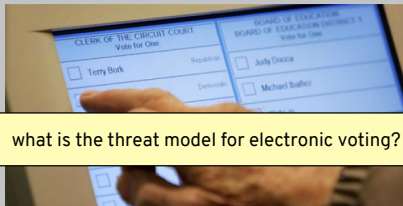


SECURITY (COMP0141): EXAMPLE THREAT MODELLING



EXAMPLE: ELECTRONIC VOTING



what is the threat model for electronic voting?

Pac-Man installed on voting machine
without breaking tamper seals

The next group of slides go through the exercise of working through a threat model for electronic voting

ELECTRONIC VOTING: THREATS

Threats (who is the adversary?)

Capabilities?

Motivation?

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ELECTRONIC VOTING: THREATS

Threats (who is the adversary?)

Capabilities?

Motivation?

Voter(s)
Election official
Manufacturer of EVM
Software engineer
Cleaner

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ELECTRONIC VOTING: THREATS

Threats (who is the adversary?)

Capabilities?

Voter(s)
Election official
Manufacturer of EVM
Software engineer
Cleaner

Motivation?

Vote as someone else (S)
Rig the election (T)
Learn someone's vote (I)
Prevent others from voting (D)

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ELECTRONIC VOTING: VULNERABILITIES

Vulnerabilities (where can system break?)

Capabilities?

Voter(s)
Election official
Manufacturer of EVM
Software engineer
Cleaner

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ELECTRONIC VOTING: VULNERABILITIES

Vulnerabilities (where can system break?)

Capabilities?

Voter(s)
Election official
Manufacturer of EVM
Software engineer
Cleaner



Vulnerabilities

Weak cryptography/design
Software/hardware defects
Hardware defects
Software defects
Machine access before/after election

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ELECTRONIC VOTING: LIKELIHOOD

Likelihood (might this happen?)

Motivation

Capabilities

Vulnerabilities

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ELECTRONIC VOTING: LIKELIHOOD

Likelihood (might this happen?)

Motivation

Rig the election

yes!

Vote as someone

yes!

Rig the election

no!

Capabilities

Manufacturer of EVM

Janitor

Voter

Software engineer

Election official

Vulnerabilities

Hardware defects

Access to machines

Weak cryptography

Hardware defects

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ELECTRONIC VOTING: IMPACT

Impact (what if bad things happen?)

Motivation?

Vote as someone else (S)

Rig the election (T)

Learn someone's vote (I)

Prevent others from voting (D)

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ELECTRONIC VOTING: IMPACT

Impact (what if bad things happen?)

Scale

Small group
Huge!
Small to large group
Small to large group



Motivation?

Vote as someone else (S)
Rig the election (T)
Learn someone's vote (I)
Prevent others from voting (D)

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ELECTRONIC VOTING: PROTECTION

Protection (what does it cost?)

Vulnerabilities

Weak cryptography/design
Software/hardware defects
Hardware defects
Software defects
Machine access before/after election

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ELECTRONIC VOTING: PROTECTION

Protection (what does it cost?)

Cost

Expensive (binary)
Cheap - expensive
Expensive
Cheap - expensive
Cheap (risk management)



Vulnerabilities

Weak cryptography/design
Software/hardware defects
Hardware defects
Software defects
Machine access before/after election

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EXAMPLE: HACKING CARS



what is the threat model for driving a car?

ANDY GREENBERG SECURITY 07.21.19 6:00 AM
**HACKERS REMOTELY KILL A JEEP ON THE
HIGHWAY—WITH ME IN IT**

La Jolla, California 92093-0404
Email: {s,dlmccoy,brian.danders,hovav.savage}@cs.ucsd.edu

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Do the exercise again yourself for driving cars, which are increasingly electronic and Internet-connected devices – there are some prompts in the following slides. Alternatively feel free to pick your own setting and work through an example there.

DRIVING A CAR: THREATS

Threats (who is the adversary?)

Capabilities?

Passenger(s)
Manufacturer
Hacker
Other driver(s)
???

Motivation?

Crash the car! (T)

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DRIVING A CAR: VULNERABILITIES

Vulnerabilities (where can system break?)

Capabilities?

Passenger(s)
Manufacturer
Hacker
Other driver(s)
???

Vulnerabilities



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DRIVING A CAR: LIKELIHOOD

Likelihood (might this happen?)

Motivation

Capabilities

Vulnerabilities

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DRIVING A CAR: IMPACT

Impact (what if bad things happen?)

Scale

Motivation?

Crash the car! (T)



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DRIVING A CAR: PROTECTION

—

Protection (what does it cost?)

Cost Vulnerabilities

