RELIABILITYFIRST

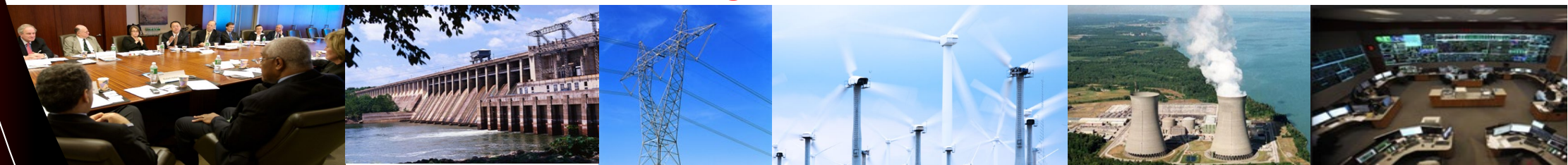
Annual Reliability and Compliance Workshop: Building Sustainable Programs

Day 2

Thursday, September 23, 2021

1:00 – 5:00 p.m. Eastern

PUBLIC



Welcome and Logistics

- This WebEx event is not being recorded.
- Please submit all questions through Slido instead of the WebEx chat.
- For your convenience, we will provide the workshop survey live at the end of event via Slido, so please stay on the call.
- Today's presentations will be emailed to all registrants and posted to RF website.

Join the conversation at

Slido.com

#RF2

Agenda

Presentation	Presenter(s)	Time
Opening Remarks	Brian Thiry, RF	1:00 – 1:05
Sustainability in Compliance Monitoring, Legal and Enforcement	Niki Schaefer, RF	1:05 – 1:20
Day 2 Keynote	Mark Hoog, Vector Academy	1:20 – 2:05
BREAK		2:05 – 2:15
Facility Ratings Regarding ERO Expectations and Lessons Learned	Joel Rogers, SERC	2:15 – 2:45
Facility Ratings Internal Controls	Joe Pilch, Duquesne Light Co.	2:45 – 3:15
BREAK		3:15 – 3:25
CIP-013 – Building a Sustainable Supply Chain Program	Scott Pelfrey, RF; Holly Peterson, WECC; Jordan Kethley, TexasRE; Lee Felter, MRO	3:25 – 4:10
CIP-014 Practice Guide Overview	Jamie Calderon, NERC	4:10 – 4:40
RF Community Appraisal Project	Brian Hallett, RF	4:40 – 4:55
Closing Remarks	Brian Thiry, RF	4:55 – 5:00

RF Anti-Trust Statement

It is ReliabilityFirst's policy and practice to obey the antitrust laws and to avoid all conduct that unreasonably restrains competition. This policy requires the avoidance of any conduct which violates, or which might appear to violate, the antitrust laws. Among other things, the antitrust laws forbid any agreement between or among competitors regarding prices, availability of service, product design, terms of sale, division of markets, allocation of customers or any other activity that unreasonably restrains competition.

It is the responsibility of every ReliabilityFirst participant and employee who may in any way affect ReliabilityFirst's compliance with the antitrust laws to carry out this policy.

Trivia Giveaways

RF is offering the opportunity to win a $100 Amazon gift card five times throughout each day of our Fall Workshop!

To Enter: Use Slido (Slido.com, Slido app or the QR code). At five different times during the workshop, we will announce that a content-based trivia question is coming. You will have one minute to enter your name into Slido before the question is asked. You must enter your first and last name; anonymous responders are not eligible to win.

To Win: A skill-based question will be visible in Slido. You must answer correctly and be the fastest respondent, as recorded in Slido, to win. We will announce the winners and who to email to provide an address to receive the $100 Amazon gift card.

Join the conversation at **Slido.com #RF2**

NO COST TO ENTER. Governed by the rules of Ohio. Registrants and Entrants hold RF harmless from any associated claim and RF is not responsible nor may be held liable for any technical errors or events that may prevent the promotion from running smoothly. Must be over the age of 18 with a valid US address and not an Employee of ReliabilityFirst to win. Any resulting taxes are the responsibility of the winner.

Trivia Giveaway Question 1

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- You can only win one time.

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Sustainability in Compliance Monitoring, Legal and Enforcement

Niki Schaefer, Vice President & General Counsel

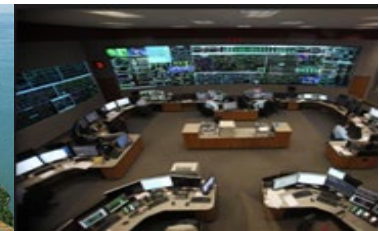
Annual Reliability and Compliance Workshop

September 23, 2021

PUBLIC



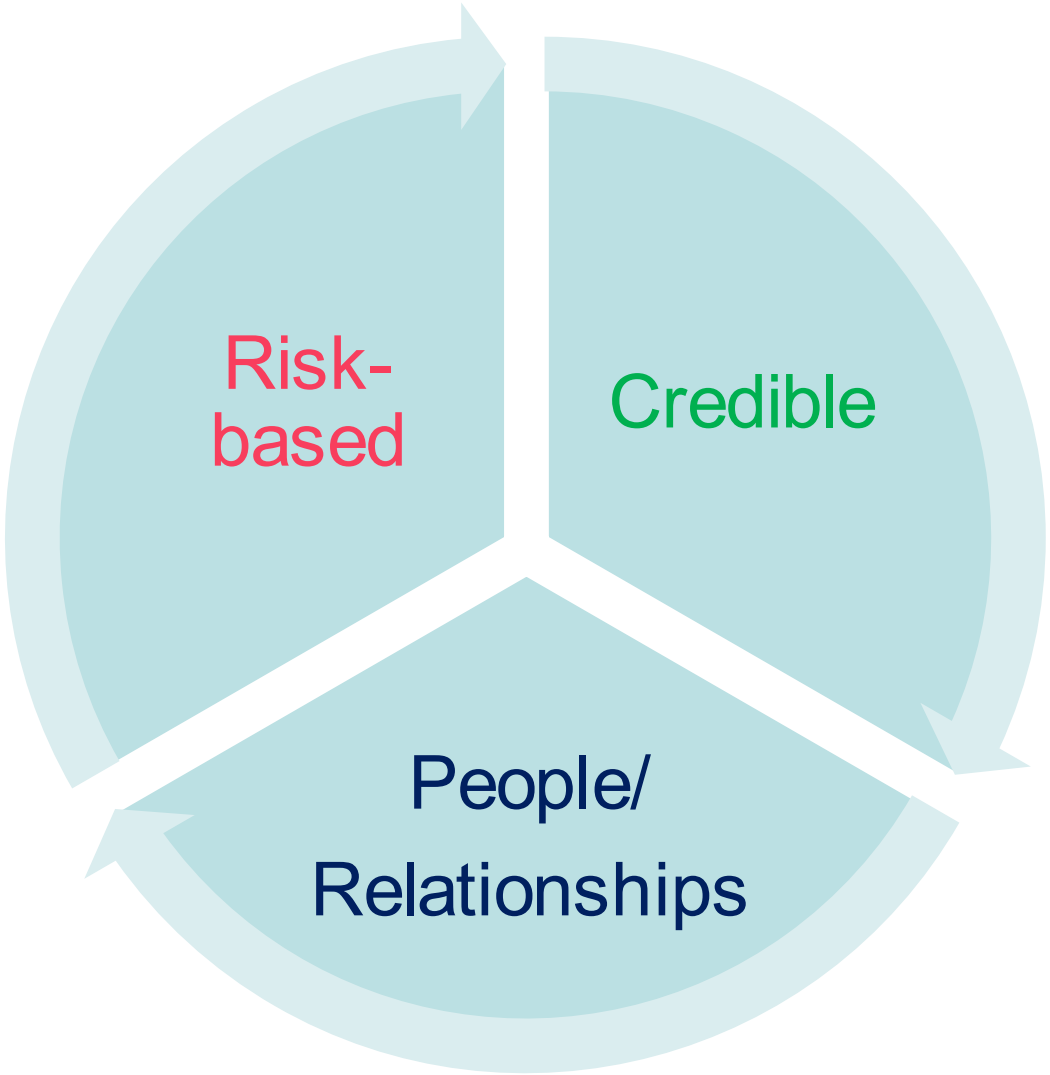


Background

- **Family**: 1 husband (Brian), 2 kids (Noah (12), Lane (10), 2 dogs (Artie and Moose)
- **Home**: born on Long Island, New York; raised in Shaker Heights, Ohio; live in Chagrin Falls, Ohio
- **Education**: Shaker Heights High School, Cornell University, Case School of Law
- **Interests**: running, snowboarding, wakeboarding, cooking and dining out, entertaining, traveling, fashion
- **Volunteer work**: The Gathering Place, American Heart Association
- **Previous jobs**: Counsel, Electrical Sector and Litigation at Eaton Corporation; RF enforcement; trial lawyer

Elements of CMEP Sustainability



Vision for Our CMEP Team

- Risk-focused
- Thoughtful
- Reasonable
- Collaborative
- Innovative

Questions & Answers

Forward Together ReliabilityFirst

Trivia Giveaway Question 2

Please log into Slido now for the opportunity to win a $100 Amazon gift card!

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Keynote Speaker

Mark Hoog
President, Vector Academy

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Annual Reliability Workshop

September 22-23, 2021

Building Sustainable Programs

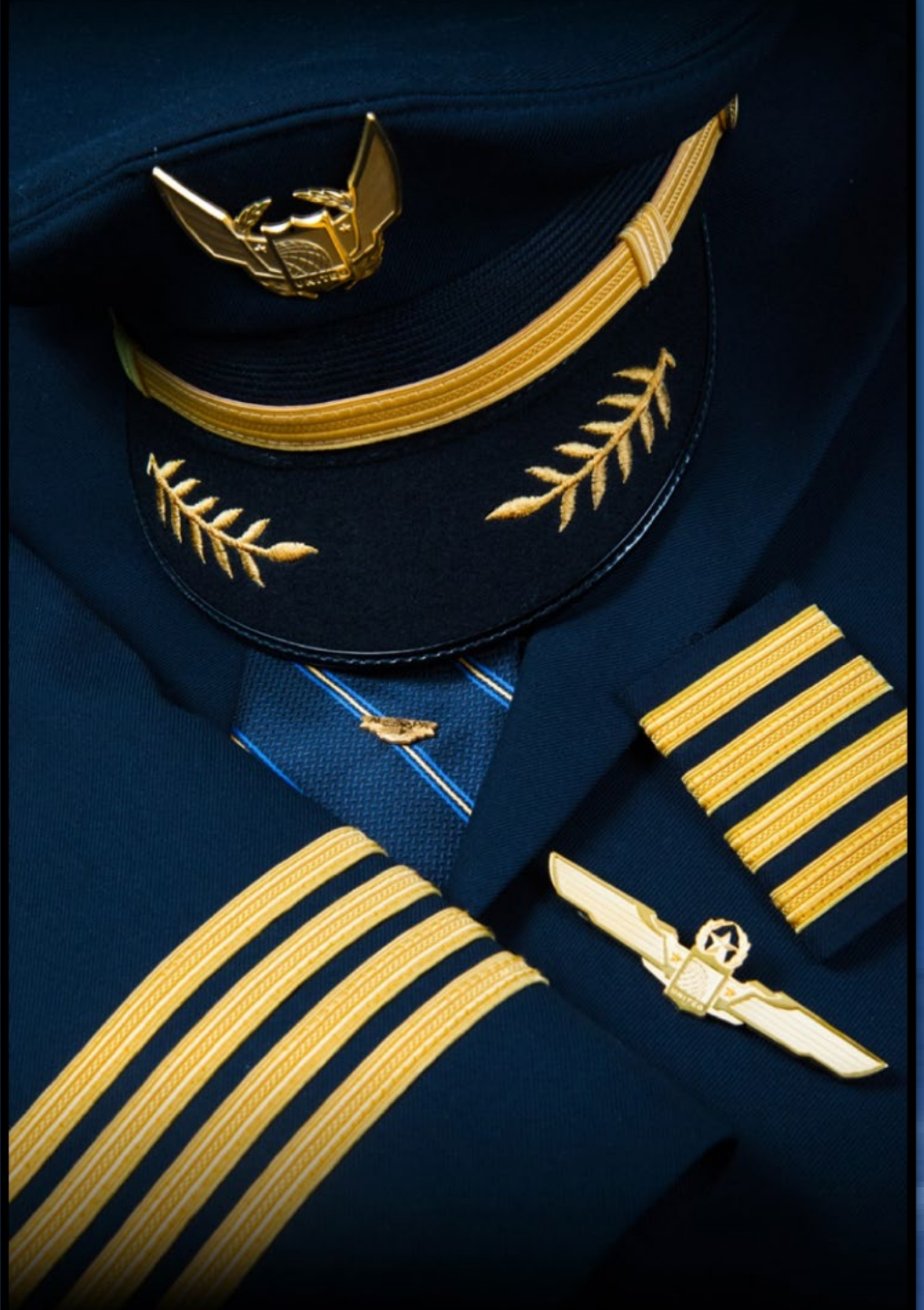
RELIABILITY FIRST


NFL

There is history being made today…

By being here…you are a part of it!


MY STORY



1 Person…
2 Questions


9/11


BIG TOP


YOUR SONG
The First Growing Field Adventure
by Mark E. Hoon
Illustrations by Robert J. Ackerman


DREAM MACHINE
Another Growing Field Adventure


Field of Dreams
Growing Field Adventure


TREASURE ISLAND


MAGIC MOUNTAIN

CONSCIOUS LEADERSHIP

Think of someone influential throughout history…

“1 word” tenet?

Courageous

Tenacious

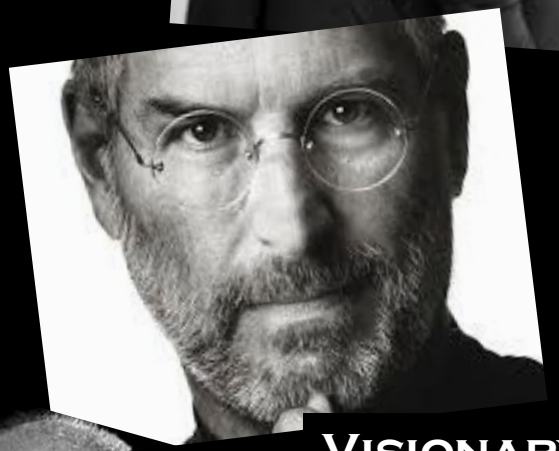
Dreamer

Inspiring

Loving

Innovative

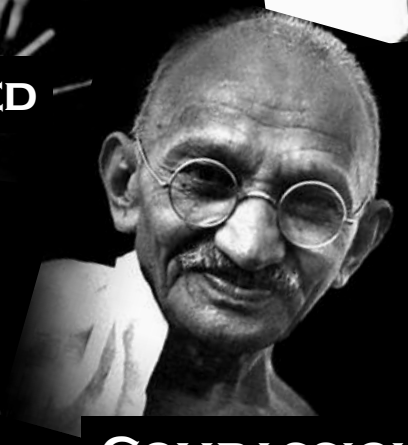
Determined



Visionary

Creative

Strength



Compassionate

Conscious Leadership Skills

Risk based

- Listen/Think
- distinguish
- thoughtfulness
- understanding

Credible

- innovative
- consistent
- reasonable
- Centered on mission
- collaborative
- Transparent

Invest in people

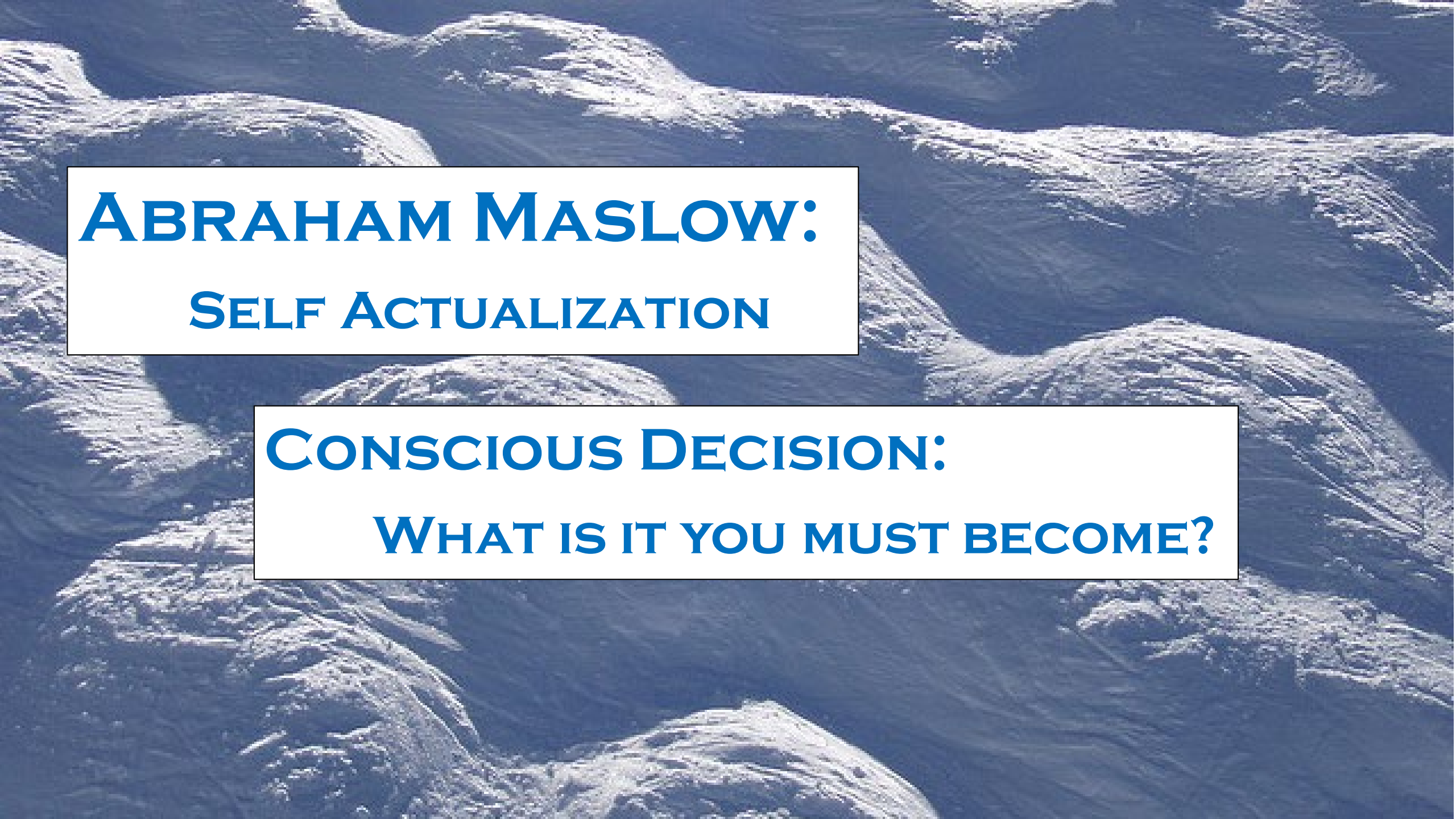
- Skill & relationships
- Support people
- Vision for future
- relationships


3
Conscious Decisions
to make
TODAY!

Conscious Decision #1:

Freestyle


What are your “3 bones”?
Backbone?
Funny-bone?
Wishbone?



Abraham Maslow:

Self Actualization

Conscious Decision:

What is it you must become?

Conscious Decision #2:

Leadership Paradigm


Conscious:
Culture (safety)?
How do you work along side Reliability First?
Reliability, Resilience and security: daily or just during an audit?
Continuous improvement?
Building a safety system or "hoping" for safety??
Cultivation?
Are you training, encouraging and empowering leaders?

Conscious Decision #2:

Leadership Paradigm

It does not matter what you want...
It matters what you are willing to train.

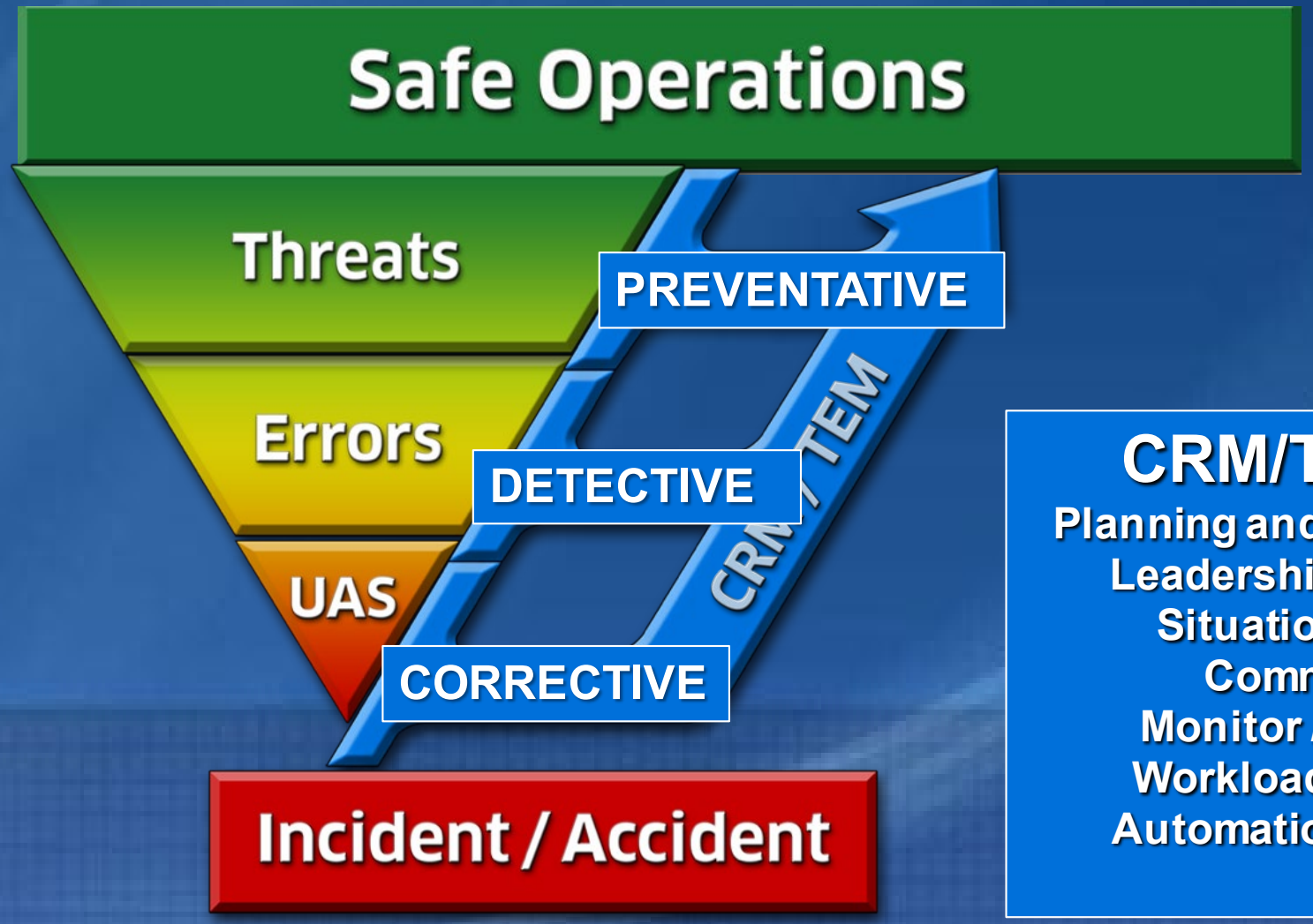

Would you fly with me at 50% safe?
Would you fly with me at 75% safe?
Would you fly with me at 99.9% safe?
UNITED
1 accident every 4 days
At 99.9% safe

Airline Safety Model

CRM/TEM Skills

Planning and Decision Making
Leadership Effectiveness
Situation Awareness
Communication
Monitor / Cross Check
Workload Management
Automation Management

Airline Safety Model



CRM/TEM Skills

Planning and Decision Making
Leadership Effectiveness
Situation Awareness
Communication
Monitor / Cross Check
Workload Management
Automation Management

Fatalities since safety system implemented in 1978?

0

Conscious Decision #3:

Invite…

1 person…

2 questions

PEOPLE TALK ABOUT
OTHER PEOPLE
FOR 1 OF 4 REASONS...

WHY DO YOU GET TO STAY?

CAN YOU IMAGINE MEETING SOMEONE THAT "RAISED YOUR BAR" EVERYTIME YOU SAW THEM?

CAN YOU IMAGINE THAT PERSON...

BEING YOU?

Don't Miss YOUR Chance...
To invite others Into the game of life!

Today is YOUR, "up-until-it"


Old Dominion Electric Cooperative
CALPINE
Dominion
CMS ENERGY
AES
the power of being global
TENASKA
DTE Energy
NIPSCO
A NiSource Company
TALEN ENERGY
WOLVERINE
POWER COOPERATIVE
EDISON MISSION ENERGY
An EDISON INTERNATIONAL℠ Company
NEPTUNE
Regional Transmission System
PSEG
PROVEN COMPLIANCE SOLUTIONS
LANSING BWL
Hometown People. Hometown Power.
APPALACHIAN POWER
An AEP Company
BOUNDLESS ENERGY™
NEXTera ENERGY
DLC
DUQUESNE LIGHT CO.
OPC-DC
Office of the People's Counsel
ADVOCACY | EDUCATION | PROTECTION
Utilities, Inc.
DATAcapable
Allegheny
ELECTRIC COOPERATIVE, INC.
ipl
an AES company
Indianapolis Power & Light Company
TVA
RF
Thank you…
for all you do!
RELIABILITY FIRST
Cloverland
ELECTRIC COOPERATIVE
pjm
MISO
ITC
A FORTIS COMPANY
Sime Darby
Energy & Utilities
CenterPoint Energy
Morgan Stanley
FirstEnergy
DUKE ENERGY
OEC
OHIO ELECTRIC CONTROL, INC
OVEC
OHIO VALLEY EDUCATIONAL COOPERATIVE
Orange & Rockland
DYNEGY
CONSUMER ADVOCATES
CAPS
OF THE PJM STATES
Exelon
CMS ENERGY
MPPA
Michigan Public Power Agency
ppl
PPL Electric Utilities
AEP
SMECO
People. Power. Progress.
CUB
Wabash Valley Power
DELIBERATELY DIFFERENT
INDIANA MICHIGAN POWER
HOOSIER ENERGY
DP&L
ATC
NAES
VINELAND
MUNICIPAL ELECTRIC UTILITY

Thank you…
for all you do!

RELIABILITY FIRST

Break

See you back at 2:15 for the presentation on Facility Ratings Regarding ERO Expectations and Lessons Learned from SERC's Joel Rogers!

Join the conversation at
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Facility Ratings Expectations and Lesson Learned

Joel Rogers, P.E., NCSO, CGAP
SERC Senior Compliance Auditor

Agenda

- Analyzing Risk
- Facility Rating Reliability Standards
- Facility Rating Methodology
- Facility Rating Locations
- Facility Rating Database
- Trends and Violations
- Walk-down Checklist
- Internal Controls

Analyzing Risk

- High Risk Reliability Standards
- Inherent Risk
- Compliance History
- Internal Controls
- Compliance Culture
- Trends
- ERO and Regional Risk

FAC-008-3

- **Purpose:** To ensure that Facility Ratings used in the reliable planning and operation of the Bulk Electric System (BES) are determined based on technically sound principles. A Facility Rating is essential for the determination of System Operating Limits.

- **Applicability**
  - Transmission Owner (TO)
  - Generator Owner (GO)

System Operating Limit

SOL (System Operating Limit) – The value (such as MW, MVAR, amperes, frequency or volts) that satisfies the most limiting of the prescribed operating criteria for a specified system configuration to ensure operation within acceptable reliability criteria. System Operating Limits are based upon certain operating criteria. These include, but are not limited to:

- **Facility Ratings** (applicable pre-and post-Contingency Equipment Ratings or Facility Ratings)
- **Transient stability ratings** (applicable pre- and post-Contingency stability limits)
- **Voltage stability ratings** (applicable pre- and post-Contingency voltage stability)
- **System voltage limits** (applicable pre- and post-Contingency voltage limits)

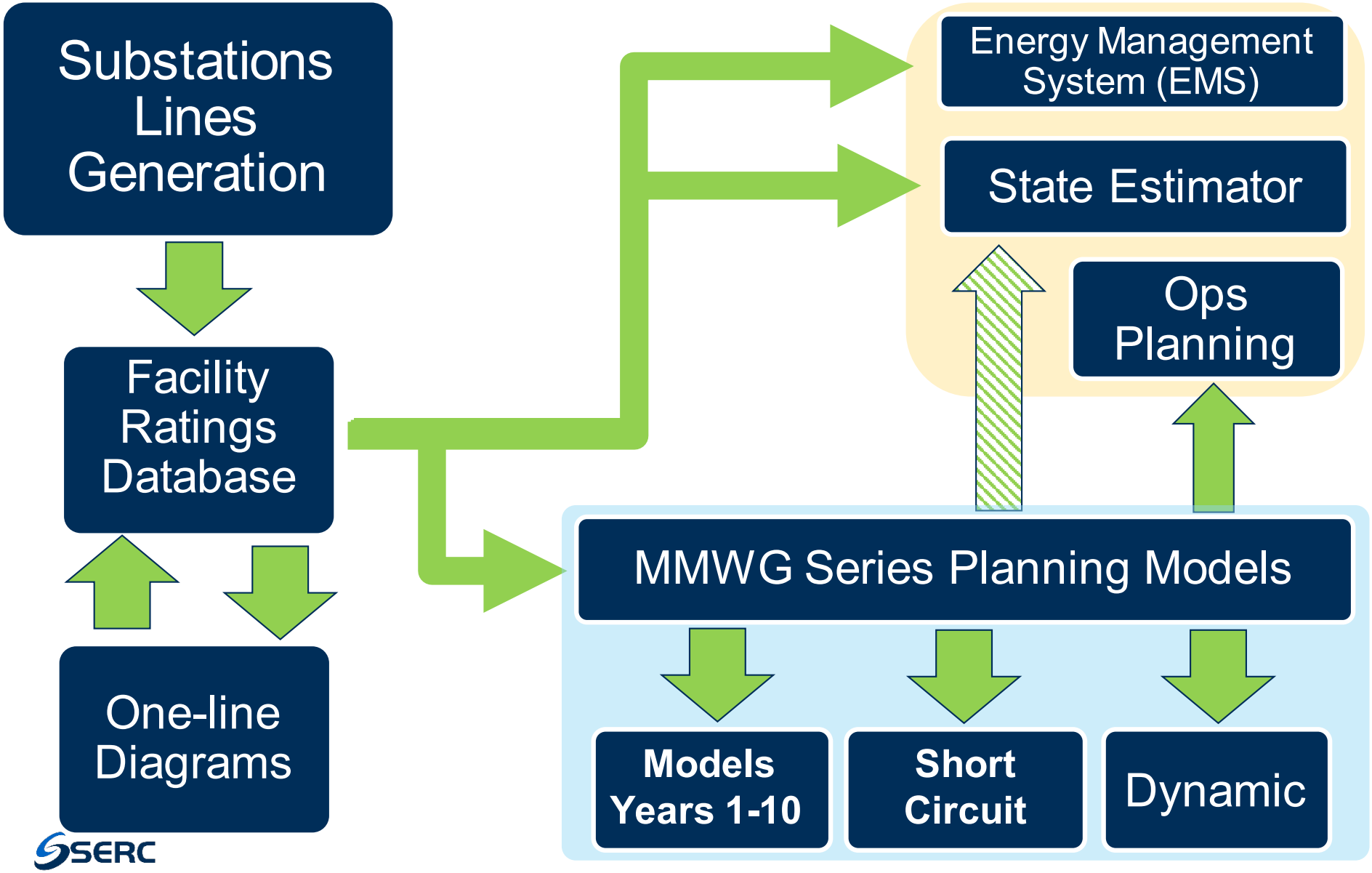
Facility Rating / SOL Standards

- **FAC-008-3 (Facility Ratings)** – confirm TO and GO have Facility Ratings consistent with FRM (Facilities Rating Methodology)
- **FAC-014-2 (Establish and Communicate SOLs)** – confirm RC and TOP SOLs are consistent between EMS, State Estimator, and offline operations planning models
- **FAC-014-2 (Establish and Communicate SOLs)** – confirm PC and TP SOLs are consistent between operations and planning models
- **TOP-001-5 (Transmission Operations)** and **TOP-002-4 (Operations Planning)** – confirm TOP SOLs are consistent between EMS, State Estimator, and offline operations planning models

Facility Rating Methodology

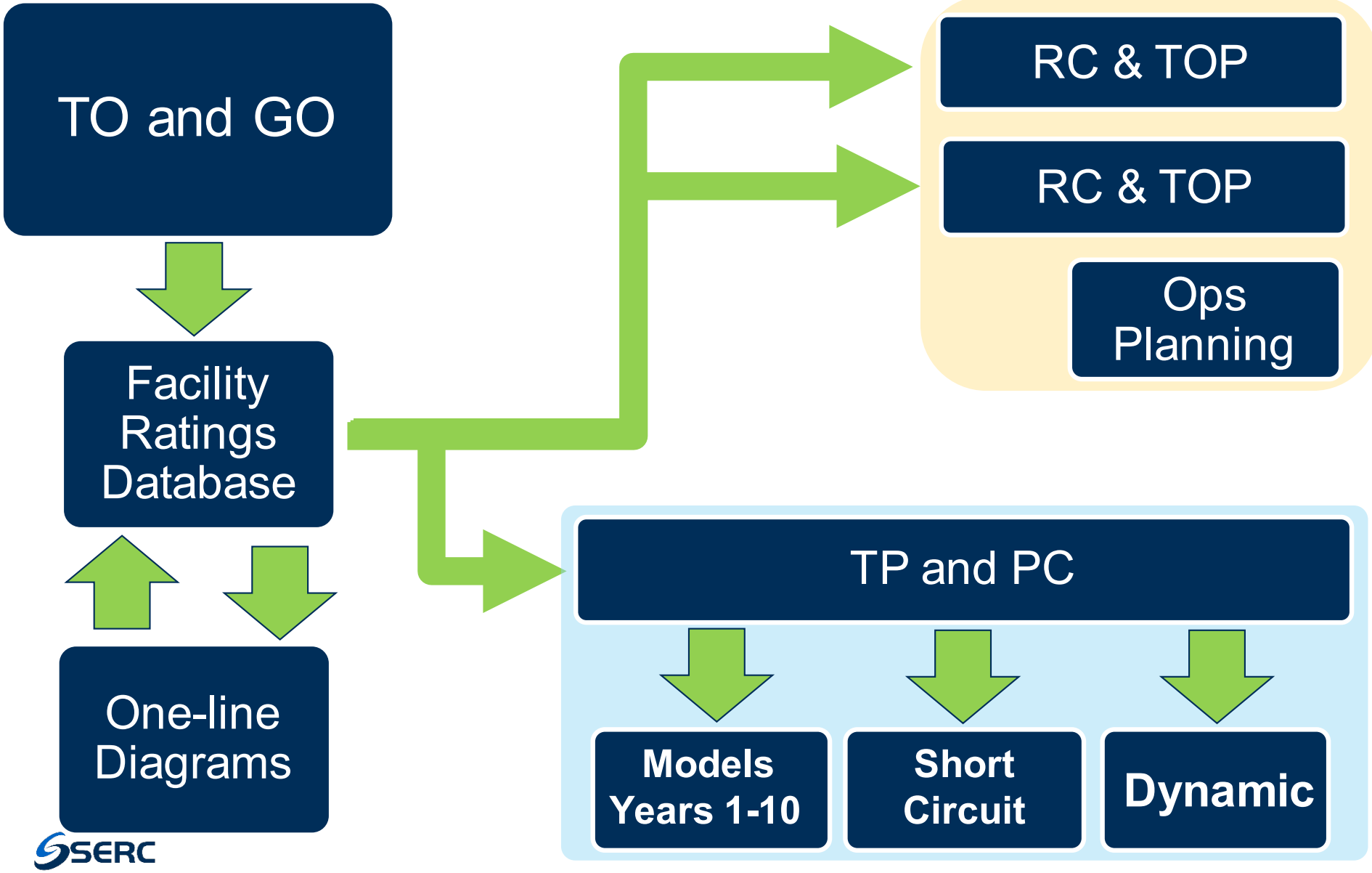
- Freedom to choose assumptions
- Based on technically sound principles
- Substation configuration
- Compliance to methodology

Facility Rating Locations



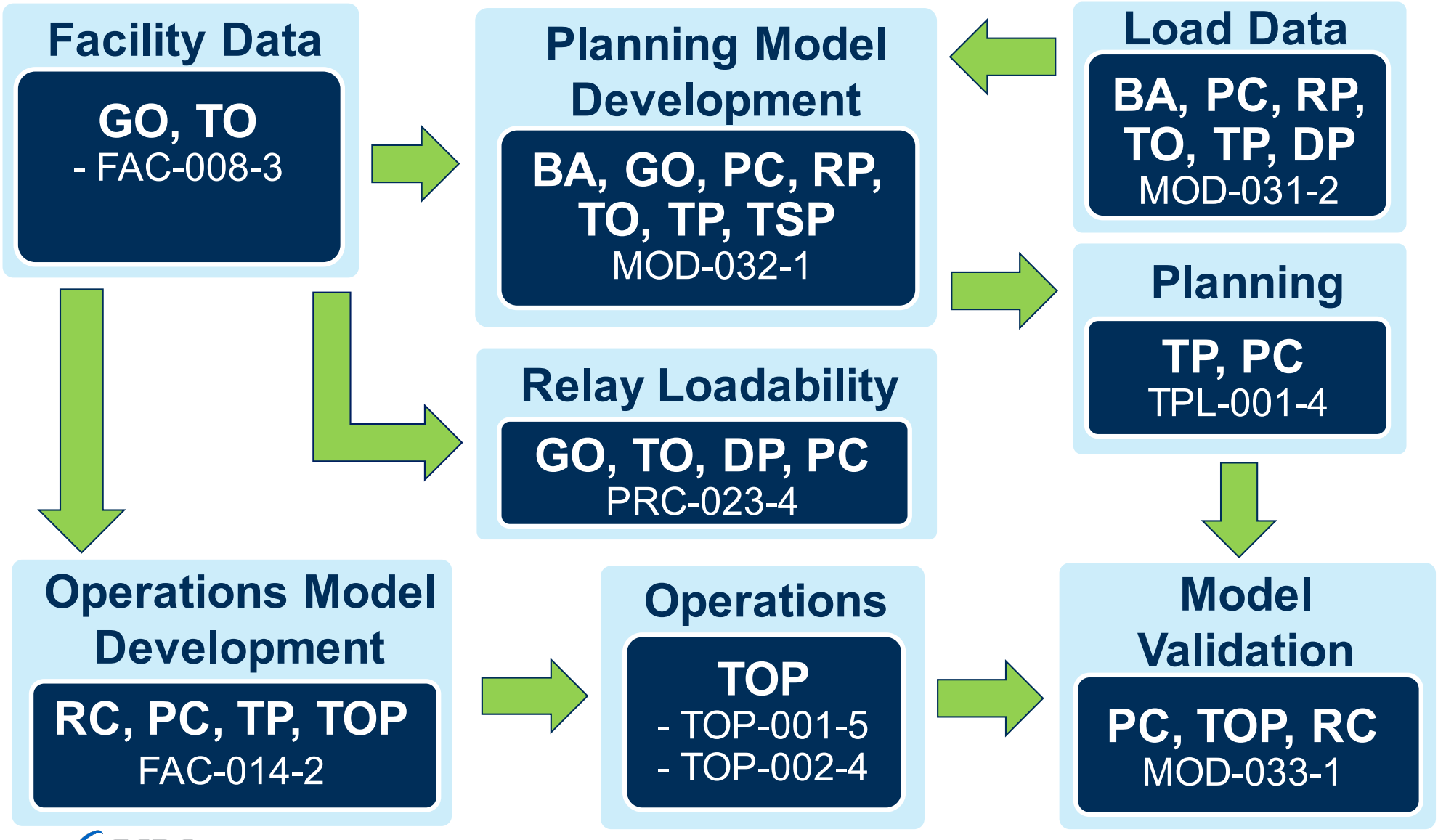
SERC

Facility Rating Locations



SERC

Facility Rating Data Flow

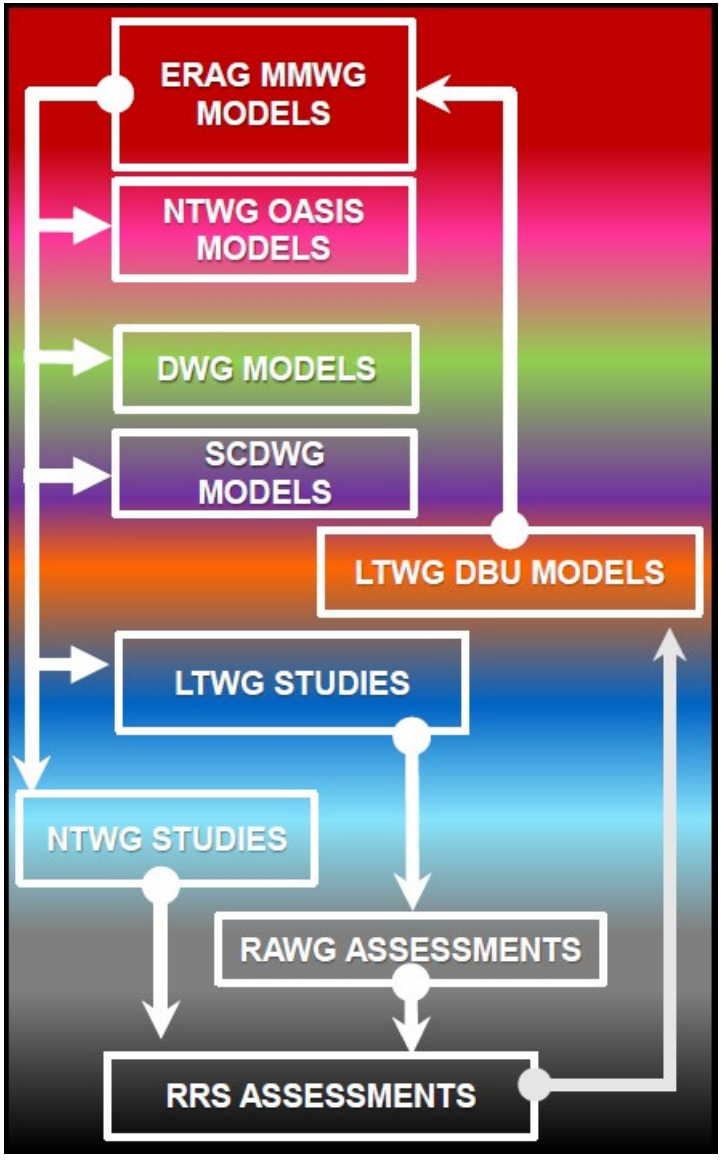


Generation and Transmission Owners

- Capturing Facility Ratings
- Quality assurance
- Periodic walk-down
- Sustainable program

Planning Models

- Planning Horizon
  - Near-term and Long-term
  - Short Circuit
  - Dynamic
- Operations Horizon
  - Next day to one year
- MOD-033-1 model validation



System Operations

- EMS
  - Alarm points
  - System topology
  - Dynamic ratings
- State Estimator
  - RTCA
  - Power flow
  - Outage evaluation

Facility Ratings Database

- Official repository
- Data gathering and entry process
- Access controls
- Software application
- Review and approval

Trends

- **Field**
  - CTs
  - Jumpers
  - Connectors and bus
- **Database**
  - Equipment consolidation
  - Omissions
- **Planning**
  - Interconnections
- **EMS and SE**
  - System Operators unable to find correct location
  - Alarm point mismatch
- **One-lines**
  - No drawings
  - No ratings data
  - Does not match field topology

2020 – 2021 FAC-008-3 Violations

	2021 FAC-008-3					Missed Equipment	Methodology	Incorrect Facility Rating	Incorrect Equipment Rating
	Audit	Self-Report	Generation	Transmission	Req.				
					R3		X		
					R3		X		
					R6			X	
	2020 FAC-008-3								
					R6	X			
					R6				X
					R6	X			
					R6	X			
					R6	X			
					R6	X			
					R6				X
	2020 FAC-009-1								
					R1			X	
					R1			X	
					R1			X	
					R1			X	
Totals	5	9	8	6		5	2	5	2

Walk-Down Checklist

Planning the Walk-Down	
	Become Familiar With Your Company's Facility Ratings Methodology
	Procure Binoculars and/or High Resolution Camera for Objects Out of Reach
	Determine Personnel Protective Equipment (PPE) Requirements
	Contact the Control Center and Security Personnel to Plan the Walk-down
	Obtain Checklist, One-line, Equipment List, Computer App., etc. for Annotations
	Review One-lines and Equipment List Prior to Walk-Down
	Check Weather Forecast for the Day of the Walk-Down

Performing the Walk-Down	
	Establish a Walk-Down Leader and Discuss the Role of Each Participant
	Conduct a Safety Briefing Prior to Entering the Substation or Plant
	Ensure Participants Know Local First Responder Numbers and Physical Address
	Ensure All Personnel Have Proper PPE
	Discuss the Order in Which Facilities Will Be Reviewed
	Discuss Who Will Open Breaker Cabinets and Access Other Equipment
	Discuss Any Hazard Areas or Ongoing Work Area that Should Be Avoided
	Contact the Control Center and Security Personnel Prior to Entry and After Exit

Internal Controls

- Periodic walk-downs
- Effective data capture
- Quality assurance review
- Periodic validation
- Access controls
- Management oversight

Link: CMEP Practice Guide - Evaluation of Facility Ratings and System Operating Limits

Summary

- Clearly defined and documented process with flowcharts
- Training on programs and processes
- Change management
- Internal controls
- Quality assurance review
- Periodic review

Questions

Link: SERC Facility Ratings E-Learning Module

Break

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Trivia Giveaway Question 3

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Duquesne Light Company
FAC-008 Program Sustainability

Joe Pilch, Manager
Transmission Planning & Interconnection

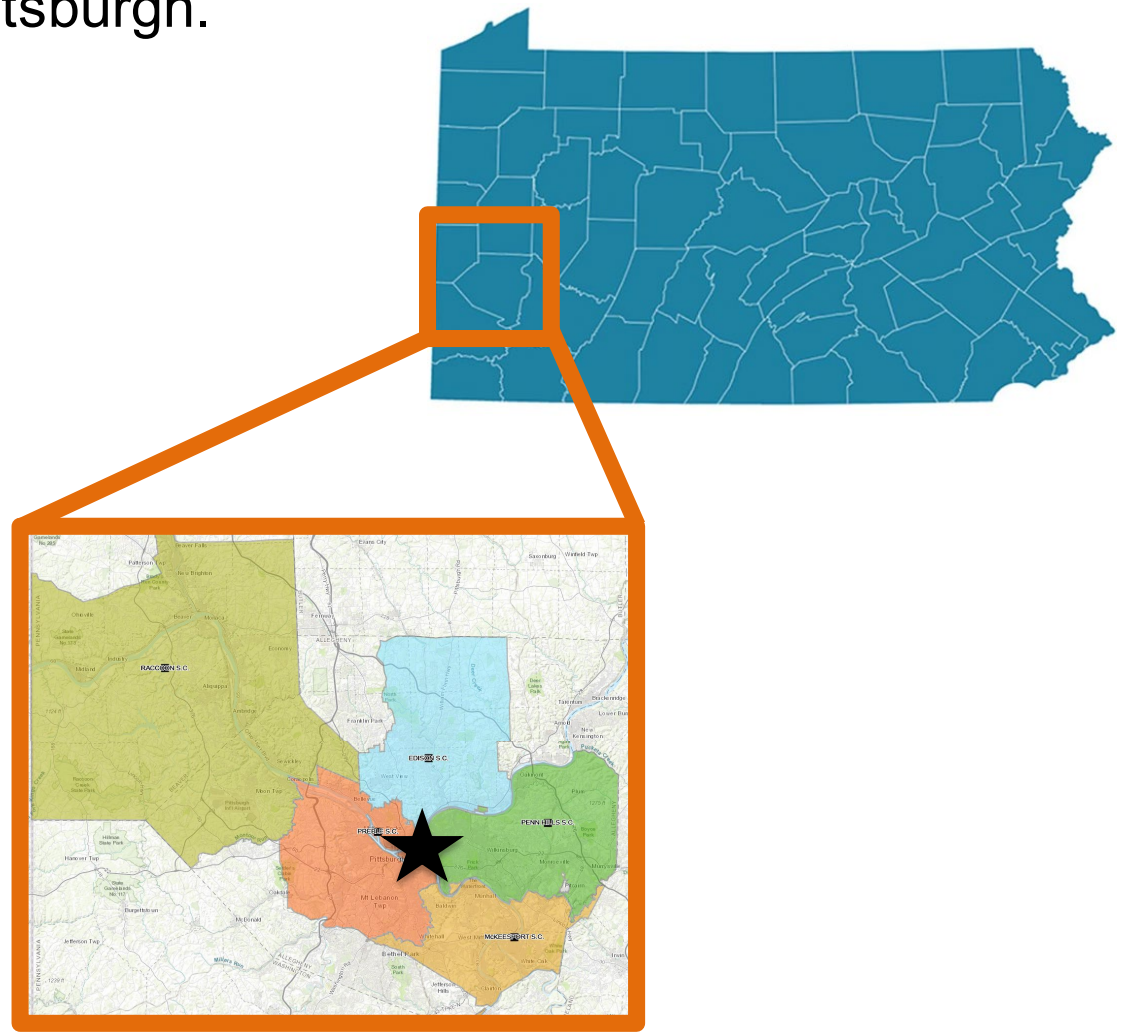
DUQUESNE LIGHT CO.

PUBLIC

DLC Company Profile

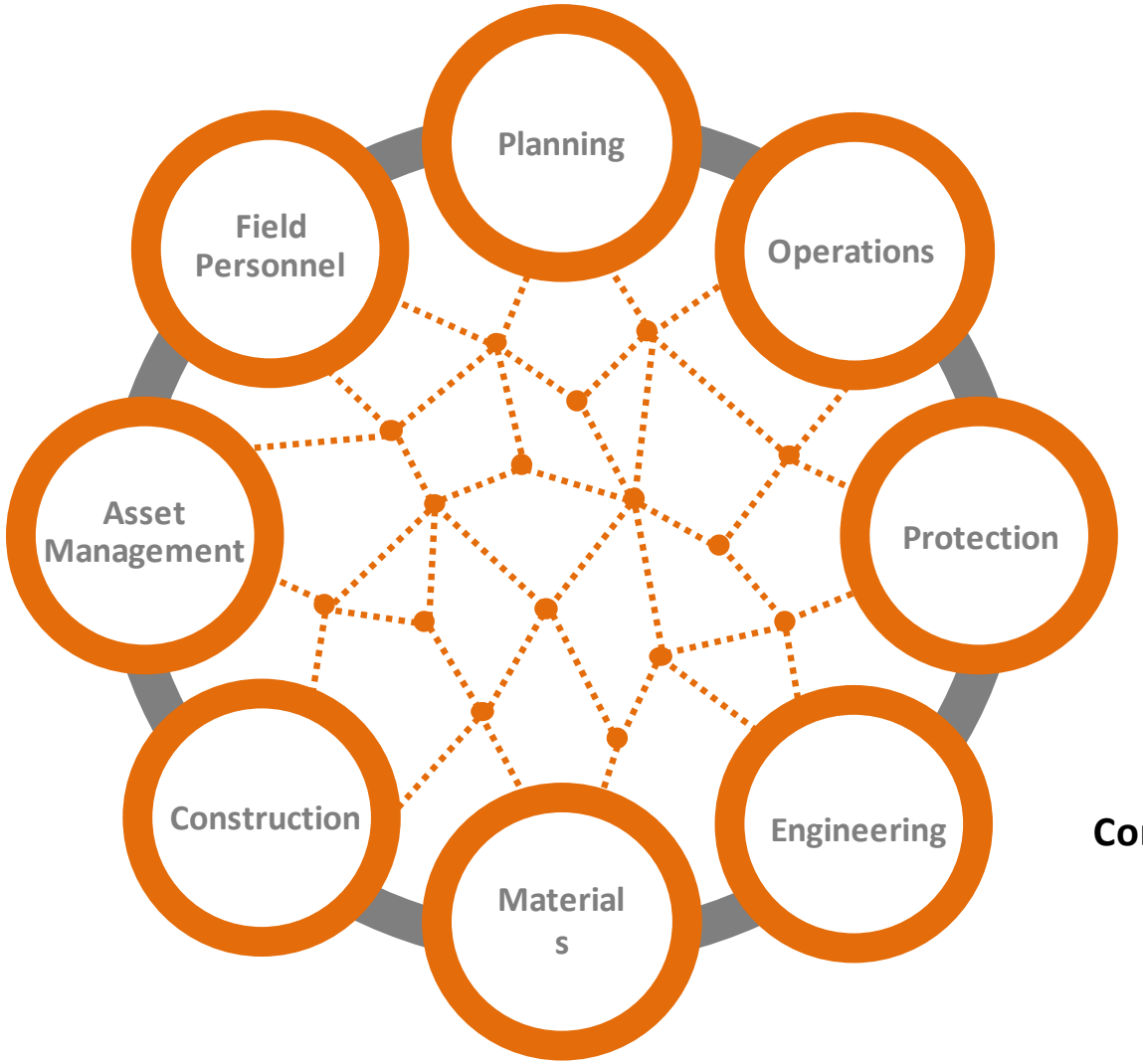
- Registered TO and DP, service territory is located in southwest Pennsylvania, surrounding the City of Pittsburgh.
  - ~ 650 miles of BES Facilities
  - ~ 120 BES Facilities
  - ~ 35 BES Substations
  - Both Rural and Urban Environments

- Transmission Voltages:
  - 345 kV
  - 138 kV
  - 69 kV



DUQUESNE LIGHT CO.

Challenges of FAC-008 Compliance



Controls make it easier!

Easier makes it <u>sustainable</u>!

DUQUESNE LIGHT CO.

FAC-008 Program Background

- Transmission Planning group is the FAC-008 standard owner

- Maintains all Facility Ratings in the DLC Transmission System Equipment Ratings Database
  - Built using .sql database structure
  - Equipment ratings are maintained via web interface
  - Can be exported to MS Excel

- Ratings Database is populated from engineering drawings
  - Equipment single lines
  - Protection single lines
  - Circuit maps

Voltage: 138 Miles:9.74 Status: Active

(138, 4) Type: Primary Power Take-Off: 0

		Summer 35C (95F)			Spring/Fall 20C (68F)			Winter 10C (50F)		
Type	Class	Norm	Emrg	LD	Norm	Emrg	LD	Norm	Emrg	LD
T SS Wire (3.5in AL PIPE)	2A	2481	3121	3452	2845	3407	3707	3058	3581	3864
T SS Wire (Two (2) - 3.5in AL PIPE)	2A	4143	5212	5765	4751	5690	6191	5107	5980	6453
T SS Wire (3.5in AL PIPE)	2A	2481	3121	3452	2845	3407	3707	3058	3581	3864
T Disconnect (2000A)	1	2000	2000	2060	2000	2000	2060	2000	2000	2060
T SS Wire (853.7 ACAR 24/13)	2A	1074	1267	1334	1193	1362	1423	1264	1421	1478
T CT (2000/5MR)	1	2328	2328	2400	2328	2328	2400	2328	2328	2400
T Relay CT (50)	1	4656	4656	4800	4656	4656	4800	4656	4656	4800
T Relay CT (21/79)	1	3492	3492	3600	3492	3492	3600	3492	3492	3600
T Circuit Breaker (3000A)	1	3000	3000	3090	3000	3000	3090	3000	3000	3090
T Relay CT (50)	1	4656	4656	4800	4656	4656	4800	4656	4656	4800
T Relay CT (87)	1	3492	3492	3600	3492	3492	3600	3492	3492	3600
T CT (2000/5MR)	1	2328	2328	2400	2328	2328	2400	2328	2328	2400
T SS Wire (853.7 ACAR 24/13)	2A	1074	1267	1334	1193	1362	1423	1264	1421	1478
T Disconnect (2000A)	1	2000	2000	2060	2000	2000	2060	2000	2000	2060

(138, NA) Type: Primary Power Take-Off: 0

		Summer 35C (95F)			Spring/Fall 20C (68F)			Winter 10C (50F)		
Type	Class	Norm	Emrg	LD	Norm	Emrg	LD	Norm	Emrg	LD
T OH Wire (795 ACSR 45/7)	2A	919	1039	1117	1082	1181	1273	1177	1265	1368
T OH Wire (853.7 ACAR 24/13)	2A	932	1055	1129	1098	1199	1286	1193	1285	1380
T OH Wire (795 ACSS/TW 20/7)	2A	929	1050	1153	1094	1193	1314	1189	1277	1411
T OH Wire (853.7 ACAR 24/13)	2A	932	1055	1129	1098	1199	1286	1193	1285	1380

(138, 4) Type: Primary Power Take-Off: 0

		Summer 35C (95F)			Spring/Fall 20C (68F)			Winter 10C (50F)		
Type	Class	Norm	Emrg	LD	Norm	Emrg	LD	Norm	Emrg	LD
T SS Wire (853.7 ACAR 24/13)	2A	1074	1267	1334	1193	1362	1423	1264	1421	1478
T Disconnect (2000A)	1	2000	2000	2060	2000	2000	2060	2000	2000	2060
T SS Wire (853.7 ACAR 24/13)	2A	1074	1267	1334	1193	1362	1423	1264	1421	1478
T CT (2000/5MR)	1	2328	2328	2400	2328	2328	2400	2328	2328	2400
T Relay CT (50)	1	4656	4656	4800	4656	4656	4800	4656	4656	4800
T Relay CT (21/79)	1	3492	3492	3600	3492	3492	3600	3492	3492	3600
T CT (2000/5MR)	1	3880	3880	4000	3880	3880	4000	3880	3880	4000
T Relay CT (87)	1	5820	5820	6000	5820	5820	6000	5820	5820	6000
T Circuit Breaker (3000A)	1	3000	3000	3090	3000	3000	3090	3000	3000	3090
T Relay CT (50)	1	4656	4656	4800	4656	4656	4800	4656	4656	4800
T Relay CT (87)	1	3492	3492	3600	3492	3492	3600	3492	3492	3600
T CT (2000/5MR)	1	2328	2328	2400	2328	2328	2400	2328	2328	2400
T Relay CT (87)	1	6208	6208	6400	6208	6208	6400	6208	6208	6400
T CT (2000/5MR)	1	3880	3880	4000	3880	3880	4000	3880	3880	4000
T SS Wire (853.7 ACAR 24/13)	2A	1074	1267	1334	1193	1362	1423	1264	1421	1478
T Disconnect (2000A)	1	2000	2000	2060	2000	2000	2060	2000	2000	2060

Ratings Database Controls

- Strict access controls to Ratings Database
  - Managed by internal access management group
  - Usernames and passwords are provided
  - Write access is only available to small group of engineers

- A comprehensive review of the Facility Rating is performed any time an equipment entry is added, removed, or modified (with some exceptions)

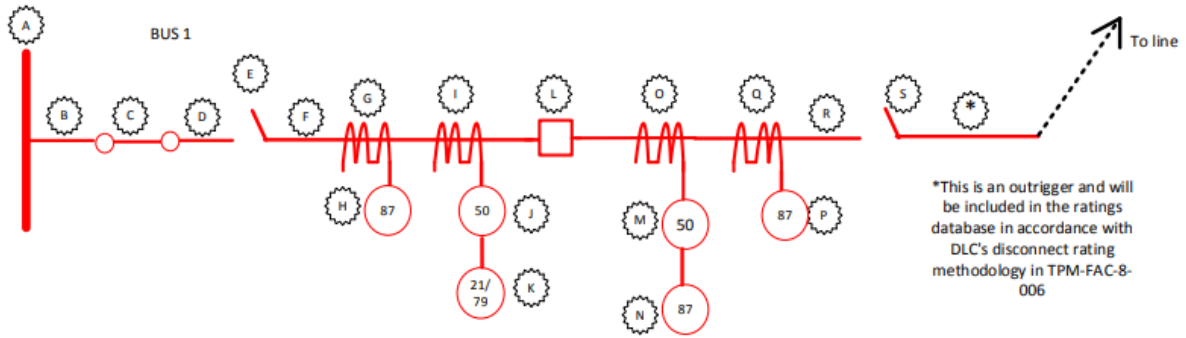
- All modifications are peer reviewed by a second engineer

Additional Ratings Database “Controls”

- Transmission System Equipment Library

Type	Manufacturer	Model	Description
T SS Wire	Mitsubishi	GIS	3000A
T SS Wire	None	AL BAR	0.225in x 4.5in AL
T SS Wire	None	AL BAR	0.25in X 6in AL
T SS Wire	None	AL BAR	0.25in x 4in AL BAR
T SS Wire	None	AL BAR	0.313in x 3in AL
T SS Wire	None	AL BAR	0.375in x 4in AL
T SS Wire	None	AL BAR	0.375in x 6in AL
T SS Wire	None	AL BAR	0.438in x 3in AL
T SS Wire	None	AL BAR	0.438in x 4in AL
T SS Wire	None	AL BAR	0.5in x 3in AL
T SS Wire	None	AL BAR	0.5in x 4in AL
T SS Wire	None	AL BAR	0.5in x 5.5in AL
T SS Wire	None	AL BAR	0.5in x 6in AL
T SS Wire	None	AL BAR	0.5in x 7in AL
T SS Wire	None	AL BAR	0.75in X 4in AL
T SS Wire	None	AL BAR	0.75in x 5in AL 6061-T6
T SS Wire	None	AL BAR	0.75in x 6in AL
T SS Wire	None	AL BAR	0.938in x 6in AL
T SS Wire	None	AL BAR	1in X 4in AL
T SS Wire	None	AL BAR	1in X 8in AL
T SS Wire	None	AL BAR	3in x 3.5in AL
T SS Wire	None	AL CHANNEL	5in Channel 0.19in WebThick AL
T SS Wire	None	AL CHANNEL	6in Channel 0.225in WebThick AL
T SS Wire	None	AL CHANNEL	6in Channel 0.314in WebThick AL
T SS Wire	None	AL CHANNEL	6in Channel 0.437in WebThick Al
T SS Wire	None	CU BAR	0.25in X 4in CU
T SS Wire	None	CU BAR	0.25in x 6in CU
T SS Wire	None	CU BAR	0.5in x 4in CU
T SS Wire	None	CU BAR	0.5in x 6in CU
T SS Wire	None	CU BAR	0.75in X 6in CU
T SS Wire	None	CU PIPE	1.5in CU PIPE

- Ratings Database equipment entry manual



Equipment Ratings

[Create Rating]

					Summer 35C (95F)			30C (86F)			25C (77F)			Spring/Fall 20C (68F)			15C (59F)			Winter 10C (50F)			5C (41F)			0C (32F)		
		Label	Class	Norm	Emrg	LD	Norm	Emrg	LD	Norm	Emrg	LD	Norm	Emrg	LD	Norm	Emrg	LD	Norm	Emrg	LD	Norm	Emrg	LD	Norm	Emrg	LD
?	Edit		2A	1424	1745	1908	1493	1798	1955	1558	1849	2001	1619	1899	2045	1678	1946	2088	1735	1992	2130	1789	2037	2170	1840	2080	2209

Potential for New Ratings Database Software

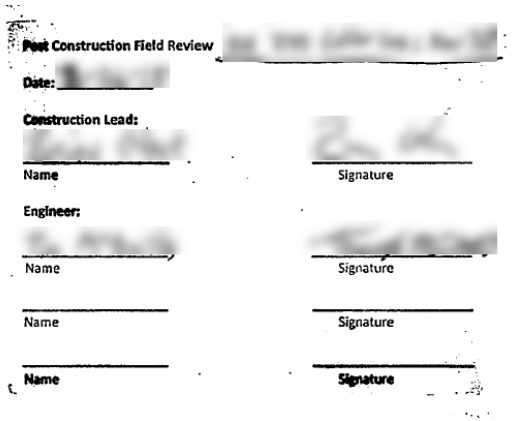
- Presently investigating commercially available software to replace DLC's existing Ratings Database.

- Goals of new software include:
  - Increased vendor support through patching
  - Potential integrations with other DLC systems (i.e., work management program, energy management system/SCADA, etc.) for enhanced controls

Facility Energization Controls

- Post Construction Field Reviews
  - Required for all transmission projects
  - Engineering/Commissioning personnel physically inspect equipment with construction team to verify as-built conditions match prints
  - Any equipment that is grounded and cleared is inspected

- Operations Center Pre-Energization Checklist
  - Includes checks for Facility Rating updates
  - Facility is not energized until all pre-reqs have been met



Post Construction Field Review

Date:

Construction Lead:

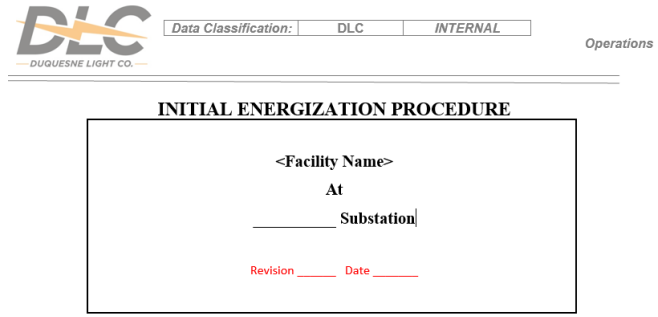
Name Signature

Engineer:

Name Signature

Name Signature

Name Signature



DLC DUQUESNE LIGHT CO. Data Classification: DLC INTERNAL Operations

INITIAL ENERGIZATION PROCEDURE

<Facility Name>

At

_____ Substation

Revision _____ Date _____

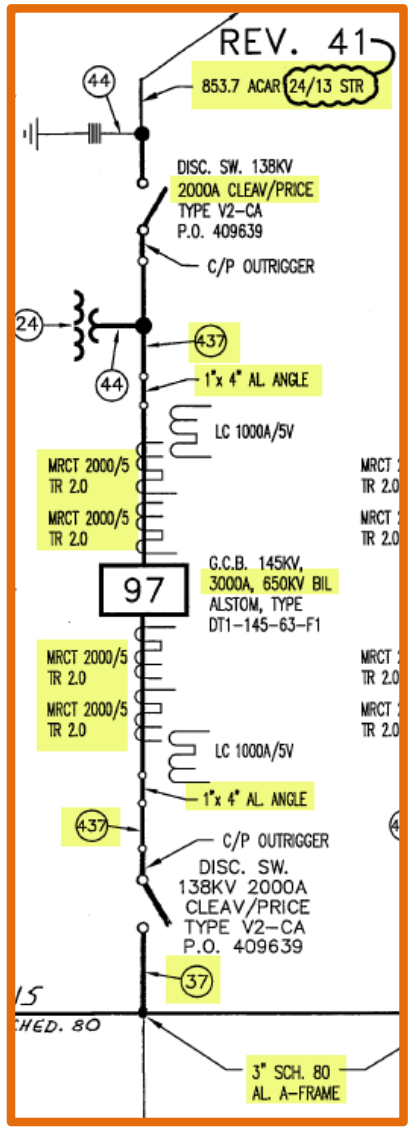
Verification of documents	Date Received	Initials	Verification of documents	Date Received	Initials
Circuit Maps (Manager, GIS and Mapping)			Updated Ratings –Tfmr (Senior Manager, System Planning)		
Station Single Lines (Manager, Substation Engineering & Manager Substation Control Engineering)			Updated Ratings – Line (Senior Manager, System Planning)		
RT Maps (Manager, Protection Engineering)			Reclosing Settings/Changes (Manager, Protection Engineering)		
Customer Single Lines (Manager, Substation Engineering & Manager Substation Control Engineering)			Temporary Settings acquired and approved (Manager, Protection Engineering)		
SCADA display updated (Manager, Operations System)			Equipment Marking signs installed (Supervisor, Substation Protection and Control)		
SOC Mapboard updated (Senior Manager, Transmission Operations)			Key Interlocks installed and functional (Supervisor, Substation Electrical Maintenance)		
State Estimator updated (Senior Manager, System Planning)			Transmission Post-Construction field review (Manager, Substation Engineering)		
eDART cut-in flag (Manager, Control Room Operations)			Transmission Planning Breaker replacement notified (Senior Manager, System Planning)		

DLC DUQUESNE LIGHT CO.

Detective Controls

- Annual 10% Ratings Database Review
  - Comprehensive review of Facility Rating
  - Validate Ratings Database matches engineering drawings

		Summer 35C (95F)			Spring/Fall 20C (68F)			Winter 10C (50F)		
Type	Class	Norm	Emrg	LD	Norm	Emrg	LD	Norm	Emrg	LD
T SS Wire (4.0in AL PIPE)	2A	3263	4070	4479	3744	4443	4809	4025	4669	5012
T SS Wire (Two (2) - 3.0in AL PIPE)	2A	4160	5167	5678	4767	5641	6099	5124	5929	6358
T SS Wire (4.0in AL PIPE)	2A	3263	4070	4479	3744	4443	4809	4025	4669	5012
T Disconnect (2000A)	1	2000	2000	2060	2000	2000	2060	2000	2000	2060
T SS Wire (2000 AAC 91 str.)	2A	1850	2209	2335	2058	2375	2489	2182	2477	2584
T SS Wire (1in X 4in AL)	2A	3087	3754	4093	3499	4080	4386	3743	4280	4566
T CT (2000/5MR)	1	3880	3880	4000	3880	3880	4000	3880	3880	4000
T Relay CT (50)	1	7760	7760	8000	7760	7760	8000	7760	7760	8000
T Relay CT (21)	1	5820	5820	6000	5820	5820	6000	5820	5820	6000
T Circuit Breaker (3000A)	1	3000	3000	3090	3000	3000	3090	3000	3000	3090
T Relay CT (50)	1	7760	7760	8000	7760	7760	8000	7760	7760	8000
T Relay CT (87/79)	1	5820	5820	6000	5820	5820	6000	5820	5820	6000
T CT (2000/5MR)	1	3880	3880	4000	3880	3880	4000	3880	3880	4000
T SS Wire (1in X 4in AL)	2A	3087	3754	4093	3499	4080	4386	3743	4280	4566
T SS Wire (2000 AAC 91 str.)	2A	1850	2209	2335	2058	2375	2489	2182	2477	2584
T Disconnect (2000A)	1	2000	2000	2060	2000	2000	2060	2000	2000	2060



Detective Controls

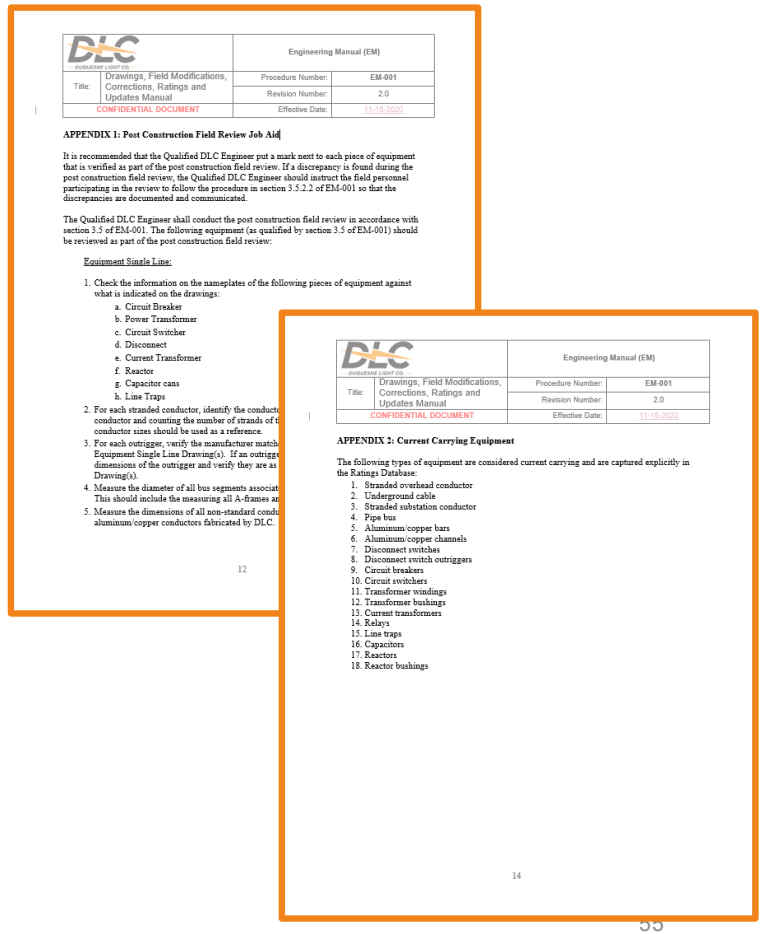
- Annual 5% Field Review
  - Facilities are removed from service and physically inspected
  - Validate engineering drawings match field conditions
  - Outages are optimized to maximize inspections with a single outage

Cycle of Improvement

- Annual Field Review (control) detected drawing error
  - Element connected to a bus disconnect switch not included on the drawing
  - Extent of condition was performed
  - Drawings were updated to match field conditions
  - No change to Facility Rating

- Root Cause Analysis
  - Root cause analysis conducted for every near miss
  - Root cause indicated insufficient post-construction field review

- Improvements to Controls
  - Strengthened post construction field review process
  - Created job aid
  - Created role-based training / Qualified Engineer Process



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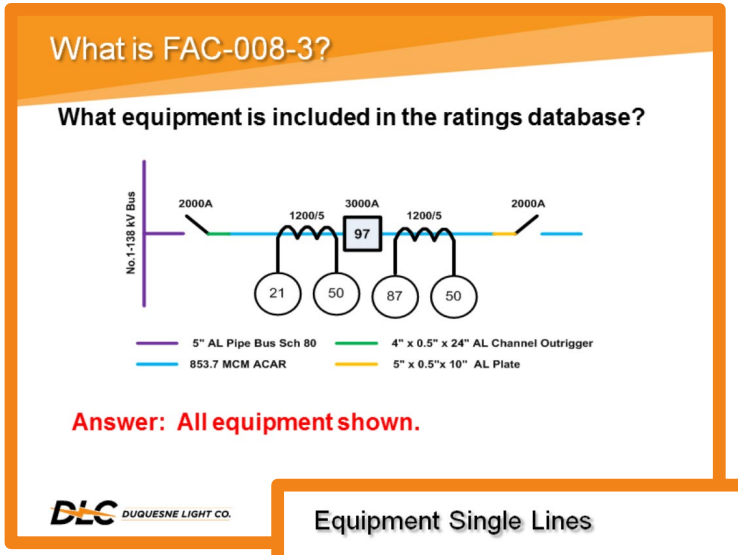
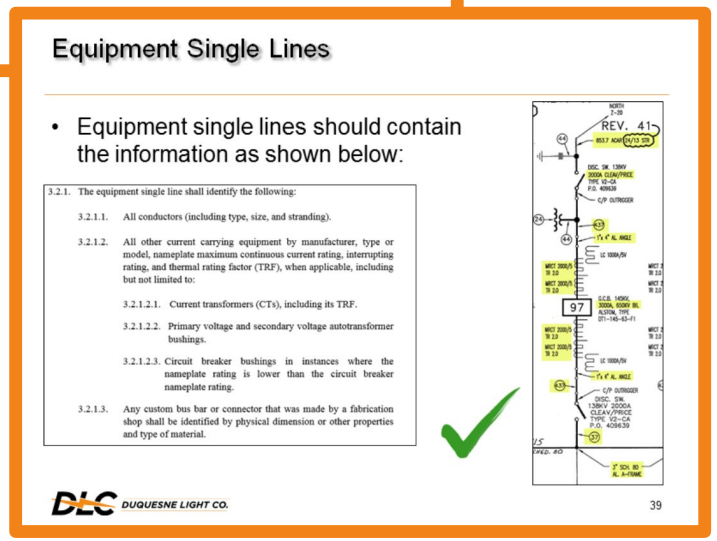
Training

- Annual training for engineering teams
  - Overview of standard
  - Actions/expectations of various groups
  - Communications between groups

- Annual refresher training for field personnel
  - Overview of standard
  - Expectations for field changes / red-lined drawings
  - Review specific examples of past oversights

- Annual Role-Based Training for different teams (“Module 2”)
  - Engineering, Planning, Electrical Maintenance, P&C Technicians
  - Asset Mgmt, Project Management, Operations, etc.





Documentation

- Transmission Planning Manual – FAC-008 Sections
  - Equipment rating methodologies
  - Requirements for ratings database maintenance
  - Ratings communications

DUQUESNE LIGHT CO.		Transmission Planning Manual	
Title:	System Ratings Database	Procedure Number:	TPM-FAC-8-002
		Revision Number:	1.9
CONFIDENTIAL DOCUMENT		Effective Date:	December 18, 2019

NERC Standard(s) Reference: FAC-008-3

- Engineering Manual
  - Requirements for information contained on drawings
  - Approval of field modifications
  - Post-construction field reviews

3.2.1. The equipment single line shall identify the following:

3.2.1.1. All conductors (including type, size, and stranding).

3.2.1.2. All other current carrying equipment by manufacturer, type or model, nameplate maximum continuous current rating, interrupting rating, and thermal rating factor (TRF), when applicable, including but not limited to:

3.2.1.2.1. Current transformers (CTs), including its TRF.

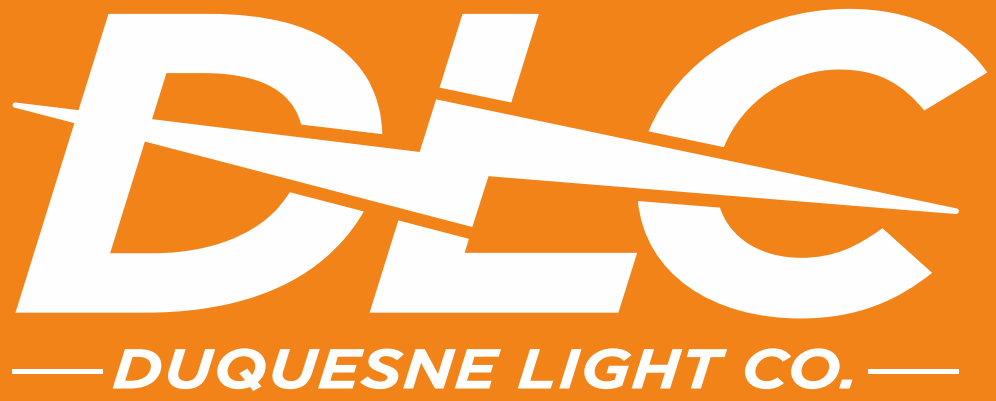
3.2.1.2.2. Primary voltage and secondary voltage autotransformer bushings.

3.2.1.2.3. Circuit breaker bushings in instances where the nameplate rating is lower than the circuit breaker nameplate rating.

3.2.1.3. Any custom bus bar or connector that was made by a fabrication shop shall be identified by physical dimension or other properties and type of material.

Planned Work vs. Emergent Work

- Controls still apply during emergency situations
- Post-Construction Field Reviews
- Operations Center Check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Break

See you back at 3:25 for the CIP-013 Panel Discussion on Building a Sustainable Supply Chain Program!

Join the conversation at
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CIP-013 - Building a Sustainable Supply Chain Program

Scott Pelfrey – Principal Technical Auditor, RF
Holly Peterson – Senior Compliance Auditor, WECC
Lee Felter – Principal Risk Assessment and Mitigation Engineer for CIP, MRO
Jordan Kethley – CIP Cyber and Physical Security Analyst, TexasRE

Annual Reliability and Compliance Workshop

September 23, 2021

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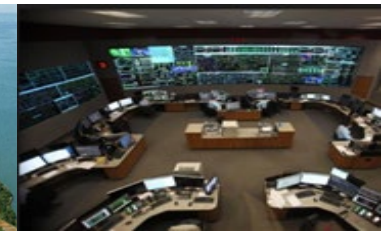

CIP-013 Supply Chain Program Panel Discussion

Lee Felter
Principal Risk Assessment and Mitigation Engineer, CIP, MRO

Scott Pelfrey
Principal Technical Auditor, RF

Jordan Kethley
CIP Cyber and Physical Security Analyst, TexasRE

Holly Peterson
Senior Compliance Auditor, WECC

CIP-013 Supply Chain Resources

TexasRE June 2021 CIP Workshop

Joint CCC ERO Enterprise Webinar on Supply Chain

NERC Supply Chain Risk Mitigation Program

Series of Supply Chain E-Learning Modules from SERC/RF

Questions & Answers

Forward Together ReliabilityFirst

Trivia Giveaway Question 4

Please log into Slido now for the opportunity to win a $100 Amazon gift card!

- You have one minute from the time this slide is shown to enter your name into Slido before the question is asked.
- You must enter your first and last name; anonymous responders are not eligible to win.
- To Win, you must answer correctly and be the fastest respondent, as recorded in Slido.
- You can only win one time.

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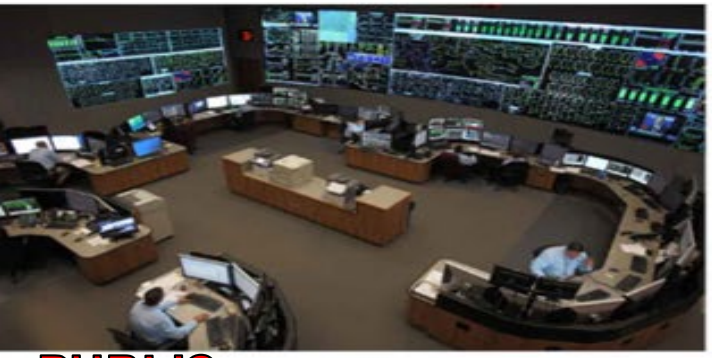
NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

CIP-014-2

R1 Risk Assessments

Jamie Calderon, Senior Engineer Grid Planning and Operations Assurance
RF 2021 Workshop
September 23, 2021

RELIABILITY | RESILIENCE | SECURITY




Where We've Been

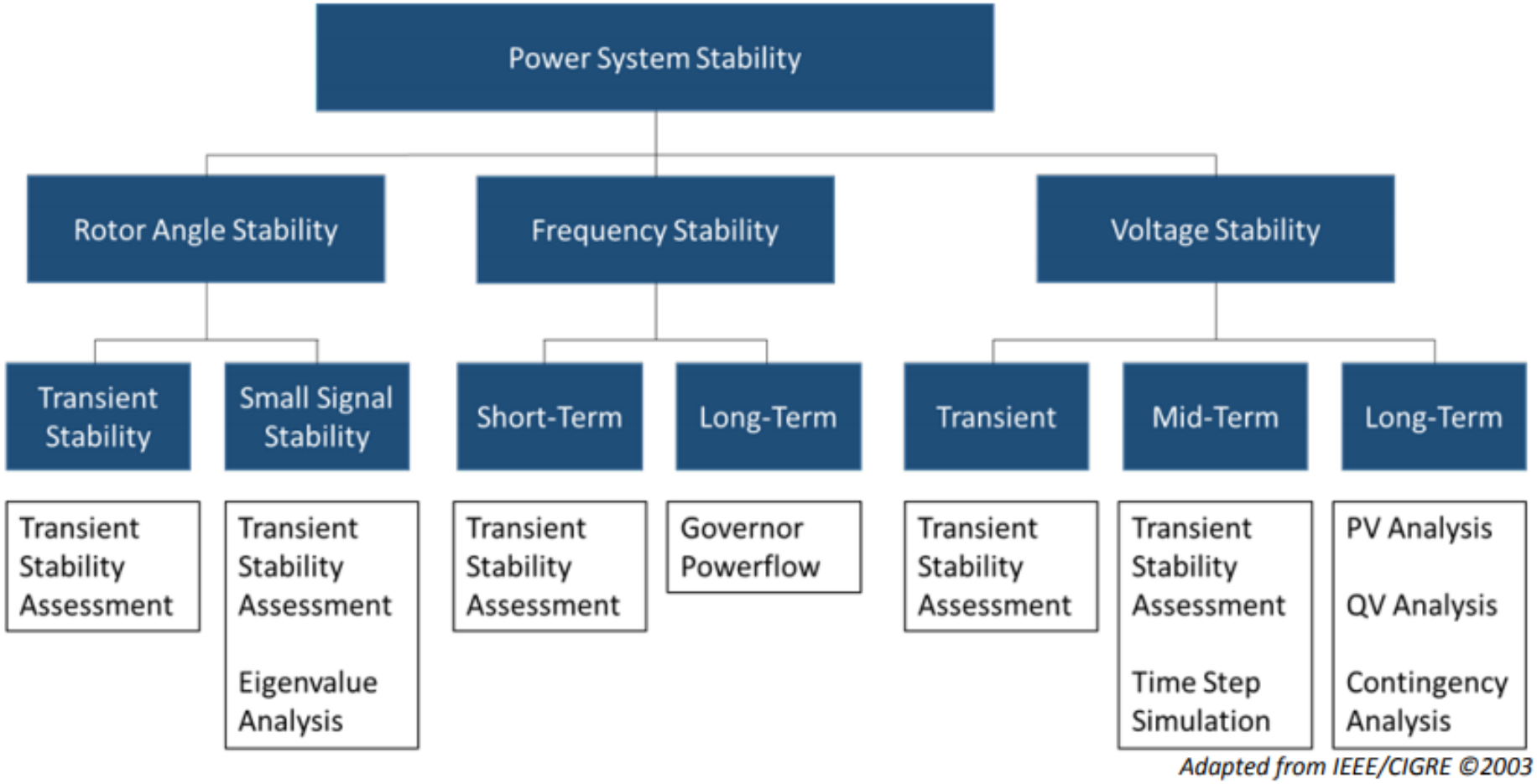
- Effective October 2015
- Few R1 Risk Assessments to date
  - (Up to 30/60 months between)
- Summary of ERO Enterprise reviews of implementation
  - FERC-led audits, Region-led Audits, Workshops, etc.
- Objective-based Reliability Standard requirements
  - Built-in flexibility for what's appropriate for individual entities (not prescriptive)
  - Objectives require implementation of an intentional design (no checkbox)
- Strong culture of compliance supports continual incremental improvements

Where We Are

- R1 states the following:
  - *"The initial and subsequent risk assessments shall consist of a transmission analysis or transmission analyses designed to identify the Transmission station(s) and Transmission substation(s) that if rendered inoperable or damaged could result in instability, uncontrolled separation, or Cascading within an Interconnection."*
- An entity meeting this requirement should be able to clearly demonstrate, through its analysis, that instability, uncontrolled separation, and Cascading within the Interconnection was or was not identified within the Interconnection.
- System Stability, uncontrolled separation, and Cascading cannot be sufficiently assessed through Steady-State studies alone.

What This Means

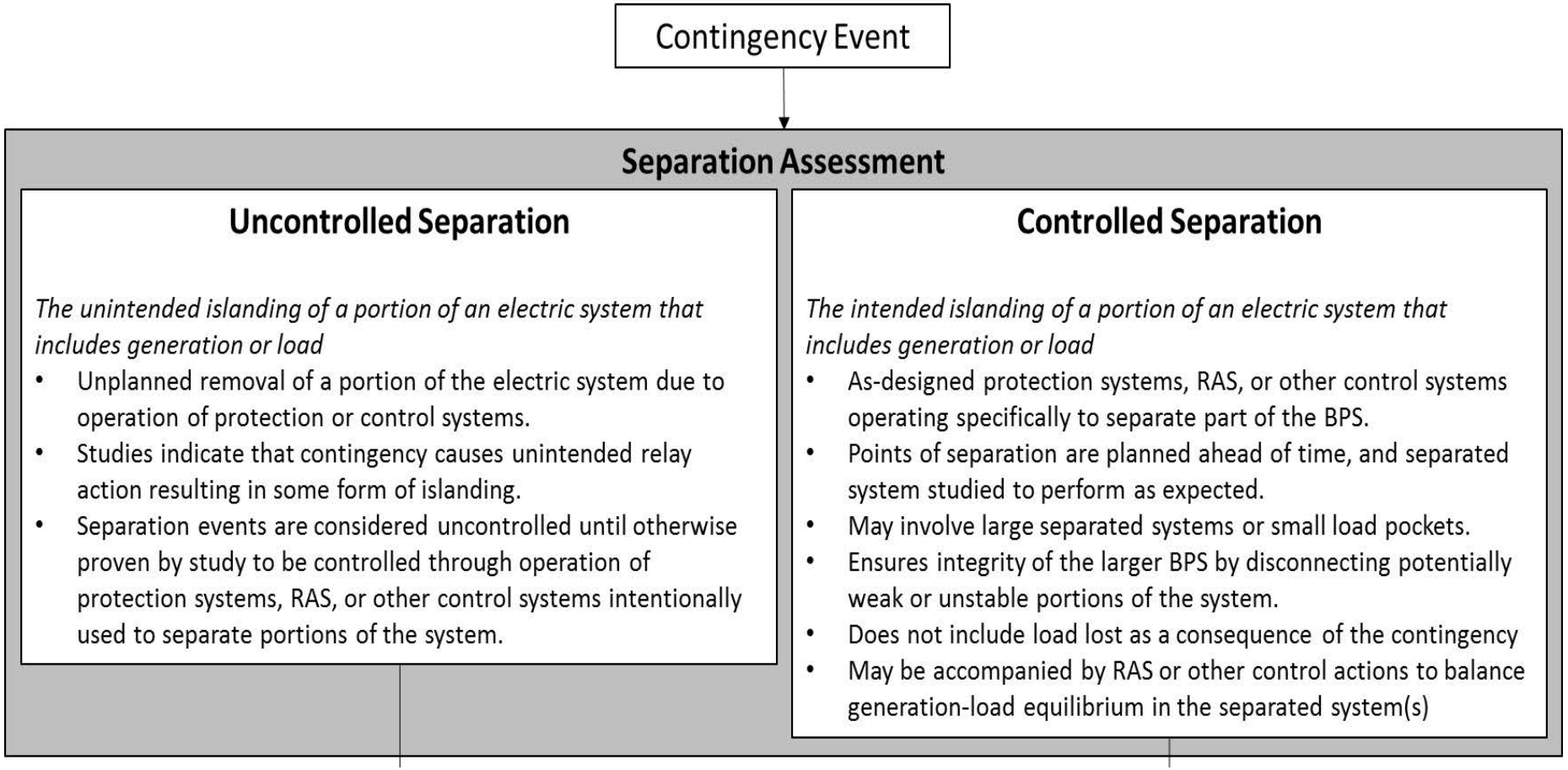
- What is power system “Stability”?



Adapted from IEEE/CIGRE ©2003

What This Means

- What is “uncontrolled separation”?
- Consider relays and how to study their operation



What This Means

- What is “Cascading”?
- Simulated in an iterative process
  - Base case solves
  - Contingency Event occurs
  - Effects on nearby system are studied in the time-domain and if/when the system reaches a Steady-State solution
  - Loop ~ The removal of overloaded elements, protection systems, RAS, etc. are simulated and the effects are studied ~ Loop
  - Thresholds/Criteria are applied to the resulting system impacts
- Similar to uncontrolled separation, the operation of relays must be considered in order to sufficiently study this adverse system condition

Where We're Going

- Additional coordination and discussions must be had to ensure that R1 risk assessments are meeting the expectations of the ERO Enterprise and the objective of the requirement language.
- Documentation will be key!
  - Appropriate criteria and thresholds
  - Adequate technical rationale for risk assessment decisions are what support how the objective is met
  - Consider each of these 3 adverse system conditions and how the risk assessment has supporting technical material.
- CMEP Practice Guide for CIP-014-2 R1: Risk Assessments expected in Fall 2021

Questions and Answers

Trivia Giveaway Question 5

Please log into Slido now for the opportunity to win a $100 Amazon gift card!

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- You can only win one time.

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RELIABILITY FIRST

Community Appraisal Project

Brian Hallett, Principal Reliability Consultant, Entity Engagement
Carl Dister, Chief Innovation Manager, Continuous Improvement

RF Fall Virtual Workshop
September 23, 2021

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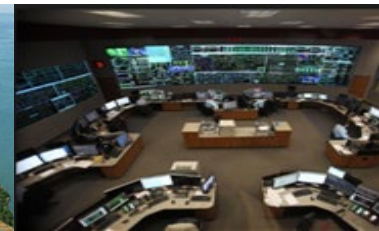


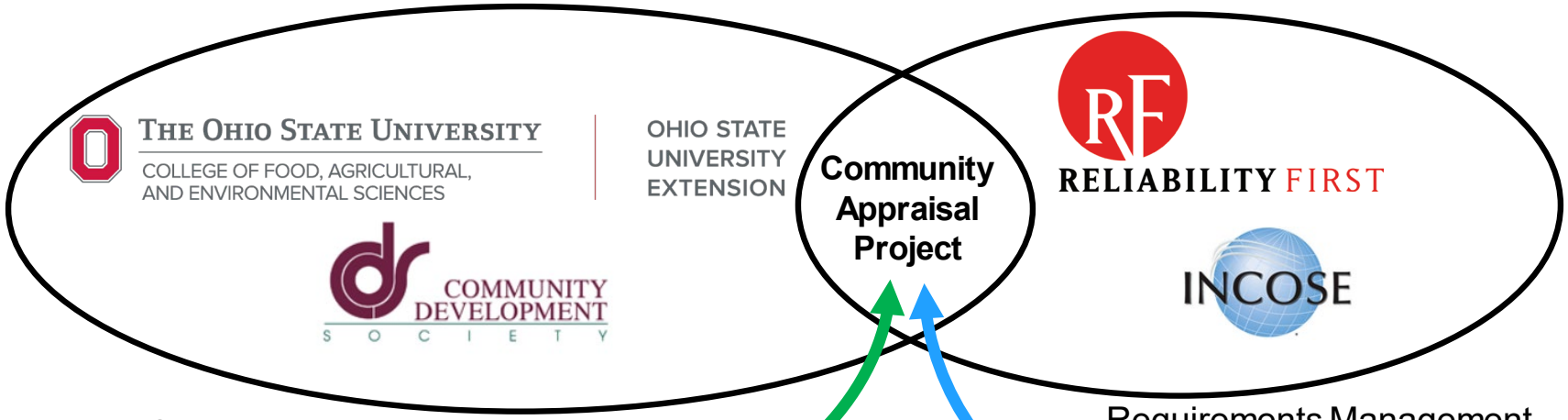
Project Aligns with RF Goals/Objectives

RF Strategic Objective: Be a Credible Regulator

- Partner with stakeholders to increase abilities to self-assess security, reliability and/or resilience posture and preparedness
  - Build relationships with Registered Entities, industry groups, national labs, **academia, communities**, etc. to drive awareness security, reliability and/or resilience
  - Develop, build and influence the industry use of **assessment tools** and methodologies
- Strengthen Entity, industry and regulator partnership/relationships

Unique Partnerships

The Partners: RF and Ohio State University Extension (OSUE) have developed a Community Appraisal Project to help communities gain the technical and social capacity needed to mitigate impacts of a 7-21 day power outage.



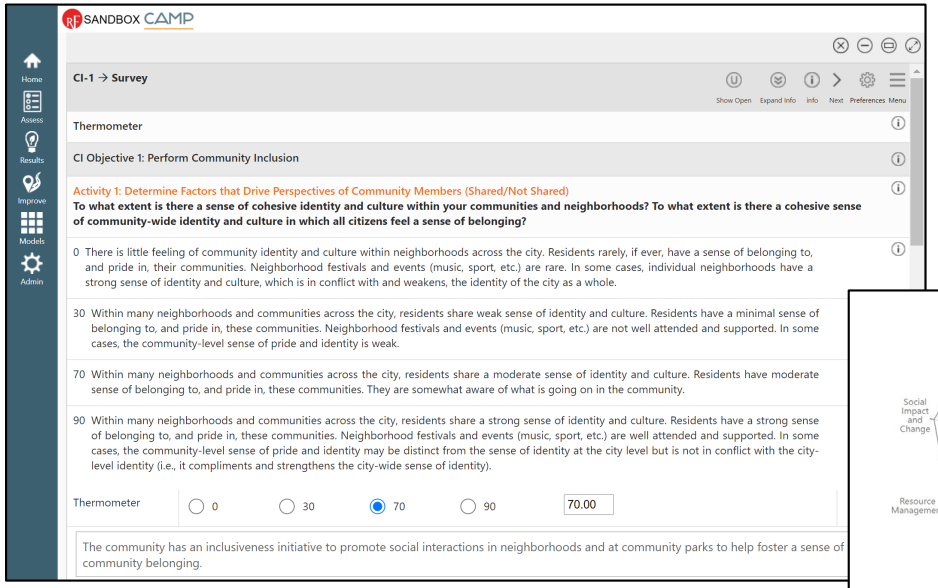
Why the transdisciplinary approach?

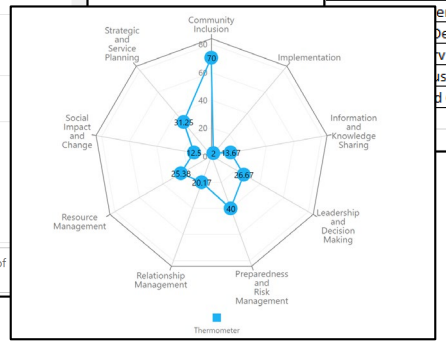
Resilience is a Sociotechnical Grand Challenge! In this approach, the strengths of cutting edge Community Development are fused with contemporary practice in Systems Engineering.

What is a Community Appraisal?

Maturity Model Self-Assessment

- The team will guide participants through a web-based tool, interpret the results, and collaboratively develop initiatives and process improvements to foster a community's capacity to withstand prolonged power outages and build long-term community resilience.
- The tool captures community capabilities against a nine-proficiency maturity model developed by the team following the review of more than 50 different existing models and methods.
- The project aims to help communities develop an understanding of the risks they face, how they are related and where they can improve resilience.





How to Read the DSM: Choose any Practice (from the Practice Names oriented vertically at the top of the columns). View that Practice as a potential informer or driver to each of the other Practices (listed in the rows). Cell Values indicate the relative impacts of the chosen Practice. DSM Convention[1]: "Inputs in Columns."	RELM	IKS	IMPL	PRM	RESM	LDM	SSP	CI	SIC
Relationship Management (RELM)	0	9	3	9	3	9	9	9	9
Information and Knowledge Sharing (IKS)	3	0	3	9	3	9	3	3	9
Implementation (IMPL)	1	3	0	3	9	9	3	1	3
Preparedness and Risk Management (PRM)	3	3	3	0	1	9	3	3	3
ement (RESM)	1	3	9	9	0	9	3	1	3
Decision Making (LDM)	3	3	1	3	1	0	9	3	3
vice Planning (SSP)	3	1	1	3	1	9	0	1	3
usion (CI)	9	3	3	3	9	9	3	0	9
d Change (SIC)	9	9	3	3	9	9	3	9	0
	CARE Program Practices: 9x9 High-Level Design Structure Matrix (DSM)								

Numerical values in non-shaded cells indicate the relative impact of the relationship:
0 = None
1 = Minor
3 = Moderate
9 = Major

Convention: The DSM Area in the column informs the DSM Area in the row by the value (#) provided in the cell.

AREA → AREA → #

mitovia

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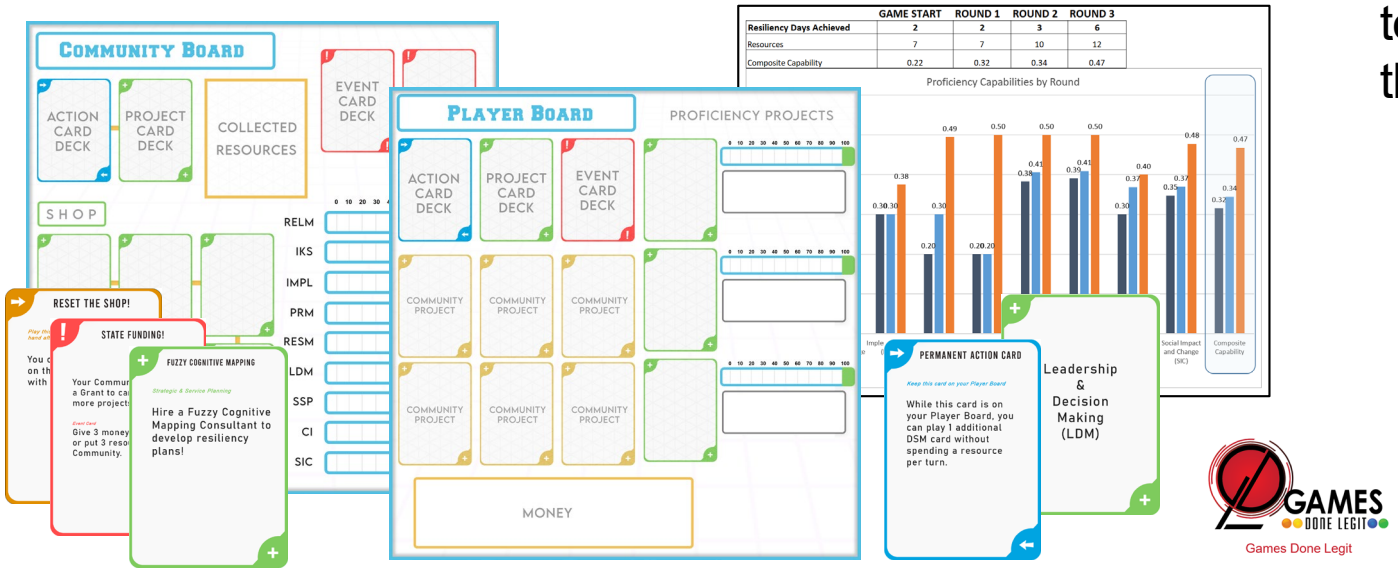
Flattening the Learning Curve

Interactive Learning through Gaming

- RF's system engineering experts and OSUE's Community Development professionals have built an engaged "game-based" approach to leading communities through an analysis of existing system limitations and developing a plan for targeted mitigation strategies.



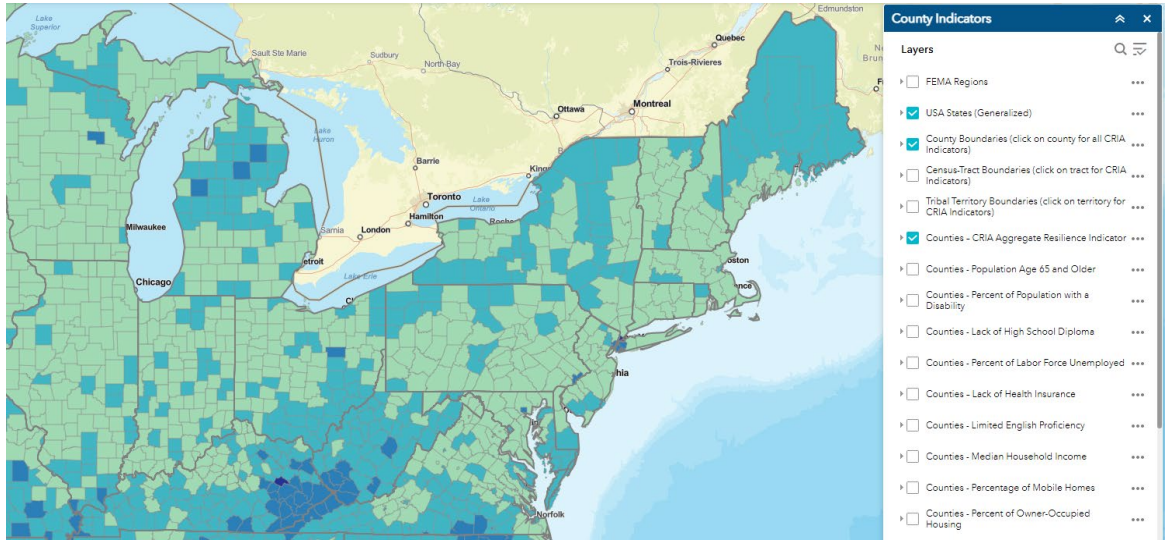
Can Communities afford to "Play Games" to address resilience?

- As problems increase in complexity, and when money is tight, communities need to tap into the creative intelligence that exists inside of each member of the community.
- Game Play helps to bring out these creative ideas and collectively judge their worthiness to help. Modern tech can really accelerate this!

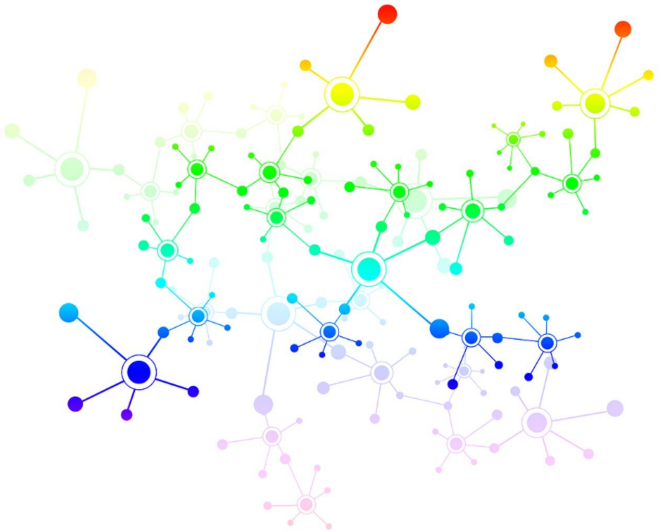
That's a Big Footprint! Where to Start?

Heat Map Development

RF has developed a heat map of its 13-state footprint that looks at the likelihood of a county to experience an extended blackout based on past reliability metrics and proximity to electric system infrastructure, combined with the county's ability to mitigate a significant blackout, should one occur.



(source: https://fema.maps.arcgis.com/apps/webappviewer/index.html?id=90c0c996a5e242a79345cdbc5f758fc6)



(source: https://phys.org/news/2019-12-small-small-world-network.html)

Long-Term, Small-World Network Propagation Approach

- We don't have resources to engage long term with every community.
- By strategically using our heat map as a compass, we can target seed communities in each large geographic cluster helping them build resilience, while also helping them build relationships with nearby "nodes" in their local hub area to spread the approach.

Why More Than a Two-day Blackout?

Don't most blackouts in a Community last one or two days at most?

- The President's National Infrastructure Advisory Council (NIAC) has found that existing national plans, response resources and coordination strategies will be outmatched by a catastrophic power outage. https://www.c-span.org/video/?c4968269/user-clip-fema-time-delay-responding
- Most communities think of blackouts as being contained within a few blocks, and power will be restored in a couple days. But the risks (weather, aging infrastructure, etc.) and complexity (automation, renewables, etc.) are creating the potential for longer duration outages on wider scales. This profound risk requires a new national focus.

Analysis and Coordination is Needed

- Significant public and private action is needed to prepare for and recover from a catastrophic outage that could leave the large parts of the nation without power for **weeks or months**, as well as cause service failures in other sectors, including water and wastewater, communications, transportation, healthcare and financial services.

What's Next?

- **Tools + Process Development**
  - Final materials are being produced.
- **Outreach to Communities**
  - Outreach to communities to begin Q3 - Q4.
- **Feed Footprint Data into Regional Risk Assessment (RRA) Process**
  - As community appraisals are completed across the 13-state footprint, RF will learn more about the needs and limitations of the citizens whose livelihoods and quality of live depend upon the reliable supply of electricity.
  - Identify open-source data, with spot validation, for inclusion into the RRA process to better understand the risks and local capabilities in the RF footprint.
  - Possible to focus outreach to the Entities that serve most-at-risk load.

Questions & Answers

Forward Together ReliabilityFirst

Slido – Share What You've Learned!

In a few words, what's your biggest actionable takeaway from today's presentations?

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Trivia Giveaway Winners

Thank you and Congrats to today's five trivia winners!

To claim your $100 Amazon gift card, please email Jody Tortora at Jody.Tortora@rfirst.org.

Closing Remarks

Thank you for attending Day 2 of our Annual Reliability and Compliance Workshop! Your feedback is extremely important to us and allows RF to continuously improve our webinars, workshops and outreach efforts.

Please take our post-event survey in Slido now at **Slido.com #RF2**.