



Web Components

A whole new web world?

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ABSTRACT

Context: With the web development being constantly changed there is big problems with reusability and compatibility. Web components are going to change the way we develop web applications and help improve the reusability and the compatibility problems currently in the market.

Objectives: In this essay, I research what the web components are going to change regarding the way we develop and how it is going to change the future of web development. We also investigate how far current web browsers has come regarding implementation of the different parts of web components and why some may not be implemented.

Results: Web components are going to change the way we develop since they are no longer required to use external sources or APIs. The big web browsers are all working on implementing the different parts of the web components only one part is currently in dispute.

Conclusion: The conclusion of this is that web components are a big step forward in the web development world and they are going to help to improve the problems with reusability and compatibility since they are no longer relaying on external sources. Since many big web browsers are already working hard to implement or has already implemented the four main parts of web components they will be used soon.

Keywords: Web Components, Web browsers,

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1 INTRODUCTION

Web development is changing regularly and slowly but surely frameworks are getting outdated due to the browsers changing standards and therefore the frameworks are no longer working. When developing web applications currently there is often a mix of modules and external library's together with a framework. Instead of having to import several different parts to a framework, web components will change this since they are built on internal APIs and standards. These APIs and Standards are what is going to change the web development world.

2 QUESTIONS

This study will focus mainly on why web components are going to improve the way the development of web applications. These questions were picked to cover the most important parts which are current state of web development, future of web development and support for web components.

1. What makes web components important in the future of web development?
2. How will web components change web development?
3. How far has the major web browsers come when it comes to supporting Web components?

3 METHOD

This essay is written to give a view of the current state of web development therefore the references are taken from some of the biggest and most established web development companies.

Since web components has their own homepage with articles the sources mainly come from searching on their site and getting redirected. Since the sources already are considered trustworthy no further validation regarding that was made. To make sure the information gathered from the references was up-to-date comparisons between at least two different articles was made.

To understand the current support of web browsers the main browsers was selected to investigate: Chrome, Firefox, Opera, Safari and Internet Explorer/Edge.

4 LITERATURE REVIEW

To find relevant information on the web I decided that the smartest way was to use the four main parts of the web components as terms which are: Custom Elements, Shadow DOM, HTML Imports, HTML Templates.

Under you get a brief explanation of what the different parts of the web components are.

Custom Elements allows the developer to create their own custom HTML element. Since they are custom they can have their own custom behavior and CSS styling.

Shadow DOM allows for encapsulation for DOM and CSS. It makes so things are separated from the DOM and the main document. The reason to separate things like this is since on big sites if CSS isn't organized very carefully the CSS can leak and mess up the main page.

HTML Imports allows for the import and reuse HTML documents in other HTML documents.

HTML Templates is a way to hold client-side content that is not supposed to be rendered instantly when the page is loaded but may be loaded in later during runtime using JavaScript.

The sources used for writing this essay focus mostly on information regarding the way web components are going to change the development and how far current browsers has come regarding supporting the different parts mentioned above.

5 ANALYSIS AND DISCUSSION

5.1 What makes web components important in the future of web development?

One of the most noticeable features that web components bring into web development is that it will work across modern browsers and be compatible with any JavaScript library or framework that supports HTML. This is going to work since web components are based on already existing web standards. ^[3,10]

But this isn't the only feature that the web components supply, since it is based on already implemented standards it allows for functions such as the possibility to encapsulate CSS with the Shadow DOM or that you can import HTML documents that allows you to write custom HTML elements that the browsers can understand. ^[2,10]

They will also bring the solution for a very common problem which is reusability and compatibility.

5.2 How will web components change web development?

In earlier states of web development template only used to be a part of the server side but lately it has become more common to implement Templates into the browser. It allows the developer to develop components in a more modular way and it also allows the developer to reuse the HTML document in other HTML documents.

This is one of the ways web components will change the way we work with development. But there are other things the web components allow such as encapsulation of CSS using the Shadow Dom. The Shadow DOM allows you to only show parts of the CSS file to the document which means you can have encapsulated CSS, before Shadow DOM there was no real way to completely encapsulate the CSS there was some ways of making it part encapsulated. The way you used to do it was to have a standard when writing your own CSS.

Now it is very easy since the Shadow DOM allows you to hide parts of the document and therefore it becomes encapsulated. ^[3,8,10]

5.3 How far has the major web browsers come when it comes to supporting Web components?

Since web components still isn't an official part of the web development at this point an important aspect of this investigation is to figure out how far the support has come. To begin with I figured out what browsers are the most used by looking at W3counter.com. The browsers I investigated are Chrome, Safari, Firefox, Opera and Internet Explorer. ^[1]

As of right now the three browsers that has the best support for web components are Chrome, Safari and Opera. Microsoft Edge is currently investigating adding support for web components whilst Fire Fox are developing the support for Custom Elements, HTML

Imports, Shadow DOM. When it comes to HTML templates every single browser except Internet Explorer and Opera Mini has support for it.

One of the least implemented part of web components is the HTML import, according to webkit.org the reason for this is “Multile browser vendors have raised concerns about how the HTML imports currently works. For example, its dependency model is not fully compatible with ES6 Modules”. Firefox has decided not to implement the HTML imports but they have decided to allow users to manually enable it with a change in the `about:config`.^[4,5,11]

Since there are statements made form more than one browser vendor regarding the current state of HTML Imports and its current way of being packaged in the ES6 modules. I believe that if the way the HTML Imports are packaged isn't changed it is either going to be scrapped or a browsers specific part since all the other parts of the web components are currently either under consideration, under implementation or implemented.^[11]

1

6 RESULTS

6.1 Web components importance in the future?

To understand the importance of what web components can offer an understanding of the major problems with web development is needed. By understanding the problems that currently exist in web development a look at how they affect Frameworks and plugins is important. The most common problems that web developers encounter is after an update, if you work with a framework with plugins/modules or a web application something often stops working or needs to be updated so it works with each framework again.

This is since there is a very big problem with reusability and compatibility in web development at this moment. The problem is very big and causes problems for developers and users. There is currently not a “good” fix for this normally the users have to find a work around for the problems with compatibility. The developers encounter problems with making the applications/modules they develop work on many platforms and in many different Frameworks. ^[9,10]

The future of web development lies in the development of web components and their integration into the major web browsers. Problems with reusability will more or less be solved since the applications will have their own built in libraries and API's. This will help us bring more broad and new technologies to the table regarding web development. This will also help with the problem regarding compatibility, since the applications are no longer going to be dependent on the frameworks or application but their built-in resources. ^[9,10]

Another important thing web components will bring an end to is the need to rewrite big parts of an application to get everything compatible. Therefore, the life of web applications is going to be longer and since they will live on the interoperable nature of web components.

6.2 How will Web components change the web development?

To understand the importance of what web components are and what you can do with them I had to understand how they worked and what they allowed me to do. There are four major parts of why web components are important. The first one is Encapsulation and with this one it helps separate the component from the main application. Encapsulation helps to make reusability, testability and reliability since the component itself is only responsible for internal parts and therefore shouldn't be a concern with the state of the application.

This helps the component author and user able to upgrade the component without being afraid of it affecting the rest of the application.

Another part is the extensibility it should be possible for components to extend other components. This is important since it will allow the component author won't have to remake the cycle and this allows for easy reuse of the components functionality.

The most important part of web components is the possibility for reusability with all the other parts mentioned a component should be easily reusable and require minimal dependencies with a clearly defined API^[4,5,7,9].

But why would we then need web components if a framework can supply the parts mentioned above?

There is a big reason to this and that is interoperability, it means that the components can be used in multiple frameworks and other different technology stacks. An example you can't in any easy way use components from frameworks such as Angular or React and that is where web components are so superior. Since they can be used easily on other technology stacks and frameworks.

6.3 How far has major browsers come regarding supporting web components?

After researching the support of web components, Chrome is superior when it comes to implementation of the web components. Since google is behind the browser chrome it is no surprise that they are also the company behind the polyfill Polymer. The polyfill are used with browsers that yet has not implemented the standards for web components. As of version 59 of Chrome it has partially started to support the Custom Elements v1 while they fully support the Custom Elements v0. The support for Custom Elements v1 both Safari and Opera has started to partially support. Chrome for Android as of version 61 also supports the majority of the web components, the only part that is not fully implemented is Custom Elements v1.

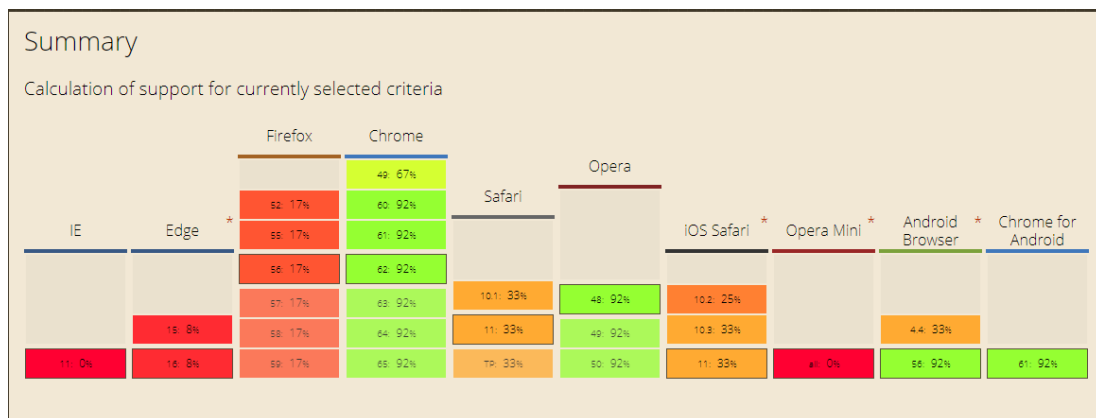


Fig 1

Firefox has started to develop the support for web components, currently Firefox only supports HTML Templates. Shadow DOM v0 and Custom Elements are currently not enabled by default but they can be enabled as of version 54. HTML Imports are something that Firefox has no plans to implement. But Shadow DOM v0, Custom Elements and HTML Imports are currently available from the config in the browser. Although Shadow DOM v1 is currently in development and there is no way to enable it at the moment.

Opera is one of the other web browsers that has started to support web components, currently Opera is supporting Shadow DOM v0, HTML Templates, Shadow DOM v1, Partial support for Custom Elements v1 and full support for Custom Elements v0. In total Opera from

version 47 and forward there is almost full support for Web Components, they also have full support for HTML Imports which is one of the least implemented Web component parts. As mentioned before it is also available from version 47 and forward.

Safari is far away from fully enabling web components, so far the only part of the web components they have implemented is HTML Templates. They have implemented HTML Templates to their mobile browsers as well. There is also partial support for Custom Elements v1 and Shadow DOM v1.^[4,5]

Internet Explorer has absolutely no support for web components at this point, and from what I can see they are not planning on implementing any support for it either. This is because as the last version of Internet Explorer to be released came out 17:th of October 2013 and that was version 11 and as of the 12:th of January 2016 Microsoft stopped supporting every version of Internet Explorer except for version 11.

Microsoft Edge has taken over Internet Explorer's place but even in Edge there is very little support for web components. The only part of the web components that currently is supported in Edge is HTML Templates. They are currently considering implementing Custom Elements v0, Custom Elements v1, Shadow DOM v1 and HTML Imports.^[4,5,6]

7 CONCLUSION

During this study, I investigated how web components are going to change the way web development is being done currently. Also, a look at how far the browsers has come to supporting the different parts of web components. To get an understanding of why/when some of the parts are going to be implemented or not was an important part.

Research question 1:

Regarding the importance of why web components are important for the future we got a very interesting answer that they are going to change the way external libraries and modules are used in the web development world. Since web components are instead relaying on internal APIs and libraries no third-party software is needed to get these to work.

Research question 2:

Regarding how the web components are going to change the way we develop web application it became clear that instead of developing everything as one big unit it is instead going to be developed into smaller components. This is to help with the problem regarding reusability and compatibility that is currently making chaos in the development world.

Research question 3:

Regarding how far the major web browsers has come in the implementation of web components we got a very clear picture of that Google Chrome and Safari is way ahead of everyone else but that the other web browser is currently working on implementing three out of the four parts of web components. It also became very clear that many web browser companies did not like the way HTML Imports was packaged in the ES6 modules.

8 FUTURE WORK

Going forward I believe it would be smart to start with testing out developing a web component. This would give a deeper understanding of how they work and why they are so strong.

From here it would be important to note how hard it is to get started with developing and how good the API are. The smart approach here would be to take one of the most implemented parts of the web components, to be able to compare it on different web browsers and such.

It would also be very interesting to test out the web components frameworks which would be Polymer, X-Tag and Bosonic since they are the most talked about. It would be smart to compare these as well to understand where the differences are in them.

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Majority of the information regarding how web components work and what they do are taking from these homepages and are used everywhere in the project.

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Figures:

Fig 1: Print screen from <https://caniuse.com/#search=Web%20components>
(Taken 2017-11-02)