

# CONTROL-ALT HACK™

## WHITE HAT HACKING FOR FUN AND PROFIT

Tamara “Tammy” Denning  
Tadayoshi “Yoshi” Kohno  
Adam “Adam” Shostack

*University of Washington*



# WHO WE ARE



Tammy



Yoshi



Adam

- Tammy + Yoshi: University of Washington, Computer Science and Engineering, Security and Privacy Research Lab
- Adam: Honorary member of the UW Security Lab

# THE REST OF THE LAB



Tammy



Yoshi



Adam



Franzi



Karl



Tope



Alexei



Miro

# THE REST OF THE LAB



Roxana



Gabe



Iva



Cynthia



Dan



Franzi



Karl



Tope



Alexei



Miro



# THE REST OF THE LAB



Roxana



Gabe



Iva



Cynthia



Dan



Mike



Anya



Deborah



Mei



Sidhant

# A TYPICAL DAY IN THE LAB

## MISSION

### Crash Test Dummy

The wheel sensor's connected to the...engine computer;  
the engine computer's connected to the...brake computer.  
The modern automobile is completely drive-by-wire.

#### CRYPTANALYSIS

You can plug into the car's internal computer network,  
but you need to bypass the authentication scheme  
before you can get anywhere.

 **HARDWARE HACKING +1**  
Hack the engine.

 **HARDWARE HACKING -1**  
...and the brakes.

 **CONNECTIONS**  
Get access to a race track for some road testing.

**Success:**  **Hacker Cred.** Next round,  
draw an extra Mission card; you may take  
both to the Staff Video Conference before you  
decide which to play (and discard the other).

**Failure:**  **Hacker Cred**

CONTROL-ALT 



# A TYPICAL DAY IN THE LAB



## MISSION

### Here's Looking at You, Kid

A webcam-equipped Wi-Fi robot in the kids' aisle? "Imagine, being able to control your toy robot from a friend's house. You're a super spy!" Time for a pro bono security audit.

#### ★ NETWORK NINJA

I find your lack of encryption disturbing.

#### 🔍 FORENSICS -1

Modify their logging procedures so that they record enough information to detect anomalous logins.

**Success:** No encryption means that anyone can intercept and watch the toy's video stream. Notify the vendor.

**+1 Hacker Cred**

**Failure: -1 Hacker Cred**

CONTROL-ALT HACK™



# A TYPICAL DAY IN THE LAB

## MISSION

### Tech or Treat?

Halloween is fast approaching, and your haunted houses are the stuff of legends.

#### SOFTWARE WIZARDRY

Robotic bat, check. LED-o'-lantern, check. Eerie soundtrack, check. Now choreograph the action with custom software.

#### CRYPTANALYSIS

Will anyone notice the secret message blinking from your pumpkin?

#### SOCIAL ENGINEERING

After all the high-tech tricks, no one was expecting that you'd be hiding inside the "stuffed" scarecrow.

**Success:**  **Hacker Cred** and draw an Entropy Card.

**Failure:**  **Hacker Cred**

CONTROL-ALT 



# A TYPICAL DAY IN THE LAB







# Wait, what?

# Yes, it's a card game

ERIC FULTON	▼	Combination of WAF design and implementation issues, inadequate documentation and inadequate user interfaces, many virtual patches can be trivially bypassed.
ABRAHAM KANG	▼	In this talk I will share the lessons learned from 10 years of web application firewall development. The focus will be on demonstrating the problems that exist today, including a previously unknown flaw in ModSecurity that remained undetected for many years. In addition, I will discuss many evasion techniques that are countered in ModSecurity, but which may be effective against other tools.
KRZYSZTOF KOTOWICZ	▼	
LONG LE	▼	As part of this talk, I will release a catalogue of protocol-level evasion techniques and a complete testing suite.
KYLE OSBORN	▼	
CHRISTEN RIOUX	▼	<b>CONTROL-ALT-HACK(TM): WHITE HAT HACKING FOR FUN AND PROFIT (A COMPUTER SECURITY CARD GAME)</b>
CORY SCOTT	▼	Presented By: Tadayoshi Kohno Tamara Denning Adam Shostack
MICHAEL TRACY	▼	July 25
JONATHAN ZDZIARSKI	▼	You and your fellow players work for Hackers, Inc.: a small, elite computer security company of ethical, white hat hackers that perform security audits and provide consultation services. Their Motto: You Pay Us to Hack You.
<b>TURBO TALKS</b>		
RYAN BARNETT	▼	In 1992, Steve Jackson Games published the game Hacker, satirizing the Secret Service raid that seized drafts of GURPS Cyberpunk. The Hacker game manual helpfully states, "Important Notice To Secret Service! This Is Only A Game! These Are Not Real Hacking Instructions! You Cannot Hack Into Real Computers By Rolling Little Dice!" Now, 20 years later, we wish to announce a new card game that's fun, yes, but also designed to illustrate important aspects of computer security. We licensed our game mechanics (Ninja Burger) from none other than Steve Jackson Games, then created all-new content--complete with illustrations and graphic design--to deal with computer security topics.
SEAN BARNUM	▼	Each person plays as a white hat hacker at a company that performs security audits and provides consulting services. Your job is centered around Missions -- tasks that require you to apply your hacker skills (Hardware Hacking, Software Wizardry, Network Ninja, Social Engineering, Cryptanalysis, Forensics, and more) and a bit of luck in order to
JONATHAN CLAUDIUS	▼	

# MOTIVATION

# CONTEXT

- Security issues litter the news

## Nearly Half a Million Yahoo Passwords Leaked [Updated]

Posted from the

Apple

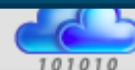
Posted from the

How I

Posted from the

Andre

Posted by samzenpus on Thursday July 12, @06:45PM  
from the protect-ya-neck dept.



## Russian Hacker Sidesteps Apple iOS In-App Purchases

Posted by Soulskill on Friday July 13, @12:25PM  
from the price-is-right dept.



- Same old story:

- People designing product X didn't think about security
- People deploying product X didn't think about security
- People using product X didn't think about security

# CONTEXT

- What's worse:
  - Sometimes companies have security teams that advocate for security, but *product teams can't justify the expense*
  - Sometimes people on the product teams want security, but their *managers can't justify the expense*
- Part of the problem: **awareness** and **priorities**



# OUR KEY QUESTIONS

- How can we get product teams to think about security during development and reach out to security teams?
- How can we get managers to invest in security?
- How can we train the next-generation computer scientists in security?
- Side question: How can we help the general public understand and prioritize security?

# STRATEGY

- Get 'em while they're young!
- Emphasis on:
  - Highschoolers
  - Undergraduates
  - Young developers
- STEM demographic
  - (Science, Technology, Engineering, Math)

# ORIENTATION



# WHY A GAME

- The Security toolbox is too full of sticks
- Let's add carrots
  - Games, humor, etc.
  - Entice people towards security
  - *Control-Alt-Hack*™ is our most recent effort in this direction
  - There's a wide open field!



# WHY A PHYSICAL GAME

- Physical artifact
  - Adam: Elevation of Privilege card deck
  - Tammy + Yoshi: Discovering Security Threats card deck
  - Core Security's *Exploit!*
- Co-location, discussion, collaboration
  - Coffee time, lunch, TGIF
- Social “permission” to explore, admit ignorance
- Humor creates relaxed, open atmosphere

# DIFFERENT TYPES OF GAMES

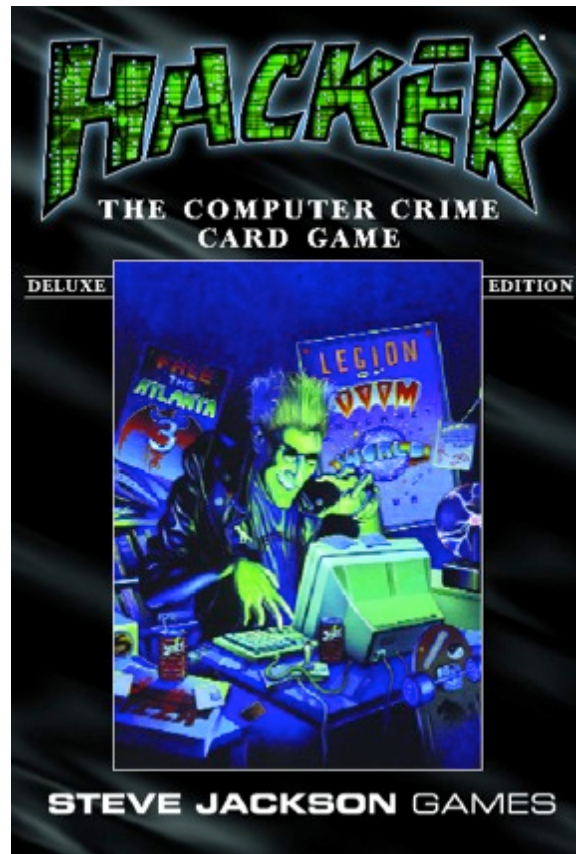
- Different games form a spectrum of:
  - Time to learn, time to play
  - Equipment: cards, boards, dice, etc.
- Craps, War, Blackjack
- Backgammon, Chess, Go
- Trivial Pursuit, Cranium, Apples to Apples
- Settlers of Catan
- Dungeons and Dragons

# DEVELOPING MECHANICS

- We are not game designers
- We scoured game stores for game mechanics
- *Ninja Burger* from Steve Jackson Games!



# Serendipity!



# GAME MECHANICS

- We licensed the Ninja Burger mechanics, but re-did the content for our purposes
- Steve Jackson has provided incredibly valuable advice and feedback
- (Though any problems are purely our own)





# CONTROL-ALT HACK™

# CONTROL-ALT-HACK™

## WHITE HAT FOR



## CONTROL-ALT-HACK™

You and your fellow players work for Hackers, Inc.: a small, elite computer security company of ethical (a.k.a., white hat) hackers who perform security audits and provide consultation services. Their motto? "You Pay Us to Hack You."

Your job is centered around Missions—tasks that require you to apply your hacker skills (and a bit of luck) in order to succeed. Use your Social Engineering and Network Ninja skills to break the Pacific Northwest's power grid, or apply a bit of Hardware Hacking and Software Wizardry to convert your robotic vacuum cleaner into an interactive pet toy...no two jobs are the same. So pick up the dice, and get hacking!

**AGES** 14 & UP  
**PLAYERS** 3 - 6  
**GAME TIME** APPROXIMATELY 1 HOUR

### GAME INCLUDES

**1 RULEBOOK**

**3 DICE**

**156 GAME CARDS**

16 Hacker Cards

56 Mission Cards

72 Entropy Cards

12 Attendance Cards

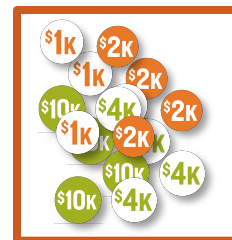
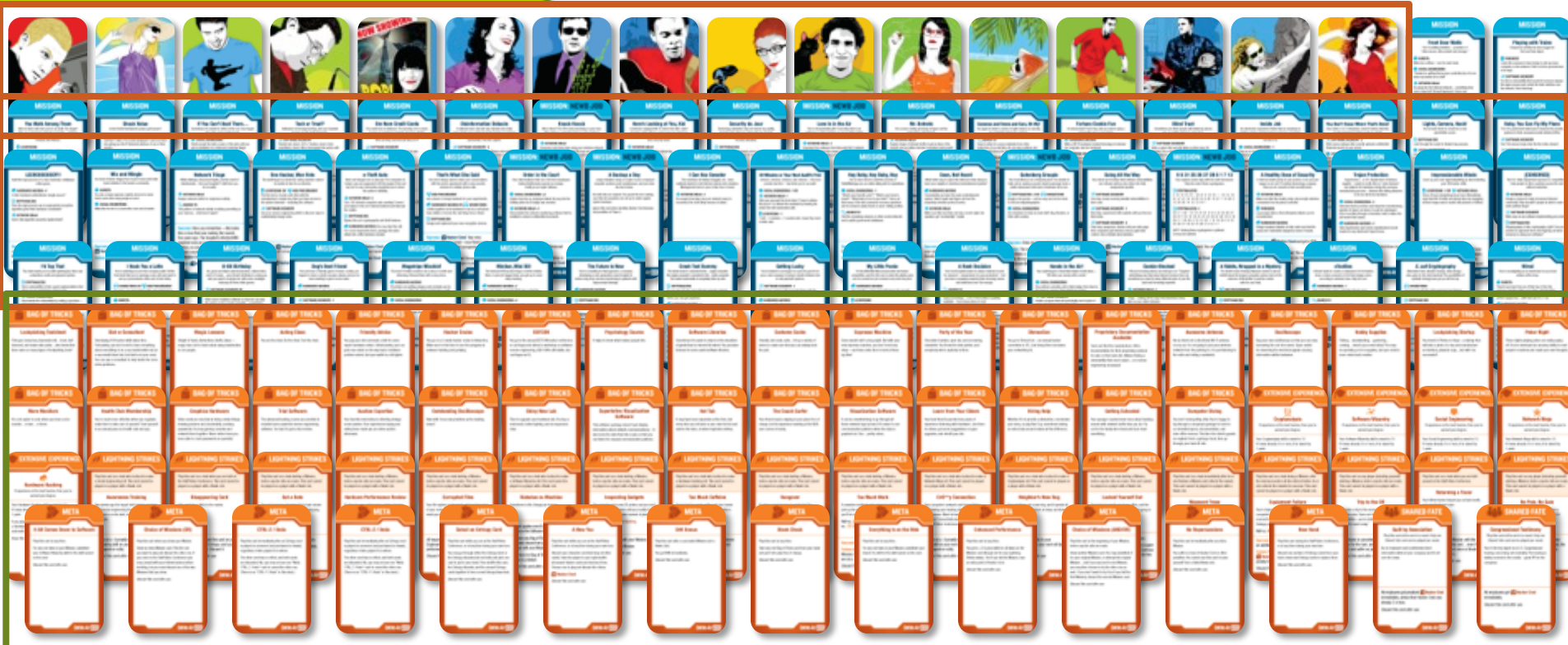
**58 HACKER CRED TOKENS**

**42 MONEY TOKENS**



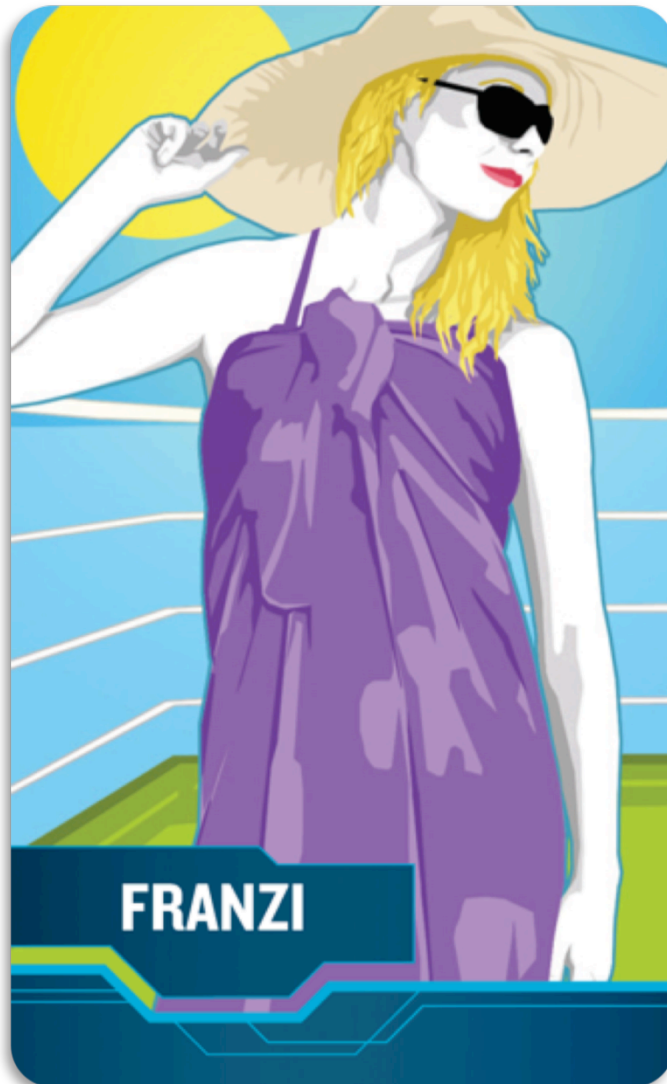
[www.ControlAltHack.com](http://www.ControlAltHack.com)

# DELICIOUS CONTENTS



CONTROL-ALT-HACK™

# THE HACKER CARD



**FRANZI**

12 HARDWARE HACKING			9 CRYPTANALYSIS
12 NETWORK NINJA			12 CONNECTIONS
8 SOCIAL ENGINEERING			8 BARISTA
* SOFTWARE WIZARDRY			10 KITCHEN SINK

She never fails a Software Wizardry roll, no matter what.

When not working as the company's resident software wizard, Franzl spends her time traveling to new places and meeting new people. Her current record is 13 countries in one year.

CONTROL-ALT HACK™

# HACKER SKILLS

## Skills all hackers have

Hardware Hacking 

Software Wizardry 

Network Ninja 

Social Engineering 

Cryptanalysis 

## Extra skills

 Barista

 Connections

 Web Procurement

 Forensics

 Lockpicking

 Search Fu






 Kitchen Sink (catchall)



# THE MISSION CARDS



## FRANZI

12 HARDWARE HACKING		 9 CRYPTANALYSIS
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* SOFTWARE WIZARDRY		 10 KITCHEN SINK

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## MISSION

### Lights, Camera, Hack!

You've been hired to consult on a new cyberthriller movie.

 **CRYPTANALYSIS**  
Look through the script for blatant inaccuracies.

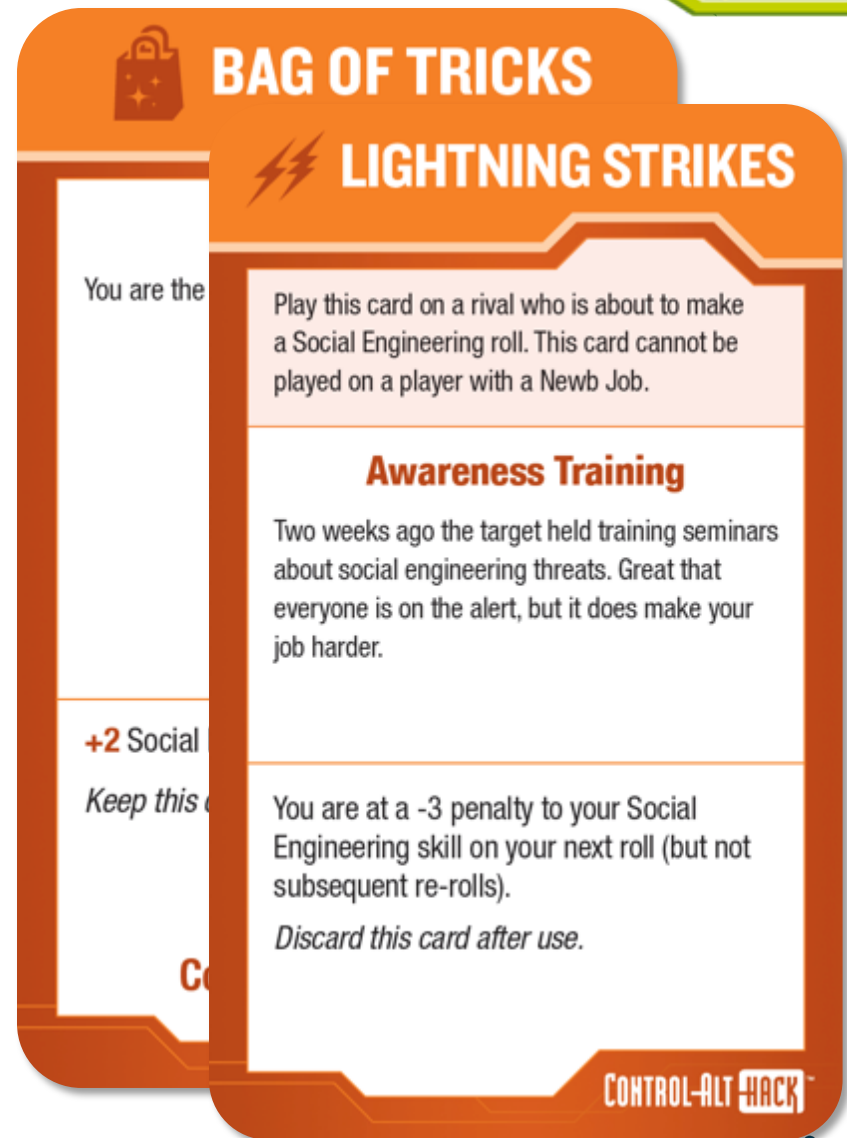
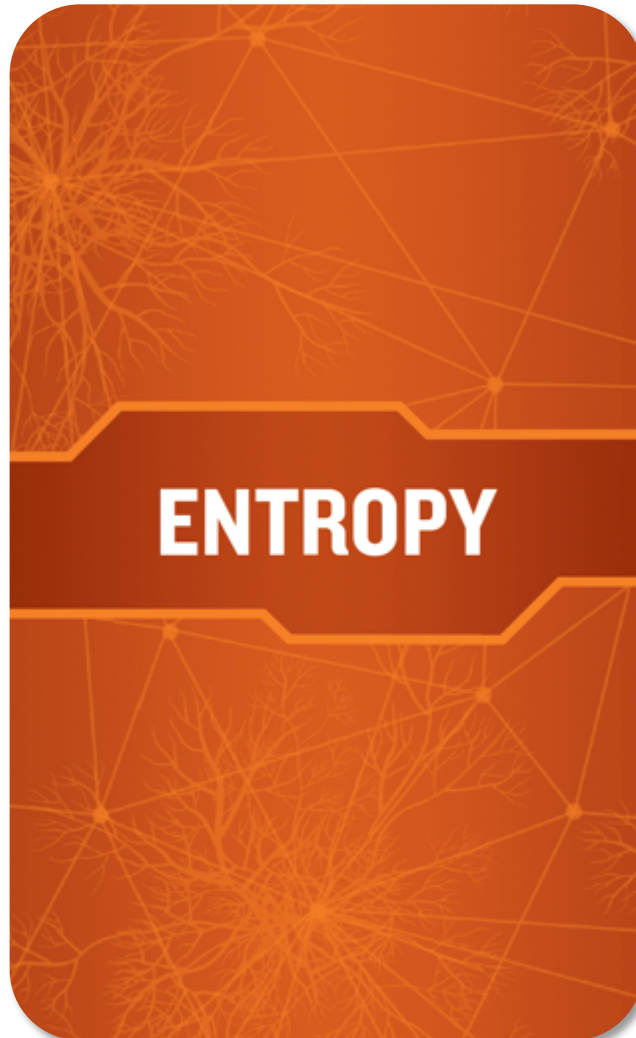
 **SOCIAL ENGINEERING +3**  
Can you convince the producers that hacking doesn't actually look like a speed-typing race?

**Success:** You're don't know that many hackers that code in leather bodysuits or designer sunglasses, but no one in your office is complaining. **+1 Hacker Cred**

**Failure:** You've already told everyone about consulting on the movie, so its inaccuracies are triply embarrassing. **-3 Hacker Cred**

CONTROL-ALT HACK™

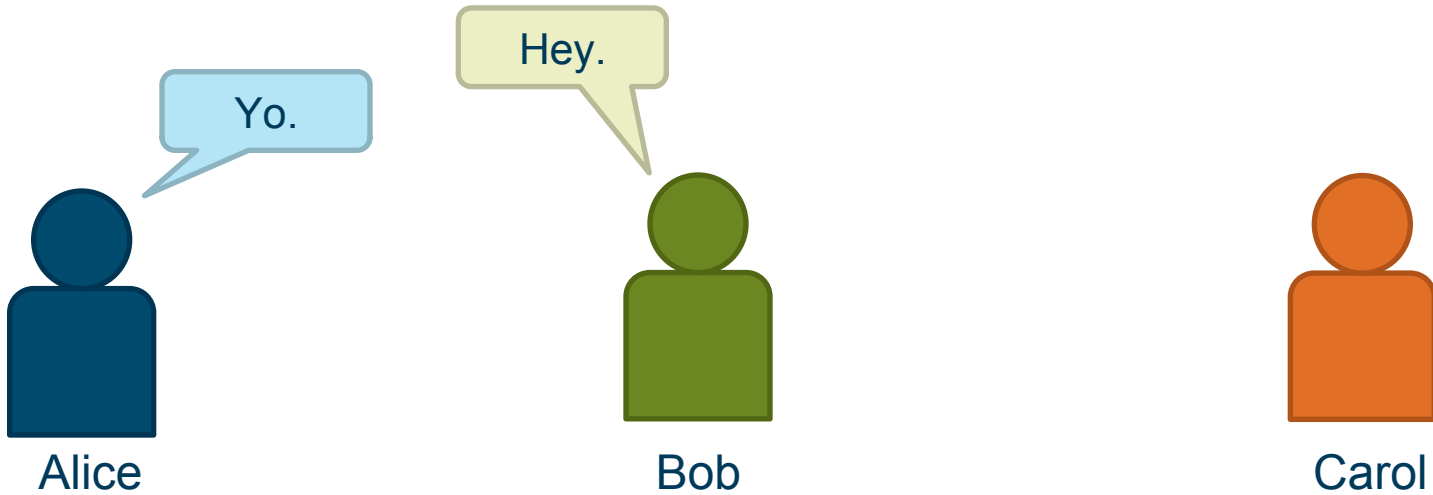
# THE ENTROPY CARDS



# HOW TO PLAY



**Alice, Bob, and Carol are playing.**



## DEBORAH

...

10	CRYPTANALYSIS
11	SEARCH FU
9	KITCHEN SINK

Once per turn, she may substitute any one skill for any other skill. This substitution only applies to one task.

As a connoisseur of misbehavior, Deborah's nothing better than a lazy snoop. She knows better than to have a challenge based on what her boss is watching.

**Alice**

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## GABRIEL

...

10	CRYPTANALYSIS
11	SEARCH FU
8	KITCHEN SINK

He normally draws two Mission cards and chooses which one he wants to use. If he comes to the Staff Video Conference, he may look at the other players' assigned Missions before he decides. The other drawn Mission is discarded.

Baking, cheesecake, and getting into the office, and getting out of the office.

**Bob**

CONTROL-ALT-HACK

## TOPE

...

9	CRYPTANALYSIS
12	BARISTA
10	KITCHEN SINK

He normally gets \$10K at the beginning of each round (instead of \$5K).

Tope is as passionate about music as he is about elegant code. He has regular gigs playing the acoustic guitar at local lounges.

**Carol**

CONTROL-ALT-HACK

### DEBORAH

10	CRYPTANALYSIS
11	SEARCH FU
9	KITCHEN SINK

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CONTROL-ALT-HACK

### GABRIEL

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CONTROL-ALT-HACK

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Everyone gets: 3 Entropy Cards, 1 Hacker Cred Card, 1 Not Attending Card, and 6 Keypunch Cards.



Alice



Bob



Carol



Ready to start playing...



5  
HACKER  
CRED

1  
HACKER  
CRED

Alice



5  
HACKER  
CRED

1  
HACKER  
CRED

Bob



5  
HACKER  
CRED

1  
HACKER  
CRED

Carol



DEBORAH


12	HACKER CRED	12	CONFIDENTIAL
10	NETWORK KNOW	11	SEARCH FU
11	SOCIAL ENGINEERING	9	RETHINK DATA
10	SOFTWARE WEAPON		

Once per turn, she may substitute any one skill for any other skill. This substitution only applies to one task.

As a consequence of Deborah's skill, nothing better than a key map on a Saturday afternoon, she knows better than to have a challenge task on what Peter's a workman.

[ENTROPY-4] [CRED]





GABRIEL

13	HACKER CRED	12	CONFIDENTIAL
10	NETWORK KNOW	14	LOCKDOWN
9	SOCIAL ENGINEERING	9	RETHINK DATA
10	SOFTWARE WEAPON		

He normally draws two Mission cards and chooses which one he wants to use. If he comes to the Staff Video Conference, he may look at the other players' engaged Missions before he decides. The other drawn Mission is discarded.

Being, chessmaking, knowing, getting—Gabriel's map about food. He's always bringing his robot cousin to the office, and gets as well as a good in school.

[ENTROPY-4] [CRED]





TOPE

11	HACKER CRED	12	CONFIDENTIAL
11	NETWORK KNOW	12	BARBERS
11	SOCIAL ENGINEERING	10	RETHINK DATA
11	SOFTWARE WEAPON		

He normally gets \$10K at the beginning of each round (instead of \$20K).

Tope is an passionate about music as he is about elegant code. He has regular gigs playing the acoustic guitar at local venues.

[ENTROPY-4] [CRED]



# Round 1

## Phase 1: Distribute Money and Draw Entropy Cards.



## Phase 2: Draw Mission Cards.



**Alice**

\$2K

5 HACKER CRED  
1 HACKER CRED

**Bob**

\$2K

5 HACKER CRED  
1 HACKER CRED

**Carol**

\$2K  
\$1K

5 HACKER CRED  
1 HACKER CRED

**DEBORAH**

12	12	12
12	12	12
12	12	12
12	12	12
12	12	12

Draw one per turn, after may substitute any one skill for any other skill. This substitution only applies to one task.

As a consequence of Deborah's nothing better than a big map on a Saturday afternoon, she knows better than to take a challenge based on what Peter's a workman.

[CONTINGENCY: 100%]



**GABRIEL**

12	12	12
12	12	12
12	12	12
12	12	12
12	12	12

He normally draws two Mission cards and chooses which one he wants to use if he comes to the Staff Video Conference, he may look at the other player's engaged Missions before he decides. The other drawn Mission is discarded.

Being, often making, knowing, getting—Gabriel's map about food. He's always bringing his robot cousin to the office, and gets as well to as good as nothing.

[CONTINGENCY: 100%]



**TOPE**

12	12	12
12	12	12
12	12	12
12	12	12
12	12	12

He normally gets \$2K at the beginning of each round (instead of \$1K).

Tope is an passionate about music as he is about playing cards. He has regular gigs playing the acoustic guitar at local venues.

[CONTINGENCY: 100%]





## ATTENDING

If you choose to attend the Staff Video Conference, play this card face down during Phase 2.

If you attend the Staff Video Conference, you:

- > draw an additional Entropy card.
- > may trade or bargain with other players to exchange Missions.
- > may be stuck with a Newb Job, if you have a low Hacker Cred score (see rules).
- > may push your Newb Job onto a player with a low Hacker Cred score (see rules).

If you are the only player who attends the Staff Video Conference, you also get one free re-roll during your Mission.

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\$2K



## NOT ATTENDING

If you choose to NOT attend the Staff Video Conference (and instead have “connectivity issues”), play this card face down during Phase 2.

If you do not attend the Staff Video Conference, you get one free re-roll during your Mission.

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5  
HACKER  
CRED

1  
HACKER  
CRED

Bob



\$2K



Alice



5  
HACKER  
CRED

1  
HACKER  
CRED



\$2K



Bob



5  
HACKER  
CRED

1  
HACKER  
CRED



\$2K  
\$1K



Carol



5  
HACKER  
CRED

1  
HACKER  
CRED





## Phase 3: Staff Video Conference.

Trade Me!

No.

\$2K



Alice

5  
HACKER  
CRED  
1  
HACKER  
CRED

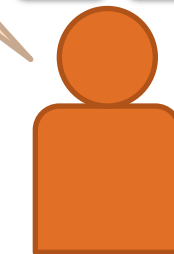
\$2K



Bob

5  
HACKER  
CRED  
1  
HACKER  
CRED

\$1K



Carol

5  
HACKER  
CRED  
1  
HACKER  
CRED





# rand()

## Phase 4: The Missions (Player Turns).

7

MISSION

5 HACKER CRED  
1 HACKER CRED

\$2K

Alice

14

MISSION

5 HACKER CRED  
1 HACKER CRED

\$2K

Bob

12

MISSION

5 HACKER CRED  
1 HACKER CRED

\$2K  
\$1K

Carol

DEBORAH

12 HARDWARE HACKING, 12 CONFIDENTIALITY, 12 NETWORK NUISANCE, 11 SEARCH FU, 11 SOCIAL ENGINEERING, 11 RETIRED DATA, 10 SOFTWARE WEEDING

ENTROPY

GABRIEL

13 HARDWARE HACKING, 12 CONFIDENTIALITY, 12 NETWORK NUISANCE, 14 LOCKPOCKETS, 10 SOCIAL ENGINEERING, 10 RETIRED DATA, 10 SOFTWARE WEEDING

ENTROPY

TOPE

11 HARDWARE HACKING, 12 CONFIDENTIALITY, 11 NETWORK NUISANCE, 11 SEARCH FU, 11 SOCIAL ENGINEERING, 11 RETIRED DATA, 11 SOFTWARE WEEDING

ENTROPY

Phas

ns).

## MISSION

### Blind Trust

Sometimes you think people will install any phone app, no matter where it comes from.  
Time for an experiment.

#### SOFTWARE WIZARDRY

Write a game that secretly takes a photo every 30 minutes. (As a white hat, you play nice, so don't upload them!)

#### SOCIAL ENGINEERING

What would make your game popular? Pigs? Birds? Kittens? Chainsaws?

**Success:** They may have trusted you, but your app isn't so blind. Some of those photos could be really, um, interesting.

**+1 Hacker Cred**

**Failure:** You released a Trojan app—what were you thinking? **-1 Hacker Cred**

CONTROL-ALT-HACK



Alice

\$2k

5  
HACKER  
CRED

1  
HACKER  
CRED



Carol

\$2k

\$1k

5  
HACKER  
CRED

1  
HACKER  
CRED





## LIGHTNING STRIKES

Play this card on a rival starting a Mission, before *any* die rolls are made. This card cannot be played on a player with a Newb Job.

### Got a Date

You met someone charming! Get a last-minute reservation for tonight's date at that amazing Thai place.

Roll vs. 🐱 Social Engineering.

**Success:** Continue with your Mission.

**Failure:** -1 Hacker Cred immediately. Continue with your Mission.

*Discard this card after use.*

CONTROL-ALT HACK™

:(



5  
HACKER  
CRED

1  
HACKER  
CRED

Alice

\$2k



5  
HACKER  
CRED

1  
HACKER  
CRED

Carol

\$2k

\$1k





# rand()

Phase

## LIGHTNING STRIKES



## DEBORAH

“...”



5  
HACKER  
CRED  
  
1  
HACKER  
CRED

\$2K

Alice



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### Got a Date

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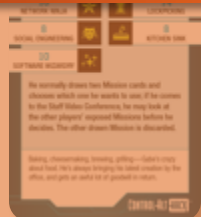
Roll vs.  Social Engineering.








**Success:** Continue with your Mission.

**Failure:**  **Hacker Cred** immediately. Continue with your Mission.

*Discard this card after use.*

CONTROL-ALT-HACK™



12 HARDWARE HACKING			10 CRYPTANALYSIS
10 NETWORK NINJA			11 SEARCH FU
11 SOCIAL ENGINEERING			9 KITCHEN SINK
10 SOFTWARE WIZARDRY			

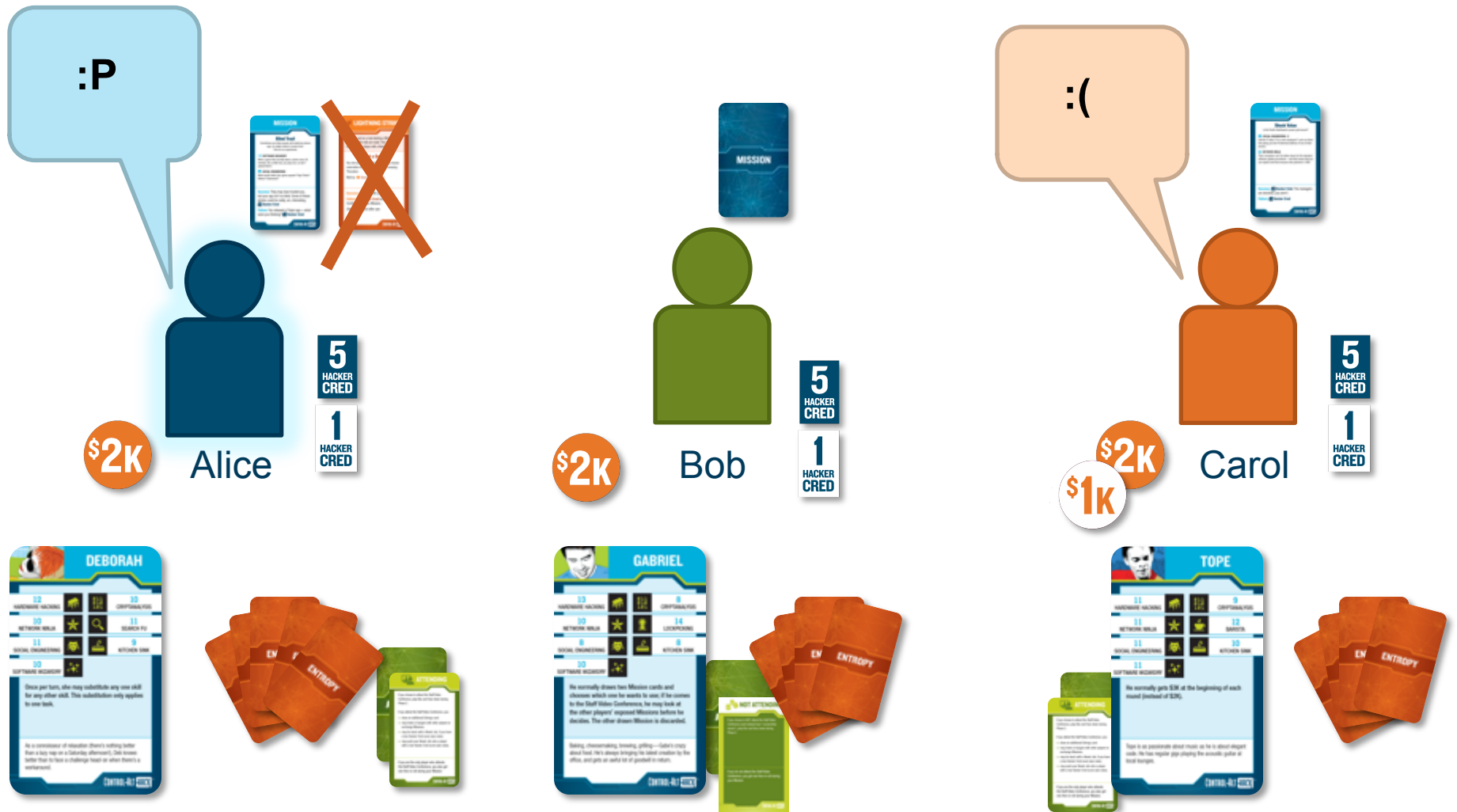
Once per turn, she may substitute any one skill for any other skill. This substitution only applies to one task.

As a connoisseur of relaxation (there's nothing better than a lazy nap on a Saturday afternoon!), Deb knows better than to face a challenge head-on when there's a workaround.

CONTROL-ALT-HACK™



## Phase 4: The Missions (Player Turns).





# rand()

Phase

MISSION

Turn

DEBORAH

8



5  
HACKER  
CRED  
  
1  
HACKER  
CRED

\$2K

Alice



## Blind Trust

Sometimes you think people will install any phone app, no matter where it comes from.  
Time for an experiment.

### SOFTWARE WIZARDRY

Write a game that secretly takes a photo every 30 minutes. (As a white hat, you play nice, so don't upload them!)

### SOCIAL ENGINEERING

What would make your game popular? Pigs? Birds? Kittens? Chainsaws?

**Success:** They may have trusted you, but your app isn't so blind. Some of those photos could be really, um, interesting.

**+1 Hacker Cred**

**Failure:** You released a Trojan app—what were you thinking? **-1 Hacker Cred**

CONTROL-ALT-HACK



12  
HARDWARE HACKING



011  
010  
101

10  
CRYPTANALYSIS

10  
NETWORK NINJA



11  
SEARCH FU

11  
SOCIAL ENGINEERING



9  
KITCHEN SINK

10  
SOFTWARE WIZARDRY



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CONTROL-ALT-HACK







# rand()

Phase

MISSION

Turn

DEBORAH

10



5  
HACKER  
CRED

1  
HACKER  
CRED

Alice

\$2K



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CONTROL-ALT-HACK



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10 SOFTWARE WIZARDRY	

Once per turn, she may substitute any one skill for any other skill. This substitution only applies to one task.

As a connoisseur of relaxation (there's nothing better than a lazy nap on a Saturday afternoon!), Deb knows better than to face a challenge head-on when there's a workaround.

CONTROL-ALT-HACK





## Phase 4: The Missions (Player Turns).

☹️

  
Alice




☹️

  
Bob




☹️

  
Carol


  
DEBORAH








  
GABRIEL








  
TOPE












# rand()



## NOT ATTENDING

If you choose to NOT attend the Staff Video Conference (and instead have “connectivity issues”), play this card face down during Phase 2.

If you do not attend the Staff Video Conference, you get one free re-roll during your Mission.

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Alice

\$2K

5  
HACKER  
CRED

1  
HACKER  
CRED

1  
HACKER  
CRED



Carol

\$2K

\$1K

5  
HACKER  
CRED

1  
HACKER  
CRED





## BAG OF TRICKS

### Magic Lessons

Sleight of hand, distractions, bluffs, fakes—magic has a lot to teach about using misdirection to con people.

Once per turn, you may re-roll a failed Social Engineering roll.

*Keep this card in play.*

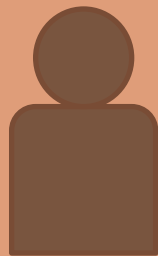
Cost: \$2K

CONTROL-ALT-HACK™

10



\$2K



Alice

5  
HACKER  
CRED

1  
HACKER  
CRED

1  
HACKER  
CRED

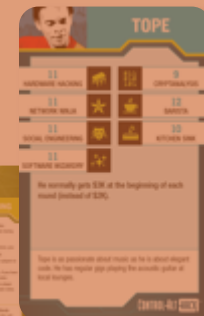
\$2K



Carol

5  
HACKER  
CRED

1  
HACKER  
CRED





# rand()

## Phase 4: The Missions (Player Turns).



Alice

\$2K

5  
HACKER  
CRED

1  
HACKER  
CRED

1  
HACKER  
CRED



Bob

\$2K

5  
HACKER  
CRED

13



Carol

\$2K

\$1K

5  
HACKER  
CRED

1  
HACKER  
CRED



## Phase 4: The Missions (Player Turns).



## Phase 5: Hacker Cred Bonus/Penalty





## Phase 6: Discard Entropy Cards



## Phase 7: Check Hacker Cred

Diagram illustrating Phase 7: Check Hacker Cred, showing three players (Alice, Bob, and Carol) and their associated cards and resources.

**Alice** (Blue icon):

- Associated with a **\$2k** resource.
- Has **5 HACKER CRED** (blue card).
- Has **1 HACKER CRED** (white card).
- Has **1 HACKER CRED** (white card).
- Has a stack of **ENTROPY** cards (orange).
- Has a **DEBORAH** card (blue) with a table of skills and a mission description.
- Has a **MISSION** card (green) with a mission description.

**Bob** (Green icon):

- Associated with a **\$2k** resource.
- Has **5 HACKER CRED** (blue card).
- Has a stack of **ENTROPY** cards (orange).
- Has a **GABRIEL** card (blue) with a table of skills and a mission description.
- Has a **MISSION** card (green) with a mission description.

**Carol** (Orange icon):

- Associated with a **\$1k** resource.
- Has **5 HACKER CRED** (blue card).
- Has a stack of **ENTROPY** cards (orange).
- Has a **TOPE** card (blue) with a table of skills and a mission description.
- Has a **MISSION** card (green) with a mission description.



# And that's a round!

(...you get the hang of it as you play)



# INCORPORATING LEARNING OBJECTIVES

# “PUBLIC RELATIONS”

- Computer science can be fun!
- Computer security can be fun!
- Stereotypes are inhibitory – computer science and computer security can be for anyone



- Help broaden the public's understanding of the word “hacker”

# KEY LEARNING OBJECTIVES

- Computer security != laptops, desktops, and the Web
- Diversity of attack techniques and attacker goals

Example Attack Techniques	Example Technologies
Cross-correlating data sources	Botnets
Disinformation	Censorship / Anti-censorship
Distractions	Consumer home technologies
Denial of service	Cyber-physical systems
Exploiting unpatched software	Financial systems
Exploiting weak passwords	Medical devices
Inside information	Military systems
Insider threat	Mobile phones
Physical compromises	RFID
Reverse engineering	SCADA / Infrastructure
Sniffing unencrypted data streams	Standards
Social engineering	Tracking / Tracking circumvention
Special equipment	

# SOCIAL ENGINEERING

## MISSION

### I Hack You a Latte

You're switching it up for this company audit. Tell the front desk that you're opening a new café and want to set up a promotional coffee cart in their lobby.

 **CONNECTIONS OR**  **WEB PROCUREMENT**


Of course, you need actual coffee cart equipment to pull this off.

 **BARISTA**

12oz, non-fat, split-shot, extra-hot, 3-pump mocha with whip. Can you keep all the orders straight?

 **NETWORK NINJA** 1

Plug into their internal wired network when nobody's looking and pwn them.

**Success:**  **1 Hacker Cred.** Choose one Bag of Tricks card from your hand or the discards; you can play the item free of charge.

**Failure:**  **1 Hacker Cred**

CONTROL-ALT 

CONTROL-ALT 



# NONSTANDARD TARGET

## MISSION

### Shock Value

Is the Pacific Northwest's power grid secure?

#### SOCIAL ENGINEERING -2

Call the IT desk ("I'm a new employee!") and con them into giving you the IP (Internet) address of one of their servers.

#### NETWORK NINJA

Their computers can't be taken down for the standard software update procedures—and that means that you can exploit code that everyone else patched in 1999.

**Success:**  **+2 Hacker Cred.** The managers are shocked; you aren't.

**Failure:**  **-1 Hacker Cred**

CONTROL-ALT 

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# UNUSUAL ATTACKS



## BAG OF TRICKS

### Dumpster Diving

You don't mind getting dirty. You're happy to dig through a company's garbage to look for un-shredded specs, documentation, and inter-office memos. This time the client's guards are vigilant. Rent a garbage truck, then go through your haul off-site.

Play this card during a Mission.  
All your Hardware Hacking rolls for the Mission are automatic successes.

*Discard this card after use.*

**Cost:** \$4K

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# HUMOR!

## MISSION: NEWB JOB

### Love Is in the Air

You're demonstrating Wi-Fi security risks in an auditorium of 500 students as part of Online Awareness Week.

#### ★ NETWORK NINJA -3

Download free software that intercepts Wi-Fi traffic, then displays the images that nearby devices are browsing. Live demos are jinxed, so triple everything.

**Success:** The students got the point. But next time, verify that all students are 18+ before the demo. **+1 Hacker Cred**

**Failure:** **-1 Hacker Cred**

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## MISSION

### I'd Tap That

The client

CRYP

Find a vul

allows yo

SOC

Demonst

with per

FORE

Recomm

help dete

Succes

Bag of

discard

Failure

## MISSION

### Going All the Way

Your client

an

SOF

First step

their cod

SOF

Next step

that wor

SOF

Final step

their com

control. C

Succes

Failure

## MISSION

### That's What She Said

You don't always want to share your conversations with the world; experiment with a new security scheme for cellular phone calls.

#### WEB PROCUREMENT

Get a bunch of cheap handsets for your experiments.

#### HARDWARE HACKING OR CONNECTIONS

Cobble together some hardware to act as a cell phone base station or borrow the real thing from a friend.

#### CRYPTANALYSIS

Design and implement your new encryption scheme.

**Success:** **+1 Hacker Cred.** Your new cellular protocol is great—now there's one more secure option that companies can decide not to use.

**Failure:** **-1 Hacker Cred.** Discard one Bag of Tricks card that you have in play.

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# REFERENCES!



# SECURITY JOKES

## MISSION: NEWB JOB

**9 6 31 25 26 27 28 6 1 7 13**

Your nephew needs help with his math homework.  
Help him solve these cryptograms.

### CRYPTANALYSIS

2 14 12 12 27 , 23 27 6 12 16 — 16 15 16  
31 27 21 14 18 25 14 9 26 13 27 7 14 26 2  
15 20 28 14 12 13 14 ?

### CRYPTANALYSIS -1

23 2 1 26 ' 13 31 27 21 6 9 6 31 25 26 27  
30 21 ? 16 15 16 31 27 21 20 27 26 15 9 14  
26 2 1 26 26 2 15 13 23 1 13 14 20 9 6 31  
25 26 14 16 23 15 26 2 6 13 1 ?

NOTE: Solving these cryptograms is optional.  
Groovy, but optional.

**Success:** No reward. You were expected to  
succeed.

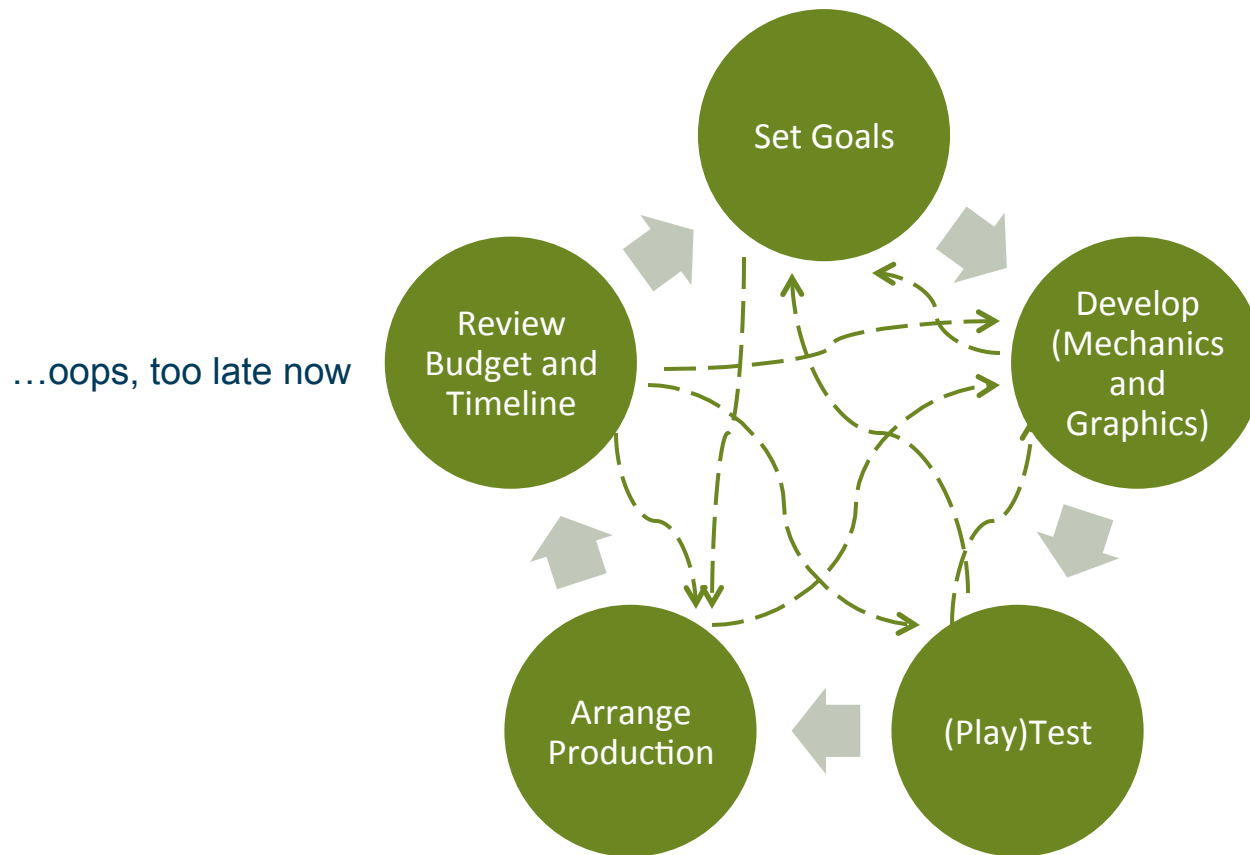
**Failure:**  **Hacker Cred.**

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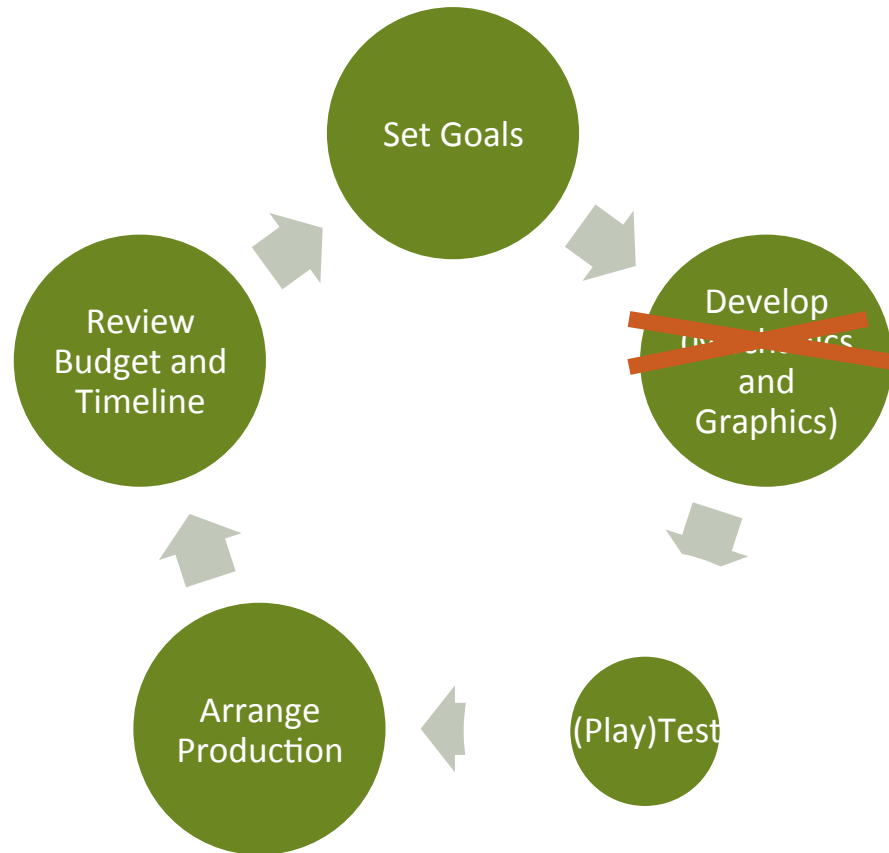
# DEVELOPMENT PROCESS

# DEVELOPMENT OVERVIEW





# DEVELOPMENT OVERVIEW



# CARD TOPICS

## neat attack techniques or characteristics

- special equipment
- man-hours
- distraction
  - enter building when there's a large conference going on
- false positives with alarm systems
- technical skills
- physical skills
- social skills
- inside information: design sc
- inside information: implemen
- inside information: usage or
- anonymity
- web tracking / advertisers
  - history stealing
- legislative changes
- online predators
- standards changes
- latent threat
- diverse geographic jurisdiction
- 3d printing
- destroy forensic logs
- buffer overflow
- DDoS
- DNS
- SSL cert problem
- reverse engineering
- using the reflections on teap
- Extortion
- Firesheep (kind of -- we have
- resale of ill-gotten goods
- human CAPTCHA-solving se
- Don't lose sensitive informat

## target technologies

- high-tech soda machine
- antivirus definitions
- medical devices
- elevators
- airport
- synthetic biology
- bank
- voting
- targeted malware
- bad random number generators
- some missions involve non-technical things, like appeal of computer science
- do something with eTextiles
- power grid
- train system
- traffic lights
- coffee shop snooping/injection
- RFID/ID systems
- casinos/gambling machines
- Augmented Reality
- Personal Sensors
- 3D printing (although there is a 3D printing-relate
- water
- food (shipping)

## Other category

- CISSP certification -- costs money.
- Maybe need to get trained in ethics?
- Does this fit here or with interesting times: You find a vulnerability and go straight to the media without thinking through the consequences. In this case, you should have told the manufacturers first. Lose reputation / get reprimanded.
- Another thing to do with money (if fail a mission): Donate to the EFF, donate to UMW, donate to Tor.

## customers

- charity
- friend or family
- government
- company
- university

## attackers

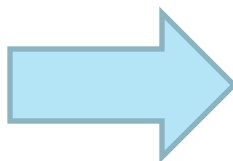
- hobbyist
- employee
- honest but curious
- neighbor
- script kiddy
- government
- organized crime
- group (a la anonymous)

## assets

# MAPPINGS

## Ninja Burger Skills

- Combat
- Stealth
- Disguise
- Climbing
- Customer Service
- Driving
- Math
- Ninja Lore
- Computers
- Animals
- Swimming



## Control-Alt-Hack Skills

- Hardware Hacking
- Network Ninja
- Social Engineering
- Software Wizardry
- Cryptanalysis
- Lockpicking
- Forensics
- Search Fu
- Barista
- Connections
- Web Procurement

# THE PROCESS

## Jim Bob's Trailer

*Ah've got a hankerin' for thet Ninja Burger goodness...*

- (1) **Combat at -1**: Meet Jim Bob's neighbors.
- (2) **Animals**: Meet Jim Bob's pit bull.
- (3) **Combat at +1**: Meet Jim Bob's kids.
- (4) **Customer Service**: When Jim Bob smiles, smile back.

**Success:** Gain 1 Honor and the Branch Manager's respect. Next round, draw two Mission cards; you may take both to the Staff Meeting before you decide which to play.

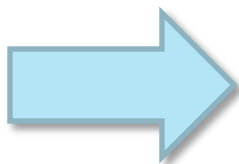
**Failure:** Lose 1 Honor.



# MAPPINGS

## Ninja Burger Skills

- Combat
- Stealth
- Disguise
- Climbing
- Customer Service
- Driving
- Math
- Ninja Lore
- Computers
- Animals
- Swimming



## Control-Alt-Hack Skills

- Hardware Hacking
- Network Ninja
- Social Engineering
- Software Wizardry
- Cryptanalysis
- Lockpicking
- Forensics
- Search Fu
- Barista
- Connections
- Web Procurement

# TRY 1

## (47) Something about a startup

What's the startup about? It could be a generic social networking blah blah, but how about maybe powerline emission security?

**Connections.** Use your connections to get funding.

**Hardware Hacking at +1.**

**Hardware Hacking at -1.**

**Cryptanalysis.** Devise a scheme to add white noise/filter...

**Success:** +1 Reputation. Next round, draw two Mission cards; you may take both to the Staff Video Conference before you decide which to play.

**Failure:** -1 Reputation.

# TRY 2

## (47) Crash Test Dummy

The wheel sensor's connected to the ... engine computer; the engine computer's connected to the ... brake computer. The modern automobile is completely drive-by-wire.

**Cryptanalysis.** You can plug into the car's internal computer network, but you need to bypass the authentication scheme before you can get anywhere.

**Hardware Hacking at +1.** Hack the engine.

**Hardware Hacking at -1.** ...and the brakes.

**Connections.** Get access to a race track for some road testing.

**Success:** +1 Reputation. Lights, speedometer, transmission, airbags – is there anything on the car that you *can't* control?

**Failure:** -1 Reputation



# TA-DA!

## MISSION

### Crash Test Dummy

The wheel sensor's connected to the...engine computer;  
the engine computer's connected to the...brake computer.  
The modern automobile is completely drive-by-wire.



#### CRYPTANALYSIS

You can plug into the car's internal computer network,  
but you need to bypass the authentication scheme  
before you can get anywhere.



#### HARDWARE HACKING +1

Hack the engine.



#### HARDWARE HACKING -1

...and the brakes.



#### CONNECTIONS

Get access to a race track for some road testing.

**Success:** **+1 Hacker Cred.** Next round,  
draw an extra Mission card; you may take  
both to the Staff Video Conference before you  
decide which to play (and discard the other).

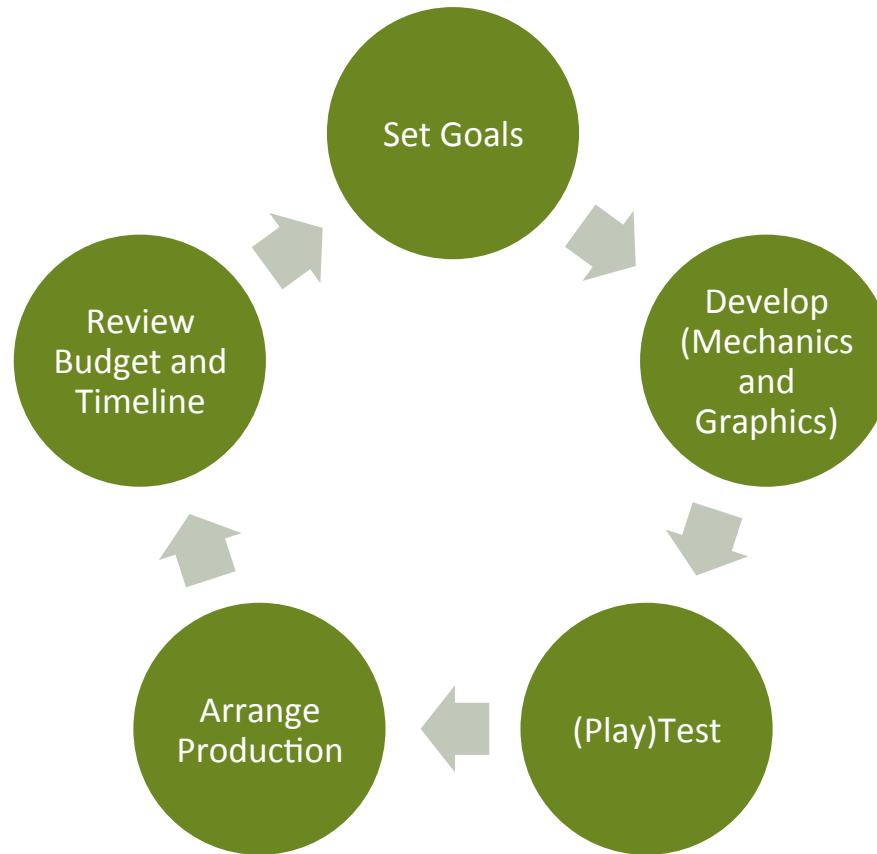
**Failure:** **-1 Hacker Cred**

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# ONE DOWN...

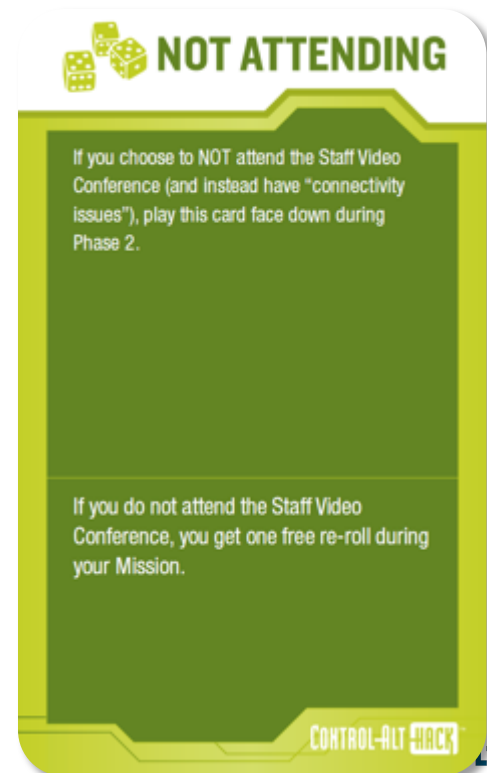
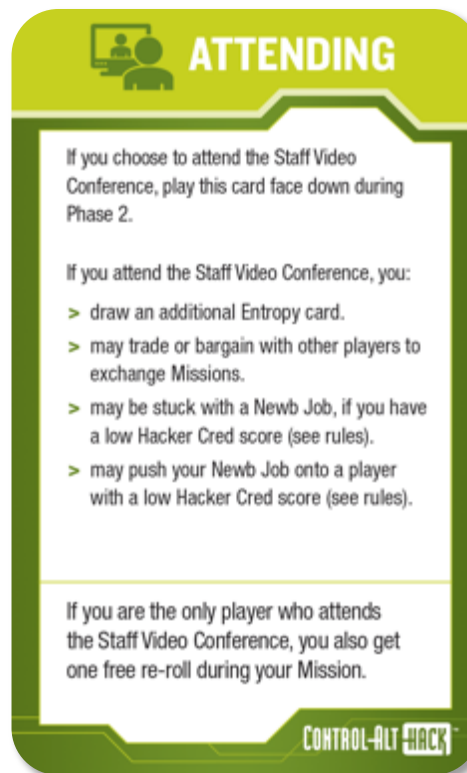
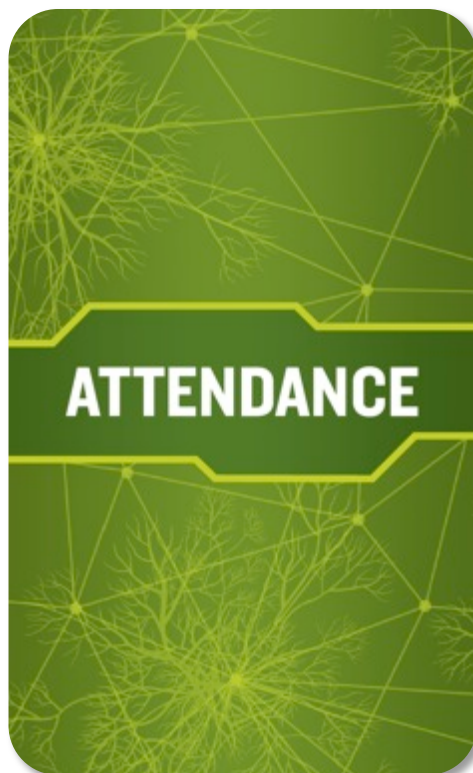
Mission Card	Combat	Stealth	Disguise	Climbing	Customer Service	Driving	Math	Ninja Lore	Computers	Animals	Swimming	Type of Technology	Adversary Capabilities	Adversary Motivations	Attack Techniques	Security Goals
Possible Mapping	Hardware Hacking	Network Ninja	Social Engineering	Software Wizardry	Cryptanalysis	Lockpickir	Forensi	Search Fu	Barista	Connections (aka Con Speaker or Social Network, was Legal)	eBay					
Errand: Work the Phones					0,-1							airports (not airplanes)	social engineering	cause havoc	social engineering, uniforms	
Figure Skating Championships			0,-1													
Frat House		-1 or Disguise	-1			-1?										
Game Store	1	0			0											
Health Spa		-3														
Ice Station Giraffe					0						0					
International Space Station				-2			0					web		financial motivation	disinformation, software vulnerability on a web site	integrity
Jim Bob's Trailer	-1,1				0						0					
Jury Room			-2,-1									social networking / phishing		damage reputation of company	spear phishing email	protect reputation
La Maison Ritze		0		-2								Infrastructure, cyber-physical		accidental, bored	social engineering (phone call), exploit unpatched software	integrity / availability
Ladder Company No 6	0			-1												
Lighthouse					0	0 OR Swimming					0 OR Driving	electronic voting machine		change election	reverse engineering	integrity of election
Little Sally Down the Well	0	-2			0											
Mad Scientist's Lab	0	0					0									
Mardi Gras	-2			1												
Mongoplex 50		0						0								
Mount Everest				0,-1,-2												
Nuclear Submarine		-1								0 0 OR Swimming	0 OR Animals					
Office Cube 2357-B				0			0					cyber-physical system / railroad		political purposes		
Officer Friendly	0					0										
Pirate Ship	0		0													
Pitcher's Mound	1			-3												
Primate Research Center				0 OR Swimming							0 OR Climbing					
Ren Faire	0	0														
Rival Fast-Food Restaurant			0		0							shredding			tape + dumpster diving lock picking, password cracking based on weak passwords	confidentiality, proper disposal of data
Roswell, NM						0	0					locks, files (conventional)	activists	activists		confidentiality

# DEVELOPMENT OVERVIEW

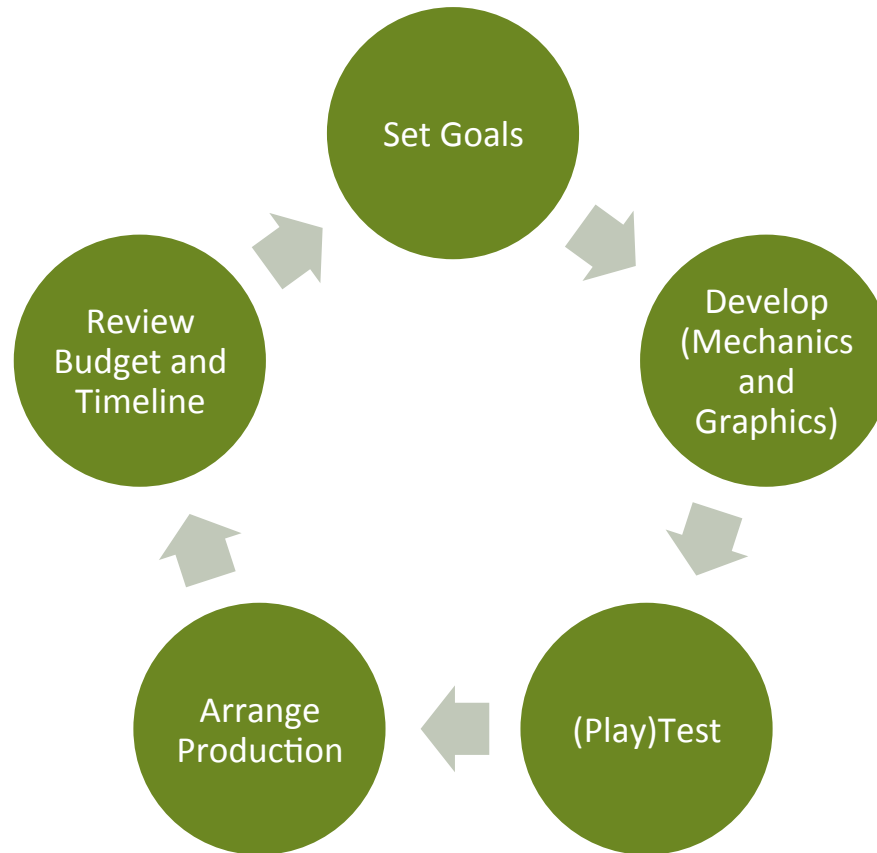


# PLAYTESTING

- Instruction refinements...clarifications...
- Attendance cards!



# DEVELOPMENT OVERVIEW



# STILL NOT PERFECT

## MISSION

### Lights, Camera, Hack!

You've been hired to consult on a new cyberthriller movie.



#### CRYPTANALYSIS

Look through the script for blatant inaccuracies.



#### SOCIAL ENGINEERING +3

Can you convince the producers that hacking doesn't actually look like a speed-typing race?

**Success:** You're don't know that many hackers that code in leather bodysuits or designer sunglasses, but no one in your office is complaining. **+1 Hacker Cred**

**Failure:** You've already told everyone about consulting on the movie, so its inaccuracies are triply embarrassing. **-3 Hacker Cred**

CONTROL-ALT **HACK**

# THE BIG PICTURE



# WHAT WE DID

- We made a card game!
- The game is designed to be fun
  - An essential property!
- While also
  - Raising awareness
  - Educating
  - Promoting communication
- Fun game with educational content – not educational game

# WHAT WE DID

- Toward meeting these goals
  - Highly iterative content creation
  - Professional design, professional manufacturing
  - Copies to give away
  - Copies to sell

# LEARNING MORE

- Website: <http://www.ControlAltHack.com>
- Twitter: @ControlAltHack  
#ControlAltHack
- List: [control-alt-hack@cs.washington.edu](mailto:control-alt-hack@cs.washington.edu)  
(announcements only)

# GETTING THE GAME

- At the printer now!
- Available for sale soon
  - Selling so that it's self-sustaining and broadly available
  - Planning to use a large, Seattle-based online retailer
  - Go to <http://www.ControlAltHack.com> to sign up for announcement emails, or follow @ControlAltHack for announcements
  - Being sold by RGB Hats, LLC

# FREE COPIES

- For U.S.A.-based educators
  - We have a limited number of copies that we can give to educators for educational uses (we'll filter)
  - Visit <http://www.ControlAltHack.com> to apply
- Educators?
  - High school AP computer science classes
  - Freshman, sophomore computer science classes
  - College computer science clubs
  - Other?
- (High school teachers may wish to remove a few cards from the deck)

# FUTURE GAME CONTENT

- Current deck (based on the original *Ninja Burger*)
  - 56 Missions
  - 72 Entropy Cards
- Possible expansion deck (based on the *Ninja Burger* expansion deck)
  - 72 new cards
- Ideas for new cards? See <http://www.ControlAltHack.com>

# THANKS TO!





# CALL TO ACTION

# CALL TO ACTION

- Go get the game
  - Go play the game
  - Share the game with others
  - Tell us how it goes
- 
- Go make your own games
  - Go add carrots to your toolbox

# CONTROL-ALT HACK™



Tammy Denning



Yoshi Kohno

*University of Washington*



Adam Shostack

Please complete speaker feedback  
surveys!

<http://www.ControlAltHack.com>

@ControlAltHack

#ControlAltHack