Active Defense 2013

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Senior Director of Trust, EMC

Agenda

- Introduction / Background
- Theory
- Application

Active Defense

INTRODUCTION

Who Wrote This?

Davi Ottenheimer

Phil and History of International Intervention (Conflict Ethics)

@daviottenheimer

- 19 Years Information Security
- Barclays, ArcSight, Yahoo!
- MSc London School of Economics

David Willson

Defense/Conflict Law

@titaninfosec

- Licensed Attorney
- 20 years U.S. Army (cyberspace ops, defense and exploit; international, operational and criminal law)
- NSA legal advisor to CYBERCOM and Army Space Command

Active Defense

BACKGROUND

Critiques of Active Defense

1. Authority
   – Law-Free Zones
   – Disobedience leads to…Anarchy!
   – Capability leads to…Chaos!
2. Attribution, Proxies and Liability
   – Shared or Dual-Use
   – Letters of Marque
3. Definition
   – Necessity
   – Proportionality
   – Force (Logical Methods)

Threat Innovation

Innovation and Conflict Law

"…one relevant body of law – international humanitarian law, or the law of armed conflict – affirmatively **anticipates technological innovation**…"

– **Harold Hongju Koh**

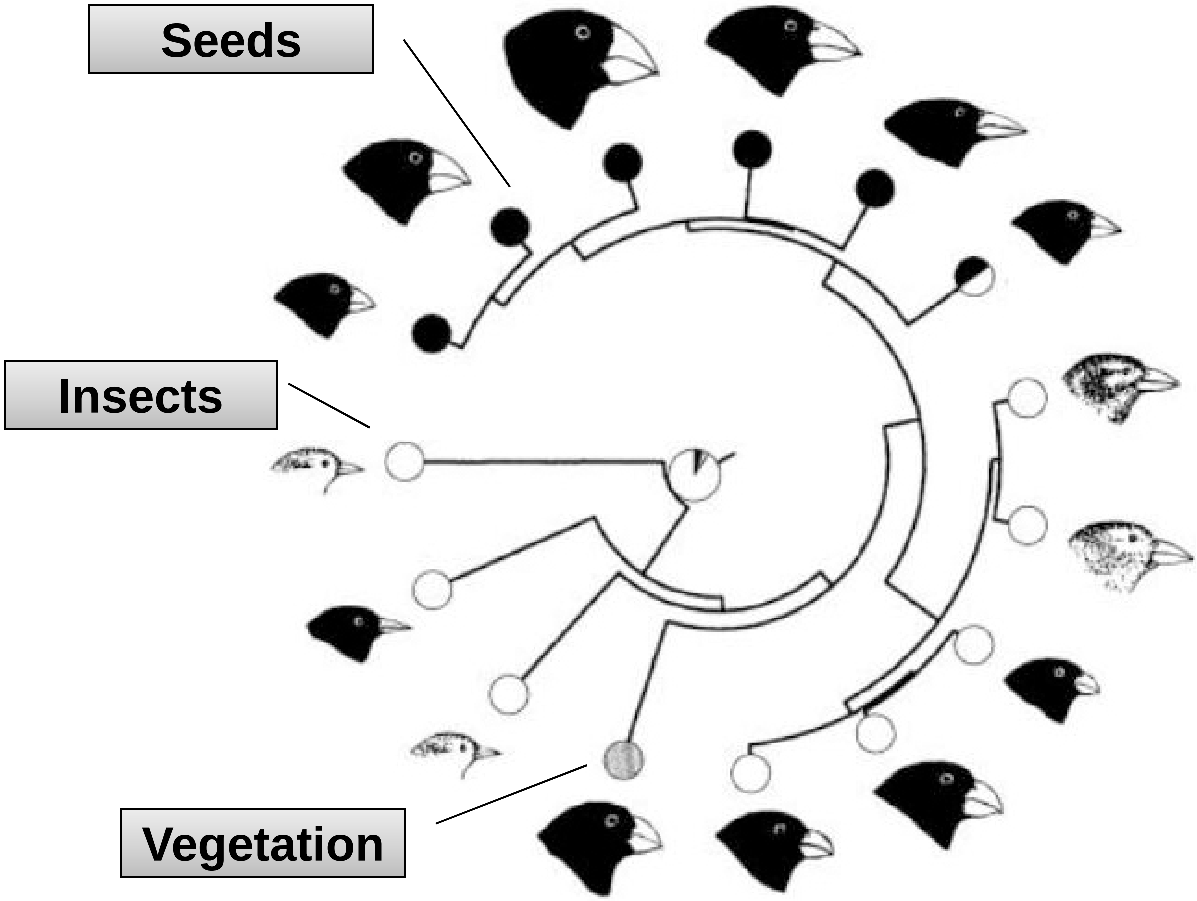
Legal Advisor, U.S. Department of State

USCYBERCOM Inter-Agency Legal Conference

September 18, 2012

http://www.state.gov/s/l/releases/remarks/197924.htm

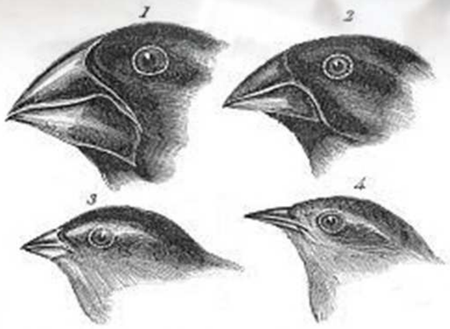
"…anticipates technological innovation…"



Seeds

Insects

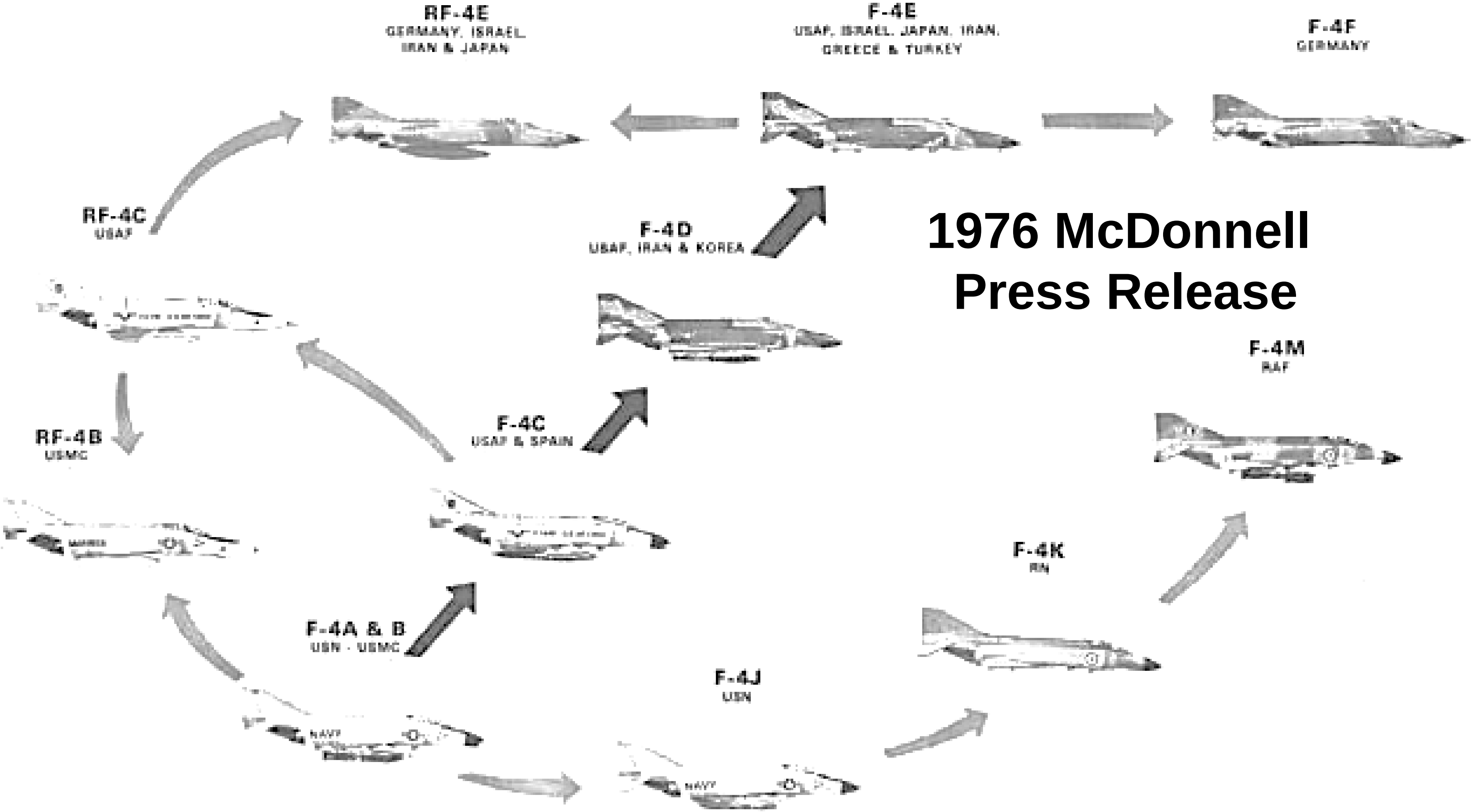
Vegetation



1. Geospiza magnirostris
2. Geospiza fortis
3. Geospiza parvula
4. Certhidea olivacea

Finches from Galapagos Archipelago

Technological Innovation



1976 McDonnell Press Release

http://aviation.watergeek.eu/f4-phantom.html

1961

http://osulibrary.oregonstate.edu/specialcollections/omeka/items/show/1536

Tech Evolution
2011

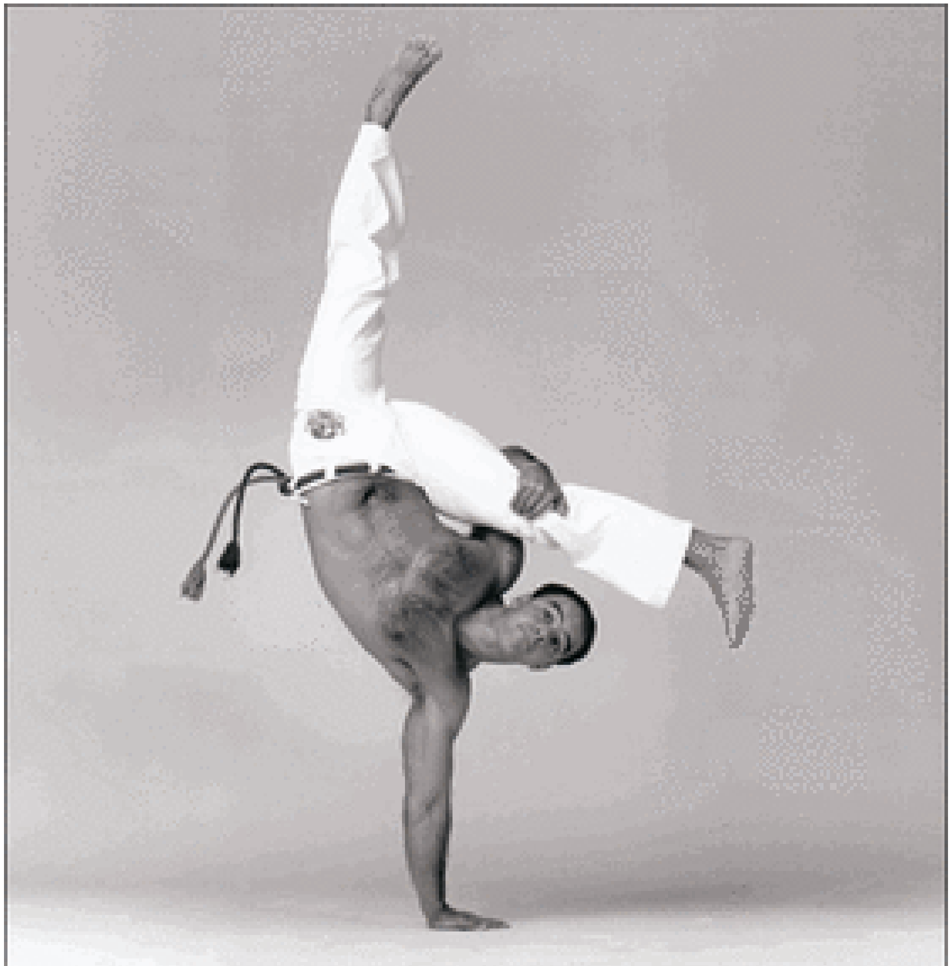
Attacked!

What Now?

Armor Up &
Stand Your Ground…

…or Actively Defend

"…**limited** offensive action and **counterattacks** to deny a **contested area** or position to the enemy…"



http://usacac.army.mil/cac2/call/thesaurus/toc.asp?id=1044

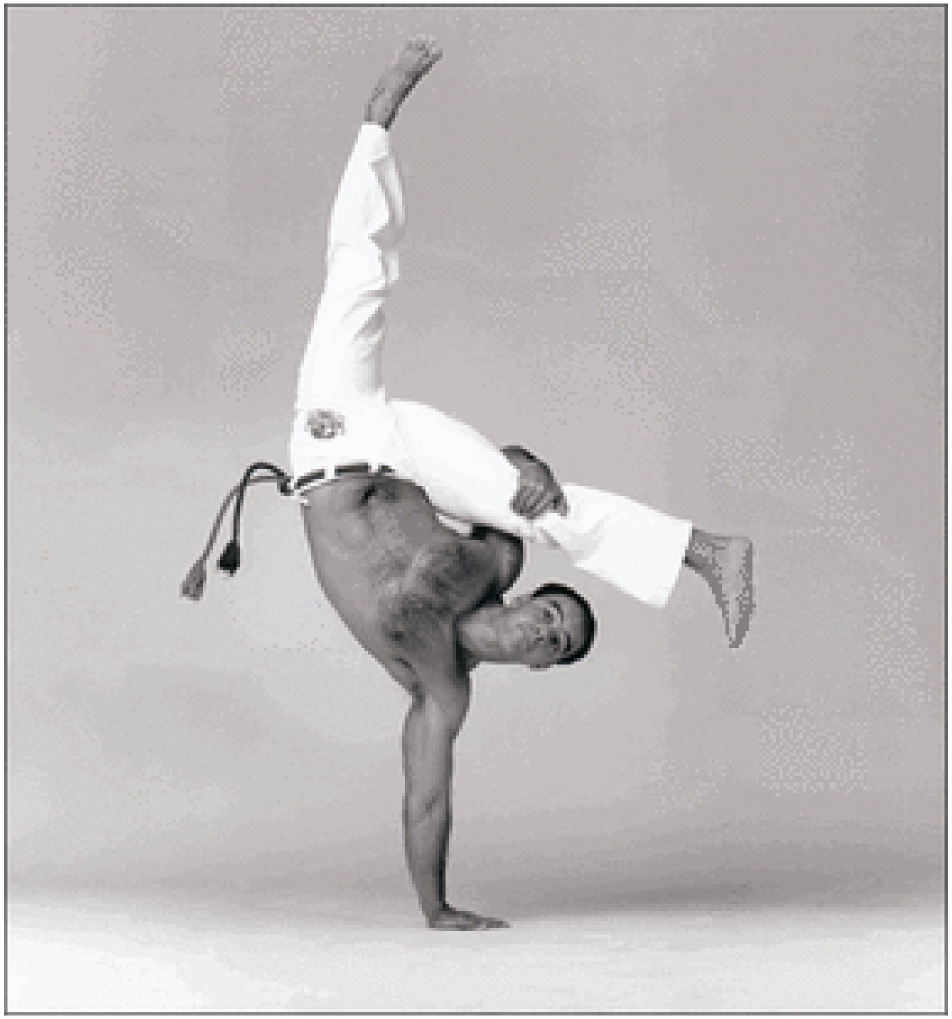
…or Actively Defend

limited counterattacks:

BLOCK

harm

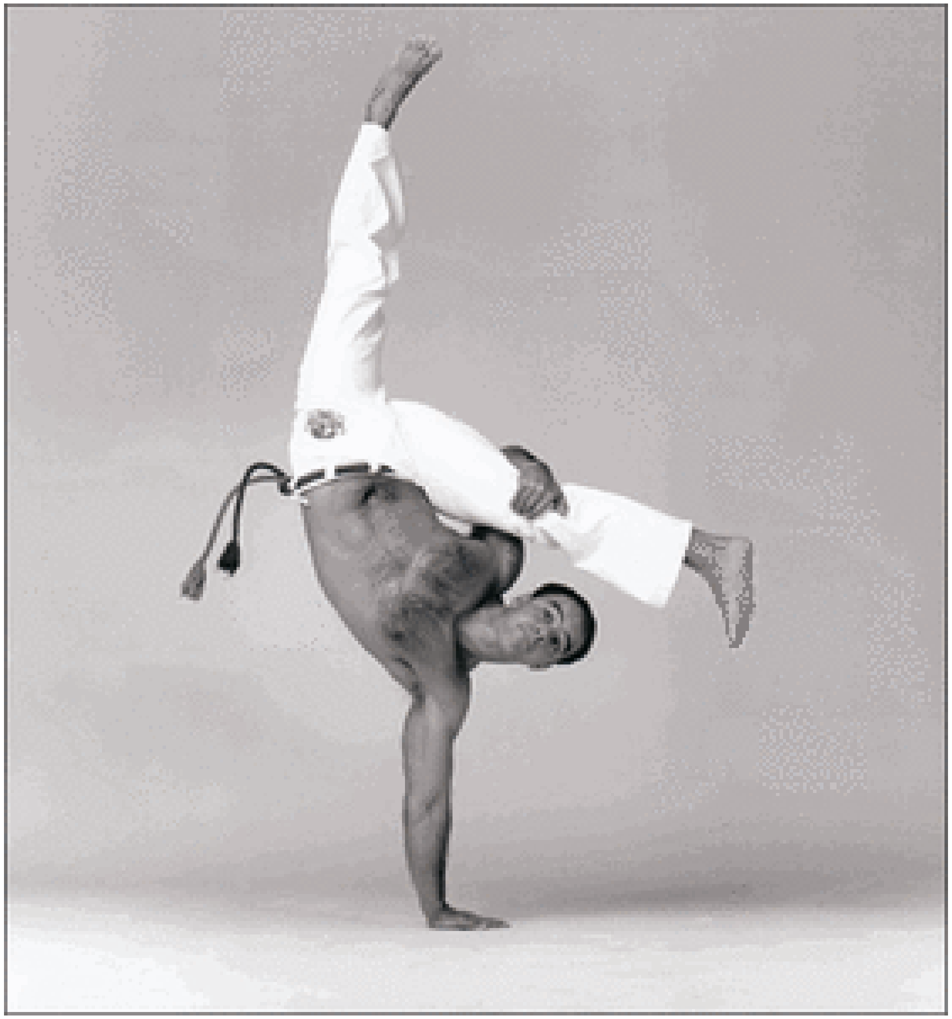
“outside”



…or Actively Defend

Is it

1. Necessary?
2. Effective?
3. Safe?
4. Legal?



Active Defense

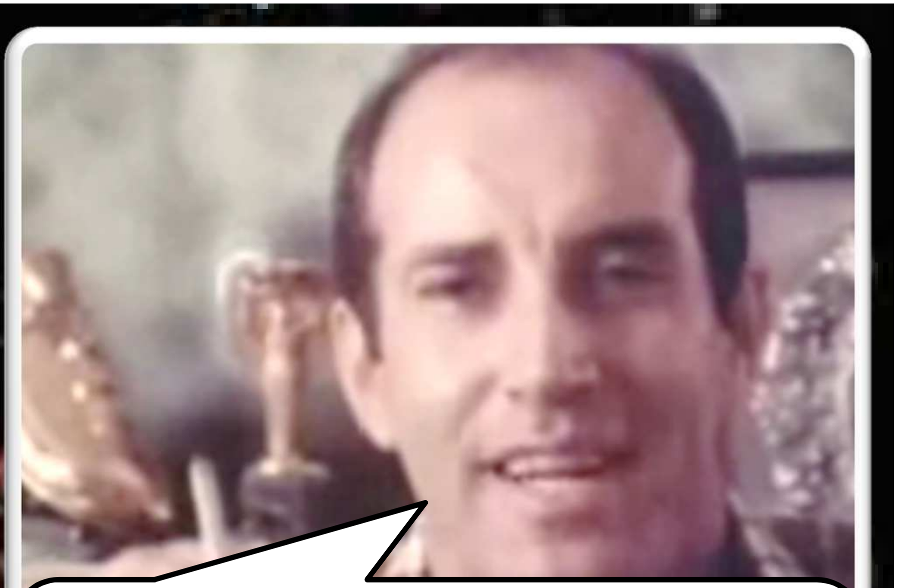
THEORY

1. Necessary?
2. Effective?
3. Safe?
4. Legal?

1) Necessary

MEECES (Motives)

- Money
- Entertainment
- Ego
- Cause
- Social Group Entrance
- Status



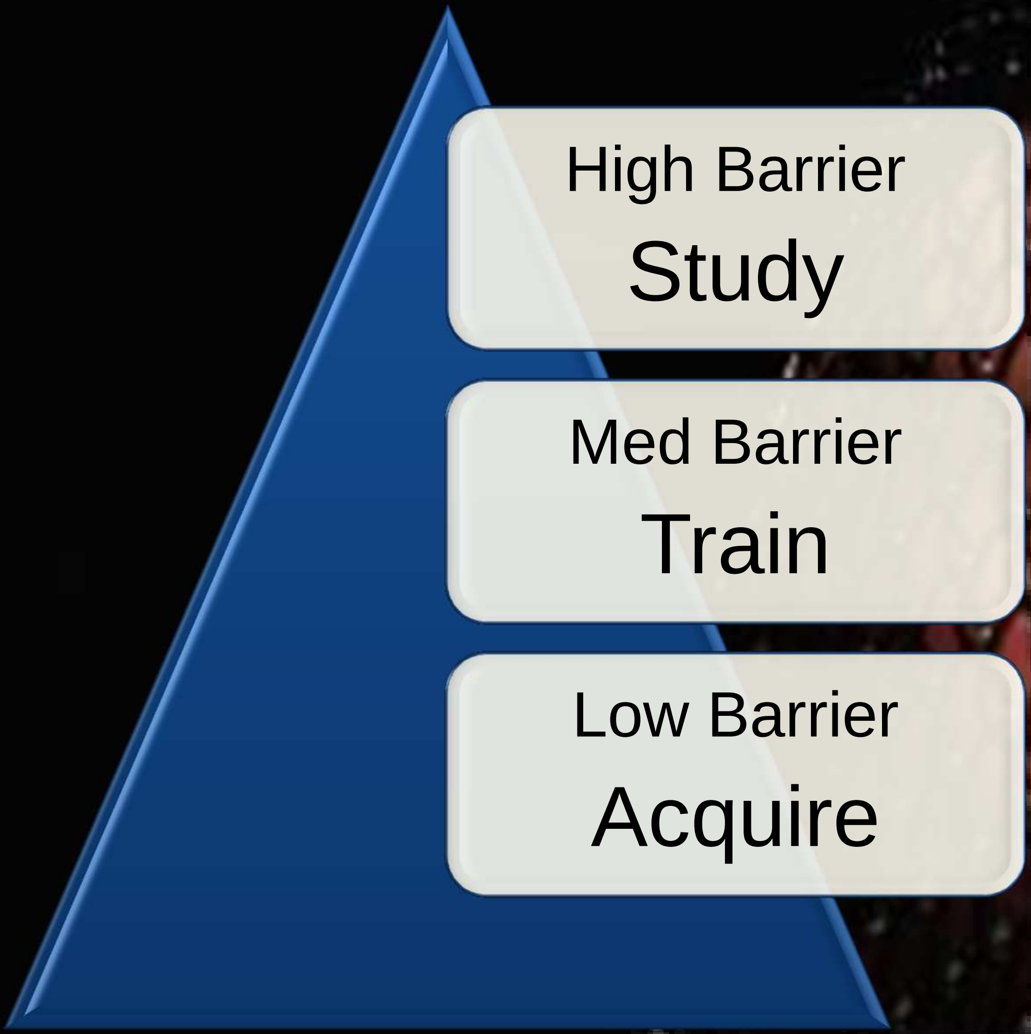
"Gosto de levar vantagem em tudo, certo?"

-- Lei de Gérson

http://youtu.be/J6brObB-3Ow

http://www.aic.gov.au/documents/1/B/A/%7B1BA0F612-613A-494D-B6C5-06938FE8BB53%7Dhtcb006.pdf

1) Necessary



High Barrier

Study

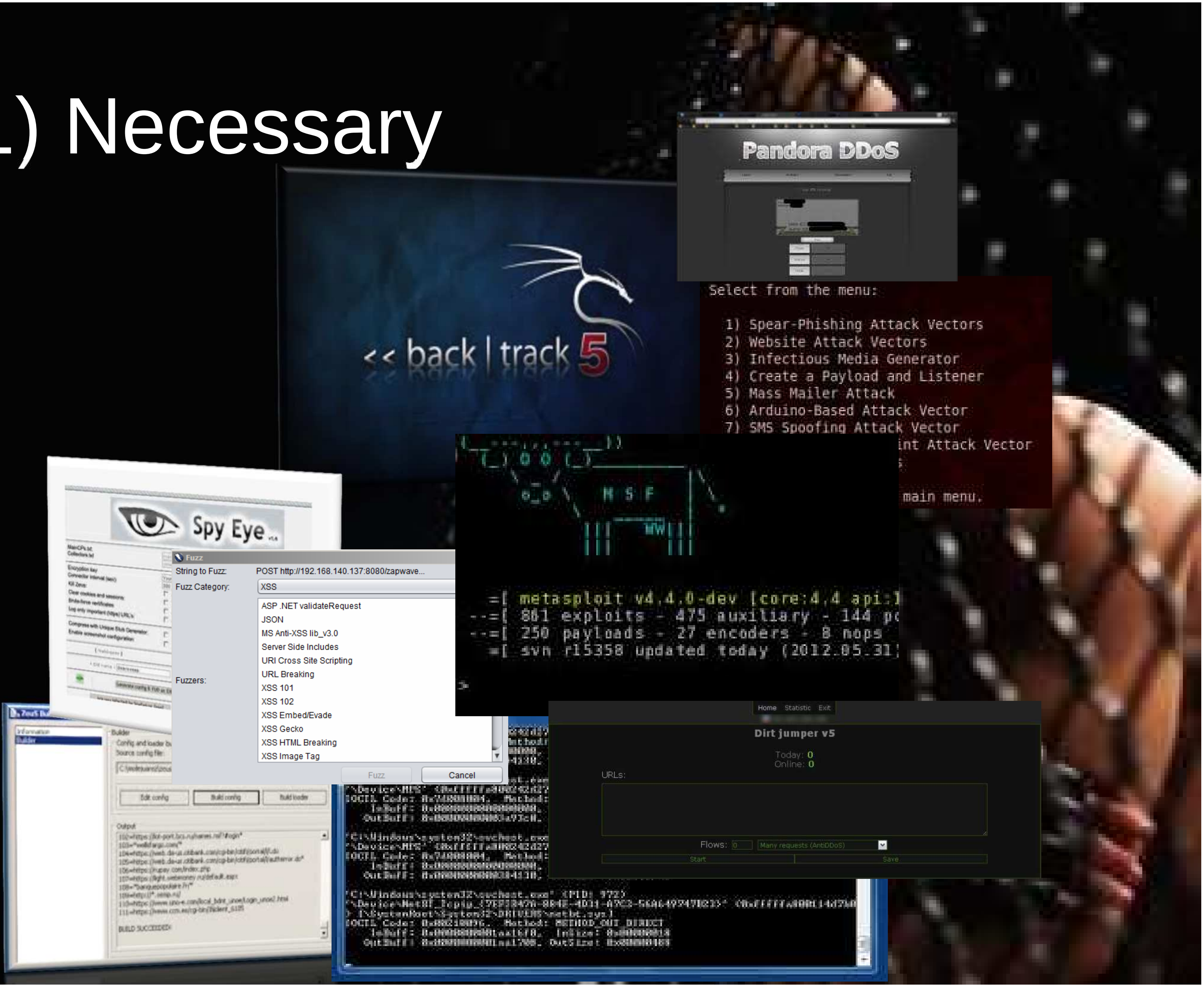
Med Barrier

Train

Low Barrier

Acquire

1) Necessary



```
Select from the menu:

  1) Spear-Phishing Attack Vectors
  2) Website Attack Vectors
  3) Infectious Media Generator
  4) Create a Payload and Listener
  5) Mass Mailer Attack
  6) Arduino-Based Attack Vector
  7) SMS Spoofing Attack Vector
                        int Attack Vector

                        main menu.
```

```
       M S F

   =[ metasploit v4.4.0-dev [core:4.4 api:1
--=[ 861 exploits - 475 auxiliary - 144 po
--=[ 250 payloads - 27 encoders - 8 nops
   =[ svn r15358 updated today (2012.05.31)

>
```

String to Fuzz: POST http://192.168.140.137:8080/zapwave...

Fuzz Category: XSS

Fuzzers:
- ASP .NET validateRequest
- JSON
- MS Anti-XSS lib_v3.0
- Server Side Includes
- URI Cross Site Scripting
- URL Breaking
- XSS 101
- XSS 102
- XSS Embed/Evade
- XSS Gecko
- XSS HTML Breaking
- XSS Image Tag

```
BUILD SUCCEEDED
```

Dirt jumper v5

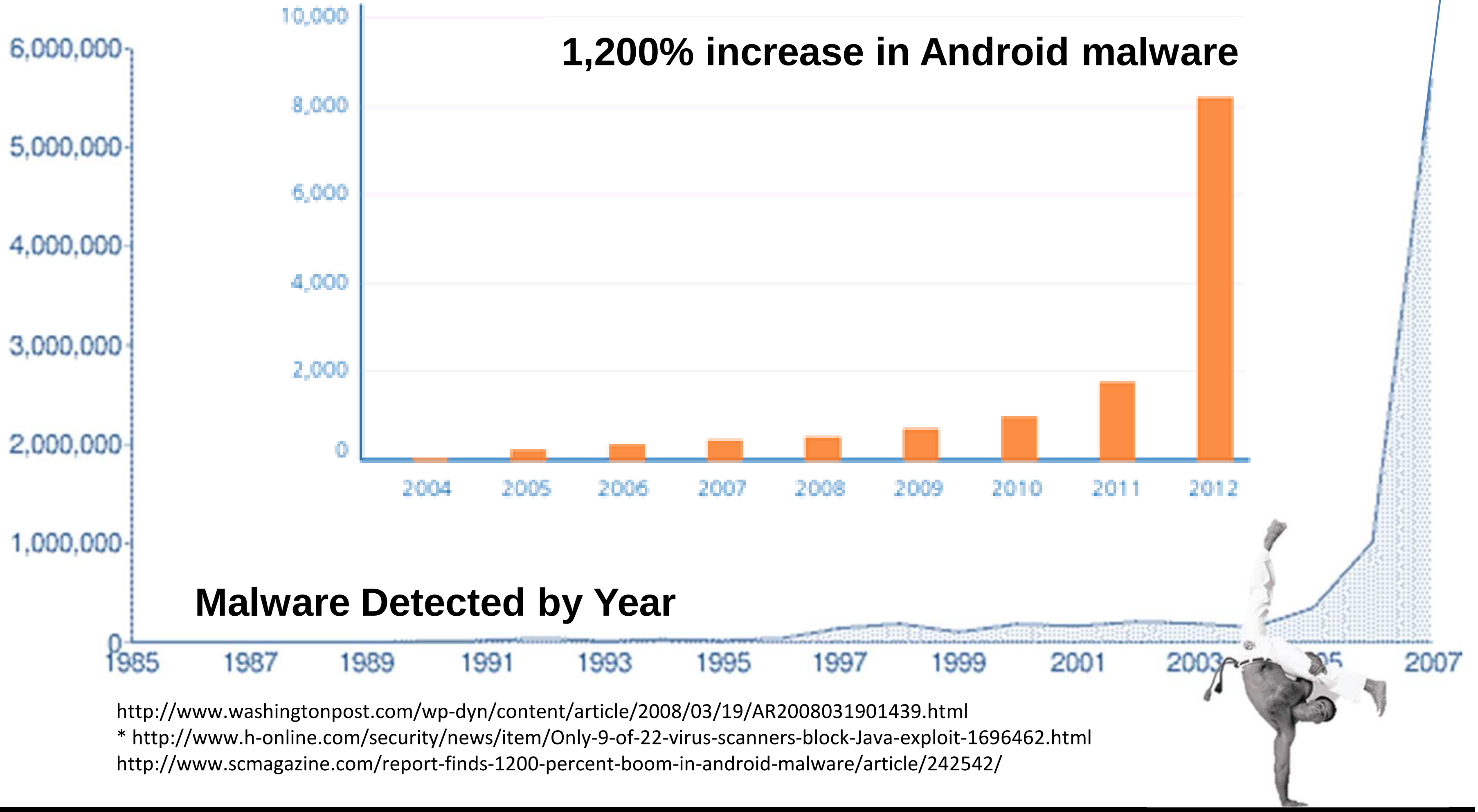
Today: 0
Online: 0

URLs:

Flows: 0 Many requests (AntiDDoS)

1) Necessary

"Only 9 of the 22 tested products managed to ***block*** both variants of the exploit" (31 August 2012) *



1,200% increase in Android malware

Malware Detected by Year

http://www.washingtonpost.com/wp-dyn/content/article/2008/03/19/AR2008031901439.html
* http://www.h-online.com/security/news/item/Only-9-of-22-virus-scanners-block-Java-exploit-1696462.html
http://www.scmagazine.com/report-finds-1200-percent-boom-in-android-malware/article/242542/

1) Necessary

- Higher Likelihood
- Higher Severity
- And…current **BLOCKS** insufficient

2) Effective

Germ Theory

- 1854 Cholera Epidemic
- Dr. Snow “Ghost map”

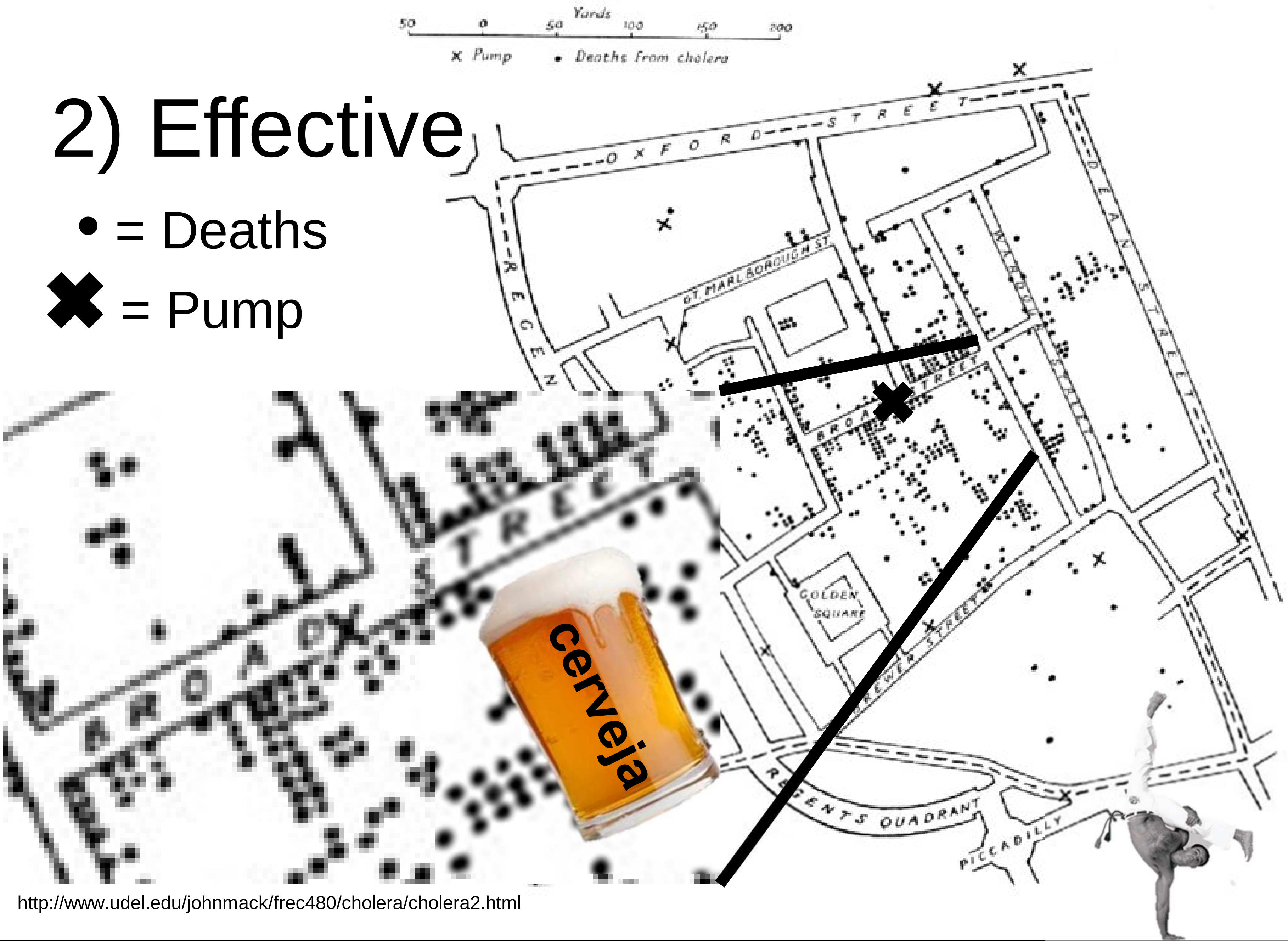
Authorities were convinced by map to ***remove pump handle***

http://secretldn.wordpress.com/2011/09/10/the-broad-street-pump/

2) Effective

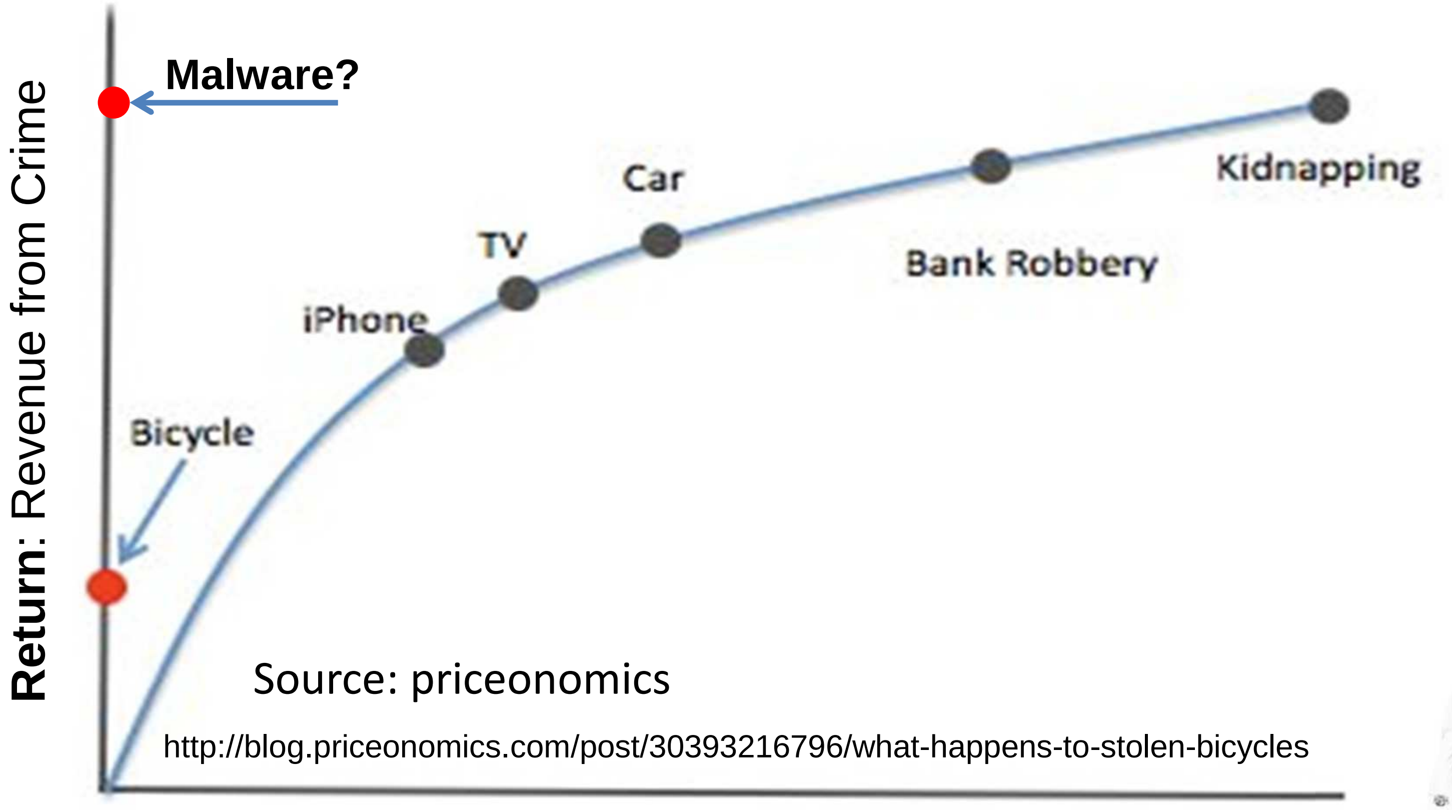
- ● = Deaths

✖ = Pump



http://www.udel.edu/johnmack/frec480/cholera/cholera2.html

2) Effective (Risk Return *Tradeoff*)



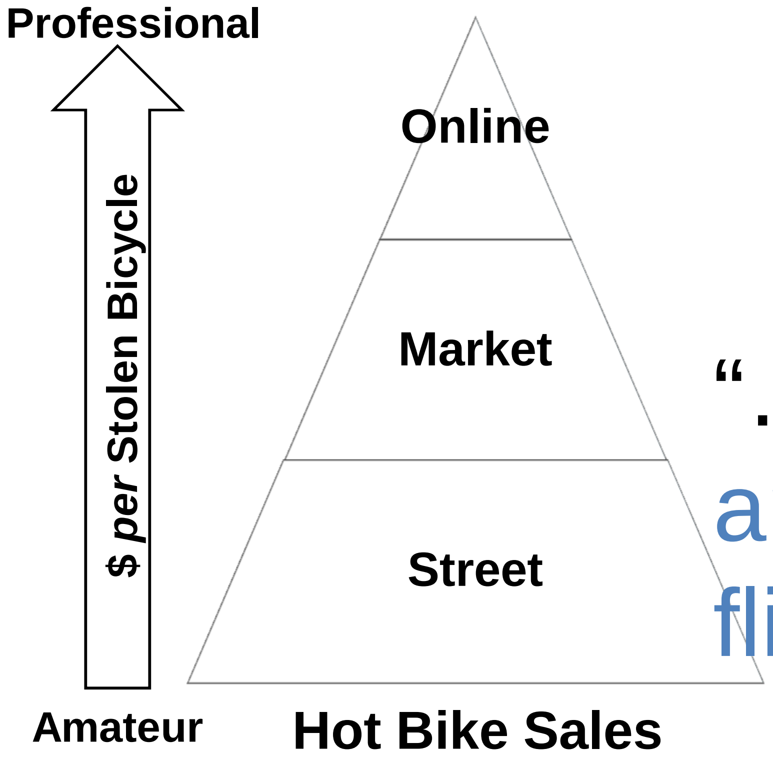
Source: priceonomics

http://blog.priceonomics.com/post/30393216796/what-happens-to-stolen-bicycles

Risk to Criminal
Probability adjusted consequences of getting caught

2) Effective

"While the police may not penalize bicycle thieves, it's becoming easier for the person whose bike was stolen to investigate the bike theft themselves."



Professional

$ *per* Stolen Bicycle

Amateur

Online

Market

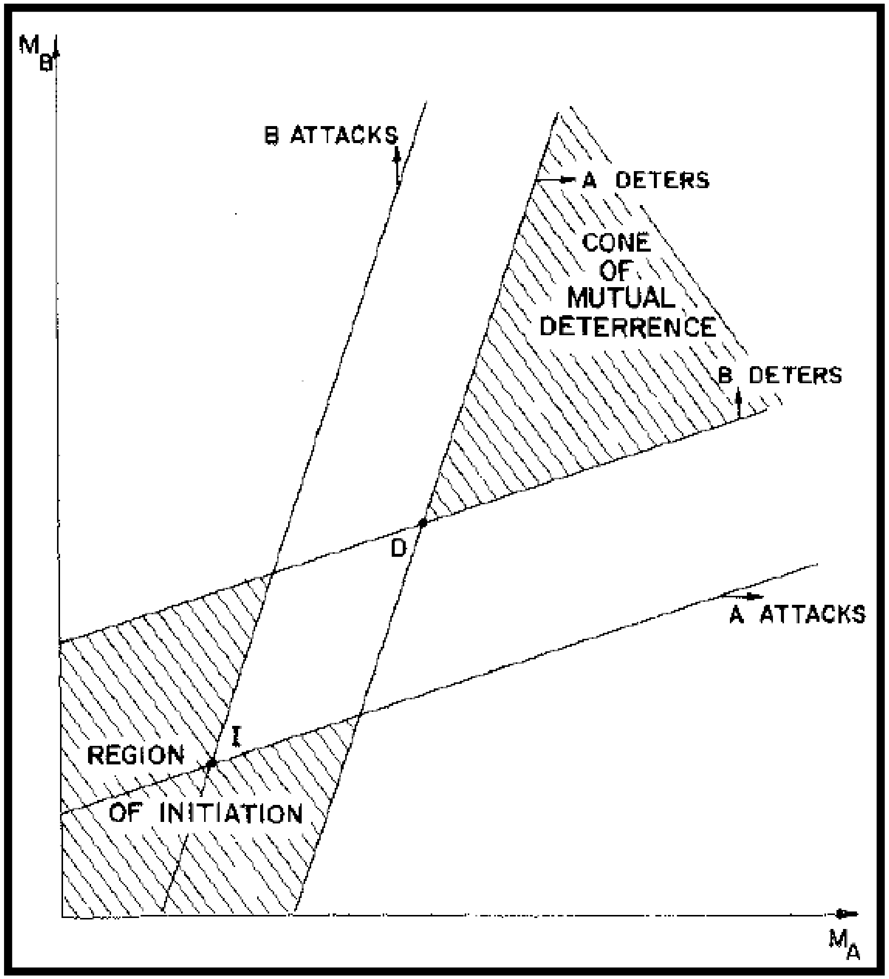
Street

Hot Bike Sales

"…harder for the amateur thief to casually flip a stolen bike."

http://blog.priceonomics.com/post/30393216796/what-happens-to-stolen-bicycles

2) Effective (Intriligator-Brito)



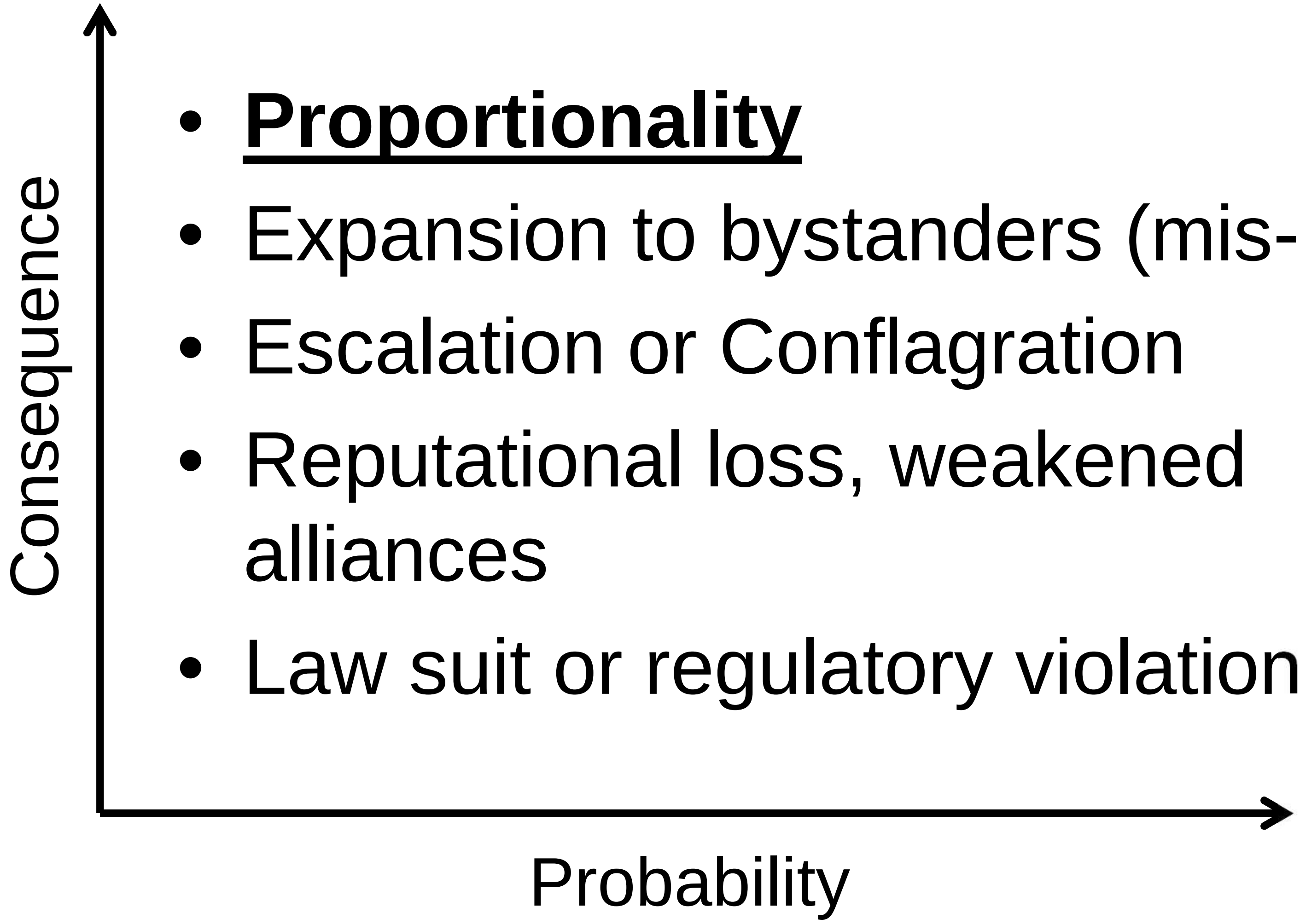
- **Defensive Capabilities**
  - Block Attackers
  - Damage Attackers
  - Speed of Defense
  - Time to Discovery
  - Time to Retaliation
- **Thresholds**
  - Minimum unacceptable damage, estimated by attacker
  - Maximum acceptable casualties of retaliation

http://www.cas.buffalo.edu/classes/psc/fczagare/PSC%20504/Intriligator.pdf

3) Safe?

3) Safe?

3) Safe?



- **Proportionality**
- Expansion to bystanders (mis-target)
- Escalation or Conflagration
- Reputational loss, weakened alliances
- Law suit or regulatory violation

3) Safe?

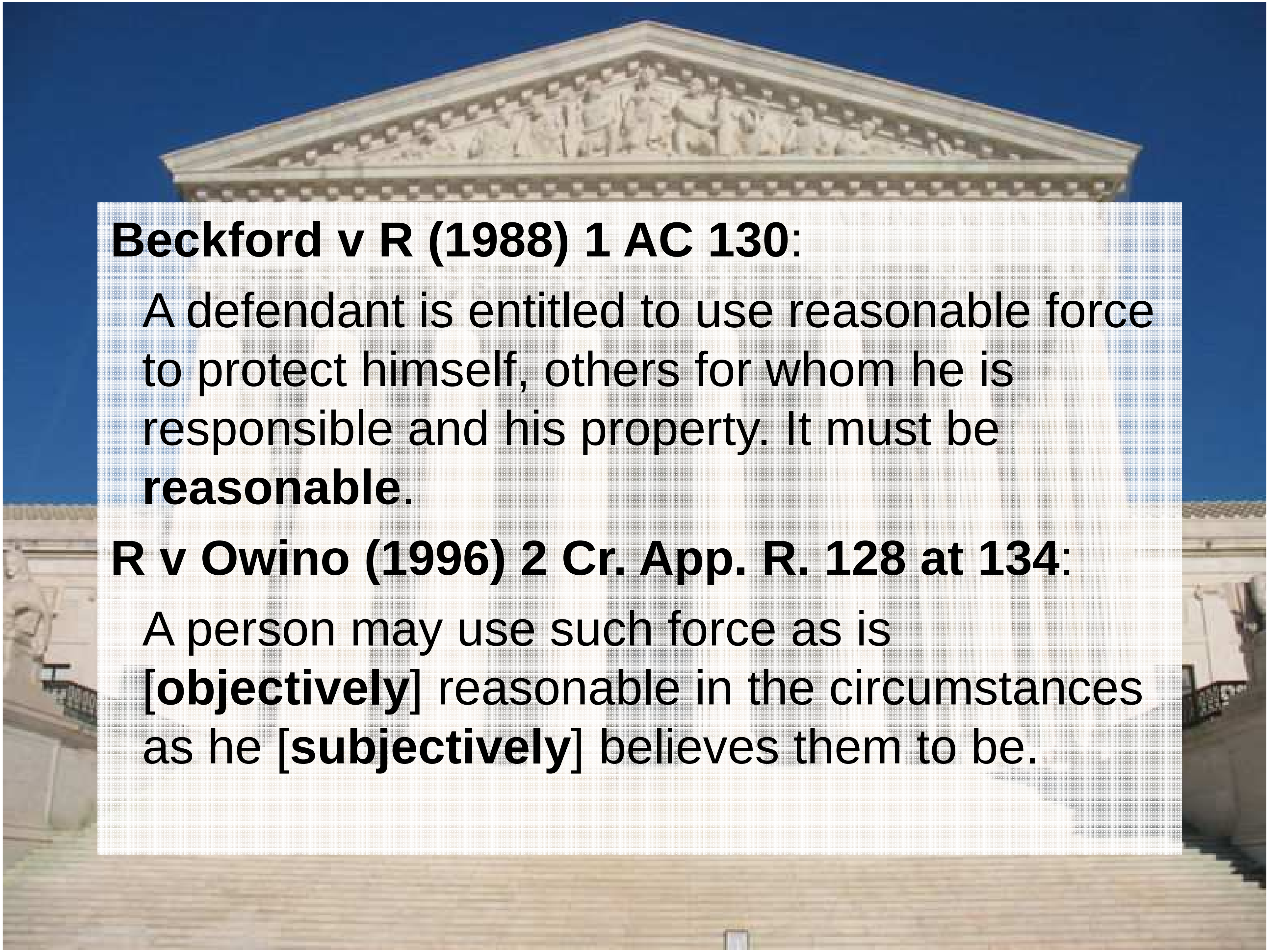
2005 Arms Referendum

- **Brazil** has 17 million guns

  1 death every 15 minutes

- 64% of those who voted rejected proposed ban

http://news.bbc.co.uk/2/hi/americas/4368598.stm



Beckford v R (1988) 1 AC 130:

A defendant is entitled to use reasonable force to protect himself, others for whom he is responsible and his property. It must be **reasonable**.

R v Owino (1996) 2 Cr. App. R. 128 at 134:

A person may use such force as is [**objectively**] reasonable in the circumstances as he [**subjectively**] believes them to be.

4) Legal?

Imminent Danger

Immediate Defense Believed Necessary (to Prevent That Danger)

No More Action Than Necessary (to Defend Against That Danger)

4) Legal?

- Who has the job of defense?
- Who defines what is reasonable?
- Can a higher authority defend you?
  - If No: are you responsible to defend yourself?
  - If Yes: what level and by which laws do you abide?

4) Legal?

- What jurisdiction are you in?
- What jurisdiction(s) will you operate in?
- What tools do you plan to use?
- How do you plan to use them?
- What impact to you is anticipated?
- What impact to others is anticipated?
  - Retribution
  - Bystanders
  - Reputation

4) Legal?

“devassar dispositivo informático alheio”

- 2008 Brazil Senate Cybercrime Law
- 2009 President “Freedom to Cook” Speech
- 2012 Chamber of Deputies Approval
  - – Lei Azeredo (Intro 1999, Revised 2008)
    - Law enforcement agencies create special cybercrime units
  - – Lei Dieckmann, Illegal to:
    - Violate security controls
    - Create vulnerabilities
    - Edit, obtain or delete information without authorization

http://ethevaldo.com.br/noticia/aprovada-a-definicao-de-crimes/
https://www.eff.org/issues/cybercrime/president-brazil-2009
http://www.article19.org/resources.php/resource/2946/en/brazil:-draft-cybercrimes-law

4) Legal?

International Considerations

- U.S. Computer Fraud and Abuse Act (CFAA)
- U.S. State Computer Trespass Laws
- U.S. Electronic Espionage Law
- U.S. Stored Communications Act
- U.S. Privacy Laws

4) Legal?

International Considerations

- UK Computer Misuse Act

  Section 1 – unauth access to computer material

  Section 2 – unauth access with intent

  Section 3 – unauth modification (add/del) w/ intent

- Budapest Convention

  Cyber Crime - CETS 185

- UN Convention

  Against Transnational Organized Crime

UN Engages in Defense

http://www.unmultimedia.org/photo/detail/452/0452379.html

UN Coaches Active Defense

http://www.unmultimedia.org/s

UN Coaches Active Defense

http://www.unmultimedia.org/s/photo/detail/167/0167141.html

Active Defense

APPLICATION

CyberFall: Active Defense Plan

- Monitor Attacks (Study, Train, Kits and Tools)

> “ [Koobface] gang’s success was more attributable to workaday persistence and willingness to adapt than technical sophistication”

- Alarm on MEECES (i.e. Group, Wealth, Asset)
- Engage *Proportionally* Based on Data

http://www.cl.cam.ac.uk/techreports/UCAM-CL-TR-746.pdf
http://www.nytimes.com/2012/01/17/technology/koobface-gang-that-used-facebook-to-spread-worm-operates-in-the-open.html?_r=1

CyberFall: Active Defense Plan

1. Assessment
   a) Internal
   b) External
2. Calculation
3. Action

1 – a) Internal Assessment

- Evidence
  - Imminence
  - Danger/Persistence
- State of Your Capabilities

1 – b) External Assessment

- Reconnaissance
  - Attack Tools
  - Attack Connections
  - Attack Links and Relationships
- Intelligence
  - Attacker Vulnerabilities
  - Attacker Assets

2 – Calculation

- Nature (Motive) of the Attack
- Threat: Imminence and Danger

	Commitment			Resources		
Level	Intensity	Stealth	Time	Power	Ability	Opportunity
3	H	H	Long	Organized	H	H
2	M	M	Varied	Grouped	M	M
1	L	L	Short	Isolated	L	L

- Terms: Jurisdiction and Restrictions
- Cost: Liabilities versus Benefits

3 – Action

- Plan

	Commitment		Resources			
Level	Intensity	Stealth	Time	Power	Ability	Opportunity
3	H	H	Long	Organized	H	H
2	M	M	Varied	Grouped	M	M
1	L	L	Short	Isolated	L	L

- Tool and Procedure Development
  - Survey
  - Access
  - Dump
  - Actively Defend

Example #1: DDoS TakeDown

1. Trace Attacks (Three Degrees)
2. Map Services and Vulnerabilities (Dirt Jumper)
3. SQL Injection and Dump Config (sqlmap)

```
./sqlmap.py --level=5 --risk=3 -u
http://www.evilsite.com/dj5/ -p k --data="k=" --
technique=t --dbms=mysql --
fileread=”/var/www/html/evilsite.com/djv5/config.php”
```

4. Command and Control

http://arstechnica.com/security/2012/08/ddos-take-down-manual/

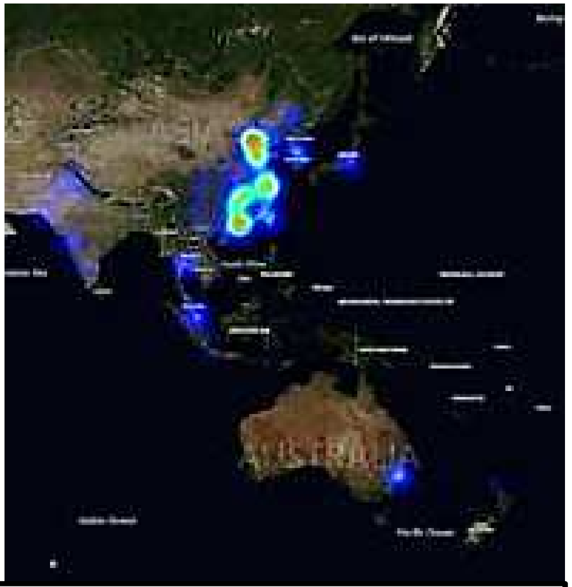
http://www.prolexic.com/knowledge-center-ddos-threat-advisory-pandora-and-vulnerability-disclosure-dirt-jumper/banners.html

Example #2 – Project MARS

1. Trace Attacks

   Elirks via Plurk, Nitol

2. Sinkhole Communications
3. Reverse/Tag Infections
4. Shutdown C&C

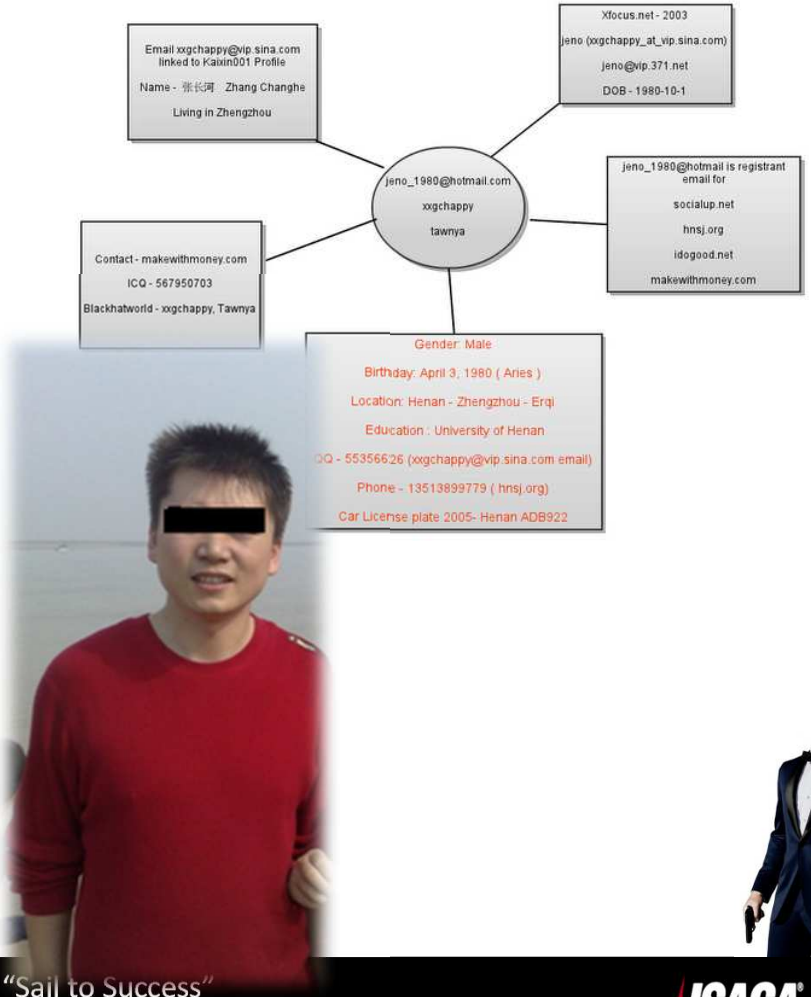


…16 days…able to block more than 609 million connections from over 7,650,000 unique IP addresses to those malicious 3322.org subdomains.

http://www.secureworks.com/research/threats/chasing_apt/
http://blogs.technet.com/cfs-file.ashx/__key/communityserver-blogs-components-weblogfiles/00-00-00-80-54/3755.Microsoft-Study-into-b70.pdf
http://blogs.technet.com/b/microsoft_blog/archive/2012/10/02/microsoft-reaches-settlement-with-defendants-in-nitol-case.aspx

Example #3 – Wycores Investigation

1. Trace Attacks
2. Profile IDs
3. Dump (QQ#)
4. ??



[redacted]

Email xxgchappy@vip.sina.com linked to Kaixin001 Profile

Name - 张长河 Zhang Changhe

Living in Zhengzhou

Xfocus.net - 2003

jeno (xxgchappy_at_vip.sina.com)

jeno@vip.371.net

DOB - 1980-10-1

jeno_1980@hotmail.com

xxgchappy

tawnya

jeno_1980@hotmail is registrant email for

socialup.net

hnsj.org

idogood.net

makewithmoney.com

Contact - makewithmoney.com

ICQ - 567950703

Blackhatworld - xxgchappy, Tawnya

Gender: Male

Birthday: April 3, 1980 (Aries)

Location: Henan - Zhengzhou - Erqi

Education : University of Henan

QQ - 55356626 (xxgchappy@vip.sina.com email)

Phone - 13513899779 (hnsj.org)

Car License plate 2005- Henan ADB922

http://cyb3rsleuth.blogspot.com/2011/08/chinese-threat-actor-identified.html
http://cyb3rsleuth.blogspot.com/2012/03/chinese-threat-actor-part-3.html

Example #4 – .br Trojan Horses

2009 Kaspersky review .br Bank Trojan Horses

- Motive: Low income population drawn into crime
- Means: Delphi (not taught in University)
- Opportunity: 1/3 (70m) of Brazil online. eBanking:
  - 7.9mil Banco do Brasil
  - 6.9mil Bradesco
  - 4.3mil Itau

…banks wish to **avoid public investigation** of such thefts.

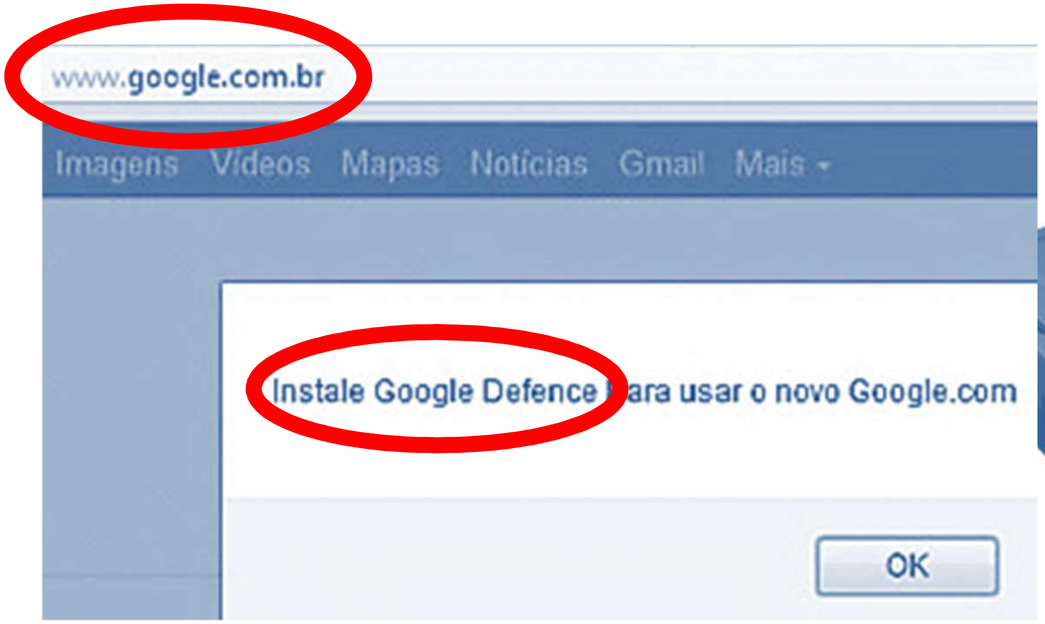
In order to **protect their reputation**, banks prefer to compensate customers for losses incurred by infection with malicious code…

http://www.securelist.com/en/analysis/204792084/Brazil_a_country_rich_in_banking_Trojans

Example #4 – .br Trojan Horses

2012 Kaspersky review .br **4.5mil** ADSL CSRF

```
<form action=http://192.168.1.1/password.cgi;
method=“POST” name=“form”>
<input type=“hidden” name=“sysPassword”
value=“newpassword”>
```



Instale Google Defence para usar o novo Google.com

“…all of them in sunny, beautiful Brazil”

http://www.securelist.com/en/blog/208193852/The_tale_of_one_thousand_and_one_DSL_modems

Example #4 – .br Trojan Horses

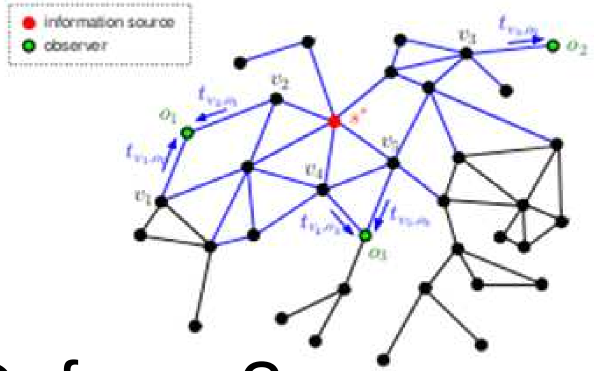
2012 Kaspersky review.br 4.5mil ADSL CSRF

- Motive: Steal banking credentials
- Means: Public Disclosure 2011-03-04 - Comtrend ADSL Router CT-5367 C01_R12 Remote Root*
  - dispara.sh: if [$ativos –le $simultaneos];
  - roda.sh: curl $copts http://$ip_completo/password.cgi...dnscfg.cgi
  - echo $ip_completo >> modem-owned.log
- Opportunity: any IP on Internet (5 of 6 *known* vulnerable routers sold/used by Brazil National Telecom Agency)

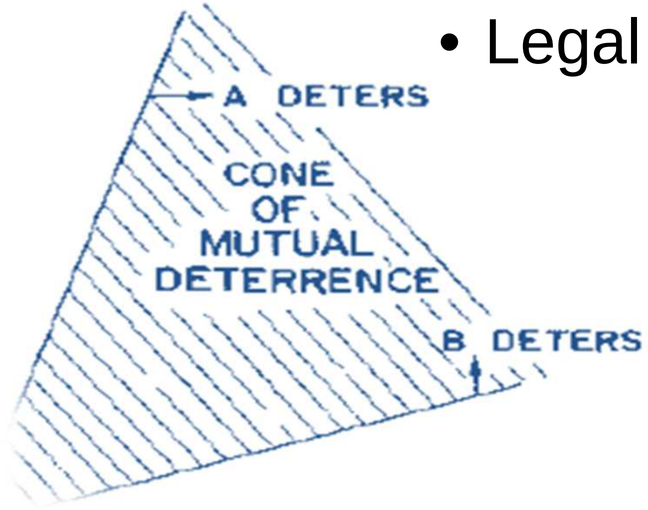
ANATEL
Agência Nacional
de Telecomunicações

* http://www.exploit-db.com/exploits/16275/

Example #4 – .br Trojan Horses



1. Who Will Trace Attacks?
2. Who Will Profile IDs?
3. Who Will Dump Data?
4. Who is Ready for Active Defense?
   - Technical Capabilities
   - Legal Framework with Guidelines



1. Higher Likelihood
2. Higher Severity
3. Current **BLOCKS** insufficient

Active Defense 2013

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THANK YOU!