QUALYS SECURITY CONFERENCE 2020

# Moving Security up the Stack
# Web Application and API Security

**Dave Ferguson**

Director of Product Management, Qualys, Inc.

# Agenda

Recent trends in Application Security

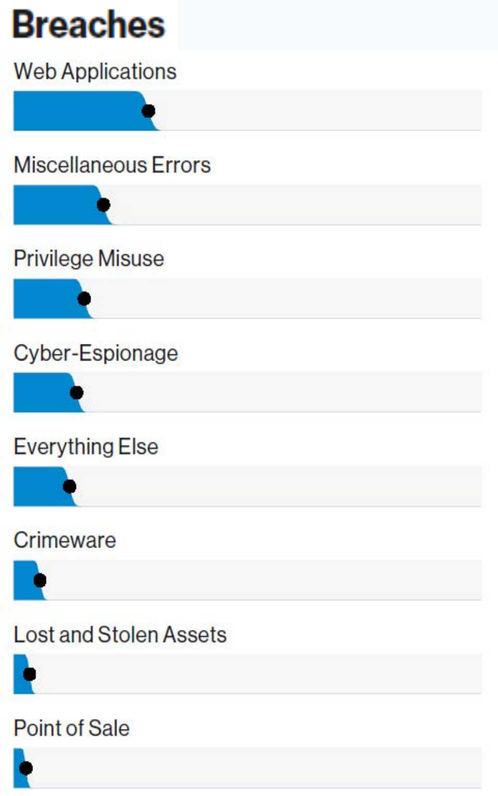
Web Application Scanning (WAS)

Qualys Periscope

Building Securing APIs

# Trends in Application Security

- Web app breaches continue
- E-commerce sites targeted
- API attacks
- Trends in AppSec testing
  - Shifting left
  - Coverage
  - Automation



Source: 2019 Verizon DBIR

# Web Application Scanning

# WAS Overview

Detects application-layer vulnerabilities in web apps & APIs

Browser engine

Automated crawling

Play back of Selenium scripts

API to integrate with other systems

Unique integration with Qualys WAF

Mature product

# 2019 Highlights

WAS Jenkins plugin v2

Updated Qualys Browser Recorder

TLS 1.3

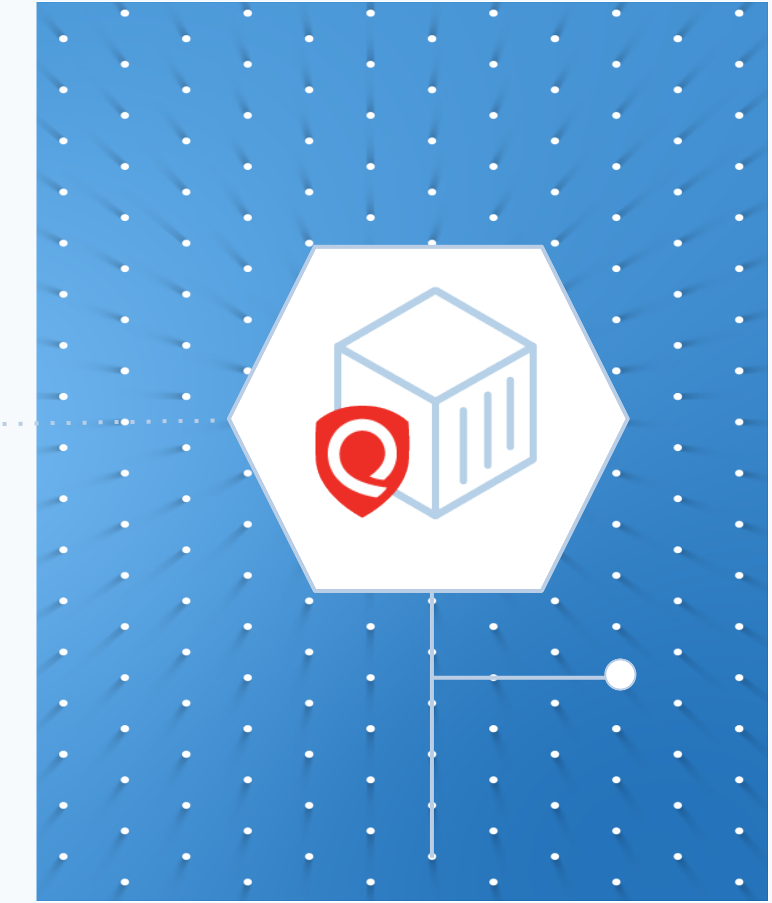
Full HTTP requests

Enhanced crawling

Postman Collections

WAS Burp extension v2

Editable QID severity



# WAS Roadmap

**2019** | **2020**

January

*Out-of-band vulnerability detections ("Periscope")*

*Customized scheduled report email*

Feb-Mar *

*SSL/TLS detections*

*OpenAPI v3 support*

*Bamboo & TeamCity plugins*

*Auth vault support*

Q2 *

*Subdomain discovery*

*Beta of new dashboard*

*Subresource integrity (SRI) tests*

*Monitoring for defacements*

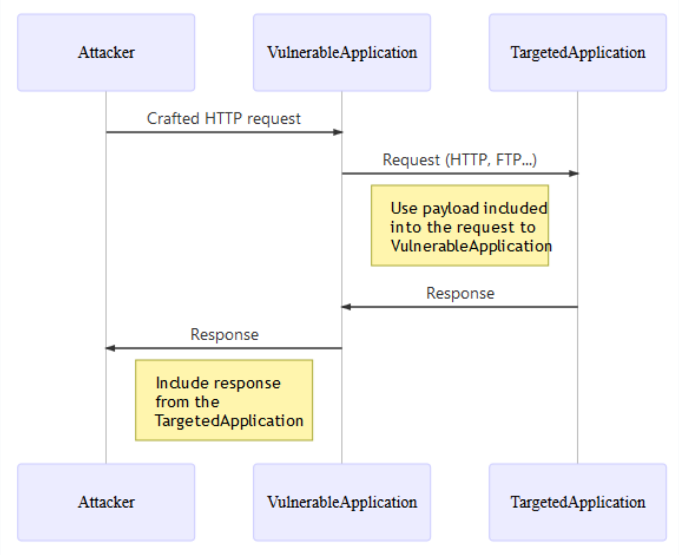
* Tentative

# Out-of-Band Vulnerabilities

Some issues can't be detected by traditional request-response

- SSRF
- SMTP header injection
- Blind XXE injection

Detecting these vulnerabilities requires a different approach


Attacker
VulnerableApplication
TargetedApplication
Crafted HTTP request
Request (HTTP, FTP...)
Use payload included into the request to VulnerableApplication
Response
Response
Include response from the TargetedApplication
Attacker
VulnerableApplication
TargetedApplication

Source: OWASP

# Introducing Periscope

Detection mechanism for out-of-band web app vulnerabilities

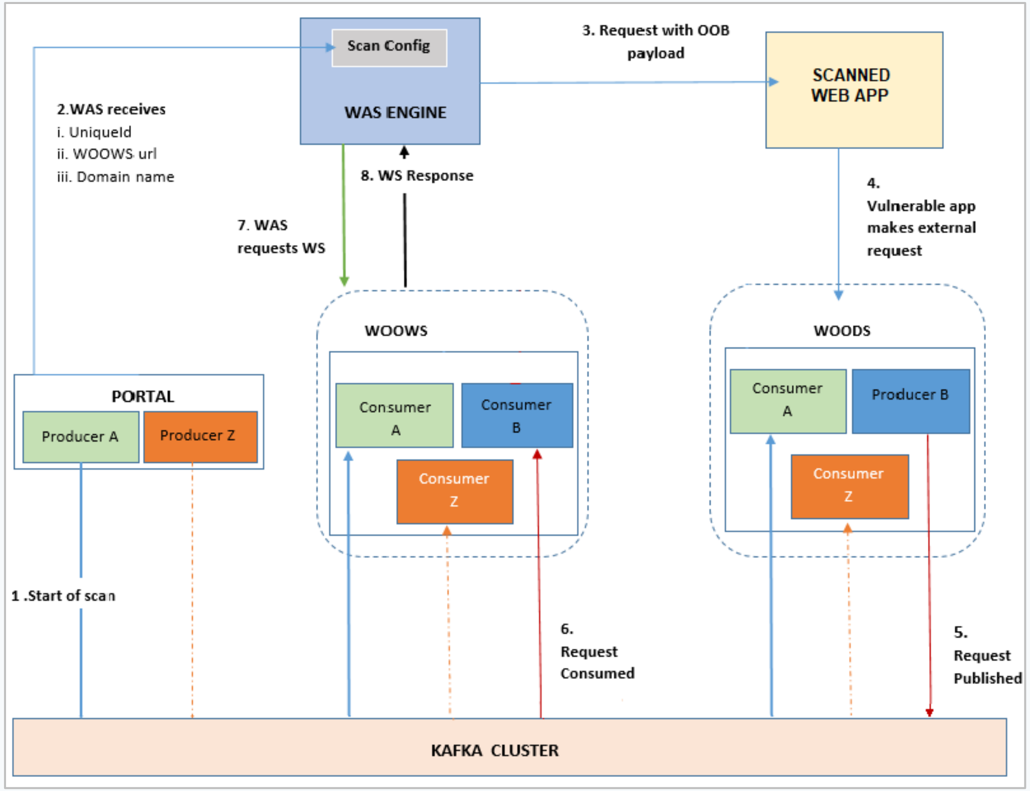
Scanner sends a test; POST request body is:

p1=joe&p2=smith&p3=http%3A%2F%2Fe528efddaa51766cb86afb19f22de54b6da1093c.1454156_35626.2086421852.ssrf01.ssrf.qualysperiscope.com

The web app tries to resolve this FQDN:

e528efddaa51766cb86afb19f22de54b6da1093c.1454156_35626.2086421852.ssrf01.ssrf.qualysperiscope.com

# Qualys Periscope


Scan Config
WAS ENGINE
3. Request with OOB payload
SCANNED WEB APP
2.WAS receives
i. UniqueId
ii. WOOWS url
iii. Domain name
8. WS Response
7. WAS requests WS
4. Vulnerable app makes external request
WOOWS
WOODS
PORTAL
Producer A
Producer Z
Consumer A
Consumer B
Consumer Z
Consumer A
Producer B
Consumer Z
1 .Start of scan
6. Request Consumed
5. Request Published
KAFKA CLUSTER

# Building Secure APIs

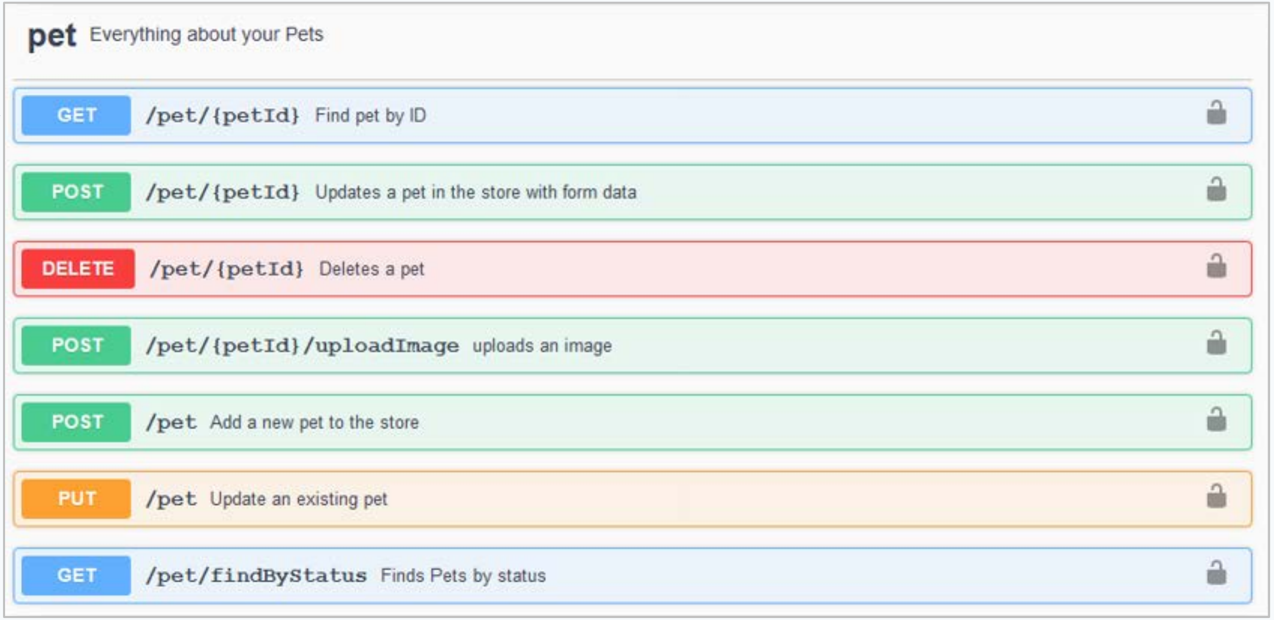
# OWASP API Security Top 10

OWASP

The Open Web Application Security Project

1. Broken Object Level Authorization (BOLA)
2. Broken User Authentication
3. Excessive Data Exposure
4. Lack of Resources & Rate Limiting
5. Broken Function Level Authorization
6. Mass Assignment
7. Security Misconfiguration
8. Injection
9. Improper Assets Management
10. Insufficient Logging & Monitoring

# Example API – Pet Store



**pet** Everything about your Pets

| | | |
|---|---|---|
| GET | `/pet/{petId}` | Find pet by ID |
| POST | `/pet/{petId}` | Updates a pet in the store with form data |
| DELETE | `/pet/{petId}` | Deletes a pet |
| POST | `/pet/{petId}/uploadImage` | uploads an image |
| POST | `/pet` | Add a new pet to the store |
| PUT | `/pet` | Update an existing pet |
| GET | `/pet/findByStatus` | Finds Pets by status |

# Relevant portion of the Swagger File

```
{
  "swagger": "2.0",
  "info": {
    "version": "1.0",
    "title": "Petstore",
   },
  "host": "api.petstore.com",
  "basePath": "/v1",
  "schemes": [
    "http", "https"
  ],
  "paths": {
    "/pet/{petId}": {
      "get": {
        "summary": "Get info for a specific pet",
        "operationId": "showPetById",
        "parameters": [
          {
            "name": "petId",
            "in": "path",
            "required": true,
            "description": "The ID of the pet to retrieve",
            "type": "integer"
          }
        ],
        "responses": {
          "200": {
            "description": "Expected successful response",
            "schema": {
              "$ref": "#/definitions/Pet"
            }
   ...snip...
```

# How Does this Help with Security?

We can leverage the Swagger spec to harden the API endpoints in a declarative way

```
"paths": {
    "/pet/{petId}": {
      "get": {
        "summary": "Get info for a specific pet",
        "operationId": "showPetById",
        "parameters": [
          {
            "name": "petId",
            "in": "path",
            "required": true,
            "description": "The ID of the pet",
            "type": "integer"
          }
        ],
```

```
"paths": {
    "/pet/{petId}": {
      "get": {
        "summary": "Get info for a specific pet",
        "operationId": "showPetById",
        "parameters": [
          {
            "name": "petId",
            "in": "path",
            "required": true,
            "description": "The ID of the pet",
            "type": "integer",
            "minimum": 1,
            "maximum": 999999
          }
        ],
```

# Capabilities Coming to Qualys API Security

Static Assessment of Swagger/OpenAPI file

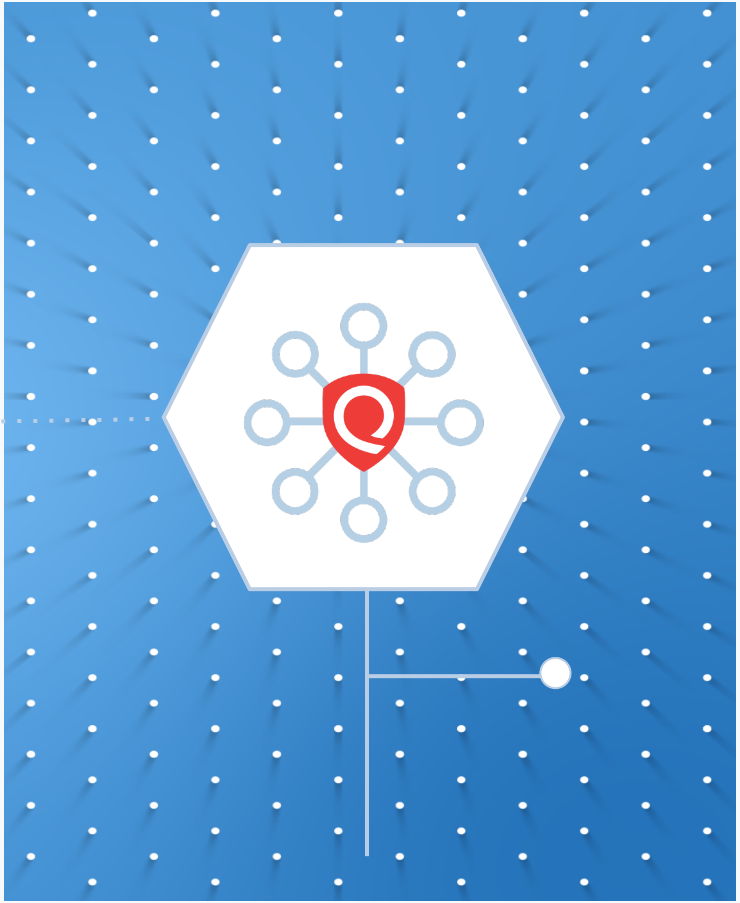
- Get recommended changes to harden your API

Conformance Scan to check the API's actual behavior

- Test the API endpoints for behavior that violates the Swagger file

Vulnerability Scan to check the API for security flaws

- Current feature in Qualys Web Application Scanning (WAS)



# Thank You

**Dave Ferguson**
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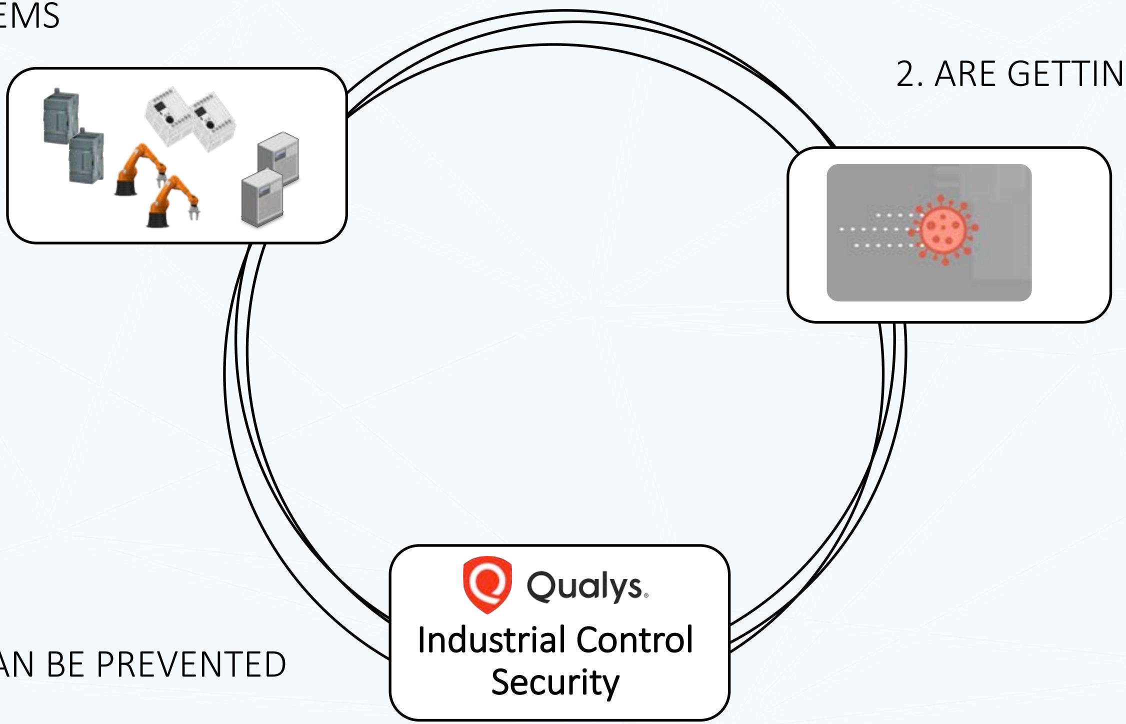
# Industry Control Systems

## Making ICS/OT a Part of Overall Vulnerability Management Program

Dharmesh Ghelani
Principal Product Manager, Qualys, Inc.

# Industrial Control Systems

Are becoming internet-aware



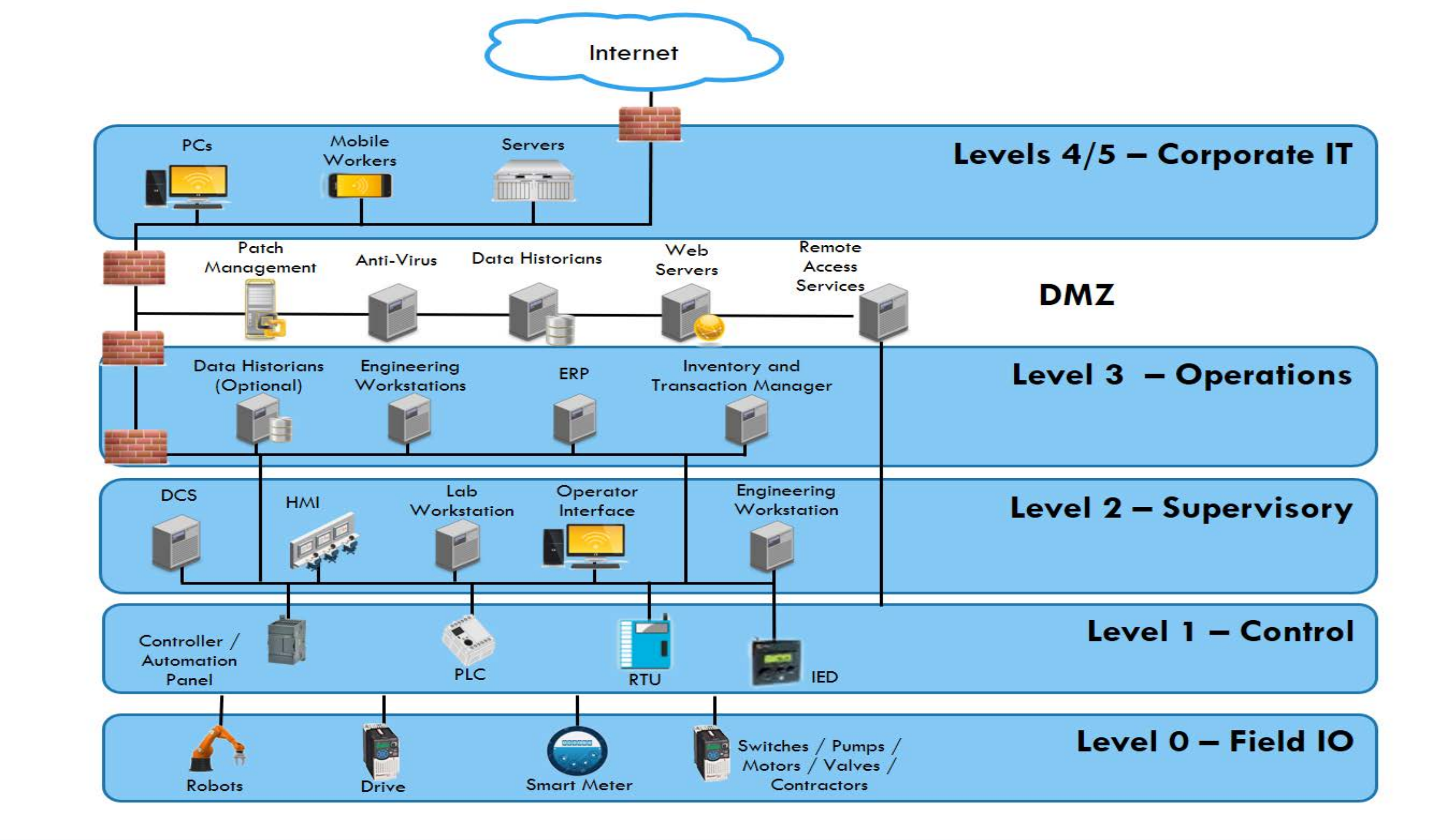
1. ICS SYSTEMS

2. ARE GETTING TARGETED

3. ATTACKS CAN BE PREVENTED

Qualys.
Industrial Control Security

# Typical Industrial Control Networks


Internet
PCs
Mobile Workers
Servers
Levels 4/5 – Corporate IT
Patch Management
Anti-Virus
Data Historians
Web Servers
Remote Access Services
DMZ
Data Historians (Optional)
Engineering Workstations
ERP
Inventory and Transaction Manager
Level 3 – Operations
DCS
HMI
Lab Workstation
Operator Interface
Engineering Workstation
Level 2 – Supervisory
Controller / Automation Panel
PLC
RTU
IED
Level 1 – Control
Robots
Drive
Smart Meter
Switches / Pumps / Motors / Valves / Contractors
Level 0 – Field IO

# Qualys Industrial Control Security v1.0

## Use cases

**Visibility**

- ➢ Inventory
- ➢ Network Topology

**Vulnerability Management**

## Technology

**Passive Sensor**

- ✓ Mirror Port
- ✓ 100% Passive

**Qualys Scanner**

- ✓ Safe Active Probes
- ✓ ICS Scan Types
- ✓ Granular Controls

**Cloud Agent**

- ✓ SCADA Serves / ERP Systems / HMI Servers
- ✓ All Industrial PCs

**Vulnerability Signatures**

Rockwell Automation
Allen-Bradley · Rockwell Software
ABB
SIEMENS
GE
YOKOGAWA
Schneider Electric
MITSUBISHI ELECTRIC
KUKA
Honeywell
Johnson Controls

# Demo

# High Level Roadmap

Design Partnership
Q1 ‘20

V 1.0 Beta

ICS V 1.0

## v1.0 Protocols…

**Most Prevalent**

- S7 Comm / Plus
- Profinet
- Ethernet IP
- BACnet
- Modbus TCP
- OPC Suite
- DNP3
- MSS / GOOSE
- IEC 104
- CC Link IE
- MQTT
- Omron Fins
- EtherCAT
- Nigara Fox
- Ethernet Powerlink

**Design Partnership**

- *MelsecNet*
- *PCCC*
- …

**IT Protocols**

- CDP
- LLDP
- TFTP / FTP
- HTTP / HTTPS
- Telnet
- SMB/CIFS

## v1.0 Major Vendors…

**Most Prevalent**

- Siemens
- Rockwell Automation
- Schneider Electric
- ABB
- GE
- Kuka
- Johnson Control

**Design Partnership**

- *Mitsubishi Electric*
- …

# Qualys Industrial Control Security Roadmap

**Compliance**

**Threat Detection**

**Process Integrity**

**Zones & Conduits Access Controls**

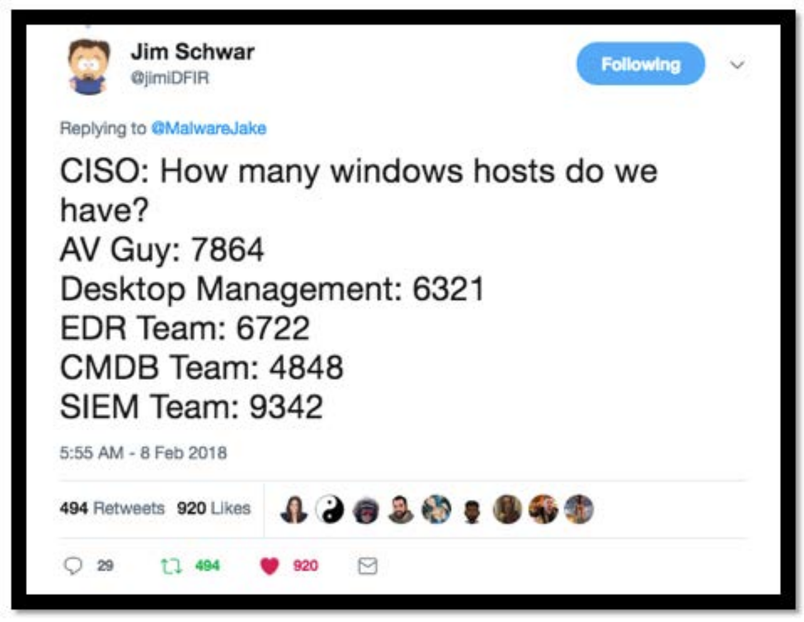
# Thank You

**Dharmesh Ghelani**
dghelani@qualys.com

# Global IT Asset Inventory

## A new Prescription for Security

Pablo Quiroga
Director, Product Management, Qualys, Inc.

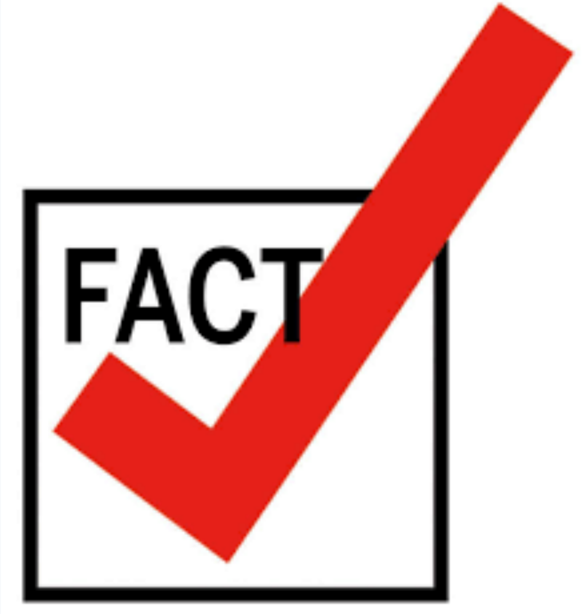

Jim Schwar
@jimiDFIR
Following

Replying to @MalwareJake

CISO: How many windows hosts do we have?
AV Guy: 7864
Desktop Management: 6321
EDR Team: 6722
CMDB Team: 4848
SIEM Team: 9342

5:55 AM - 8 Feb 2018

494 Retweets 920 Likes
29
494
920



# You Can’t Secure What You Don’t See or Know

# Global Hybrid-IT Environment

On-Premise?

Cloud, ...Containers?

Endpoints, Remote Workforce?

Mobility?

IoT, IIoT, OT?

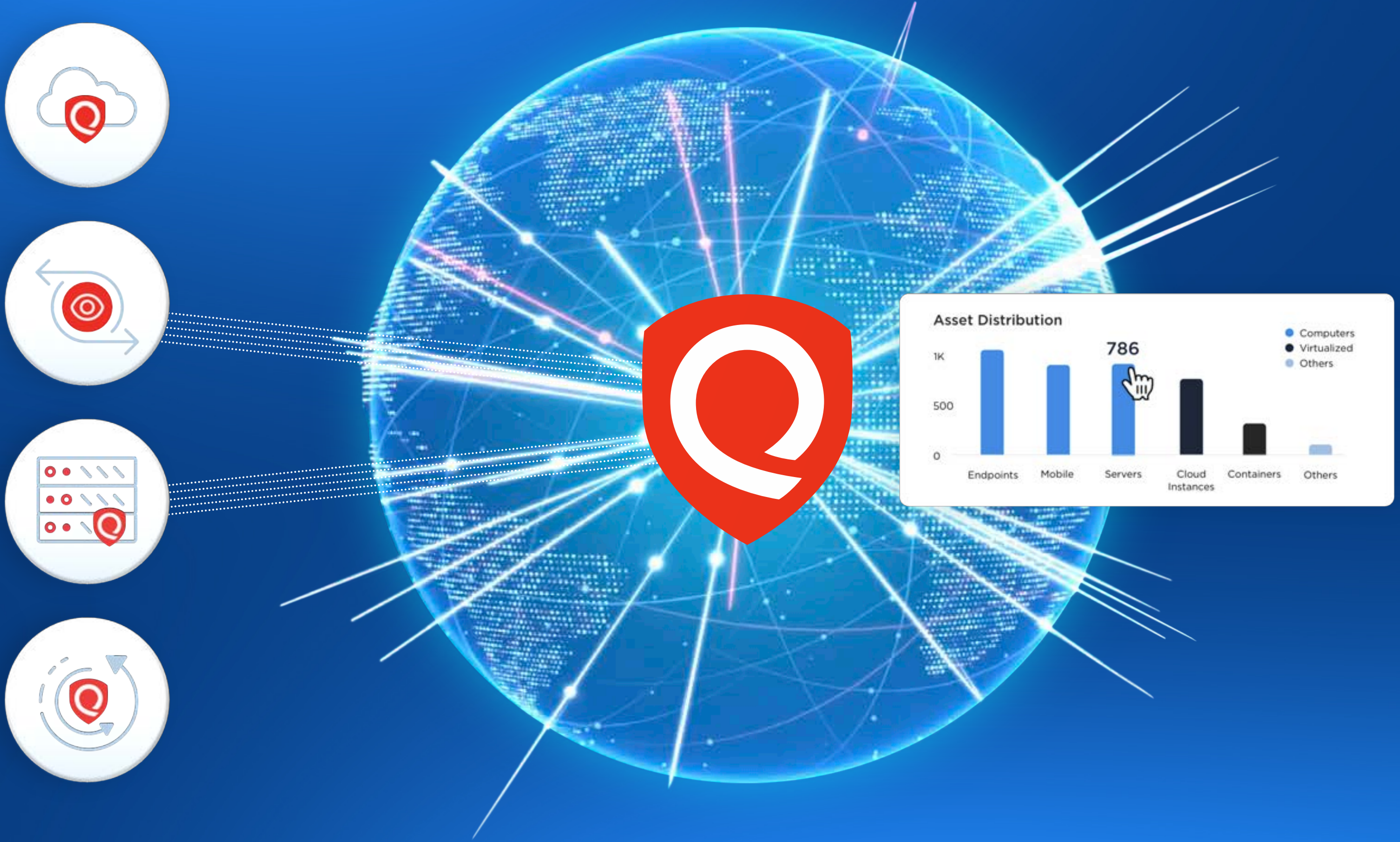
**I need visibility across everything!**

Cloud Agent

Passive Sensor

Network Scanner

Connectors
(AWS, Azure, GCP)

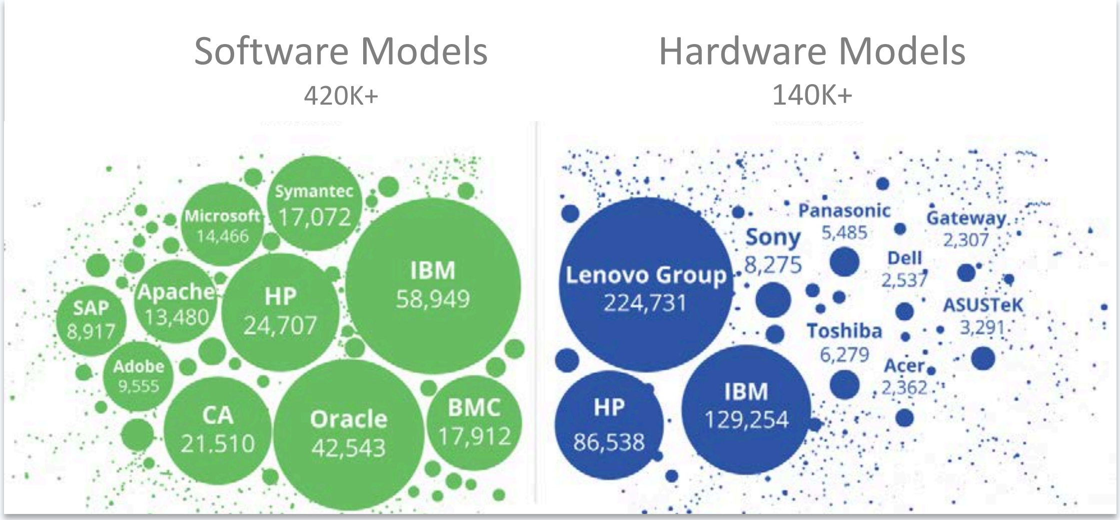

Asset Distribution
1K
500
0
786
Endpoints
Mobile
Servers
Cloud Instances
Containers
Others
● Computers
● Virtualized
● Others

|  | Operating Systems | Hardware | Software |
|---|---|---|---|
| Raw Data | Base OS Runtime AIX: 06.01.0009.0300 EE | Dell, Inc.  R510 | mysql-community-server 5.6.35-2.el7.x86_64 |

Other Tools

| | Operating Systems | Hardware | Software |
|---|---|---|---|
| Raw Data | Base OS Runtime AIX: 06.01.0009.0300 EE | Dell, Inc. R510 | mysql-community-server 5.6.35-2.el7.x86_64 |
| Category | UNIX > Server | Computers > Server | Databases > RDBMS |
| Manufacturer | IBM | Dell | Sun Microsystems |
| Owner | IBM | Dell | Oracle |
| Product | AIX | PowerEdge | MySQL Server |
| Market Version / Model | 6 | R510 | 5 |
| Edition | Enterprise | - | Community |
| Version | 6.1 | - | 5.6 |
| Update | TL9 SP3 | - | 35-2.el6 |
| Architecture | 64-Bit | - | 64-Bit |
| Lifecycle Stage | EOL/EOS | OBS | EOL |
| End-of-Life | 30-Apr-2015 | 1-Sep-2012 | 28-Feb-2018 |
| End-of-Support | 30-Apr-2017 | 1-Sep-2012 | 28-Feb-2021 |
| Support Stage | Unsupported | Obsolete | Extended Support |
| License Type | Commercial | - | Open Source (GPL-2.0) |

# Continuous IT Asset Intelligence as a Service



# DEMO

# Thank You

Pablo Quiroga
pquiroga@qualys.com

# QSC Paris

Apéritif et animations

**17:30 – 20:30**

Le Royal Monceau