Building a React Component Library for Geospatial Web Map Applications

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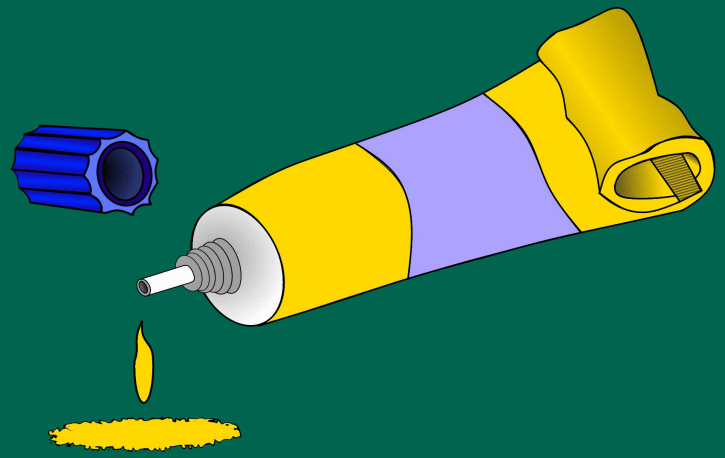
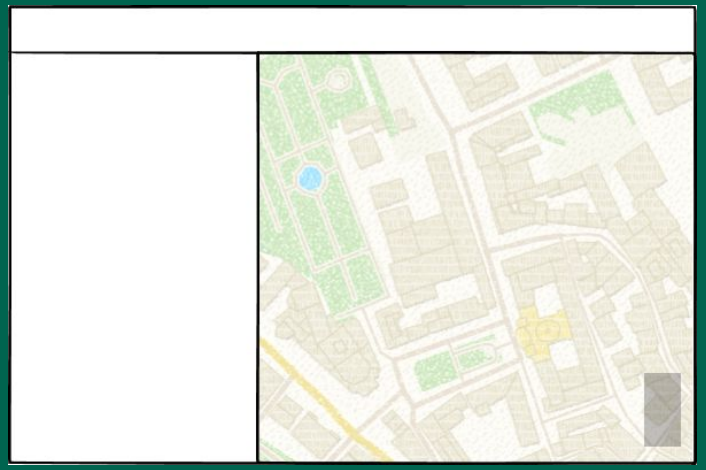
Background

- Sparkgeo provides
  - Strategic geospatial advice + consulting
  - Geospatial analysis + data acquisition
  - Cloud-centric geospatial software dev
- “Glue company”
- Solve problems by assembling solutions from different technologies, gluing them together with custom code and cloud technology
- Build with open-source tech, around open standards + specs like STAC, COGs + OGC APIs



Background

- With geospatial user interfaces (UIs), we're often repeating ourselves
- Common page layouts (navbar, side panels, map etc)
- Similar components
    - layer cards with toggles, filtering, legends, date ranges, timeline sliders, dropdowns, location search, item description/metadata



Source: Michael Gaigg / mapuipatterns.com

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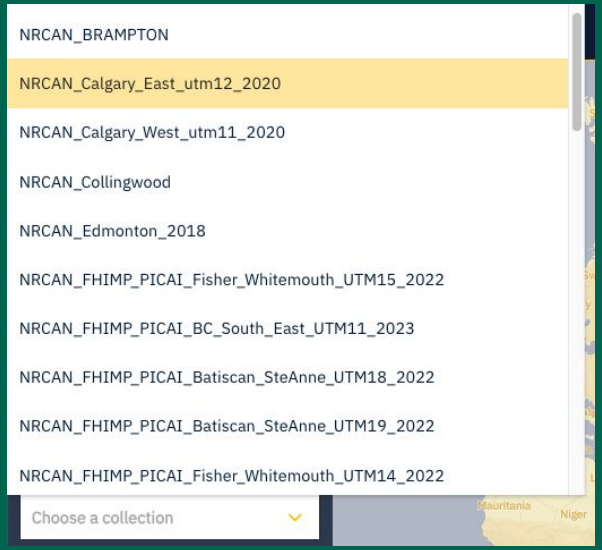
Source: globalfishingwatch.org



Source: Prescient Explorer

Background

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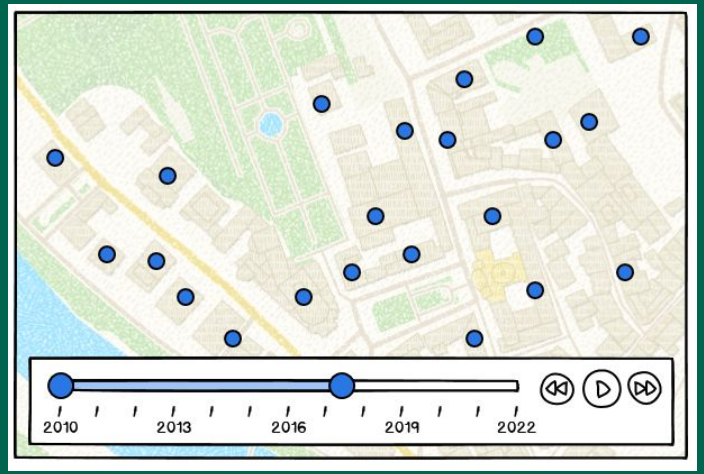
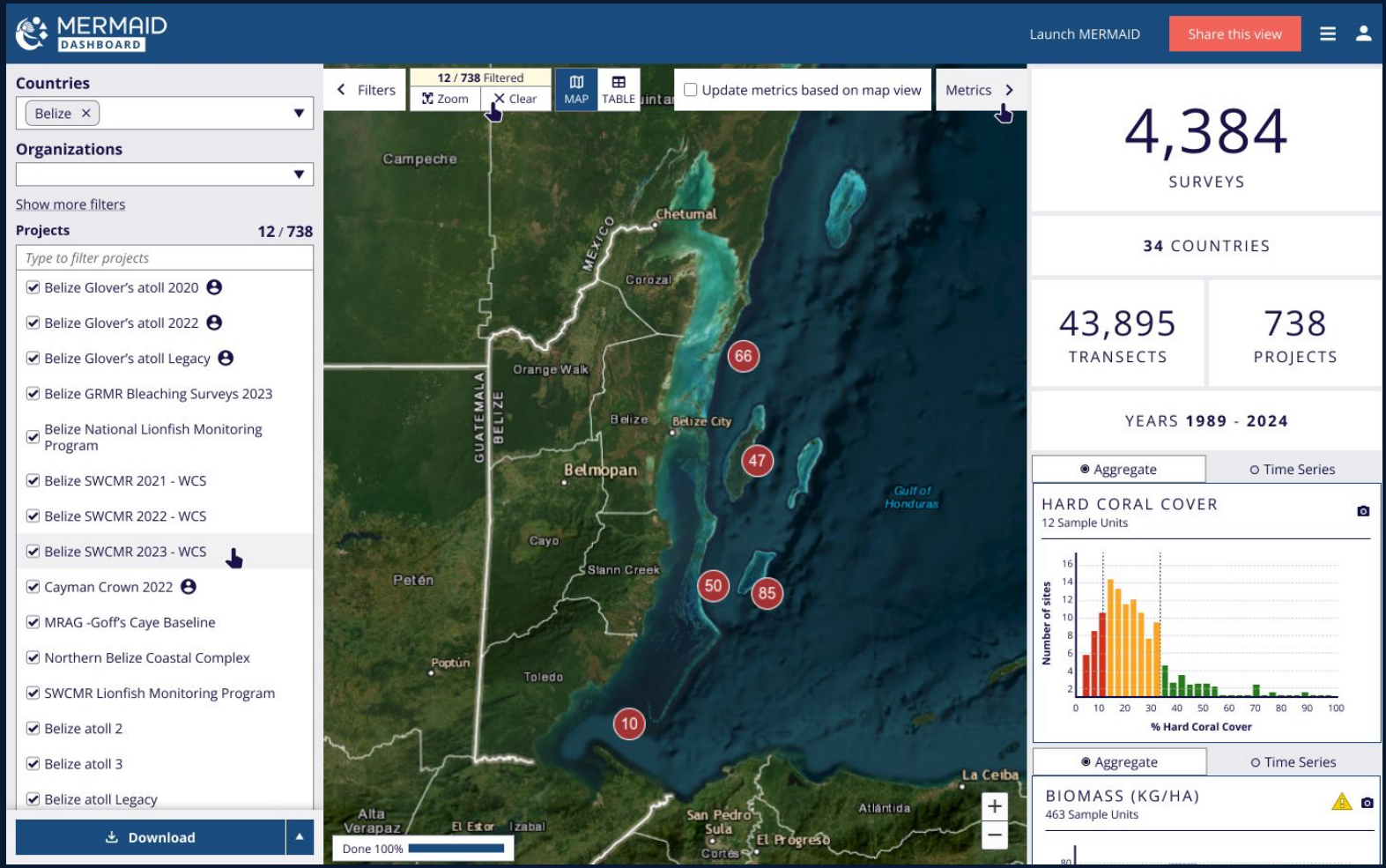


Source: Michael Gaigg / mapuipatterns.com


MERMAID
DASHBOARD
Launch MERMAID
Share this view
Countries
Belize
Organizations
Show more filters
Projects
12 / 738
Type to filter projects
Belize Glover's atoll 2020
Belize Glover's atoll 2022
Belize Glover's atoll Legacy
Belize GRMR Bleaching Surveys 2023
Belize National Lionfish Monitoring Program
Belize SWCMR 2021 - WCS
Belize SWCMR 2022 - WCS
Belize SWCMR 2023 - WCS
Cayman Crown 2022
MRAG -Goff's Caye Baseline
Northern Belize Coastal Complex
SWCMR Lionfish Monitoring Program
Belize atoll 2
Belize atoll 3
Belize atoll Legacy
Download
Filters
12 / 738 Filtered
Zoom
Clear
MAP
TABLE
Update metrics based on map view
Metrics
Campeche
Chetumal
Corozal
Orange Walk
Belize
Belize City
Belmopan
Cayo
Petén
Poptún
Toledo
Stann Creek
Gulf of Honduras
La Ceiba
Atlántida
San Pedro Sula
El Progreso
Cortés
Alta Verapaz
El Estor
Izabal
66
47
50
85
10
Done 100%
4,384
SURVEYS
34 COUNTRIES
43,895
TRANSECTS
738
PROJECTS
YEARS 1989 - 2024
Aggregate
Time Series
HARD CORAL COVER
12 Sample Units
Number of sites
% Hard Coral Cover
Aggregate
Time Series
BIOMASS (KG/HA)
463 Sample Units

geo

geo
ATLAS DATA MANAGER
TILESETS
mapbox Tileset
MAPBOX-STREETS-V8
User Tileset
FOREST
User Tileset
BOUNDARY
mapbox Tileset
COUNTRY-BOUNDARIES-V1
User Tileset
BUILDINGS
User Tileset
HIGHWAYS
User Tileset
WATERWAYS
UPLOAD
mapbox

geo

Area of Interest

Box | Point

Your bounding box is roughly 5 km²

Time Range

All times are in Coordinated Universal Time (UTC). Your time is currently UTC -7 hours.

September 05, 2023, 00:00

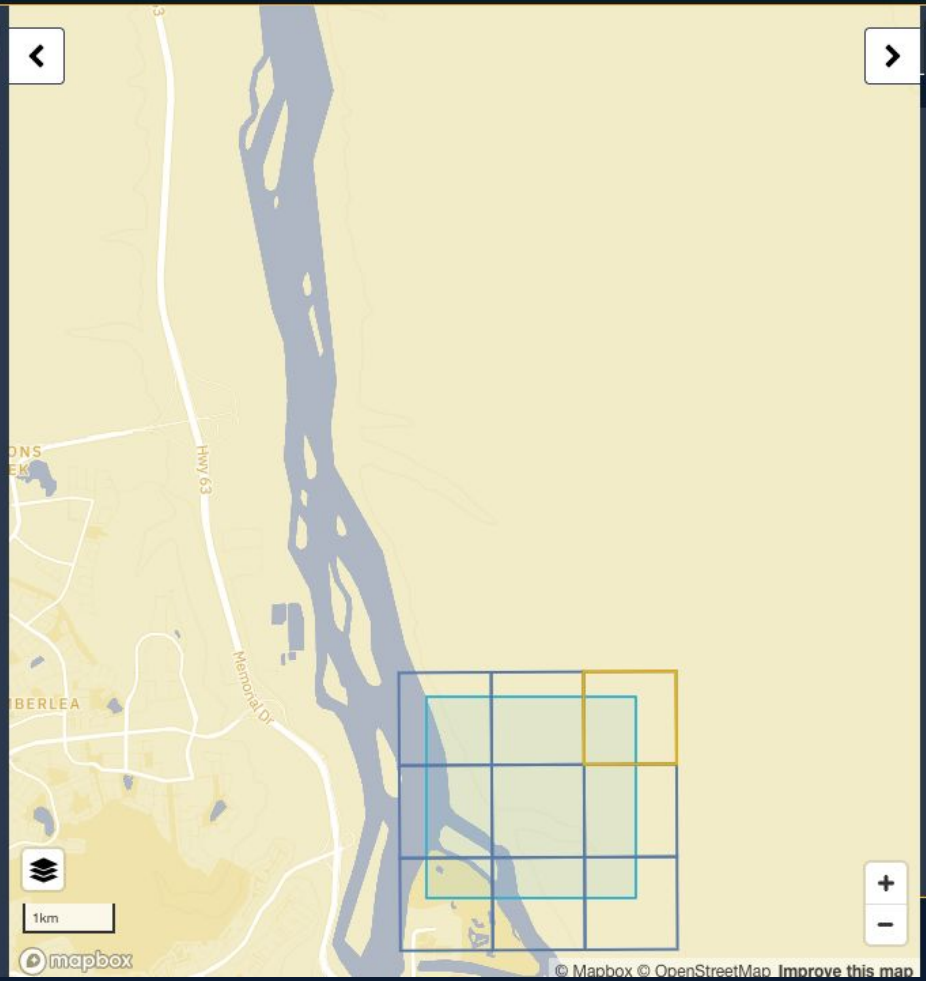
September 05, 2024, 23:59

Collections

Choose a collection

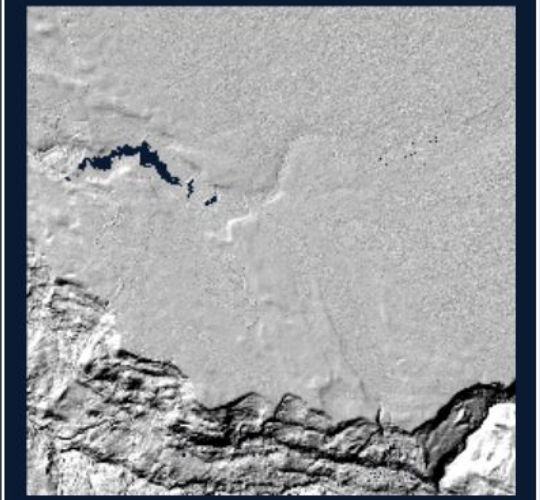
Advanced Filters

+ Add Filters



Items

Sort Results



Collection

ID UTM_N12_478_6289

Captured 2/28/2020, 4:00:00 PM

Show More

Download Selected Scene...

NRCAN: Brampton

Source | Share | Language: English

in sparkgeo.server.prescient.earth | Up | Browse | Search

stac-browser

Description

CanElevation NRCAN Collection

License proprietary

Temporal Extent 2/5/2019, 12:00:00 AM UTC - 4/5/2019, 12:00:00 AM UTC

Provider

Sparkgeo PROCESSOR HOST

Items

« First | ‹ Previous | Next › | Hide Filters

Filters

Temporal Extent

All times in Coordinated Universal Time (UTC).

Spatial Extent

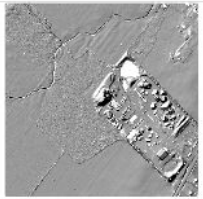
Filter by spatial extent

Items per page

Default (12)

Number of items requested per page, max. 10000 items.

Submit | Reset



UTM_N12_590_4838

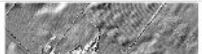
COPC COG

4/5/2019, 12:00:00 AM UTC

UTM_N12_598_4836

COPC COG

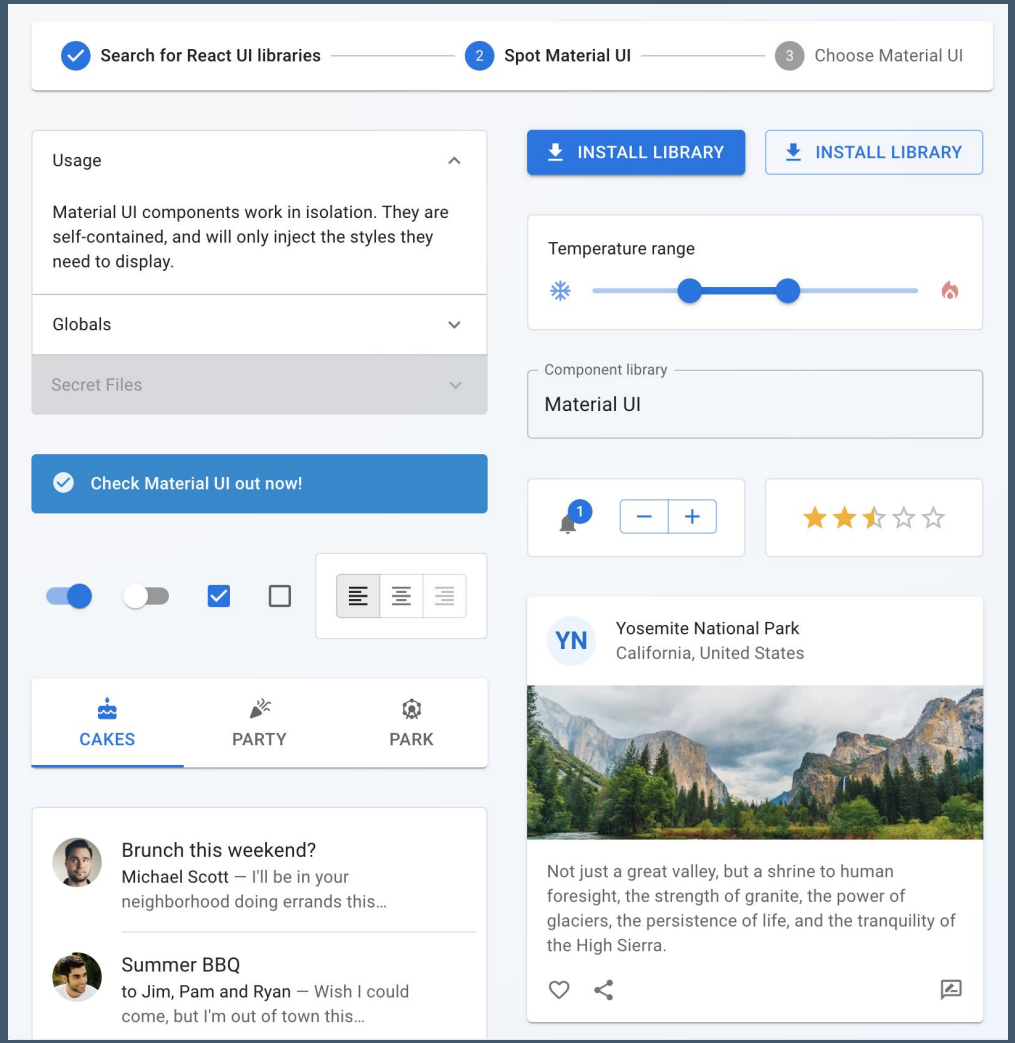
4/5/2019, 12:00:00 AM UTC

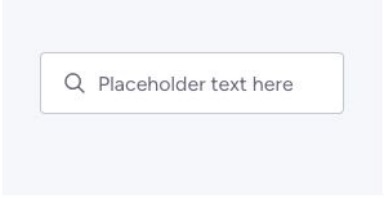


Component libraries

- **React**: Component-based architecture
- **Component library**:
  - A separate collection of pre-built, reusable user interface (UI) elements to simplify and accelerate UI development.
  - Components are modular and can be reused across projects/applications.

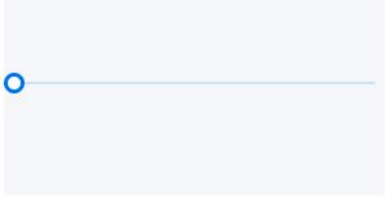
chakra


Search for React UI libraries
2
Spot Material UI
3
Choose Material UI
Usage
Material UI components work in isolation. They are self-contained, and will only inject the styles they need to display.
Globals
Secret Files
Check Material UI out now!
CAKES
PARTY
PARK
Brunch this weekend?
Michael Scott — I'll be in your neighborhood doing errands this...
Summer BBQ
to Jim, Pam and Ryan — Wish I could come, but I'm out of town this...
INSTALL LIBRARY
INSTALL LIBRARY
Temperature range
Component library
Material UI
1
YN
Yosemite National Park
California, United States
Not just a great valley, but a shrine to human foresight, the strength of granite, the power of glaciers, the persistence of life, and the tranquility of the High Sierra.



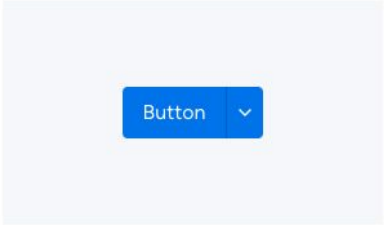
Search
Displays content classification.

Skeleton
Skeleton loading componet used to indicate content and ui loading.

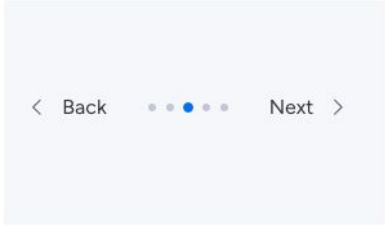


Slider
Displays a slider bar with range selection

Spinner
Displays information related to an element over it.



SplitButton
Dual-function menu button offers a default action and a secondary action



Steps
Steps display progress through a sequence of logical and numbered steps. They may also be used for navigation.

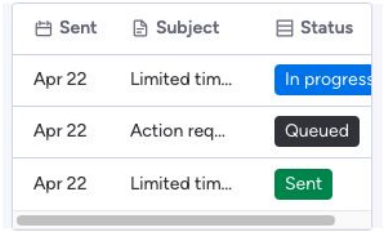
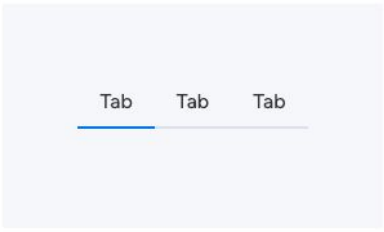


Table
Tables are used to organize data, making it easier to understand.



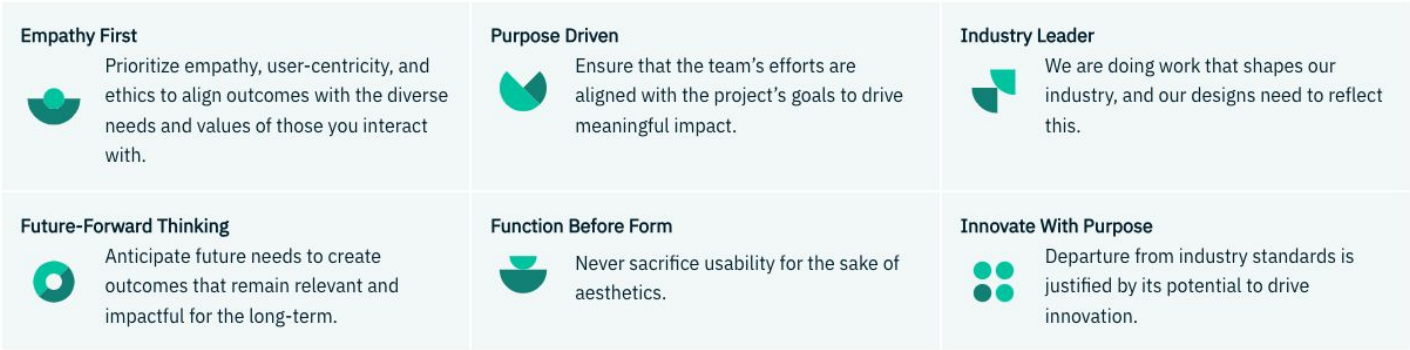
Tabs
Allow users to navigate between related views of content.

Text
The text component serves as a wrapper for applying typography styles to the text it contains.

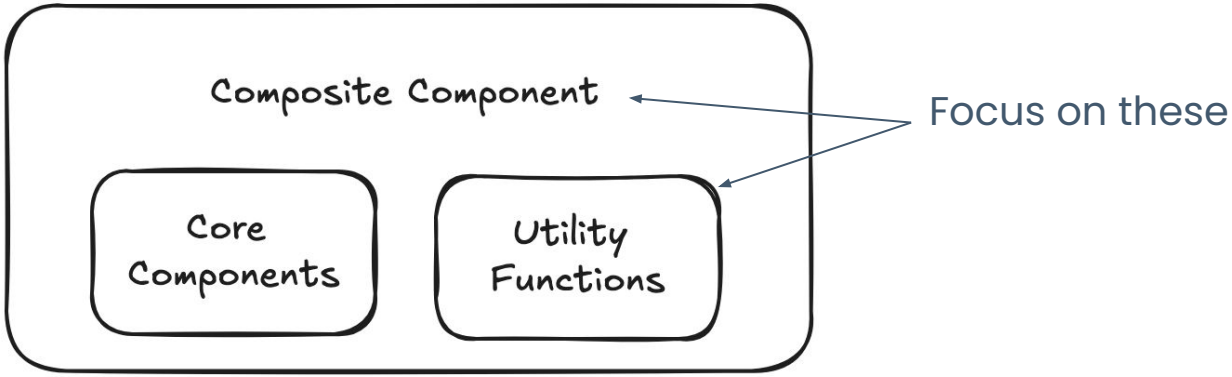
Source:
vibe.monday.com

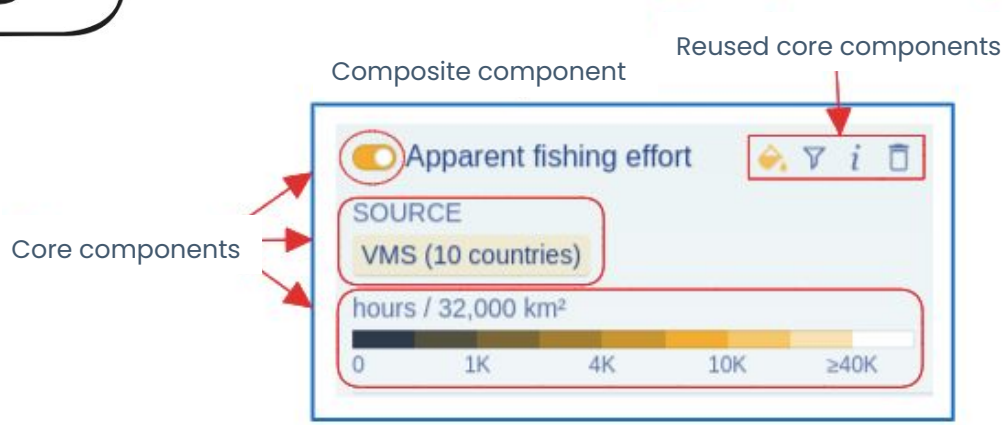
Strategy

- Open source
- Needs to add value. What's the niche?
    - "Is it useful now? If not, change something or stop doing it"
- Needs to be useful on a range of projects
  i.e. flexible and customizable
- Map library agnostic
- Focus on our design principles:



Approach

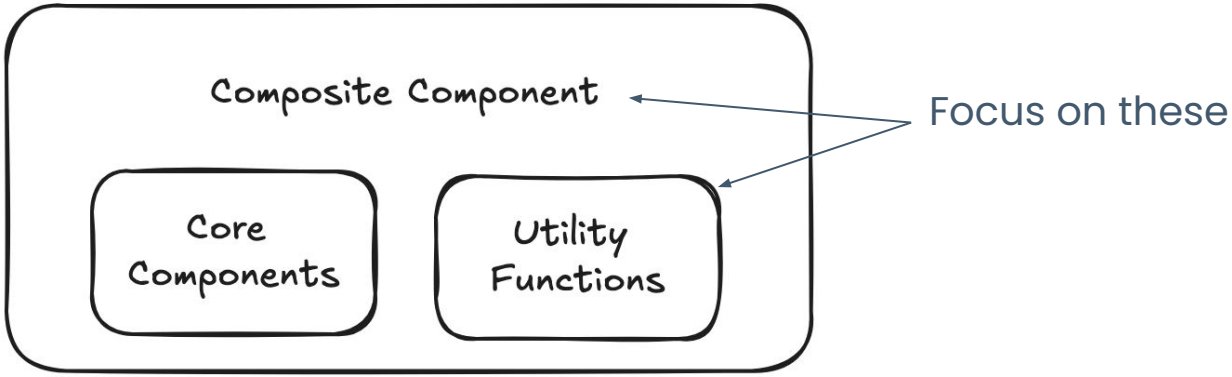




Source: globalfishingwatch.org

geo

Approach



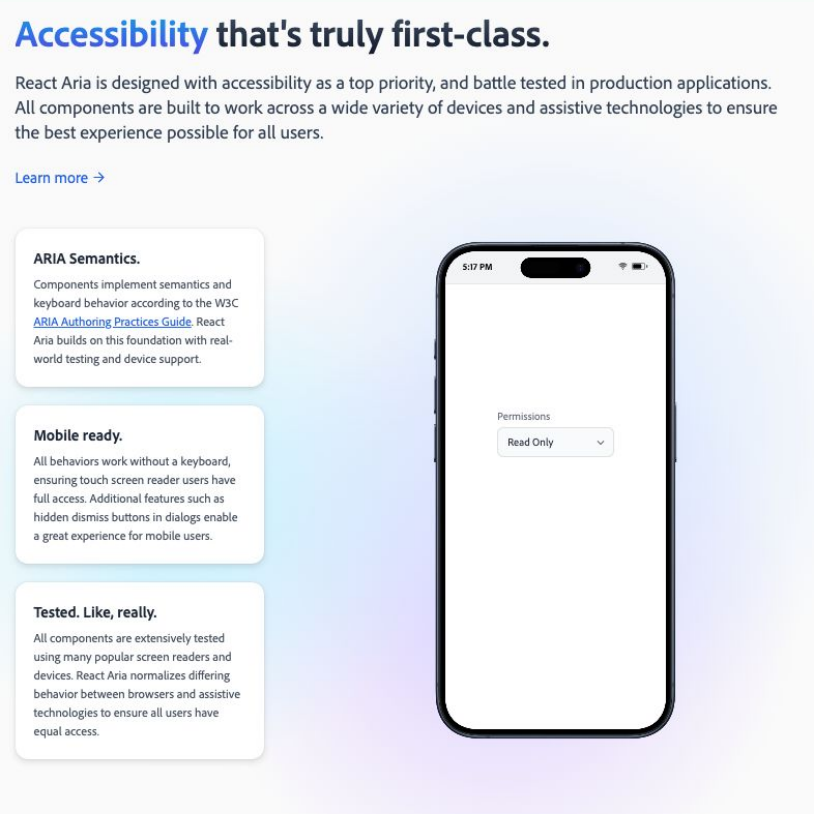
Select a collection: NRCAN_Brampton

geo

React Aria

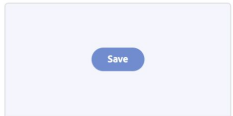
“React Aria is a collection of unstyled React components and hooks that helps you build accessible, high quality UI components for your own application or design system. If you’re building a component library for the web from scratch with your own styling, start here.”

(ARIA = Accessible Rich Internet Applications)



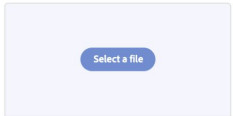
React Aria Components

Buttons



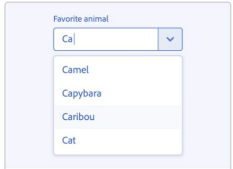
Button
A button allows a user to perform an action with a mouse, touch, or keyboard.

ToggleButton
A toggle button allows a user to toggle between two states.

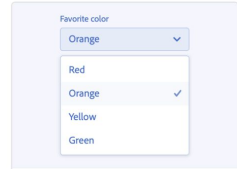


FileTrigger
A file trigger allows a user to access the file system with a Button.

Pickers

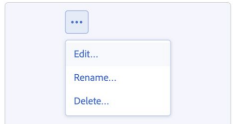


ComboBox
A combobox combines a text input with a listbox, and allows a user to filter a list of options.

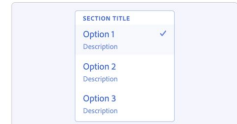


Select
A select displays a collapsible list of options, and allows a user to select one of them.

Collections



Menu
A menu displays a list of actions or options that a user can choose.



ListBox
A listbox displays a list of options, and allows a user to select one or more of them.

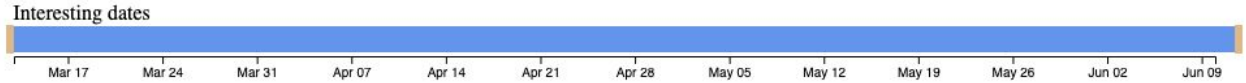
GridList
A grid list displays a list of interactive items, with keyboard navigation, row selection, and actions.

geo

Build bulletproof UI components faster

Storybook is a frontend workshop for building UI components and pages in isolation. Thousands of teams use it for UI development, testing, and documentation. Find out more at https://storybook.js.org!

DateRangeSlider



Show code

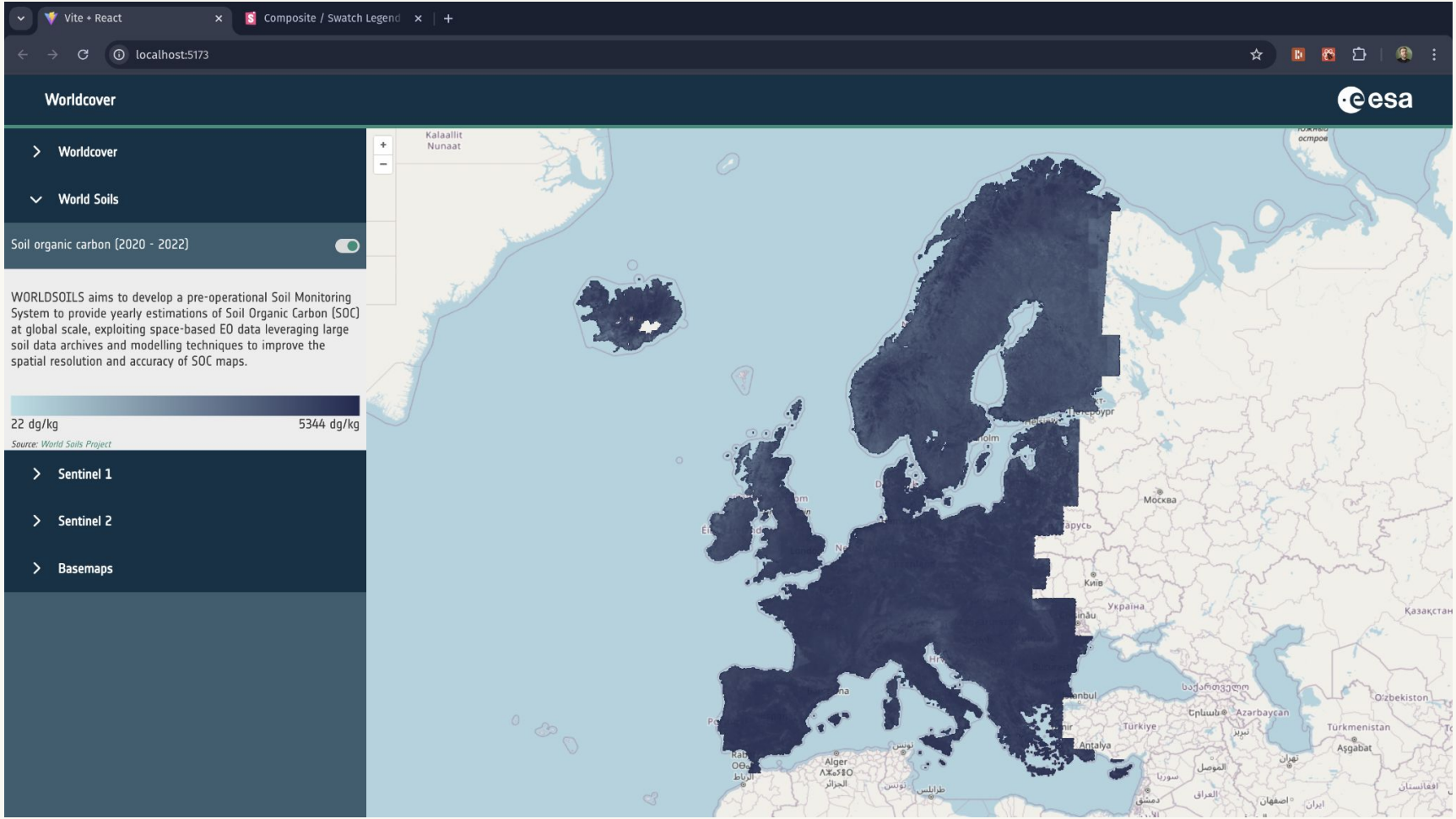
Name	Description	Default	Control
label *	`string`	-	Interesting dates
bounds	`{ min: Date, max: Date }`	-	bounds : { RAW min : 2024-03-13T07:00:00.000Z max : 2024-06-10T07:00:00.000Z }
valuesChanging	`func`	-	-
valuesChanged	`func`	-	-

Challenges

- Creating a library to share between projects is hard
  - New features/components initially driven by project demands. Coordination is tricky
  - Designing generic, customizable components
  - Theming/styling to match project requirements (i.e. customer branding)
  - Versioning and breaking changes
  - Reaching a consensus on technologies and tooling
  - Ensuring component are robust and well tested
  - Ensuring design guidelines and accessibility requirements are met

Challenges

- Creating and maintaining an **open source** project is even harder
  - Licensing
  - Modules
  - Publishing NPM packages
  - Versioning, releases, breaking changes
  - Repository set up
  - Managing issues
  - Developer onboarding
  - Community engagement


Vite + React
Composite / Swatch Legend
localhost:5173
Worldcover
esa
Worldcover
World Soils
Soil organic carbon (2020 - 2022)
WORLDSOILS aims to develop a pre-operational Soil Monitoring System to provide yearly estimations of Soil Organic Carbon (SOC) at global scale, exploiting space-based EO data leveraging large soil data archives and modelling techniques to improve the spatial resolution and accuracy of SOC maps.
22 dg/kg
5344 dg/kg
Source: World Soils Project
Sentinel 1
Sentinel 2
Basemaps
Kalaallit Nunaat
Москва
Київ
Україна
Türkiye
Antalya
Azərbaycan
Türkmenistan
Aşgabat
O'zbekiston
Alger

What's next

- Make the repo public
- Build more components
- Release NPM package
- Map library-specific modules?
- Community engagement!
  - Will this be useful?
  - What features would be useful?
  - Are we missing anything?