Internet interoperability

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In 2013 the European Council noted:

> *There is also a need to address the bottlenecks in accessing one's "digital life" from different platforms which persist due to a lack of interoperability or lack of portability of content and data. This hampers the use of digital services and competition. An open and non-discriminatory framework must therefore be put in place to ensure such interoperability and portability without hindering development of the fast moving digital sphere and avoiding unnecessary administrative burden, especially for SME's*[1]

Few concrete steps have been taken since then, but their calls were again echoed at Barcelona this year, where the GSMA and some telecoms industry CEOs called for regulators to 'ensure that [internet] services platforms are open and interoperable'[2].This note considers what 'internet interoperability' might mean and whether (and how) a case might be made for regulation to deliver it [3]

Why now?

There are several reasons why policymakers and telecoms executives might be talking about interoperability and portability now. One is that the telecoms industry has been calling for a 'level playing field' between themselves and internet services providers like Google for several years and that an obvious distinction between the telecoms industry and internet is that rival telecoms networks have regulatory obligations to interconnect their networks with each other using common standards, whereas internet services platforms do not.

Another reason may be that interoperability sounds like a pro-consumer thing which policymakers favour and which telecoms operators do anyway. Telecoms operators were required to allow consumers to keep the same phone numbers when they switched operators in order to increase competition. It is easy to see why regulators and operators might assume that apps or personal data should now be subject to the same obligations.

Some of the internet companies have also begun worrying about a lack of interoperability and proprietary standards. For example, Vint Cerf of Google has recently worried that historical data will no longer be accessible because new internet technologies are not backwards compatible and we discard the old ones[4]. Part of Cerf's point is that interoperability may become more important but also more difficult to achieve as markets become more mature. This may also be another reason why the

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[1] https://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ec/139197.pdf
[2]The most detailed discussion I have seen of the telecoms operator viewpoint so far is found in Telefonica's Digital Manifesto (p.32-) at http://www.digitalmanifesto.telefonica.com/manifesto/A_Digital_Manifesto.pdf
[3]I have discussed interoperability in less detail in earlier papers, see *Confusion, denial and anger: the telecoms industry and the internet* at https://docs.google.com/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWFpbnxmZWFzZXl3YWxlc3xneDo5ZDE4ZjllYWI5YmFiMmQ and *Platform neutrality* at https://docs.google.com/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWFpbnxmZWFzZXl3YWxlc3xneDoyZDA5YWYxNDE0ODA1MjJm
[4] http://www.theguardian.com/technology/2015/feb/13/google-boss-warns-forgotten-century-email-photos-vint-cerf

issue is being highlighted as some internet markets begin to mature and the winners or dominant firms can be more clearly identified.

Internet interoperability today

By 'interoperability', we refer to the ability of users to combine complementary products supplied by different firms. Realising any of these outcomes requires common technical standards (often called 'open' standards in the sense that any firm can access and use them) or a standard interface which allows non-standardised components to work together. Portability then refers to the capacity of the user to take their services, applications or data from one device, network, operating system or platform to another without having to make significant adjustments or further investments to ensure that it works.

It is simplistic to think that all internet services platforms are closed and proprietary and that all telecoms services are open and interoperable is a caricature. A core principle of the internet is that every component of the internet interoperates with every other to route packets efficiently from one place to another, and that this is done using open standards and without the need for further co-ordination or agreement between the different parties that might be involved in the process. Moreover, the services which then run over the internet work without requiring permission from those who convey the packets. In this sense, the internet represents a significant expansion of interoperability over traditional telecoms networks because 'best efforts' interoperability no longer requires first reaching agreement about the technical characteristics of particular services[5]. So long as users are both running the same application on their smartphones, the internet requires no further agreement between the respective network operators (or any other party) in order for the service to work.

The key question is then whether users should have to run the same application on their smartphones in order to be able to communicate with each other, and whether they should need to the same type of smartphone in order to be able to do. This question arises because whilst the internet is designed to be 'dumb', the internet services conveyed over it and the platforms supported by it are much more complex than their telecoms predecessors. Traditional telecoms handsets were simple and any 'intelligence' required to deliver and manage the services provided to and from them remained inside the network itself. Internet services rely upon the intelligence that sits in the user's device, in the form of an operating system (OS) that manages the device and software or applications which then run on the OS directly, or over middleware. In addition, many internet services platforms involve 'multi-sided' business models, or otherwise demand and then store a great deal of the users' personal data on the platform. This data is retained in proprietary formats and may be difficult and costly for users to replicate on other platforms.

All of this means that there are (at least) four types of interoperability scenarios which are relevant to this debate and which it is useful to distinguish between:

(a) *Device/network Interoperability*

Since the liberalisation of telecoms equipment markets over 20 years ago, telecoms hardware has generally been interoperable between different networks such that an iPhone user on a Vodafone network could expect to move to a Telefonica network and be able to access the same services. Some

[5] In practice, operators and service providers may have to co-ordinate to ensure that new internet services do not undermine network performance, or may agree to take measures to ensure that a particular service is delivered on terms other than 'best efforts'. How far operators should be able to do this is, of course, the topic of ongoing debates over 'net neutrality'

qualifications are needed here: owners of CDMA handsets had to buy a new handset if they wanted to move to a GSM network[6]; manufacturers of mobile devices have taken more than a decade to agree common standards for interoperability between handsets and phone chargers; and telecoms operators still seek to restrict portability for (good) commercial reasons by requiring minimum commitments in contracts and applying fees if users seek to exit early. Device vendors and network operators may also enter into 'exclusive' arrangements which ensure that new devices can initially be attached to some networks but not to others.

(b) OS/Application Interoperability

Whilst global standards ensure that hardware is generally interoperable at a technical level, software for internet services is much less so. Internet services platforms are generally 'open' in the sense that each platform will publish Application Programming Interfaces and provide developer toolkits which enable third parties to build software programmes to run on their respective OS. Any restrictions on access to the platform for apps written using the appropriate APIs tend to be commercial in nature (although there are also good non-commercial reasons for wanting to restrict malware and other malicious forms of software).

Because applications interwork with the OS to work with the device and perform other functions, each application must be coded to the APIs of a particular OS and will not interoperate with a different OS. Thus, applications and services which are downloaded from the Apple iStore will not run on a non-Apple iOS, whilst apps written for Android will not run on an iPhone.However, the Firefox OS is an example of what might be regarded as a fully interoperable OS which allows developers to write directly to the phone using HTML5.

A Skype app on an iPhone will interoperate with a Skype app on an Android device, and both will then interoperate irrespective of the network or the device each is attached to.

(c) Inter-platform Interoperability

A Skype user cannot talk to the user on Apple Facetime. Both users have to be using the same Skype platform to communicate. This prompts concerns that network effects will allow one platform to dominate and that further entry will be impossible unless smaller rivals are able to interoperate with the dominant platform. This was, after all, the concern that led AT&T to be the first telecoms operator to interoperate its long distance network with smaller rivals under the Kingsbury Commitment of 1913, providing the model for interconnection between competing telecoms operators which has underpinned competition in the industry ever since. In contrast, most internet platforms do not interoperate with their rivals and instead require a user to download many different applications if they wish to interoperate with other users on different platforms.

(d) *Data Portability*

The fact that many internet platforms allow or encourage users to upload personal data such as photographs, music or videos onto the platform rather than storing it on a device allows users to move between *devices* and between *networks* with ease. However, there are concerns that the costs of

[6] For a good discussion on the merits of mandating standards in mobile telecoms (with the risk of 'locking in' the wrong technology) rather than letting the market determine the outcome, see http://www.tau.ac.il/~gandal/telecomstandards.pdf

replicating data (or the impossibility of doing so when much of the data is unique) on another platform in another format prevent users from moving between *platforms*.

The telecoms industry has an imperfect analogy for porting data between platforms in the porting of telephone numbers between networks[7]. In the latter case, it has become the right of a user to port their telephone number from one network to another when moving between them and a series of technical standards and industry processes have developed to enable this to happen. In the case of data held by internet platforms, users similarly worry that they and others will lose access to data which is difficult to reproduce and which forms an important part of an individual's digital identity. Allowing users or obliging platform owners to port data from one platform to another in a standardised format is therefore seen as an important means of lowering barriers to switching between platforms. As we saw with device portability, it is also possible that the technical ability to transfer data from one platform to another is limited by commercial restrictions which would prevent users from doing so.

In summary, calls for interoperability of internet services platforms arise either because of concerns about network effects and the risk that markets will come to be dominated by a single platform into which all users are inexorably drawn (e.g. Facebook), or from concerns that, even if markets contain a number of evenly matched rivals (e.g. iOS and Android), the absence of interoperability raises barriers to switching and so dampens competition between them.

There are other legitimate reasons for interoperability which seem less relevant to the present case. For example, the absence of interoperability in 'winner takes all' markets may create a 'hold up' problem for the development of a market if users delay their purchases until it becomes clear which of the competing platforms will win. This is more likely the case if consumers are being asked to make a significant investment which carries with it a risk of being written off later. For example, users might delay purchasing a smartphone until it becomes clear which OS will enjoy support from a wide range of applications developers. The smartphone market may struggle to develop as a result, and interoperability may be required to change this. However, I think few would argue that a lack of interoperability has inhibited the adoption of smartphones or applications, both of which have seen astonishing growth over the past 5 years.

As noted earlier, even in markets which have performed well without interoperability in their early stages, there may still be a case for imposing interoperability once the market matures. Many economists would argue that many markets develop best, and innovation is maximised, when there is competition at the outset between different proprietary standards. This can be particularly powerful when combined with network effects (whereby the value of the platform increases for both existing and new users as it grows in size) and multi-sided markets (which can further compound the impact of network effects on both sides). It can also be powerful if it means users face high switching costs and so become more valuable for the platforms to acquire from the outset, as this can produce even more aggressive competition and help to expand the overall market. Thus, just as telecoms operators can subsidise handsets more aggressively if they can also lock in the users to fixed contracts, so internet platforms can subsidise 'free' services if they can lock in the user data thereby acquired for themselves. If, on the other hand, it was easier for users to switch between platforms and users could use any application to communicate with any other application (as in telecoms), the internet companies would have weaker incentives both to compete hard to acquire the users and to expand the platform rapidly in order to exploit network effects. This is one reason why interoperability can

[7] Telefonica cites it in its Digital Manifesto, see fn 1

sometimes be favoured by firms themselves as a means of reducing risk (since it reduces the prospect of 'winner takes all' and 'loser takes nothing' outcomes) and softening competition.

However, after a period of intense and beneficial competition between rival platforms, one or more platforms may come to dominate and a continued lack of interoperability may then begin to harm rather than benefit consumers. On this view, the same features of the market which drove the internet platforms to compete fiercely to acquire customers in the first place also allow them to retain and later exploit those users they do capture. In other words, the reason why firms compete so hard for users in the initial phase of the market is precisely because they know that it will be so difficult or costly to persuade users to switch away from a rival platform once the market matures. This could be due to network effects (the difficulty of persuading users to switch away from the largest platform), to sunk costs in proprietary hardware, OS and/or applications which have been downloaded onto the device, or to the impossibility of reproducing personal data which is held on a particular platform. Interoperability may then be a way of restoring the market to a more dynamic state (although others will argue that the dominant platforms will inevitably be usurped by the next wave of disruptive innovation and that no intervention is required in the meantime).

Extending internet interoperability

It is clear that interoperability is a not a self-evident good. Many markets do not produce interoperability, even when consumers take significant risks when choosing between rival technologies. For example, consumers are asked to choose between proprietary games consoles which cost the same as many smartphones and then pay for games which do not interoperate with rival consoles and which cost much more than most smartphone apps. Many households have cupboards full of abandoned games as a result. But nobody is seriously demanding that standards be developed to enable games to be ported from one console to another.

The case for extending internet interoperability therefore needs to be made on its merits. In doing so, we can probably ignore the case of device/network interoperability. This is because the internet services platforms themselves have limited influence over either the development or adoption of global telecoms standards such as LTE which ensure that devices interoperate with networks. Of the internet services platforms, only Apple is a significant manufacturer of hardware and it does not have enough of the overall hardware market to play a decisive role in the standards process. Apple has sought to restrict user choice by concluding exclusive distribution agreements with particular network operators in the past, but this has not prevented Apple devices from interoperating with other networks once those terms have expired. The restrictive agreements appear to have been undertaken with the support of the operators concerned. Policymakers have occasionally raised concerns about such arrangements on competition grounds[8], but I do not believe anybody is suggesting that there is a case for prohibiting of such arrangements altogether. Let us, therefore, turn instead to the other interoperability issues.

OS/Application interoperability

The case for requiring interoperability between the OS and the applications (or what otherwise might be referred to as 'app portability') is interesting. Two significant rival OS platforms exist today (iOS and Android), giving users at least some degree of choice, but the market has also proved

[8] As in France in 2008, where Orange's 5 year exclusive distribution agreement with Apple was voided by the competition authority (see http://www.autoritedelaconcurrence.fr/user/standard.php?id_rub=256&id_article=1040).

unpredictable, with high profile failures (Blackberry and, more arguably, Windows) and some new entry (Firefox, China OS). Application developers appear to have been able and willing to develop different versions of the same applications for both the iOS and Android platforms, with little suggestion that the lack of interoperability between the two has served to limit the availability of apps for either platform (which might have been the case if the additional costs of developing apps for more than one OS had been higher)[9]. Users are able to download many of the same apps from either platform, often at low cost. Users may incur sunk costs of tens or hundreds of dollars when downloading apps but these costs are modest when compared to those they incur when buying many other non-interoperable services in their daily lives[10]. Nor has the risk that they may choose a losing platform seem to have deterred or delayed the adoption of smartphones or applications.

Thus, one of the challenges which telecoms operators face in their advocacy of interoperability is the challenge that, if interoperability between applications and different OSs really is so beneficial to users, we have not seen one or more of the existing internet service platforms embrace it or new platform promote interoperability in order to compete with its proprietary rivals. The Firefox OS was launched in 2013 to do precisely that (and has strong support from a number of telecoms operators), but there is nothing to suggest it will usurp Android or iOS in the foreseeable future.

Interoperability advocates face further challenges as well. The first arises from the difficulty in quantifying the consumer harm that might arise from a lack of interoperability between applications and the OS. In Apple's case, it might be said that the cost of higher barriers to switching associated with non-interoperable applications is reflected in the higher prices that Apple is able to charge for its devices. Demonstrating this would first require some understanding about what Apple would charge if users could instead port their apps to a rival platform, thereby avoiding the costs of replicating the applications on the other platform and the time spent doing so. In Android's case, there is competition between rival device manufacturers ('inter-Android competition') and users can transfer their Android inventory easily from one device to another. It is unlikely, therefore, that a lack of interoperability would result in higher device costs for Android phones[11]. In this case, a lack of interoperability is more likely to support higher charges to advertisers, since higher platform switching costs should enable Google to capture and retain more user data as a result. However, demonstrating this would be extraordinarily difficult and policymakers may be less concerned if users suffer no direct harm as a result (particularly if, as noted below, imposing interoperability on the Android OS would also result in other costs to the user in terms of compromises on functionality and time to market).

The other challenge arises because the imposition of interoperability obligations would also create costs which would then have to be weighed up against any benefits which might arise from requiring applications to be interoperable across different OS. This is a fundamental challenge since, as noted earlier, although the case for interoperability in a market often strengthens as it matures, the costs of implementing it also tend to increase as devices are rolled out to an ever larger base of users and the costs of 'retrofitting' open standards grows accordingly. One strategy may often be to impose

[9] Although various industry reports suggest that the number of platforms a typical app developer will write for is reducing – from 2.9 to 2.2 over the past 12 months, largely due to the demise of the Blackberry platform.

[10] I recently bought a cycle rack from a car manufacturer which cost many times more than my app inventory and which does not appear to fit on any other type of vehicle. Interoperable models of cycle racks are also available, but (it is claimed) are a much poorer fit to my car. This is another example where standardisation involves a degree of compromise on functionality and performance (but avoids having to write off the investment).

[11] Unless Google were to seek to extract excess profits from Android licensing arrangements with hardware manufacturers, which I am not aware has been alleged.

interoperability obligations at the beginning of a market's development so as to avoid this 'retrofitting' problem (or, at a minimum, to regulate so as to ensure that firms cannot introduce barriers to retrofitting). But you may only want to do this in cases where you can be confident a particular market would otherwise later 'tip' or where competition will be significantly impeded by high switching costs, since even imposing the option of interoperability could retard investment and deter firms from seeking to dominate a particular market (or even other markets not regulated in this way). Unfortunately policymakers are rarely in a good position to predict how markets will develop.

It is very difficult and probably unwise to speculate about what these costs might be if we were to require interoperability between applications and mobile OS, but studies of the implementation of other 'open' standards (such as ODF for documents) suggest that implementing interoperability is difficult and often involves accepting significant compromises to the user experience[12]. This is, of course, precisely why Apple and others argue that proprietary standards allow for better integration and co-ordination between their OS and the applications which are developed specifically for it, resulting in a better experience for the user. The global success of Apple (and widespread user enthusiasm for the features that rely upon close interworking between proprietary applications and the proprietary OS) suggests they may have a point.

Today's proprietary standards also enable rapid development and time to market, which may be compromised if competitors first had to agree standardised APIs amongst themselves. Other costs are also becoming apparent in the standards setting process for the telecoms industry, notably growing uncertainty around how to treat standards essential patents and a rise in patent litigation and costs. Better standards processes might remove these concerns, but when the telecoms operators have sought to develop interoperable services such as 'Joyn' amongst themselves, they have often appeared rather cumbersome in comparison with the agility of today's proprietary internet platforms

Platform interoperability

Similar issues arise in relation to calls for interoperability between rival platforms in the same part of the value chain (what might be thought of as 'horizontal' interoperability, in contrast to the 'vertical' interoperability discussed in the previous section). In this case, the concern is less that a lack of interoperability creates a barrier to switching by users but that it allows a dominant platform to exploit network effects in order to 'tip' the market and so makes it impossible for rivals to compete.

A classic example is a social networking platform such as Facebook or a messaging platform such as WhatsApp, where in both cases the combination of the size of the platform (in terms of number of users) and the absence of interoperability with rivals makes it attractive for new users to join these platforms and unattractive for existing users to leave them. Again, this argument tends to be more persuasive once it becomes clear which platform is likely to dominate a particular market and the first phase of intense competition for users is over. But for every example of a large internet services platform that continues to dominate, there is another that has been displaced. We also know that large number of users can easily and cheaply download rival applications and so establish rival communities, and that users can co-ordinate amongst their social groups to switch collectively to rival platforms (since the location of their own social group is often a more important factor in determining which platform to use than the presence of millions of other anonymous users). Note that these are exactly the same questions that have been discussed in telecoms regulation when considering whether

[12] On ODF, see http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1201708

price discounts for 'on net' calls allow large network operators to exclude smaller rivals and 'tip' the market, and whether they should be prohibited as a result.

The other challenge again relates to the implementation costs of interoperability. At first sight this is more straightforward than in the case of app/OS interoperability, where changes would likely need to be made to the OS in every iPhone or Android device, since in this case we are concerned with establishing a standard interface between the platforms. How costly would it be for Skype or WhatsApp to publish standardised interfaces which would allow them to interwork with rival platforms? And to what extent would this inhibit and delay new product innovation, if these firms were first be required to share details of product standards with their rivals and agree how to interoperate? These kinds of co-ordination problems are commonplace in any standardised environment, but are more challenging when technologies and functionality are constantly evolving.

As a result, regulators have generally been reluctant to impose inter-platform interoperability. A notable exception was the attempt by the FCC to require Microsoft and other rival platforms to interoperate with its Instant Messenger platform as a condition of approving the AOL/TimeWarner merger in 2000, although the obligation was never enforced because new platforms displaced AOL in the meantime. Cisco requested similar interoperability obligations during the European Commission's review of Microsoft's acquisition of Skype in 2011, but the Commission was not persuaded to impose interoperability in that case.

Data portability

The case for data portability – allowing users to take any personal data they have uploaded to a particular platform to another platform when they switch – can be made on either competition or 'user rights' grounds. Some platforms, such as Facebook and Google, allow a degree of portability today[13], whilst the new European Data Protection Regulation proposed statutory obligations for platforms to export data in a common, standardised format to another platform (as well as providing it to the user themselves) at the user's request[14].

The competition case is straightforward, namely that as users develop ever more complex relationships with internet service platforms, the 'costs' of replicating the data in order to enable the same relationship and the services provided on another platform become ever greater. An individual's 'social graph' develops over many years and is, literally, impossible to replicate from scratch. Moreover, many users may not be aware of these costs, since they may not even be aware of the data they are disclosing to the platform, until they come to consider switching to another. These costs will deter many from switching, and so dampen competition between rival platforms or allow a single dominant platform to emerge.

As we discussed earlier, the strength of this argument is likely to increase as the costs of replicating data increase over time, as they become more apparent to both users and policymakers, and as the adverse consequences of requiring portability (for example, a weakening of any incentives to initially acquire users) recede. This argument is also given support by a 'consumer rights' claim that personal data remains the 'property' of the user themselves rather than the platform, and should therefore

[13] https://www.facebook.com/help/131112897028467, and Google Takeout

[14] Originally Article 18 of the Commission proposal. Many Member States have expressed significant reservations about an unqualified obligation to port, with the result that the current text merely proposes to 'encourage firms to develop interoperable data formats'. The Commission hopes that the proposals will finally be adopted during 2015, although the negotiations have been protracted and difficult, see http://europa.eu/rapid/press-release_MEMO-15-3802_en.htm

follow the user if they decide to switch to another platform (or, often, if they decide to multi-home on several platforms at the same time). This argument takes us into important questions of privacy and data protection which are beyond the scope of this note, but it seems to me that there is a growing consensus that some degree of data portability is desirable on various grounds, provided that the implementation costs of doing so do not impose disproportionate costs on the platforms or fatally undermine investment and innovation incentives. Steps are already being proposed in Europe to address this aspect of the debate, steps which might also have significant implications for non-internet firms. For example, whilst most internet services platforms will not hold billing records about customers which could be ported, all telecoms companies do. Similarly, arrangements may need to be made in future to port contacts and SMS records from one telecoms operator to another.

Last thoughts

The case for extending interoperability to internet services platforms may be a good one, but it still needs work to make it. In the meantime, there is also an obvious irony in telecoms operators calling for more interoperability and regulation of internet services platforms today. As I have explained, the case *against* interoperability is a 'dynamic efficiency' case – that proprietary platforms allow firms to capture a greater share of the benefits of innovation by allowing firms to establish market power, reducing time to market and co-ordination costs, and raising switching costs. This incentivises firms to invest and to innovate, and consumers benefit accordingly in dynamic, innovation-driven markets. On the other hand, the case *for* interoperability is essentially a 'static efficiency' case – that open standards reduce market power, narrow opportunities for differentiation and increase competition. Observant readers will know that, in other contexts, telecoms CEOs have become fierce critics of regulation which is intended to promote 'static efficiency'. The industry will therefore also need to explain why policymakers should take a different view when it comes to regulating internet platforms.