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CYBER DEFENSE SUMMIT 2019

Avenues of Exploitation

Use of Zero-Day Vulnerabilities by Tracked Groups

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Jared Semrau

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- Background in cyber criminal monetization and money laundering analysis and threat analysis of vulnerability exploitation.

- Current focus on vulnerabilities, their exploitation, and high-level vulnerability trending.

Parnian Najafi

Senior Analyst, Advanced Analysis

- Background in vulnerability and IoT penetration testing
- Current focus on technical capabilities of threat actors

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- Background in Deep & Dark Web research
- Current focus on high level trends in state-sponsored and criminal activity

Key Questions

Key Questions

- What is a zero-day?
- Are zero-days a concern to me?
- Who is using them and why?
- How has zero-day usage changed over time?
- What can I do to protect my company?

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Definitions and Methodology

What is a Zero-Day?

Definitions

- A zero-day vulnerability is a known flaw in software or hardware that leaves systems exposed to cyber attacks before a patch is available to properly mitigate the risk.
- For the purpose of this study, we focused on zero-days that had been actively exploited in the wild for malicious activity.

Data Sources

- FireEye original research
- Google Project Zero - 0day “in the wild” spreadsheet
- Open source collections

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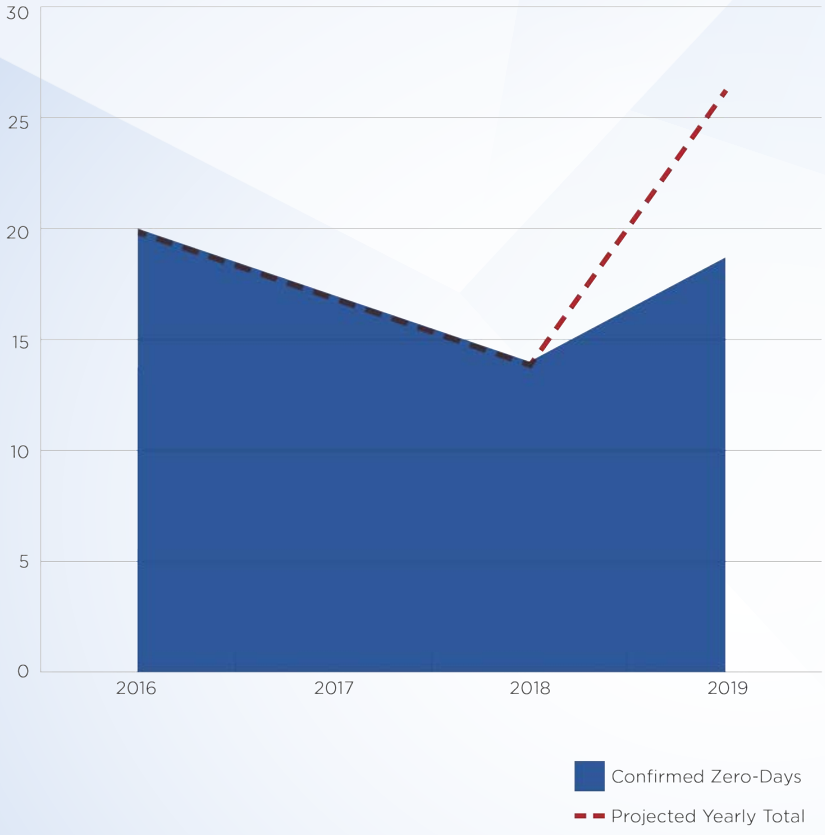
Image Source: KRPO

Historical Trends in Zero-Day Exploitation

Overall Trends: Zero-Days



- Spike in zero-day exploitation in 2019
- Breaks downward trend since 2016
- Important: number of vulnerabilities vs. breadth of exploitation
- Could be indication of shift in zero-day discovery rate

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Decline in Exploit Kit Usage

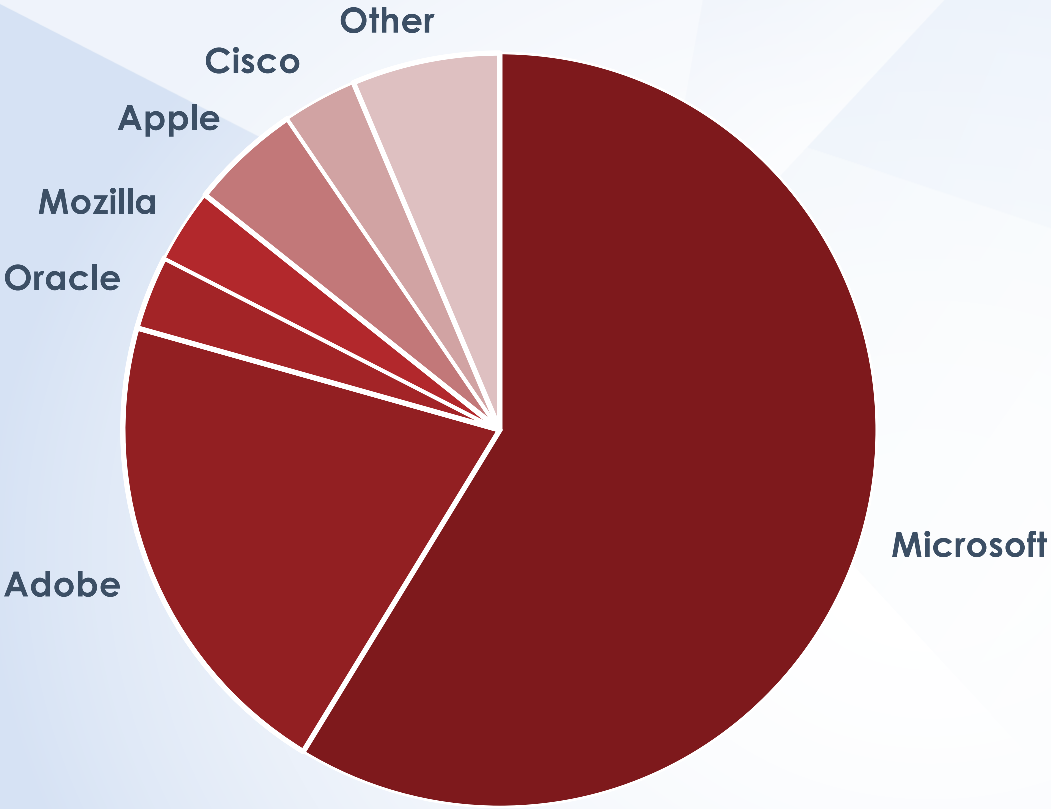
- Zero-day exploits used to be observed regularly in exploit kits
- Successful law enforcement activity
  - Black Hole Exploit Kit
  - Angler Exploit Kit
- Most remaining developers either quit, or established more exclusive relationships
- Since 2017, no new zero-days in exploit kits

Other Factors Leading to Decline

- Decreased viability of browser-based attacks:
  - Increased default security settings in Java shakes up targeting in 2013
  - Default automatic browser updates introduced
  - Looming Flash end-of-life

- Shift in actor tactics
  - Financially motivated actors increasingly performing targeted attacks, requiring different exploits
  - Increased use of exploit document builders, one-day exploits, and macros

Vendors Affected by Zero-Days



- **Zero-Day targeting of obscure software is rare**
  - Actors want most bang for their buck
  - Common software provides widest potential attack surface
- **Over 75% of all zero-days are Microsoft or Adobe**

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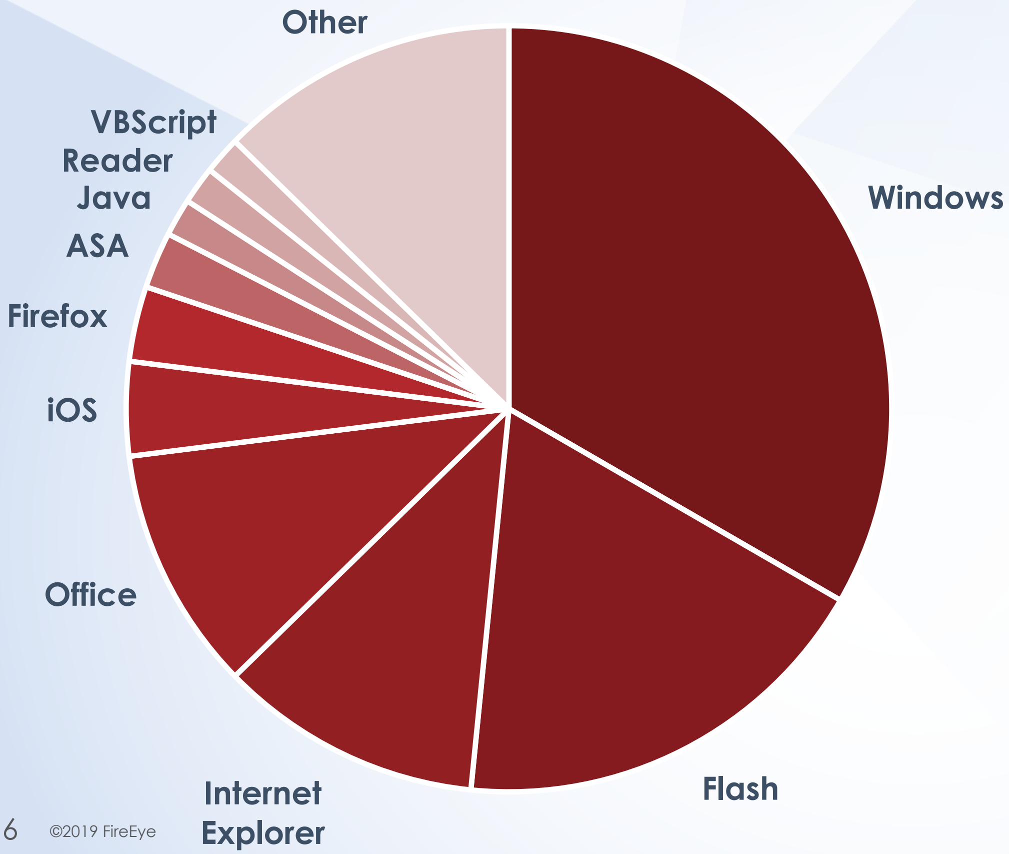
Products Affected by Zero-Days



- Same story as vendors…
- A handful of products account for the vast majority of zero-day activity

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Current State of Zero-Day Landscape in 2019

Significant Shift in Capabilities

- Zero-days used to be the exclusive property of the most sophisticated state and criminal actors
- New groups display access (FIN6, SandCat)
- Increased commodification of zero-days
  - Bug bounty programs and private security firms
  - Some companies suspected of selling zero-days to actors
  - Helps to explain recent spike in discovery rate

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Less Significance of Access

- Access to zero-days as a measure of threat actor sophistication
- Effect of rise of private security firms and bug bounty programs on sophistication measurement
- Exploit development speed for a known vulnerability as a measure of sophistication

Recognition vs. Financial Incentives

- Actors capable of discovering zero-days have competing interests
  - Recognition/ bragging rights
  - Financial gain

- Other factors:
  - Nationalization of zero-days

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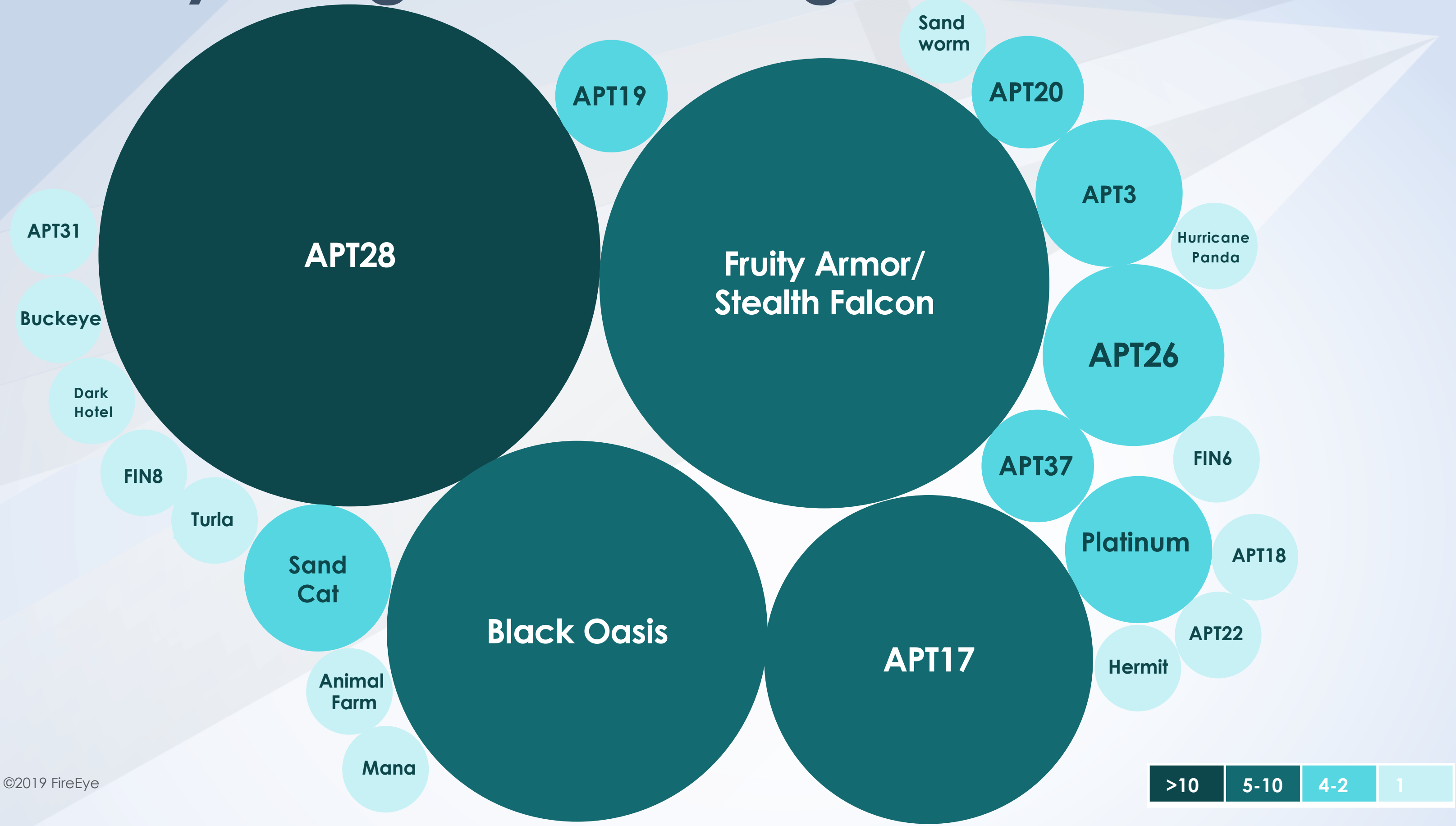
Zero-Day Usage by Tracked Groups

Zero-Day Usage CVEs Assigned 2012-2019



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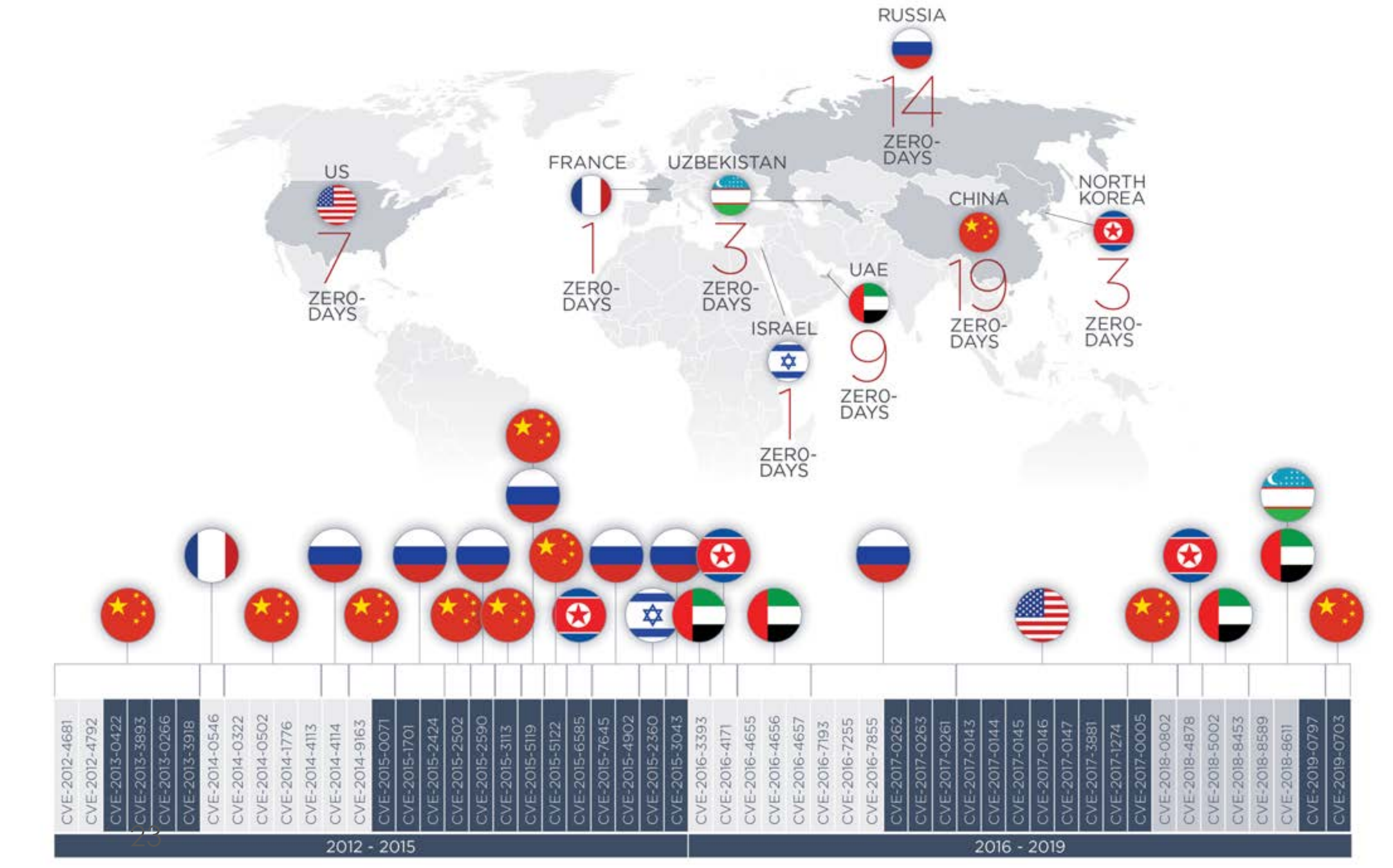
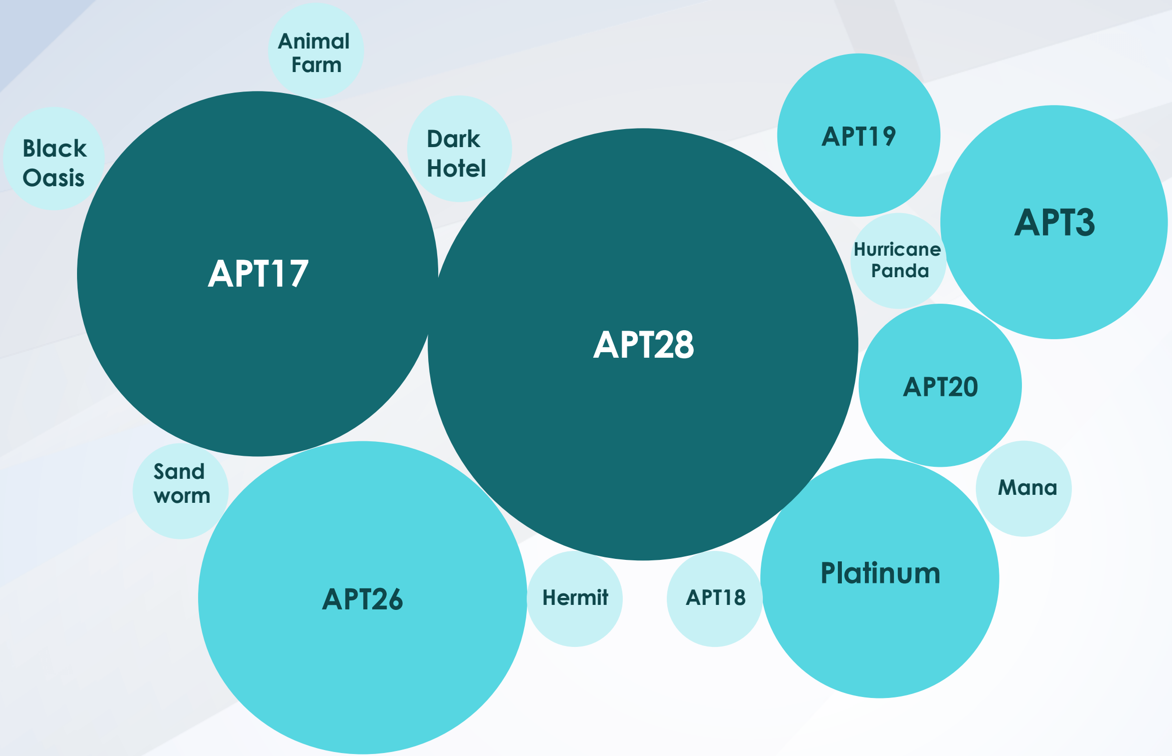
Zero-Day Usage by Country



Zero-Day Usage, CVEs Assigned 2012-2015



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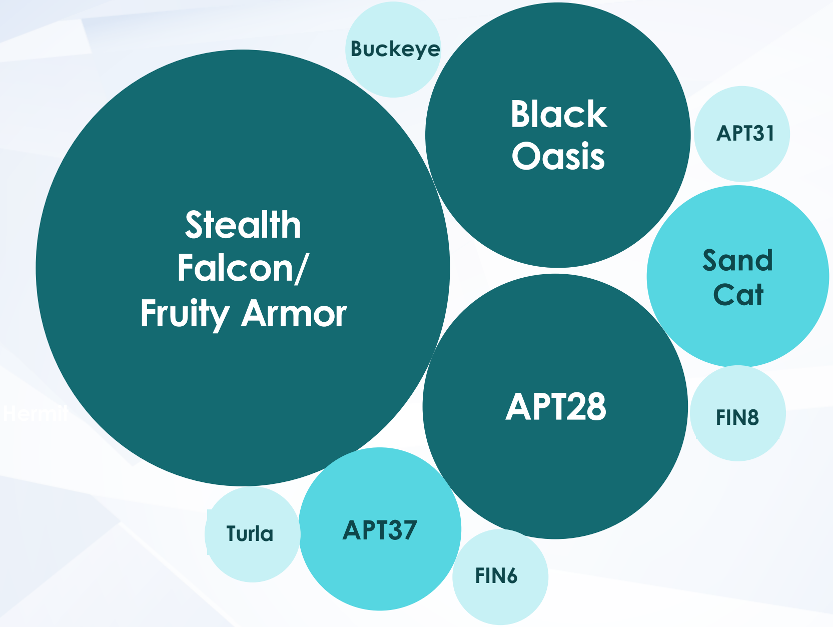
Zero-Day Usage, CVEs Assigned 2016-2019



>10	5-10	4-2	1

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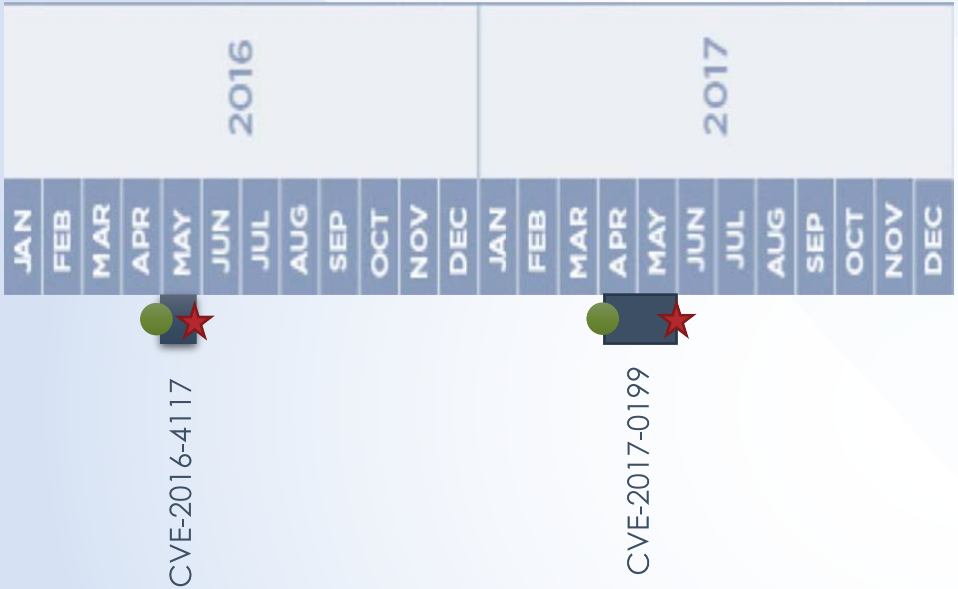
Notable APT Groups

2016-2019

- FruityArmor/Stealth Falcon
- SandCat
- BlackOasis

Case Study: Time to Exploit

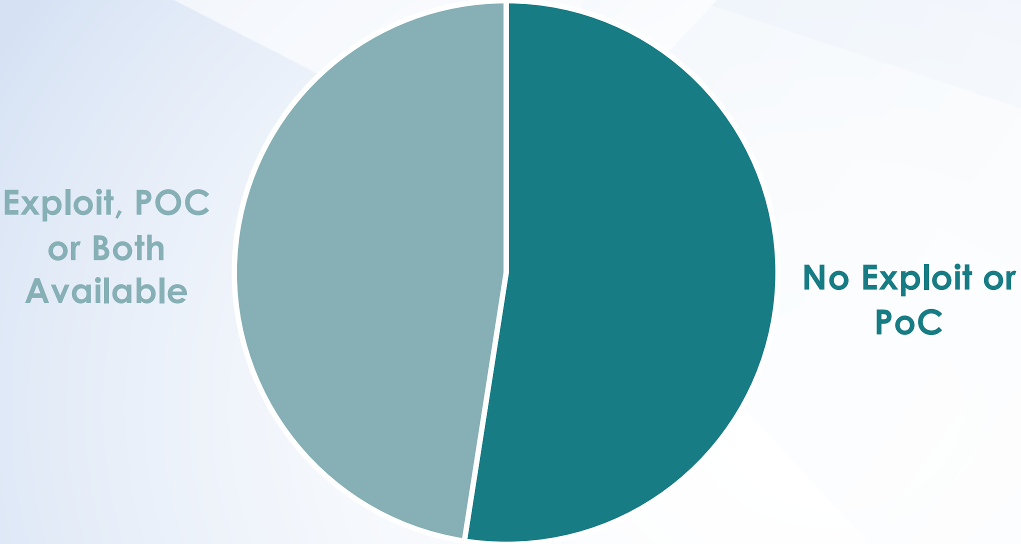
CVE Release Date vs. Date of APT37 CVE Exploitation



● CVE Release Date

★ Exploit

Zero-Day vs. Public Exploit or POC Availability



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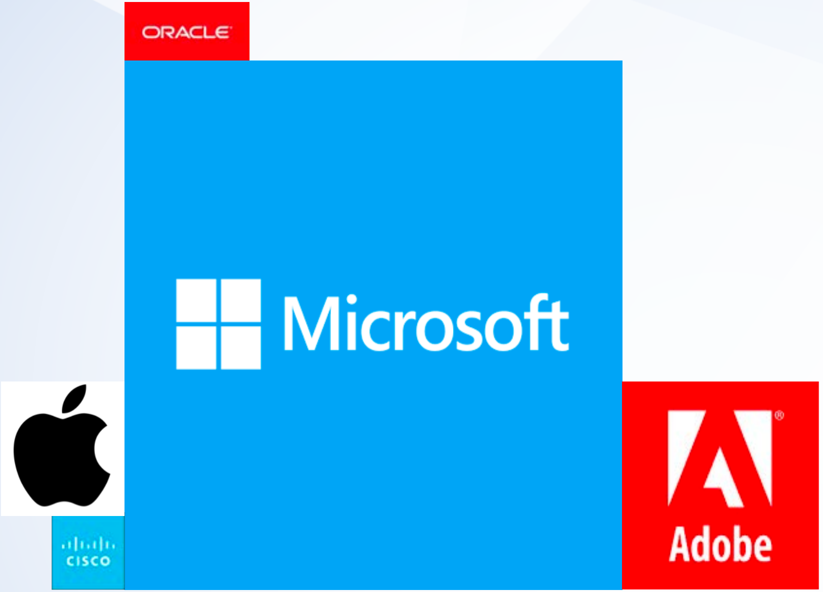
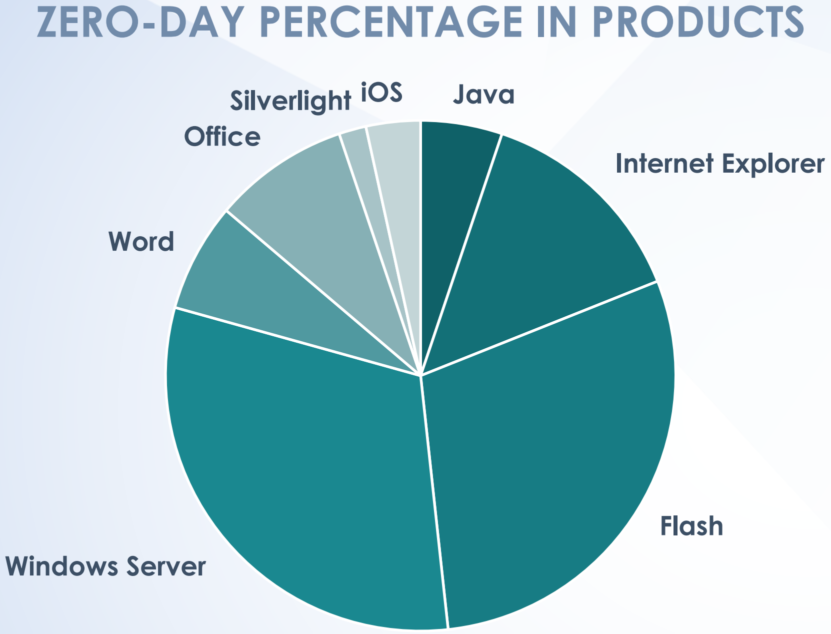
Most Affected Vendors by Tracked Groups



- 78% of Global Markets use Microsoft operating system vs. 14% using Apple

Most Affected Products by Tracked Groups



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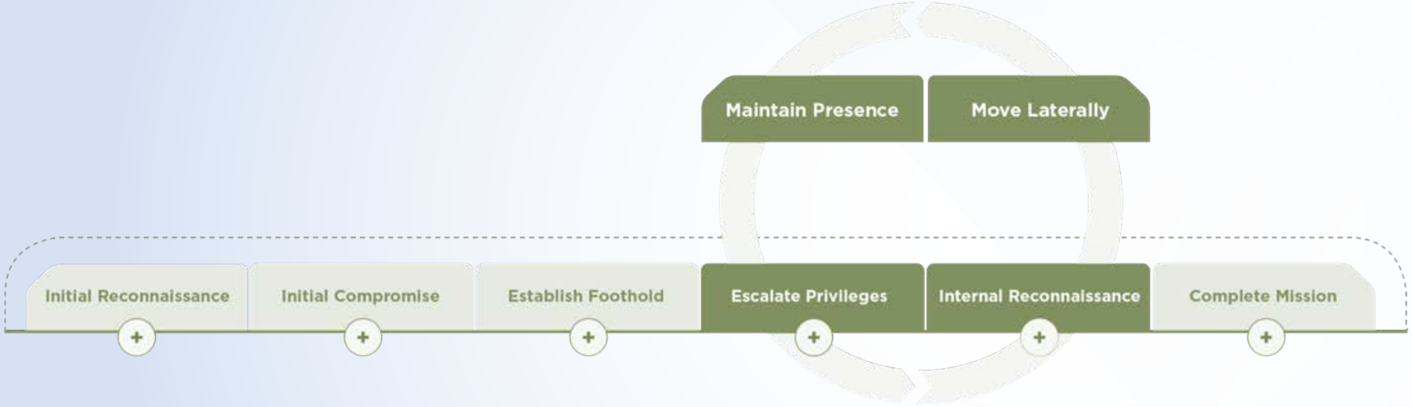
Implications

What are the Key Takeaways?

The Who and Why Matters

- Knowing who is targeting you and why matters!
- Even if you can’t stop the zero-day, understanding their lifecycle can help you prepare to stop them elsewhere



Potential Shift in Capabilities

- More zero-days, but also more targeted use
  - Likelihood of being targeted has gone down, but activities are still as damaging as ever
  - Even if spike doesn’t continue, we should still be prepared
- Increased commodification changes how we view sophistication of groups

Patch Preparedness

- Can't predict zero-days, but can be prepared
  - Patch commonly targeted vendors and products (Microsoft and Adobe)
- Notable breaches have taught us that exploitation impacts everyone
  - Everyone needs to share the responsibility
- Prioritize active threats first
  - Limited patching resources require efficiency
  - Active Threat → Potential Threat → No Known
  - Ignore CVSS scores and branded vulnerabilities

Questions?

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Thank You!