HTTP Security Headers

Ken Lee
klee@etsy.com

Hosted by OWASP & the NYC Chapter

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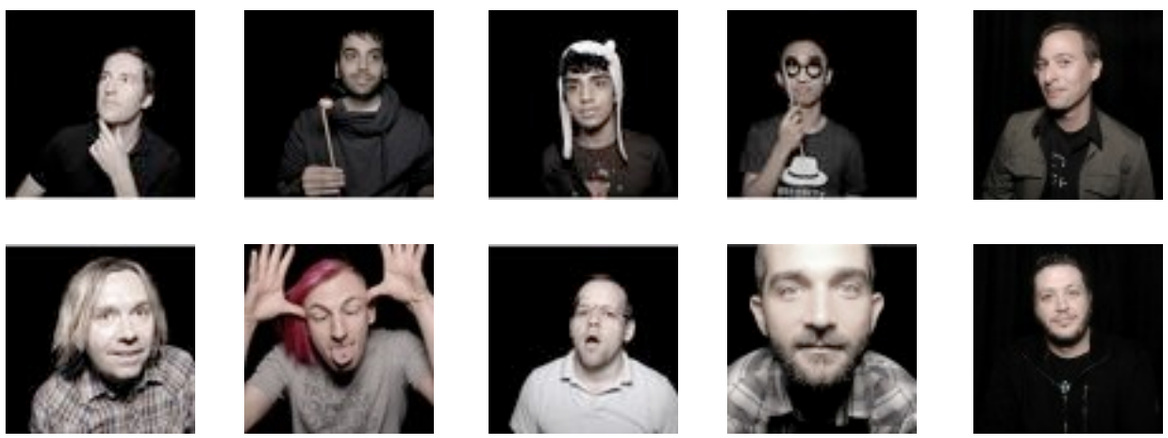
The Etsy Security Team



What’s an Etsy?

Sell Registry Community Blogs Mobile Gift Cards Help

Etsy | Register | Sign In | Search for items and shops | Search | Cart

Browse

- Art
- Home & Living
- Jewelry
- Women
- Men
- Kids
- Vintage
- Weddings
- Craft Supplies
- Trending Items
- Holidays
- Gift Ideas
- Mobile Accessories

Etsy Finds

Men / Scarves

agirlnamedlaney

Holidays / Stockings

Elmtreetextiles

Gifts / Phone Cases

MooseberryCases

Handpicked Items See more — Picked by Julie Rudziensky

White Feather Ring
DobleEle $9.00 USD

FOLD OVER CLUTCH // yell...
BlackbirdAn... $76.19 USD

Simple Gold Necklace / Coin...
burnish $33.00 USD

Bird Mobile - Ivory
RobinsonDe... $52.00 USD

Security Headers?

Why Security Headers?

Security Headers

Fundamentally, a user security issue

Security Headers

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Changes are browser-impacting

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Unfortunately, browsers != users

Security Headers

Fundamentally, a user security issue

Changes are browser-impacting

Unfortunately, browsers != users

Often requires non-trivial changes

Security Headers

Strategies for deployment

Security Headers

Strategies for deployment

Lessons learned from our bug bounty

Overview

HTTP Strict Transport Security (HSTS)

Overview

HTTP Strict Transport Security (HSTS)

Content Security Policy (CSP)

Overview

HTTP Strict Transport Security (HSTS)

Content Security Policy (CSP)

X-Frame-Options (XFO)

Overview

HTTP Strict Transport Security (HSTS)

Content Security Policy (CSP)

X-Frame-Options (XFO)

Miscellaneous

HSTS --What is it?

A guarantee to visit the url using HTTPS

HSTS --What is it?

A guarantee to visit the url using HTTPS

You have to have seen the site before

What's the Attack?

The Classic Man-in-the-Middle Attack

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Let's just turn on TLS/SSL for everything

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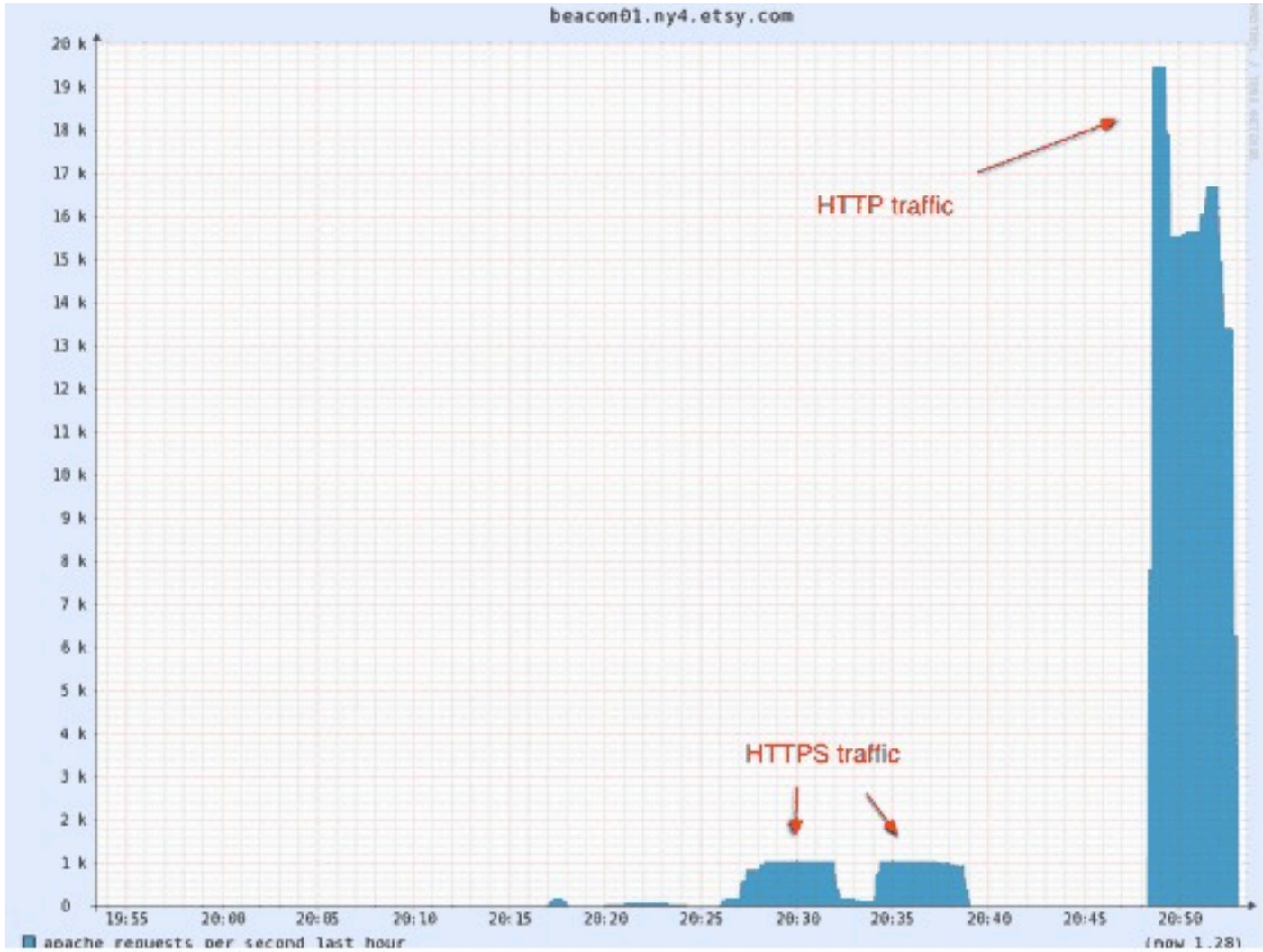
The Classic Man-in-the-Middle Attack

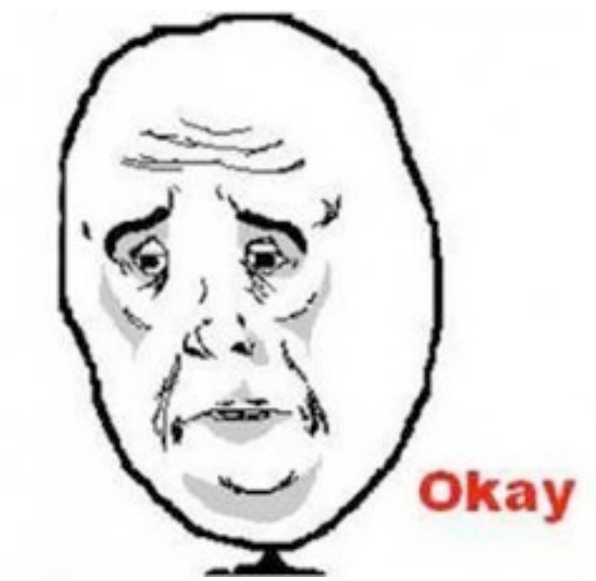
Let's just turn on TLS/SSL for everything

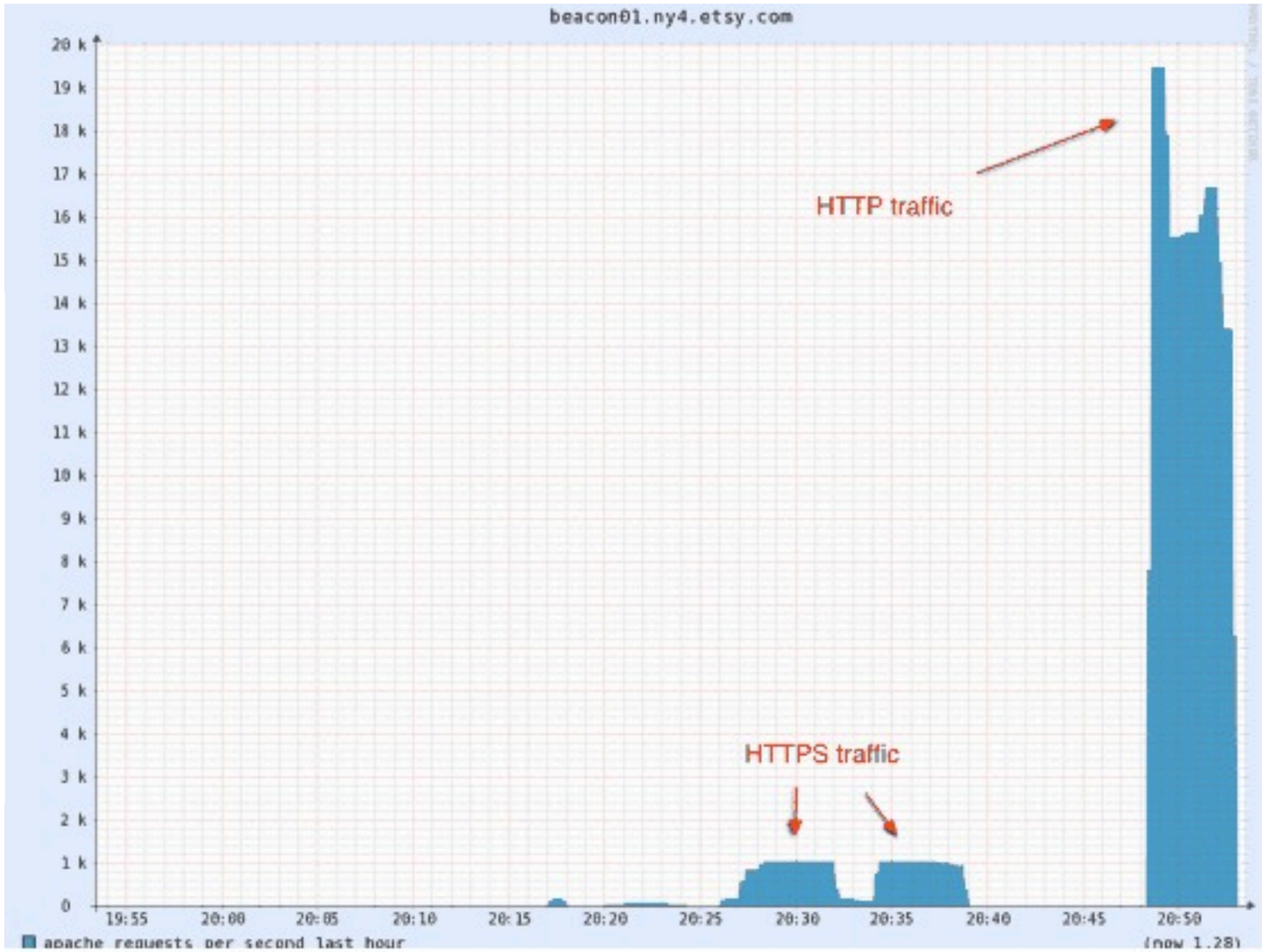
Make HTTPS canonical for your site

HTTP/HTTPS Traffic



HTTP/HTTPS Traffic





HSTS Background

Infrastructure changes needed for SSL

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Infrastructure changes needed for SSL

Bundle HSTS as part of an SSL preference for users

The Old Ways

Split Architecture

The Old Ways

Split Architecture

Most pages HTTP, “secure” ones HTTPS

The Old Ways

Split Architecture

Most pages HTTP, “secure” ones HTTPS

Load balancers constrained rollout

On Load Balancers

HTTP-> HTTPS logic handled by the LB

On Load Balancers

HTTP-> HTTPS logic handled by the LB

Difficult and slow to change

On Load Balancers

HTTP-> HTTPS logic handled by the LB

Difficult and slow to change

Broke HTTPS plugins

Refactoring

HTTP-> HTTPS logic handled by the app

Refactoring

HTTP-> HTTPS logic handled by the app

Make it easy to add new secure pages

Refactoring

HTTP-> HTTPS logic handled by the app

Make it easy to add new secure pages

Transparency for developers

How Do I HTTPS

Ramp it up!

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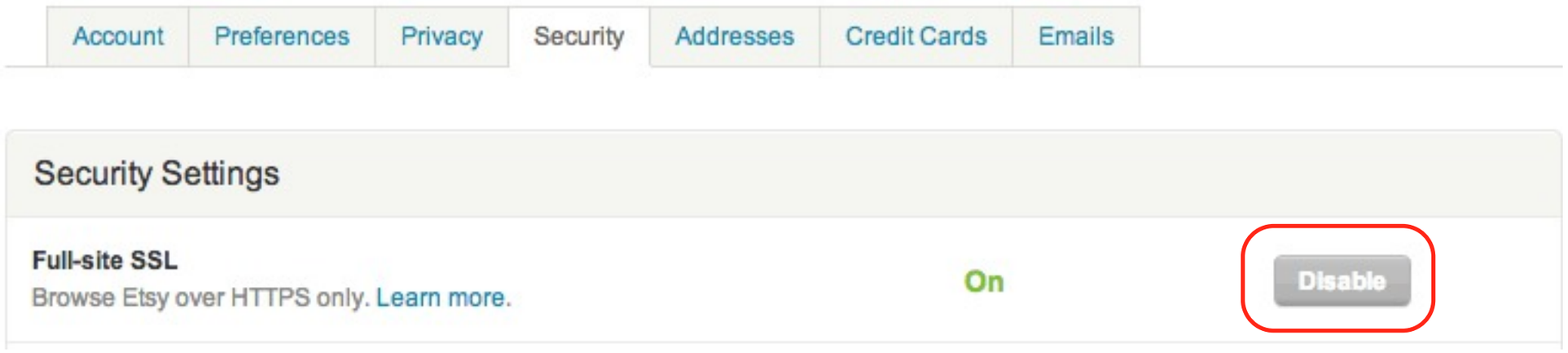
Enabled HSTS if SSL preference “on”

How Do I HTTPS

Ramp it up!

Enabled HSTS if SSL preference “on”

Bail-out Mechanism:



The HSTS Header

Enabled header when full-site SSL “on”

The HSTS Header

Enabled header when full-site SSL “on”

Strict-Transport-Security: max-age=631138520; includeSubDomains

HSTS Part 2

Strict-Transport-Security: max-age=631138520; **includeSubDomains**

All subdomains get HSTS that match the host

HSTS Part 3

Note the difference: HSTS on ‘www.etsy.com’

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Query domain

Input a domain name to query the current HSTS set:

Domain: www.etsy.com Query

Found: mode: `STRICT` sts_include_subdomains:`true`

HSTS Part 3

Note the difference: HSTS on ‘www.etsy.com’

Query domain

Input a domain name to query the current HSTS set:

Domain: www.etsy.com Query

Found: mode: `STRICT` sts_include_subdomains:`true`

Query domain

Input a domain name to query the current HSTS set:

Domain: subdomain.etsy.com Query

Not found

HSTS Part 2

Check out Chrome's HSTS settings

chrome://net-internals/#hsts

HSTS Rollout

Implement HTTPS management on app level

HSTS Rollout

Implement HTTPS management on app level

Rolled out to admins -> sellers -> buyers

HSTS Rollout

Implement HTTPS management on app level

Rolled out to admins -> sellers -> buyers

Code-based “SSL wrangler” in repo

SSL Wranglin’

Controller to handle SSL transition

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Skipped for users with full-site SSL pref on

SSL Wranglin’

Controller to handle SSL transition

Skipped for users with full-site SSL pref on

On sign-out, set HSTS max-age=0

Wins

Fixes on-domain mixed content

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Fixes on-domain mixed content

Browser transparently 302 redirects

SSL Concerns

Do your CDNs support it?

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What about 3rd party content providers?

SSL Concerns

Do your CDNs support it?

What about 3rd party content providers?

Can your servers/LBs handle it?

Kill Mixed Content

You still need to fix off-domain HTTP

Kill Mixed Content

You still need to fix off-domain HTTP

Browser mixed content warnings

Kill Mixed Content

You still need to fix off-domain HTTP

Browser mixed content warnings

Mobile

HSTS supported on mobile browsers

Mobile

HSTS supported on mobile browsers

Notably absent from others

Mobile

HSTS supported on mobile browsers

Notably absent from others

HSTS: Be Ready

Not a crutch for fixing routing problems!

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There will be outliers

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SSL/TLS errors confuse users

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Not a crutch for fixing routing problems!

There will be outliers

SSL/TLS errors confuse users

Have a process for managing HSTS

X-Frame-Options

Problem: Clickjacking

X-Frame-Options

Framing sucks, get rid of framing!

X-Frame-Options

How do you prevent this type of attack?

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```
<script>

if (top!=self) top.location.href=self.location.href

</script>
```

X-Frame-Options

How do you prevent this type of attack?

```
<script>

if (top!=self) top.location.href=self.location.href

</script>
```

Not really a defense at all

How Do I Use XFO?

Figure out when you're being framed

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Log the framing attempts

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Whitelist specific framing sites (search engines)

How Do I Use XFO?

Figure out when you're being framed

Log the framing attempts

Whitelist specific framing sites (search engines)

Only allow whitelisted sites to frame

Be Careful

Thoroughly vet your whitelist

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Read about XFO's options

Be Careful

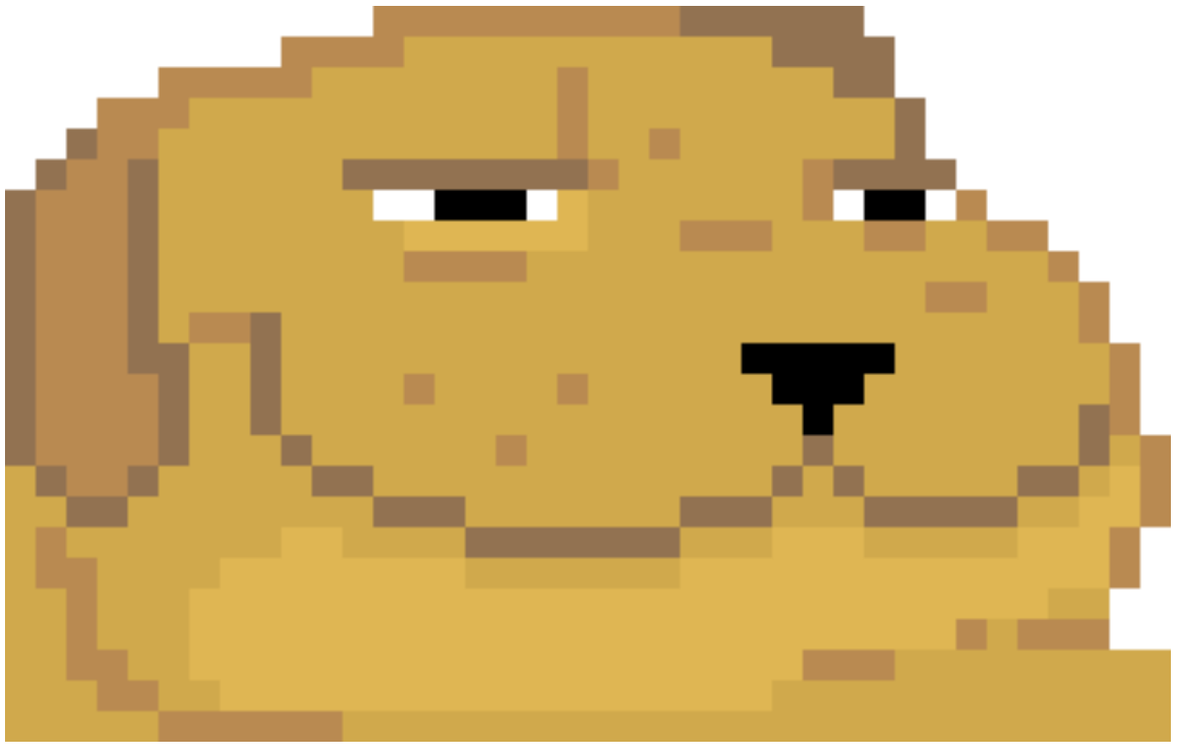
Thoroughly vet your whitelist

Read about XFO's options

Test thoroughly

Non-Whitelisted sites

Non-Whitelisted sites



Don’t Forget...

If you’re taking away framing, warn your users

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If you’re taking away framing, warn your users

Whitelisting will break *everyone else*

Let's Talk CSP

Policies can grow fairly large

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Doesn't like inline javascript by default

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Policies can grow fairly large

Doesn't like inline javascript by default

Where do I start?

CSP 1.0

Most websites have inline JS

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Removing/refactoring some of it just isn't possible

CSP 1.0

Most websites have inline JS

Removing/refactoring some of it just isn't possible

FF & Chrome use unprefixed 'Content-Security-Policy'

CSP 1.1

Will have browser javascript API support

CSP 1.1

Will have browser javascript API support

Support for inline CSP in a <meta> tag

CSP 1.1

CSP 1.1 will allow for script-nonce and script-hash

CSP Lessons

CSP introduced the idea of a reporting mechanism

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Identify pages with inline scripts => smaller policy size

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Log, aggregate reports to find mixed content

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Log, aggregate reports to find mixed content

Some interesting results

```
.log csp_violation=1 mixed_content=1|top blocked_uri
```

nned events

[..] Deselect

ts before 4:30:09 PM November 15, 2013

Export Options

None

ked_uri

tt.arcadeparlor.com/cmn?p=YTIxNDY2NDczMTBh0iypKb1PmEyzjib4JUQAg6W%2FuZT3Qkk0nx4%2B4>
static.datafastguru.info
intext.nav-links.com
aa.static.facdn.com
tt.friendschecker.com/pubjs?pid=104937&sid=23772&uid=54a256f9680b43808b38d8d16029bb2e
tt.friendschecker.com/pubjs?pid=104937&sid=23762&uid=7d5a347ba1d84917a5bf685c3d670085
wl.ttinlinejs.info
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whiterabbitproducts.com/whiteRabbit/inject.js?ctid=ct3196716~54_0
tt.toparcadehits.com/cmn?p=YTM3OTI2NTA5MDmL5xgGYSddcBC5rRfQWELRlHDjbqKrR%2ByMtc0wCz

How Do I Deploy CSP?

Organize and assess your existing javascript

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Have specific template logic for handling javascript

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Give devs an ‘opt-out’ mechanism for inline js

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Organize and assess your existing javascript

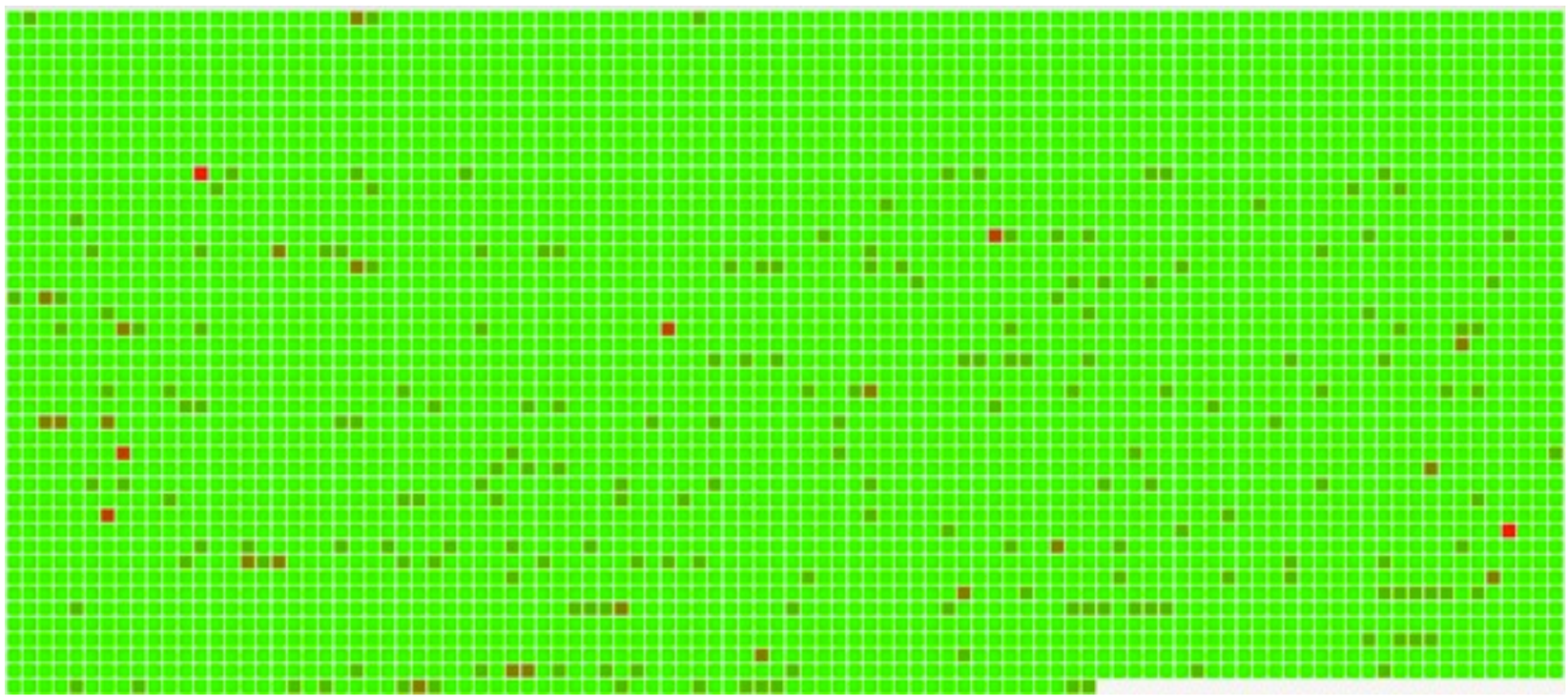
Have specific template logic for handling javascript

Give devs an ‘opt-out’ mechanism for inline js

Deploy to specific parts/subdomains of your site

CSP Compliance

Actively monitor the # of inline scripts you have left



Some CSP Tools

Some tools for CSP Generation

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https://github.com/Kennysan/CSPTools

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Browser proxy, automated browser, and csp parser

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Lets you create/test a CSP for your prod environment

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X-XSS-Protection

Originally IE XSS blocking mechanism

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Looks for parameter arguments in response

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Side effect: Clients can break your javascript

X-XSS-Protection

X-XSS-Protection: 1; mode=block

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Reflected XSS protection, but now...

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Chrome lets you specify a report url

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Reflected XSS protection, but now...

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Clientside protection; serverside reporting

XSS Logging

X-XSS-Protection: 1; mode=block; report-uri=/log.php

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Other browsers: Implement server-side XSS-Auditor

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Look for this functionality in CSP 1.1

X-Content-Type-Options

X-Content-Type-Options: nosniff

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Older versions of IE will guess response content-type

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Ignores Content-Type specified!

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Example: query parameter lets you specify .html

X-Content-Type-Options

X-Content-Type-Options: nosniff

Older versions of IE will guess response content-type

Ignores Content-Type specified!

Example: query parameter lets you specify .html

IE will consider the content to be text/html!

Final Thoughts

Treat header deployment like any other code

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Be agile with header development

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Can’t deploy everywhere? Have a plan--deploy in part

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Starting with security is easier than baking it in later

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Be agile with header development

Can’t deploy everywhere? Have a plan--deploy in part

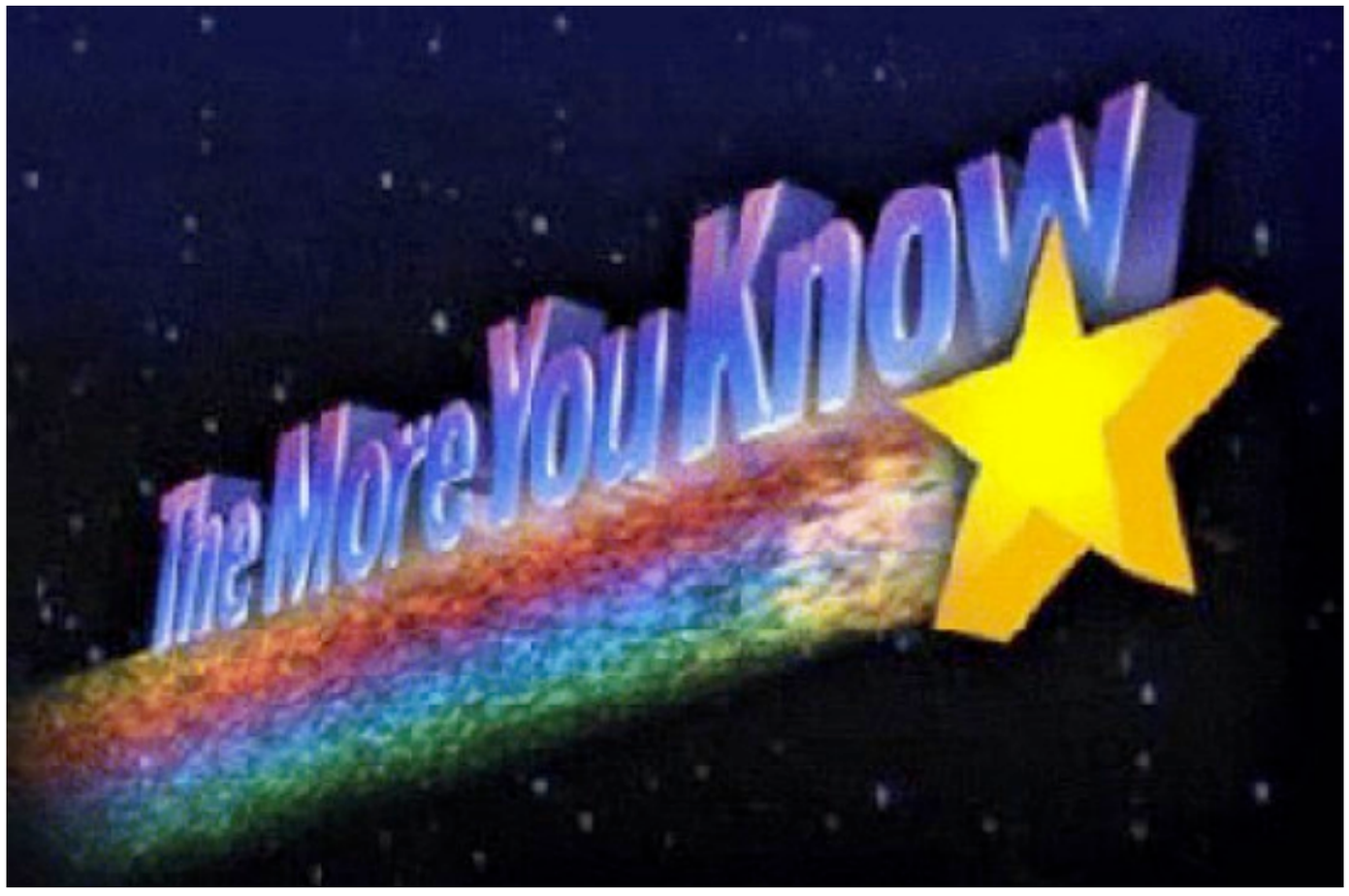
Starting with security is easier than baking it in later

Log early and often--you learn a lot

Thanks for Listening!

@kennysan

klee@etsy.com



github.com/kennysan