How to prevent a disaster in cyberspace?

The need for an international approach to undermine the criminal cyber architecture

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Presentation

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Topics - overview

- General trends today
- Cyber crimes and cyber criminals today
- What hinders the combat today?
- A proposal for an integrated response
- Belgian experiences
General trends today

- Evolution towards **e-society**
  - replace persons by e-applications
  - Interconnecting all systems (admin, industrial, control)

- **IP** is **common platform** offered by **many ISPs**
  integrating telephony / data / VPN & all new apps
  = opportunities / Achilles tendon / scattered traces

- **Poor security** in **legacy** applications and protocols (userid+pw) => identity fraud is easy

- **Enduser** is not yet educated to act properly
What do criminals want?

- *Become rich / powerfull* rapidly, easily, very big ROI in an illegal way if needed

- *Destabilaze (e-)society* by causing troubles
How : cyber crimes today

- **e-fraud** => give money to the criminals
- **spam** => start for eFrauds
- **hacking** =>
  - change content of your website (defacing)
  - transfer money from the hacked system
  - espionnage => know your victim
  - use of hacked system => storage / spam / proxy / DNS / CC / DDOS
- **DDOS** distributed denial of service attacks
How to combat cyber criminals?

Analyze their methods and tools
Botnet attack on a webserver / node
Interesting DDOS

- 2004 UK: gambling website down (+ hoster + ISP)
- 2005 Netherlands: 2 botnets: millions of zombies
- 2005 Belgium: Commercial firm during social conflict
- 2006 Sweden: Gov websites after police raid on P2P
- 2007 Estonia: political inspired widespread DDOS attack
- 2008 Georgia: cyber war during military conflict
- 2010 Worldwide: Wikileaks cyberconflict
What are botnets used for?

Making money!

- Sometimes still for **fun** (scriptkiddies)
- **Spam** distribution via Zombie
- **Click generation** on banner publicity
- **Dialer** installation on zombie to make premium rate calls
- **Spyware / malware / ransomware** installation
- **Espionage**: banking details / passwords / keylogging
- **Transactions** via zombie PC
- Capacity for distributed denial of service attacks **DDOS** => disturb functioning of internet device (server/router)
Malware update / knowledge transfer

Command & Control Server

Knowledge server

Collected Info

trigger event

Internet

Malware update server

Webserver / node

Very frequent MW update request

MW update
Cyber criminal’s toolbox

- **malware** => trojan horses
  - distribution via mail, p2p, social networks, websites
  - auto-update & auto-propagation in network
  - very high rate of new versions

- remote control of infected systems
  => **botnets**

- creation of **knowledge databases**
  - collected & keylogged info of infected pc

- keyservers in **safe haven** countries
But the criminal cyber architecture also includes ...

- **Underground fora** and chatrooms
  - Botnets for hire
  - Malware on demand / off the shelf packages
  - Trade stolen Credit cards / credentials
  - Money laundering services

- **Organized Cyber criminals**
  - take over / set up **ISP’s**
  - infiltrate in **development firms**
And the victims?

- **Who?**
  - Communication networks and service providers
  - Companies especially transactional websites
  - Every internet user

- **Reaction**
  - *Unaware* of incidents going on => dark number
  - Victims try to solve it themselves
  - Nearly *no complaints* made => dark number

- **Result?** The hackers go on developing botnets
Risks

- Economical disaster
  - Large scale: critical infrastructure
  - Small scale: enterprise

- Individual & corporate (secret) data

- **Loss of trust** in e-society
Combined threat

- What if abused by terrorists? Cyber army? ... simultaneously with a real world attack?
- How will you handle the crisis? Your telephone system is not working!
Intermediate conclusions

- Society is very dependant of ICT
- eSociety is very vulnerable for attacks
- Urgent need to reduce risks on critical ICT
- Botnets as criminal cyber infrastructure is common platform for lots of cybercrimes

=> undermine it and you reduce crime
### Traditional way of law enforcement to tackle cybercrime

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
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<tbody>
<tr>
<td><strong>Reactive</strong></td>
<td>- Register complaint $\Rightarrow$ judicial case</td>
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<tr>
<td></td>
<td>- Hotlines (or cooperation with)</td>
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<tr>
<td></td>
<td>- (Eventually) undercover operations</td>
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<tr>
<td><strong>Proactive (?)</strong></td>
<td>- Who is doing what, where and how?</td>
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<tr>
<td></td>
<td>- Patrolling the net</td>
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<td><strong>Effective (?) but not undermining cybercriminals</strong></td>
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What hinders an effective combat of cyber crime?

- Unawareness and negligence *end user*
- Lack of overall *view on risks / incidents* by
  - Enterprise managers
  - Political decision makers
- Combating: *everyone on his own*
- Lack of specialized investigators
- Jurisdictions limited by *national* borders
- Subscriber *identity fraud*
- *Mobility* of the (criminal) services in cloud
What actions are needed?

*Everyone* plays a role in e-security.

We have to do it as *partners*.

We have to do it in an *integrated way*. 
Goals for operational cybercrime action plan

- As “society” (= gov & private sector) improve **detection** and **get a view and act** on
  - criminal cyberinfrastructure especially botnets
  - incidents threatening eSociety

- **Strengthen robustness** of ICT eSociety
  - ISP’s / Enterprises / End users

- **Weaken and dismantle** the criminal cyberinfrastructure
  - Each partner within his role & competence
Webserver / node

Preserve evidence
Report incident

Stop activity
Bring to court

Identify critical infrastructure
Alarm procedures
Preserve evidence
Prevent infection & MW autopropagation
Detect infections & desinfect

Actions against botnet architecture

Hacker

Take out of order
Analyse to identify hacker & zombies

Botnetservers
CC, Knowledge, MW
Role of governments & international organizations

- Working according **a strategy**
- Develop **international** plans & reaction schemes for **critical ICT infrastructure protection**

- Develop **legal framework**
  - **Obligation to report** cybercrime incidents
  - **Obligation to secure** your computer system (?)
  - Possibility for ISP to **cut off** infected machines (?)
  - Obligation to respond to requests of Gov authority when serious incidents happen
Telecommunications sector

- Prevent / reduce SPAM
- Have to make there infrastructure robust
- Report serious incidents to CERT
- Integrated reaction with authorities

- Implement strong authentication in internet protocols and services
- Detect negligent end users & react/help/cut off
Enterprises

- E-Security = **business risk** =>
  management responsibility

- Think about **how to survive** when e-systems are under attack

  - Enforce **detection** of incidents – IDS?
  - **Report** incidents to CERT? to police?

  - Integrate **strong authentication** in e-business applications
Developers

- Strong authentication
  - Use the strongest available but ...
  - Think as a hacker
  - How can a transaction on an infected PC be intercepted?

- Store **IP-addresses** and timestamps
  - of the end user! not of the router!
  - Needed in case of an **incident**!
Responsibilization of end user

- **Awareness** raising => media

- **Training** on e-security & attitude
  - already at school
  - in the enterprises

- Obligation to **secure his PC properly**?
Role of police and justice?

- **Gather intelligence** about Botnets
- **Dismantle botnet servers** in your country
- **Analyse Botnet-servers** to find traces to criminals
- **Focus on knowledge servers & CC servers**
Belgian experience

- 1 national **FCCU** + 25 Regional CCU = 175 officers (computer forensics & cybercrime combat)
- 2 specialized Federal prosecutors
  - minimum 1 ICT reference prosecutor / district
- FCCU analyses attacks on critical ICT infra
- **BelNIS** Gov Network information security
  - Develops and organizes ICT security strategy
  - Problem : no central authority
- Since 2009 : **Cert.be** for Gov and Critical infra
Belgian experience

- eBanking fraud => start of **Malware analysis**
  - Gain insight in how it’s working
  - Leads to detection of botnet-servers / bogus ISP’s
- Combined team **cybercrime & financial investigators**
- **Building trust** with law enforcement with other countries
- Collaboration with several partners and organizations
  => Information send to & analysed by **Cert.be**

- Effective in **dismantling of Botnet-servers** (50 since ‘09)
- Impact of 1 Malware distribution server ? Analysis shows
  - 2 months 1,5 million downloads, 300.000 unique IP’s
Problems

- Botnet-servers often on victim’s servers
  - But is it really a victim?
- No knowledge-servers in BE
- Language problem during analysis CC-server
- Is it the role of the police / Cert?
  - If Cert does it (eg Finland)
    - => fast but do we go after criminals afterwards?
    - Which incidents are severe enough to report to police?
  - If police does it
    - Which botnet-servers do we analyse?
    - Malware analysis => help from AV-industry?
Do we really have an impact?

- Several hundreds of botnets
- 5,000 – 10,000 botnet servers worldwide
- Millions of infected end users

=> need for action in every country
Contact information

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