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Building a Next Generation Security Architecture

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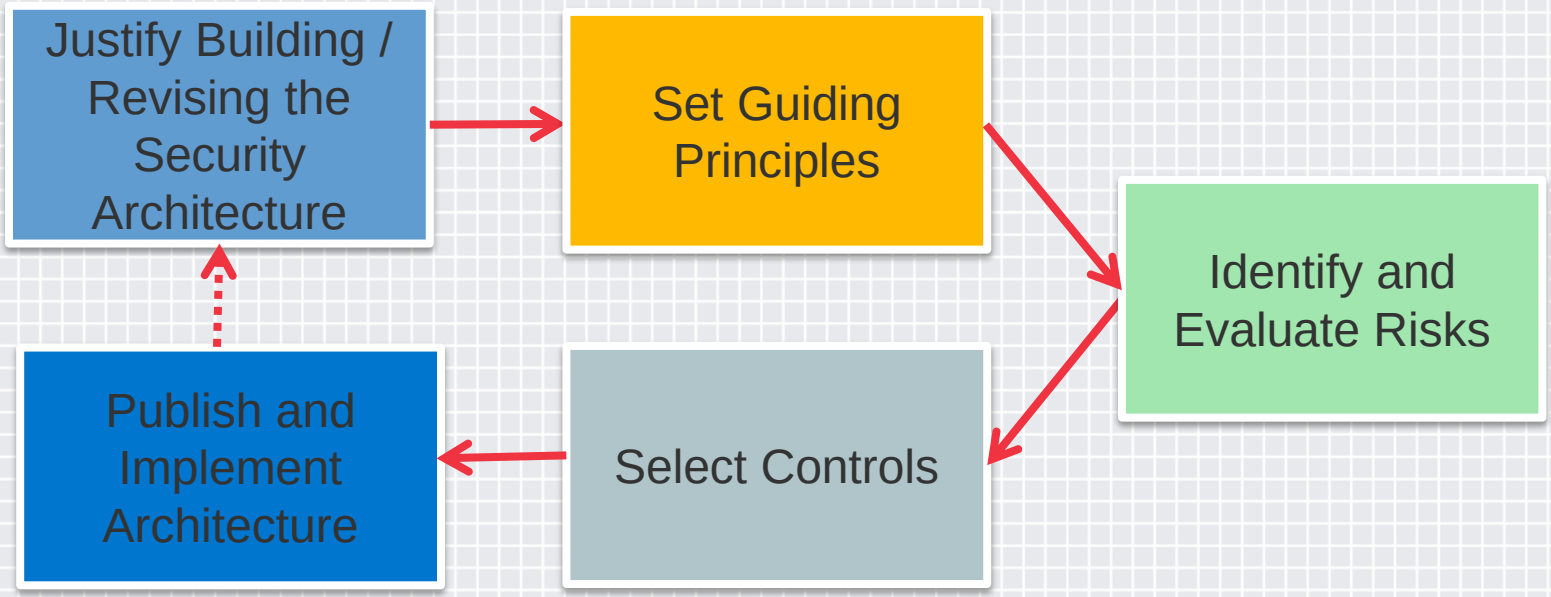
Introduction to the presentation: Building a security architecture



Technique #2

Shout [someone else's] "Data Breach" at the top of your lungs.

Technique #3: Develop a Business Case

- Oil and Natural Gas (ONG) Business Models
- Regulation
- Technology
- Threats

Information security challenges with Oil and Natural Gas business models

- Joint ventures and partnerships
- Specialized computing environments
  - Process Control
  - Supervisory Control And Data Acquisition (SCADA)
- Exotic environments

Cyber security regulation applicable to Oil and Natural Gas Industry

- Sarbanes-Oxley (2002)
- State data breach notification laws (first in 2002)
- Homeland Security Presidential Directive HSPD-7
- Chemical Facility Anti-Terrorism Standards (CFATS) (2007)
- Transportation Security Administration (TSA) Pipeline Security Guidelines (2008)
- Federal Energy Regulatory Commission (FERC) Critical Infrastructure Protection (CIP) (2008)
- Department of Energy (DOE) ONG Cybersecurity Capability Maturity Model (C2M2) (2012)
- National Institute of Standards and Technology (NIST) Framework for Improving Critical Infrastructure Cybersecurity (2014)
- State of the Union proposals (Information sharing / Data Breach Notification) (2015)
- Cybersecurity Information Sharing Act (2015)
- Etc. Etc. Etc. Etc……

Cyber security regulation applicable to Oil and Natural Gas Industry

- Privacy
- Localization
- ISO 27000 (2005 and 2013)
- In progress European Union work
  - Network and Information Security Directive
  - Data Protection regulation

Technology Shifts (2005)

- A cloud was a meteorological event

Technology Shifts (2005)

- The only thing that “tweeted” were birds

Technology Shifts (2005)

- Tablets were made of paper

Technology Shifts

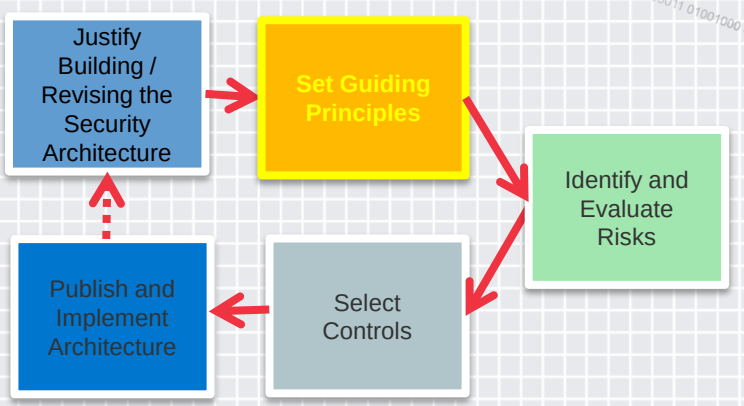
- Cloud Computing
- Social Media
- Mobility
- Internet of Things

And finally, we get to threats

- A botnet (Conficker) infected millions of new PCs for 3 years after it was ‘suppressed’. - *According to Computerworld's Gregg Keizer,(April 26, 2012)*
- The New York Times and The Washington Post have been victims of cyber-intrusions. - *According to Washington Post's Craig Timberg and Ellen Nakashima (February 20, 2013)*
- Millions of Target customers were impacted by the Target data breach. - *According to Washington Post's Jia Lynn Yang and Amrita Jayakumar (January 10, 2014)*

Applying threats to Oil and Gas Industry

- US National Counterintelligence Executive Report – October 2011
  - "The pace of foreign economic collection and industrial espionage activities against major US corporations and US Government agencies is accelerating."
  - Energy and natural resources companies are among those likely to be "priority targets"
- Documented attacks / threats
  - Targeted attacks (Advanced Persistent Threats)
  - Hacktivist (like Anonymous) activities
- "Game changers"
  - Shamoon
  - Stuxnet
- Threat actors (external and internal)


Justify Building / Revising the Security Architecture
Set Guiding Principles
Identify and Evaluate Risks
Select Controls
Publish and Implement Architecture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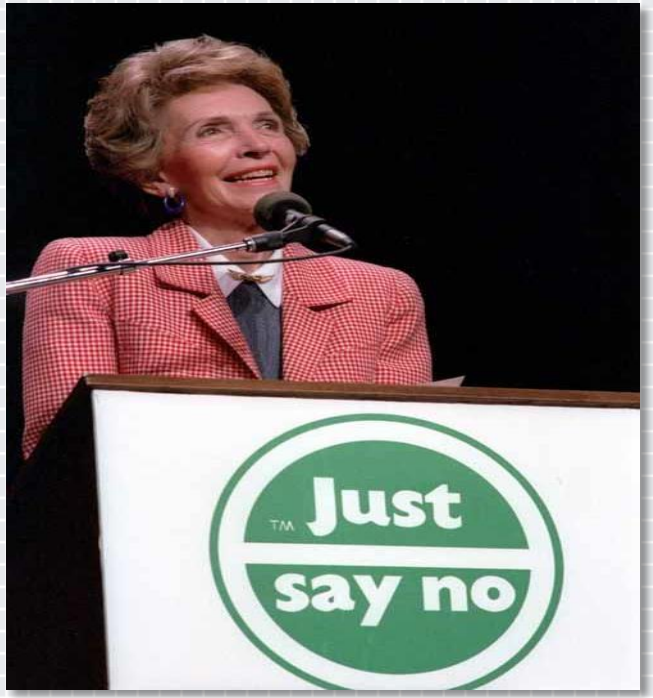
Security is an enabler that allows the business to accomplish its mission.



Courtesy Ronald Reagan Library

Security is architected so that it is the natural path for a person to take

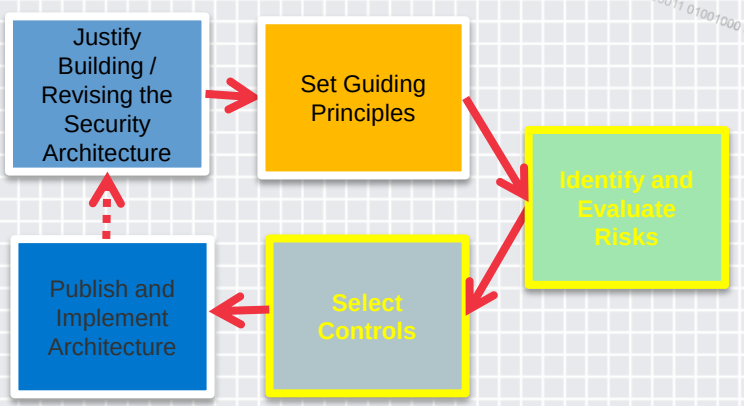
Re-architected Security Controls

Security must evolve to address future technologies and emerging threats

“Prediction is very difficult, especially about the future.”

— attributed to Niels Bohr
(1885 - 1962)

Scenario Planning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These are risks?

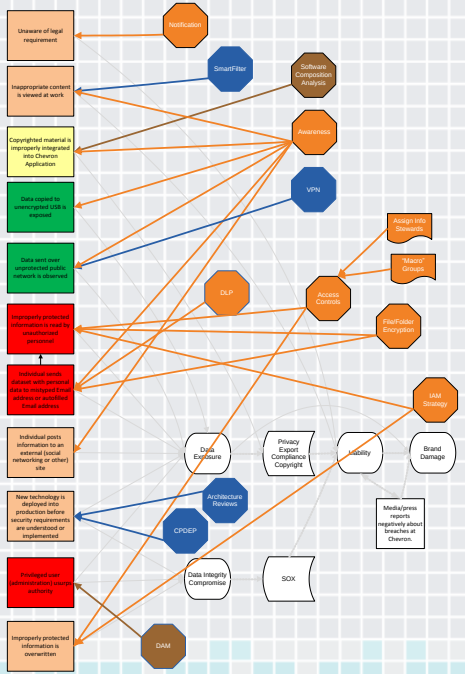
Chevron

Scenario modeling

- Threat modeling

Attacker	Tradecraft	Vulnerability	Action	Target	Result	Objective
Nation State - high motive; high capability	Advertise wrong BGP routes	Excessive/improper access	Spoof	Ports	Theft	Financial Gain
Nation State - high motive; low capability	Cable physically severed	User behavior	ReRoute	People	Data loss	Intellectual property
Nation State - low motive; low capability	DNS cache poisoning	Zero day	Copy	IP addresses	Control	Strategic advantage
Hacktivist - Anonymous	SYN floods (denial of service)	Privilege escalation	Read	Big data	Destroy	Mayhem
Hacktivist - Lawsuit	Data subpoenaed	User manipulation	Probe	Classified information	Reputational damage	Bragging rights
Traditional attention seeking hacker	Targeted phishing	Unpatched systems	Bypass	Customer data	Monetary loss	Damage economy
Opportunist	SQL Injection	Posting personal data	Flood	Contacts	Deny	Industrial espionage
Malicious insider	Cross-site scripting	Insecure application development	Deny	Keys	Shareholder action	
Non-malicious insider (accident)	Password cracking	Known worm/virus	Identity Fraud	Credentials	Regulatory investigation	
Malicious privileged user (administrator)	Malware		Masquerade			
	Physical theft		Gain trust			
	Physical attack (guns/ bullets)		Infiltrate			
	Social engineering					

- Attack graphs



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Threat modeling – Example One

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	Physical theft		Gain trust			
	Physical attack (guns/ bullets)		Infiltrate			
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Threat modeling – Example Two

Attacker	Tradecraft	Vulnerability	Action	Target	Result	Objective
Nation State - high motive; high capability	Advertise wrong BGP routes	Excessive/improper access	Spoof	Ports	Theft	Financial Gain
Nation State - high motive; low capability	Cable physically severed	User behavior	ReRoute	People	Data loss	Intellectual property
Nation State - low motive; low capability	DNS cache poisoning	Zero day	Copy	IP addresses	Control	Strategic advantage
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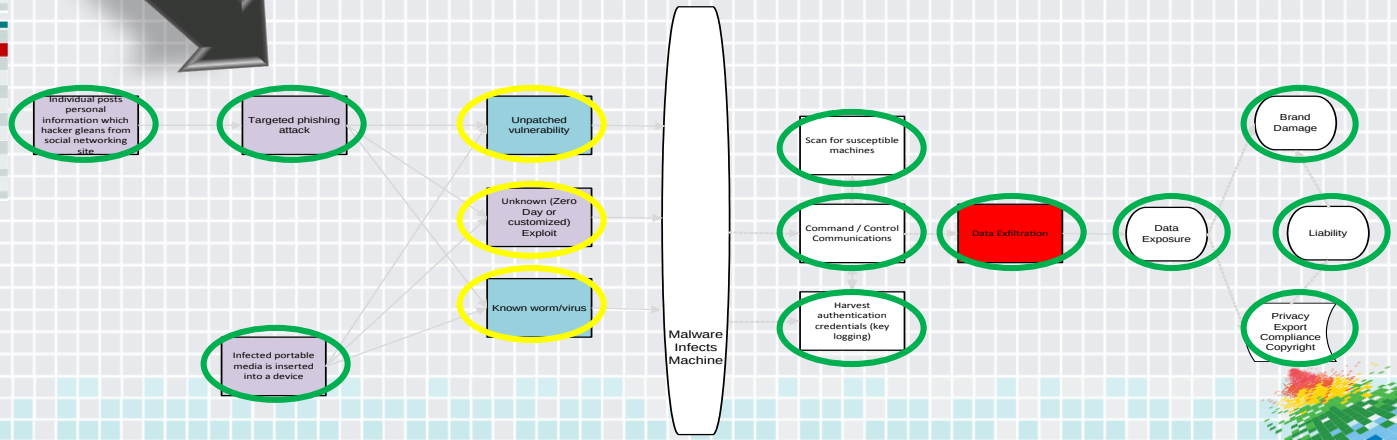
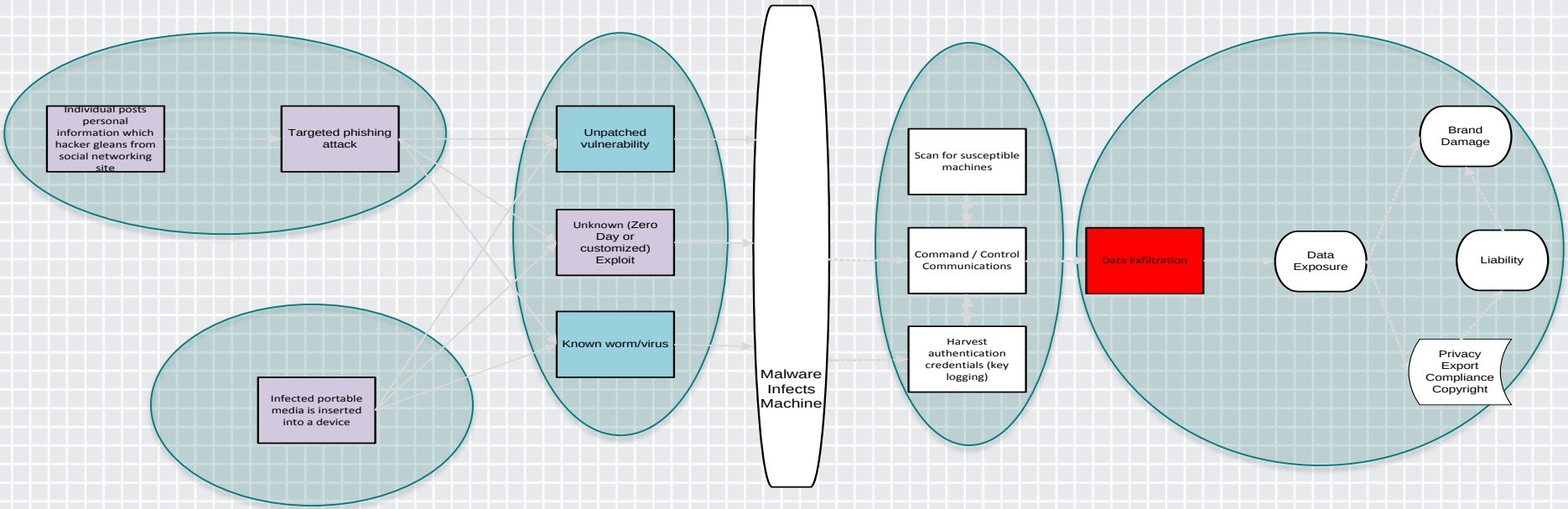
Attack Graphs

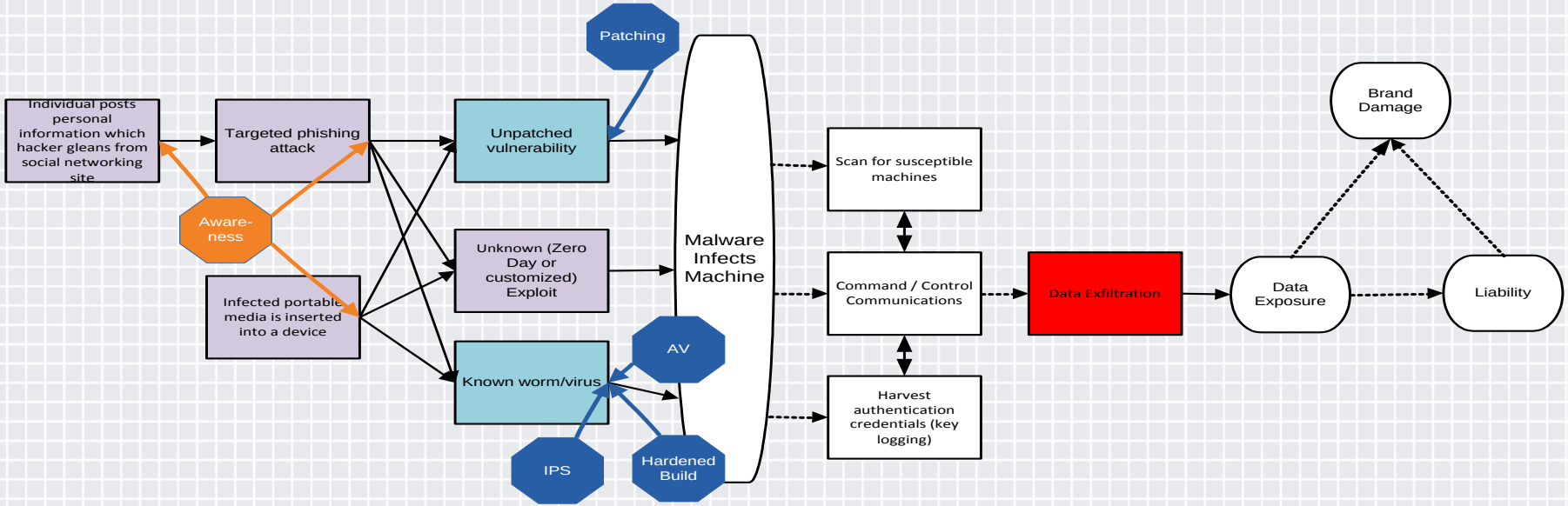
- Visual representations of possible attack paths and consequences
- Allow “summary” of multiple (related) attacks on a single graph
- Addressing any of the vulnerabilities (boxes) addresses the attack



Addressing APT: A typical targeted attack



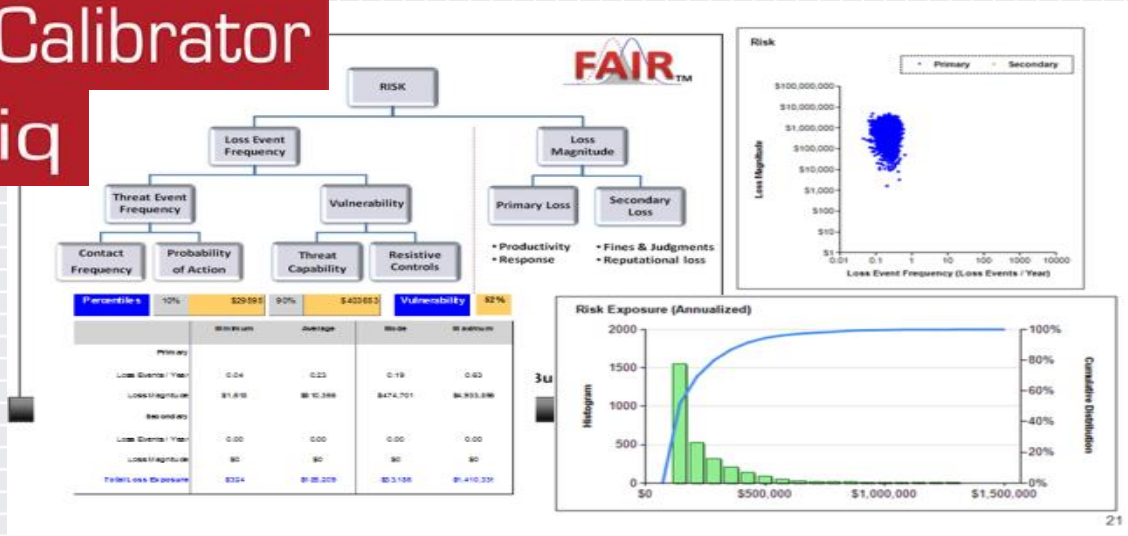
Current Control Set Versus APT



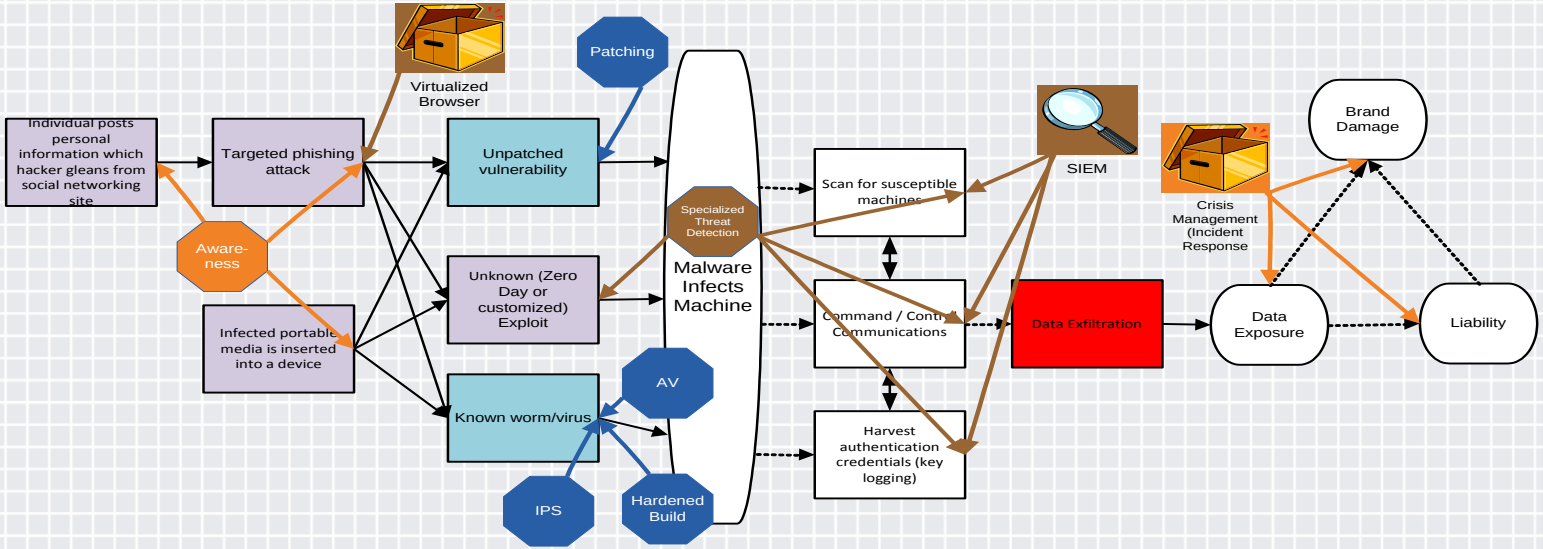
Quantitative Risk Assessment

FAIR Risk Calibrator

FAIR iq



Putting it all together – Addressing APT



Maintain

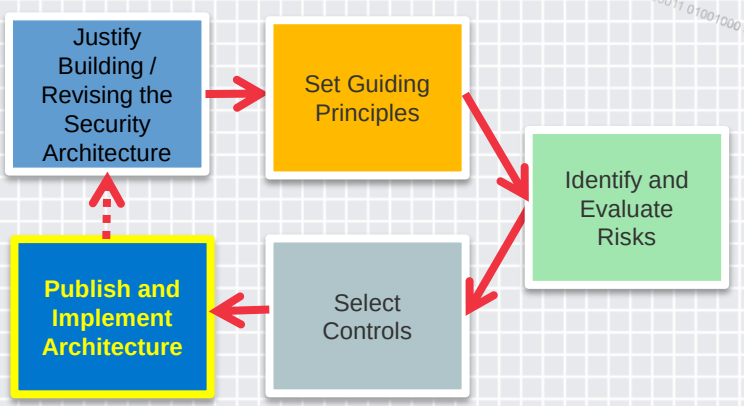
- Patching
- Hardened build
- IPS (Intrusion Prevention System)
- Anti-virus

Maintain and Improve

- Awareness training
- Incident response (implement crisis management)

Implement

- Virtualized browser
- Specialized Threat Detection
- SIEM (Security Information and Event Management)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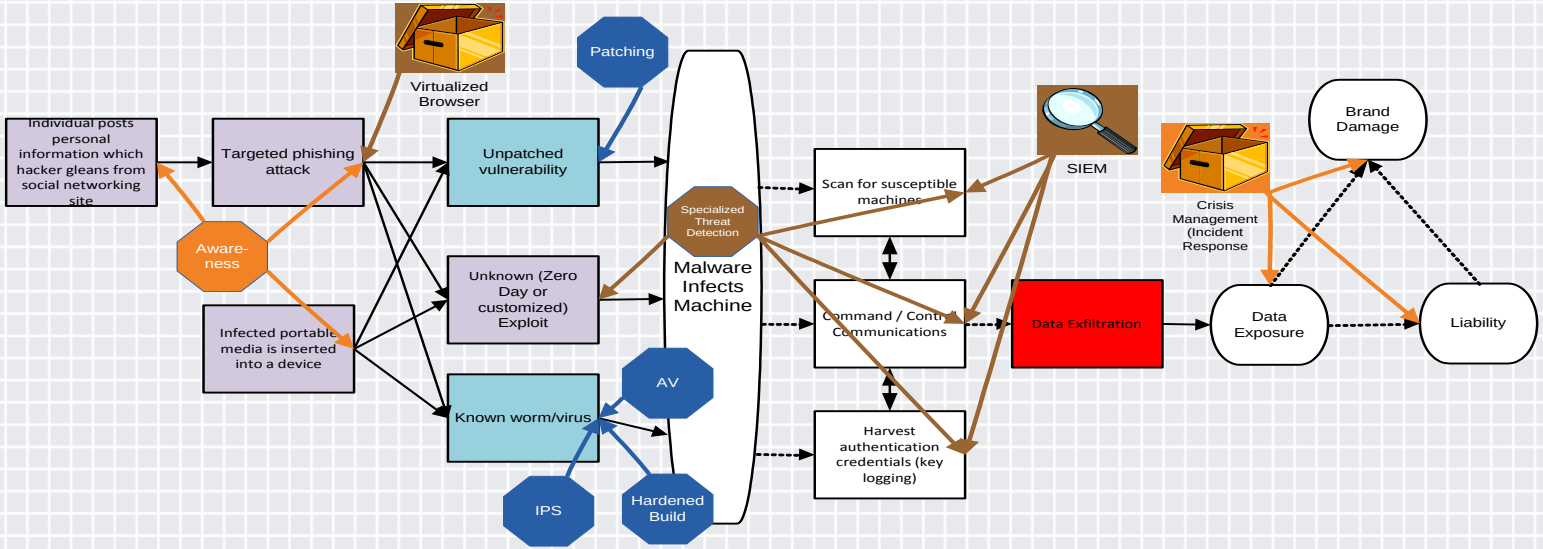
Optimizing risk reduction with budget



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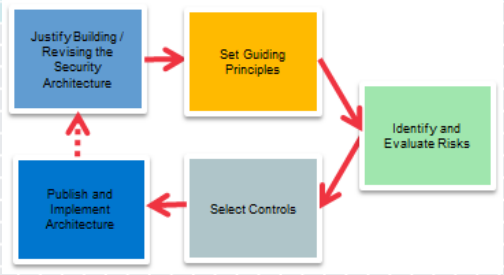
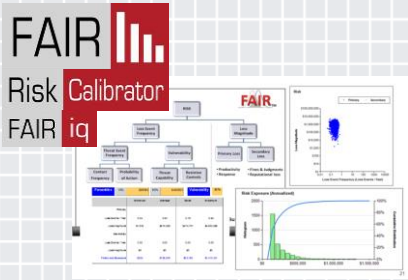
Where we are going…

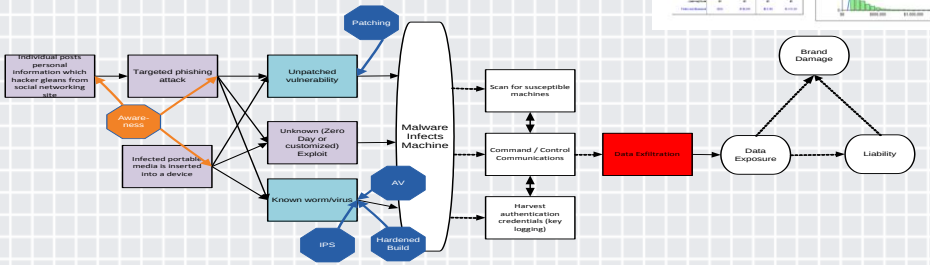
- Run quantitative risk analysis on each control
- Identify those with most impact (most reduction in risk for less cost)
- Prioritize higher those projects to implement those controls

Apply Slide

- Immediate Actions – Determine need
- Within three months – Execute the process
  - Collect business requirements
  - Build threat scenarios to identify potential attack vectors
  - Risk Assessment
  - Identify controls and execute project plan
- Long term - Recycle







Resources

- Threat Modeling
  - John Howard, Thomas Longstaff; "*A Common Language for Computer Security Incidents";* Sandia National Laboratories; October 1998. DOI= http://prod.sandia.gov/techlib/access-control.cgi/1998/988667.pdf
- Attack Graphs
  - Anoop Singhal, Ximming Ou; "*Security Risk Analysis of Enterprise Networks Using Probabilistic Attack Graphs"*: National Institute of Standards and Technology; August 2011. DOI= http://csrc.nist.gov/publications/nistir/ir7788/NISTIR-7788.pdf
  - Ian Green "*Extreme Cyber Scenario Planning and Attack Tree Analysis*"; Commonwealth Bank of Australia – presented at RSA Conference 2013; Video - http://www.rsaconference.com/media/extreme-cyber-scenario-planning-fault-tree-analysis; Slides - http://www.rsaconference.com/writable/presentations/file_upload/stu-w21b.pdf
- Scenario Planning
  - Peter Schwartz; "The Art of the Long View: Paths to Strategic Insight for Yourself and Your Company"; Currency Doubleday; 1991
  - "*Scenarios: An Explorer's Guide*"; Shell International BV; 2008; http://s05.static-shell.com/content/dam/shell/static/future-energy/downloads/shell-scenarios/shell-scenarios-explorersguide.pdf
- Risk Assessment
  - The Open Group™ Risk Taxonomy Standard (O-RT): https://www2.opengroup.org/ogsys/catalog/C13K
  - The Open Group™ Risk Analysis Standard (O-RA): https://www2.opengroup.org/ogsys/catalog/C13G

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Questions?

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