HTML5APPS

DELIVERABLE D3.3

APPS STANDARDIZATION

ROADMAP 1

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1. INTRODUCTION

To facilitate information, coordination and participation of research projects with respect to HTML5 app standardisation, the HTML5Apps project has developed a standardization roadmap outlining the current state of standardization efforts relevant to HTML5 apps inside and outside of W3C.

This roadmap is published quarterly by the project and widely distributed.

This version of the roadmap corresponds to the deliverable 3.3 as identified in the project Description of Work, matching the state of this roadmap after the first year of the project.

2. STANDARDS FOR WEB APPLICATIONS ON MOBILE: CURRENT STATE AND ROADMAP

Latest version
http://www.w3.org/Mobile/mobile-web-app-state/

This version
http://www.w3.org/2014/07/mobile-web-app-state/ (PDF version)

Previous version
http://www.w3.org/2014/04/mobile-web-app-state/

Web technologies have become powerful enough that they are used to build full-featured applications; this has been true for many years in the desktop and laptop computer realm, but is increasingly so on mobile devices as well.

This document summarizes the various technologies developed in W3C that increase the capabilities of Web applications, and how they apply more specifically to the mobile context. A good subset of these technologies are described and explained in the W3C on-line training on programming Web applications.

2.1. STATUS AND CHANGES

This document is the 14th edition of this overview of mobile Web applications technologies. The previous edition was released in April 2014. A live version of this document accepts contributions on the W3C Web and Mobile Interest Group Github repository.

This document is published by the Web and Mobile Interest Group; feedback on every aspect of this document should be sent to public-web-mobile@w3.org, the publicly archived mailing list of the interest group, or raised as issues on the Github repository, or alternatively to the author (dom@w3.org). It will serve as input for the next iteration of the document.

A new section in this edition covers the emerging field of **integrated payments** on the Web, following recent work started by W3C in this space.

It documents the following changes in the Web platform since April 2014:

Emerging work

- early work on a Wake Lock API, that would enable developers to prevent their users device to go on standby mode, has started in the Device APIs Working Group;
- early work on a geofencing API has started in the Geolocation Working Group;
- early work on a background synchronization API for browsers, based on Service Worker, has started;
- an alternative to Network Service Discovery (whose future remains unclear) has emerged as an early proposal called Named Web Sockets;
- early work on credential management and on-line authorization integration is being discussed in the Web Applications Working Group;
- work on a new version of the Indexed Database API is under consideration in the Web Applications Working Group;
- a Web Bluetooth Community Group was started to look at an in-browser API to interact with Bluetooth Low Energy devices;

Published as First Public Working Draft

- the First Public Working Draft of Service Workers, a mechanism that enables powerful off-line Web applications, was released;
- the First Public Working Draft of WOFF 2.0, the optimized font file format format for the Web, was released;
- the First Public Working Draft of Media Queries level 4, making it possible to taylor the style and layout of a Web page to e.g. the ambient light environment, was released;

Reached Last Call

- CSS Font Loading Module Level 3 was published as a Last Call Working Draft;
- the Beacon API, allowing to ask the browser to make HTTP requests after a page has been closed, was published as a Last Call Working Draft;

Returned to Last Call

- the Canvas API returned to Last Call Working Draft status to add important accessibility features;
- HTML Media Capture, Ambident Light events returned to Last Call Working Draft status to take into account implementors feedback;

Reached Candidate Recommendation

- the HTML5 specification was published as updated Candidate Recommendation (after a short Last Call Working Draft), on its final stretch to W3C Recommendation status later this year;

Specification merged, split or abandoned

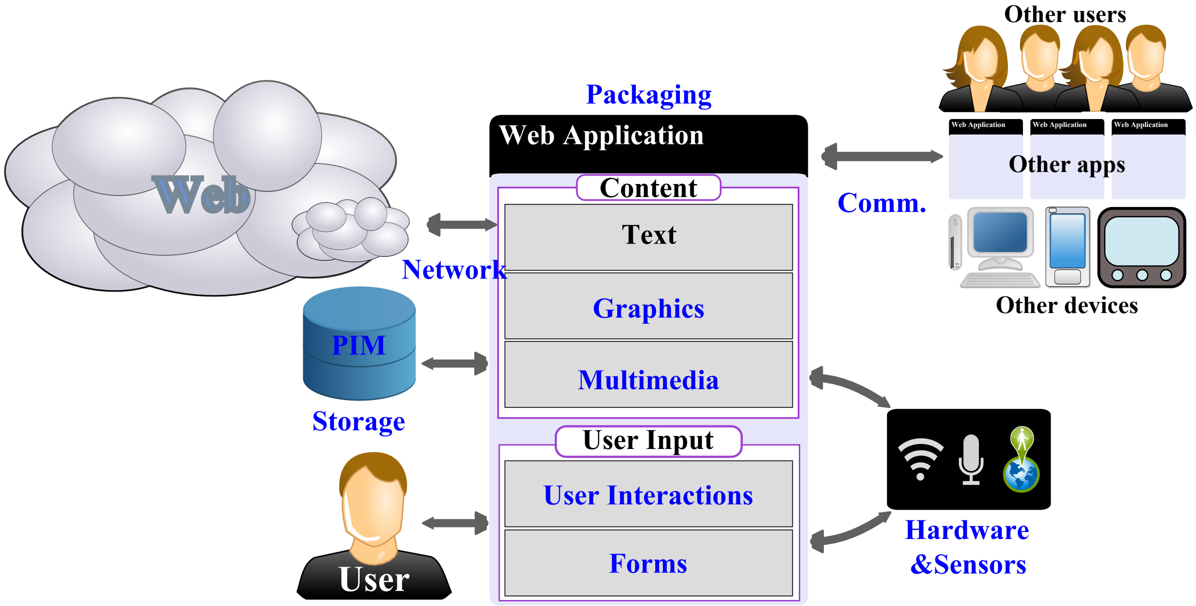
- the `srcset` attribute and `picture` element, used to create responsive images, were merged into the HTML 5.1 specification, as their first implementations in browsers are emerging;

Newly tracked

- the document now tracks viewport-relative CSS units and CSS Mobile text size adjustment that helps make Web pages adapt to the underlying device;
- the ability of the `autocomplete` attribute in HTML 5.1 to help fill contact information and credit card data is now specifically tracked in this document;

2.2. DOCUMENT STRUCTURE

The features that these technologies add to the Web platform are organized under the following categories: graphics, multimedia, device adaptation, forms, user interactions, data storage, personal information management, sensors and hardware integration, network, communication and discovery, packaging, payment, performance & optimization and privacy & security.



The Web as an application development platform

In each category, a table summarizes for each feature:

- which W3C specification defines the feature,
- which W3C group is responsible of the said specification,
- the stage of the specification in the W3C Recommendation track (see below),
- the estimated stability of the feature, i.e. how little the author expects it to change, from an early draft that can still evolve a lot, to a finished document with only minor expected changes,
- a link to the latest editors draft of the document, and a representation of the recent editing activity;
- some qualitative indication on availability of implementations on mobile devices, based on data collected primarily from Can I Use… and mobile HTML5, completed with data from Mozilla developer network, QuirksMode, JWPalyer's state of HTML5 video, Chromium Dashboard, Internet Explorer Platform status, the Device APIs WOorking Group Implementation status as well as the author’s understanding of the mobile devices market (see also the code used to generate the support icons)
- When available, a link to a relevant tutorial on WebPlatform Docs, and to relevant on-line training courses on W3DevCampus
- a link to the test suite for the said feature, and when relevant, a github ribbon to access the underlying git repository.

As a reminder, W3C creates Web standards by progressing documents through its Recommendation track, with the following stages:

- Editors “Editors drafts” represent the current view of the editors of the specification but have no standing in terms of standardization.
- WD “Working Drafts” (WD) are early milestones of the Working Group progress.
- LCWD “Last Call Working Drafts” signal that the Working Group has determined that the specification fulfills its requirements and all the known issues have been resolved, and thus requests feedback from the larger community.
- CR “Candidate Recommendations” (CR) trigger a call for implementations where implementors are invited to implement the specification and send feedback; Working Groups are expected to show the specification gets implemented by running test suites they have developed.
- PR “Proposed Recommendations” (PR) manifests that the group has gathered sufficient implementation experience, and triggers the final review by W3C Members
- Rec “W3C Recommendations” (Rec) are stable and completed Web standards; these documents only get updated rarely, through the “Edited Recommendation” process, as a results from errata collected by Working Groups.

Prior to starting standardization, a Working Group needs to be chartered, based on input from W3C Members, often through the organization of a workshop, or after the reception of a W3C Member Submission.

W3C has set up Community Groups, a mechanism that allows anyone to do experimental work within the W3C infrastructure, under IPR rules that are compatible to transition the work to the W3C standardization process.

2.3. GRAPHICS

SVG, Scalable Vector Graphics, provides an XML-based markup language to describe two-dimensions vector graphics. Since these graphics are described as a set of geometric shapes, they can be zoomed at the user request, which makes them well-suited to create graphics on mobile devices where screen space is limited. They can also be easily animated, enabling the creation of very advanced and slick user interfaces.

The integration of SVG in HTML5 opens up new possibilities, for instance applying advanced graphic filters (through SVG filters) to multimedia content, including videos. SVG 2.0 is set to facilitate that integration and complete the set of features in SVG.

In complement to the declarative approach provided by SVG, the **`<canvas>`** element added in HTML5 enables a 2D programmatic API that is well-suited for processing graphics in a less memory intensive way. That API not only allows rendering graphics, but can also be used to do image processing and analysis — HTML 5.1 adds the ability to do that processing in a separate Web Worker.

Both SVG and HTML can be styled using **CSS** (Cascading Style Sheets); in particular, CSS3 (the third level of the specification) is built as a collection of specifications set to offer a large number of new features that make it simple to create graphical effects, such as rounded corners, complex background images, shadow effects (*CSS Backgrounds and Borders*), rotated content (*CSS Transforms*, including with 3D effects).

Animations can be described declaratively via *CSS Animations*, and *CSS Transitions*.

Animations can also be managed via scripting through the API exposed in Web Animations; as they can be resource intensive, the possibility offered by the *Timing control for script-based animations API* to manage the rate of updates to animations can help keep them under control.

To ensure optimal performances when animating parts of an app, authors can make use of the CSS `will-change` property to let browsers compute the animation ahead of its occurrence.

CSS Flexbox allows to build complex layouts as required for interactive applications on small screens.

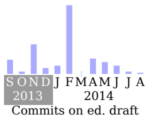
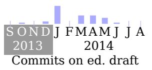
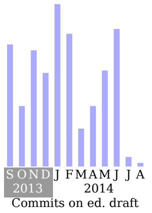
Fonts play also an important role in building appealing graphical interfaces, but mobile devices are in general distributed with only a limited set of fonts. **WOFF 1.0** (*Web Open Font Format*) addresses that limitation by making it easy to use fonts that are automatically downloaded through style sheets, while keeping the size of the downloaded fonts limited to what is actually needed to render the interface. The upcoming WOFF 2.0 update to that format promises 25%-smaller download sizes, reducing the time needed to download and display these fonts.

Given the time required for downloading fonts over mobile networks, authors need to adapt their content to the progressive availability of fonts; CSS Font Loading gives the necessary events to developers to enable that adaptation.

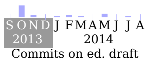
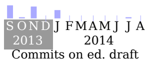
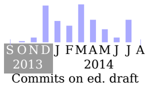
Another important aspect in graphics-intensive applications (e.g. games) is the possibility to use the entire screen to display the said graphics; the ***Fullscreen API*** lets a Web application requests and detects full screen display.

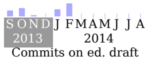
Likewise, in these scenarios, it is often useful to be able to **lock the orientation of the screen**; the *Screen Orientation API* allows not only to detect orientation change, but also to lock the orientation in a specific state.

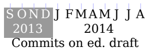
NB: a 3D graphic API for HTML5 `canvas`, called WebGL, has been developed outside of W3C, as part of the Khronos Group; this API has been built to be compatible with OpenGL ES, i.e. for embedded systems, and is intended to work on mobile devices.

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
2D Vector Graphics	Scalable Vector Graphics (SVG) 1.1 Specific…	SVG	Rec	Finished	New version of SVG (SVG 2.0) in preparat…	Widely deployed 3.2+ 4.4+ 10+ 36+ 10+ 10+ 31+	WebPlatform.org	High coverage
	Scalable Vector Graphics (SVG) 2		WD	Early draft	Last updated August 2014 	N/A X X X X X X X		N/A
2D Progra… API	HTML Canvas 2D Context	HTML	LCWD	Stable	Last updated June 2014 	Widely deployed 3.2+ 3+ 10+ 36+ 10+ 10+ 31+	WebPlatform.org W3DEV CAMPUS	Good coverage
	Canvas Proxy for Web Workers in HTML 5.1		WD	Early draft	Last updated August 2014 	None ? ? ? ? ? ? ?		None

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
Rounded Corners	CSS Backgro… and Borders Module Level 3	CSS	LCWD	Mostly finished	Last updated March 2014 S O N D J F M A M J J A 2013 2014 Commits on ed. draft	Well deployed 6.0+ 4.4+ 22+ 36+ 10+ 11+ 31+	WebPlatform.org	Good coverage
Complex backgr… images	CSS Backgro… and Borders Module Level 3		LCWD	Mostly finished	Last updated March 2014 S O N D J F M A M J J A 2013 2014 Commits on ed. draft	Well deployed 6.0+ 4.4+ 22+ 36+ 10+ 11+ 31+	WebPlatform.org	Good coverage
Box shadow effects	CSS Backgro… and Borders Module Level 3		LCWD	Mostly finished	Last updated March 2014 S O N D J F M A M J J A 2013 2014 Commits on ed. draft	Well deployed 6.0+ 4.4+ 22+ 36+ 10+ 11+ 31+	WebPlatform.org	Good coverage
2D Effects	CSS Transfor… Module Level 1	SVG and CSS	WD	Mostly stable	Last updated July 2014 S O N D J F M A M J J A 2013 2014 Commits on ed. draft	Well deployed 3.2+ 2.1+ 11+ 36+ 10+ 10+ 31+	WebPlatform.org	Good coverage

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
3D Effects	CSS Transfor… Module Level 1		WD	Stabilizing	Last updated July 2014 	Well deployed 3.2+ 3+ 22+ 36+ 10+ 10+ 31+	WebPlatform.org	Good coverage
Animati…	CSS Animati…	CSS	WD	Early draft	Last updated April 2014 S O N D 2013 J F M A M J J A 2014 Commits on ed. draft	Well deployed 3.2+ 4+ 12.1+ 36+ 10+ 10+ 31+	WebPlatform.org	well started
	CSS Transiti…		WD	Early draft	Last updated July 2014 	Well deployed 3.2+ 2.1+ 10+ 36+ 10+ 10+ 31+	WebPlatform.org	well started
	Web Animati… 1.0	SVG and CSS	WD	Early draft	Last updated July 2014 	Limited X X X 36+ X X X		None

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
	Timing control for script-based animatio…	Web Perform…	CR	Stable	Last updated October 2013 	Well deployed 6.0+ 4.4+ 22+ 36+ 10+ 10+ 31+		Well started
	CSS Will Change Module Level 1	CSS	WD	Early draft	Last updated June 2014 	A few experim… ones X X X 36+ X X X		N/A
Complex layouts	CSS Flexible Box Layout Module Level 1		LCWD	Mostly finished	Last updated February 2014 	Well deployed 7.0+ 4.4+ 12.1+ 36+ 10+ 11+ 31+		Well started
Downlo… fonts	WOFF File Format 1.0	WebFonts	Rec	Finished	Finished	Good deploym… 5.0+ 4.4+ 11+ 36+ 10+ 10+ 31+	WebPlatform.org	Good coverage

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
	WOFF File Format 2.0		WD	Early draft	Last updated June 2014 Commits on ed. draft	Very limited X X X 36+ X X X		N/A
	CSS Font Loading Module Level 3	CSS	LCWD	Stabilizing	Last updated August 2014 Commits on ed. draft	Limited X X X 35+ X X X		N/A
Fullscr... display	Fullscreen	CSS and Web Applicat...	WD	Early draft	Last updated October 2012  Commits on ed. draft	Limited X X 22+ 36+ 10+ 11+ 31+	WebPlatform.org	None
Orienta... Lock	The Screen Orientat... API	Web Applicat...	WD	Early draft	Last updated April 2014 Commits on ed. draft	Very limited ? ? ? ? ? 11+ 14+		None

2.4. MULTIMEDIA

HTML5 adds two tags that dramatically improve the integration of multimedia content on the Web: the **`<video>`** and **`<audio>`** tags. Respectively, these tags allow embedding video and audio content, and make it possible for Web developers to interact much more freely with that content than they would through plug-ins. They make multimedia content first-class citizens of the Web, the same way images have been for the past 20 years.

The playback content can be augmented and completed via Media Source Extensions that lets developers generate media content in JavaScript.

To cater for the needs of some content providers, a proposal to enable **playback of protected content**, *Encrypted Media Extensions* is an API that is under consideration in the HTML Working Group.

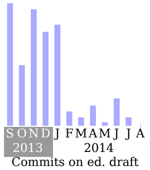
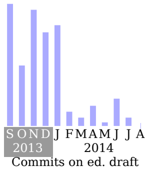
The *Network Service Discovery* API opens the door for integrating DLNA-hosted content into Web applications, although the future of that specification is currently under scrutiny, due to the current lack of implementors interest.

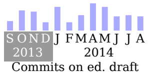
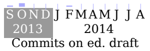
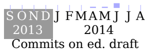
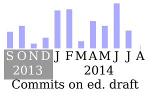
While the new HTML5 tags allow to play multimedia content, the *HTML Media Capture* defines a **markup-based mechanism to access captured multimedia content** using attached camera and microphones, a very common feature on mobile devices. The Web Real-Time Communications Working Group and the Device APIs Working Group are building together an API (`getUserMedia`) to directly manipulate **streams from camera and microphones**, as well as an API to record these streams into files, and another API to use access to cameras to take photos programatically.

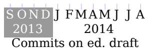
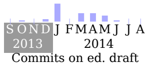
Beyond capturing and recording, two additional APIs add multimedia manipulation capabilities to the Web platform. We have already mentioned the *Canvas 2D Context* API: it enables modifying images, which in turn opens up the possibility of **video editing**.

In a similar vein, the Audio Working Group is working on an API that that makes it possible to modify audio content, as well as **analyze, modify and synthesize sounds**, the Web Audio API.

The combination of all these features marks the starting point of the Web as a comprehensive platform for multimedia, both for consuming and producing. The rising interest around bridging the Web and TV worlds (manifested through the W3C Web and TV Interest Group) should strengthen that trend in the coming months. Mobile devices are expected to take a growing role in many users TV experience, providing a “second screen” experience, where users can find more information on or interact with a TV program they're watching via their mobile devices.

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
Video playback	video element in HTML5	HTML	CR	Stable	Last updated July 2014  Commits on ed. draft	Good deploym… 3.2+ 2.3+ 11+ 36+ 10+ 10+ 31+	WebPlatform.org W3DEV CAMPUS	Well started
Audio playback	audio element in HTML5		CR	Stable	Last updated July 2014  Commits on ed. draft	Good deploym… 3.2+ 2.3+ 11+ 36+ 10+ 10+ 31+	WebPlatform.org W3DEV CAMPUS	Started
Genera… of media content	Media Source Extensio…		CR	Stable	Last updated August 2014 S O N D 2013 J F M A M J J A 2014 Commits on ed. draft	Limited ? ? ? 23+ ? 11+ 25+	WebPlatform.org	None

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
Protect… content playback	Encrypted Media Extensio…		WD	Early draft	Last updated August 2014  	Limited X X X 32+ X 11+ X		None
Multim… Gallery access	Network Service Discovery	Device APIs	WD	Early draft, unsure future	Last updated February 2014  	None X X X X X X X		None
Capturi… audio/ video	HTML Media Capture		LCWD	Stable	Last updated June 2014  	Growing deploym… 6.0+ 3.0+ X 18+ 10+ X 9+		well started
	Media Capture and Streams	Device APIs and Web Real-Time Commu…	WD	Stabilizing	Last updated July 2014  	Limited but growing X X 12+ 36+ 10+ X 31+		well started

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
	MediaSt... Recording		WD	Early draft	Last updated November 2013 S O N D J F M A M J J A 2013 2014 Commits on ed. draft	None X X X X X X X		None
	Mediast... Image Capture		WD	Early draft	Last updated July 2013  	None X X X X X X X		None
Image & Video analysis, modific...	HTML Canvas 2D Context	HTML	LCWD	Stable	Last updated June 2014  	Widely deployed 3.2+ 3+ 10+ 36+ 10+ 10+ 31+	WebPlatform.org W3DEV CAMPUS	Good coverage
Audio analysis, modific...	Web Audio API	Audio	WD	Starting to stabilize	Last updated June 2014 S O N D J F M A M J J A 2013 2014 Commits on ed. draft	Growing 6.0+ X 22+ 36+ X X 31+	WebPlatform.org	Started

2.5. DEVICE ADAPTATION

Mobile devices not only differ widely from traditional computers, but they also have a lot of variations among themselves, in term of screen size, resolution, type of keyboard, media recording capabilities, etc.

The Device Description Repository API is a unified server-side API that allows Web developers to retrieve data on the devices that are accessing their pages on a variety of device information database.

The Media Capture Streams API exposes some specific information on capabilities of camera and microphones to make it possible to take advantage of the large variety of media capturing devices provided on mobile phones.

CSS Media Queries offer a mechanism that allows adapting the layout and behavior of a Web page based on some of the characteristics of the device, including the screen resolution — to which Media Queries Level 4 proposes to add the availability and type of a pointing device, the ability to hover over elements, and the ambient luminosity.

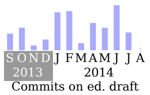
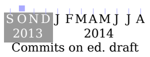
CSS Device Adaptation defines a set of CSS directives to define the size on which this layout should be based, relatively to the size of the underlying device — specifying what has been implemented using the `<meta name="viewport">` element so far.

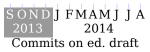
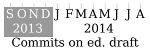
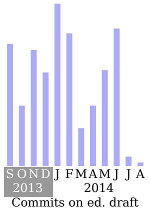
The viewport-relative CSS units `vw` and `vh` let design layouts that adapt to the dimensions of the viewport, while CSS Mobile Text Size Adjustment lets text adapt to zoomed parts of a page.

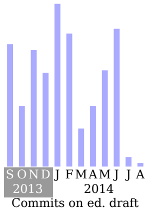
The Responsive Images Community Group (RICG) is currently working on an extension to HTML, known as the `picture` element, that allows authors define what image to load depending on device capabilities and/or other media features. The RICG publishes a use cases and requirements document that fully describes the problem.

As a complementary approach, the `srcset` attribute, specified by the WHATWG and also published as an extension to HTML, let Web developers define the various device pixel ratios of an image, letting the browser pick the best choice for the pixel density of the screen. As of January 2014, there is general agreement amongst browser vendors to implement both `picture` and `srcset`.

SVG, which lets define images that can be scaled up and down without any loss of quality, is another critical tool to the development of Web applications that adapt to the resolution of the underlying device.

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
Device informa…	Device Descript… Reposito… Simple API	Device Descript…	Rec	finished	N/A	Limited		Good Coverage
Media Capture Capabil…	Media Capture and Streams	Device APIs and Web Real-Time Commu…	WD	Early draft	Last updated July 2014 	None X X X X X X X		None
CSS-based adaptat…	Media Queries	CSS	Rec	Finished	Finished	Widely deployed 3.2+ 2.1+ 10+ 36+ 10+ 10+ 31+	WebPlatform.org	Good coverage
	Media Queries Level 4		WD	Early draft	Last updated July 2014 S O N D J F M A M J J A 2013 2014 Commits on ed. draft	None ? ? ? ? ? ? ?		None
	CSS Device Adaptati…		WD	Early draft	Last updated October 2013 	Very limited X X 11.1+ X X 10+ X	WebPlatform.org	N/A

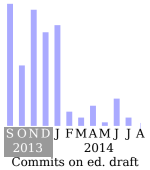
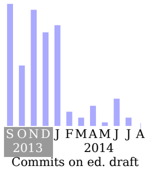
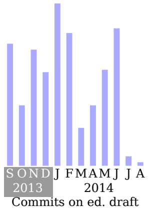
Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
	viewport relative units in CSS Values and Units Module Level 3		CR	Mostly finished	Last updated March 2013 	Well deployed 6.0+ 4.4+ 22+ 36+ 10+ 10+ 31+		Good coverage
	CSS Mobile Text Size Adjustm… Module Level 1		Editors	Early draft	Last updated April 2013 	Very limited 5.0+ X X X X X 31+		N/A
Respon… images	picture element in HTML 5.1	HTML	WD	stabilizing	Last updated August 2014 	Limited X X X 38+ X X 33+		N/A

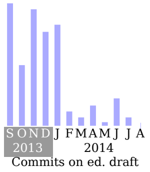
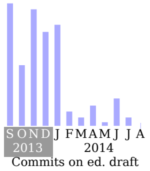
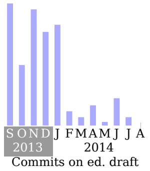
Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
	srcset attribute in HTML 5.1		WD	Stabilizing	Last updated August 2014 	Limited but growing 8+ X 22+ 36+ X X X		None
	Scalable Vector Graphics (SVG) 1.1 Specific…	SVG	Rec	Finished	New version of SVG (SVG 2.0) in preparat…	Widely deployed 3.2+ 4.4+ 10+ 36+ 10+ 10+ 31+	WebPlatform.org	High coverage

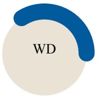
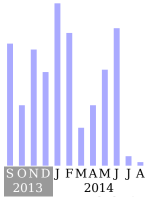
2.6. FORMS

The ability to build rich forms with HTML is the basis for user input in most Web-based applications. Due to their limited keyboards, text input on mobile devices remains a difficult task for most users; *HTML5* address parts of this problem by offering new type of form controls that optimize the way users will enter data:

- **date and time entries** can take advantage of a number of dedicated form controls (e.g. `<input type="date">`) where the user can use a native calendar control;
- the `<input type="email">`, `<input type="tel">` and `<input type="url">` can be used to optimize the ways user enter these often-difficult to type data, e.g. through dedicated virtual keyboards, or by accessing on-device records for these data (from the address book, bookmarks, etc.);
- the **`inputmode`** attribute (proposed in HTML 5.1) defines the type of textual input expected in a text entry;
- the **`pattern`** attribute allows both to guide user input as well as to avoid server-side validation (which requires a network round-trip) or JavaScript-based validation (which takes up more resources);
- the **`placeholder`** attribute allows to guide user input by inserting hints as to what type of content is expected in a text-entry control;
- the `<datalist>` element allows creating free-text input controls coming with **pre-defined values** the user can select from; HTML 5.1 defines a mechanism for the `autocomplete` attribute to automatically fill input fields based on **well-known data** for the user.

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
Date and time entries	Data and Time input element in HTML5	HTML	CR	Mostly stable	Last updated July 2014  Commits on ed. draft	Growing 8+ 4.4+ 10+ 36+ 10+ X X	WebPlatform.org W3DEV CAMPUS	Just started
Custom... text entries (tel, email, url)	telephone, email and URL input element in HTML5		CR	Stable	Last updated July 2014  Commits on ed. draft	Well deployed 5+ 3+ 11+ 18+ 4.7.1+ 10+ 4+	WebPlatform.org W3DEV CAMPUS	Just started
Input modality	inputmode attribute in HTML 5.1		WD	Early draft	Last updated August 2014  Commits on ed. draft	None ? ? ? ? ? ? ?	WebPlatform.org W3DEV CAMPUS	None

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
Input pattern	pattern attribute in HTML5		CR	Stable	Last updated July 2014  Commits on ed. draft	Limited but growing X X 11+ 18+ 4.7.1+ X 4+	WebPlatform.org W3DEV CAMPUS	Just started
Input hint	placehol… attribute in HTML5		CR	Stable	Last updated July 2014  Commits on ed. draft	Well deployed 3.2+ 2.1+ 11+ 36+ 10+ 10+ 31+	WebPlatform.org W3DEV CAMPUS	Started
Autoco… for text entries	datalist element in HTML5		CR	Stable	Last updated July 2014  Commits on ed. draft	Growing X 4.4.3+10+ 36+ 10+ 10+ 31+		None

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
	autocom… attribute in HTML 5.1			Early draft	Last updated August 2014  Commits on ed. draft	None ? ? ? 31+ ? ? ?		None

2.7. USER INTERACTIONS

An increasing share of mobile devices relies on touch-based interactions. While the traditional interactions recognized in the Web platform (keyboard, mouse input) can still be applied in this context, a more specific handling of touch-based input is a critical aspect of creating well-adapted user experiences, which **Touch Events in the DOM** (Document Object Model) enable. The work on that specification is now nearly finished.

Meanwhile, the Pointer Events Working Group has made good progress on an alternative approach to handle user input, Pointer Events, that allows to handle mouse, touch and pen events under a single model. This new approach is expected to replace the currently more widely deployed Touch Events.

As more and more content gets rendered as long scrollable lists, more and more logic is attached to scrolling events, and the quality of the user experience of these actions is highly dependent on their performances. The CSSOM View Module determines when scrolling events get fired, and let developers specify the type of scrolling behavior they want.

The proposed work on CSS Scroll Snap Points adds greater ability to control the behavior of panning and scrolling by defining points to which an app view would snap when the user moves through the page.

The CSS `will-change` property is also available to indicate to browsers that a given part of the page will be soon scrolled to and should be pre-rendered.

Many mobile devices use on-screen keyboards to let users type; the Input Method Editor (IME) API makes it possible to coordinate the interactions between that on-screen keyboard and Web applications.

Conversely, many mobile devices use haptic feedback (such as vibration) to create new form of interactions (e.g. in games); work on a **vibration API** in the Device APIs Working Group is making good progress.

But as the Web reaches new devices, and as devices gain new user interactions mechanisms, it also becomes important to allow Web developers to react to a more abstract set of user interactions: instead of having to work in terms of “click”, “key press”, or “touch event”, being able to react to an “undo” command, or a “next page” command independently of how the user instructed it to the device will prove beneficial to the development of device-independent Web applications. The IndieUI Events specification, developed by the Indie UI Working Group, aims at addressing this need.

Mobile devices follow their users everywhere, and many mobile users rely on them to remind them or notify them of events, such as messages: the ***Web Notifications*** specification enables that feature in the Web environment, while the Push API makes it possible for server-side notifications to alert the user, even if the browser is not running.

Mobile devices, and mobile phones in particular, are also in many cases well-suited to be used through voice-interactions; the **Speech API Community Group** is exploring the opportunity of starting standardization work around a JavaScript API that would make it possible for users to interact with a Web page through spoken commands.

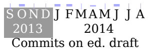
Whether users are speaking commands to their apps or working with them through non-haptic interactions, they risk seeing the screens turned off automatically by their devices screensaver. An early proposal for a Wake Lock API would let developers signal the needs to keep the screen up in these circumstances.

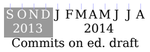
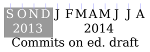
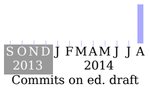
The hardware constraints of mobile devices, and their different usage context can make mobile users experience similar barriers to people with disabilities. These similarities in barriers mean that similar solutions can be used to cater for them, making a Web site accessible both for people with disabilities and mobile devices a natural goal (as detailed in Relationship between Mobile Web Best Practices and WCAG).

How Web Content Accessibility Guidelines (WCAG) and User Agent Accessibility Guidelines (UAAG) provide guidance on mobile accessibility — that is, making websites and applications more accessible to people with disabilities when they are using mobile phones and a broad range of other devices — is discussed in Mobile Accessibility.

WAI-ARIA provides semantic information on widgets, structures and behaviors hooks to make Web applications more accessible, including on mobile devices.

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
Touch-based interac…	Touch Events	Web Events	Rec	Finished	Last updated July 2014 SOND J FMAMJ J A 2013 2014 Commits on ed. draft	Largely deployed 3.2+ 2.1+ 11+ 36+ 10+ X 31+	WebPlatform.org W3DEV CAMPUS	Complete
	Pointer Events	Pointer Events	CR	Stable	Last updated July 2014 SOND J FMAMJ J A 2013 2014 Commits on ed. draft	Limited deploym… X X X X X 11+ X	WebPlatform.org	Just started
Smooth scrolling	CSSOM View Module	CSS	WD	Still changing	Last updated June 2014 SOND J FMAMJ J A 2013 2014 Commits on ed. draft	None X X X X X X X		N/A
	CSS Scroll Snap Points Module Level 1		Editors	Early draft	Last updated March 2014 SOND J FMAMJ J A 2013 2014 Commits on ed. draft	Experim… X X X X X 10+ X		None

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
	CSS Will Change Module Level 1		WD	Early draft	Last updated June 2014 Commits on ed. draft	A few experim… ones X X X 36+ X X X		N/A
On-screen keyboard interac…	Input Method Editor API	Web Applicat…	WD	Still changing	Last updated April 2014 Commits on ed. draft	Very limited X X X X X 11+ X		N/A
Vibration	Vibration API	Device APIs	LCWD	Mostly stable	Last updated June 2014  Commits on ed. draft	Growing X 4.4+ 22+ 36+ 10+ X 31+		Started
Intent-based events	IndieUI: Events 1.0	Indepen… User Interface (Indie UI)	WD	Early draft	Last updated June 2014 Commits on ed. draft	None		None

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
Notifica…	Web Notificat…	Web Notificat…	LCWD	Stabilizing	Last updated August 2013  	Growing deploym… X 4.4+ 22+ X 10+ X 31+		None
	Push API	Web Applicat…	WD	Early draft, now with Service Workers	Last updated August 2014 	None X X X X X X X		N/A
Speech-based interac…	Web Speech API	Speech API Commu… Group	N/A	N/A	Last updated January 2013  	Limited but growing 7.0+ X X 36+ X X X		N/A
Screen wake	Wake Lock API	Device APIs	N/A	Unofficial draft	Last updated August 2014  	None X X X X X X X		N/A

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
Accessi…	Relation… between Mobile Web Best Practices (MWBP) and Web Content Accessib… Guidelines (WCAG)	Education and Outreach and Mobile Web Best Practices	NOTE	Finished	N/A	N/A		N/A
	Accessible Rich Internet Applicat… (WAI-ARIA) 1.0	Protocols and Formats	Rec	Stable	Last updated February 2014	Well deployed 3.2+ 4.4+ 10+ 36+ X 10+ 31+		Well started

2.8. DATA STORAGE

A critical component of many applications is the ability to save state, export content, as well as integrate data from other files and services on the system.

For simple data storage, the ***Web Storage*** specification offers two basic mechanisms, `localStorage` and `sessionStorage`, that can preserve data respectively indefinitely, or on a browser-session basis.

For richer interactions, the Web platform provides the ***File Reader API*** makes it possible to load the content of a file.

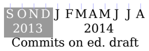
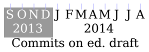
Previously, the Web Applications Working Group had considered complementary File Writer and FileSystems APIs, but these approached have been abandoned. Discussions have started on a new proposal for a sandboxed filesystem API.

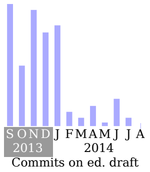
Meanwhile, the HTML5 `download` attribute provides a simply mechanism to trigger a file download (rather than a page navigation), with the possibility of setting a user-friendly filename.

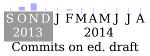
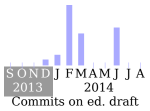
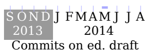
On top of this file-based access, the ***Indexed Database API*** (IndexedDB) defines a database of values and hierarchical objects that integrates naturally with JavaScript, and can be queried and updated very efficiently - a new version of the specification is under consideration. Note that the work around a client-side SQL-based database, which had been started in 2009, has been abandoned in favor of this new system.

As more and more data need to be stored by the browser (e.g. for offline usage), it becomes critical for developers to get reliable storage space, which the proposed **Quota Management API** will offer to Web applications.

Likewise, as some of this data need to be encrypted, the Web Cryptography API from the Web Cryptography Working Group exposes strong cryptography primitives to Web applications, and can be bound to pre-provisioned keys via the WebCrypto Key Discovery API.

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
Simple data storage	Web Storage	Web Applicat…	Rec	Finished	Last updated May 2014 S O N D J F M A M J J A 2013 2014 Commits on ed. draft	Well deployed 3.2+ 2.1+ 11+ 36+ 10+ 10+ 31+	WebPlatform.org	Complete
File operati…	File API		LCWD	Stabilizing	Last updated July 2014 S O N D J F M A M J J A 2013 2014 Commits on ed. draft	Getting well deployed 6.0+ 3+ 11.1+ 36+ 10+ 10+ 31+	W3DEV CAMPUS	Started
	File API: Writer		Retired	Abando…	Last updated January 2013 	Limited X X 22+ 36+ 10+ X X		None
	File API: Director… and System		Retired	Abando…	Last updated January 2013 	Limited X X 22+ 36+ 10+ X X		None

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
	FileSyst… API		N/A	Early proposal	Last updated March 2014 S O N D J F M A M J J A 2013 2014 Commits on ed. draft	N/A		None
	download attribute in HTML5	HTML	CR	Stable	Last updated July 2014 	Limited, but growing X 4.4+ 22+ 36+ 10+ X 31+		None
Database query/ update	Indexed Database API	Web Applicat…	CR	Stable	Last updated March 2014 S O N D J F M A M J J A 2013 2014 Commits on ed. draft	Growing 8+ 4.4+ 22+ 36+ 10+ 10+ 31+	WebPlatform.org W3DEV CAMPUS	Good coverage
	Web SQL Database		Retired	Abando…	N/A	Somewhat deployed, but won't be further deployed 3.2+ 2.1+ 11+ 36+ 10+ X X	WebPlatform.org W3DEV CAMPUS	N/A

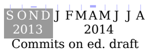
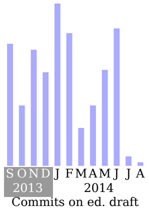
Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
Quota for storage	Quota Manage… API		WD	Early work	Last updated February 2014 	Very limited X X X 18+ X X X		None
Encrypt… storage	Web Cryptog… API	Web Cryptog…	LCWD	Stabilizing	Last updated June 2014 	Limited but growing X X X 37+ X 11+ 19+		None
	WebCry… Key Discovery		WD	Early work	Last updated May 2014 	None X X X X X X X		None

2.9. PERSONAL INFORMATION MANAGEMENT

Applications can benefit from integrating with their users’ existing data records; on mobile devices, the address book and calendar are particularly useful source of information.

For Web apps outside of the browser, a purely programmatic approach is part of the System Applications Working Group, with work on a Contacts Manager API in progress.

In the browser, HTML 5.1 provides autocompleted fields for contacts information that would let browsers re-use data from addressbooks.

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
Addres... data	Contacts Manager API	System Applicat...	WD	Early draft	Last updated April 2014  Commits on ed. draft	None ? ? ? ? ? ? ?		None
	autocom... attribute in HTML 5.1	HTML	WD	Early draft	Last updated August 2014  Commits on ed. draft	None ? ? ? 31+ ? ? ?		None

2.10. SENSORS AND HARDWARE INTEGRATION

Mobile devices are packed with sensors, making them a great bridge between the real and virtual worlds: GPS, accelerometer, ambient light detector, microphone, camera, thermometer, etc.

To take full advantage of these sensors in mobile Web applications, Web developers need to be provided with hooks to interact with them.

The ***Geolocation API*** provides a common interface for locating the device, independently of the underlying technology (GPS, WIFI networks identification, triangulation in cellular networks, etc.). Work towards a new version of the API that would include geofencing has started.

Web applications can also now access **orientation and acceleration** data via the *DeviceOrientation Event Specification*.

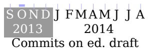
A number of APIs for other sensors are under development: the Battery Status API, the *Proximity Events* API, the *Ambient Light Events* API or the proposed *Ambient Humidity Events* API.

As already mentioned in the section on multimedia, there is ongoing work on APIs to open up access to camera and microphone streams.

The opportunity for Web applications to use **Near-Field Communications (NFC)** mechanisms have led to the chartering of the NFC Working Group to develop a Web NFC API.

A more global access to sensors and hardware (including USB and bluetooth) is in scope for the **System Applications Working Group**. A Web Bluetooth Community Group was recently started to develop a Bluetooth Low Engergy API for browsers.

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
Geoloc…	Geoloca… API Specific…	Geoloca…	Rec	Finished	Last updated July 2014 S O N D J F M A M J J A 2013 2014 Commits on ed. draft	Widely deployed 3.2+ 2.1+ 11+ 36+ 10+ 10+ 31+	WebPlatform.org W3DEV CAMPUS	Good coverage
Motion sensors	DeviceO… Event Specific…		LCWD	Stabilizi… but with planned updates	Last updated April 2014 S O N D J F M A M J J A 2013 2014 Commits on ed. draft	Well deployed 4.2+ 3+ 12+ 36+ 10+ 11+ 31+	WebPlatform.org W3DEV CAMPUS	Started
Battery Status	Battery Status API	Device APIs	CR	Stable	Last updated August 2014 S O N D J F M A M J J A 2013 2014 Commits on ed. draft	Very limited X X X X X X 31+		Good coverage
Proximity sensors	Proximity Events		CR	Stable	Last updated April 2014 S O N D J F M A M J J A 2013 2014 Commits on ed. draft	Very limited X X X X X X 31+		Started

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
Ambient Light sensor	Ambient Light Events		LCWD	Stable	Last updated June 2014 S O N D J F M A M J J A 2013 2014 Commits on ed. draft	Very limited X X X X X X 31+		Started
Humidity sensor	Ambient Humidity Events		N/A	Unofficial draft	Last updated October 2013 	None X X X X X X X		N/A
Camera & Microp… streams	Media Capture and Streams	Device APIs and Web Real-Time Commu…	WD	Stabilizing	Last updated July 2014 S O N D J F M A M J J A 2013 2014 Commits on ed. draft	Limited but growing X X 12+ 36+ 10+ X 31+		well started
NFC	Web NFC API	Near Field Commu…	WD	Very early draft	Last updated April 2014 S O N D J F M A M J J A 2013 2014 Commits on ed. draft	None X X X X X X X		None

2.11. NETWORK

Network connectivity represents a major asset for mobile devices: the Web is an immense store of content, as well as an almost endless source of processing power, overcoming two of the limitations of mobile devices.

The Web platform is growing a number of APIs that facilitate establishing network connectivity in different contexts.

XMLHttpRequest (the basis for Ajax development) is a widely deployed API to load content from Web servers using the HTTP and HTTPs protocol: the W3C specification (formerly known as *XMLHttpRequest Level 2*) completes the existing deployed API with the ability to make requests on servers in a different domain, programmatic feedback on the progress of the network operations, and more efficient handling of binary content.

The recently started ***Beacon*** API would let developers queue unsupervised HTTP requests, leaving it to the browser to execute them when appropriate, opening the door for better network optimizations.

Early work on a ***Web Background Synchronization API*** would provide a robust Service Worker-based mechanism to enable Web applications to download and upload content in the background, even in the absence of a running browser.

By default, browsers do not allow to make request across different domains (or more specifically, across different *origins*, a combination of the protocol, domain and port) from a single Web page; this rule protects the user from having a Web site abusing their credentials and stealing their data on another Web site. Sites can opt-out of that rule by making use of the ***Cross-Origin Resource Sharing*** mechanism, opening up much wider cooperation across Web applications and services.

XMLHttpRequest is useful for client-initiated network requests, but mobile devices with their limited network capabilities and the cost that network requests induce on their battery (and sometimes on their users bill) can often make better use of server-initiated requests. The ***Server-Sent Events*** API allows triggering DOM events based on push notifications (via HTTP and other protocols.)

Early work on a **Push API** would allow Web applications to receive server-sent messages whether or not the said Web app is active in a browser window. An IETF Working Group charter is under discussion to standardize the protocol aspects of the mechanism.

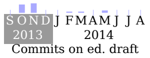
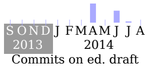
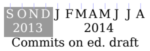
The ***WebSocket API***, built on top of the IETF *WebSocket protocol*, offers a bidirectional, more flexible, and less resource intensive network connectivity than XMLHttpRequest.

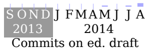
The work on Web Real-Time Communications will also provide direct **peer-to-peer data connections** between browsers with real-time characteristics, opening the way to collaborative multi-devices Web applications.

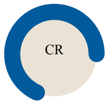
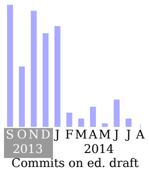
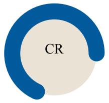
Of course, an important part of using network connectivity relies on being able to determine if such connectivity exists, and the type of network available. The HTML5 **onLine DOM flag** (and its associated change event, `ononline`) signals when network connectivity is available to the Web environment.

The network-information API, which was supposed to address discovery of the network characteristics, has been abandoned for the time being due to lack of clear supporting use cases.

The **Resource Timing API** offers to measure precisely the impact of the network on the time needed to load various resources, offering another approach to adapt a Web app to its network environment.

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
HTTP(s) network API	XMLHtt… Level 1	Web Applicat…	WD	stabilizing	Last updated May 2014 	Very broad for basic features, growing for most recent ones 5.0+ 3+ 12+ 36+ 10+ 10+ 31+		Well started
	Beacon	Web Perform…	LCWD	Early draft	Last updated February 2014 S O N D J F M A M J J A 2013 2014 Commits on ed. draft	None X X X X X X 31+		N/A
	Web Backgro… Synchro…	Web Applicat…	N/A	Early draft	Last updated July 2014 	None X X X X X X X		None
Cross-domain requests	Cross-Origin Resource Sharing	Web Applicat… and Web Applicat… Security	Rec	Stable	Last updated June 2012 	Getting well-deployed 3.2+ 2.1+ 12+ 36+ 10+ 10+ 31+	WebPlatform.org	Well started

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
Server-pushed requests	Server-Sent Events	Web Applicat…	CR	Stable	Last updated May 2014 S O N D J F M A M J J A 2013 2014 Commits on ed. draft	Getting well-deployed 4.0+ 4.4+ 11.1+ 36+ 10+ X 31+	WebPlatform.org	Good coverage
	Push API		WD	Early draft, now with Service Workers	Last updated August 2014 	None X X X X X X X		N/A
Bidirec… connect…	The WebSoc… API		CR	Stable	Last updated June 2014 S O N D J F M A M J J A 2013 2014 Commits on ed. draft	Good deploym… 6.0+ 4.4+ 12.1+ 36+ 10+ 10+ 31+	WebPlatform.org W3DEV CAMPUS	Well started
P2P data connect…	WebRTC 1.0: Real-time Commu… Between Browsers	Web Real-Time Commu…	WD	Early draft	Last updated July 2014 S O N D J F M A M J J A 2013 2014 Commits on ed. draft	Limited but growing X X 22+ 36+ X X 31+	WebPlatform.org	None

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
on-line state	onLine state in HTML5	HTML		Mostly stable	Last updated July 2014 	Limited X 2.2+ X 18+ X 8+ X		None
Network charact...	The Network Informat... API	Device APIs	Retired	Abando...	Last updated April 2014 S O N D J F M A M J J A 2013 2014 Commits on ed. draft	Very limited X 2.2+ X X 10+ X 10+		None
	Resource Timing	Web Perform...		Stable	Last updated March 2014 S O N D J F M A M J J A 2013 2014 Commits on ed. draft	Growing X 4.4+ 22+ 36+ X 10+ X		Early start

2.12. COMMUNICATION AND DISCOVERY

Beyond connection to on-line services, allowing communications between users, but also between devices and between applications is an important aspect of a good mobile development platform. To communicate with unknown devices or pre-existing services, a discovery component is critical.

For Web apps not in a browser, the System Applications Working Group is working on a complete Messaging API.

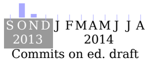
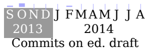
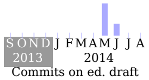
The `postMessage` API of *HTML5 Web Messaging* allows for Web Applications to communicate between each other.

The Network Service Discovery API offers to discover services on the local network (such as the ones offered via DLNA), enabling mobile Web applications to integrate seamlessly with these services.

An alternative proposal to the Network Service Discovery API has emerged: Named Web Sockets offers to provide well-known sockets to existing and approved local network services.

The **Web Real-Time Communications Working Group** is the host of specifications for a wider set of communication opportunities:

- **Peer-to-peer connection** across devices,
- **P2P Audio and video streams** allowing for real-time communications between users.

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
Emails, SMS and MMS	Messagi… API	System Applicat…	WD	First draft	Last updated November 2013 	None ? ? ? ? ? ? ?		None
Inter-app commu…	HTML5 Web Messagi…	Web Applicat…	CR	Stable	Last updated May 2014 S O N D J F M A M J J A 2013 2014 Commits on ed. draft	Well deployed 3.2+ 2.1+ 10+ 36+ 10+ 11+ 31+		Good coverage
Network services discovery	Network Service Discovery	Device APIs	WD	Early draft, unsure future	Last updated February 2014 	None X X X X X X X		None
	Named Web Sockets		N/A	Early proposal	Last updated June 2014 	None X X X X X X X		None

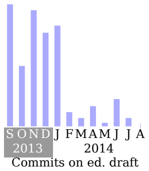
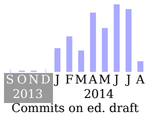
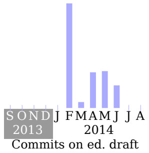
Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
P2P connect… and audio/ video streams	WebRTC 1.0: Real-time Commu… Between Browsers	Web Real-Time Commu…	WD	Early draft	Last updated July 2014 S O N D J F M A M J J A 2013 2014 Commits on ed. draft	Limited but growing X X 22+ 36+ X X 31+	WebPlatform.org	None

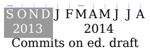
2.13. PACKAGING

An important aspect of the user experience of applications is linked to how the user perceives the said application is available permanently (even when off-line, which is particularly important on mobile devices), as well as how it can be shared and distributed, typically through purchases via applications stores — this is adequately addressed by packaging the application.

The Web platform offers two complementary approaches to packaging Web applications:

- HTML5's **`ApplicationCache`** enables access to Web applications off-line through the definition of a manifest of files that the browser is expected to keep in its cache; while relatively well deployed, the current approach has shown some strong limitations and the HTML and Web Applications Working Groups are considering a potentially major overhaul of the technology, likely based on ServiceWorker
- a JSON-based manifest format in development by the the Web Apps Working Group. The System Applications Working Group was building a runtime and security model on top of that packaging, but is now instead defining an application lifecycle specification based on top of Service Workers.

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
Offline Web apps	Applicat... in HTML5	HTML	CR	Stable (but Service Workers will be the preferred approach when available)	Last updated July 2014 	Well deployed 3.2+ 2.1+ 11+ 36+ 10+ 10+ 31+	WebPlatform.org W3DEV CAMPUS	None
	Service Workers	Web Applicat...	WD	Early draft	Last updated August 2014 	None X X X X X X X		None
Packaged Web App	Manifest for web apps and bookma...		WD	Early draft	Last updated June 2014 	N/A X X X X X X X		N/A

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
	Runtime and Security Model for Web Applicat...	System Applicat...	WD	Early draft, will likely be replaced by a different approach	Last updated March 2014 	N/A ? ? ? ? ? ? ?		N/A
	Applicat... Lifecycle and Events		N/A	Early draft	Last updated May 2014 	N/A		N/A

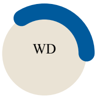
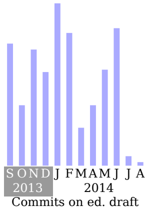
2.14. PAYMENT

Native mobile application stores have made it much easier for developers to monetize some of their applications, either by selling the application itself to users, or by providing in-app purchases.

While Web applications can use well-known on-line payment solutions, these solutions have so far proved much harder to use on mobile devices.

In March 2014, W3C organized a workshop on Web payments to identify ways in which standards could help make that payment experience much simpler, in particular on mobile devices. A charter for a W3C Interest Group to drive work in this space is in development.

Meanwhile, HTML5.1 provides specific help for autocomplete of credit card details, making it easier to pay via credit cards once these details have been entered once.

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
Integra… payment	Credit card details autocom… in HTML 5.1	HTML		Early draft	Last updated August 2014 	Very limited ? ? ? 31+ ? ? ?		None

2.15. PERFORMANCE & OPTIMIZATION

Due to their limited CPU, and more importantly to their limited battery, mobile devices require a lot of attention in terms of performance.

The work started by the Web Performance Working Group on ***Navigation Timing***, ***Resource Timing***, ***Performance Timeline*** and ***User Timing***, gives tools to Web developers for optimizing their Web applications.

Early work on a *Resource Priorities* specification, part of the Web Performance Working Group new charter, would let developers indicate which network requests should be prioritized.

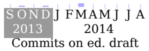
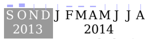
The proposed work on Efficient Script Yielding offers the opportunity to Web developers to use more efficiently asynchronous programming, but has so far gained very limited traction.

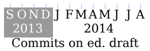
The API to determine whether a Web page is being displayed (***Page Visibility API***) can also be used to adapt the usage of resources to the need of the Web application, for instance by reducing network activity when the page is minimized. Likewise, the Timing control for script-based animations API can help reduce the usage of resources needed for playing animations.

Beyond optimization of resources, the perceived reactivity of an application is also a critical aspect of the mobile user experience. The **thread-like mechanism** made possible via *Web Workers* allows keeping the user interface responsive by offloading the most resource-intensive operations into a background process.

The battery API allows adjusting the use of resources to the current level of power available in the battery of a mobile device.

The *Mobile Web Application Best Practices* provide general advice on how to build Web applications that work well on mobile devices, taking into account in particular the needs for optimization. The opportunity to update these best practices is under discussion in the Web and Mobile Interest Group.

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
Timing hooks	Navigati… Timing	Web Perform…	Rec	Finished	Finished	Well deployed 8+ 4+ 22+ 36+ 10+ 10+ 31+		Good coverage
	Resource Timing		CR	Stable	Last updated March 2014  Commits on ed. draft	Growing X 4.4+ 22+ 36+ X 10+ X		Early start
	Perform… Timeline		Rec	Finished	Finished	Limited ? ? ? 30+ ? 11+ ?		Started
	User Timing		Rec	Finished	Finished	Growing X 4.4+ 22+ 36+ X 10+ X		Well started
Network prioriti…	Resource Priorities		WD	Early draft	Last updated April 2014  Commits on ed. draft	Experim… X X X X X 11+ X		None

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
Priority handling	Efficient Script Yielding		Editors	Early draft	Last updated April 2013  	Very limited X X X X X 10+ X		None
Page Visibility detection	Page Visibility		Rec	Finished	Finished	Well deployed 7.0+ 4.4+ 12.1+ 36+ 10+ 10+ 31+		Good coverage
Animati… optimiz…	Timing control for script-based animatio…		CR	Stable	Last updated October 2013 S O N D J F M A M J J A 2013 2014 Commits on ed. draft	Well deployed 6.0+ 4.4+ 22+ 36+ 10+ 10+ 31+		Well started
Threadi…	Web Workers	Web Applicat…	CR	Stable	Last updated May 2014 S O N D J F M A M J J A 2013 2014 Commits on ed. draft	Well deployed 5.0+ 2.1+ 11+ 36+ 10+ 10+ 31+	WebPlatform.org W3DEV CAMPUS	Well started

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
Battery Status	Battery Status API	Device APIs	CR	Stable	Last updated August 2014 Commits on ed. draft	Very limited X X X X X X 31+		Good coverage
Optimiz… Best Practices	Mobile Web Applicat… Best Practices	Mobile Web Best Practices	Rec	Finished	N/A	N/A	W3DEV CAMPUS	N/A

2.16. PRIVACY & SECURITY

Mobile devices follow their users everywhere, and hold some of their most private or confidential data (contacts, pictures, calendar, etc.) As a result, it is critical for users to be able to rely on their phones to keep that data safe from attackers.

W3C specifications are reviewed for their security and privacy impact as part of their progress through the Recommendation track; the Privacy Interest Group and the Web Security Interest Group in particular are coordinating reviews on their respective fields.

But beyond these cross-technology considerations, a number of ongoing work items address needs for additional protection.

The first line of defense for users, and the unit of isolation for Web apps is the same-origin policy that roughly limits what a Web application can access to content and data hosted on the same origin, i.e. the combination of URL scheme, domain name and port.

For legacy reasons, this policy is not as stringent on some parts of the Web platform, exposing users to greater attack surface via cross-site scripting or cross-site request forgery. To enable Web application authors to reduce the attack surface beyond what legacy requires, the ***Content Security Policy*** offers hooks that severely limits damages that an attacker could hope to achieve.

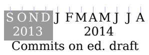
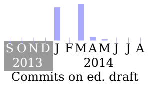
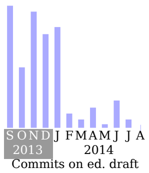
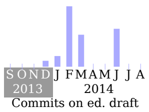
To further strengthen the integrity of their applications, Web developers can make use of the proposed ***Subresource integrity*** mechanism, that makes it possible to block man-in-the-middle attacks or compromised third-parties providers.

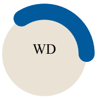
In applications that aggregate content from multiple (possibly untrusted) sources, the HTML5 `iframe` sandbox makes it possible to restrict what kind of interactions third-party embedded content can make use of.

As described earlier, the Web Cryptography API provides the necessary tools to encrypt data for storage and transmission from within Web applications, with access pre-provisioned keys via the WebCrypto Key Discovery API.

For users that wish to indicate their preferences not to be tracked across Web applications and sites, the Tracking Preference Expression (also known as Do No Track) enables browsers to communicate explicitly their wish to content providers, and to determine whether a given content provider asserts fulfilling that wish.

To facilitate the authentication of users to on-line services, early work has started on identifying opportunities for browsers to help manage credentials and on-line authorization

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
Strengt… security	Content Security Policy 1.0	Web Applicat… Security	CR	Stable	Last updated June 2013 	Well-deployed 6.0+ 4.4+ 22+ 36+ 10+ 10+ 31+	WebPlatform.org	Well started
	Subreso… Integrity		WD	Just started	Last updated May 2014 	None X X X X X X X		None
	Sandbox… iframe in HTML5	HTML	CR	Stable	Last updated July 2014 	Widely deployed 4.2+ 2.2+ 22+ 36+ 10+ 10+ 31+		None
Encrypt… storage	Web Cryptog… API	Web Cryptog…	LCWD	Stabilizing	Last updated June 2014 	Limited but growing X X X 37+ X 11+ 19+		None

Feature	Spec.	Working Group	Maturity	Stability	Latest editors draft	Current impl.	Dev. doc	Test suite
	WebCry… Key Discovery			Early work	Last updated May 2014 Commits on ed. draft	None X X X X X X X		None
Tracking protecti…	Tracking Preferen… Expressi… (DNT)	Tracking Protection		Stabilizing	Last updated July 2014	Good deploym… 5+ ? ? 23+ ? 9+ 6+		None

2.17. ACKNOWLEDGMENTS

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