Threat Modeling Wins for Agile AppSec

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(Co Founder and Chief Evangelist, we45)

Yours Truly

Rahul Raghavan

(Co Founder and Chief Evangelist)

- Software Developer turned Security Engineer turned Techno Marketing Chappie!
- Head of Pre-sales and Solution Development
- Things that keep me up at night
    - AppSec Automation Models
    - DevSecOps Value Realisation
    - Threat Modeling / Test Case Automation
    - Penetration Testing 2.0

………….also an avid Cinephile!

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Over the next 45 mins…

- Why Threat Model?
- Common Reasons for Failure
- Threat Modeling Schools of Thought
- Threat Playbook
- Threat Modeling and Security Testing

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Application Security Today

- Increase in Tooling
- Increase in Test Iterations
- Feedback Loops (Shifting Right & Left)
- 'X'-as-Code execution models
- Integration with mainstream SDLC
- Metrics and Metadata (Vulnerabilities, Maturity etc)

The Castles of Threat Modeling

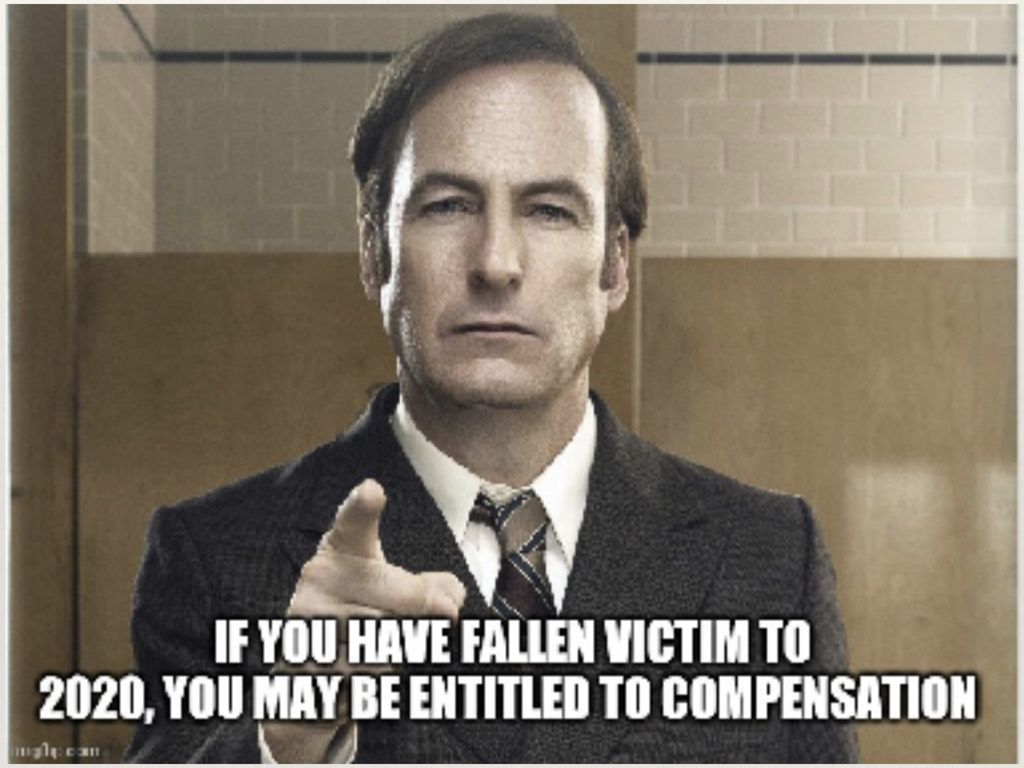
"Find 30% of issues even before they're coded"

"Incident Response Teams are a thing of the past"

"AppSec is Dead without Threat Modeling"

"In trust boundaries we trust" - everybody else meet HR

"Threat Modeling in 30 days!"


IF YOU HAVE FALLEN VICTIM TO
2020, YOU MAY BE ENTITLED TO COMPENSATION
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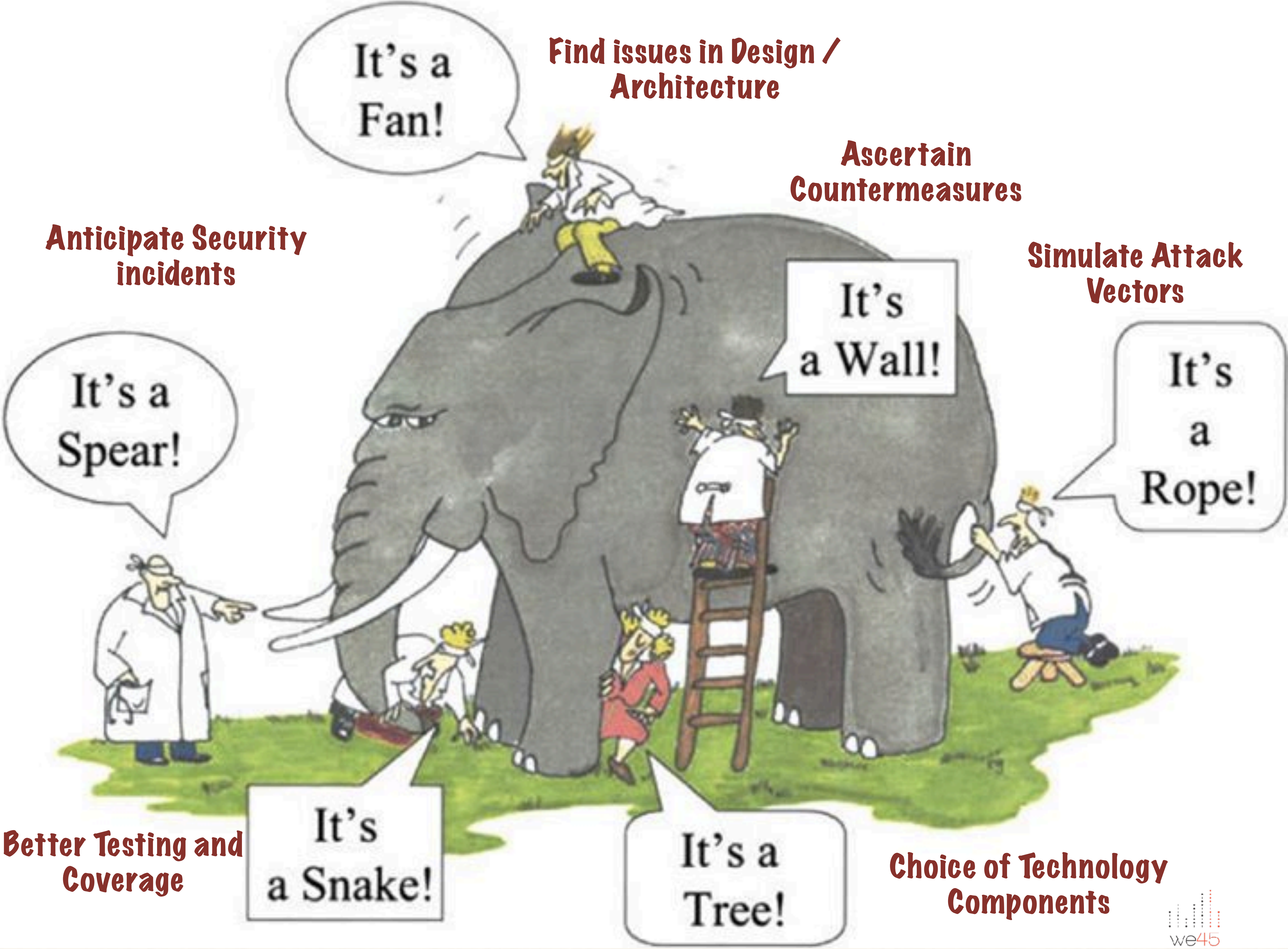
But at Ground Zero….

Definition of Threat Modeling

Why do Threat Models Fail?



Find issues in Design / Architecture

Ascertain Countermeasures

Anticipate Security incidents

Simulate Attack Vectors

Better Testing and Coverage

Choice of Technology Components

~~Definition of Threat Modeling~~

Motivation to Threat Model

1. Not understanding WHY

- Identify architecture/ design flaws
- Understand inherent threats to system components
- Evaluate attack surfaces : abuse cases
- Ascertain depth of security test cases
- Change - Impact Analysis

PS : “There is no one size fits all”

2. An over-emphasis on HOW

- What methodology should I use?
- What tool should I use?
- How should it be documented?
- Who should be doing it?
- Is it complex enough?

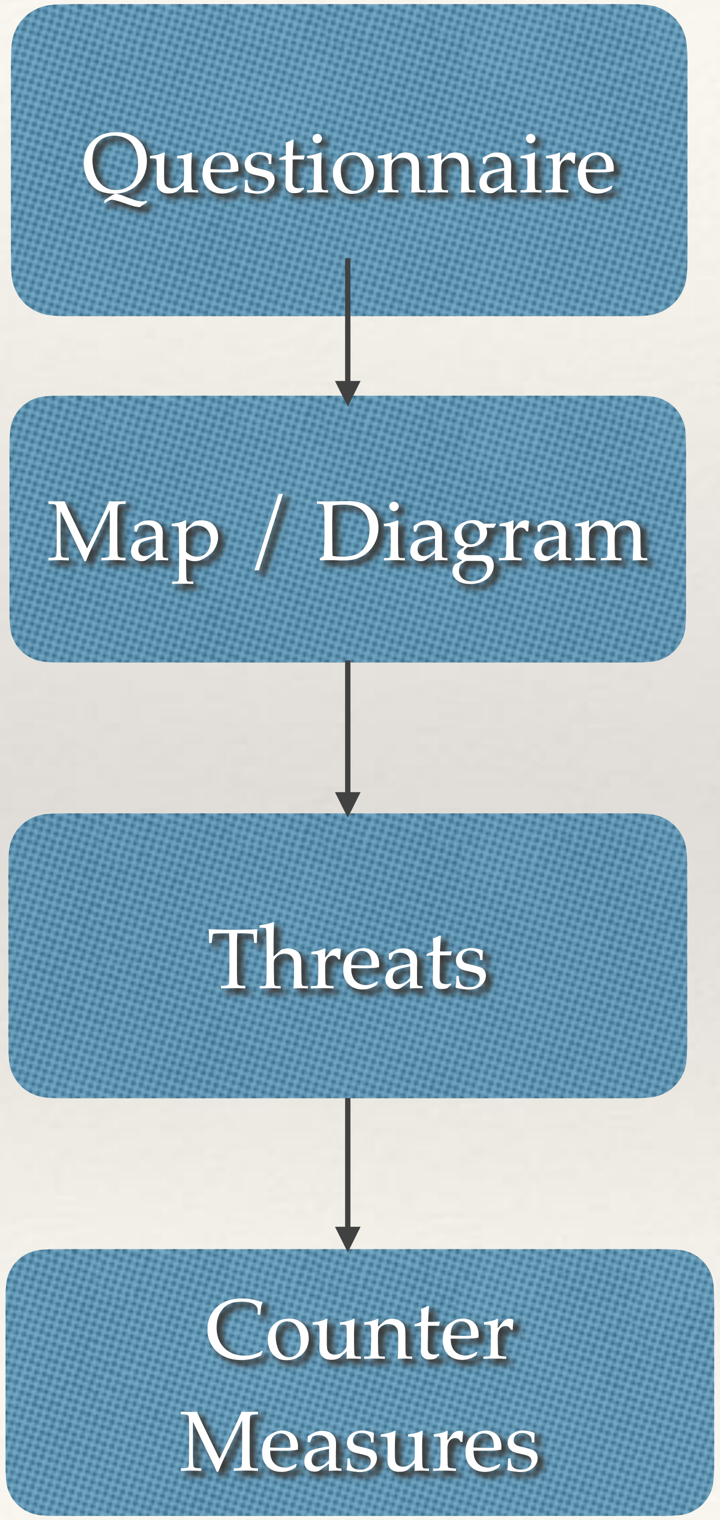
PS : “Document what you do, not the other way around”

The Threat Modeling Schools of Thought

Story Driven Threat Modeling	Component Driven Threat Modeling
Attack Driven - What If?	System Driven
Abuse Cases	Known Issues
Post Design / Development	Pre Design / Design
Security Professionals / Developers	Security Professionals / Developers / Architects
Focus on Depth	Focus on Scale
E.g : ThreatPlayBook, Manual	E.g : Ir*** *i**, *D *l*m**t*

Component Driven Threat Modeling

Generic Workflow



Questionnaire

- Technology Stack (Language, Components, Cloud Provider)
- Domain (BFSI, Healthcare..)
- Compliance Checks

Map / Diagram

- Process Flow / Data Flow
- Actors / Users

Threats

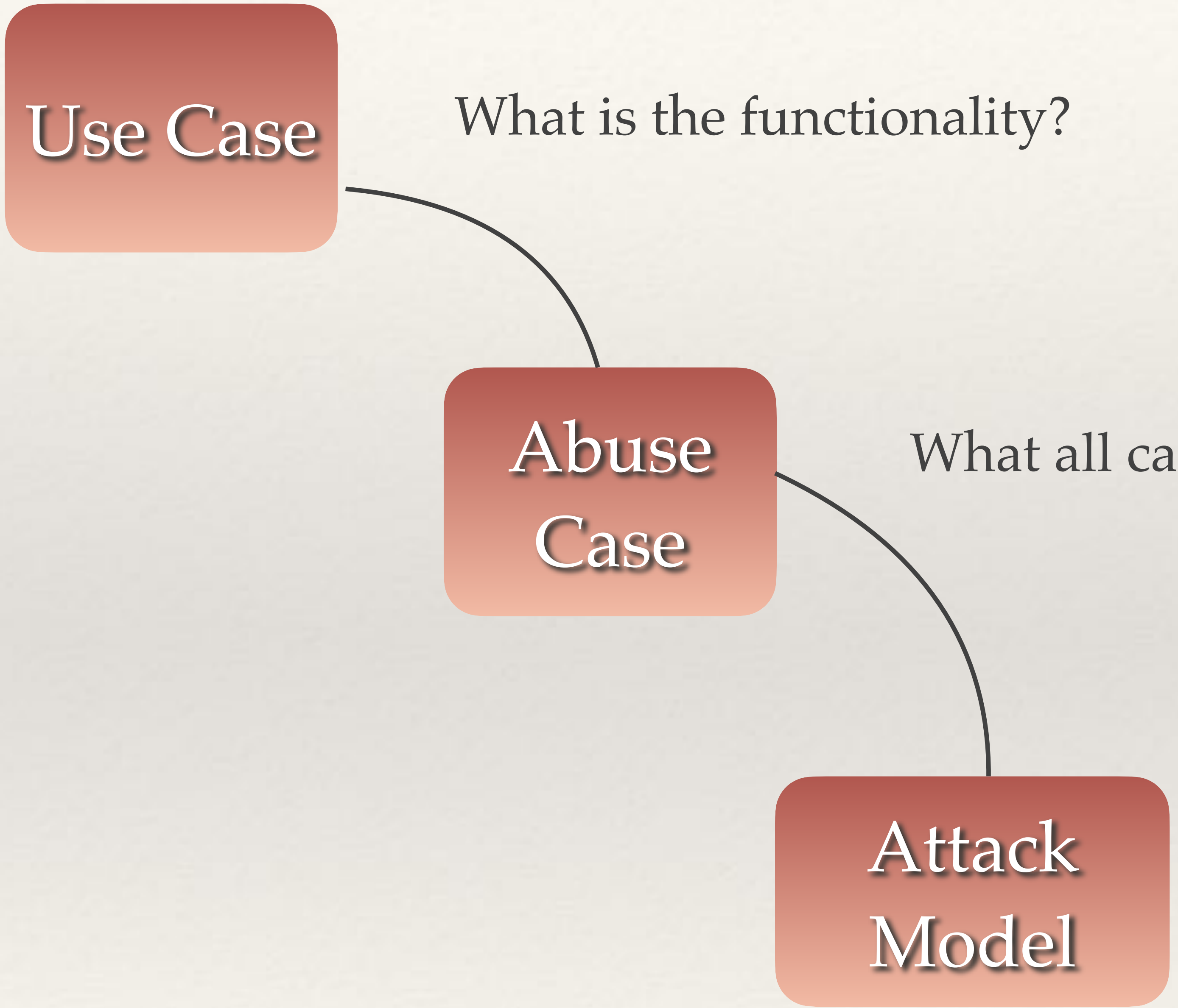
- List of threats and associated tasks

Counter Measures

- Remediation and validation strategies

Story Driven Threat Modeling

The Anatomy



Use Case

What is the functionality?

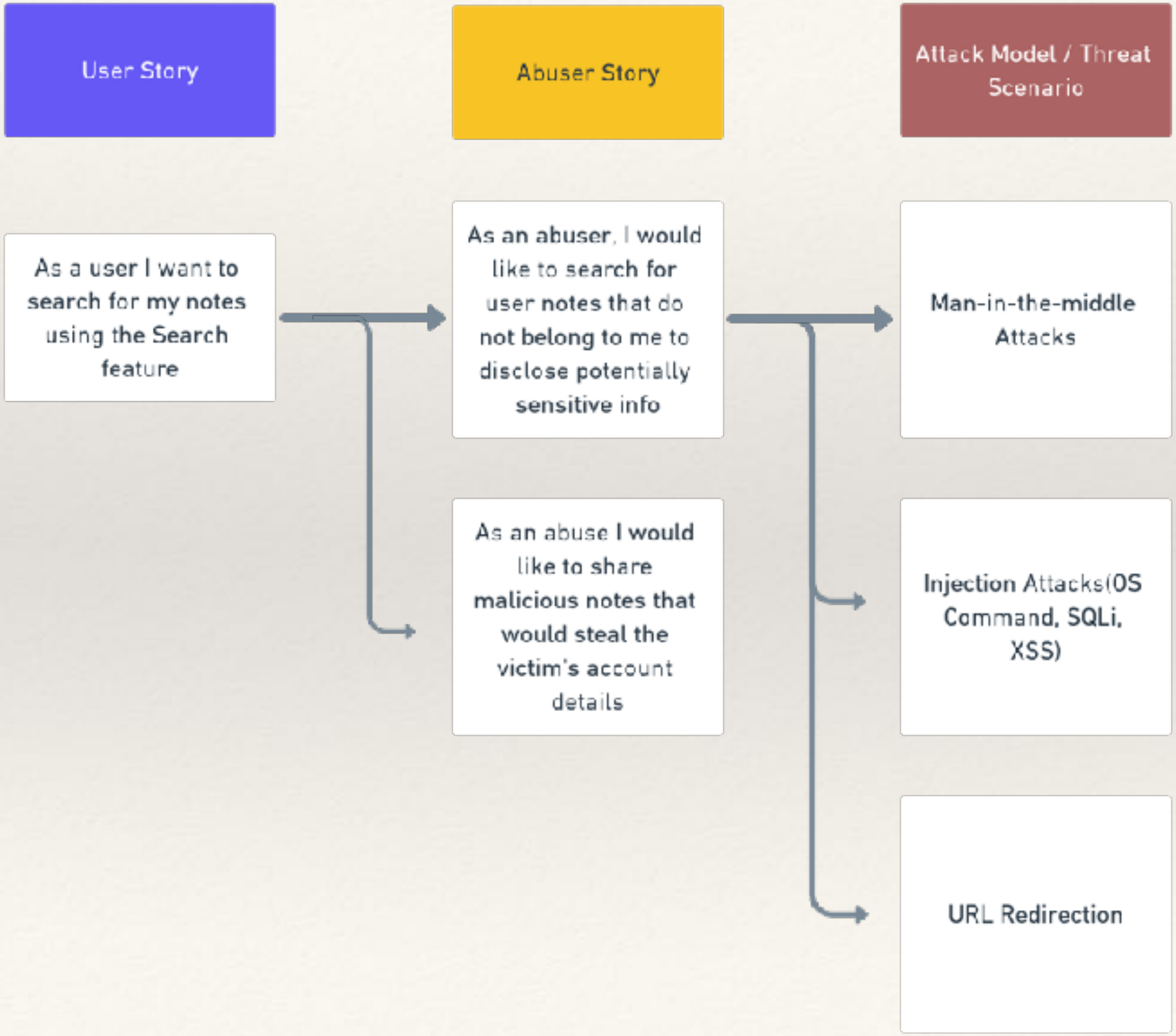
Abuse Case

What all can go wrong with it?

Attack Model

How can an abuse case come to life?

An example



User Story

Abuser Story

Attack Model / Threat Scenario

As a user I want to search for my notes using the Search feature

As an abuser, I would like to search for user notes that do not belong to me to disclose potentially sensitive info

As an abuse I would like to share malicious notes that would steal the victim's account details

Man-in-the-middle Attacks

Injection Attacks(OS Command, SQLi, XSS)

URL Redirection

THREAT PLAYBOOK

https://github.com/we45/ThreatPlaybook

Threat Playbook

- "Threat-Modeling-As-Code" framework built on Python, Mongodb, GraphQL
- Best suited for Story driven threat modeling
- Threat-to-vulnerability correlation using CWE IDs
- Automation friendly, developer centric and open source

Threat Playbook - A Demo

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Threat Modeling

A means to efficient Security Testing

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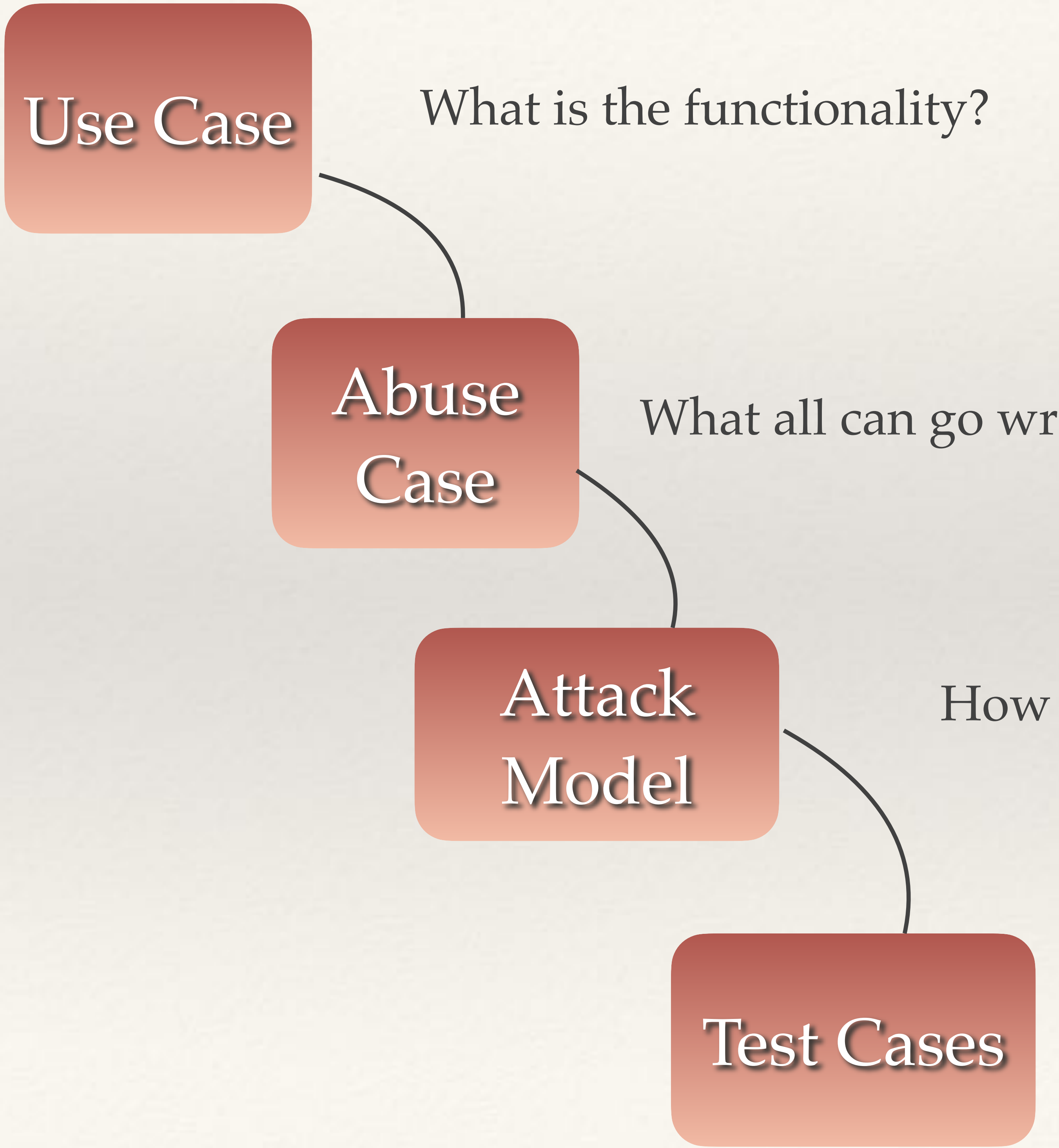
The Anatomy



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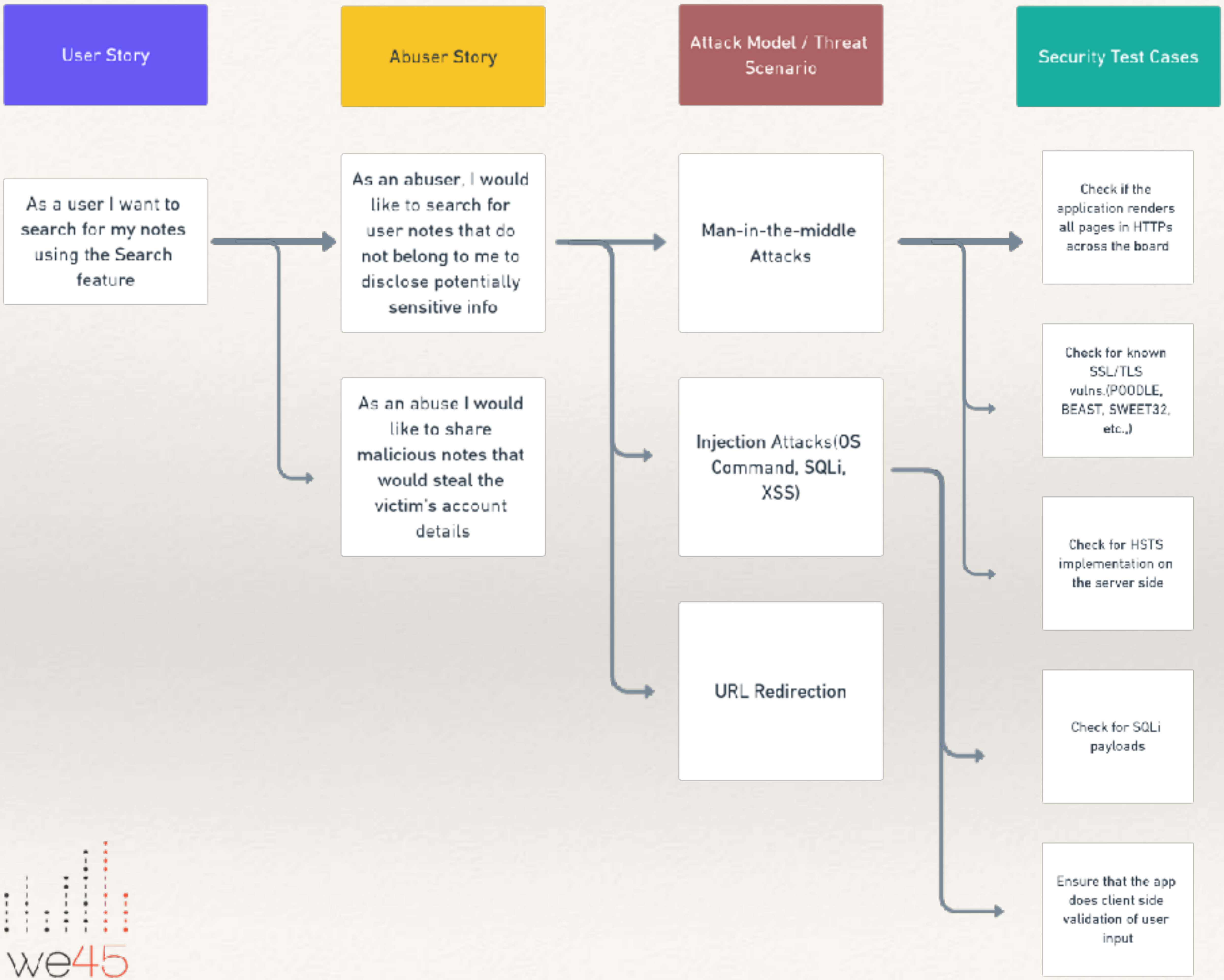
Test Cases

How plausible are they?



User Story

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Security Test Cases

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Man-in-the-middle Attacks

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URL Redirection

Check if the application renders all pages in HTTPs across the board

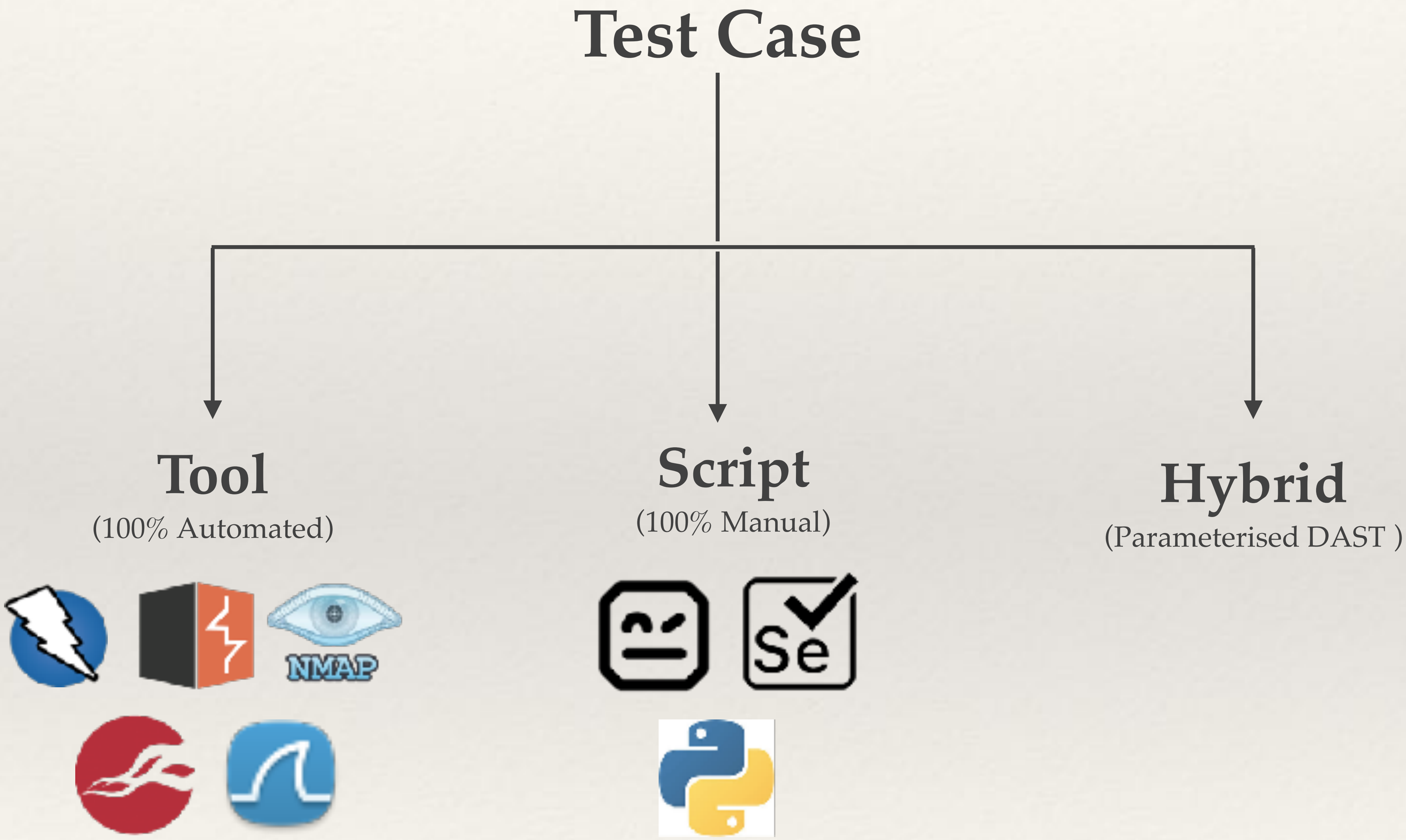
Check for known SSL/TLS vulns.(POODLE, BEAST, SWEET32, etc.,)

Check for HSTS implementation on the server side

Check for SQLi payloads

Ensure that the app does client side validation of user input

The Link to Automation



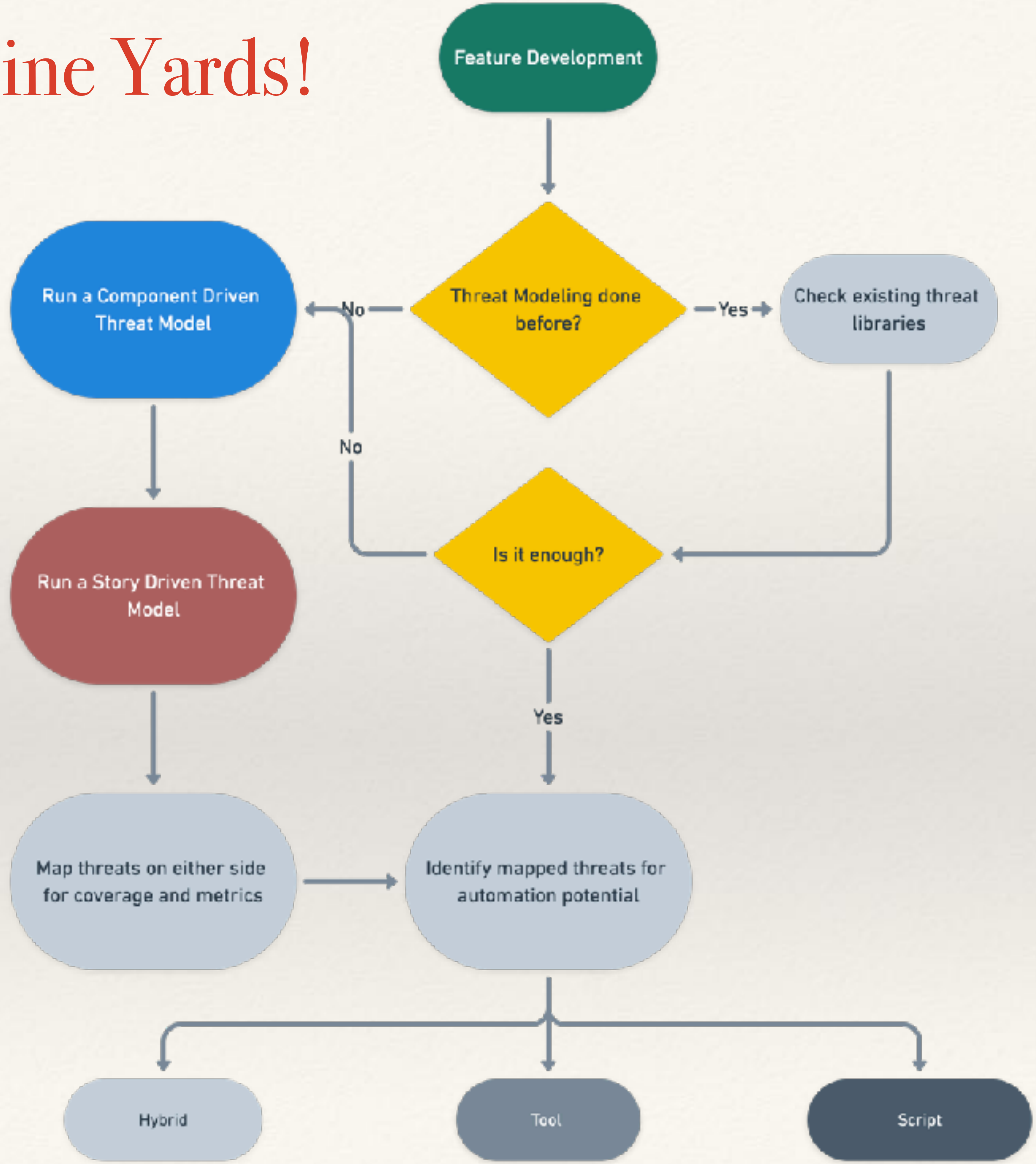
Test Case

Tool
(100% Automated)

Script
(100% Manual)

Hybrid
(Parameterised DAST)

The Whole Nine Yards!


Feature Development
Threat Modeling done before?
No
Yes
Run a Component Driven Threat Model
Check existing threat libraries
No
Is it enough?
Run a Story Driven Threat Model
Yes
Map threats on either side for coverage and metrics
Identify mapped threats for automation potential
Hybrid
Tool
Script

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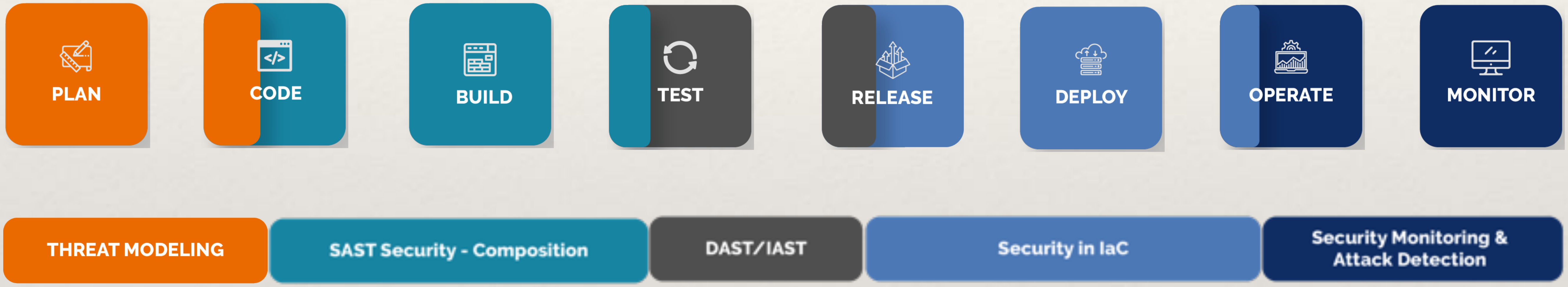
Agile Threat Modeling



PLAN

CODE

BUILD

TEST

RELEASE

DEPLOY

OPERATE

MONITOR

THREAT MODELING

SAST Security - Composition

DAST/IAST

Security in IaC

Security Monitoring & Attack Detection

Model Stories

Security Test Cases

Security Test Automation

Detection Models

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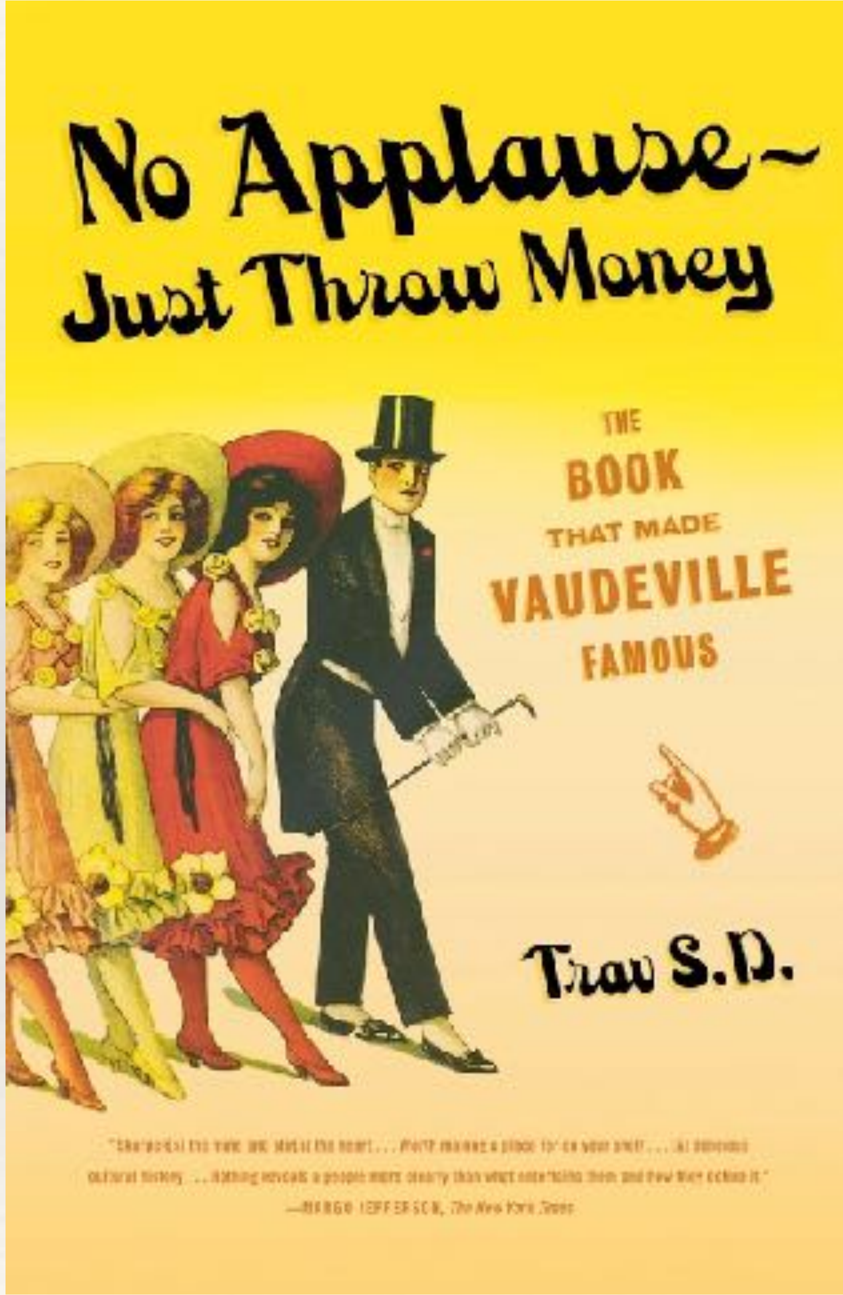
In Summary

- Know what works best for you!
- Balance between Depth and Scale
- Make Threat Modeling more accessible
- ……especially to QA!
- Frequent Threat Modeling = Per Sprint
- Incremental + Consistent + Collaborative =

Thank You!



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