Spatial Navigation on the Web

TPAC 2018
Breakout Session

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LG

Overview

❑ **Spatial Navigation**

❑ **Use cases**

❑ **Spec**

- Heuristic processing model
- API

❑ **Next Steps**

❑ **Demo**

Spatial Navigation?

❑ Two-dimensional navigation within the pages of web app.

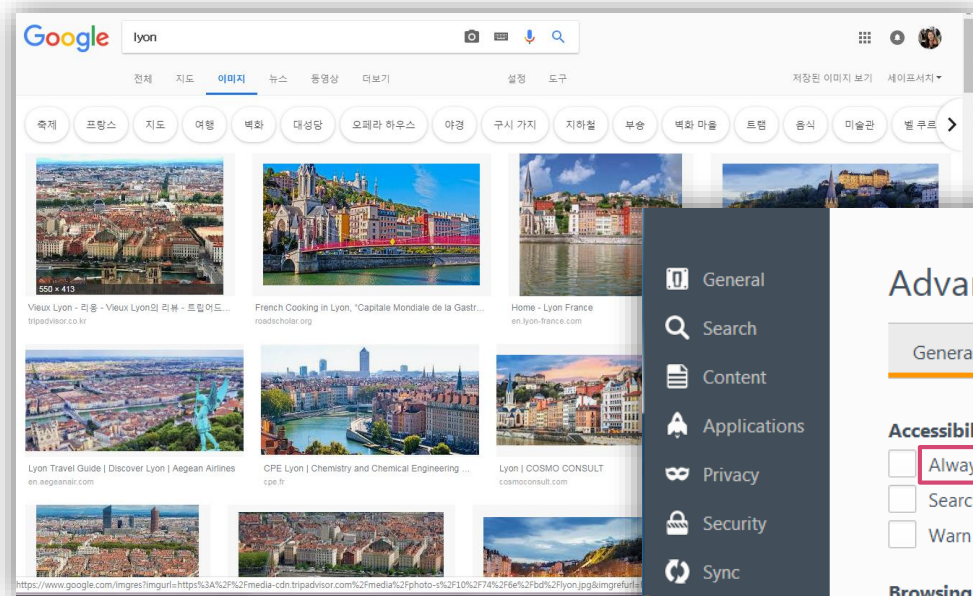❑ Navigate around your pages in an intuitive and robust way in various devices. (TV, PC, IVI, etc)
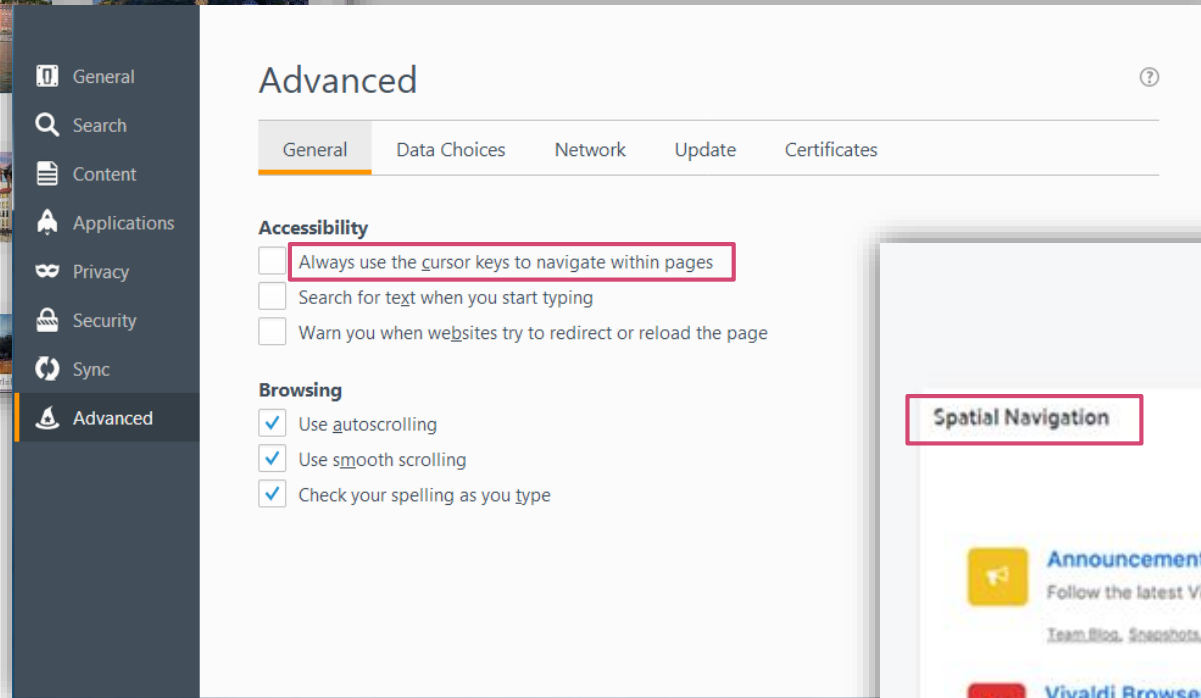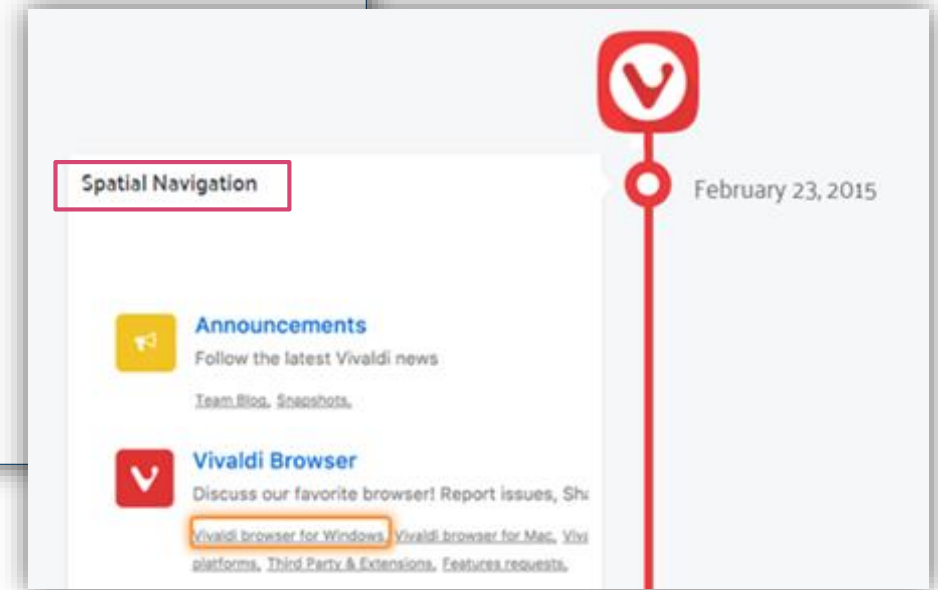

TV Web Application

Grid-like Web Application

Use cases

Google's Product
(Image Search,
Gmail,
Google Docs)

Directional Cursor Navigation
in Firefox

Spatial Navigation Feature
in Vivaldi

Use cases

THE NETFLIX TECH BLOG

May 18, 2017 · 7 min read

Pass the Remote: User Input on TV Devices

by Andrew Eichacker

The Netflix TV team works with device manufacturers to explore new input methods (like your phone!) and improve the screens we watch our favorite shows on. Beyond that, we're testing the boundaries for content discovery and playback while bringing Netflix to more users around the world.

BBC Home Getting Started Overview Widgets Other JS Doc Testing FAQ

Focus Management

Introduction

Spatial navigation (i.e. navigating around the UI via 5-point navigation) is handled for you by the framework if you make use of the *VerticalList, HorizontalList* and *Grid* widgets (or subclasses of them such as *HorizontalCarousel*).

- *VerticalList* consumes up and down key events, preventing bubbling of the event to the list's parent widget if it successfully moved the focus to the next/previous item in the list
- *HorizontalList* does the same for left and right key events
- *Grid* consumes all directional (up, down, left and right) key events

Events that are not consumed bubble up through the Widget tree (not the DOM), until a higher-level widget can consume them. By nesting both Vertical and Horizontal lists within each other, you can build up a complex UI.

For more details about events, please see the *Events* section.

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npm   spatial navigation

24 packages found

Sort Packages

Optimal
Popularity
Quality
Maintenance

Who's Hiring?

ClimaCell, Tinder, Airtable and lots of other companies are hiring javascript developers.

See all 19 companies

spatial-navigation-polyfill
A polyfill for the spatial navigation
spatial-navigation polyfill web
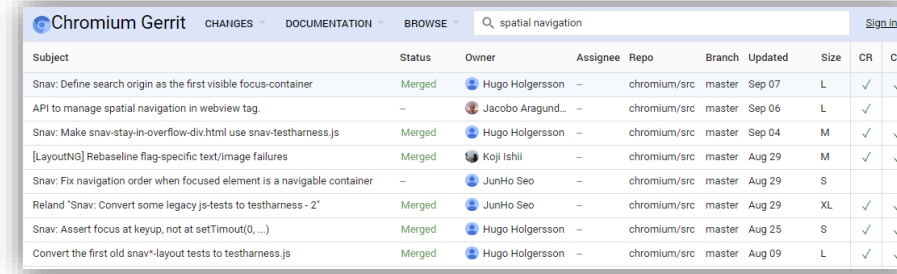jihyerish published 1.0.0 · a month ago

lrud
Left, Right, Up, Down. A spatial navigation library for devices with input via directional controls
tv navigation tv-apps react react-tv focus focus management spatial navigation smart tv
thunderchild15 published 2.6.0 · a month ago

vue-spatialnavigation
Spatial navigation support for VueJS
vue spatial navigation navigation tv typescript keyboard vue-spatialnavigation
twcapps published 1.2.1 · 4 months ago

Need for Standard!

❑ Evolving navigation for evolving layout in the web

❑ Limitation of JS lib for handling iframe, shadow DOM

❑ Less customization for consistent UX

History

17.11

Introduce the
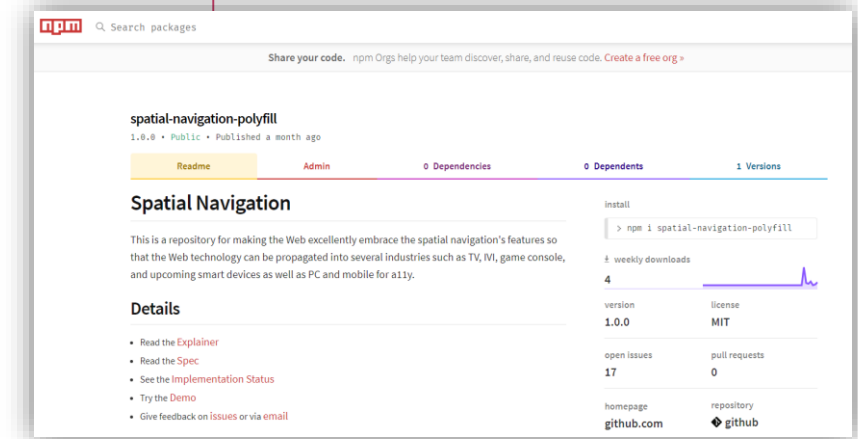Spatial Navigation
@W3C TPAC 2017

18.04

Introduce
Spatial Navigation
Spec Draft
@CSS WG F2F

18.08

Contribute patch (#8)
to Chromium upstream
about the Heuristic
Behavior of
Spatial Navigation

18.09

Release polyfill

Find the Primitive Features

Processing Model
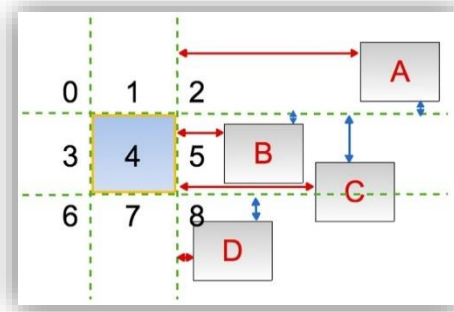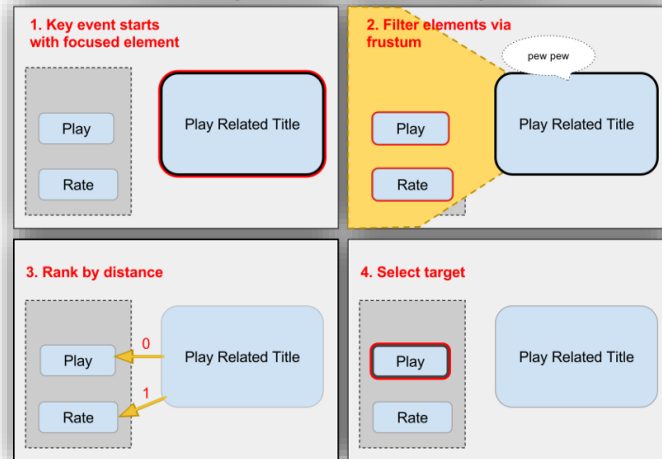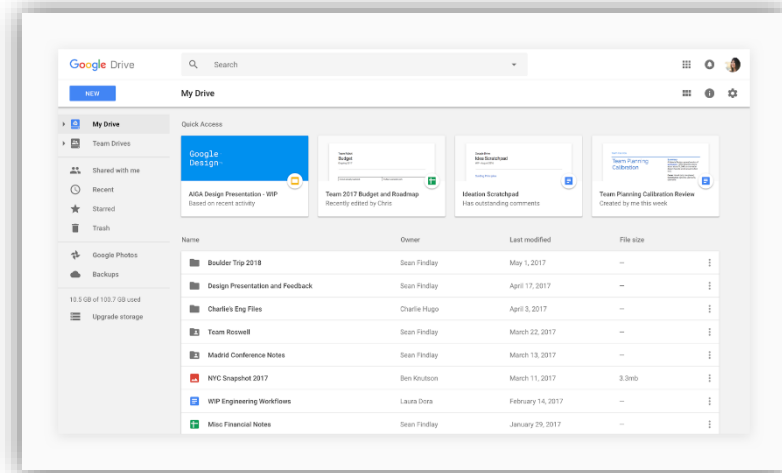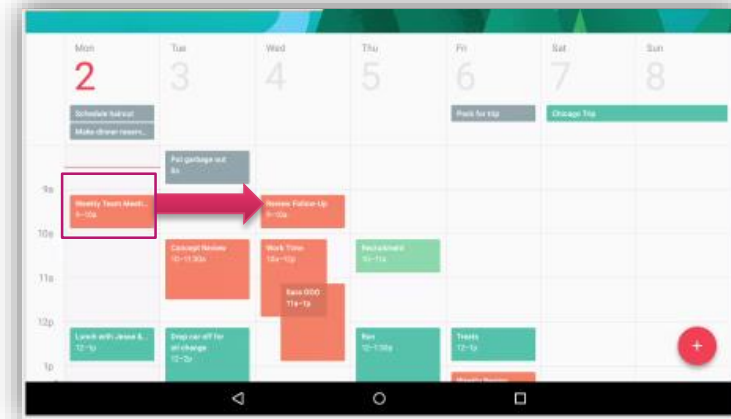
APIs

Spatial Navigation in WICG

❑ Processing Model

❑ APIs

Spatial Navigation
Editor's Draft, 18 October 2018

This version:
http://wicg.github.io/spatial-navigation

Issue Tracking:
GitHub
Inline In Spec

Editors:
Jihye Hong (LG Electronics)
Florian Rivoal (Invited Expert)

Abstract

This specification defines a general model for navigating the focus using the arrow keys, as well as related CSS and JavaScript features.
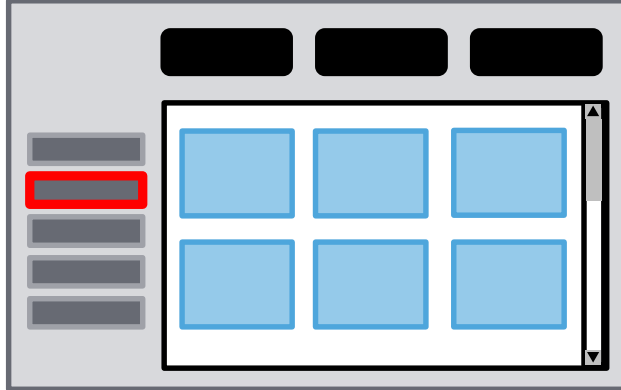
Status of this document

https://wicg.github.io/spatial-navigation/

Spatial Navigation Container

❑Scope for searching the focusable elements from the currently focused element
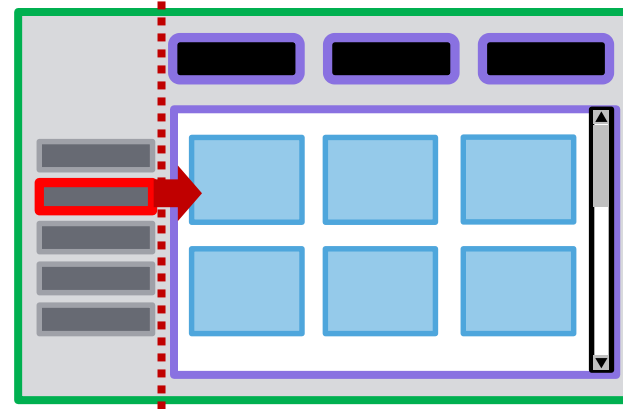
❑Document, scrollable element (by default)

Currently focused element
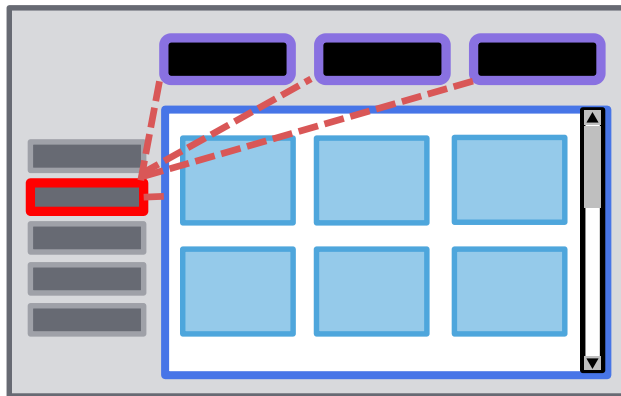
Spatial Navigation Container
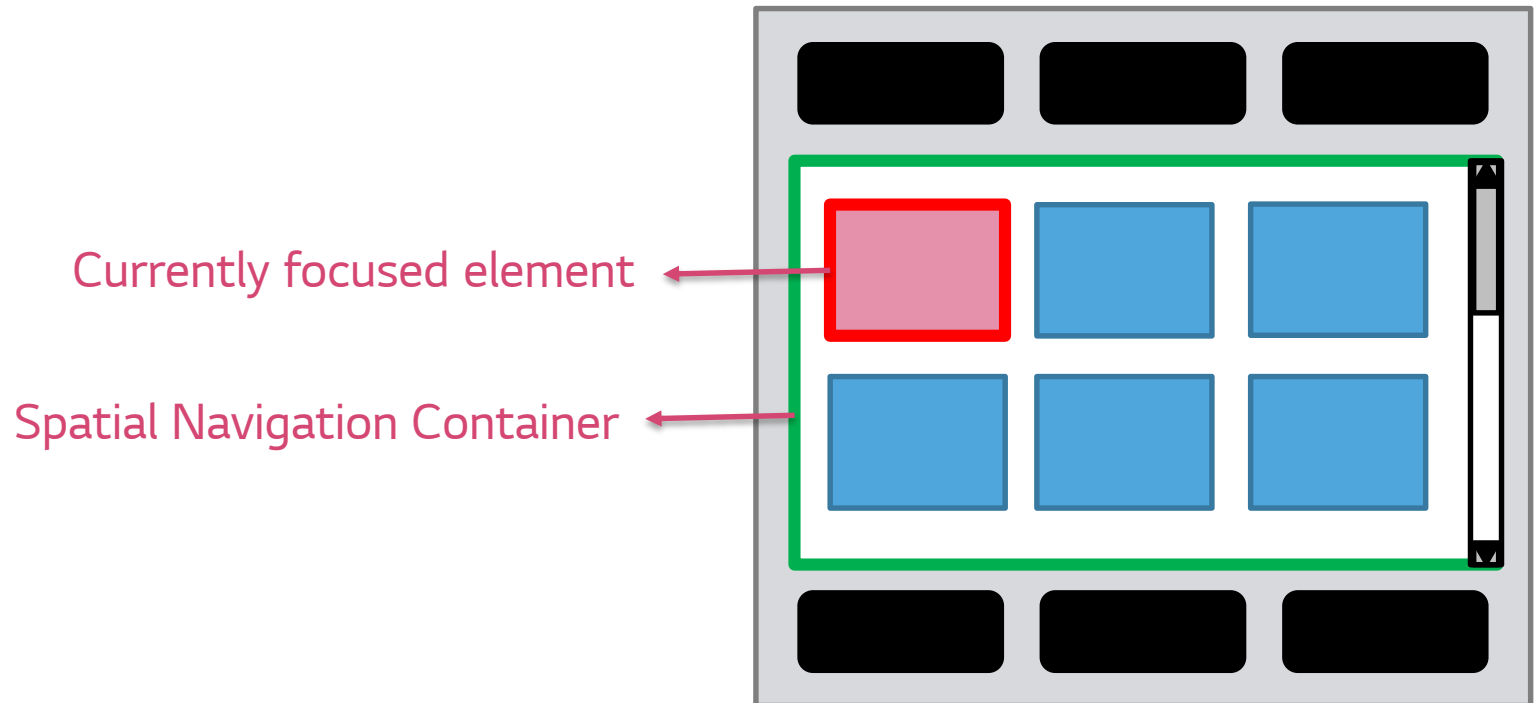
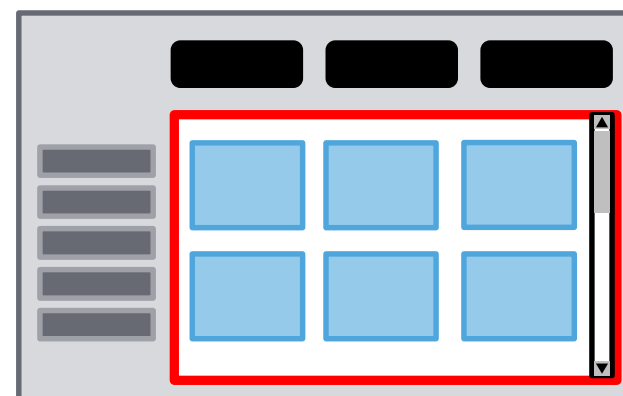# Basic Spatial Navigation Heuristics

1. Pressing ⊡ from an element

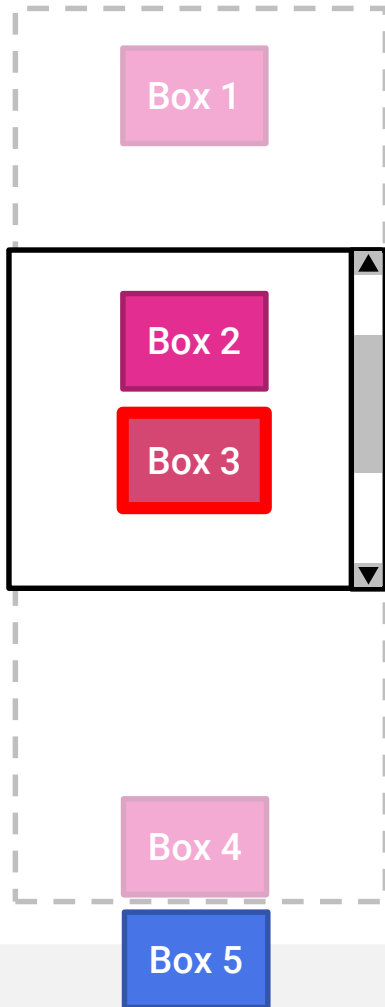2. Find candidates within the spatial navigation container

3. Select the best candidate

4. Focus the best candidate

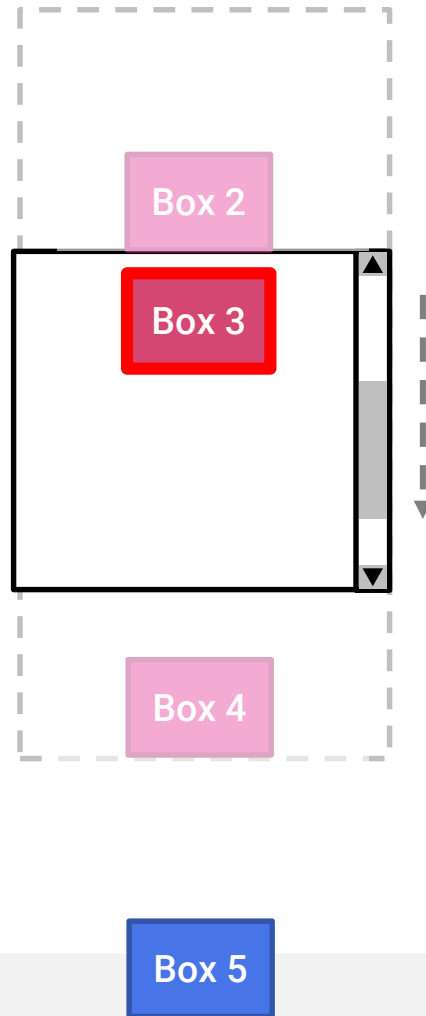# Spatial Navigation Heuristic Behavior
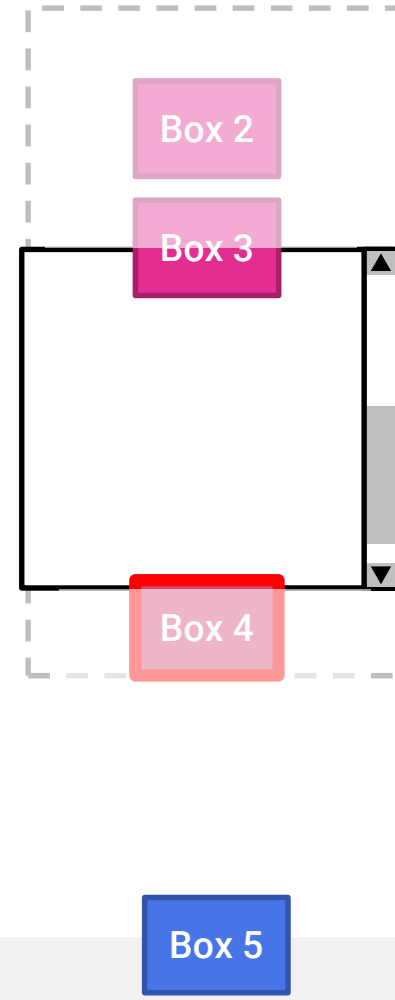
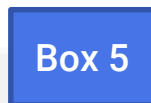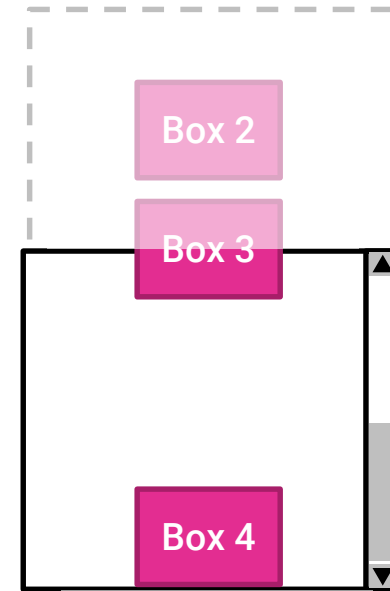❑Combining the UA-defined arrow key behaviors

Spatial Navigation Heuristic Behavior

❑Combining the UA-defined arrow key behaviors
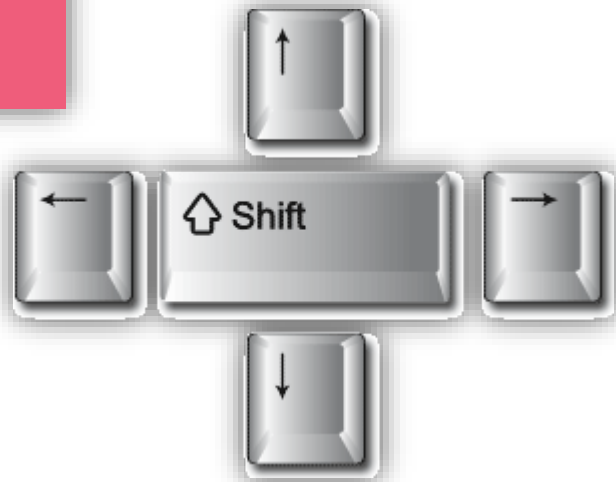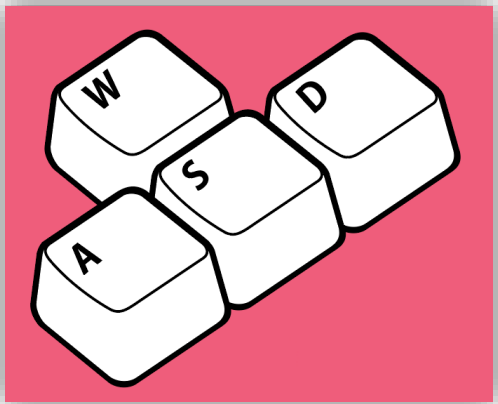
4. Pressing ⊡ moves down the scrollbar until the end

Box 2

Box 3

Box 4
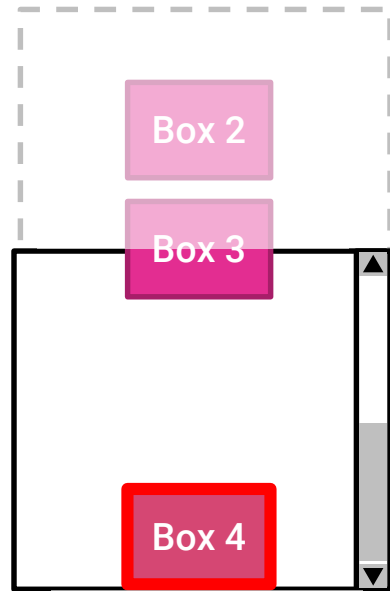
Box 5

5. Pressing ⊡ moves the focus out of the scroll area and Box 5 gains the focus

Box 2

Box 3

Box 4

Box 5

APIs

❑ window.navigate(direction)

- Move the focus to the best candidate in the corresponding direction
- Mapping other key combinations


```
const redContainer = document.getElementsByClassName("container c1")[0];
redContainer.addEventListener('keydown', function(e) {
    const dir = WASD_KEY_CODE[e.keyCode];
    if(window.navigate && dir) {
        window.navigate(dir);
        e.preventDefault();
    }
}, true);
```

APIs

❑ element.focusables(option)

- Finds all the focusable elements inside the container
- Directly move the focus without manually scrolling

```
enum FocusableAreaSearchMode {
    "visible",
    "all"
};

dictionary FocusableAreasOptions {
    FocusableAreaSearchMode mode;
};
```
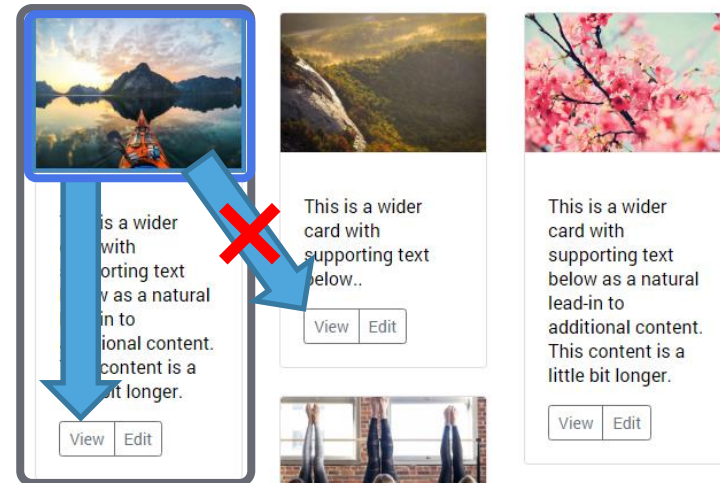
APIs
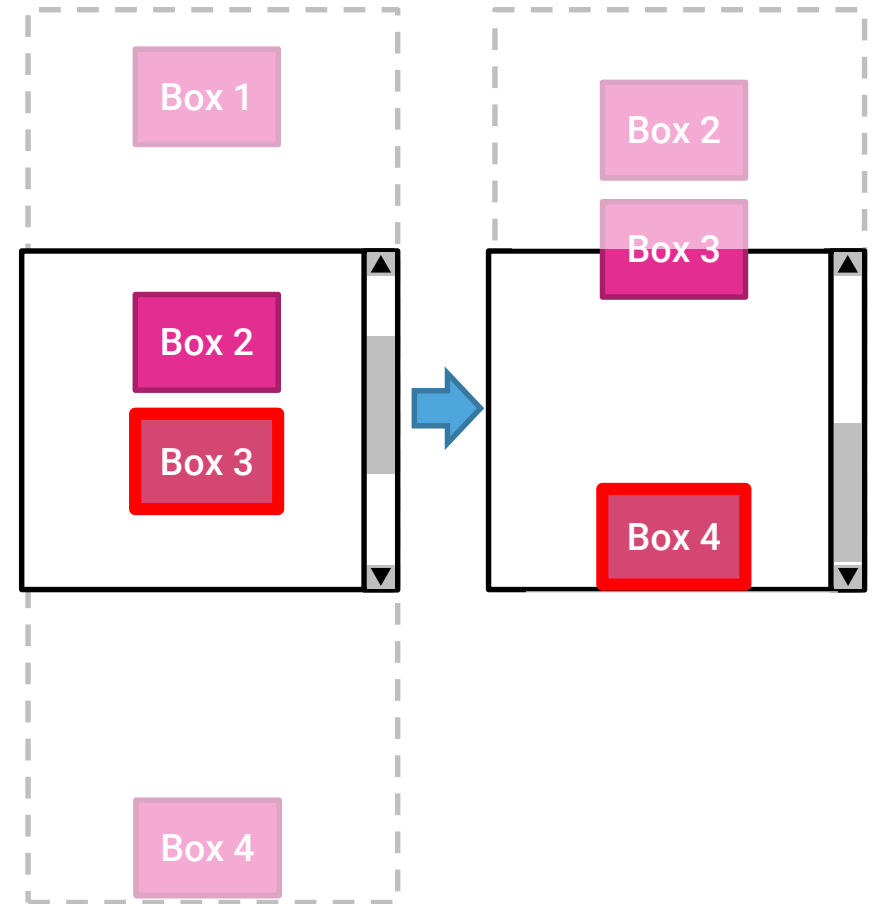
❏Customize finding the best candidate

- spatialNavigationSearch(), getSpatialNavigationContainer()
- Navigate Events
- spatial-navigation-contain CSS property
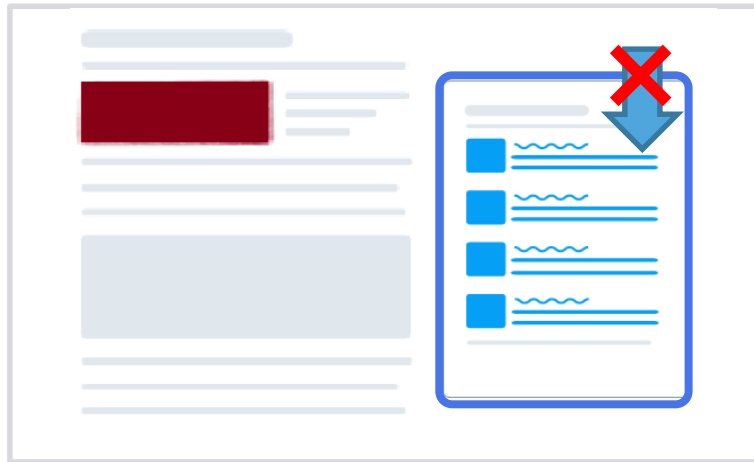
Infinite scroll

Grouped elements

APIs

❏ Customize finding the best candidate

- CSS UI nav-* properties
    - Auto
      "The <u>user agent determines</u> which element to navigate the focus to in response to direction al navigational input."

Spatial Navigation Heuristics

§ 5.3. Keyboard control

§ 5.3.1. Directional Focus Navigation: the 'nav-up', 'nav-right', 'nav-down', 'nav-left' properties

Name:	'nav-up', 'nav-right', 'nav-down', 'nav-left'
Value:	auto | <id> [current | root | <target-name>]?
Initial:	auto
Applies to:	all enabled elements
Inherited:	no
Percentages:	N/A
Computed value:	as specified
Canonical order:	per grammar
Animation type:	discrete

https://drafts.csswg.org/css-ui/#nav-dir

Try the Spatial Navigation!

https://wicg.github.io/spatial-navigation/demo/

https://www.npmjs.com/package/spatial-navigation-polyfill

Next Steps

❑ Implementation

- Google

  - Chromium Open Source, Accessibility

- Vewd

  - Chromium Patch and Spec Reviews

- Vivaldi

  - Investigating about applying the Spatial Navigation

Next Steps

❑ Spec Extension

- Handling the various focusable elements

- Improving the distance function

- Managing the focus

https://allyjs.io/data-tables/focusable.html

Discussion

❏ **Open Questions**

- https://github.com/WICG/spatial-navigation/blob/master/explainer.md#open-questions

❏ **Github issues**

- https://github.com/WICG/spatial-navigation/issues

Thank you! :)

LG