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Messaging app interoperability – facing the trade-offs

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Executive summary

Interoperability, the ability to communicate across applications, has been proposed as a regulatory measure designed to counter network effects across a range of digital services, including messaging applications. Parallels are drawn with telephony and messaging (SMS) which are interoperable across telephony networks and operators.

This paper explores the parallels and differences between telecoms and messaging applications, and the trade-offs involved in imposing levels of interoperability beyond those achieved via telephony and SMS services, IP-networks (which support broader network interoperability for messaging apps than for telephony and SMS) and beyond the level of interoperability delivered via voluntary initiatives.

The question is not whether electronic communications should be interoperable, but whether an extension of mandated interoperability standards to a diverse and growing range of messaging applications is desirable given the complex challenges and trade-offs it presents.

The history of efforts to create rich communications services (RCS) to supplement telephony and SMS is illustrative. It has proved difficult and protracted.

The challenges in making diverse messaging services fully interoperable are greater than those for RCS and include trade-offs in terms of the nature of competition, the pace and extent of innovation, alignment with user preferences, security and privacy, and moderation.

In relation to competition, there is a trade-off between promoting 'me too' competition in relation to standardised features and competition to discover and meet a diversity of needs (analogously there can be a trade-off between promoting regulated access-based

competition in telecoms and investment in competing network infrastructure).

In relation to innovation a challenge, if interoperability were mandated, is what features would be made interoperable since applications include different features which may be incompatible, for example permanent and ephemeral messaging.

Innovation via changes to standards is also likely to be slow, and the commercial motive for such innovation more limited than it is absent most proposed mandated interoperability standards. There is tension between interoperability, variety and innovation.

The rise in enterprise, government and educational use of messaging apps during the COVID-19 pandemic also demonstrates that interoperability was not necessary for competition. Multihoming, the use of multiple applications, is the norm and coordination for a given interaction can be facilitated via an invite.

In relation to preferences, consumers and enterprises value the diversity of applications that have evolved to meet specific needs for communication and expression. Messaging apps can be viewed as having freed us from the constraints of interoperable homogenous telecoms, as they have returned us to forms of interaction and expression that are closer to those in real life. Users value non-interoperable differentiated services alongside standardised any-to-any telecoms services. Broader interoperability mandates would limit the scope to tailor the nature of interactions to specific contexts and applications.

In relation to security and privacy, interoperability would increase available entry points - the 'attack surface' - by opening up a messaging system to those on other applications. It could also slow the response to an exploit if a change to standards was required

to defeat it. To use an ecosystem analogy – interoperability could create a vulnerable monoculture and slow adaptation.

Messaging is also key to the security of broader software and physical systems since secure keys may be exchanged via messaging apps.

Messaging apps also may be used for social exploits to obtain individuals credentials and malicious code may be introduced via messaging.

Encryption is a means of securing communications, and encryption would likely prove challenging or impossible to implement alongside broad interoperability without standardisation. Mandated interoperability might therefore deny users the benefits of encryption in the short-term whilst slowing adaptation to overcome weaknesses if, and once, a standard was agreed. Some encryption also utilises specific hardware as well as software, so interoperability (if feasible) would not be backward compatible and would tend to tie hardware and software development to the pace of the standardisation process.

In relation to moderation and user reporting, there are challenges and trade-offs in terms of who would be responsible for meeting obligations and community standards, how the costs of moderation would be attributed and how users would interact when different norms and rules apply across applications. Further, given that one means of limiting the spread of harmful content is to limit forwarding, it is not clear how this could be made compatible with interoperability.

Messaging apps are interoperable across IP-networks (including Wi-Fi) and a diversity of supported devices. In these respects, messaging apps are more interoperable than telephony and SMS. Should a broader interoperability mandate nevertheless be contemplated, the trade-offs involved should first be assessed.

Mandating interoperability standards for messaging apps would be an intrusive intervention and risks harm in terms of innovation, security and privacy.

1. Context

Gasser and Palfrey (2011) define interoperability as:¹

“the ability to transfer and render useful data and other information across systems (including organisations), applications, or components”

Interoperability involves an ongoing or real-time connection and exchange of data between enterprises and is distinct from one-off data portability initiated by consumers. Data portability typically involves a one-off transfer of data to a consumer or another application provider. The focus of this paper is on interoperability.

Interoperability has value for telephony and SMS services in enabling anyone to reach anyone who has a telephone number and is connected via a standard compatible device. Such interoperability may also reduce network effects, an advantage that a network with a large number of existing users may have compared to an entrant with fewer users.

Degrees of interoperability may be achieved via *de facto* standards (e.g. the application programming interfaces or ‘APIs’ relating to operating systems, which evolve in competition with one another), via standards agreed by participants (e.g. USB) or via mandated standards (e.g. European open banking standards).

The possible extension of mandated interoperability standards beyond telephony and SMS services to other messaging services is the focus of this paper.

Existing regulation

The European Electronic Communications Code (2020)² expanded the definition of electronic communications services to include internet-based services that do not connect with publicly assigned numbering resources (most messaging applications). The code allows for the possibility of mandated interoperability for certain messaging applications subject to specific criteria being met but does not mandate interoperability *per se*.

Article 61 (1) provides for national regulators to encourage and where appropriate ensure interoperability where doing so is beneficial:

“the interoperability of services, exercising their responsibility in a way that promotes efficiency, sustainable competition, the deployment of very high capacity networks, efficient investment and innovation, and gives the maximum benefit to end-users.”

Article 61 2(c) sets a threshold for the extension of interoperability to messaging apps, namely where end-to-end connectivity between end-users - currently provided by telephony and SMS - is endangered:

“in justified cases, where end-to-end connectivity between end-users is endangered due to a lack of interoperability between interpersonal communications services, and to the extent necessary to ensure end-to-end connectivity between end-users, obligations on relevant providers of number-independent interpersonal communications services which reach a significant level of coverage and user

¹ Gasser and Palfrey, Breaking Down Digital Barriers: When and How ICT Interoperability Drives Innovation, March 2008. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1033226

² DIRECTIVE (EU) 2018/1972 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 December 2018 establishing the European Electronic Communications Code. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L1972&from=EN>

uptake, to make their services interoperable;”

Whilst the Code has a presumption in favour of interoperability, the threshold for extending interoperability mandates to messaging applications is high.

To date interoperability requirements have not been imposed on any number-independent interpersonal communications services in any member state of the European Union, though the Code is comparatively recent. Further, there would first need to be a decision by the European Commission that mandated interoperability was required in a specific instance.

Prospective regulation

More generally, and not specifically or necessarily in relation to messaging applications, interoperability has been proposed as a remedy in digital markets by the UK Digital Competition Expert Panel³, a European Commission expert review⁴, the George J. Stigler Center for the Study of the Economy and the State and The University of Chicago Booth School of Business⁵, and in the House Judiciary Report on Competition in Digital Markets.⁶ The UK Competition and Markets Authority⁷ has also proposed interoperability as a possible intervention in digital markets.

The European Commission⁸ has published a draft proposed Digital Markets Act (DMA) which would require ‘gatekeeper’ platforms to ensure interoperability of their systems in some circumstances. Whilst number-independent interpersonal communications services are identified as core platform services under the draft DMA, additional interoperability requirements between such services are not proposed under the Commission’s proposal for the DMA i.e. the proposed approach recognises the fact that interoperability of messaging apps is addressed via the European Electronic Communications Code.

Whilst interoperability is widely cited as a possible regulatory intervention, the details in terms of to whom, and how it might be applied, and how policy trade-offs and conflicts might be addressed, remain to be addressed.

Further, whilst possible interoperability requirements for tech are frequently argued by analogy with telecommunications, there are differences between telecommunications and messaging apps that make the analogy weak. As Feasey (2019) noted in relation to the question ‘what can we learn from telecoms’:⁹

“Telecoms regulators have not, at least to date, been willing to engage with these issues or to consider actions that might challenge or disrupt the telecom industry’s long standing attachment to standards and

³ Digital Competition Expert Panel, Unlocking digital Competition, March 2019.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/785547/unlocking_digital_competition_furman_review_web.pdf

⁴ European Commission, Competition policy for the digital era, 2019.

<https://ec.europa.eu/competition/publications/reports/kd0419345enn.pdf>

⁵ George J. Stigler Center for the Study of the Economy and the State and The University of Chicago Booth School of Business, Committee for the Study of Digital Platforms Market Structure and Antitrust Subcommittee, July 2019.

<https://som.yale.edu/sites/default/files/CompetitionDigitalPlatformsStigler19.pdf>

⁶ House Judiciary Committee, Investigation into Competition in Digital Markets, October 2020.

https://judiciary.house.gov/uploadedfiles/competition_in_digital_markets.pdf

⁷ Competition and Markets Authority, Advice of the Digital Markets Taskforce, 15 December 2020.

<https://www.gov.uk/cma-cases/digital-markets-taskforce>

⁸ European Commission, Digital Markets Act, December 2020. https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/digital-markets-act-ensuring-fair-and-open-digital-markets_en

⁹ Richard Feasey, Ex ante digital regulation, InterMEDIA, Vol 48 Issue 2, July 2020. <https://www.iicom.org/intermedia/vol-48-issue-2/ex-ante-digital-regulation/>

interoperability. Digital regulators will need to think much more critically than their telecoms counterparts about the conditions under which imposing service interoperability obligations might be justified.”

This caution applies to messaging applications as well as tech more generally. In order to arrive at

good policy, it is essential to go back to first principles, consider the particulars of the technology and market in question and to consider the trade-offs that imposing interoperability would involve.

2. Telecoms and the rise of messaging apps

Telecoms

Telephony and SMS services are interoperable across switched networks for anyone with a publicly assigned telephone number and access to a network. Price can be a constraint, but technically the services are any-to-any.

Interoperability has enabled small networks to connect with large networks in order to enjoy the same network effects in relation to telephony and SMS. This interoperability is grounded in standards regarding equipment and transmission quality coordinated by the International Telecommunications Union (ITU). In contrast, messaging applications are network agnostic, therefore specific network interoperability requirements in relation to such services are not necessary.

Interoperable telephony (and in some countries SMS) services also provide the basis for contacting emergency services. Further, network coverage for SMS and telephony services is greater than for data service, making them more suitable for emergency services contact.

Whilst there are initiatives to create standards in relation to specific apps that can be used to contact the emergency services, this is distinct from the notion of making messaging apps in general interoperable; indeed, such interoperability may not be desirable since emergency service systems are not designed to receive messages from communications apps.¹⁰

Interoperability has worked well in relation to telephony and SMS. There is therefore a tendency to assume that interoperability is a good thing more generally for communications.

However, the value we place on interoperability of telephony and SMS reflects the previous constraints of technology, for example the only means of reaching someone was their telephone number, use of multiple services - multi-homing - was not feasible and service agnostic IP networks did not exist. We accommodated ourselves to the constraints of the technology services on offer, but this may not have reflected our underlying preferences.

The characteristics of interoperable telecommunications services also involved trade-offs, for example high charges for call termination that the calling party pays and high international charges (with both resulting in regulation in Europe, for example). Price remains a barrier to reaching others using telephony and SMS internationally.

Another trade-off with any-to-any connectivity is spamming (the sending of unsolicited messages to large numbers of users) which in addition to affecting user value for the service is a route to fraud and security breaches. Spamming is harder to manage with any-to-any connectivity, and is a challenge where networks are obliged to accept incoming calls and messages.

Telephony and SMS interoperability was also specific to switched networks. The services could not utilise IP-networks including Wi-Fi (though voice over Wi-Fi is now increasingly available via a work-around that is network and handset specific).

Telephony and SMS have also failed to evolve to offer richer communication services, in part because the services were built around internationally agreed interoperable standards. Innovation is not precluded by standards but the

¹⁰ European Emergency Number Association, Next Generation 112. <https://eena.org/our-work/eena-special-focus/next-generation-112/>

motivation for innovating is weakened since there is no competitive gain for the innovator. It also takes time to reach consensus and agree changes to standards.

There are initiatives to offer rich communications services (RCS) that are interoperable but getting an interoperable service to market has proved a protracted undertaking, and success is not assured.¹¹

RCS, chosen for adoption by the GSMA in 2008, incorporates some features of messaging apps. It is intended to be interoperable between RCS users. However, it was not until 2016 that the GSMA proposed a standard called the Universal Profile with a single industry agreed set of features and technical enablers.¹²

Whilst T-Mobile announced support for RCS on Android phones to other networks in 2020,¹³ the Cross Carrier Messaging Initiative was abandoned in 2021.¹⁴

Google also moved to support RCS directly via Android Messages with Google handling the back end.¹⁵ There is support for RCS, but it is not universal and has involved a long and torturous evolution.

RCS illustrates that standardised services take considerable time to develop and agree, which also suggests that consumers benefit from having a choice between heterogenous and rapidly evolving non-interoperable services and

standardised interoperable services - whether RCS or telephony and SMS.

Consumers may also not want all their communications to be interoperable; they may value degrees of separation between different interactions. In real life we maintain divisions in terms of the norms and who participates in different conversational contexts, for example, at work versus socially, or teenagers' interactions with adults versus one another.

When one looks at the diversity and growth of internet-based communications services it is clear that a lack of interoperability has not been a showstopper, rather it has allowed the freedom to go beyond the limitations of telephony and SMS.

With messaging apps you don't pay to reach someone, applications are interoperable across IP networks including Wi-Fi, conversations can be contextual (say LinkedIn versus Tinder) and the rapid trial and error nature of non-standardised innovation has 'discovered' valued features, some of which were surprise hits, for example emoji.¹⁶

Several building blocks were required before messaging applications could take off, but a core driver for their adoption was arguably the constraints inherent to interoperable telephony and SMS set against users underlying preference for more diverse, and perhaps non-

¹¹ The Verge, RCS: What it is and why you might want it, December 2018.

<https://www.theverge.com/2018/12/12/18137937/rcs-rich-communication-service-messaging-explainer-what-is-google-chat>

¹² The Verge, RCS, What it is and why you might want it. December 2018.

<https://www.theverge.com/2018/12/12/18137937/rcs-rich-communication-service-messaging-explainer-what-is-google-chat>

¹³ The Verge, T-Mobile now supports cross-carrier RCS messaging. May 2020.

<https://www.theverge.com/2020/5/26/21270386/tmobile-rcs-cross-carrier-universal-profile-google-messages>

¹⁴ Light Reading, Verizon, AT&T, T-Mobile kill RCS plans. April 2021. <https://www.lightreading.com/ossbscx/verizon-atandt-t-mobile-blow-rcs-launch/d/d-id/768729>

¹⁵ The Verge, Is Google finally managing its messaging mess? May 2020.

<https://www.theverge.com/2020/5/27/21271186/google-rcs-t-mobile-encryption-ccmi-universal-profile>

¹⁶ Emoji Unicode is standardised to allow interoperability but with the visual implementation differing by service provider <https://a16z.simplecast.com/episodes/all-about-emojis-and-innovation-kMYSLVQK>

interoperable, forms of communication and expression.

Building blocks underpinning the growth of messaging apps

The internet enabled messaging services, including Skype (founded in 2003) which targeted reducing the cost of voice calls. Over time Skype evolved to support a range of features, notably video calls. Skype had its own system for identifying users.

The internet itself is built on the interoperable TCP/IP protocol, while the universal use of HTML allows webpages to be viewed on any device. The internet's standards are created and managed by the IETF and are adopted by consensus. Whilst the internet is interoperable, it has enabled diverse innovation since it is application agnostic and innovation can occur at the edge.

The internet was not however initially 'mobile' whereas communications frequently are. The development of smartphones coupled with apps stores and more capable mobile data networks facilitated the explosive growth of communications apps.

The building blocks for the explosive growth of communications apps therefore include both a shift from telco network and service specific interoperability to more general IP network interoperability coupled with other elements that were proprietary.

The resulting 'ecosystems' therefore involve an evolving mix of closed and open systems elements, and support applications that themselves offer APIs for other applications, for example, Microsoft allows third-party app developers to integrate into the Microsoft Teams meeting experience¹⁷.

Open and interoperable elements may constitute part of an overall system that includes vertically integrated proprietary elements. It would be a mistake to think that everything should be integrated, or conversely consist of small building blocks that are open and interoperable. Rather, it is vital to understand the trade-offs involved in increasing interoperability.

Messaging app innovation and growth

Being free from the technical constraints of telecommunications, messaging apps have proliferated and are diverse. Messaging is also a function built into many other apps. Messaging apps have seen a huge variety of features and forms of expression which go beyond telephony and SMS. For example:

- The ability to communicate via multiple devices (depending on developer support)
- Engage in group chat and video conversations
- Share photos and videos, and modify these in creative ways
- Send messages longer than 160 characters
- See who is online or replying
- Generate read receipts
- Send ephemeral messages
- Use Wi-Fi as well as cellular

Messaging apps have also seen the development of diverse business models including advertising funded, subscription (e.g. Zoom and Slack, with free service tiers) and as a complement to other elements of an ecosystem (e.g. iMessage).

Arguably, spurred by this ongoing wave of innovation, standards-based telecoms services have also sought to add new features via RCS (discussed earlier).

¹⁷ The Verge, Microsoft Teams opens its doors to third-party apps during meetings, July 2020.

<https://www.theverge.com/2020/7/21/21332414/microsoft-teams-third-party-apps-calls-meetings-integration-features>

COVID-19 has also brought business to business interactions using a variety of messaging apps to prominence. Applications including Zoom, Microsoft Teams, BlueJeans, Google Meet, WhatsApp and Webex are used by businesses, government, schools and universities to support remote interaction. Apps that had been consumer-oriented such as Zoom were adopted for business use, creating demand for improved security.^{18 19}

Given that business to business interactions are often driven by invitations, and may include browser-based versions of the app, the ability for messaging apps to use different standards has facilitated rapid innovation and a diversity of tools for different purposes.

Both the choice of application for a given interaction, and that everyone is using the same

application and feature set, is important for effective communication. Interoperability between applications would therefore either:

- Require adoption of identical features thereby reducing innovation and scope to tailor different forms of interaction; or
- Risk reducing the quality of interaction by permitting applications with different feature sets to interoperate.

It might, for example, be counterproductive either to make Microsoft Teams' feature set identical to that of Zoom, or for someone on Teams to join a Zoom call or vice versa if the feature sets vary. In short, universal interoperability might prove counterproductive from the user's perspective.

¹⁸ The Verge, Zoom's end-to-end encryption has arrived, October 2020.

<https://www.theverge.com/2020/10/27/21535818/zoom-end-to-end-encryption-e2ee-security-privacy-video-conferencing>

¹⁹ Blum *et al*, E2E Encryption for Zoom meetings, October 2020. https://github.com/zoom/zoom-e2e-whitepaper/blob/master/zoom_e2e.pdf

3. Mandating messaging interoperability would involve challenging trade-offs

Interoperability and openness is neither good nor bad *per se*; it depends. As a joint paper by the Autorité de la concurrence and the Competition and Markets Authority put it:²⁰

“Openness achieves full benefits of network effects and economies of scale for component makers, increased intra-ecosystem competition and market entry through component innovation is more easily feasible. However, two ways have been discussed which show that closure can be good for competition: closed systems increase inter-system competition (which can lead to fierce competition ‘for the market’) and they can lead to an increased incentive to innovate and to entry due to future profit expectations.”

However, the trade-offs are wider than around the form of competition and incentives for innovation and include consequences for alignment with users’ preferences, cybersecurity, privacy and content moderation.

The degree of interoperability is also not solely a regulatory question; markets involve a complex and evolving mix of interoperable and non-interoperable elements.

Introduction of interoperability across a set of applications controlled by a single entity is also more straightforward than for an open system of any-to-any interoperability. Co-ordination can be managed, and the approach does not need to be robust to the involvement of third parties i.e. trust is more readily managed.

The policy challenge is therefore to be clear about why more or less interoperability than the market delivers might be better for consumers and competition, and to be clear about the trade-offs involved in judging whether to intervene or not.

Further, once a regulatory judgement is imposed, responsibility for reappraising what is optimal as technology and markets change shifts to the regulator. They are not likely to be as responsive to change as markets, and the tendency for standards to become entrenched should be a consideration in deciding whether or not to impose them in the first place.

Mandated interoperability may not align with consumer preferences

We value and are accustomed to the any-to-any nature of telephony and SMS services. Further, the failure of telco multi-media messaging services (MMS) is, in part, attributed to its failure to work seamlessly across devices and networks.²¹

There therefore tends to be a presumption that consumers always prefer interoperability and that imposing an interoperability requirement across messaging services would benefit consumers.

Yet, just as we converse in different ways according to different norms with different groups in different ‘real life’ contexts, we may want to maintain distinctions online by using different applications. As Douglas Adams put it in relation to the constrained nature of one-way

²⁰ Autorité de la concurrence and the Competition and Markets Authority (CMA), The economics of open and closed systems, December 2014.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/387718/The_economics_of_open_and_closed_systems.pdf

²¹ Krupa Nathwani and Ken Eason, Perceptions versus expectations of multimedia messaging service (MMS), *Personal and Ubiquitous Computing*, May 2015.

media and more generally in relation to 20th Century communications technology:²²

“I expect that history will show ‘normal’ mainstream twentieth century media to be the aberration...”

People tend to distinguish their use of voice calls from email, SMS or video calls; of LinkedIn from Facebook; of Microsoft Teams from WhatsApp or Tinder from Snapchat.

Communications norms, modes and technologies may also be codified by institutions, for example, as documented by Gitlab²³. Distinctions have value.

A survey of consumers in Germany found that they value the ability to demarcate communications:²⁴

“...people proactively use the boundaries between communications services to compartmentalize their social contacts according to relationship closeness.”

It should not be taken as given that universally interoperable communications would better meet consumer’s needs; particularly taking account of the existing option to use telephony and SMS for that purpose.

Further, and in relation to business-to-business communications in particular, the ability to multi-home, the fact that interactions tend to be arranged via invites, the need for a common interaction space and the fact that many applications have browser-based versions available means that interoperability could impede effective communication.

Interoperability would inevitably leave differences in terms of unsupported features or the user interface, so allowing different apps to join a conversation could lower the quality of interaction.

If greater interoperability than what existing telephony and SMS and voluntary standardisation (e.g. RCS) deliver is desired then the impact on consumers of mandating greater interoperability should be assessed. It should not be assumed that greater interoperability would necessarily increase the effectiveness and value of interaction and expression for consumers and business users.

Mandated interoperability involves trade-offs in terms of competition

Interoperability can increase competition and innovation, for example, APIs that allow apps to interact with mobile operating systems, devices and sensors have allowed a flourishing of innovation.

However, the case for mandated interoperability to mitigate network effects and accumulated data advantages is arguably overstated for online and app-based messaging where consumers do not necessarily value any-to-any connectivity.²⁵

Mandated interoperability would also tend to change the nature of competition, even if it did facilitate more competitors. In particular, it would facilitate ‘me too’ competition whilst reducing the incentive to compete for the market or for the future of the market.

Experience in relation to telecoms network regulation illustrates the success and pitfalls of

²² Douglas Adams, How to Stop Worrying and Learn to Love the Internet, August 1999.

<https://douglasadams.com/dna/19990901-00-a.html>

²³ GitLab Communication. <https://about.gitlab.com/handbook/communication/>

²⁴ Arnold, Schneider and Lennartz, Interoperability of interpersonal communications services – A consumer perspective, *Telecommunications Policy*, Volume 44, Issue 3, April 2020.

<https://www.sciencedirect.com/science/article/abs/pii/S0308596120300197>

²⁵ Eugene Wei, TikTok and the Sorting Hat, August 2020. <https://www.eugenewei.com/blog/2020/8/3/tiktok-and-the-sorting-hat>

promoting ‘me too’ competition. Network access regulation facilitated retail competition, but discouraged investment in new access technologies including fibre by existing operators and entrants alike.²⁶ This trade-off was recognised by the European Commission in the development of the new European Electronic Communications Code.²⁷

Once established, ‘me too’ competition also tends to create a lobby for the *status quo* technology and business models i.e. a group opposed to innovation that includes not only those dependent on existing regulation but also potentially the regulator who helped create the regulatory and market *status quo*.

Another form of competition is competition for the future; namely technology and business model innovation which renders existing ways of doing things largely irrelevant.

Competition for the future involves placing bets on how technology, markets and the expression of user preferences will evolve; whereas interoperability standards are unlikely to be forward looking in this sense and may therefore inadvertently constrain or discourage the exploration of new possibilities. Competition for the future and innovation, considered below, are closely related.

The overall impact of an interoperability requirement for messaging apps on competition is thus far from straightforward.

Mandated interoperability may decrease innovation

Viber founder Talmon Marco observed that:²⁸

“You can choose to interoperate or innovate; you cannot do both at the same time.”

Interoperability involves a trade-off with innovation because it can take a long time to agree and change standards, existing standards may be incompatible with fundamental innovation and because the incentive to innovate is reduced if the fruits of innovation are shared via a standard.

Sometimes universal standards are necessary, but where they are not essential competing innovations and *de facto* standards may be superior.

The failure of telephony and SMS to evolve, and the slow pace of development and adoption of RCS, the proposed successor to SMS, versus apps is illustrative of the trade-off between mandated interoperability and innovation.

One can also imagine possible scenarios in which mandating a standard would have led to inferior outcomes over time, for example, if the original USB standard had been mandated it is likely that the higher speed and more versatile USB-C standard would have taken longer to reach the market, if it had done so at all.

Mandated interoperability increases the challenge of ensuring security and privacy

Messaging services compete on the basis of privacy and security features. For example, some messaging services are encrypted, thereby supporting privacy and security; and Telegram has, for example, sought to acquire users based

²⁶ Martin Cave, Christos Genakos and Tommaso Valletti, The European Framework for Regulating Telecommunications: A 25-year Appraisal, February 2019. Review of Industrial Organisation.

<https://www.readcube.com/articles/10.1007/s11151-019-09686-6>

²⁷ European Commission, DIRECTIVE (EU) 2018/1972 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 December 2018 establishing the European Electronic Communications Code. Article 191. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L1972&from=DE>

²⁸ The Verge, Alone together: will one messaging app rule them all? May 2013.

<https://www.theverge.com/2013/5/2/4293460/one-messaging-app-to-rule-them-all-one-app-to-find-them>

on its market positioning as secure and privacy oriented.

Further, whilst openness can enable greater scrutiny of systems by security researchers, mandating interoperability standards would involve a number of trade-offs that may undermine security and privacy. These trade-offs include the challenge of supporting encryption on an interoperable basis, the fact that interoperability would tend to create a 'monoculture', slow the response to an exploit and increase the 'attack surface' since applications would be interconnected.

Further, messaging is itself not only sensitive from a security point of view, but messaging is a key element of the security of broader systems. Secure keys are exchanged via messages including SMS, messaging may be used as a means of 'social hacking' to gain access to credentials and messaging may be used as a conduit to inject malicious code. Once access is gained it can be used for a range of malicious purposes including banking fraud, electoral interference and to compromise the safety of critical infrastructure²⁹. Secure messaging is therefore important for security more generally.

An illustration of the complexity and challenge of squaring interoperability with security is provided by the effort Apple went to in order to support third party keyboards (third party keyboards 'see' your keystrokes and therefore involve security and privacy risks). Apple developed the 'extensions' framework as a means of preserving privacy and security for third party applications including keyboards.³⁰

There are therefore examples of specific systems that have been made more interoperable consistent with security, but it is often non-trivial and would be likely to prove more complex across a range of services and service providers.

Full interoperability may be incompatible with encryption

The UK Digital Regulation Cooperation Forum have pointed to a potential tradeoff between end-to-end encryption (important for privacy) and interoperability.³¹

Growth in home working during COVID-19 has also highlighted the importance of secure communications for government and enterprise. However, more secure systems tend to be less-open systems, and mandated interoperability would at the very least be challenging, perhaps impossible, to square with end-to-end encryption.

Zoom is illustrative of the challenge of squaring encryption, convenience and a degree of interoperability. Zoom came under pressure to offer greater security as it was adopted by enterprise. Zoom implemented end-to-end encryption, but with important qualifications:³²

“Although E2EE meetings are more secure, they don't work with a few of Zoom's features. These include its cloud recording, live transcription, polling, meeting reactions, and join before host features. Participants also won't be able to join using 'telephone, SIP/H.323 devices, on-premise configurations, or Lync/Skype clients,' as

²⁹ Ars Technica, Hackers behind life-threatening attack on chemical-maker are sanctioned, October 2020.

<https://arstechnica.com/information-technology/2020/10/us-sanctions-russian-hackers-who-hit-chemical-maker-with-dangerous-malware/>

³⁰ Ars Technica, Explaining iOS 8's extensions: Opening the platform while keeping it secure, June 2014.

<https://arstechnica.com/gadgets/2014/06/explaining-ios-8s-extensions-opening-the-platform-while-keeping-it-secure/>

³¹ Digital Regulation Cooperation Forum: Plan of work for 2021 to 2022, March 2021.

<https://www.gov.uk/government/publications/digital-regulation-cooperation-forum-workplan-202122>

³² The Verge, Zoom's end-to-end encryption has arrived, October 2020.

<https://www.theverge.com/2020/10/27/21535818/zoom-end-to-end-encryption-e2ee-security-privacy-video-conferencing>

Zoom says these can't be end-to-end encrypted."

Two trade-offs are identified, with useability and with third party communications services. We might not therefore want all our communications to be encrypted (if that involves a loss of other features) and full interoperability may be incompatible with end-to-end encryption.

Interoperability creates a monoculture which cannot readily adapt

Monocultures in biology are known for their vulnerability. To the extent that interoperability creates a monoculture it too could increase vulnerability. Once an exploit is found it can spread further.

Interoperability increases the attack surface

Interoperability increases the attack surface by allowing messages from one app to reach other apps, and by potentially allowing the weakest link, which may be a specific vulnerability rather than an insecure app *per se*, to be exploited to cause harm across a broader set of apps.

The 2020 Twitter-mediated bitcoin scam, which was shut down comparatively quickly, might have involved greater harm had hijacked Twitter accounts been able to message non-Twitter users. With interoperability the 'fire break' between apps would be reduced or removed.

A possible response to concern over privacy and security with an expanded attack surface may be licensing of those to whom data and messages can be transferred. This would, however, introduce a regulatory barrier to entry and competition.

Lessons from legacy telephony and SMS

Nuisance calls have long been a problem, but the problem has multiplied with robotic calls and the ability to make calls at close to zero cost. The result has been fraud and security breaches. A recent response to this by the FCC has been to create an exemption to the obligation to accept calls i.e., to reduce interoperability somewhat.³³

The use of SMS for two factor authentication highlights how communications underpins security more generally, for example, for banking and e-commerce. Yet it also highlights a vulnerability, namely telephony and SMS are vulnerable as means of so-called out-of-band verification.³⁴

Standards related to interoperability and number portability have contributed to vulnerability. One attack mode involves obtaining a duplicate SIM card that allows control of the bank customer's phone number, another involves redirecting the text messages banks use to send one-time passwords.³⁵

"The attacks underscore the inherent insecurity and lack of privacy in the global telephone network... It could take years to fully secure the system given the size of the global network and the number of telecoms that use it."

Mandated interoperability would complicate moderation

If interoperability allows messages and content to originate in one messaging app and terminate in another there is a question over who is responsible for moderation and user reporting of violations of community standards and how different applications would interact.

³³ Ars Technica, FCC: Phone carriers that profit from robocalls could have all calls blocked, July 2020.

<https://arstechnica.com/tech-policy/2020/07/fcc-phone-carriers-that-profit-from-robocalls-could-have-all-calls-blocked/>

³⁴ National Institute of Standards, NIST Special Publication 800-63B: Digital Identity Guidelines, June 2017.

<https://pages.nist.gov/800-63-3/sp800-63b.html>

³⁵ Ars Technica, Thieves drain 2fa-protected bank accounts by abusing SS7 routing protocol, 2020.

<https://arstechnica.com/information-technology/2017/05/thieves-drain-2fa-protected-bank-accounts-by-abusing-ss7-routing-protocol/>

There is a question over who would be responsible for meeting any legal requirements and for the costs of moderation. There is also a question over how apps which have different voluntary standards, norms and user expectations would interconnect, for example, Facebook and Twitter have different approaches to 'misinformation'.

Moderation is an evolving area and there are differences, for example, between the appropriate approach where content is visible versus encrypted. WhatsApp, where messages are encrypted, has limited the extent to which individuals can forward a message to slow down the spread of viral messages³⁶. A different approach might be appropriate for a different app. It is not clear how different approaches would be reconciled with interoperability.

Mandated interoperability would lead to further intrusive regulation

Interoperability tends to be discussed in general terms as a means of promoting competition which would involve a clean one-off mandate. In

practice mandated interoperability would draw the regulator into ongoing and increasingly detailed regulation.

For example, discussion of interoperability in relation to messaging tends, at least implicitly, to assume it is solely a software challenge rather than a software-hardware challenge.

In practice hardware and software may be intimately linked in order to deliver security and privacy, or simply a better user experience. Further, the need to coordinate hardware and software innovation in order to achieve 'leaps' is one reason why ecosystems exist (interface changes are an example, multitouch devices required a new operating system and there would be no point in introducing one without the other).

Examples of software-hardware integration include the storage by Apple of security keys in dedicated hardware³⁷ and security specific hardware requirements for Windows 11.³⁸ Such integration, which offers security benefits, may limit the scope for, or at the very least complicate, interoperability.

³⁶ The Verge, WhatsApp says its forwarding limits have cut the spread of viral messages by 70 percent, April 2020. <https://www.theverge.com/2020/4/27/21238082/whatsapp-forward-message-limits-viral-misinformation-decline>

³⁷ For example, Apple, Storing Keys in the Secure Enclave.

https://developer.apple.com/documentation/security/certificate_key_and_trust_services/keys/storing_keys_in_the_secure_enclave

³⁸ Microsoft, Windows 11 enables security by design from the chip to the cloud, June 2021.

<https://www.microsoft.com/security/blog/2021/06/25/windows-11-enables-security-by-design-from-the-chip-to-the-cloud/>

4. Inter-agency appraisal of trade-offs is required before interoperability is extended

Interoperability is neither good nor bad *per se*, it depends on the circumstances and trade-offs involved. As far as *de facto* or industry standards are concerned there are incentives to consider the trade-offs involved and to limit the scope of interoperability to areas where it is beneficial.

There is a sound case that access to basic interoperable telephony and SMS services is beneficial. It does not follow that the extension of interoperability to the diverse range of messaging applications would be beneficial.

Care is therefore needed to limit mandated interoperability to those areas where it offers net benefits compared to non-standardised approaches, competing *de facto* standards and voluntary industry standards coupled with the interoperable fallback of telephony and SMS.

To ensure that the various trade-offs involved with prospective mandatory standards are assessed an inter-agency appraisal is required in order to consider the potential impacts on the nature of competition, innovation, the user experience, security and privacy and moderation.

Mandatory interoperability is an intrusive intervention which should only be imposed following careful appraisal. As an assessment put it:³⁹

“[Interoperability] obligations could be very intrusive, as they pose risks to incentives to invest and innovation and are costly to implement by the LGP [large gatekeeper platforms]. Therefore, they should be imposed:

- *with great care, only when necessary to achieve market contestability;*

- *when they are proportionate to meet such objective;*
- *in a tailor-made manner, according to the business model of the LGP [large gatekeeper platform] on which the obligations are imposed.”*

There are no clear grounds for mandating interoperability of messaging beyond existing interoperable telephony and SMS.

An interoperability mandate for messaging would risk harm in terms of innovation, security and privacy. Given a lack of clear benefits, the bar for an extension of interoperability to messaging should be high.

³⁹ Centre on Regulation in Europe, Digital Markets Act: Making Economic Regulation of Platforms fit for the Digital Age, November 2020. <https://cerre.eu/publications/digital-markets-act-economic-regulation-platforms-digital-age/>