

# THE RISK MANAGEMENT ASSOCIATION

## Complexity is the new Cyber Adversary

- **Robert Gardner**, Founder, New World Technology Partners
- **Greg Witte**, CISSP-ISSEP, CISM, Senior Security Engineer, Huntington Ingalls Industries - Technical Solutions
- **Max Planck**, Technical Director, Institute for Complex Additive Systems Analysis, New Mexico Tech
- **Tom Walheim**, Scientist/Staff Engineer, Cyber Systems, L3 Harris Technologies



Copyright © 2021 The Risk Management Association

# The New Cyber Adversary

Cyberspace is a rapidly changing, real-time complex system-of-systems

“It surrounds us and penetrates us.  
It binds the (enterprise) together”

Obi Wan Kenobe

Enabling exploitable, accidental, even spontaneously combustible, often irreversible, highly impactful breaches

In 2003, "...a tree branch in Ohio started an outage that cascaded across a broad swath from Michigan to New England and Canada."

NY Daily News Aug 2013



In 2009, a Czech Internet router advertised a very long route path that couldn't be handled running legacy software

causing a cascade of events where routers repeatedly shut down and rebooted, saturating the system causing Internet disruptions around the globe



In 2010 Cathay Pacific Flight 780's crew were unable to change the thrust output of the engines.

The complex system of jet fuel supply chain, airport operations and aircraft fuel system conspired to enable small undetectable particles to breach engine performance



## What Do These Have in Common?

There were no nefarious adversarial actors or single failures at play

The complex, heterogeneous nature of the systems themselves led to emergent behaviors

- behaviors that cannot be predicted by examining individual components but are rather produced by the system as a whole

Facilitating “perfect storms” that conspired to enable these catastrophes



# The Financial System is No Different

“...systemic risk in the financial system is analogous to the reliability risks posed by complex networks encountered in fields such as ecology, epidemiology, biology and engineering”

Andrew Haldane, Executive Director of the Bank of England

## Cyberspace is a real-time, complex system of systems

Once just a support system, an electronic filing system

Now it's the enterprise's central nervous system, ***its assets***

Rapidly changing and getting more complex

- Runaway internet interconnections; myriad channels
- Mobility, with radios, sensors and controllers
- Mergers & Acquisitions system blending
- Big Data, Cloud, Social Networks
- Internet of Things
- AI



# Complex processes operating on unstable cyber systems exacerbate systemic risk

Usage of unstable processes presents its own risk...

- Complex Supply Chains and Counterparty Networks
- Too many non-obvious Interlinkages and Interdependencies
- Hastily Integrated Idiosyncratic Events or Conditions

Combined with unstable cyber underpinnings...

- May obfuscate breach sources and adversaries
- Multiplies risk and concomitant consequences

# A Chat: SMEs Explore the Risks and the Remedies

1. Identifying Current and Emerging Vulnerabilities

*Tom Walheim, L3Harris*

2. Quantifying Consequences by System Behavior Modeling

*Max Planck, ICASA*

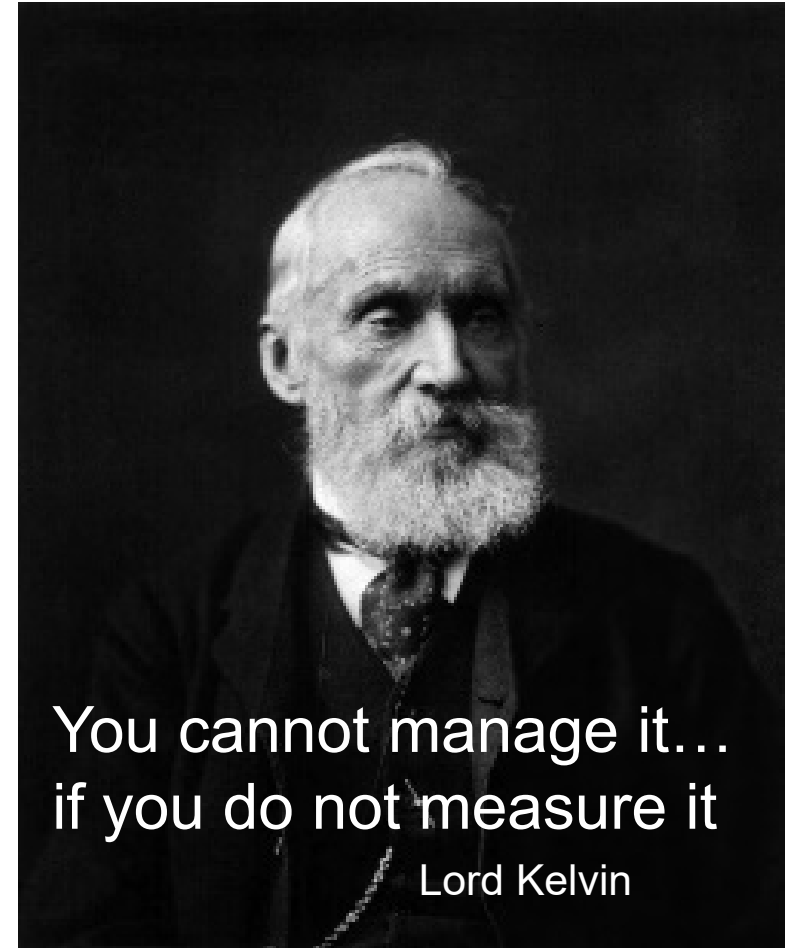
3. Achieving Cyber Security and Enterprise Resilience

*Greg Witte, Huntington Ingalls Industries*

# Summary

Managing Complexity is a System Engineering endeavor

1. Model ecosystem behavior and quantify enterprise consequences
2. Consider the eco-system impact of the newest IT feature du jour



# Summary

Managing Complexity is a System Engineering endeavor

1. Model ecosystem behavior and quantify enterprise consequences
2. Consider the eco-system impact of the newest IT feature du jour
3. **Evolve resilient ecosystem architecture to absorb breaches and limit impact propagation**

