

# Android and the challenge of platform management

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Google Android is usually described as a mobile operating system – the software that links mobile hardware with applications and thus enables users to operate their smartphones and tablets in an effective way. Yet, for purposes of economic analysis, Android is better understood as an online ecosystem or platform. The central role of platforms is to balance the interests of a diverse set of constituencies, all of which are necessary for mobile operating software to be successful and widely adopted (Evans, 2014).

Online platforms create value by linking different types of users who need each other in order to derive economic benefit from their activities. Just as credit cards facilitate payment, thus broadening the scope for viable transactions to the gain of both merchants and buyers; and shopping malls bring together different types of sellers so that consumers can come to meet them in one place; online platforms ensure a variety of interest groups – phone manufacturers, app developers, advertisers, end users – operate in an environment that will lead to the maximum possible number of beneficial exchanges.

The fundamental tradeoff that online ecosystems such as Android must weigh is between interoperability – i.e. compatibility between devices, applications, and interfaces – and choice. There is no one solution to this tradeoff, and the current structure of the mobile software market reflects the various alternative arrangements that market players have chosen.

## **The relevant interest groups**

### *Original equipment manufacturers (OEMs)*

OEMs produce the hardware – i.e. the physical component – of smartphones. Prominent firms in this sphere are Apple, Samsung, Huawei and ZTE. The latter three use Android for at least some of their devices, and – as we will see below – they have adopted the Google ecosystem to varying degrees.

The goal of OEMs is to sell as many devices as possible given their price, which necessitates both a significant degree of differentiation – so that manufacturers can build a brand that is distinguishable from competitors – but also interoperability, so end users will be able and willing to switch brands. From the perspective of mobile software, the success of OEMs requires some level of consistency in the user experience, so that consumers are not discouraged from adopting new devices from different manufacturers.

### *App developers*

The value of smartphones to users hinges on the availability and quality of applications – programmes designed by software developers which make it possible to perform a variety of tasks, purchase goods and services, and obtain information through mobile devices. Diversity and choice of mobile apps is essential to attract users to an operating system, so software providers have set up marketplaces from which users can download all manner of applications. As of June 2016, there were 2.2 million unique apps – both free and fee-paying – on the Google Play app store, compared to 2 million for Apple iOS and 669,000 for Windows Store, the next-biggest marketplace in app volume (Statista, 2016a).

Developers can monetise applications in a number of ways: by charging for downloads, providing fee-paying services within the app, by offering subscriptions or posting ads. They care about app popularity and downloads, which in turn depend on ensuring the application works well across devices. This is especially important because app marketplaces feature extensive user feedback, so bad functionality – and the associated bad reviews – can break an app. Developers thus value consistency and interoperability of their apps across devices and across different versions of the software platform.

### *Advertisers*

Online advertising spend in Europe has grown more than fivefold over the last decade, from €6.6bn in 2006 to €36.4bn in 2015 (IAB Europe, 2016). In 2015, annual internet advertising revenues exceeded TV ad revenues for the first time. Within online advertising, mobile is the fastest-growing format, with a growth rate of 60 per cent between 2014 and 2015 (Ibid.).

Advertising is central to the viability of mobile ecosystems because software and app providers depend to a large extent on ad revenues to make their products widely available. 68.8 per cent of Android apps were free to download as of 2015, up from 60.8 per cent in 2009 (Statista, 2016b). Because pricing structure can have a disproportionate impact on the number of platform users, it is efficient for providers to recoup their investment through ads rather than direct charges to end users.

However, advertisers in their turn will only find it worthwhile to spend on mobile ads if those will reach a large number of users, a fraction of whom will click on the ad and possibly purchase the good or service advertised. Furthermore, the greater the number of users, the more ads can be accurately targeted on the basis of user profiles.

### *End users*

Smartphone adoption has grown rapidly over the last half-decade. The smartphone penetration rate in Western Europe is expected to reach 64.7 per cent in 2017, up from 22.7 per cent in 2011 (Statista, 2016c). In 2015, mobile broadband take-up overtook fixed broadband take-up for the first time, with 75 per cent of individuals across the EU now able to access the internet through their smartphones (Williamson et al., 2016). And they use it for a growing number of tasks, with the average Android user reported to carry as many as 95 applications on her phone (Sawers, 2014).

A greater part of economic and social life is thus taking place online and, specifically, via mobile devices. Since online platforms feature network externalities – the more users on one side of the platform, the more valuable the platform becomes to all other sets of users – this means that opportunities for fruitful interaction can be expected to grow. But that will depend on the ability of platforms to effectively meet the expectations and demands of each type of user involved.

### **The threat of fragmentation**

Android is today the most popular mobile operating system in Europe, with market shares ranging from 53.1 per cent in the UK to 91.7 per cent in Spain (Kantar Worldpanel, 2016). It is followed by Apple's iOS, which covers 44 and 7.9 per cent of the British and Spanish mobile OS markets, respectively.<sup>i</sup> Whilst this may seem like the long-standing state of affairs, the pre-eminence of Google and Apple is a relatively new phenomenon. As recently as 2006, Symbian – then used by OEMs including Motorola, Nokia and Samsung – was the dominant platform, with a 67 per cent market share (Yoo, 2016).

Despite its privileged position at the start of the smartphone age, Symbian succumbed to fragmentation, meaning a growing lack of interoperability across devices. Apps designed for one Symbian device could not run on other devices, which stifled the growth of the platform and prevented the emergence of a unified app store (Ibid.). Fragmentation is a recurrent problem in open-source platforms, in which users have access to the source code and can modify it freely. In some cases, it has led to the emergence of incompatible versions of the same software, undermining the platform's positive network effects.

The usual remedy to fragmentation has been for software providers to make their operating systems proprietary, thus foreclosing the emergence of 'forked' – modified – versions of the software. Both Microsoft's Windows and Apple's Mac OS operate in this way. However, proprietary systems forego important benefits of open source, such as users' ability to improve on the existing code. The opportunity to develop alternative versions also acts as a competitive spur for software providers.

### **Android and Apple iOS: two models of platform management**

There is a tradeoff for platforms between interoperability – which requires at least some degree of centralised management of user interfaces within an operating system – and choice – which is generally preferred given diverse user preferences, but may lead to welfare-decreasing fragmentation. The two market leaders in mobile software at the present time have resolved this tradeoff in starkly different ways.

Apple operates a vertically integrated, proprietary business model. It makes its own hardware and does not license iOS to third parties. Google, on the other hand, licenses Android to independent OEMs on a royalty-free basis (Körber, 2014).<sup>ii,iii</sup> There is no straightforward method to establish which of these two strategies is optimal – indeed, it may well be that both are optimal along different dimensions! Apple's system guarantees the interoperability of apps across phones, and it provides a consistent user experience, which is part of its value proposition (Yoo, 2016). On the other hand, its highly centralised management of platform software means less scope for experimentation and less variety.

Google's model of open-source software, coupled with a modular architecture that seeks to prevent fragmentation, has resulted in greater take-up of Android by users, with a diverse set of OEMs manufacturing Android-compatible phones. There are, moreover, different layers of integration with Android for firms to choose from. Amazon, for example, runs its Kindle Fire tablet on a 'forked' version of Android which is not necessarily compatible with all Android apps. A number of

Android phones in certain markets – including Huawei in Russia, Archos in France and a range of OEMs in China – come without any pre-loaded Google apps (see Zuluaga, 2016).

There are two sets of agreements which manufacturers can sign and abide by to ensure interoperability of their devices with the Android ecosystem. One is the Anti-Fragmentation Agreement (AFA), which enables OEMs to label their devices Android-compatible. The other is the Mobile Applications Distribution Agreement (MADA), which enables OEMs to pre-load a suite of the most popular Google apps royalty-free (Körber, 2014). These agreements have been attacked by some of Google's competitors as predatory distribution. But they are better described as standard contracts with independent manufacturers to ensure compatibility and a consistent user experience, akin to the one offered by proprietary systems such as Apple and Blackberry. It should be stressed that such interoperability and consistency does not just benefit Google by making Android more attractive. OEMs also gain from it as users are better able to switch, and thus to adopt their devices. And users benefit from the mixture of system consistency and product variety that these arrangements facilitate.

## Policy implications

One of the features of online platforms is that interventions on one side of the market may have disproportionate effects on other sides and on the overall volume of transactions taking place on the platform (Evans, 2014). In that sense, platforms are a microcosm of the market economy, with a diverse set of agents – each with their own objectives – interacting with one another and promoting social welfare whilst pursuing their own private aims. The platform manager's job is to institute and enforce governance mechanisms which will promote the 'good' – variety, choice, compatibility – and minimise the 'bad' – fragmentation, uniformity, stagnation (Yoo, 2016). This function is facilitated by the fact that the platform manager's own welfare – its profitability – is dependent on the popularity of the platform, which in turn hinges on the platform's ability to promote and adequately balance the interests of a diverse set of stakeholders.

Each platform in the mobile sphere has resolved the tradeoffs inherent in platform management in different ways. Apple and Microsoft have opted for proprietary management models, whilst Android relies on an open-source model with a number of voluntary constraints on manufacturers and developers. Competition in the way that different ecosystems vie for users is one of the central drivers of continued innovation in the digital sphere (Zuluaga, 2016).

There is currently an ongoing competitive probe of Android, which alleges that Google abused its pre-eminent position in mobile software to impose predatory agreements on counterparties and foreclose rival apps. There are two problems with this line of argument. Firstly, it is difficult to argue that Google is imposing conditions on OEMs and app developers when it operates what is ostensibly the most flexible set of arrangements for platform management of all major operating systems. This is underscored by the continued popularity of Android among developers and end users. Secondly, regulators should be aware of the likelihood of unintended consequences following from intervention, notably that Android might become proprietary like its rivals, reducing choice with deleterious consequences for users.

There is simply not enough evidence to suggest that Google is behaving in an anti-competitive fashion, with harmful effects on users. On the contrary, mobile platforms are among the most vibrant parts of the digital economy and where much of the recent growth online has taken place. These auspicious developments, coupled with the potential adverse side-effects from intervening in complex systems, ought to give the European Commission pause.

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<sup>i</sup> Android’s mobile OS market share ranges from 70 to 80 per cent in other key European markets such as France, Germany, and Italy. Apple’s, conversely, stands at 15 to 20 per cent in these markets (Kantar, 2016).

<sup>ii</sup> In October 2016, Google released its first smartphone, Pixel. However, the vast majority of Android phones are made by independent OEMs.

<sup>iii</sup> Microsoft also licenses Windows Phone to OEMs, but it does so for a fee (Körber, 2014).