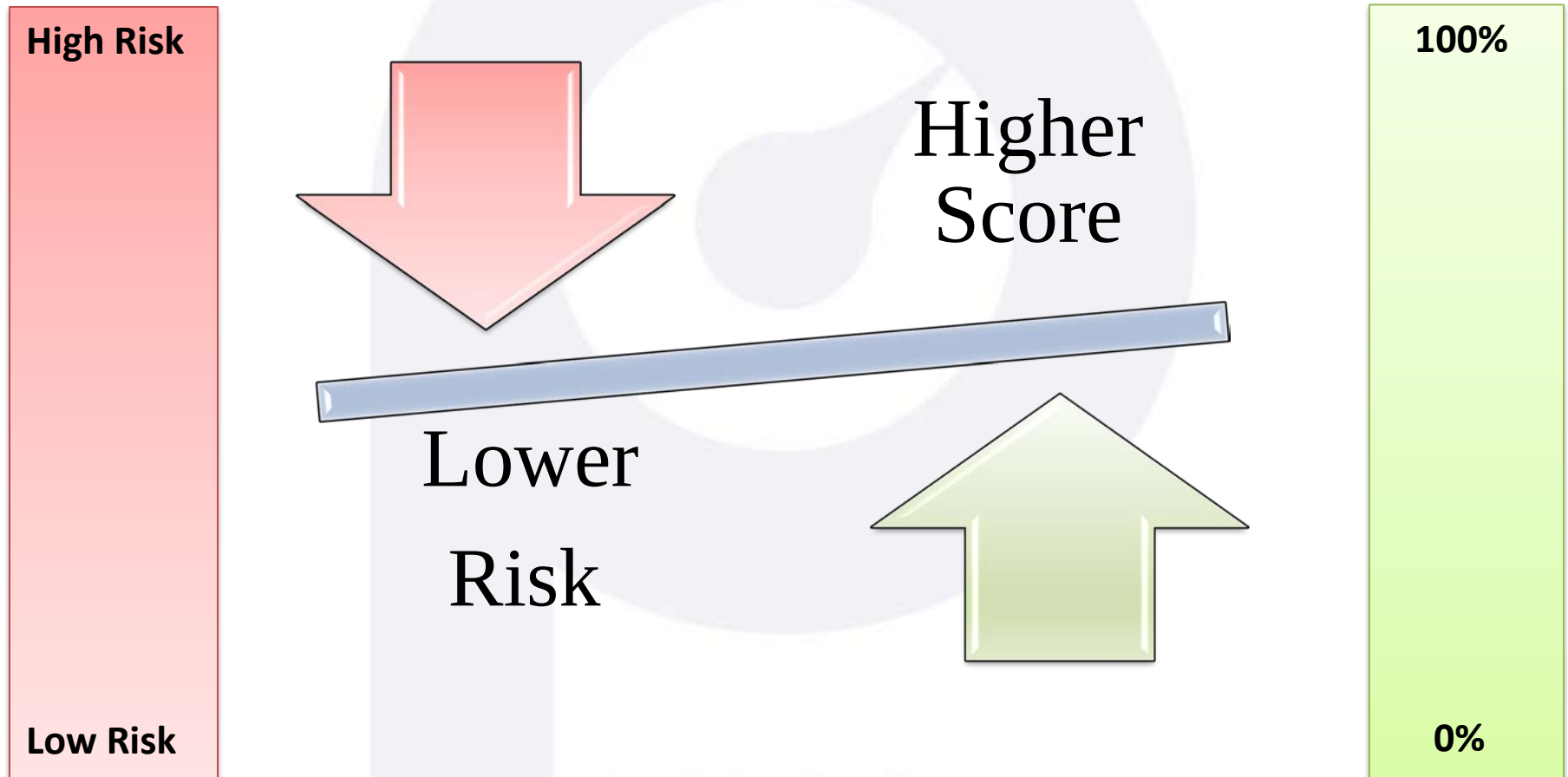
Year-Over-Year Changes in Misoperation Rate by Region



Additional New NPCC Risk-Based Score

- Calculate score based on combination of misoperation risk factors, including misoperation category, cause, and voltage class. Total score includes points for participation in the SP7 Working Group.
- Target specific areas of misoperations such as “Unknown” cause in order to foster improved performance over time
- Measure the entity performance over the time (Quarterly and Yearly)
- The Entity MRI Score pertains only to BES protection system misoperations and operations data

Score Vs. Risk



Entity Misoperation Risk Index Score (Entity MRI Score)

I	J	K	L	M	N	O	P	Q	
Equipment Name (as listed by Protection that Misoperated)	Equipment Type (select from drop down)	Facility Voltage (select from drop down)	Equipment Removed from Service (Permanently or Temporarily) as the result of the Misoperation	Fault Type (Optional, select from drop down)	Event Description	Restoration Method (Optional, select from drop down)	Misoperation Category (select from drop down)	Cause(s) of Misoperation (select from drop down)	Incorrect Setting/Log Failure/Malfunctions S from

**Misoperation [Category - Cause – Voltage]
(CCV)**



Misoperation Category	Weighting Factor (25)
Failure to Trip - During Fault, Slow Trip - During Fault	12
Failure to Trip - Other than Fault, Slow Trip - Other than Fault	8
Unnecessary Trip - During Fault	4
Unnecessary Trip - Other than Fault	1

Cause of Misoperation	Weighting Factor (25)
Unknown/unexplainable	15
Incorrect settings, Logic errors, Design errors, As-left personnel error	8
Relay failures/malfunctions, Communication failures, AC system, DC system, Other/Explainable	2

Misoperation Voltage Class	Weighting Factor (25)
$300 < x \leq 765$ kV (Including HVdc)	12
$200 \leq x \leq 300$ kV	8
< 200 kV	5

Misoperation Report Combination:

Misoperation Report Combination #	Misoperation Category	Cause of Misoperation	Misoperation Voltage Class	Risk Factor
1	Failure to Trip - During Fault, Slow Trip - During Fault	Unknown/unexplainable	300 < x ≤ 765 kV (Including HVdc)	12+15+12=39

Misoperation Report Combination #	Misoperation Category	Cause of Misoperation	Misoperation Voltage Class	Risk Factor
36	Unnecessary Trip - Other than Fault	Relay failures/malfunctions, Communication failures, AC system, DC system, Other/Explainable	< 200 kV	1+2+5=8

Entity MRI Score Equations:

$$\text{Misoperation Rate} = \frac{\text{Total Misoperation count}}{(\text{Total correct Operation count}) + (\text{Total Misoperation count})}$$

$$\text{Total Risk Factor} = \sum \text{Risk Factors of All Misoperations for the Period Under Consideration}$$

$$\text{Average Risk Factor per Misoperation} = \frac{\text{Total Risk Factor}}{\text{Total \# of Misoperations}}$$

$$\text{Average Risk per Operation} = \text{Misoperation Rate} \times \text{Average Risk Factor per Misoperation}$$

$$\text{Risk Based Score} = 95 \times \left[1 - \frac{\text{Average Risk per Operation}}{39} \right]$$

$$\text{Entity MRI Score} = \text{Risk Based Score} + \text{Working Group Participation}$$

Average Risk per Operation

$$\text{Average Risk per Operation} = \frac{\text{Total Misoperation}}{\text{Total Operation}} \times \frac{\text{Total Risk Factor}}{\text{Total Misoperations}}$$

Example

Misoperation Category	Cause of Misoperation	Misoperation Voltage Class
Unnecessary Trip - During Fault	Communication failures	345kV
Unnecessary Trip - During Fault	Other/Explainable	345kV
Unnecessary Trip - During Fault	Communication failures	345kV
Unnecessary Trip - During Fault	Other/Explainable	345kV
Unnecessary Trip - During Fault	AC system	230kV
Unnecessary Trip - Other than Fault	Relay failures/malfunctions	138kV
Unnecessary Trip - During Fault	DC system	230kV
Unnecessary Trip - During Fault	DC system	230kV
Unnecessary Trip - Other than Fault	Relay failures/malfunctions	138kV
Unnecessary Trip - Other than Fault	Relay failures/malfunctions	138kV
Unnecessary Trip - Other than Fault	Relay failures/malfunctions	138kV
Unnecessary Trip - Other than Fault	Communication failures	138kV
Unnecessary Trip - Other than Fault	Incorrect settings	138kV
Unnecessary Trip - Other than Fault	Incorrect settings	138kV

Misoperation Report Combination #	Misoperation Category	Cause of Misoperation	Misoperation Voltage Class	Risk Factor
25	Unnecessary Trip - During Fault	Relay failures/malfunctions, Communication failures, AC system, DC system, Other/Explainable	300< x ≤765 kV (Including HVdc)	18
26	Unnecessary Trip - During Fault	Relay failures/malfunctions, Communication failures, AC system, DC system, Other/Explainable	200≤ x ≤300 kV	14
36	Unnecessary Trip - Other than Fault	Relay failures/malfunctions, Communication failures, AC system, DC system, Other/Explainable	< 200 kV	8

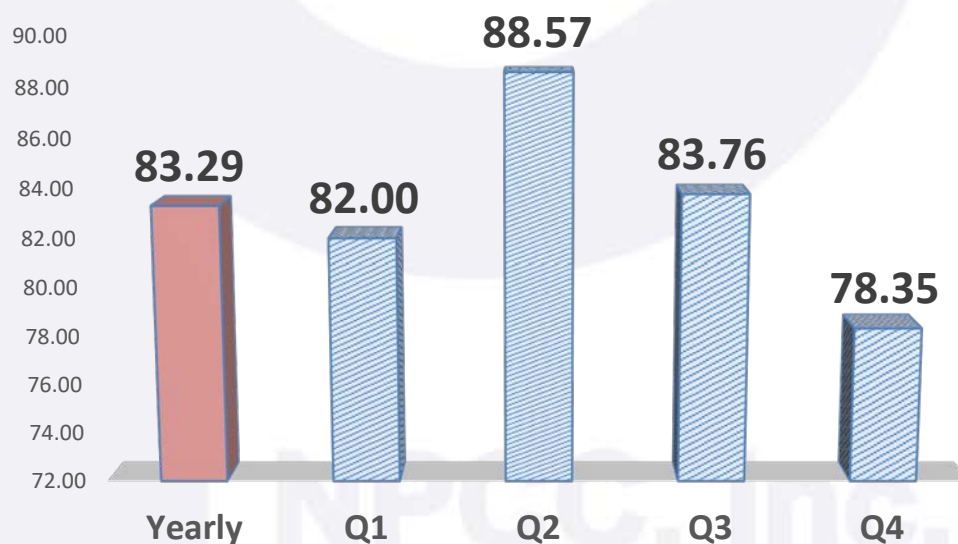
Number of Misops per each Risk Factor	Sum of Risk Factors
4	72
3	42
7	56
Total Risk Factor	170
Total Number of Misops	14
Average Risk Factor per Misop	12.14

Q1	Operations	Misoperations
Total	23	14

Misop Rate	Average Risk Factor per Misop	Average Risk per Operation = Misop Rate x Avg Risk per Misop	Risk-Based Score= 95x(1 – Avg. Risk per Operation/39)	WG participation	WG Score	Entity MRI Score
60.9%	12.14	7.39	77.00	Yes	5	82.00

Entity MRI Score

Misop Rate	Average Risk Factor per Misop	Average Risk per Operation = Misop Rate x Avg Risk per Misop	Risk-Based Score= $95 \times (1 - \text{Avg. Risk per Operation}/39)$	WG participation	WG Score	Entity MRI Score	
56.1%	12.22	6.86	78.29	Yes	5	83.29	Yearly
60.9%	12.14	7.39	77.00	Yes	5	82.00	Q1
38.5%	12.20	4.69	83.57	Yes	5	88.57	Q2
58.3%	11.43	6.67	78.76	Yes	5	83.76	Q3
66.7%	13.33	8.89	73.35	Yes	5	78.35	Q4



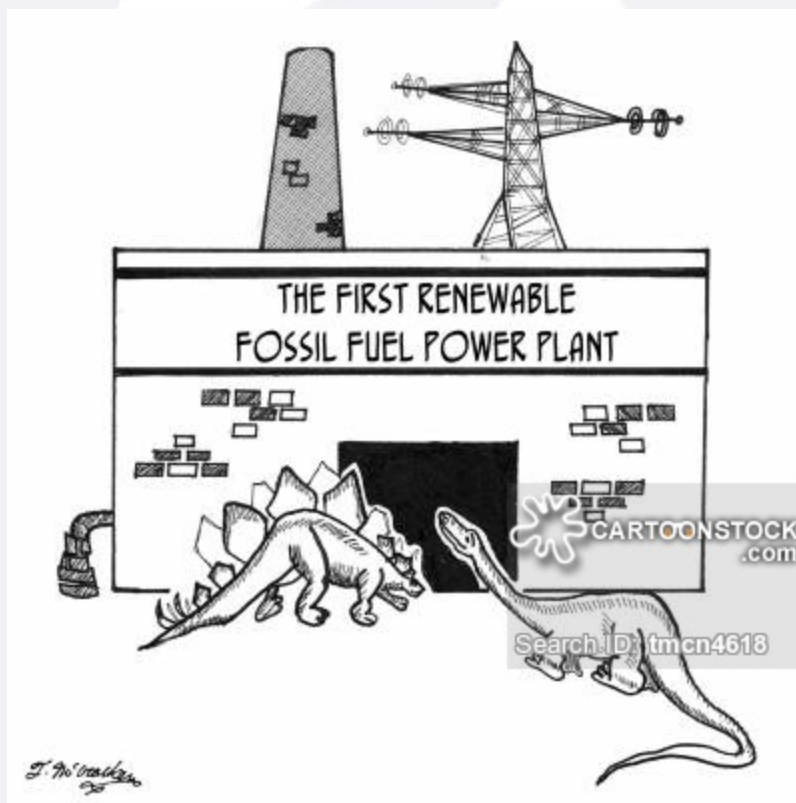
NPCC intends for the Entity MRI Score

- Gage the entity performance over a period of time (Quarterly, Yearly, etc.)
- Trend its performance in comparison to similar size companies
- Encourage continuous improvements by taking appropriate actions or implement mitigation plans to improve Entity MRI Score

Questions?

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Vegetation Analysis in **3D**



Andrew Flynn
GIS Analyst/Developer

Veg. Management Standard - FAC-003-4

Purpose:

“Manage vegetation located on transmission rights of way..., thus preventing the risk of those vegetation-related outages...”

VELCO's Objectives:

- Locate and track vegetation close to exceeding the minimum vegetation clearance distance.
- Assist field personnel through internal controls (LiDAR and inventory applications).

LiDAR at VELCO

- LiDAR Light Detection And Ranging
- Helicopter Based
 - Low and slow
 - Higher detail
- Leaf Off Conditions
- Support:
 - Vegetation mgmt.
 - PLS-CADD models
 - ROW encroachments



Vegetation Applications

Drawbacks of LiDAR Deliverables

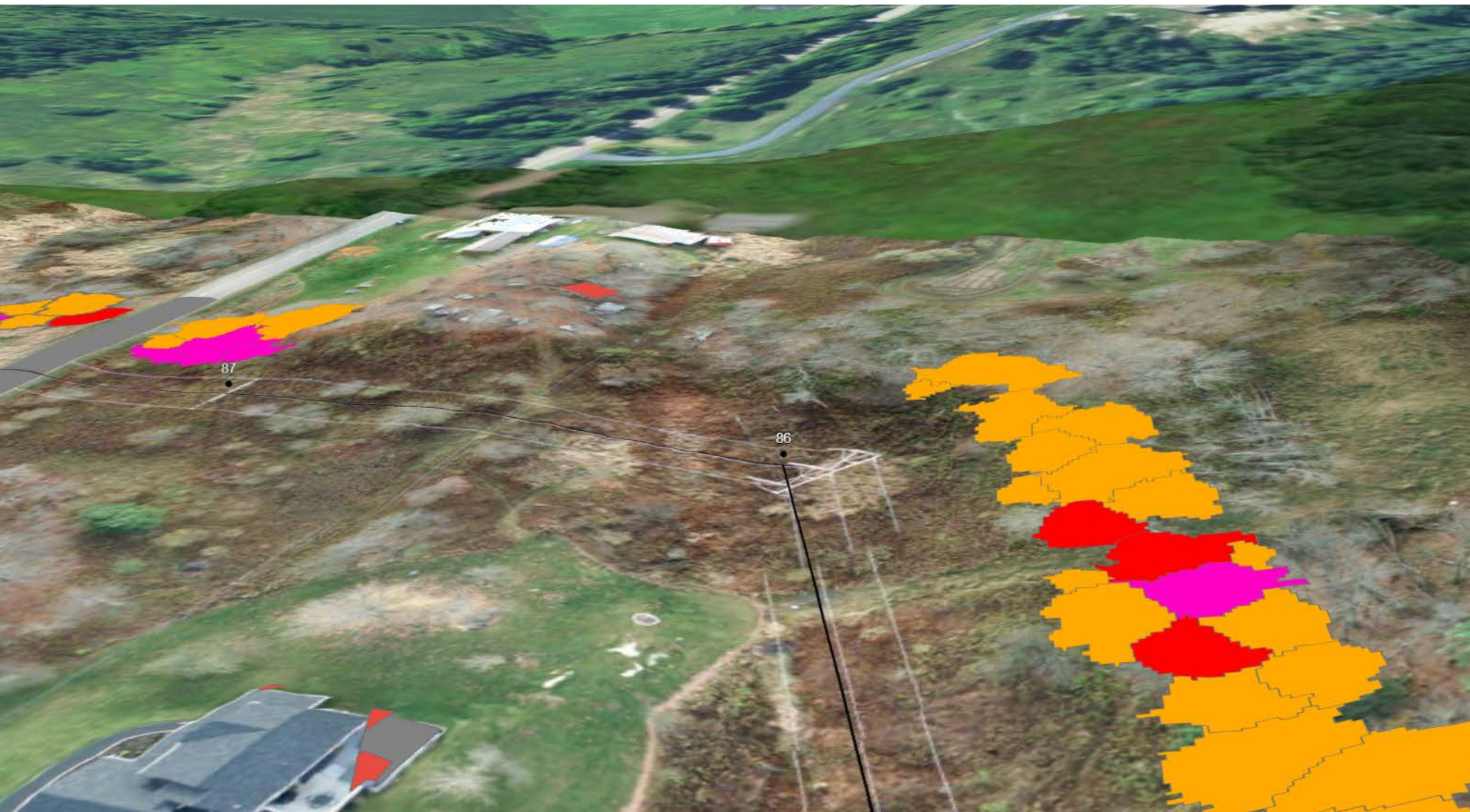
- Limited by devices and apps
- 2D Features can be challenging to identify
- Classified Point Cloud



Defense-In-Depth Strategy

“Reliability standards should not be viewed as a body of unrelated requirements, but rather should be viewed as part of a portfolio of requirements designed to achieve an overall defense-in-depth strategy...”

The End Product

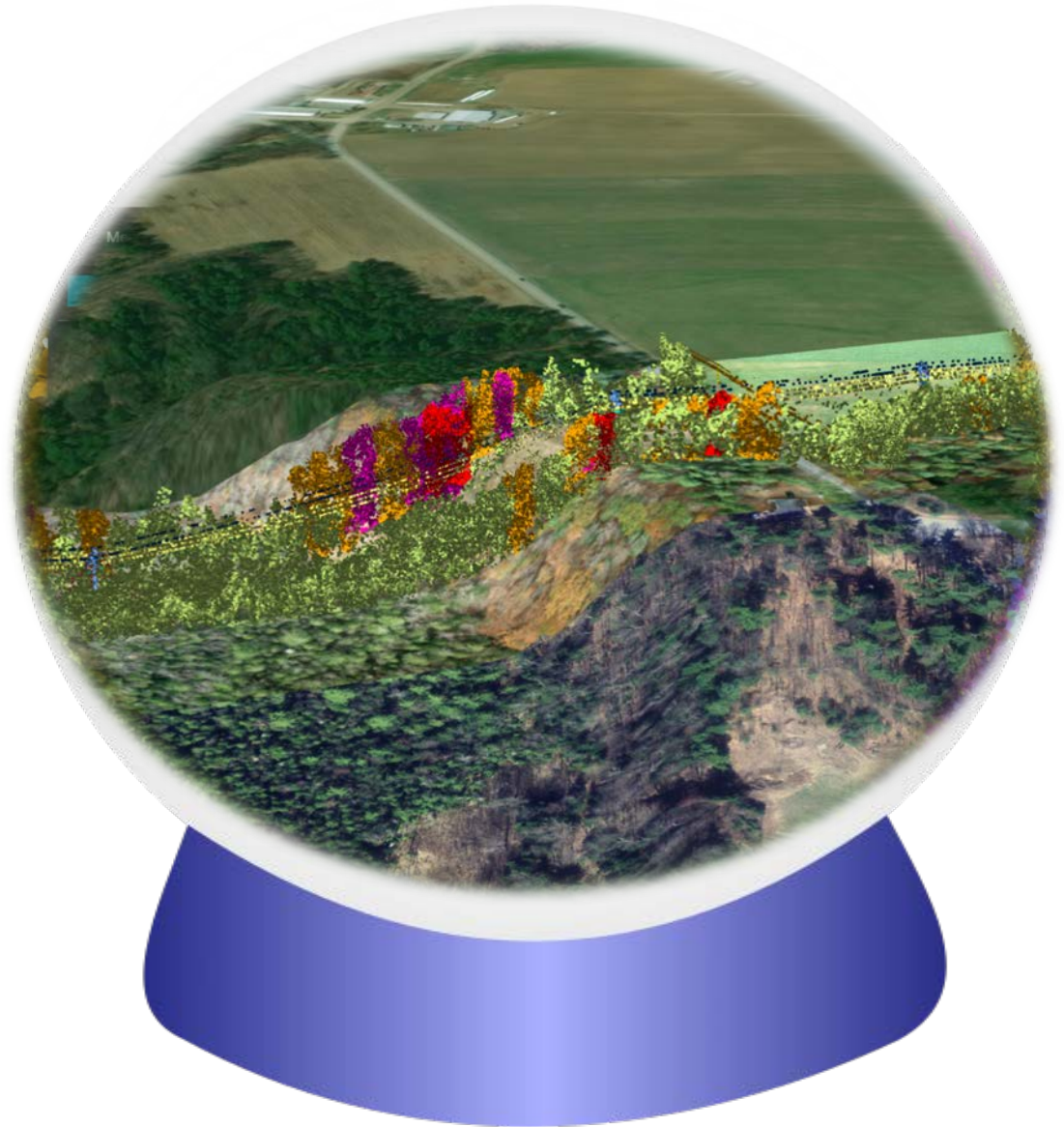


Lets Try a Live Demo...

[LINK](#)

Looking to the Future

- Substation Review
- Viewshed Simulation
- Distance Measurement
- Access Planning



Questions?

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OUTREACH PROGRAMS

PHYSICAL ASSESSMENT

CYBER ASSESSMENT

PHYSICAL AND CYBER ASSESSMENT





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