CMA's market study into mobile ecosystems: final report summary

The CMA's study into mobile ecosystems – ie operating systems, app stores and web browsers – has concluded that Apple and Google's duopoly means they have a stranglehold over these key gateways. There are many potential interventions which could help unlock competition and protect millions of businesses and people reliant on their services. The CMA is taking targeted action now to tackle some of the many problems, and the new pro-competition digital regime will have additional powers to oversee key digital markets like these.

Apple and Google have a tight grip over these increasingly crucial ecosystems – putting them in a powerful position. Both companies unilaterally determine the 'rules of the game', making it difficult for rival businesses such as browsers or alternative app stores to compete. Many companies have raised frustrations with us. We found greater concerns with respect to Apple (as it imposes more direct restrictions), although Google also holds significant power.

Apple and Google's stewardship has helped bring benefits for people and businesses, such as substantial investment and popular trusted products. But there are also significant downsides, even if they are not always immediately obvious to people. Tens of thousands of UK businesses such as app and web developers, which rely on these ecosystems to serve their customers, face restrictions and terms that they have little choice but to accept. Consumers are likely to miss out on new innovations, have less choice, and ultimately face higher prices. Both Apple and Google are making substantial and growing profits – unabated for over a decade. This matters not only for people and businesses, but for the UK's wider digital economy including tech start-ups struggling to get a foothold.

These problems are entrenched and will not go away unless steps are taken. We have identified a wide range of changes to open up competition in browsers and app distribution, remove or revise unnecessary restrictions, and introduce new safeguards aimed at ensuring fair and reasonable treatment of app developers.

The CMA is acting now to tackle concerns where possible using our existing powers, as part of a wide portfolio of digital cases already underway. We are:

- consulting on a market investigation into mobile browsers and cloud gaming – both of which involve restrictions holding back potentially disruptive innovation

- taking further enforcement action including opening a new investigation into Google's app store payment practices, alongside our similar investigation into Apple, and we will be launching further digital cases beyond the study.

There are no easy or quick fixes. A new *ex ante* regulatory approach is required to oversee powerful tech firms like these and support the UK's innovative tech sector. We welcome the government's commitment to establish a new regime with tailored powers to tackle these problems.

Mobile ecosystems matter to people and businesses

Mobile devices, particularly smartphones, play a fundamental role in the lives of people in the UK, and consumers are willing to spend substantial sums of money on them (equivalent to almost £500 per household in 2021). They provide fast and convenient access to a wide range of products, content and services, through dedicated apps or through the open web (accessed through a browser). They are the most widely used device for accessing the internet: in 2021 88% of UK adults used a smartphone to go online and UK consumers downloaded over 3 billion apps. This means it is important that these devices, and the services offered with them, are of the highest quality, that prices are kept as competitive as possible and new innovative services have the freedom to flourish.

This market study has looked widely at mobile ecosystems across four areas:

- **Mobile devices and operating systems** – most devices use Apple's iOS or Google's Android operating system, which determine and control key features such as the interface, speed and technical performance, and what software can run on the device.

- **Distribution of native apps (eg via app stores)** – most apps are 'native', ie written to run on a specific operating system. Some come pre-installed but the vast majority are downloaded through app stores, which are the key gateways through which app developers can distribute apps to people. Apple's App Store is the only permitted app store on its devices and over 90% of downloads on Android devices are from Google's Play Store. Apps can also be downloaded from the open web (ie 'sideloaded') though this is rarely done.

- **Mobile browsers and browser engines** – browsers are used to access and search the internet and are another key gateway between users and businesses. They are one of the most widely used apps – with potentially over 55 million weekly active UK users. The two most used browsers are Apple's Safari and Google's Chrome, which have a combined share of supply of around 90%. Browsers run on browser engines, which are fundamental to the speed and capability of browsers. In 2021, 97% of all mobile web browsing in the UK was powered by either Apple's or Google's browser engine. Browsers also enable people to access 'web apps', which have the potential to be similar to native apps without being tailored to each operating system.

- **Apple and Google's role in competition between app developers** – Apple and Google's control of their app stores puts them in a key position to set the rules for competition between app developers whilst also directly competing with their own apps. They unilaterally determine: what apps are allowed; how they are ranked and discovered; and set commission rates and many other rules.

Both companies have undoubtedly played an important role in driving the overall growth and development of these digital markets – with many people and

businesses alike valuing and benefitting from their products and services. Benefits include: products that work seamlessly together; innovations in improving products and services, including expanding what people can do on their devices; creating general confidence and trust amongst users (which can help smaller new businesses); funding a number of free services that are valued by people; and creating a new series of markets (like app stores) benefitting many businesses and making it easier for smaller app developers to access users. People are generally satisfied with their devices and the way they work.

It is also important to recognise the valuable roles that Apple and Google play as stewards of their ecosystems, helping to protect users' privacy, security and safety online.

However, Apple and Google have cemented their powerful position as the two main gatekeepers that hold the 'keys' to these increasingly vital mobile ecosystems. Both firms are well placed to leverage their power into other markets linked to their ecosystems, including new emerging ones. It is extremely difficult for other firms to enter, expand and compete meaningfully – Apple's and Google's positions are unassailable without steps to level the playing field. Where it will be more difficult to unlock competition, safeguards for users and businesses may also be needed.

Their decisions can be 'make or break' for many thousands of UK businesses, including many start-up app developers – determining which apps are available on their app stores, what functionality these apps can have, and how they can connect with customers. Similarly, most UK businesses – along with web developers that they hire or employ – rely on browsers for their websites or web apps, which enable millions of people to navigate the web and access their services effectively via their mobile devices. Problems in either app stores or browsers can cost developers and UK businesses time and money. Many companies have raised concerns with us during the course of this study, particularly about the negative impact Apple's restrictions have had on their businesses.

We support the UK government's commitment to making the UK one of the most attractive places in the world to start and grow a digital business. The evidence we have found in this study – such as through our interaction with a large number of independent web developers – illustrates that changes are needed to ensure that these businesses can flourish.

Examples of concerns raised by businesses

"From my experience developing medical applications for my employer I can say that we have been forced into making native apps because of the lack of capability of the browsing engines in the past, particularly mobile Safari as continues to be the case… **Despite this, in the case of one quarter billion dollar revenue product the native app was eventually abandoned because of the restrictions** that both Apple and Google place on monetization within the app and their prohibitively high share of that income."

"More specialised agencies do not have the money and resources to invest in the huge costs of native app development, meaning when a client requires an 'app like' experience we cannot offer it affordably. Were Apple devices to have progressive web app functionality on the level of Windows or Android then we could use web apps where possible to provide these services. **The lack of many of these features costs us business and limits the scope of the market we can offer**."

"I am a UK resident who performs two roles as a Technical Lead of a large technology consultancy and as a CTO of a start-up... In both roles, Apple's monopolistic and anti-competitive approach to their platform **fundamentally harms the businesses I work for and the clients I serve**."

"**Safari being the only browser option killed my startup**… I was building a web app, because building the same app, three times, concurrently doesn't make sense for an early startup. I knew it'd be an uphill battle, but apple was insufferable."

"As a developer, **Apple's treatment of the web on iPhones and iPads costs my business extra manhours**, and effectively forces me into Apple's pay-to-play ecosystem. My apps could largely exist exclusively on the Web if Apple wasn't putting its thumb on the scale."

While the impact on businesses and the way they are able to compete is clear, the effect on the millions of consumers using these services is less immediately visible. Although people do not have to pay directly for many of the services and apps, consumers ultimately lose out when competition does not work well. Weak competition within and between Apple's and Google's mobile ecosystems is harming consumers and will continue to do so absent intervention. Consumers will lose out as:

- new and valuable **innovations** could be held back in some areas, particularly where they affect Apple's and Google's businesses; eg new types of services like cloud gaming on iOS or technological developments like web apps;

- **choice** is more limited; eg in browsers and app stores – hindering the development of new bespoke curated app stores to meet people's different needs such as stores for different age groups or for gaming enthusiasts; and

- **prices** are higher than they should be; eg prices for Apple's devices, Google's search advertising fees, and both firms' app store commissions are all above

a competitive rate – ultimately leading to higher prices for the end consumer or worse quality.

Apple's and Google's differing business models affect their approach

Although there are many similarities in the range of products and services that Apple and Google provide, they each have different business models. There are important differences in the structure and focus of their businesses, which affect their incentives and the approaches they take in operating their ecosystems. Figure 1 illustrates some of the key ecosystem features for which their approaches differ.

Figure 1: comparison of key ecosystem features
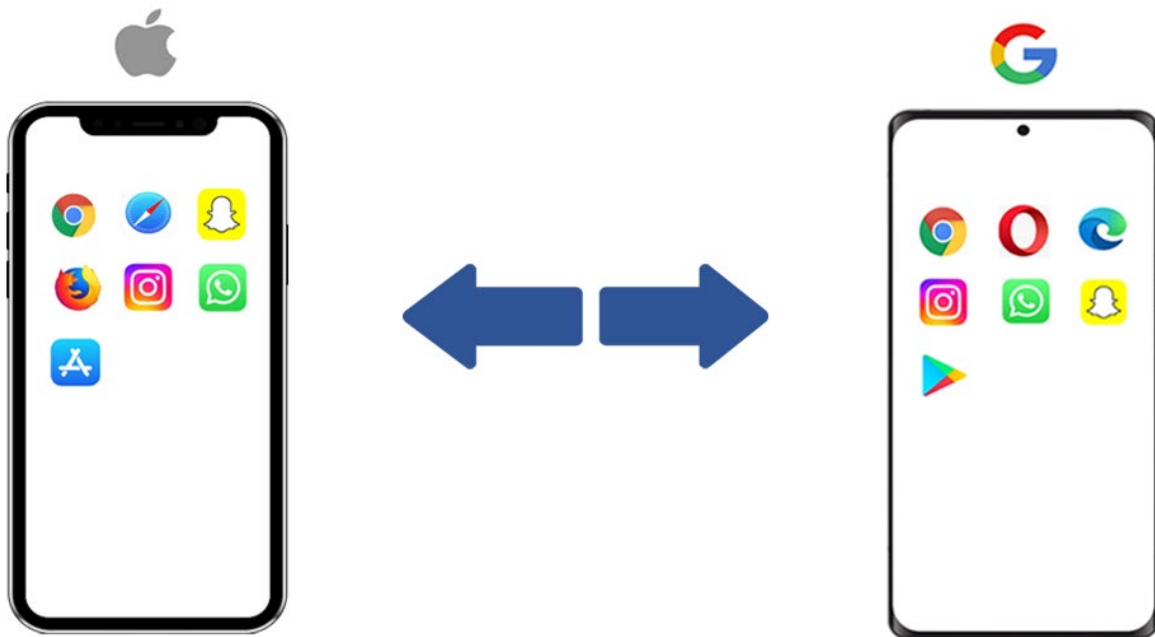
Apple (iOS phones)	Feature	Google (Android phones)
App Store	Main app distribution route	Play Store
Up to 30%	Commission rate on app stores purchases	Up to 30%
No	Alternative app stores	Yes (not via Play Store)
No	Sideloading	Yes (with steps/warnings)
No	Access to cloud gaming through app stores	Yes
Safari	Main browsers	Chrome
WebKit	Web engine	Blink
No	Competing browser engines	Yes
Yes	Browsers pre-installed/set as default	Yes

Their differing incentives are illustrated most clearly by the contrast in their primary sources of revenue – Apple makes the vast majority (around 80%) of its revenue from device sales, where it dominates the sale of more expensive higher-end devices and imposes tight controls over the hardware and software run on its

devices. Google on the other hand makes the majority of its revenues (around 90%) from advertising. Google's ecosystem is more open in some respects than Apple – imposing fewer direct restrictions. However, Google uses its control over products and services such as Android, Chrome and the Play Store to mutually reinforce the use and demand for each of them – with the ultimate aim of driving traffic to its search engine. It does this in large part through a series of agreements with Android device manufacturers.

Aside from these differences, Apple and Google both also earn substantial and increasing revenue from their app stores. For example, Apple's net revenue for the App Store in the UK increased substantially [80-100%] between 2018 and 2021.

Both make persistently high and growing profits

Over the last decade, both Apple and Google have consistently earned substantial profits from their mobile ecosystems – with very high margins and returns on capital employed (ie the annual return made on the investments needed to run the business).

- Apple made £80 billion in profit globally in 2021 and we estimate its return on capital employed has been over 100% – very high in any sector.

- Google made £57 billion in profit globally in 2021, and updated analysis from our previous study on digital advertising shows that it earned a return on capital employed of 39% (on average between 2011 and 2021) – well above any reasonable competitive benchmark for many years.

Although high profits are not necessarily a concern in themselves, these supra-competitive returns are consistently above what would be expected in a properly competitive market – and have been sustained and growing for over a decade. While the revenue earned in these areas may cross-subsidise a number of other services that are offered for free to users (like app stores, browsers and some of their own apps), the size of the profits above demonstrates that even where the costs of these are taken into account, the profits earned are still very high.

Our illustrative analysis suggests that between them, Apple and Google were able to earn more than £4 billion of profits in 2021 from their UK mobile businesses over and above what was required to reward investors with a fair return. This suggests that there is significant scope for competition to drive greater innovation through increased investment – with huge implications for UK consumers including new and innovative products and services and/or lower prices.

Apple and Google's stranglehold on these markets

When people in the UK buy a new mobile device, they are faced with a binary choice between two mobile ecosystems controlled either by Apple or by Google.

Apple and Google use this tight hold over these markets to control and influence the services and online content people can access on their phones – giving them the

ability to tilt the playing field in their own favour, while restricting or deterring new innovations that could disrupt their hold in these markets.

Both have a strong grip over a similar set of products and services within their respective ecosystems, although this control manifests in different ways.

Apple's tight grip with many restrictions

Apple imposes many restrictions such as prohibiting any other app store on its devices, blocking direct downloads from the web, and restricting other ways to access services. These may have some benefits for security or user privacy. However, they can also limit competition or cause users to lose out in other ways. For example, **Apple's restrictions have effectively blocked cloud gaming services from its app store and hampered the development of web apps through its restrictions on browser engines – both are potentially disruptive new ways of providing services to consumers which could pose a threat to Apple's business.** Almost all of Apple's own apps and services (such as iMessage) are unavailable on Android devices and some of its connected devices (eg Apple Watch) cannot be used with Android or have more limited functionality. Our survey of smartphone owners found that the most frequently quoted reason for iOS users not to switch was 'because I have other devices linked to my phone/operating system'.

> **Blocking cloud gaming**
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> Apple has impeded the emergence of cloud gaming (permitted on Android) – new services which could revolutionise gaming by using the power of the cloud to offer access to advanced games without the need to download games or purchase expensive hardware.
>
> This could pose a threat to its App Store business, since it is an alternative way of discovering and distributing games. It could also reduce the importance of top-end 'high-spec' phones like Apple's – one of their selling points.

Apple restricts the functionality and use of other browsers as it does not allow competing browser engines – meaning all iOS-based browsers must use Apple's own engine, including even Chrome. We heard concerns that Apple has not implemented (or substantially delays) a wide range of key features in its browser engine. We received a substantial number of complaints directly from web developers about the impact of this restriction; including the limitations and frustrations of having to rely on Apple's WebKit engine. This not only affects many UK businesses but limits the potential for rival browsers to differentiate themselves, eg improving browser speed, which inhibits competition.

It also materially affects the functionality of web apps – limiting the constraint these could have on native apps and Apple's market power from its App Store. Apple also receives a significant share of revenue from Google Search traffic on iOS devices.

Web apps – innovative technology held back by Apple's browser restrictions

Web apps are similar to native apps but accessed through a browser – they do not need to be tailored to each operating system meaning one app can be developed for use across Android and iOS. Many businesses offer web apps instead of or in addition to native apps such as Wordle, Uber and Pinterest.

Web apps have the potential to be an alternative way to access content without needing to rely on app stores – potentially weakening Apple and Google's hold over app distribution. Development and usage of web apps is currently much lower than native apps and many app developers do not see them as a viable alternative.

The development and take-up of web apps are being hindered because the features and functionality are severely restricted or delayed on iOS; eg push notifications and full-screen functionality, among many others. Many developers raised concerns about this. One developer told us that web apps had been 'strangled' by Apple's approach and another said that the WebKit restriction is 'holding up the entire web development world, as often developers have to limit their web apps "minimum common denominator" of features, and usually Safari is way behind on features, and a better browser can't be installed'. As a result any efficiency savings from web apps are lost, as a separate native app is still needed for iOS, rather than developers being able to produce a single web app.

We spoke to the creator of Wordle about his experience of developing the game for the web and the challenges directly attributed to the restrictions imposed by Apple. While Wordle is a success story, we cannot know how many other small start-ups have failed due to Apple's restrictions.

Google paid Apple approximately £[1-1.5] billion in ad revenue in the UK for being the default search engine on the Safari browser alone. This reflects Apple's strong position in browsers.

We also received a substantial number of complaints from app developers about the way in which Apple governs its App Store and the restrictions it imposes. The majority of developers we contacted had concerns about its opaque app review process and the impact this had on their businesses – describing it as 'obscure', 'arbitrary', 'capricious' and 'Kafkaesque', with Apple rejecting apps without sufficient reasoning or being inconsistent in applying its rules. This can add significant delays and costs to app developers, as well as impacting customers using those apps.

Apple has also blocked access for other app developers to various hardware and software functionality on its iPhone, such as the technology that enables contactless mobile payments (using the Near Field Communication (NFC) chip), meaning this increasingly popular way to pay can only be made via Apple's Wallet, restricting other potentially innovative businesses. This new way of paying is growing very fast: 17 million people – nearly a third of the adult population – were registered to use

mobile payments by the end of 2020, an increase of 7.4 million people (over 75%) compared to 2019.

Google imposes fewer restrictions but still wields strong power

Google has fewer explicit restrictions in some respects (for example it allows other app stores and browser engines), but it still holds a significant amount of control within its ecosystem.

It has a series of agreements with Android device manufacturers involving sizeable payments to ensure that Chrome and the Play Store come pre-installed prominently on most Android phones, and that Google is the default search engine in many other browsers. Manufacturers can only use Google's version of the Android operating system if they pre-install and prominently place the Play Store, and important parts of that operating system can only be updated through the Play Store. These include agreements where Google shares a percentage of its significant search advertising revenues (and in some cases revenue from Play Store) with other Android manufacturers in return for placing and promoting Google apps. This is very difficult for other rivals to replicate, which gives Google a key advantage – its products are used by the overwhelming majority of Android customers. Through these agreements Google uses its products and services to reinforce each other, protecting its position.

While other app stores are allowed on Android (unlike iOS), alternative app stores cannot be downloaded through Google's Play Store; instead they are either pre-installed by manufacturers or must be directly downloaded by the user (ie sideloaded – a process involving several steps and security warnings). These only place a limited constraint on Google, as their usage is substantially lower, and they are not considered to be a viable substitute by app developers. Rival Android app stores also face material barriers – in particular there are strong network effects, meaning an app store needs a critical mass of users to attract app developers and vice versa.

We heard fewer concerns from app developers about Google's operation of the Play Store. It is also less restrictive than Apple on access to hardware functionality like contactless payments. However, there are some signs that Google's approach is tightening in certain respects, for example in relation to the need for particular apps to use Google's payment systems for in-app purchases.

Both set 'the rules of the game' and exert control

While there are differing concerns over Apple and Google, each is in a key position to control the key gateways in its ecosystem.

- **They provide the two main mobile operating systems in the UK.** Of these, Android is the only licensable operating system available – meaning device manufacturers have no other credible choice. Design and control of the iOS and Android operating systems has fundamental implications for the products and services accessed through mobile devices.

- **Their app stores face limited competition**. Apple's App Store is the only way to access native apps on iOS, so it has a monopoly. Although on Android app stores other than Google's Play Store can be pre-installed (eg Samsung Galaxy is the largest alternative) these face barriers in attracting enough app developers and users to be successful, as well as Google's agreements mentioned above. The App Store and Play Store do not compete strongly with one another – most app developers are on both and each has a sizeable set of different customers. Both are, in effect, must-have trading partners for successful app developers.

> **Requirements to use their app store payment systems and high commission rates**
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> Both Apple and Google require certain app developers to use their in-app payment systems. Through these they collect up to 30% commission on subscriptions and 'in-app' digital purchases (like gaming, dating, music streaming apps). This does not apply to physical goods and services like a grocery delivery or a taxi journey. Both companies say this is necessary so they can collect a commission from sales made through their app stores, though we found there may be other, less restrictive ways for them to do this.
>
> These commissions are high and are set above a competitive level. This also risks distorting competition as Apple and Google's apps do not pay this commission (eg Google's YouTube Premium is priced higher on iOS than Android – where it pays no commission). App developers do not get the benefit of choosing the right payment systems for their app or users, and it breaks the link between developers and their customers. Developers should be allowed to handle payments directly and be given a meaningful choice in payment systems.

- **They unilaterally determine the terms of access to their app stores** for apps – many of which compete directly with their own. Both charge significant commission rates on app developers' revenues through the use of their in-app payment systems, where the effective rate has stayed [between 25-30%] over the years for both Apple and Google. Both have made substantial and growing profits (with high margins) from their app stores which have not been competed away by other distribution channels. There is little that app developers can do as they need to be on both app stores to access the different sizeable customer base each has. This puts Apple and Google in a very powerful position – meaning they can impose terms which developers have no choice but to accept if they want to be on their app stores. This is far beyond the general 'cut and thrust' between businesses, as most developers are simply not in a position to negotiate.

- **They operate the two main browsers**. Each has a strong share of the market in its ecosystem, and both control the way that browsers perform on

their devices by supplying the two browser engines on which most mobile browsers are powered – the key exception being Firefox which uses its Gecko engine on Android devices.

Figure 2: extent of browser engine choice within each ecosystem
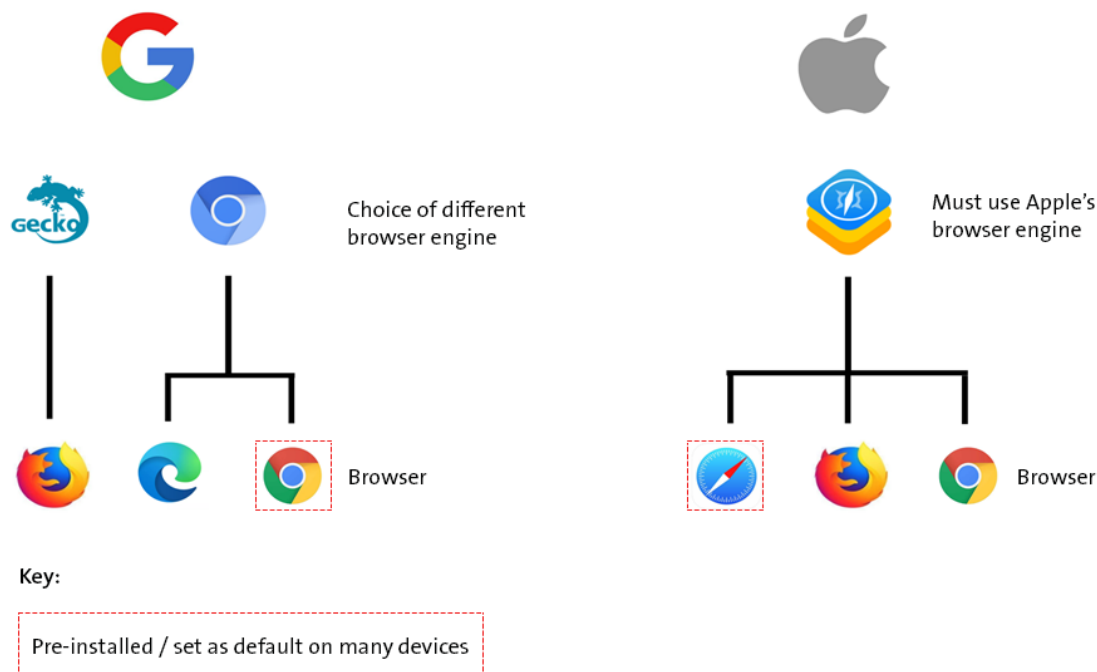
No significant threats from other competitors

There have been no successful attempts at challenging the position of Apple's and Google's ecosystems, although some competitors have tried. These markets have certain characteristics which make it very challenging for other businesses to enter and expand, including:

- **Network effects**. There are significant indirect network effects particularly in operating systems and app stores; ie the more apps and content on the operating system or app store, the more users it attracts, and vice versa. This creates a 'chicken and egg' problem which can be difficult for new entrants or those wanting to expand, to overcome. This makes it very difficult for a new operating system or alternative app stores to get a foothold.

- **Pre-installation, defaults and choice architecture**. Pre-installing apps or browsers and setting certain ones as defaults can have significant impacts on people's behaviour. There is strong evidence that default behaviour, ie avoiding wasting time by accepting the default option, can shape key decisions and can be difficult to shift. This can have a profound impact on competition. Apple directly determines what is pre-installed and what defaults are set – Google has less direct control, though it exerts strong influence on Android device manufacturers via sizeable payments for pre-installation. Even where choices are offered to consumers, we found many examples of how choice architecture inhibits people's ability to make effective choices. Nudges and the design of choices when they

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are presented, which are controlled by Apple and Google as gatekeepers of these ecosystems, can lead to consumer decisions that are in these companies' best interests.

- **Barriers to switching**. There are potential barriers for people switching, and in particular the perception of challenges and difficulties in switching. Most people are buying a replacement device, rather than picking a new system for the first time, and in doing so they rarely switch operating systems, particularly for Apple users. Our survey found only 5% had switched from an iOS to an Android device, and only 8% had switched from an Android to an iOS device. Apple says that this limited switching is because most people are happy with its products. While our survey confirmed that there were high levels of user satisfaction with mobile devices, it also found that people (including marginal users, ie those who considered switching but did not) worried about many factors like the 'hassle', learning costs, transferring data/apps and the ability to connect other devices to their phones (particularly Apple users).

Examples of people's concerns about switching, from our survey

'*Once you get an iPhone you can only really use it with Apple products, like watches. They tie you in, in that way.*' - Android to iOS considerer

'*I did think, what if I make the switch and then there are things I can't do as easily, so I just stayed put.*' - iOS to Android considerer

'*I knew there would be a way to transfer things, but in the end, I just decided I didn't have the time to be bothered with it this time.*' - Android to iOS considerer

'*I wouldn't say I am the biggest Apple fan, but it is just really convenient how everything talks to each other.*' - iOS to Android considerer

'*I thought it's not worth paying all that money for an iPhone really [so considered switching] - the thing is, when you have an iPhone it really goes well communicating with let's say your MacBook/iPad so I have this kind of feeling or thought that it's getting more difficult for me to get out of this existence from Apple.*' - iOS to Android considerer.

Large established ecosystems are difficult for rivals to challenge

Apple and Google have both built large interconnected ecosystems including different products and services that complement their core service.

- Apple's core business comes from selling hardware and associated operating systems (ie iPhone and iOS – with around 50% of its 2021 worldwide revenue coming from that alone). This means it has an incentive to invest in new features and services and to encourage replacement of older devices. But between 2016 and 2020 its revenue growth was mainly driven by 'services' (ie income driven from content or apps on its devices). It has also expanded into connected markets like contactless mobile payments and products that connect to its mobile devices like its Apple Watch and the Apple HomePod.

- Google has long held a strong position in search through its search engine, but has expanded this into browsers (Chrome), operating systems (Android) and video and music streaming (through YouTube). Like Apple it has also expanded into connected devices like Fitbit and Google Home, and has growing revenues from services.

Integrated ecosystems can deliver benefits through a seamless and efficient user experience, but can make it much more difficult for competing businesses to establish a foothold, as Apple and Google control the key 'entry points' to all these core markets within their ecosystems. Having large ecosystems can also make it much easier for Apple and Google to extend their power (and sizeable profits) into connected or new emerging markets. Other competitors may struggle as they cannot provide the same large range of services within an ecosystem unless they can compete on as many fronts. Such large ecosystems also give both companies unparalleled access to data on customers' behaviour, preferences, and purchasing habits, which is a further advantage and can reinforce their market power.

The CMA has no concern with businesses being big; nor are we saying that smaller or less efficient rivals should be given a 'leg up'. A competitive market that is working well means companies can expand to become large successful businesses and get rewarded for their innovation, as both Apple and Google have done. However, the concern in the case of these mobile ecosystems is that there are significant barriers to entry and expansion such that these two companies are not under sufficient pressure from competitors. The existence of a credible threat from rivals helps to keep businesses on their toes, innovating and offering better services to their customers. Without this threat, that incentive is much weaker.

Interventions are needed to tackle their market power and harmful practices

We have identified a wide range of possible interventions to address these problems, aimed at both opening up competition within and between ecosystems by reducing barriers, removing restrictions and allowing greater choice, and protecting against the potential negative effects of Apple and Google's market power. Without intervention, both companies will maintain, and even strengthen, their grip.

We have assessed the relative merits of potential interventions in broad terms, including some of the benefits, costs and risks, particularly those related to security, privacy and the wider user experience, as well as other implementation challenges.

There are various interventions that could transform these markets for the better. These include measures to:

- open up these markets to help level the playing field for other businesses to compete with Apple's and Google's app stores and browsers by removing and revising existing restrictions, and measures to enable users to make active and effective choices, eg tackling the power of defaults; and

- prevent Apple and Google from exploiting their power by introducing a number of changes to:

- o ensure they cannot unfairly favour their own businesses - particularly where they are offering their own apps and browsers;
- o provide greater transparency and information about their decision-making (eg app review process, app store rankings); and
- o ensure others can access their platforms on fair and reasonable terms – including fair commission rates.

As we do not have the power to implement such interventions through a market study, we have not reached any final views or carried out detailed remedy design. But as part of our assessment, we have considered which current or potential future tools may be the most appropriate mechanism for taking these forward; including using the CMA's existing powers and the envisaged powers of the proposed new digital regime (which is expected to have enforceable conduct requirements to govern powerful firms' behaviour and pro-competitive interventions to open up competition – as set out in the government's consultation response). This will also need to be informed by international developments, as other countries are also exploring many of these interventions. In particular the European Commission's proposals for the Digital Markets Act (DMA) covers many similar areas. Changes could be made on a global basis; any further action we take will need to take this into account.

A wide range of measures to safeguard app developers

Apple and Google are both the rule-makers and referees for app markets in which they also directly compete; this can give them an unfair advantage. There are a wide range of different concerns around the operation of their app stores. There is a strong case for measures to help level the playing field for firms and ensure competition between app developers is not distorted, such as: requiring a fair and transparent app review process; restrictions on Apple and Google sharing and using data or insights from their operation of the app store with their app development business; not unreasonably restricting third-party access to hardware and software, eg the NFC chip that enables contactless payments. Many of these issues would be ideally suited for the proposed new regime's conduct requirements.

However, there are some issues that are suited to our existing powers and where we can take action now. Apple's restriction on new cloud gaming services is an area where a targeted intervention could be introduced. Based on evidence to date there look to be limited costs or risks from doing so. We are proposing this is explored further through a market investigation as set out below, alongside our concerns on browsers. Further, we will take enforcement action where appropriate in relation to specific conduct or practices. For example, we have an ongoing competition law investigation which is looking into concerns raised about Apple's rules mandating the use of its own in-app purchasing systems; and we are announcing, at the same time as this final report, the launch of an investigation into Google's in-app purchase rules in the Play Store.

Finally, we considered interventions to formalise separation of parts of Apple's and Google's businesses eg operational or structural separation. But these types of

changes would be both difficult to implement and costly. At this stage these do not appear to be necessary, as other changes could deliver many of the benefits at lower cost, but this should be kept under review where problems persist.

Opening up competition and addressing harms in app distribution

Apple's and Google's app stores are the two main gateways for app developers and users. Many stakeholders have called for changes to allow alternative app stores and sideloading, or in the case of Google make these channels easier and more accessible. There could be significant potential benefits from interventions that open up choice for users, such as new curated app stores, and increase the competitive pressure on Apple and Google. These measures could also in turn help to address the concerns about the imbalanced relationship that both companies have with app developers and put greater competitive pressure on the high commission rates. Several alternatives, most notably Samsung's Galaxy Store, already exist.

But these are not straightforward interventions. Significant concerns have been raised about their implications, particularly on security and privacy. We agree that these are important and that sufficient safeguards need to be in place. Our view is that these security concerns are likely to be surmountable, although will need to be given further consideration.

Sideloading and alternative app stores, in isolation, may not be a 'silver bullet'. They have had relatively limited impact to date within Android – although they are undermined by other factors, in particular the agreements Google has with manufacturers to pre-install and prominently display the Play Store and the frictions that come with sideloading (ie the process involved and security issues). How much these changes move the dial is also likely to be linked to other interventions, and both would need careful design and implementation. There are also risks that Apple and Google could impose restrictive terms of access through their control of the operating systems, undermining the effectiveness of any such changes.

Given this, it may well be that other types of intervention will be necessary to constrain Apple's and Google's market power more directly – such as through fair trading terms to address high commission rates.

At this stage we consider these issues and potential interventions would be better suited to the tailored powers of the new digital regime, which could oversee, monitor and adjust any changes in a more flexible and responsive manner. In the meantime, we will seek to work with other countries that are pressing ahead with some of these changes (eg sideloading).

Improving choice and quality in browsers

We found a wide range of concerns relating to browsers and browser engines; with evidence that Apple's restrictions in particular limit access to open web services on iOS devices, the quality of browsers, and the choice in practice for consumers. There are a range of possible interventions; in particular removing Apple's restrictions on competing browser engines, but also other supporting interventions such as mandating access to certain functionality for browsers including supporting web

apps, requiring Apple and Google to provide equal access to APIs for rival browsers, and making it easier for people to choose and change their default browser.

There are also security and technical implications to some of these types of interventions and there would be costs in making these changes (for Apple but also for rivals) which will need to be taken into account. However, the evidence suggests these are manageable and that greater competition would drive not only significant benefits in terms of innovation, investment and improved quality, but could potentially also drive even better security. In the longer term, greater competition could spur browsers to invest more in security to win more security-conscious users from each other.

We also heard concerns that removing Apple's restrictions could tip the market even further in favour of Google's browser engine (the other engine most used). We do not consider this risk is a strong reason for not allowing greater competition and it could in fact spur Apple to invest and innovate more, meaning improvements for web developers and ultimately consumers when browsing the web on their phones (eg faster content loading, new and improved web formats etc).Given our concerns and the potential set of relatively discrete interventions, there is a strong case for using our existing powers and launching a market investigation to explore them further, as explained below.

Greater inherent challenges in opening up competition in operating systems

We looked at a number of interventions to reduce barriers to switching for customers between the two ecosystems. We found the strongest case for interventions to enhance interoperability of Apple's connected devices with Android (eg Apple Watch) and ensuring access to all the necessary APIs to enable smoother migration of apps and data. We also looked at ways to lower barriers for new operating systems and found that of these, there is a case for Google to remove the restriction on making its apps only available to manufacturers that use Google's version of Android and not on other versions (given Google already makes many of its apps and services available on iOS).

But there are challenges in tackling the inherent barriers to competition, and some potential efficiencies in having two large operating systems, which could be difficult to overcome. The difficulties experienced by Amazon and Huawei in the smartphone market illustrate these challenges. An alternative measure would be to separate the operating system from ownership of apps or app stores, as some have suggested, but this would be very intrusive and other changes could potentially bring similar benefits. Overall, it could be very difficult to overcome Apple's and Google's market power in operating systems, but we are confident that changes in other downstream parts of their ecosystem would have more impact.

Protecting security, safety and privacy remains important

Both firms argue that many of their controls are needed to maintain the security and quality of the overall service for people and businesses, and in some cases to safeguard personal information. We agree these factors are very important and will need to be taken into account when looking at potential changes in these markets.

Apple, in particular, argues that many of its restrictions make its devices safer and more secure, which is what attracts people to its products and differentiates it from others. We have carefully looked at these factors and obtained expert advice to understand these issues in more depth. We found there is likely to be significant scope for allowing more competition and removing or revising many of the current restrictions, without compromising safety, security or the privacy of people's data.

We are also concerned that privacy, security and safety decisions could be skewed by the interests of Apple and Google, which in essence often act as quasi-regulators in their roles as ecosystem stewards. Both companies have made important positive changes for consumers in this regard, and this is something we support. But in some cases we have found that Apple and Google are making decisions that could benefit their own services over others and mean that users may not make effective choices.

We have engaged closely with the Information Commissioner's Office (ICO) – the UK's authority responsible for upholding data privacy – in considering privacy issues alongside competition. We support market developments that promote greater control and choice for consumers while also ensuring these are 'competition neutral', ie do not favour some companies over others. It is important that Apple and Google apply the same standards to themselves as to others.

We are concerned that this is not the case in relation to Apple's App Tracking Transparency (ATT) framework. ATT requires apps to show a specific prompt to request users' permission for the app to 'track' them. It is clear there are significant privacy benefits from this. However, Apple has implemented different choice architecture design and language in this prompt to the ones it uses for its own apps, even though they serve similar purposes. The way this has been implemented may also distort user choice, potentially tilting the playing field in Apple's favour and impacting the ability for developers to attract users and monetise their apps.

In 2021, the CMA raised competition concerns with Google in relation to its proposed Privacy Sandbox changes on its Chrome browser, and recently accepted legally binding commitments from Google to address those concerns. Google recently announced it is developing similar changes for apps. This could also raise potential competition concerns, although Google has indicated that it intends voluntarily to apply the principles of its commitments to these changes as well. We will continue to monitor this development.

After this study, and in partnership with the ICO, we hope to work constructively with Apple on its ATT framework to explore our competition concerns while upholding the privacy benefits for users.

Next steps

The importance of a new pro-competitive regulatory regime

The evidence from this market study further demonstrates the need for the government's proposed new pro-competition regulatory regime, which would oversee key digital firms that are deemed to have 'strategic market status' (SMS).

There is a strong case for designating both Apple and Google with SMS for each of their main activities in their mobile ecosystems and bringing them within the remit of the new regime, once it is in place.

Many of the concerns we have regarding Apple and Google's hold over their mobile ecosystems could not be addressed through quick or easy fixes. There are connections between the issues and interventions, ie some may need to be used in conjunction or in sequence; and in many cases changes will require ongoing monitoring and oversight. This is why a new digital regime with specific tailored powers is required. This regime will have the ability to test, iterate over time and oversee these markets on an ongoing basis. It will bring greater flexibility to ensure actions are effective and responsive to developments as key digital markets like these evolve.

The government has confirmed its intention to establish a new pro-competition regime and recently published its consultation response setting out more details about the proposed regime – which we welcome. In the meantime, a Digital Markets Unit has been established within the CMA on a non-statutory basis to begin work while awaiting its new powers. The Queen's Speech in May 2022 announced the government's plans to publish a draft Bill. Although this means a full Bill will not be introduced in the next Parliamentary session (2022 to 2023), we understand that the government intends to introduce legislation when time permits and we will work with the government, Parliament and other stakeholders to progress these plans.

Taking targeted action

There have been calls for the CMA to take further action now across a number of areas both from this study and our previous market study into online platforms and digital advertising, particularly in light of the update on timing of the new regime. For example, we have received a number of requests for us to launch a broad market investigation covering the issues in both this and our previous market study.

The CMA has a wide range of digital work already underway, and we will be continuing to make strong use of our existing markets, mergers, competition and consumer powers where appropriate to tackle the concerns arising. In doing so, we will focus on areas where we can most effectively implement targeted interventions in a timely manner using our existing powers. At this stage, a very wide market investigation attempting to cover all the issues identified in this study would not be the most efficient or effective way to address many of these issues. However, as we indicated in our interim report, we will continue to keep the use of our powers under review and stand ready to take further action where necessary.

We have considered how we could use our markets and enforcement powers in a targeted way to tackle some of the wide range of concerns we have found within this market study, which broadly fall into three categories:

- Targeted issues where immediate action is being taken or could be taken more effectively using our existing powers; eg issues regarding browsers, cloud gaming, and app store terms and conditions, as set out below;

- Areas where the types of concerns considered would be most efficiently addressed through the new pro-competition digital markets regime; eg app distribution and many of the measures to safeguard app developers;

- Areas where the case for immediate intervention is not as strong; eg operating systems.

Market investigation into mobile browsers and cloud gaming

We are now consulting on a [proposed market investigation reference into mobile browsers and cloud gaming](#); covering the supply of mobile browsers and browser engines, and the distribution of cloud gaming services through app stores on mobile devices.

Since our interim report was published, we received a number of submissions calling for further action in browsers; from rival browser providers, as well as many UK web developers and small start-up businesses concerned about Apple's browser engine restriction and the impact it has in holding back innovation like web apps, resulting in worse services for users. In relation to cloud gaming, we heard concerns from several cloud gaming providers about Apple's restriction in particular, and the impact on their business and harm to consumers prevented from accessing these innovative services.

Based on the further work we have undertaken during the second half of this study, these areas are well suited to a market investigation and would bring significant benefit to consumers. In particular:

- Potential benefits and effectiveness – these are two areas where current restrictions look to be significantly affecting innovation and the ability of businesses to compete – in particular preventing the emergence of innovative and disruptive technologies to emerge, to the detriment of consumers and businesses. While needing further consideration, we have confidence that removing certain restrictions could likely be implemented without undermining people's security, privacy and safety online.

- Timely impact of interventions – given the discrete nature of these areas, targeted interventions would have a greater chance of making real-world changes in a timely manner, without requiring a complex package of supporting interventions in other connected markets.

- Potential positive spill-over effects – interventions in these areas could have positive knock-on effects on competition in other areas of mobile ecosystems over the longer term, such as in native app distribution and operating systems.

- Urgency – cloud gaming and to some extent web apps are still in their relative infancy. How these technologies emerge in the next few years could have a significant impact for the next decade.

We consider there are reasonable grounds for suspecting that there are features which prevent, restrict or distort competition in these markets and that the legal test for making a market investigation reference is met. During the consultation we are interested to hear views about the issues we have identified and the reasons for proposing to make a reference.

Growing our active portfolio of digital markets work

In addition to using our markets powers, we will also continue to use our competition law powers wherever possible to tackle concerns that we have identified. We are launching a new investigation into Google's app store and its associated terms and conditions, as well as progressing our similar investigation into Apple's App Store. We will look to launch further enforcement cases arising out of our concerns from this study and other previous studies.

These actions add to the numerous ways in which already using our existing tools on various fronts, eg in relation to Amazon and Google on fake reviews, Meta's use of data to compete with others' services and its acquisition of Giphy, and music streaming.

In particular, arising out of concerns from our previous digital advertising market study, we have recently launched two other digital competition cases relating to our concerns over ad tech. This portfolio will continue to grow as we do more to tackle problems in digital markets using our current powers, while continuing to also work hard to prepare for the full Digital Markets Unit role.

In parallel, we will carry on working with other countries and the EU, in particular where there are a number of relevant ongoing competition cases or other proposed interventions. Most recently, for example, the EU has issued a Statement of Objections to Apple in relation to contactless payment – an area of concern we have also highlighted in our market study as highlighted above.

Building a global consensus with our international and UK partners

A number of other countries have undertaken similar work or are currently looking at similar issues. We have engaged with many of these as part of our study. Some countries have already made changes and in these cases there are lessons to be learned in how such changes are designed, monitored and enforced.

The UK is not alone in looking to tackle these problems and there is a growing global consensus that changes are needed, whether that is additional mechanisms for oversight, powers or safeguards. This is being done in different ways, reflecting the different regimes and country-specific contexts, but the overall direction is clear and consistent.

Notably the European Commission is pushing ahead with new legislation – the DMA – which covers many of the same areas and potential interventions considered in this study and beyond. While there are some differences between the approach being taken in the DMA and the UK's proposed digital regime, it will be important for us to continue to work closely with our European partners and other countries.

Further action by these other authorities may result in changes that would affect market conditions in the UK and our further work may similarly affect others. We will continue to monitor this and contribute to the broader global debate on how best to tackle issues raised by digital platforms with substantial market power. The most effective way to address this power and open up competition will be through coherent international action built on a common understanding of the problems and the best way to tackle them.

Given this global shift, changes that Apple and Google make as a result of action taken in other countries (such as the DMA) could, if designed effectively, also resolve our concerns. There may be efficiencies for them in making changes on a one-off, global basis, rather than a more piecemeal approach. We will therefore seek to engage with Apple and Google, and other interested parties, beyond the end of this study; both in our active cases and more broadly in the context of the forthcoming Digital Markets Unit.

We will also continue to work closely with the government and other regulators in particular through the Digital Regulation Cooperation Forum to forge greater cooperation on online regulatory matters. This will be increasingly important given the unique challenges posed by digital platforms.

Overall we will continue to explore and tackle the challenges raised by these and other key digital markets, to ensure that the UK has a dynamic tech sector, where consumers and businesses benefit alike from the increased innovation, investment, choice and many other benefits that come from competitive markets.