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

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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

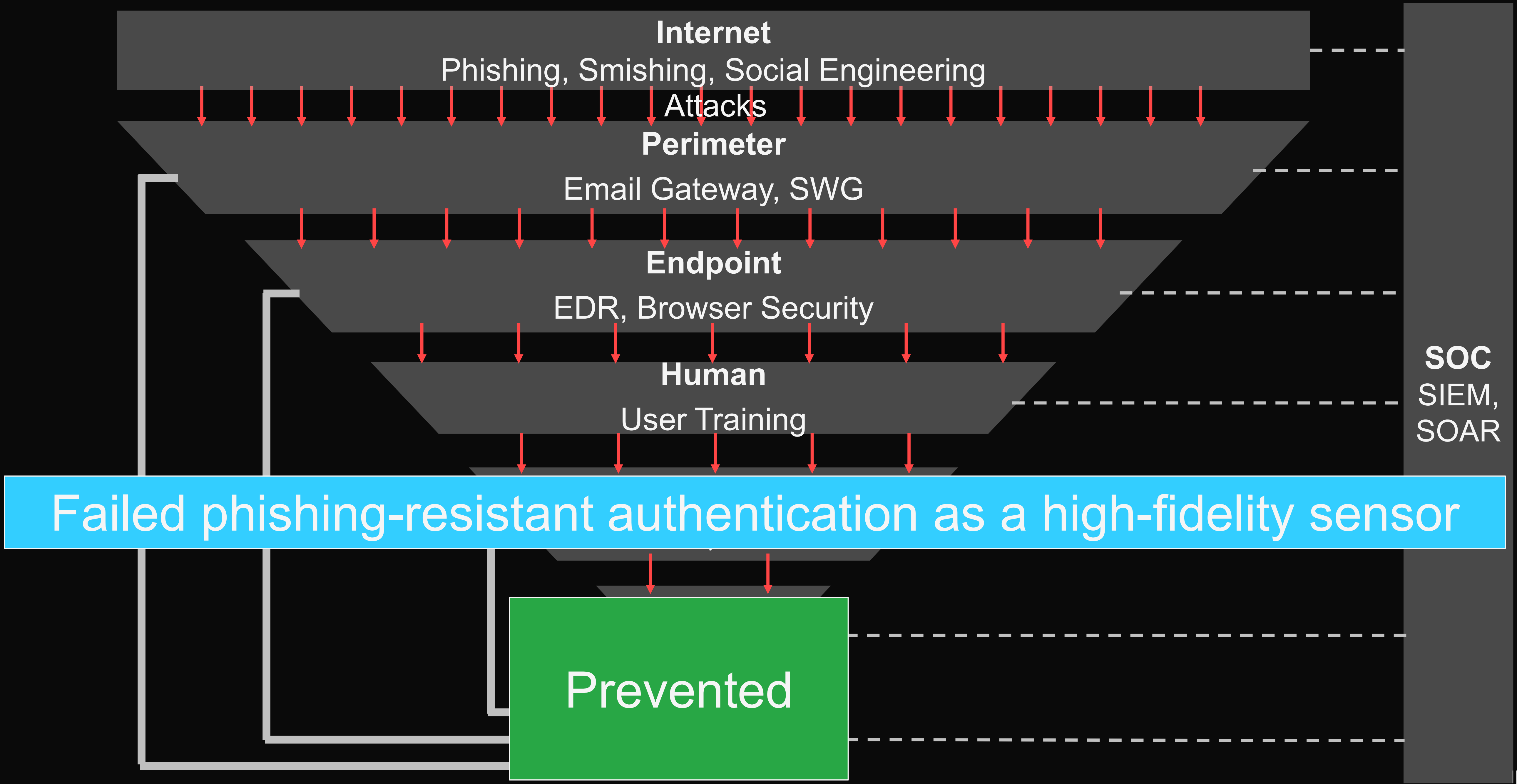
1. The Signal: A New Methodology

- 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



Failed phishing-resistant authentication as a high-fidelity sensor

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

Thousands

Security-Mature Organizations

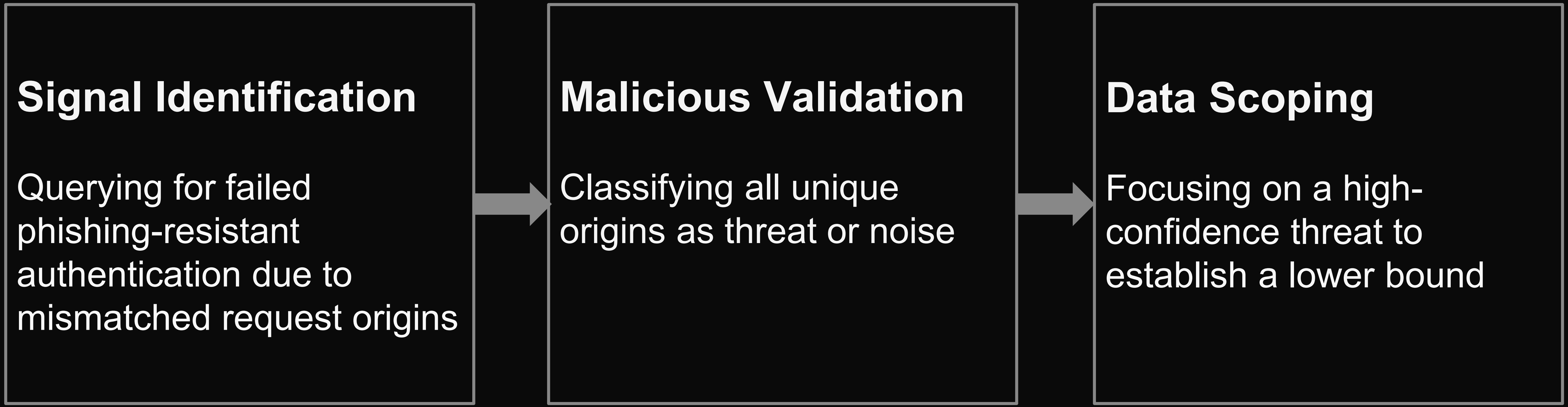
26

Months of Longitudinal Data

~3 Billion

Authentication Events Analyzed

Methodology: From Syslog to Final Dataset



Signal Identification

Querying for failed phishing-resistant authentication due to mismatched request origins

Malicious Validation

Classifying all unique origins as threat or noise

Data Scoping

Focusing on a high-confidence threat to establish a lower bound

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

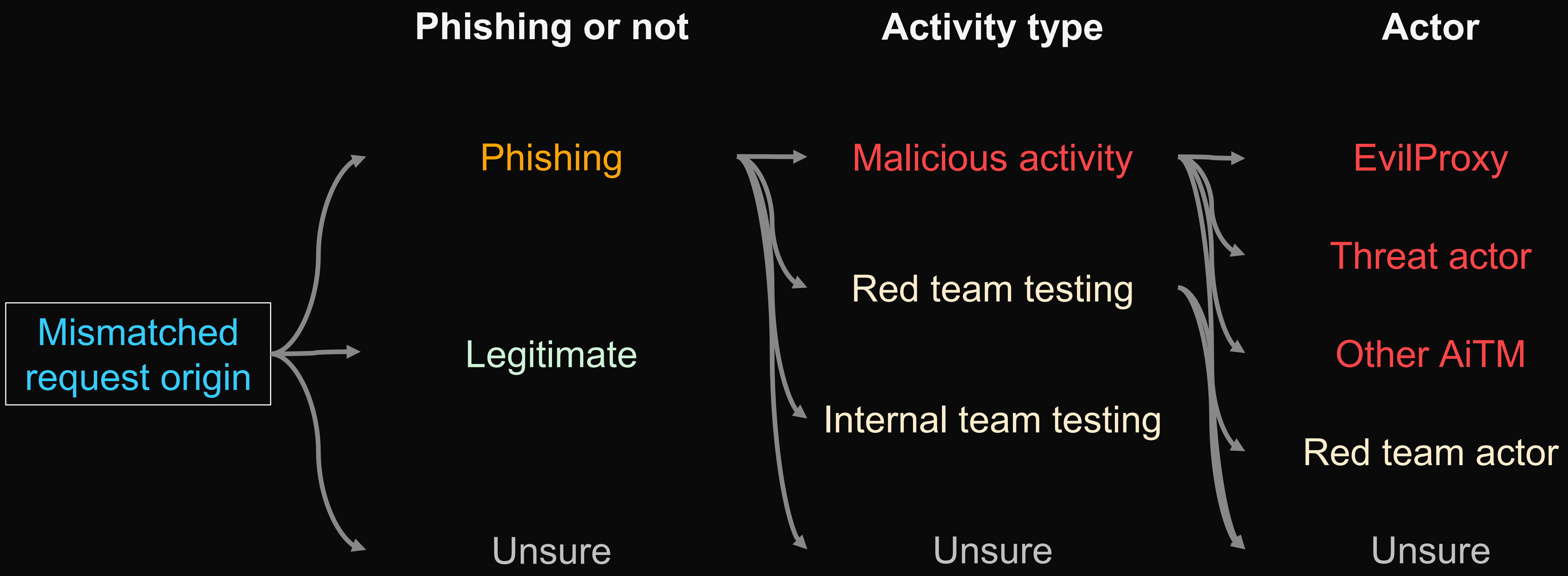
AI-Assisted Classification

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

Customer Validation

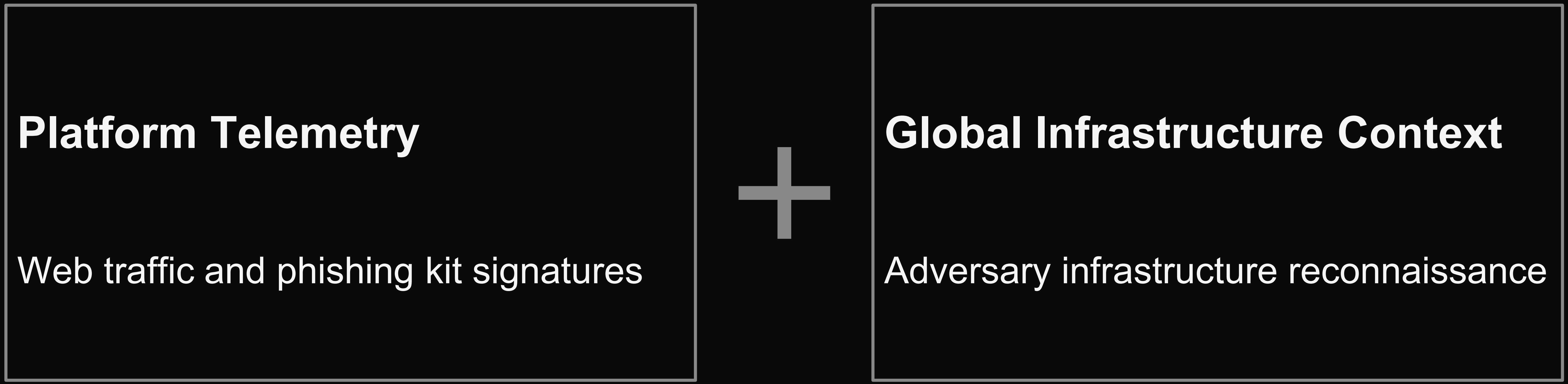
Outreach via notifications and questionnaires provides classification from customers

Hierarchical Classification Schema



Approach 1: Expert Analysis

Intelligence from cyber defense operations



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

Organizations

(Deep but Narrow)

+ In-depth view of their own security posture

- Only see inside their organizations
- Limited by tools and capabilities

?

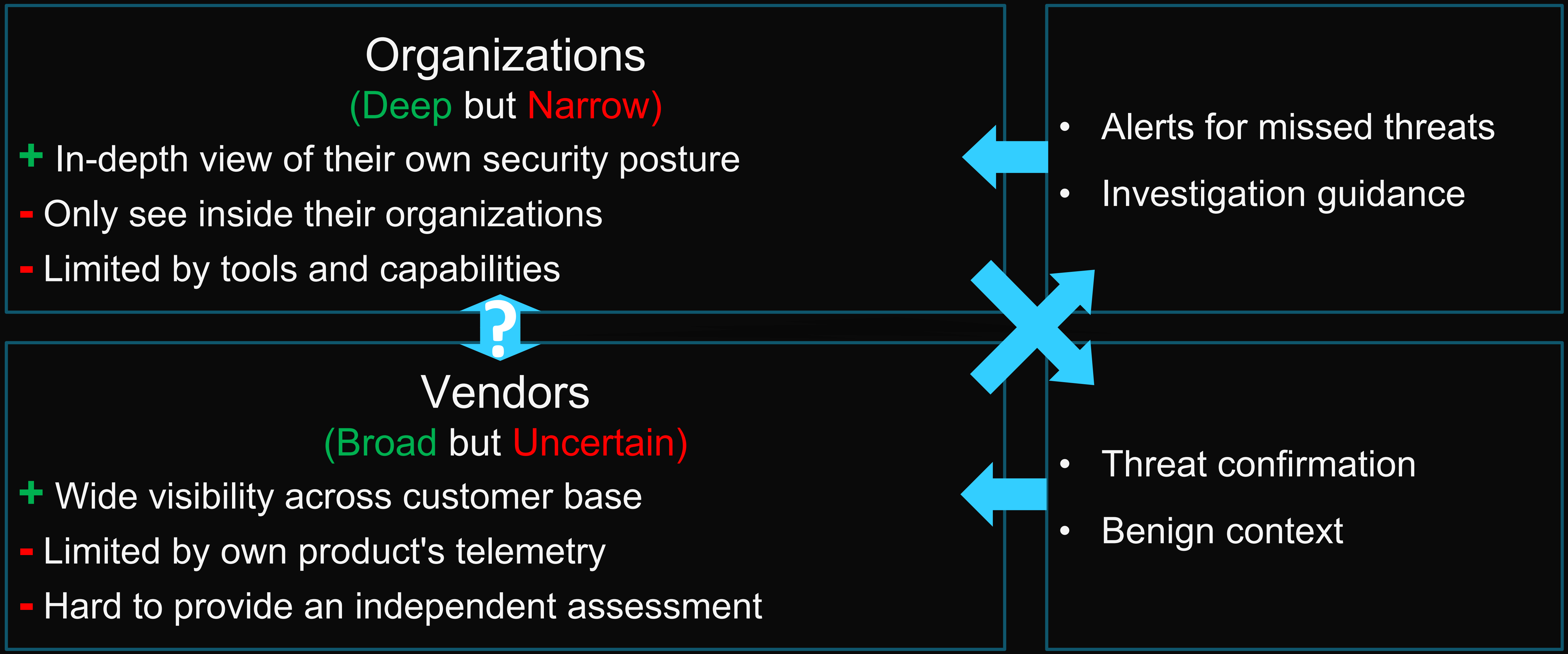
Vendors

(Broad but Uncertain)

+ Wide visibility across customer base

- Limited by own product's telemetry
- Hard to provide an independent assessment

Approach 3: Customer Validation



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- Alerts for missed threats
- Investigation guidance

- Threat confirmation
- Benign context

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

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Security Win
Closing the Awareness Gap

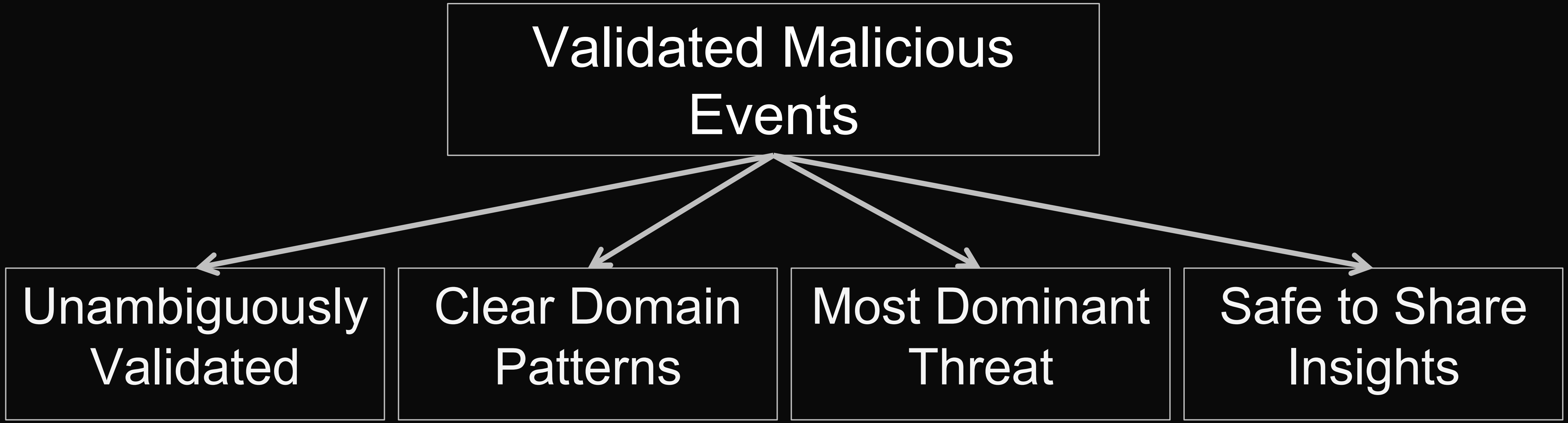
5 of 7 EvilProxy incidents

- 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



Validated Malicious Events

Unambiguously Validated

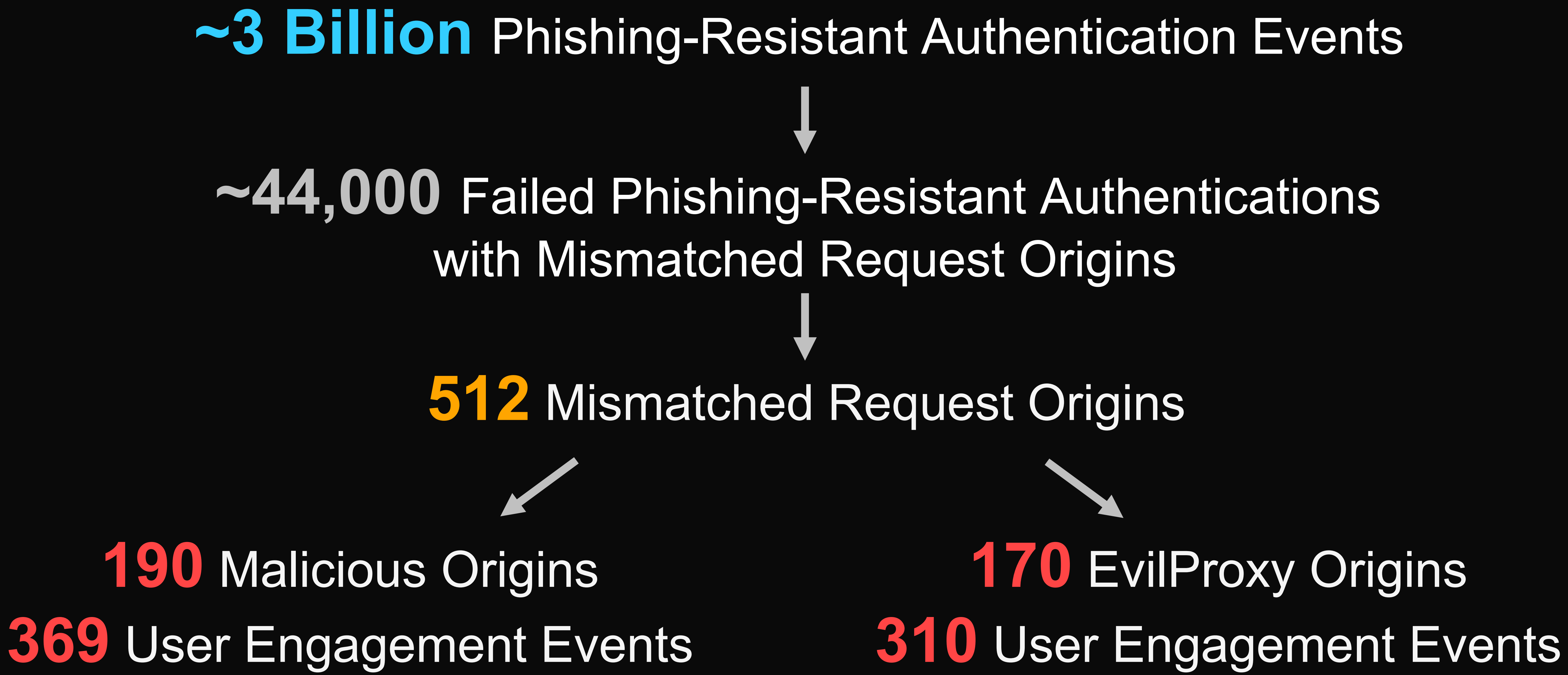
Clear Domain Patterns

Most Dominant Threat

Safe to Share Insights

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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2. The Evidence: Empirical Insights
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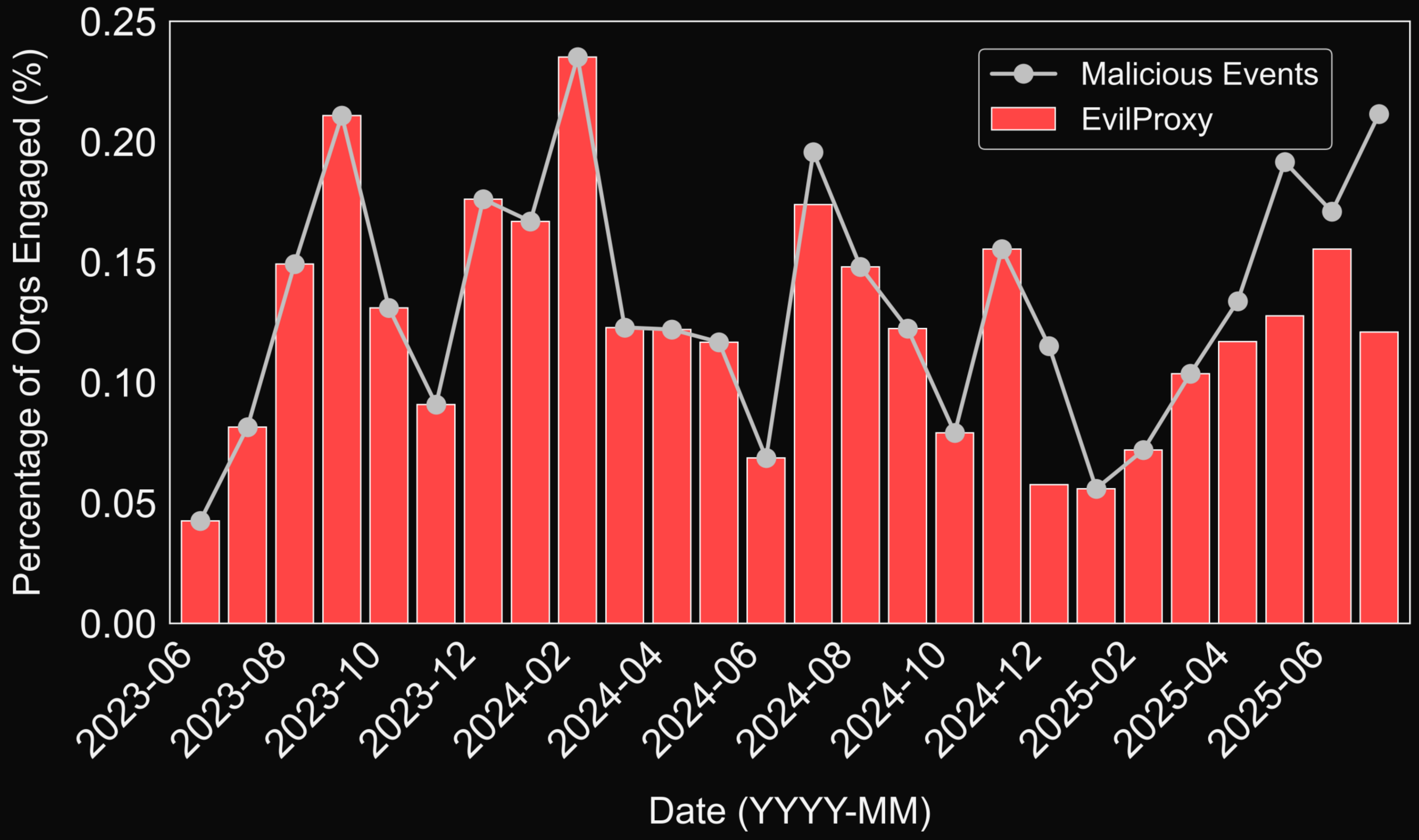
AiTM Phishing Threat is Persistent



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 engagments, 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

0.12%/Month

0%/Month

of organizations that have malicious AiTM phishing user engagements

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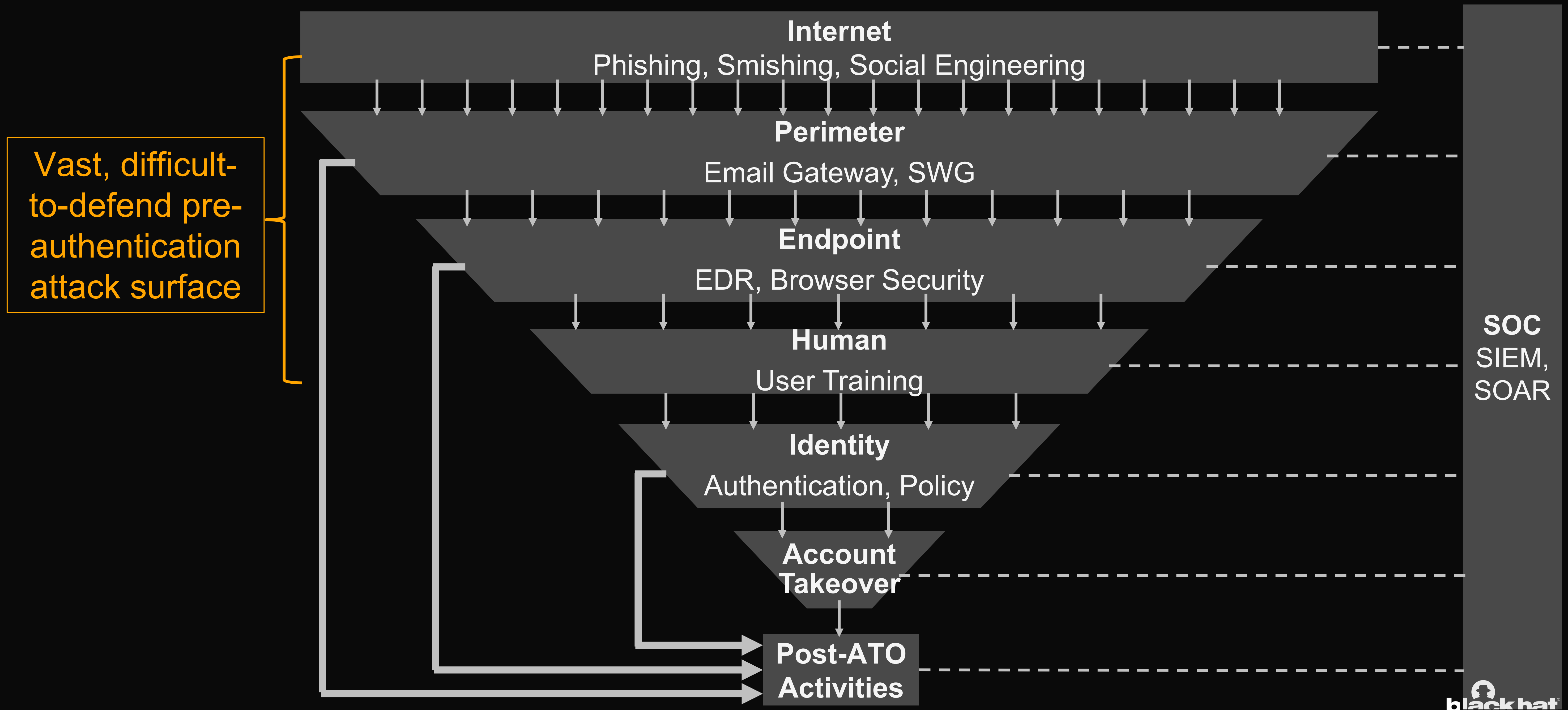
0.12% /Month

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



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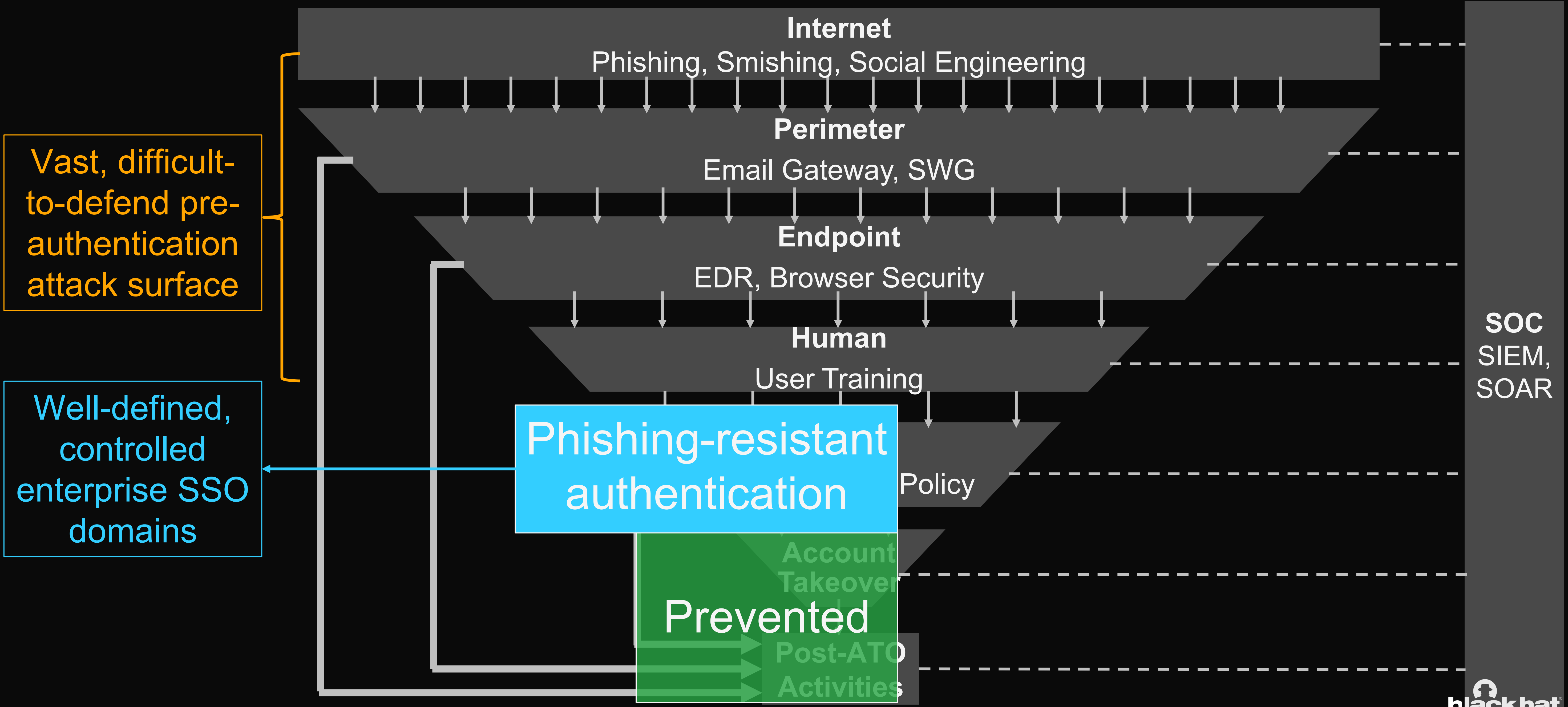

Internet
Phishing, Smishing, Social Engineering
Perimeter
Email Gateway, SWG
Endpoint
EDR, Browser Security
Human
User Training
Policy
Account Takeover
Post-ATO Activities
SOC
SIEM, SOAR
Vast, difficult-to-defend pre-authentication attack surface
Well-defined, controlled enterprise SSO domains
Phishing-resistant authentication
Prevented

The Complete Picture

Attacker Reality

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

* Resecurity EvilProxy Phishing-as-a-Service with MFA Bypass Emerged in Dark Web

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Defender Reality

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

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** Okta Secure Sign-in Trends Report 2025

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Defender Ideal

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

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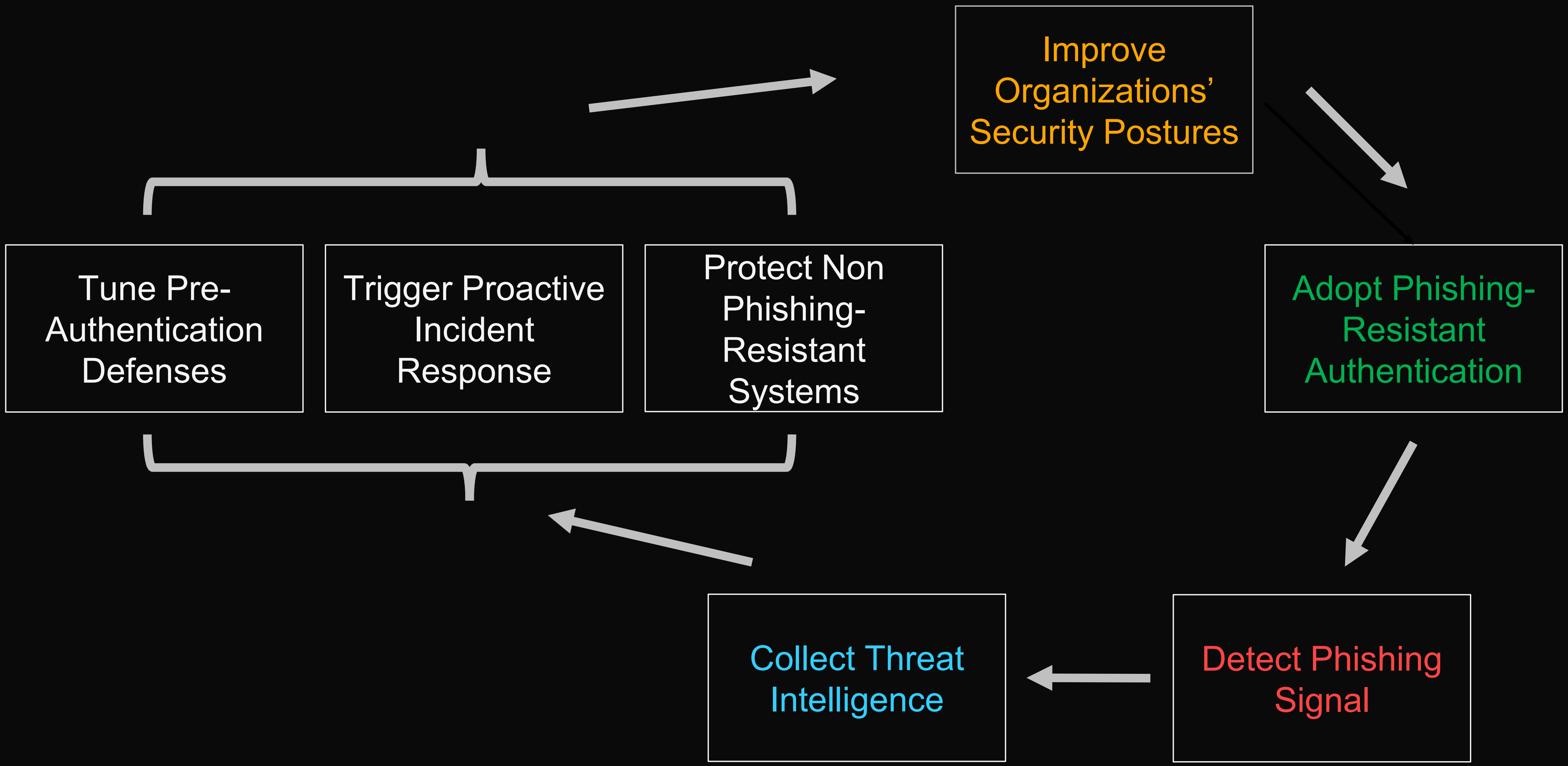
** Okta Secure Sign-in Trends Report 2025

Hope: A Sensor That Grows with Adoption



Improve Organizations' Security Postures

Adopt Phishing-Resistant Authentication

Detect Phishing Signal

Collect Threat Intelligence

Tune Pre-Authentication Defenses

Trigger Proactive Incident Response

Protect Non Phishing-Resistant Systems

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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.

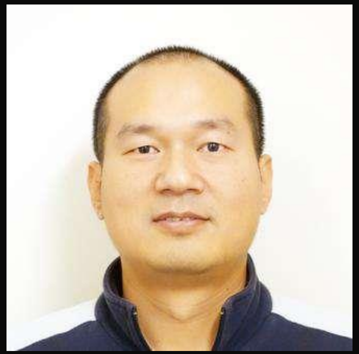
Call to Action

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



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THANK YOU

Get the full research & demo

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