Item 4.2: Summer Intern Presentations

Bill Magness
ERCOT President & CEO

Board of Directors Meeting

ERCOT Public
August 13, 2019

2019 Summer Interns

- 17 students representing 9 universities across the U.S.
- Contributed to 15 different departments this summer
- Recruiting received more than 1,400 applications for 17 summer internship openings

2019 Summer Interns Attend the Following Universities

UT Austin	6
UT Dallas	1
Texas A&M University	4
Baylor University	1
Texas State University	1
Arizona State University	1
University of Washington	1
Rensselaer Polytechnic Institute	1
Pennsylvania State University	1
Total	**17**

Jessica Wert

Master of Science in Electrical Engineering

Texas A&M University (May 2020)

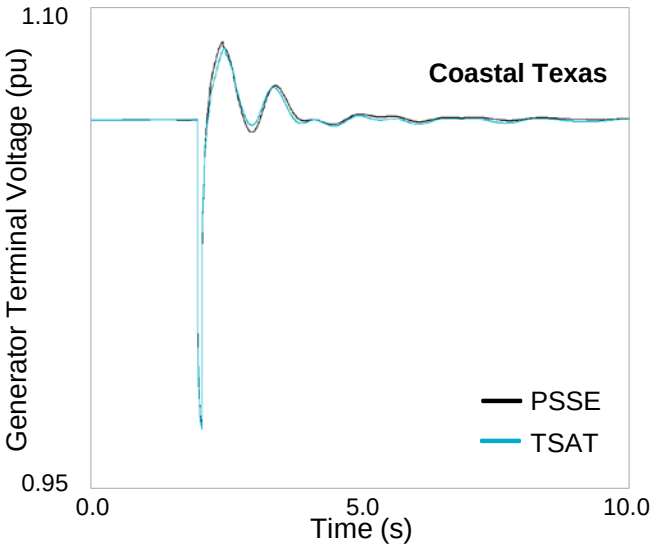
2019 Transmission Operations Planning

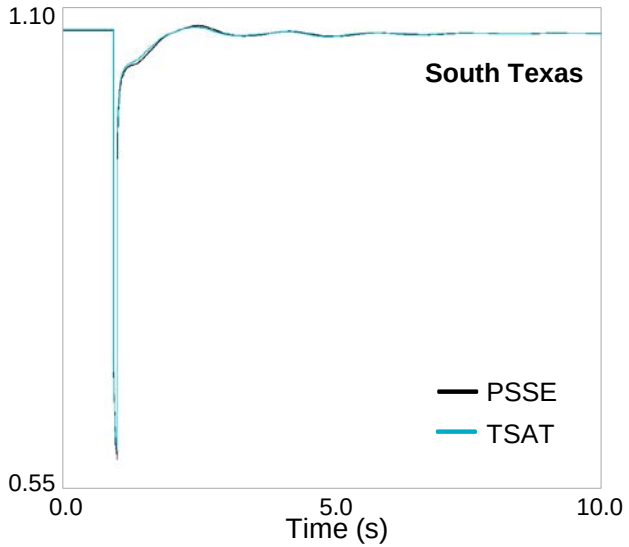
Overview

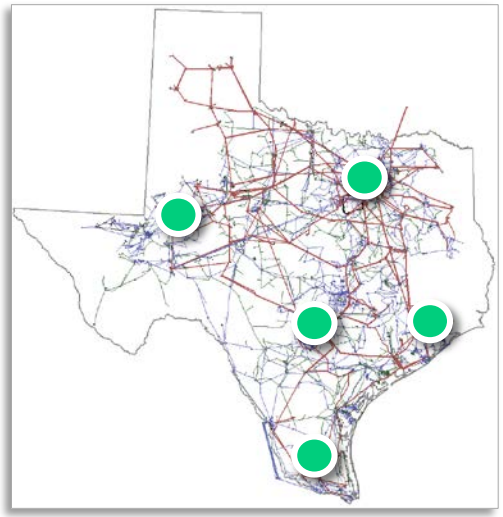
Goals

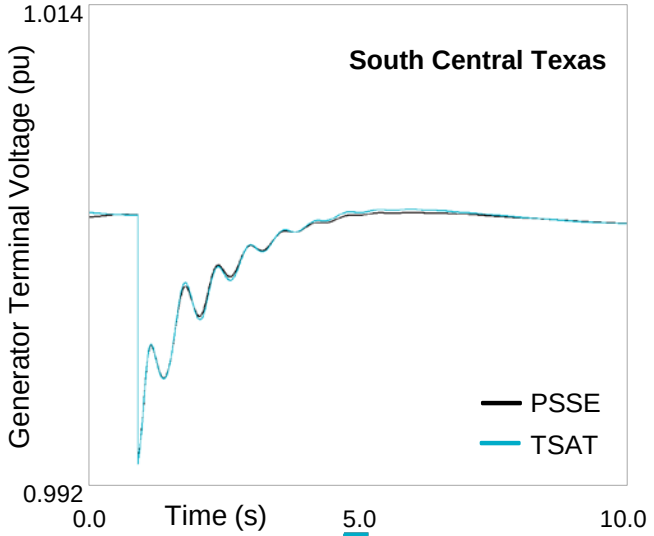
- Foundation for dynamic simulation studies in real-time systems
- Benchmark dynamic responses
- Demonstrate functionality in production environment

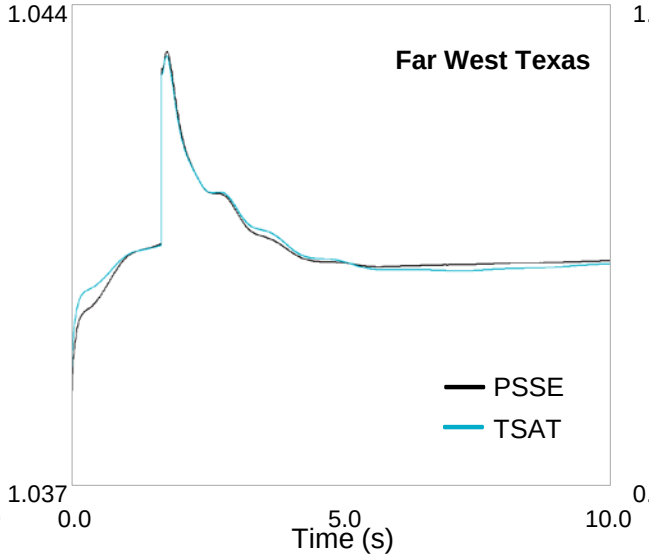
Benchmarking TSAT Against PSS®E Across ERCOT

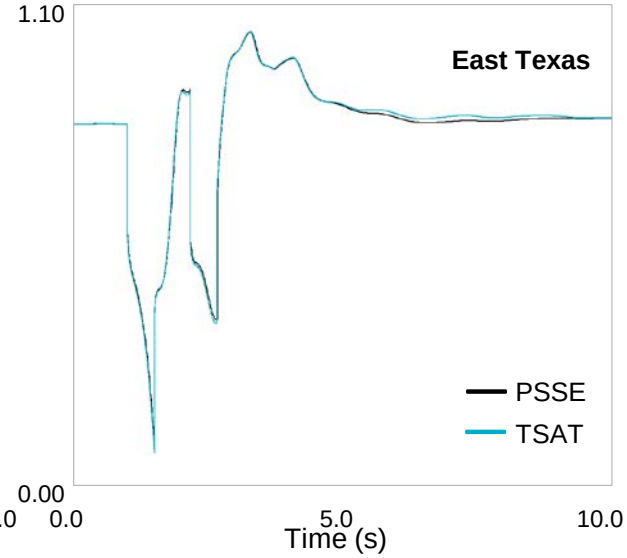




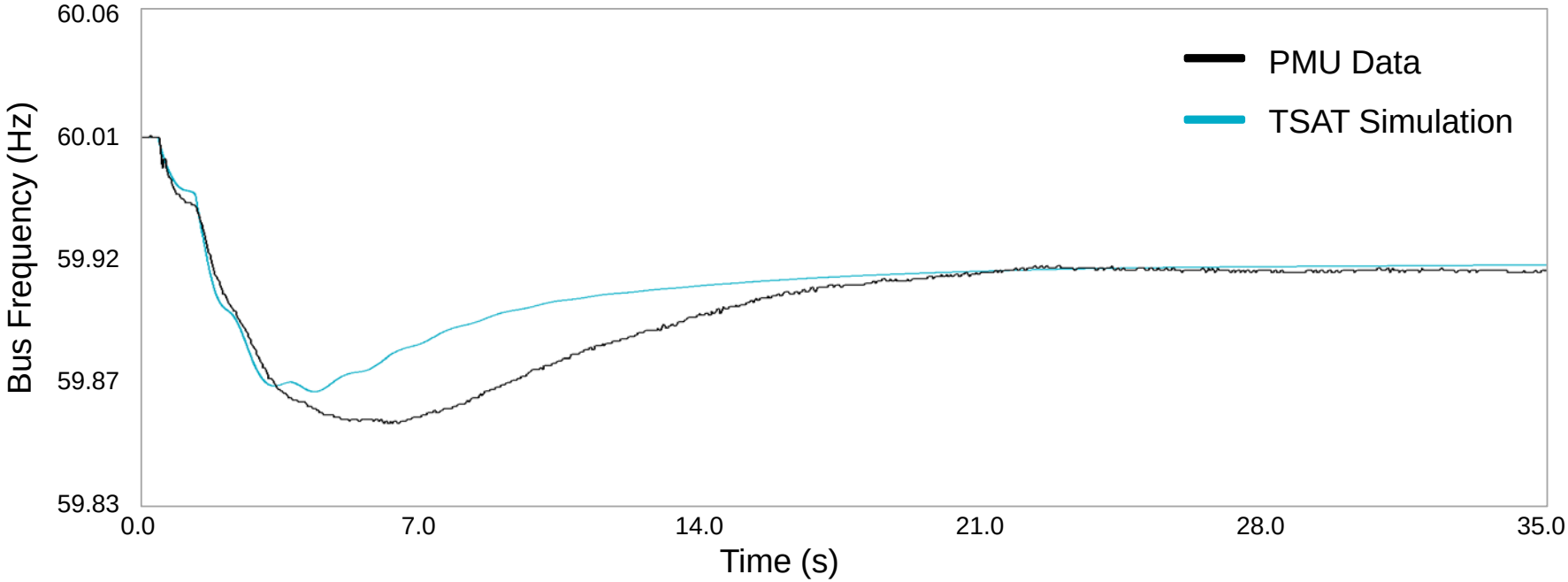








Benchmarking TSAT Against PMU Data



TSAT demonstrates shallower frequency drops

- Governor deadband modeling
- Governor response status
- Load-frequency dependence

Conclusions

Achievements

Benchmark dynamic contingency response in key areas

- Establishes trust in TSAT performance

Demonstrate functionality in production system (study mode)

- Contribute to reliable and efficient grid operations
- Can enhance operator training experience

Key Takeaway

Foundation to find stability-related operating limits in real time

- Stable operations of grid can be achieved more reliably and efficiently

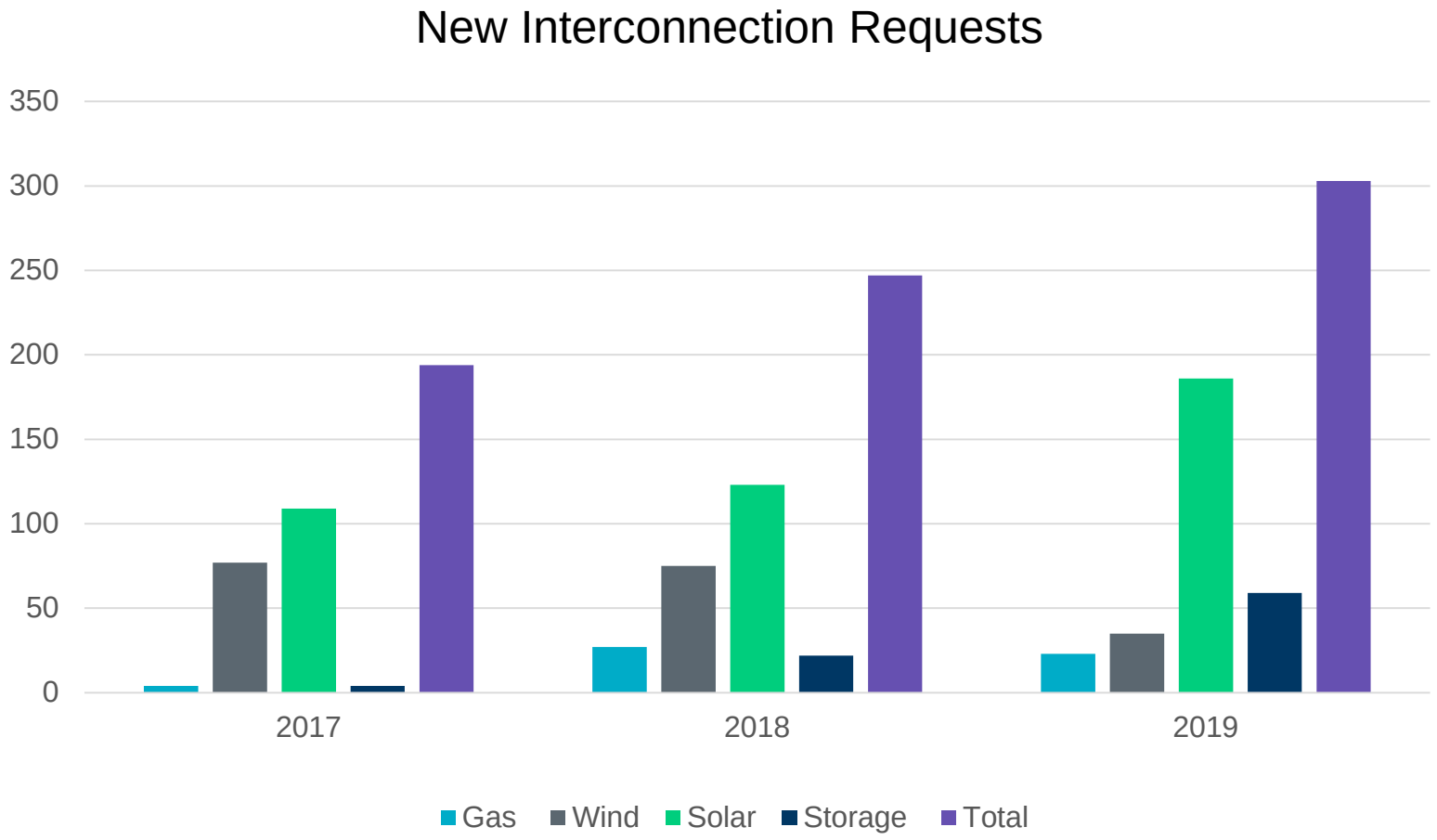
Vijay Singh

Master of Science in Electrical Engineering

University of Texas (December 2019)

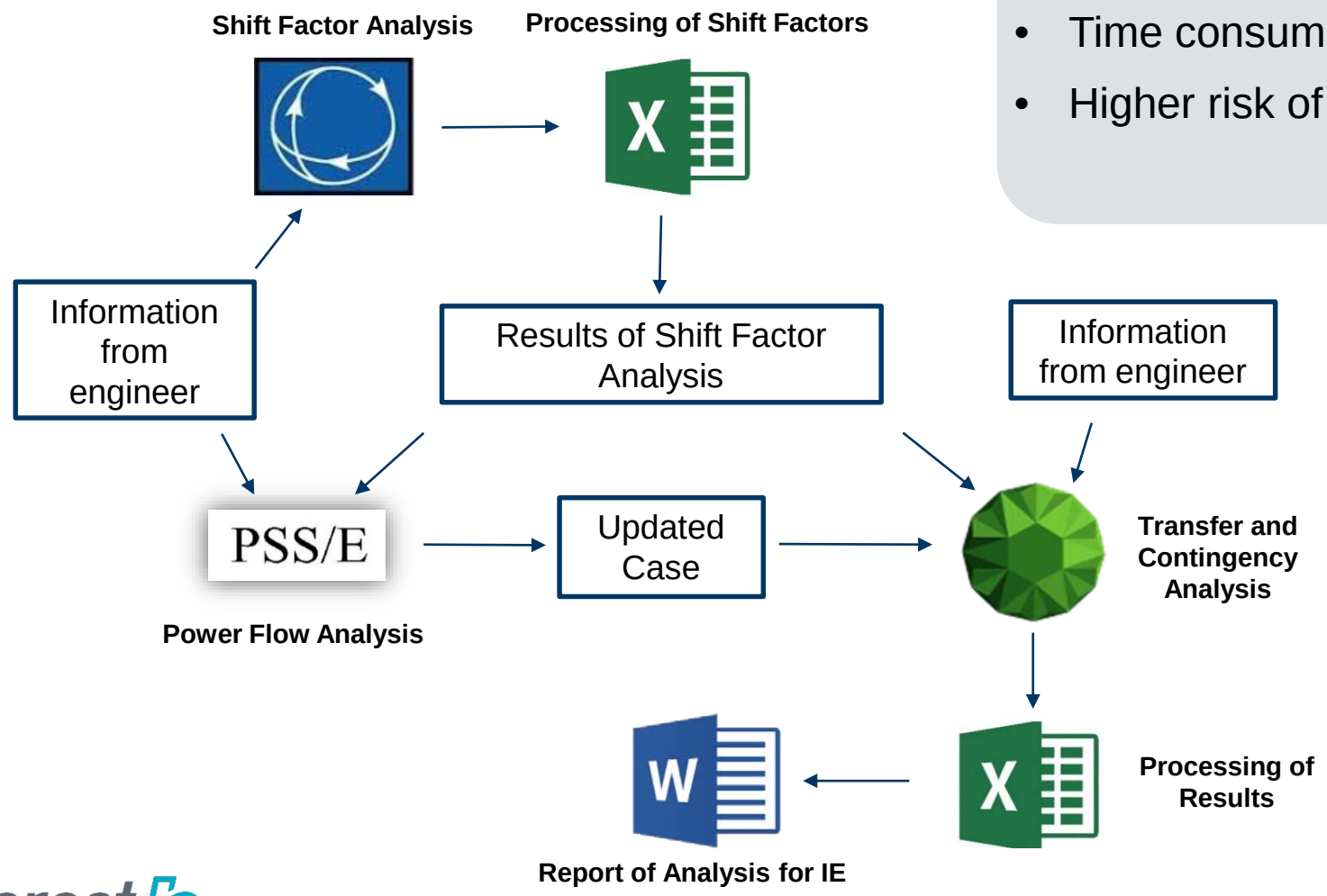
2019 Resource Integration

Overview



All interconnection requests require a screening study.

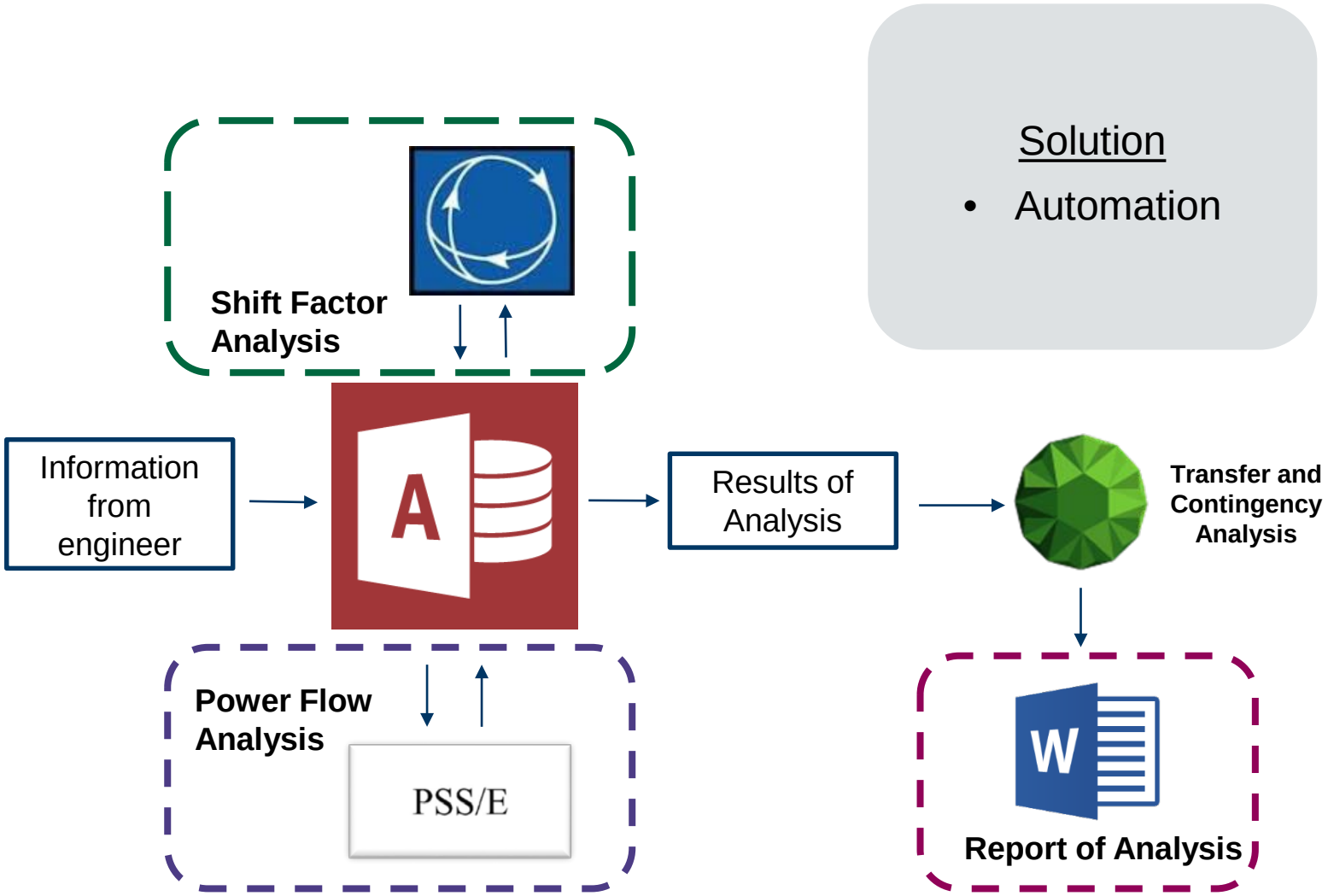
Current Screening Study Process



Problem

- Time consuming
- Higher risk of errors

Screening Study Process with Tool



Screening Study with Tool

Benefits

ERCOT

- Shorter study times
- Reduced potential errors
- Standardized process

Market Participants

- Faster turnaround
- Concise report
- Consistent results

Personal

- Gained new skills
- Experience
- Personal connections

Caleb Holland

Bachelor of Science Electrical and Computer Engineering
University of Texas (December 2020)

John Lawson

Bachelor of Science Electrical and Computer Engineering
Baylor University (December 2019)

David Zhou

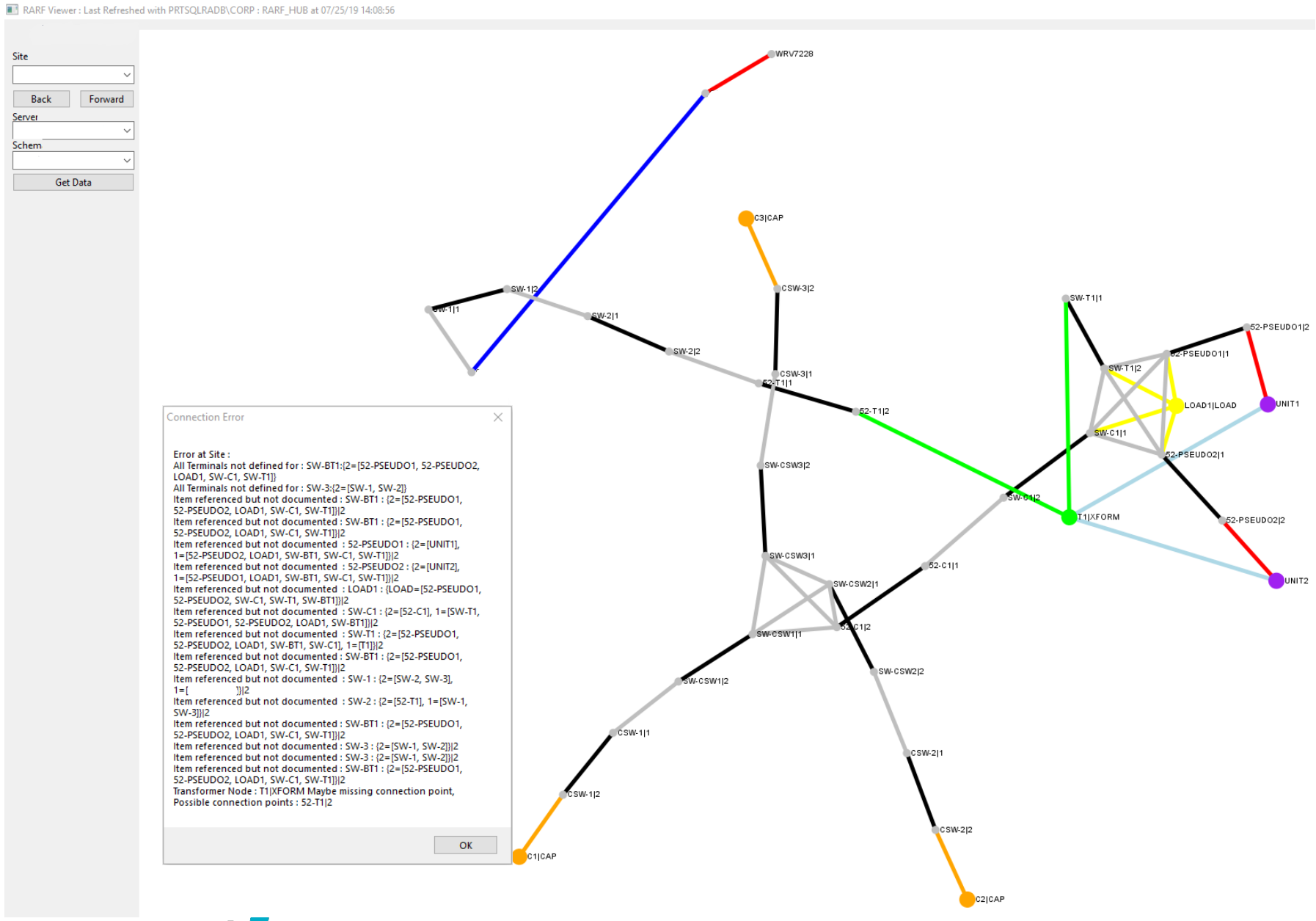
Bachelor of Science Electrical and Computer Engineering
University of Texas (May 2020)

2019 Grid Planning and Operations Administration

Problems with Current RARF Implementation

DESCRIPTION OF CHANGE	BREAKER / SWITCH			Normal Operating Status (when In-service)	Voltage Level	Static Ratings for Planning			Connected Device 1	
	Switch Name	Ercot Station Code Mnemonic	Switch Code			Continuous Rating	2-hr Emergency Rating	15 Min Rating		
List	enter all caps	enter all caps	Automatic	Open/Closed	kV	MVA	MVA	MVA	enter all caps	
CHANGE	SWITCH_1	STATION_1	STATION_1_STATION_1_SWITCH_1	CLOSED	138	200.00	200.00	200.00	SWITCH_2	BREAK
CHANGE	SWITCH_2	STATION_1	STATION_1_STATION_1_SWITCH_2	CLOSED	138	200.00	200.00	200.00	SWITCH_1	BREAK
CHANGE	BREAKER_1	STATION_1	STATION_1_STATION_1_BREAKER_1	OPEN	138	200.00	200.00	200.00	BREAKER_4	
CHANGE	BREAKER_2	STATION_1	STATION_1_STATION_1_BREAKER_2	CLOSED	138	200.00	200.00	200.00	SWITCH_4	
	SWITCH_3	STATION_1	STATION_1_STATION_1_SWITCH_3	CLOSED	138	200.00	200.00	200.00	SWITCH_6	
	SWITCH_4	STATION_1	STATION_1_STATION_1_SWITCH_4	CLOSED	138	200.00	200.00	200.00	BREAKER_X_Y	
	SWITCH_5	STATION_1	STATION_1_STATION_1_SWITCH_5	CLOSED	138	200.00	200.00	200.00	SWITCH_3	SWITC
CHANGE	BREAKER_3	STATION_1	STATION_1_STATION_1_BREAKER_3	CLOSED	138	200.00	200.00	200.00	SWITCH_8	
	BREAKER_4	STATION_1	STATION_1_STATION_1_BREAKER_4	OPEN	138	200.00	200.00	200.00	BREAKER_3	SWITC
	SWITCH_6	STATION_1	STATION_1_STATION_1_SWITCH_6	CLOSED	138	200.00	200.00	200.00	BREAKER_G_H	
CHANGE	BREAKER_5	STATION_1	STATION_1_STATION_1_BREAKER_5	CLOSED	138	200.00	200.00	200.00	SWITCH_I_J	
	BREAKER_6	STATION_1	STATION_1_STATION_1_BREAKER_6	CLOSED	138	200.00	200.00	200.00	BREAKER_2	SWITC
	SWITCH_7	STATION_1	STATION_1_STATION_1_SWITCH_7	CLOSED	13.8	200.00	200.00	200.00	SWITCH_X_Y	
	SWITCH_8	STATION_1	STATION_1_STATION_1_SWITCH_8	CLOSED	13.8	200.00	200.00	200.00	TRANSFORMER_1	
CHANGE	SWITCH_9	STATION_1	STATION_1_STATION_1_SWITCH_9	CLOSED	13.8	200.00	200.00	200.00	TRANSFORMER_2	
CHANGE	SWITCH_10	STATION_1	STATION_1_STATION_1_SWITCH_10	CLOSED	13.8	200.00	200.00	200.00	CAPACITOR_1	
CHANGE	BREAKER_X_Y	STATION_1	STATION_1_STATION_1_BREAKER_X_Y	CLOSED	13.8	200.00	200.00	200.00	CAPACITOR_2	
	BREAKER_A_B	STATION_1	STATION_1_STATION_1_BREAKER_A_B	CLOSED	13.8	200.00	200.00	200.00	REACTOR_1	SWITC
	BREAKER_C_D	STATION_1	STATION_1_STATION_1_BREAKER_C_D	OPEN	13.8	200.00	200.00	200.00	REACTOR_2	
CHANGE	SWITCH_X_Y	STATION_1	STATION_1_STATION_1_SWITCH_X_Y	CLOSED	13.8	200.00	200.00	200.00	LINE_1	
	SWITCH_A_B	STATION_1	STATION_1_STATION_1_SWITCH_A_B	CLOSED	13.8	200.00	200.00	200.00	LINE_2	
	SWITCH_C_D	STATION_1	STATION_1_STATION_1_SWITCH_C_D	CLOSED	13.8	200.00	200.00	200.00	STATIC_VAR_1	
	BREAKER_E_F	STATION_1	STATION_1_STATION_1_BREAKER_E_F	CLOSED	13.8	200.00	200.00	200.00	STATIC_VAR_2	
CHANGE	BREAKER_G_H	STATION_1	STATION_1_STATION_1_BREAKER_G_H	CLOSED	13.8	200.00	200.00	200.00	LOAD_1	
CHANGE	BREAKER_I_J	STATION_1	STATION_1_STATION_1_BREAKER_I_J	OPEN	13.8	200.00	200.00	200.00	LOAD_2	SWITC
	SWITCH_E_F	STATION_1	STATION_1_STATION_1_SWITCH_E_F	CLOSED	13.8	200.00	200.00	200.00	SWITCH_X_Y	
	SWITCH_G_H	STATION_1	STATION_1_STATION_1_SWITCH_G_H	CLOSED	13.8	200.00	200.00	200.00	BREAKER_5	
CHANGE	SWITCH_I_J	STATION_1	STATION_1_STATION_1_SWITCH_I_J	CLOSED	13.8	200.00	200.00	200.00	SWITCH_8	SWITC

... | Line Data | Line Temperature | Most Limiting Series Element | Breaker_Switch Data | Capacitor and Reactor Data | Transformer Data | Transformer Tap Settings | Static_Var_Compensator Data | Series Device Data | Load data | PUN_LOAD | One Line | Tran ...


RARF Viewer : Last Refreshed with PRTSQLRADB\CORP : RARF_HUB at 07/25/19 14:08:56
Site
Back
Forward
Server
Schem
Get Data
Connection Error
Error at Site :
All Terminals not defined for : SW-BT1:{2=[52-PSEUDO1, 52-PSEUDO2, LOAD1, SW-C1, SW-T1]}
All Terminals not defined for : SW-3:{2=[SW-1, SW-2]}
Item referenced but not documented : SW-BT1 : {2=[52-PSEUDO1, 52-PSEUDO2, LOAD1, SW-C1, SW-T1]}|2
Item referenced but not documented : SW-BT1 : {2=[52-PSEUDO1, 52-PSEUDO2, LOAD1, SW-C1, SW-T1]}|2
Item referenced but not documented : 52-PSEUDO1 : {2=[UNIT1], 1=[52-PSEUDO2, LOAD1, SW-BT1, SW-C1, SW-T1]}|2
Item referenced but not documented : 52-PSEUDO2 : {2=[UNIT2], 1=[52-PSEUDO1, LOAD1, SW-BT1, SW-C1, SW-T1]}|2
Item referenced but not documented : LOAD1 : {LOAD=[52-PSEUDO1, 52-PSEUDO2, SW-C1, SW-T1, SW-BT1]}|2
Item referenced but not documented : SW-C1 : {2=[52-C1], 1=[SW-T1, 52-PSEUDO1, 52-PSEUDO2, LOAD1, SW-BT1]}|2
Item referenced but not documented : SW-T1 : {2=[52-PSEUDO1, 52-PSEUDO2, LOAD1, SW-BT1, SW-C1], 1=[T1]}|2
Item referenced but not documented : SW-BT1 : {2=[52-PSEUDO1, 52-PSEUDO2, LOAD1, SW-C1, SW-T1]}|2
Item referenced but not documented : SW-1 : {2=[SW-2, SW-3], 1=[ ]}|2
Item referenced but not documented : SW-2 : {2=[52-T1], 1=[SW-1, SW-3]}|2
Item referenced but not documented : SW-BT1 : {2=[52-PSEUDO1, 52-PSEUDO2, LOAD1, SW-C1, SW-T1]}|2
Item referenced but not documented : SW-3 : {2=[SW-1, SW-2]}|2
Item referenced but not documented : SW-3 : {2=[SW-1, SW-2]}|2
Item referenced but not documented : SW-BT1 : {2=[52-PSEUDO1, 52-PSEUDO2, LOAD1, SW-C1, SW-T1]}|2
Transformer Node : T1|XFORM Maybe missing connection point, Possible connection points : 52-T1|2
OK
WRV7228
C3|CAP
CSW-3|2
SW-1|2
SW-1|1
SW-2|1
SW-2|2
CSW-3|1
52-T1|1
52-T1|2
SW-CSW3|2
SW-CSW3|1
SW-CSW2|1
SW-CSW1|1
SW-CSW1|2
CSW-1|1
CSW-1|2
C1|CAP
52-C1|1
52-C1|2
SW-CSW2|2
CSW-2|1
CSW-2|2
C2|CAP
SW-T1|1
SW-T1|2
SW-C1|1
T1|XFORM
52-PSEUDO1|2
52-PSEUDO1|1
LOAD1|LOAD
UNIT1
52-PSEUDO2|1
52-PSEUDO2|2
UNIT2

Resource Integration and Ongoing Operations - Resource Services