Web Performance & Documentation System

General Services Administration | USAgov Team

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Keywords:
web performance, optimizing speed, documentation

Summary:
To optimize the **performance** of the USA.gov website, Charlie used **JavaScript, HTML/CSS,** and **Drupal CMS** to implement **Lighthouse** suggestions. This increased the web performance score by 15%+ for a platform with **~7 million monthly users**. He also interviewed, researched, and built a new **documentation** system on **GitHub Wiki** to hold the team's project documentation.

CODING IT FORWARD >
2024 FELLOWSHIP

Web Performance & Documentation System

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usa.gov

Web Performance

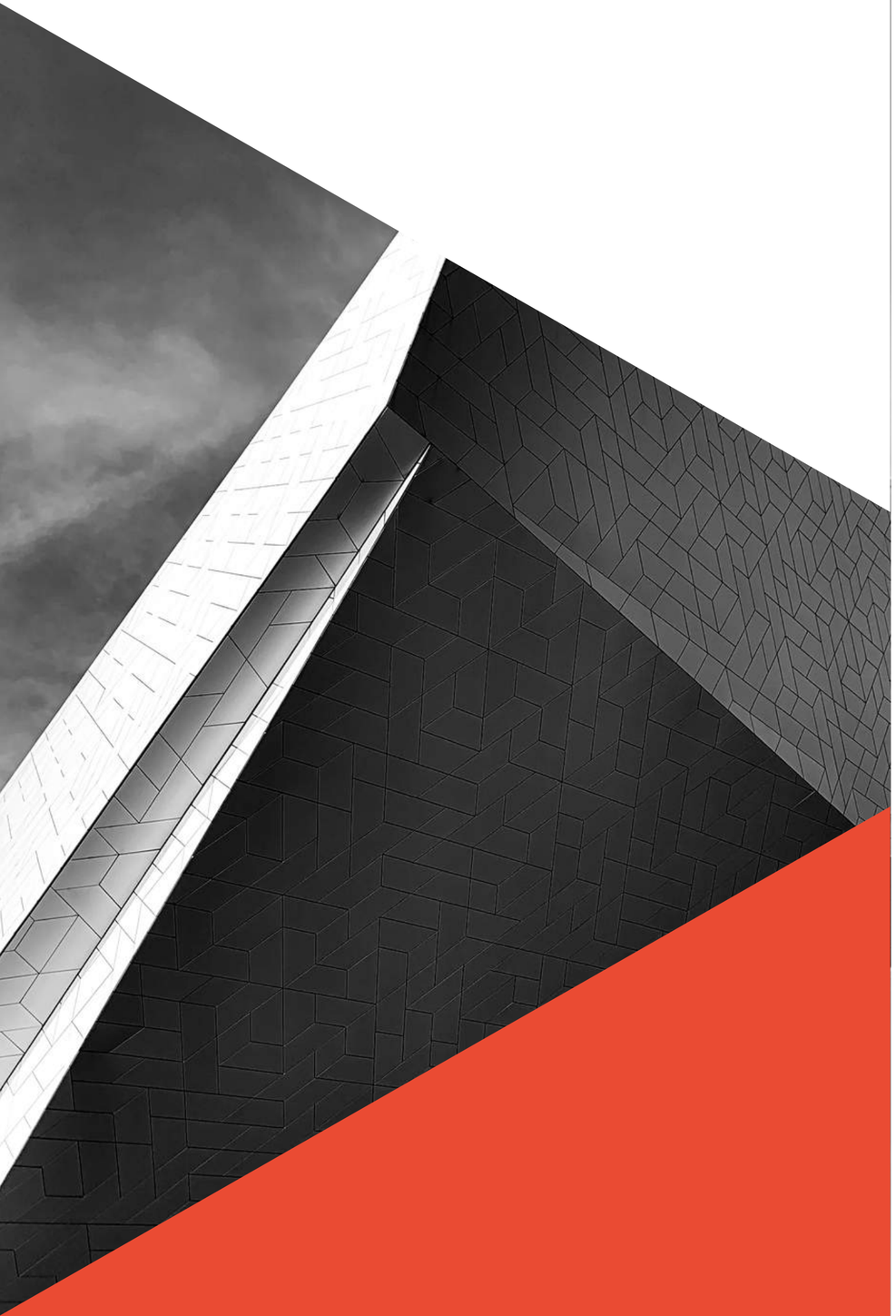
Improving USA.gov rendering speed.

Project Objective

Identify, Research, Implement

Make high impact changes to improve web performance

- popular pages: USA.gov, USA.gov/es
- measure before and after effects using web performance analytical tools
- document findings, successes, failures, feasibilities, etc.
- mobile >>> desktop



Analytical Tools

Lighthouse

Open-source, automated tool for improving web page quality

- runs series of audits and generates a report

SiteImprove

Growth-centered analytical software to help teams make data-driven decisions.

- runs Lighthouse through a central server
- tests performance from different geographic locations

Initial Page Performance

Lighthouse

- **Mobile Score: ~70**
- **Desktop Score: ~85**

Passing Audits: 16

SiteImprove: ~75

Suggestions: 17

Implemented Optimizations

01

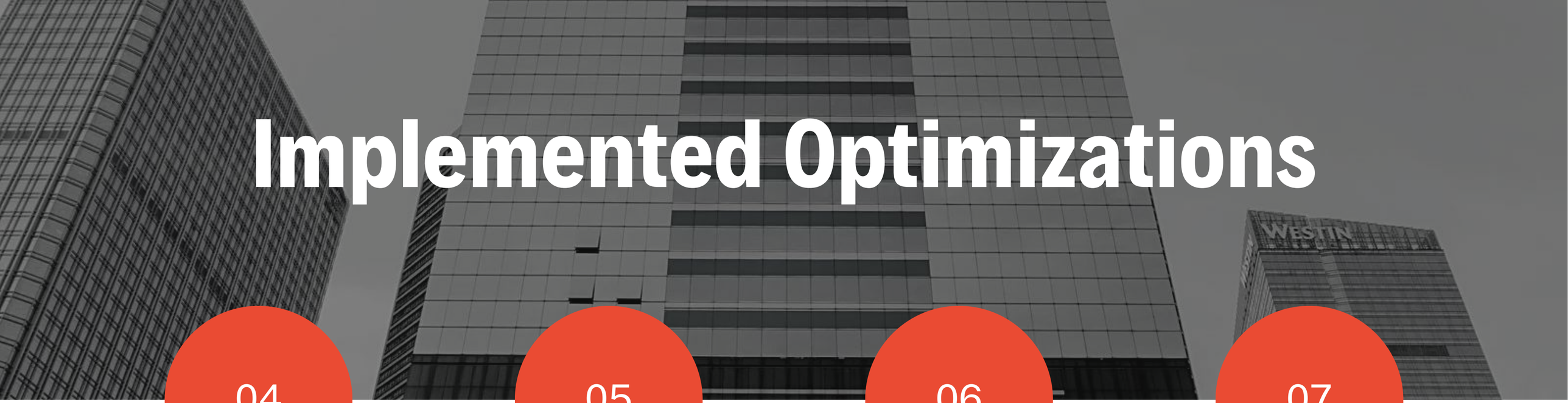
Lazy Loading Offscreen Images

02

Explicit Image Dimensions and Responsive Images

03

Preconnecting to Required Origins



Implemented Optimizations

04

Passive Listeners for Scrolling Performance

05

Preloading Largest Contentful Paint

06

Prioritizing Critical Resources

07

Removing Unused CSS

Lazy Loading

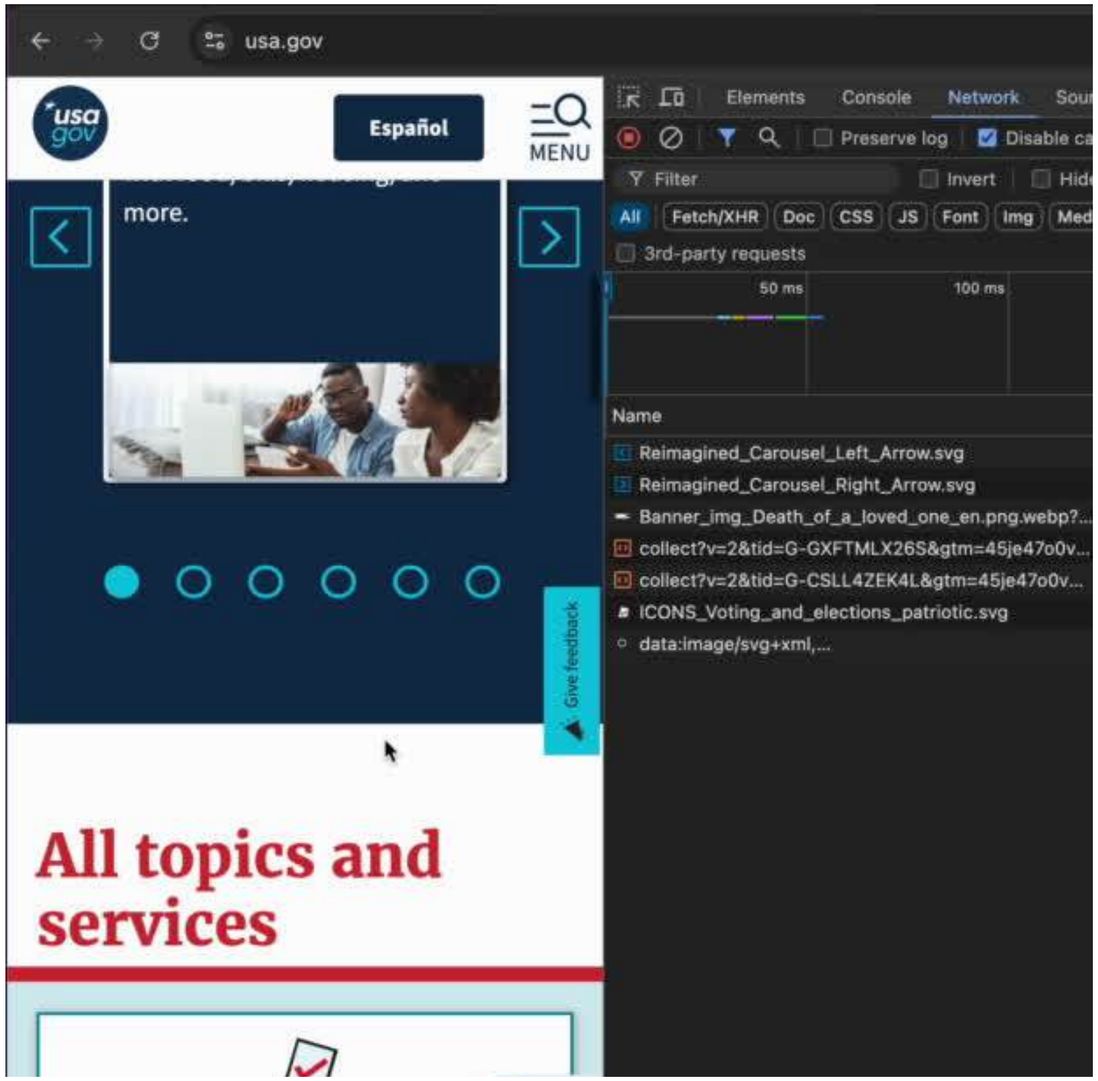
Savings: 245KiB

Delay image download until image is scrolled into viewport

- reduce size of initial resource download
- request images from the server only when needed

Lazy Loading Demo

USA.gov homepage



Explicit Dimensions

Best Practice

Specify width and height attributes

- browser allocates the correct amount of space before loading the image
- prevent layout shifts and improve page rendering speed

Responsive Images

Savings: 6 KiB

USAgov logo size adjusts dynamically

- reduce data transmission and speed up loading time on mobile devices
- serve smaller images on smaller screens

Modified Images

Explicit dimensions for one-off and recurrent images

Responsive imaging for the USAgov logo

Preconnect Required Origins

Savings: 320ms

Establish early connections to 3rd-party resources

- informs browser of necessary resources to begin making connections ASAP!
- multiple 3rd party JavaScript resources

Passive Listeners

Best Practice

Customize the behavior of certain interactive events

- activate passive event listeners on scroll and touch actions
- passive = does not prevent default action
- browser does not block/delay scrolling

Preload Largest Contentful Paint

Best Practice

Preload largest image resource for mobile screens

- help browser identify critical resources to load at a higher priority
- important for mobile screen sizes

Preload LCP

USA.gov homepage

Prioritize Critical Resources

Best Practice

Asynchronous download, non-blocking execution for scripts

- Scripts are blocking resources
- Make sure <script> tags have “defer” attribute

Remove Unused CSS

Savings: ~30.6KiB and ~51ms

Remove code for unused USWDS components

- original static site used stylesheet containing all USWDS components
- reduce amount of unused code, size of the final compiled CSS, and compile times

Performance Results

Lighthouse:

- **Mobile Score: ~70 → 84**
- **Desktop Score: ~85 → 98**

Passing Audits: 16 22

SiteImprove: ~75 → 78

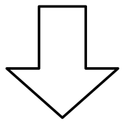
Suggestions: 17 11

Challenges

Lighthouse Inconsistencies

Navigating Documentation

CMS vs Static Site



Lack Complete Solution

Next Steps and Handoff

USA.gov Web Performance

01 Complete final deliverable

02 Walk team through future solutions

03 Monitor web performance after changes make it to production

Documentation System

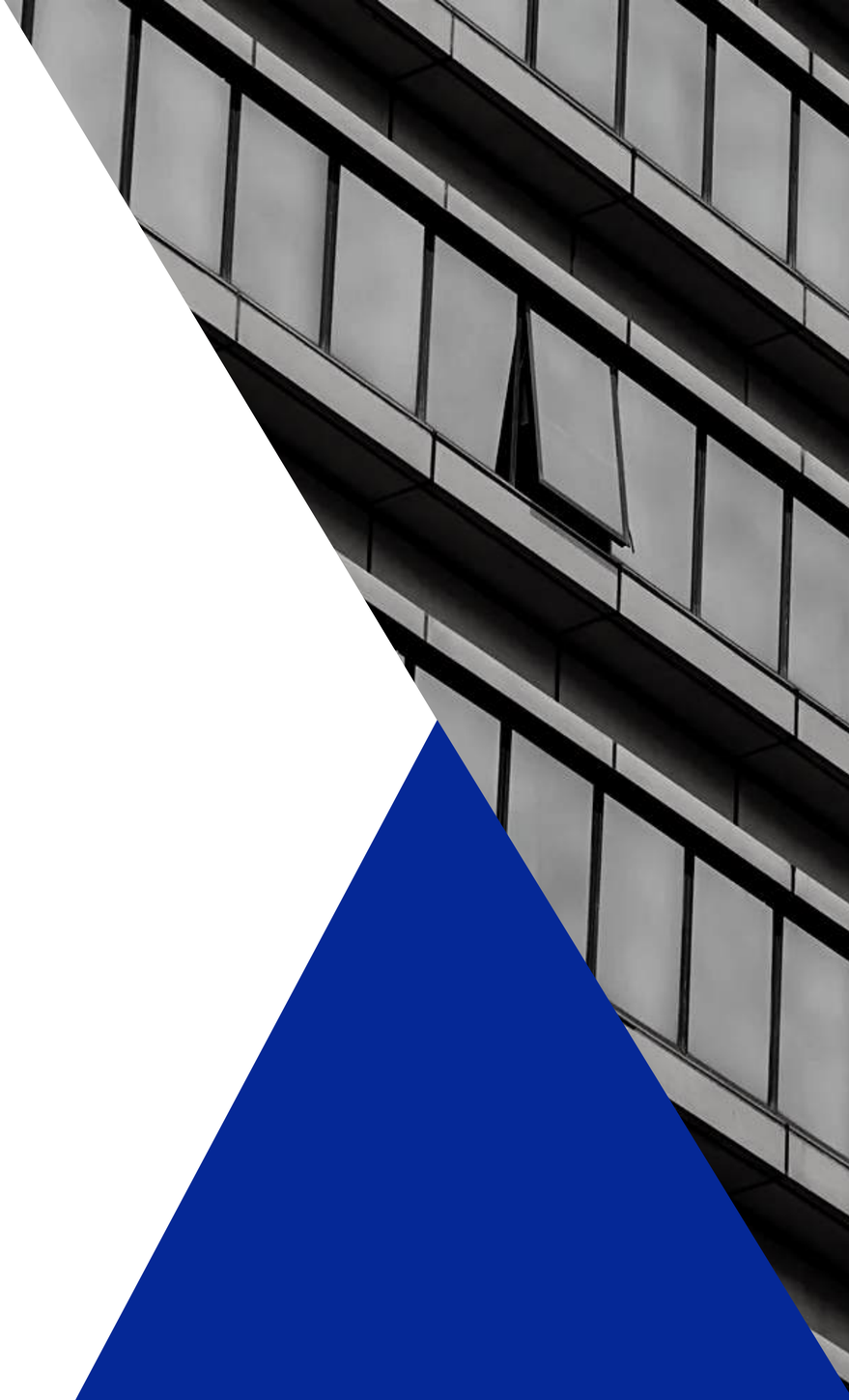
USAgov WebOps Team
Documentation

Project Objective

Interview, Propose, Migrate

The USA.gov team lacks a structured and standardized documentation system

- Research systems, platforms, etc
- Implement a documentation system and help the team transition



Personal Observations

Things I noticed

My own experiences with the project

- Documentation was scattered
- Time spent waiting for document access
- Lack of explanation behind project practices

Interview Stage

Pain Points?

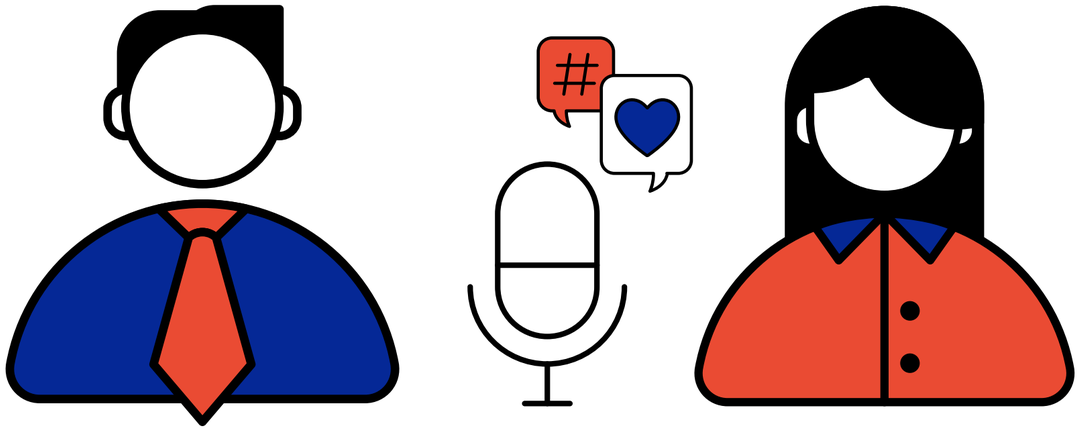
Current Process?

Must-Have Features?

Lack of Structure

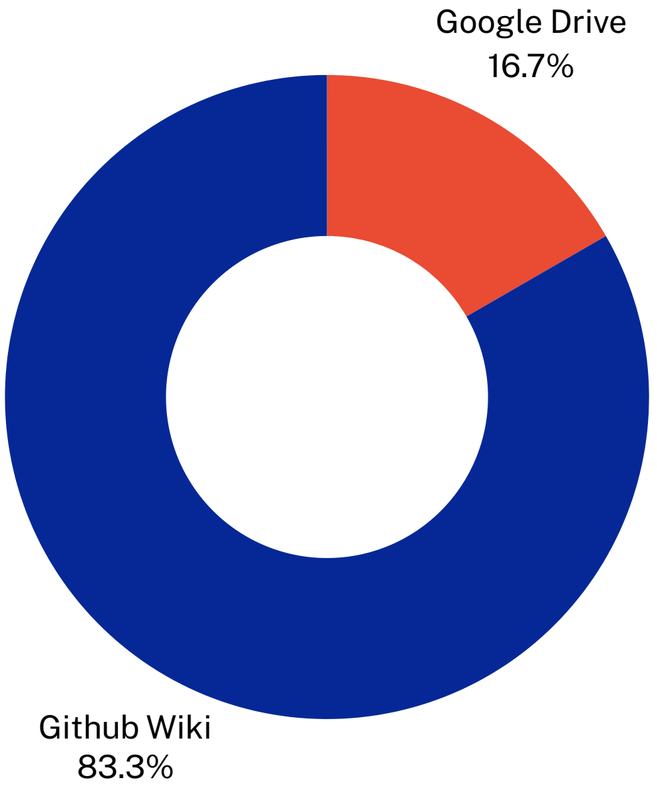
Nonexistent

Consolidation, Indexing, Version Control



Proposal Stage

Discussing and Deciding:
Documentation Platform and Scaffolding



WebOps voted GitHub Wiki

Wiki Organization

About USAgov

General documentation about the USAgov project. WebOps team information, security plans, etc.

How–To Guides

Detail the steps required to solve a problem or accomplish a goal. Answers the "How?" question.

Technical References

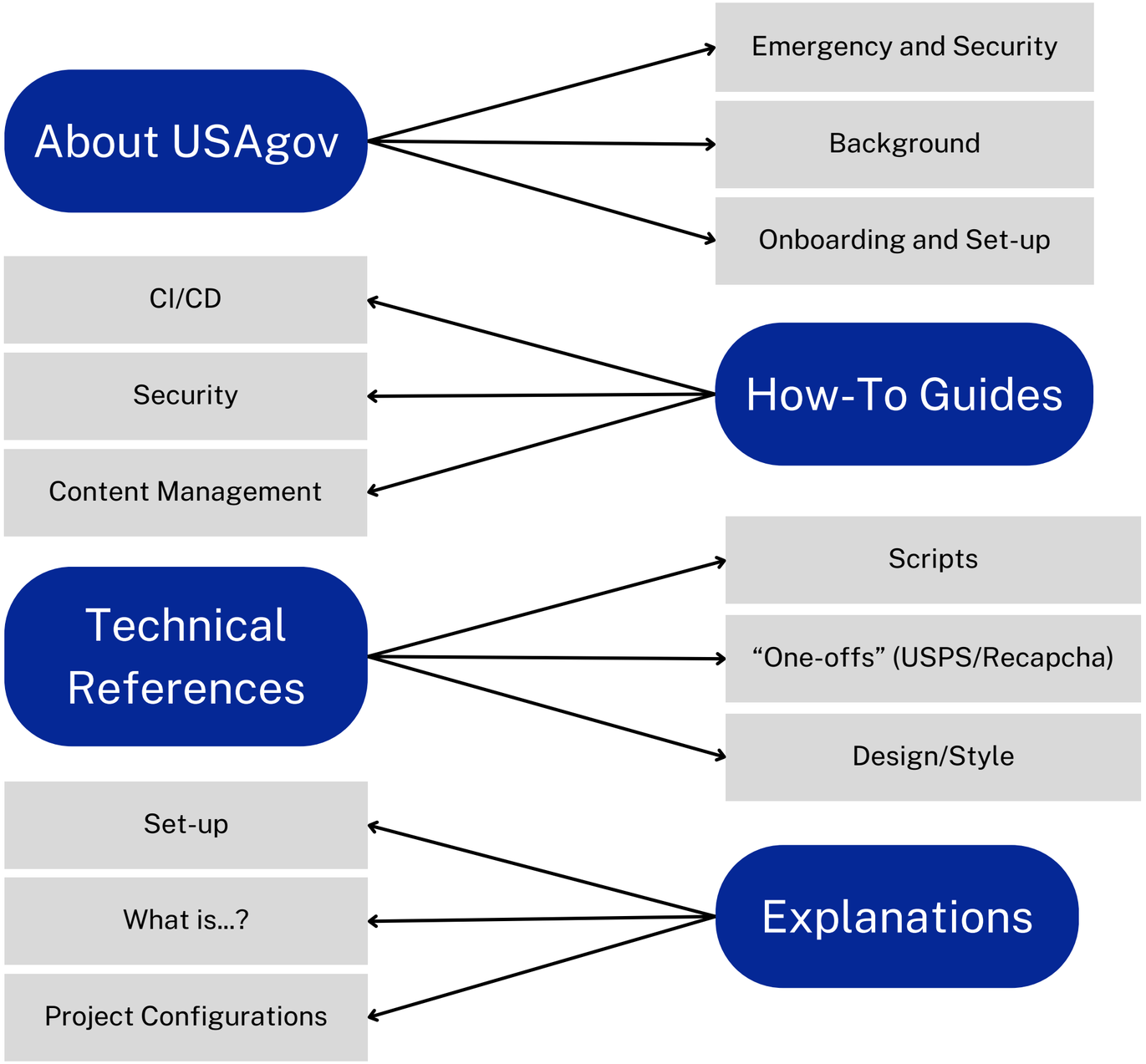
Technical descriptions of the project code. Describe key classes, functions, APIs, methods, etc, and set out how to use them.

Explanations

Helps clarify and illuminate a particular topic and provide wider context to the project. Answers the “Why?” question.

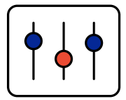
Team Brainstorming

Organizing subsections and handling pre–existing documentation



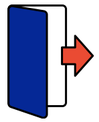
Challenges

So Many Options



Win Some, Lose Some

Scheduling Team Meetings



Culture Change

Next Steps and Handoff

USA.gov Documentation Wiki

01 Keep moving pre-existing documentation to new wiki

02 Add new documentation to the wiki, and use it!

03 Regular meetings to clean up documentation


Any Questions?

Thank you!

Russell O’Neill
Amy Farrell
David Stenger
Yaritza Garcia
Isabel Laurenceau
Chris Wachtman
Bryant Jones
Jacob Yaeger
Mark Vitek

Mike Dranove
Oscar Merida
Nicole Brennan
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Amy Kinter
Nick Adams
Annabel Lombard
All of CIF
All of PX Portfolio
And all of GSA TTS!!