RSAConference2020

San Francisco | February 24 – 28 | Moscone Center

HUMAN ELEMENT

SESSION ID: **PDAC-R01**

What Was Once Old Is New Again: Domain Squatting in 2020

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@herebepanda

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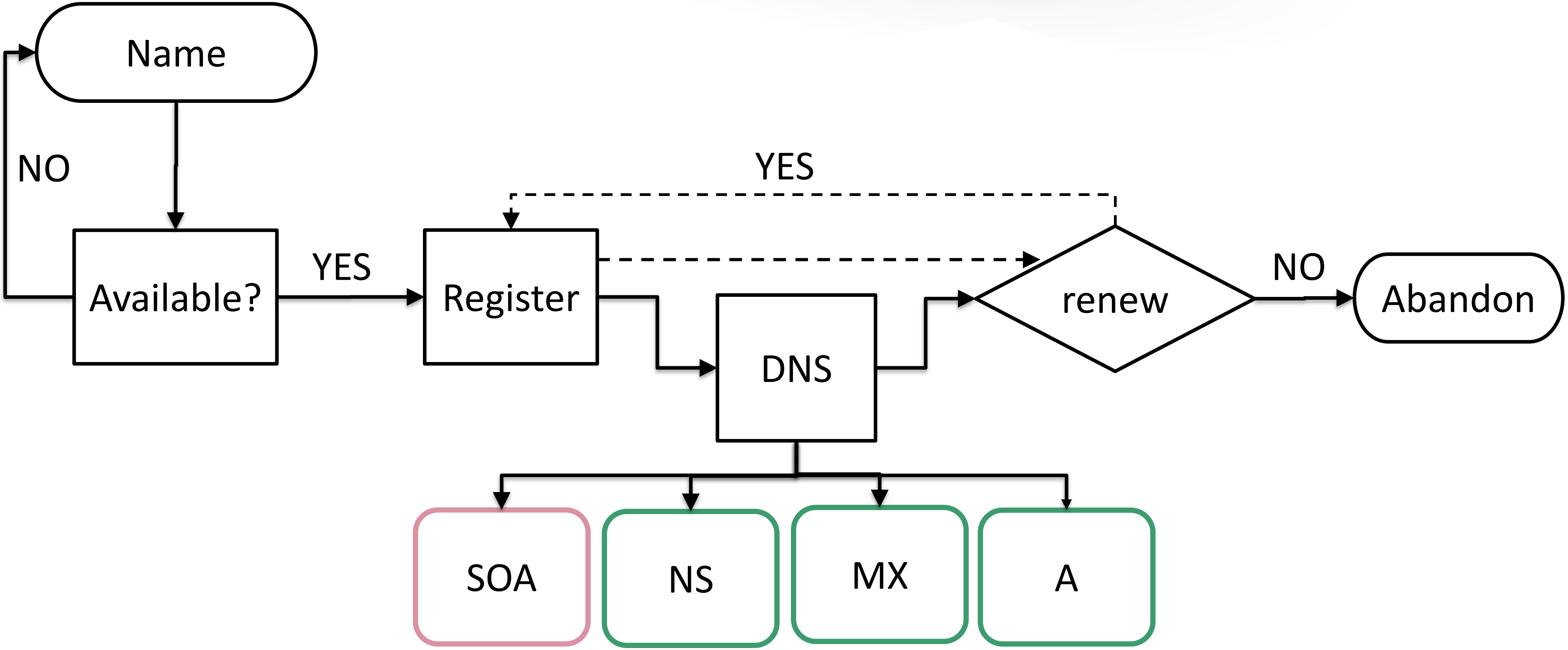
Sense of Security
@_w_m__

Agenda

- Story 1: The adventure
  - An introduction to domain squatting and our work to quantify how big of a problem it is.
- Story 2: A cautionary tale
  - How we used domain squatting to gather tons of useful information during our red team exercises.

Introduction: Domain Squatting 101

Domain Registration Process



Domain Squatting: Goals

Financial Gain

- Sell domain
- Advertising
- Affiliate programs
- …

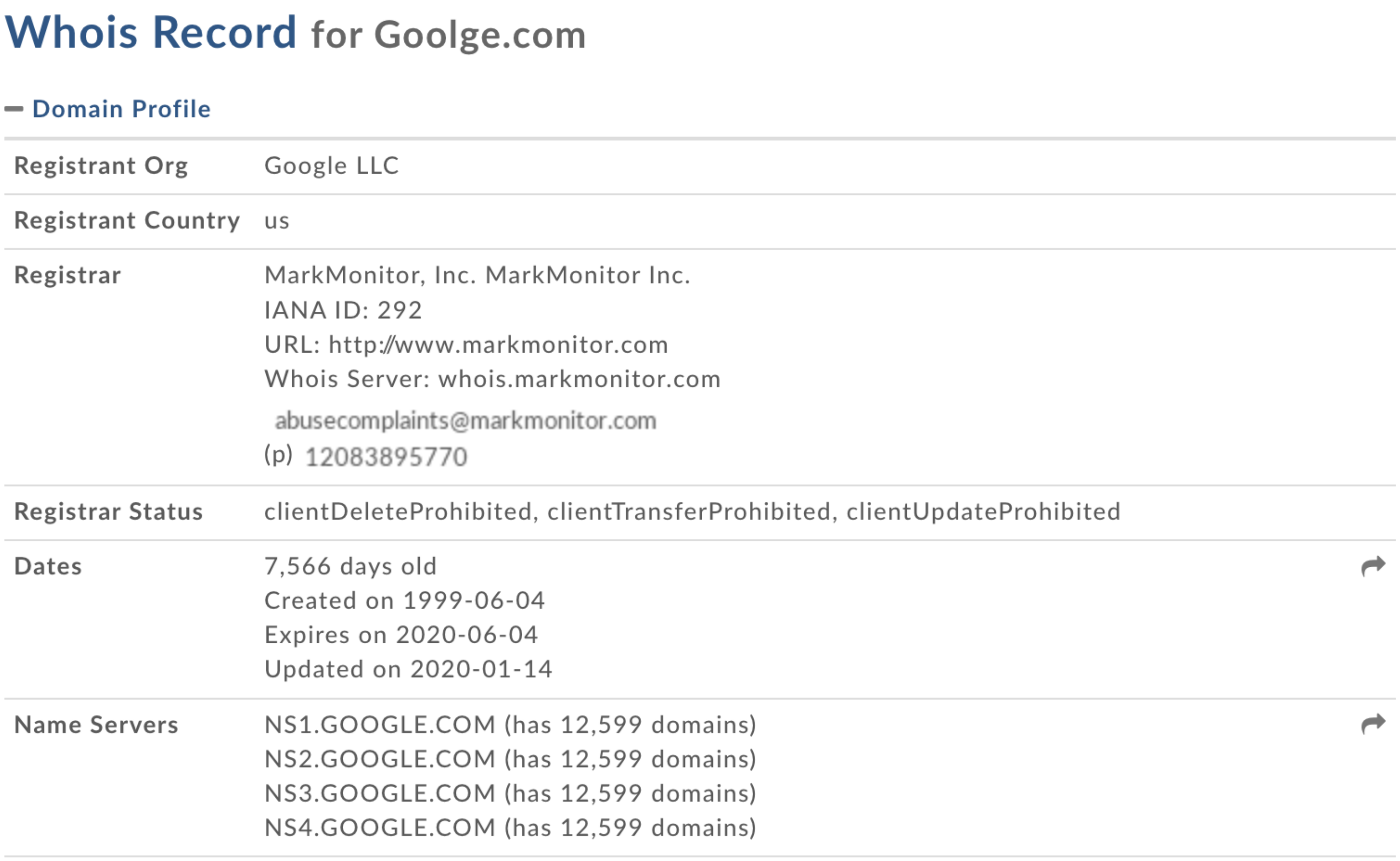
Maliciousness

- Phishing
- Malware
- Information leakage/gathering
- …

Domain Generation methods

- Typosquatting
- TLD “substitution”
- “Missing-dot”
- ”Combo”
- Homoglyphic
  - à, ğ, ẘ
- Abandoned domains
- Homophones
  - bobs-oars.com = bobs-ores.com

FYI: goolge.com



Whois Record for Goolge.com

– Domain Profile

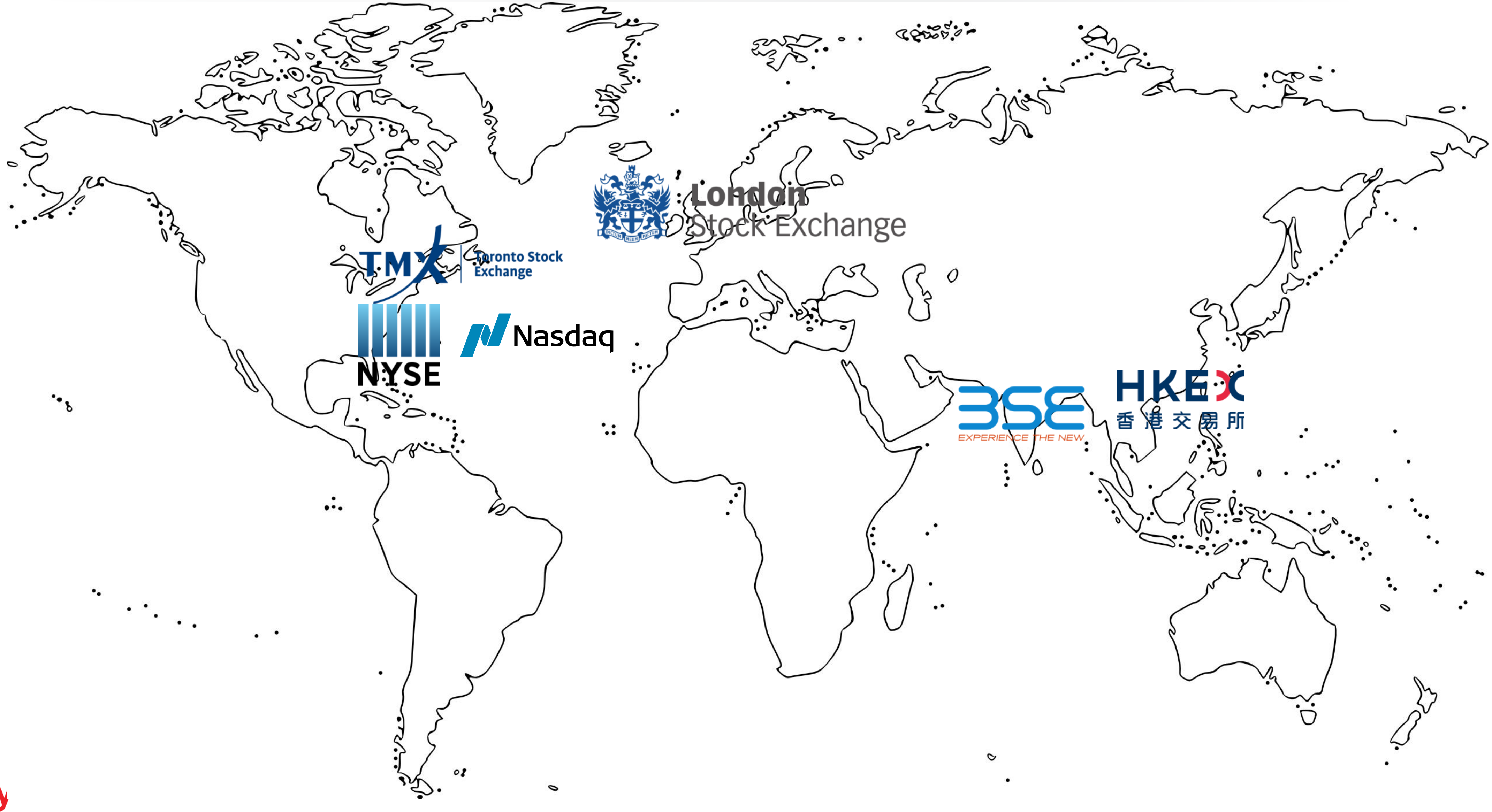
Registrant Org	Google LLC
Registrant Country	us
Registrar	MarkMonitor, Inc. MarkMonitor Inc. IANA ID: 292 URL: http://www.markmonitor.com Whois Server: whois.markmonitor.com abusecomplaints@markmonitor.com (p) 12083895770
Registrar Status	clientDeleteProhibited, clientTransferProhibited, clientUpdateProhibited
Dates	7,566 days old Created on 1999-06-04 Expires on 2020-06-04 Updated on 2020-01-14
Name Servers	NS1.GOOGLE.COM (has 12,599 domains) NS2.GOOGLE.COM (has 12,599 domains) NS3.GOOGLE.COM (has 12,599 domains) NS4.GOOGLE.COM (has 12,599 domains)

Chapter 1: The Journey Begins

Some questions we had

- How many domain squatting domains are there?
- Just how big a problem is domain squatting?

The targets


TMX Toronto Stock Exchange
NYSE
Nasdaq
London Stock Exchange
BSE EXPERIENCE THE NEW
HKEX 香港交易所

The targets

4,478 targets

3,126 DNS domains

Our approach v0.1

- Sourced 247+ million registered domains
- Squatting categories:
  1. Typosquatting – (Levenshtein distance)
  2. TLD "substitution" (1550+ TLDs)
  3. "Missing-dot" (wwwexample.com)

Levenshtein distance

- Words/domains within 1 “edit” of a target domain

1..............................0..............................1

xample.com   example.com   examples.com

Finding the squatters

- 267,634 possible squat domains identified

– Typosquatting :	173,512
– TLD “substitution” :	92,890
– “Missing dot” :	1,232

- A LOT were legitimate, so we needed to differentiate
  - abc.com is not a squat of abb.com

The journey begins…

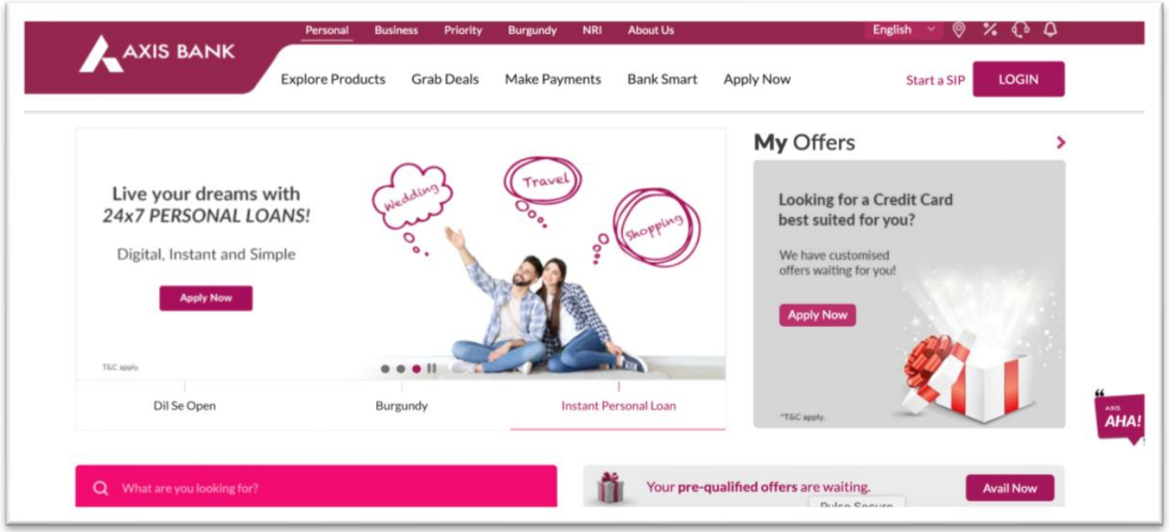
Chapter 2: Categorisation

Let’s get with the categories

- Categorised all 267,634 domains
- Manually verified 1000’s
- Many, many false-negatives
- Cannot use domain categorization alone

Not always correct

Banking and Finance



Live your dreams with
24x7 PERSONAL LOANS!

Digital, Instant and Simple

T&C apply.

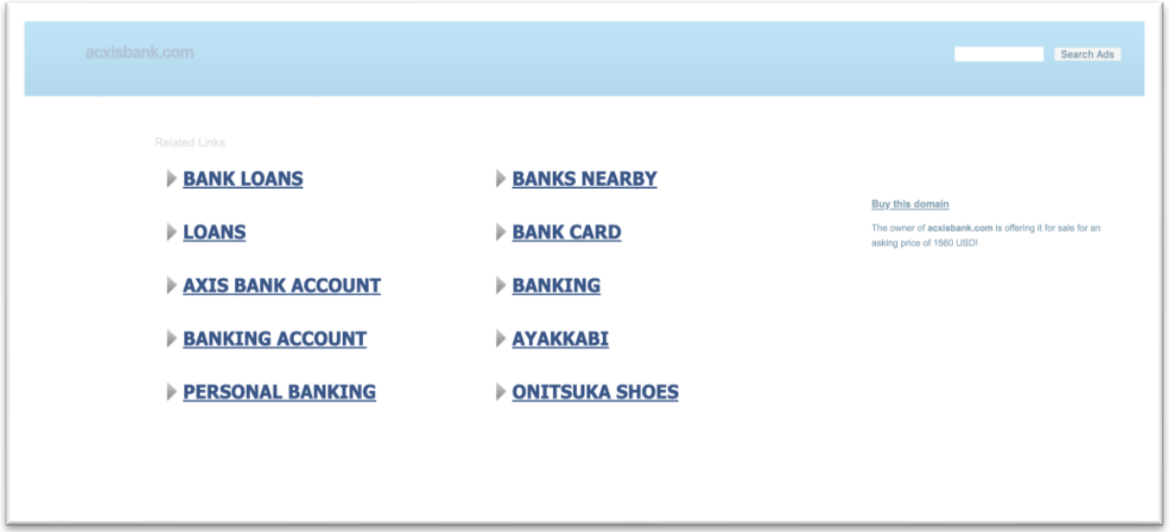
Looking for a Credit Card best suited for you?

We have customised offers waiting for you!

*T&C apply.

Your pre-qualified offers are waiting.

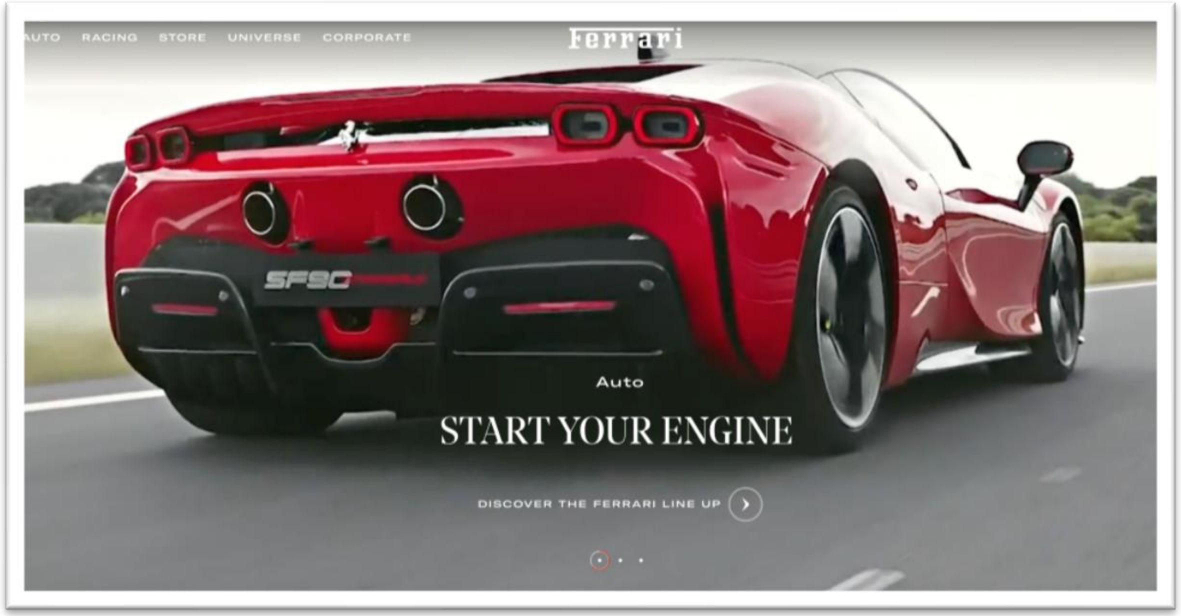
Business



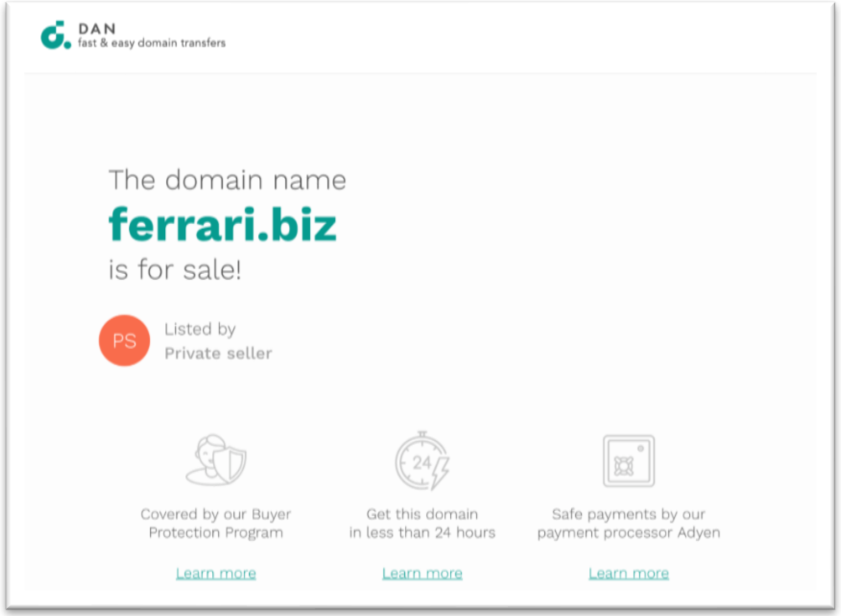
The owner of **acxisbank.com** is offering it for sale for an asking price of 1560 USD!

Although sometimes…

Personal Vehicles



Spam URLs


DAN
fast & easy domain transfers

The domain name
ferrari.biz
is for sale!

PS Listed by
Private seller

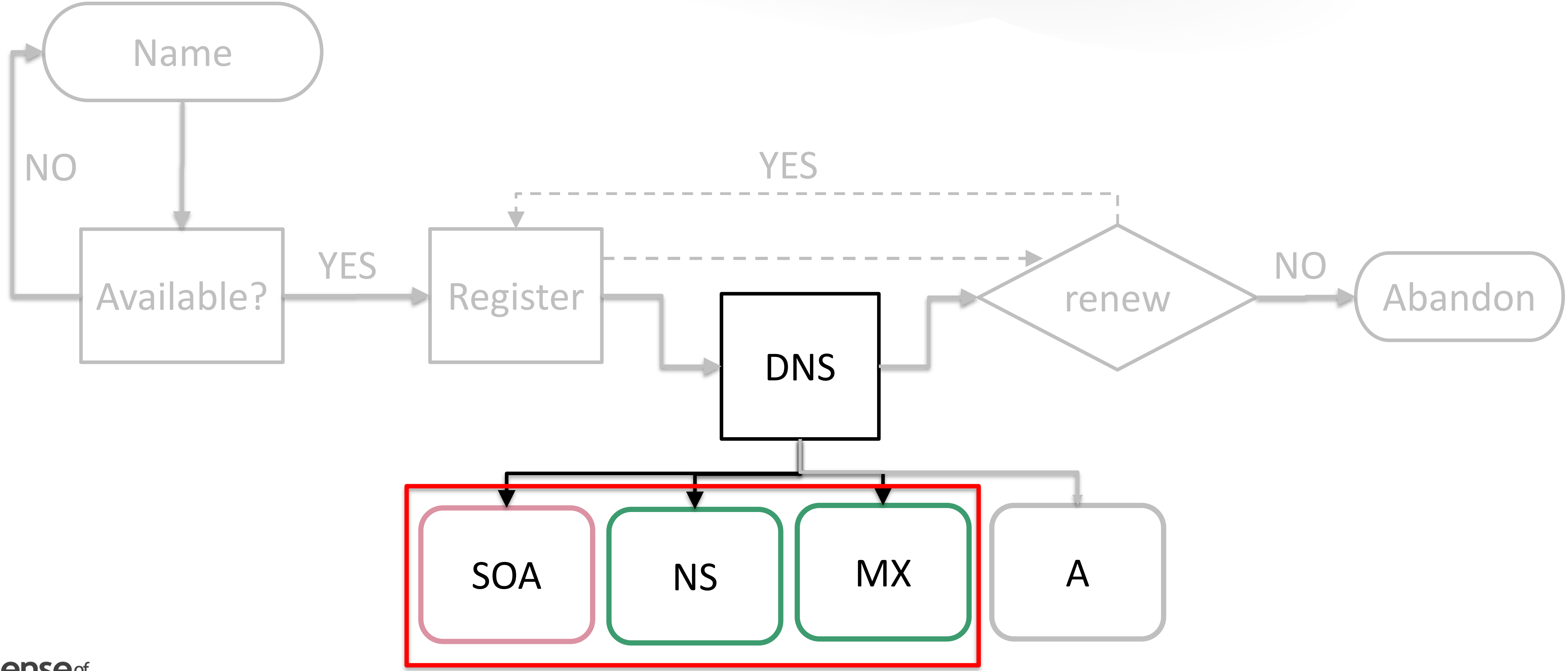
Covered by our Buyer Protection Program
Learn more

Get this domain in less than 24 hours
Learn more

Safe payments by our payment processor Adyen
Learn more

Chapter 3: DNS

Records collected



DNS Totals

Start of Authority (SOA):	268,130
Name servers (NS) :	757,981
Mail Exchangers (MX):	1,053,492
Grand Total:	2,079,603

Largest DNS SOA providers

1. namebrightdns.com
2. uniregistrymarket.link
3. sedoparking.com
4. parkingcrew.com
5. dns.com
6. bodis.com
7. cscdns.net
8. registrar-servers.com

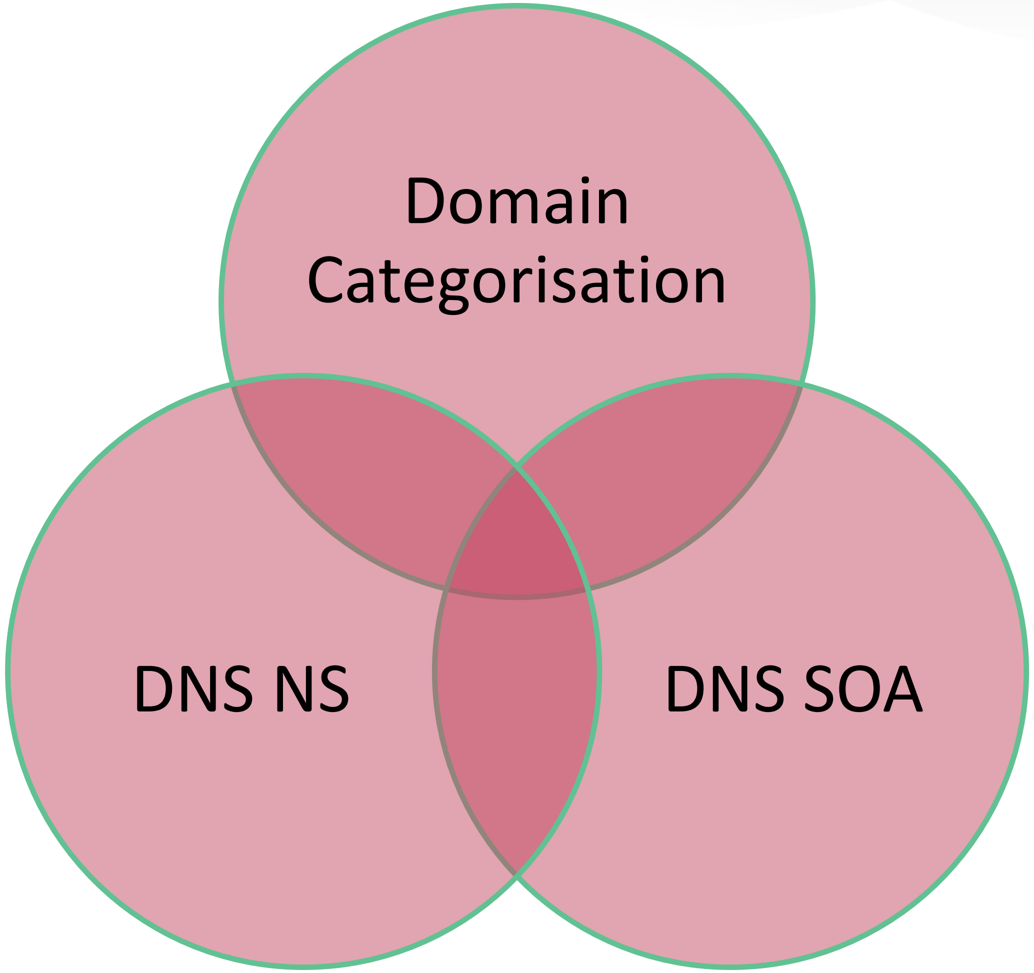
Verification

- Again cross-referenced results with screenshots
- More false-negatives
- Squatters don’t all congregate on known “bad” DNS servers
- Squatters also host on “good” DNS servers

We venture forth….

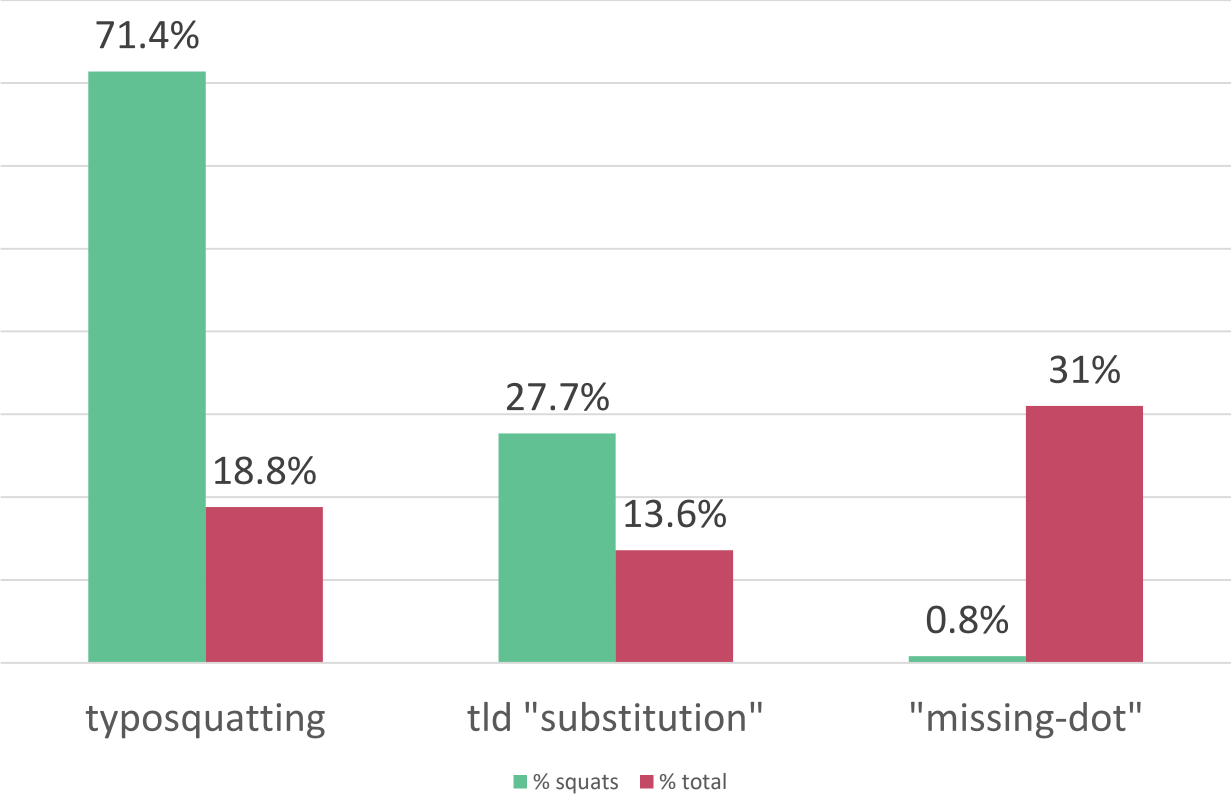
Chapter 4: Intersection

Correlation



Confirmed squatting domains

- Conservatively identified 45,646 domains
  - Approximately 17% of the total domains



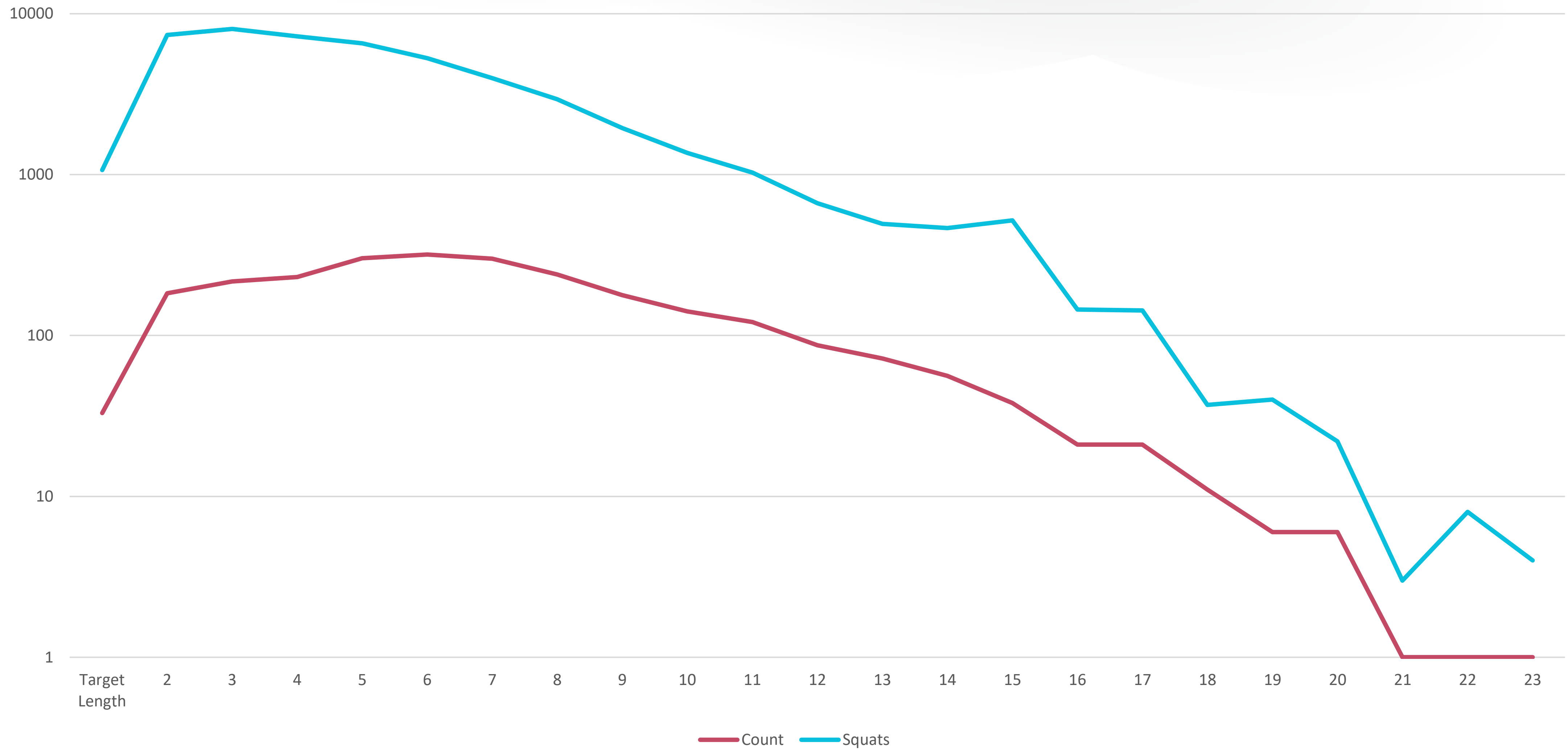
Largest DNS SOA squat providers

1. uniregistrymarket.link.
2. sedoparking.com.
3. parkingcrew.net.
4. dns.com.
5. above.com.
6. bodis.com.
7. parklogic.com.
8. name-services.com.
9. domaincontrol.com.

Top 10 squatted organisations

1. Ares Management (aresmgmt.com)
2. Fogo de Chão (fogo.com)
3. Facebook (facebook.com)
4. Quantum Corporation (quantum.com)
5. Zillow (zillow.com)
6. Coupons.com (coupons.com)
7. Progressive Corporation (progressive.com)
8. Uber (uber.com)
9. The Hartford (thehartford.com)
10. United Airlines Holdings (united.com)

Domain Length: Counts and Squats



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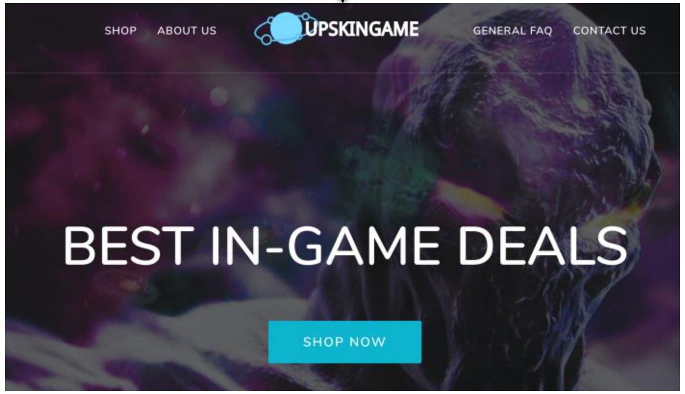
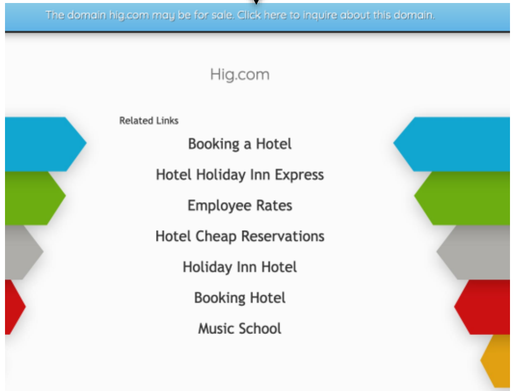
Umbrella Popularity List—Top Million Domains

hig.com

Rank #214,070

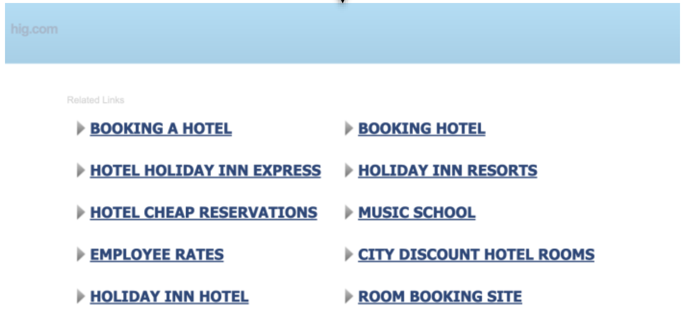



The domain hig.com may be for sale. Click here to inquire about this domain.

Hig.com

Related Links

Booking a Hotel
Hotel Holiday Inn Express
Employee Rates
Hotel Cheap Reservations
Holiday Inn Hotel
Booking Hotel
Music School


hig.com

Related Links

- BOOKING A HOTEL
- HOTEL HOLIDAY INN EXPRESS
- HOTEL CHEAP RESERVATIONS
- EMPLOYEE RATES
- HOLIDAY INN HOTEL
- BOOKING HOTEL
- HOLIDAY INN RESORTS
- MUSIC SCHOOL
- CITY DISCOUNT HOTEL ROOMS
- ROOM BOOKING SITE

Chapter 5: Conclusion

Remember for later…

Squat domains with MX records: `23,131(~50%)`

Lessons learned

1. Using Levenshtein distance is useful, but expect a lot of data
2. It’s difficult to tie a squatting domain back to a specific target
3. It’s even more difficult to identify the actual owner of the squatting domain
4. Domain categorisation is not an exact science
5. DNS domains change OFTEN (duh)
6. Squatters employ some creative techniques to hide their infrastructure

Future work - v0.2

- Go bigger:
  - Targets (more stock exchanges)
  - Squat types (combo, abandoned, etc.)
  - Domains list (250 million is not enough)
- Continuous analysis, not point in time
- "Faster" domain categorisation system
  - We played nice, but need something that scales
- Include more features (screenshots, ssdeep, keywords)

A Cautionary Tale:
Red Team domain squatting

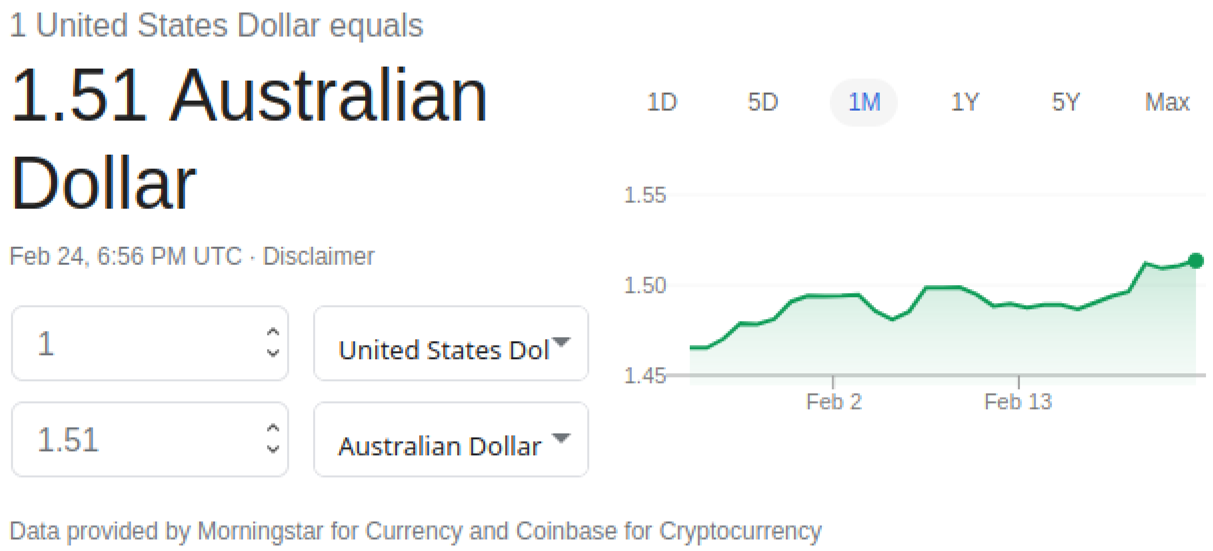
Chapter 1: The Quest for Treasure

Goals

- Find a more intelligent way of identifying useful squatting domains, not as much brute force
- Capitalize on mistakes made by clients and employees
- Gather data passively
  - Email behavior
  - Types of data sent / received
  - Supply chain interactions
  - Contextual information used for social engineering

Problems needed solving

- Large number of candidate domains
- Traditional obvious ones already taken
- Budget of AU$20 ☺ (That's Aus $$)



1 United States Dollar equals

1.51 Australian Dollar

Feb 24, 6:56 PM UTC · Disclaimer

1 — United States Dol

1.51 — Australian Dollar

Data provided by Morningstar for Currency and Coinbase for Cryptocurrency

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Chapter 2: Red Team 2019

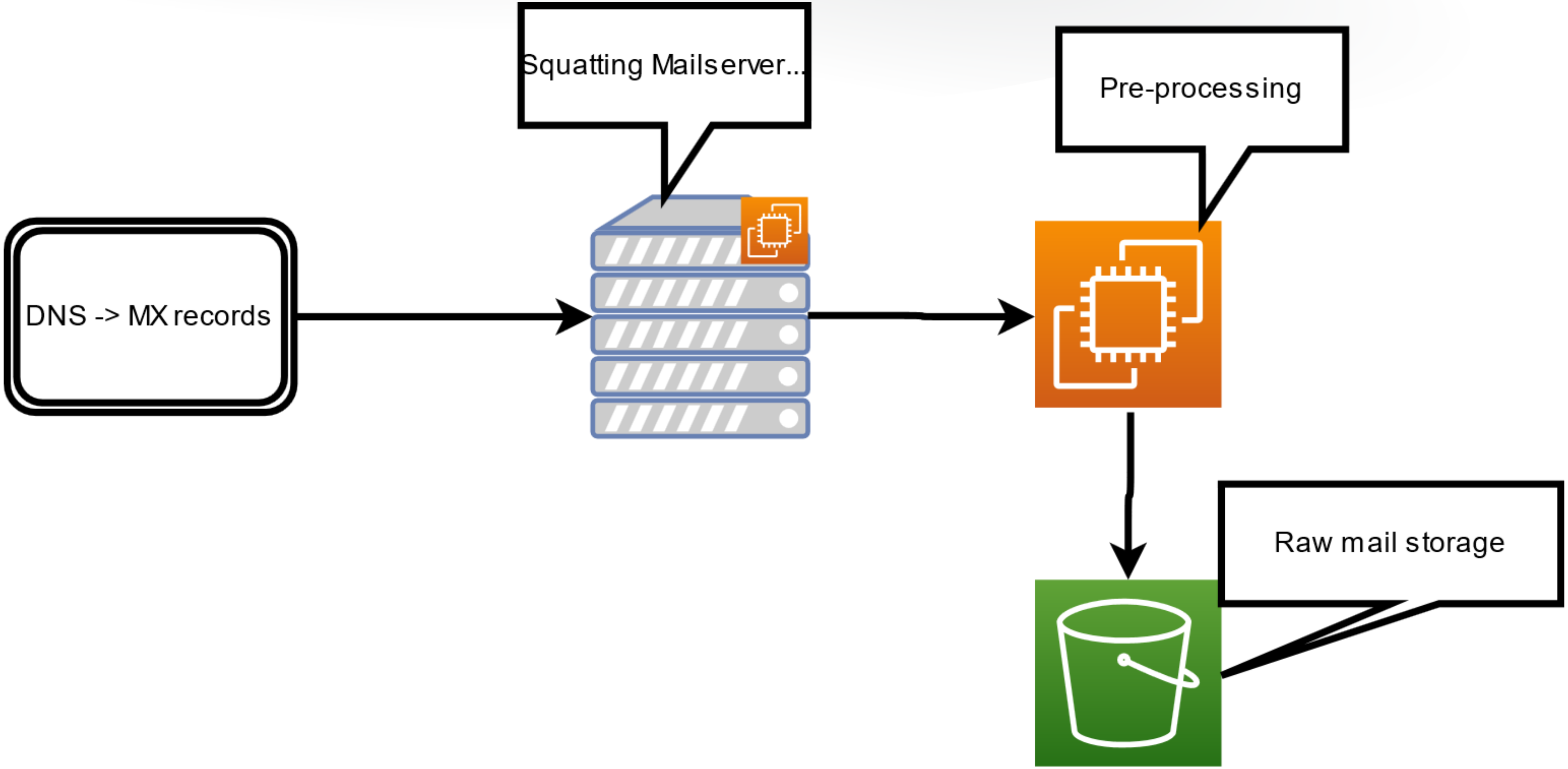
The Target

- Multinational Medical service provider
  - Hospital services
  - Pharmaceutical services
  - Doctor and specialist services
  - 5,000+ employees
- Interactions
  - Employees
  - Patient (Medical, financial)
  - Suppliers (Services, Productions and infrastructure)
  - Government (Healthcare, financial and law enforcement)
- Highly sensitive data

Choosing our domain

- Breach data as “validation source”
  - There is lots of it, and mostly free
  - Typo’s in breach data is usually caused by people mistyping their own email address
  - Typo domains with multiple occurrences in breach data is typically a good indication
- Found a target domain with multiple unique accounts (Lots of employees making the same mistake)

The Setup



DNS -> MX records

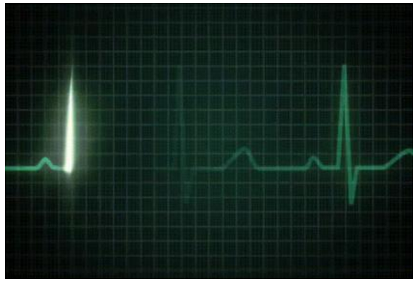
Squatting Mailserver...

Pre-processing

Raw mail storage

General Statistics

- First email received within 2 min
- 10,000+ emails received during 30 day period
- ~2,600 legitimate file attachments (disregarded images from mail signatures, etc.) of these 850 were classed as business related documents
- 12.6% of emails received were from target organization internally



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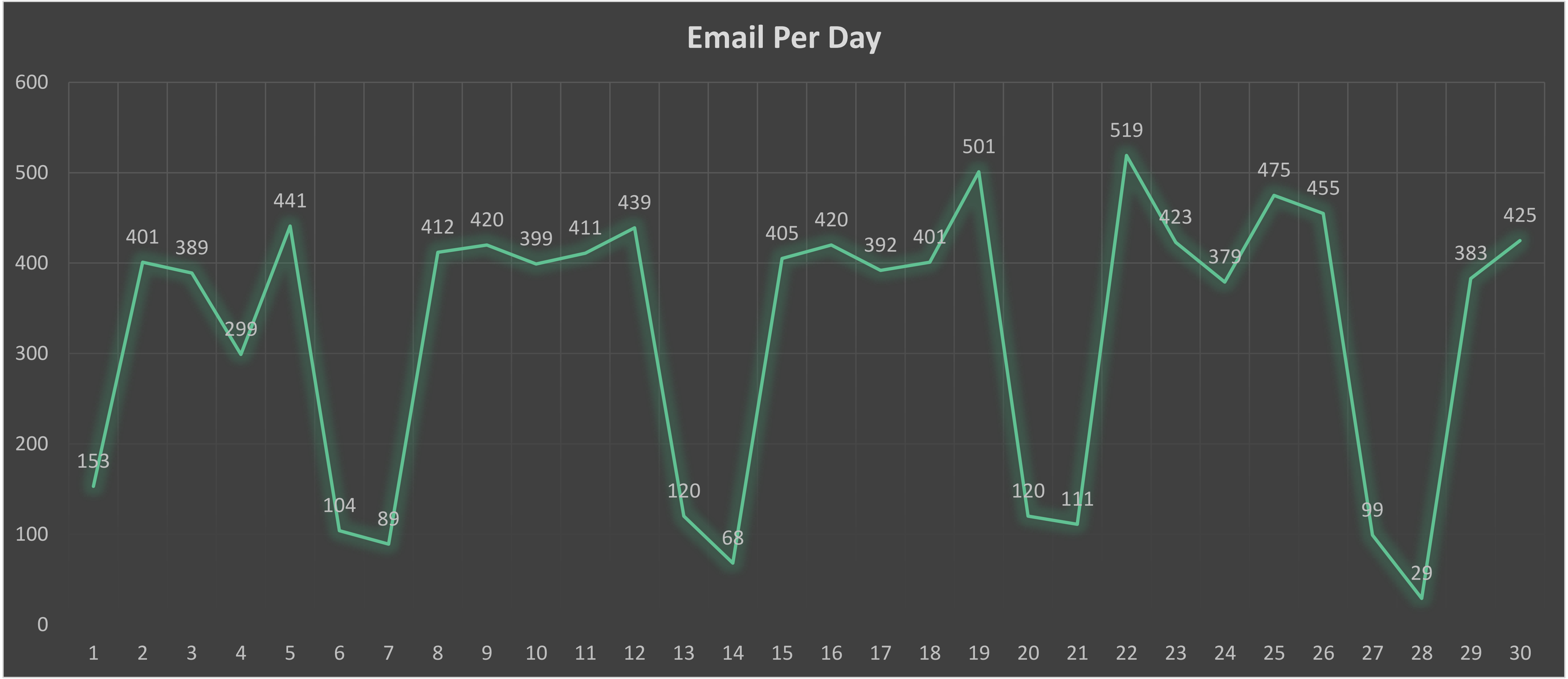

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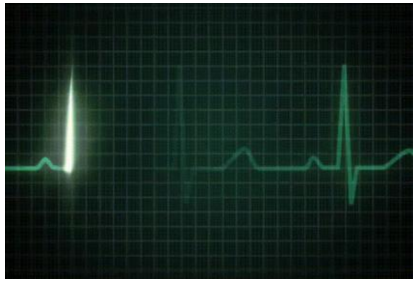
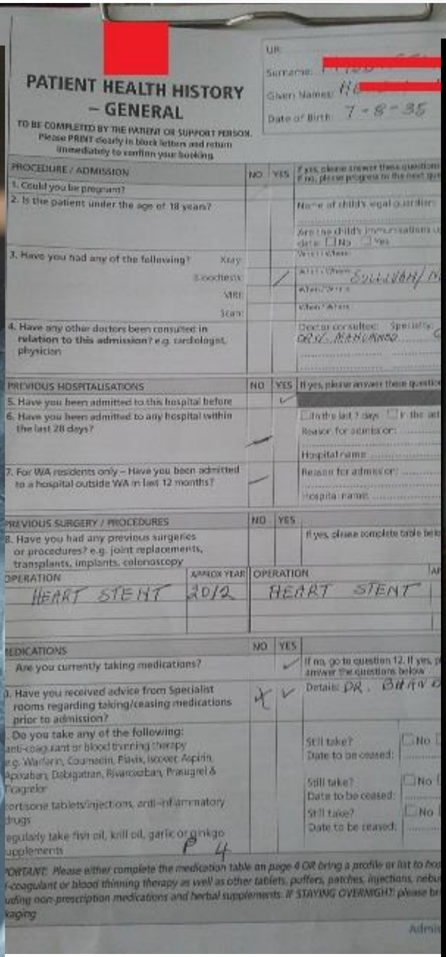


Loot



[redacted]

PATIENT HEALTH HISTORY – GENERAL

TO BE COMPLETED BY THE PATIENT OR SUPPORT PERSON. Please PRINT clearly in block letters and return immediately to confirm your booking

UR:
Surname: [redacted]
Given Names: [redacted]
Date of Birth: 7-8-35

PROCEDURE / ADMISSION	NO	YES	If yes, please answer these questions If no, please progress to the next que
1. Could you be pregnant?			
2. Is the patient under the age of 18 years?			Name of child's legal guardian: Are the child's immunisations up to date □ No □ Yes
3. Have you had any of the following? Xray:			Where / When
Bloodtests:		✓	Where / When SULLIVAN/ N
MRI:			When / Where
Scan:			When / Where
4. Have any other doctors been consulted in relation to this admission? e.g. cardiologist, physician			Doctor consulted: Specialty: DR/. MAHONARO
PREVIOUS HOSPITALISATIONS	NO	YES	If yes, please answer these questio
5. Have you been admitted to this hospital before		✓	
6. Have you been admitted to any hospital within the last 28 days?	✓		□ In the last 7 days □ In the last Reason for admission: Hospital name:
7. For WA residents only – Have you been admitted to a hospital outside WA in last 12 months?	✓		Reason for admission: Hospital name:
PREVIOUS SURGERY / PROCEDURES	NO	YES	
8. Have you had any previous surgeries or procedures? e.g. joint replacements, transplants, implants, colonoscopy			If yes, please complete table belo

OPERATION	APPROX YEAR	OPERATION	AP
HEART STENT	2012	HEART STENT	

MEDICATIONS	NO	YES	
Are you currently taking medications?		✓	If no, go to question 12. If yes, p answer the questions below
Have you received advice from Specialist rooms regarding taking/ceasing medications prior to admission?	X	✓	Details: DR. BHAV
Do you take any of the following: anti-coagulant or blood thinning therapy e.g. Warfarin, Coumadin, Plavix, Iscover, Aspirin, Apixaban, Dabigatran, Rivaroxaban, Prasugrel & Ticagrelor			Still take? □ No Date to be ceased:
cortisone tablets/injections, anti-inflammatory drugs			Still take? □ No Date to be ceased:
regularly take fish oil, krill oil, garlic or ginkgo supplements P 4			Still take? □ No Date to be ceased:

PORTANT: Please either complete the medication table on page 4 OR bring a profile or list to ho -coagulant or blood thinning therapy as well as other tablets, puffers, patches, injections, nebu uding non-prescription medications and herbal supplements. If STAYING OVERNIGHT please br kaging

Admis

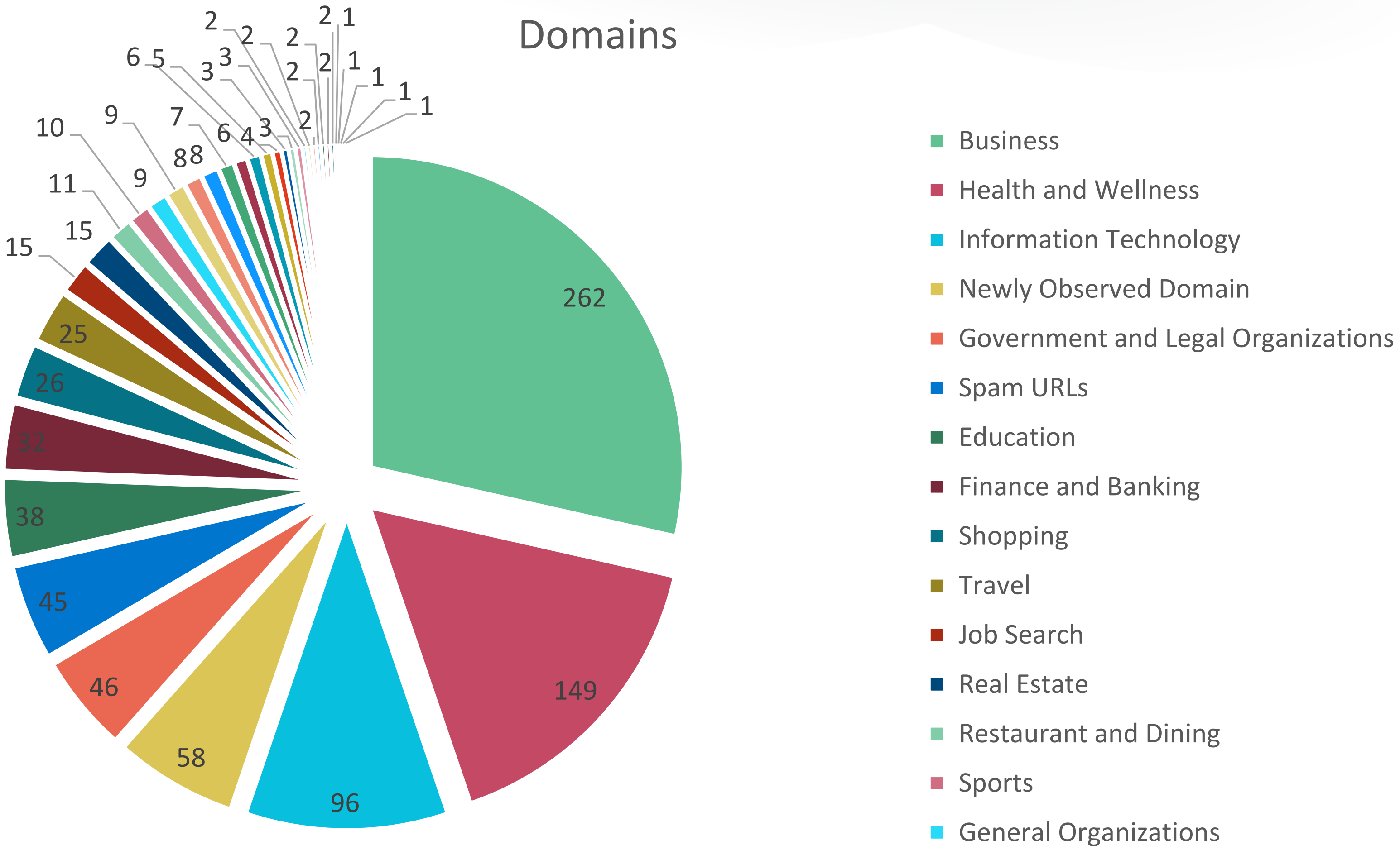
[redacted]

[redacted]

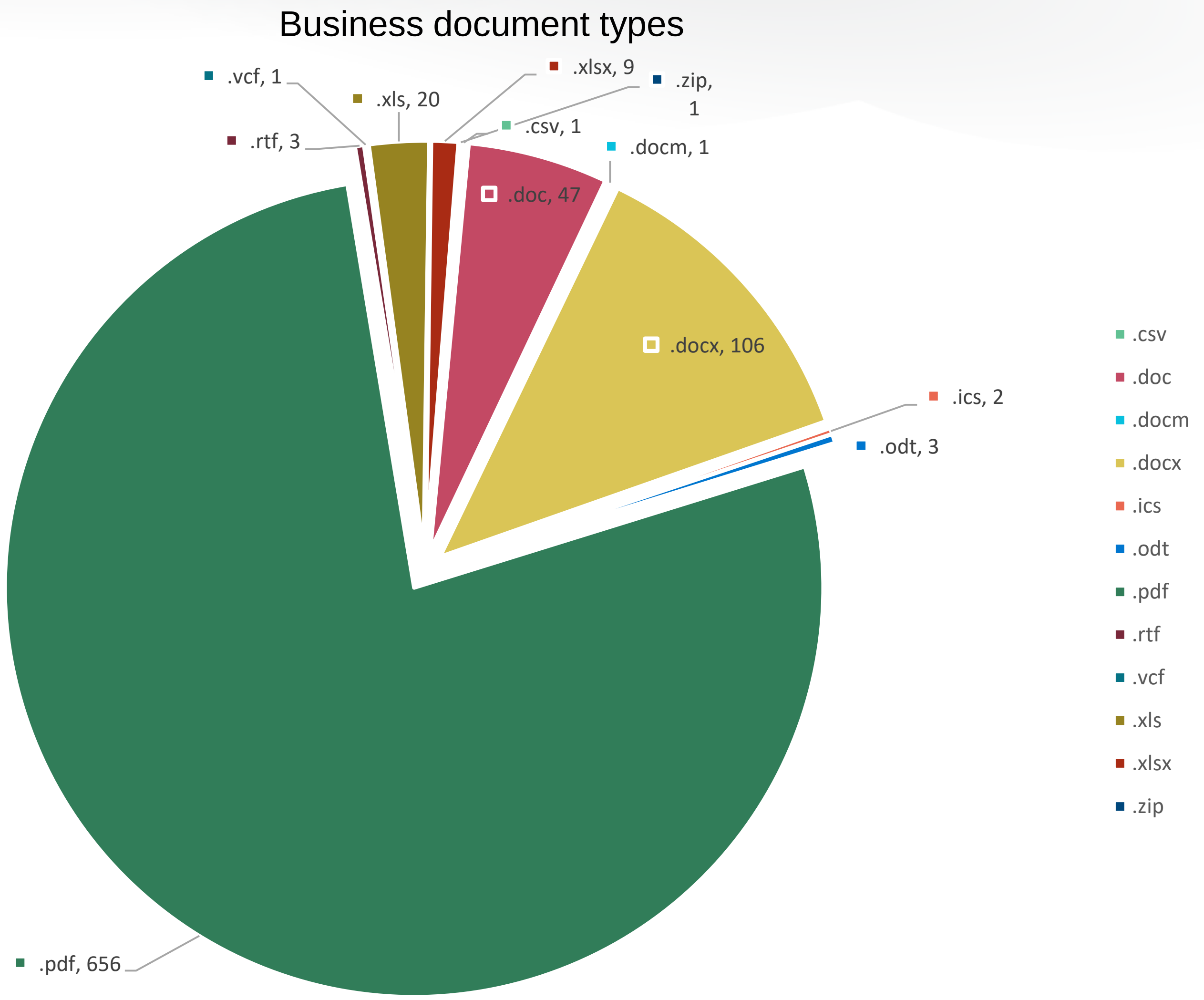
[redacted]

RunDate: 04/09/2019, Run #43, 09069150-1-WB1R
Reason: BIN NOT OUT

Who Were Sending The Emails



Attachment Breakdown



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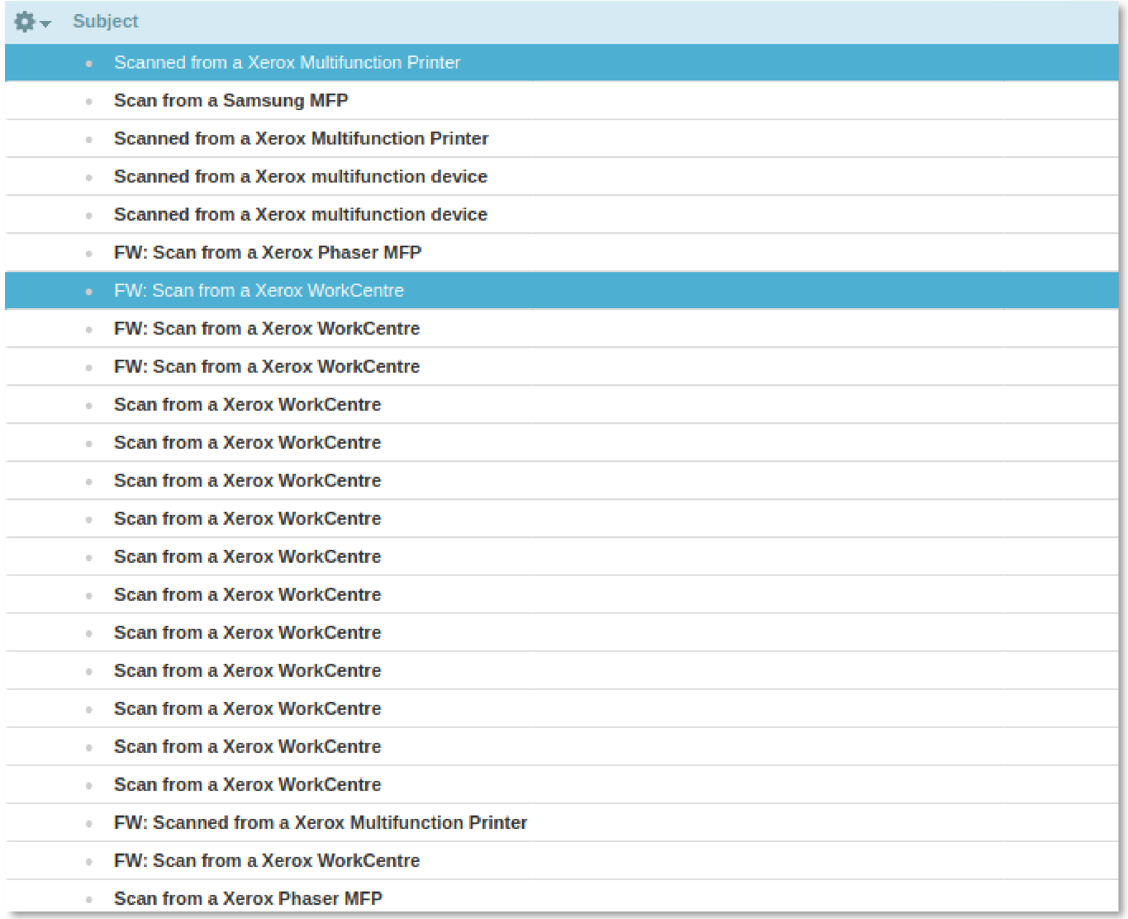
Leaky MFPs



Subject

- Scanned from a Xerox Multifunction Printer
- Scan from a Samsung MFP
- Scanned from a Xerox Multifunction Printer
- Scanned from a Xerox multifunction device
- Scanned from a Xerox multifunction device
- FW: Scan from a Xerox Phaser MFP
- FW: Scan from a Xerox WorkCentre
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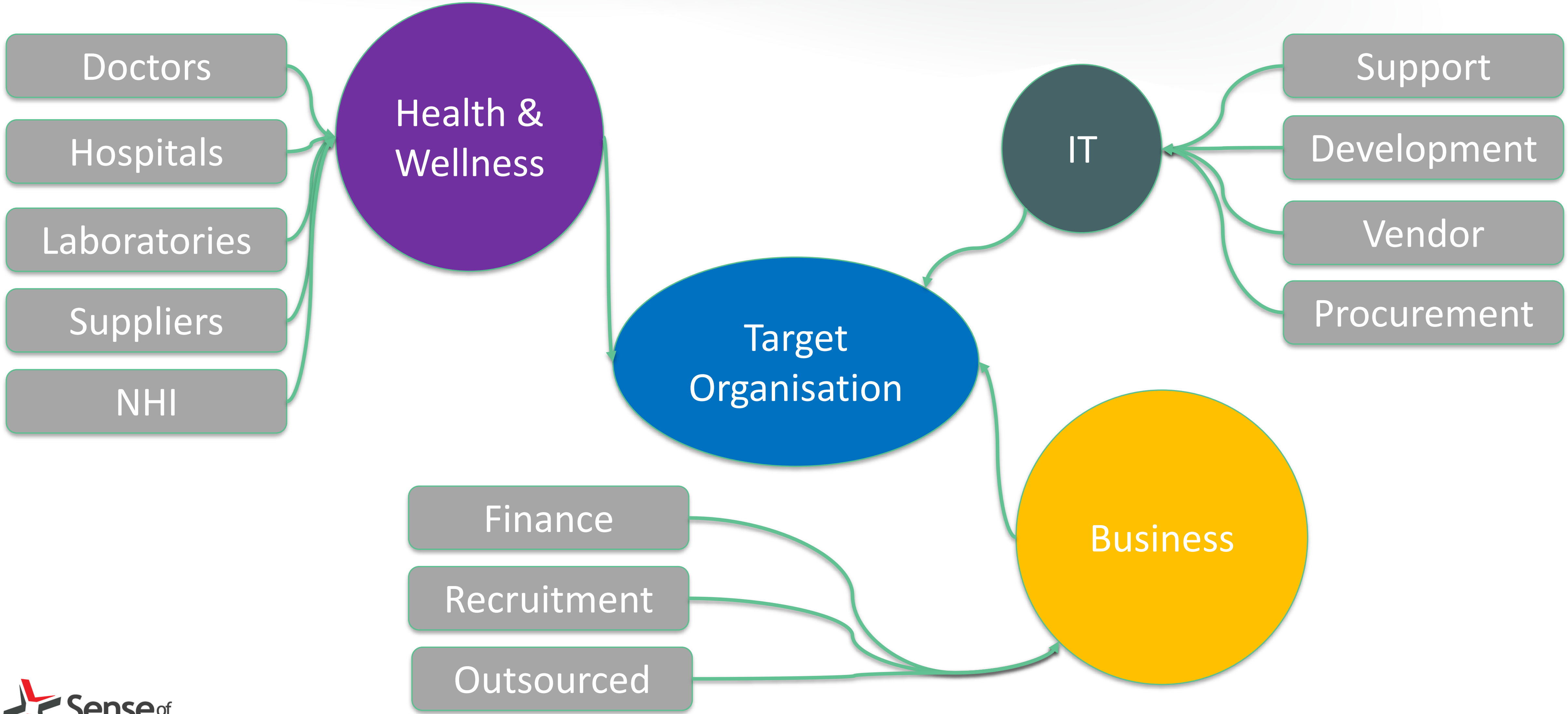
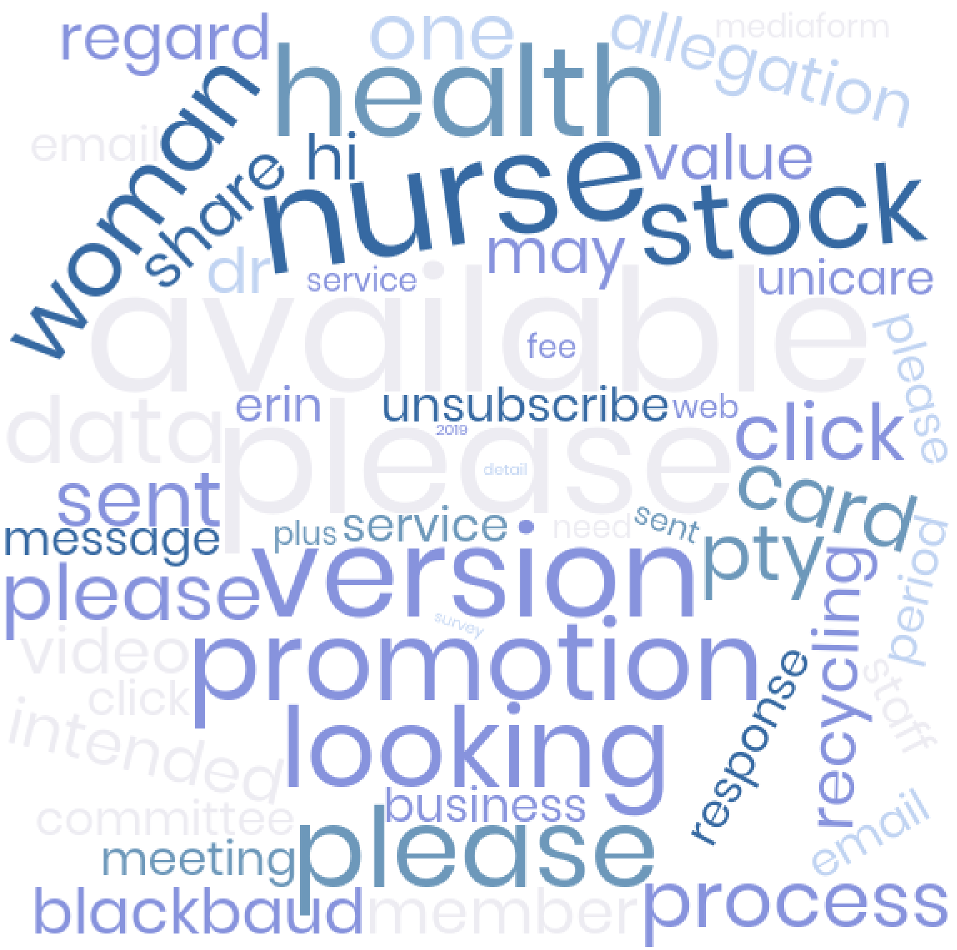
- FW: Scanned from a Xerox Multifunction Printer
- FW: Scan from a Xerox WorkCentre
- Scan from a Xerox Phaser MFP

Supply Chain map



Conversations – Information & Technology



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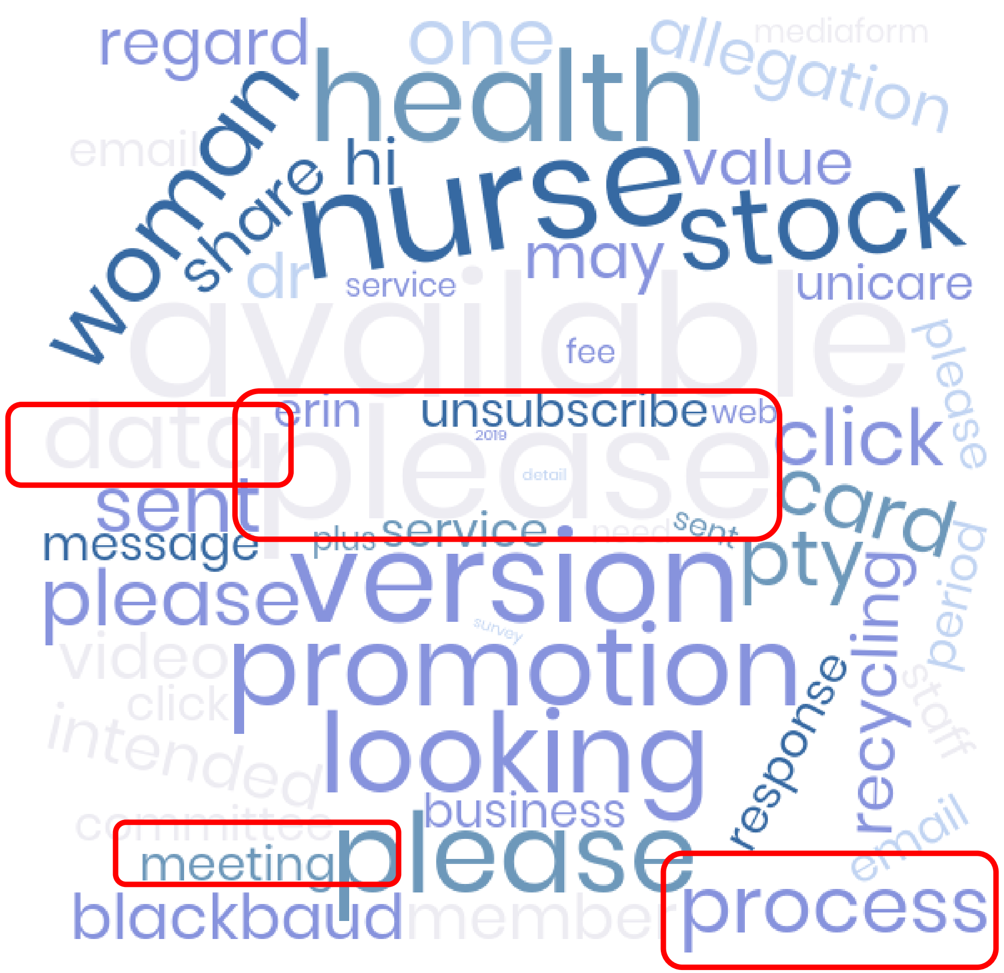
Conversations – Information & Technology



Chapter 3: Execute plan A! …B…C

Putting the Information to Work – Plan A

The Phish…

- Phishing campaign
  - Client had aggressive mail filtering rules in place
  - Support emails disclosed the endpoint protection in place
  - Identified several email addresses whitelisted to receive .docm macro enabled documents

Putting the Information to Work – Plan A

The Phish…

- Phishing campaign
  - Client had aggressive mail filtering rules in place
  - Support emails disclosed the endpoint protection in place
  - Identified several email addresses whitelisted to receive .docm macro enabled documents

DENIED

CROWDSTRIKE

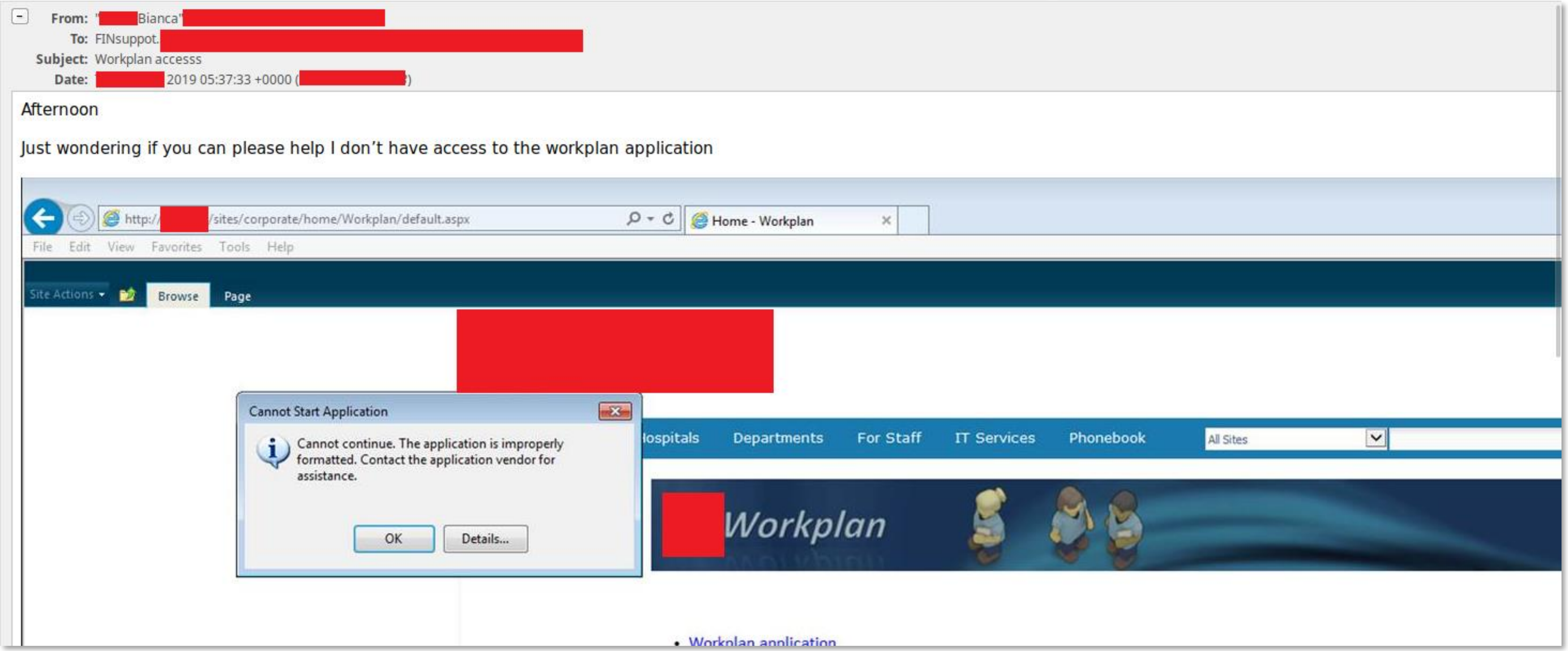
Putting the Information to Work – Plan B

Hello Bianca, this is Will from FINSupport…

- Telephone campaign (Vishing)
  - Zero success due to heightened client employee awareness
  - Using application support ticket as pretext for call
  - 100% success in convincing target that we are from IT ☺

Putting the Information to Work

Hello Bianca, this is Will from FINSupport…



From: "[redacted]Bianca"[redacted]
To: FINsuppot.[redacted]
Subject: Workplan accesss
Date: [redacted]2019 05:37:33 +0000 ([redacted])

Afternoon

Just wondering if you can please help I don't have access to the workplan application

http://[redacted]/sites/corporate/home/Workplan/default.aspx

Home - Workplan

[redacted]

Cannot Start Application

Cannot continue. The application is improperly formatted. Contact the application vendor for assistance.

[redacted] Workplan

- Workplan application

Putting the Information to Work

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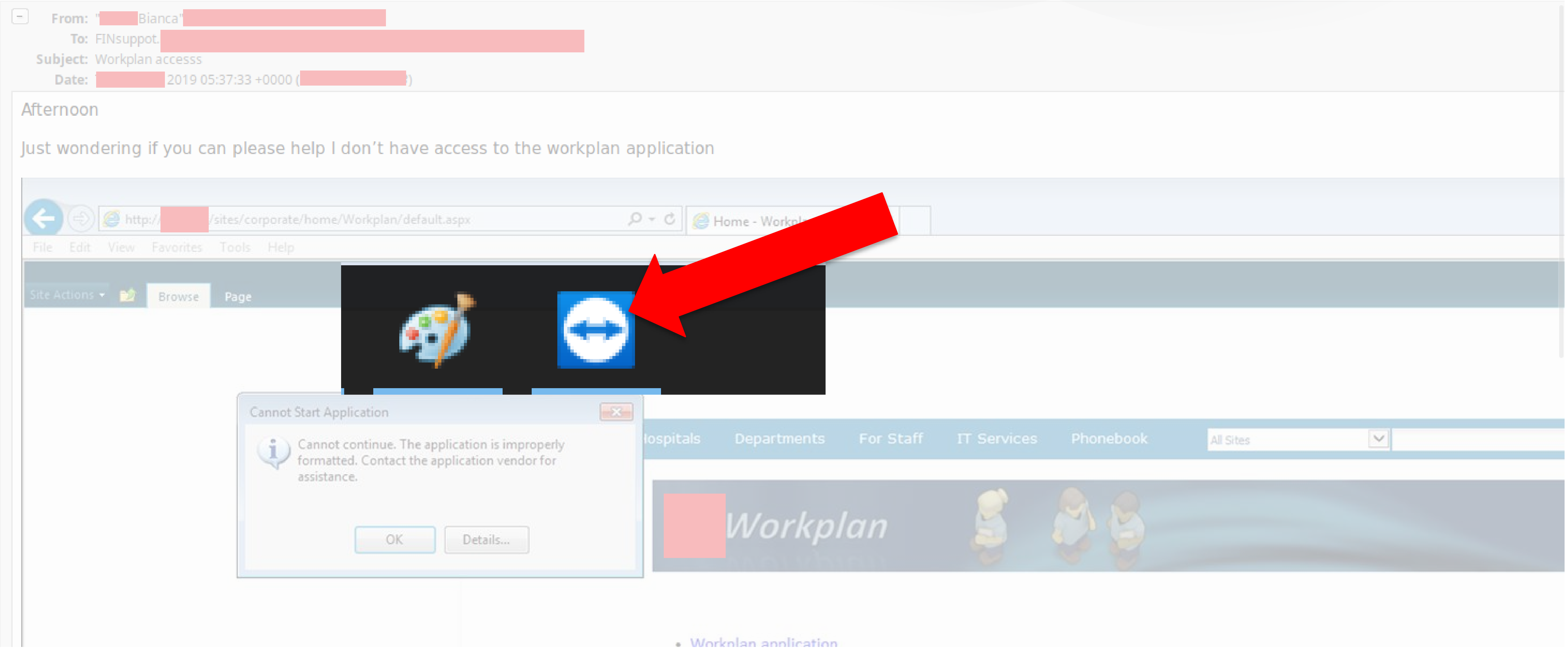

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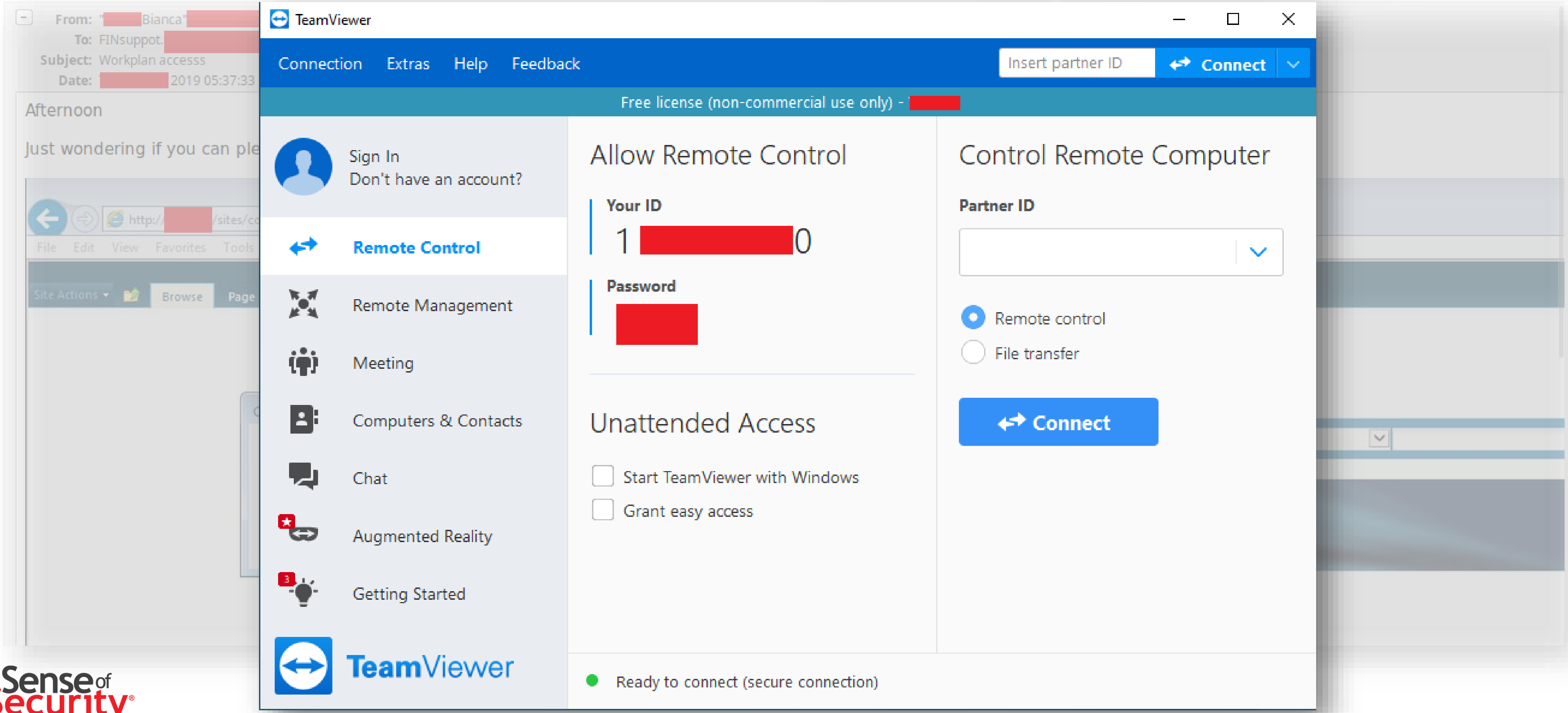

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Date: [redacted]2019 05:37:33

Afternoon

Just wondering if you can ple

http://[redacted]/sites/c

TeamViewer

Free license (non-commercial use only) - [redacted]

Allow Remote Control

Your ID
1 [redacted] 0

Password
[redacted]

Unattended Access

□ Start TeamViewer with Windows
□ Grant easy access

Control Remote Computer

Partner ID

● Remote control
○ File transfer

● Ready to connect (secure connection)

Putting the Information to Work

At the end of the rainbow

- Internal information
  - Received onboarding emails containing domain information from HR systems
  - Internal Risk management system password reset / registration emails
  - Sensitive business and internal documents from multifunction office devices

Defensive measures

Apply

- Proactive actions
  - Up to date domain inventory
  - Register trademarks
  - Response procedures / takedown playbooks
  - Employee education
- Reactive actions
  - Monitor internet sources for potentially risky domain registrations
  - Identify typo domains within your mail server logs
  - Take control (and keep control) of the riskiest domains

Questions

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Cyber Security + Customer Experience

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Willem Mouton
willemm@senseofsecurity.com.au