



Unmasking Organizations' Security Postures: Insights from Phishing-Resistant Authentication

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#BHEU

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The Unknown Phishing Problem

The critical **blind spot** in enterprise security:

What is the scope of malicious adversary-in-the-middle (AiTM) phishing user engagements?

Agenda

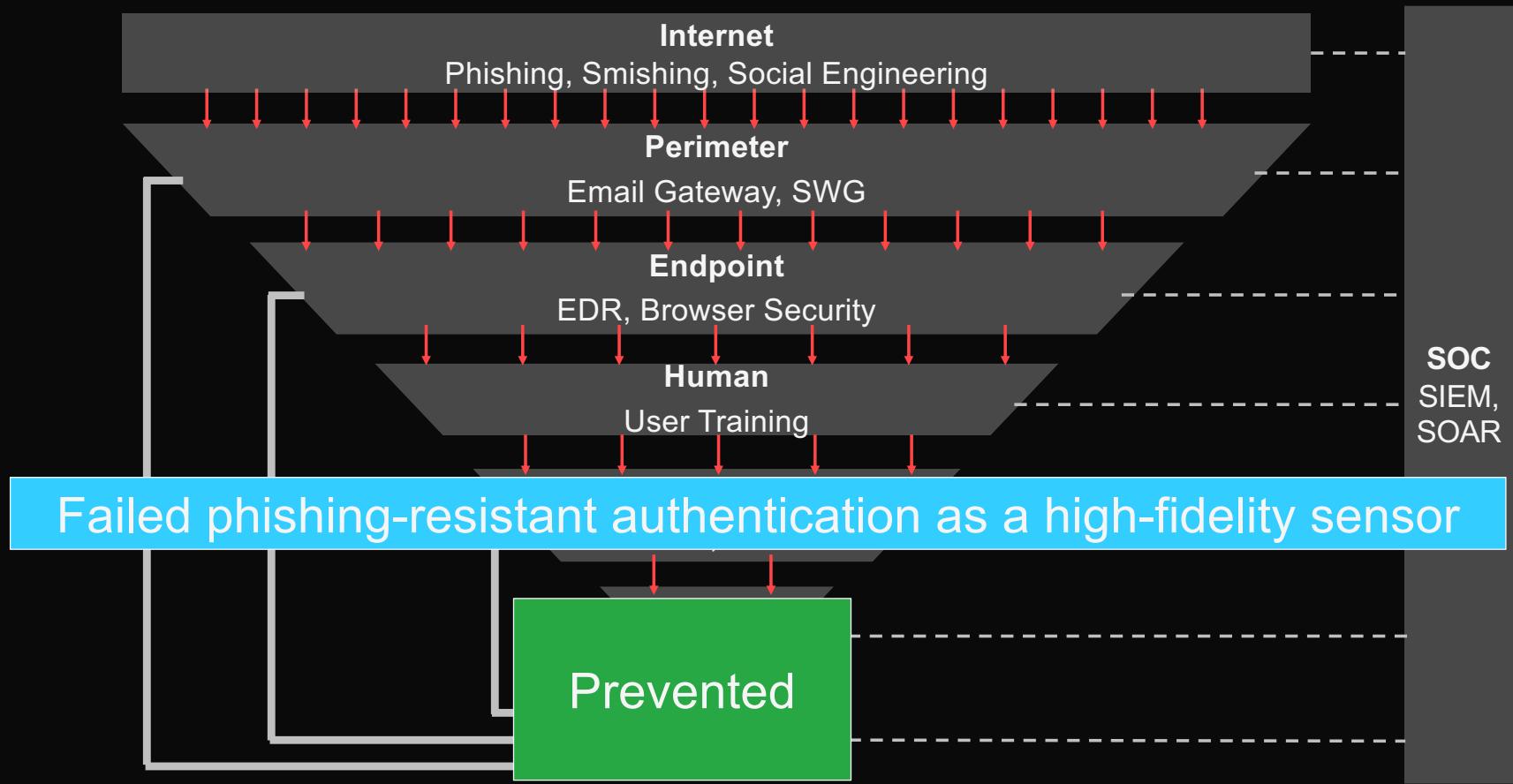
1. The Signal: A New Methodology

- How to turn failed phishing-resistant authentication into a high-fidelity sensor

An Idea

What if we could find a sensor close to account takeovers and with minimal false negatives?

A New Signal



Phishing-Resistant Authentication

Core Principle: Origin-Binding

Legitimate Path

example.com → Authenticator →

Domain matches: 'example.com' = 'example.com' → Login succeeds

Phishing Path

phishing.com → Authenticator →

Domain mismatches: 'phishing.com' != 'example.com' or not exist → Login fails

The Scale of the Study

1.5

Years Research

26

Months of Longitudinal Data

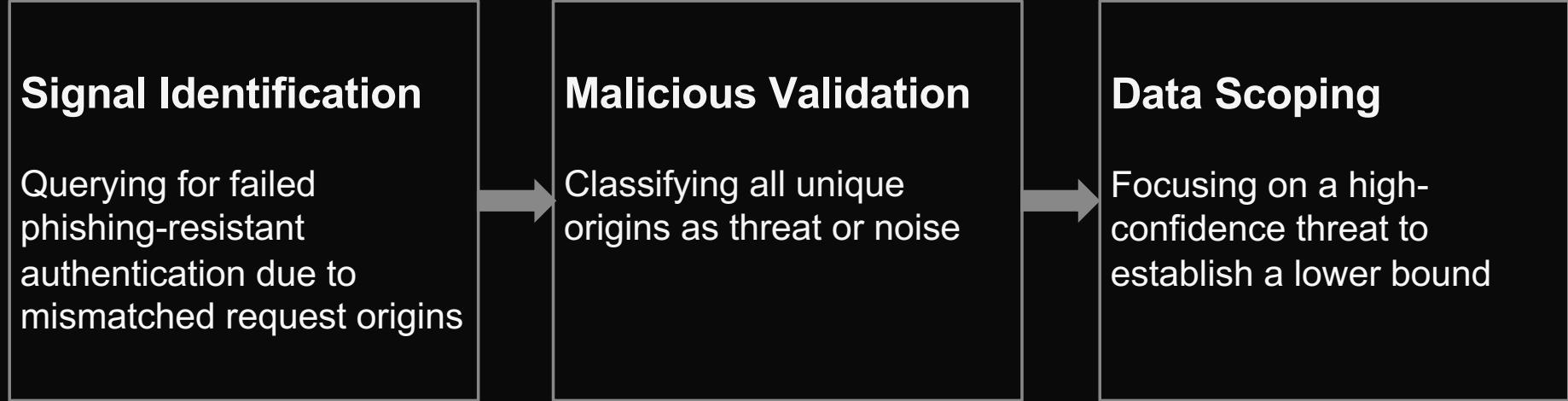
Thousands

Security-Mature Organizations

~3 Billion

Authentication Events Analyzed

Methodology: From Syslog to Final Dataset



Hunting for the Signal

Okta Syslog

Hunting Query

```
Outcome.reason eq 'FastPass declined phishing attempt'
```

Critical Log Data

```
eventType: user.authentication.auth_via_mfa
Outcome.Reason: FastPass declined phishing attempt
Outcome.Result: FAILURE

System.DebugContext.DebugData.Risk:
{reasons=Mismatched request origin:<phishing-
domain.com>; ... Application Name: <Targeted App> ...}
```

Malicious Validation

Threat or noise? A three-pronged analysis

Expert Analysis

The internal security team categorizes origins and enriches them with threat intelligence

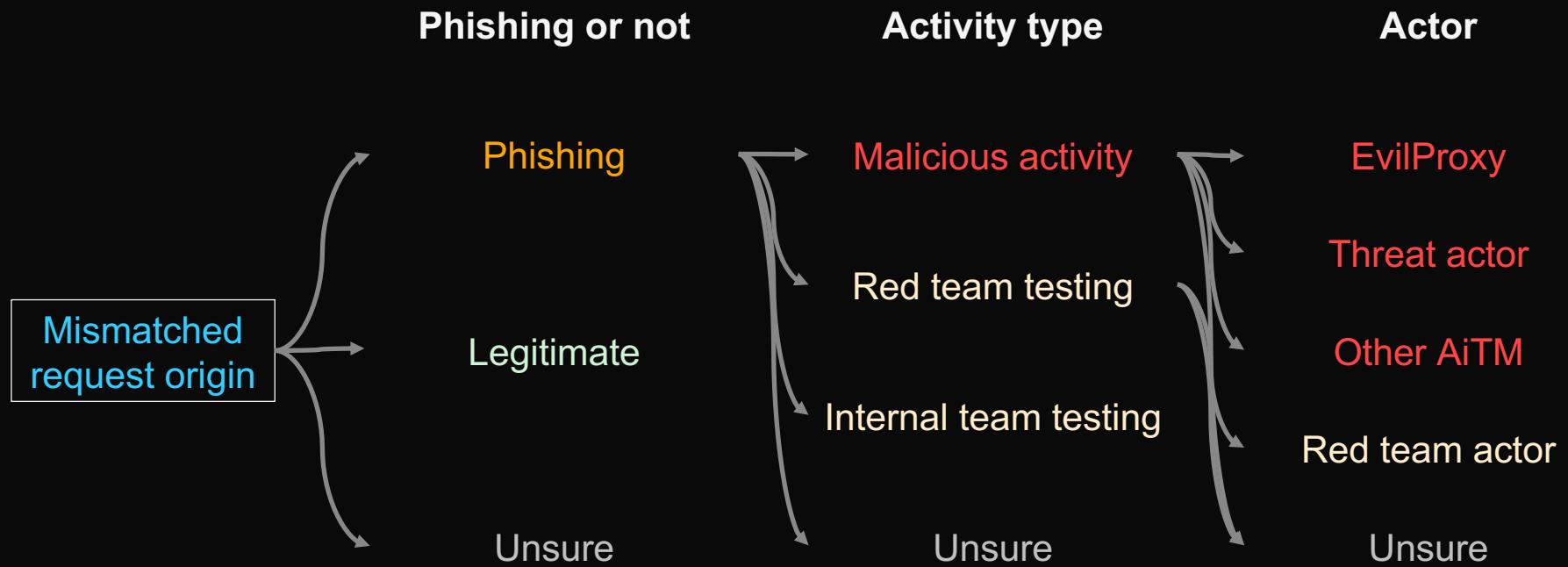
AI-Assisted Classification

An LLM, fed with threat literature, labels origins, with human verification for accuracy

Customer Validation

Outreach via notifications and questionnaires provides classification from customers

Hierarchical Classification Schema



Approach 1: Expert Analysis

Intelligence from cyber defense operations

Okta Platform Telemetry

Web traffic and phishing kit signatures



Global Infrastructure Context

Adversary infrastructure reconnaissance

A high-quality initial classification

Approach 2: AI-Assisted Classification

LLM was prone to hallucination

- Provided a grounding document *
- Required reason for classification to enable rapid human verification

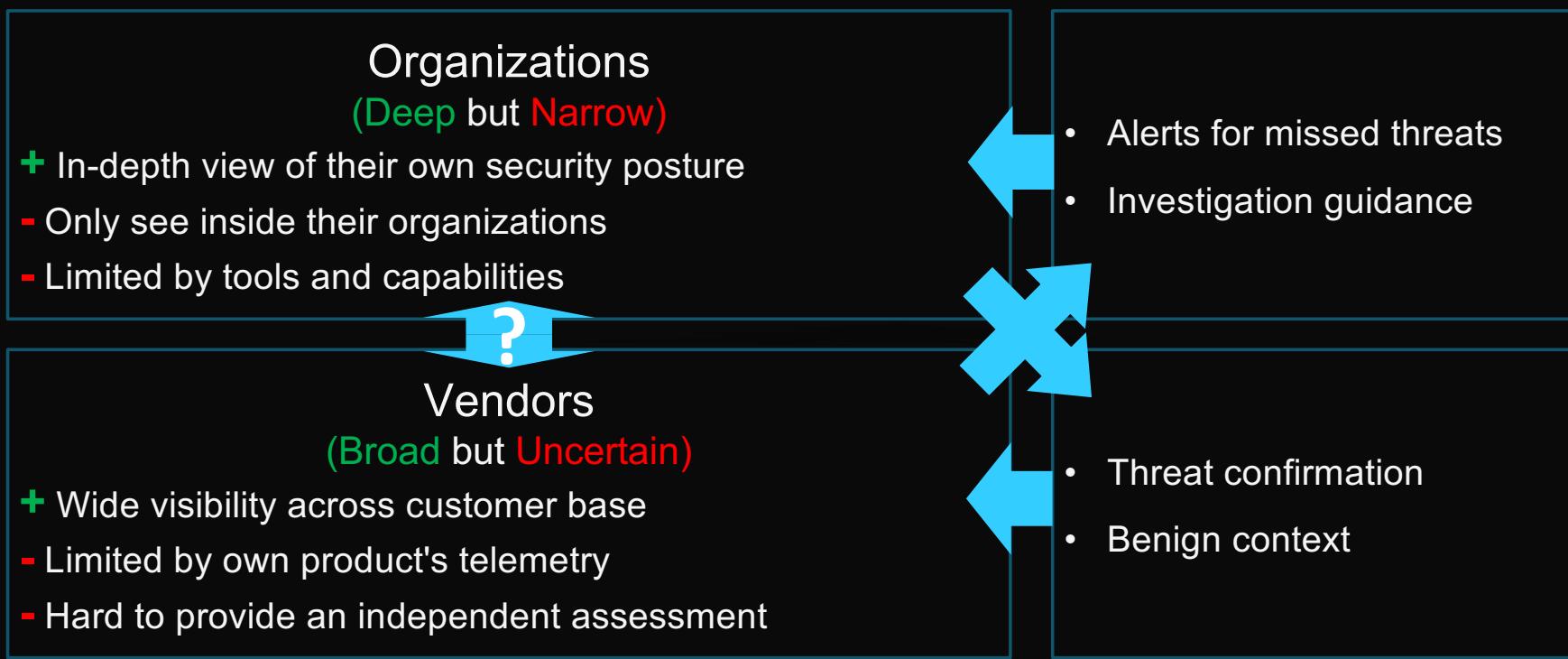
LLM failed on the large batch, silently dropping or combining URLs

- Manually verified all URLs by cross-referencing inputs against the LLM's final output

The LLM successfully achieved perfect alignment with expert analysis for EvilProxy classification

* [Sekoia Global analysis of Adversary-in-the-Middle phishing threats](#)

Approach 3: Customer Validation



Learnings from Customer Validation

Research Win Closing the Validation Gap

~20% response rate

- Confirmed malicious EvilProxy events
- Identified red team and internal security testing
- Understood reasons for legitimate origin domain mismatches

Security Win Closing the Awareness Gap

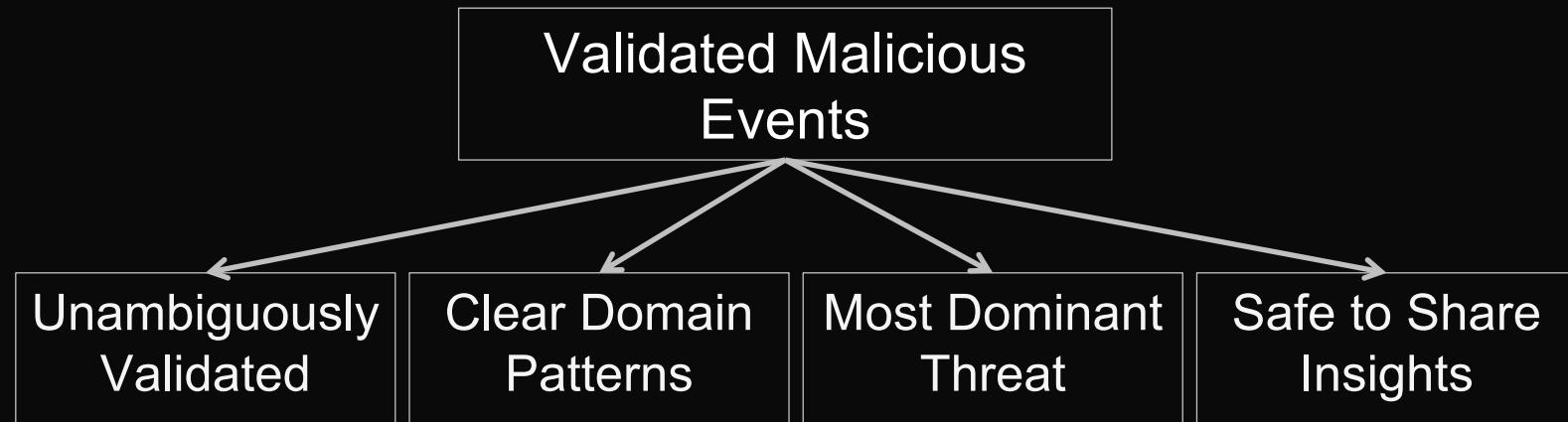
5 of 7 EvilProxy incidents

- Admins reported they had not detected them until our notification
- Admins suggested using the signal for incident response, SIEM enhancement, and IP blocking

An ongoing feedback loop (active for 9 months)

Scope the Dataset

Establishing a conservative lower bound



*The lower-bound dataset: **EvilProxy campaigns***

Validated Dataset

~3 Billion Phishing-Resistant Authentication Events



~44,000 Failed Phishing-Resistant Authentications
with Mismatched Request Origins



512 Mismatched Request Origins



190 Malicious Origins

369 User Engagement Events

170 EvilProxy Origins

310 User Engagement Events

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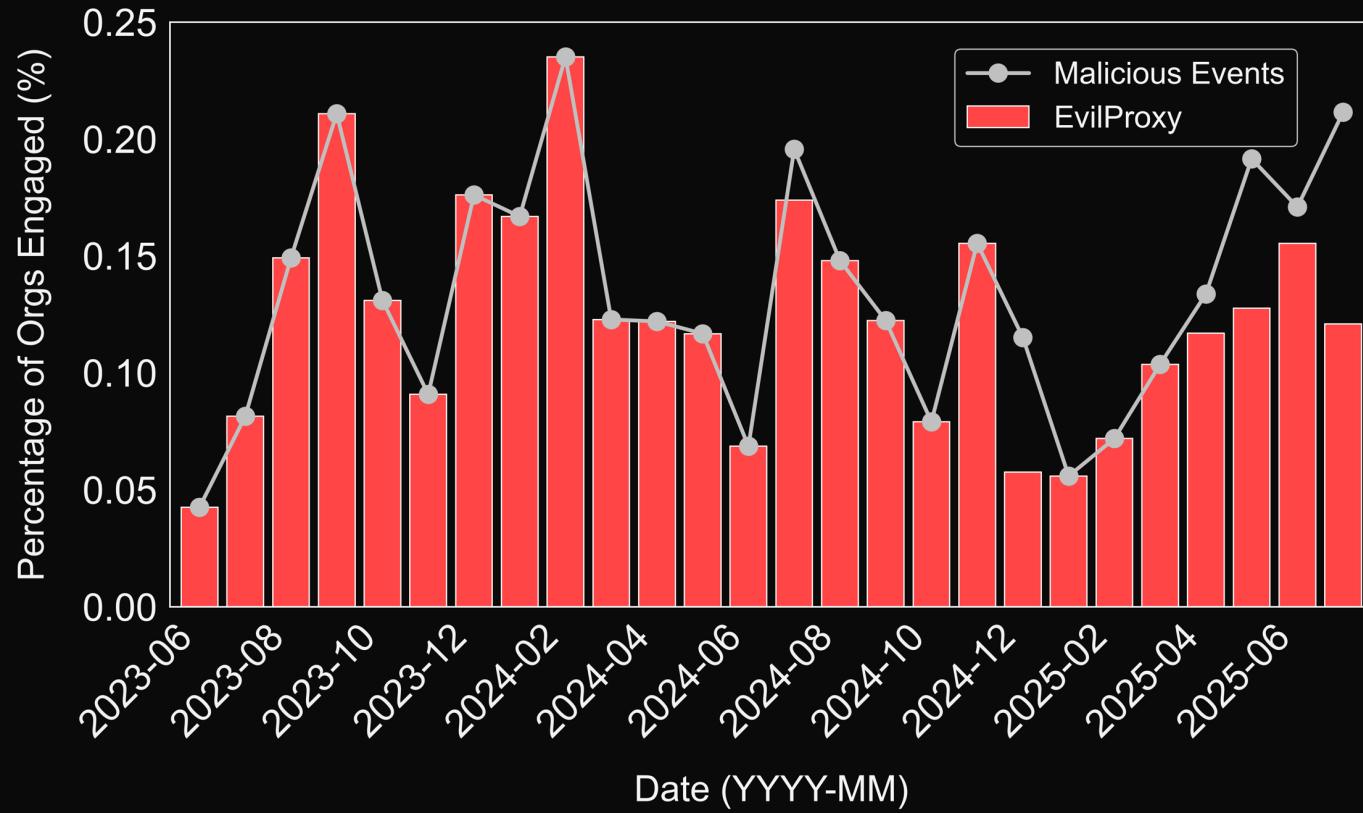
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2. The Evidence: Empirical Insights

- What two years of malicious AiTM phishing reveals about enterprise threats

AiTM Phishing Threat is Persistent



What Did the Attackers Actually Do

Infrastructure: leveraging commercial cloud

- Top 10 ISPs in the syslog were cloud/VPS providers
 1. Akamai Connected Cloud (Linode)
 2. DigitalOcean

Authentication phishing domains: disposable

- Attackers used rapid rotation to evade blocklists, some had more engagements, e.g. kanakratna[.]com

Phishing kits: old still works

- Older EvilProxy kit responsible for more user engagements

Who was Being Successfully Engaged

Geography: Americas-focused

- Organizations in Americas were engaged more than in EMEA and APAC

Organization size: all sizes, but a higher rate for larger ones

- Largest enterprises (20,000+) were most frequently engaged

Industry: broad industry coverage

- Professional Services organizations were engaged at the highest rates

Application: O365 was the overwhelming lure

- Successful engagements were largely redirected from Microsoft O365

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3. The Implications: Defense in Precision

- How to apply these findings to your security practice

Lower-Bound Estimate

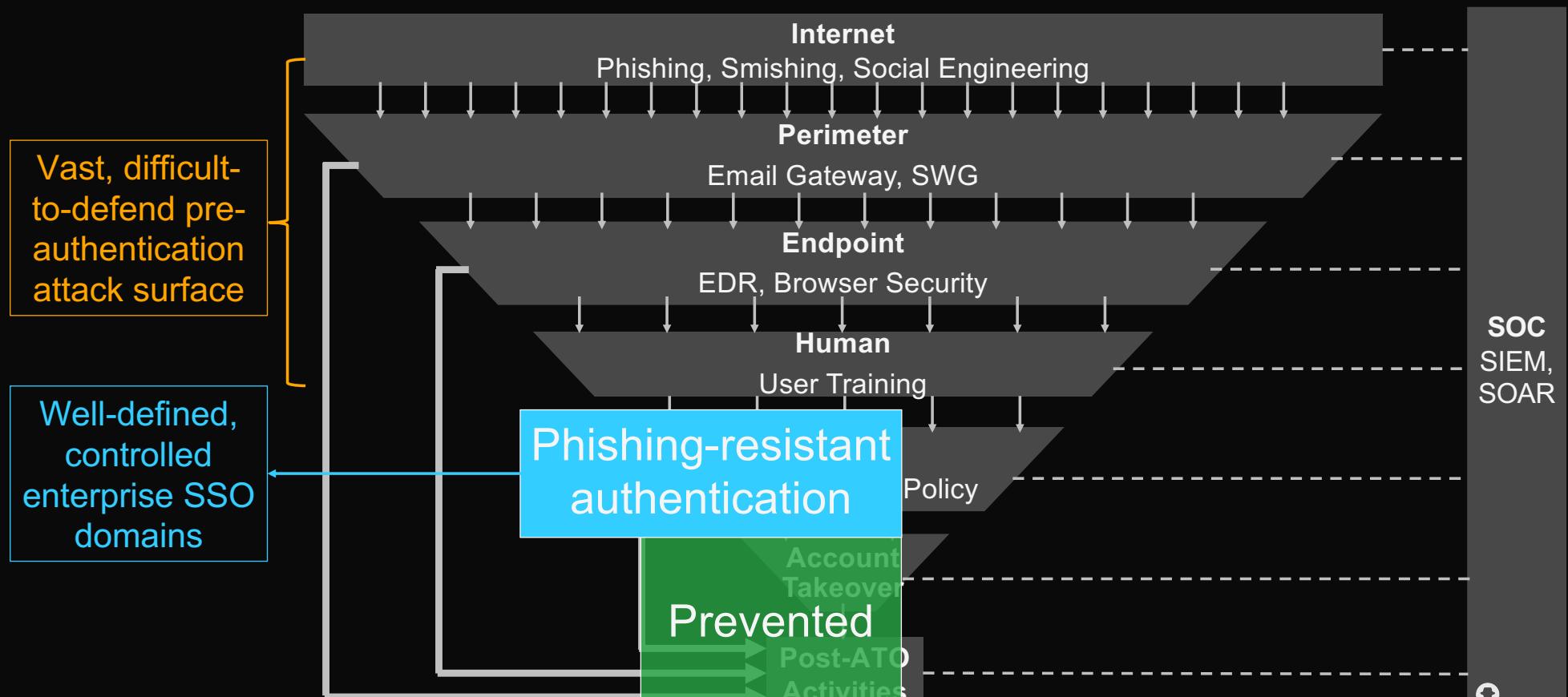
0.0%/~~Month~~

of organizations that have malicious AiTM phishing user engagements

This number is intentionally conservative

- Strict conservatism in threat inclusion criteria
- An overestimation of the total number of protected organizations
- A bias toward security-mature organizations

Defense in Precision



The Complete Picture

Attacker Reality

- AiTM PhaaS for just \$400/month
- Broad target coverage with low effort
- Repeatable success

Defender Reality

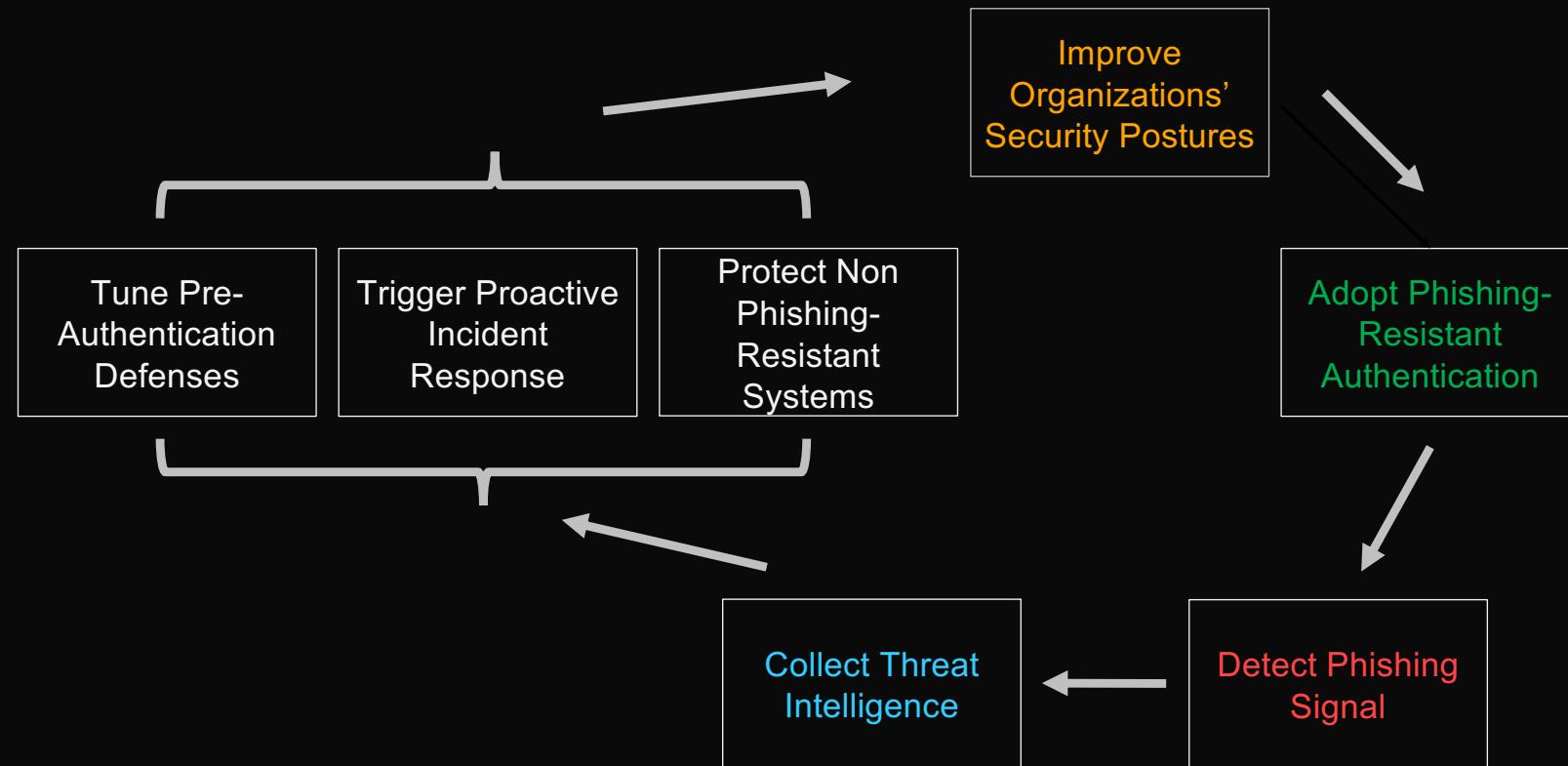
- Pre-Authentication defenses insufficient
- MFA not fully adopted (70% *), and ineffective
- Phishing-resistant MFA adoption gaining momentum (14% *)

Defender Ideal

- Block the phishing attempt (**shield**)
- Identify the threat (**sensor**)
- Minimize identity-based phishing

* [Okta Secure Sign-in Trends Report 2025](#)

Hope: A Sensor That Grows with Adoption



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4. The Playbook: Sound Bytes and Call to Action

- What you need to do next to enhance your organization's security posture

Sound Bytes

Your true phishing risk may be **higher** than you think.

- Sophisticated attacks constantly exploit security gaps and user vulnerabilities.

Your current posture may have a **blind spot**.

- Pre-authentication controls are insufficient, also need strong authentication.

Phishing-resistant authentication is both **a shield** and **a sensor**.

- Prevent phishing but also provide timely and high-fidelity detection.

Call to Action

Enterprise security postures are insufficient.

Prioritize phishing-resistant authentication
and integrate high-fidelity alerts
to respond to phishing attacks you could miss.

It has been a Team Sport



Moussa Diallo



Yu Liu



Gabriel Marusic



Gary Khemani



Kelly Kern



Justin Bergez



Erik Kuhrman



Angie Yanez



Dave Case



Matt Egan



Karim Lalji



Justin Boots

THANK YOU

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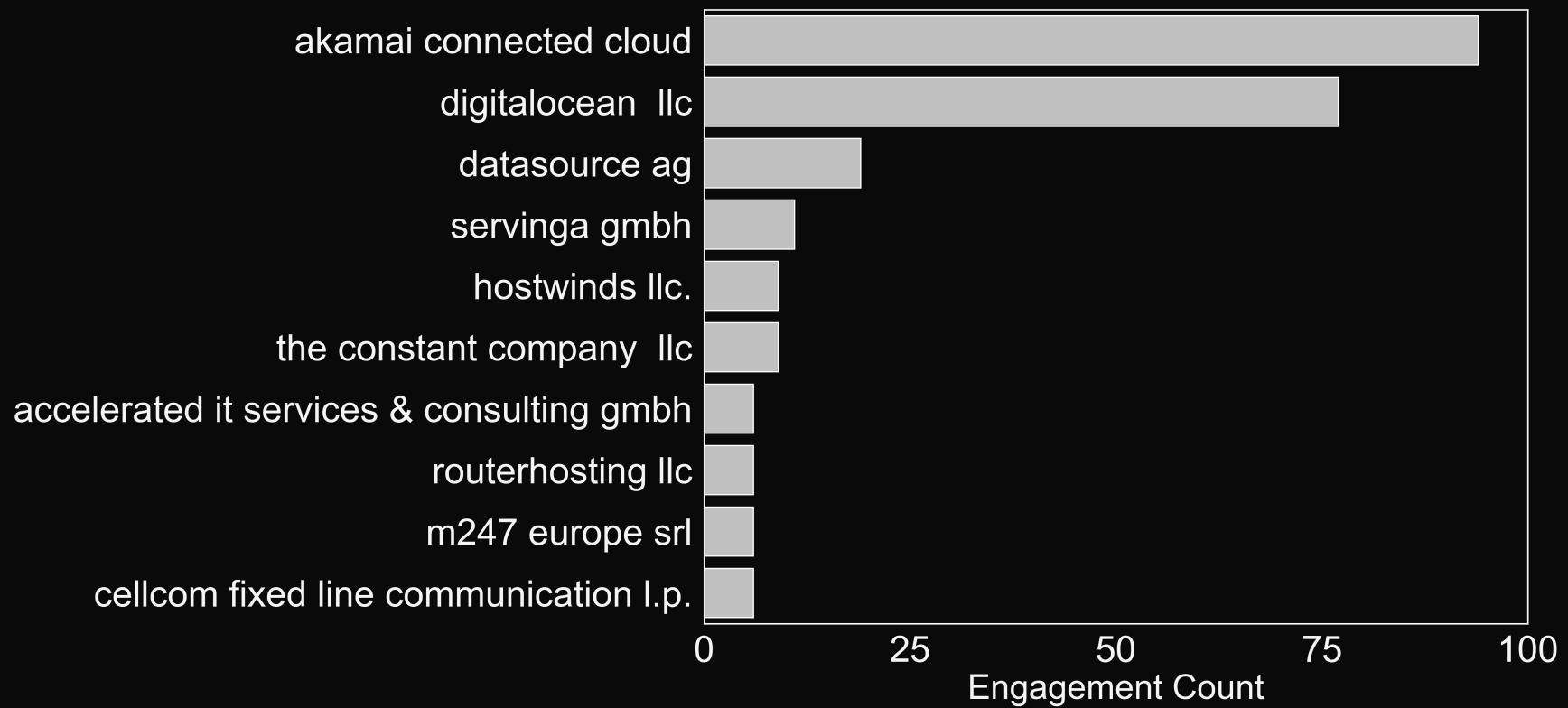


Get the full research & demo

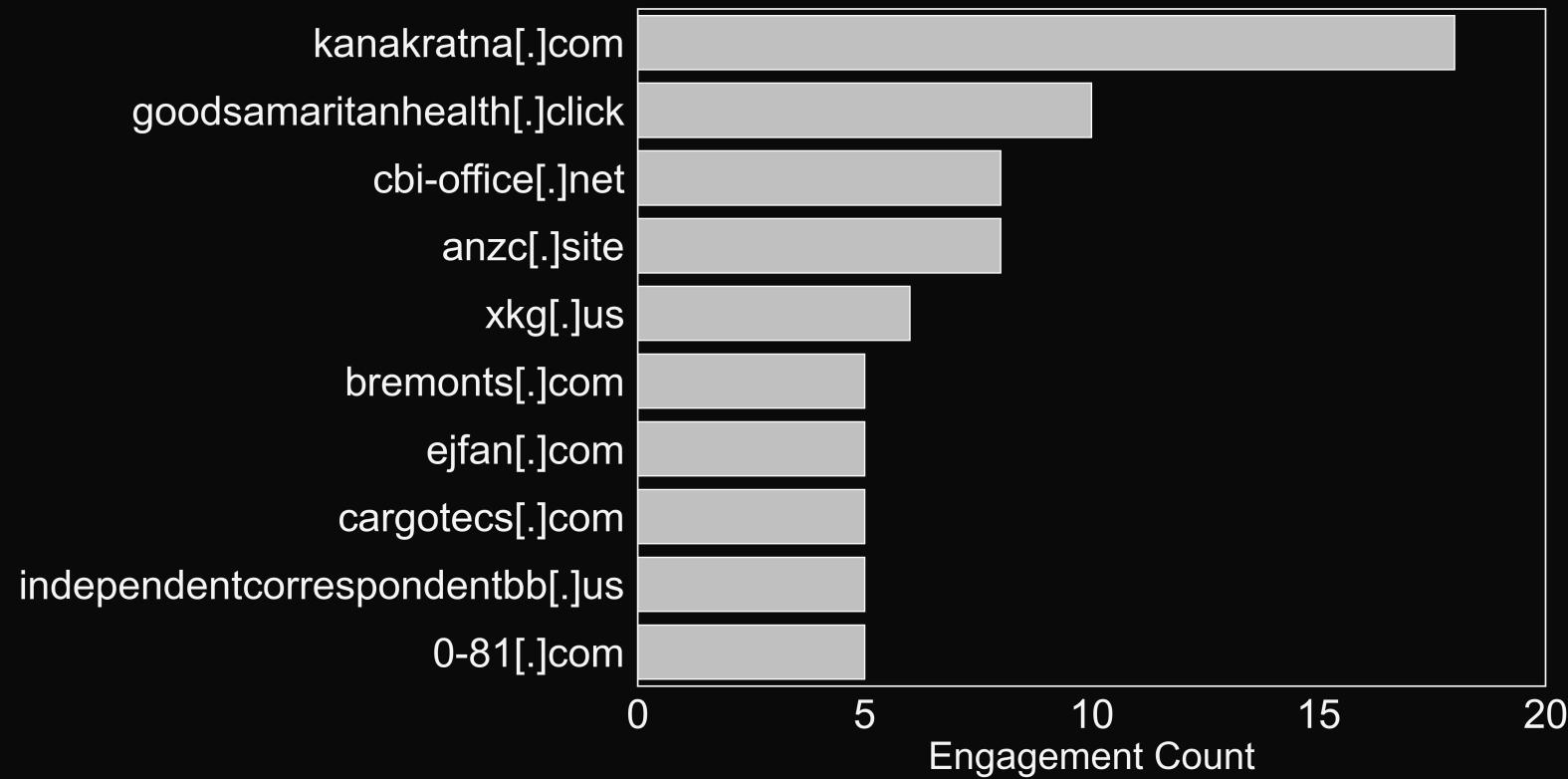


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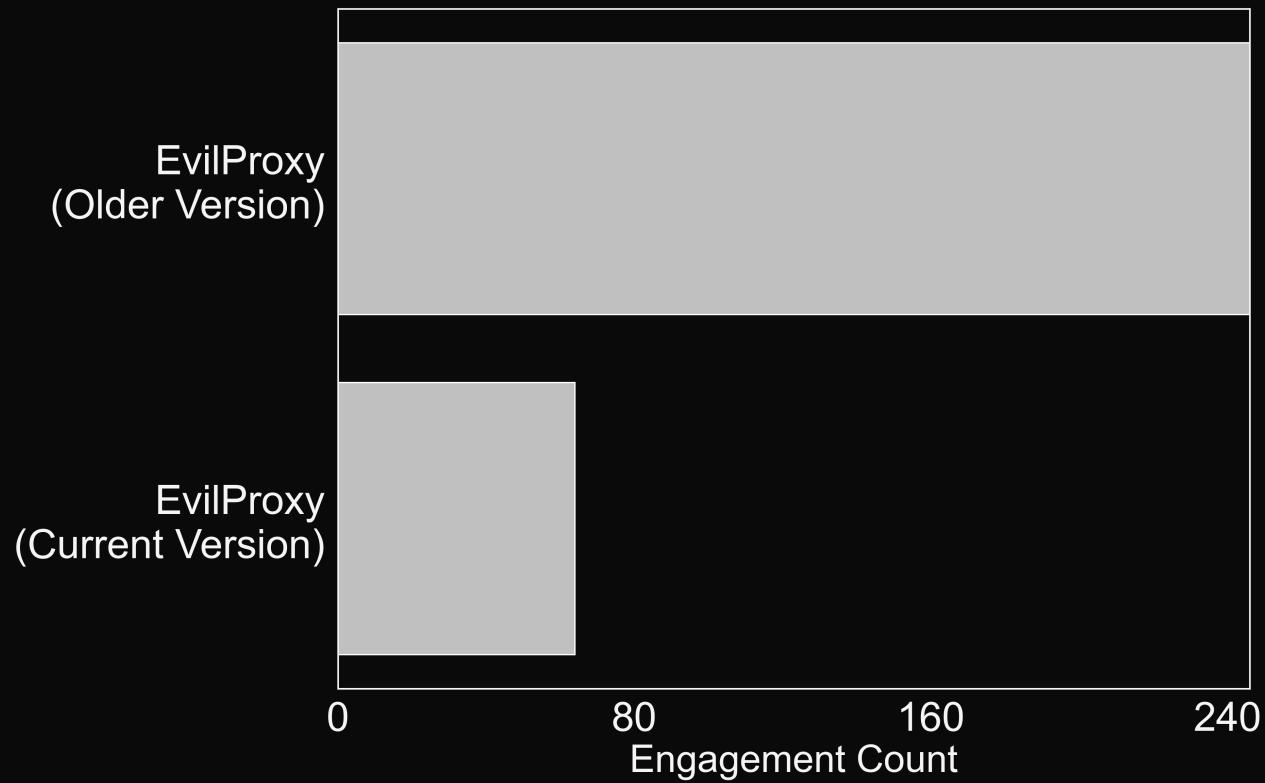
Top 10 Attacker ISPs



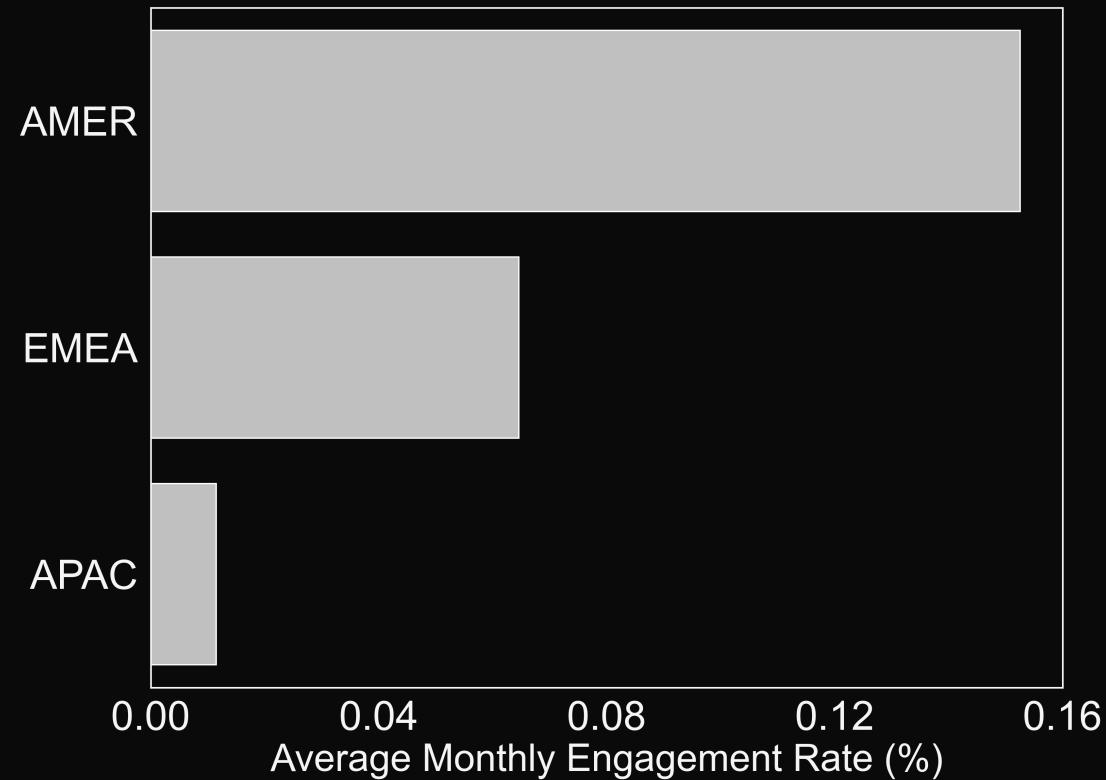
Top 10 Phishing Domains



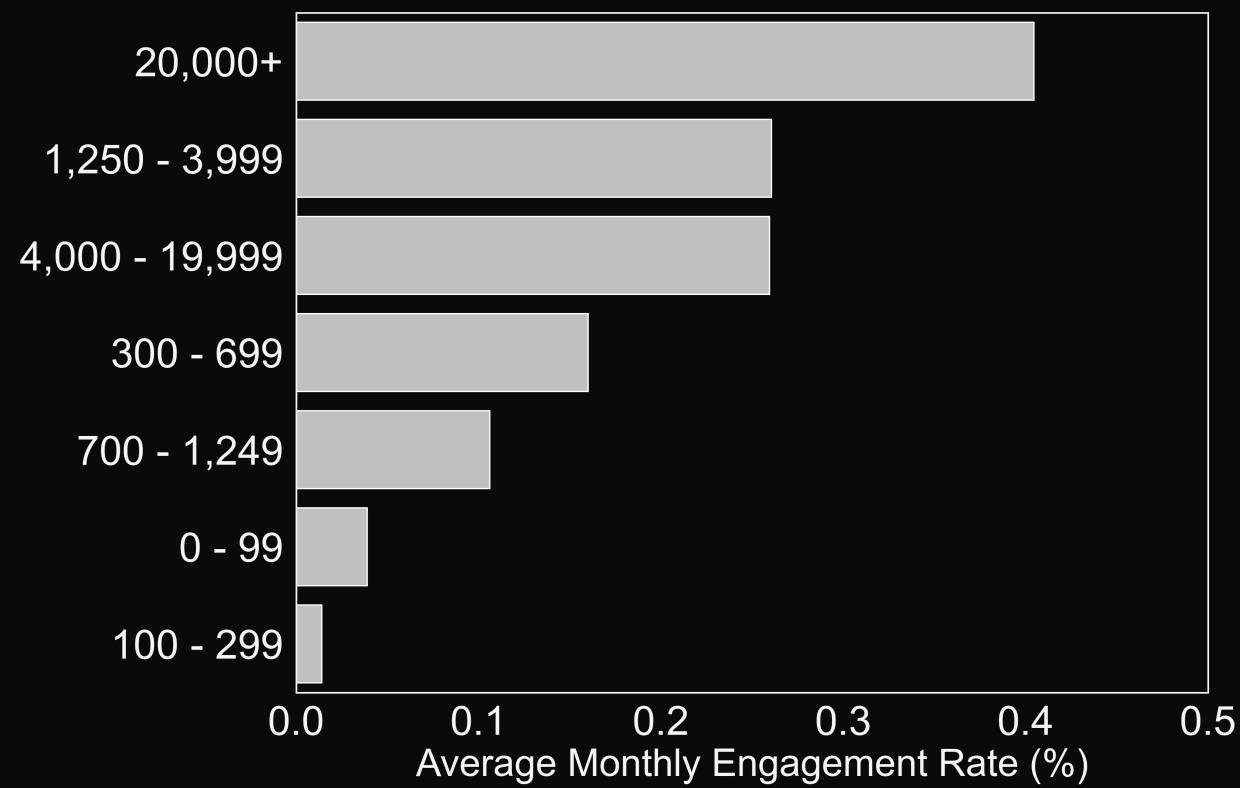
Phishing Kits Used



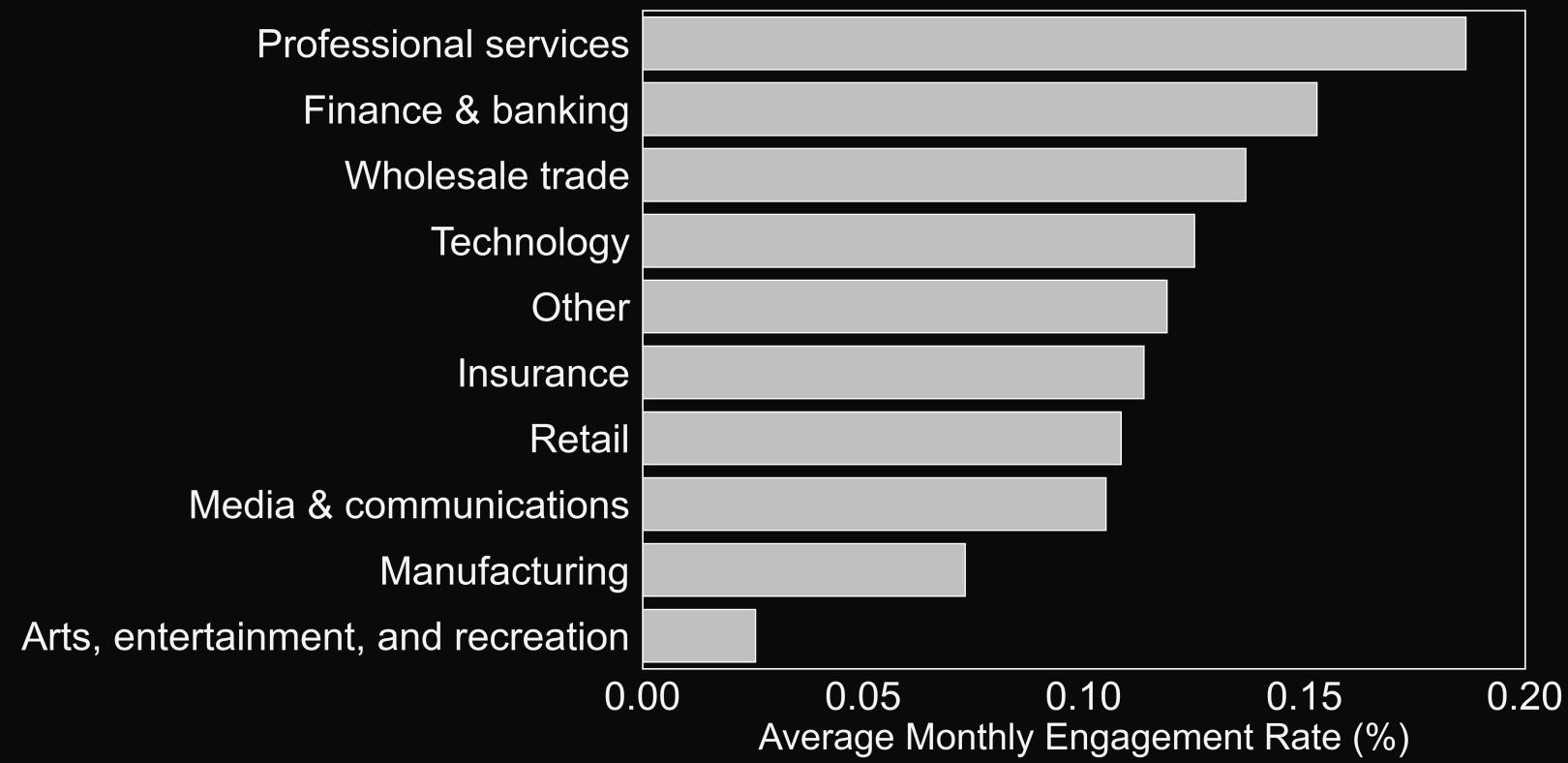
Engagement Rate By Geography



Engagement Rate By Organization Size



Top 10 Engagement Rate By Industry



Engagement By Application

