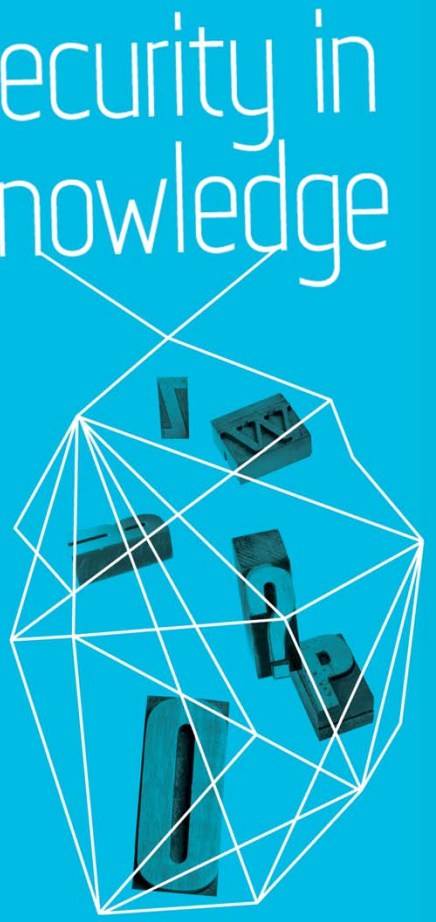
RSA CONFERENCE 2013

EXTREME CYBER SCENARIO PLANNING & ATTACK TREE ANALYSIS



Ian Green
Manager, Cybercrime & Intelligence
Commonwealth Bank of Australia

Session ID: GRC-T17
Session Classification: ADVANCED

WHY?

"What keeps you up at night?"

"What keeps you up at night?"

Extreme events are costly

- 10% or $400m wiped off market cap

How prepared are you?

General Keith Alexander
Director, National Security Agency
Commander, United States Cyber Command

Source: The Aspen Security Forum 2012
http://www.youtube.com/watch?v=rtvi_RiFzOc&feature=plcp

How prepared are you?

General Keith Alexander
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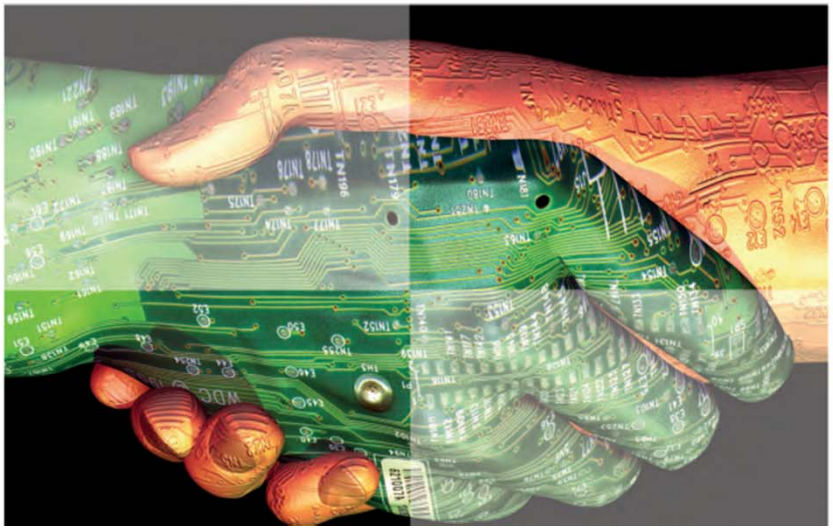
WORLD ECONOMIC FORUM

COMMITTED TO IMPROVING THE STATE OF THE WORLD

Risk and Responsibility in a Hyperconnected World
Pathways to Global Cyber Resilience

Prepared in collaboration with Deloitte

June 2012

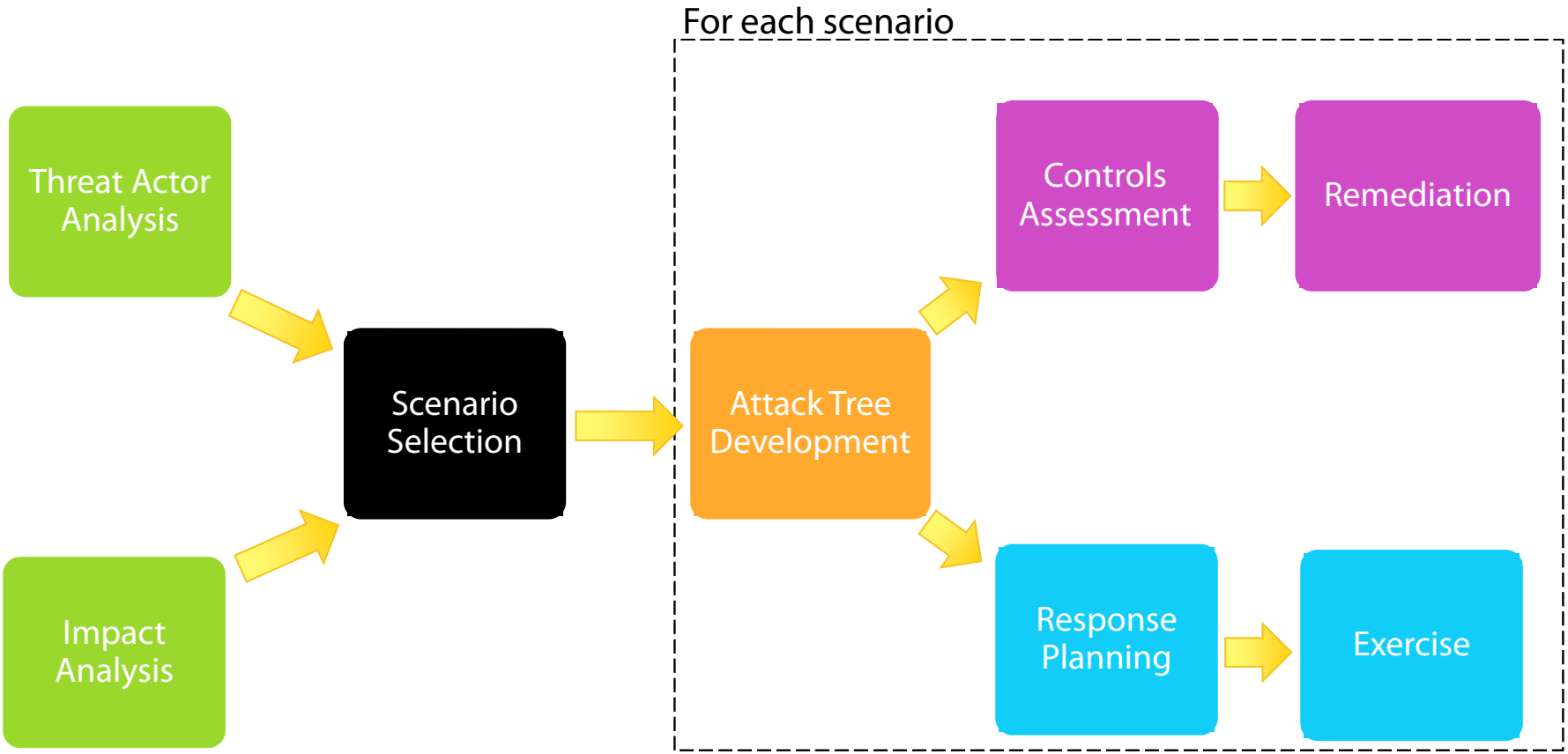


- Cyber Resilience
  - mean time to failure
  - mean time to recovery
- "Can only be achieved by adopting a holistic approach of the management of cyber risk"
- "While failures are unavoidable, cyber resilience prevents systems from completely collapsing"

http://www3.weforum.org/docs/WEF_IT_PathwaysToGlobalCyberResilience_Report_2012.pdf

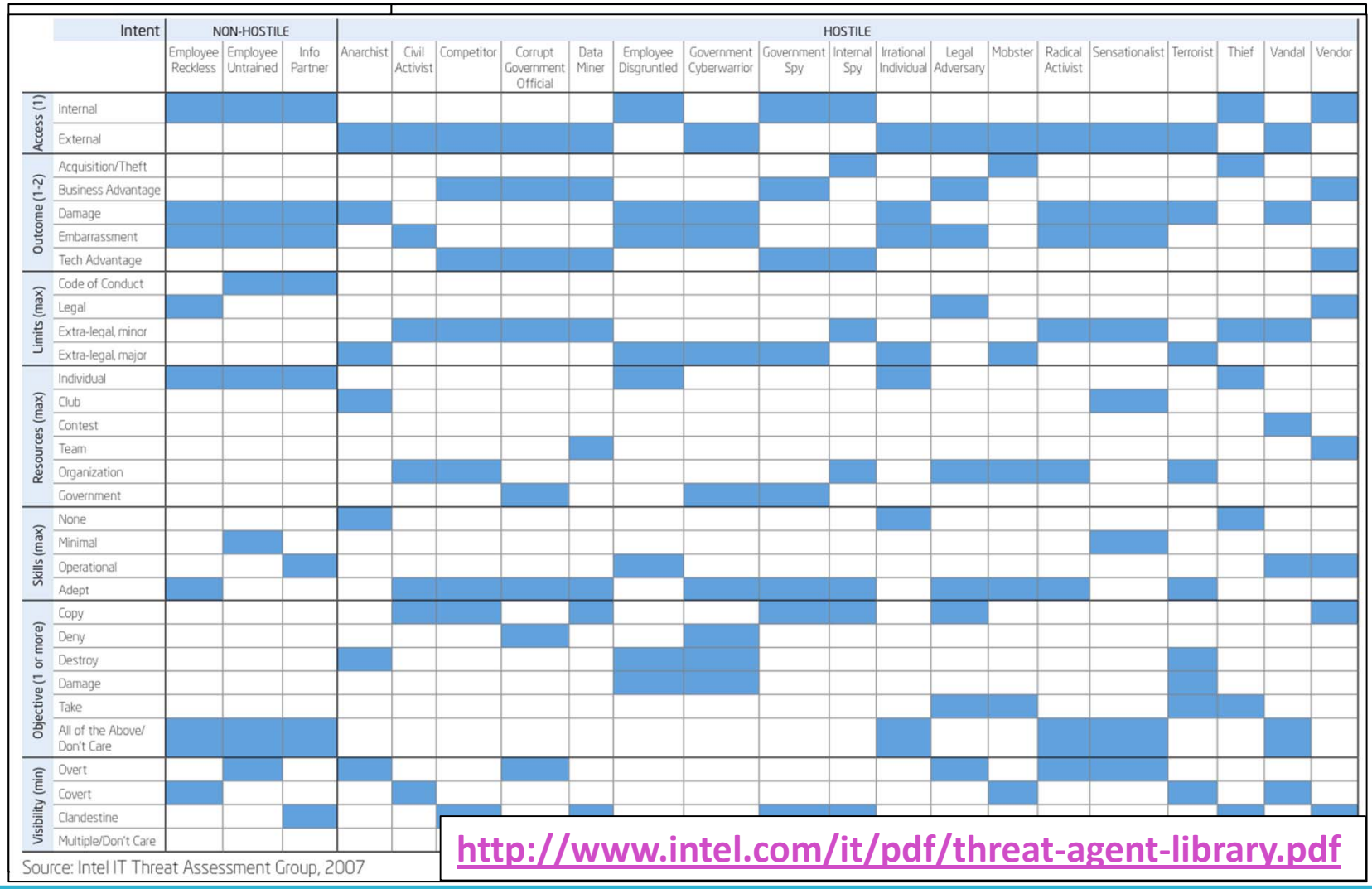
HOW?

Threat Actor Analysis



Aim: Identify actors who pose a significant threat to the organisation

Threat Agent Library – Intel



	Intent	NON-HOSTILE			HOSTILE																
		Employee Reckless	Employee Untrained	Info Partner	Anarchist	Civil Activist	Competitor	Corrupt Government Official	Data Miner	Employee Disgruntled	Government Cyberwarrior	Government Spy	Internal Spy	Irrational Individual	Legal Adversary	Mobster	Radical Activist	Sensationalist	Terrorist	Thief	Vandal	Vendor
Access (1)	Internal	■	■	■						■		■	■							■		■
	External				■	■	■	■	■		■			■	■	■	■	■	■		■	
Outcome (1-2)	Acquisition/Theft												■			■				■		
	Business Advantage						■	■	■			■			■							■
	Damage	■	■	■	■					■	■			■			■	■	■		■	
	Embarrassment	■	■	■		■				■	■			■	■		■	■				
	Tech Advantage						■	■	■			■	■									■
Limits (max)	Code of Conduct		■	■																		
	Legal	■													■							■
	Extra-legal, minor					■	■	■	■				■				■	■		■	■	
	Extra-legal, major				■					■	■	■		■		■			■			
Resources (max)	Individual	■	■	■						■				■						■		
	Club				■													■				
	Contest																				■	
	Team								■													■
	Organization					■	■						■		■	■	■		■			
	Government							■			■	■										
Skills (max)	None				■									■						■		
	Minimal		■															■				
	Operational			■						■											■	■
	Adept	■				■	■	■	■		■	■	■		■	■	■		■			
Objective (1 or more)	Copy					■	■		■			■	■		■							■
	Deny							■			■											
	Destroy				■					■	■								■			
	Damage									■	■								■			
	Take														■	■			■	■		
	All of the Above/ Don't Care	■	■	■										■			■	■			■	
Visibility (min)	Overt		■		■			■							■		■	■				
	Covert	■				■										■			■		■	
	Clandestine			■			■		■			■	■							■		■
	Multiple/Don't Care																					

Source: Intel IT Threat Assessment Group, 2007

http://www.intel.com/it/pdf/threat-agent-library.pdf

Agent Attributes - Intel

WHO

- **Intent:** Non-hostile, Hostile
- **Access**: Internal, External
- **Skill Level**: None, Minimal, Operational, Adept
- **Resources**: Individual, Club, Contest, Team, Organisation, Government
- **Limits**: Code of conduct, Legal, Extra-legal (minor), Extra-legal (major)

HOW

- **Visibility**: Overt, Covert, Clandestine, Don't Care
- **Objective**: Copy, Destroy, Injure, Take, Don't Care
- **Outcome**: Acquisition / Theft, Business Advantage, Damage, Embarrassment, Technical Advantage

Agent Attributes - Intel

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- **Intent:** Non-hostile, **Hostile**
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HOW

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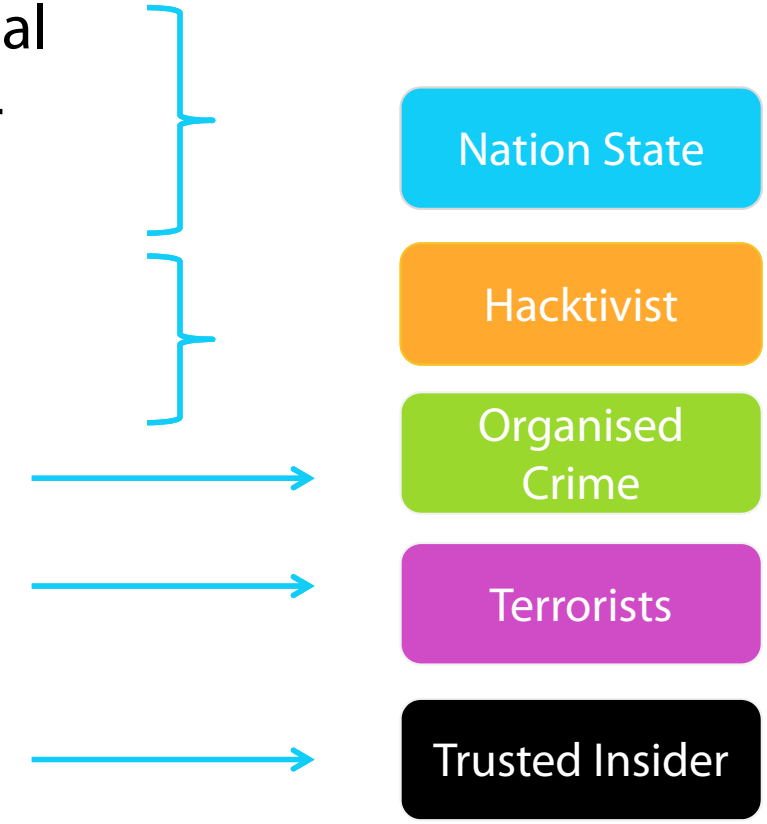
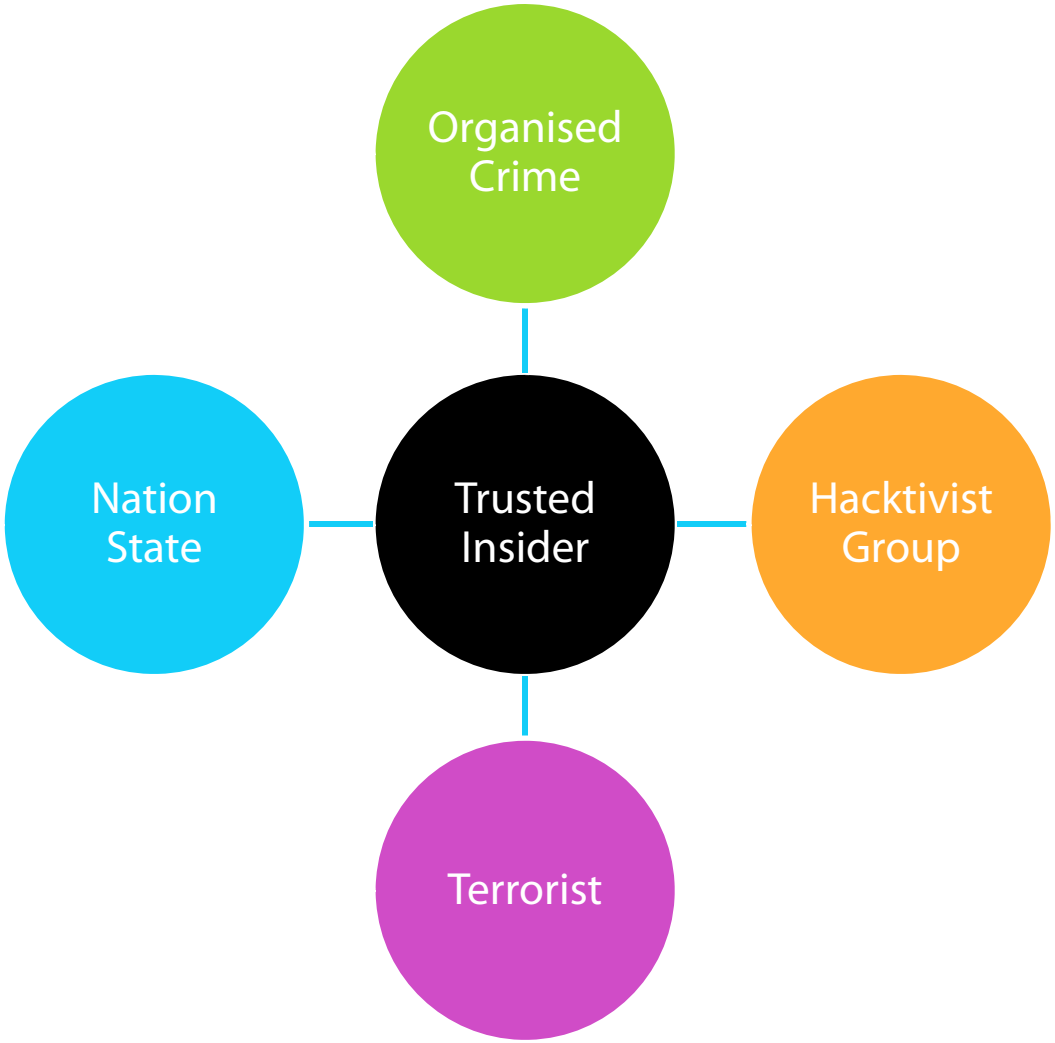
Consolidated Threat Actors

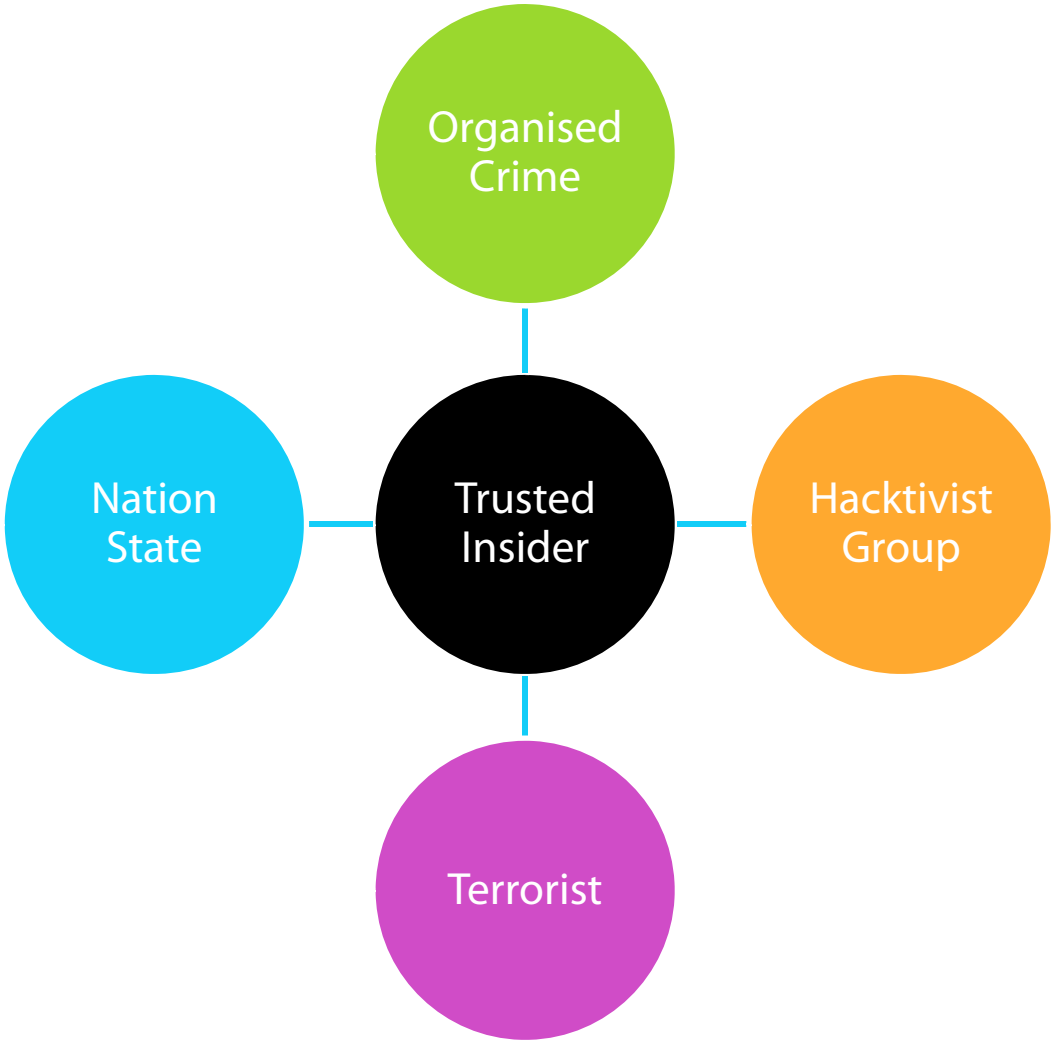
- Corrupt Government Official
- Government Cyber Warrior
- Government Spy
- Civil Activist
- Radical Activist
- Mobster
- Terrorist
- ~~Competitor~~
- Internal Spy



Threat Actor Analysis



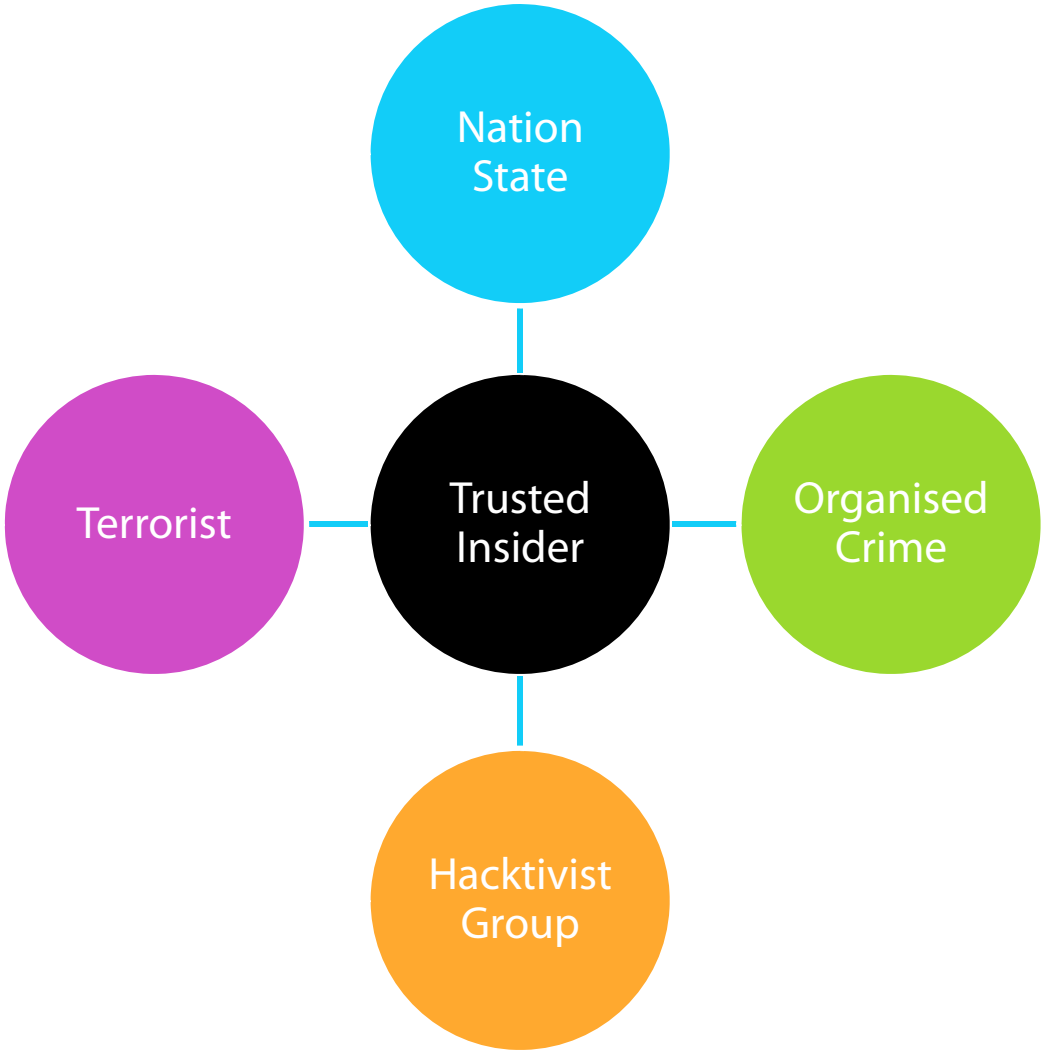
Threat Actor Analysis



Hacktivist Group

Intent: Hostile
Access: External
Skill Level: Adept
Resources: Organisation
Limits: Extra-legal (major)
Visibility: Overt
Objective: Copy, Injure
Outcome: Damage, Embarrassment

Threat Actor Analysis



Organised Crime

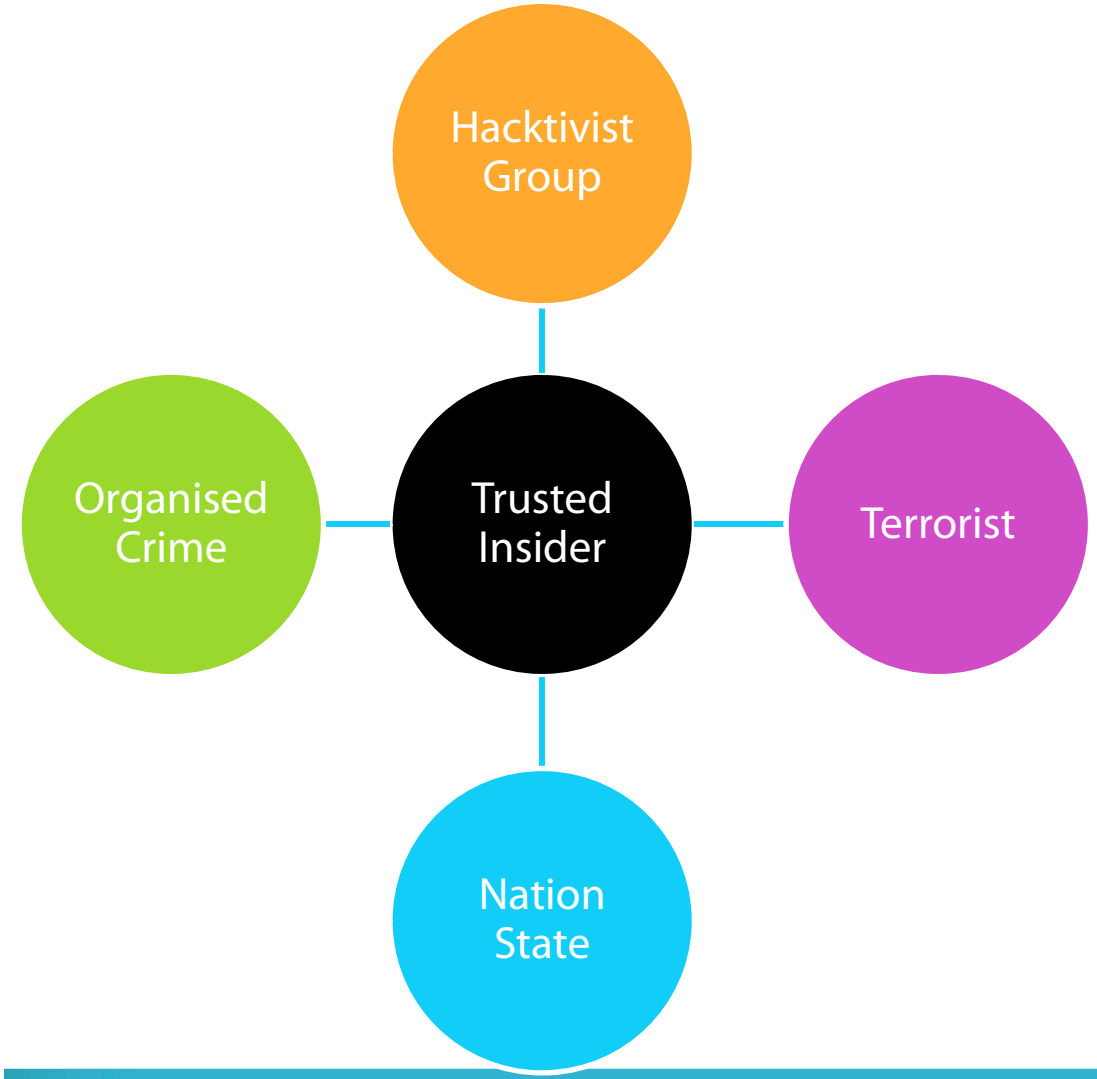
Intent: Hostile
Access: External
Skill Level: Adept
Resources: Organisation
Limits: Extra-legal (major)
Visibility: Covert
Objective: Take
Outcome: Acquisition / Theft

Threat Actor Analysis

Nation State

Intent: Hostile
Access: External
Skill Level: Adept
Resources: Government
Limits: Extra-legal (major)
Visibility: Clandestine
Objective: Copy
Outcome: Technical Advantage

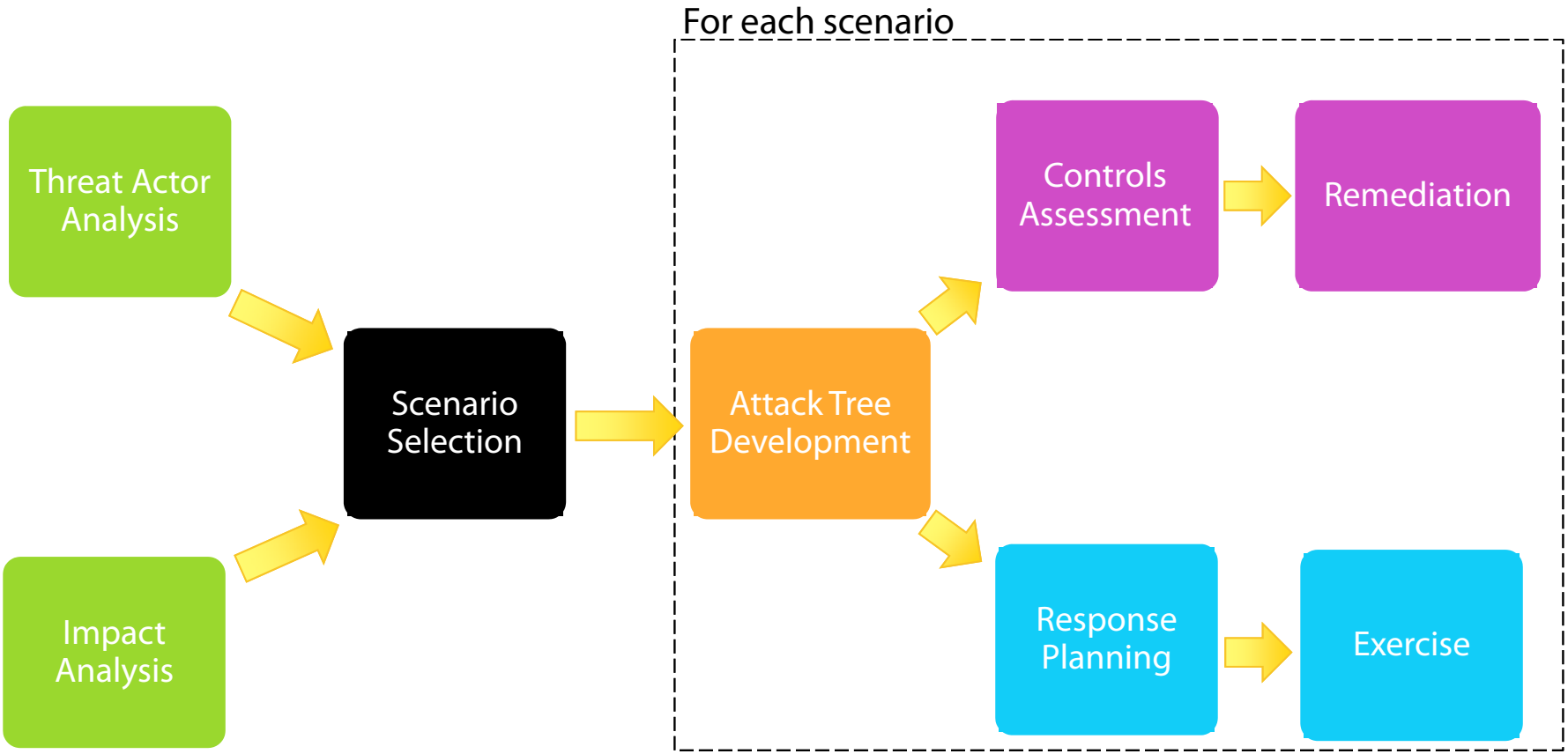
Threat Actor Analysis



Terrorist

Intent: Hostile
Access: External
Skill Level: Adept
Resources: Organisation
Limits: Extra-legal (major)
Visibility: Covert
Objective: Destroy
Outcome: Damage

Impact Analysis



Aim: Determine what your organisation really cares about protecting

Business Impact Matrix

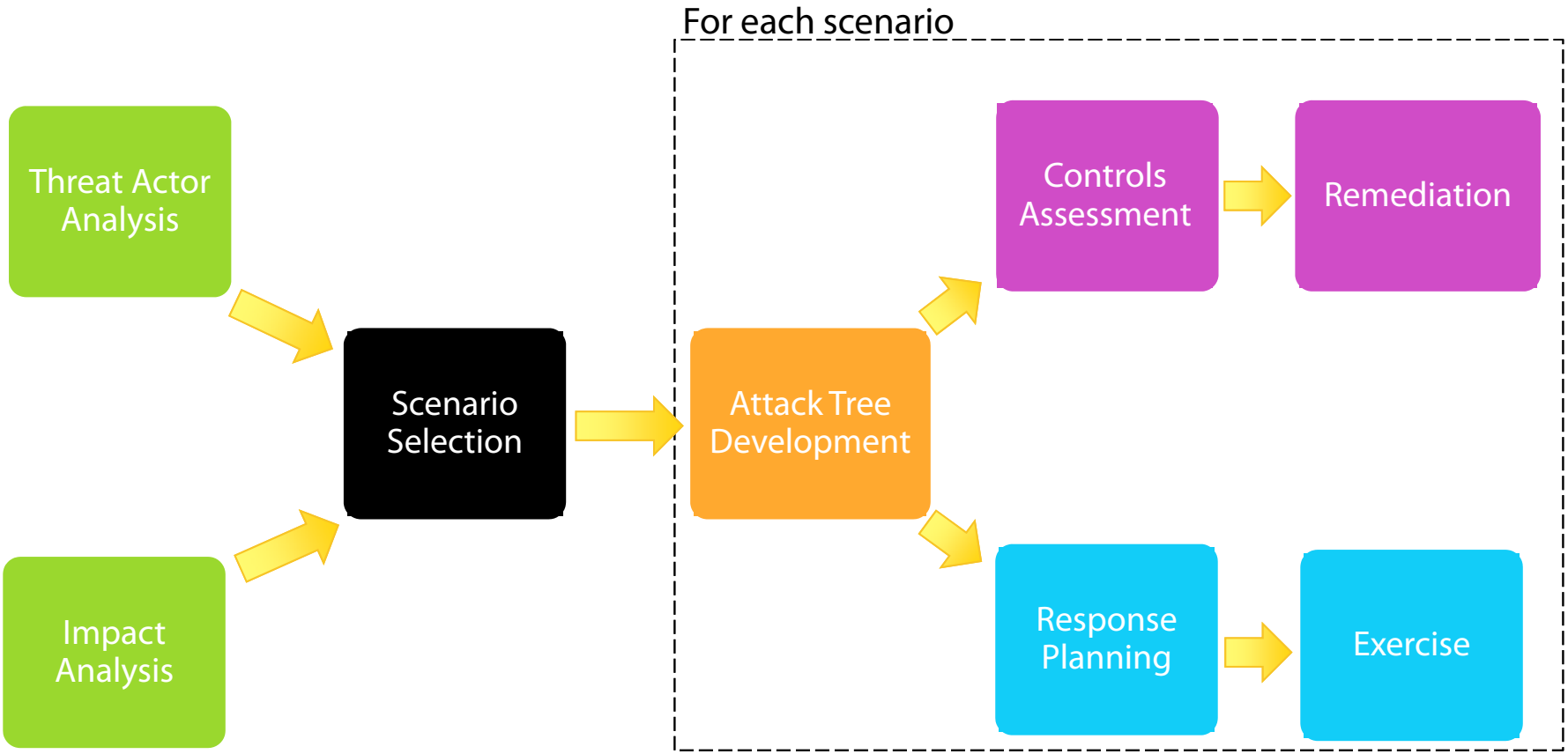
Impact

	Financial	Customer Service & Operations	Reputation / Brand	Legal / Regulatory Compliance	People	Customers
5	>$500m	Significant loss of customers due to extensive interruption to service capability	Substantial damage to brands resulting from extensive negative national publicity	Loss of license, loss of public listing or substantial penalties on Directors	Death or severe injury to employees	Serious financial impact to all customers
4	$200m-$500m	….	….	….	….	….
3	$50m-$200m	…	…	…	…	…
2	<$50m	…	….	…	…	…
1	<$50m	…	…	…	…	…

Values at Risk

- Health and safety of employees
- Customer funds and stocks
- Customer data (private information)
- Customer data (intellectual property)
- Corporate data (sensitive information)
- Corporate data (intellectual property)
- Availability of banking channels (Internet facing)
- Availability of banking channels (back end)

Scenario Selection

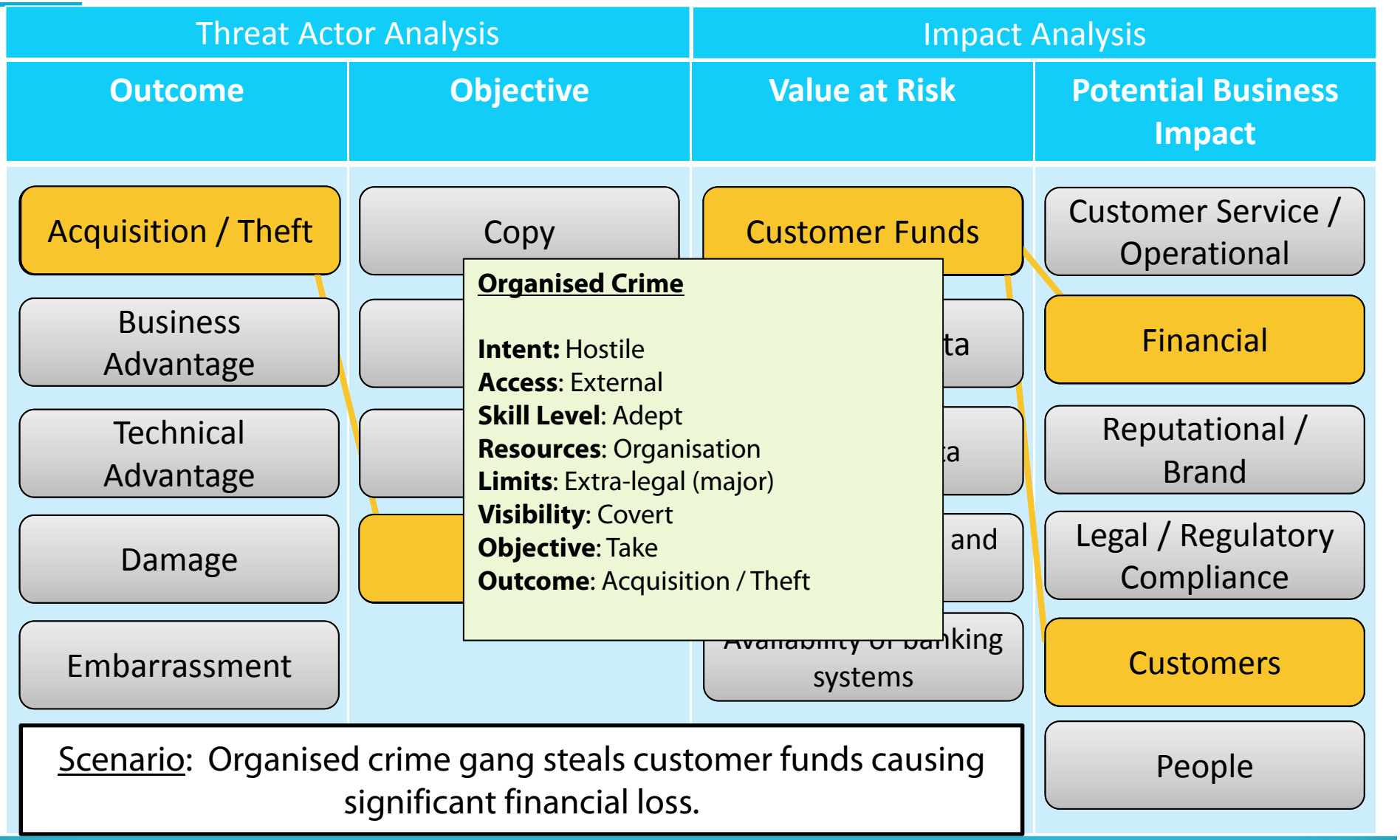


Aim: Select scenarios that could have a catastrophic impact on the organisation

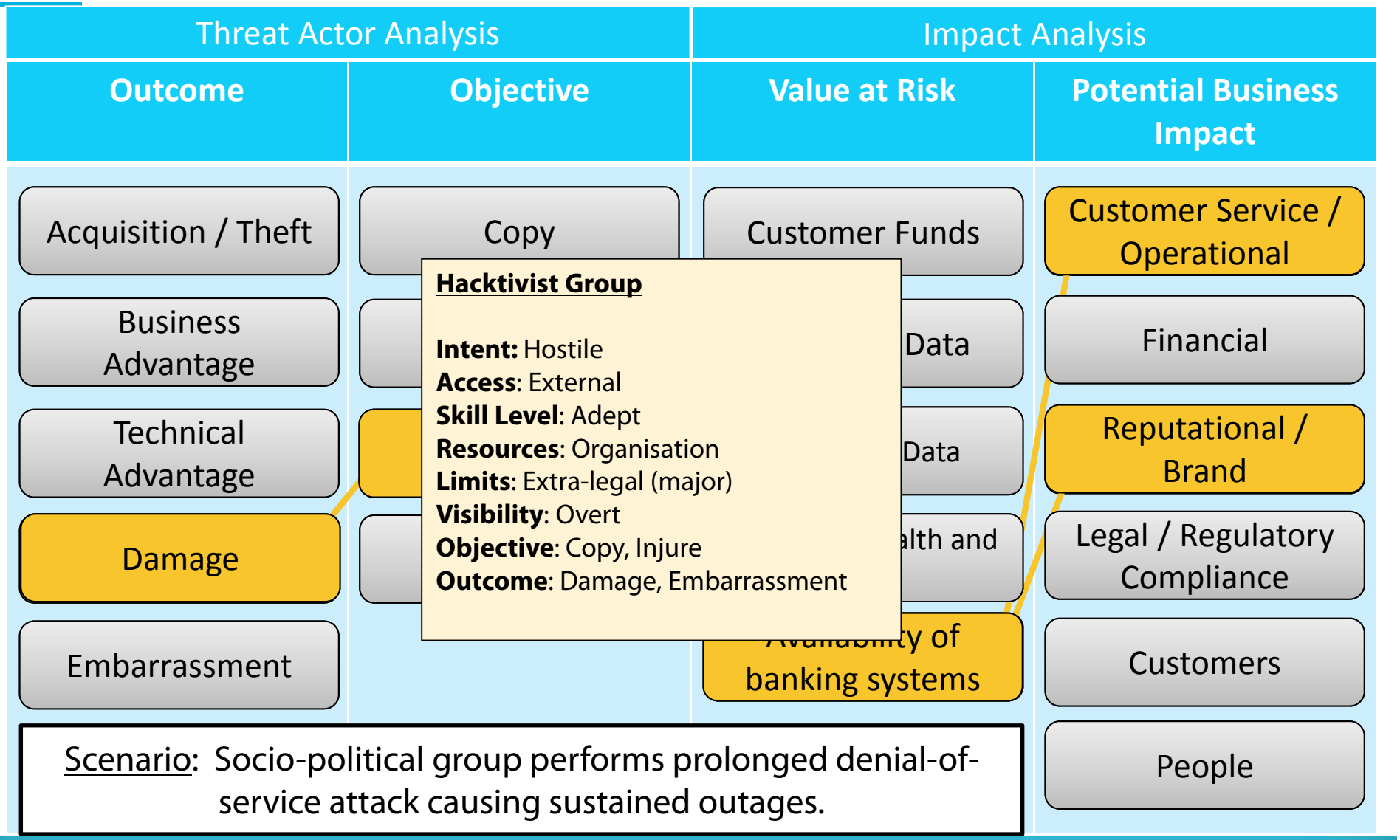
Scenario Selection

Threat Actor Analysis		Impact Analysis	
Outcome	**Objective**	**Value at Risk**	**Potential Business Impact**
Acquisition / Theft	Copy	Customer Funds	Customer Service / Operational
Business Advantage	Destroy	Customer Data	Financial
Technical Advantage	Injure	Corporate Data	Reputational / Brand
Damage	Take	Employee health and safety	Legal / Regulatory Compliance
Embarrassment		Availability of banking systems	Customers
			People

Scenario Selection



Scenario Selection



Is it "Extreme"?

Impact

	Financial	Customer Service & Operations	Reputation / Brand	Legal / Regulatory Compliance	People	Customers
5	>$500m	Significant loss of customers due to extensive interruption to service capability	Substantial damage to brands resulting from extensive negative national publicity	Loss of license, loss of public listing or substantial penalties on Directors	Death or severe injury to employees	Serious financial impact to all customers
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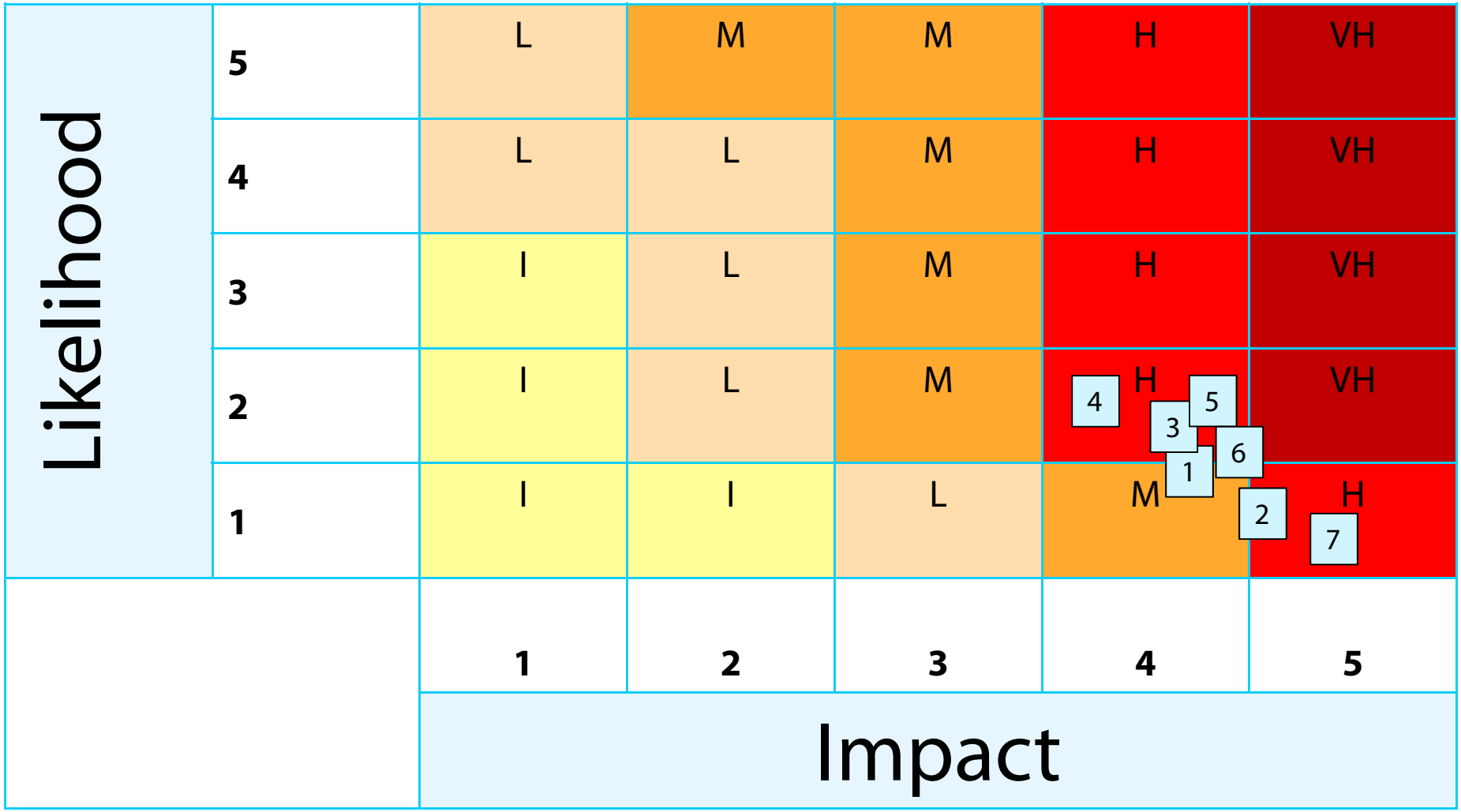
2	<$50m	…	….	…	…	…
1	<$50m	…	…	…	…	…

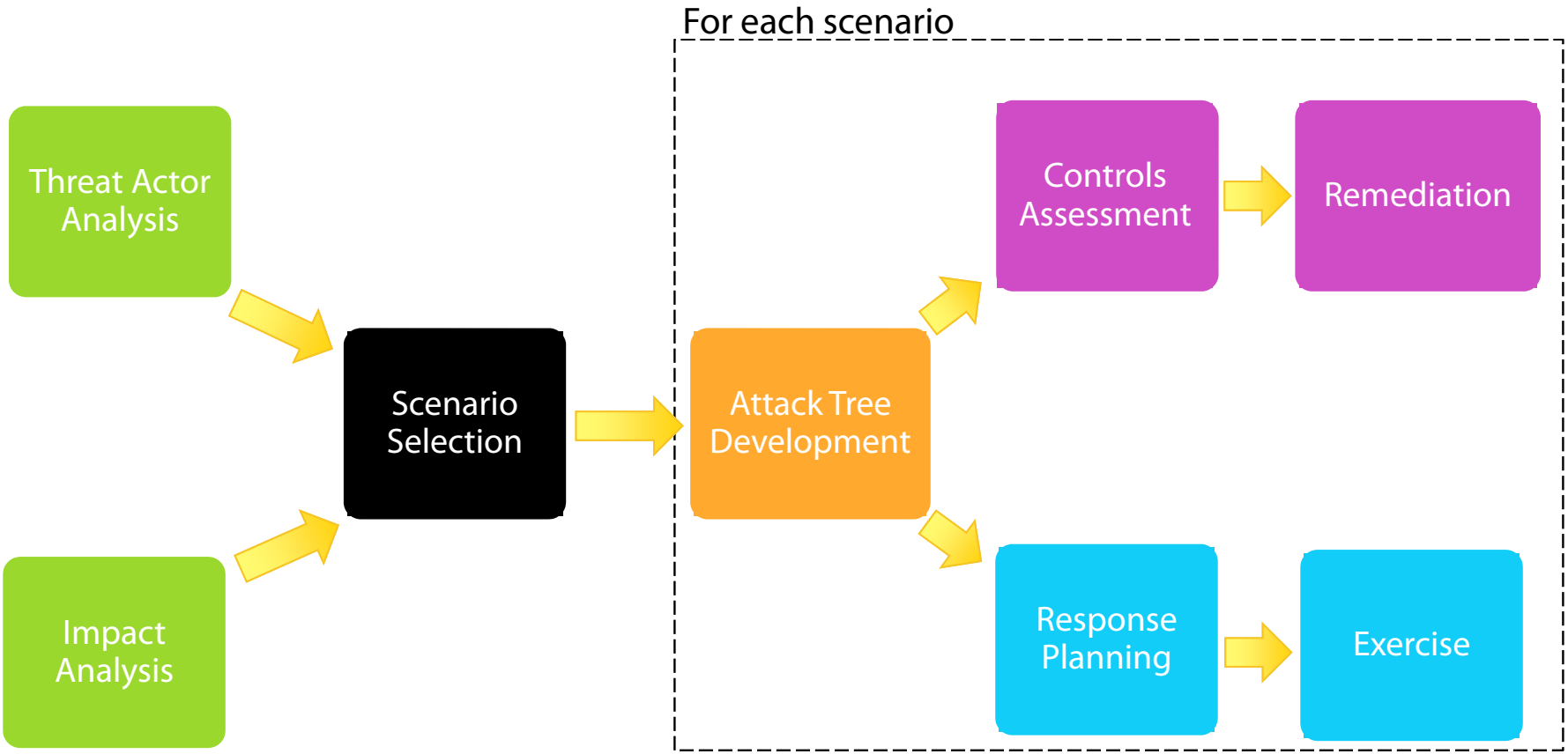
Scenarios on Risk Matrix



Scenario Selection

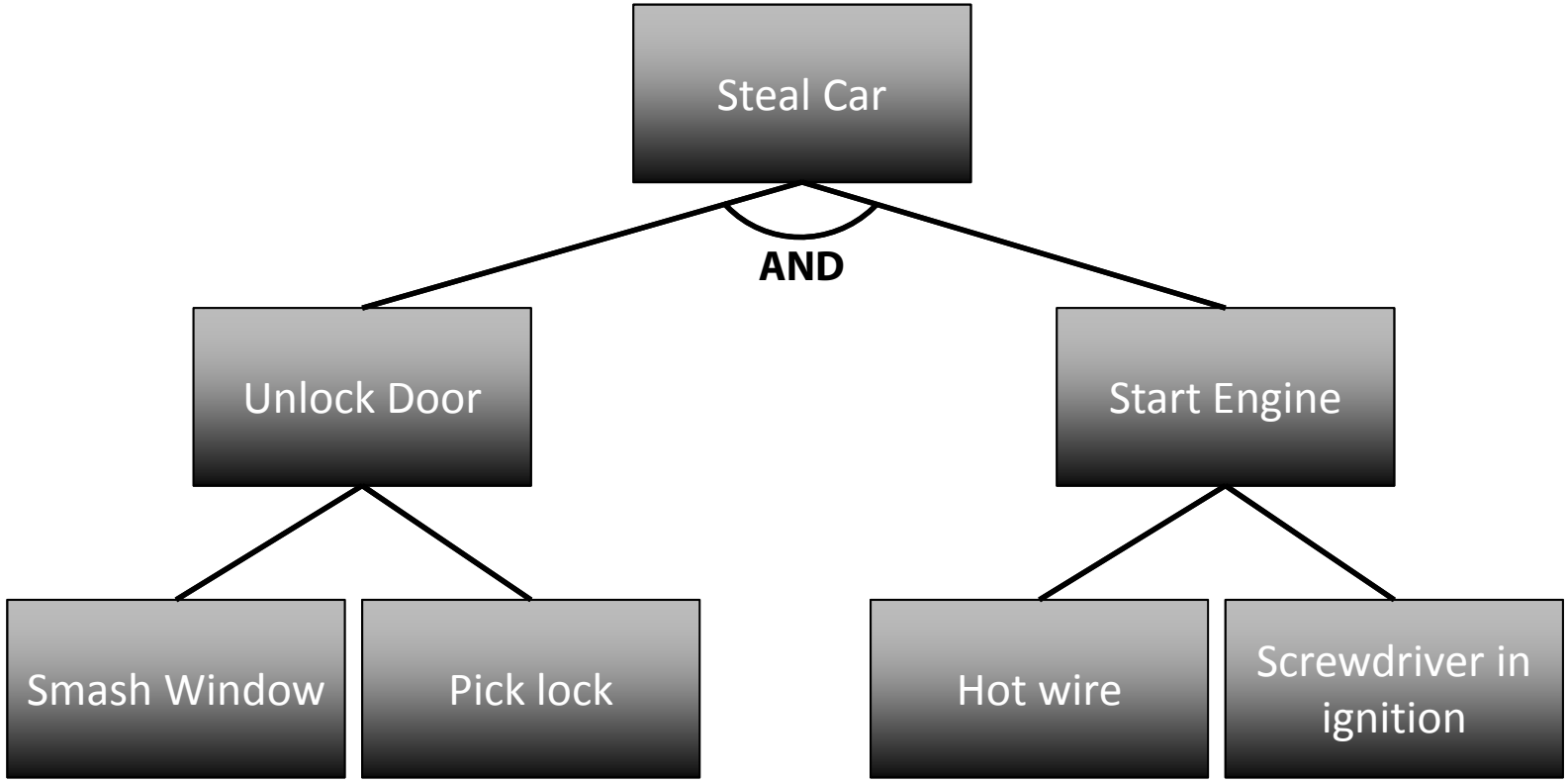
	Organised Crime	Hacktivist Group	Nation State	Terrorist
Financial Gain	1 Large scale targeting of bank customers using malware to steal funds.			
	2 High value fraud conducted against backend payment system.			
Theft / Exposure		4 Exfiltrate and disclose large sets of corporate data to embarrass or discredit the bank.	6 Exfiltrate corporate intellectual property for strategic, commercial or political gain.	
	5 Compromise bank IT systems and exfiltrate large sets of customer data.			
Sabotage / Operations Impact		3 Targeted, prolonged DDoS against multiple Internet facing systems.		7 Destructive cyber-attack against multiple bank data centres.

Attack Tree Development

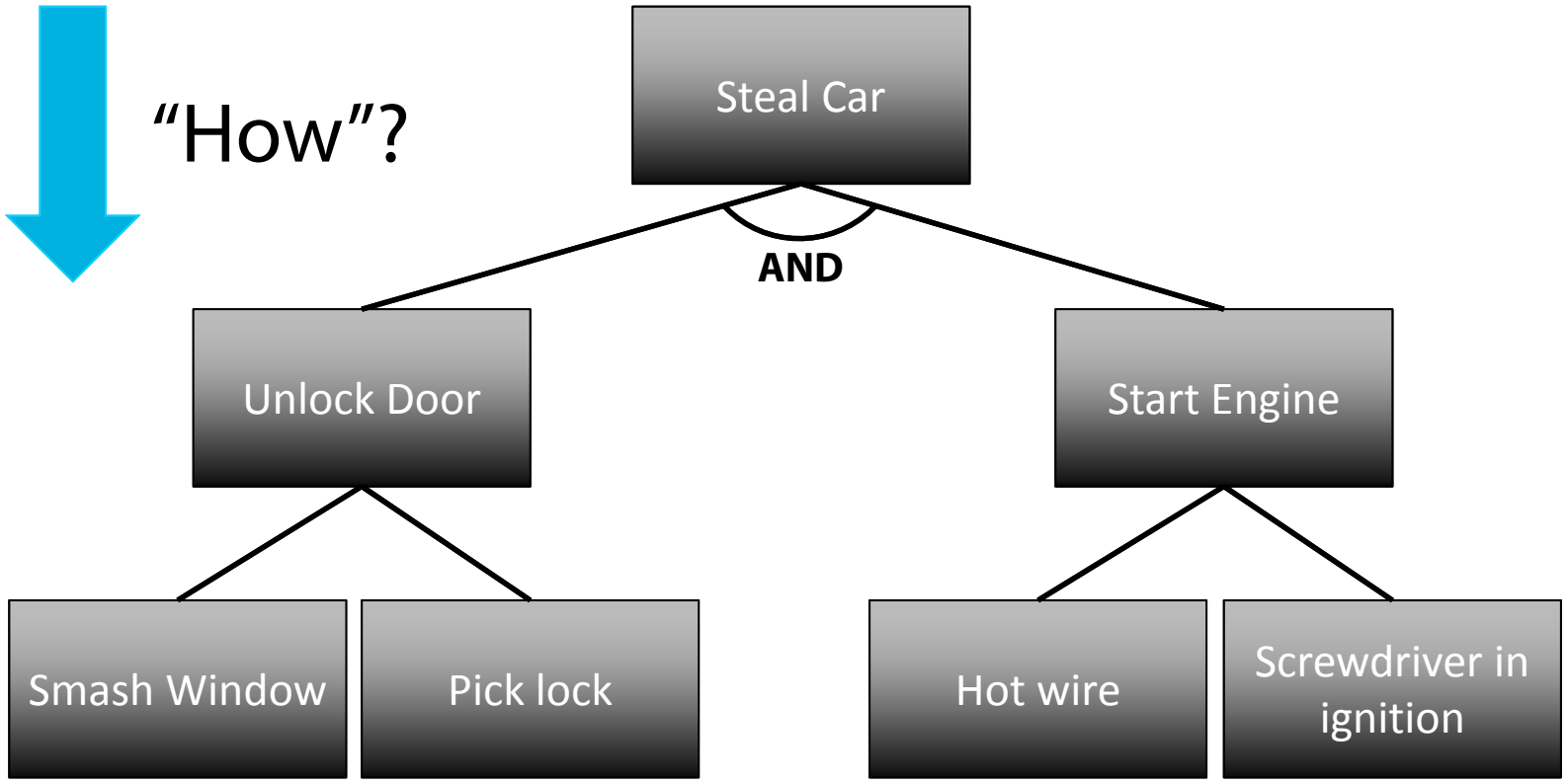


Aim: Develop detailed attack trees for each extreme scenario

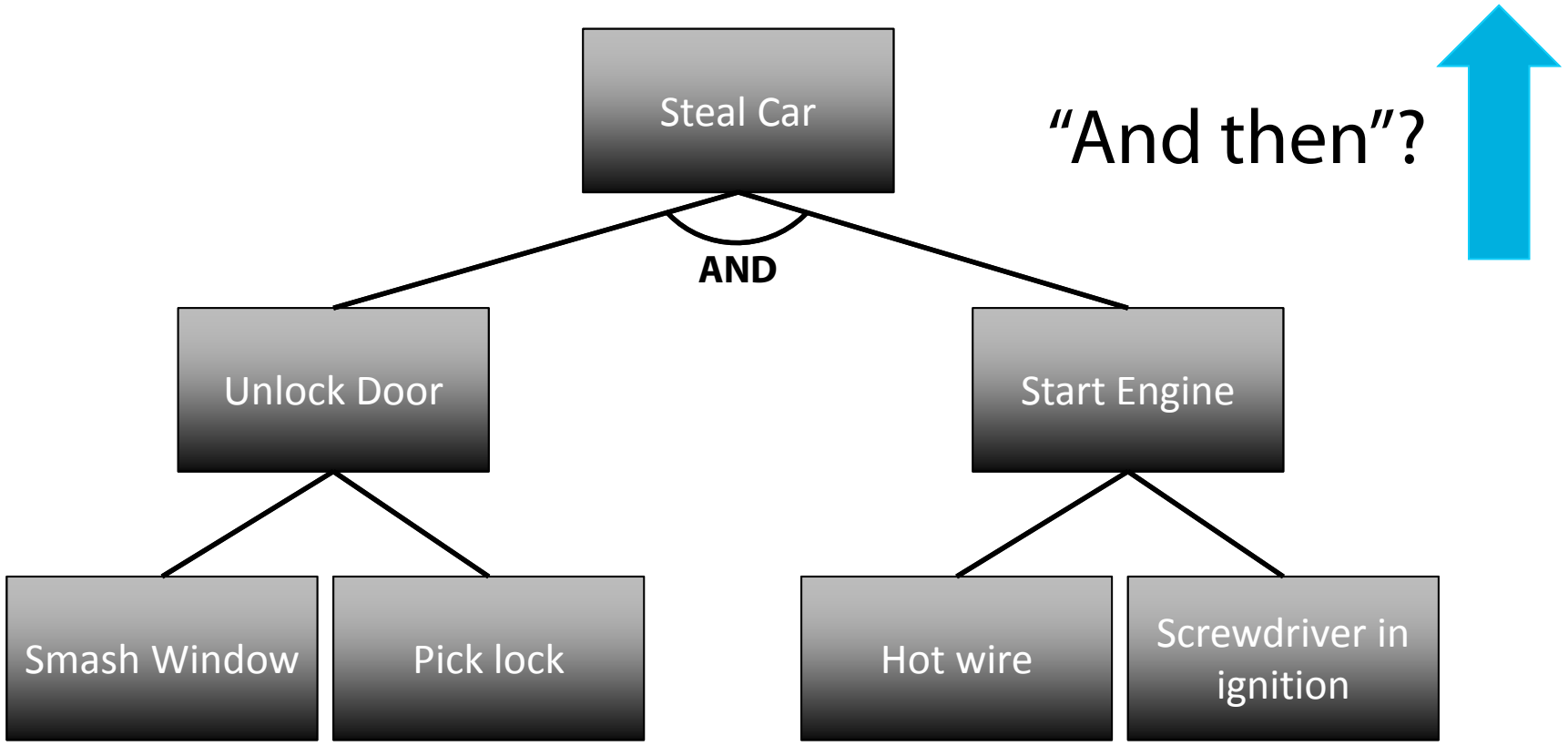
Attack Tree Analysis



Attack Tree Analysis



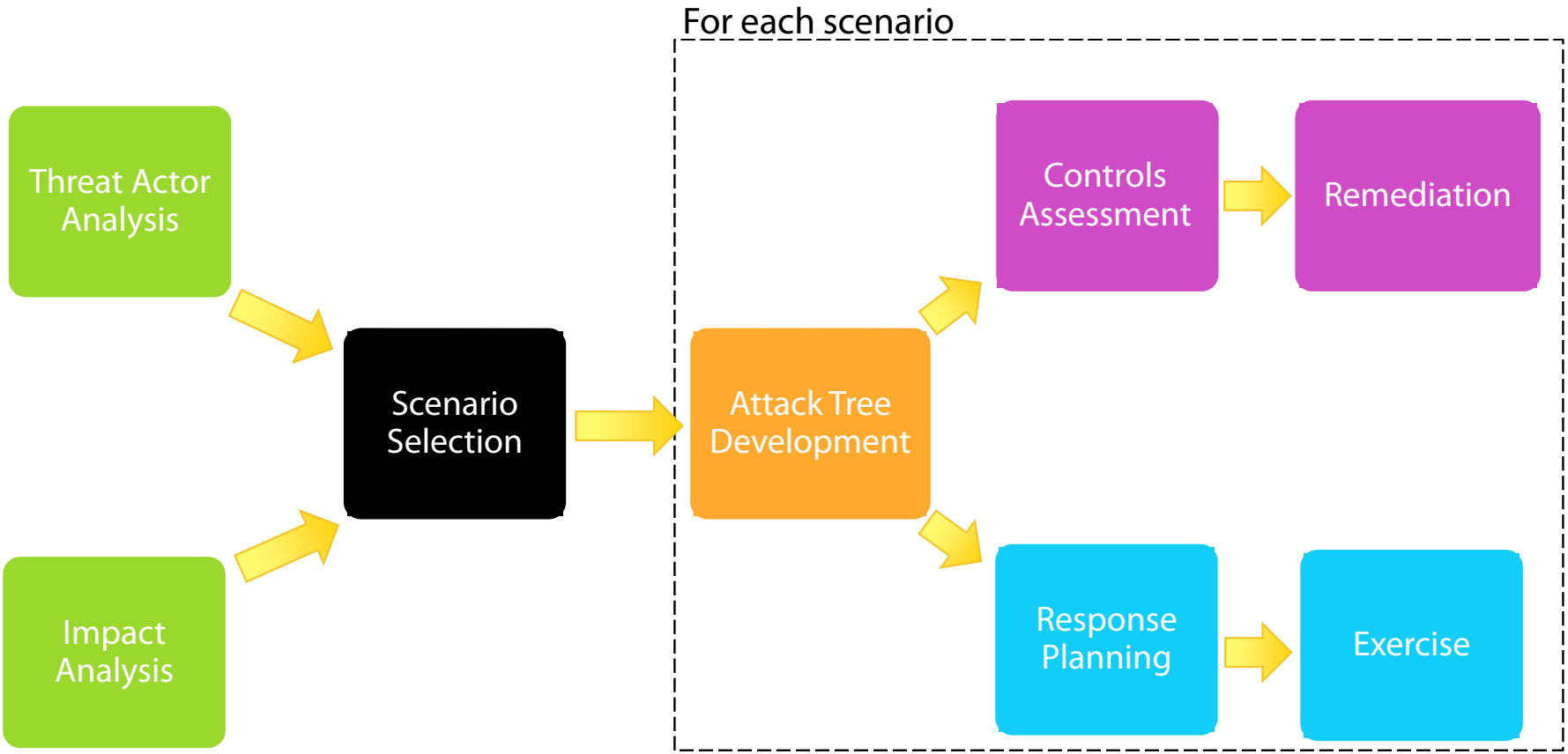
Attack Tree Analysis



Attack Tree Demonstration

Demonstration of attack trees (Prezi)

Controls Assessment



Aim: Map controls to attack trees and assess effectiveness

Industry Standard Control Sets

- Provides a consistent set of controls for assessment and comparison

- May not be relevant to a particular scenario
- May not be pitched at the right level to be useful

- Options available:
  - DSD Top 35 Mitigation Strategies
    - http://www.dsd.gov.au/infosec/top35mitigationstrategies.htm
  - NIST Special Publication 800-53
    - http://web.nvd.nist.gov/view/800-53/home
  - SANS 20 Critical Controls for Effective Cyber Defense
    - http://www.sans.org/critical-security-controls/

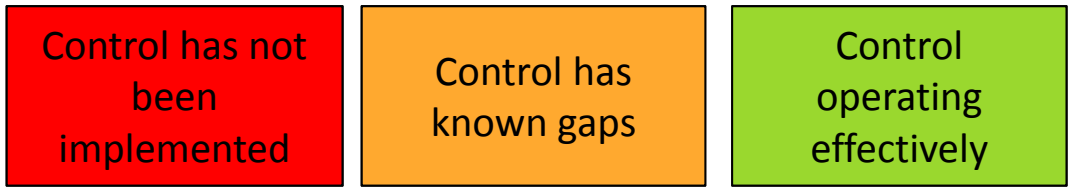
Hybrid Control Set

Application Whitelisting	Data Encryption	Physical Security Controls
Third Party Governance	Data Loss Prevention	Penetration Testing
Layer 7 DDoS Prevention	Network Segmentation	MiTB Detection

Controls Assessment

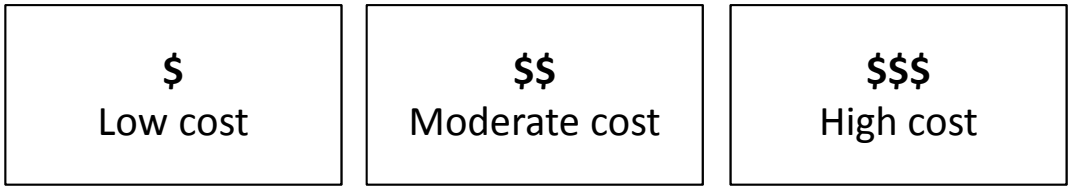
- Type of control:

- Status of control:

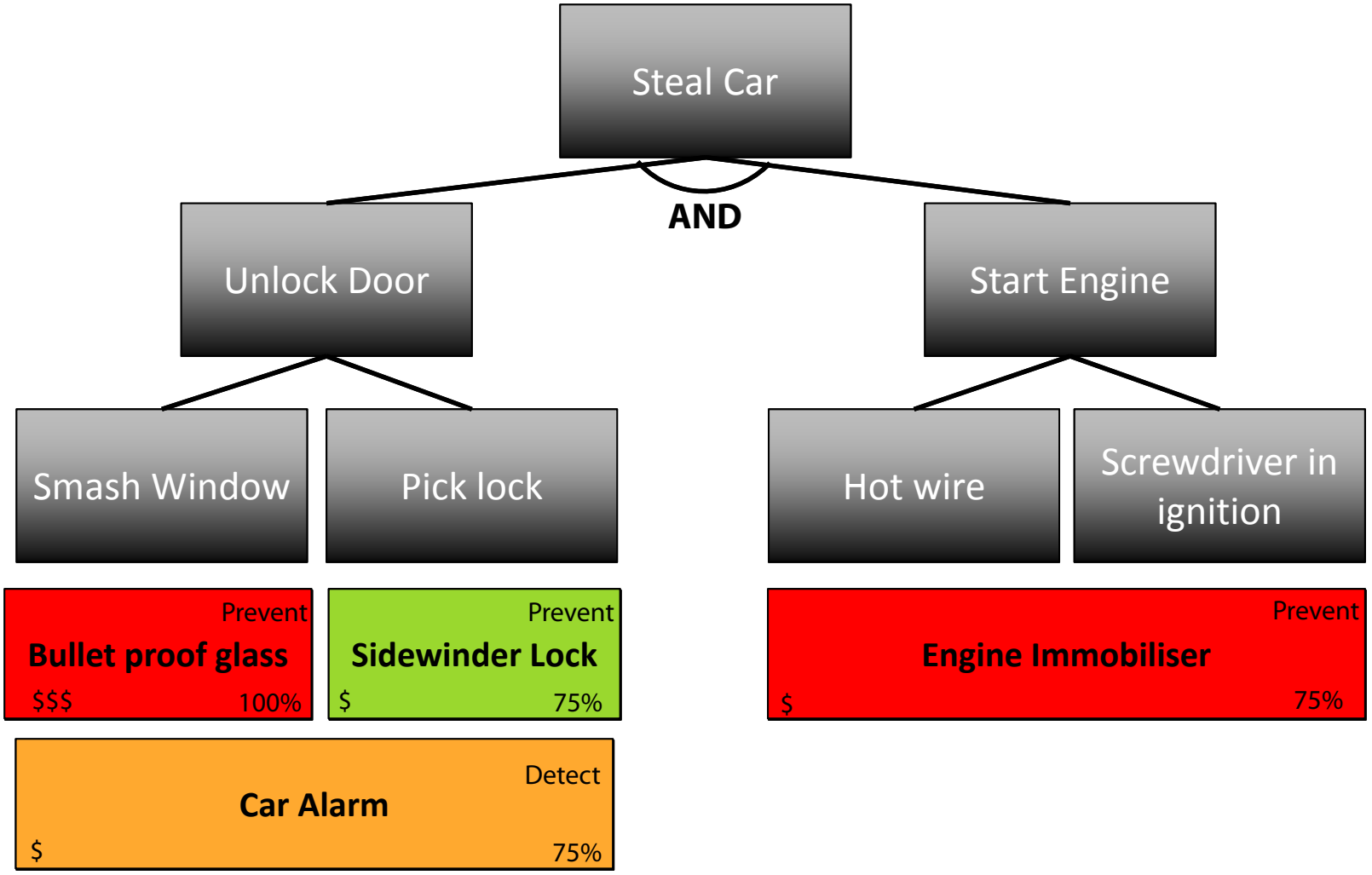


- Potential to mitigate:

- Cost of control:



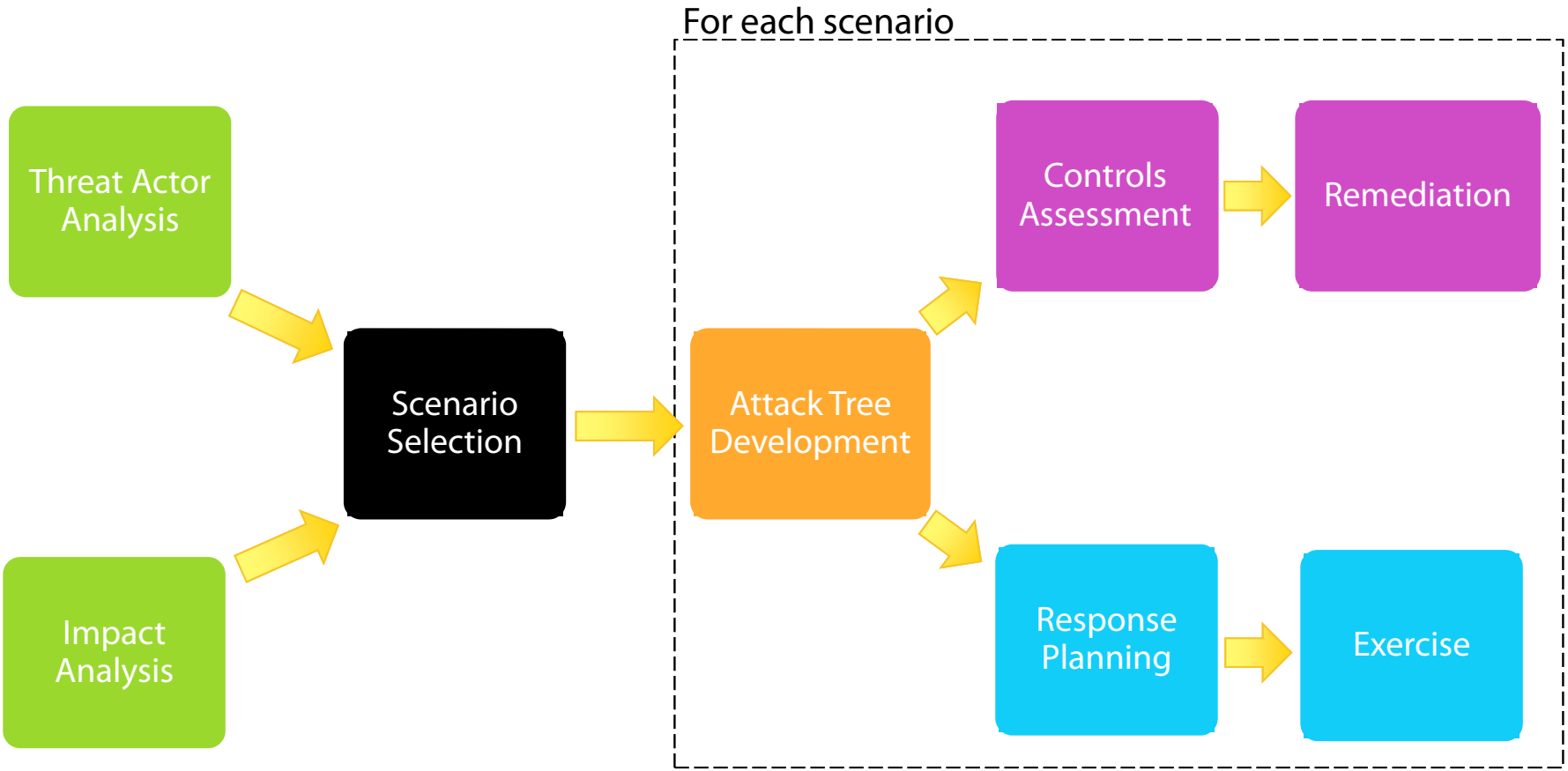
Control Mapping



Attack Tree Demonstration

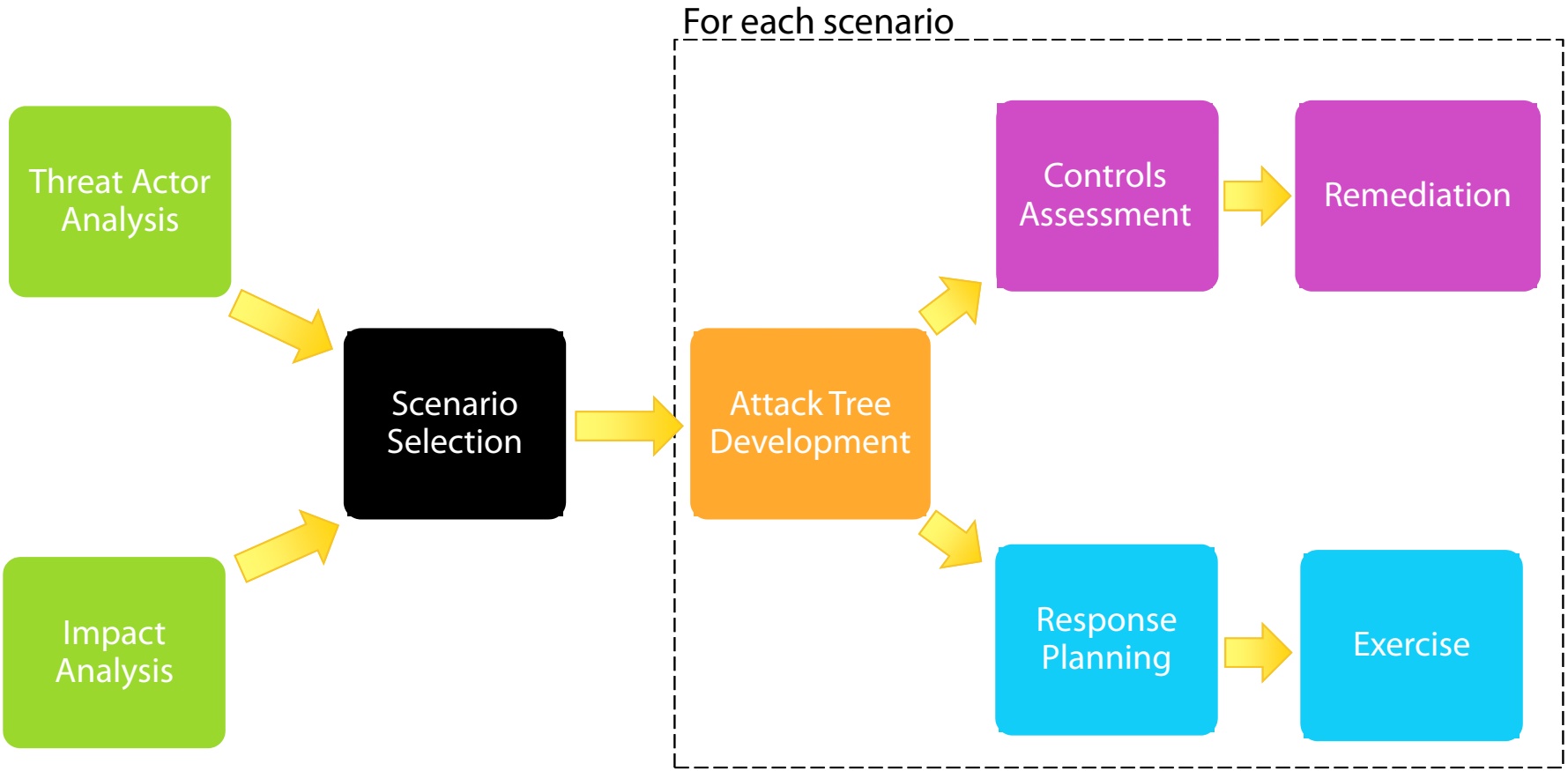
Demonstration of attack trees (Prezi)

Remediation



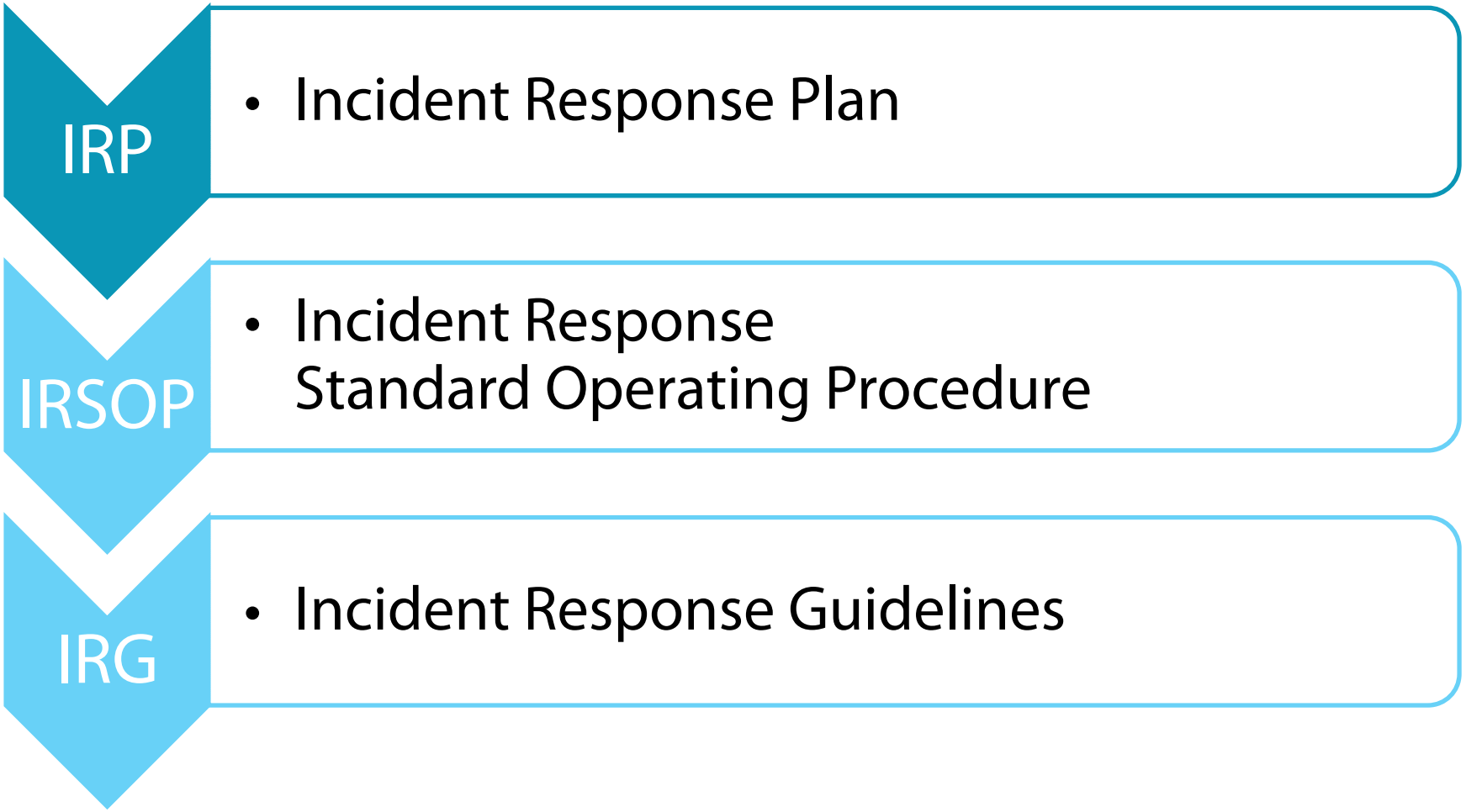
Aim: Use controls assessment to plan remediation projects which address control gaps

Response Planning



Aim: Create or enhance existing response plans to cater for extreme scenarios

Incident Response Framework



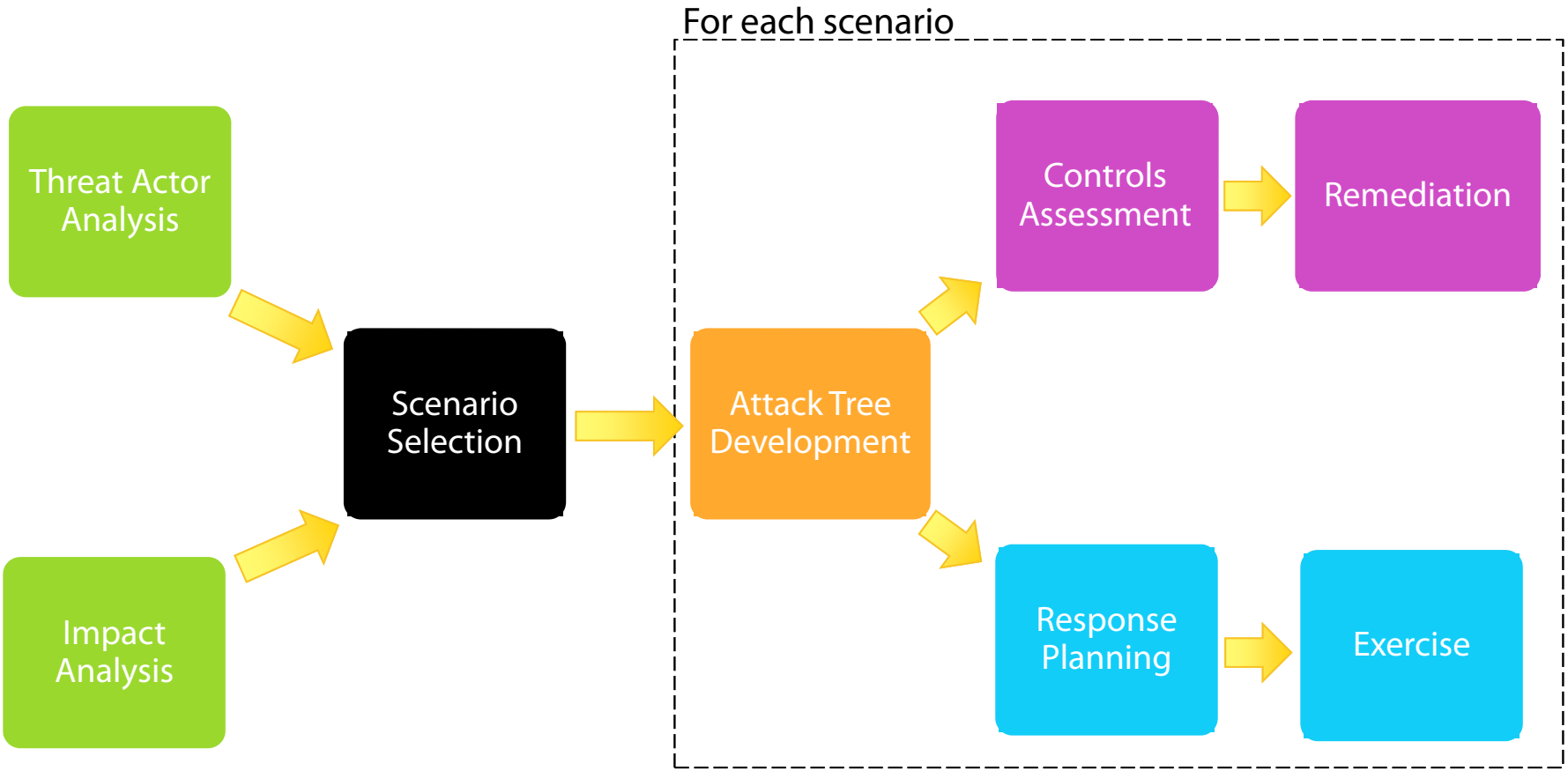
Incident Response Standard Operating Procedures

Denial of Service	Compromised Information	Compromised Asset
Unlawful Activity	Probing	Malware

IR Considerations

- Will your incident response plans hold up to extreme scenarios?
- What outside resources will you lean on for assistance in an extreme scenario?
- Have you documented and shared all your contacts into government, law enforcement, service providers?
- Have you discussed & planned your response with external stakeholders? Do you know what you will expect from each other if such a scenario occurs?
- Have you practiced your incident response?

Exercise

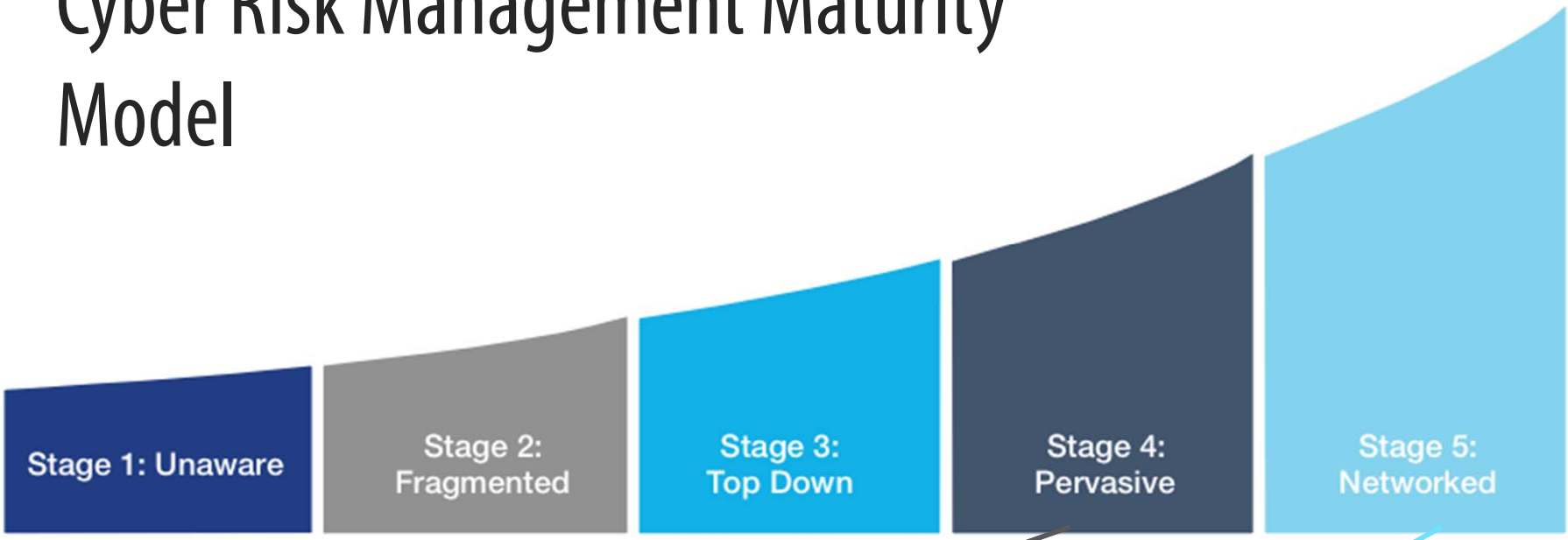


Aim: Test control strength, response plan and overall preparedness

Example: "BYO Botnet"

- HTTP "large resource" request
- HTTPS "large resource" request
- HTTPS "slow" POST attack
- HTTPS search query attack
- SSL Exhaustion
- DNS Query attack
- TCP SYN flood
- IP Fragmentation Attack
- ICMP flood

Cyber Risk Management Maturity Model

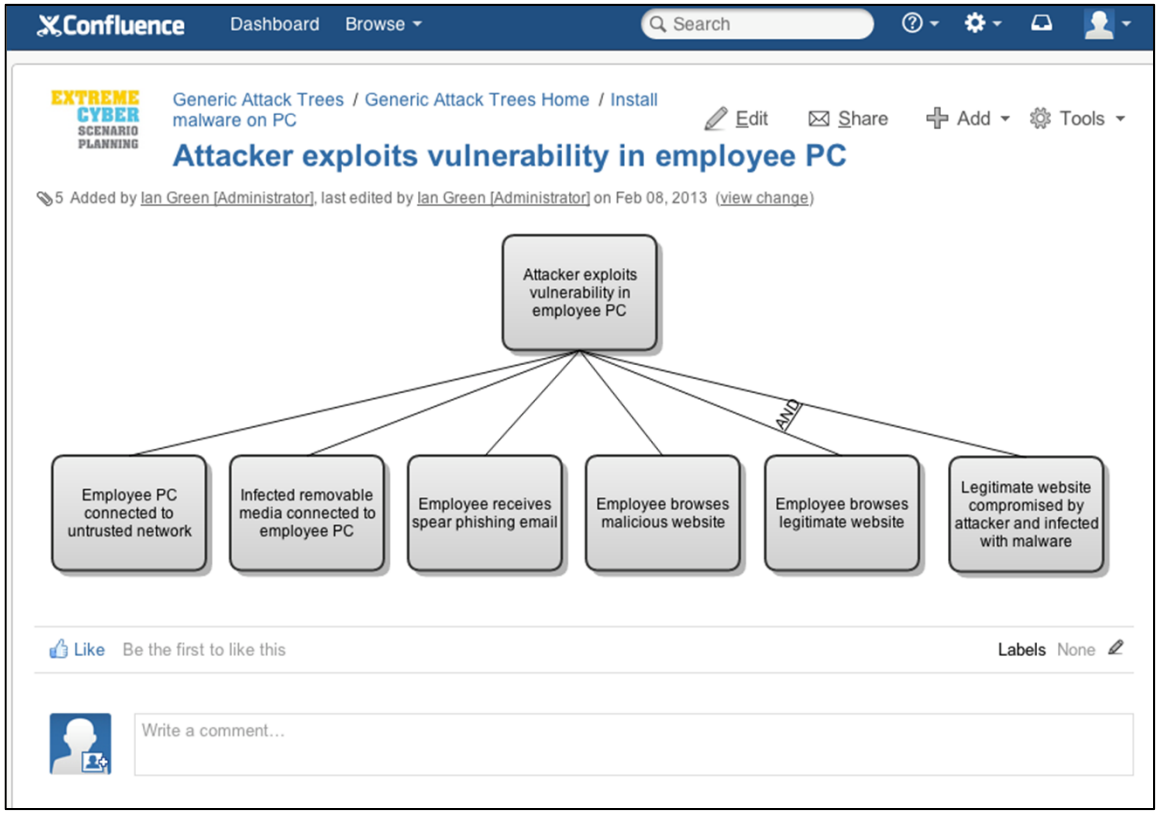


The organisation's leadership takes ownership of cyber risk management… they understand the organisation's vulnerabilities and controls.

The organisation is highly connected to their peers and partners, sharing information and jointly mitigating cyber risk

Source: World Economic Forum
http://www3.weforum.org/docs/WEF_IT_PathwaysToGlobalCyberResilience_Report_2012.pdf

extremecyber.net



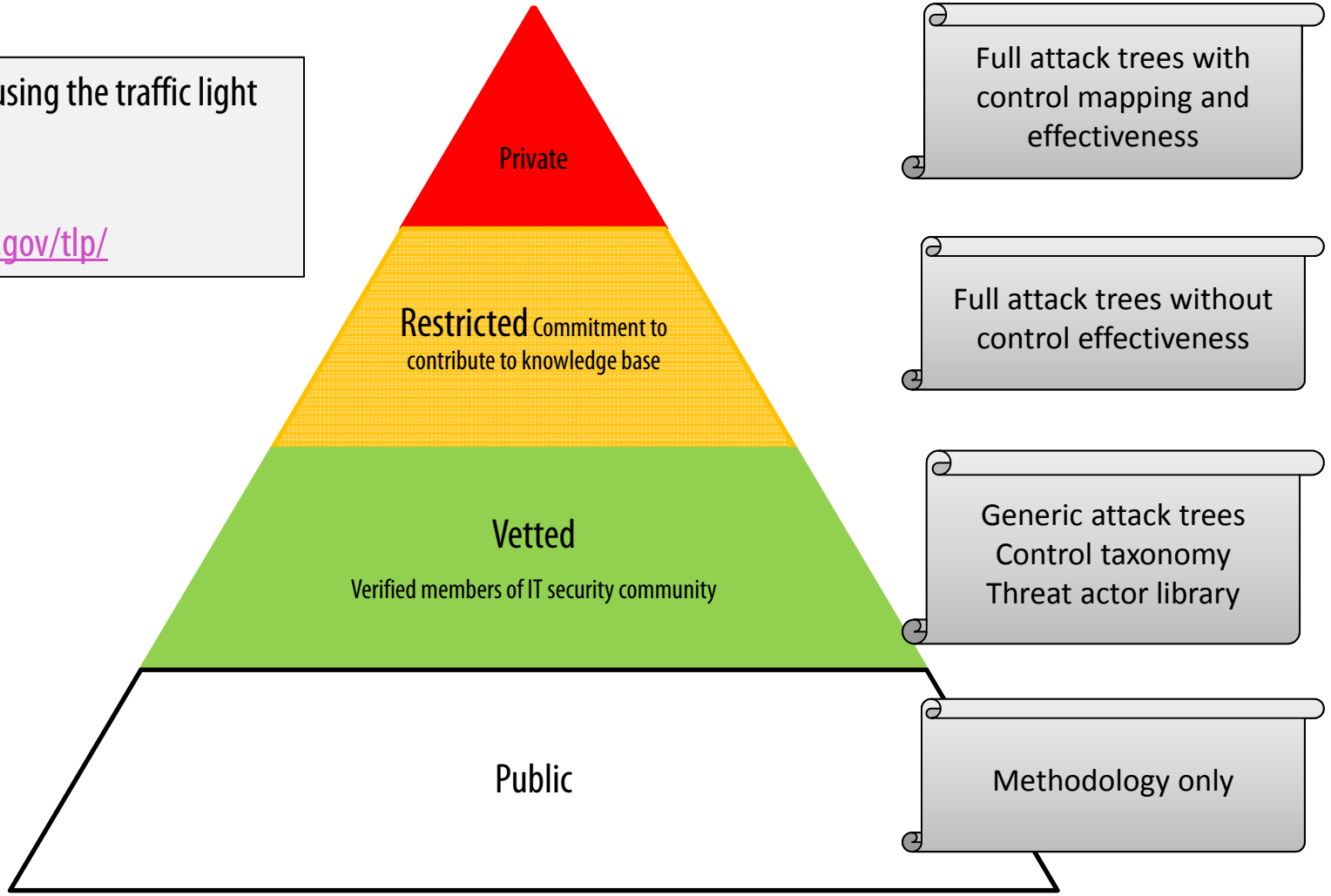
- Traffic light protocol
- Methodology
- Control taxonomy
- Threat actor library
- Generic attack trees
- Full scenario analysis

- Join "Extreme Cyber Scenario Planning" on LinkedIn

extremecyber.net

Information shared using the traffic light protocol:

http://www.us-cert.gov/tlp/



Questions?

- LinkedIn Group "Extreme Cyber Scenario Planning"
- pragmaticsec
- cybercrime@cba.com.au