



DIGITAL WEB SERVICES NETWORK

Bringing together digital product managers, designers, and engineers.

cdt.ca.gov/dwsn

DWSN Quarterly Forum

Thursday, January 18, 2024



California
DEPARTMENT OF TECHNOLOGY
STRATEGY INNOVATION DELIVERY



Digital Web Services Network

- Welcome to the DWSN forum, we will begin shortly.
- For the best experience, please use your computer to join the meeting.
- Mute your audio.
- Turn off your video.
- Use the raise hand button or the meeting chat for comments and questions.



**DIGITAL
WEB
SERVICES
NETWORK**

Opening Remarks

Koji Kumpulainen

State Web Services Manager
California Department of Technology

DWSN Forum Agenda

- Opening Remarks..... Koji Kumpulainen (10 minutes)
- Build.ca.gov.... Sam Hayashi, Peggy Gartin, Christina Florente, Linda Tracy, Konstantin Koryaka (30 minutes)
- Design System.....Jon Grant, Carter Medlin (30 minutes)
- Big idea/Open discussion.....Harvey Dhillon (10 minutes)
- Suggested Future Topics / Closing Remarks..... Koji Kumpulainen (10 minutes)



**DIGITAL
WEB
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NETWORK**

Build.ca.gov


Sam Hayashi, Peggy Gartin, Christina
Florente, Linda Tracy,
Konstantin Koryaka

Build.ca.gov

Our journey

California Department of Technology
Office of Data and Innovation

Official website of the State of California

 Building California's future

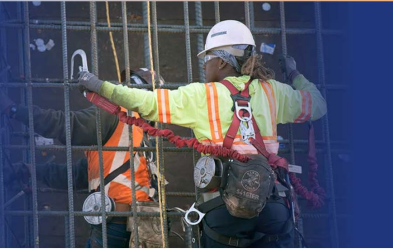
Home About More resources

A bright future doesn't just happen—we must build it

California is building:

- clean energy
- better transportation
- more broadband
- a protected environment
- more good-paying jobs


[Learn more](#)




Building more, faster – for all

To meet big challenges, you need a big investment. And California is making it, along with unprecedented help from the Biden-Harris Administration.

California is investing \$180 billion in infrastructure over the next 10 years. This money will fund upgrades that benefit every community – especially disadvantaged communities. It will help us fight some of our toughest problems.

	Climate change	Equity	Jobs
 <p>Dollars at work now \$41 billion</p>	More clean energy will keep millions of tons of carbon out of our air	These investments will benefit communities disadvantaged by pollution, discrimination, lack of services	These projects will add 400,000 jobs to our economy over 10 years



California is building more, faster – and creating thousands of good-paying jobs in the process. This goes far beyond roads and bridges – this is about investing in our communities and our families, giving opportunity to hard-working Californians and ensuring we deliver on our world-leading climate goals.

— Governor Gavin Newsom

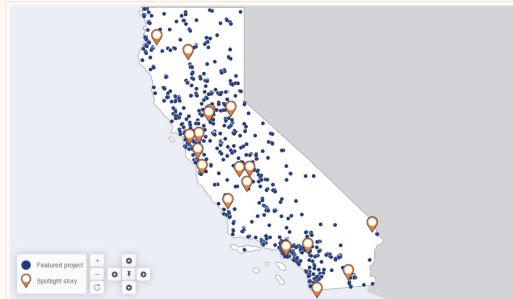
Infrastructure projects



There are thousands of infrastructure projects planned or underway in California. Here are some examples.

Project map

Select any point in the map for details. Project locations are approximate.

[All](#) [Spotlight stories](#) [Featured projects](#)



Legend:  Featured project  Spotlight story

Presenters

Christina Florente, Lead UX designer
California Department of Technology
Christina.Florente@state.ca.gov

Peggy Gartin, Content designer
Office of Data and Innovation
Peggy.Gartin@innovation.ca.gov

Sam Hayashi, Data engineer
California Department of Technology
Sam.Hayashi@state.ca.gov

Konstantin Koryaka, Lead developer
California Department of Technology
Konstantin.Koryaka@state.ca.gov

Linda Tracy, Accessibility and analytics
California Department of Technology
Linda.Tracy@state.ca.gov

Agenda

About build.ca.gov

User experience and content

Accessibility

Data, map, and tech

Questions

About build.ca.gov

Background

- **Funding for infrastructure** (roads, water, broadband, energy, etc.)
- Up to **\$180 billion** in federal and state funding
- Executive Order N-8-23
 - Assemble Infrastructure Strike Team to maximize funding opportunities
 - **Create a website** to showcase the projects (our task)





Goal

Make California
infrastructure funding
transparent

Timeline



May - Aug 2022

Talks of data coming soon



Sep – Dec 2022

Tell a story – website prototypes (no real content)



Jan – May 2023

Dashboard for reporting and funding, initial gathering data



Jun – Sep 2023

Website showcasing projects; gather data from all topics.



Oct 2023 – Jan 2024

Work on messaging and adding real stories; went live 1/9/2024



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Demo - Homepage

Learn more

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Project team

Leadership

Christina Spagnoli, GovOps

Stuart Drown, GovOps

Russel Atterberry, GovOps

Blaine Wasylkiw, CDT

Jeffery Marino, ODI

Christian Crumlish, ODI

Jonathon Porat, CDT

Blake Valenta, ODI

Katie Regan, CDT

Koji, CDT

Joy Bonaguro, ODI

Artem Khomishen, CDT

Anneli Wong, CDT

Selvarani Janarthanan, CDT

Product management

Ryan Kelly, Consultant

Shawn Arnwine, Consultant

Corinna Martinez, CDT

Jarett Krumrei, CDT

Karuna Tamatam, CDT

Vincent Chao, CDT

UX Team

Christina Florente, CDT

Peggy Gartin, ODI

Michael Sullivan, ODI

Sharon Rabang, CDT

Daria Tabeck, CDT

Sarah Letson, ODI

Ryan Hamilton, CDT

Kimberly Losenara, ODI

Data and GIS

Sam Hayashi, CDT

Jessica Zhang, CDT

Raphael Chan, CDT

Fernando Cabangon, CDT

Carmen Gonsalves, CDT

Vijya Charugundla, CDT

Developers

Konstantin Koryaka, CDT

Melanie Mazanec, Consultant

Chris Eddy, CDT

Jagroop Singh, CDT

Anureet Sandhu, CDT

Vikram Verma, CDT

DevSecOps

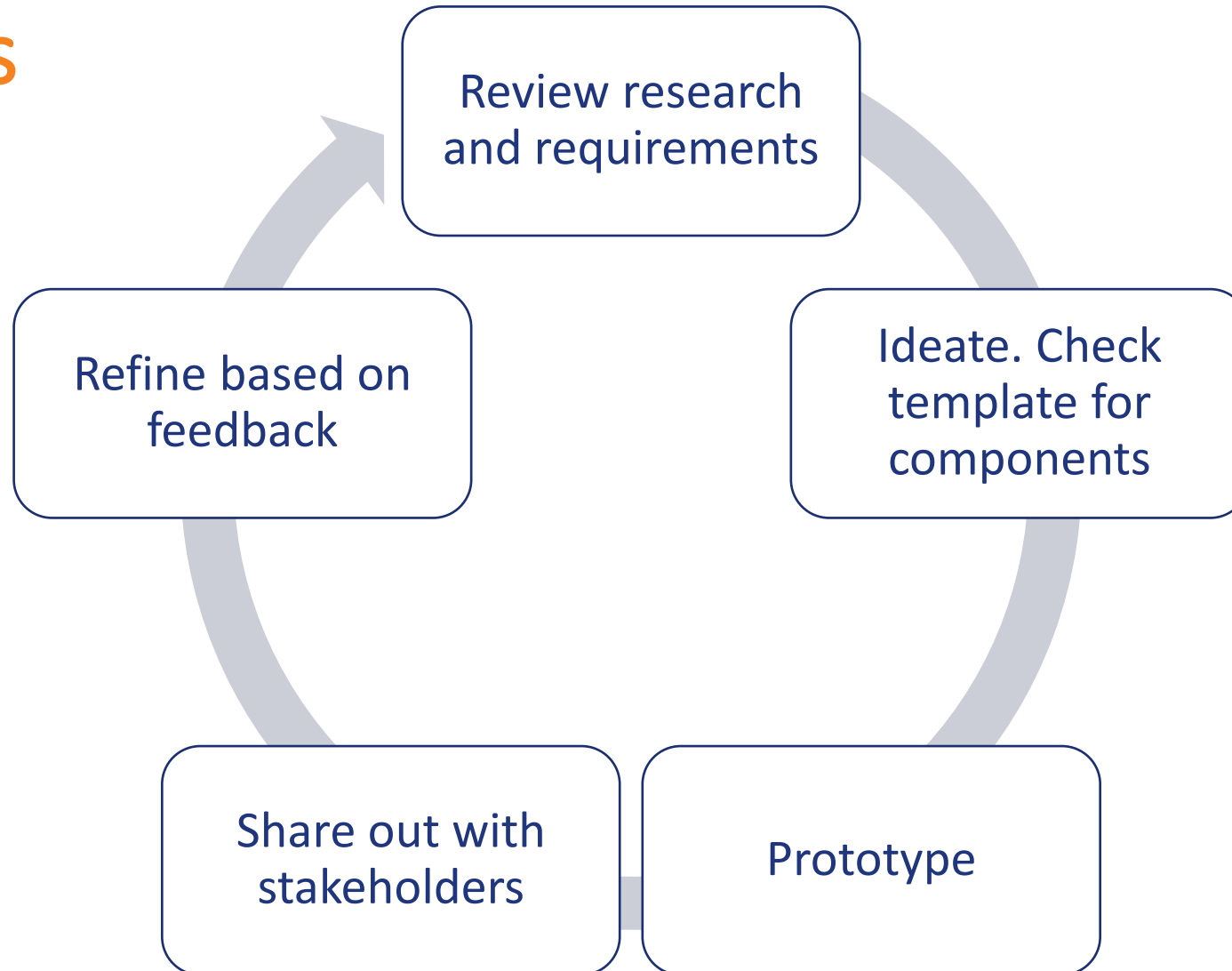
Saranya Ramasamy, CDT

Sirisha Ibrahim-Patnam, CDT

Sandeep Johl, CDT

User experience and content

UX design process



Research

- Desk research on funding sources, executive notice
- Stakeholder workshop (audience, business requirements)
- User interviews
- Desk research on dashboards, data tables, and maps
- 1 usability test

Requirements and user needs

Business requirements

- Collect project data
- Showcase projects over time
- Show projects on a map
- Make it intuitive

User needs

- Individual or Legislature: Find projects that affect my community
- Reporter: Find projects that I can report on
- Plain language
- Accessible

Design tools

- State Template V6 components
- State Template UI kit
- Figma
- Coda (for documenting specs)
- Getty images for placeholder

State template V6 Homepage (pt 1)

Items from the state
template:

- Header
- Navigation
- Feature banner
- Typography
- Blockquote

Official website of the State of California

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Home About More resources

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It will help us fight some of our toughest problems.

<p>Dollars at work now</p> <p>\$41 billion</p>	<h4>Climate change</h4> <p>More clean energy will keep millions of tons of carbon out of our air</p>	<h4>Equity</h4> <p>These investments will benefit communities disadvantaged by pollution, discrimination, lack of services</p>	<h4>Jobs</h4> <p>These projects will add 400,000 jobs to our economy over 10 years</p>
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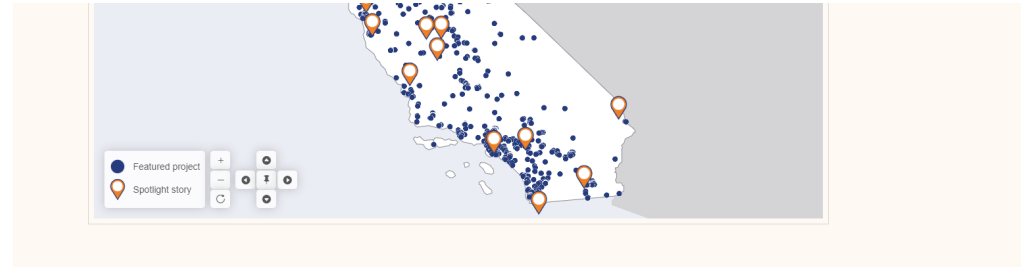
 “California is building more, faster – and creating thousands of good-paying jobs in the process. This goes far beyond roads and bridges – this is about investing in our communities and our families, giving opportunity to hard-working Californians and ensuring we deliver on our world-leading climate goals.”

– Governor Gavin Newsom

State template V6 Homepage (pt 2)

Items from the state
template:

- Form elements
- Modal
- Footer



Project list

Learn more about these projects. You can sort and filter by county, topic, or type, or search by project name. The **Details** link will take you to more information about an individual project.

Note: Projects tagged as "Multiple Counties" cross at least one county line. These projects will appear when you filter on an included county.

[Export filtered list](#) [Export all](#)

County	Project	County	Topic	Project details
All	980 Corridor Alternatives Study (Vision 980 Study-Phase 1)	Alameda	Transportation	Details
All	AC Transit - Division 4 Hydrogen Fueling Infrastructure Upgrade	Alameda	ZEV	Details
All	Alameda County Near Livermore from Grant Line Road Undercrossing to 0.1 Mile East of North Flynn Road Install Lighting System	Alameda	Safety	Details
	Alameda County Near Livermore from Grant Line Road Undercrossing to 0.1 Mile East of North Flynn Road Install Lighting System	Alameda	Safety	Details
	Alameda County Near Oakland at Various Locations from 0.1 Mile North of 7TH Street Undercrossing to 0.5 Mile North of 16TH Ave Overcrossing. Crash CU	Alameda	Roads, Bridges and Major Projects	Details
	Alameda County Outer Barrier Separation Between Route 13 and Two Frontage Roads	Alameda	Safety	Details
	Alameda County at Sunol and in Pleasanton and Dublin Precast Concrete Pavement and Hma	Alameda	Roads, Bridges and Major Projects	Details
	Alameda County in Berkeley and Albany from 0.6 Mile North of University Avenue Overcrossing to 0.3 Mile South of EL Cerrito Separation and Overhead E	Alameda	Roads, Bridges and Major Projects	Details
	Alameda County in Berkeley at Various Locations from Domingo Avenue to Mabel Street Upgrade Ada Curb Ramps, Hma, and Modify Signal & Lighting.	Alameda	Roads, Bridges and Major Projects	Details
	Alameda County in Fremont from North End of			

Previous 1 2 3 4 5 ... 110 Next

Alameda County Near Livermore from Grant Line Road Undercrossing to 0.1 Mile East of North Flynn Road Install Lighting System

Topic: Transportation
Type: Featured project
Agency: Department of Transportation

Funding: \$288,000
Funding type: Formula
Location: Alameda
Status: Awarded
Source: [Invest.gov](#)

Close

Design challenge

Challenge: Display 9 column table.

Problem: Horizontal scrolling across many empty cells, too much info at a time.

Solution: Modal. Display table with 3 data columns and a details link. Link opens a modal with more information.

The screenshot shows a web application interface for managing broadband projects. On the left, there is a 'List filter' section with dropdown menus for 'County' (set to 'All'), 'Topic' (set to 'Selected (1)'), and 'Type' (set to 'All'). Below these is a search box for 'Search listed projects' and a 'Reset' button. The main area is a table with columns: 'Project', 'County', 'Topic', and 'Project details'. The table lists several projects, including 'Fiber Master Plan and Broadband Expansion' in Alameda County. A modal window is open over the table, displaying details for the 'Colusa County Broadband Network Design' project. The modal includes fields for 'Topic: Broadband', 'Type: Featured project', 'Budget: \$500,000', 'Location: Colusa', a 'Related link' to a CPUC website, and 'Source: California Infrastructure Strike Team'. An 'Investment description' paragraph is also present. A 'Close' button is located at the bottom right of the modal.

Project	County	Topic	Project details
Fiber Master Plan and Broadband Expansion	Alameda	Broadband	Details
Oakland Last-Mile Connectivity Planning & Design project	Alameda	Broadband	Details
Alpine County Broadband Network Design	Alpine	Broadband	Details
Amador County Broadband Network Design	Amador	Broadband	Details
Butte County Broadband Network Design	Butte	Broadband	Details
Chico Fiber Utility Network Design	Butte	Broadband	Details
Oroville Broadband Network Design	Butte	Broadband	Details
Calaveras County Broadband Engineering Unserved/Underserved	Calaveras	Broadband	Details
ReConnect - Calaveras County Broadband Infrastructure Design	Calaveras	Broadband	Details
Colusa County Broadband Network Design	Colusa	Broadband	Details

Colusa County Broadband Network Design

Topic: Broadband

Type: Featured project

Budget: \$500,000

Location: Colusa

Related link: <https://www.cpuc.ca.gov/industries-and-topics/internet-and-phone/broadband-implementation-for-california/local-agency-technical-assistance>

Source: [California Infrastructure Strike Team](#)

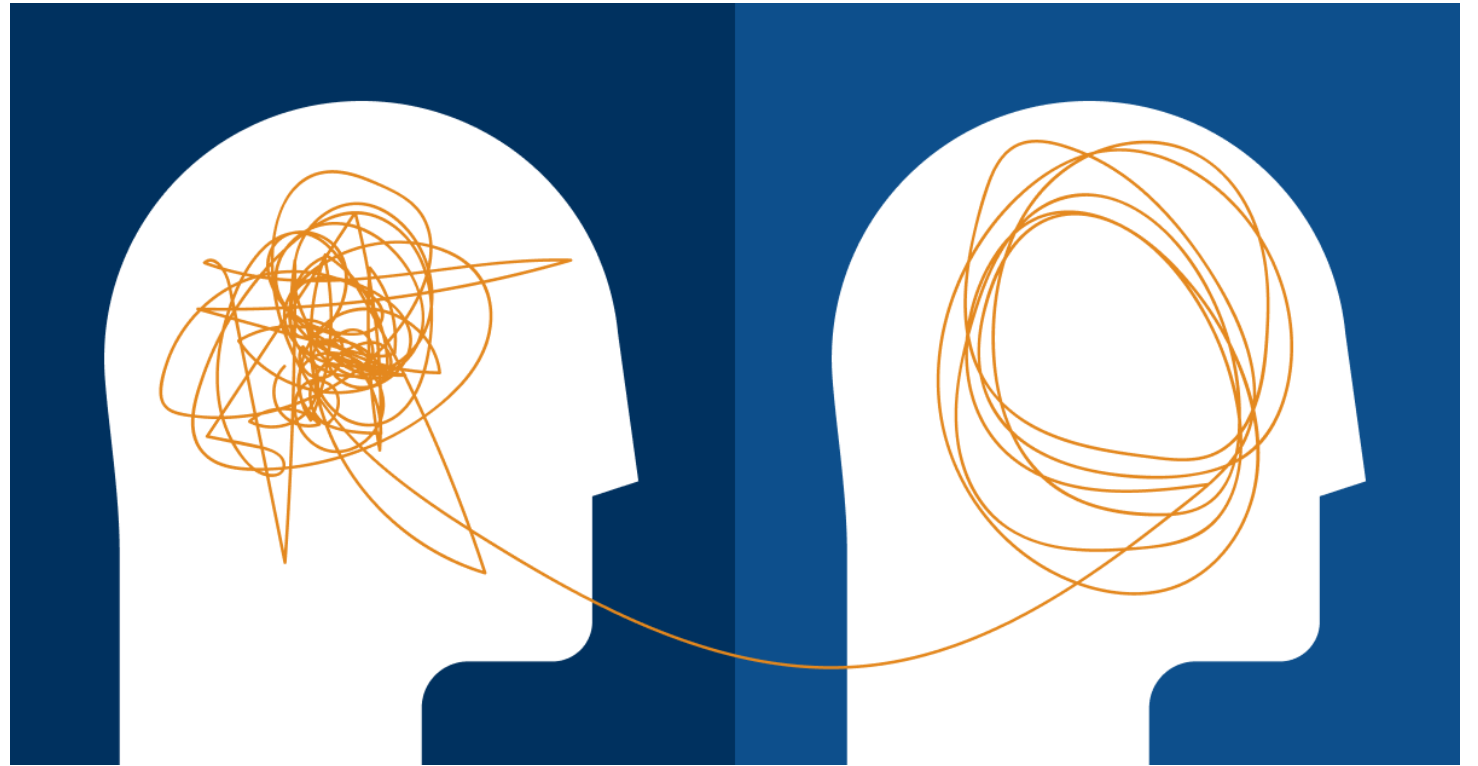
Investment description: The proposed technical assistance grant will fund network design services, and include development of Conceptual Network Designs and Cost Estimations; High-Level Design and Foundational Planning; leading to Low-Level Design and Engineering of constructible and shovel-ready project area(s) that will provide service to households and businesses.

[Close](#)

Content

Plain language:

Text your audience can understand the first time they read it.



Content

Why we use plain language

Lowers barriers to understanding

Reduces frustration

Serves people better

Adds to equity

Content

Plain language standard



Reading level of
Grade 8 or less



Short, simple
sentences



Small, common
words



Active voice

Content

Plain language process



Content Result

19 easy-to-read
project stories

Electric school buses help power the grid

Topic: ZEV

Type: Spotlight story

Phase: Post-award

In 2016, Twin Rivers Unified became the first school district in California to use electric school buses. Since then, the district has expanded its fleet. These buses don't just keep the air cleaner in Sacramento. They also use a vehicle-to-grid technology that sends power back to the grid.

[Learn more](#)



Close

Accessibility

Accessibility Process

Accessibility checks include:

- Manual testing
 - Keyboard navigation
 - Screen reader (JAWS and NVDA)
- Automated testing
 - Browser extension
 - DOM Tool extension

Accessibility Automated Tools

Tools we typically use are:

- WAVE Evaluation tool (browser extension)
- Color Contrast Analyzer
- Siteimprove (browser extension)
- axeDev Tools extension (DOM inspector extension)

Accessibility – Map and Table

Key accessibility items:

- How content was read using a screen reader.
- User interaction when using a keyboard on the site.

Accessibility – Using a screen reader

Manual test included:

- Listening and checking content was reading properly.

Accessibility – Using a keyboard (Map)

Manual map test included checking the :

- Focus of each interactive element.
- Navigation from county to county.
- Navigation between dots within the active county.
- Opening and closing the map dots.

Accessibility – Using a keyboard (Table)

Manual table test included checking the :

- Focus on each drop-down component.
- Navigation between each drop-down.
- Filters applied to the data table when checkboxes were selected.
- Navigation between each detail link in the table rows.

Data, map, and tech

Data challenges

Data availability

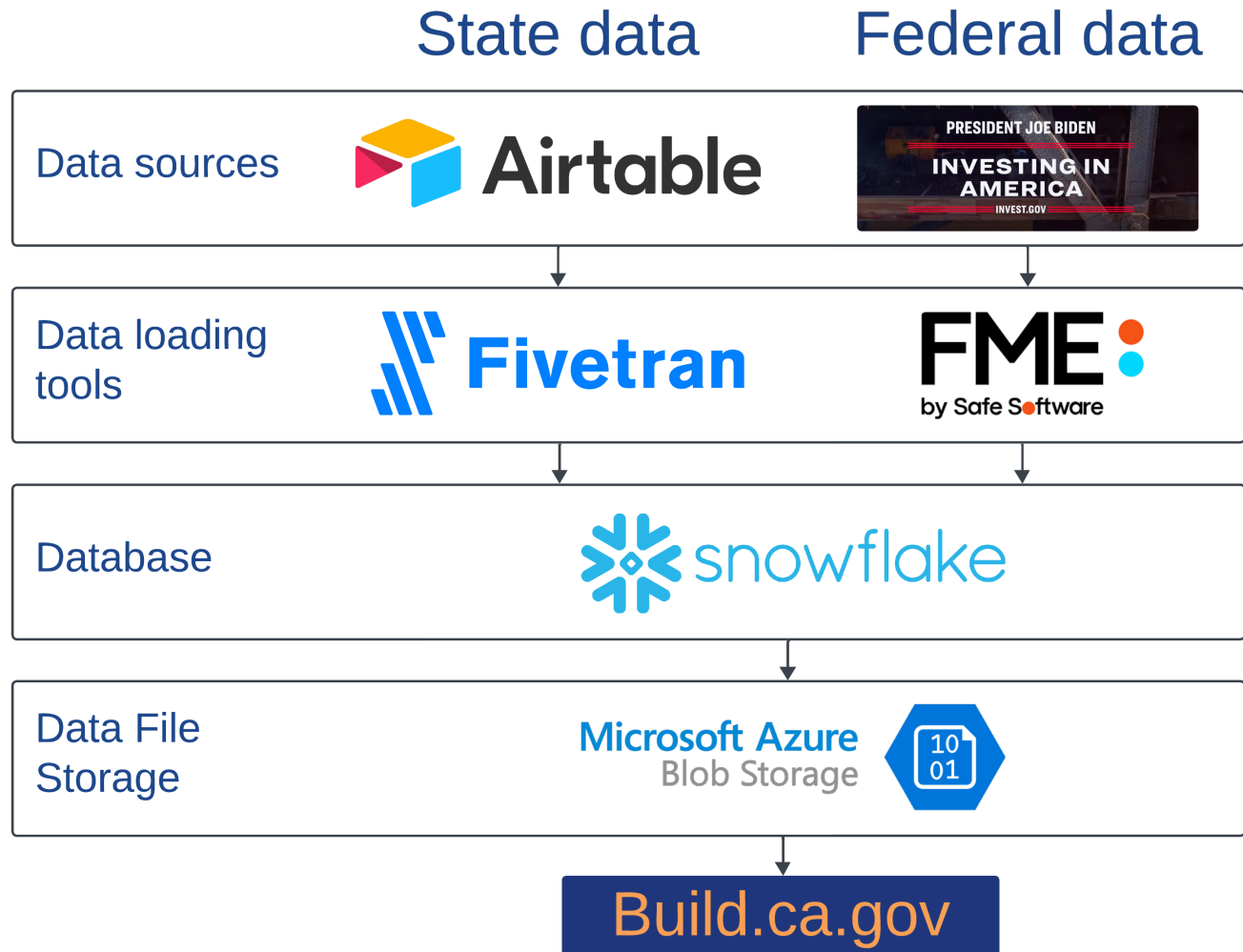
Incompatible data

Managing State data

Map data

Data pipeline

- Two data sources and two data loading tools
- Database merges pipelines



State data source and loading tool



Airtable

- Data is input by State workgroups into individual topic tables
- Data is then synced into single table for the data pipeline ingestion

Fivetran

- Automated ELT (extract, load and transform) process moves data from Airtable to Snowflake every 24 hours

Federal data source and loading tool



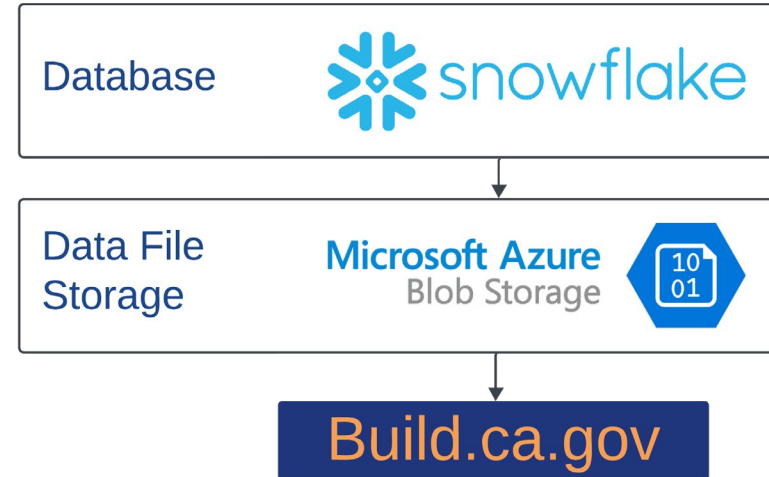
Invest.gov

- Whitehouse infrastructure funding tracking website

FME

- FME is used to automate the download of the xlsx Invest.gov data from the "Download the map data" link
- FME is also used to download the GeoJSON backend map display data from Invest.gov

Database and file storage



Snowflake

- State and federal data are joined and modeled in table views
- Stored procedure creates a JSON file that is loaded into staging Azure blob storage

Microsoft Azure Blob Storage

- Staging JSON file is moved to production blob storage using an email trigger sent to Azure Data Factory once data is finalized
- Build.ca.gov calls the production JSON file for project table and map

Table development

DataTables plugin

PROS

- Instant client-based search and filtering
- Good documentation and community support

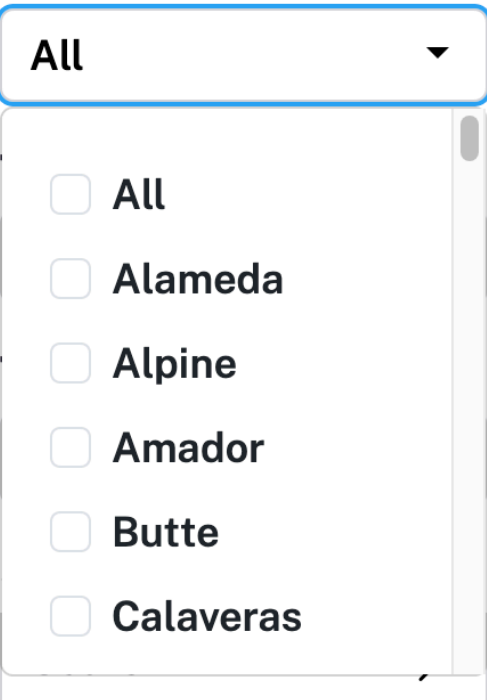
CONS

- Bulky JS and CSS libraries
- jQuery dependency

Checkboxes dropdown component

Developed custom dropdown component with checkboxes

County



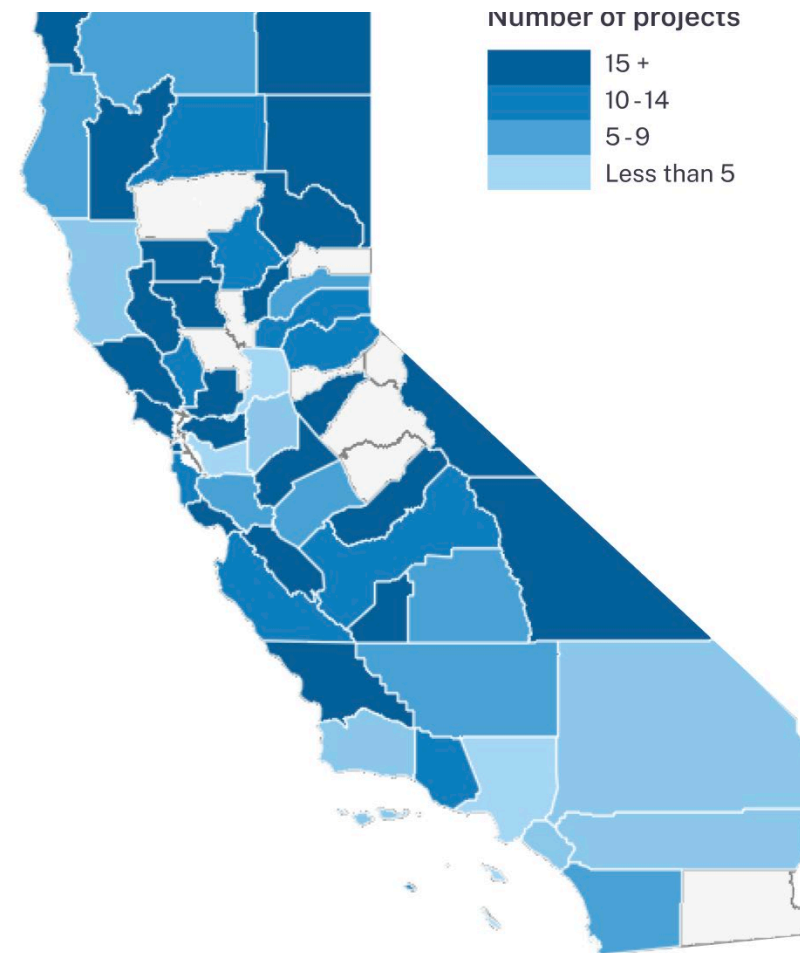
The image shows a custom dropdown menu for selecting a county. The dropdown is titled "County" and has a blue border. The selected option is "All", which is displayed in the dropdown header. Below the header, a list of counties is shown, each with an unchecked checkbox: "All", "Alameda", "Alpine", "Amador", "Butte", and "Calaveras". The dropdown is open, and the list of counties is visible.

Custom dropdown
component with
checkboxes

Evolution of the map

Infrastructure project original map solution

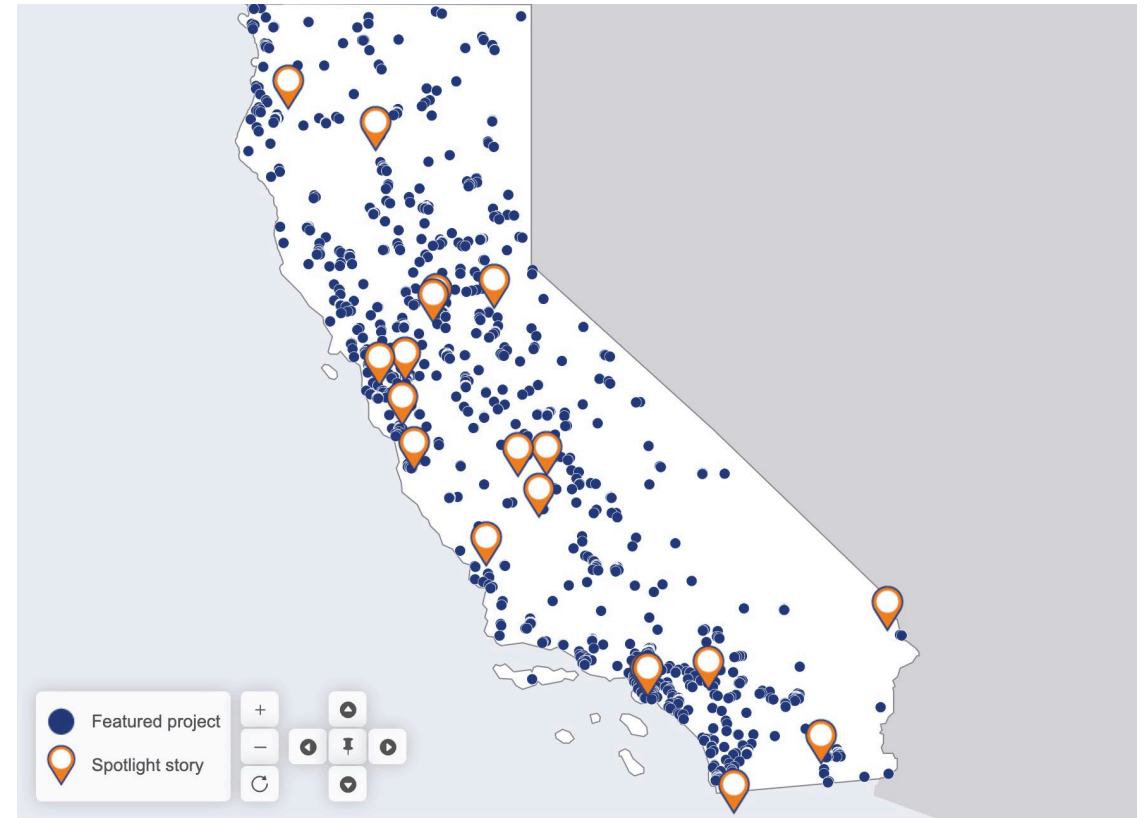
- ESRI base map layer
- 58 D3 interactive color-coded county outlines
- Zooms in county outline on click and filters the table.



Infrastructure project original map solution

Map challenges

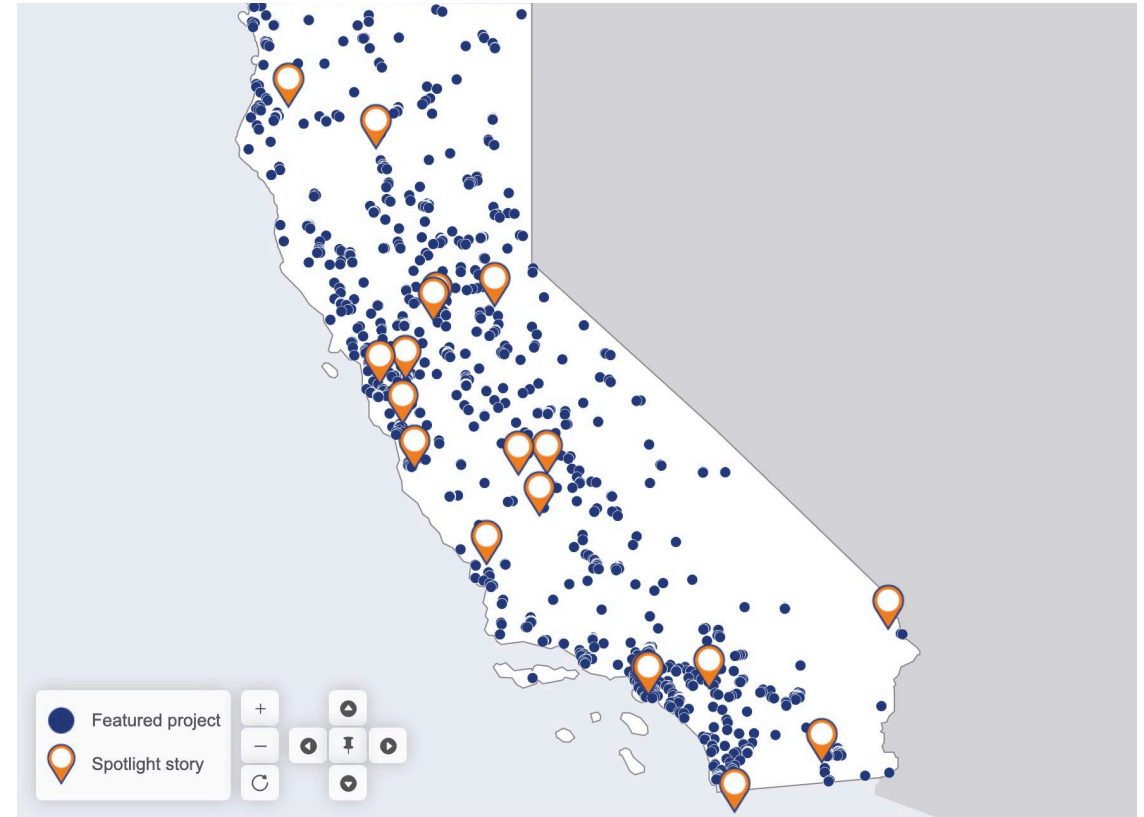
- Show 2700+ individual projects
- Many project did not have lat. and long.
- View projects details on click
- Making map accessible (tabbing through all the projects)



Infrastructure project current map solution

Map solutions

- Added D3 dots for each project
- Scattered projects with no exact location around a county centroid
- Integrated State template modal functionality with project details for each project
- Introduced keyboard shortcuts to speed up the tabbing through the map



Infrastructure project current map solution

Tech stack



State Web Template
eleventy framework



JS libraries: Maplibre,
ESRI, D3 libraries
(map)

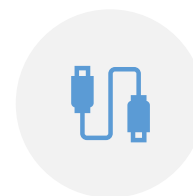


Table:
DataTables plugin



Azure data storage
services
and pipelines



Airtable,
Snowflake, Geojson

Questions



**DIGITAL
WEB
SERVICES
NETWORK**

Design System

Koji Kumpulainen, Jon Grant,
Carter Medlin

Core team

Leadership

Koji Kumpulainen

Artem Khomishen

Greg Duncan

Product management

Alice Nguyen

UX Team

Angelina Gerasimov

Ryan Hamilton

Sharon Rabang

Developers

Jon Grant

Carter Medlin

Partners

All y'all.

What are design systems?

In general, design systems act as a centralized collection of design resources crafted for a specific company or brand. This is to ensure that teams on different projects all create products that have a consistent look and feel.

They usually have pre-built component libraries, styles, and guidelines.

The way we define a design system: **A Design System is a collection of solved problems.**

Our objective with Eureka

Create a design system of known, tested, and proven solutions
to improve the digital experience for all Californians.

We're going to accomplish this objective by

01

Taking what we've learned from the State Web Template and Design System Beta

02

Conducting user research

03

Testing designs with users

04

Partnering with you

Main Goals



Improve

website performance (speed and responsiveness) and accessibility



Create

a cohesive UX with familiar interactions across all CA.gov



Bridge

the gap between designers and developers



Provide

guidance on design, content, and development

Main Goal

Community.

Design systems are for people, so we prefer:

- **community > control**

There is no design system—Jina Anne



State Template Problems

Difficult to upgrade

Confusing Classes

Global JS & CSS

DIVs everywhere



Web
Components
to the rescue!

What is a Web Component?

JavaScript
Module

- JS, CSS, HTML

Custom Tag
definition

- `<ca-page>`

Shadow DOM

- Encapsulated


```
<div class="accordion">
  <details>
    <summary>Topic Header</summary>
    <div class="accordion-body">
      <p>
        Accordion body text
      </p>
    </div>
  </details>
</div>
```



```
<ca-accordion data-summary="Topic Header">
  <p>
    Accordion body text
  </p>
</ca-accordion>
```



Easy definition

- No classes
- No DIVs
- We take care of the layout
- Customize with events

```
div.accordion > summary {  
  font-size: large;  
}
```



```
summary {  
  font-size: large;  
}
```



Simple CSS

- Applies only to the Web Component
- No more global classes
- No collisions with other code
- Smaller bundles

Easy upgrading



Design System Bundler



One small JS file with
only what you use



No more frameworks

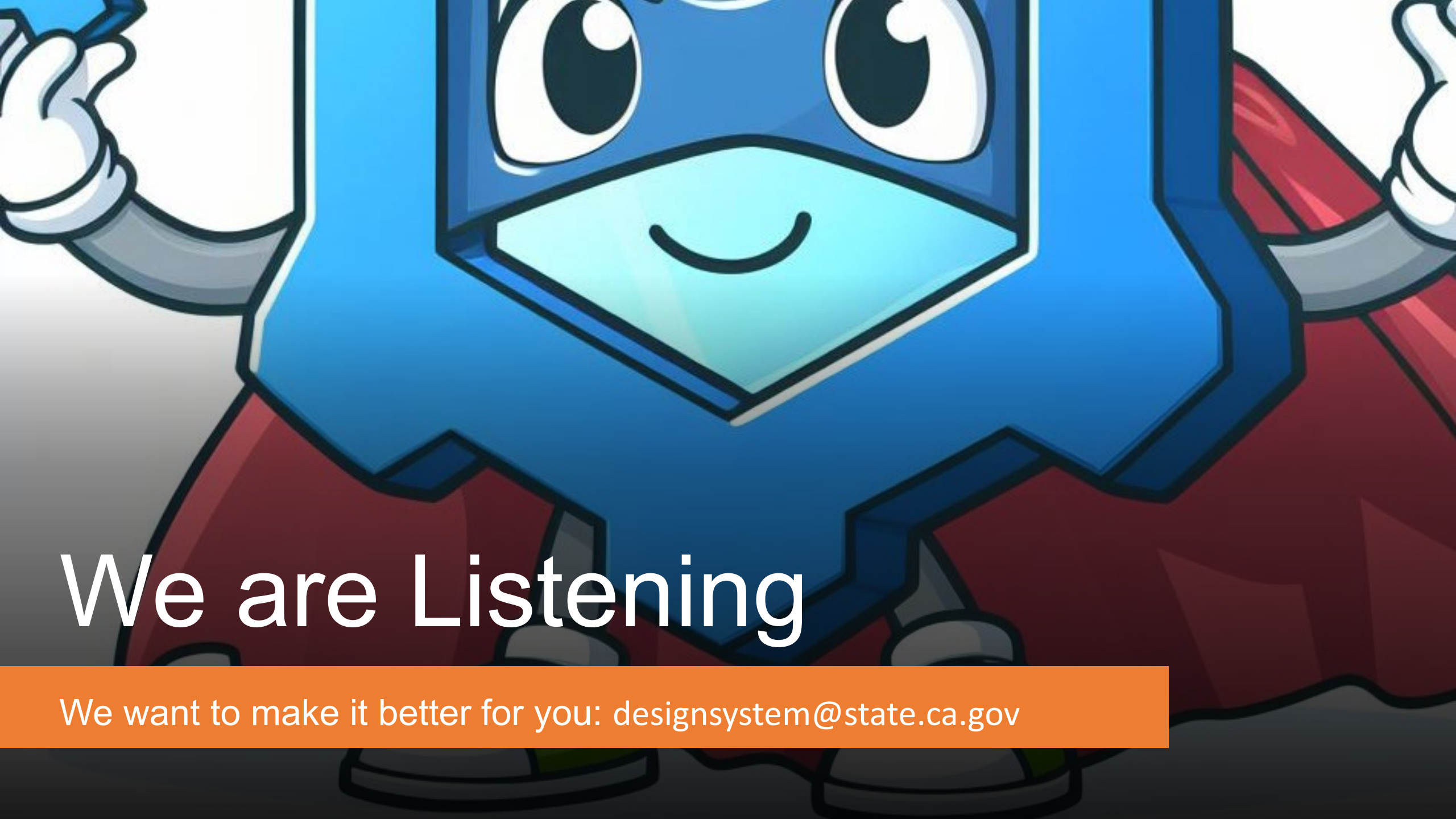
Live Feedback



Website Auditing



Track Module Usage



We are Listening

We want to make it better for you: designsystem@state.ca.gov



DIGITAL WEB SERVICES NETWORK

Big idea/ Open Discussion

Harvey Dhillon
Web Consulting
California Department of
Technology



DIGITAL WEB SERVICES NETWORK

Suggested Future Topics
Closing Remarks

Koji Kumpulainen
State Web Services Manager
California Department of Technology

Thank you

Post conference materials will be published on the [DWSN Website](#).

For questions, please write to: DigitalWebServicesNetwork@state.ca.gov



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