osquery Super Features

Lauren Pearl
Head of Strategy & Ops @ Trail of Bits

Agenda

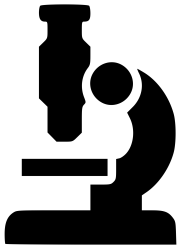
- **Introduction** - Trail of Bits, myself, our osquery user study
- **Super Features -** what they are, how to find, why they're important
- **Findings** - 3 Super Features for osquery
- **Conclusion** - what we're doing about it
- **Q&A (?)**

Trail of Bits

Cyber security research company - High-end security research with a real--world attacker mentality to reduce risk and fortify code.

Security Research

- As a leading cybersecurity research provider to DARPA, the Army and the Navy – we create and release open source research tools



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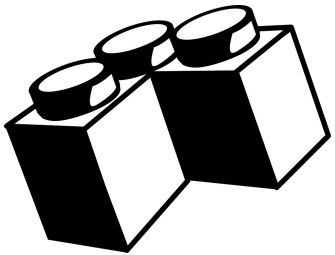

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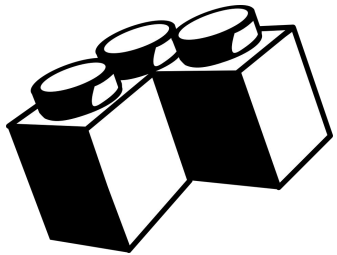

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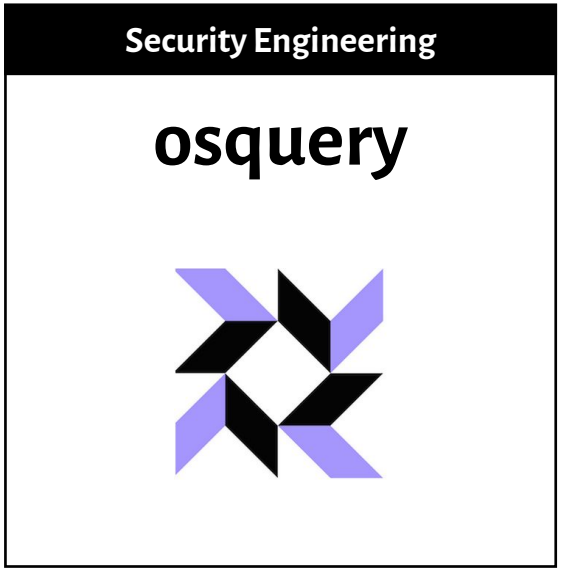
Trail of Bits - osquery



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2018
- Improve container introspection
- Trail of Bits extension repo
  - EFIgy Extension
  - Google Santa integration extension
  - NTFS extension
  - Firewall management extension

Who am I?

Name: Lauren Pearl
Title: Head of Strategy and Ops for Trail of Bits
Aka. Resident Business Nerd

What I am:
- Internal and external business analyst

Before Trail of Bits:
- Ran family a shoe retail company →
- Stint as a web app dev (lite)
- NYU MBA
- Deloitte strategy and ops consultant

osquery Blogs:
- How are teams currently using osquery?
- What are the current pain points of osquery?
- What do you wish osquery could do?

osquery User Study

- Interviewed 5 Silicon Valley tech companies
- Monitored osquery GitHub issues
- Added insights from pool of Trail of Bits clients
- Technical insights from Trail of Bits developers
- Management insight from dog-fooding osquery internally
- Edited and gut-checked by peers in the osquery community

What are Super Features?

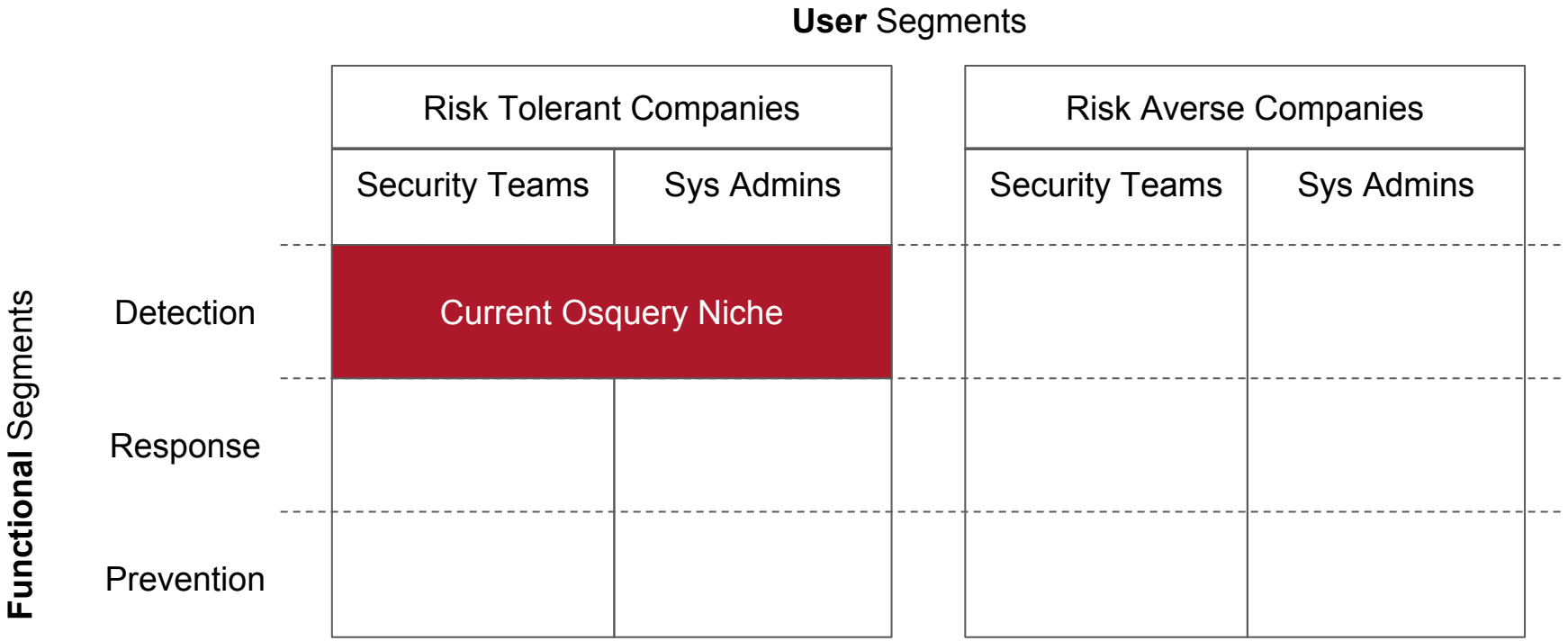
Super Features

Definition: Product attributes that represent a **foundational expansion** in a product's utility

In order to be a Super Feature, a potential feature must:

- Shift product niche into an additional market segment
- Must increase the consumer surplus
- Must not destroy existing value for users

Expanding product niche



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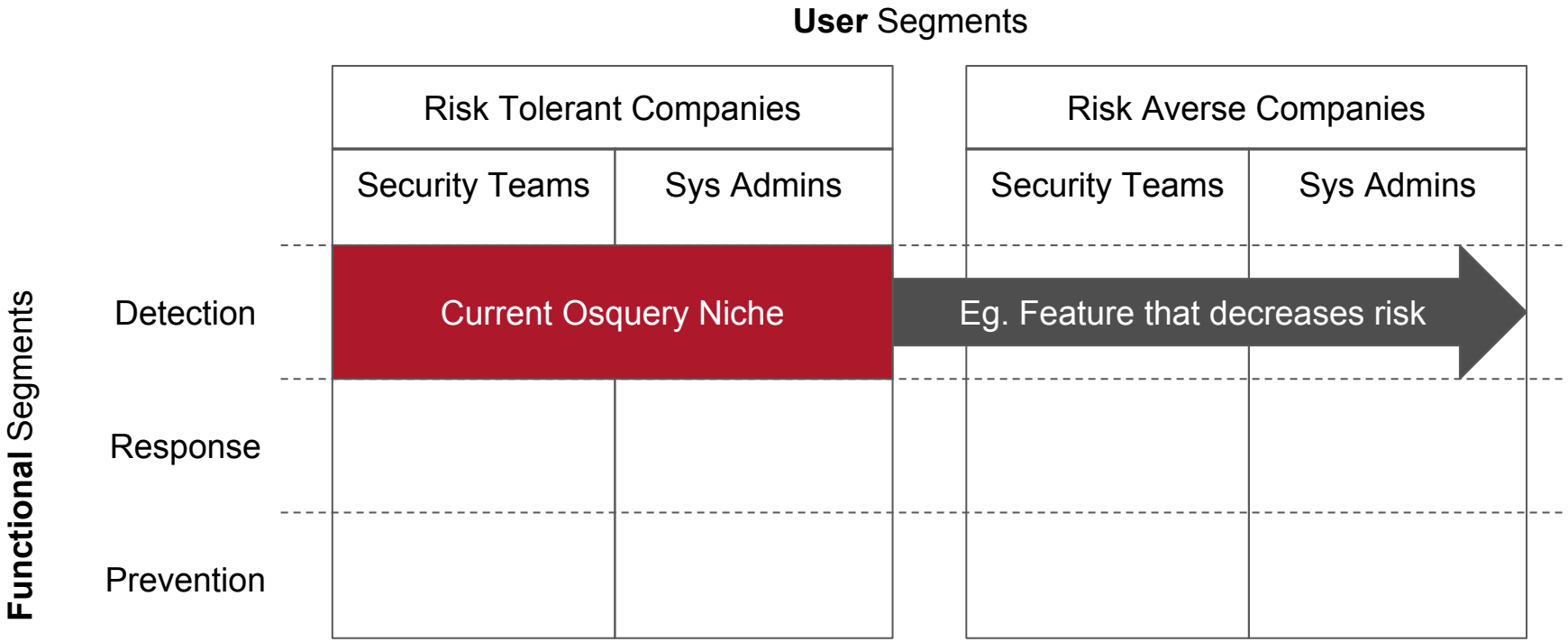


Increasing consumer surplus

Consumer Surplus = Technology Value - Technology Price

In order to increase Consumer Surplus with a new product, you have to provide **value advantages or price advantages** over the existing market technology

Why identify osquery Super Features?

Value maximization - Focus on the features that beget the most value for users overall

Development coordination - No wandering dev path from different teams who want different things

Product momentum - Generate excitement by picking features that bring the product to the next level

Findings!
3 osquery Super Features

Super Feature #1:
Write Access for Extensions

Nightmare - HACKERS!!

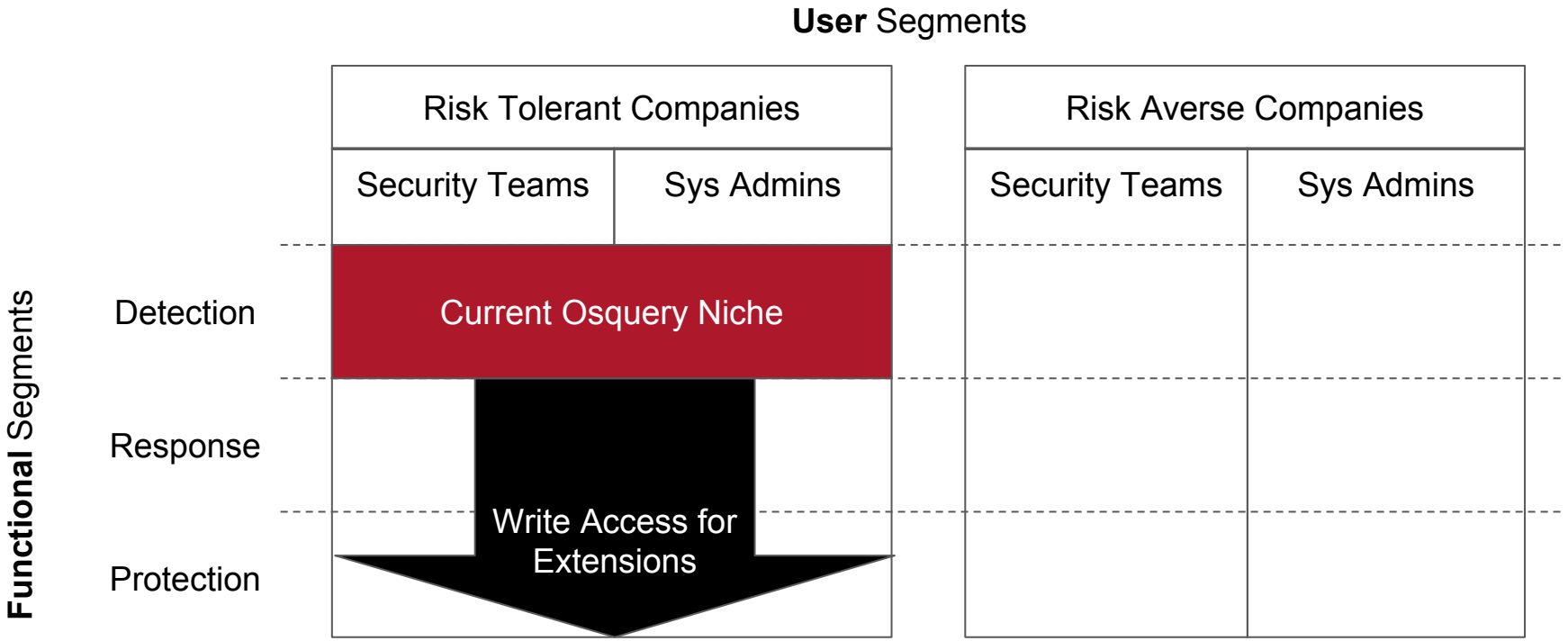
Reality - Stay safe by using extensions

- Read access only

Extensions

- Only has write access to (non-core) tables that specifically enable the feature
- Constrained write access doesn't allow executables - it's just a list of addresses
- Utilizes least privilege by design

Expanding osquery product niche



Write Access for Extensions

Increase consumer surplus	Advantages among commercial orchestration tools: ● Users could harden the system right from the SQL interface ● Can cover all these needs, with more limited permissions: ○ Application whitelisting and enforcement ○ Managing licenses ○ Partitioning firewall settings ○ Force password changes ○ Revoke accounts
Doesn't destroy value	● osquery core continues to only have read-access ● Write permission with least privilege in narrow channels
Bonus!	We've actually already built this! It's in a PR awaiting review. It enables: ● Our firewall management extension ● Our Google Santa integration extension

Super Feature #2:
Triggered Response on Detection

Triggered Response on Detection

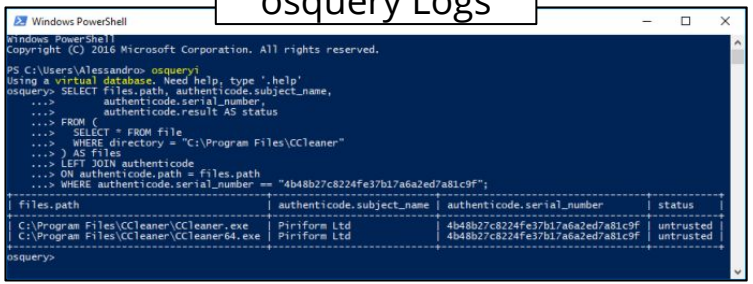
IoA Repositories

VirusTotal

REVERSING LABS

OpenDNS

osquery Logs



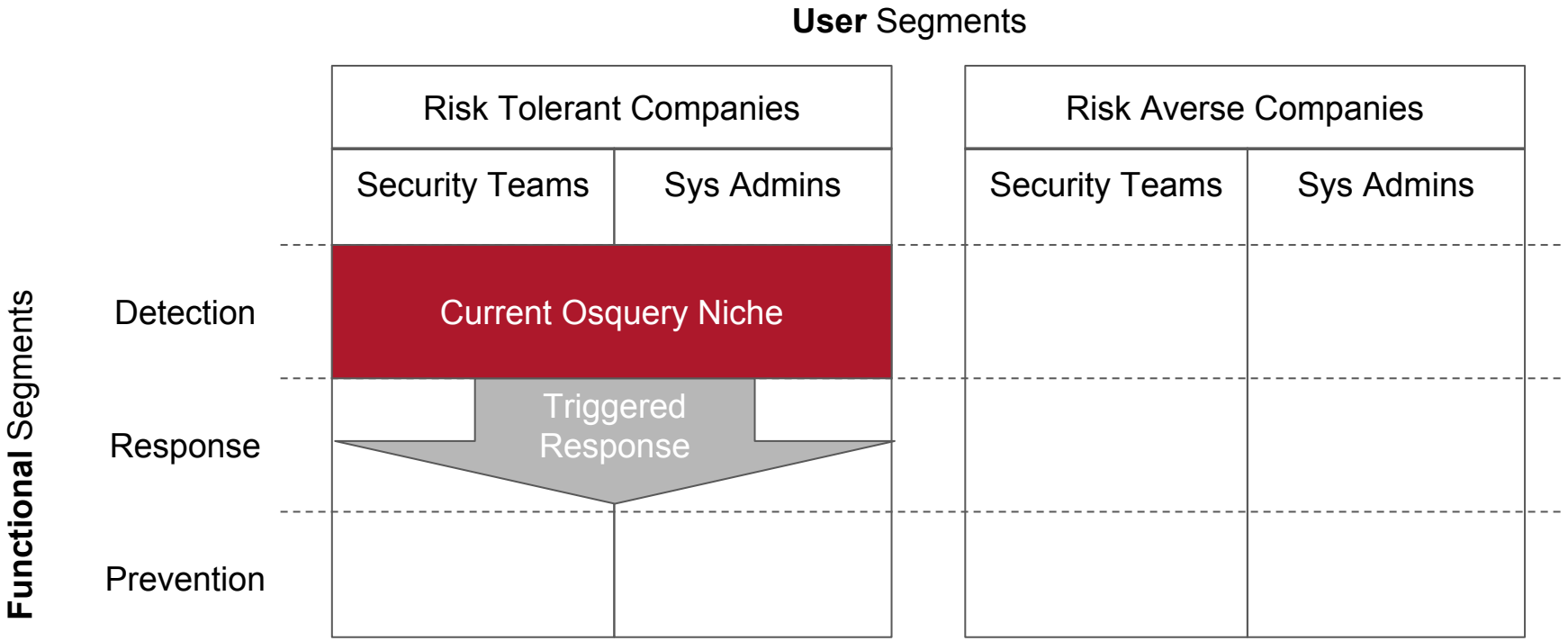
This log matches a list of bad things!

Texts a Number

Quarantines Endpoint

Sends logs to analysis tool

Expanding osquery product niche



Triggered Response on Detection

Increase consumer surplus	Advantages among current incident response tools: ● osquery would be more transparent and flexible ● Triggers and responses are infinitely customizable. Some examples: ○ *"…Upon detection of X log, query this table more often"* ○ *"…If a process from this blacklist is logged, send all endpoint's query data to This Tool for analysis"* ○ *"…If log Y is reported, quarantine the endpoint and send a message to CISO's pager"*
Doesn't destroy value	● Users can customize triggers and responses to minimize service disruptions from false positives

Super Feature #3:
Technical Debt Overhaul

Technical Debt Overhaul?

How is this a Super Feature?

Requests we heard

Guardrails & rules for queries:

- Resources and parameters to prevent users from making mistakes

Enhance Deployment Options:

- Easier deployment & updating

Integrated Testing, Debugging, and Diagnostics:

- More resources for testing and diagnosing issues that help improve reliability and predictability

Enhanced Event-Driven Data Collection:

- Better event-handling configurations, published best practices, and guardrails for gathering data

Enhanced Performance Features:

- Do more with fewer resources. Either enhance performance, or allow osquery to operate on endpoints with low resource profiles or mission-critical performance requirements.

Better Configuration Management:

- Out of the box custom tables and osqueryd scheduled queries for differing endpoint environments

Support for Offline Endpoint Logging:

- Forensic data availability to support remote endpoints requiring offline endpoints to store data locally –- including storage of failed queries –- and push to the server upon reconnection

Support for Common Platforms:

- Support for all features on all operating systems.

Requests we heard …are from technical debt

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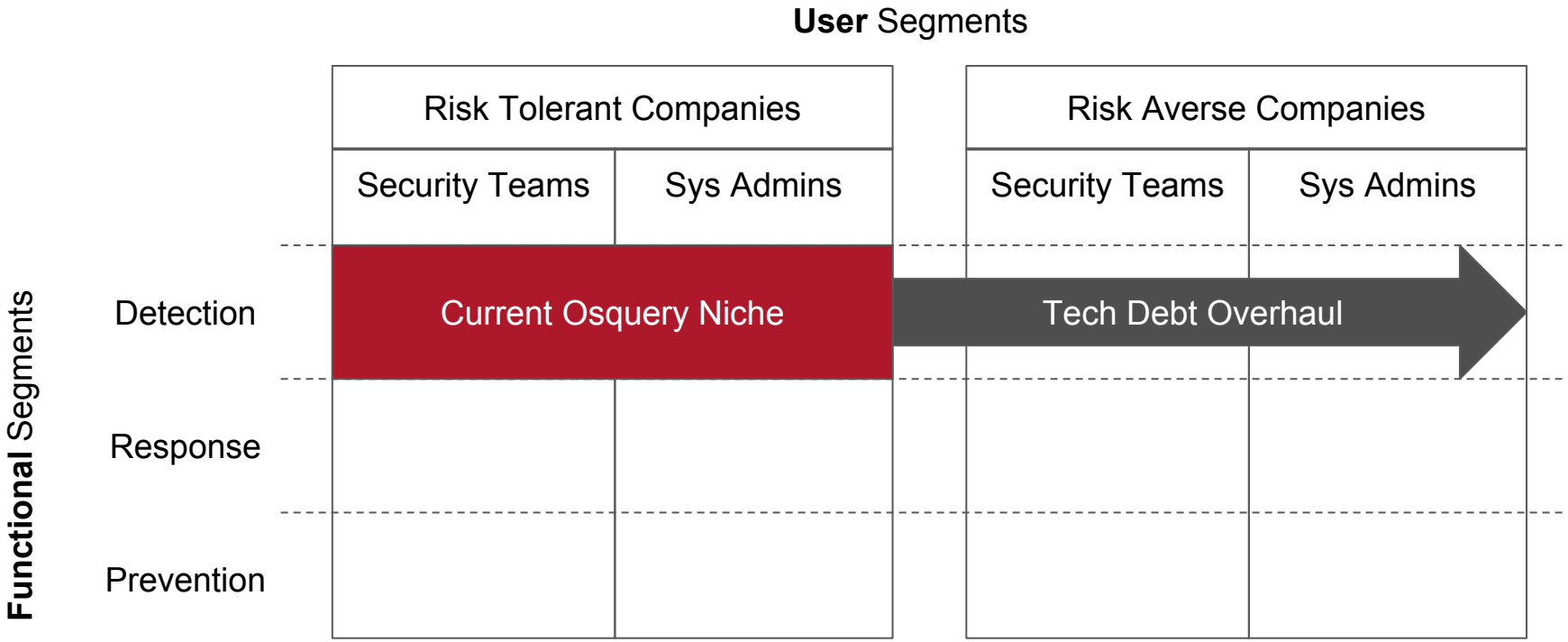

Technical Debt Overhaul

Increase consumer surplus	Increases advantages currently realized by osquery users, and increases the number of users who can access these advantages: ● Clears a majority of user issues around performance, reliability, and ease of use
Doesn't destroy value	● Doesn't, almost by definition

Where to now

osquery Development Support Plans!

Support Plans

12-Month Assurance Plan:
"All you can eat" osquery bug fixes and feature enhancements including:

- Root-cause and fix issues
- Develop new tables and extensions
- Redesign parts of osquery core as required

Bespoke osquery Development:
One-off engagements focused on individual features such as:

- Porting osquery to a new platform
- Proprietary or non-core features
- Forks

Resources for All Clients

- Private Trail of Bits Slack channel
- Trail of Bits osquery Clients group membership
- Bi-Weekly Iteration Planning Meeting
- Private GitHub repo with issue tracker
- Special access and support for Trail of Bits osquery extensions
- Early access to all software increments

And here are the Benefits

- No show-stopping bugs
- Direct access to our team of engineers
- Peace of mind - no internal engineers have to worry about issues with osquery
- First access to our latest releases means consistently cutting-edge technology
- Users drive the product direction of osquery, while Trail of Bits handles the heavy lifting

Contact Us

Lauren Pearl

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www.trailofbits.com

Appendix

Write-Access for Extensions - IRL Proof

fwctl osquery Extension https://github.com/trailofbits/osquery-extensions/tree/master/firewall

Provides osquery with the ability to:

- View and *manage* the OS-native firewall rules and /etc/hosts file (port and host blocking)
- Verify what your endpoints are blocking, and add new blocking rules as needed

Triggered Response - IRL Proof

osquery suites that have alerting:

KOLIDE

Uptycs

doorman

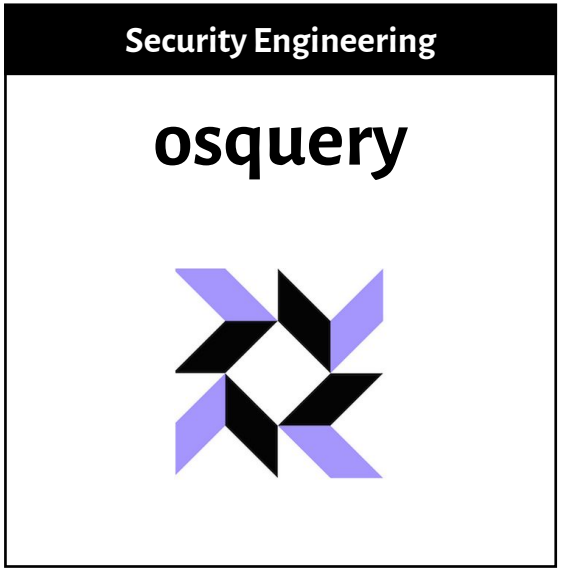
Example of custom alerting techniques:

elasticsearch

ElastAlert

Jira

Technical Debt Overhaul - IRL Proof



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Increasing consumer surplus - Open Source

Definition: Consumer surplus is the difference between what users are willing to pay (what they value) and what they actually have to pay

	Commercial Product	Open Source Product
Price	$$$$$ - Subscription	$ - Shared investment
Ownership	Suppliers	Users
Features	Based on supplier needs	Based on user needs

If you replace a commercial solution with an equivalent or better open source one, consumer surplus is increased

osquery users

Known user industries:

- High-tech service and products
- Mobile payments
- Media & telecom
- Retail
- Consulting & security services

Known user departments:

- Security
- System administration

Expanding osquery product niche