The Guardians of Name Street: Studying the Defensive Registration Practices of the Fortune 500

Boladji Vinny Adjibi, Athanasios Avgetidis, Manos Antonakakis, Michael Bailey and Fabian Monrose

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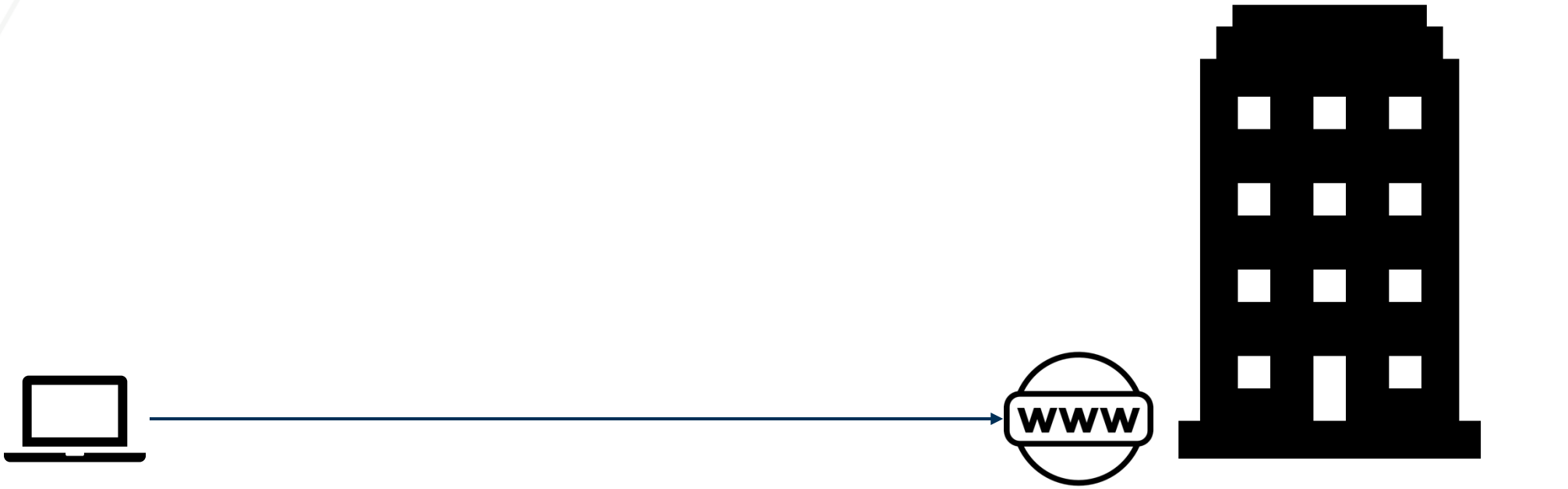
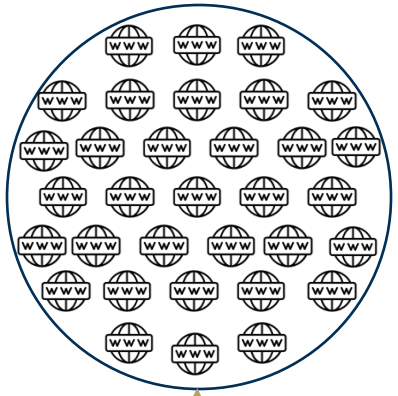


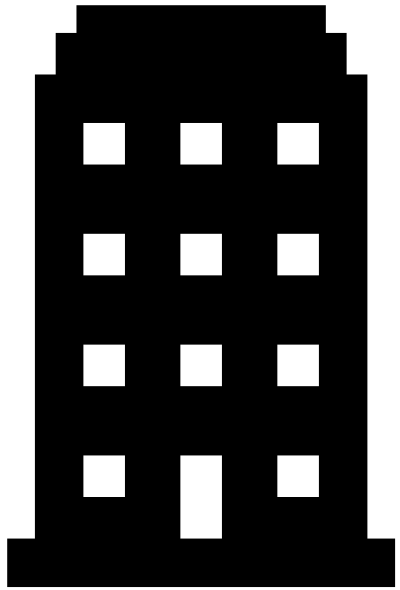
End User

Company and their domain name



Domain names similar to the company’s domain name

End User



Company and their domain name

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The space of “similar” domain names

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Typo-squatting (Wang et al., 2006)

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Homograph squatting (Quinkert et al., 2019)

Level-squatting (Du et al., 2019)

Target embedding (Roberts et al., 2019)

Brand name squatting (Kumar et al., 2021)

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1,500+
Top-Level Domains

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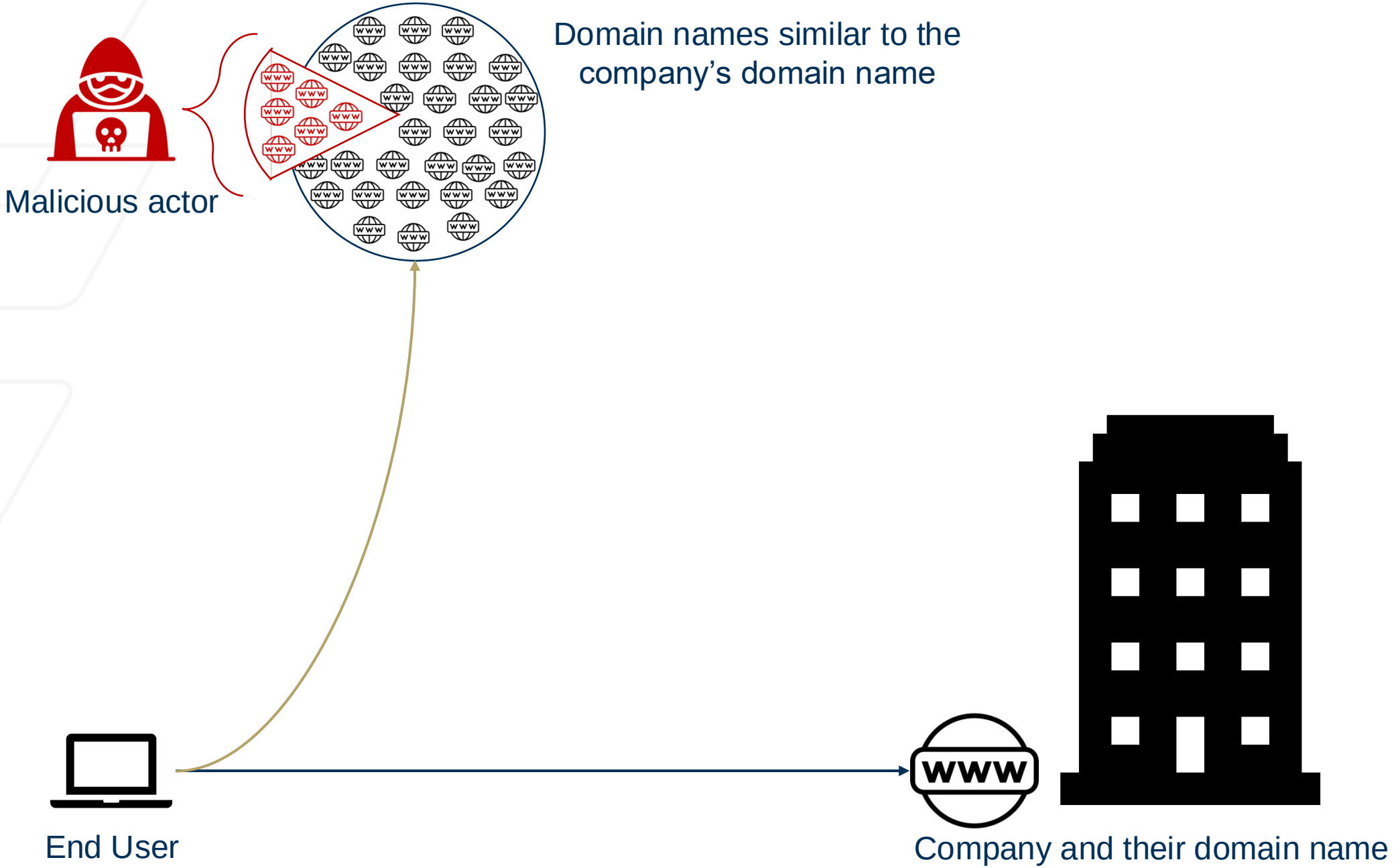
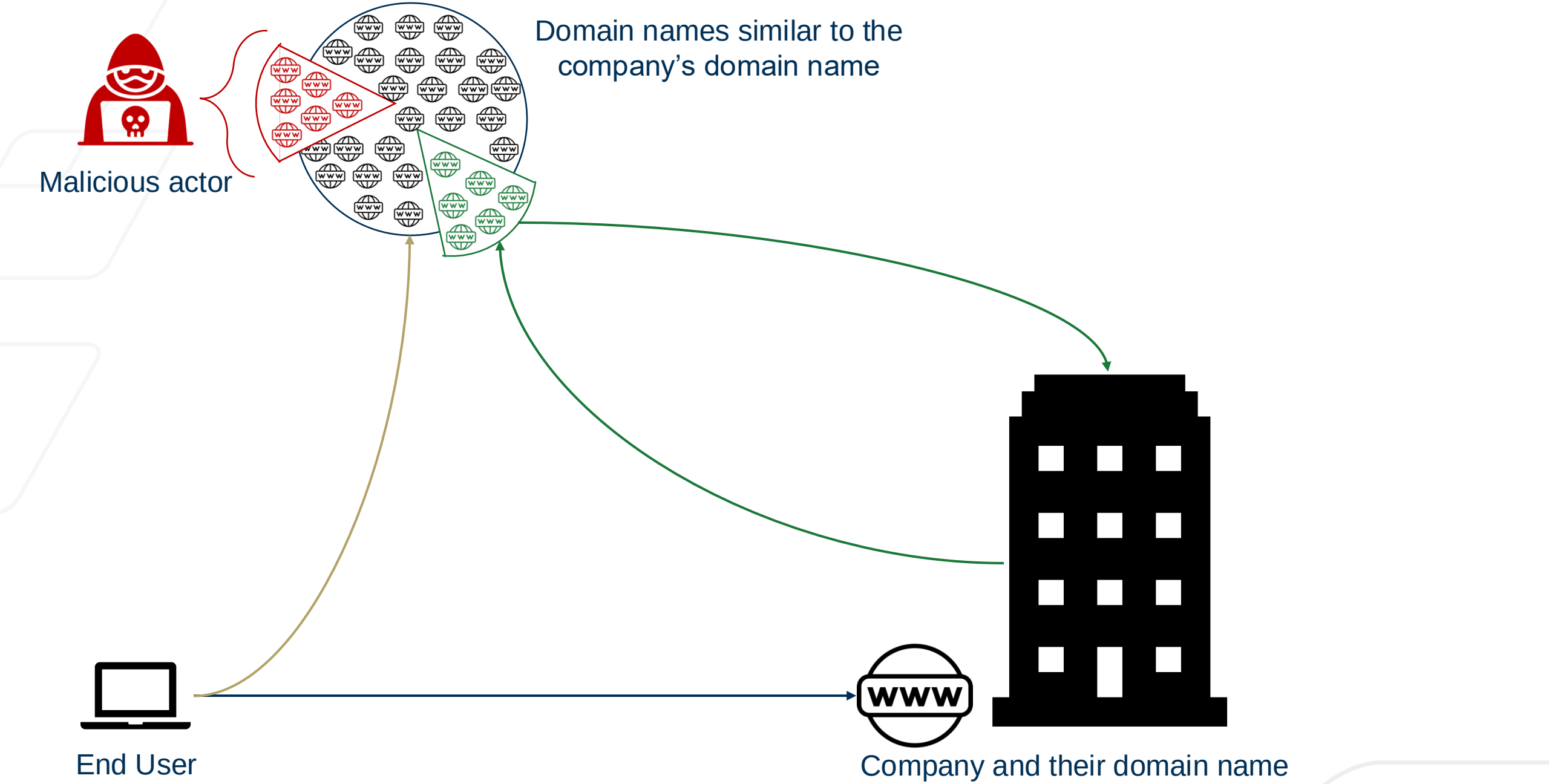

Domain names similar to the company's domain name
Malicious actor
End User
Company and their domain name


Domain names similar to the company's domain name
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Base domains

Operations

Domain names

Fortune 500’s

Corporate domains

Capital One Financial Corp | capitalone.com | COF

Fortune 500's
Corporate domains

Abbreviation squatting
conef.com

Bit-squatting
capitanone.com

Brand name squatting
capitalonefinancialcorp.com

Homograph squatting
capital0ne.com

Sound-squatting
capitalwon.com

Stock name squatting NEW
cof.com

TLD-squatting
capitalone.net

Typo-squatting
capitaline.com

×

383
Generic Top-Level
Domains in our study

Base domains — Operations — Domain names

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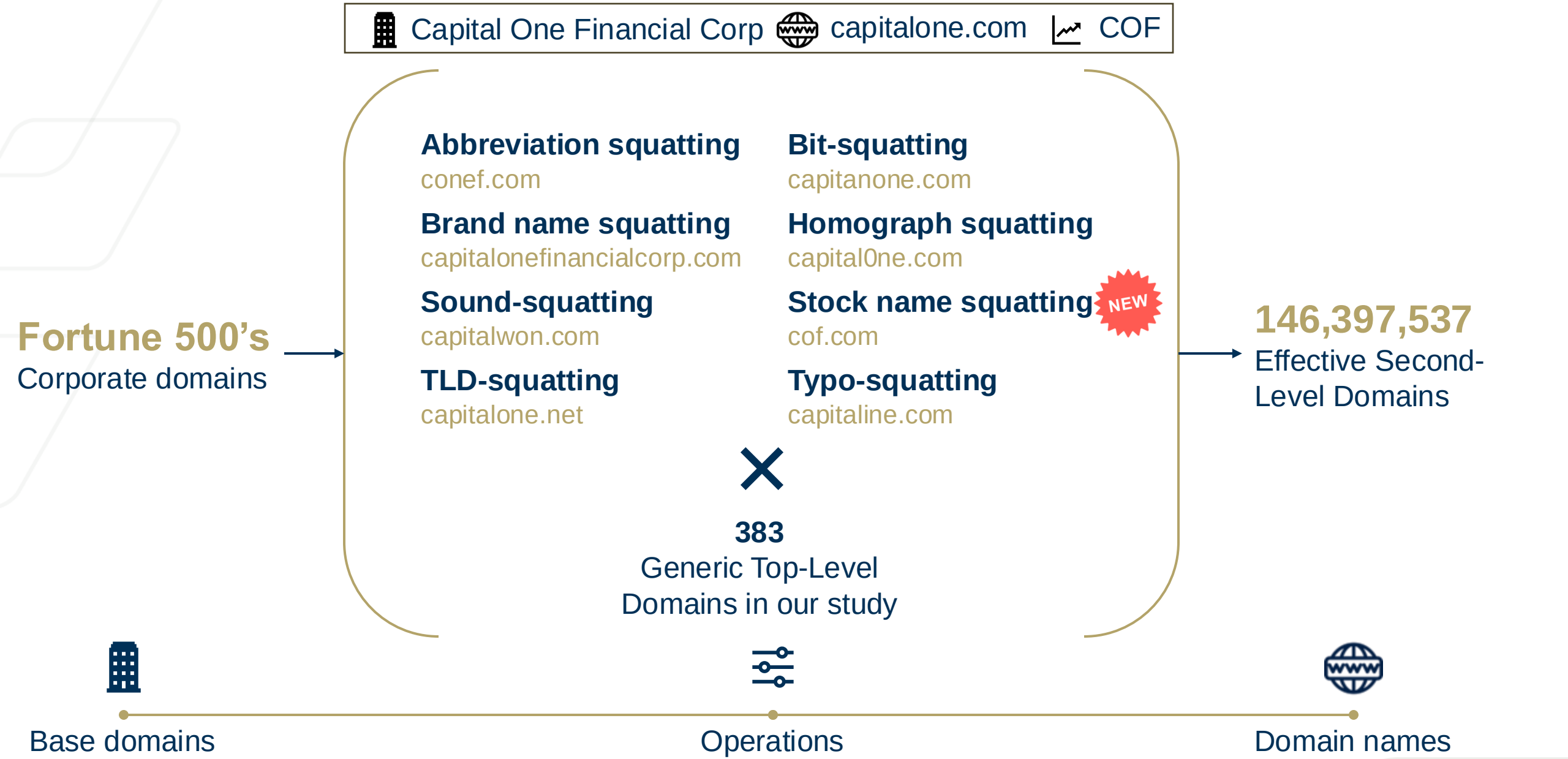

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Identifying defensive registrations

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Identifying defensive registrations

CHALLENGES

- Prevalence of external name servers
- Redacted WHOIS records
- Mergers and name changes

SOLUTIONS

- Careful check to find name servers operated exclusively internally
- Conservative matching of Registrant Org. in WHOIS records
- Finding alternative names using SEC and Wikipedia data

CZDS

U.S. Securities and Exchange Commission

WHOIS Records

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What is a defensive registration?

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What is a defensive registration?

1

Authoritative name servers CZDS

All the name servers are **subdomains** of the base domain name.

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What is a defensive registration?

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Alternative name servers CZDS

All the name servers are subdomains of domain names **owned by subsidiaries**.

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Registrant information

The **registrant organization** in the WHOIS record refers to a subsidiary.

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Registrant information

The **registrant organization** in the WHOIS record refers to a subsidiary.

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Contact details

The **WHOIS email address'** domain name is owned by subsidiaries.

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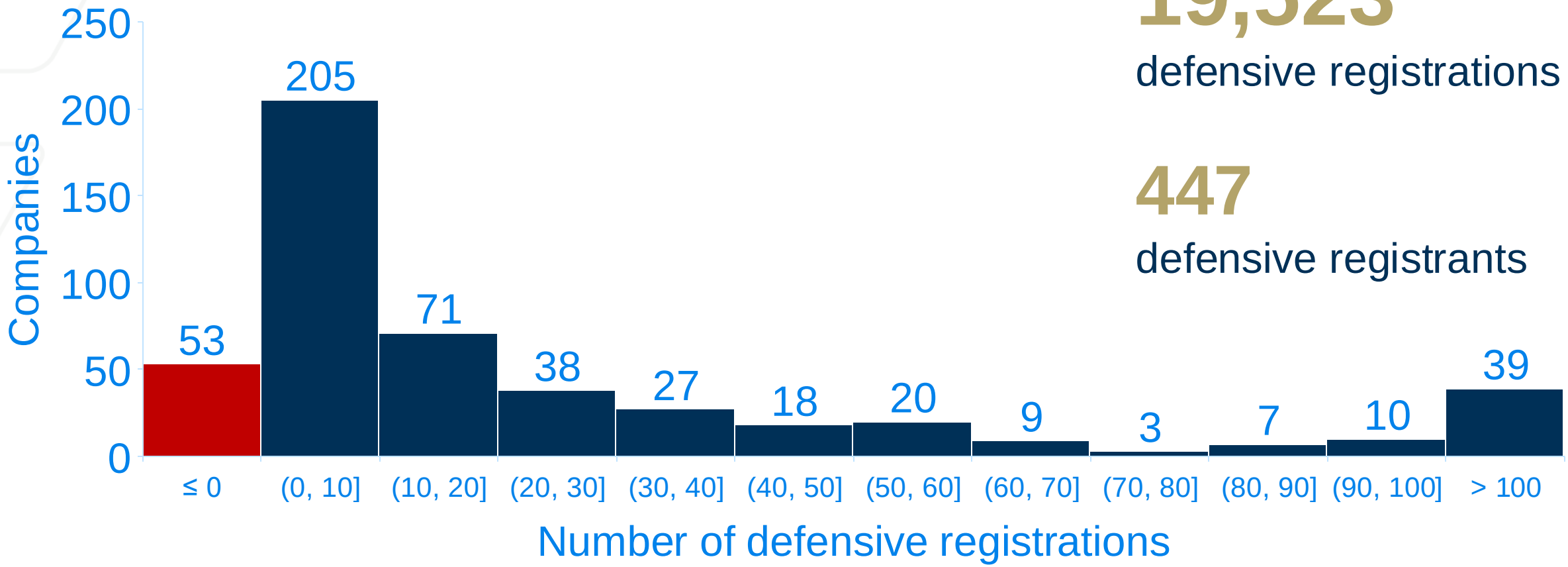
Defensive registrations



19,523
defensive registrations

447
defensive registrants

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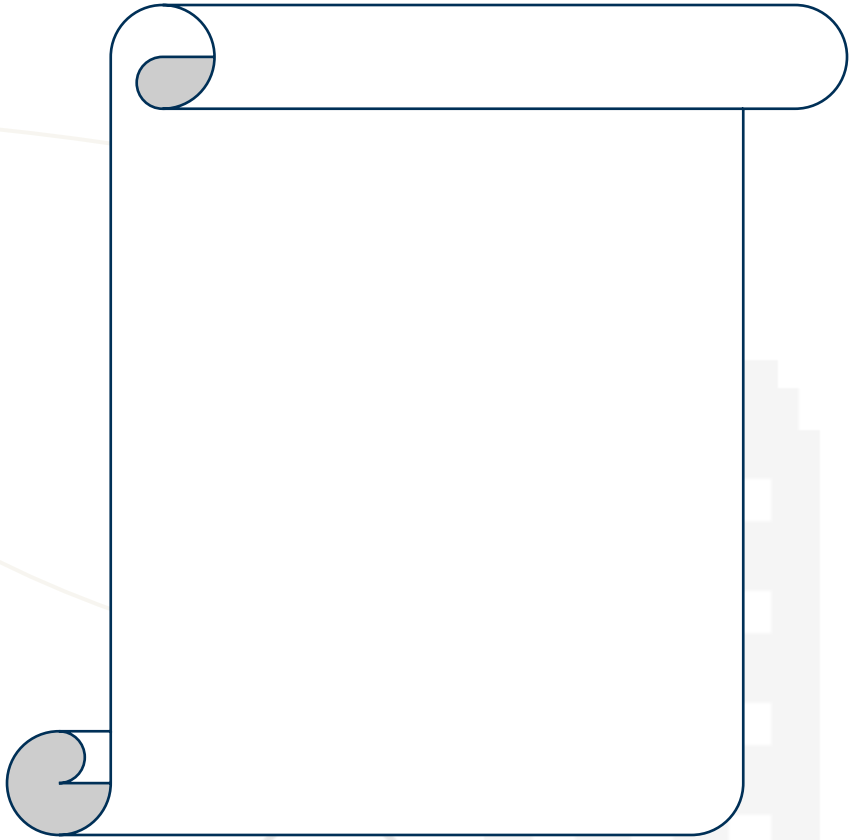
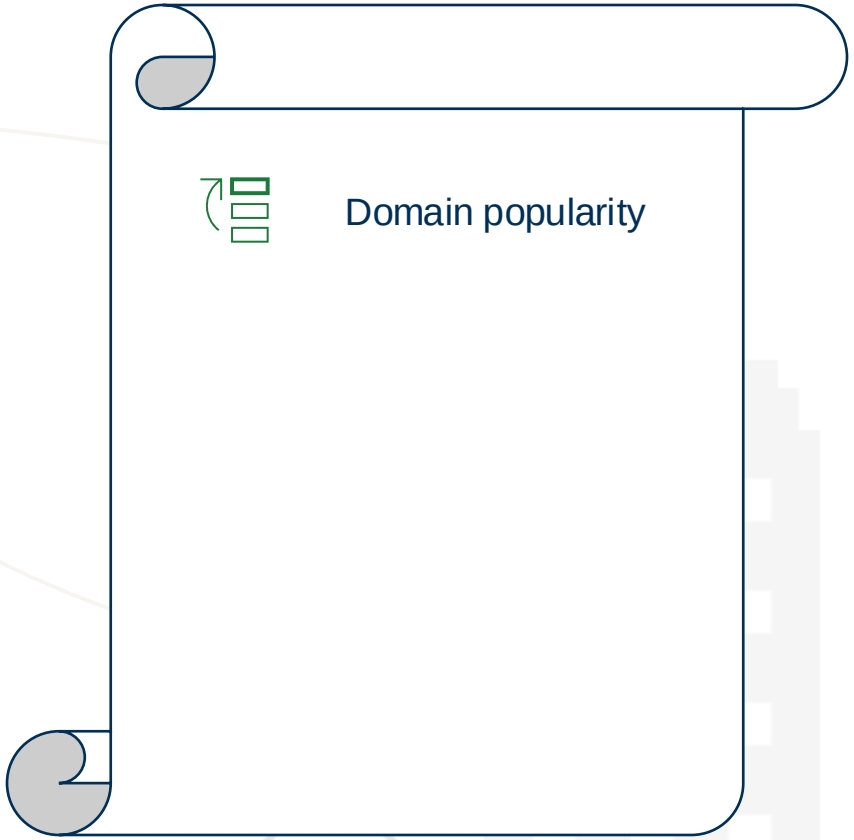
Correlations with number of defensive registrations



Correlations with number of defensive registrations



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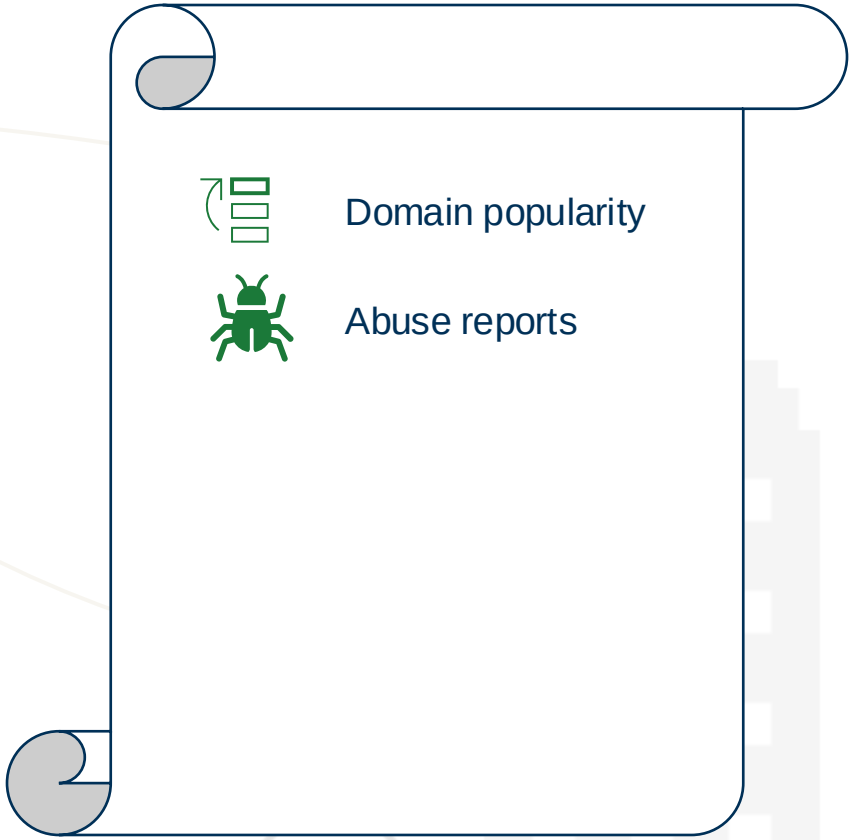

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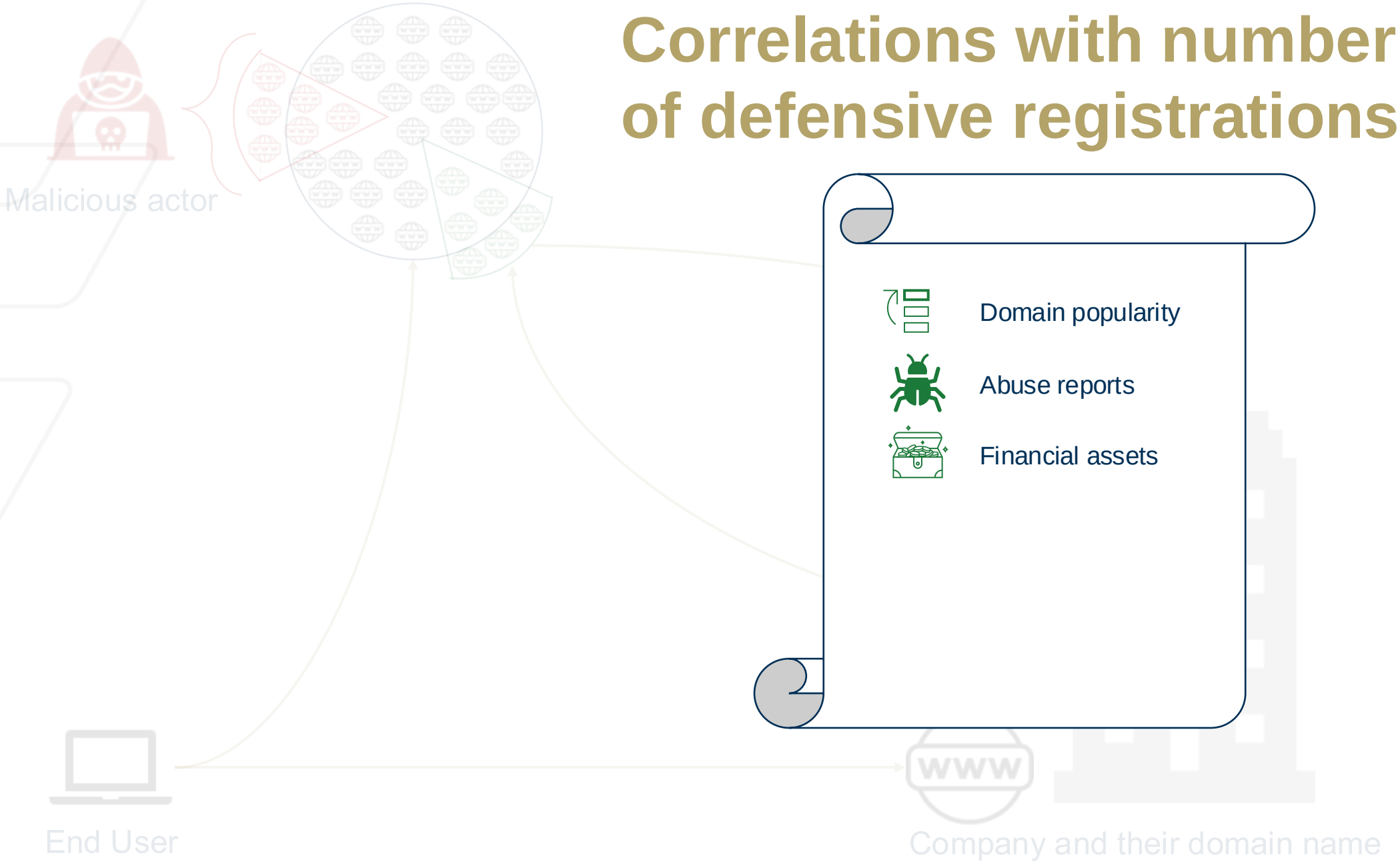

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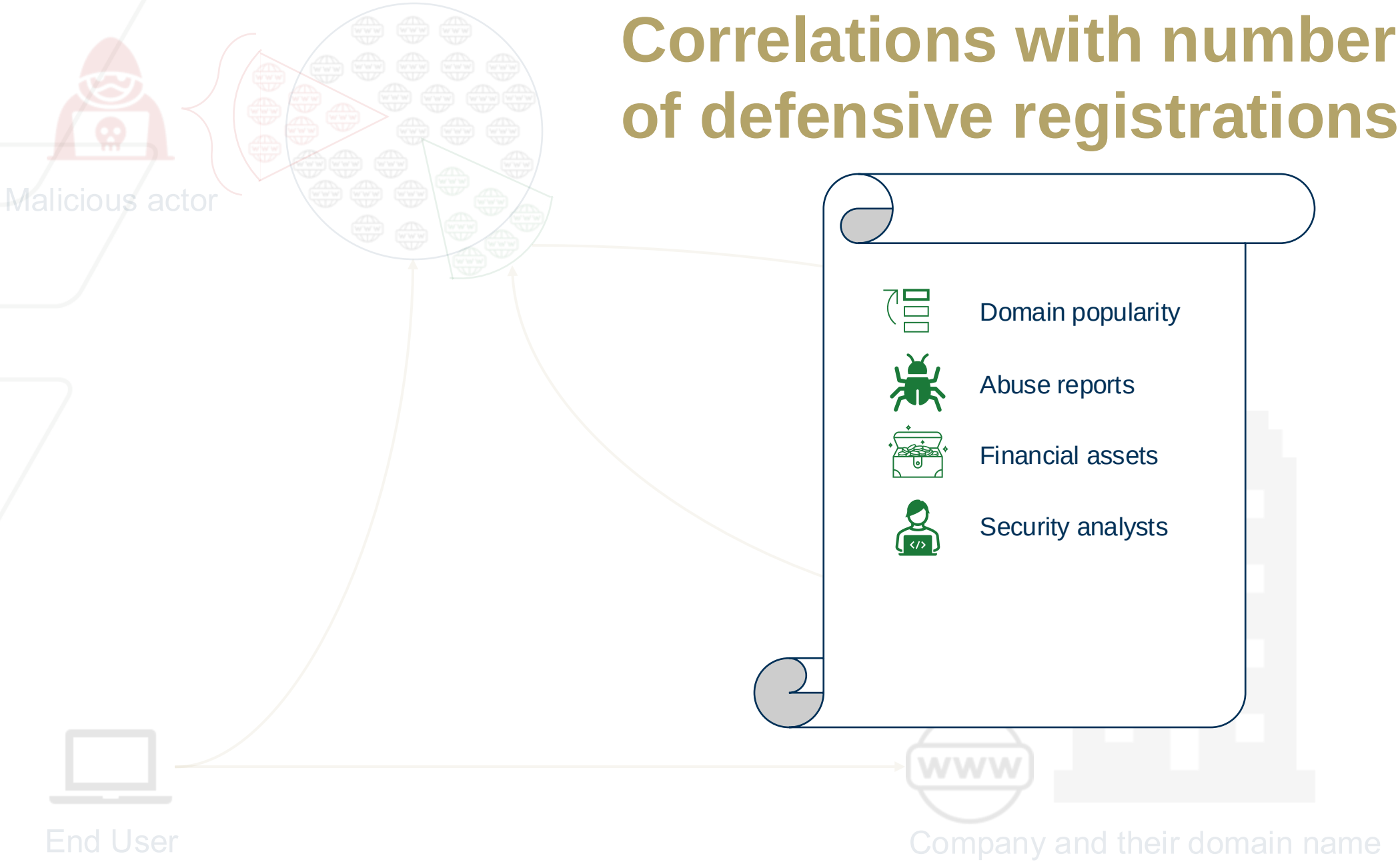

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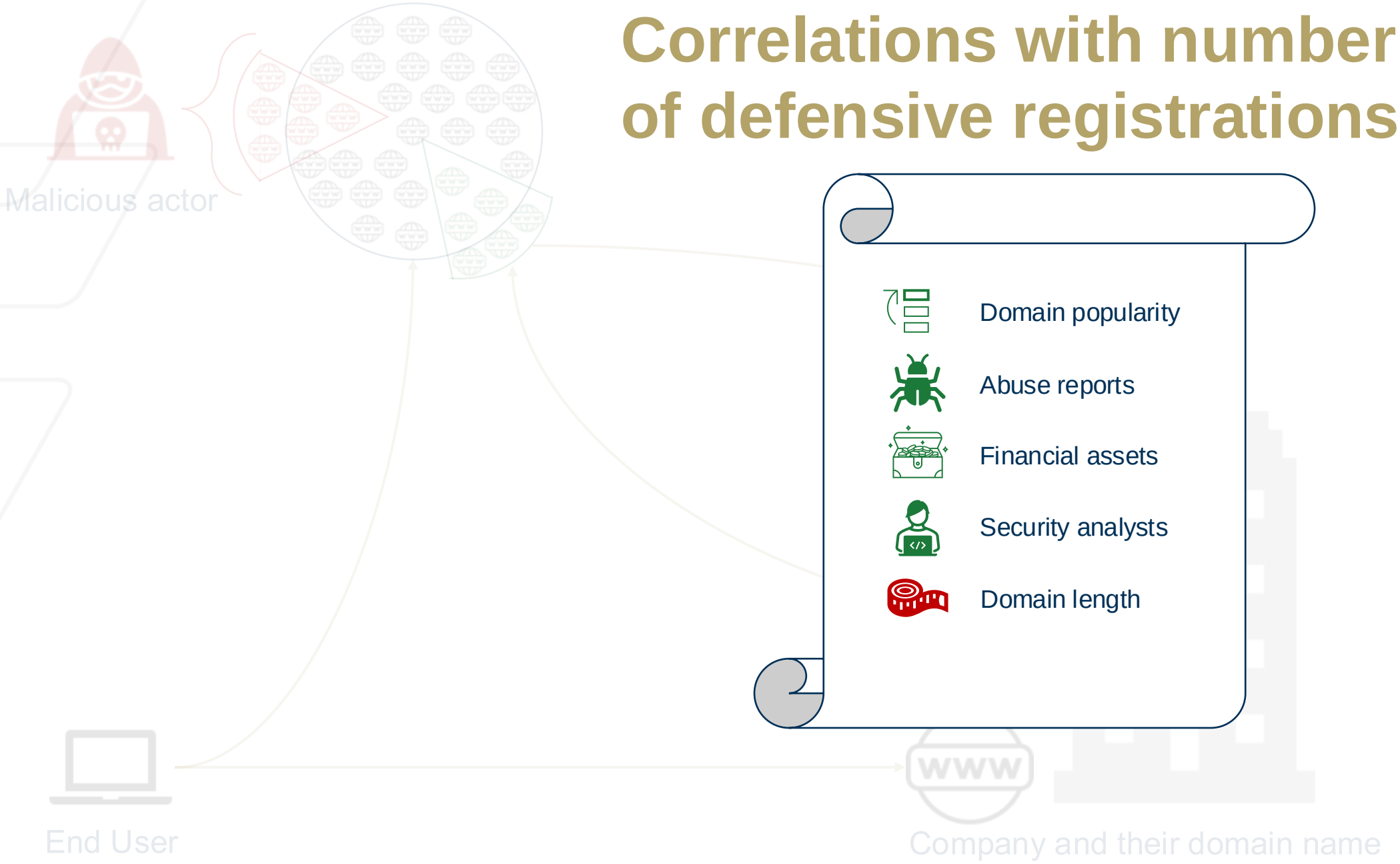

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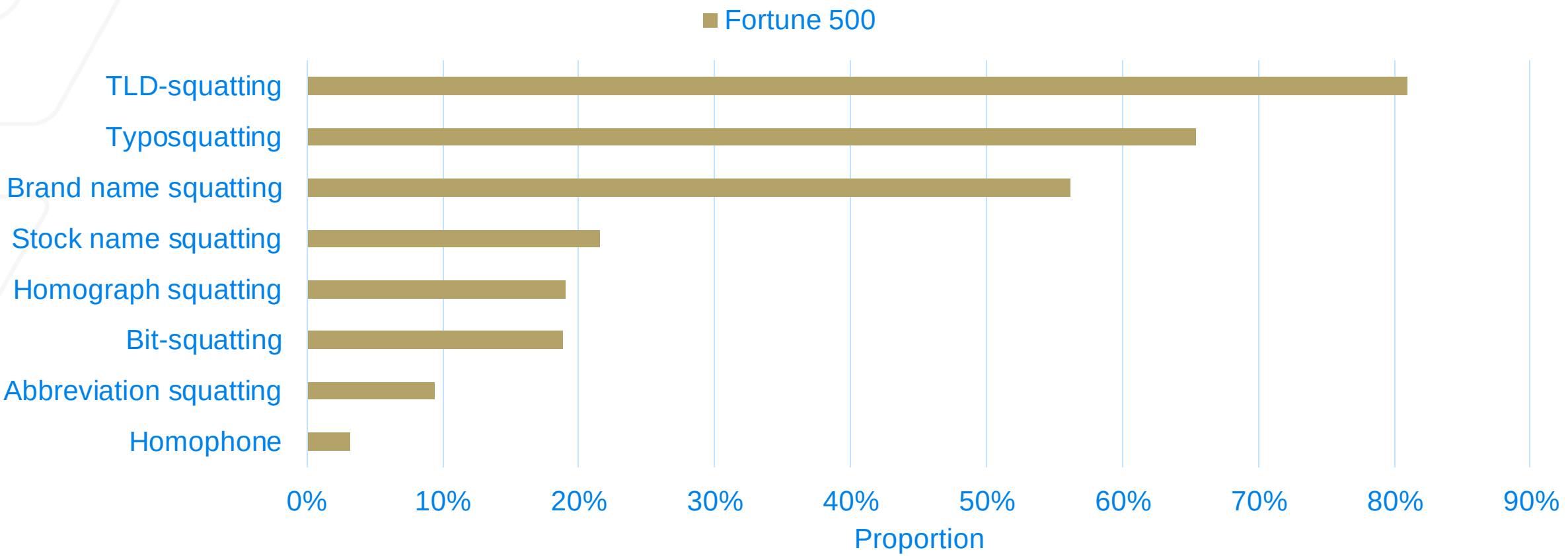
Portfolio of defensive registrations



Proportion of companies registering domains from the transformation.

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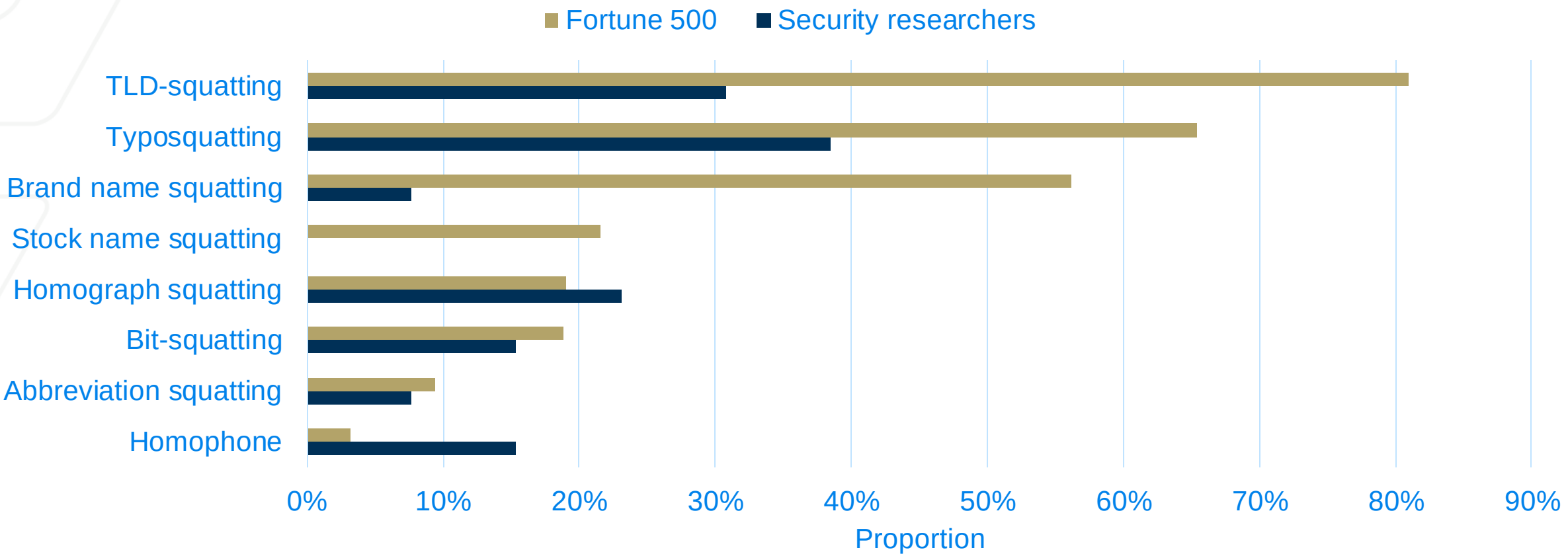
Portfolio of defensive registrations



- Proportion of companies registering domains from the transformation.
- Proportion of peer-reviewed security papers discussing defensive registrations of the transformation

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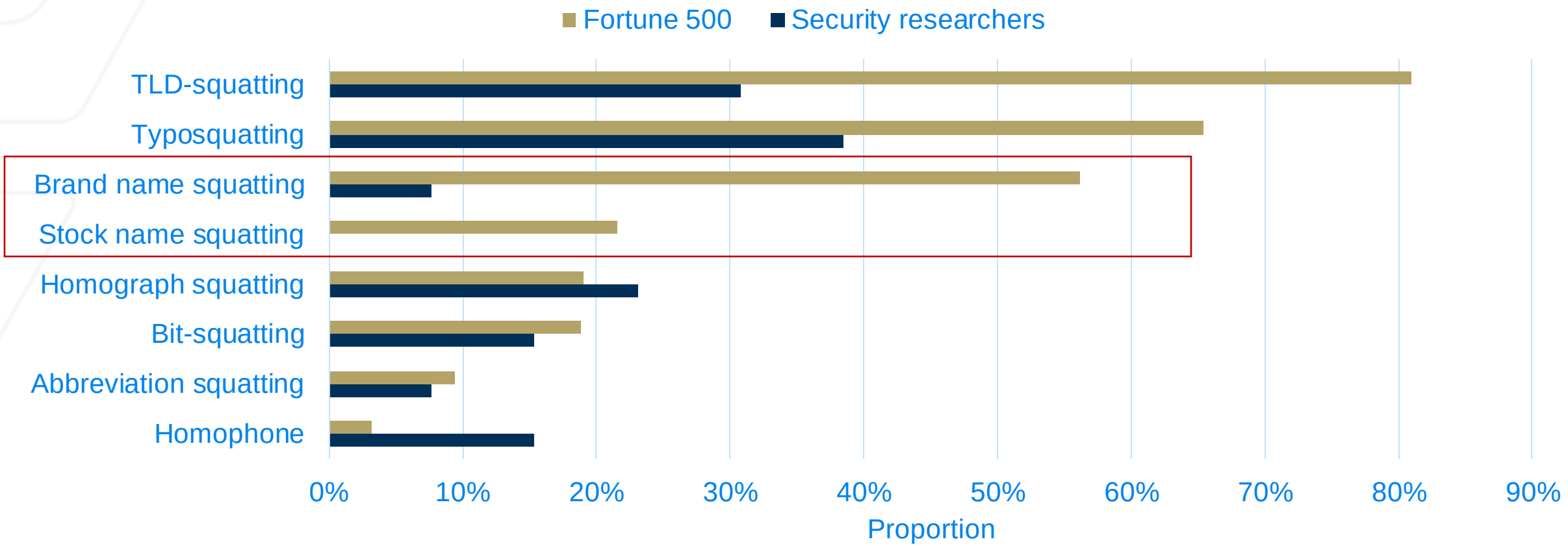

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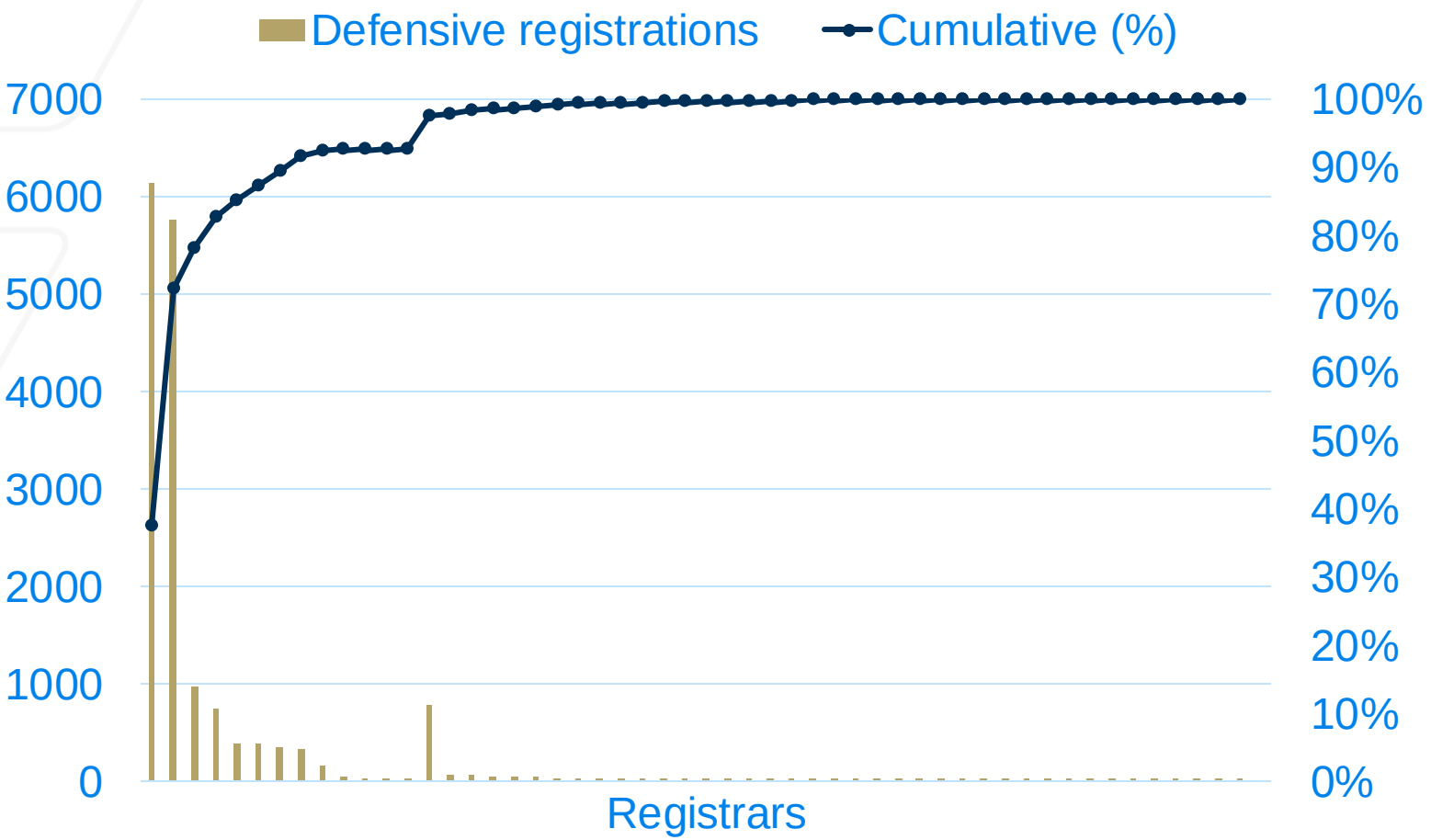
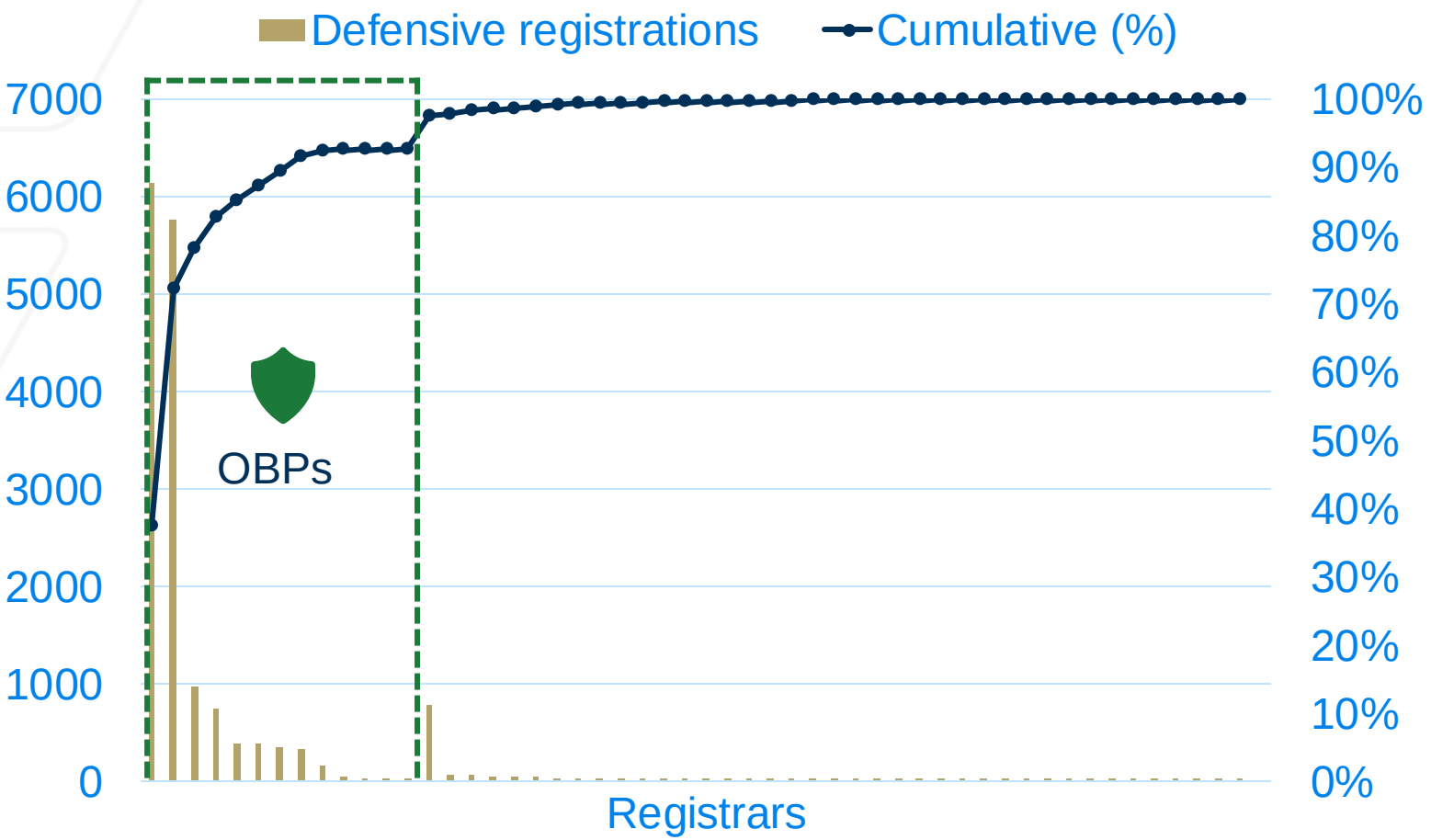
Registrars for defensive registrations



Registrars for defensive registrations



97%

of defensive registrations made by **Online Brand Protection Service Providers**

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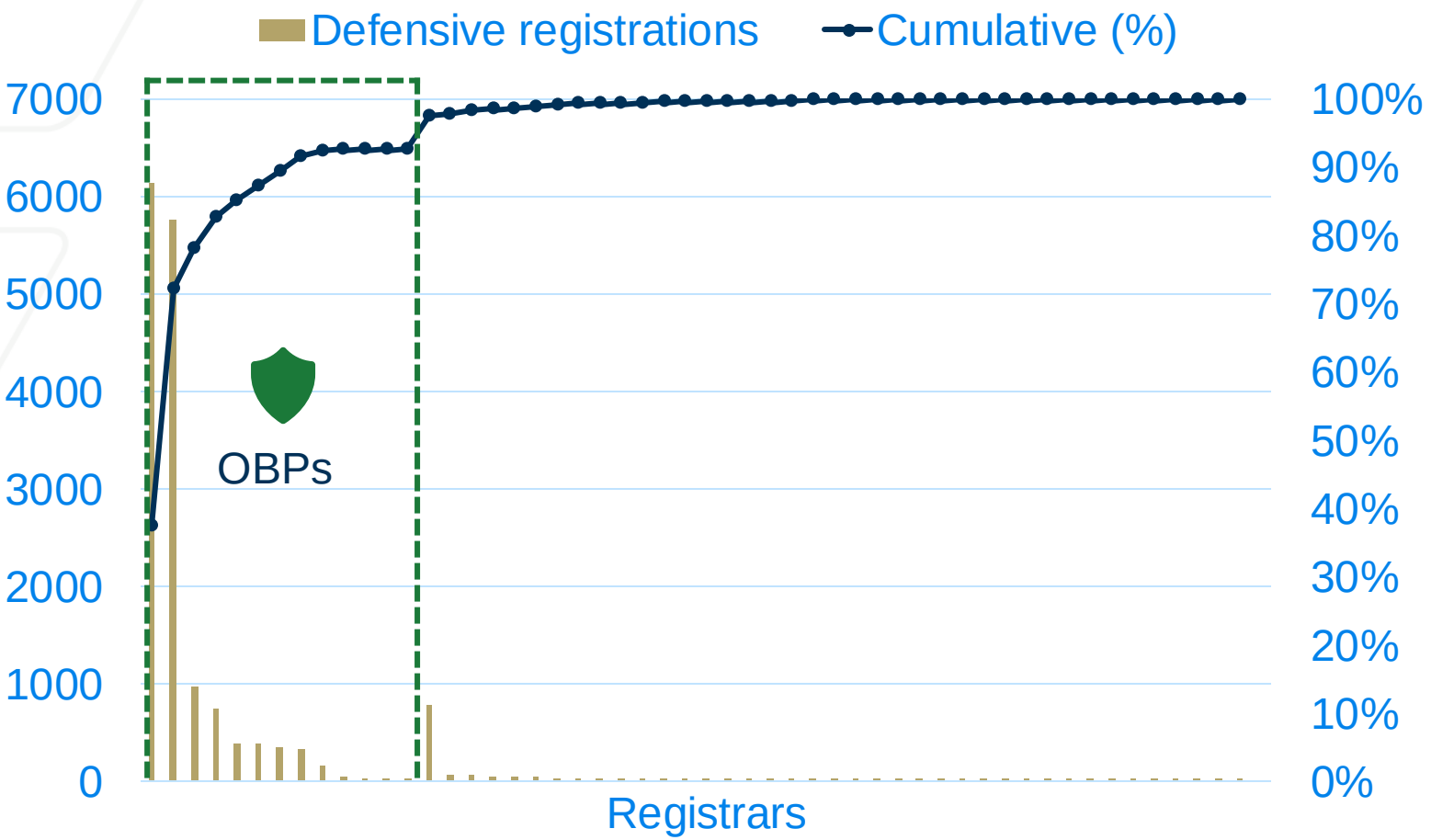
Registrars for defensive registrations



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of defensive registrations made by **Online Brand Protection Service Providers**

How **effective** are their strategies?

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Effectiveness of OBPs' defensive registrations

Large U.S. ISP
109,180,596 records
Oct. 2020 – Dec. 2023

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Protection of current customers

What proportion of traffic goes to the OBPs' chosen domain names vs. available domains?

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Predicted performance for prospective customers

Generate transformations for the 53 companies without defensive registrations.

Predicted performance for prospective customers

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Identify domain names that were historically available for registration

Affinito et al. *Domain name lifetimes: Baseline and threats,* Traffic Monitoring and Analysis, 2022

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Predicted performance for prospective customers

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Identify
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Predict
each OBP's ranking of the domain names by learning from their observed selections

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Reverse engineering of OBPs' strategies

Online Brand Protection Service Provider	Performance with top 5% guesses
MarkMonitor Inc.	98.12%
CSC Corporate Domains, Inc.	97.79%
SafeNames Ltd.	96.14%
Nom-iq Ltd. dba COM LAUDE	94.58%
GoDaddy Corporate Domains, Inc.	88.37%
Network Solutions LLC	80.96%

Predicted performance for prospective customers

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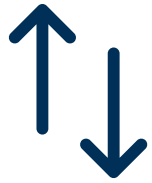

Predict
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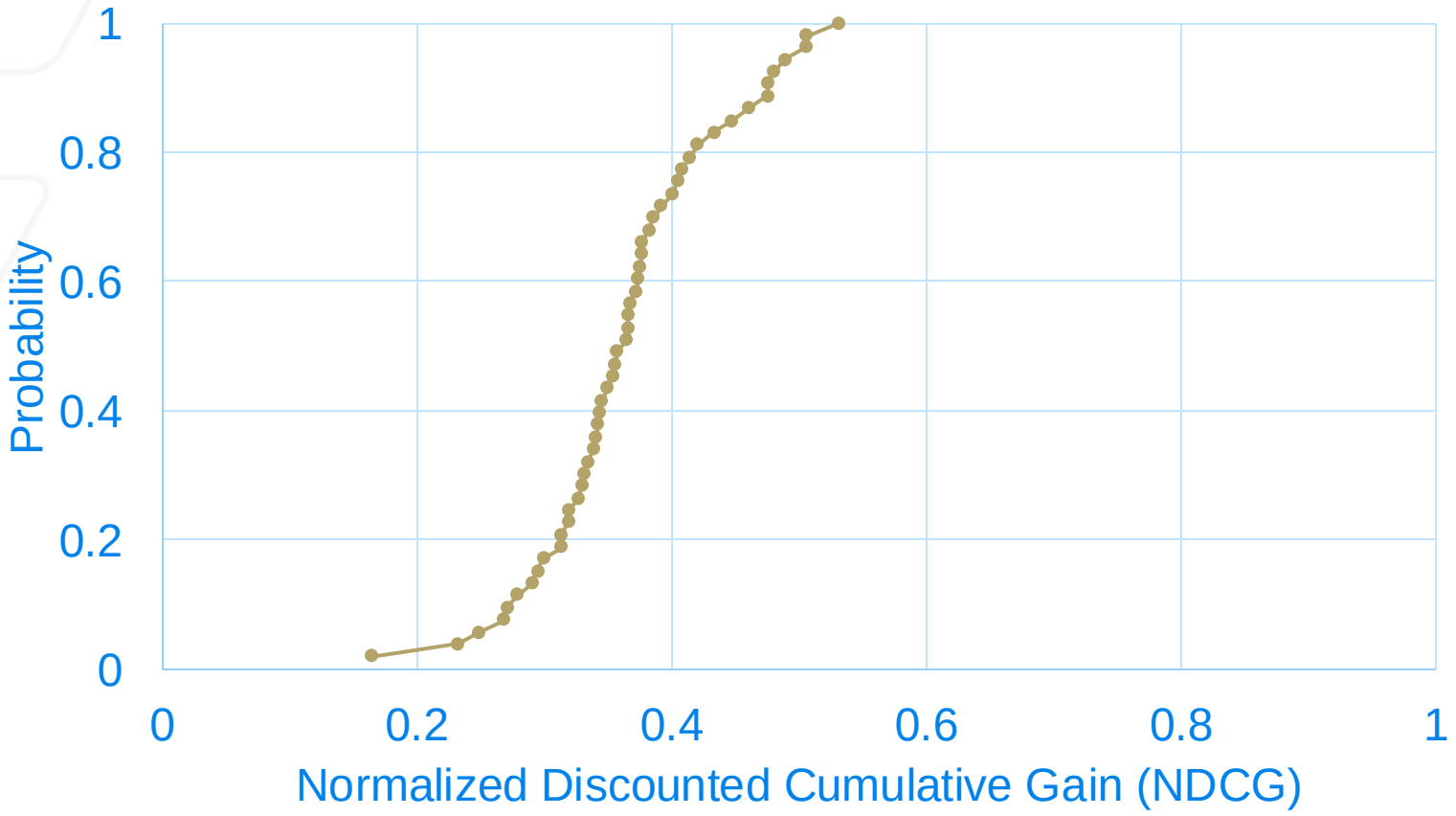
Assess
the alignment between predicted rankings and real-world traffic data

Predicted performance for prospective customers



The **best median** score:

0.36

There is still **room for improvement** for their strategies.

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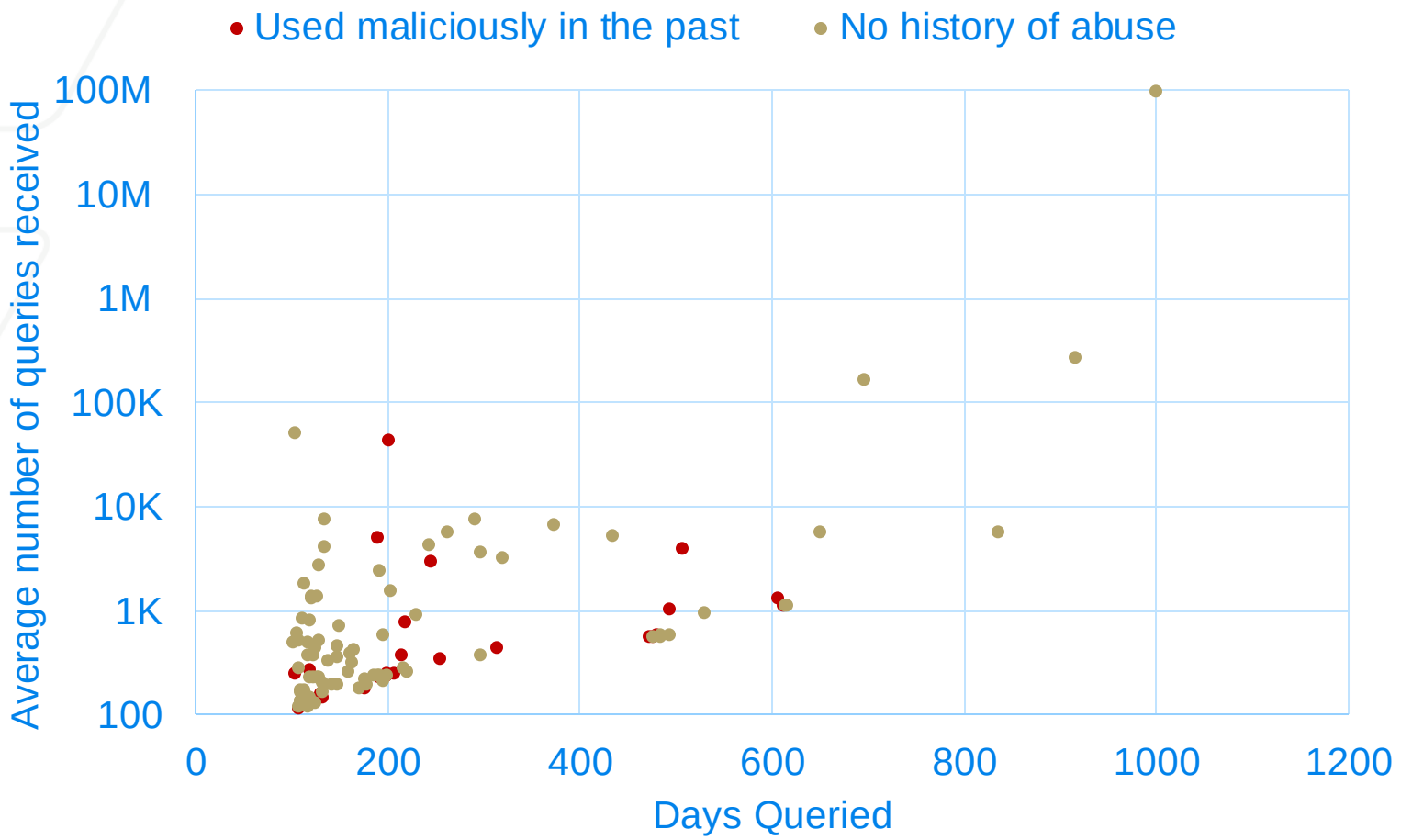
Queries received by available domains



110

available domains queried for **more than 100 days**.

Adversaries can use those domain names maliciously.

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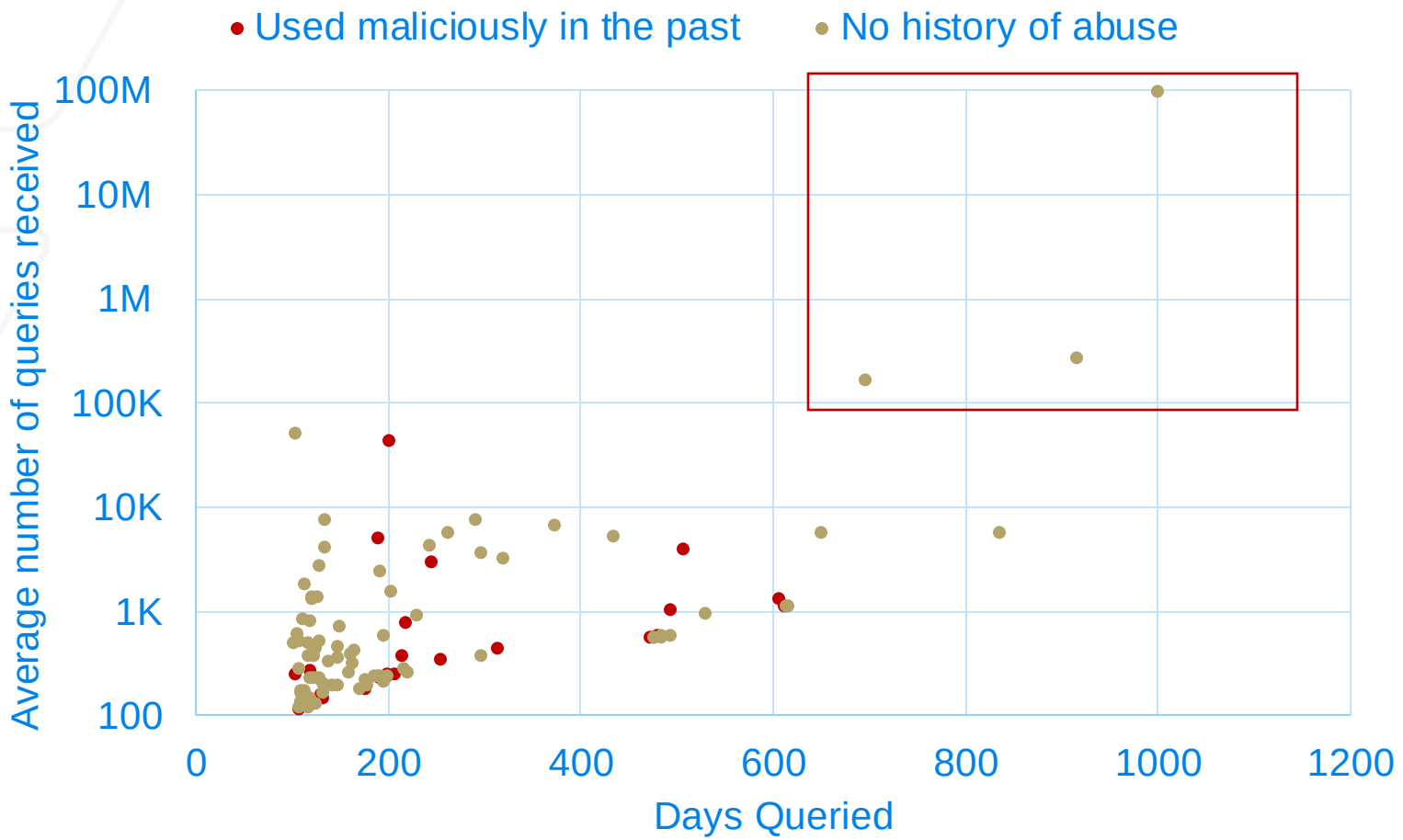

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Summary

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Comprehensive study of defensive registrations

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Summary

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Assessment of the adequacy of observed defensive strategies

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Comprehensive study of defensive registrations

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Summary

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Better recommender models for defensive registrations

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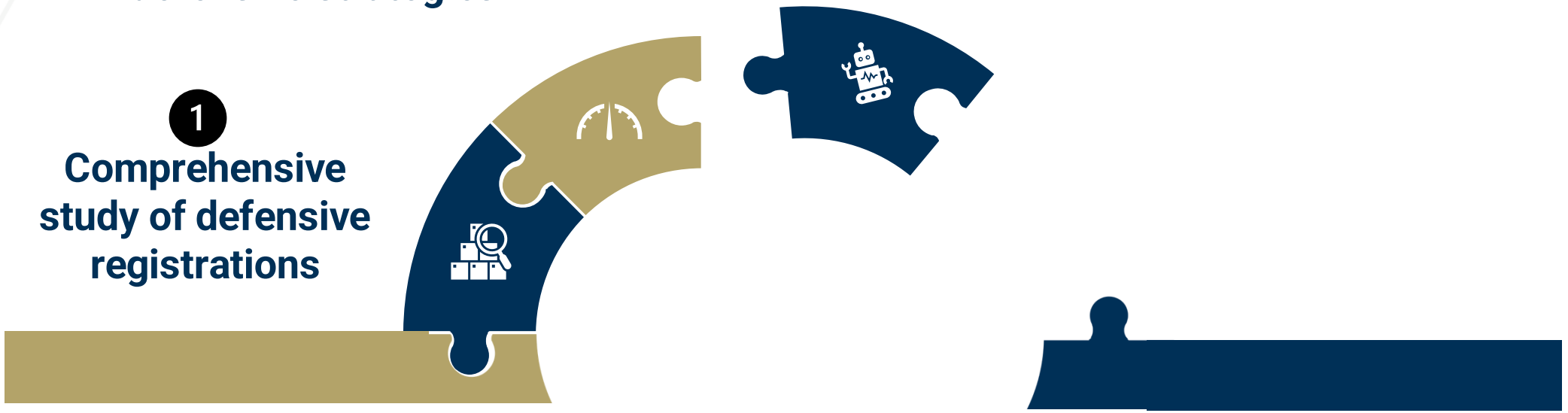

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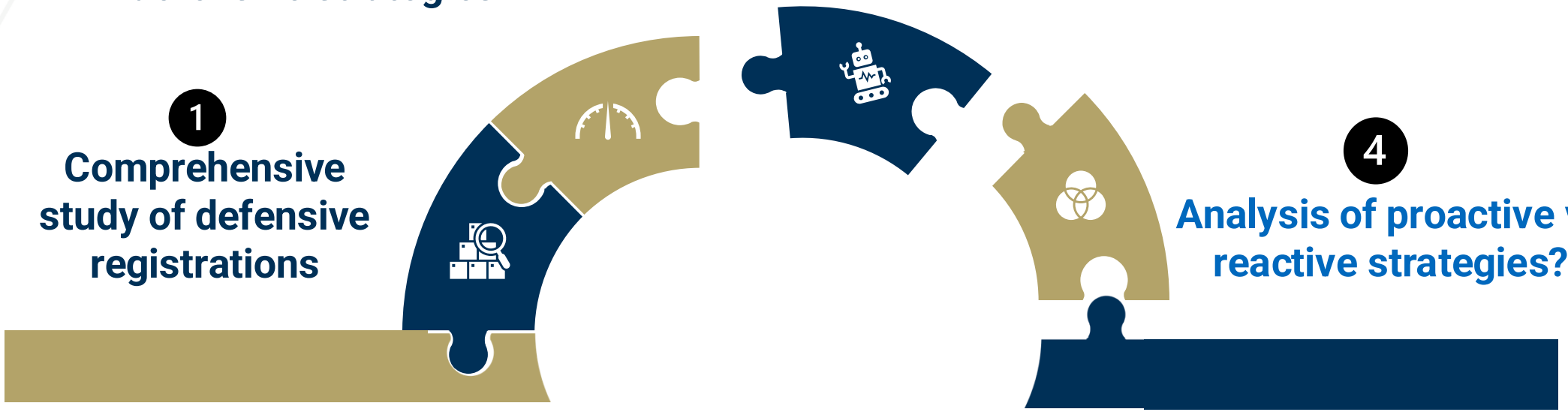

4
Analysis of proactive vs reactive strategies?

Thanks

Vinny Adjibi
vinny.adjibi@gatech.edu

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