The consequence of non-cooperation in the fight against phishing

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Outline

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Phishing website take-down

- We empirically examine phishing website 'take-down'
  - Widely-used countermeasure in fight against phishing
  - Banks, or 3rd party take-down companies, collect 'feeds' of phishing URLs
  - Feeds obtained from banks, third parties and using proprietary spam traps
  - Verify URLs in feed, then issue take-down notices to relevant ISPs and/or registrars
- Average phishing website lifetimes
  - According to industry: from '5 hours' to 'less than 24 hours'
  - Our measurements (eCrime '07): 62 to 95 hours
  - Why the disparity?

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Data collection methodology

- Amalgamate several phishing 'feeds'
  - One large brand owner
  - PhishTank
  - APWG
  - Two take-down companies (each a combination of outside feeds and proprietary collection)
- Automated testing system
  - Data collection period: October 2007–March 2008
  - Continuously query sites until they stop responding or change
  - Distinguish between 'ordinary', 'rock-phish', and 'fast-flux'
  - Verification (ordinary phishing): fetch HTML and check whether bank name is present

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How we measure cooperation

- Focus on URL feeds from take-down companies $\mathcal{T}_A$ and $\mathcal{T}_B$
  - Feeds represent their global view
  - $\mathcal{T}_A$: 54 client banks attacked 10/07–3/08
  - $\mathcal{T}_B$: 66 client banks attacked 10/07–3/08
  - We only examine phishing attacks on these 120 brands
  - Take-down companies only care about phishing sites targeting their clients, but they also detect other phishing sites

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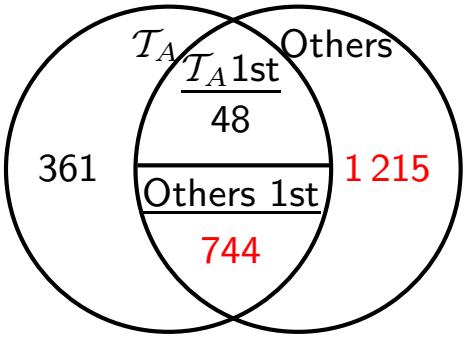
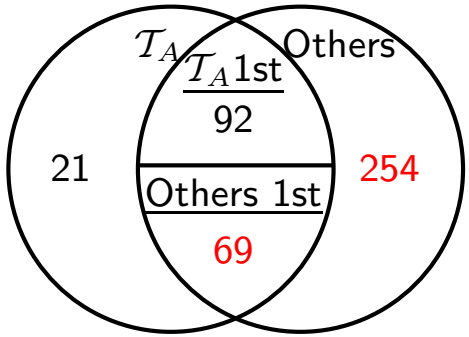
How one bank suffers when take-down companies don't share phishing URLs

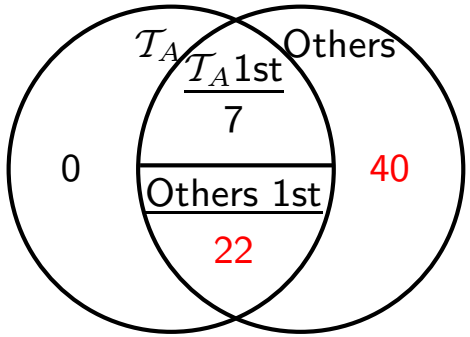
Ordinary phishing sites



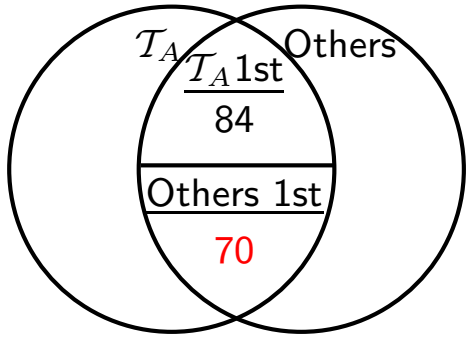
Mean lifetime (hours)



Median lifetime (hours)



Mean difference (hours)



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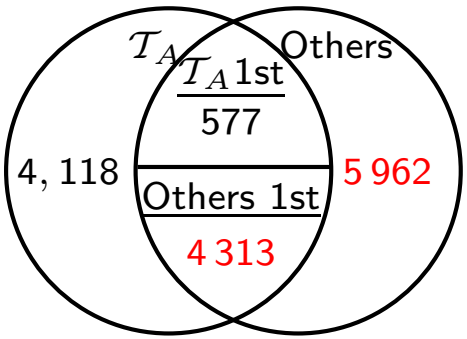
Most banks suffer when phishing URLs are not shared

$\mathcal{T}_A$'s 54 client banks attacked 10/07–3/08

Ordinary phishing sites



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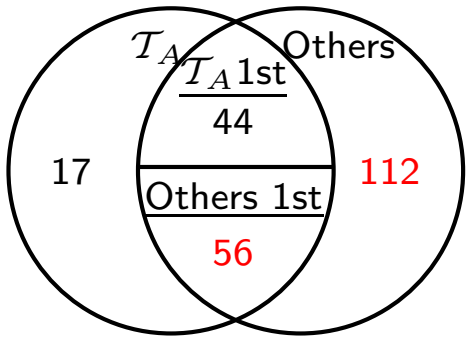
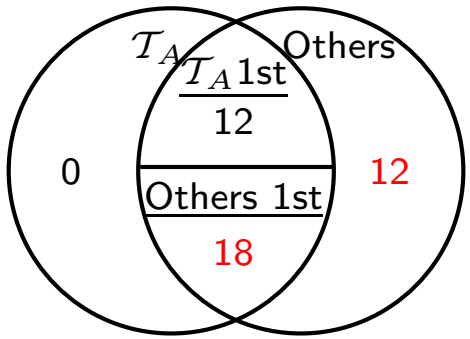
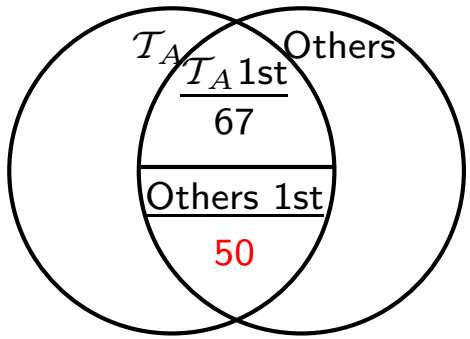


Median lifetime (hours)

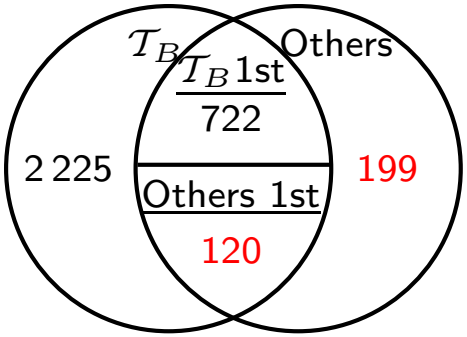


Mean difference (hours)

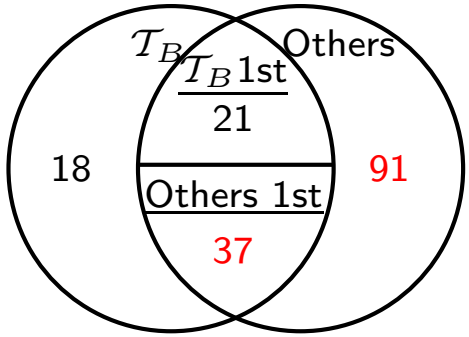


$\mathcal{T}_B$'s 66 client banks attacked 10/07–3/08

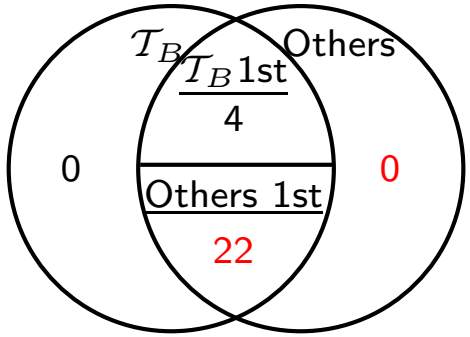
Ordinary phishing sites



Mean lifetime (hours)



Median lifetime (hours)



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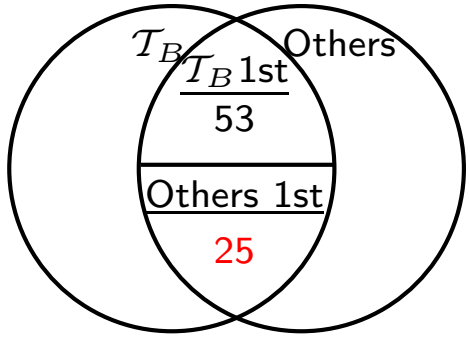

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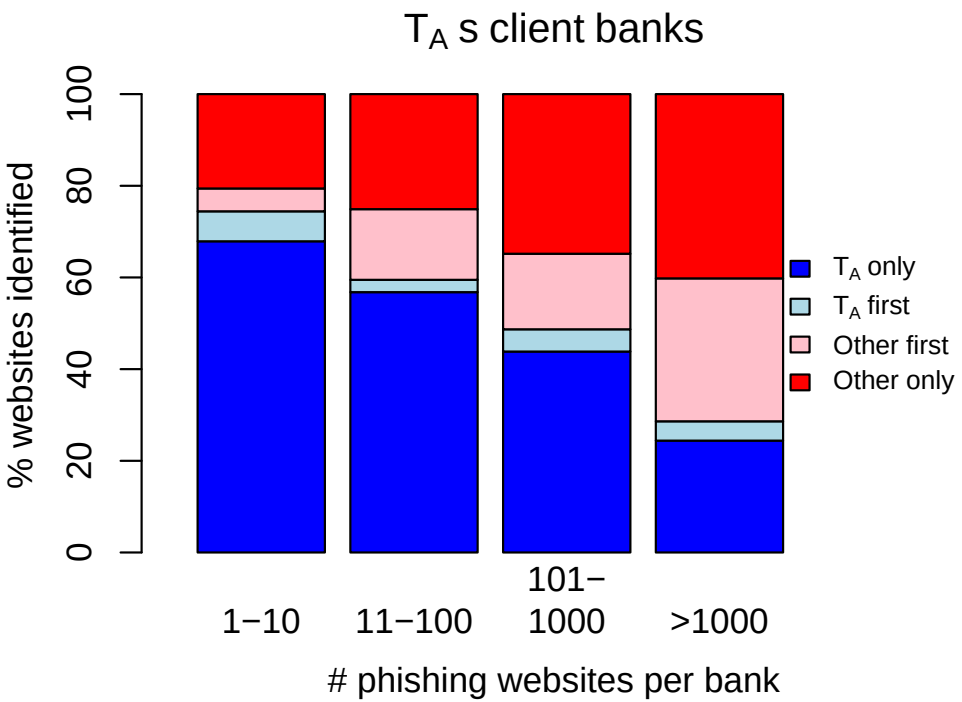
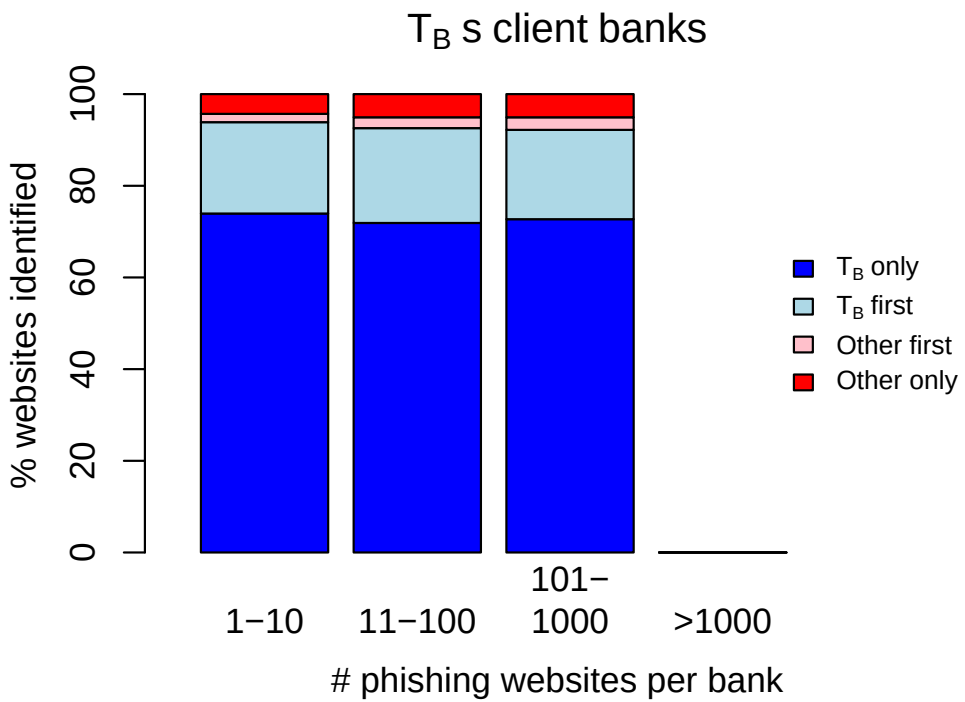
Popularity of phishing target affects gain from sharing





Long-lived phishing websites caused by not sharing URLs

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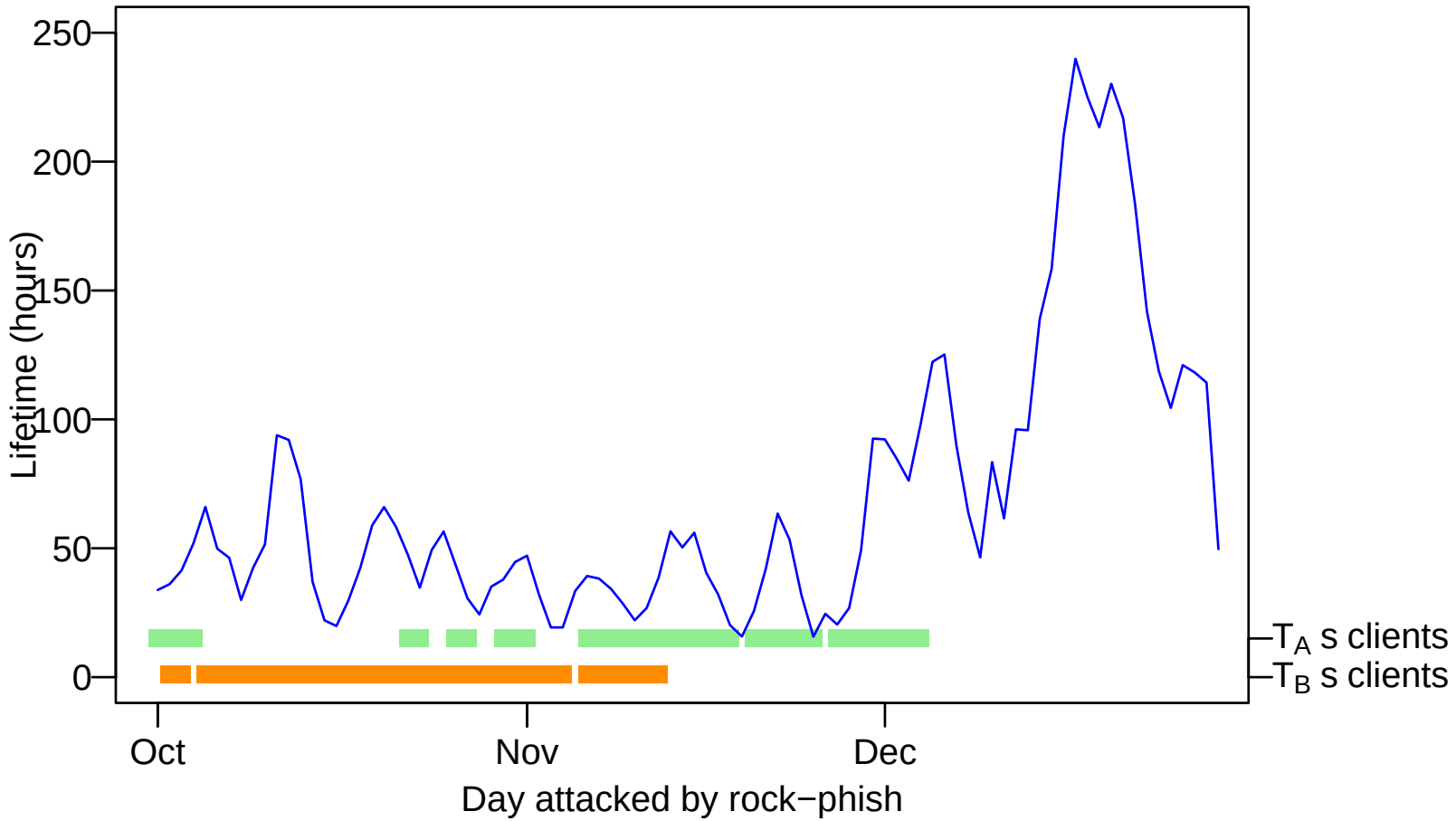
Rock-phish website lifetimes depend on $\mathcal{T}_A$ and $\mathcal{T}_B$'s effort



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How can we estimate the cost of non-cooperation

- Estimating user response to phishing
  - We automatically collect world-readable 'Webalizer' web page usage statistics from phishing sites
  - We measure user response to phishing over time (eCrime '07)
  - Florêncio and Herley create similar estimate using different method
- Gartner estimate cost of identity theft to be $572 per victim
- Consequently, we derived an estimate of financial risk as a consequence of phishing website uptime

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What is the cost of non-cooperation?

- We can estimate losses caused by not sharing feeds
  - Compare the lifetimes of phishing websites known to $\mathcal{T}_A$ and $\mathcal{T}_B$ to the lifetimes of websites unknown to them
  - Time difference is a direct consequence of not sharing feeds
- Financial exposure for $\mathcal{T}_A$'s clients
  - Total exposure of $\mathcal{T}_A$'s 54 targeted banks 10/07–3/08: \$276m
  - 5 962 sites impersonating $\mathcal{T}_A$'s clients missed by $\mathcal{T}_A$: \$119m
  - 4 313 websites found by $\mathcal{T}_A$ 50 hours after other sources: \$44m

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Cost of non-cooperation (prolonged lifetimes and $)

Exposure figures (6-month totals)	$\mathcal{T}_A$**'s client banks**	$\mathcal{T}_B$**'s client banks**
Actual values	1 005k hrs ($276m)	78k hrs ($32.0m)
Effect of not sharing	587k hrs ($163m)	17k hrs ($3.5m)
Expected if sharing	418k hrs ($113m)	61k hrs ($28.5m)

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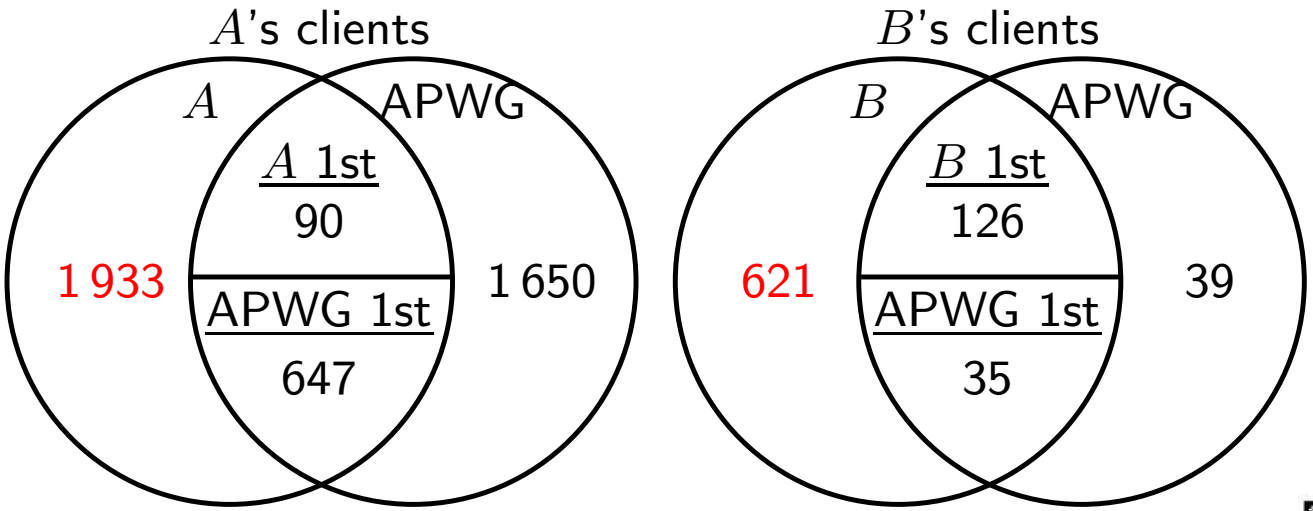
How can we improve cooperation?

- Leverage existing industry cooperation
  - The APWG distributes a feed based on contributions from its members and the public
  - The take-down companies already take the APWG's feed, they should be encouraged to give back



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How can we improve cooperation?

- Cooperation is not without precedent
  - Anti-virus companies exchange virus/malware samples
  - Each company verifies the sample's legitimacy and develops custom signatures
  - Similarly, take-down companies could share raw feeds, and add value by individually sorting out the incorrect submissions and certifying their assessments
- No one ever said cooperation is easy
  - Competitive concerns (lower barrier to entry, perceived leaders don't stand to gain much)
  - Free-riding potential
- The stakes are too high for the banks to not demand better cooperation

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Conclusions

- We have shown that phishing URL feeds are not shared between competing take-down companies
- Lack of cooperation substantially increases the lifetimes of phishing websites, and, consequently, banks' financial exposure
- Banks should demand take-down companies share raw URL feeds (perhaps via the APWG's existing feed)
- For more, see
  `http://www.lightbluetouchpaper.org/`
  `http://people.seas.harvard.edu/~tmoore/`
- Email: `tmoore@seas.harvard.edu`

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