Submission in response to the Digital Platform Services Inquiry – September 2021 Report on market dynamics and consumer choice screens in search services & web browsers

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Thank you for the opportunity to comment.

This submission represents my personal views only. My background is in Web technology and standards, starting with a spell as La Trobe University's Webmaster in 1995, then working for Australian ISPs and corporations before moving to Silicon Valley, where I've worked for both start-ups and large, globally recognised tech companies (albeit remotely after returning to Melbourne in 2006).

As part of that work, I've served as Chair of the HTTP Working Group since 2007, have authored or edited over 30 standards documents, and have served on both the W3C Technical Architecture Group and the Internet Architecture Board, the peak architectural bodies of the Web and the Internet, respectively.

In doing so, I have become familiar not only with browser technology, but also with the motivations and mindset of a browser vendor; while I cannot and will not claim to represent them,[*] my status as a close observer might be helpful. It is with that somewhat informed perspective that I hope to be of service to you in this submission.

Browser Monetisation

Question 5(a) asks '*How are browsers monetised?*' While there is not a single answer to this question, I'd like to highlight a few different (and not exclusive) answers:

- As widely discussed, Apple and Mozilla receive significant compensation from search engines for preferred placement in Safari and Firefox, respectively. With Mozilla, this amounts to USD400-450 million annually,[1] and arguably has made a substantial contribution to diversity in the market, because it is used to support not only a distinct browser but also a distinct browser engine.[2] According to the CMA, 'Google paid

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[*] In the spirit of full disclosure: in the past I have briefly been contracted to Mozilla to perform a time-limited task. This submission in no way represents them, and I don't believe that relationship influenced the contents of this submission in any way.

[1] Discussed further infra.

[2] Catalin Cimpanu, 'Sources: Mozilla extends its Google search deal', *ZDNet* (Web Page, 12 August 2020) <https://www.zdnet.com/article/sources-mozilla-extends-its-google-search-deal/>.

around £1.2 billion in return for default positions in the UK alone, the substantial majority of which was paid to Apple for being the default on the Safari browser.'[3]

- Apple, Google, and Microsoft all provide a browser as part of an operating system (including mobile operating systems). This can be (and has been) seen as tying, but it also recognises that much activity on computers today takes place in a browser, supporting the perception that it is a necessary feature of an operating system as a product (even if it is only used to download another browser).

- Google also derives significant value through integration between Chrome and its online services; according to its CFO in 2011,

  > everybody that uses Chrome is a guaranteed locked-in user for us in terms of having access to Google… [this] impacts many of our other products that work as part of Chrome. So the lifetime value of a Chrome user is phenomenal.[4]

  Google is to date unique in this, although Microsoft's Web-based online services have started to compete with Google recently.

- Mozilla provides a browser within the context of a social mission.[5] Arguably, Apple does as well.[6] Although non-economic, these motivations should not be overlooked.

- Browsers might also attempt to monetise their privileged position they have regarding user data and activity. For example, Brave has created an alternative online advertising ecosystem that inserts ads onto Web pages in a more privacy-preserving way.[7] Chrome has proprietary mechanisms that are alleged to make tracking easier,[8] and Firefox's changes to its DNS implementation[9] are more examples that show the potential for monetisation, even if in these cases they are not attempting to do so.

- Finally, browsers have tremendous influence over the development and evolution of the Web itself. While standards bodies impose architectural regulation on the Web, browser vendors wield substantial power, because Web sites have a powerful incentive to interoperate with popular browsers. While the converse is also true (browsers need to work with Web sites), there are vastly fewer browsers, and market share further concentrates power there into very few hands. The resulting value derived from effectively if only partially controlling the future of the Web cannot be ignored, even if it is difficult to quantify.

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[3] *Online platforms and digital advertising* (Final report, 1 July 2020) 13 https://www.gov.uk/cma-cases/online-platforms-and-digital-advertising-market-study>.

[4] Larry Dignan, 'Why is Chrome so important to Google? It's a "locked-in user"', *ZDNet* (Web Page, 14 April 2011) <https://www.zdnet.com/article/why-is-chrome-so-important-to-google-its-a-locked-in-user/>

[5] 'The Mozilla Manifesto' (Web Page) <https://www.mozilla.org/en-US/about/manifesto/>.

[6] 'Privacy – Apple' (Web Page) <https://www.apple.com/privacy/>.

[7] 'Brave Rewards' (Web Page) <https://brave.com/brave-rewards/>.

[8] 'Is Chrome really secretly stalking you across Google sites using per-install ID numbers? We reveal the truth' The Register (Web Page, 5 February 2020) <https://www.theregister.com/2020/02/05/google_chrome_id_numbers/>.

[9] 'Firefox turns controversial new encryption on by default in the US', *The Verge* (Web Page, 25 February 2020) <https://www.theverge.com/2020/2/25/21152335/mozilla-firefox-dns-over-https-web-privacy-security-encryption>.

Browser Differentiation

Question 5(b) asks '*Are browsers significantly differentiated products? If so, in what respects?*'

At their core, Web browsers are extremely *un*differentiated. By specification, design and user expectation, they are required to behave in the same way when the user follows a link, when they load the resulting web page, when a stylesheet guides the presentation of the page, and when that page runs a script.

This exacting interoperability is largely the result of history. When Internet Explorer was the dominant browser, it set the bar for interoperability by fiat, enabled by the many web sites that only worked with it. This was seen as unhealthy by the larger Web community, and it spawned a strong, widely shared desire to ensure that the Web would be defined by specification, rather than the largest implementation.

The nature of browser interoperability is also evident in is a growing body of specifications that detail the minutia of how they operate,[10] coupled with extensive test suites.[11] Google (as the currently dominant browser vendor) participates in and substantially contributes to these efforts. Taken together, these efforts help to assure that choice of browser does not affect the usability or utility of the Web.

Of course, bugs will always be found; browsers are not always perfectly substitutable on a site that depends on a particular browser's implementation quirks. However, the degree of substitutability in browsers' handling of 'core' tasks like rendering HTML has risen substantially in the last decade, and should continue to increase for the foreseeable future.

That said, there are still factors which can differentiate browsers:

- Browsers often attempt to differentiate on how quickly or efficiently they can load pages, run scripts, etc.[12]

- Some browsers are adapted to support alternative user interfaces: e.g., screen readers for the blind.[13]

- Browsers routinely differentiate on 'add-on' features such as bookmark managers, password managers, textual translation functions, developer tools, operating system integration, etc. This includes extensions (discussed more extensively below).

- There are numerous opportunities for extension in the core protocols, formats and APIs in the Web platform (as distinct from *browser extensions*, discussed below). For example, a browser might introduce a new HTTP request header, or it might support a new JavaScript API. Often, this can be characterised as pre-standardisation activity, to prototype and refine the design without the added cost and risk of coordinated

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[10] See, eg, 'Fetch', *WHATWG* (Living Standard) <https://fetch.spec.whatwg.org>, which details how a browser makes a HTTP request, in addition to the actual HTTP specifications, which specify the protocol itself.

[11] See, eg, 'web-platform-tests dashboard' (Web Page) <https://wpt.fyi/results/>, which as of this writing has 41,001 distinct tests for browser interoperability.

[12] See, eg, 'What is the Fastest Web Browser?', *Brave* (Web Page) <https://brave.com/learn/fastest-web-browser/>.

[13] See, eg, 'JAWS' (Web Page) <https://www.freedomscientific.com/products/software/jaws/>.

standardisation activity. At an extreme, it can reveal a difference in how browser vendors perceive the boundaries of the Web.[14] Note that to be successful, most protocol extensions of this sort must also be supported in some fashion by Web sites – which often depends on how much market power a given browser has.

- Browsers might differentiate by how they relate to the user – for example, through their approach to user privacy and safety. As a 'user agent', browsers have a privileged role in the Web architecture,[15] and are designed and expected to act as an information fiduciary for the user regarding their data and activity. How well a particular browser serves this duty can be a major differentiating factor.

BROWSER EXTENSIONS

Question 7 asks '*To what extent is it important for a browser to be able to offer a range of extensions and software for consumers?*'

From the perspective of a browser vendor, extensions provide an important 'escape hatch' from pressure to modify browser behaviour. They have several benefits:

- Even large companies like Google and Apple have limited resources for browser development. Extensions allow browser vendors to focus them on core functionality.

- Users' needs are diverse. Browsers are naturally conservative, limited by the security and privacy properties required of the open web. Extensions allow customisation.

- Allowing extensions reduces the pressure to create new browsers, thereby avoiding fragmentation of the market. This *could* be seen as vaguely anti-competitive, but the resources needed to maintain a secure, usable browser are non-trivial, and significant fragmentation in the browser market would likely result in reduced consumer welfare.

- Many extensions make trade-offs in terms of performance, usability, and especially privacy that are not acceptable to browser vendors. By shifting the responsibility for these trade-offs to the extension author, the browser vendor can maintain the integrity of their product without falling into the trap of paternalistically deciding what's best for all users.

Most browsers choose to limit the extensions that they offer through a vetting process, or a 'store' experience.[16] In most cases, this is an attempt to mitigate the inherent security and privacy risks associated with extensions, combined with the lack of understanding of those

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[14] See, eg, Alex Russell, 'Platform Adjacency Theory' (Web Page, 30 June 2020) <https://infrequently.org/2020/06/platform-adjacency-theory/>.

[15] See discussion at 'We Fight For the Users: An Appreciation of IETF's RFC 8890', *Electronic Freedom Foundation* (Web Page) <https://www.eff.org/deeplinks/2020/10/we-fight-users>.

[16] See, eg, 'Chrome web store', *Google* (Web Page) <https://chrome.google.com/extensions>.

issues by many users. Abusive extensions that take advantage of this ignorance have been widely documented,[17] and the industry is still developing responses to these issues.[18]

As such, requiring browsers to allow particular extensions, or extensions in a particular format could result in diminished consumer welfare, because it would remove the flexibility required to balance extensibility with security and privacy.

Ecosystem Lock-in

Question 12 asks '*Do device ecosystems result in any lock-in effects for consumers, or affect consumer switching or barriers to entry in the supply of browsers or search services?*'

I will limit my comments here to one item: Apple's requirement that no browser engine other than the one they provide (WebKit) be used on iOS devices.[19]

Apple has been criticised for this requirement widely. In combination with what is perceived by some as under-investment in WebKit, Apple is seen to be constraining the development of the Web.[20]

Sidestepping debate over the merits of that view, I want to emphasise the larger point – if Apple is forced to allow other browser engines on iOS, the result will likely be further concentration of market power by Google, as Blink and Chromium gain market share, putting Safari and WebKit at risk.[21] That outcome would have a much larger impact on the Web as well as consumer welfare, compared to any issues with tying WebKit to iOS.

Technological Change

Question 15 asks '*Are there technological changes that will affect the supply of browsers, search services and/or the device ecosystem…?*'

The technological challenges of creating a new Web browser are relatively easy to overcome despite the inherent complexity of the Web, thanks to the availability of open-source browser engines (e.g., WebKit, Gecko and Blink). Brave, for example, launched their browser with seed funding of USD7 million.[22] Vivaldi estimated that USD6.07 million was required for the first release of their Blink-based browser.[23]

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[17] See, eg, 'Malicious extension abuses Chrome sync to steal users' data', *BleepingComputer* (Web Page, 5 February 2021) <https://www.bleepingcomputer.com/news/security/malicious-extension-abuses-chrome-sync-to-steal-users-data/>.

[18] See, eg, 'More than 200 browser extensions ejected from Firefox and Chrome stores' *ArsTechnica* (Web Page, 31 January 2020) <https://arstechnica.com/information-technology/2020/01/mozilla-and-google-crack-down-on-malicious-and-abusive-browser-extensions/>.

[19] 'App Store Review Guidelines', *Apple Developer* (Web Page) <https://developer.apple.com/app-store/review/guidelines/#software-requirements>.

[20] See, eg, Nolan Lawson, 'Safari is the New IE' (Web Page, 30 June 2015) <https://nolanlawson.com/2015/06/30/safari-is-the-new-ie/>.

[21] See further discussion infra.

[22] 'Brave', *Crunchbase* (Web Page) <https://www.crunchbase.com/organization/brave-software/company_financials>.

[23] Joachim Dagenborg, 'Browser startup Vivaldi says needs 5 million users to turn profit', *Reuters* (Web Page, 15 April 2016) <https://www.reuters.com/article/us-internet-vivaldi-idUSKCN0XC1J6>

By far the more onerous task is building a user base for your new browser. Although browsers are readily substitutable (as discussed above), building user trust and awareness is *much* more difficult, as is overcoming inertia due to familiarity with a particular product.

As a result, incremental technological changes are unlikely to disrupt or constrain the browser market directly, as any major functions will likely be standardised and implemented in all the major browser engines, this making them available to downstream browsers.

However, the underlying browser engine market might very well be severely constrained by technological changes, especially if the complexity of maintaining parity becomes too much of a burden for some vendors (e.g., Microsoft, who recently stopped work on their in-house browser engine to favour Google-sponsored Blink).[24]

The loss of Microsoft's engine created widespread concern about the lack of diversity in browser engines;[25] if one more were lost, effective control of the Web would fall to just two vendors, with one having a strong upper hand.

This risk is reflected in debates about what the Web is. For example, Google's Project Fugu seeks to supplant native apps on phones with apps based on Web technology, by introducing a galaxy of new features to the Web platform.[26] While doing so might improve competitiveness in app markets, it comes at the cost of significant complexity burden for browser engine vendors that can lead to reduced market diversity, and arguably makes undesirable trade-offs in security and privacy. As a result, Mozilla and Apple, among others, have pushed back on this expansion.

However, these risks pale compared to the greater risk of continuing Web and Internet fragmentation. As sites and browsers are increasingly subject to requirements for localised concerns that require technical changes – whether it be to backdoor encryption, require identification, or impose censorship – we will quickly move to a world without a unified Web, and need to use different browsers to access different kinds of content depending on who you are, where you are, and what you want to do. That would be a loss for everyone – and not just because it's inconvenient. The erosion the Web as a single platform would result in numerous opportunities for fraud, abuse, and human rights violations worldwide.[27]

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[24] 'Microsoft Edge: Making the web better through more open source collaboration', *Microsoft* (Web Page, 6 December 2018) <https://blogs.windows.com/windowsexperience/2018/12/06/microsoft-edge-making-the-web-better-through-more-open-source-collaboration/>.

[25] See, eg, Rachel Nabors, 'The Ecological Impact of Browser Diversity' *CSS-Tricks* (Web Page, 4 September 2018) <https://css-tricks.com/the-ecological-impact-of-browser-diversity/>.

[26] See, eg, Konstantin Münster, 'What Is Project Fugu — Google's Initiative To Unlock All Native Device Features For The Web', *Start it up* (Web Page, 6 May 2020) <https://medium.com/swlh/what-is-project-fugu-googles-initiative-to-unlock-all-native-device-features-for-the-web-892fafa726f9>.

[27] See, eg, 'Internet Fragmentation: An Overview' *World Economic Forum* (White Paper, January 2016) <http://www3.weforum.org/docs/WEF_FII_Internet_Fragmentation_An_Overview_2016.pdf>.