FMEA CONNECTIONS WORKSHOP

Cybersecurity for Utilities

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Introduction

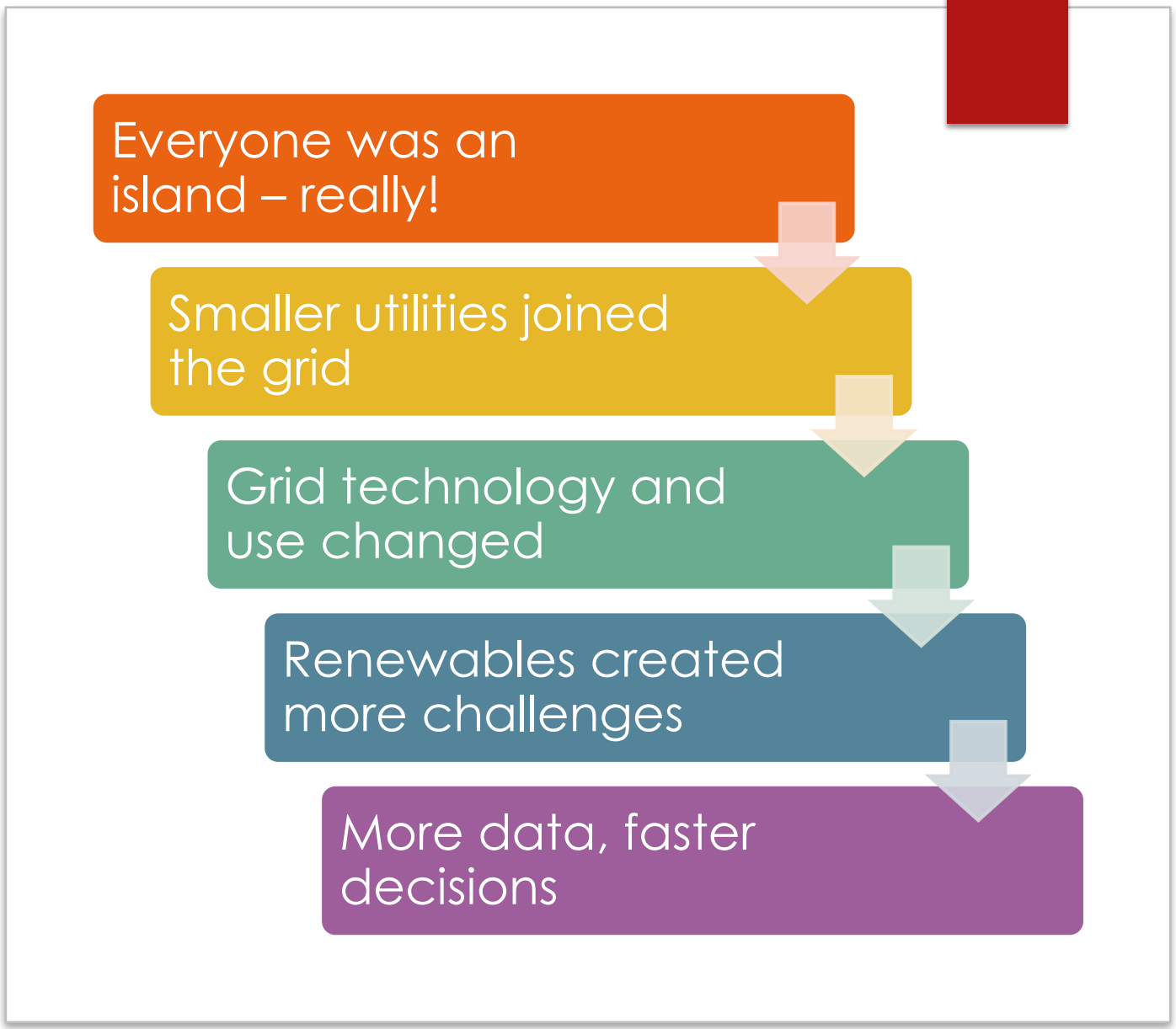
- Proven track record in IT Security
- NERC CIP experience - NERC CIPC, CSSWG, FRCC & SERC
- SANS GCIP Certified
- Designed state-wide secure networks
- Working with APPA
- Working with E-ISAC, DOE
- Current chair for Cyber Mutual Assistance

IT vs OT

- IT priorities
  - Confidentiality
  - Integrity
  - Availability

- OT priorities
  - Availability (and safety)
  - Integrity
  - Confidentiality

How Did We Get Here?



It's Not All About OT…

- Most threats come from IT
- Ransomware and cryptocurrency
- New community turned into a business model (RAAS)

More Challenges To Utilities

Staffing

- The great resignation
- Asking existing staff to do more
- Remote access becomes ubiquitous

Lack of visibility (Colonial pipeline!)

- Executive decision leads to shutdown

Cybersecurity for Utilities

FMEA Connections Workshop – November 3 2021

INTRODUCTION

- Former utility staff (telecommunications, water & electric)
- First NERC CIP auditor in the US
- Drafter of NERC CIP standards and formal interpretations
- NERC CIP Supply Chain Working Group contributor
- Former Principal Investigator US DOE National Electric Sector Cybersecurity Organization
- EnergySec Founder, Director and President Emeritus
- Centro de Ciberseguridad Industrial (CCI) US Coordinator
- Cybersecurity Advisory Team for State Solar, NARUC/NASEO
- Advisor to multiple industrial security product vendors
- GCIP, CISA, CRISC, CISSP-ISSAP, SSCP, NSA-IAM, CVI, TCP, SCP

THE HORSESHOE NAIL

- Small doesn’t mean lower probability target
- You will be automatically scanned/hacked if vulnerable
- Your resources (data, bandwidth, CPU cycles) = $$$
- Smaller is perceived as less security (easier to hack)
  - 43% of cyberattacks are aimed at small companies
  - Only 14% are prepared to defend themselves
  - 50% - 70% of all ransomware attacks are directed at small companies
- Launch point to larger targets
  - Connectivity
  - Trust relationships

WHAT WORKS?

- Do the “Top Ten” and reduce your risk by 80% or more
- Too many security products to track
- Too many frameworks to follow
- What works in the real world – your Muni world?
- Scientifically proven – ITPI, empirical results
- Operationally proven – CISA, INL, DOE, NERC
- Real world – 35+ years of experience
- You don’t have to eat the whole elephant at once

1. ASSET INVENTORY

- Not everything, but at least the important stuff
- If you don’t know what you have, you can’t protect it
- All the other key control areas are based on this
- Start with simple baseline elements
  - Make/model
  - Network and/or or host address
  - OS and/or firmware
  - All other software installed
  - Listening Ports (services)
  - Patches (or patch state; vulnerability)

2. PHASE OUT FRAGILE SYSTEMS

- Legacy systems
- Custom systems
- Unique systems
- That one “application” written by 3 engineers
- Brittle hardware
- Borrowed IT used as OT
- Applications that don’t play nice in the tech sandbox
- Applications that are the hardest to update
- Standardization will lower costs/risk and improve uptime

3. ARCHITECT FOR DEFENSE

- You should at least have a firewall between IT/OT
- Specific points for detection and visibility
  - Network boundary
  - Each network segment
  - Critical systems
  - Administrative & engineering systems
- Dependencies on outside systems
- Dependencies on outside business processes
- Intelligent islanding, shear-away networks & “turtle mode”

4. REMOTE ACCESS

- Is anything connected directly to the Internet?
- Remote administration
- Remote operations
- Vendor support
- Consider using a jump host
- Multi-factor authentication
- Monitor and alert

5. RESTRICT ACCESS

- Change all default accounts/passwords
- Unique user accounts wherever you can
- Eliminate shared accounts if possible
  - Where you can’t, track who has them
- Principle of least privilege
- Fewest administrator accounts/groups
- Different credentials for OT AD and IT AD
- Remove access ASAP for shared and unique users
- Use LONG passwords, not complex

6. VULNERABILITY MANAGEMENT

- Insecure by design
- First-to-market
- Patching vs. vulnerabilities
- Zero-days, forever-days
- Patching priority: perimeter first, then work inward
- Vulnerability “scanners”
  - Passive vs. active
- Role of configuration management

7. CONTROL CHANGE

- Best defense against both accidents and malice…
- Establish a change control/review board
- Prepare for backing out any change
- Record all changes through baseline tracking
- Test changes, whenever/wherever possible

8. MONITOR

- Monitor as much as you possibly can
- Network monitoring
- System monitoring
- SIEM tools
  - Tuning
  - Monitoring and alerts
  - False positives
  - Integration with other tools
- OT-specific tools exist
- Can integrate with enterprise (most attacks start w/ IT)
- Neighborhood Keeper

9. KEEP IT SIMPLE

- Don’t over-buy security technologies
- Train your staff
- Complexity is the enemy of security
- Fewer places for attackers (or problems) to hide
- Reduces attack surface area
- Less expensive through volume purchase
- Easier on supply chain risk

10. RESPONSE AND RECOVERY

- Write down an Incident Response Plan (IRP)
- Keep it simple – something you can follow
- Public Power Incident Response Play Book
- Paper or table-top exercises
- NERC GridEx
- Cyber Mutual Assistance (CMA)
- Practice like it’s game day
- Are you sure you can recover?
- Have you actually tried to do it?

BONUS - REGULATION

- Compliance does not equal security
- Often necessary to establish a minimum bar
- Yes, hackers are faster than laws
- You can prescribe action, but not attitude
- “Transient Regulation”
  - Executive Orders
  - National Security Memorandum
  - Insurance
  - Contracts

BONUS - FRAMEWORKS & METRICS

- Where do you start? Is there a playbook?
- Pick one, apply it, and measure to it
- Perfection is the enemy of the good
- Most don’t need a gap assessment
  - Attach to existing initiatives, fold in more over time
- Suggest NIST-800-53 and 800-82
  - Fits within NIST Cyber Security Framework
  - Companion to ES-C2M2 (Cybersecurity Capability Maturity Model)
  - Will likely be the US standard for all critical infrastructure(s)
- Consistent measurement to demonstrate progress

BONUS – PEOPLE

- What if you installed 20 new security cameras and no one was watching them?
- Best tool in unskilled hands is a false sense of security
- Break down HR barriers
  - Entry level security talent
  - Higher rates for specific cyber skills or management
- Become a training path & be ok with them leaving
- Encourage conferences and networking for wide relationship connections

SUMMARY – PROVEN TO WORK

- Asset Inventory
- Phase out fragile systems
- Build a network you can defend
- Lock down all remote access
- Restrict user access
- Manage vulnerabilities and patches
- Change control and configuration management
- Monitor as much as possible
- Simplify: fewer security tools, less complexity in systems
- Practice response and recovery like it’s game day

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Secrets of Cybersecurity

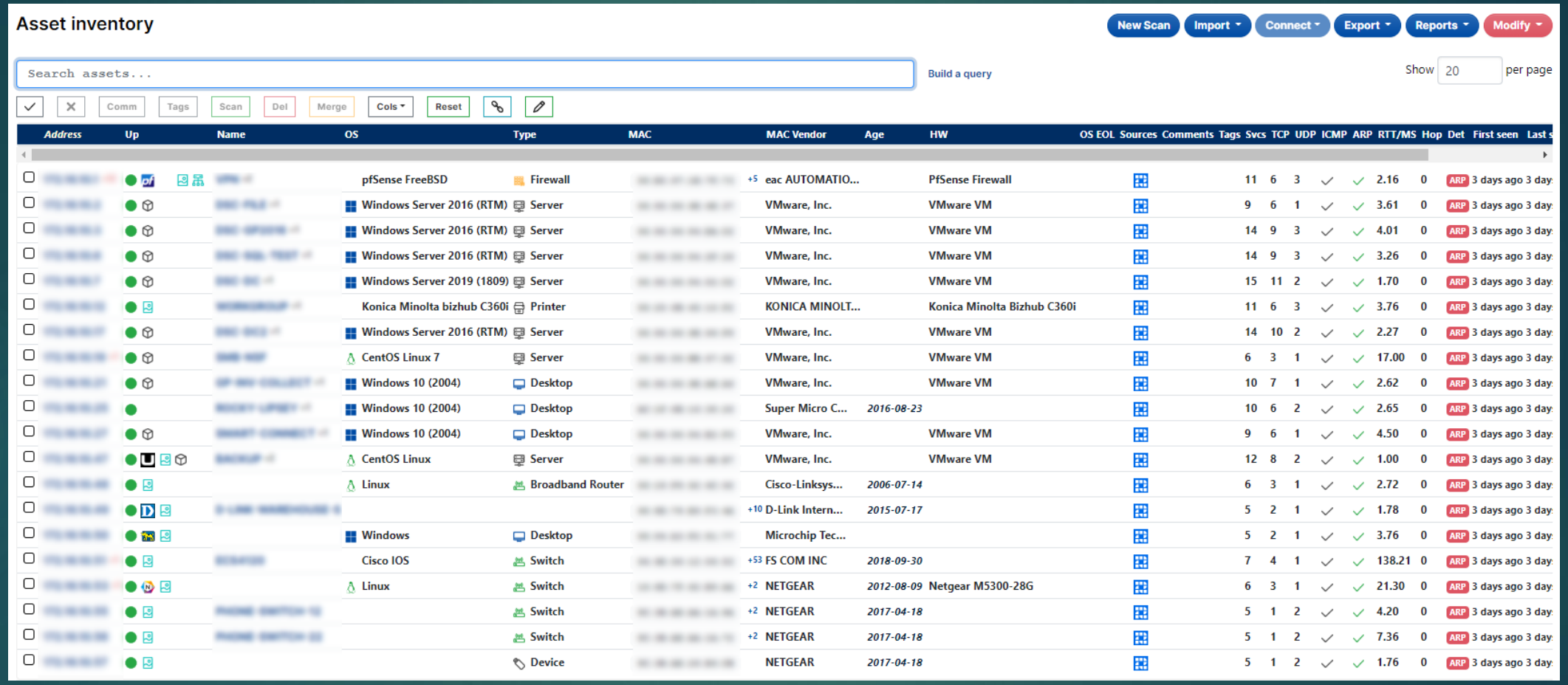
None of this is new

It's hard to keep up

It takes a lot of time

Free and low cost resources are available

Inventory



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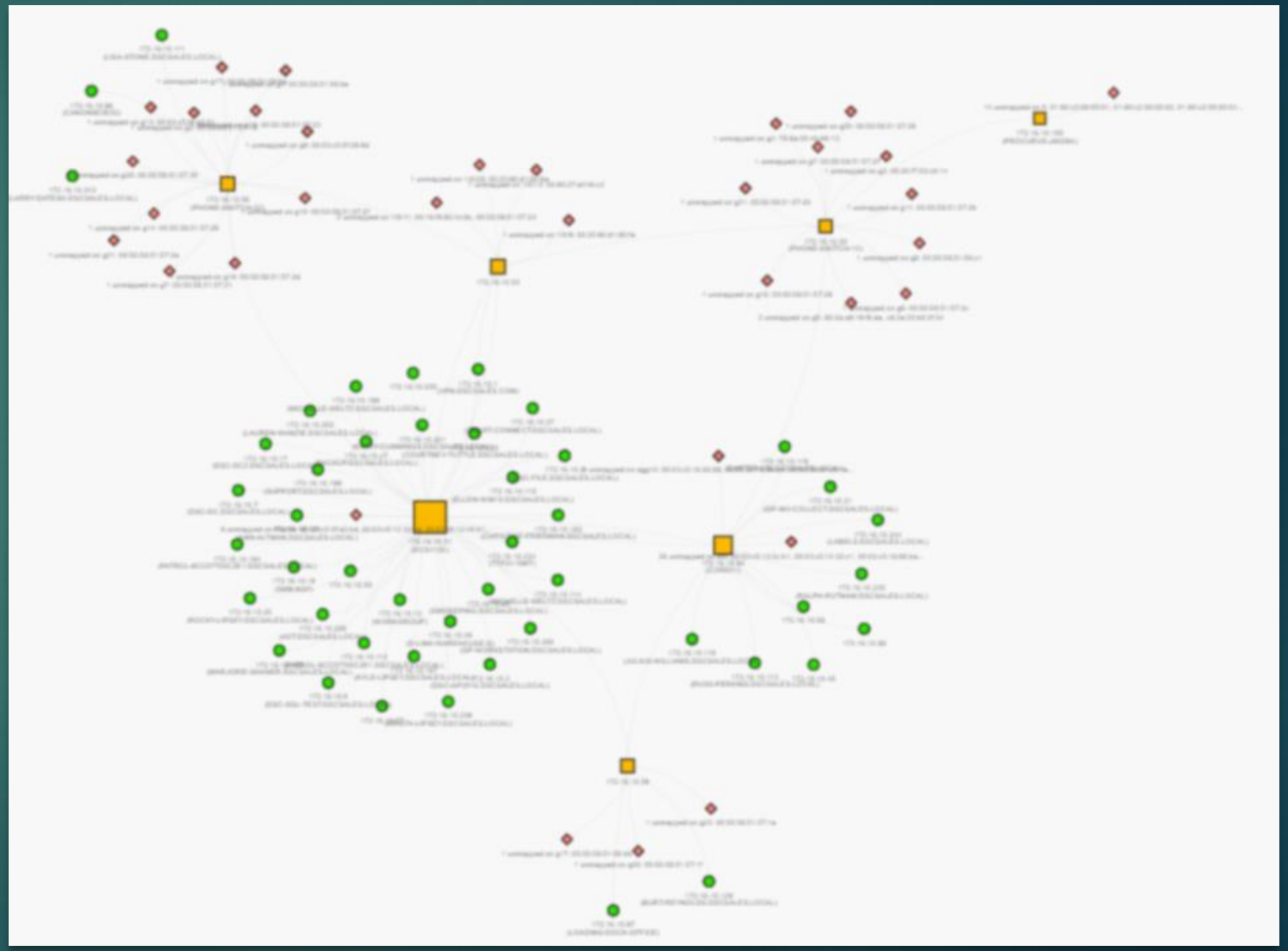
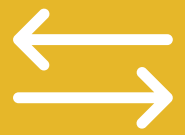
Inventory



https://Rumble.Run

Know your limits!

Don't run "IT Tools" on OT systems

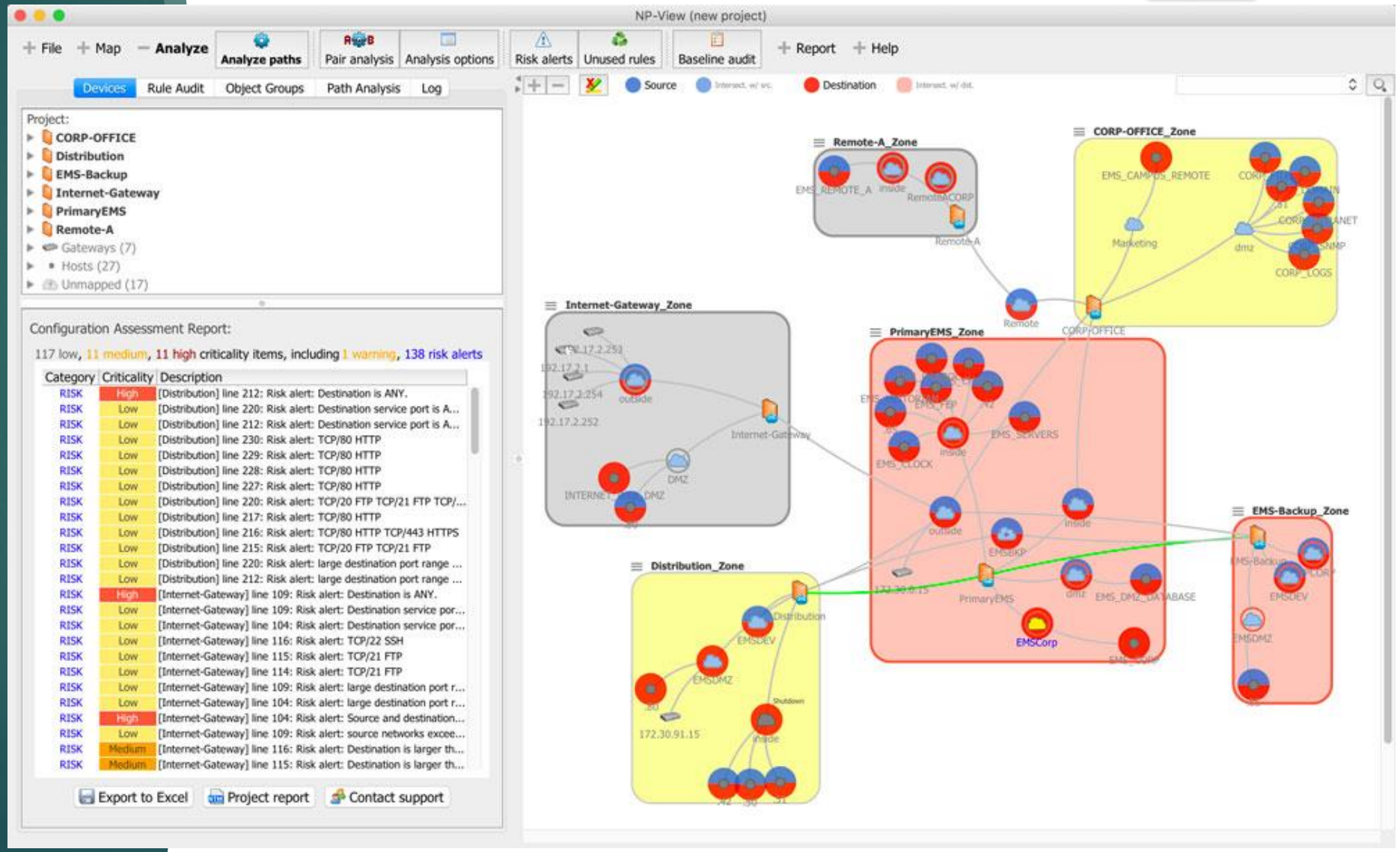


- What hasn't changed?
- What are we working around?
- New employees: what don't you like?
- What are your customers complaining about?

Computers don't have sell-by dates

Network Security

- No shortcuts ;(
- NP-View



Remote Access

One of the biggest risks to your organization

Please use a VPN (and a good one at that)

Oldsmar
-> TeamViewer

Vulnerability Management

Patching philosophies

- Now: drop everything, this is bad
- Never: doesn't apply to us or our systems
- Next: important, plan for it

Assessment tools (Qualys, Tenable)

- Point-in time
- Should be repeated on a periodic basis

100 Day Plan

- ESCC
- Dragos Neighborhood Keeper
- NRECA's Essence
- Funding

Funding

- IOU's vs Municipals
- DOE CEDS Grants
- INVEST Act - $1.86B (?)

Risk Reduction

- Training
  - Phishing
  - Exercises
    - Be prepared!

Exercises

- CISA Table Top Exercise Package
- GridEx
- NUARI
- MS-ISAC (CIS)

CMA (Cyber Mutual Assistance)

- ✓ Typically “no-notice”
- ✓ No clear beginning and end
- ✓ Not geographically bounded

“Am I next? Am I ready to respond?”

TRADITIONAL MUTUAL AID

PROGRAM STATISTICS

- **174** Participating Entities in the US & Canada:
  - Public Power
  - Federal Entities
  - Cooperatives
  - Investor-owned
  - RTOs/ISOs
- Approximately:
  - **80%** of US electricity customers
  - **80%** of US domestic natural gas customers
  - **1.25 million** electricity customers in Canada

Action Plan

1. Get a checkup
2. Exercise!
3. Talk to people who understand your business model to make sure solutions are right-sized for your utility
4. Get involved with CMA
5. Work with your JAA to see what kind of member services or joint action opportunities exist!