

# Mapping criminal infrastructures from “patient zero” using Whois

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Massive data breaches  
– e.g., Target, Sony –  
were the result of a  
successful phishing  
attack

*Whois helps investigators  
learn what's below the  
surface of breaches or  
other cyber attacks*



# Patient zero



The first patient in an outbreak **who is** noticed by health authorities typically triggers a response or investigation



From patient zero investigators gather information to map the progression of a disease outbreak


- Who is patient zero?
- What are his symptoms?
- Where was he found?
- Where did he travel from and to?
- When did he travel?
- What threat does his condition pose?

# Index domains are the “patient zeros” of cyber investigations

- **Who is** the domain holder?
  - Notify the breach victim
  - Pursue the cyber attacker
- Where and when were the domains registered?
- *What other domains have similar registration data?*

**Attacks often involve a *conspiracy of domains...*  
use index domain to identify that conspiracy**





How do first  
responders  
use Whois?

Criminal Abuse of Domain Names:  
Bulk Registration and Contact Information Access

<http://www.interisle.net/sub/CriminalDomainAbuse.pdf>

# CASE STUDY CRIMINAL DOMAINS IN .TOKYO

- Abuse activity in .TOKYO from December 12, 2018 through December 25, 2018
- 8,715 .TOKYO criminal abuse domain names

Registrar	IANA ID	Criminal Abuse Domains Identified	Percent
GMO Internet, Inc. d/b/a Onamae.com	49	8,713	100.0
NameCheap, Inc.	1068	2	0.0

Nearly all of these were registered using a single registrar

1 ¥ =  
€0.0083

Over 20 million registrations! Domain registration service with the largest share in Japan

Anyone can win the domain first. Domain registration now!

.com	.net	.jp	.work	.xyz	.site	.tokyo
999 yen	1,160 yen	1,160 yen ~	1 yen	25 yen	50 yen	149 yen

Current price expiration date: Thursday, August 22, 2019 until 17:00 (残り 19日 14時45分41秒43)

Web site will create random names

Customers can upload a file of names

Search for a domain

1. Enter a string

2. Select domain type

やらのなぎや損! 集客効率UP!!

SEO対策に高ドメインパワーの中古ドメインが効果的!!

## WHY THIS REGISTRAR?

- VERY CHEAP DOMAIN REGISTRATIONS
- CUSTOMERS CAN REGISTER IN VOLUME
- CUSTOMERS CAN GENERATE RANDOM LOOKING DOMAINS



# CHEAP DOMAIN NAMES CONTRIBUTE TO A CRIMINAL MARKETPLACE IN WHICH SMALL INVESTMENTS CAN YIELD EXTRAORDINARY RETURNS



1000s OF DOMAIN NAMES CAN BE ACQUIRED FOR PENNIES PER DOMAIN FROM REGISTRARS LIKE GMO INTERNET



MAILING LISTS CAN BE PURCHASED IN THE DARK WEB OR ONLINE



RANSOMWARE CAN BE PURCHASED AS A SERVICE FOR €35  
PHISHING KITS CAN BE DOWNLOADED FOR FREE FROM SOCIAL MEDIA SITES  
ONLINE TUTORIALS ARE AVAILABLE FROM YOUTUBE



ASSUMING A RANSOMWARE EXTORTION FEE OF \$200-500 USD, A RANSOMWARE ATTACK IS PROFITABLE WITH A HANDFUL OF VICTIMS



**EVEN A SINGLE RANSOMWARE OR PHISHING CAMPAIGN IS A LUCRATIVE ENTERPRISE**

# IDENTIFYING CRIMINAL ACTORS: SEARCH AND PIVOT

- .TOKYO sample spans a “post-GDPR” time period
- Use historical and recent Whois records
- Use {registrant name, registrant organization, registrant email} to
  - SEARCH historical Whois databases
  - PIVOT to other databases or social media
- to identify the criminal actors
- Only some Whois records contain contact data
- Assume that criminals submit inaccurate or fraudulently composed data

# WHAT DOES SEARCH-AND-PIVOT REVEALS?

- The harmful content or attack messages
- Where criminal actors host *infrastructure*, e.g.
  - Malware or ransomware executables
  - Phishing or financial fraud web pages
  - Political influence campaign material
  - Mail servers that send phishing lures
  - DNS servers that support DDoS attacks
- Other domain holders that may be part of a criminal enterprise
- Other Top-level domains in which the criminal actor has registered names



# WHAT SEARCH-AND-PIVOT FROM “PATIENT ZERO” REVEALED

- The suspect appears to have used GMO’s bulk registration tools to *generate thousands of random-looking domains names in matters of minutes.*
  - GMO offered .TOKYO domains registrations at very low cost.
- The suspect provided a registrant address in Japan.
  - The suspects targeted .TOKYO but not exclusively. .INFO, .CLUB, .ONLINE, .XYZ, .BIZ, .SPACE, and .WORK were also targeted.
- The suspect hosted Japanese phishing or malware at three hosting providers:
  - InterQ GMO Internet, Inc. , IDC Frontier, Inc., Sakura Internet, Inc.



## LET'S REVIEW:

JAPANESE SPAMMERS TARGETED  
JAPANESE USERS USING A  
JAPANESE REGISTRAR AND  
JAPANESE HOSTING OPERATORS



COMPLETE WHOIS RECORDS  
ARE ESSENTIAL  
IF FIRST RESPONDERS AND  
LAW ENFORCEMENT  
ARE TO IDENTIFY VICTIMS  
AND CRIMINAL ACTORS

BUT... DUE TO AN OVERLY  
BROAD INTERPRETATION OF  
THE EU GDPR

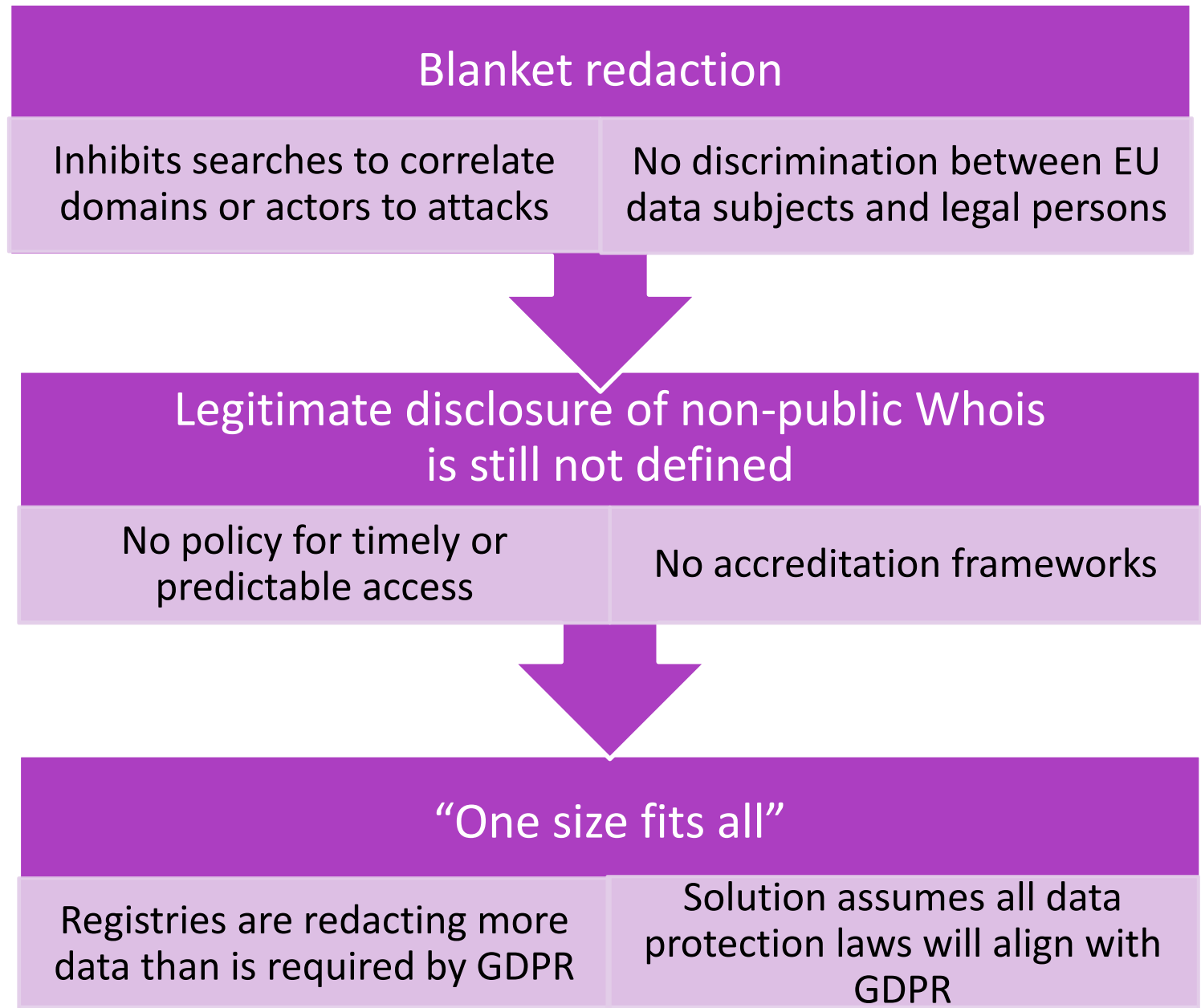
*PUBLIC WHOIS IS NOW DARK*

```
search-btn a span
ent .sf-sub-indicator (
er-outer .cart-menu .cart-icon-w
nav .sf-menu > li.current_page
nav .sf-menu > li.current-menu
nav > ul > li > a: hover > .sf-sub
nav ul #search-btn a: hover span,
nav .sf-menu > li.current-menu-
hover .icon-salient-cart, .ascend
!important; color: #ffffff !impo
rent header#top nav>ul>li.but
widget-area-toggle a i
er-outer .sf-sub-indicator
```

# EU'S GDPR IS INTENDED TO PROTECT PERSONAL PRIVACY

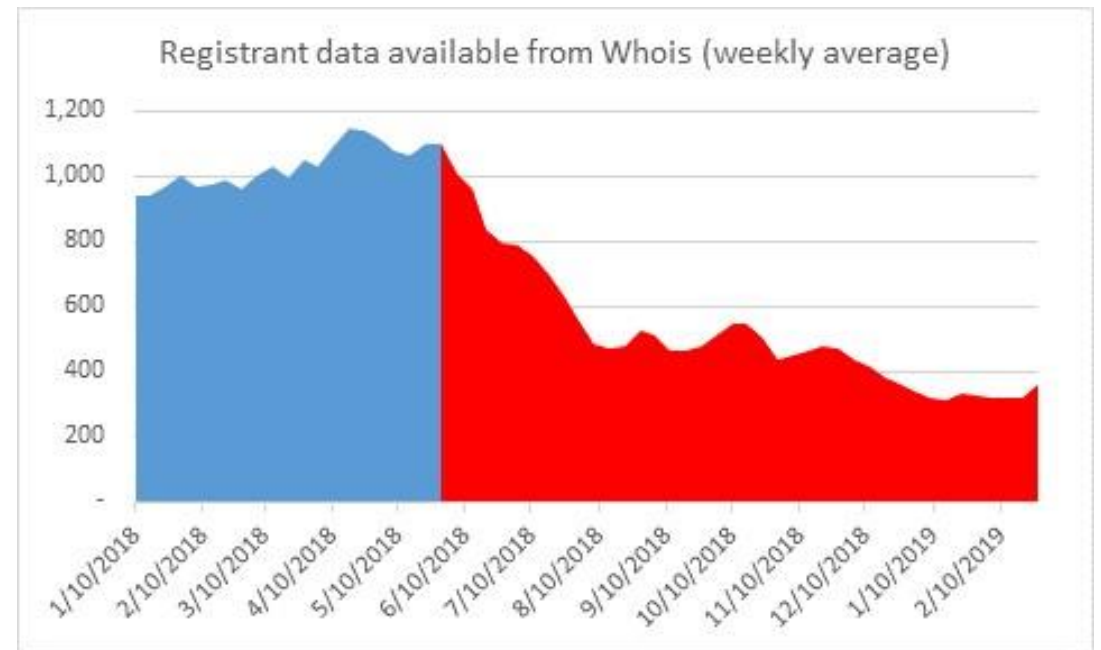
*Whois implementation protects Internet criminals or dark organizations*

ADVERSE  
EFFECTS OF  
ICANN  
WHOIS  
POLICY





# EFFECT OF ICANN POLICY ON ACCESS TO HISTORICAL COMPLETE WHOIS RECORDS



Facts & Figures: Whois Policy Changes  
Impair Blocklisting Defenses  
<http://lnnk.in/@whoisimpedesblocklisting>



**PRIVACY PROTECTION AND  
PUBLIC SAFETY: A DELICATE  
BALANCING ACT**

- WHEN PRIVACY REGULATION BLOCKS CRIMINAL INVESTIGATION CITIZENS ARE EXPOSED TO HARM AND LOSS
- DATA PROTECTION REGULATIONS MUST ACCOMMODATE FIRST RESPONDER AND LAW ENFORCEMENT ACCESS TO CRITICAL INFORMATION



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