An Introduction to Protecting your (Mostly Online) Identity

Carlos Jensen
School of EECS
Oregon State University

cjensen@eecs...
Overview

• Introduction to me & what I do

• Introduction/Background
  ▫ What is Identify Theft
  ▫ Who is at risk
  ▫ Sources for Identity Theft

• Online Profiling and Identity Theft
  ▫ Common techniques for Online Identity Theft
  ▫ Common techniques for Online Profiling

• Discussion / Q&A
My Research - Usable Privacy & Security

Users characterized as #1 security vulnerability

- Users consistently and passionately express concern & interest
- Users consistently fail to act, or circumvents safeguards
My Research - Usable Privacy & Security

Users often characterized as #1 security vulnerability
- Users consistently and passionately express concern & interest
- Users consistently fail to act, or circumvents safeguards

Root cause: Communication problems
- Giving users information and options that matter & make sense!

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Understanding Users & Tools

User studies
- Actions vs. Intent
- Comprehension
- Interests & concerns

Impact of Policies & legislation

IEEE Security & Privacy
Int. Journal of Human Comp. Studies
ACM CHI

<table>
<thead>
<tr>
<th></th>
<th>P3P</th>
<th>Cookies</th>
<th>Web-bugs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Claim knowledge</td>
<td>21.5%</td>
<td>90.3%</td>
<td>34.8%</td>
</tr>
<tr>
<td>Demonstrate knowledge</td>
<td>Of above</td>
<td>25.0%</td>
<td>15.5%</td>
</tr>
<tr>
<td></td>
<td>Overall</td>
<td>5.4%</td>
<td>14.0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5.4%</td>
</tr>
</tbody>
</table>
Identity Theft
What is Identity Theft?

“Identity theft and identity fraud are terms used to refer to all types of crime in which someone wrongfully obtains and uses another person's personal data in some way that involves fraud or deception, typically for economic gain.” *U.S. Dept. of Justice*

http://www.usdoj.gov/criminal/fraud/idtheft.html
Types of Identity Theft

- Credit Card Fraud: 26%
- Phone or Utilities Fraud: 18%
- Bank Fraud: 17%
- Employment-Related Fraud: 12%
- Government Documents/Benefits Fraud: 9%
- Loan Fraud: 5%
- Other Identity Theft: 25%
- Attempted Identity Theft: 6%

Types of Identity Theft

Goal is to assume your identity in order to commit:

- Credit card fraud
  - Open new accounts in your name
  - Hijack accounts
- Phone & Utilities fraud
- Bank/Finance fraud
  - Counterfeit checks
  - Opening new accounts and writing bad checks
  - Take out mortgages & car loans
- Government documents fraud
Who is at risk for Identity Theft
Who is at risk for Identity Theft

<table>
<thead>
<tr>
<th>Rank</th>
<th>State</th>
<th>Victims per 1000 pop</th>
<th>Victims (in 1000’s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Arizona</td>
<td>5.5</td>
<td>362</td>
</tr>
<tr>
<td>2</td>
<td>Nevada</td>
<td>4.6</td>
<td>110</td>
</tr>
<tr>
<td>3</td>
<td>California</td>
<td>4.4</td>
<td>1,581</td>
</tr>
<tr>
<td>4</td>
<td>Texas</td>
<td>4.1</td>
<td>931</td>
</tr>
<tr>
<td>5</td>
<td>Colorado</td>
<td>3.4</td>
<td>158</td>
</tr>
<tr>
<td>6</td>
<td>Florida</td>
<td>3.3</td>
<td>596</td>
</tr>
<tr>
<td>7</td>
<td>Washington</td>
<td>3.2</td>
<td>203</td>
</tr>
<tr>
<td>8</td>
<td>New York</td>
<td>3.2</td>
<td>608</td>
</tr>
<tr>
<td>9</td>
<td>Georgia</td>
<td>3.0</td>
<td>277</td>
</tr>
<tr>
<td>10</td>
<td>Illinois</td>
<td>3.0</td>
<td>389</td>
</tr>
<tr>
<td>11</td>
<td>Maryland</td>
<td>3.0</td>
<td>169</td>
</tr>
<tr>
<td>12</td>
<td>New Mexico</td>
<td>3.0</td>
<td>57</td>
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<td>13</td>
<td>Oregon</td>
<td>2.9</td>
<td>104</td>
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<tr>
<td>14</td>
<td>New Jersey</td>
<td>2.6</td>
<td>230</td>
</tr>
<tr>
<td>15</td>
<td>Michigan</td>
<td>2.5</td>
<td>249</td>
</tr>
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</table>

Oregon high on statistics

Of these cases;

- 68.2% of ID theft off-line
- 11.6% of ID theft online
- 20.2% of unknown origin
The Cost of Identity Theft

Financial costs:

<table>
<thead>
<tr>
<th>Year</th>
<th># of victims</th>
<th>Average Loss</th>
<th>Total Loss</th>
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<tbody>
<tr>
<td>2005</td>
<td>8.4 million</td>
<td>$6,483</td>
<td>$56.6 Billion</td>
</tr>
<tr>
<td>2006</td>
<td>9.3 million</td>
<td>$6,278</td>
<td>$55.7 Billion</td>
</tr>
<tr>
<td>2007</td>
<td>10.1 million</td>
<td>$5,720</td>
<td>$49.3 Billion</td>
</tr>
</tbody>
</table>

Plus time to fix record (mean=25h, Avg=5hr)

http://www.privacyrights.org/ar/idtheftsurveys.htm
Commonly (miss)used information

- Name
- Address
- SSN’s
- Family details
- Credit Card Numbers
- Email addresses
- Accounts
  - Entities
  - Types
- How dangerous is this information?
- How difficult is it to get this information?
Common “Causes” for Identity Theft

- Lost or stolen wallets
- Information misuse by family, friends, colleagues
- Dumpster diving
- Pretexting/social engineering
- Online scams & tracking
- Data brokers
The value of private information?

See http://turbulence.org/Works/swipe/calculator.html for cost of data from legitimate sources.

(Demo)

**Black market**: Credit card numbers with Mothers Maiden Name & codes: ~5% of available balance

World of Warcraft account details: $10.00
Online Privacy Threats

**Online Identity Theft**

**Goal:** Steal credit card or other financial or account information

**Mechanisms:**
- Phishing (email)
  - Trojans, worms, viruses
- Spyware
- Server Hacks

**Online Profiling**

**Goal:** Track your activities Online, including what you do, and who you interact with

**Mechanisms:**
- Cookies
- Webbugs
- Deceptive/Abusive data practices
Spam & Phishing
Spam & Phishing

Spam is unsolicited commercial email

Phishing attacks are email messages aimed at tricking you into revealing some valuable information
  ▫ Submitting credit card numbers
  ▫ Submitting account information (user name, password)

Phishing – Sent randomly, hoping people will bite
Spear-Phishing – Targeted phishing attacks
Puddle-Phishing – Targeting small communities
Phishing

Dear ORST Webmail Subscriber,

We notice that your webmail account has been compromised by spammers. They have gained access to your webmail account and have been using it for illegal internet activities. You are to send us your account information immediately to enable us reset your account. A new password will be sent to you once this is done. Send the information as follows:

*User Name:
*Password:

You are advised to send this information immediately or we will delete your account from our network.

THE ORST HELP DESK
Anatomy of Phishing

Email gets passed from one server to the next until it reaches destination.

Can (sometimes) be traced

This is the information your email program will give you about this message, if you really really want.

Overwhelmed yet?
Anatomy of Phishing

The important pieces

<- OSU didn’t think this was spam
<- Message came via Emory University
<- Message came via Emory University
<- Message came from dialup modem!
<- Server reference for message
<- Note discrepancy!!!
<-
Anatomy of Phishing

Your spammers were operating out of Latvia (maybe)

Was Emory helping them?

Does the sending computer belong to the spammers?

The role of Bot-nets, viruses & worms
Why Phishing Works

In 2003 approximately 2 million people gave away information in phishing attacks (5% of recipients) valued at $1.2 billion

90% of study participants fooled by good phishing sites
Why Phishing Works

Common techniques

- Address obfuscation for links
  - www.cilibank.com
  - www.ebay-security.com
  - www.capitalone.com

- Visual deception
  - Emails, logos and sites that look real
  - Bring up real site in addition to fake login box

Surviving Phishing Attacks

- Don’t follow links from email
- Don’t download files from email
- Keep an up-to-date spam filter

- Use common sense!
  - If it sounds too good/bad to be true... It probably is

More Information at: http://www.antiphishing.org/resources.html
Spyware

Spyware is software installed on your machine which secretly tracks your activities, such as:

- All the websites you visit
- All the characters you type (keylogger)

and later transmitted to a third party for either target advertising or theft of passwords and financial information
Spyware

Route of entry:

- User installation
  - False advertising & deception
    - Software promises to do one thing, in addition tracks
    - Often promise to fight spyware or viruses!
    - Often attached to shareware and P2P software
    - Toolbars for browsers
  - Examples
    - 180 solutions
    - RedSherriff

- Stealth installation
  - Take advantage of holes in security or browser
  - Aka. Drive-by Installation
Who is Responsible?

- **You!**
- **Get help from:**
  - Federal Trade Commission
  - Credit Card issuer/Bank
  - Internet Service Provider
Online Profiling

While not as bad as identity theft, can still be damaging, and often used together

Two main mechanisms:
- Cookies (3rd party)
- Webbugs

Both (potentially) enable a 3rd party to see where you go

See http://www.epic.org/privacy/profiling/ for dangers of profiling
Glossary

**Cookies**
- Text files saved on your computer to allow a given server to “remember” you
- Can only be read by specified server
- Can be set by any “page” you go to
  - Session cookies
  - 1st party cookies
  - 3rd party cookies

**Webbugs**
- Used both in Spam and web pages
- 1x1 pixel transparent images used to contact a 3rd party server to notify it that you have visited the page, or read the email
- Aka web-beacon, tracking bug, pixel tag, PattyMail
How cookies work

- Session cookies disappear when you close your browser
- 1st party cookies are set for you, by you
- 3rd party cookies are set for someone else to pick up
Demo: Tamper Data (Firefox)

Tamper Data is a plug-in for Firefox which lets you review & manipulate what information flows between your computer & websites
The iWatch Web-crawler

iWatch web-crawler catalogues online data collection and practices such as:
- Cookies,
- Webbugs,
- Popups,
- Banner Advertising,
- Privacy Policies and Seals

iWatch supports the study of:
- Evolution of practices over time
- Geographic and industry trends
- Technology adoption and impact

Provide data to aid
- Consumers
- Legislators
- E-merchants
- Researchers

<table>
<thead>
<tr>
<th>May 05</th>
<th>Aug 06</th>
<th>May 07</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pages</td>
<td>119,237</td>
<td>121,103</td>
<td>377,728</td>
</tr>
<tr>
<td>Domains</td>
<td>15,792</td>
<td>10,421</td>
<td>27,392</td>
</tr>
<tr>
<td>Pages/Domain</td>
<td>7.55</td>
<td>11.22</td>
<td>13.78</td>
</tr>
<tr>
<td>Countries</td>
<td>43</td>
<td>43</td>
<td>59</td>
</tr>
<tr>
<td>Domains/Country</td>
<td>367.26</td>
<td>242.35</td>
<td>462.27</td>
</tr>
</tbody>
</table>
Internet Forensics

Going beyond surface statistics

What happens when the website and 1007 of its closest friends decide to share their data?

Node size and color indicates amount of data collected

What happens when sites lie in their policies?

27% of sites with P3P policies fail to disclose cookie use
Top 20 3\textsuperscript{rd} Party-Resource Servers

1. graphics.fansonly.com
2. graphics.ocsn.com
3. server-au.imrworldwide.com
4. i.cmpnet.com
5. welcome.hp-ww.com
6. www.qksrv.net
7. dw.com.com
8. pics.ebaystatic.com
9. server-dk.imrworldwide.com
10. ehg-dig.hitbox.com
11. server-us.imrworldwide.com
12. pagead2.googlesyndication.com
13. switch.atdmt.com
14. hostingprod.com
15. ehg-findlaw.hitbox.com
16. view.atdmt.com
17. incude.ebaystatic.com
18. images.findlaw.com
19. ads.api.no
20. ad.doubleclick.net

Of the top 20 3\textsuperscript{rd} party-resource servers:
70\% are ad-servers or marketers
30\% are dedicated image or script servers