



Assessing Actions Along the Spectrum of Cyberspace Operations

Presented by USCYBERCOM/JA

*This presentation does not
necessarily reflect the position of
the US Government.*



Spectrum of Cyber Operations



Access Operations

- Digital intelligence (e.g., stealthy implant)

Cyber Disruption

- Interrupt the flow of information or function of information systems

Change, delete, manipulate data, (e.g., changing a word in a document);
Modify software to cause system glitches, (e.g., causing a reboot or causing a file to close);
Disrupting communications, or command and control (e.g. blocking emails, web forums, telephone communication)

Cyber Attack

- Use of force
- Physical damage or destruction
- Physical injury or death

Very stealthy

Less stealthy



Spectrum of Cyber Operations

With that background, we will discuss several real world and exercise examples of cyber operations to determine where they fall on the spectrum of cyber operations



Access Operations

- Digital intelligence (e.g., stealthy implant)

Cyber Disruption

- Interrupt the flow of information or function of information systems without physical damage or injury

Cyber Attack

- Use of force
- Physical damage or destruction
- Physical injury or death

Very stealthy

Less stealthy



Spectrum of Cyber Operations



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Cyber Disruption

- Interrupt the flow of information or function of information systems

Cyber Attack

- Physical damage to property or injury to persons

Operation Buckshot Yankee Implant

- Code embedded in flash drive
- Downloaded when inserted into computer
- (Ran code to enable exfiltration)

Very stealthy

Less stealthy



Spectrum of Cyber Operations



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- Digital intelligence (e.g., stealthy implant)

Cyber Disruption

- Interrupt the flow of information or function of information systems

Cyber Attack

- Physical damage to property or injury to persons

Change Data with No Physical Damage to Gain Access

- Erase admin logs
- Cause reboot to upload or activate program
- Install program

Very stealthy

Less stealthy



Spectrum of Cyber Operations



Access Operations

- Digital intelligence (e.g., stealthy implant)

Cyber Disruption

- Interrupt the flow of information or function of information systems

Cyber Attack

- Physical damage to property or injury to persons

Cyber Shock Wave—Move One

- Malware downloaded to cell phones during basketball game
- Designed to spread to linked computers
- Botnet ready to order

Very stealthy

Less stealthy



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Cyber Disruption

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Cyber Attack

- Physical damage to property or injury to persons

Small scale Denial of Service against Non-Government Adversary

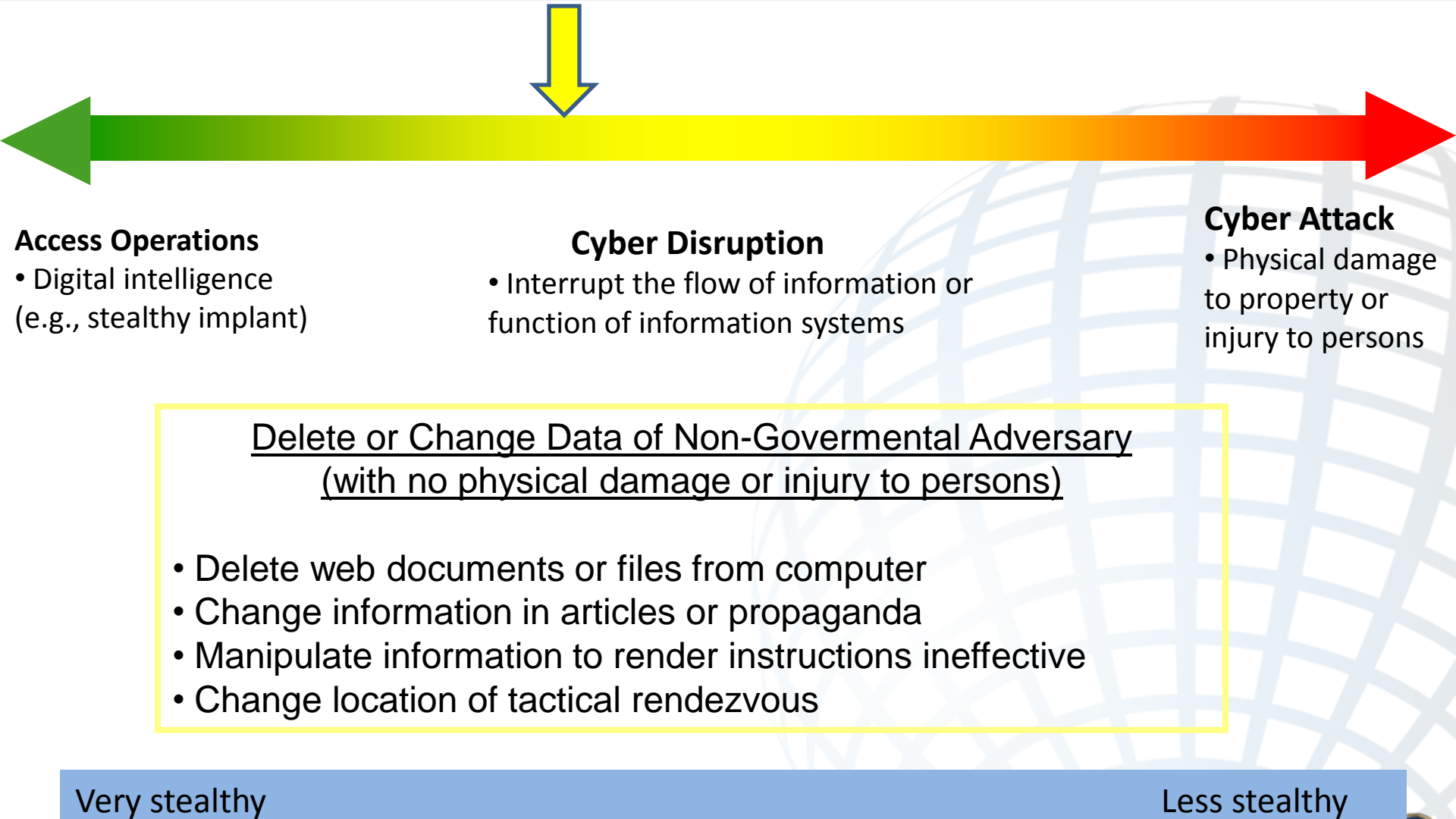
- Block adversary publication of a magazine or pamphlets (e.g. Inspire)
- Block email communications
- Block access to website

Very stealthy

Less stealthy

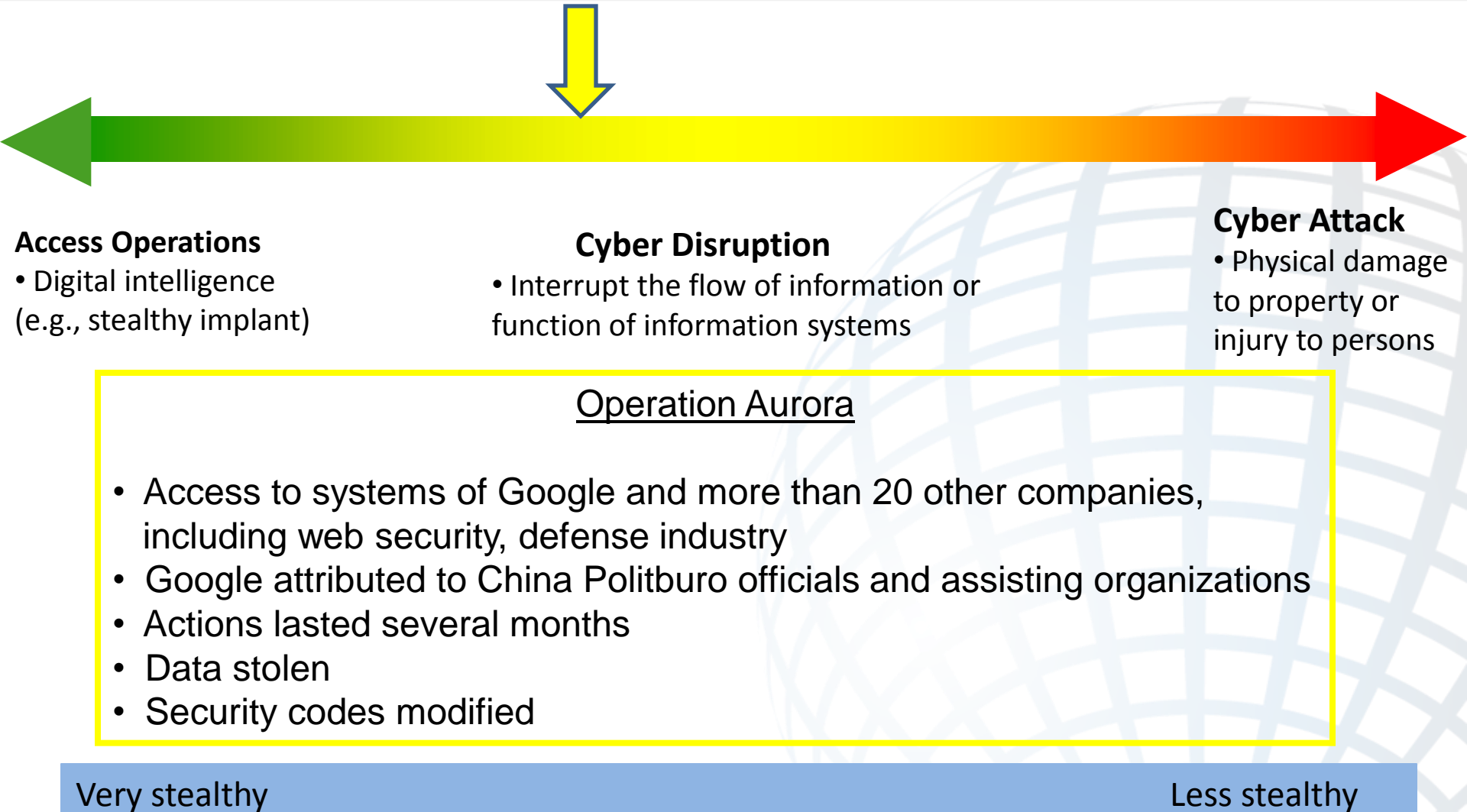


Spectrum of Cyber Operations





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U.S. and South Korea 2009

- 27 Government and commercial sites hit with a denial of service
- Estimated over 50K+ computers in botnet sending requests
- Targeted NY Stock Exchange, NASDAQ, Yahoo financial, Dept of Transportation, Treasury, FTC, White House, Secret Service
- DDOS lasted from hours to a few days

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Less stealthy



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Cyber Attack

- Physical damage to property or injury to persons

Estonia 2007

- Intermittent DDOS against government and businesses over the course of a month
- Botnets used; actions transited over 170 countries
- Online banking down for most of the month
- Government unable to send emails for days at a time
- Data changed on websites including defacement and propaganda
- Primarily economic impact and degraded communications

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Cyber Attack

- Physical damage to property or injury to persons

Estonia 2007

- NOTE: Estonia and NATO stated these actions did not constitute a use of force
- We may consider actions less than Estonia as less than a use of force
- Many cyber disruption actions fall below this threshold
 - (Month long DDOS against banking, government web-sites, communication)

Very stealthy

Less stealthy



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Cyber Attack

- Physical damage to property or injury to persons

Cyber Shock Wave—Move 2

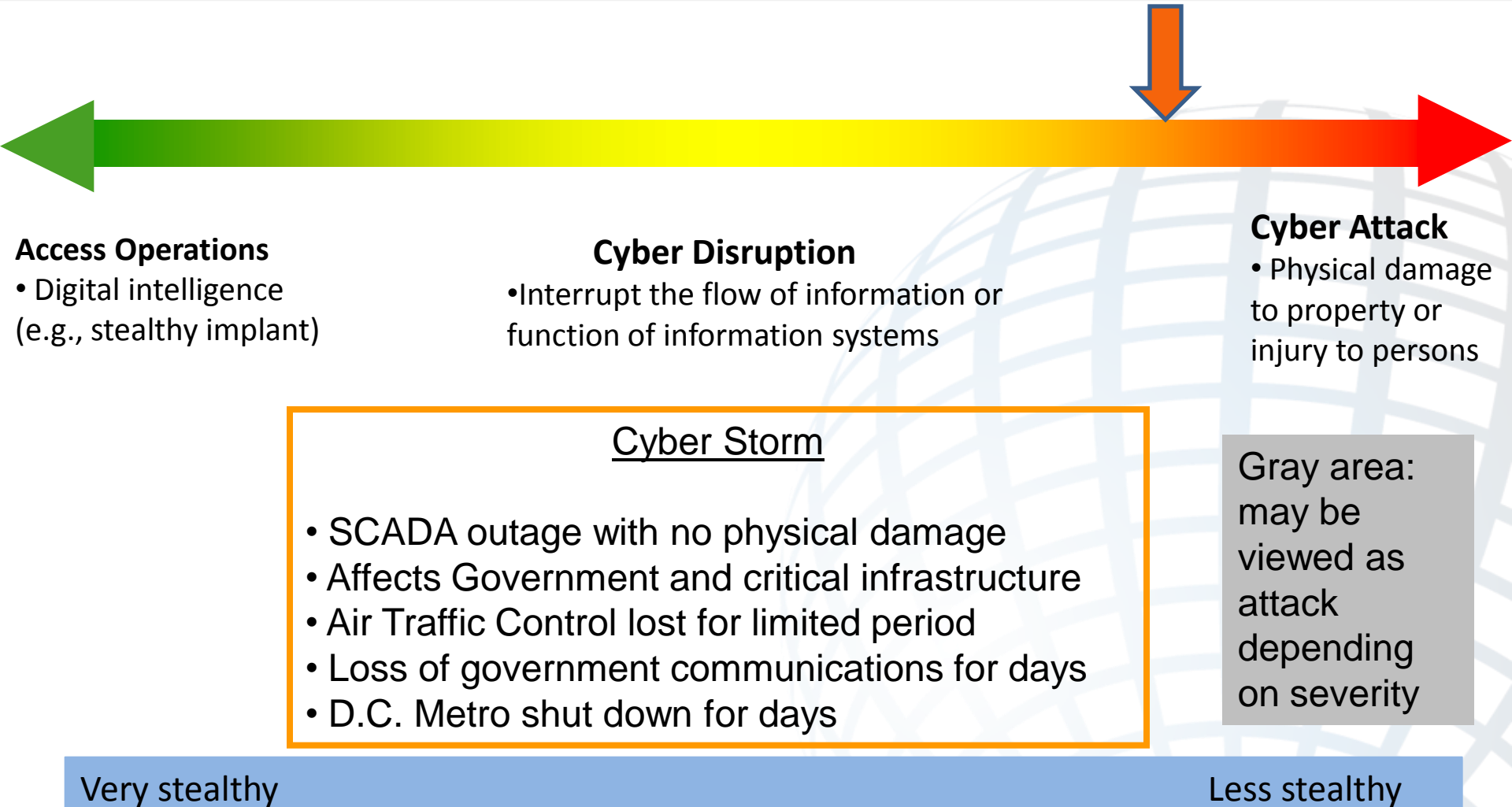
- Botnet spread through malware-generated emails
- Civilian SCADA outage with no physical damage
- 40 Million lost electricity in Eastern U.S. for hours to days
- 60 Million lost cell phone access for days
- Wall Street down for 1 week

Very stealthy

Less stealthy



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Cyber Attack

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Stuxnet

- Precision-Effect Code infiltrated Iran's nuclear facilities for uranium enrichment
- Cyber code altered rotation speed of centrifuges
- Over 1000 centrifuges damaged

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Less stealthy



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Cyber Attack

- Physical damage to property or injury to persons

Deleting or Manipulating Data (causing physical damage and injury)

- Alter subway data to cause trains to collide
- Altering flight paths causing planes to collide
- Altering or deleting information in medical and pharmaceutical records causing serious illness and death when patients treated

Very stealthy

Less stealthy



Spectrum of Cyber Operations



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Cyber Disruption

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Cyber Attack

- Physical damage to property or injury to persons

Cyber Attack During Conflict

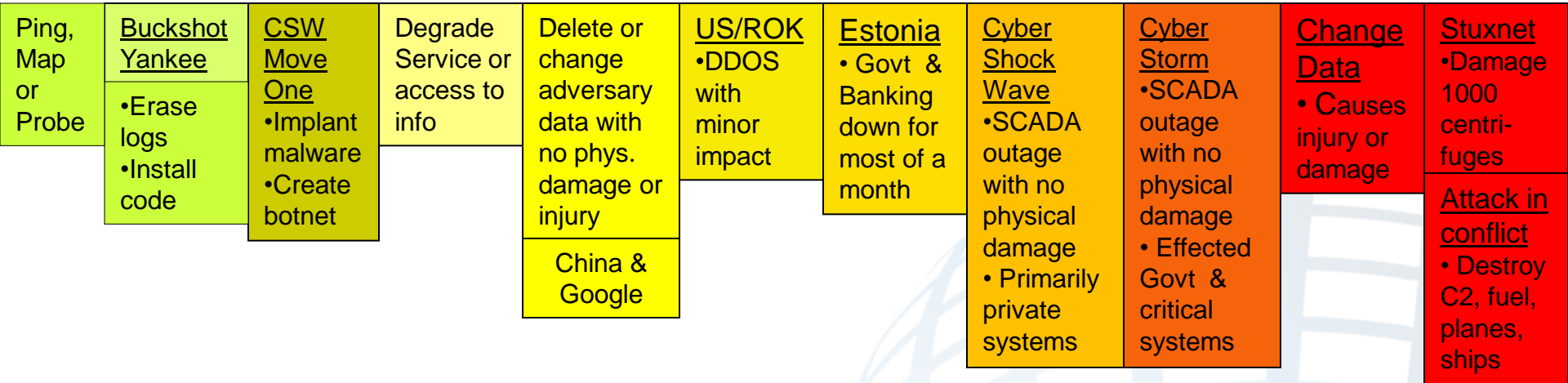
- Damage command and control systems
- Cause in-flight failure on military aircraft
- Cause detonation at military fuel depot

Very stealthy

Less stealthy



Spectrum of Cyber Operations



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Cyber Disruption
• Interrupt the flow of information or function of information systems without physical damage or injury

Cyber Attack
• Physical damage to property or injury to persons

Very stealthy Less stealthy