OT Security & Risk Metrics

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Founder, S4 Events

We Know Very Little

- What can we say that is supported by data?
  - Ransomware on IT is the most common cyber incident cause of outages
  - Unsecured Internet accessible OT is being exploited by hackers & adversaries
  - A strong security perimeter between IT and OT has prevented many IT cyber incidents from spreading to OT
  - Removable media controls and endpoint detection have reduced walk-in malware from the most common OT cyber incident to number 2 or 3
  - Consequence reduction has direct and measurable impact on risk reduction

Most Everything Else Is An Unproven Assumption

Not Knowing Is Dangerous

- Misallocation of time and money
- Inability to perform effective risk management
- False sense of security

Even Worse … Unwarranted Certainty

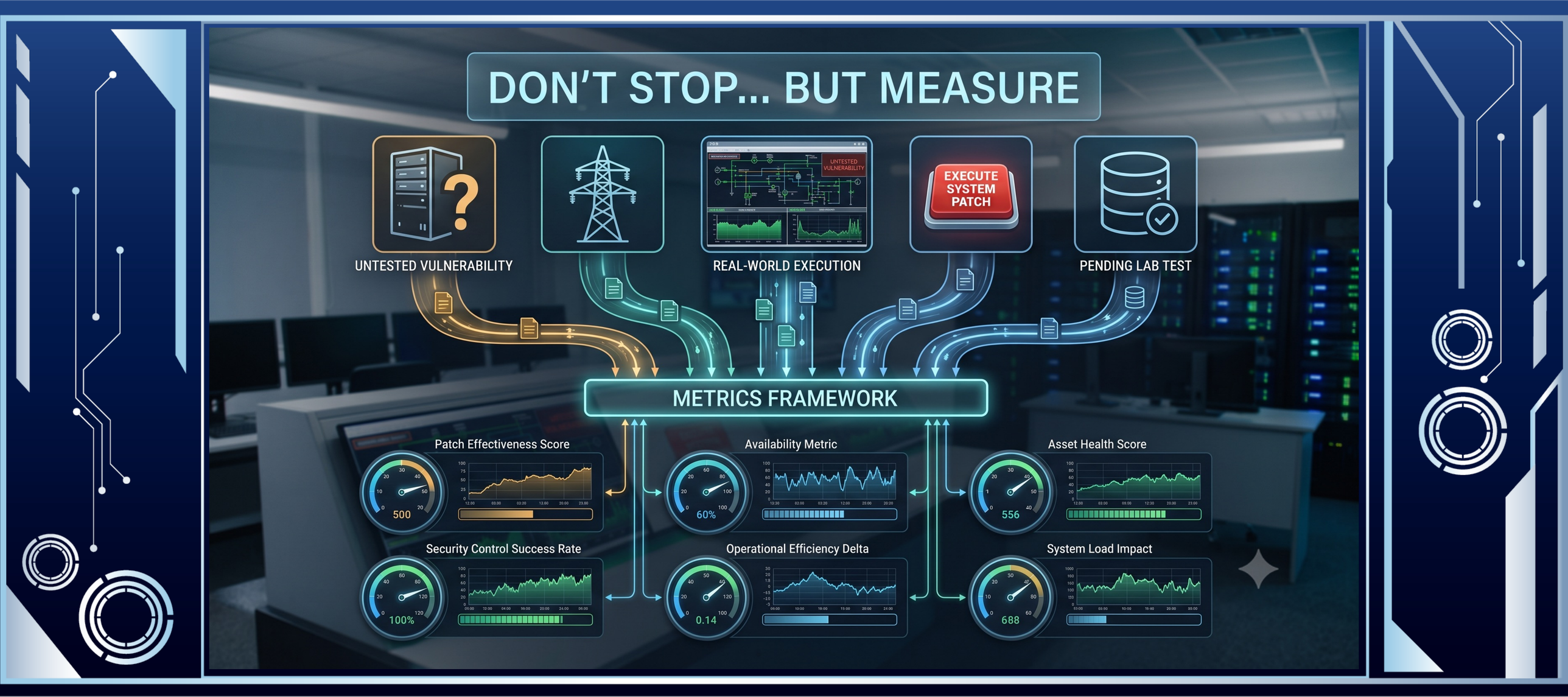
Example: Asset Inventory

- You can’t protect what you don’t know
  - Safes, locked rooms, firewalls, …
  - Why do countries still have power and water? Factories producing?
  - Why do we have air conditioning and power in this building?
- You can improve protection if you know what you are protecting?
  - How much better and at what cost?
- And what does ”know” mean?

Large & Growing Set Of Unproven ”Good Practice”

Example: Detection

- Detecting attacks is a good thing; you should have a detection capability
- What do you monitor?
  - Minimize false negatives and false positives
  - Resource efficiency
- Armis / Claroty / Dragos / Nozomi / …
  - How much of our OT environment should we monitor … and at what cost?
  - 80 / 20 rule? Why?


DON’T STOP... BUT MEASURE
UNTESTED VULNERABILITY
REAL-WORLD EXECUTION
EXECUTE SYSTEM PATCH
PENDING LAB TEST
METRICS FRAMEWORK
Patch Effectiveness Score
500
Availability Metric
60%
Asset Health Score
556
Security Control Success Rate
100%
Operational Efficiency Delta
0.14
System Load Impact
688

Two Metrics … For Every Project

- Implementation Effectiveness
- Risk Reduction

- Bonus: Tier 2 / Near Misses


FLAWED

Start With A Hypothesis

- What are we expecting the security control to do?
  - Prevent unauthorized access to OT Zone
  - Shorten attacker dwell time
  - Provide data for forensics
  - Prevent lateral movement in OT Zone

Implementation Effectiveness

- How are we expecting it to meet the hypothesis?
- What architecture / design / configuration / human activity is required to support the hypothesis?

JIM MILLER

RATING DEPLOYED OT FIREWALLS' EFFECTIVENESS

Before we start…

- Overall process
  - Rate a firewall from 0-100 (start with 0)
  - Rewarded for secure settings and restrictive rules
- Two sections
  - Configuration (15 points)
  - Rules / Policy (85 points)
- People / Process
  - Not comparing vendors

Implementation Effectiveness

- Alternate approaches
  - Purple teaming … test your security control (action)
  - Lab or third-party analysis
  - Your idea here
- Automate metric collection and display

Risk Reduction (the hard one)

- Did the action we took reduce OT cyber related risk?
- You need data
  - How often did the security control get activated?
  - How often did it work as hypothesized? And not?
  - What was the cost of the consequence prevented?
  - What was the actual cost of failure?

Begin With Your Hypothesis

A firewall at the IT / OT security perimeter
will block all traffic, including attacks,
that is not permitted

Identify Your Data

- Total Number Of Connection Attempts To & From OT
- Blocked Connection Attempts

Identify Your Data

- Total Number Of Connection Attempts
- Blocked Connection Attempts
  - On control system ports (502, 5900, 44818)
  - On control system ports and IP addresses in use
- Blocked Content
- Blocked Exfil Attempts
- Annual Cost (product and people)

Create Your Risk Reduction Metric

(Blocked connections to key resources on dangerous ports
+
(Exfil attempts x 1000))
x
(Consequence / difficulty)
=
Risk Reduction

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LIFECYCLE COSTS


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Begin With Your Hypothesis

Our OT Detection Platform (define)
will detect attacks and allow us to act
to prevent an outage in our Operations.

Identify Your Data

- Number of detected attacks by platform
  - Number of detected attacks likely to succeed
- Number of detected attacks that were stopped from causing an unacceptable impact
- Annual Cost

It Hasn’t Happened Yet

Likelihood & Consequence
Contribution To Risk Reduction

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The Impact Of OT Cyber Incidents Is Minimal

How Can We Determine Actual Threat?

	API 754
Tier 1	Loss of containment with injury or death
Tier 2	Loss of containment no injury or death
Tier 3	Safeguard is challenged
Tier 4	Process, inspection not happening properly

How Can We Determine Actual Threat?

	OT Security / Near Miss Version
Tier 1	High consequence cyber incident
Tier 2	Access available to cause Tier 1, but didn’t
Tier 3	OT asset compromised, Tier 1 not possible
Tier 4	Cyber maintenance / hygiene failure

You / We Need To Collect Near Miss Incident Data
When There Is Access
Could That Access Cause A Tier 1 Incident
With The Desire & Skill?

THANK YOU