RSA CONFERENCE ASIA PACIFIC 2013

LESSONS LEARNED FROM A RIGOROUS ANALYSIS OF TWO YEARS OF ZERO-DAY ATTACKS

Symantec Research Labs

Marc Dacier, Leylya Yumer, Tudor Dumitras

Session ID: CLE-T02

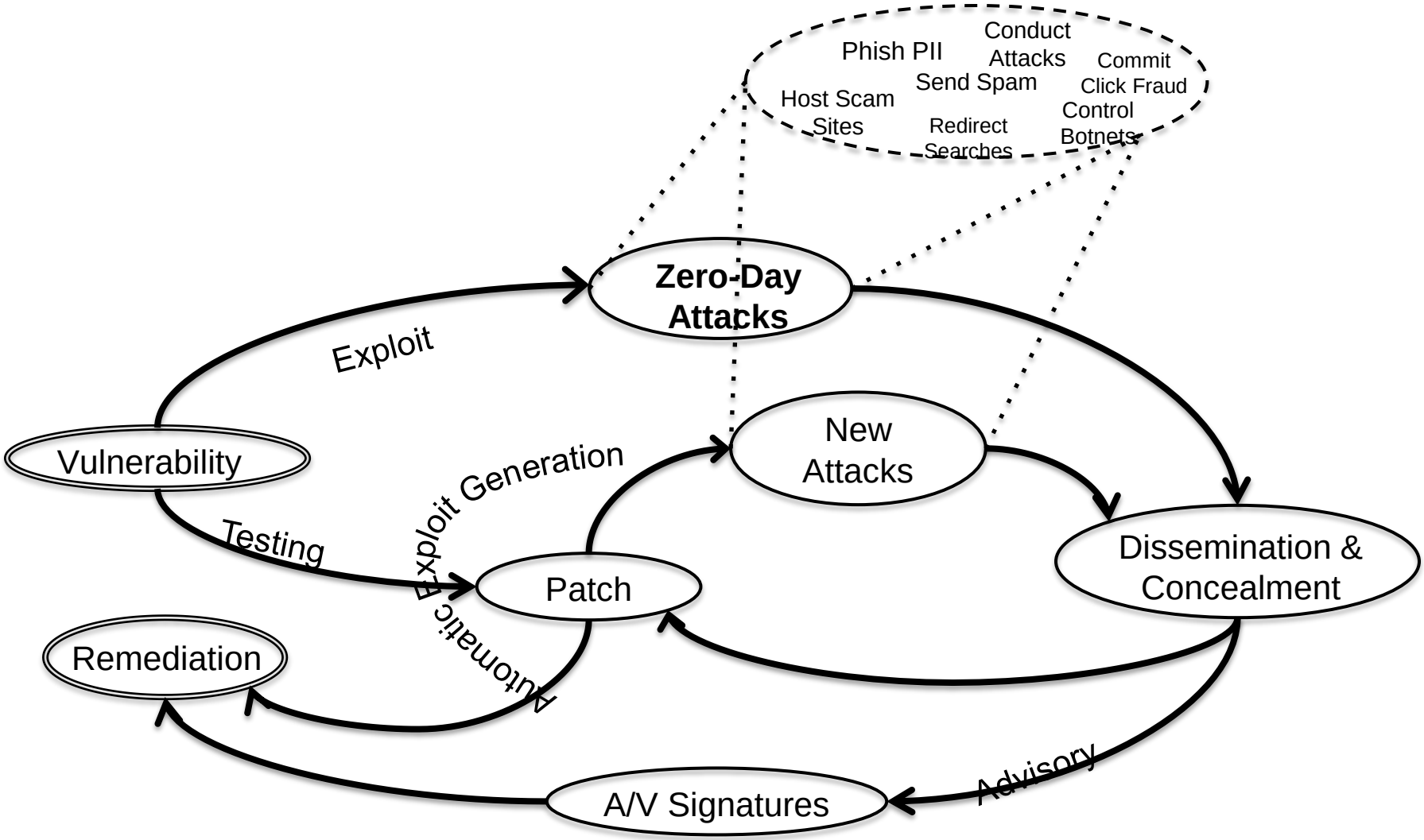
Session Classification: Intermediate

Symantec

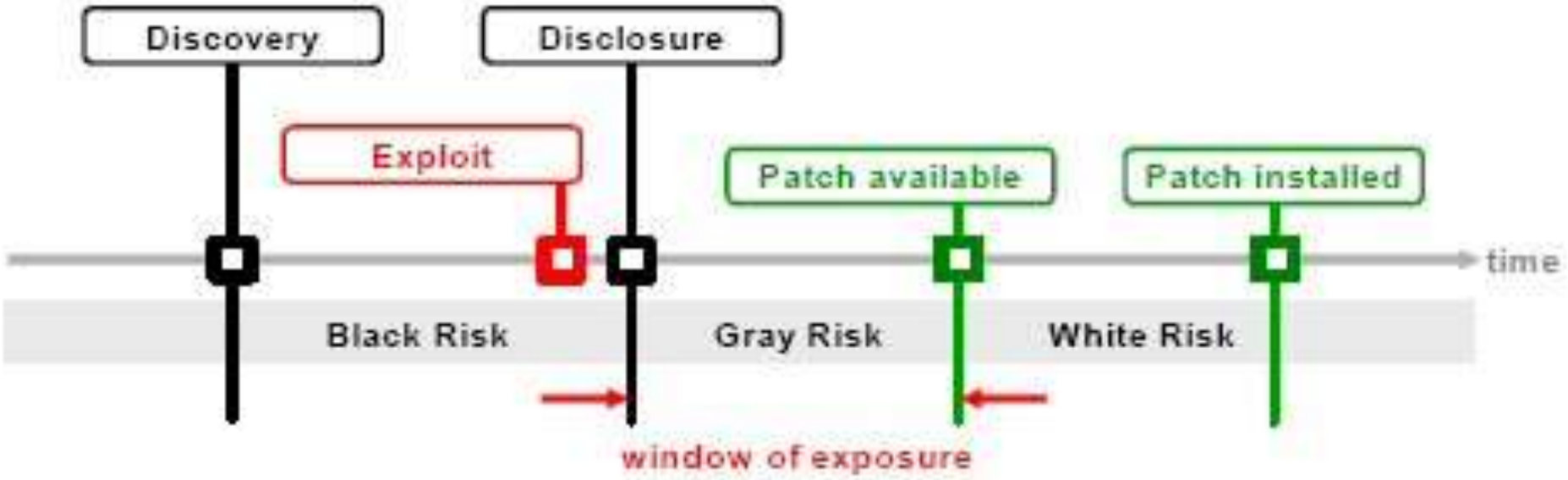
Zero-Day (Day Zero) (0-day) Attacks

- Takes advantage of unknown vulnerabilities on programs before
  - Are discovered
  - Are publicly disclosed
  - Have a security patch provided by the software vendor
- Common definition
  - An attack that uses a zero-day (0-day) exploit
- Generic definition
  - An attack that compromises computers with unknown methods

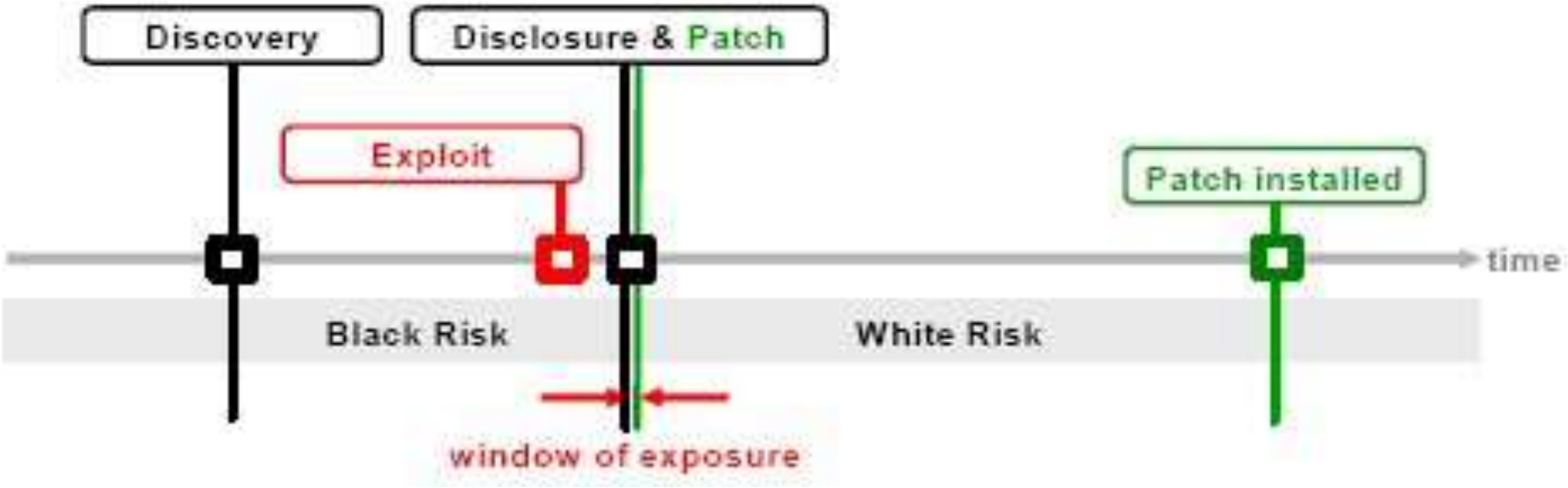
Vulnerability lifecycle



Life-cycle of a vulnerability

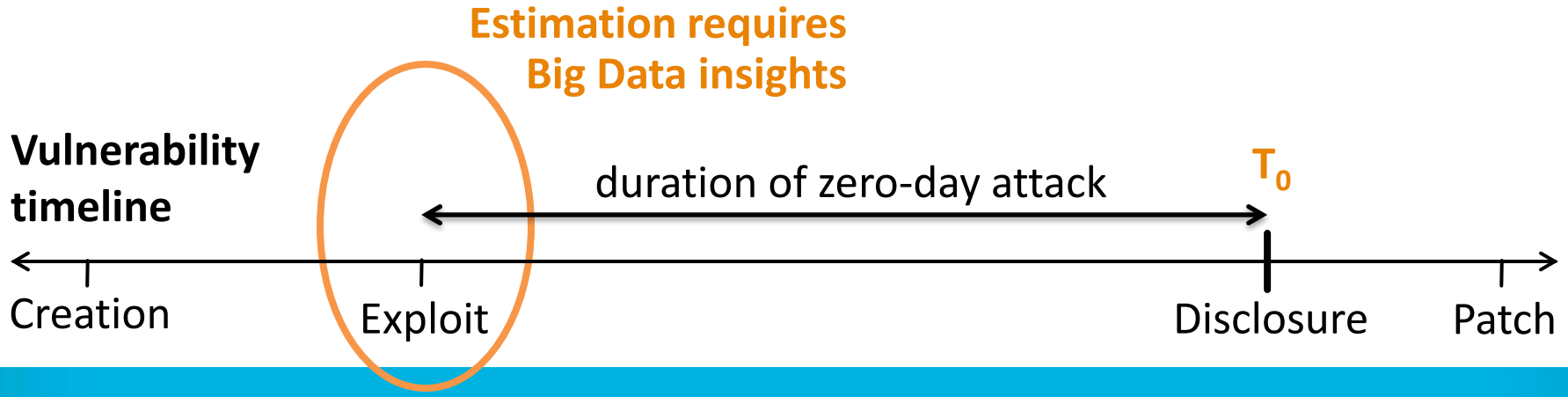


Life-cycle of a vulnerability



Research Questions

- **Are there more** zero-day vulnerabilities in the wild that we are not aware of?
- What is the typical **duration of zero-day attacks**?
- What is the **prevalence** of zero-day attacks?



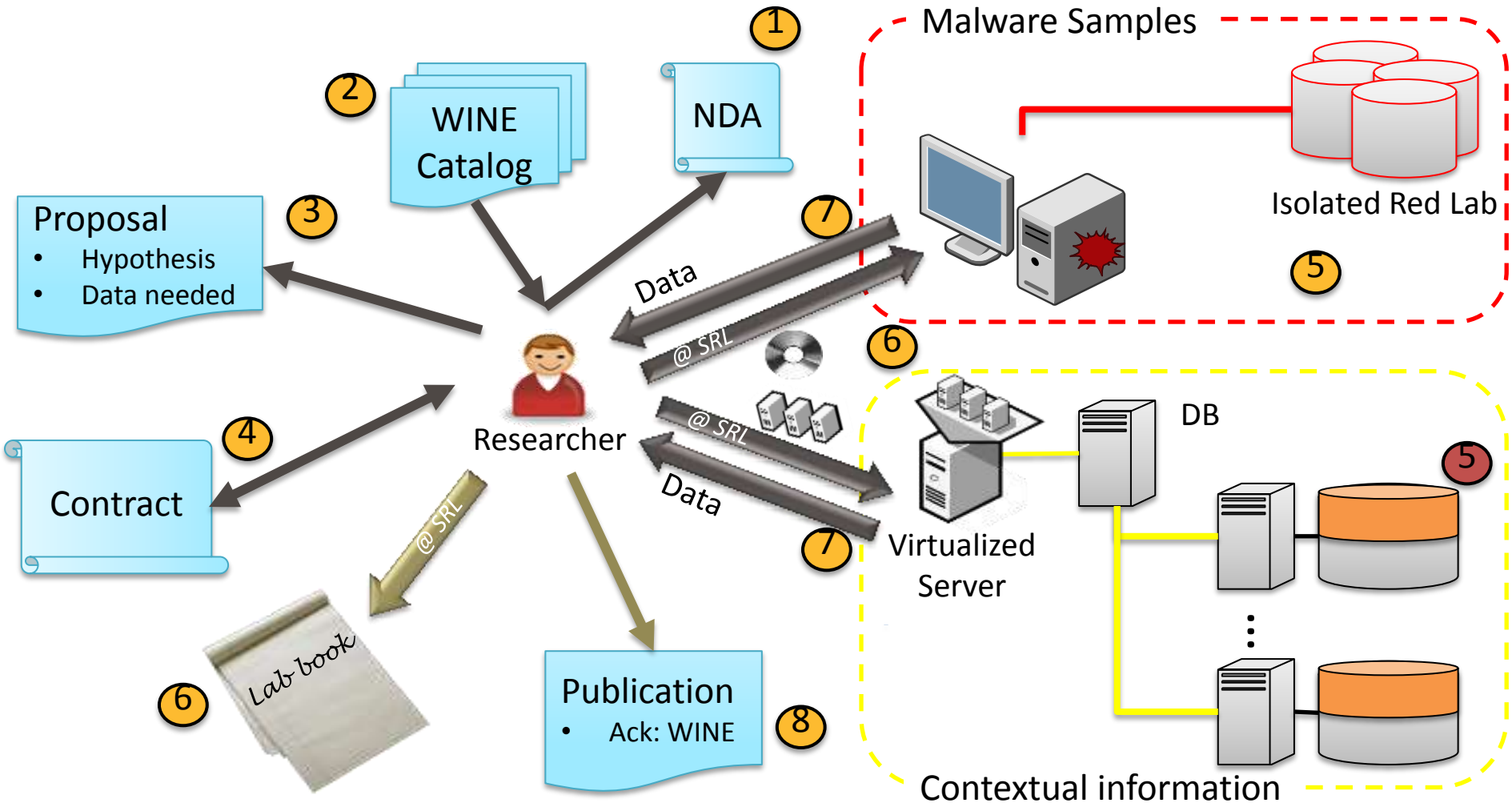
Building the ground-truth?

- Since 1996, some sources provide information about known vulnerabilities
  - IBM-ISS, SecurityFocus, Secunia, CERT, SecurityTracker, SecWatch, FrSirt
- Databases that correlate the information
  - National Vulnerability Database (NVD)
  - Open-source Vulnerability Database (OSVDB)
- A standardized identifier for known vulnerabilities
  - Common Vulnerabilities and Exposures (CVE)

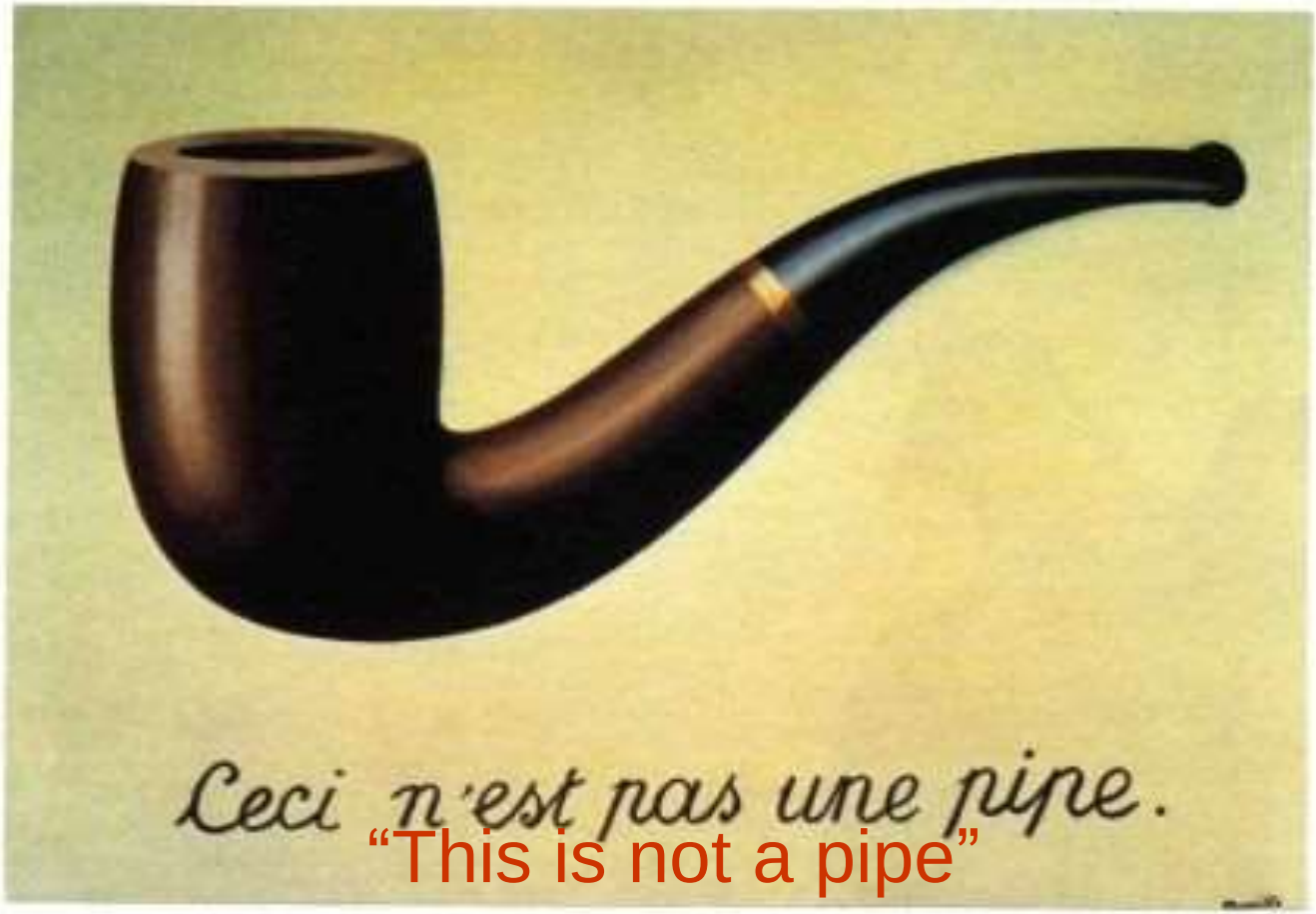
WINE

- The Worldwide Intelligence Network Environment (WINE)
  - Malware Samples
  - Binary Reputation
  - A/V Telemetry
  - URL Reputation
  - Email Spam
  - IPS Telemetry
  - DNS Data

WINE: Operational Model



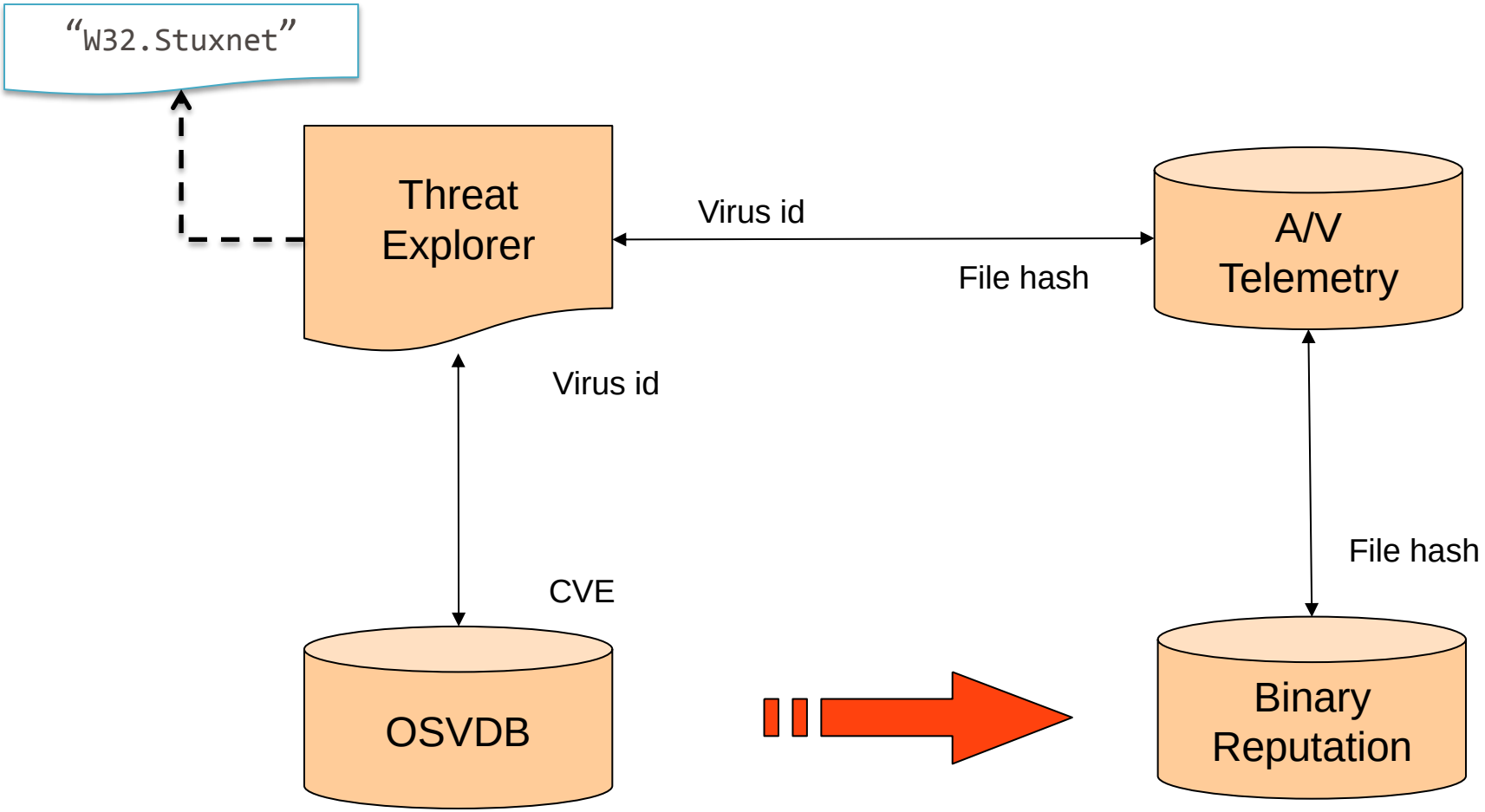
Beware



"This is not a pipe"

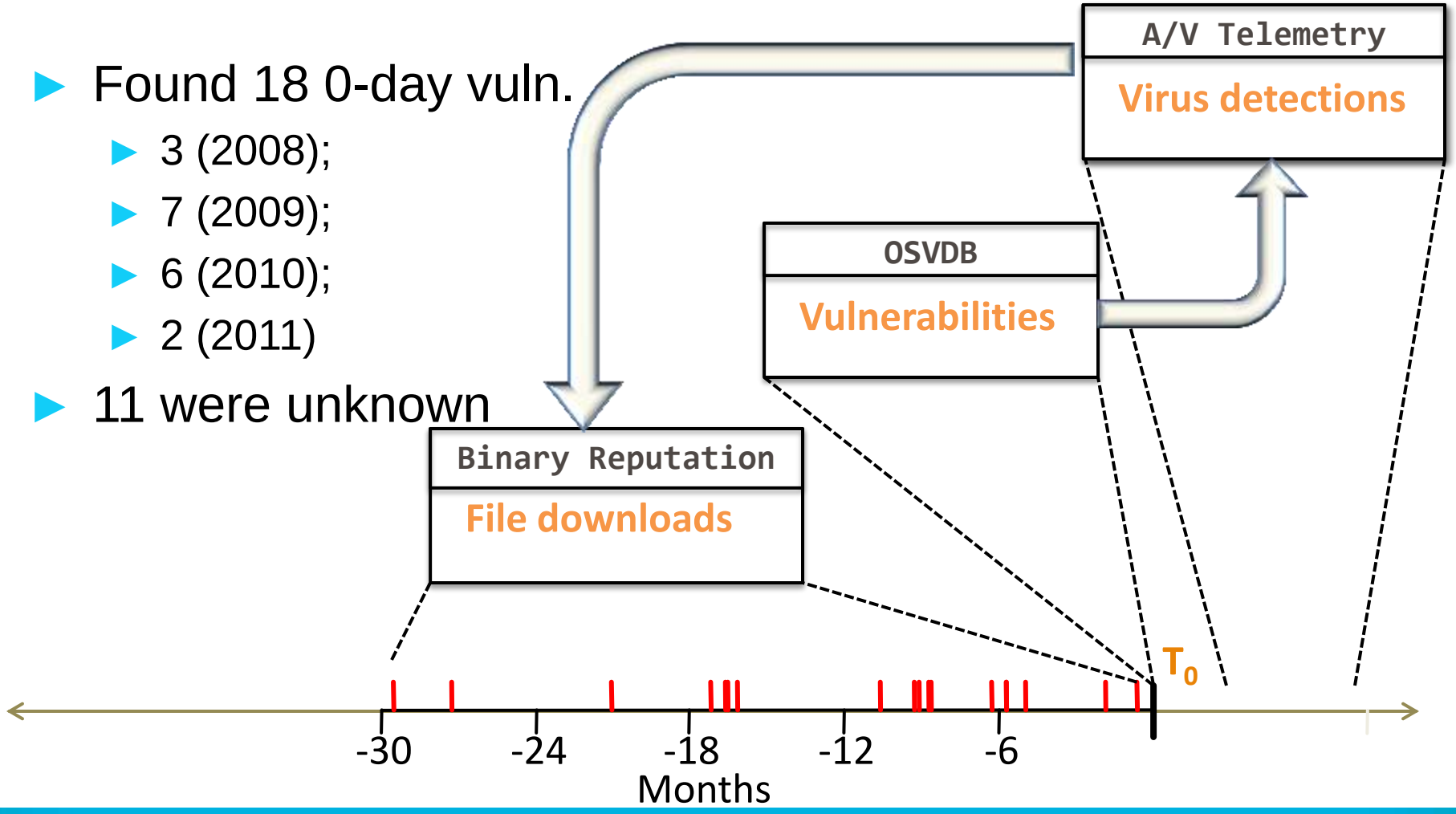
René Magritte (1898-1967)

Methodology



Results

- Found 18 0-day vuln.
  - 3 (2008);
  - 7 (2009);
  - 6 (2010);
  - 2 (2011)
- 11 were unknown

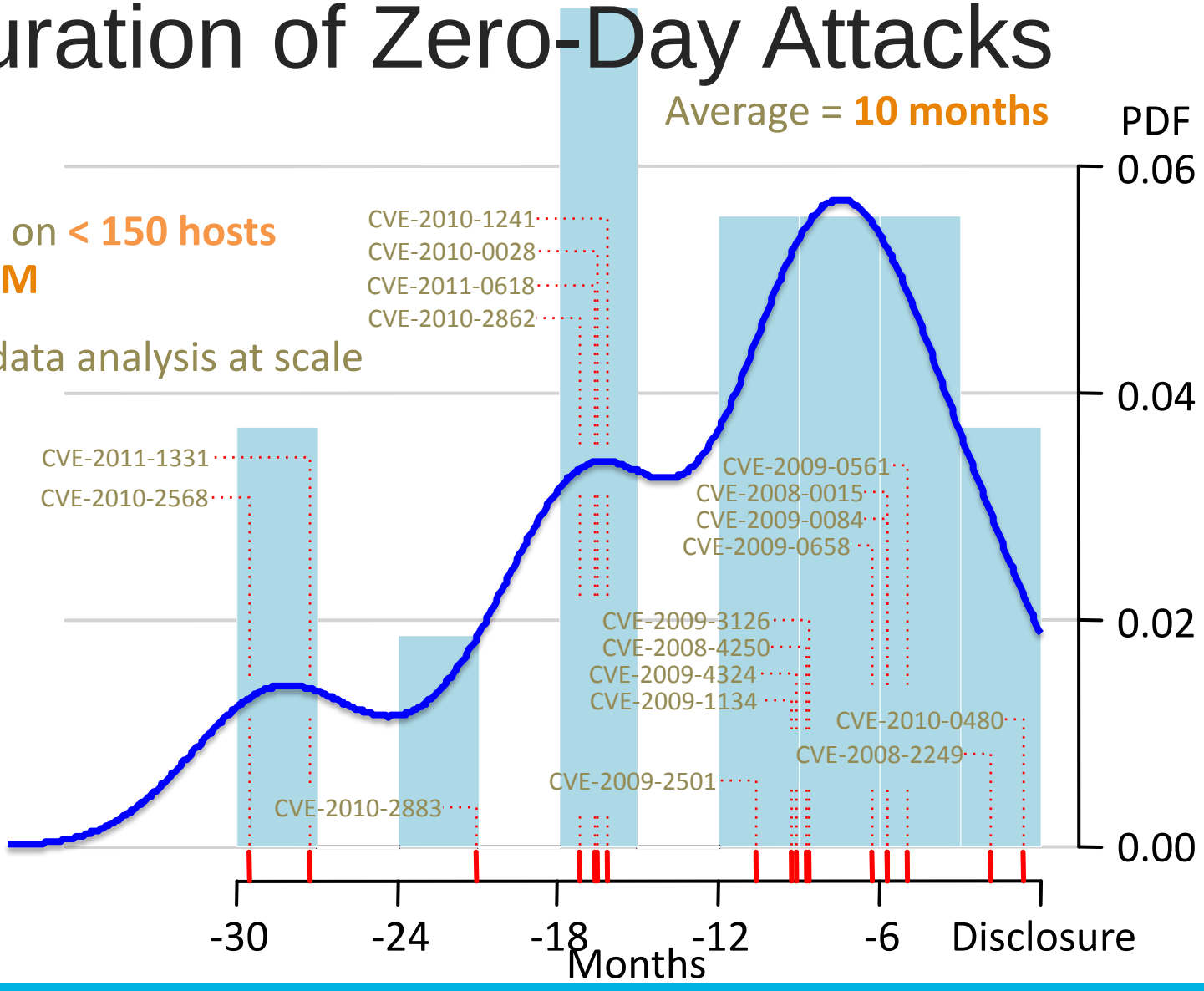


Duration of Zero-Day Attacks

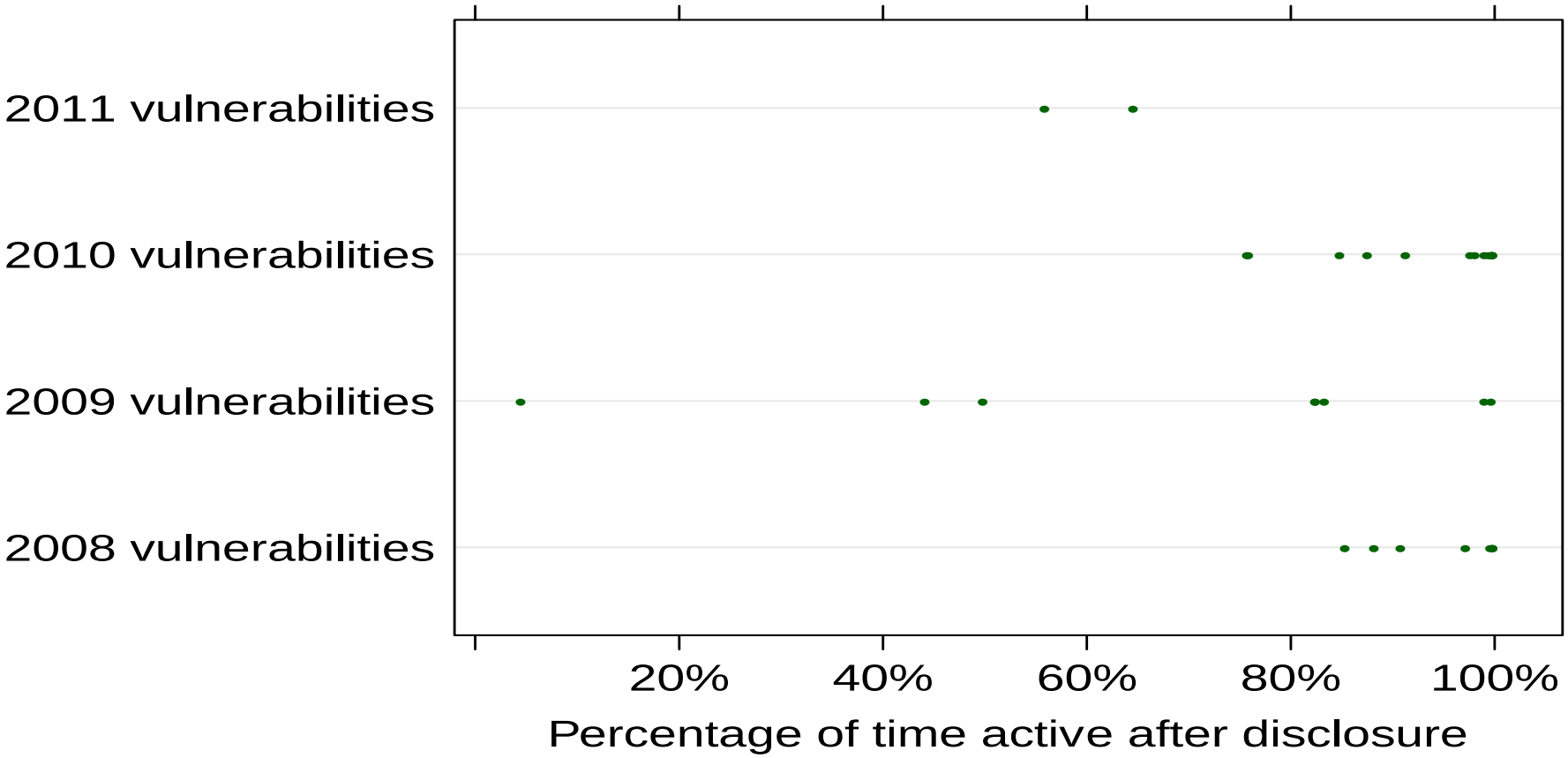
Average = **10 months**

Detected on **< 150 hosts** out of **11M**

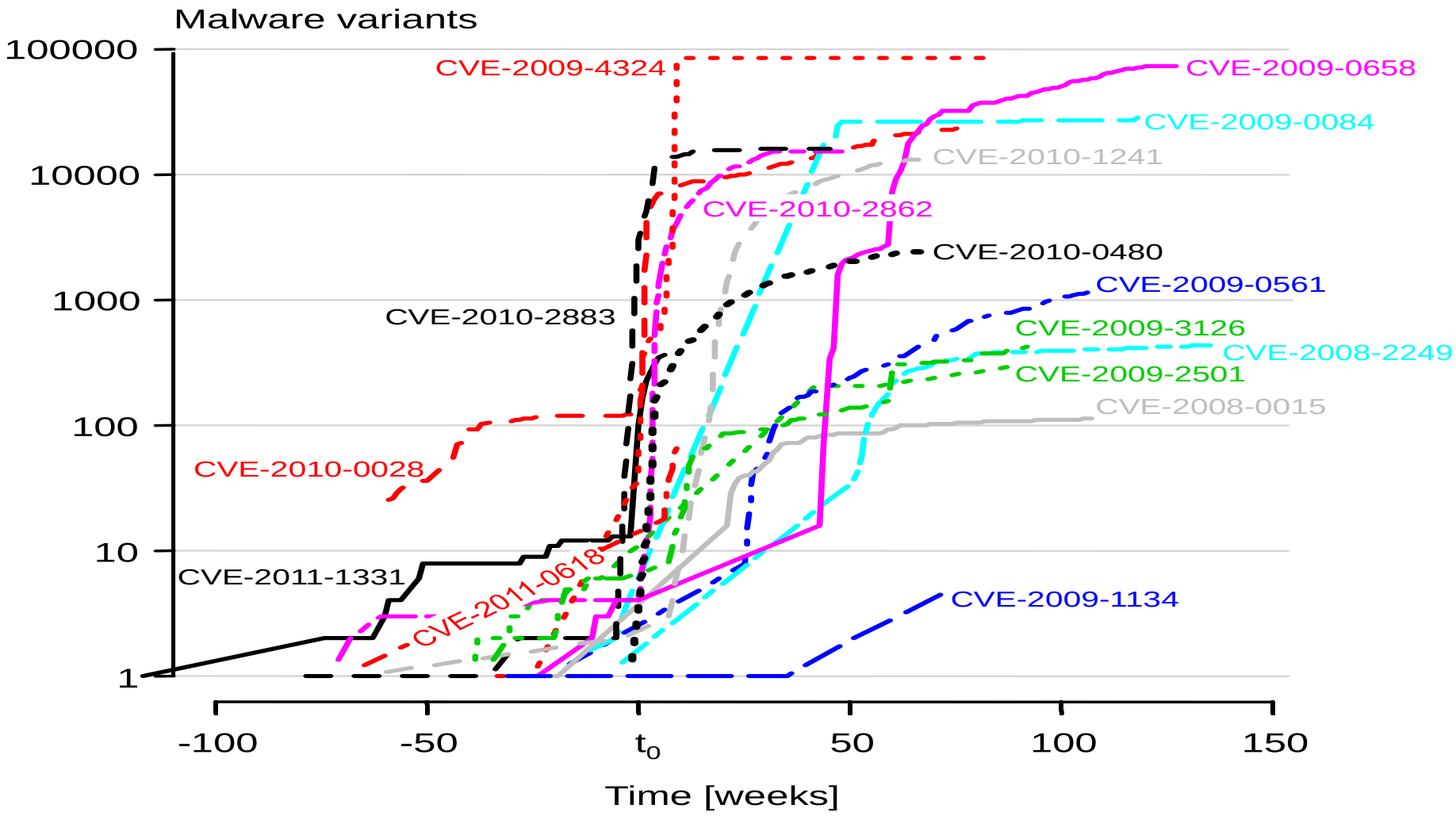
Require data analysis at scale



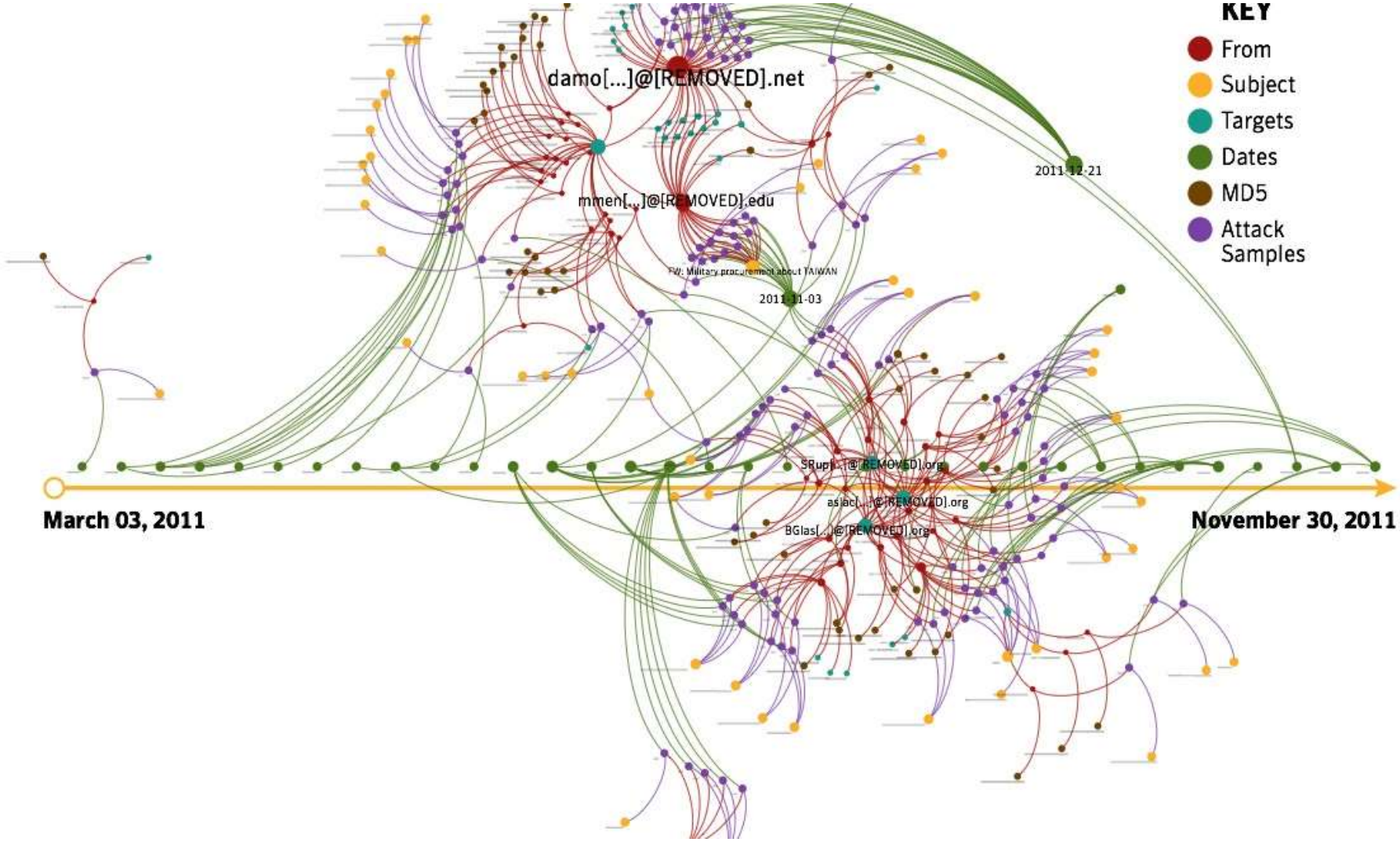
The usage of 0-day vulnerabilities after disclosure



What happens after disclosure…



Taidoor Attacks - 2011



Limitations

Web attacks

Polymorphism

Exploits in non-executable files

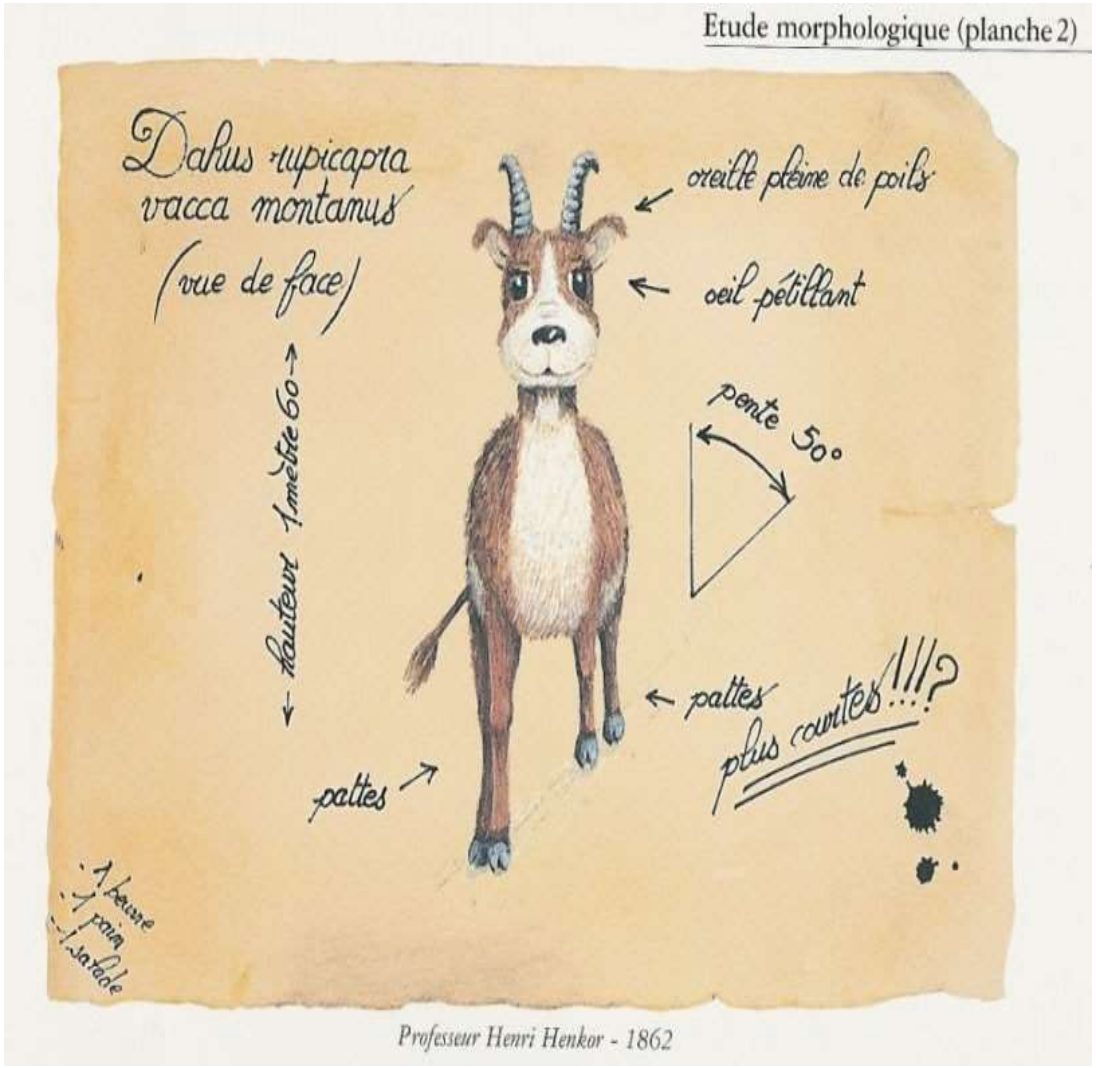
Highly Targeted Attacks

Dahu: Definition

- “The Dahu is an extremely shy animal living in the Alps of France and Switzerland.[…] It has adapted to its steep environment by having legs shorter on the uphill side and longer on the downhill side […] “

“The Dahu, An endangered Alpine species”,
Science, 2568, November 1996, pp.112,
www.vidonne.com/html/dahu-reignier.htm

Dahu


Etude morphologique (planche 2)
Dahus rupicapra vacca montanus (vue de face)
oreille pleine de poils
oeil pétillant
pente 50°
hauteur 1 mètre 60
pattes
pattes plus courtes !!!?
Professeur Henri Henkor - 1862

Food for thoughts

- Dahus are rare, bizarre, stimulating from an intellectual point of view but ...
  - Does it justify the existence of *Dahusian research*?
  - How can we make sure we are not building tools against *Dahusian hackers*?
  - How can we avoid (re)inventing *Dahusian solutions*?

Conclusions

- Using data collected from real users, we were able to find 18 zero-day vulnerabilities
- Zero-day attacks last between 19 days and 30 months, with a median of 8 months and an average of approximately 10 months
- The public disclosure of vulnerabilities is followed by an increase of up to five orders of magnitude in the volume of attacks
- To decrease the window of exposure, software vendors should be more careful to provide patches and make sure everyone applies them