

Maps for HTML Roadmap

2022-03-31



Vision	2
Background and Problem Statement	2
Goals	2
Approach	3
Roadmap	4
Milestones years 1-5	4
Milestones years 6-11	5
Appendix	6
Terminology and Jargon	6
About Bocoup	6
Stakeholders	6
Contextual History of Web Maps 1997 - 2019	7

Maps for HTML Roadmap

2022-03-31



Vision

By 2033, the web platform will include standard mapping features; web maps frameworks will include standards based accessibility features, will perform well, preserve privacy, and make map authoring easier for users.

Background and Problem Statement

Geospatial information on the Web is fragmented, inadequately covered by Web standards, and lacking interoperability and accessibility. This raises significant barriers to its effective and equitable use.

In 2016, Peter Rushforth laid out a [vision for maps on the web](#), and started the [Maps for HTML community group](#) at the W3C. In 2020, Natural Resources Canada (NRCAN) engaged Bocoup to conduct a review of MapML specification. Bocoup attended the W3C-OGC Workshop on Maps for the Web, delivered a [report](#), and published a [case study](#).

In November 2021, NRCAN re-engaged Bocoup to establish a rationale and conceptual framework for accessible map rendering by Web browsers, and create an implementation plan. Bocoup conducted a landscape analysis, static analysis on web maps usage in HTTP Archive, engaged and interviewed web maps framework authors, and GIS experts, and surveyed web developers. A summary of this research was published in [Bocoup's Maps or HTML Research report](#). This roadmap contains the implementation plan resulting from this work.

Goals

1. Engage communities impacted by maps as key stakeholders in the design of web maps
2. Improve accessibility for web maps
3. Improve performance of web maps
4. Allow for privacy-preserving interaction of web maps
5. Make it easier to author web maps
6. Make geospatial data indexable on the web

Maps for HTML Roadmap

2022-03-31



Approach

According to our research, 16% of web pages use maps, but 84% of surveyed map makers don't have the necessary tools to make accessible maps. This was strongly echoed in follow up interviews, which also called out performance issues in existing web mapping tools. These findings indicate a need for standardized accessible web maps.

Bocoup identified three viable approaches to standardize web maps (covered in the above linked research document), and presented these findings to browser implementers. Implementers encouraged taking an iterative approach to standardizing maps, and focusing on buy-in from map frameworks during the process. Based on this feedback and standards development experience, Bocoup recommended the third approach from the research document, “the iterative approach”. The iterative approach includes:

1. Research and co-design
2. Closing gaps in web frameworks
3. Specifying each feature needed to finish closing gaps
4. Soliciting and incorporate additional review (polyfill implementation)
5. Implementing the feature in Chromium, WebKit, Gecko
6. Writing wpt tests in parallel to implementation
7. Adding new standards to map frameworks
8. Writing user documentation on MDN
9. Maintaining standard and implementation
10. Communicating changes to the stakeholder communities

Maps for HTML Roadmap

2022-03-31



Roadmap

The tables below describe a high-level eleven-year roadmap for the Web Maps ecosystem infrastructure partnership, including 16 key milestones.

Milestones years 1-5

#	Milestone	Goals	Dates
1	Form a working group and continued stakeholder conversations	1	2022
2	Research, gap analysis, and web framework patching to support <ol style="list-style-type: none">1. Accessible interaction model2. Performance optimizations3. Privacy optimizations4. Map rendering model Patch frameworks using existing technologies (e.g. ARIA, AOM, CSS Houdini, Web Animation API, WebGL).	2, 3, 4	2022 - 2024
3	Synthesis of gap analysis and standards plan to close those gaps.	1	2024
4	Disaggregate the MapML polyfill into individual, discrete custom elements based on Milestone 2 research with support for an accessible map interaction model (e.g sound based, haptic, printed, keyboard navigable), and a focus on performance, and privacy. <ul style="list-style-type: none">• Write specifications, connect with the working group that would own the contribution, and make spec changes• Solicit and Incorporate Additional Review by co-designers, ARIA APG CG, WHATWG, CSS WG, W3C Privacy CG, W3C WebAppSec WG, i18n WG, browser implementers, map library authors, W3C TAG• Write individual polyfills• Review by affected web developers and end users• Address feedback	2, 3, 4, 5, 6	2023-2025
5	Standardize the rest of the map rendering model using above process <ul style="list-style-type: none">• Styling maps• Browser-provided sourcing of map data• Map search• Built-in map data in browsers• Translation between projections• Picture in picture	2, 3, 4	2022 - 2026
6	Implement Map rendering model in browsers	2, 3, 4	
7	Add support for map rendering model standard to map frameworks	2, 3, 4	

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Maps for HTML Roadmap

2022-03-31



Milestones years 6-11

#	Milestone	Goals	Dates
8	<ul style="list-style-type: none">Implement Disaggregated MapML Polyfill in browsersWrite Tests in parallel to implementationWrite user documentation	2, 3, 4, 5, 6	2026-2031
9	Add support for Disaggregated MapML Polyfills to map frameworks	5	2030-2032
10	Create a browser-level coordinate Reference System, including support for Display images (tiles, different zoom levels), tilting and rotating, and bearing support <ul style="list-style-type: none">Research CRS APIWrite a specificationSolicit and Incorporate Additional Review	5	2024 - 2027
11	Implement CRS in browsers	5	
12	Add support for CRS standard to map frameworks	5	
13	Standardize a pan and zoom capability in CSS <ul style="list-style-type: none">Write a specification, connect with the CSS WG, and make spec changesSolicit and Incorporate Additional Review by co-designers, ARIA APG CG, WHATWG, CSS WG, W3C Privacy CG, W3C WebAppSec WG, i18n WG, browser implementers, map library authors, W3C TAGWrite individual polyfillsReview by affected web developers and end usersAddress feedbackWrite Tests (in parallel to implementation)Write user documentation	3, 5	2024 ~ 2033 depending on consensus
14	Implement pan and zoom in browsers	3, 5	
15	Add support for pan and zoom standard to map frameworks	3, 5	
16	Implement a high-level map element based on above standards	5, 6	2026 ~ 2032 depending on consensus

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Appendix

Terminology and Jargon

- **GIS** - Geographic Information System
- **Basemap** - background non-editable, geo-referenced image that gives point references on a map.
- **GeoJSON** - format for representing geographic data, such as coordinates or points and any metadata said point(s) have.
- **Polygons** - a closed line or perimeter that represents an area.
- **Map Projection** - a mathematical model that transforms the locations of features on the Earth's surface to locations in a two-dimensional representation.
- **Tile** - Spatial unit by which geographic data is organized, subdivided, and stored in a map library.
- **MDN** - Mozilla Developer Network, the documentation site for web developers.
- **Gecko** - The browser engine used by Firefox.
- **Webkit** - The browser engine used by Safari.
- **Chromium** - the browser engine used by Chrome, Samsung Internet, and other browsers.
- **OGC** - Open Geospatial Consortium.
- **W3C** - World Wide Web Consortium.

About Bocoup

Bocoup is a [mission and values](#) driven web platform firm that partners with tech companies, nonprofits, and governments on design, engineering, standards development and strategy.

Stakeholders

- NRCan
- Bocoup
- Igalia

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2022-03-31

- Google
- Microsoft
- Mozilla
- Apple
- Samsung
- W3C
- OGC

Contextual History of Web Maps 1997 - 2019

The following table shows a list of historical web maps milestones between 1994 and 2019.

Milestone	Impact	Date
HTML <map> element introduced	Took up the name “map” in HTML for image mapping, precluding geospatial map element from being created with the same name. (source)	1997
OpenStreetMap is created	First open source, open content world map.	2004
Yandex Maps	Yandex becomes a web map vendor.	2004
Google Maps	Google becomes a web map vendor. Today has wide adoption in terms of embeds on web pages.	2005
Google Earth	3D map client, initially as a desktop-only application, and later also as a web application.	2005
OpenLayers	Open source web based map framework.	2005

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Apple's iPhone is released	Momentum shift from feature phones to smartphones, and from GPS devices to smartphones.	2007
AppleMaps	Apple becomes a web map vendor.	2012
Maps for HTML Community Group is created	Start of discussion around making web maps part of HTML. (source)	2016
"Integrate Web map support into browsers" discussion at W3C TPAC	Minutes	2019